# Sicherheitsdatenblatt/ Material Safety Data Sheet/ Fiche de Données de Sécurité / Fiche Signalétique

# FORMALDEHYD 40 VOL.%/ FORMALDEHYDE 40 VOL%/ FORMALDEHYDE 40 VOL.%

## 1. Hersteller/Lieferant
## Manufacturer/Supplier
## Producteur/Fournisseur

**Brenntag Schweizerhall AG**
Elsässerstrasse 231
CH-4002 Basel

Montag – Freitag / Monday – Friday / Lundi – Vendredi
8:00 – 12:00 H  13:00H – 17:00H

Telephone: +41 (0)58 344 80 00
Fax: +41 (0) 58 344 82 08
E-mail address : doku@brenntag.ch

Notrufnummer, Schweizerisches Toxikologisches Informationszentrum
Emergency telephone number, Swiss Toxicological Information Centre
Numéro d'appel d'urgence, Centre Suisse d'Information Toxicologique

Tel. +41 (0) 44251 51 51

Nationale Notrufnummer
National Emergency Telephone Number
Numéro National d'Appel en cas d'Urgence

Tel. 145

## 8. Begrenzung und Überwachung der Exposition/Persönliche Schutzausrüstungen
## Exposure controls/personal protection
## Contrôles de l'exposition/ protection individuelle

| Inhaltsstoff: | Formaldehyd | CAS-Nr.: | 50-00-0 |
|---|---|---|---|

### Arbeitsplatzgrenzwerte

SUVA, Kurzzeitiger Expositionsgrenzwert (STEL):
0,6 ppm, 0,74 mg/m3

SUVA, Zeitgewichteter Durchschnitt
0,3 ppm, 0,37 mg/m3

SUVA
Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden.

EU OELIII, Kurzzeitiger Expositionsgrenzwert (STEL):
0,74 mg/m3

EU OELIII, Kurzzeitiger Expositionsgrenzwert (STEL):
0,6 ppm

EU OELIII, Zeitlich gewichteter Mittelwert (TWA):
0,3 ppm, 0,37 mg/m3

EU OELIII, Zeitlich gewichteter Mittelwert (TWA):
0,5 ppm, 0,62 mg/m3

| Component: | formaldehyde | CAS-No.: | 50-00-0 |
|---|---|---|---|

### Occupational Exposure Limits

SUVA, Short Term Exposure Limit (STEL):
0,6 ppm, 0,74 mg/m3

SUVA, Time Weighted Average (TWA):
0,3 ppm, 0,37 mg/m3

SUVA
If in compliance with the OEL and BEL values, then there should be no risk of reproductive damage.

EU OELIII, Short Term Exposure Limit (STEL):
0,74 mg/m3

EU OELIII, Short Term Exposure Limit (STEL):
0,6 ppm

EU OELIII, Time Weighted Average (TWA):
0,3 ppm, 0,37 mg/m3

EU OELIII, Time Weighted Average (TWA):
0,5 ppm, 0,62 mg/m3

| **Composant:** | **formaldéhyde** | **No.-CAS:** | **50-00-0** |
|---|---|---|---|

### Limites d'exposition professionnelle

SUVA, Seuil limite d'exposition à court terme (STEL)
0,6 ppm, 0,74 mg/m3

SUVA, Limite d'exposition pondérée dans le temps (VME):
0,3 ppm, 0,37 mg/m3

SUVA
Aucun risque pour l'embryon si les valeurs de AGW et de BGW sont respectées.

EU OELIII, Seuil limite d'exposition à court terme (STEL):
0,74 mg/m3

EU OELIII, Seuil limite d'exposition à court terme (STEL):
0,6 ppm

EU OELIII, Limite d'exposition pondérée dans le temps (TWA):
0,3 ppm, 0,37 mg/m3

EU OELIII, Limite d'exposition pondérée dans le temps (TWA):
0,5 ppm, 0,62 mg/m3

| **Inhaltsstoff:** | **Methanol** | **CAS-Nr.:** | **67-56-1** |
|---|---|---|---|

### Arbeitsplatzgrenzwerte

EU ELV, Zeitlich gewichteter Mittelwert (TWA):
200 ppm, 260 mg/m3
Indikativ

SUVA, Zeitgewichteter Durchschnitt
200 ppm, 260 mg/m3

SUVA
Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden.

SUVA, Angabe zur Haut:
Kann durch die Haut absorbiert werden.

SUVA, Kurzzeitiger Expositionsgrenzwert (STEL):
400 ppm, 520 mg/m3

### Biologische Grenzwerte

CH BAT, Methanol, Urin
30 mg/l, Probenahmezeit: c) Langzeitexposition nach mehreren (4-5) Arbeitsschichten. b) Ende der Exposition/Schichtende.

| **Component:** | **methanol** | **CAS-No.:** | **67-56-1** |
|---|---|---|---|

### Occupational Exposure Limits

EU ELV, Time Weighted Average (TWA):
200 ppm, 260 mg/m3
Indicative

SUVA, Time Weighted Average (TWA):
200 ppm, 260 mg/m3

SUVA
If in compliance with the OEL and BEL values, then there should be no risk of reproductive damage.

SUVA, Skin designation:
Can be absorbed through the skin.

SUVA, Short Term Exposure Limit (STEL):
400 ppm, 520 mg/m3

### Biological Exposure Indices

CH BAT, methanol, Urine
30 mg/l, Sampling time: c) Long term exposure after several (4-5) work shifts. b) End of exposure / end of shift.

| **Composant:** | **méthanol** | **No.-CAS:** | **67-56-1** |
|---|---|---|---|

### Limites d'exposition professionnelle

EU ELV, Limite d'exposition pondérée dans le temps (TWA):

200 ppm, 260 mg/m3
Indicatif

SUVA, Limite d'exposition pondérée dans le temps (VME):
200 ppm, 260 mg/m3

SUVA
Aucun risque pour l'embryon si les valeurs de AGW et de BGW sont respectées.

SUVA, Désignation de la peau:
Peut être absorbé à travers la peau.

SUVA, Seuil limite d'exposition à court terme (STEL)
400 ppm, 520 mg/m3

### Indices d'exposition biologique

CH BAT, methanol, Urine
30 mg/l, Durée de prélèvement: c) L'exposition à long terme après plusieurs (4-5) quarts de travail. b) Fin de l'exposition / fin d'un quart de travail.

## 13. Verfahren der Abfallbehandlung
## Waste treatment methods
## Méthodes de traitement des déchets

Für dieses Produkt kann keine Abfallschlüsselnummer gemäss Verordnung über den Verkehr mit Abfällen (VeVA) festgelegt werden, da erst der Verwendungszweck durch den Verbraucher eine Zuordnung erlaubt. Die Abfallschlüsselnummer ist in Absprache mit dem regionalen Entsorger festzulegen, wie z.B. mit:

Brenntag Schweizerhall AG
Lohnmatte 1
4573 Lohn-Ammannsegg
Switzerland
Phone: +41 58 344 84 00
infolohn@brenntag.ch

No waste code can be defined for this product in accordance with the Ordinance on the Movement of Waste (VeVA), as the intended use dictates the assignment. The waste code is established in consultation with a regional waste disposer, such as:

Brenntag Schweizerhall AG
Lohnmatte 1
4573 Lohn-Ammannsegg
Switzerland
Phone: +41 58 344 84 00
infolohn@brenntag.ch

Un numéro de code déchet selon l'ordonnance sur les mouvements de déchets (OMoD) ne peut être défini pour ce produit. Cette attribution est dictée par l'utilisation prévue du produit par l'utilisateur final. Le code déchet est établi en consultation avec l'entreprise d'élimination, par exemple:

Brenntag Schweizerhall SA
Lohnmatte 1
4573 Lohn-Ammannsegg
Suisse
Téléphone : +41 58 344 84 00
infolohn@brenntag.ch

## 15. Rechtsvorschriften
## Regulatory information
## Informations relatives à la réglementation

| | | |
|---|---|---|
| Mengenschwelle nach StFV<br>Threshold quantity MAO<br>Seuil quantitatif OPAM | : | 200 kg |

**ChemRRV**
**ORRChem**
**ORRChim**

| | | |
|---|---|---|
| Anhang<br>Annex<br>Annexe | : | Anhang 1.10: Krebserzeugende, erbgutverändernde und fortpflanzungsgefährdende Stoffe<br>Anhang 1.11: Gefährliche flüssige Stoffe<br>Annex 1.10: Carcinogenic, mutagenic and reproductive toxic substances<br>Annex 1.11: Hazardous liquids<br>Annexe 1.10: Substances cancérogènes, mutagènes et toxiques pour la reproduction<br>Annexe 1.11: Substances liquides dangereuses |
| Besondere Kennzeichnung<br>Specific labeling<br>Désignation spéciale | : | Nur für gewerbliche Anwender<br>Only for professional users<br>Réservé aux utilisateurs professionnels |

**Sonstige Vorschriften (SDB)**
**Other regulations (SDS)**
**Autres prescriptions (FDS)**

| | | |
|---|---|---|
| | : | Artikel 4 Absatz 4 der Jugendarbeitsschutzverordnung (SR 822.115) und Artikel 5 und 6 der Verordnung des WBF über gefährliche Arbeiten für Jugendliche (SR 822.115.2): Jugendliche in der beruflichen Grundbildung dürfen |

nur mit diesem Produkt (diesem Stoff / dieser Zubereitung) arbeiten, wenn dies in der jeweiligen Bildungsverordnung zur Erreichung ihres Ausbildungszieles vorgesehen ist, die Voraussetzungen des Bildungsplans erfüllt sind und die geltenden Altersbeschränkungen eingehalten werden. Jugendliche, die keine berufliche Grundbildung absolvieren, dürfen nicht mit diesem Produkt (diesem Stoff / dieser Zubereitung) arbeiten. Als Jugendliche gelten Arbeitnehmer beider Geschlechter bis zum vollendeten 18. Altersjahr.
Artikel 13 Mutterschutzverordnung (SR 822.111.52): Schwangere Frauen und stillende Mütter dürfen bei ihrer Arbeit nur dann mit diesem Produkt (diesem Stoff / dieser Zubereitung) in Kontakt kommen, wenn aufgrund einer Risikobeurteilung gemäss Art. 63 ArGV 1 (SR 822.111) feststeht, dass keine konkrete gesundheitliche Belastung für Mutter und Kind vorliegt oder diese durch geeignete Schutzmassnahmen ausgeschlossen werden kann.

Article 4 para. 4 of the Ordinance on the protection of young people in the workplace (SR 822.115) and Articles 5 and 6 of the EAER regulation on hazardous work and young people (SR 822.115.2): Young people undergoing basic vocational training may only work with this product if the relevant training ordinance makes provision for them to do so with a view to enabling them to achieve their training objectives and if the preconditions for the training plan have been met and the applicable age restrictions have been complied with. Young people who are not completing any basic vocational training are not permitted to work with this product.
Employees of either sex who are under 18 years old are classed as young people.
Article 13 Maternity ordinance (SR 822.111.52): Expectant and nursing mothers are only permitted to come into contact with this product during the course of their work if, based on a risk assessment carried out in accordance with Article 63 of Ordinance 1 on the Employment Act (ArGV 1) (SR 822.111), the chemicals in question have been found not to cause any specific harm to mothers or children or if such harm can be ruled out by taking appropriate protective measures.

Article 4 alinéa 4 Ordonnance sur la protection des jeunes travailleurs (OLT 5, RS 822.115) et Article 5 et 6 Ordonnance du DEFR sur les travaux dangereux

pour les jeunes (822.115.2) : Les jeunes en formation professionnelle initiale ne peuvent travailler avec ce produit (cette substance / cette préparation) que si cela est prévu dans l'ordonnance de formation professionnelle pour atteindre les buts de formation et que si les conditions du plan de formation et les limites d'âge applicables soient respectées. Les jeunes qui ne suivent pas de formation professionnelle initiale ne peuvent pas travailler avec ce produit (cette substance / cette préparation). Sont réputés jeunes gens les travailleurs des deux sexes âgés de moins de 18 ans. Article 13 Ordonnance sur la protection de la maternité (RS 822.111.52): Les femmes enceintes et les mères qui allaitent ne peuvent entrer en contact avec ce produit (cette substance / cette préparation) dans le cadre de leur travail que lorsque qu'il est établi sur la base d'une analyse de risques au sens de l'art. 63 OLT 1 (RS 822.111) qu'aucune menace concrète pour la santé de la mère et de l'enfant n'est présente ou que celle-ci peut être exclue grâce à des mesures de protection appropriées.

# FICHE DE DONNÉES DE SÉCURITÉ
conformément au Règlement (CE) No. 1907/2006

INEOS Paraform

# Formaldéhyde 37% (11% Méthanol)

| Version | Date de révision: | Numéro de la FDS: | Date de dernière parution: 26.10.2018 |
|---|---|---|---|
| 4.3 | 17.12.2018 | 427780-00009 | Date de la première version publiée: 21.12.2015 |

## RUBRIQUE 1: Identification de la substance/du mélange et de la société/l'entreprise

### 1.1 Identificateur de produit

Nom commercial : Formaldéhyde 37% (11% Méthanol)

Code du produit : 22.6120.3711.

### 1.2 Utilisations identifiées pertinentes de la substance ou du mélange et utilisations déconseillées

Utilisation de la substance/du mélange : Produit chimique

### 1.3 Renseignements concernant le fournisseur de la fiche de données de sécurité

Société : INEOS Paraform GmbH & Co. KG
Hauptstraße 30
55120 Mainz, Germany

Téléphone : +49 6131 621 114

Adresse e-mail de la personne responsable de FDS : sdb-paraform@ineos.com

### 1.4 Numéro d'appel d'urgence

Emergency telephone number (24 h / 365 d):
Europe: +49 6132 84463 (GBK ID 92706)
Rest of World: +1 352 323 3500 (GBK/Infotrac ID 92706)

## RUBRIQUE 2: Identification des dangers

### 2.1 Classification de la substance ou du mélange

**Classification (RÈGLEMENT (CE) No 1272/2008)**

| | |
|---|---|
| Toxicité aiguë, Catégorie 3 | H301: Toxique en cas d'ingestion. |
| Toxicité aiguë, Catégorie 2 | H330: Mortel par inhalation. |
| Toxicité aiguë, Catégorie 3 | H311: Toxique par contact cutané. |
| Corrosion cutanée, Sous-catégorie 1B | H314: Provoque des brûlures de la peau et de graves lésions des yeux. |
| Lésions oculaires graves, Catégorie 1 | H318: Provoque de graves lésions des yeux. |
| Sensibilisation cutanée, Catégorie 1 | H317: Peut provoquer une allergie cutanée. |
| Mutagénicité sur les cellules germinales, Catégorie 2 | H341: Susceptible d'induire des anomalies génétiques. |

| | |
|---|---|
| Cancérogénicité, Catégorie 1B | H350: Peut provoquer le cancer. |
| Toxicité spécifique pour certains organes cibles - exposition unique, Catégorie 1 | H370: Risque avéré d'effets graves pour les organes. |
| Toxicité spécifique pour certains organes cibles - exposition unique, Catégorie 3 | H335: Peut irriter les voies respiratoires. |

### 2.2 Éléments d'étiquetage

**Étiquetage (RÈGLEMENT (CE) No 1272/2008)**

Pictogrammes de danger :

Mention d'avertissement : Danger

Mentions de danger :

H301 + H311 Toxique par ingestion ou par contact cutané.
H314 Provoque des brûlures de la peau et de graves lésions des yeux.
H317 Peut provoquer une allergie cutanée.
H330 Mortel par inhalation.
H335 Peut irriter les voies respiratoires.
H341 Susceptible d'induire des anomalies génétiques.
H350 Peut provoquer le cancer.
H370 Risque avéré d'effets graves pour les organes.

Conseils de prudence :

**Prévention:**

P201 Se procurer les instructions avant utilisation.
P280 Porter des gants de protection/ des vêtements de protection/ un équipement de protection des yeux/ du visage.

**Intervention:**

P304 + P340 + P310 EN CAS D'INHALATION: transporter la personne à l'extérieur et la maintenir dans une position où elle peut confortablement respirer. Appeler immédiatement un CENTRE ANTIPOISON/un médecin.
P305 + P351 + P338 + P310 EN CAS DE CONTACT AVEC LES YEUX: Rincer avec précaution à l'eau pendant plusieurs minutes. Enlever les lentilles de contact si la victime en porte et si elles peuvent être facilement enlevées. Continuer à rincer. Appeler immédiatement un CENTRE ANTIPOISON/un médecin.
P308 + P311 EN CAS d'exposition prouvée ou suspectée: Appeler un CENTRE ANTIPOISON/un médecin.

**Stockage:**

P403 + P233 Stocker dans un endroit bien ventilé. Maintenir le récipient fermé de manière étanche.

Composants dangereux qui doivent être listés sur l'étiquette:
Formaldéhyde
Méthanol

### 2.3 Autres dangers

Des vapeurs peuvent former un mélange explosif avec l'air.

## RUBRIQUE 3: Composition/informations sur les composants

### 3.2 Mélanges

**Composants**

| Nom Chimique | No.-CAS<br>No.-CE<br>No.-Index<br>Numéro d'enregis-trement | Classification | Concentration (% w/w) |
|---|---|---|---|
| Formaldéhyde | 50-00-0<br>200-001-8<br>605-001-00-5<br>01-2119488953-20-0008 | Acute Tox.3; H301<br>Acute Tox.2; H330<br>Acute Tox.3; H311<br>Skin Corr.1B; H314<br>Eye Dam.1; H318<br>Skin Sens.1A; H317<br>Muta.2; H341<br>Carc.1B; H350<br>STOT SE3; H335 | >= 30 - < 50 |
| Méthanol | 67-56-1<br>200-659-6<br>603-001-00-X<br>01-2119433307-44 | Flam. Liq.2; H225<br>Acute Tox.3; H301<br>Acute Tox.3; H331<br>Acute Tox.3; H311<br>STOT SE1; H370 | >= 10 - < 20 |

Pour l'explication des abréviations voir section 16.

## RUBRIQUE 4: Premiers secours

### 4.1 Description des premiers secours

Conseils généraux : En cas d'accident ou de malaise, consulter immédiatement un médecin.
Si les symptômes persistent ou en cas de doute, consulter un médecin.

Protection pour les secouristes : Les secouristes doivent veiller à se protéger et utiliser l'équipement de protection individuelle recommandé lorsqu'un risque d'exposition existe.

En cas d'inhalation : En cas d'inhalation, déplacer à l'air frais.
En cas d'arrêt respiratoire, pratiquer la respiration artificielle.
En cas de difficultés respiratoires, mettre sous oxygène.
Faire immédiatement appel à une assistance médicale.

En cas de contact avec la : En cas de contact, rincer immédiatement avec beaucoup

| | | |
|---|---|---|
| peau | | d'eau pendant au moins 15 minutes en retirant les vêtements et chaussures contaminées.<br>Faire immédiatement appel à une assistance médicale.<br>Laver les vêtements avant de les remettre.<br>Nettoyer méticuleusement les chaussures avant de les réutiliser. |
| En cas de contact avec les yeux | : | En cas de contact, rincer les yeux immédiatement avec beaucoup d'eau pendant au moins 15 minutes.<br>Retirer les lentilles de contact si on peut le faire facilement.<br>Faire immédiatement appel à une assistance médicale. |
| En cas d'ingestion | : | En cas d'ingestion, NE PAS faire vomir.<br>En cas de vomissement, la personne doit se pencher en avant.<br>Appeler immédiatement un médecin ou un centre AntiPoison.<br>Rincer soigneusement la bouche avec de l'eau.<br>Ne jamais rien faire avaler à une personne inconsciente. |

**4.2 Principaux symptômes et effets, aigus et différés**

| | | |
|---|---|---|
| Risques | : | Toxique par ingestion ou par contact cutané.<br>Peut provoquer une allergie cutanée.<br>Provoque de graves lésions des yeux.<br>Mortel par inhalation.<br>Peut irriter les voies respiratoires.<br>Susceptible d'induire des anomalies génétiques.<br>Peut provoquer le cancer.<br>Risque avéré d'effets graves pour les organes.<br>Provoque de graves brûlures.<br><br>Provoque des brûlures de l'appareil digestif. |

**4.3 Indication des éventuels soins médicaux immédiats et traitements particuliers nécessaires**

| | | |
|---|---|---|
| Traitement | : | Effectuer un traitement symptomatique et d'appoint. |

## RUBRIQUE 5: Mesures de lutte contre l'incendie

**5.1 Moyens d'extinction**

| | | |
|---|---|---|
| Moyens d'extinction appropriés | : | Eau pulvérisée<br>Mousse résistant à l'alcool<br>Dioxyde de carbone (CO2)<br>Poudre chimique sèche |
| Moyens d'extinction inappropriés | : | Jet d'eau à grand débit |

**5.2 Dangers particuliers résultant de la substance ou du mélange**

| | | |
|---|---|---|
| Dangers spécifiques pendant la lutte contre l'incendie | : | Ne pas utiliser un jet d'eau concentré, qui pourrait répandre le feu. |

La distance de retour de flamme peut être considérable.
Les vapeurs peuvent former des mélanges explosifs avec l'air.
Une exposition aux produits de combustion peut être dangereuse pour la santé.

Produits de combustion dangereux : Oxydes de carbone

**5.3 Conseils aux pompiers**

Équipements de protection particuliers des pompiers : En cas d'incendie, porter un appareil de protection respiratoire autonome. Utiliser un équipement de protection individuelle.

Méthodes spécifiques d'extinction : Utiliser des moyens d'extinction appropriés aux conditions locales et à l'environnement proche.
Les récipients fermés peuvent être refroidis par eau pulvérisée.
Eloigner les contenants de la zone de feu si cela peut se faire sans risque.
Évacuer la zone.

## RUBRIQUE 6: Mesures à prendre en cas de dispersion accidentelle

**6.1 Précautions individuelles, équipement de protection et procédures d'urgence**

Précautions individuelles : Évacuer le personnel vers des endroits sûrs.
Seul un personnel qualifié devrait pénétrer de nouveau dans la zone.
Enlever toute source d'ignition.
Suivez les conseils de manipulation et les recommandations en matière d'équipement de protection.

**6.2 Précautions pour la protection de l'environnement**

Précautions pour la protection de l'environnement : Tout déversement dans l'environnement doit être évité.
Éviter tout déversement ou fuite supplémentaire, si cela est possible en toute sécurité.
Éviter la dispersion (p.ex. par bac de rétention ou barrières à huile).
Retenir l'eau de lavage contaminée et l'éliminer.
Prévenir les autorités locales si des fuites significatives ne peuvent pas être contenues.

**6.3 Méthodes et matériel de confinement et de nettoyage**

Méthodes de nettoyage : Utiliser des outils ne provoquant pas d'étincelles.
Enlever avec un absorbant inerte.
Rabattre les gaz/les vapeurs/le brouillard à l'aide d'eau pulvérisée.
Pour les déversements importants, installer des digues ou d'autres méthodes de confinement pour empêcher la propagation du produit. Si le produit endigué peut être pompé, entreposer le produit récupéré dans un récipient approprié.

Nettoyer les substances résiduelles du déversement à l'aide d'un absorbant approprié.
Des règlementations locales ou nationales peuvent s'appliquer audéversement et à l'élimination de ce produit, de même qu'aux matériaux et objets utilisés pour le nettoyage. Vous devrez déterminer quelle réglementation est applicable.
Les sections 13 et 15 de cette fiche de sécurité fournissent des informations concernant certaines exigences locales ou nationales.

