

EASCR

European Association for Safer Coatings Removal

Paint Stripping The Unknown or Ignored Risk

English Translation

- Gerald Altnau, EASCR
[Les Décapants Peintures en Europe](#) – *Paint Stripping in Europe*
- Christine Boust, INRS – Institut National de Recherche et de Sécurité, France
[Les Décapants Peintures en France](#) – *Paint Stripping in France*
- Reinhold Ruehl, BG BAU – Berufsgenossenschaft der Bauwirtschaft, Germany
[Les Décapants Peintures en Allemagne](#) – *Paint Stripping in Germany*
French speaker: Mathieu Foulonneau – Rutolan France
- Tony Musu, ETUI – European Trade Union Confederation, Belgium
[Le Point de Vue des Travailleurs](#) – *The Workers' Point of View*
- Eric Martin, TB Peinture, France
[Le Point de Vue de l'Employeur](#) – *The Employer's Point of View*

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Paint Stripping The Unknown or Ignored Risk



Dr. Gerald G. Altnau
Hattersheim - Germany

Paint Stripping in Europe

Paint stripping with dichloromethane as the only choice?

- 90% or more of all paint strippers used in Europe are based on dichloromethane (DCM).
- Typical composition:
 - 70 – 90% dichloromethane, Xn + 10% methanol, T =
- Consumption:
 - 1995 – 1999: ~ 45.000 tons per year
source: TNO report 1999
 - 2003: 30.000 – 39.000 tons per year
source: ETVAREAD - April 2004 & CEFIC - November 2005
- DCM paint stripper production is a concentrated industry with only 150 – 180 people involved in the production European wide.
- DCM paint stripper producers produce also „alternative formulations“ but hold back on own sales and prefer to compete on price with DCM formulations versus small enterprises specialized on safer alternatives.

What is the truth?

- Dichloromethane based paint strippers are said to offer
 - High effectivity
 - Low cost
 - Easy to handle
 - Low safety & health risk (especially when formulated with vapor retardants)
- In 2004 in the ETVAREAD report for the EU Commission 17 DCM paint strippers (incl. Vapour retardation) were tested and all exceeded by far existing exposure limits with values between 400 1700 ppm.
- In 2000 a DCM paint stripper expert team of the German Association of the Chemical Industry concluded already that these paint strippers generally exceed exposure limits (also exterior).

The secrets of the market

Dichloromethane

- is one of the fastest evaporating solvents
- vapors are 3 times heavier than air
- is absorbed through breathing and the skin
- can create chemical burns (3rd degree)
- is a narcotic and was used as general anaesthetic in the early 20th century.
- Can create sensations of drunkenness and euphoria, headaches, dizziness, etc. when exposed to more than 500 ppm
(Testud, Arch.mal.prof. 2002, 63)
- Can effect the central nervous system after 1.5 - 3 h at 193 ppm in air. (Putz et al, J Environ Pathol Toxicol 2:97-112)

DCM classification

- Toxicity
 - Acute: narcotic, generation of carbon monoxide, death
 - Genotoxic in vivo and in vitro
 - Tumors in mice, relevance for humans?
- Exposure limits between 15 (N) and 100 ppm (e.g. N, NL)
- Germany no exposure limit since 2006 (carcinogenicity and cell effects!)
- No EU occupational exposure limit
- EU-classification:
 - Xn - harmful
 - R40 - possible risks of irreversible effects
 - Carc. Cat. 3 - substances which have tested to be possibly carcinogenic

Dichloromethane versus alternatives solvents

Conclusion:

- Two out of three selected alternative solvents are better than dichloromethane, because
 - Lower risk level
 - Key effect is less important
 - Tox database is better than for dichloromethane

Dr. Bruno Orthen, Toxicologist
Federal Institute of Occupational Safety & Health, Germany
Presentation for the EU Commission, November 2005

	Relative risk level	Effect	Database
Chlorure de methylene	4650 - 46500	cancer, death	limited (D-MAK)
Dibasic esters	40 - 1350	nose	sufficient
2-(2-Ethoxyethoxy) ethanol	19	nose, larynx	sufficient
Benzyl alcohol	no information		

DCM Paint Stripping in the EU Commission

- The European Commission Working Group on the „Marketing and Use of Dangerous Substances and Preparations“ investigates DCM paint strippers because of their high risk potential since 2000.
- Since more than 10 years dichloromethane paint strippers are already restricted in 3 EU member states (Denmark, Sweden and Austria).
- The Commission pays repeatedly for studies on DCM paint strippers which are consistently criticized by the Scientific Committee of the EU Commission because the involved health risk is not sufficiently addressed.
- The EU Commission avoids a restriction proposal.

