

Stofdocument deel A

CAS-nr: 156-59-2 (*cis*)

***cis*-1,2-dichloorethyleen^a**

C₂H₂Cl₂



VN-nr: 1150

GEVI: 33

Synoniemen: (*cis*-)1,2-dichlooretheen, (*cis*-)1,2-DCE (Engels: *cis*-1,2-dichloroethene)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarden	VRW (mg/m³)	550	550	550	550	550	550
Alarmeringsgrenswaarden	AGW (mg/m³)	1.700	1.700	1.700	1.700	1.400	900
Levensbedreigende waarden	LBW (mg/m³)	3.900	3.900	3.900	3.900	3.100	1.600
Datum vaststelling: 16-10-2018		1 mg/m ³ = 0,248 ppm; 1 ppm = 4,031 mg/m ³					
Explosiegrens: 6,2-16 volume% ≈ 250.000-640.000 mg/m ³			Geur: typerende geur				
			LOA: 1083 mg/m ³				
Fysisch-chemische eigenschappen				Overige informatie			
Uiterlijk: kleurloze vloeistof		Molecuulmassa: 96,9 g/mol		Publieke grenswaarde: niet vastgesteld MAK: 800 mg/m ³ (afgeleid voor mengsel) TLV-TWA: 800 mg/m ³			
Brand: zeer brandgevaarlijk		Zuurgraad: geen data					
		LogKow: 1,86					
Relatieve dichtheid van verzadigd damp-lucht mengsel: 1,5		Wateroplosbaarheid: 0,35 g/100 ml (slecht)					
		Verzadigde dampdruk: 240 mbar					
Toxicologische eigenschappen							
Effecten bij inhalatoire blootstelling				Toxiciteit bij eenmalige, inhalatoire blootstelling			
<u>Onder VRW:</u> hoesten				<ul style="list-style-type: none"> De stof werkt irriterend op de ogen en luchtwegen. De stof kan inwerken op het CZS. De narcotische effecten kunnen al optreden bij concentraties die nog niet als irriterend voor de ogen en luchtwegen worden ervaren. Blootstelling kan verlaging van bewustzijn veroorzaken en schade aan de longen, lever en hartspier. In ernstige gevallen kans op bewusteloosheid en sterfte 			
<u>VRW → AGW:</u> duizeligheid, sufheid, prikkeling van ogen en keel							
<u>AGW → LBW:</u> hoofdpijn, sufheid, duizeligheid, tranende ogen, keelpijn, misselijkheid							
<u>Boven LBW:</u> bewustzijnsdaling, narcose, cardiovasculaire collaps, sterfte							
Effecten bij blootstelling aan vloeistof				Carcinogeniteit			
<u>Huidcontact:</u> droge huid, roodheid en pijn				IARC classificatie: niet geëvalueerd CRP: niet afgeleid			
<u>Oogcontact:</u> roodheid en pijn, slecht zien en hoornvliesbeschadiging.							
Beknopte medische informatie							
Ontsmetting damp							
<i>algemeen:</i> frisse lucht, rust en onmiddellijk arts raadplegen.							
Ontsmetting vloeistof							
<i>huid:</i> verontreinigde kleding uittrekken, spoelen en wassen met water en zeep, arts raadplegen.							
<i>ogen:</i> minimaal 15 min. spoelen met water (evt. contactlenzen verwijderen), bij aanhoudende irritatieklachten (oog)arts brengen.							
<i>inslikken:</i> mond laten spoelen (uitspugen!), GEEN braken opwekken, niet laten drinken en direct spoedeisende medische hulp inzetten.							
Specifieke behandeling en materialen: geen.							
Neem contact op met het NVIC (Tel:+31 (0)30 274 8888) voor informatie met betrekking tot medisch handelen							

^a Er zijn geen afzonderlijke interventiewaarden afgeleid voor mengsels van *cis*- en *trans*-1,2-dichloorethyleen (CAS nummer voor mengsels: 540-59-0), vanwege wisselende samenstellingen. De interventiewaarden voor *cis*-1,2-dichloorethyleen gelden daarom ook voor alle *cis-trans*-mengsels.

Stofdocument deel B

CAS-nr: 156-59-2
C₂H₂Cl₂

cis-1,2-dichloroethene^b



UN-nr: 1150

Basis for the Dutch Intervention Values

VRW: AEGL values adopted, 2 hour value added.

AGW: Different PoD as for AEGL for 10 min-1 hour values, 4-8 hour values adopted, 2h value added.

LBW: Different point of departure as for AEGL values, 2hr value added.