**6.4 Référence à d'autres rubriques**

Voir les sections: 7, 8, 11, 12 et 13.

## RUBRIQUE 7: Manipulation et stockage

**7.1 Précautions à prendre pour une manipulation sans danger**

| | | |
|---|---|---|
| Mesures d'ordre technique | : | Voir les mesures techniques à la section CONTRÔLES D'EXPOSITION/PROTECTION INDIVIDUELLE. |
| Ventilation locale/totale | : | Utiliser avec une ventilation avec extraction à la source. |
| Conseils pour une manipulation sans danger | : | Eviter le contact avec la peau et les vêtements.<br>Ne pas respirer les vapeurs ou le brouillard de pulvérisation.<br>Ne pas avaler.<br>Eviter tout contact avec les yeux.<br>A manipuler conformément aux normes d'hygiène industrielle et aux consignes de sécurité, sur la base des résultats de l'évaluation de l'exposition du lieu de travail.<br>Maintenir le récipient fermé de manière étanche.<br>Pour travailler avec des irritants ou sensibilisateurs respiratoires, les individus déjà sensibles doivent consulter leur médecin.<br>Tenir à l'écart de la chaleur et des sources d'ignition.<br>Éviter l'accumulation de charges électrostatiques.<br>Prenez soin de prévenir les déversements, les déchets et de minimiser les rejets dans l'environnement. |
| Mesures d'hygiène | : | S'assurer que des systèmes de rinçage des yeux et des douches de sécurité soient situés à proximité du poste de travail. Ne pas manger, ne pas boire et ne pas fumer pendant l'utilisation. Laver les vêtements contaminés avant de les remettre. |

**7.2 Conditions d'un stockage sûr, y compris d'éventuelles incompatibilités**

| | | |
|---|---|---|
| Exigences concernant les aires de stockage et les conteneurs | : | Conserver dans des conteneurs proprement étiquetés. Garder sous clef. Conserver hermétiquement fermé. Conserver dans un endroit frais et bien ventilé. Stocker en tenant compte des législations nationales spécifiques. Tenir à l'écart de la chaleur et des sources d'ignition. |
| Précautions pour le stockage | : | Ne pas stocker avec les types de produits suivants : |

| | |
|---|---|
| en commun | Oxydants forts<br>Peroxydes organiques<br>Liquides inflammables<br>Matières solides inflammables<br>Liquides pyrophoriques<br>Matières solides pyrophoriques<br>Substances et mélanges auto-échauffants<br>Substances et mélanges qui, au contact de l'eau, dégagent des gaz inflammables<br>Explosifs<br>Gaz |

### 7.3 Utilisation(s) finale(s) particulière(s)

Utilisation(s) particulière(s) : Donnée non disponible

## RUBRIQUE 8: Contrôles de l'exposition/protection individuelle

### 8.1 Paramètres de contrôle

**Limites d'exposition professionnelle**

| Composants | No.-CAS | Type de valeur (Type d'exposition) | Paramètres de contrôle | Base |
|---|---|---|---|---|
| Formaldéhyde | 50-00-0 | VLE | 0,6 ppm<br>0,74 mg/m3 | CH SUVA |
| Information supplémentaire | Pas de risque accru de cancer si la VME est respectée, Sensibilisateurs; Les substances marquées d'un S provoquent particulièrement souvent des réactions. d'hypersensibilité (maladies allergiques)., Cancérogène, Catégorie 2, National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, Deutsche Forschungsgemeinschaft, Health and Safety Executive (Occupational Medicine and Hygiene Laboratory), Si la VME a été respectée, il n'y a pas à craindre de lésions du foetus. | | | |
| | | VME | 0,3 ppm<br>0,37 mg/m3 | CH SUVA |
| Information supplémentaire | Pas de risque accru de cancer si la VME est respectée, Sensibilisateurs; Les substances marquées d'un S provoquent particulièrement souvent des réactions. d'hypersensibilité (maladies allergiques)., Cancérogène, Catégorie 2, National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, Deutsche Forschungsgemeinschaft, Health and Safety Executive (Occupational Medicine and Hygiene Laboratory), Si la VME a été respectée, il n'y a pas à craindre de lésions du foetus. | | | |
| Méthanol | 67-56-1 | VME | 200 ppm<br>260 mg/m3 | CH SUVA |
| Information supplémentaire | Possibilité d'intoxication par résorption transcutanée. Certaines substances pénètrent dans l'organisme non seulement par les voies respiratoires, mais également au travers de la peau. Il en résulte un accroissement notable de la charge toxique interne de l'individu exposé., National Institute for Occupational Safety and Health, Institut National de Recherche et de Sécurité pour la prévention des accidents du travail et des maladies professionnelles, Si la VME a été respectée, il n'y a pas à craindre de lésions du foetus. | | | |

| | | | | |
|---|---|---|---|---|
| | | VLE | 800 ppm<br>1.040 mg/m3 | CH SUVA |
| Information supplémentaire | Possibilité d'intoxication par résorption transcutanée. Certaines substances pénètrent dans l'organisme non seulement par les voies respiratoires, mais également au travers de la peau. Il en résulte un accroissement notable de la charge toxique interne de l'individu exposé., National Institute for Occupational Safety and Health, Institut National de Recherche et de Sécurité pour la prévention des accidents du travail et des maladies professionnelles, Si la VME a été respectée, il n'y a pas à craindre de lésions du foetus. | | | |
| | | TWA | 200 ppm<br>260 mg/m3 | 2006/15/EC |
| Information supplémentaire | Indicatif, Identifie la possibilité d'absorption significative à travers la peau | | | |

**Valeurs limites biologiques d'exposition au poste de travail**

| Nom de la substance | No.-CAS | Paramètres de contrôle | Heure d'échantillonnage | Base |
|---|---|---|---|---|
| Méthanol | 67-56-1 | Méthanol: 30 mg/l (Urine) | fin de l'exposition, de la période de travail, exposition de longue durée: après plusieurs périodes de travail | CH BAT |
| | | Méthanol: 936 µmol/l (Urine) | fin de l'exposition, de la période de travail, exposition de longue durée: après plusieurs périodes de travail | CH BAT |

**Dose dérivée sans effet (DNEL) conformément au Règlement (CE) No. 1907/2006:**

| Nom de la substance | Utilisation finale | Voies d'exposition | Effets potentiels sur la santé | Valeur |
|---|---|---|---|---|
| Formaldéhyde | Travailleurs | Inhalation | Long terme - effets systémiques | 9 mg/m3 |
| | Travailleurs | Inhalation | Long terme - effets locaux | 0,375 mg/m3 |
| | Travailleurs | Contact avec la peau | Long terme - effets systémiques | 240 mg/kg p.c./jour |
| | Travailleurs | Inhalation | Aigu - effets locaux | 0,75 mg/m3 |
| | Consommateurs | Inhalation | Long terme - effets systémiques | 3,2 mg/m3 |
| | Consommateurs | Contact avec la peau | Long terme - effets systémiques | 102 mg/kg p.c./jour |
| | Consommateurs | Ingestion | Long terme - effets systémiques | 4,1 mg/kg p.c./jour |
| | Travailleurs | Contact avec la peau | Long terme - effets locaux | 0,037 mg/cm2 |
| | Consommateurs | Inhalation | Long terme - effets locaux | 0,1 mg/m3 |
| | Consommateurs | Contact avec la peau | Long terme - effets locaux | 0,012 mg/cm2 |

| | | | | |
|---|---|---|---|---|
| Méthanol | Travailleurs | Inhalation | Long terme - effets systémiques | 260 mg/m3 |
| | Travailleurs | Inhalation | Aigu - effets systémiques | 260 mg/m3 |
| | Travailleurs | Inhalation | Long terme - effets locaux | 260 mg/m3 |
| | Travailleurs | Inhalation | Aigu - effets locaux | 260 mg/m3 |
| | Travailleurs | Contact avec la peau | Long terme - effets systémiques | 40 mg/kg p.c./jour |
| | Travailleurs | Contact avec la peau | Aigu - effets systémiques | 40 mg/kg p.c./jour |
| | Consommateurs | Inhalation | Long terme - effets systémiques | 50 mg/m3 |
| | Consommateurs | Inhalation | Aigu - effets systémiques | 50 mg/m3 |
| | Consommateurs | Inhalation | Long terme - effets locaux | 50 mg/m3 |
| | Consommateurs | Inhalation | Aigu - effets locaux | 50 mg/m3 |
| | Consommateurs | Contact avec la peau | Long terme - effets systémiques | 8 mg/kg p.c./jour |
| | Consommateurs | Contact avec la peau | Aigu - effets systémiques | 8 mg/kg p.c./jour |
| | Consommateurs | Ingestion | Long terme - effets systémiques | 8 mg/kg p.c./jour |
| | Consommateurs | Ingestion | Aigu - effets systémiques | 8 mg/kg p.c./jour |

**Concentration prédite sans effet (PNEC) conformément au Règlement (CE) No. 1907/2006:**

| Nom de la substance | Compartiment de l'Environnement | Valeur |
|---|---|---|
| Formaldéhyde | Eau douce | 0,44 mg/l |
| | Eau de mer | 0,44 mg/l |
| | Utilisation/rejet intermittent(e) | 4,44 mg/l |
| | Station de traitement des eaux usées | 0,19 mg/l |
| | Sédiment d'eau douce | 2,3 mg/kg |
| | Sédiment marin | 2,3 mg/kg |
| | Sol | 0,2 mg/kg |
| Méthanol | Eau douce | 20,8 mg/l |
| | Eau de mer | 2,08 mg/l |
| | Utilisation/rejet intermittent(e) | 1540 mg/l |
| | Station de traitement des eaux usées | 100 mg/l |
| | Sédiment d'eau douce | 77 mg/kg |
| | Sédiment marin | 7,7 mg/kg |
| | Sol | 100 mg/kg |

### 8.2 Contrôles de l'exposition

**Mesures d'ordre technique**

Réduire au minimum les concentrations d'exposition au travail.
Utiliser avec une ventilation avec extraction à la source.

**Équipement de protection individuelle**

Protection des yeux : Porter les équipements de protection individuelle suivants:

Des lunettes de protection résistant aux produits chimiques doivent être portées.
En cas de risque d'éclaboussures, porter:
Écran facial

Protection des mains

| | | |
|---|---|---|
| Matériel | : | Caoutchouc nitrile |
| Délai de rupture | : | 120 - < 240 min |
| Épaisseur du gant | : | 0,425 mm |
| Directive | : | DIN EN 374 |
| Indice de protection | : | Classe 4 |

| | | |
|---|---|---|
| Matériel | : | caoutchouc butyle |
| Délai de rupture | : | > 480 min |
| Épaisseur du gant | : | 0,3 mm |
| Directive | : | DIN EN 374 |
| Indice de protection | : | Classe 6 |

| | | |
|---|---|---|
| Matériel | : | Caoutchouc fluoré |
| Délai de rupture | : | > 480 min |
| Épaisseur du gant | : | 0,7 mm |
| Directive | : | DIN EN 374 |
| Indice de protection | : | Classe 6 |

Remarques : Le choix du type de gants de protection contre les produits chimiques doit être effectué en fonction de la concentration et de la quantité des substances dangereuses propres aux postes de travail. Dans le cas d'applications spéciales, il est recommandé de se renseigner auprès du fabricant de gants sur la résistance aux produits chimiques des gants de protection indiqués ci-dessus. Se laver les mains avant les pauses et à la fin de la journée de travail.

Protection de la peau et du corps : Choisissez des vêtements de protection appropriés sur base des données de résistance chimique et d'une évaluation du potentiel d'exposition locale.
Porter les équipements de protection individuelle suivants:
Vêtements de protection antistatiques retardateurs de flamme, sauf si l'évaluation démontre que le risque d'atmosphères explosives ou d'inflammation spontanée est faible
Il est important d'éviter tout contact avec la peau en utilisant des vêtements de protection imperméables (gants, tabliers, bottes, etc.).

Protection respiratoire : Utiliser une protection respiratoire adéquate sauf en présence d'une ventilation locale par aspiration ou s'il est démontré que l'exposition est dans les limites préconisées par les directives d'exposition.
Type de Filtre recommandé:
Filtre ABEK-P3

## RUBRIQUE 9: Propriétés physiques et chimiques

### 9.1 Informations sur les propriétés physiques et chimiques essentielles

| | | |
|---|---|---|
| Aspect | : | liquide |
| Couleur | : | incolore |
| Odeur | : | Âcre |
| Seuil olfactif | : | Donnée non disponible |
| pH | : | Donnée non disponible |
| Point de fusion/point de congélation | : | < -15 °C |
| Point initial d'ébullition et intervalle d'ébullition | : | env. 97 °C |
| Point d'éclair | : | 66 - 73 °C |
| Taux d'évaporation | : | Donnée non disponible |
| Inflammabilité (solide, gaz) | : | Non applicable |
| Limite d'explosivité, supérieure / Limite d'inflammabilité supérieure | : | 72 % (v) |
| Limite d'explosivité, inférieure / Limite d'inflammabilité inférieure | : | 7 % (v) |
| Pression de vapeur | : | 1 hPa (20 °C) |
| Densité de vapeur relative | : | Donnée non disponible |
| Densité | : | 1,08 - 1,10 g/cm³ (20 °C) |
| Solubilité(s) | | |
| Hydrosolubilité | : | complètement soluble |
| Coefficient de partage: n-octanol/eau | : | log Pow: 0,35 |
| Température d'auto-inflammabilité | : | 380 °C (1.013 hPa)<br>Méthode: DIN 51794 |
| Température de décomposition | : | La substance ou le mélange n'est pas classé comme auto-réactif. |
| Viscosité | | |

| | | |
|---|---|---|
| Viscosité, dynamique | : | 1,8 - 2,5 mPa.s (25 °C)<br>Méthode: DIN 51562 |
| Viscosité, cinématique | : | Donnée non disponible |
| Propriétés explosives | : | Non explosif |
| Propriétés comburantes | : | La substance ou le mélange n'est pas classé comme comburant. |

**9.2 Autres informations**

| | | |
|---|---|---|
| Inflammabilité (liquides) | : | Donnée non disponible |
| Taille des particules | : | Non applicable |

## RUBRIQUE 10: Stabilité et réactivité

**10.1 Réactivité**

Non classé comme danger de réactivité

**10.2 Stabilité chimique**

Stable dans des conditions normales.

**10.3 Possibilité de réactions dangereuses**

| | | |
|---|---|---|
| Réactions dangereuses | : | Liquide combustible.<br>Des vapeurs peuvent former un mélange explosif avec l'air.<br>Peut réagir avec les agents oxydants forts. |

**10.4 Conditions à éviter**

| | | |
|---|---|---|
| Conditions à éviter | : | Chaleur, flammes et étincelles. |

**10.5 Matières incompatibles**

| | | |
|---|---|---|
| Matières à éviter | : | Oxydants |

**10.6 Produits de décomposition dangereux**

On ne connaît pas de produits de décomposition dangereux.

## RUBRIQUE 11: Informations toxicologiques

**11.1 Informations sur les effets toxicologiques**

| | | |
|---|---|---|
| Informations sur les voies d'exposition probables | : | Inhalation<br>Contact avec la peau<br>Ingestion<br>Contact avec les yeux |

**Toxicité aiguë**

Toxique par ingestion ou par contact cutané.

Mortel par inhalation.

**Produit:**

| | | |
|---|---|---|
| Toxicité aiguë par voie orale | : | Estimation de la toxicité aiguë: 243,9 mg/kg<br>Méthode: Méthode de calcul |
| Toxicité aiguë par inhalation | : | Estimation de la toxicité aiguë: 261 ppm<br>Durée d'exposition: 4 h<br>Atmosphère de test: gaz<br>Méthode: Méthode de calcul |
| Toxicité aiguë par voie cutanée | : | Estimation de la toxicité aiguë: 564,85 mg/kg<br>Méthode: Méthode de calcul |

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Toxicité aiguë par voie orale | : | Estimation de la toxicité aiguë: 100 mg/kg<br>Méthode: Avis d'expert |
| Toxicité aiguë par inhalation | : | Estimation de la toxicité aiguë: 100 ppm<br>Durée d'exposition: 4 h<br>Atmosphère de test: gaz<br>Méthode: Avis d'expert |
| Toxicité aiguë par voie cutanée | : | DL50 (Lapin): 270 mg/kg |

**Méthanol:**

| | | |
|---|---|---|
| Toxicité aiguë par voie orale | : | Estimation de la toxicité aiguë (Humain): 300 mg/kg<br>Méthode: Avis d'expert |
| Toxicité aiguë par inhalation | : | Estimation de la toxicité aiguë: 3 mg/l<br>Durée d'exposition: 4 h<br>Atmosphère de test: vapeur<br>Méthode: Avis d'expert<br>Remarques: Basé sur la classification harmonisée du règlement UE 1272/2008, Annexe VI |
| Toxicité aiguë par voie cutanée | : | Estimation de la toxicité aiguë (Humain): 300 mg/kg<br>Méthode: Avis d'expert |

**Corrosion cutanée/irritation cutanée**

Provoque de graves brûlures.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Espèce | : | Lapin |
| Méthode | : | OCDE ligne directrice 404 |
| Résultat | : | Corrosif après 3 minutes à 1 heure d'exposition |

**Méthanol:**

| | | |
|---|---|---|
| Espèce | : | Lapin |
| Résultat | : | Pas d'irritation de la peau |

**Lésions oculaires graves/irritation oculaire**

Provoque de graves lésions des yeux.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Espèce | : | Lapin |
| Résultat | : | Effets irréversibles sur les yeux |

**Méthanol:**

| | | |
|---|---|---|
| Espèce | : | Lapin |
| Résultat | : | Pas d'irritation des yeux |

**Sensibilisation respiratoire ou cutanée**

**Sensibilisation cutanée**

Peut provoquer une allergie cutanée.

**Sensibilisation respiratoire**

Non classé sur la base des informations disponibles.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Type de Test | : | Essai de stimulation locale des ganglions lymphatiques (LLNA) |
| Voies d'exposition | : | Contact avec la peau |
| Espèce | : | Souris |
| Méthode | : | OCDE ligne directrice 429 |
| Résultat | : | positif |
| Evaluation | : | Taux de sensibilisation élevé probable ou prouvé de la peau chez l'homme |

**Méthanol:**

| | | |
|---|---|---|
| Type de Test | : | Test de Maximalisation |
| Voies d'exposition | : | Contact avec la peau |
| Espèce | : | Cochon d'Inde |
| Résultat | : | négatif |

**Mutagénicité sur les cellules germinales**

Susceptible d'induire des anomalies génétiques.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Génotoxicité in vitro | : | Type de Test: Test de mutation bactérienne inverse (AMES) |

Résultat: positif

Type de Test: Test d'aberration chromosomique in vitro
Résultat: positif

Génotoxicité in vivo : Type de Test: Test de micronoyaux sur les érythrocytes de mammifères (test cytogénétique in vivo)
Espèce: Rat
Voie d'application: Inhalation
Résultat: positif

Mutagénicité sur les cellules germinales- Evaluation : Résultat(s) positif(s) de tests de mutagénicité in vivo sur des cellules somatiques de mammifères.

**Méthanol:**

Génotoxicité in vitro : Type de Test: Test de mutation bactérienne inverse (AMES)
Méthode: OCDE ligne directrice 471
Résultat: négatif

Type de Test: Essai in vitro de mutation génique sur cellules de mammifères
Résultat: négatif

Génotoxicité in vivo : Type de Test: Test de micronoyaux sur les érythrocytes de mammifères (test cytogénétique in vivo)
Espèce: Souris
Voie d'application: Injection intrapéritonéale
Résultat: négatif

**Cancérogénicité**

Peut provoquer le cancer.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Espèce | : | Rat |
| Voie d'application | : | Inhalation (gaz) |
| Durée d'exposition | : | 28 Mois |
| Résultat | : | positif |

Cancérogénicité - Evaluation : Preuves suffisantes de carcinogénicité dans des expériences sur des animaux

**Méthanol:**

| | | |
|---|---|---|
| Espèce | : | Souris |
| Voie d'application | : | Inhalation (vapeur) |
| Durée d'exposition | : | 18 Mois |
| Résultat | : | négatif |

**Toxicité pour la reproduction**

Non classé sur la base des informations disponibles.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Incidences sur le développement du fœtus | : | Type de Test: Développement embryo-fœtal<br>Espèce: Rat<br>Voie d'application: Inhalation (gaz)<br>Résultat: négatif |

**Méthanol:**

| | | |
|---|---|---|
| Effets sur la fertilité | : | Type de Test: Fécondité / développement embryonnaire précoce<br>Espèce: Souris<br>Voie d'application: Ingestion<br>Résultat: négatif |
| Incidences sur le développement du fœtus | : | Type de Test: Développement embryo-fœtal<br>Espèce: Souris<br>Voie d'application: Ingestion<br>Résultat: positif<br>Remarques: Les effets ont été constatés uniquement aux doses toxiques pour la mère. |

**Toxicité spécifique pour certains organes cibles - exposition unique**

Peut irriter les voies respiratoires.
Risque avéré d'effets graves pour les organes.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Evaluation | : | Peut irriter les voies respiratoires. |

**Méthanol:**

| | | |
|---|---|---|
| Organes cibles | : | Yeux, Système nerveux central |
| Evaluation | : | Risque avéré d'effets graves pour les organes. |

**Toxicité spécifique pour certains organes cibles - exposition répétée**

Non classé sur la base des informations disponibles.

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Evaluation | : | Aucun effet significativement dangereux pour la santé n'a été observé chez les animaux à des concentrations de 250 ppmV/6h/d ou moins. |

**Toxicité à dose répétée**

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Espèce | : | Rat |
| NOAEL | : | 6 ppm |
| LOAEL | : | 10 ppm |
| Voie d'application | : | Inhalation (gaz) |
| Durée d'exposition | : | 28 jours |

**Méthanol:**

| | | |
|---|---|---|
| Espèce | : | Rat |
| NOAEL | : | 1,06 mg/l |
| Voie d'application | : | Inhalation (vapeur) |
| Durée d'exposition | : | 90 jours |

**Toxicité par aspiration**

Non classé sur la base des informations disponibles.

