

CONCEPT ACHTERGRONDDOCUMENT BIJ ADVIES GESPOTEN PUR-SCHUIM - Gevaaraanduidingen en blootstellingslimieten voor grondstoffen van gespoten PUR-schuim

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Table 1. Health Hazard codes according to Globally Harmonized System of Classification and Labelling of Chemicals (source: ECHA)

| Chemical | CAS-number | Health Hazard codes (met Nederlandse gevarenaanduiding) |
|--------------------------------------|-------------------|--|
| Isocyanates | | |
| Methylene bisphenyl isocyanate (MDI) | CAS 101-68-8 | H315 Huidcorrosie/-irritatie, gevarencategorie 2; H317 Huidsensibilisatie, gevarencategorie 1; H319 Ernstig oogletsel/oogirritatie, gevarencategorie 2A; H332 Acute toxiciteit bij inademing, gevarencategorie 4; H334 Sensibilisatie van de luchtwegen, gevarencategorie 1; H335 Specifieke doelorgaantoxiciteit bij eenmalige blootstelling, gevarencategorie 3, irritatie van de luchtwegen; H351 Kankerverwekkendheid, gevarencategorie 2; H373 Specifieke doelorgaantoxiciteit bij herhaalde blootstelling, gevarencategorie 2; |
| Methyl isocyanate | CAS 624-83-9 | H301 Acute orale toxiciteit, gevarencategorie 3; H311 Acute dermale toxiciteit, gevarencategorie 3; H315 Huidcorrosie/-irritatie, gevarencategorie 2; H317 Huidsensibilisatie, gevarencategorie 1; H318 Ernstig oogletsel/oogirritatie, gevarencategorie 1; H330 Acute toxiciteit bij inademing, gevarencategorie 1 en 2; H334 Sensibilisatie van de luchtwegen, gevarencategorie 1; H335 Specifieke doelorgaantoxiciteit bij eenmalige blootstelling, gevarencategorie 3, irritatie van de luchtwegen; H361d Voortplantingstoxiciteit, gevarencategorie 2 |
| Ethyl isocyanate | CAS 109-90-0 | Geen geharmoniseerde classificatie |
| Phenyl isocyanate | CAS 103-71-9 | Geen geharmoniseerde classificatie |
| Propyl isocyanate | CAS 110-78-1 | Geen geharmoniseerde classificatie |
| Isocyanic acid | CAS 75-13-8 | Geen geharmoniseerde classificatie |
| Polymeric MDI | CAS 9016-87-9 | Geen geharmoniseerde classificatie |
| 4,4'-methylenedianiline (MDA) | CAS 101-77-9 | H317 Huidsensibilisatie, gevarencategorie 1; H341 Mutageniteit in geslachtscellen, gevarencategorie 2; H350 Kankerverwekkendheid, gevarencategorie 1A en 1B; H370 Specifieke doelorgaantoxiciteit bij eenmalige blootstelling, gevarencategorie 1; H373 Specifieke doelorgaantoxiciteit bij herhaalde blootstelling, gevarencategorie 2; |
| Blowing agents | | |