Date: 16-10-2018

AEGL document: Final, 2010

Dutch Intervention Values (mg/m³)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
VRW	550	550	550	550	550	550	Threshold for eye irritation in humans
AGW	1,700	1,700	1,700	1,700	1,400	900	Narcosis in rats
LBW	3,900	3,900	3,900	3,900	3,100	1,600	Threshold for lethality in rats

Derivation of the Dutch Intervention Values

1,2-dichloroethene can exist both as a *cis*- and a *trans*-isomer as well as in different mixtures. For the mixtures no data were reported in the AEGL document. The *trans*-isomer data package is more extensive than the *cis*-isomer data package. The reported studies indicate that the *cis*-isomer is more acutely toxic than the *trans*-isomer.

VRW: Though the *cis*-isomer of 1,2-dichloroethene is more potent, the toxicity profiles of both isomers is similar. The data package for the *trans*-isomer is more extensive. Therefore, the VRW values for *trans*-1,2-dichloroethene will be used to derive VRW values for *cis*-1,2-dichloroethene. The acute lethality data and data on narcosis suggests use of a modifying factor of 2 to cover for the difference in toxic potency.

Derivation of VRW-values for *trans*-1,2-dichloroethene

The VRW for *trans*-1,2-dichloroethene is based on data from a human volunteer study (n=2). Subjects were exposed to *trans*-1,2-dichloroethene for 5 minutes to 275, 950, 1,700 and 2,200 ppm (corresponding with 1,108, 3,829, 6,852 and 8,867 mg/m³, respectively), 10 minutes to 825 and 1,200 ppm (corresponding with 3,325 and 4,836 mg/m³, respectively) and 30 minutes to 1000 ppm (corresponding with 4,031 mg/m³). In this study *trans*-1,2-dichloroethene at a concentration of 1108 mg/m³ for 5 minutes showed no effects. A concentration of 3,325 mg/m³ caused slight dizziness after 5 minutes during a 10 minute exposure and slight eye irritation was observed at a concentration of 3,829 mg/m³ for 5 minutes. Dizziness and slight burning of the eyes was reported after 10 minutes in a 30 minute exposure regimen to 1,000 ppm (corresponding with 4,031 mg/m³). The NOAEC for eye irritation of 3,325 mg/m³ was used as point of departure. The default uncertainty factor of 3 was considered sufficient to account for intraspecies differences. Time scaling was not applied as eye irritation is considered to be concentration-dependent rather than concentration × time-dependent. The results are supported by data from a rat developmental study, where *trans*-1,2-dichloroethene exposed pregnant rats showed clear ocular discharge (13/24) and periorcular wetness (3/24) at 2,000 ppm (8,061 mg/m³). At 6,000 ppm (24,184 mg/m³) increased incidences of both effects were observed and at 1,200 ppm (48,368 mg/m³) all animals showed both effects, but not more severe eye effects were reported.

AGW: Though the *cis*-isomer of 1,2-dichloroethene is more potent, the toxicity profiles of both isomers is similar. The data package for the *trans*-isomer is more extensive. Therefore, the AGW values for *trans*-1,2-dichloroethene will be used to derive AGW values for *cis*-1,2-dichloroethene. The acute lethality data suggests use of a modifying factor of 2 to cover for the difference in toxic potency.

^b No separate intervention values have been derived for mixtures of *cis*- and *trans*-1,2-dichloroethylene (CAS: 540-59-0), because of differing compositions. Intervention values for *cis*-1,2-dichloroethylene apply to all *cis-trans*-mixtures.

Derivation of AGW-values for trans-1,2-dichloroethene

The AGWs for 2, 4 and 8 hours are based on a developmental toxicity study. Pregnant rats were exposed to *trans*-1,2-dichloroethene at concentrations of 2,000, 6,000 and 12,000 ppm, equivalent with 8,061, 24,184 and 48,368 mg/m³, for 6 hours during GD7-16. Rats exposed to 48,368 mg/m³ showed narcotic effects. The level of 24,184 mg/m³ was used as point of departure. The default total uncertainty factor of 10 (3x3) was considered sufficient to account for inter- and intraspecies differences. Time-scaling was performed using the equation $C^n \times t = k$, using default values for n of 1 and 3 for extrapolation to longer and shorter exposure durations, respectively, except for the 10, 30 and 60 min exposure durations. Extrapolation using n=3 to these values would lead to exposure time and duration at which healthy adult humans responded with symptoms reaching a level of severe dizziness. Dizziness was seen in humans after exposure at 1,000 ppm (4,031 mg/m³) for 10 minutes, during an exposure lasting for 30 minutes. Not to come into conflict with human data, the 10- and 30-minute and 1 hour values were set equal to the 2 hour value of 3,500 mg/m³.