EASCR — European Association for Safer Coating Removal

- EASCR was founded on October 29, 2004
 - to defend „Alternative Paint Strippers“ in the EU Commission.
 - to combine more than 150 years of experience to develop and offer paint strippers free of DCM.
 - to improve safety in coating removal and cleaning work places.
 - to educate about alternative solutions to replace hazardous substances.

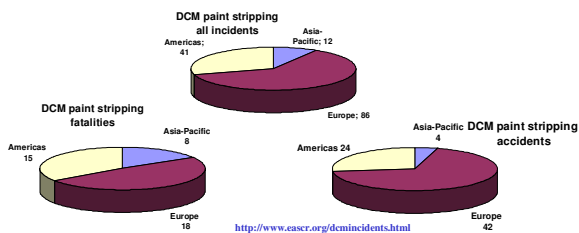


EASCR (l. to r.): Dr. Gerald Altnau (EASCR), Sheila and Ivor Chivers (Eco Solutions), Julie Fearon (EASCR), Harald Utler (STS), Robert Le Ruette (Vliegenthart & Rutolan), Georg Scheidel Jun. and Werner Reinecke (Scheidel)

www.eascr.org

What price pay the users?


- During the last 30 years 139 persons had accidents with DCM paint stripper globally
 - 49 fatalities and 90 persons injured
 - 117 professionals and 22 consumers
- In Europe 18 persons died and 42 were injured.
- Europe is leading in all categories with 62% of all known incidents!





PAINT STRIPPERS IN FRANCE


Salon « Couleurs et finitions »
16 mars 2007

PAINT STRIPPERS USED IN FRANCE

- Data based on an INRS study « Les décapants chimiques industriels » PR22-202-06
- An enquiry based on the ORFILA database, representative of the number and the product compositions on the French market (no quantities)
- 60 paint stripping agents


Christine BOUST
16/3/2007



PAINT STRIPPING AGENTS USED IN FRANCE RESULTS

- 50% of the formulations contain methylene chloride at a concentration between 52 to 95 %
 - Others components can be :
 - Solvents : méthanol or toluene
 - Co-solvents : hydrocarbons or toluene+alcohol
 - Vapour Retarding Additives : Paraffinic waxes
 - Surfactants
 - Others additives : activation agents, thickening agents, corrosion inhibitors


Christine BOUST
16/3/2007



PAINT STRIPPING AGENTS USED IN FRANCE RESULTS

- 25% of the formulations are alkaline strippers
 - Essentially containing soda or potash
 - Half are aqueous, others are powders or pastes
 - Can contain : hydrocarbons, NMP, surfactants, glycol ethers, thickening agents

Christine BOUST
16/3/2007



PAINT STRIPPING AGENTS USED IN FRANCE RESULTS

- Others are composed by hydrocarbons or organic solvents :
 - Hydrocarbons based products can contain xylene, toluene, glycol ethers, acetates, ketones
 - Acid ou basic aqueous solutions with benzylic alcohol
 - Oxygenated solvents can be DMSO, MEK or blends of NMP and co-solvent or DBE

Christine BOUST
16/3/2007



Dichloromethane in France

Salon « Couleurs et finitions »
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Dichloromethane

- Used as foaming agent for polyurethans, solvent (in pharmaceutical industry for example) and in stripping preparation
- In 2005 about 11000 tons were used in France, of which 4000 tons were in paint strippers
- 40000 French workers were potentially exposed

Dichloromethane

- Toxicity described in INRS document :
 - FT 34 (www.inrs.fr)
- Occupational exposure limit values in France:
 - VLE : 100 ppm
 - VME : 50 ppm
- Use under regulatory conditions (articles of French « Code du travail » :
 - R231-54 à R231-54-17)

