VKIS - VSI – IGM – BGHM List of Substances for Metal Working Fluids according to DIN 51385 for metalworking

VKIS

vsi-schmierstoffe.de

BGHM Berufsgenossenschaft Holz und Metall

21st edition 2021-12-15

VKIS – VSI – IGM – BGHM – List of Substances for Metal Working Fluids according to DIN 51385 for metal working

1 General

This list of substances is intended to support environmental and occupational health and safety compatible and process oriented handling of substances and preparations. It will be reviewed by representatives from the Verbraucherkreis Industrieschmierstoffe (VKIS), the Verband Schmierstoff-Industrie e. V. (VSI), the Industriegewerkschaft Metall (IGM) under moderation of the Fachbereich Holz und Metall (FBHM) of the Deutsche gesetzliche Unfallversicherung (DGUV), represented by the Berufsgenossenschaft Fachbereich Holz und Metall (BGHM) in a working group upon up-to-dateness and will be revised if needed. It is complementary to the VKIS-Data- and Inspection sheets and points to the suppliers' and users' responsibility to comply with effective German law, edicts and *technical* regulations. This does not exclude, that this substance list can be applied outside Germany with regard to environmental and industrial safe as well as process oriented handling of substances and mixtures.
This list of substances comprises specific requirements for the following preparations according DIN 51385:

- Water miscible (wm) and water-mixed (wg) coolants
- Non-water miscible (nw) coolants

and analogously for

- Additives, added to the coolant before and during its use. This includes e. g. defoamers, biocides (for pre and re-conservation), disinfection cleaners, stabilizers, emulsifiers, corrosion inhibitor add-ons, high pressure add-ons.

DIN 51385 comprises information beyond MWF on products for MQL (minimum quantity lubrication), multifunctional oils and deformation lubricants. There is no claim on completeness for denomination of specific ingredients in such products.

21st edition 2021-12-15

In general metal working fluids contain several substances and are “mixtures” in terms of EG-regulation (EG) no 1907/2006 (REACH). If the metal working fluid meets the criteria of article 31 of the REACH regulation, the supplier must make available an EG Safety Data Sheet according Appendix II to the buyer of the coolant. Classification and labeling of the metal working fluid is according regulation (EG) No. 1272/2008 (CLP) and is listed in section 2 of the safety data sheet.
In addition to the classification and labeling the EG safety data sheet for the hazard assessment will contribute to an improvement of occupational health and safety.
Particularly for small and midsize enterprises

- the Technical Bulletin
- the EC-Safety Data Sheet and
- the VKIS-VSI-IGM-BGHM-list of substances

do form the basis for occupational health and safety provisions. The respective departments of the Metal Working Fluid user plant should receive the a.m. datasheets with every new coolant sample.
Recommended practice handling control is communicated by DGUV-Regel 109-003 (previous BGR/GUV-R 143).

The metal working fluid assessment-standard of the DGUV-Regel 109-003 of 10 mg/m^3 is based on technically, not sanitary justified. The assessment criteria (TRGS 900, MAK DFG, etc.) of the individual substances must always be complied with.
It should always be aspired to minimize the metal working fluid exposition. The technical state of the art standard as described in DGUV Regel 109-003 must be applied. A project has been launched by DGUV to examine, if sanitary based assessment-standards for metalworking fluids can be generated. Not all limits given in DGUV-Regel 109-003 are up-to-date. This standard is under review currently. The limits for individual substances can be found in TRGS 900 and in this list.

EG-CLP-regulation (Classification, Labeling & Packaging) for the implementation of GHS (Globally Harmonized System) has become effective on January 20th 2009. It must be applied for substances since December 1st 2010, for mixtures it is mandatory since June 1st 2015. In GHS some threshold values for labeling and pictograms have been changed, R-phrases have been substituted by H-phrases (H=”Hazard”) and S-phrases by P-phrases (P=”Precautionary”). There was a transition period for labeling of mixtures according to the previous system until June 1st 2017 for goods packed before June 1st 2015. There is no obligation to re-label. A transfer list for old labeling can be found in the glossary.

The respective current version of this list can be found on the homepages of:

- VSI : www.vsi-schmierstoffe.de
- IGM: www.igmetall.de and
- Fachbereich Holz und Metall: http://www.dguv.de/fb-holzundmetall/index.jsp ; Themenfeld KSS und Gefahrstoffe: http://www.dguv.de/fb-holzundmetall/sg/sg_maf/kss/index.jsp

From the 11th edition onward there is a current translation in English available. Decisive however are the contents of the version in German language.

2 Requirements to inclusion of substances

The substances listed below have been adopted for occupational health, toxicological, environmental or process oriented reasons.