LBW: Though the *cis*-isomer of 1,2-dichloroethene is more potent, the toxicity profiles of both isomers is similar. Though lethality data for the *cis*-isomer are available, the data were insufficient to derive reliable LC₀₁ values. Comparison of the calculated LC₅₀ values from the *cis*- and *trans*-isomer does indicate that the *cis*-isomer is twice as potent as the *trans*-isomer. Therefore, the LBW values for *trans*-1,2-dichloroethene will be used to derive LBW values for *cis*-1,2-dichloroethene, using a modifying factor of 2 to cover for the difference in toxic potency.

Derivation of LBW-values for trans-1,2-dichloroethene

The LBWs were primarily based on a 4 hour rat lethality study. Rats (5/sex/conc) were exposed to 12,300, 22,500, 28,100, and 34,100 ppm *trans*-1,2-dichloroethene, equivalent with 49,577, 90,690, 113,262 and 137,446 mg/m³, leading to lethality of 0/10, 4/10, 7/10 and 10/10 animals, respectively. Older lethality studies with mice (3/concentration) reported a.o.100% death after 21-32 minutes exposure to 105,000 mg/m³, 100% death between 66-92 minutes of exposure to 80,000 mg/m³, and 100% death 121-142 minutes exposure to 75,000 mg/m³.

The 4 hour LC₀₁ of 62,220 mg/m³ calculated with DoseResp, was used as point of departure for deriving LBW values. The default total uncertainty factor of 10 (3x3) was considered sufficient to account for inter- and intraspecies differences. Time-scaling was performed using the equation $C^n \times t = k$, using default values for n of 1 and 3 for extrapolation to longer and shorter exposure durations, respectively. Using n=3 to calculate the 10 and 30 min and 1 hour exposures would lead to LBWs of 18,000, 12,000, and 9,900 mg/m³. Not to come into conflict with the lethality data in mice (all animals dying within 75-114 minutes exposure 16 250 ppm (65 000 mg/m³) *cis*-1,2-dichloroethene and after 121-142 minutes exposure to 18 750 ppm (75 000 mg/m³) *trans*-1,2-dichloroethene), the 10 and 30 min and 1 hour LBWs are set equal to the 2 hour value of 7,800 mg/m³.

Additional toxicological information (including relevant results of a general literature search, if any)

1,2-Dichloroethene is a flammable, colourless liquid existing in both *cis* and *trans*-isomers and as a mixture of these two isomers. The *trans*-isomer is commercially isolated by distillation and sold as a highly purified product that is used in precision cleaning of electronic equipment.

Nonlethal toxicity and lethality data indicate that 1,2-dichloroethene has a narcotic effect and that the *cis*-isomer is about two times more potent than the *trans*-isomer with respect to narcosis. In general animal exposure to the *trans*-isomer took 2 – 3 times longer to lose equilibrium than when exposed to the same concentration of the *cis*-isomer. Furthermore, a minimum alveolar concentration of 0.0183 % of the *trans*-isomer was needed for induction of anaesthesia, whereas a concentration of 0.0071% was needed with the *cis*-isomer. Narcotic observations indicated a progression from equilibrium effects, followed by lethargy, light narcosis (loss of limb reflex, maintenance of corneal reflex), finally deep narcosis (loss of corneal reflex), and in some cases death. Dose-related ocular irritation was observed in rats. Lethality data (comparison of 4 hour LC₅₀ values) also indicate that the *cis*-isomer (LC₅₀ 13 700 ppm) is twice as potent as the *trans*-isomer (LC₅₀ 24 100 ppm).

No data on developmental and reprotoxic effects in humans were located for *cis*-1,2-dichloroethene. A reproductive study in rats with *trans*-1,2-dichloroethene shows a decrease in foetal body weight in the offspring.

H332: Harmful if inhaled

Carcinogenicity and derivation of the CRP value	Odour and derivation of the LOA value
<p>IARC classification: not evaluated</p> <p>No carcinogenic risk potency (CRP) was derived</p>	<p>Odour: characteristic odour (AEGL: ethereal, slightly acrid)</p> <p>OT: 69 mg/m³ [AEGL, 2010; O'Neil et al, 2001]</p> <p>LOA = 11.8 * 69 * 1.33 = 1083 mg/m³</p> <p>(The concentration Level leading to distinct Odour Awareness (I=3) is calculated using the formula: $I = 2.33 * \log(C/OT) + 0.5$. A correction factor of 1.33 is applied to this value)</p> <p>The LOA is comparable with the VRW values.</p>

Other standards and guidelines (1h values in mg/m³, unless otherwise indicated)^a			
VRW level 550	AEGL-1 554	ERPG-1 -	<p>IDLH: 1,000 ppm (4,031 mg/m³) (30 minutes)</p> <p>(for mixtures of 1,2-dichloroethenes)</p>
AGW level 1,700	AEGL-2 1,980	ERPG-2 -	
LBW level 3,900	AEGL-3 3,366	ERPG-3 -	

^a Note that the AEGL values as presented here (in mg/m³) are derived using the conversion factors of the AEGL.