## RUBRIQUE 12: Informations écologiques

### 12.1 Toxicité

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Toxicité pour les poissons | : | CL50 : 6,7 mg/l<br>Durée d'exposition: 96 h<br>Remarques: Selon les données provenant de composants similaires |
| Toxicité pour la daphnie et les autres invertébrés aquatiques | : | CE50 (Daphnia pulex (Daphnie)): 5,8 mg/l<br>Durée d'exposition: 48 h<br>Méthode: OCDE Ligne directrice 202 |
| Toxicité pour les algues | : | CE50 (Desmodesmus subspicatus (Algue verte)): 4,89 mg/l<br>Durée d'exposition: 72 h<br>Méthode: OCDE Ligne directrice 201 |
| Toxicité pour les microorganismes | : | CE50 : 34,1 mg/l<br>Durée d'exposition: 120 h |
| Toxicité pour les poissons (Toxicité chronique) | : | NOEC: >= 48 mg/l<br>Durée d'exposition: 28 jr<br>Espèce: Oryzias latipes (Killifish rouge-orange) |
| Toxicité pour la daphnie et les autres invertébrés aquatiques (Toxicité chronique) | : | NOEC: >= 6,4 mg/l<br>Durée d'exposition: 21 jr<br>Espèce: Daphnia magna (Grande daphnie )<br>Méthode: OCDE Ligne directrice 211 |

**Méthanol:**

| | | |
|---|---|---|
| Toxicité pour les poissons | : | CL50 (Lepomis macrochirus (Crapet arlequin)): 15.400 mg/l<br>Durée d'exposition: 96 h |
| Toxicité pour la daphnie et les autres invertébrés aquatiques | : | CE50 (Daphnia magna (Grande daphnie )): > 10.000 mg/l<br>Durée d'exposition: 48 h |
| Toxicité pour les algues | : | CE50 (Pseudokirchneriella subcapitata (algues vertes)): 22.000 mg/l<br>Durée d'exposition: 96 h<br>Méthode: OCDE Ligne directrice 201 |
| Toxicité pour les microorganismes | : | CI50 : > 1.000 mg/l<br>Durée d'exposition: 3 h |
| Toxicité pour les poissons (Toxicité chronique) | : | NOEC: 15.800 mg/l<br>Durée d'exposition: 200 h<br>Espèce: Oryzias latipes (Killifish rouge-orange) |

### 12.2 Persistance et dégradabilité

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Biodégradabilité | : | Résultat: Facilement biodégradable.<br>Biodégradation: 91 %<br>Durée d'exposition: 14 jr<br>Méthode: OCDE ligne directrice 301C<br>Remarques: Selon les données provenant de composants similaires |

**Méthanol:**

| | | |
|---|---|---|
| Biodégradabilité | : | Résultat: Facilement biodégradable.<br>Biodégradation: 95 %<br>Durée d'exposition: 20 jr |

### 12.3 Potentiel de bioaccumulation

**Composants:**

**Formaldéhyde:**

| | | |
|---|---|---|
| Coefficient de partage: n-octanol/eau | : | log Pow: 0,35 |

**Méthanol:**

| | | |
|---|---|---|
| Bioaccumulation | : | Espèce: Leuciscus idus(Ide)<br>Facteur de bioconcentration (FBC): < 10 |

Coefficient de partage: n-octanol/eau : log Pow: -0,77

**12.4 Mobilité dans le sol**

Donnée non disponible

**12.5 Résultats des évaluations PBT et vPvB**

Non pertinent

**12.6 Autres effets néfastes**

Donnée non disponible

## RUBRIQUE 13: Considérations relatives à l'élimination

**13.1 Méthodes de traitement des déchets**

Produit : Eliminer le produit conformément à la réglementation locale en vigueur.
Selon le code européen des déchets (CED) le code de déchet n'est pas relatif au produit lui-même mais à son application.
Le code de déchet doit être attribué par l'utilisateur, si possible en accord avec les autorités responsables pour l'élimination des déchets.

Emballages contaminés : Les conteneurs vides doivent être acheminés vers un site agréé pour le traitement des déchets à des fins de recyclage ou d'élimination.
Les récipients vides conservent des résidus et peuvent être dangereux.
Ne pas pressuriser, couper, souder, braser, percer, meuler ou exposer de tels conteneurs à la chaleur, aux flammes, à des étincelles ou à d'autres sources d'ignition. Ils peuvent exploser et causer des blessures et / ou la mort.
Sauf indication contraire : éliminer comme produit non utilisé.

## RUBRIQUE 14: Informations relatives au transport

**14.1 Numéro ONU**

**ADN** : UN 2209

**ADR** : UN 2209

**RID** : UN 2209

**IMDG** : UN 2209

**IATA** : UN 2209

**14.2 Désignation officielle de transport de l'ONU**

**ADN** : FORMALDÉHYDE EN SOLUTION

**ADR** : FORMALDÉHYDE EN SOLUTION

| | | |
|---|---|---|
| **RID** | : | FORMALDÉHYDE EN SOLUTION |
| **IMDG** | : | FORMALDEHYDE SOLUTION |
| **IATA** | : | Formaldehyde solution |

**14.3 Classe(s) de danger pour le transport**

| | | |
|---|---|---|
| **ADN** | : | 8 |
| **ADR** | : | 8 |
| **RID** | : | 8 |
| **IMDG** | : | 8 |
| **IATA** | : | 8 |

**14.4 Groupe d'emballage**

**ADN**

| | | |
|---|---|---|
| Groupe d'emballage | : | III |
| Code de classification | : | C9 |
| Numéro d'identification du danger | : | 80 |
| Étiquettes | : | 8 |

**ADR**

| | | |
|---|---|---|
| Groupe d'emballage | : | III |
| Code de classification | : | C9 |
| Numéro d'identification du danger | : | 80 |
| Étiquettes | : | 8 |
| Code de restriction en tunnels | : | (E) |

**RID**

| | | |
|---|---|---|
| Groupe d'emballage | : | III |
| Code de classification | : | C9 |
| Numéro d'identification du danger | : | 80 |
| Étiquettes | : | 8 |

**IMDG**

| | | |
|---|---|---|
| Groupe d'emballage | : | III |
| Étiquettes | : | 8 |
| EmS Code | : | F-A, S-B |

**IATA (Cargo)**

| | | |
|---|---|---|
| Instructions de conditionnement (avion cargo) | : | 856 |
| Instruction d' emballage (LQ) | : | Y841 |
| Groupe d'emballage | : | III |
| Étiquettes | : | Corrosive |

**IATA (Passager)**

| | | |
|---|---|---|
| Instructions de conditionnement (avion de ligne) | : | 852 |
| Instruction d' emballage (LQ) | : | Y841 |

Groupe d'emballage : III
Étiquettes : Corrosive

**14.5 Dangers pour l'environnement**

**ADN**
Dangereux pour l'environnement : non

**ADR**
Dangereux pour l'environnement : non

**RID**
Dangereux pour l'environnement : non

**IMDG**
Polluant marin : non

**14.6 Précautions particulières à prendre par l'utilisateur**

La(Les) classification(s) de transport fournie(s) ici servent uniquement à des fins d'information et est(sont) basé(e)s sur les propriétés des matières non emballées, tel que décrit dans la fiche des caractéristiques de sécurité. Les classifications de transport peuvent varier selon le mode de transport, les tailles des emballages et les variations dans les réglementations régionales ou nationales.

**14.7 Transport en vrac conformément à l'annexe II de la convention Marpol et au recueil IBC**

Remarques : Non applicable pour le produit tel qu'il est fourni.

## RUBRIQUE 15: Informations relatives à la réglementation

**15.1 Réglementations/législation particulières à la substance ou au mélange en matière de sécurité, de santé et d'environnement**

REACH - Listes des substances extrêmement préoccupantes candidates en vue d'une autorisation (Article 59). : Non applicable

REACH - Liste des substances soumises à autorisation (Annexe XIV) : Non applicable

Règlement (CE) Nº 1005/2009 relatif à des substances qui appauvrissent la couche d'ozone : Non applicable

Règlement (CE) Nº 850/2004 concernant les polluants organiques persistants : Non applicable

Règlement (CE) Nº 649/2012 du Parlement européen et du Conseil concernant les exportations et importations de produits chimiques dangereux : Non applicable

REACH - Restrictions applicables à la fabrication, la mise sur le marché et l'utilisation de certaines substances et préparations dangereuses et de certains articles dangereux (Annexe XVII) : Les conditions de limitation pour les entrées suivantes doivent être prises en compte:
Numéro sur la liste 3

Méthanol (Numéro sur la liste 69)

Ordonnance sur la protection contre les accidents majeurs
Le seuil quantitatif selon l'ordonnance sur la protection contre les accidents majeurs (OPAM 814.012) : 200 kg

Composés organiques volatils : La loi sur les taxes d'incitation pour les composés organiques volatils (VCOV)
Contenu en composés organiques volatils (COV): 49 %

**Autres réglementations:**

Article 13 Ordonnance sur la protection de la maternité (RS 822.111.52): Les femmes enceintes et les mères qui allaitent ne peuvent entrer en contact avec ce produit (cette substance / cette préparation) dans le cadre de leur travail que lorsque qu'il est établi sur la base d'une analyse de risques au sens de l'art. 63 OLT 1 (RS 822.111) qu'aucune menace concrète pour la santé de la mère et de l'enfant n'est présente ou que celle-ci peut être exclue grâce à des mesures de protection appropriées.

Article 4 alinéa 4 Ordonnance sur la protection des jeunes travailleurs (OLT 5, RS 822.115) et Article 1 lit. f Ordonnance du DEFR sur les travaux dangereux pour les jeunes (822.115.2) : Les jeunes en formation professionnelle initiale ne peuvent travailler avec ce produit (cette substance / cette préparation) que si cela est prévu dans l'ordonnance de formation professionnelle pour atteindre les buts de formation et que si les conditions du plan de formation et les limites d'âge applicables soient respectées. Les jeunes qui ne suivent pas de formation professionnelle initiale ne peuvent pas travailler avec ce produit (cette substance / cette préparation). Sont réputés jeunes gens les travailleurs des deux sexes âgés de moins de 18 ans.

Le produit appartient au groupe chimique 1 selon l'Ordonnance sur les produits chimique suisse (OChim 813.11).

**Les composants de ce produit figurent dans les inventaires suivants:**

TSCA : Toutes les substances chimiques de ce produit sont soit listées dans l'inventaire TSCA soit en sont exeptées en conformité avec l'inventaire TSCA.

DSL : Toutes les substances chimiques de ce produit sont conformes à la LCPE 1999 et au RRSN et sont exemptés ou non de l'inscription sur la Liste canadienne intérieure des substances (DSL).

PICCS : Tous les composants sont listés ou dispensés.

IECSC : Tous les composants sont listés ou dispensés.

NZIoC : Tous les composants sont listés ou dispensés.

AICS : Tous les composants sont listés ou dispensés.

ENCS/ISHL : Tous les composants sont inscrits dans le ENCS / ISHL ou exemptés de liste d'inventaire.

KECI : Tous les composants sont listés, exemptés ou notifiés.

**15.2 Évaluation de la sécurité chimique**

Une Évaluation de la Sécurité Chimique a été faite pour cette substance.

## RUBRIQUE 16: Autres informations

Autres informations : Les points sur lesquels on a apporté des modifications par rapport à la version précédentes sont mis en évidence par deux lignes verticales dans le corps du présent document.

**Texte complet pour phrase H**

| | | |
|---|---|---|
| H225 | : | Liquide et vapeurs très inflammables. |
| H301 | : | Toxique en cas d'ingestion. |
| H311 | : | Toxique par contact cutané. |
| H314 | : | Provoque des brûlures de la peau et de graves lésions des yeux. |
| H317 | : | Peut provoquer une allergie cutanée. |
| H318 | : | Provoque de graves lésions des yeux. |
| H330 | : | Mortel par inhalation. |
| H331 | : | Toxique par inhalation. |
| H335 | : | Peut irriter les voies respiratoires. |
| H341 | : | Susceptible d'induire des anomalies génétiques. |
| H350 | : | Peut provoquer le cancer. |
| H370 | : | Risque avéré d'effets graves pour les organes. |

**Texte complet pour autres abréviations**

| | | |
|---|---|---|
| Acute Tox. | : | Toxicité aiguë |
| Carc. | : | Cancérogénicité |
| Eye Dam. | : | Lésions oculaires graves |
| Flam. Liq. | : | Liquides inflammables |
| Muta. | : | Mutagénicité sur les cellules germinales |
| Skin Corr. | : | Corrosion cutanée |
| Skin Sens. | : | Sensibilisation cutanée |
| STOT SE | : | Toxicité spécifique pour certains organes cibles - exposition unique |
| 2006/15/EC | : | Valeurs limites indicatives d'exposition professionnelle |
| CH BAT | : | Switzerland. Liste des VBT |
| CH SUVA | : | Valeurs limites d'exposition aux postes de travail |
| 2006/15/EC / TWA | : | Valeurs limites - huit heures |
| CH SUVA / VME | : | valeur moyenne d'exposition |
| CH SUVA / VLE | : | valeur limite d'exposition caculée sur une courte durée |

ADN - Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures; ADR - Accord européen relatif au transport international des marchandises dangereuses par la route; AICS - Inventaire australien des substances chimiques; ASTM - Société américaine pour les essais de matériaux; bw - Poids corporel; CLP - Règlement relatif à la classification, à l'étiquetage et à l'emballage des substances; règlement (CE) n° 1272/2008; CMR - Cancérogène, mutagène ou toxique pour la reproduction; DIN - Norme de l'Institut allemand de normalisation; DSL - Liste nationale des substances (Canada); ECHA - Agence européenne des produits chimiques; EC-Number - Numéro de Communauté européenne; ECx - Concentration associée à x % de réponse; ELx - Taux de charge associée à x %

de réponse; EmS - Horaire d'urgence; ENCS - Substances chimiques existantes et substances nouvelles (Japon); ErCx - Concentration associée à une réponse de taux de croissance de x %; GHS - Système général harmonisé; GLP - Bonnes pratiques de laboratoire; IARC - Centre international de recherche sur le cancer; IATA - Association du transport aérien international; IBC - Code international pour la construction et l'équipement des navires transportant des produits chimiques dangereux en vrac; IC50 - Concentration inhibitrice demi maximale; ICAO - Organisation de l'aviation civile internationale; IECSC - Inventaire des substances chimiques existantes en Chine; IMDG - Marchandises dangereuses pour le transport maritime international; IMO - Organisation maritime internationale; ISHL - Sécurité industrielle et le droit de la santé (Japon); ISO - Organisation internationale de normalisation; KECI - Inventaire des produits chimiques coréens existants; LC50 - Concentration létale pour 50 % d'une population test; LD50 - Dose létale pour 50 % d'une population test (dose létale moyenne); MARPOL - Convention internationale pour la prévention de la pollution par les navires; n.o.s. - Non spécifié; NO(A)EC - Effet de concentration non observé (négatif); NO(A)EL - Effet non observé (nocif); NOELR - Taux de charge sans effet observé; NZIoC - Inventaire des produits chimiques en Nouvelle-Zélande; OECD - Organisation pour la coopération économique et le développement; OPPTS - Bureau de la sécurité chimique et prévention de la pollution; PBT - Persistant, bio-accumulable et toxique; PICCS - Inventaire des produits et substances chimiques aux Philippines; (Q)SAR - Relations structure-activité (quantitative); REACH - Règlement (CE) n° 1907/2006 du Parlement européen et du Conseil concernant l'enregistrement, l'évaluation, l'autorisation et la restriction des produits chimiques; RID - Règlement concernant le transport international des marchandises dangereuses par chemin de fer; SADT - Température de décomposition auto-accélérée; SDS - Fiche de Données de Sécurité; SVHC - substance extrêmement préoccupante; TCSI - Inventaire des substances chimiques à Taiwan; TSCA - Loi sur le contrôle des substances toxiques (États-Unis); UN - Les Nations Unies; UNRTDG - Recommandations des Nations Unies relatives au transport des marchandises dangereuses; vPvB - Très persistant et très bioaccumulable

**Information supplémentaire**

| | | |
|---|---|---|
| Sources des principales données utilisées pour l'établissement de la fiche de données de sécurité | : | Données techniques internes, données provenant des FDS des matières premières, résultats de la recherche sur le portail eChem de l'OCDE et sur le site de l'Agence européenne des produits chimiques, http://echa.europa.eu/ |

| **Classification du mélange:** | | **Procédure de classification:** |
|---|---|---|
| Acute Tox. 3 | H301 | Méthode de calcul |
| Acute Tox. 2 | H330 | Méthode de calcul |
| Acute Tox. 3 | H311 | Méthode de calcul |
| Skin Corr. 1B | H314 | Méthode de calcul |
| Eye Dam. 1 | H318 | Méthode de calcul |
| Skin Sens. 1 | H317 | Méthode de calcul |
| Muta. 2 | H341 | Méthode de calcul |
| Carc. 1B | H350 | Méthode de calcul |
| STOT SE 1 | H370 | Méthode de calcul |
| STOT SE 3 | H335 | Méthode de calcul |

Les renseignements fournis dans la présente fiche de données de sécurité (FDS) sont basés sur l'état de nos connaissances à la date de sa publication et sont donnés en toute bonne foi. Ces

renseignements sont fournis à seul titre d'orientation pour que la manipulation, l'utilisation, la transformation, l'entreposage, le transport, l'élimination et le rejet de la matière en question soient effectués en toute sécurité et ne sauraient donc être interprétés comme une garantie ou considérés comme des spécifications de qualité. Les renseignements fournis ne se réfèrent qu'à la matière spécifiée en haut de la présente fiche des données de sécurité FDS et peuvent ne pas s'appliquer lorsque cette matière est mélangée à d'autres ou qu'elle est transformée, sauf indication spécifiée dans le texte. Les utilisateurs de cette matière sont priés de réexaminer les informations et les recommandations fournies et de les adapter aux méthodes de manipulation, d'utilisation, de transformation et d'entreposage qu'ils comptent employer, en évaluant si possible la pertinence de la matière objet de la FDS à son stade final d'utilisation.

CH / FR

**Annex to the extended safety data sheet (eSDS**

**1. Overview of exposure scenarios (ES)**


| ES number | ES Code | Scenario name | Use descriptor | Page |
|---|---|---|---|---|
| 1 | 1 | Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% | ERC 1, 2, 3, 4, 5, 6A, 6B, 6C, 6D, 7; PROC 1, 2, 3, 4, 5, 6, 8A, 8B, 9, 10, 13, 14, 15 | 5 |
| 2 | 2 | Industrial use of preparations containing formaldehyde up to 5% | ERC 2, 3, 5, 6C, 6D; PROC 1, 2, 3, 4, 5, 6, 7, 8A, 8B, 9, 10, 13, 14, 15, 16, 21, 22C, 23C, 24C, 25C | 61 |
| 3 | 3 | Industrial use of preparations containing formaldehyde up to 25% | ERC 2, 3, 4, 5, 6C, 6D; PROC 5, 8A, 8B, 9, 13, 15 | 104 |
| 4 | 4 | Professional use of preparations containing formaldehyde up to 1.5% | ERC 8A, 8B, 8C, 8D, 8F; PROC 5, 8A, 8B, 10, 11, 13, 15, 16, 21, 23C, 24C, 25C | 118 |
| 5 | 5 | Professional use of preparations containing formaldehyde up to 5% | ERC 8A; PROC 8A, 11, 13, 15 | 147 |


**1.1 General information**

General remarks

Substance characteristics
The following parameters are taken into account:
- Formaldehyde is not stable; therefore it is stored as formalin (30-60%). Formaldehyde has another vapour pressure than formalin. For the application of different vapour pressures in different situations (temperature, percentage formaldehyde) is referred to the section justification of choices on general ART parameters and the percentage modification used in ECETOC TRA.
- The molecular weight of formaldehyde is 30.03 g/mol.

The Formaldehyde Chemical Safety Report (CSR) describes worker exposure assessment based on worker exposure values modelled with a Tier 1 or Tier 2 model. The report “Analysis of worker exposure in manufacture and use of formaldehyde in Europe, including downstream applications” (Van Manen-Vernooij et al., 2013), added in section 13 of IUCLID describes and uses available user and literature data for worker exposure assessment as far as possible, supplemented by model estimates for situations with insufficient useful user and literature data. Worker exposure assessments underpinned with user and/or literature data presented in Van Manen-Vernooij et al. (2013) support the model estimations in the CSR.
The potential risks of consumer exposure to formaldehyde, due to indoor exposure caused by the use of formaldehyde based resins in the production of several materials, was studied by evaluating both indoor air concentrations of formaldehyde, emission criteria and emissions of materials and reasonable worst case exposure scenarios of indoor air concentrations caused by emissions of materials, calculated via modelling. The results of that evaluation are in the report “Analysis of consumer exposure associated with the use of products and articles containing formaldehyde –based resins” (Marquart et al., 2013), which is added in section 13 of IUCLID.

**Quantitative worker exposure assessment**

The worker exposure assessments have at first instance been performed by ECETOC TRA, version 3.0 build in EasyTRA 4.0.0. EasyTRA uses algorithms on the basis of the latest versions of the ECHA REACH Guidance chapters R12 (as of March 2010), R14, R15, and R16 (as of October 2012). EasyTRA works in compliance with ECETOC® Targeted Risk Assessment 3 (as of July 2012) for the calculation of worker exposure.

ECETOC TRA version 3.0 has been used with the following modifications:
- Percentage substance: The percentage of formaldehyde in a mixture was not used as such in the calculations of inhalation exposure in ECETOC TRA v3.0. Instead, the partial vapour pressure of formaldehyde of the relevant concentration was calculated at the relevant temperature with the Lacy equation described in the monograph on formaldehyde by Walker (1964). This partial vapour pressure was entered into ECETOC TRA v3.0 and the estimation was done without further correction for percentage of substance. It therefore seems that 100% formaldehyde is used in each contributing scenario, but this is not the case. To explain this an example will be given, but first a few assumptions about temperatures and concentrations are summarised. Three temperatures, 20, 60 and 100°C were used for the estimations with ECETOC TRA. For closed processes 100°C is used (PROC 1-4). For PROC 5, 6, 8b, 13, 14, 15, 16, 22, 23, 25 a temperature of 60°C is assumed. For PROC 8a a temperature of 60°C is assumed for professional use and room temperature (20°C) is assumed for industrial use. For all other PROCs room temperature was assumed. In cases where pure formaldehyde (as a formalin solution 30-60%) was used (during manufacturing, formulation and in the industrial use up to 60% exposure scenarios) vapour pressure calculations were performed with a 49% concentration as this is in the middle of the concentration range. For the example we will take a look at PROC 6 of ES 1. The vapour pressure is calculated with the following formula: VP = 9.942 – 0.953 * (0.488^(w/10)) – 2905 / T . In which VP is de vapour pressure in log mmHg, W is the concentration in %, and T is the temperature in Kelvin. The resulting vapour pressure of PROC 6 of ES 1, where 60°C is assumed and pure formaldehyde is used, is 2089.60 Pa. This vapour pressure and the altered process temperature are in the tier 2 worker settings in EasyTRA along with the following explanation: “Process temperature of 60 degrees Celsius assumed for industrial use of preparations with 30-60% formaldehyde in this type of process. Vapour pressure 2089.68 Pa based on Walker, No 159 of American Chemical Society Monograph series P. 115”.
- For dermal exposure estimates, no correction for percentage of substance in the products was made in the estimates with ECETOC TRA v3.0. The method used for correcting the partial vapour pressure for inhalation exposure makes it very difficult to also include another form of correction for percentage of substance for dermal exposure. Since all RCRs for dermal exposure were very low it was decided to use dermal exposure values uncorrected for percentage of substance.
- LEV: No effect of LEV on dermal exposure was assumed.
- Gloves: The following effectiveness values are assumed: Use of suitable gloves in combination with specific activity training: 95%; Use of suitable gloves in combination with intensive management supervision controls: 98%. The last option is not available in ECETOC TRA v3.0. It was therefore used by calculating the value without gloves and then adding the reduction effect of gloves afterwards.