| | | |
|---|-----------------|--|
| Trans-1-Chloro-3,3,3-trifluoropropene (Solstice™, HFO-1233zd) | CAS 102687-65-0 | Geen geharmoniseerde classificatie |
| dichlorofluoroethane (HCFC-141b) | CAS 1717-00-6 | Geen geharmoniseerde classificatie |
| 1,1,1,3,3-pentafluoropropane (HFC-245fa) | CAS 460-73-1 | Geen geharmoniseerde classificatie |
| 1,1,1,2,3,3,3-heptafluoropropane (HFC-227) | CAS 431-89-0 | Geen geharmoniseerde classificatie |
| 1,1,1,3,3-pentafluorbutane (HFC-365) | CAS 406-58-6 | Geen geharmoniseerde classificatie |
| 1,1,1,2-tetrafluoroethane (HFC134a) | CAS 811-97-2 | Geen geharmoniseerde classificatie |
| Amine katalysts | | |
| Bis(2-dimethylaminoethyl)ether (BDMAEE) | CAS 3033-62-3 | Geen geharmoniseerde classificatie |
| Dimethylethanolamine (DMEA) | CAS 108-01-0 | H302 Acute orale toxiciteit, gevarencategorie 4; H312 Acute dermale toxiciteit, gevarencategorie 4; H314 Huidcorrosie/-irritatie, gevarencategorie 1A, 1B en 1C; H332 Acute toxiciteit bij inademing, gevarencategorie 4; |
| N,N,N,-Trimethylaminoethylethanolamine (TMAEEA) | CAS 2212-32-0 | Geen geharmoniseerde classificatie |
| 2,2'-iminodiethanol | CAS 111-42-2 | H302 Acute orale toxiciteit, gevarencategorie 4; H315 Huidcorrosie/-irritatie, gevarencategorie 2; H318 Ernstig oogletsel/oogirritatie, gevarencategorie 1; H373 Specifieke doelorgaantoxiciteit bij herhaalde blootstelling, gevarencategorie 2; |
| Benzyl dimethylamine | CAS 103-83-3 | H302 Acute orale toxiciteit, gevarencategorie 4; H312 Acute dermale toxiciteit, gevarencategorie 4; H314 Huidcorrosie/-irritatie, gevarencategorie 1A, 1B en 1C; H332 Acute toxiciteit bij inademing, gevarencategorie 4; |
| Cyclohexyldimethylamine | CAS 98-94-2 | Geen geharmoniseerde classificatie |
| Tris-(dimethyl aminopropyl)amine (Polycat 9) | CAS 33329-35-0 | Geen geharmoniseerde classificatie |
| Triethylenediamine (TEDA) | CAS 280-57-9 | Geen geharmoniseerde classificatie |
| Bis(2-dimethylaminoethyl)(methyl)amine | CAS 3030-47-5 | H302 Acute orale toxiciteit, gevarencategorie 4; H311 Acute dermale toxiciteit, gevarencategorie 3; H314 Huidcorrosie/-irritatie, gevarencategorie 1A, 1B en 1C; |
| Dibutyltin dilaurate | CAS 77-58-7 | H341 Mutageniteit in geslachtscellen, gevarencategorie 2; H360fd Voortplantingstoxiciteit, gevarencategorie 1A en 1B; H372 Specifieke doelorgaantoxiciteit (immuun systeem) bij herhaalde blootstelling, gevarencategorie 1; |
| Flame retardants | | |
| Tris-(1-chloro-2-propyl) phosphate (TCPP) | CAS 13674-84-5 | Geen geharmoniseerde classificatie |
| Triethyl Phosphate (TEP) | CAS 78-40-0 | H302 Acute orale toxiciteit, gevarencategorie 4; |

Sources of exposure limits in Table 2:

- EU: The European lowest relevant Occupational Exposure Limit. Based on Gestis: <http://limitvalue.ifa.dguv.de>
- USA: The USA lowest of Occupational Exposure Limits from National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA). Based on Gestis <http://limitvalue.ifa.dguv.de>
- AIHA: American Industrial Hygiene Association. <https://www.tera.org/OARS/#reservations>
- REACH: In the context of REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation) derived no effect level (DNEL) for inhalation (unless otherwise stated). If systemic and local DNELs were given, the lowest was taken.
- OEHHA: California Office of Environmental Health Hazard Assessment. <https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary>
- ATSDR: Agency for toxic substances and disease registry. Minimal risk levels <https://www.atsdr.cdc.gov/mrls/mrllist.asp#210tag>
- Environmental Protection Agency (EPA) Acute Exposure Guideline Values: <https://www.epa.gov/aegl/access-acute-exposure-guideline-levels-aegls-values#chemicals>. EPA Reference concentrations for long-term exposure are an estimate of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime (respiratory and systemic). https://cfpub.epa.gov/ncea/iris_drafts/atoz.cfm?list_type=alpha

Table 2a. Exposure limits for inhalation and dermal exposure to isocyanates

| Chemical | Organization | Acute occupational exposure limit ($\mu\text{g}/\text{m}^3$) | Long-term occupational exposure limit ($\mu\text{g}/\text{m}^3$) | Acute population exposure limit ($\mu\text{g}/\text{m}^3$) | Long-term population exposure limit ($\mu\text{g}/\text{m}^3$) |
|--|--------------|--|--|--|--|
| <i>Isocyanate (CAS-number)</i> | | | | | |
| Methylene bisphenyl isocyanate (MDI) (CAS 101-68-8) | | | | | |
| | EU | 50 | 30 | - | - |
| | USA | 200 | 50 | - | - |
| | REACH | 100 | 50 | 50 | 25 |
| | OEHHA | - | - | 12 | Chronic: 0,08 8h/day: 0,16 |
| | EPA | - | - | - | 0,6 |
| | ATSDR | - | - | - | - |
| Methyl isocyanate (CAS 624-83-9) | | | | | |
| | EU | 24 | 20 | - | - |
| | USA | - | 50 | - | - |
| | REACH | - | - | - | - |