Dichloromethane

- 6 fatalities have been recorded in France since 1990 during exposition at high concentration levels :
 - Manual stripping in enclosed atmosphere
 - Use of open stripping tanks

Paint Stripping in Germany



Reinhold Rühl
 Berufsgenossenschaft der Bauwirtschaft
 German Employer's Liability Insurance of the Construction Industry
 For many years chairman for the working group TRGS 612
 „Alternative substances for dichloromethane based paint strippers“

BG BAL

Paint Stripping in Germany

Accidents and Exposure in Germany

1987 and 1989 several fatal accidents happened in Germany during paint stripping

Exposure to DCM during paint stripping
 Limit value 100 ml/m³ (ppm)


	DCM – Concentration ppm	
	Indoor	Outdoor
Minimum	82	44
95th percentile	687	372
Maximum	843	632
Measurement value	62*	37

BG BAL

Paint Stripping in Germany

Paint stripping with DCM - Protection measures

Boiling point of DCM < 65°C,
Self-contained respiratory protection is needed!




Older persons are normally not able to carry this protection

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Paint Stripping in Germany

Paint stripping with DCM - Protection measures

Glove materials (break-through time)

Latex 2 min	Polyvinyl chloride 4 min	
↓		
Fluoro rubber 150 min	Nitrile rubber 5 min	
	Polychloroprene 6 min	Butyl rubber 8 min

BG BAL

Paint Stripping in Germany

Paint stripping with DCM - Protection measures

- We are not aware of any single construction site, on which these protection measures were used!
- We are not aware of any single decorator, who was examined, whether he can carry self-contained respiratory protection!

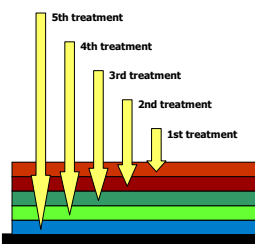
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Paint Stripping in Germany

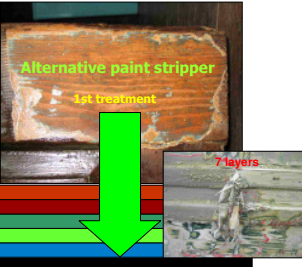
Paint stripper without DCM

- DCM paint strippers strip only 1 layer per treatment
- Alternative paint strippers treat several layers because of their longer activity

DCM paint stripper



Alternative paint stripper




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Paint Stripping in Germany

■ TRGS 612 'Substitutes for DCM paint strippers' (1995)

- Hazards and measures are listed
- Alternatives and their advantages are recommended




**no implementation
in safety data sheets
and at construction sites**

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Paint Stripping in Germany

■ Economically paint stripping



	Dichloromethane-free Strippers	Dichloromethane-based Strippers
Eye protection	If splashing is possible: goggles	If splashing is possible: goggles
Gloves made from	Polychloroprene, Nitrile caoutchouc	Fluoro caoutchouc
Skin protection	Fat free /low fat content ointment	Fat free /low fat content ointment
Respiratory protection during treatment - by hand - by spraying	- filter types: A1-P2	Self-contained respirators Self-contained respirators
Protective clothing during treatment and cleaning	Disposable chemical protection clothing	Disposable chemical protection clothing
Cost	approx. 75,- Euros	approx. 2.750,- Euros

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Paint Stripping in Germany

■ Cancer Risk of Dichloromethane

- TNO-Report, 1999
- Scientific Committee on Toxicity, Ecotoxicity and the Environment of the EU-Commission:

**Cancer risks
approx. $1,5 \times 10^{-2}$ (bei 100 ppm)**

**With 687 ppm
the cancer risk amounts to 10% !**

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Paint Stripping in Germany

■ TRGS 612 'Substitutes for DCM paint strippers'

In 2006 a comparison test was accomplished on behalf of the Working Group to the TRGS 612

This group is part of the „Committee on Hazardous Substances“, advising the German Ministry for Economy & Work

In this Working Group all involved parties have been represented and cooperated including

Decorators Associations, Paint Stripper Producers (with or without DCM), Dichloromethane producers Institutions, Regulatory Bodies, etc.