The standard occupational hygiene strategy was used for the iterations, which includes the prescription of technical conditions first (e.g. LEV), followed by organisational measures (e.g. time restrictions) and use personal protection (e.g. RPE) at last. However, for certain contributing scenarios this strategy might not fit e.g. maintenance activities, transfer activities may not first rely on LEV, because of a lack of technical feasibility. The choice of the risk management measure used therefore also relies on the feasibility and achievability in the specific situation. For large open services enclosure and LEV are for instance not feasible options. In these cases prescribing personal protective equipment is a better alternative. Only RMMs that are considered to be technically feasible are used in a contributing scenario.
If respiratory protection equipment was prescribed in a contributing scenario, time restriction of <4 hours was added (even though this would not be necessary to ensure safe use). This is ensure that long-term activities (> 4 hours) do not take place in combination with respiratory protection equipment.
Personal protective equipment recommendations
Where the use of respiratory protection is advised, the following materials should be used:
- Suitable respiratory protection for lower concentration or short-term effect: Gas filter for gases/vapours of inorganic compounds (e.g. EN 14387 Type B).
- Suitable respiratory protection for higher concentrations or long-term effect: Self-contained breathing apparatus.

Where the use of gloves is advised, the following chemically resistant glove materials (tested to EN374) also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN374) should be used:
- butyl rubber (butyl) – 0.7 mm coating thickness
- nitrile rubber (NBR) – 0.4 mm coating thickness

Where eye protection is advised tightly fitting safety goggles (splash goggles (e.g. EN 166) should be used. A chemical-protective face shield (e.g. EN 166) should be used where suitable face shields are advised.

A chemical-protection suit (f.e. according to EN 14605) should be used where suitable coveralls are advised.

Combined quantitative exposure
As the inhalation exposure is set against the long-term local DNEL and dermal exposure is set against the long-term systemic DNEL, a combined systemic RCR is not calculated. The DNEL for long-term systemic inhalation is equal to the long-term local DNEL. The exposure value of the long-term systemic route would therefore be equal or lower to the long-term local route, as the systemic route takes time into consideration but the local route does not. If the RCRs of the long-term local inhalation route is combined with the long-term systemic dermal route is still below 1. It can therefore be stated that the combined long-term systemic exposure (inhalation and dermal) is controlled.

Second tier quantitative worker exposure assessment
For higher tier inhalation exposure assessments the Advanced REACH Tool version 1.5 (ART) was used. ART is a second tier model, which was developed for higher tier exposure assessment generating scientifically justified and realistic exposure estimates. For a detailed description of the model is referred to R14 of the ECHA Guidance on information requirements and chemical safety assessment and on the ART website www.advancedreachtool.com. Within ART, a number of generic choices have been made for all assessments which are described below.

ECETOC TRA assumes that the conditions of use do not lead to formation of aerosol or mist. Hence, the ART model is used for inhalation exposure assessment of aerosol forming processes including PROC 7 and 11. For the use of formalin (30-60% formaldehyde) it became clear that the first tier assessments did not lead to conclusions of control of risks for the inhalation route. Therefore, higher tier exposure assessments with ART have been performed for these exposure scenarios.

Choices on the use of Advanced REACH Tool (ART)

Only the mechanistic model of ART is used. ART calculates several percentiles and confidence intervals. The basic estimator is the median value for the given inputs. Percentiles are used to represent the variability within the Exposure Scenario. They are calculated by ART based on known and published studies on variability within and between companies within the same type of use. Confidence intervals represent uncertainty and are calculated from the unexplained variation in the model calibration (which links ART-scores to actual exposure levels) from which the within and between company variation have been subtracted, because this has already been taken into account in the variability. For the estimations with ART the reasonable worst case exposure level has been defined in this case as the upper limit of the interquartile confidence interval of the 75th percentile. This estimator takes account of a reasonable variation and a reasonable uncertainty. It is considered that the final estimate made in this way corresponds reasonably well to the estimate that would have been reached if a calculation would be done of the 90th percentile based on the total unexplained variation in the calibration of ART. Thereby it would probably be the most similar result to a 90th percentile of models such as Stoffenmanager and RISKOFDERM that do not differentiate between variability and uncertainty.

Some PROCs are described by different activities within ART. If safe use was not demonstrated without RPE, RPE was prescribed for only part of the activities to limit the period of uncomfortable use of RPE where possible. This was done by modifying the task estimate responsible for the high exposure level with the protective effect of RPE. This correction of a task with RPE was followed by the calculation of time weighted average exposure levels with the following equation:

Full shift TWA = ((Exp_t1 * Fact_RPE * T_t1) + (Exp_t2 * T_t2))/T_fullshift

Where:
Exp_t1 = exposure estimate for the high exposure task (task 1)
Fact_RPE = reduction factor for RPE used with the high exposure task
T_t1 = duration of exposure due to task 1 = duration task 1
Exp_t2 = exposure estimate for the lower (longer duration) task 2
T_t2 = duration of exposure due to task 2 = duration task 2
T_fullhift = duration of full shift (8 hours or 480 minutes)

ART estimates exposure over the duration of one or more activities or over a full shift. It cannot estimate short term (acute) exposure levels, higher than the exposure level over an activity that may occur for periods within one activity. For these situations, short term exposure levels are considered to be 2 times the calculated full shift (480 min) exposure level for exposures related to activities with a duration of 1 hour or more and equal to the activity exposure level for activities with a duration of less than 1 hour.

Justification of choices on general parameters

The mechanistic model of ART is relatively complex and requires a large number of choices. Choices relate to e.g. activity emission potential, operational conditions (OC) and risk management measures (RMM). A number of choices made are the same for all contributing scenarios in the Exposure Scenario. These choices are described below, while the scenario specific choices are justified in the relevant ES.

- The physical state of the substance is a liquid
- Transfer activities are estimated for solutions of 30-60%, 5% and 1.5% of formaldehyde in water.
- Vapour pressure of pure formaldehyde, which may exist only in the process of manufacturing/formulation (at high temperatures (50-150˚C), is above the limit of ART. The limit of ART (100,000 Pa) is used for these type of estimations.
- Formaldehyde in pure form is not stable. Therefore, it is always handled after production as solution in water (30-60%), called formalin. For formaldehyde stored, handled or used as formalin the vapour pressure is 1400 Pa (partial vapour pressure for formalin solution at room temperature).
- For the transfer activities with 1.5 and 5% formaldehyde solution estimations were performed with 1400 Pa (partial vapour pressure for formalin solution at room temperature). Room temperature was assumed because these processes take place after extra dilution of the warmer original solution with water. A corrected concentration was used in the ART assessment, as the vapour pressure of the formalin solution (30-60%) was used. For the 5% solution estimation a corrected concentration of 8.1% was used, because 5% of 100% is equal to 8.1% of 60%.
- For the production-transfer activities with 30-60% formaldehyde high temperatures (up to 60˚C) were taken into account. This was done by using the vapour pressure of 1520 Pa (49% formaldehyde at 55˚C). This information is from the same literature source that indicated the vapour pressure for 37% formaldehyde at room temperature. 49% is used as this is in the middle of the concentration range. 55˚C is chosen as this reasonable worst case if the process is up to 60˚C.

Because a direct value for vapour pressure of the relevant percentage at the relevant temperature range was used, no further correction was needed for fraction or temperature. Therefore:

o Mole fraction of the substance in the mixture was set to 1

o Process temperature was set to room temperature (15-25˚C).

- Mole fraction of the substance = 1. In reality the mole fraction of formaldehyde in the solution is much lower than 1 (generally around 0.37). However, the (partial) vapour pressure for formaldehyde in solution is used and not the pure vapour pressure. This already corrects for the fact that formaldehyde is in a solution. Therefore, the mole fraction was not reduced to prevent taking account of the dilution twice.
- The room size of industrial settings was set on 300 m³ reflecting a reasonable worst-case size for large rooms and process halls.
- A ventilation rate of 3 air changes per hour is assumed for industrial settings reflecting proper general ventilation in this type of industry.
- The room size and ventilation rate of professional settings was set on 30 m³ and 1 air change per hour (ACH) respectively, reflecting a reasonable worst case situation for professional settings.

These choices are considered to be fitting reasonable worst cases for the handling of formaldehyde in this Exposure Scenario. For other parameters the inputs vary per Contributing Scenario.

Efficacy values in CSR

For a number of risk management measures, the efficacy is relevant information to incorporate in the Exposure Scenarios that will be communicated with the SDS. However, within ART the efficacy of a specific measure is not always given or easy to calculate. Where relevant, the information relating the efficacy of these RMM is given, even in an ‘efficacy value’ or other measure:

- the efficacy of RMM like LEV, vapour recovery system, RPE and level of containment are given as a percentage of reduction that should be achieved
- the required ventilation is given in air changes per hour (ACH)
- the room size in which activities may be performed and the maximum duration of activities are given as exact values
- The reduction factors used for RPE are based on the reduction factors for RPE used by ECETOC TRA Version 3.0.
- the percentage of formaldehyde and the process temperature are given as a range.

Peak exposure values

For assessment of risks of short term exposure the following method was used to derive peak exposure levels for inhalation exposure.
It was assumed that estimations made with ART, taking the upper quartile confidence limit of the 75th percentile estimate, correspond (roughly) with the 90th percentile of the full exposure distribution for the situation. Therefore, to derive the 95th percentile of short term exposure levels, the full shift value as estimated with ART was multiplied by 2. This is in accordance to the method described in Guidance document R.14.

Estimations with ECETOC TRA v3.0 are considered to correspond to the 75th percentile of the full exposure distribution for the situation. For the short term local route ECETOC TRA v3.0 derives a peak exposure value without correction factors.

Measured worker exposure levels

The exposure estimates in this CSR are based on exposure modelling. However, to support the values estimated here an analysis of measured worker exposure levels, based on data gathered from manufacturers and users of formaldehyde as well as available literature, was made. The results of that analysis are presented in the appended report “Analysis of worker exposure in manufacture and use of formaldehyde in Europe, including downstream applications” (Van Manen-Vernooij et al., 2013).

**Qualitative worker exposure assessment**

General
Formaldehyde as a pure substance is classified/labeled for severe skin burns and eye damage (H314/R34) and skin sensitization effects (H317/R43 – Skin Sens. Cat 1). Besides that, formaldehyde may also cause cancer (H350/R45 Carc. Cat 1B). In accordance with the REACH guidance part E, Table E 3-1 a qualitative assessment is performed to identify suitable risk management measures for the sensitizing potency of the substance on the skin, the damaging potency of the substance on the eyes and corrosive properties on the skin.
According to the specific concentration limits for formaldehyde described in chapter 3 of the CSR, classification/labeling for severe skin burns and eye damage (H314/R34) applies if the formaldehyde concentration in preparation is ≥ 25%. In case of using preparations with a formaldehyde content ≥ 5% - < 25%, skin and eye irritation effects may occur (H315/R38, H319/R36). Classification/Labeling for skin sensitization effects (H317/R43) applies in case of using preparations with a Formaldehyde concentration ≥ 0.2%.

Eyes
Preparations with a formaldehyde content of 1.5% used ES 4 are not classified for eye effects.
The concentration of formaldehyde is assumed to be above the concentration limit for serious damage to the eyes (≥ 25%) in uses described in ES 1 and 3. Preparations with 5% formaldehyde used in ES 2 and 5 may cause serious irritation effects on the eyes. The risk of both eye effects is evaluated qualitatively.

Exposure to the eyes can occur in two ways: direct from the air (splashes, aerosols, dust) or indirect via hand-eye contact. The likelihood/frequency of hand-eye contact is considered to be low due to the fact that the likelihood of actual hand exposure is at most low and workers have been trained to prevent exposure. For PROCs where aerosols are formed, the intensity of exposure due to contact of the eyes with air is estimated to be high due to the formation of aerosols.
Because of the severe nature of the effect, all risks should be avoided. Therefore, suitable eye protection like goggles, face shields or full face masks should be worn at the workplace to prevent eye exposure in all processes with mixtures containing ≥ 5% Formaldehyde. With the above described measures taken into account, the actual eye exposure is low and the risk of severe eye damage is considered to be controlled.

Skin
The likelihood/frequency of exposure is assessed for each PROC combined with a specification of measures depending on the specific PROC.
The concentration of formaldehyde is assumed to be above the concentration limit for skin sensitization (≥ 0.2%) in all processes. Hence, the risk of skin sensitization is evaluated qualitatively for all processes. Formaldehyde preparations described in ES 1 and 3 exceed the limit for classification/labelling for severe skin burns. Formaldehyde preparations described in ES 2 and 5 may cause skin irritation. The risk of all three skin effects is evaluated qualitatively. Preparations with 1.5% formaldehyde used in ES 4 are not classified for corrosive and/or irritating effects on the skin.

PROC: 1, 2, 3, 8b, 9
Likelihood/frequency of exposure is considered to be practically negligible for PROC 1 due to the high integrity closed systems and very low for the other PROCs mentioned due to the generally closed processes with only occasional potential contact. Good practices and training need to be ensured and suitable gloved need to be applied. With the protective measures described in the exposure scenario taken into account, the actual exposure is low and the risk of skin effects is considered to be controlled.

PROC: 4, 5, 8a, 14, 15, 16, 21, 22, 23, 24, 25
The likelihood/frequency of dermal exposure is considered to be at most low for the PROCs mentioned due to generally closed processes and the careful handling of the (hot) substance in sampling situations and laboratories. The intensity of exposure may in some cases potentially be medium to high, however, actual exposure will be largely prevented by protective measures including good practices and training combined with the use of chemically resistant gloves and suitable coveralls. With the protective measures described in the exposure scenario taken into account, the actual dermal exposure is very low and the risk of skin effects is considered to be controlled.

PROC: 6, 10, 13
Likelihood and frequency of exposure may be high due to the open nature of the processes. The intensity of exposure may in some cases potentially be high as well, however, actual exposure will be largely prevented by protective measures including good practices and training combined with use of suitable coveralls and chemically resistant gloves. Management/supervision should be in place to check that the RMMs are being used correctly and OCs followed. With the protective measures described in the exposure scenario taken into account, the actual dermal exposure is low and the risk of skin effects is considered to be controlled.

PROC: 7, 11
The process of industrial and professional spraying described by PROC 7 and 11 respectively is considered an open process with aerosol formation. Both the likelihood/frequency and the intensity of dermal exposure are considered high. However, actual exposure will be largely prevented by the combination of the following measures; good practices and training need to be ensured. Besides that, suitable eye protection, face shields, coveralls and chemically resistant gloves need to be applied. Management/supervision should be in place to check that the RMMs are being used correctly and OCs followed. With the protective measures described in the exposure scenario taken into account, the actual dermal exposure is low and the risk of skin effects is considered to be controlled.

**Environment**

In the chemical safety assessment performed according to Article 14(3) in connection Annex I section 3 (Environmental Hazard Assessment) and section 4 (PBT/ vPvB Assessment) no hazard was identified. Therefore according to REACH Annex I (5.0) an exposure-estimation is not necessary. Consequently all identified uses of the substance are assessed as safe for the environment.

**Consumer exposure**

In REACH regulation, Article 14, it is defined when a chemical safety assessment is necessary for substances. Article 14-2(a) refers to concentration limits in the classification and labeling directive. No Exposure Scenario needs to be made for products (preparation) with a concentration below the limits that Article 14-2 refers to. As formaldehyde is classified as toxic, the Exposure Scenarios need to be made for a chemical safety assessment when formaldehyde is present in a preparation in concentrations above 0.1%.

Formaldehyde is present in small concentrations in preparations like detergents, coatings and adhesives. Regarding consumer uses, the concentration of formaldehyde in this type of preparations does not exceed 0.1%. According to Article 14-2, the use of this type of preparations by consumers does not need to be evaluated in the chemical safety assessment.
The use of formaldehyde in resins, which are used in the production of articles like paper, panel boards and textiles, will result in a service life stage. For this stage, percentages of formaldehyde in the final article are below 0.1%. This percentage is maintained by the use of certification marks which are in place for panel boards, wall papers and floorings. It could be argued based on the article mentioned above that no Exposure Scenario is necessary for formaldehyde in articles in such low concentrations. Although Article 14-2 does not refer directly to articles with a concentration below certain limits, but only to preparations, it is considered reasonable to extrapolate this Article to articles. Scientifically it is to be expected that in general substances are emitted more extensively from preparations than from articles, because of the lower mobility of substances in matrices of which articles are made.

Although exposure scenarios are therefore not necessary for service life of articles made with formaldehyde based resins, it is well-known that authorities worry about the potential risks of exposure of the general public to formaldehyde in houses and other buildings and about the potential emissions from materials, such as textiles or wood based panels. Several studies of formaldehyde concentrations in houses have been made to see whether there is indeed a risk. Therefore, the potential risks of consumer exposure to formaldehyde due to indoor exposure caused by the use of formaldehyde based resins in the production of several materials was studied by evaluating both indoor air concentrations of formaldehyde, emission criteria and emissions of materials and reasonable worst case exposure scenarios of indoor air concentrations caused by emissions of materials, calculated via modelling. The results of that evaluation are in the report “Analysis of consumer exposure associated with the use of products and articles containing formaldehyde –based resins” (Marquart et al., 2013), which is added in section 13 of IUCLID.

**2.1 Scenario 1: Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%**

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

Description of ES 1

| | |
|---|---|
| **Free short title** | Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% |
| **Systematic title based on use descriptor** | ERC 1, 2, 3, 4, 5, 6A, 6B, 6C, 6D, 7; PROC 1, 2, 3, 4, 5, 6, 8A, 8B, 9, 10, 13, 14, 15 |
| **Name of constributing environmental scenario and corresponding ERC** | ERC 1 Production of chemicals<br>ERC 2 Formulation of preparations<br>ERC 3 Formulation in articles<br>ERC 4 Industrial use of processing aids<br>ERC 5 Industrial use resulting in inclusion into or onto a matrix<br>ERC 6a Industrial use of intermediates<br>ERC 6b Industrial use of reactive processing aids<br>ERC 6c Production of plastics<br>ERC 6d Production of resins/rubbers<br>ERC 7 Industrial use of substances in closed systems |
| **Name(s) of contributing worker scenarios and corresponding PROCs** | PROC 1 - Use in closed process, no likelihood of exposure<br>PROC 2 - Use in closed, continuous process with occasional controlled exposure<br>PROC 3 - Use in closed batch process (synthesis or formulation)<br>PROC 3 - Use in closed batch process (synthesis or formulation)<br>PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises<br>PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)<br>PROC 6 - Calendering operations<br>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities<br>PROC 8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities<br>PROC 9 - Transfer of chemicals into small containers (dedicated filling line)<br>PROC 10 - Roller application or brushing<br>PROC 13 - Treatment of articles by dipping and pouring<br>PROC 14 - Production of preparations or articles by tabletting, compression, extrusion, pelletisation<br>PROC 15 - Use of laboratory reagents in small scale laboratories |

**2.2 Conditions of use affecting exposure**

**2.2.1 Contributing Scenario (1) controlling environmental exposure for ERC 1**
**2.2.2 Contributing Scenario (2) controlling environmental exposure for ERC 2**
**2.2.3 Contributing Scenario (3) controlling environmental exposure for ERC 3**
**2.2.4 Contributing Scenario (4) controlling environmental exposure for ERC 4**
**2.2.5 Contributing Scenario (5) controlling environmental exposure for ERC 5**
**2.2.6 Contributing Scenario (6) controlling environmental exposure for ERC 6A**
**2.2.7 Contributing Scenario (7) controlling environmental exposure for ERC 6B**
**2.2.8 Contributing Scenario (8) controlling environmental exposure for ERC 6C**
**2.2.9 Contributing Scenario (9) controlling environmental exposure for ERC 6D**
**2.2.10 Contributing Scenario (10) controlling environmental exposure for ERC 7**

| |
|---|
| As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed. |

**2.2.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 1**

| | |
|---|---|
| **Name of contributing scenario** | PROC 1 Use in closed process, no likelihood of exposure |
| Scenario subtitle | CS 1 Use in closed process, no likelihood of exposure - long term local |
| **Qualitative Risk Assessment** | |
| General | Handle substance within closed system.<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |

| | |
|---|---|
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | no |
| High level containment | inhalation: 99.9 % *(justification: High level of containment (99.9% reduction), consisting of:<br>- Sealed and enclosed system<br>- The enclosure is not opened during the activity<br>- The system is designed to minimize the surface area which can contact the material or pairs of valves with wash space between them.)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>PROC 1: high integrity closed systems<br>Far field source of exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Process temperature: Hot process (50-150 degrees)<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: High level containment (99.9% reduction)<br>Process fully enclosed? Yes<br>Work area: Indoors<br>Room size: 300 $m^3$<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min |

**2.2.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 1**

| | |
|---|---|
| **Name of contributing scenario** | PROC 1 Use in closed process, no likelihood of exposure |
| Scenario subtitle | CS 1 Use in closed process, no likelihood of exposure - short term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Handle substance within closed system.<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| High level containment | inhalation: 99.9 % *(justification: High level of containment (99.9% reduction), consisting of:*<br>*- Sealed and enclosed system*<br>*- The enclosure is not opened during the activity*<br>*- The system is designed to minimize the surface area which can contact the material or pairs of valves with wash space between them.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS1 (PROC 1).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 2**

| | |
|---|---|
| **Name of contributing scenario** | PROC 2 Use in closed, continuous process with occasional controlled exposure |
| Scenario subtitle | CS 2 Use in closed, continuous process with occasional controlled exposure - long term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Handle substance within closed system.<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 480 min/day, duration of activity has been considered linearly *(justification: Closed process: Daily, up to 360 minutes.<br>Dedicated transfer: Daily, up to 120 minutes.)* |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Dedicated transfer and closed process: wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % *(justification: Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level of containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:<br>Medium level of containment (99% reduction), consisting of:<br>- Physical containment or enclosure of the source of emission.<br>- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.<br>Examples include sealing heads, transfer containers and multiple o-rings.<br>Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |

| | |
|---|---|
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 2 is considered the result of two sources:<br>Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 100%<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Hot processes (50-150 degrees)<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Room temperature (15-25 degrees)<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 120 min<br>Use of respiratory protection with effectiveness 90% |

**2.2.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 2**

| | |
|---|---|
| **Name of contributing scenario** | PROC 2 Use in closed, continuous process with occasional controlled exposure |
| Scenario subtitle | CS 2 Use in closed, continuous process with occasional controlled exposure - short term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Handle substance within closed system.<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |

| | |
|---|---|
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % *(justification: Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level of containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:<br>Medium level of containment (99% reduction), consisting of:<br>- Physical containment or enclosure of the source of emission.<br>- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.<br>Examples include sealing heads, transfer containers and multiple o-rings.<br>Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS2(PROC 2).<br>Worker exposure related to PROC 2 is considered the result of two sources: Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br><br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources * peak factor 2. |

**2.2.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 3**

| | |
|---|---|
| **Name of contributing scenario** | PROC 3 Use in closed batch process (synthesis or formulation) |
| Scenario subtitle | CS 3 Use in closed batch process (synthesis/formulation) - long term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Handle substance within closed system.<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |

| | |
|---|---|
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 480 min/day, duration of activity has been considered linearly *(justification: Closed process: Daily, up to 360 minutes.*<br>*Dedicated transfer: Daily, up to 120 minutes.)* |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Dedicated transfer and closed process: wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % *(justification: Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level of containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:*<br>*Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings.*<br>*Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |

| | |
|---|---|
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 3 is considered the result of two sources:<br>Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 100%<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Hot processes (50-150 degrees)<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Room temperature (15-25 degrees)<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 120 min<br>Use of respiratory protection with effectiveness 90% |

**2.2.16 Contributing Scenario (16) controlling industrial worker exposure for PROC 3**

| | |
|---|---|
| **Name of contributing scenario** | PROC 3 Use in closed batch process (synthesis or formulation) |
| Scenario subtitle | CS 3 Use in closed batch process (synthesis/formulation) - short term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Handle substance within closed system.<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection.<br>In case of potential exposure: |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % *(justification: Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level of containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:<br>Medium level of containment (99% reduction), consisting of:<br>- Physical containment or enclosure of the source of emission.<br>- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.<br>Examples include sealing heads, transfer containers and multiple o-rings.<br>Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |

| | |
|---|---|
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS3(PROC 3).<br>Worker exposure related to PROC 3 is considered the result of two sources: Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br><br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources * peak factor 2. |