| | | | | | |
|-------------------------------------|-------|-----|---|---------------------|---|
| | OEHHA | - | - | - | 1 |
| | EPA | - | - | 160 (1h) 20 (8h) | - |
| | ATSDR | - | - | - | - |
| Ethyl isocyanate (CAS 109-90-0) | | | | | |
| | EU | 170 | 60 (direct contact and presence in air) | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |
| | OEHHA | - | - | - | - |
| | EPA | - | - | 99 (1h) 12 (8h) | - |
| | ATSDR | - | - | - | - |
| Phenyl isocyanate (CAS 103-71-9) | | | | | - |
| | EU | 50 | 20 | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |
| | OEHHA | - | - | - | - |
| | EPA | - | - | 47 (1h) 15 (8h) | - |
| | ATSDR | - | - | - | - |
| Propyl isocyanate (CAS 110-78-1) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| | ATSDR | - | - | - | - |
| Isocyanic acid (CAS 75-13-8) | | | | | |
| | EU | 36 | 18 | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |

| | | | | | |
|--|-------------------------------|---------|---------------------------------|--------------------------------------|--------------------------------------|
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| | ATSDR | - | - | - | - |
| Polymeric MDI (CAS 9016-87-9) | | | | | |
| | EU | 50 | 50 | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |
| | OEHHA | - | - | 12 | Chronic: 0,08 8h/day: 0,16 |
| | EPA | - | - | - | - |
| | ATSDR | - | - | - | 1 |
| Di- and triisocyanates [as NCO µg/m ³] | | | | | |
| | EU | 20 | 20 | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |
| | OEHHA | - | - | - | - |
| | EPA | | | | |
| | Netherlands Health council | - | Risk based 0,1 | - | - |
| 4,4'-methylenedianiline (MDA) (CAS 101-77-9) | | | | | |
| | EU | 810 | 9 | - | - |
| | USA | 800 | 80 | - | - |
| | REACH | unknown | Inhalation: 14,8 Dermal: 4,2 | Unknown (no exposure expected) | Unknown (no exposure expected) |
| | OEHHA | - | - | - | 20 |
| | EPA | - | - | - | - |
| | ATSDR | - | - | - | - |

Table 2b. Exposure limits for inhalation and dermal exposure to blowing agents

| Chemical | Organization | Acute occupational exposure limit (mg/m³) | Long-term occupational exposure limit (mg/m³) | Acute population exposure limit (mg/m³) | Long-term population exposure limit (mg/m³) |
|-----------------|---------------------|---|---|---|---|
|-----------------|---------------------|---|---|---|---|

| Blowing agents | | | | | |
|---|-------|-----------|-----------|-----------|-----------|
| Trans-1-Chloro-3,3,3-trifluoropropene (Solstice™, HFO-1233zd) (CAS 102687-65-0) | EU | - | - | - | - |
| | USA | - | - | - | - |
| | AIHA | - | 4.270 | - | - |
| | REACH | - | 1.779 | - | 379 |
| | OEHHA | - | - | - | - |
| | EPA | | | | |
| | ATSDR | | | | |
| dichlorofluoroethane (HCFC-141b) (CAS 1717-00-6) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | AIHA | 14.350 | 2.391 | - | - |
| | REACH | - | - | - | - |
| | OEHHA | - | - | - | - |
| | EPA | - | - | 4.850 | - |
| 1,1,1,3,3-pentafluoropropane (HFC-245fa) (CAS 460-73-1) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | AIHA | - | 1.645 | | |
| | REACH | No hazard | No hazard | No hazard | No hazard |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| 1,1,1,2,3,3,3-heptafluoropropane (HFC-227) (CAS 431-89-0) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | - | 61.279 | - | 6.533 |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| 1,1,1,3,3-pentafluorbutane (HFC-365) (CAS 406-58-6) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |

| | | | | | |
|---|-------|-------|--------|--------|-------|
| | REACH | - | - | - | - |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| 1,1,1,2-tetrafluoroethane (HFC134a) (CAS 811-97-2) | | | | | |
| | EU | 3.000 | 2.000 | - | - |
| | USA | - | - | - | - |
| | AIHA | - | 4.173 | - | - |
| | REACH | - | 13.936 | - | 2.476 |
| | OEHHA | - | - | - | - |
| | EPA | - | - | 34.000 | - |