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Paint Stripping in Germany

■ TRGS 612 'Substitutes for DCM paint strippers'

- 13 paint strippers: (2 with DCM, 11 without DCM)
- 22 different coating on metal sheets
- Temperature during test: day / 8 - 9°C, night / 5 °C

**Dispersion paint, Oil paint, Alkyd resin laquer
Latex paint, Polyurethan laquer**

where not tested because it is accepted, that these surfaces can be removed with DCM-free strippers

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Paint Stripping in Germany

■ TRGS 612 'Substitutes for DCM paint strippers'

	Décapants	
	DCM-free	with DCM
2 Comp. Epoxy		
Disboxid	-	-
Disboxid 444/Dispox 447	+	+
Sikafloor 2530	+	+
Sikafloor 261	+	+
Plastophen H-S	+	+
Coil Coating		
PVDF	-	-
Colorcoat HPS 200	+	-
Polyester	-	-
Powder Coating		
PVDF	-	-
Interpon	+	+

Each coating, which can be removed with DCM paint strippers, can also be removed with DCM-free paint strippers!

These results are incorporated into the new Technical Rule TRGS 612

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■ TRGS 612 'Substitutes for DCM paint strippers' (2006)

- For all coatings, which can be removed with DCM paint strippers, usually also suitable effective DCM-free paint strippers are available on the market and applicable from a technical point of view.
- On construction sites a high risk exists for other non-involved persons.
Therefore construction sites must be evacuated, when DCM-based paint strippers are used.
- From an economical point of view, it makes more sense to use DCM-free paint strippers.

Workers' Point of View

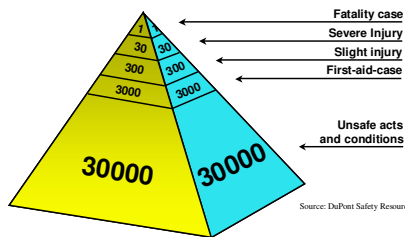
Tony Musu, ETUI-REHS
 Salon "Couleurs et finitions"
 Paris, 16 March 2007



Chemicals and Occupational diseases/fatalities in Europe (EU-15)

- 18 % of workers in Europe declare to handle hazardous products and 20,5 % to inhale toxic vapours (Dublin Foundation, 2006)
- Between 18% and 30% of all occupational diseases recognised each year in the EU are related to exposure to chemicals (based on Eurostat data, 2004)
- In 2001, more than 26 000 deaths of European workers due to exposure to hazardous chemicals (ILO, 2005)
- Each year in Europe ~ 1 fatality due to the use of dichloromethane (EASCR, 2007)

The Fault Pyramid

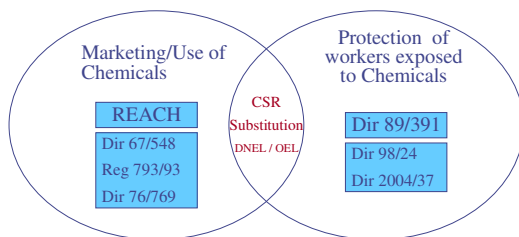


Statistical analysis shows that 30.000 unsafe conditions result in one fatal accident!
 By analogy we can assume that the identified 25 fatalities were caused by 750.000 fold unsafe conditions when handling paint strippers with DCM in Europe. The reality has to be even higher because not all fatalities became public due to data confidentiality.

The European legislation related to chemical agents

- Directive 1967: classification and labelling of dangerous substances (> 7000 substances including DCM)
- Directive of 1976: restrictions on the marketing and use of certain dangerous substances (eg.: asbestos)
- 1981: notification of new substances
- Directive of 1991: safety data sheets
- Regulation of 1993: evaluation and control of risks (141 priority substances, evaluation completed for ~ 40 of them)
- the REACH Regulation enters into force in June 2007 (Registration, Evaluation & Authorisation of CHemicals)

REACH and the OSH legislation



➔ Two co-existing legislations for the substitution of hazardous substances with safer alternatives

Obligations for the employers in the Chemical Agents Directive (98/24/EC)