**2.2.17 Contributing Scenario (17) controlling industrial worker exposure for PROC 4**

| | |
|---|---|
| **Name of contributing scenario** | PROC 4 Use in batch and other process (synthesis) where opportunity for exposure arises |
| Scenario subtitle | CS 4 Use in batch or other process (synthesis) where opportunity for exposure arises - long term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Provide extract ventilation to points where emissions occur (LEV).<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 480 min/day, duration of activity has been considered linearly *(justification: Dedicated transfer and open parts of the process: Daily, up to 60 min.<br>Closed process: Daily, up to 360 min.)* |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Dedicated transfer, closed process and open parts of the process: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 95 % *(justification: Open parts of the processs: Use of respiratory protective equipment (95% reduction).<br>Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:<br>Medium level of containment (99% reduction), consisting of:<br>- Physical containment or enclosure of the source of emission.<br>- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.<br>Examples include sealing heads, transfer containers and multiple o-rings.<br>Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |

| | |
|---|---|
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 4 is considered the result of three sources:<br>Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 1<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 90%<br><br>Specific for open parts of the process:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Activities with open liquid surfaces or open reservoirs<br>Activities with agitated surfaces, open surface < 0.1 m2<br>Primary localised control: Local Exhaust Ventilation – Fixed capturing hood (90% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 95% |

**2.2.18 Contributing Scenario (18) controlling industrial worker exposure for PROC 4**

| | |
|---|---|
| **Name of contributing scenario** | PROC 4 Use in batch and other process (synthesis) where opportunity for exposure arises |
| Scenario subtitle | CS 4 Use in batch or other process (synthesis) where opportunity for exposure arises - short term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Provide extract ventilation to points where emissions occur (LEV).<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |

| | |
|---|---|
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % *(justification: Open parts of the processs: Use of respiratory protective equipment (95% reduction).*<br>*Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:*<br>*Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings.*<br>*Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS4(PROC 4).<br>For ART estimations, worker exposure related to PROC 4 is considered the result of three sources:<br>Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources * peak factor 2. |

**2.2.19 Contributing Scenario (19) controlling industrial worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 5 Mixing or blending in batch processes (multistage and/or significant contact) - long term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Provide extract ventilation to points where emissions occur (LEV).<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 480 min/day, duration of activity has been considered linearly *(justification: Dedicated transfer and open parts of the process: Daily, up to 60 min.<br>Closed process: Daily, up to 360 min.)* |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Dedicated transfer, closed process and open parts of the process: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 95 % *(justification: Open parts of the processs: Use of respiratory protective equipment (95% reduction).<br>Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:<br>Medium level of containment (99% reduction), consisting of:<br>- Physical containment or enclosure of the source of emission.<br>- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.<br>Examples include sealing heads, transfer containers and multiple o-rings.<br>Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |

| | |
|---|---|
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 5 is considered the result of three sources:<br>Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 1<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 90%<br><br>Specific for open parts of the process:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Activities with open liquid surfaces or open reservoirs<br>Activities with agitated surfaces, open surface < 0.1 m2.<br>Primary localised control: Local Exhaust Ventilation – Fixed capturing hood (90% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 95% |

**2.2.20 Contributing Scenario (20) controlling industrial worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 5 Mixing or blending in batch processes (multistage and/or significant contact)- short term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Provide extract ventilation to points where emissions occur (LEV).<br>Relevant for transfer activities<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |

| | |
|---|---|
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 150 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % *(justification: Open parts of the processs: Use of respiratory protective equipment (95% reduction).*<br>*Dedicated transfer: Use of respiratory protective equipment (90% reduction).)* |
| Medium level containment | inhalation: 99 % *(justification: Dedicated transfer and closed process:*<br>*Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings.*<br>*Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS5(PROC 5).<br>For ART estimations, worker exposure related to PROC 5 is considered the result of three sources:<br>Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources * peak factor 2. |

**2.2.21 Contributing Scenario (21) controlling industrial worker exposure for PROC 6**

| | |
|---|---|
| **Name of contributing scenario** | PROC 6 Calendering operations |
| Scenario subtitle | CS 6 Calendering operations - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 95 % |

**2.2.22 Contributing Scenario (22) controlling industrial worker exposure for PROC 6**

| | |
|---|---|
| **Name of contributing scenario** | PROC 6 Calendering operations |
| Scenario subtitle | CS 6 Calendering operations - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |

| | |
|---|---|
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

**2.2.23 Contributing Scenario (23) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 7a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (30-60% formaldehyde) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>In case of outdoor use:<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 55 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

| | |
|---|---|
| Medium level containment | inhalation: 99 % *(justification: Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Weight fraction: 100%<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 100-1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 240 min<br>Use of respiratory protection with effectiveness 90% |

**2.2.24 Contributing Scenario (24) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 7a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (30-60% formaldehyde) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>In case of outdoor use:<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 55 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |

| | |
|---|---|
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |
| Medium level containment | inhalation: 99 % *(justification: Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS7a (PROC 8a).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.25 Contributing Scenario (25) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 7b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (5% formaldehyde) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>In case of outdoor use:<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Medium level containment | inhalation: 99 % *(justification: Medium level of containment (99% reduction), consisting of:<br>- Physical containment or enclosure of the source of emission.<br>- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.<br>Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 8.1% (8.1% of 62% = 5%)<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 100-1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min |

**2.2.26 Contributing Scenario (26) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 7b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (5% formaldehyde) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>In case of outdoor use:<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |

| | |
|---|---|
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Medium level containment | inhalation: 99 % *(justification: Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS7b (PROC 8a).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.27 Contributing Scenario (27) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 8 Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (solid) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.*<br><br>*Justification use of solid: The substance in this contributing scenario is used in solid fertilizer granules with urea formaldehyde resin.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |

| | |
|---|---|
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | no |

**2.2.28 Contributing Scenario (28) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 8 Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (solid) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.*<br><br>*Justification use of solid: The substance in this contributing scenario is used in solid fertilizer granules with urea formaldehyde resin.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**2.2.29 Contributing Scenario (29) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 9a Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (30-60% formaldehyde) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |

| | |
|---|---|
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 55 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localised control: Vapour recovery system (80% reduction)<br>Work area: Indoors<br>Room size: 300 $m^3$<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 240 min<br>Use of respiratory protection with effectiveness 90% |

**2.2.30 Contributing Scenario (30) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 9a Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (30-60% formaldehyde) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |

| | |
|---|---|
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 55 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS9a (PROC 8b).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.31 Contributing Scenario (31) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 9b Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (5% formaldehyde) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |

| | |
|---|---|
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Medium level containment | inhalation: 99 % *(justification: Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 8.1% (8.1% of 62% = 5%)<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localised control: Vapour recovery system (80% reduction)<br>Work area: Indoors<br>Room size: 300 $m^3$<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min |

**2.2.32 Contributing Scenario (32) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 9b Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (5% formaldehyde) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Transfer via enclosed lines<br>Ensure submerged loading<br>Vapour recovery system<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |

| | |
|---|---|
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Medium level containment | inhalation: 99 % *(justification: Medium level of containment (99% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel.*<br>*Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS9b (PROC 8b).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.33 Contributing Scenario (33) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 10a Transfer of substance or preparations into small containers (dedicated filling line including weighing) (30-60% formaldehyde) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>Provide extract ventilation to points where emissions occur (LEV).<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 55 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |
| Low level containment | inhalation: 90 % *(justification: Low level of containment (90% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The process is contained with a loose lid or cover, which is not air tight. This includes tapping molten metal through covered launders and placing a loose lid on a ladle. This class also includes bags or liners fitted around transfer points from source to receiving vessel. These include Muller seals, Stott head and single bag, and associated clamps and closures.)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 10-100 L/min<br>Open process with submerged loading<br>Primary localised control: Low level of containment (90% reduction)<br>Secondary localised control: LEV - fixed capturing hood (90% reduction)<br>Work area: Indoors<br>Room size: 300 $m^3$<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 240 min<br>Use of respiratory protection with effectiveness 90% |

**2.2.34 Contributing Scenario (34) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 10a Transfer of substance or preparations into small containers (dedicated filling line including weighing) (30-60% formaldehyde) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>Provide extract ventilation to points where emissions occur (LEV).<br>Ensure good work practices are implemented |

| | |
|---|---|
| Eyes | Use suitable eye protection.<br>In case of potential exposure: |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 55 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |
| Low level containment | inhalation: 90 % *(justification: Low level of containment (90% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The process is contained with a loose lid or cover, which is not air tight. This includes tapping molten metal through covered launders and placing a loose lid on a ladle. This class also includes bags or liners fitted around transfer points from source to receiving vessel. These include Muller seals, Stott head and single bag, and associated clamps and closures.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS10a (PROC 9).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.35 Contributing Scenario (35) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 10b Transfer of substance or preparations into small containers (dedicated filling line including weighing) (5% formaldehyde) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>Provide extract ventilation to points where emissions occur (LEV).<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |

| | |
|---|---|
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Low level containment | inhalation: 90 % *(justification: Low level of containment (90% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The process is contained with a loose lid or cover, which is not air tight. This includes tapping molten metal through covered launders and placing a loose lid on a ladle. This class also includes bags or liners fitted around transfer points from source to receiving vessel. These include Muller seals, Stott head and single bag, and associated clamps and closures.)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 8.1% (8.1% of 62% = 5%)<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 10-100 L/min<br>Open process with submerged loading<br>Primary localised control: Low level of containment (90% reduction)<br>Secondary localised control: LEV - fixed capturing hood (90% reduction)<br>Work area: Indoors<br>Room size: 300 $m^3$<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min |

**2.2.36 Contributing Scenario (36) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 10b Transfer of substance or preparations into small containers (dedicated filling line including weighing) (5% formaldehyde) - short term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Reduce concentration to less than 5%<br>Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure submerged loading<br>Provide extract ventilation to points where emissions occur (LEV).<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Low level containment | inhalation: 90 % *(justification: Low level of containment (90% reduction), consisting of:*<br>*- Physical containment or enclosure of the source of emission.*<br>*- The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The process is contained with a loose lid or cover, which is not air tight. This includes tapping molten metal through covered launders and placing a loose lid on a ladle. This class also includes bags or liners fitted around transfer points from source to receiving vessel. These include Muller seals, Stott head and single bag, and associated clamps and closures.)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS10b (PROC 9).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.2.37 Contributing Scenario (37) controlling industrial worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 11 Roller application or brushing - long term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

**2.2.38 Contributing Scenario (38) controlling industrial worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 11 Roller application or brushing - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**2.2.39 Contributing Scenario (39) controlling industrial worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 12 Treatment of articles by dipping and pouring - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

**2.2.40 Contributing Scenario (40) controlling industrial worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 12 Treatment of articles by dipping and pouring - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |

| | |
|---|---|
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**2.2.41 Contributing Scenario (41) controlling industrial worker exposure for PROC 14**

| | |
|---|---|
| **Name of contributing scenario** | PROC 14 Production of preparations or articles by tabletting, compression, extrusion, pelletisation |
| Scenario subtitle | CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 95 % |

**2.2.42 Contributing Scenario (42) controlling industrial worker exposure for PROC 14**

| | |
|---|---|
| **Name of contributing scenario** | PROC 14 Production of preparations or articles by tabletting, compression, extrusion, pelletisation |
| Scenario subtitle | CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - short term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Reduce concentration to less than 60%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

**2.2.43 Contributing Scenario (43) controlling industrial worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 14 Use as a laboratory reagent - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of controlled ventilation (10 to 15 air changes per hour)<br>Avoid skin contact.<br>Ensure good work practices are implemented<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |

| | |
|---|---|
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate <0.1 L/min<br>Open process with splash loading<br>Primary localised control: LEV-Enclosed hood-Fume cupboard<br>Work area: Indoors<br>Room size: 100 $m^3$<br>Ventilation rate: 10 air changes per hour (ACH)<br>Duration (mins): 480 min |

**2.2.44 Contributing Scenario (44) controlling industrial worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 14 Use as a laboratory reagent - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 60%<br>Provide a good standard of controlled ventilation (10 to 15 air changes per hour)<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 60%. It is however set at 100% since the concentration limit of 60% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 25 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |

| | |
|---|---|
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS14 (PROC 15).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**2.3 Exposure estimation**

**2.3.1 Contributing Scenario (1) controlling environmental exposure for ERC1**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.2 Contributing Scenario (2) controlling environmental exposure for ERC2**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.3 Contributing Scenario (3) controlling environmental exposure for ERC3**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.4 Contributing Scenario (4) controlling environmental exposure for ERC4**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.5 Contributing Scenario (5) controlling environmental exposure for ERC5**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.6 Contributing Scenario (6) controlling environmental exposure for ERC6A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.7 Contributing Scenario (7) controlling environmental exposure for ERC6B**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.8 Contributing Scenario (8) controlling environmental exposure for ERC6C**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.9 Contributing Scenario (9) controlling environmental exposure for ERC6D**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.10 Contributing Scenario (10) controlling environmental exposure for ERC7**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**2.3.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 1**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 1 Use in closed process, no likelihood of exposure - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.000686 mg/kg bw/day | 240 mg/kg bw/day | 2.86E-6 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>PROC 1: high integrity closed systems<br>Far field source of exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Process temperature: Hot process (50-150 degrees)<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: High level containment (99.9% reduction)<br>Process fully enclosed? Yes<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min) | 0.025 mg/m$^3$ | 0.375 mg/m$^3$ | 0.066667 |

**2.3.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 1**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 1 Use in closed process, no likelihood of exposure - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS1 (PROC 1).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.051 mg/m$^3$ | 0.750 mg/m$^3$ | 0.068 |

**2.3.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 2**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 2 Use in closed, continuous process with occasional controlled exposure - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.027429 mg/kg bw/day | 240 mg/kg bw/day | 0.000114 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 2 is considered the result of two sources: Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 100%<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Hot processes (50-150 degrees)<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Room temperature (15-25 degrees)<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products | 0.253 mg/m$^3$ | 0.375 mg/m$^3$ | 0.674667 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 120 min<br>Use of respiratory protection with effectiveness 90%) | | | |

**2.3.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 2**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 2 Use in closed, continuous process with occasional controlled exposure - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS2(PROC 2).<br>Worker exposure related to PROC 2 is considered the result of two sources:<br>Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br><br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources * peak factor 2.) | 0.510 mg/m$^3$ | 0.750 mg/m$^3$ | 0.680 |

**2.3.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 3**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 3 Use in closed batch process (synthesis/formulation) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.013714 mg/kg bw/day | 240 mg/kg bw/day | 0.000057 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 3 is considered the result of two sources:<br>Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates | 0.253 mg/m$^3$ | 0.375 mg/m$^3$ | 0.674667 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| of both sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 100%<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Hot processes (50-150 degrees)<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Room temperature (15-25 degrees)<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 120 min<br>Use of respiratory protection with effectiveness 90%) | | | |

**2.3.16 Contributing Scenario (16) controlling industrial worker exposure for PROC 3**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 3 Use in closed batch process (synthesis/formulation) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS3(PROC 3).<br>Worker exposure related to PROC 3 is considered the result of two sources:<br>Fugative emissions from a closed process and a very limited duration of dedicated transfer of the substance.<br><br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of both sources * peak factor 2.) | 0.510 mg/m$^3$ | 0.750 mg/m$^3$ | 0.680 |

**2.3.17 Contributing Scenario (17) controlling industrial worker exposure for PROC 4**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 4 Use in batch or other process (synthesis) where opportunity for exposure arises - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.137143 mg/kg bw/day | 240 mg/kg bw/day | 0.000571 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 4 is considered the result of three sources: Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 1<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 90%<br><br>Specific for open parts of the process:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Activities with open liquid surfaces or open reservoirs<br>Activities with agitated surfaces, open surface < 0.1 m2<br>Primary localised control: Local Exhaust Ventilation – Fixed capturing hood (90% reduction) | 0.285 mg/m$^3$ | 0.375 mg/m$^3$ | 0.760 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 95%) | | | |

**2.3.18 Contributing Scenario (18) controlling industrial worker exposure for PROC 4**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 4 Use in batch or other process (synthesis) where opportunity for exposure arises - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS4(PROC 4).<br>For ART estimations, worker exposure related to PROC 4 is considered the result of three sources: Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources * peak factor 2.) | 0.570 mg/m$^3$ | 0.750 mg/m$^3$ | 0.760 |

**2.3.19 Contributing Scenario (19) controlling industrial worker exposure for PROC 5**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 5 Mixing or blending in batch processes (multistage and/or significant contact) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.274286 mg/kg bw/day | 240 mg/kg bw/day | 0.001143 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>For ART estimations, worker exposure related to PROC 5 is considered the result of three sources: Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile confidence limits of the 75th percentile estimates of all three sources.<br><br>General:<br>Substance product type: Liquid<br>Weight fraction: 1<br>Work area: Indoors<br>Room size: 300 m³ | 0.285 mg/m$^3$ | 0.375 mg/m$^3$ | 0.760 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Ventilation rate: 3 air changes per hour (ACH)<br><br>Specific for closed process:<br>Far field exposure<br>Vapour pressure: 100 000 Pa (Pure Formaldehyde, limit of ART)<br>Activity class: Handling of contaminated objects<br>Treated/contaminated surface: surface <0.1 m2<br>Level of contamination: <10% of surface<br>Containment: Medium level containment (99% reduction)<br>Process fully enclosed? Yes<br>Duration (mins): 360 min<br><br>Specific for dedicated transfer:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids and >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localized control: Vapour recovery system (80% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 90%<br><br>Specific for open parts of the process:<br>Near field exposure<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Activities with open liquid surfaces or open reservoirs<br>Activities with agitated surfaces, open surface < 0.1 m2.<br>Primary localised control: Local Exhaust Ventilation – Fixed capturing hood (90% reduction)<br>Duration (mins): 60 min<br>Use of respiratory protection with effectiveness 95%) | | | |

**2.3.20 Contributing Scenario (20) controlling industrial worker exposure for PROC 5**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 5 Mixing or blending in batch processes (multistage and/or significant contact)- short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS5(PROC 5).<br>For ART estimations, worker exposure related to PROC 5 is considered the result of three sources: Fugative emissions from a closed process, dedicated transfer of the substance and exposure from open parts of the process.<br>Exposure value used: time weighted average exposure level using the upper interquartile | 0.570 mg/m$^3$ | 0.750 mg/m$^3$ | 0.760 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| confidence limits of the 75th percentile estimates of all three sources * peak factor 2.) | | | |

**2.3.21 Contributing Scenario (21) controlling industrial worker exposure for PROC 6**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 6 Calendering operations - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.329143 mg/kg bw/day | 240 mg/kg bw/day | 0.001371 |
| inhalation, longterm local | 0.312774 mg/m$^3$ | 0.375 mg/m$^3$ | 0.834064 |

**2.3.22 Contributing Scenario (22) controlling industrial worker exposure for PROC 6**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 6 Calendering operations - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.312774 mg/m$^3$ | 0.750 mg/m$^3$ | 0.417032 |

**2.3.23 Contributing Scenario (23) controlling industrial worker exposure for PROC 8A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 7a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (30-60% formaldehyde) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.164571 mg/kg bw/day | 240 mg/kg bw/day | 0.000686 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Weight fraction: 100%<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 100-1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Work area: Indoors<br>Room size: 300 m³ | 0.170 mg/m$^3$ | 0.375 mg/m$^3$ | 0.453333 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 240 min<br>Use of respiratory protection with effectiveness 90%) | | | |

**2.3.24 Contributing Scenario (24) controlling industrial worker exposure for PROC 8A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 7a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (30-60% formaldehyde) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS7a (PROC 8a).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.340 mg/m$^3$ | 0.750 mg/m$^3$ | 0.453333 |

**2.3.25 Contributing Scenario (25) controlling industrial worker exposure for PROC 8A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 7b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (5% formaldehyde) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 8.1% (8.1% of 62% = 5%)<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 100-1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min) | 0.260 mg/m$^3$ | 0.375 mg/m$^3$ | 0.693333 |

**2.3.26 Contributing Scenario (26) controlling industrial worker exposure for PROC 8A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 7b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (5% formaldehyde) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS7b (PROC 8a).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.520 mg/m$^3$ | 0.750 mg/m$^3$ | 0.693333 |

**2.3.27 Contributing Scenario (27) controlling industrial worker exposure for PROC 8A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 8 Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (solid) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.274286 mg/kg bw/day | 240 mg/kg bw/day | 0.001143 |
| inhalation, longterm local | 0.050 mg/m$^3$ | 0.375 mg/m$^3$ | 0.133333 |

**2.3.28 Contributing Scenario (28) controlling industrial worker exposure for PROC 8A**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 8 Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities (solid) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.050 mg/m$^3$ | 0.750 mg/m$^3$ | 0.066667 |

**2.3.29 Contributing Scenario (29) controlling industrial worker exposure for PROC 8B**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 9a Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (30-60% formaldehyde) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.164571 mg/kg bw/day | 240 mg/kg bw/day | 0.000686 |
| inhalation, longterm local (measured / external: | 0.110 mg/m$^3$ | 0.375 mg/m$^3$ | 0.293333 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Vapour pressure: 1520 Pa (Formaldehyde solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localised control: Vapour recovery system (80% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 240 min<br>Use of respiratory protection with effectiveness 90%) | | | |

**2.3.30 Contributing Scenario (30) controlling industrial worker exposure for PROC 8B**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 9a Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (30-60% formaldehyde) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS9a (PROC 8b).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.220 mg/m$^3$ | 0.750 mg/m$^3$ | 0.293333 |

**2.3.31 Contributing Scenario (31) controlling industrial worker exposure for PROC 8B**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 9b Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (5% formaldehyde) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th | 0.170 mg/m$^3$ | 0.375 mg/m$^3$ | 0.453333 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 8.1% (8.1% of 62% = 5%)<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate >1000 L/min<br>Open process with submerged loading<br>Primary localised control: Medium level of containment (99% reduction)<br>Secondary localised control: Vapour recovery system (80% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min) | | | |

**2.3.32 Contributing Scenario (32) controlling industrial worker exposure for PROC 8B**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 9b Transfer of chemicals (charging/discharging) from/to vessels/large containers at dedicated facilities (5% formaldehyde) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS9b (PROC 8b).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.340 mg/m$^3$ | 0.750 mg/m$^3$ | 0.453333 |

**2.3.33 Contributing Scenario (33) controlling industrial worker exposure for PROC 9**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 10a Transfer of substance or preparations into small containers (dedicated filling line including weighing) (30-60% formaldehyde) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.082286 mg/kg bw/day | 240 mg/kg bw/day | 0.000343 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Vapour pressure: 1520 Pa (Formaldehyde | 0.060 mg/m$^3$ | 0.375 mg/m$^3$ | 0.160 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| solution 49%, 55 degrees)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 10-100 L/min<br>Open process with submerged loading<br>Primary localised control: Low level of containment (90% reduction)<br>Secondary localised control: LEV - fixed capturing hood (90% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 240 min<br>Use of respiratory protection with effectiveness 90%) | | | |