Table 2c. Exposure limits for inhalation and dermal exposure to catalysts

| Chemical | Organization | Acute occupational exposure limit ($\mu\text{g}/\text{m}^3$) | Long-term occupational exposure limit ($\mu\text{g}/\text{m}^3$) | Acute population exposure limit ($\mu\text{g}/\text{m}^3$) | Long-term population exposure limit ($\mu\text{g}/\text{m}^3$) |
|---|--------------|--|--|--|--|
| Catalysts | | | | | |
| Bis(2-dimethylaminoethyl)ether (BDMAEE) (CAS 3033-62-3) | | | | | |
| | EU | 1.000 (direct and air) | 330 | - | - |
| | USA | - | - | - | - |
| | REACH | No hazard | 80 | No hazard | 13 |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Dimethylethanolamine (DMEA) (CAS 108-01-0) | | | | | |
| | EU | 22.000 | 5.000 | - | - |
| | USA | - | - | - | - |
| | REACH | 5.280 | 1.760 | No hazard | 438 |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| N,N,N,-Trimethylaminoethylethanolamine (TMAEEA) (CAS 2212-32-0) | | | | | |

| | | | | | |
|--|-------|--|--|------------|--|
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | No hazard | 1.175 | No hazard | 290 |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| 2,2'-iminodiethanol (CAS 111-42-2) | | | | | |
| | EU | 500 | 500 | - | - |
| | USA | - | 15.000 | - | - |
| | REACH | Low hazard | Inhalation: 500 Dermal: 130 per kg bw/day | Low hazard | Inhalation: 125 Dermal: 70 per kg bw/day |
| | OEHHA | - | - | - | 3 |
| | EPA | - | - | - | - |
| Benzyl dimethylamine (CAS 103-83-3) | | | | | |
| | EU | 10.000 | 5.000 | - | - |
| | USA | - | - | - | - |
| | REACH | - | Inhalation: 14.600 Dermal: 2.300 per kg bw/day | - | Inhalation: 43.750 Dermal: 1.250 per kg bw/day |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Cyclohexyldimethylamine (CAS 98-94-2) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | Inhalation: 8.300 Dermal: high hazard, no threshold | Inhalation: 530 Dermal: 600 per kg bw/day | No hazard | No hazard |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Tris-(dimethyl aminopropyl)amine (Polycat 9) (CAS 33329-35-0) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | - | - | - | - |

| | | | | | |
|---|--------|---|---|--|---|
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Triethylenediamine (TEDA) (CAS 280-57-9) | | | | | |
| | EU | - | - | - | - |
| | Canada | - | 4600 | - | - |
| | REACH | - | Inhalation : 8240 Dermal : 1,4 mg/kg body weight/day | - | Inhalation : 1460 Dermal : 0,5 mg/kg body weight/day |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Bis(2-dimethylaminoethyl)(methyl)amine (CAS 3030-47-5) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | - | Inhalation : 1058 Dermal : 300 microg/kg body weight/day | - | Inhalation : 260,8 Dermal : 150 microg/kg body weight/day |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Dibutyltin dilaurate (CAS 77-58-7) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | Inhalation: 59 Dermal : 2,08 mg/kg body weight/day | Inhalation: 20 Dermal: 430 microgram/kg body weight/day | Inhalation : 40 Dermal : 500 microgram/kg body weight/day | Inhalation : 4,6 Dermal : 160 microgram/kg body weight/day |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |

Table 2d. Exposure limits for inhalation and dermal exposure to flame retardants

| Chemical | Organization | Acute occupational exposure limit ($\mu\text{g}/\text{m}^3$) | Long-term occupational exposure limit ($\mu\text{g}/\text{m}^3$) | Acute population exposure limit ($\mu\text{g}/\text{m}^3$) | Long-term population exposure limit ($\mu\text{g}/\text{m}^3$) |
|---|--------------|--|--|--|--|
| <i>Flame retardants</i> | | | | | |
| Tris-(1-chloro-2-propyl) phosphate (TCPP) (CAS 13674-84-5) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | REACH | Inhalation: 5.820 Dermal: 2.080 per kg bw/day | Inhalation: 5.820 Dermal: 2.080 per kg bw/day | Inhalation: 1.460 Dermal: 1.040 per kg bw/day | Inhalation: 1.460 Dermal: 1.040 per kg bw/day |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |
| Triethyl Phosphate (TEP) (CAS 78-40-0) | | | | | |
| | EU | - | - | - | - |
| | USA | - | - | - | - |
| | AIHA | - | 7.450 | - | - |
| | REACH | Low hazard, no threshold | Inhalation: 9.900 Dermal: 2.000 per kg bw/day | Low hazard, no threshold | Inhalation: 1.740 Dermal: 1.000 per kg bw/day |
| | OEHHA | - | - | - | - |
| | EPA | - | - | - | - |