- Determine whether any hazardous chemical agents are present at the workplace
- Assess any risk to the H & S of workers arising from their use
- Ensure that the risk is eliminated or reduced to a minimum starting with substitution
- If substitution is not possible, apply a hierarchy of preventive and protective measures
- Compliance with the European occupational exposure limit values (if they exist) and with the national OEL (always)
- Information and training for workers

Occupational exposure limit values for the DCM

	Exposure limits	
	[mg/m ³]	[ml/m ³] or ppm
Norway	50	15
Sweden	120	35
Denmark	122	35
France	180	50
Austria	175	50
Ireland	174	50
Belgium, Spain	177	50
Italy		50
Finland, Great Britain, Netherlands	350	100
Germany (until end of 2005), since 2006 no OEL!	350	100
Switzerland	360	100
USA		25

In USA, OSHA has reduced the DMC OEL to 25 ppm in 1997

- „With the new standards we expect to **save 34 lives a year**“ said Joseph A. Dear, who heads the Occupational Safety and Health Administration (OSHA).
- 237.500 workers use methylene chloride to strip paint, clean metal parts and produce foam cushions.
- The new OSHA standards include an **eight-hour time-weighted average permissible exposure limit (PEL) of 25 ppm in air**, a 15 minutes short-term exposure level (STEL) of 125 ppm and a 12,5 ppm action level.
- OSHA previous standard, dating back to the 1970's included a 500 ppm PEL with a 1000 ppm ceiling limit.

Conclusions

- Dichloromethane (DCM) is a product classified as dangerous at the European level
- European and national legislations oblige the employers, which use DCM to eliminate risks or to reduce them to a minimum
- If safer alternatives exist, employers have to use them
- Substitution with safer alternative allows to avoid cost to employers, to workers and to Social security.

The Point of view of the Employer

Eric Martin
TB Peinture
Sept-Saulx, France



51400 Sept Saulx
France

The Company

- Activity: finishing work on buildings , coatings and decoration, renovation of furnitures, exterie carpentries
- Employed : 8 persons
- Location : Sept Saulx (51)
- Turn-over 2005 : 480 k€.



51400 Sept Saulx
France

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Paint Stripping

- Used for restoration of furnitures and outside carpentry
- Part dimensions: 1 m² or less
- Material : iron and wood
- Kind of polutions : paints

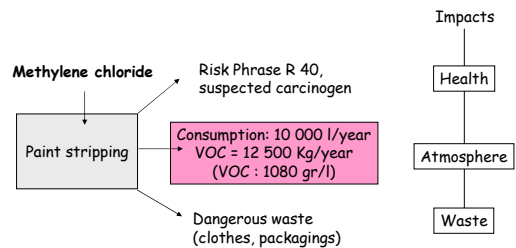


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The Old Process

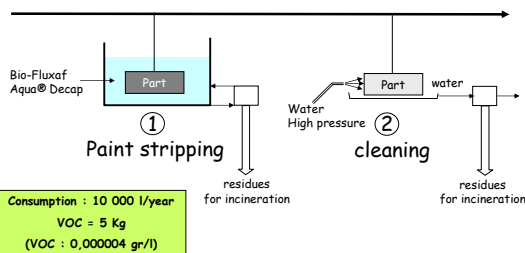


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The New Process



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Investment

- Realized in 2006 :
 - Stainless steel paint stripping tank, decanting equipment, lid, filtration system 46 770 € H.T
 - transport / hoisting equipment 1 843 € H.T
 - Planned for 2007 :
 - water moist ventilation system (cleaning) 3 972 € H.T
 - rails for hoisting equipment and its power supply 8 615 € H.T
- TOTAL 61 200 € H.T

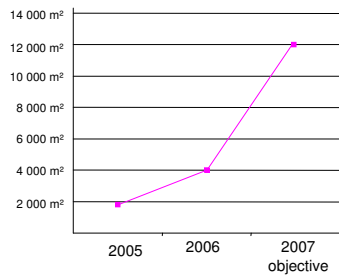


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Paint Stripping Development



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Conclusions & Perspectives

- Improvement of working conditions
- Reduction of **VOCs classified as dangerous from 13 000 Kgs to 5 Kgs of non-classified VOCs per year.**
- New markets
- New OEM customers
- Future growth

OEM = Original Equipment Manufacturer



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