**2.3.34 Contributing Scenario (34) controlling industrial worker exposure for PROC 9**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 10a Transfer of substance or preparations into small containers (dedicated filling line including weighing) (30-60% formaldehyde) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS10a (PROC 9).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.110 mg/m$^3$ | 0.750 mg/m$^3$ | 0.146667 |

**2.3.35 Contributing Scenario (35) controlling industrial worker exposure for PROC 9**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 10b Transfer of substance or preparations into small containers (dedicated filling line including weighing) (5% formaldehyde) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.342857 mg/kg bw/day | 240 mg/kg bw/day | 0.001429 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 8.1% (8.1% of 62% = 5%)<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate 10-100 L/min<br>Open process with submerged loading | 0.085 mg/m$^3$ | 0.375 mg/m$^3$ | 0.226667 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Primary localised control: Low level of containment (90% reduction)<br>Secondary localised control: LEV - fixed capturing hood (90% reduction)<br>Work area: Indoors<br>Room size: 300 m³<br>Ventilation rate: 3 air changes per hour (ACH)<br>Duration (mins): 480 min) | | | |

**2.3.36 Contributing Scenario (36) controlling industrial worker exposure for PROC 9**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 10b Transfer of substance or preparations into small containers (dedicated filling line including weighing) (5% formaldehyde) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS10b (PROC 9).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.170 mg/m$^3$ | 0.750 mg/m$^3$ | 0.226667 |

**2.3.37 Contributing Scenario (37) controlling industrial worker exposure for PROC 10**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 11 Roller application or brushing - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.548571 mg/kg bw/day | 240 mg/kg bw/day | 0.002286 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**2.3.38 Contributing Scenario (38) controlling industrial worker exposure for PROC 10**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 11 Roller application or brushing - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**2.3.39 Contributing Scenario (39) controlling industrial worker exposure for PROC 13**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 12 Treatment of articles by dipping and pouring - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.164571 mg/kg bw/day | 240 mg/kg bw/day | 0.000686 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**2.3.40 Contributing Scenario (40) controlling industrial worker exposure for PROC 13**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 12 Treatment of articles by dipping and pouring - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**2.3.41 Contributing Scenario (41) controlling industrial worker exposure for PROC 14**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.041143 mg/kg bw/day | 240 mg/kg bw/day | 0.000171 |
| inhalation, longterm local | 0.312774 mg/m$^3$ | 0.375 mg/m$^3$ | 0.834064 |

**2.3.42 Contributing Scenario (42) controlling industrial worker exposure for PROC 14**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.312774 mg/m$^3$ | 0.750 mg/m$^3$ | 0.417032 |

**2.3.43 Contributing Scenario (43) controlling industrial worker exposure for PROC 15**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 14 Use as a laboratory reagent - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.006857 mg/kg bw/day | 240 mg/kg bw/day | 0.000029 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure. | 0.300 mg/m$^3$ | 0.375 mg/m$^3$ | 0.800 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Near field exposure<br>Substance product type: Liquid<br>Liquid weight fraction: 100%<br>Vapour pressure: 1400 Pa (Formaldehyde solution 30-60%, room temperature)<br>Activity class: Transfer of liquid products<br>Activities with falling liquids use rate <0.1 L/min<br>Open process with splash loading<br>Primary localised control: LEV-Enclosed hood-Fume cupboard<br>Work area: Indoors<br>Room size: 100 m³<br>Ventilation rate: 10 air changes per hour (ACH)<br>Duration (mins): 480 min) | | | |

**2.3.44 Contributing Scenario (44) controlling industrial worker exposure for PROC 15**
*Manufacturing of formaldehyde and aq. formaldehyde solutions, formulation, use as intermediate or monomer, use of preparations or mixtures containing formaldehyde up to 60% CS 14 Use as a laboratory reagent - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES1, CS14 (PROC 15).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.600 mg/m$^3$ | 0.750 mg/m$^3$ | 0.800 |

**2.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**3.1 Scenario 2: Industrial use of preparations containing formaldehyde up to 5%**

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

Description of ES 2

| | |
|---|---|
| **Free short title** | Industrial use of preparations containing formaldehyde up to 5% |
| **Systematic title based on use descriptor** | ERC 2, 3, 5, 6C, 6D; PROC 1, 2, 3, 4, 5, 6, 7, 8A, 8B, 9, 10, 13, 14, 15, 16, 21, 22C, 23C, 24C, 25C |
| **Name of constributing environmental scenario and corresponding ERC** | ERC 2 Formulation of preparations<br>ERC 3 Formulation in articles<br>ERC 5 Industrial use resulting in inclusion into or onto a matrix<br>ERC 6c Production of plastics<br>ERC 6d Production of resins/rubbers |

| | |
|---|---|
| **Name(s) of contributing worker scenarios and corresponding PROCs** | PROC 1 - Use in closed process, no likelihood of exposure<br>PROC 2 - Use in closed, continuous process with occasional controlled exposure<br>PROC 3 - Use in closed batch process (synthesis or formulation)<br>PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises<br>PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)<br>PROC 6 - Calendering operations<br>PROC 7 - Industrial spraying<br>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities<br>PROC 9 - Transfer of chemicals into small containers (dedicated filling line)<br>PROC 10 - Roller application or brushing<br>PROC 13 - Treatment of articles by dipping and pouring<br>PROC 14 - Production of preparations or articles by tabletting, compression, extrusion, pelletisation<br>PROC 15 - Use of laboratory reagents in small scale laboratories<br>PROC 16 - Using material as fuel sources, limited exposure to unburned product to be expected<br>PROC 21 - Low energy manipulation of substances in materials and/or articles<br>PROC 22c - Potentially closed operations with minerals at elevated temperature - pt > mp - High Fugacity<br>PROC 23c - Open processing and transfer of minerals at elevated temperature - pt > mp - High Fugacity<br>PROC 24c - High (mechanical) energy work-up of substances bound in materials and/or articles - pt > mp - High Fugacity<br>PROC 25c - Hot work operations with metals - pt > mp - High Fugacity |

**3.2 Conditions of use affecting exposure**

**3.2.1 Contributing Scenario (1) controlling environmental exposure for ERC 2**
**3.2.2 Contributing Scenario (2) controlling environmental exposure for ERC 3**
**3.2.3 Contributing Scenario (3) controlling environmental exposure for ERC 5**
**3.2.4 Contributing Scenario (4) controlling environmental exposure for ERC 6C**
**3.2.5 Contributing Scenario (5) controlling environmental exposure for ERC 6D**

| |
|---|
| As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed. |

**3.2.6 Contributing Scenario (6) controlling industrial worker exposure for PROC 1**

| | |
|---|---|
| **Name of contributing scenario** | PROC 1 Use in closed process, no likelihood of exposure |
| Scenario subtitle | CS 1 Use in closed process, no likelihood of exposure - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |

| | |
|---|---|
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.7 Contributing Scenario (7) controlling industrial worker exposure for PROC 1**

| | |
|---|---|
| **Name of contributing scenario** | PROC 1 Use in closed process, no likelihood of exposure |
| Scenario subtitle | CS 1 Use in closed process, no likelihood of exposure - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.8 Contributing Scenario (8) controlling industrial worker exposure for PROC 2**

| | |
|---|---|
| **Name of contributing scenario** | PROC 2 Use in closed, continuous process with occasional controlled exposure |
| Scenario subtitle | CS 2 Use in closed, continuous process with occasional controlled exposure - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |

| | |
|---|---|
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.9 Contributing Scenario (9) controlling industrial worker exposure for PROC 2**

| | |
|---|---|
| **Name of contributing scenario** | PROC 2 Use in closed, continuous process with occasional controlled exposure |
| Scenario subtitle | CS 2 Use in closed, continuous process with occasional controlled exposure - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |

| | |
|---|---|
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.10 Contributing Scenario (10) controlling industrial worker exposure for PROC 3**

| | |
|---|---|
| **Name of contributing scenario** | PROC 3 Use in closed batch process (synthesis or formulation) |
| Scenario subtitle | CS 3 Use in closed batch process (synthesis or formulation) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**3.2.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 3**

| | |
|---|---|
| **Name of contributing scenario** | PROC 3 Use in closed batch process (synthesis or formulation) |
| Scenario subtitle | CS 3 Use in closed batch process (synthesis or formulation) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |

| | |
|---|---|
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**3.2.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 4**

| | |
|---|---|
| **Name of contributing scenario** | PROC 4 Use in batch and other process (synthesis) where opportunity for exposure arises |
| Scenario subtitle | CS 4 Use in batch and other process (synthesis) where opportunity for exposure arises - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |

| | |
|---|---|
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**3.2.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 4**

| | |
|---|---|
| **Name of contributing scenario** | PROC 4 Use in batch and other process (synthesis) where opportunity for exposure arises |
| Scenario subtitle | CS 4 Use in batch and other process (synthesis) where opportunity for exposure arises - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 100 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**3.2.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 5 Mixing or blending in batch processes (multistage and/or significant contact) - long term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 5 Mixing or blending in batch processes (multistage and/or significant contact) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |

| | |
|---|---|
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.16 Contributing Scenario (16) controlling industrial worker exposure for PROC 6**

| | |
|---|---|
| **Name of contributing scenario** | PROC 6 Calendering operations |
| Scenario subtitle | CS 6 Calendering operations - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.17 Contributing Scenario (17) controlling industrial worker exposure for PROC 6**

| | |
|---|---|
| **Name of contributing scenario** | PROC 6 Calendering operations |
| Scenario subtitle | CS 6 Calendering operations - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.18 Contributing Scenario (18) controlling industrial worker exposure for PROC 7**

| | |
|---|---|
| **Name of contributing scenario** | PROC 7 Industrial spraying |
| Scenario subtitle | CS 7a Industrial spraying - long term local option 1 |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure that the worker is in a seperated (control) room with independent air supply<br>Provide extract ventilation to points where emissions occur (LEV).<br>Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Wear suitable face shield |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |
| Complete segregation with ventilation and filtrations of recirculated air | inhalation: 90 % *(justification: Complete segregation with ventilation and filtrations of recirculated air with an effectiveness of 90%)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Far field<br>Process temperature: Room temperature<br>Vapour pressure: 31.14 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, high application rate >3L/min<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: Complete segregation with ventilation and filtrations of recirculated air (90% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: Yes<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 300 $m^3$<br>Work area: Indoors<br>Duration (mins): 240<br>Ventilation rate: 3 air changes per hour (ACH)<br>Use of respiratory protection effectiveness 95% |

**3.2.19 Contributing Scenario (19) controlling industrial worker exposure for PROC 7**

| | |
|---|---|
| **Name of contributing scenario** | PROC 7 Industrial spraying |
| Scenario subtitle | CS 7a Industrial spraying - short term local option 1 |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Provide a good standard of general ventilation (not less than 3 - 5 air changes per hour)<br>Ensure that the worker is in a seperated (control) room with independent air supply<br>Provide extract ventilation to points where emissions occur (LEV).<br>Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Wear suitable face shield |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |
| Complete segregation with ventilation and filtrations of recirculated air | inhalation: 90 % *(justification: Complete segregation with ventilation and filtrations of recirculated air with an effectiveness of 90%)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES2, CS7a (PROC 7).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**3.2.20 Contributing Scenario (20) controlling industrial worker exposure for PROC 7**

| | |
|---|---|
| **Name of contributing scenario** | PROC 7 Industrial spraying |
| Scenario subtitle | CS 7b Industrial spraying - long term local option 2 |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Provide a good standard of controlled ventilation (10 to 15 air changes per hour)<br>Ensure that the worker is in a seperated (control) room with independent air supply<br>Provide extract ventilation to points where emissions occur (LEV).<br>Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Wear suitable face shield |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 15 mins to 1 hour |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Complete segregation with ventilation and filtrations of recirculated air | inhalation: 90 % *(justification: Complete segregation with ventilation and filtrations of recirculated air with an effectiveness of 90%)* |

| | |
|---|---|
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Far field<br>Process temperature: Room temperature<br>Vapour pressure: 31.14 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, high application rate >3L/min<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: Complete segregation with ventilation and filtrations of recirculated air (90% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: Yes<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 300 m³<br>Work area: Indoors<br>Duration (mins): 60<br>Ventilation rate: 10 air changes per hour (ACH) |

**3.2.21 Contributing Scenario (21) controlling industrial worker exposure for PROC 7**

| **Name of contributing scenario** | PROC 7 Industrial spraying |
|---|---|
| Scenario subtitle | CS 7b Industrial spraying - short term local option 2 |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of controlled ventilation (10 to 15 air changes per hour)<br>Ensure that the worker is in a seperated (control) room with independent air supply<br>Provide extract ventilation to points where emissions occur (LEV).<br>Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Wear suitable face shield |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Complete segregation with ventilation and filtrations of recirculated air | inhalation: 90 % *(justification: Complete segregation with ventilation and filtrations of recirculated air with an effectiveness of 90%)* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES2, CS7b (PROC 7).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**3.2.22 Contributing Scenario (22) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 8 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**3.2.23 Contributing Scenario (23) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 8 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - short term local |

| | |
|---|---|
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**3.2.24 Contributing Scenario (24) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 9 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |

| | |
|---|---|
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.25 Contributing Scenario (25) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 9 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.26 Contributing Scenario (26) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 10 Transfer of chemicals into small containers (dedicated filling line) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.27 Contributing Scenario (27) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 10 Transfer of chemicals into small containers (dedicated filling line) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | In case of potential exposure:<br>Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |

| | |
|---|---|
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.28 Contributing Scenario (28) controlling industrial worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 11 Roller application or brushing - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |

| | |
|---|---|
| Respiratory protection | 90 % |

**3.2.29 Contributing Scenario (29) controlling industrial worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 11 Roller application or brushing - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**3.2.30 Contributing Scenario (30) controlling industrial worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 12 Treatment of articles by dipping and pouring - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**3.2.31 Contributing Scenario (31) controlling industrial worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 12 Treatment of articles by dipping and pouring - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**3.2.32 Contributing Scenario (32) controlling industrial worker exposure for PROC 14**

| | |
|---|---|
| **Name of contributing scenario** | PROC 14 Production of preparations or articles by tabletting, compression, extrusion, pelletisation |
| Scenario subtitle | CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.33 Contributing Scenario (33) controlling industrial worker exposure for PROC 14**

| | |
|---|---|
| **Name of contributing scenario** | PROC 14 Production of preparations or articles by tabletting, compression, extrusion, pelletisation |
| Scenario subtitle | CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |

| | |
|---|---|
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.34 Contributing Scenario (34) controlling industrial worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 14 Use of laboratory reagents in small scale laboratories - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |

| | |
|---|---|
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**3.2.35 Contributing Scenario (35) controlling industrial worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 14 Use of laboratory reagents in small scale laboratories - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**3.2.36 Contributing Scenario (36) controlling industrial worker exposure for PROC 16**

| | |
|---|---|
| **Name of contributing scenario** | PROC 16 Using material as fuel sources, limited exposure to unburned product to be expected |
| Scenario subtitle | CS 15 Using material as fuel sources, limited exposure to unburned product to be expected - long term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 2.5%. It is however set at 100% since the concentration limit of 2.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.37 Contributing Scenario (37) controlling industrial worker exposure for PROC 16**

| | |
|---|---|
| **Name of contributing scenario** | PROC 16 Using material as fuel sources, limited exposure to unburned product to be expected |
| Scenario subtitle | CS 15 Using material as fuel sources, limited exposure to unburned product to be expected - short term local |
| **Qualitative Risk Assessment** | |
| General | Ensure good work practices are implemented<br>Reduce concentration to less than 5% |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 2.5%. It is however set at 100% since the concentration limit of 2.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |

| | |
|---|---|
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.38 Contributing Scenario (38) controlling industrial worker exposure for PROC 21**

| | |
|---|---|
| **Name of contributing scenario** | PROC 21 Low energy manipulation of substances in materials and/or articles |
| Scenario subtitle | CS 16 Low energy manipulation of substances bound in materials and/or articles - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.39 Contributing Scenario (39) controlling industrial worker exposure for PROC 21**

| | |
|---|---|
| **Name of contributing scenario** | PROC 21 Low energy manipulation of substances in materials and/or articles |
| Scenario subtitle | CS 16 Low energy manipulation of substances bound in materials and/or articles - short term local |
| **Qualitative Risk Assessment** | |

| | |
|---|---|
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.40 Contributing Scenario (40) controlling industrial worker exposure for PROC 22C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 22c Potentially closed operations with minerals at elevated temperature - pt > mp - High Fugacity |
| Scenario subtitle | CS 17 Potentially closed processing operations with minerals/metals at elevated temperature - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |

| | |
|---|---|
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.41 Contributing Scenario (41) controlling industrial worker exposure for PROC 22C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 22c Potentially closed operations with minerals at elevated temperature - pt > mp - High Fugacity |
| Scenario subtitle | CS 17 Potentially closed processing operations with minerals/metals at elevated temperature - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.42 Contributing Scenario (42) controlling industrial worker exposure for PROC 23C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 23c Open processing and transfer of minerals at elevated temperature - pt > mp - High Fugacity |
| Scenario subtitle | CS 18 Open processing and transfer operations with minerals/metals at elevated temperature - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Wear a suitable respiratory protection with adequate effectiveness (90%).<br>In case of potential exposure:<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.43 Contributing Scenario (43) controlling industrial worker exposure for PROC 23C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 23c Open processing and transfer of minerals at elevated temperature - pt > mp - High Fugacity |
| Scenario subtitle | CS 18 Open processing and transfer operations with minerals/metals at elevated temperature - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.2.44 Contributing Scenario (44) controlling industrial worker exposure for PROC 24C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 24c High (mechanical) energy work-up of substances bound in materials and/or articles - pt > mp - High Fugacity |
| Scenario subtitle | CS 19 High (mechanical) energy work-up of substances bound in materials and/or articles - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | solid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**3.2.45 Contributing Scenario (45) controlling industrial worker exposure for PROC 24C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 24c High (mechanical) energy work-up of substances bound in materials and/or articles - pt > mp - High Fugacity |
| Scenario subtitle | CS 19 High (mechanical) energy work-up of substances bound in materials and/or articles - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**3.2.46 Contributing Scenario (46) controlling industrial worker exposure for PROC 25C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 25c Other hot work operations with metals - pt > mp - High Fugacity |
| Scenario subtitle | CS 20 Other hot work operations with metals - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**3.2.47 Contributing Scenario (47) controlling industrial worker exposure for PROC 25C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 25c Other hot work operations with metals - pt > mp - High Fugacity |
| Scenario subtitle | CS 20 Other hot work operations with metals - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |

| | |
|---|---|
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**3.3 Exposure estimation**

**3.3.1 Contributing Scenario (1) controlling environmental exposure for ERC2**
*Industrial use of preparations containing formaldehyde up to 5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**3.3.2 Contributing Scenario (2) controlling environmental exposure for ERC3**
*Industrial use of preparations containing formaldehyde up to 5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**3.3.3 Contributing Scenario (3) controlling environmental exposure for ERC5**
*Industrial use of preparations containing formaldehyde up to 5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**3.3.4 Contributing Scenario (4) controlling environmental exposure for ERC6C**
*Industrial use of preparations containing formaldehyde up to 5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**3.3.5 Contributing Scenario (5) controlling environmental exposure for ERC6D**
*Industrial use of preparations containing formaldehyde up to 5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**3.3.6 Contributing Scenario (6) controlling industrial worker exposure for PROC 1**
*Industrial use of preparations containing formaldehyde up to 5% CS 1 Use in closed process, no likelihood of exposure - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.001714 mg/kg bw/day | 240 mg/kg bw/day | 7.14E-6 |
| inhalation, longterm local | 0.012511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.033363 |

**3.3.7 Contributing Scenario (7) controlling industrial worker exposure for PROC 1**
*Industrial use of preparations containing formaldehyde up to 5% CS 1 Use in closed process, no likelihood of exposure - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.012511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.016681 |

**3.3.8 Contributing Scenario (8) controlling industrial worker exposure for PROC 2**
*Industrial use of preparations containing formaldehyde up to 5% CS 2 Use in closed, continuous process with occasional controlled exposure - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.068571 mg/kg bw/day | 240 mg/kg bw/day | 0.000286 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**3.3.9 Contributing Scenario (9) controlling industrial worker exposure for PROC 2**
*Industrial use of preparations containing formaldehyde up to 5% CS 2 Use in closed, continuous process with occasional controlled exposure - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**3.3.10 Contributing Scenario (10) controlling industrial worker exposure for PROC 3**
*Industrial use of preparations containing formaldehyde up to 5% CS 3 Use in closed batch process (synthesis or formulation) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.020571 mg/kg bw/day | 240 mg/kg bw/day | 0.000086 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**3.3.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 3**

*Industrial use of preparations containing formaldehyde up to 5% CS 3 Use in closed batch process (synthesis or formulation) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**3.3.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 4**
*Industrial use of preparations containing formaldehyde up to 5% CS 4 Use in batch and other process (synthesis) where opportunity for exposure arises - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.205714 mg/kg bw/day | 240 mg/kg bw/day | 0.000857 |
| inhalation, longterm local | 0.250219 mg/m$^3$ | 0.375 mg/m$^3$ | 0.667251 |

**3.3.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 4**
*Industrial use of preparations containing formaldehyde up to 5% CS 4 Use in batch and other process (synthesis) where opportunity for exposure arises - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.250219 mg/m$^3$ | 0.750 mg/m$^3$ | 0.333626 |

**3.3.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 5**
*Industrial use of preparations containing formaldehyde up to 5% CS 5 Mixing or blending in batch processes (multistage and/or significant contact) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**3.3.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 5**
*Industrial use of preparations containing formaldehyde up to 5% CS 5 Mixing or blending in batch processes (multistage and/or significant contact) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**3.3.16 Contributing Scenario (16) controlling industrial worker exposure for PROC 6**
*Industrial use of preparations containing formaldehyde up to 5% CS 6 Calendering operations - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 1.371 mg/kg bw/day | 240 mg/kg bw/day | 0.005714 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**3.3.17 Contributing Scenario (17) controlling industrial worker exposure for PROC 6**
*Industrial use of preparations containing formaldehyde up to 5% CS 6 Calendering operations - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**3.3.18 Contributing Scenario (18) controlling industrial worker exposure for PROC 7**
*Industrial use of preparations containing formaldehyde up to 5% CS 7a Industrial spraying - long term local option 1*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 2.143 mg/kg bw/day | 240 mg/kg bw/day | 0.008929 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Far field<br>Process temperature: Room temperature<br>Vapour pressure: 31.14 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, high application rate >3L/min<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: Complete segregation with ventilation and filtrations of recirculated air (90% reduction)<br>Personal enclosure: No (0% reduction) | 0.200 mg/m$^3$ | 0.375 mg/m$^3$ | 0.533333 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Effective housekeeping practices in place: Yes<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 300 m³<br>Work area: Indoors<br>Duration (mins): 240<br>Ventilation rate: 3 air changes per hour (ACH)<br>Use of respiratory protection effectiveness 95%) | | | |

**3.3.19 Contributing Scenario (19) controlling industrial worker exposure for PROC 7**
*Industrial use of preparations containing formaldehyde up to 5% CS 7a Industrial spraying - short term local option 1*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES2, CS7a (PROC 7).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.400 mg/m$^3$ | 0.750 mg/m$^3$ | 0.533333 |

**3.3.20 Contributing Scenario (20) controlling industrial worker exposure for PROC 7**
*Industrial use of preparations containing formaldehyde up to 5% CS 7b Industrial spraying - long term local option 2*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 2.143 mg/kg bw/day | 240 mg/kg bw/day | 0.008929 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Far field<br>Process temperature: Room temperature<br>Vapour pressure: 31.14 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, high application rate >3L/min<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: Complete segregation with ventilation and filtrations of recirculated air (90% reduction)<br>Personal enclosure: No (0% reduction) | 0.330 mg/m$^3$ | 0.375 mg/m$^3$ | 0.880 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Effective housekeeping practices in place: Yes<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 300 m³<br>Work area: Indoors<br>Duration (mins): 60<br>Ventilation rate: 10 air changes per hour (ACH) ) | | | |

**3.3.21 Contributing Scenario (21) controlling industrial worker exposure for PROC 7**
*Industrial use of preparations containing formaldehyde up to 5% CS 7b Industrial spraying - short term local option 2*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES2, CS7b (PROC 7).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.660 mg/m$^3$ | 0.750 mg/m$^3$ | 0.880 |

**3.3.22 Contributing Scenario (22) controlling industrial worker exposure for PROC 8A**
*Industrial use of preparations containing formaldehyde up to 5% CS 8 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**3.3.23 Contributing Scenario (23) controlling industrial worker exposure for PROC 8A**
*Industrial use of preparations containing formaldehyde up to 5% CS 8 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**3.3.24 Contributing Scenario (24) controlling industrial worker exposure for PROC 8B**
*Industrial use of preparations containing formaldehyde up to 5% CS 9 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.218942 mg/m$^3$ | 0.375 mg/m$^3$ | 0.583845 |

**3.3.25 Contributing Scenario (25) controlling industrial worker exposure for PROC 8B**
*Industrial use of preparations containing formaldehyde up to 5% CS 9 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.218942 mg/m$^3$ | 0.750 mg/m$^3$ | 0.291922 |

**3.3.26 Contributing Scenario (26) controlling industrial worker exposure for PROC 9**
*Industrial use of preparations containing formaldehyde up to 5% CS 10 Transfer of chemicals into small containers (dedicated filling line) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.342857 mg/kg bw/day | 240 mg/kg bw/day | 0.001429 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**3.3.27 Contributing Scenario (27) controlling industrial worker exposure for PROC 9**
*Industrial use of preparations containing formaldehyde up to 5% CS 10 Transfer of chemicals into small containers (dedicated filling line) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**3.3.28 Contributing Scenario (28) controlling industrial worker exposure for PROC 10**
*Industrial use of preparations containing formaldehyde up to 5% CS 11 Roller application or brushing - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 1.371 mg/kg bw/day | 240 mg/kg bw/day | 0.005714 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**3.3.29 Contributing Scenario (29) controlling industrial worker exposure for PROC 10**
*Industrial use of preparations containing formaldehyde up to 5% CS 11 Roller application or brushing - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**3.3.30 Contributing Scenario (30) controlling industrial worker exposure for PROC 13**
*Industrial use of preparations containing formaldehyde up to 5% CS 12 Treatment of articles by dipping and pouring - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**3.3.31 Contributing Scenario (31) controlling industrial worker exposure for PROC 13**
*Industrial use of preparations containing formaldehyde up to 5% CS 12 Treatment of articles by dipping and pouring - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**3.3.32 Contributing Scenario (32) controlling industrial worker exposure for PROC 14**
*Industrial use of preparations containing formaldehyde up to 5% CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.171429 mg/kg bw/day | 240 mg/kg bw/day | 0.000714 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**3.3.33 Contributing Scenario (33) controlling industrial worker exposure for PROC 14**
*Industrial use of preparations containing formaldehyde up to 5% CS 13 Production of preparations or articles by tabletting, compression, extrusion, pelletisation - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**3.3.34 Contributing Scenario (34) controlling industrial worker exposure for PROC 15**
*Industrial use of preparations containing formaldehyde up to 5% CS 14 Use of laboratory reagents in small scale laboratories - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.017143 mg/kg bw/day | 240 mg/kg bw/day | 0.000071 |
| inhalation, longterm local | 0.062555 mg/m$^3$ | 0.375 mg/m$^3$ | 0.166813 |

**3.3.35 Contributing Scenario (35) controlling industrial worker exposure for PROC 15**
*Industrial use of preparations containing formaldehyde up to 5% CS 14 Use of laboratory reagents in small scale laboratories - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.062555 mg/m$^3$ | 0.750 mg/m$^3$ | 0.083406 |

**3.3.36 Contributing Scenario (36) controlling industrial worker exposure for PROC 16**
*Industrial use of preparations containing formaldehyde up to 5% CS 15 Using material as fuel sources, limited exposure to unburned product to be expected - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.017143 mg/kg bw/day | 240 mg/kg bw/day | 0.000071 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**3.3.37 Contributing Scenario (37) controlling industrial worker exposure for PROC 16**
*Industrial use of preparations containing formaldehyde up to 5% CS 15 Using material as fuel sources, limited exposure to unburned product to be expected - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**3.3.38 Contributing Scenario (38) controlling industrial worker exposure for PROC 21**
*Industrial use of preparations containing formaldehyde up to 5% CS 16 Low energy manipulation of substances bound in materials and/or articles - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.141429 mg/kg bw/day | 240 mg/kg bw/day | 0.000589 |
| inhalation, longterm local | 0.300 mg/m$^3$ | 0.375 mg/m$^3$ | 0.800 |

**3.3.39 Contributing Scenario (39) controlling industrial worker exposure for PROC 21**
*Industrial use of preparations containing formaldehyde up to 5% CS 16 Low energy manipulation of substances bound in materials and/or articles - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.300 mg/m$^3$ | 0.750 mg/m$^3$ | 0.400 |

**3.3.40 Contributing Scenario (40) controlling industrial worker exposure for PROC 22C**
*Industrial use of preparations containing formaldehyde up to 5% CS 17 Potentially closed processing operations with minerals/metals at elevated temperature - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.141429 mg/kg bw/day | 240 mg/kg bw/day | 0.000589 |
| inhalation, longterm local | 0.300 mg/m$^3$ | 0.375 mg/m$^3$ | 0.800 |

**3.3.41 Contributing Scenario (41) controlling industrial worker exposure for PROC 22C**
*Industrial use of preparations containing formaldehyde up to 5% CS 17 Potentially closed processing operations with minerals/metals at elevated temperature - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.300 mg/m$^3$ | 0.750 mg/m$^3$ | 0.400 |

**3.3.42 Contributing Scenario (42) controlling industrial worker exposure for PROC 23C**
*Industrial use of preparations containing formaldehyde up to 5% CS 18 Open processing and transfer operations with minerals/metals at elevated temperature - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.070714 mg/kg bw/day | 240 mg/kg bw/day | 0.000295 |
| inhalation, longterm local | 0.300 mg/m$^3$ | 0.375 mg/m$^3$ | 0.800 |

**3.3.43 Contributing Scenario (43) controlling industrial worker exposure for PROC 23C**
*Industrial use of preparations containing formaldehyde up to 5% CS 18 Open processing and transfer operations with minerals/metals at elevated temperature - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.300 mg/m$^3$ | 0.750 mg/m$^3$ | 0.400 |

**3.3.44 Contributing Scenario (44) controlling industrial worker exposure for PROC 24C**
*Industrial use of preparations containing formaldehyde up to 5% CS 19 High (mechanical) energy work-up of substances bound in materials and/or articles - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.141429 mg/kg bw/day | 240 mg/kg bw/day | 0.000589 |
| inhalation, longterm local | 0.200 mg/m$^3$ | 0.375 mg/m$^3$ | 0.533333 |

**3.3.45 Contributing Scenario (45) controlling industrial worker exposure for PROC 24C**
*Industrial use of preparations containing formaldehyde up to 5% CS 19 High (mechanical) energy work-up of substances bound in materials and/or articles - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.200 mg/m$^3$ | 0.750 mg/m$^3$ | 0.266667 |

**3.3.46 Contributing Scenario (46) controlling industrial worker exposure for PROC 25C**
*Industrial use of preparations containing formaldehyde up to 5% CS 20 Other hot work operations with metals - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.014143 mg/kg bw/day | 240 mg/kg bw/day | 0.000059 |
| inhalation, longterm local | 0.150 mg/m$^3$ | 0.375 mg/m$^3$ | 0.400 |

**3.3.47 Contributing Scenario (47) controlling industrial worker exposure for PROC 25C**
*Industrial use of preparations containing formaldehyde up to 5% CS 20 Other hot work operations with metals - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.150 mg/m$^3$ | 0.750 mg/m$^3$ | 0.200 |

**3.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.1 Scenario 3: Industrial use of preparations containing formaldehyde up to 25%**

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

Description of ES 3

| | |
|---|---|
| **Free short title** | Industrial use of preparations containing formaldehyde up to 25% |
| **Systematic title based on use descriptor** | ERC 2, 3, 4, 5, 6C, 6D; PROC 5, 8A, 8B, 9, 13, 15 |
| **Name of constributing environmental scenario and corresponding ERC** | ERC 2 Formulation of preparations<br>ERC 3 Formulation in articles<br>ERC 4 Industrial use of processing aids<br>ERC 5 Industrial use resulting in inclusion into or onto a matrix<br>ERC 6c Production of plastics<br>ERC 6d Production of resins/rubbers |
| **Name(s) of contributing worker scenarios and corresponding PROCs** | PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)<br>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities<br>PROC 8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities<br>PROC 9 - Transfer of chemicals into small containers (dedicated filling line)<br>PROC 13 - Treatment of articles by dipping and pouring<br>PROC 15 - Use of laboratory reagents in small scale laboratories |

**4.2 Conditions of use affecting exposure**

**4.2.1 Contributing Scenario (1) controlling environmental exposure for ERC 2**
**4.2.2 Contributing Scenario (2) controlling environmental exposure for ERC 3**
**4.2.3 Contributing Scenario (3) controlling environmental exposure for ERC 4**
**4.2.4 Contributing Scenario (4) controlling environmental exposure for ERC 5**
**4.2.5 Contributing Scenario (5) controlling environmental exposure for ERC 6C**
**4.2.6 Contributing Scenario (6) controlling environmental exposure for ERC 6D**

| |
|---|
| As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed. |

**4.2.7 Contributing Scenario (7) controlling industrial worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 1 Mixing or blending in batch process (multistage and/or significant contact) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

**4.2.8 Contributing Scenario (8) controlling industrial worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 1 Mixing or blending in batch process (multistage and/or significant contact) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**4.2.9 Contributing Scenario (9) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 2 Transfer of chemicals from/to vessels/large containers at non-dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

**4.2.10 Contributing Scenario (10) controlling industrial worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 2 Transfer of chemicals from/to vessels/large containers at non-dedicated facilities - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**4.2.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 3 Transfer of chemicals from/to vessels/large containers at dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |

| | |
|---|---|
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

**4.2.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 3 Transfer of chemicals from/to vessels/large containers at dedicated facilities - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>In case of potential exposure:<br>Wear a suitable respiratory protection with adequate effectiveness (90%).<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |

| | |
|---|---|
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 95 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**4.2.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 4 Transfer of chemicals into small containers (dedicated filling line) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | no |

**4.2.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 9**

| | |
|---|---|
| **Name of contributing scenario** | PROC 9 Transfer of chemicals into small containers (dedicated filling line) |
| Scenario subtitle | CS 4 Transfer of chemicals into small containers (dedicated filling line) - short term local |

| | |
|---|---|
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**4.2.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 5 Treatment of articles by dipping and pouring - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |

| | |
|---|---|
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | 90 % |

**4.2.16 Contributing Scenario (16) controlling industrial worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 5 Treatment of articles by dipping and pouring - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | enhanced (70%) |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**4.2.17 Contributing Scenario (17) controlling industrial worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 6 Use as a laboratory reagent - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 98 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with intensive management supervision control.)* |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**4.2.18 Contributing Scenario (18) controlling industrial worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 6 Use as a laboratory reagent - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 25%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with intensive management supervision control.<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 25%. It is however set at 100% since the concentration limit of 25% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | medium |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | industrial |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**4.3 Exposure estimation**

**4.3.1 Contributing Scenario (1) controlling environmental exposure for ERC2**
*Industrial use of preparations containing formaldehyde up to 25%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**4.3.2 Contributing Scenario (2) controlling environmental exposure for ERC3**
*Industrial use of preparations containing formaldehyde up to 25%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**4.3.3 Contributing Scenario (3) controlling environmental exposure for ERC4**
*Industrial use of preparations containing formaldehyde up to 25%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**4.3.4 Contributing Scenario (4) controlling environmental exposure for ERC5**
*Industrial use of preparations containing formaldehyde up to 25%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**4.3.5 Contributing Scenario (5) controlling environmental exposure for ERC6C**
*Industrial use of preparations containing formaldehyde up to 25%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**4.3.6 Contributing Scenario (6) controlling environmental exposure for ERC6D**
*Industrial use of preparations containing formaldehyde up to 25%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**4.3.7 Contributing Scenario (7) controlling industrial worker exposure for PROC 5**
*Industrial use of preparations containing formaldehyde up to 25% CS 1 Mixing or blending in batch process (multistage and/or significant contact) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.164571 mg/kg bw/day | 240 mg/kg bw/day | 0.000686 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**4.3.8 Contributing Scenario (8) controlling industrial worker exposure for PROC 5**
*Industrial use of preparations containing formaldehyde up to 25% CS 1 Mixing or blending in batch process (multistage and/or significant contact) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**4.3.9 Contributing Scenario (9) controlling industrial worker exposure for PROC 8A**
*Industrial use of preparations containing formaldehyde up to 25% CS 2 Transfer of chemicals from/to vessels/large containers at non-dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.274286 mg/kg bw/day | 240 mg/kg bw/day | 0.001143 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**4.3.10 Contributing Scenario (10) controlling industrial worker exposure for PROC 8A**
*Industrial use of preparations containing formaldehyde up to 25% CS 2 Transfer of chemicals from/to vessels/large containers at non-dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**4.3.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 8B**
*Industrial use of preparations containing formaldehyde up to 25% CS 3 Transfer of chemicals from/to vessels/large containers at dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.164571 mg/kg bw/day | 240 mg/kg bw/day | 0.000686 |
| inhalation, longterm local | 0.046916 mg/m$^3$ | 0.375 mg/m$^3$ | 0.12511 |

**4.3.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 8B**
*Industrial use of preparations containing formaldehyde up to 25% CS 3 Transfer of chemicals from/to vessels/large containers at dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.469161 mg/m$^3$ | 0.750 mg/m$^3$ | 0.625548 |

**4.3.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 9**
*Industrial use of preparations containing formaldehyde up to 25% CS 4 Transfer of chemicals into small containers (dedicated filling line) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.137143 mg/kg bw/day | 240 mg/kg bw/day | 0.000571 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**4.3.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 9**
*Industrial use of preparations containing formaldehyde up to 25% CS 4 Transfer of chemicals into small containers (dedicated filling line) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**4.3.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 13**
*Industrial use of preparations containing formaldehyde up to 25% CS 5 Treatment of articles by dipping and pouring - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.164571 mg/kg bw/day | 240 mg/kg bw/day | 0.000686 |
| inhalation, longterm local | 0.187664 mg/m$^3$ | 0.375 mg/m$^3$ | 0.500438 |

**4.3.16 Contributing Scenario (16) controlling industrial worker exposure for PROC 13**
*Industrial use of preparations containing formaldehyde up to 25% CS 5 Treatment of articles by dipping and pouring - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.187664 mg/m$^3$ | 0.750 mg/m$^3$ | 0.250219 |

**4.3.17 Contributing Scenario (17) controlling industrial worker exposure for PROC 15**
*Industrial use of preparations containing formaldehyde up to 25% CS 6 Use as a laboratory reagent - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.006857 mg/kg bw/day | 240 mg/kg bw/day | 0.000029 |
| inhalation, longterm local | 0.12511 mg/m$^3$ | 0.375 mg/m$^3$ | 0.333626 |

**4.3.18 Contributing Scenario (18) controlling industrial worker exposure for PROC 15**
*Industrial use of preparations containing formaldehyde up to 25% CS 6 Use as a laboratory reagent - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.12511 mg/m$^3$ | 0.750 mg/m$^3$ | 0.166813 |

**4.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**5.1 Scenario 4: Professional use of preparations containing formaldehyde up to 1.5%**

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

Description of ES 4

| | |
|---|---|
| **Free short title** | Professional use of preparations containing formaldehyde up to 1.5% |
| **Systematic title based on use descriptor** | ERC 8A, 8B, 8C, 8D, 8F; PROC 5, 8A, 8B, 10, 11, 13, 15, 16, 21, 23C, 24C, 25C |
| **Name of constributing environmental scenario and corresponding ERC** | ERC 8a Wide dispersive indoor use of processing aids in open systems<br>ERC 8b Wide dispersive indoor use of reactive substances in open systems<br>ERC 8c Wide dispersive indoor use resulting in inclusion into or onto a matrix<br>ERC 8d Wide dispersive outdoor use of processing aids in open systems<br>ERC 8f Wide dispersive outdoor use resulting in inclusion into or onto a matrix |
| **Name(s) of contributing worker scenarios and corresponding PROCs** | PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)<br>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities<br>PROC 8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities<br>PROC 10 - Roller application or brushing<br>PROC 11 - Non industrial spraying<br>PROC 13 - Treatment of articles by dipping and pouring<br>PROC 15 - Use of laboratory reagents in small scale laboratories<br>PROC 16 - Using material as fuel sources, limited exposure to unburned product to be expected<br>PROC 21 - Low energy manipulation of substances in materials and/or articles<br>PROC 23c - Open processing and transfer of minerals at elevated temperature - pt > mp - High Fugacity<br>PROC 24c - High (mechanical) energy work-up of substances bound in materials and/or articles - pt > mp - High Fugacity<br>PROC 25c - Hot work operations with metals - pt > mp - High Fugacity |

**5.2 Conditions of use affecting exposure**

**5.2.1 Contributing Scenario (1) controlling environmental exposure for ERC 8A**
**5.2.2 Contributing Scenario (2) controlling environmental exposure for ERC 8B**
**5.2.3 Contributing Scenario (3) controlling environmental exposure for ERC 8C**
**5.2.4 Contributing Scenario (4) controlling environmental exposure for ERC 8D**
**5.2.5 Contributing Scenario (5) controlling environmental exposure for ERC 8F**

| |
|---|
| As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed. |

**5.2.6 Contributing Scenario (6) controlling professional worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 1 Mixing or blending in batch processes (multistage and/or significant contact) - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |

| | |
|---|---|
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**5.2.7 Contributing Scenario (7) controlling professional worker exposure for PROC 5**

| | |
|---|---|
| **Name of contributing scenario** | PROC 5 Mixing or blending in batch processes (multistage and/or significant contact) |
| Scenario subtitle | CS 1 Mixing or blending in batch processes (multistage and/or significant contact) - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |

| | |
|---|---|
| Respiratory protection | 90 % |

**5.2.8 Contributing Scenario (8) controlling professional worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 2 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |

**5.2.9 Contributing Scenario (9) controlling professional worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 2 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

**5.2.10 Contributing Scenario (10) controlling professional worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 3 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |

| | |
|---|---|
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**5.2.11 Contributing Scenario (11) controlling professional worker exposure for PROC 8B**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities |
| Scenario subtitle | CS 3 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 90 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**5.2.12 Contributing Scenario (12) controlling professional worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 4a Roller application or brushing- long term local outdoors |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | outdoors (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 99 % *(justification: Use of respiratory protection effectiveness 99%)* |

**5.2.13 Contributing Scenario (13) controlling professional worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 4a Roller application or brushing - short term local outdoors |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | outdoors (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |

| | |
|---|---|
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 99 % *(justification: Use of respiratory protection effectiveness 99%)* |

**5.2.14 Contributing Scenario (14) controlling professional worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 4b Roller application or brushing- long term local indoors |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |

**5.2.15 Contributing Scenario (15) controlling professional worker exposure for PROC 10**

| | |
|---|---|
| **Name of contributing scenario** | PROC 10 Roller application or brushing |
| Scenario subtitle | CS 4b Roller application or brushing - short term local indoors |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

**5.2.16 Contributing Scenario (16) controlling professional worker exposure for PROC 11**

| | |
|---|---|
| **Name of contributing scenario** | PROC 11 Non industrial spraying |
| Scenario subtitle | CS 5a Professional spraying - long term local outdoors |
| **Qualitative Risk Assessment** | |
| General | Ensure that the task is not carried out overhead.<br>Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | outdoors (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |

| | |
|---|---|
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 98 % *(justification: Use of respiratory protection effectiveness 98%)* |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Near field<br>Process temperature: Room temperature<br>Vapour pressure: 20.1 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, moderate application rate (0.3 – 3 L/min)<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: No (0% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: No (0% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: No<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Work area: Outdoors<br>Source located close to buildings: Yes<br>Duration (mins): 15<br>Use of respiratory protection effectiveness 98% |

**5.2.17 Contributing Scenario (17) controlling professional worker exposure for PROC 11**

| | |
|---|---|
| **Name of contributing scenario** | PROC 11 Non industrial spraying |
| Scenario subtitle | CS 5a Professional spraying - short term local outdoors |
| **Qualitative Risk Assessment** | |
| General | Ensure that the task is not carried out overhead.<br>Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | outdoors (30%) |
| Domain | professional |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 98 % *(justification: Use of respiratory protection with effectiveness 98% necessary for demonstrating safe use during peak exposure events.<br>Types of RPE with APF40 include powered-assisted full face masks, hoods and/or helmets. )* |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES4, CS5a (PROC 11).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**5.2.18 Contributing Scenario (18) controlling professional worker exposure for PROC 11**

| | |
|---|---|
| **Name of contributing scenario** | PROC 11 Non industrial spraying |
| Scenario subtitle | CS 5b Professional spraying - long term local indoors |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of controlled ventilation (10 to 15 air changes per hour)<br>Provide extract ventilation to points where emissions occur (LEV).<br>Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 15 mins to 1 hour |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |

| | |
|---|---|
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Near field<br>Process temperature: Room temperature<br>Vapour pressure: 20.1 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, moderate application rate (0.3 – 3 L/min)<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: No (0% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: No<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 30 m³<br>Work area: Indoors<br>Duration (mins): 30<br>Ventilation rate: Specialised room ventilation with more than 10 ACH<br>Use of respiratory protection effectiveness 95% |

**5.2.19 Contributing Scenario (19) controlling professional worker exposure for PROC 11**

| | |
|---|---|
| **Name of contributing scenario** | PROC 11 Non industrial spraying |
| Scenario subtitle | CS 5b Professional spraying - short term local indoors |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

| | |
|---|---|
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES4, CS5b (PROC 11).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**5.2.20 Contributing Scenario (20) controlling professional worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 6 Treatment of articles by dipping and pouring - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**5.2.21 Contributing Scenario (21) controlling professional worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 6 Treatment of articles by dipping and pouring - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |

| | |
|---|---|
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**5.2.22 Contributing Scenario (22) controlling professional worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 7 Use of laboratory reagents in small scale laboratories - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |

| | |
|---|---|
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**5.2.23 Contributing Scenario (23) controlling professional worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 7 Use of laboratory reagents in small scale laboratories - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**5.2.24 Contributing Scenario (24) controlling professional worker exposure for PROC 16**

| | |
|---|---|
| **Name of contributing scenario** | PROC 16 Using material as fuel sources, limited exposure to unburned product to be expected |
| Scenario subtitle | CS 8 Using material as fuel sources, limited exposure to unburned product to be expected - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |

**5.2.25 Contributing Scenario (25) controlling professional worker exposure for PROC 16**

| | |
|---|---|
| **Name of contributing scenario** | PROC 16 Using material as fuel sources, limited exposure to unburned product to be expected |
| Scenario subtitle | CS 8 Using material as fuel sources, limited exposure to unburned product to be expected - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |

| | |
|---|---|
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |

**5.2.26 Contributing Scenario (26) controlling professional worker exposure for PROC 21**

| | |
|---|---|
| **Name of contributing scenario** | PROC 21 Low energy manipulation of substances in materials and/or articles |
| Scenario subtitle | CS 9 Low energy manipulation of substances bound in materials and/or articles - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**5.2.27 Contributing Scenario (27) controlling professional worker exposure for PROC 21**

| | |
|---|---|
| **Name of contributing scenario** | PROC 21 Low energy manipulation of substances in materials and/or articles |
| Scenario subtitle | CS 9 Low energy manipulation of substances bound in materials and/or articles-short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |

| | |
|---|---|
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**5.2.28 Contributing Scenario (28) controlling professional worker exposure for PROC 23C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 23c Open processing and transfer of minerals at elevated temperature - pt > mp - High Fugacity |
| Scenario subtitle | CS 10 Open processing and transfer operations with minerals/metals at elevated temperature - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |

| | |
|---|---|
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**5.2.29 Contributing Scenario (29) controlling professional worker exposure for PROC 23C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 23c Open processing and transfer of minerals at elevated temperature - pt > mp - High Fugacity |
| Scenario subtitle | CS 10 Open processing and transfer operations with minerals/metals at elevated temperature - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**5.2.30 Contributing Scenario (30) controlling professional worker exposure for PROC 24C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 24c High (mechanical) energy work-up of substances bound in materials and/or articles - pt > mp - High Fugacity |
| Scenario subtitle | CS 11 High (mechanical) energy work-up of substances bound in materials and/or articles - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |

| | |
|---|---|
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 75 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |

**5.2.31 Contributing Scenario (31) controlling professional worker exposure for PROC 24C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 24c High (mechanical) energy work-up of substances bound in materials and/or articles - pt > mp - High Fugacity |
| Scenario subtitle | CS 11 High (mechanical) energy work-up of substances bound in materials and/or articles - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |

| | |
|---|---|
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 75 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

**5.2.32 Contributing Scenario (32) controlling professional worker exposure for PROC 25C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 25c Other hot work operations with metals - pt > mp - High Fugacity |
| Scenario subtitle | CS 12 Other hot work operations with metals - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**5.2.33 Contributing Scenario (33) controlling professional worker exposure for PROC 25C**

| | |
|---|---|
| **Name of contributing scenario** | PROC 25c Other hot work operations with metals - pt > mp - High Fugacity |
| Scenario subtitle | CS 12 Other hot work operations with metals - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 1.5%<br>Ensure good work practices are implemented |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | solid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | high |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,980 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**5.3 Exposure estimation**

**5.3.1 Contributing Scenario (1) controlling environmental exposure for ERC8A**
*Professional use of preparations containing formaldehyde up to 1.5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**5.3.2 Contributing Scenario (2) controlling environmental exposure for ERC8B**
*Professional use of preparations containing formaldehyde up to 1.5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**5.3.3 Contributing Scenario (3) controlling environmental exposure for ERC8C**
*Professional use of preparations containing formaldehyde up to 1.5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**5.3.4 Contributing Scenario (4) controlling environmental exposure for ERC8D**
*Professional use of preparations containing formaldehyde up to 1.5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**5.3.5 Contributing Scenario (5) controlling environmental exposure for ERC8F**
*Professional use of preparations containing formaldehyde up to 1.5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**5.3.6 Contributing Scenario (6) controlling professional worker exposure for PROC 5**
*Professional use of preparations containing formaldehyde up to 1.5% CS 1 Mixing or blending in batch processes (multistage and/or significant contact) - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.175153 mg/m$^3$ | 0.375 mg/m$^3$ | 0.467076 |

**5.3.7 Contributing Scenario (7) controlling professional worker exposure for PROC 5**
*Professional use of preparations containing formaldehyde up to 1.5% CS 1 Mixing or blending in batch processes (multistage and/or significant contact) - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.175153 mg/m$^3$ | 0.750 mg/m$^3$ | 0.233538 |

**5.3.8 Contributing Scenario (8) controlling professional worker exposure for PROC 8A**
*Professional use of preparations containing formaldehyde up to 1.5% CS 2 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.218942 mg/m$^3$ | 0.375 mg/m$^3$ | 0.583845 |

**5.3.9 Contributing Scenario (9) controlling professional worker exposure for PROC 8A**
*Professional use of preparations containing formaldehyde up to 1.5% CS 2 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.218942 mg/m$^3$ | 0.750 mg/m$^3$ | 0.291922 |

**5.3.10 Contributing Scenario (10) controlling professional worker exposure for PROC 8B**
*Professional use of preparations containing formaldehyde up to 1.5% CS 3 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.087577 mg/m$^3$ | 0.375 mg/m$^3$ | 0.233538 |

**5.3.11 Contributing Scenario (11) controlling professional worker exposure for PROC 8B**
*Professional use of preparations containing formaldehyde up to 1.5% CS 3 Transfer of chemicals from/to vessels/ large containers at dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.087577 mg/m$^3$ | 0.750 mg/m$^3$ | 0.116769 |

**5.3.12 Contributing Scenario (12) controlling professional worker exposure for PROC 10**
*Professional use of preparations containing formaldehyde up to 1.5% CS 4a Roller application or brushing- long term local outdoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 1.371 mg/kg bw/day | 240 mg/kg bw/day | 0.005714 |
| inhalation, longterm local | 0.218942 mg/m$^3$ | 0.375 mg/m$^3$ | 0.583845 |

**5.3.13 Contributing Scenario (13) controlling professional worker exposure for PROC 10**
*Professional use of preparations containing formaldehyde up to 1.5% CS 4a Roller application or brushing - short term local outdoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.218942 mg/m$^3$ | 0.750 mg/m$^3$ | 0.291922 |

**5.3.14 Contributing Scenario (14) controlling professional worker exposure for PROC 10**
*Professional use of preparations containing formaldehyde up to 1.5% CS 4b Roller application or brushing- long term local indoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 1.371 mg/kg bw/day | 240 mg/kg bw/day | 0.005714 |
| inhalation, longterm local | 0.218942 mg/m$^3$ | 0.375 mg/m$^3$ | 0.583845 |

**5.3.15 Contributing Scenario (15) controlling professional worker exposure for PROC 10**
*Professional use of preparations containing formaldehyde up to 1.5% CS 4b Roller application or brushing - short term local indoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.218942 mg/m$^3$ | 0.750 mg/m$^3$ | 0.291922 |

**5.3.16 Contributing Scenario (16) controlling professional worker exposure for PROC 11**
*Professional use of preparations containing formaldehyde up to 1.5% CS 5a Professional spraying - long term local outdoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 5.357 mg/kg bw/day | 240 mg/kg bw/day | 0.022321 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Near field<br>Process temperature: Room temperature<br>Vapour pressure: 20.1 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, moderate application rate (0.3 – 3 L/min)<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: No (0% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: No (0% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: No<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Work area: Outdoors<br>Source located close to buildings: Yes<br>Duration (mins): 15<br>Use of respiratory protection effectiveness 98%) | 0.280 mg/m$^3$ | 0.375 mg/m$^3$ | 0.746667 |

**5.3.17 Contributing Scenario (17) controlling professional worker exposure for PROC 11**
*Professional use of preparations containing formaldehyde up to 1.5% CS 5a Professional spraying - short term local outdoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES4, CS5a (PROC 11).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.560 mg/m$^3$ | 0.750 mg/m$^3$ | 0.746667 |

**5.3.18 Contributing Scenario (18) controlling professional worker exposure for PROC 11**
*Professional use of preparations containing formaldehyde up to 1.5% CS 5b Professional spraying - long term local indoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 5.357 mg/kg bw/day | 240 mg/kg bw/day | 0.022321 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Near field<br>Process temperature: Room temperature<br>Vapour pressure: 20.1 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, moderate application rate (0.3 – 3 L/min)<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: No (0% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: No<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 30 m³<br>Work area: Indoors<br>Duration (mins): 30<br>Ventilation rate: Specialised room ventilation with more than 10 ACH<br>Use of respiratory protection effectiveness 95%) | 0.210 mg/m$^3$ | 0.375 mg/m$^3$ | 0.560 |

**5.3.19 Contributing Scenario (19) controlling professional worker exposure for PROC 11**
*Professional use of preparations containing formaldehyde up to 1.5% CS 5b Professional spraying - short term local indoors*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES4, CS5b (PROC 11).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.410 mg/m$^3$ | 0.750 mg/m$^3$ | 0.546667 |

**5.3.20 Contributing Scenario (20) controlling professional worker exposure for PROC 13**
*Professional use of preparations containing formaldehyde up to 1.5% CS 6 Treatment of articles by dipping and pouring - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.175153 mg/m$^3$ | 0.375 mg/m$^3$ | 0.467076 |

**5.3.21 Contributing Scenario (21) controlling professional worker exposure for PROC 13**
*Professional use of preparations containing formaldehyde up to 1.5% CS 6 Treatment of articles by dipping and pouring - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.175153 mg/m$^3$ | 0.750 mg/m$^3$ | 0.233538 |

**5.3.22 Contributing Scenario (22) controlling professional worker exposure for PROC 15**
*Professional use of preparations containing formaldehyde up to 1.5% CS 7 Use of laboratory reagents in small scale laboratories - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.017143 mg/kg bw/day | 240 mg/kg bw/day | 0.000071 |
| inhalation, longterm local | 0.062555 mg/m$^3$ | 0.375 mg/m$^3$ | 0.166813 |

**5.3.23 Contributing Scenario (23) controlling professional worker exposure for PROC 15**
*Professional use of preparations containing formaldehyde up to 1.5% CS 7 Use of laboratory reagents in small scale laboratories - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.062555 mg/m$^3$ | 0.750 mg/m$^3$ | 0.083406 |

**5.3.24 Contributing Scenario (24) controlling professional worker exposure for PROC 16**
*Professional use of preparations containing formaldehyde up to 1.5% CS 8 Using material as fuel sources, limited exposure to unburned product to be expected - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.017143 mg/kg bw/day | 240 mg/kg bw/day | 0.000071 |
| inhalation, longterm local | 0.175153 mg/m$^3$ | 0.375 mg/m$^3$ | 0.467076 |

**5.3.25 Contributing Scenario (25) controlling professional worker exposure for PROC 16**
*Professional use of preparations containing formaldehyde up to 1.5% CS 8 Using material as fuel sources, limited exposure to unburned product to be expected - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.175153 mg/m$^3$ | 0.750 mg/m$^3$ | 0.233538 |

**5.3.26 Contributing Scenario (26) controlling professional worker exposure for PROC 21**
*Professional use of preparations containing formaldehyde up to 1.5% CS 9 Low energy manipulation of substances bound in materials and/or articles - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.141429 mg/kg bw/day | 240 mg/kg bw/day | 0.000589 |
| inhalation, longterm local | 0.280 mg/m$^3$ | 0.375 mg/m$^3$ | 0.746667 |

**5.3.27 Contributing Scenario (27) controlling professional worker exposure for PROC 21**
*Professional use of preparations containing formaldehyde up to 1.5% CS 9 Low energy manipulation of substances bound in materials and/or articles- short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.280 mg/m$^3$ | 0.750 mg/m$^3$ | 0.373333 |

**5.3.28 Contributing Scenario (28) controlling professional worker exposure for PROC 23C**
*Professional use of preparations containing formaldehyde up to 1.5% CS 10 Open processing and transfer operations with minerals/metals at elevated temperature - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.070714 mg/kg bw/day | 240 mg/kg bw/day | 0.000295 |
| inhalation, longterm local | 0.280 mg/m$^3$ | 0.375 mg/m$^3$ | 0.746667 |

**5.3.29 Contributing Scenario (29) controlling professional worker exposure for PROC 23C**
*Professional use of preparations containing formaldehyde up to 1.5% CS 10 Open processing and transfer operations with minerals/metals at elevated temperature - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.280 mg/m$^3$ | 0.750 mg/m$^3$ | 0.373333 |

**5.3.30 Contributing Scenario (30) controlling professional worker exposure for PROC 24C**
*Professional use of preparations containing formaldehyde up to 1.5% CS 11 High (mechanical) energy work-up of substances bound in materials and/or articles - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.141429 mg/kg bw/day | 240 mg/kg bw/day | 0.000589 |
| inhalation, longterm local | 0.175 mg/m$^3$ | 0.375 mg/m$^3$ | 0.466667 |

**5.3.31 Contributing Scenario (31) controlling professional worker exposure for PROC 24C**
*Professional use of preparations containing formaldehyde up to 1.5% CS 11 High (mechanical) energy work-up of substances bound in materials and/or articles - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.175 mg/m$^3$ | 0.750 mg/m$^3$ | 0.233333 |

**5.3.32 Contributing Scenario (32) controlling professional worker exposure for PROC 25C**
*Professional use of preparations containing formaldehyde up to 1.5% CS 12 Other hot work operations with metals - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.014143 mg/kg bw/day | 240 mg/kg bw/day | 0.000059 |
| inhalation, longterm local | 0.200 mg/m$^3$ | 0.375 mg/m$^3$ | 0.533333 |

**5.3.33 Contributing Scenario (33) controlling professional worker exposure for PROC 25C**
*Professional use of preparations containing formaldehyde up to 1.5% CS 12 Other hot work operations with metals - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.200 mg/m$^3$ | 0.750 mg/m$^3$ | 0.266667 |

**5.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**6.1 Scenario 5: Professional use of preparations containing formaldehyde up to 5%**

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

Description of ES 5

| | |
|---|---|
| **Free short title** | Professional use of preparations containing formaldehyde up to 5% |
| **Systematic title based on use descriptor** | ERC 8A; PROC 8A, 11, 13, 15 |
| **Name of constributing environmental scenario and corresponding ERC** | ERC 8a Wide dispersive indoor use of processing aids in open systems |
| **Name(s) of contributing worker scenarios and corresponding PROCs** | PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities<br>PROC 11 - Non industrial spraying<br>PROC 13 - Treatment of articles by dipping and pouring<br>PROC 15 - Use of laboratory reagents in small scale laboratories |

**6.2 Conditions of use affecting exposure**

**6.2.1 Contributing Scenario (1) controlling environmental exposure for ERC 8A**

| |
|---|
| As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed. |

**6.2.2 Contributing Scenario (2) controlling professional worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 1 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |

**6.2.3 Contributing Scenario (3) controlling professional worker exposure for PROC 8A**

| | |
|---|---|
| **Name of contributing scenario** | PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities |
| Scenario subtitle | CS 1 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 960 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |

**6.2.4 Contributing Scenario (4) controlling professional worker exposure for PROC 11**

| | |
|---|---|
| **Name of contributing scenario** | PROC 11 Non industrial spraying |
| Scenario subtitle | CS 2 Professional spraying - long term local |
| **Qualitative Risk Assessment** | |
| General | Provide a good standard of controlled ventilation (10 to 15 air changes per hour)<br>Provide extract ventilation to points where emissions occur (LEV).<br>Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |

| | |
|---|---|
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 15 mins to 1 hour |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 95 % |
| Use of external/measured value inhalation | The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Near field<br>Process temperature: Room temperature<br>Vapour pressure: 31.14 Pa<br>Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, moderate application rate (0.3 – 3 L/min)<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: No (0% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: No<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 30 $m^3$<br>Work area: Indoors<br>Duration (mins): 30<br>Ventilation rate: Specialised room ventilation with more than 10 ACH<br>Use of respiratory protection effectiveness 95% |

**6.2.5 Contributing Scenario (5) controlling professional worker exposure for PROC 11**

| | |
|---|---|
| **Name of contributing scenario** | PROC 11 Non industrial spraying |
| Scenario subtitle | CS 2 Professional spraying - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 1.5%. It is however set at 100% since the concentration limit of 1.5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 20 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 1,500 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 95 % |
| Use of external/measured value inhalation | A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES5, CS2 (PROC 11).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2. |

**6.2.6 Contributing Scenario (6) controlling professional worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 3 Treatment of articles by dipping and pouring - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Supervision in place to check that the RMMs in place are being used correctly and OCs followed.<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | 1 - 4 hours |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |

| | |
|---|---|
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Ventilation | good (30%) |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | 90 % |

**6.2.7 Contributing Scenario (7) controlling professional worker exposure for PROC 13**

| | |
|---|---|
| **Name of contributing scenario** | PROC 13 Treatment of articles by dipping and pouring |
| Scenario subtitle | CS 3 Treatment of articles by dipping and pouring - short term local |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 480 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | yes (inhalation 80 %) |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | 90 % |

**6.2.8 Contributing Scenario (8) controlling professional worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 4 Use of laboratory reagents in small scale laboratories - long term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented<br>Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| Eyes | Use suitable eye protection. |
| **Product characteristics** | |
| Physical state | liquid |

| | |
|---|---|
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | > 4 hours (default) |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |
| **Technical conditions and measures to control dispersion and exposure** | |
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Protective gloves | 95 %, burst-time: > 4 hours (default) *(justification: Wear chemically resistant gloves in combination with specific activity training.)* |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**6.2.9 Contributing Scenario (9) controlling professional worker exposure for PROC 15**

| | |
|---|---|
| **Name of contributing scenario** | PROC 15 Use of laboratory reagents in small scale laboratories |
| Scenario subtitle | CS 4 Use of laboratory reagents in small scale laboratories - short term local |
| **Qualitative Risk Assessment** | |
| General | Reduce concentration to less than 5%<br>Ensure good work practices are implemented |
| Eyes | Use suitable eye protection. |
| Title.dermal | Avoid skin contact.<br>Wear chemically resistant gloves in combination with specific activity training<br>Wear suitable coveralls to prevent exposure to the skin. |
| **Product characteristics** | |
| Physical state | liquid |
| Concentration in substance | 100 %, concentration has been considered linearly *(justification: The actual percentage formaldehyde used this contributing scenario is 5%. It is however set at 100% since the concentration limit of 5% has already been taken into account in the vapour pressure settings. See Ch 1.1 Introduction to the assessment for a detailed explanation.)* |
| Process temperature | 60 °C |
| Fugacity / Dustiness | low |
| **Frequency and duration of use** | |
| Duration of activity | less than 15 mins |
| Frequency of use | 5 days / week |
| **Human factors not influenced by risk management** | |
| Exposed skin surface | 240 $cm^2$ |
| **Other given operational conditions affecting workers exposure** | |
| Location | indoors |
| Domain | professional |

| Technical conditions and measures to control dispersion and exposure | |
|---|---|
| Local exhaust ventilation | no |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | |
| Respiratory protection | no |
| Local exhaust ventilation | inhalation: 99 % *(justification: Local exhaust ventilation (enclosing hood, fume cupboard, 99% reduction).)* |

**6.3 Exposure estimation**

**6.3.1 Contributing Scenario (1) controlling environmental exposure for ERC8A**
*Professional use of preparations containing formaldehyde up to 5%*

As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

**6.3.2 Contributing Scenario (2) controlling professional worker exposure for PROC 8A**
*Professional use of preparations containing formaldehyde up to 5% CS 1 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.312774 mg/m$^3$ | 0.375 mg/m$^3$ | 0.834064 |

**6.3.3 Contributing Scenario (3) controlling professional worker exposure for PROC 8A**
*Professional use of preparations containing formaldehyde up to 5% CS 1 Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.312774 mg/m$^3$ | 0.750 mg/m$^3$ | 0.417032 |

**6.3.4 Contributing Scenario (4) controlling professional worker exposure for PROC 11**
*Professional use of preparations containing formaldehyde up to 5% CS 2 Professional spraying - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 5.357 mg/kg bw/day | 240 mg/kg bw/day | 0.022321 |
| inhalation, longterm local (measured / external: The ART model has been used to estimate inhalative exposure.<br>Exposure value used: the upper limit of the interquartile confidence interval of the 75th percentile estimate.<br><br>Emission sources: Near field<br>Process temperature: Room temperature<br>Vapour pressure: 31.14 Pa | 0.320 mg/m$^3$ | 0.375 mg/m$^3$ | 0.853333 |

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| Liquid weight fraction: 1<br>Activity coefficient: 1<br>Substance product type: Liquids<br>Situation: Surface spraying of liquids, moderate application rate (0.3 – 3 L/min)<br>Spray direction: Only horizontal or downward<br>Spray technique: Spraying with high compressed air use<br>Primary localized controls: Fixed capturing hood (90% reduction)<br>Secondary localized controls: No (0 % reduction)<br>Segregation: No (0% reduction)<br>Personal enclosure: No (0% reduction)<br>Effective housekeeping practices in place: No<br>General housekeeping practices in place: No<br>Process fully enclosed: No<br>Room size: 30 m³<br>Work area: Indoors<br>Duration (mins): 30<br>Ventilation rate: Specialised room ventilation with more than 10 ACH<br>Use of respiratory protection effectiveness 95%) | | | |

**6.3.5 Contributing Scenario (5) controlling professional worker exposure for PROC 11**
*Professional use of preparations containing formaldehyde up to 5% CS 2 Professional spraying - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local (measured / external: A peak factor of 2 is used for estimation of short term exposure.<br><br>Short term exposure estimation based on long term ART scenario described for ES5, CS2 (PROC 11).<br>Exposure value used: upper interquartile confidence limit of the 75th percentile estimate for full shift exposure * peak factor 2.) | 0.630 mg/m$^3$ | 0.750 mg/m$^3$ | 0.840 |

**6.3.6 Contributing Scenario (6) controlling professional worker exposure for PROC 13**
*Professional use of preparations containing formaldehyde up to 5% CS 3 Treatment of articles by dipping and pouring - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.685714 mg/kg bw/day | 240 mg/kg bw/day | 0.002857 |
| inhalation, longterm local | 0.175153 mg/m$^3$ | 0.375 mg/m$^3$ | 0.467076 |

**6.3.7 Contributing Scenario (7) controlling professional worker exposure for PROC 13**
*Professional use of preparations containing formaldehyde up to 5% CS 3 Treatment of articles by dipping and pouring - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.250219 mg/m$^3$ | 0.750 mg/m$^3$ | 0.333626 |

**6.3.8 Contributing Scenario (8) controlling professional worker exposure for PROC 15**
*Professional use of preparations containing formaldehyde up to 5% CS 4 Use of laboratory reagents in small scale laboratories - long term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| dermal, longterm systemic | 0.017143 mg/kg bw/day | 240 mg/kg bw/day | 0.000071 |
| inhalation, longterm local | 0.062555 mg/m$^3$ | 0.375 mg/m$^3$ | 0.166813 |

**6.3.9 Contributing Scenario (9) controlling professional worker exposure for PROC 15**
*Professional use of preparations containing formaldehyde up to 5% CS 4 Use of laboratory reagents in small scale laboratories - short term local*

The quantitative risk characterisation for this worker exposure has been calculated by EasyTRA.

The following table shows the exposure estimations via the dermal and inhalatory route together with the total exposure of workers over all routes.

| Route | Exposure concentration (EC) | DNEL | Risk characterisation ratio = EC/DNEL |
|---|---|---|---|
| inhalation, shortterm local | 0.062555 mg/m$^3$ | 0.750 mg/m$^3$ | 0.083406 |

**6.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.