The list contains in sections 3.1 – 3.4, Appendix I and Appendix IIa, IIb as basic principle only substances, which are considered "relevant for usage (in MWF)". In addition also substances may be listed for transparency reasons,

- which are considered relevant for usage in European countries,
- which have been relevant for usage in previous years and for which therefore over the next years current health-related information should be available in this list,
- which are listed in the DFG-MAK-list in section Xc as MWF constituents and which have a MAK-threshold or a limit according TRGS 900
- for which on an individual case base an inclusion into the list has been decided within the working group

The relevance for usage is ascertained by the technical committee of MWF formulators within VSI; supplementary information from VKIS, IGM and BGHM, which suggest relevance for usage in MWF, is taken into account. Completeness of all relevant MWF ingredients cannot be assured.
Substances, for which relevance of usage is not known, for which however there is an indication for a relevance of usage, will be reviewed based on simultaneously existing relevance to human health and/or relevance to the environment by the technical committee of the MWF formulators within VSI upon relevance for usage; and if there is confirmed relevance for usage they will be included into the list (or - where appropriate – into appendices I, IIa, IIb of the list).
As indicator for relevance of usage in general are considered an inclusion in the PC25 list in the REACH registration and/or inclusion into the list in section IIb (MWF components in DFG-MAK-list, currently no MAK- threshold deducible however). Other indicators for relevance of usage may be considered case-by-case.
Relevance on human health is assumed in general, if a substance is classified with one or more of the following H-phrases:

- H300; H301; H304; H310; H311; H314; H317; H318; H319; H330; H331; H334; H335; H340 H350; H351; H360; H361; H362; H370; H372 (classification by registrant or harmonized classification according to CLP) or
- if a substance has a national or international occupational limit value (e. g. from TRGS 900, MAK-list, SCOEL-assessment, ACGIH-limit value list etc.) or a DNEL (worker, chronic) of ≤ 1 mg/m³.

So, if following criteria apply

1. Indicator for relevance of usage
2. Relevance for human health (as demonstrated by regulatory values as limits or classification) and
3. Confirmed relevance of usage, and
4. The working group have assessed afore mentioned relevancies, e. g. in view of the conditions of use, e. g. under conditions of dilution

the respective substance will in general be included into the list inclusive of its appendices. Additionally the relevance for the environment can be a criterion for the inclusion of substances into the list (H400; H410; H411).

So the list cannot warrant completeness for all MWF ingredients. It is recommended that interested persons, who cannot find a particular MWF ingredient in the list, obtain information regarding classification, limit values and toxicological information from:

- European Chemicals Agency (ECHA)
  https://echa.europa.eu/de/information-on-chemicals/registered-substances
- Deutsche Forschungsgemeinschaft (DFG), Rationales of MAK-values
  https://onlinelibrary.wiley.com/doi/book/10.1002/3527600418
- Institut für Arbeitsschutz der Deutschen gesetzlichen Unfallversicherung (IFA),
  GESTIS Stoffdatenbank (Gefahrstoffinformationssystem) [*GESTIS substances data base (dangerous substances information system*]
  https://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index.jsp

- Institut für Arbeitsschutz der Deutschen gesetzlichen Unfallversicherung (IFA), national and international limit values
  https://www.dguv.de/ifa/gestis/gestis-wissenschaftliche-begruendungen/herkunft-deutscher-luftgrenzwerte/auslaendische-luftgrenzwerte/index.jsp

The threshold values for a ban of use listed in 3.1a are valid for non-water-miscible MWF and water-miscible MWF in condition as delivered.
When evaluating a substitution the customary application and use of the product must be implied.
For substances labeled according CLP-regulation 1272/2008/EG as carcinogenic, mutagenic, reproduction toxic class 1A or class 1B, toxic class 1 to 3, bio-accumulative, persistent or aqua toxic, particular attention must be paid during hazard evaluation, if remaining hazards are kept as low as possible.
All substances contained in mixtures, which are regulated in the dangerous substances and environmental legislation (e.g. GefStoffV (Regulation for recasting of the Hazardous substances regulation and for amendments to the explosives act), Wasserrecht (Water Act)) or demanding further caution during handling, must be declared.
The threshold values listed in 3.2 are valid for non-water-miscible MWF and water-miscible MWF in condition as delivered, for water-mixed MWF after new preparation.
Furthermore substances w/o final occupational health and toxicological assessment are listed in Appendix I. For such substances it is aspired to review them within the next 2 years.
The handling of biocides (biocidal substances and biocidal products) is dealt with in Appendices IIa till IIc.
If coolants are further subject to dangerous goods transportation regulations the compulsory procedure for packaging, labeling, declaration and transportation must be adhered to. Regulations in the German Waste Avoidance, Recycling and Disposal Act (Kreislaufwirtschafts- und Abfallgesetz) shall be observed.

3 Lists of Substances

3.1a Prohibited substances

The substances listed must not be used in metal working fluids due to statutory provisions. The substances listed are prohibited substances or substances with restricted use in accordance with EC dangerous substances and environmental legislation as well as in accordance with German law and directives and sub-legal regulations (TRGS).
The quoted limits for the prohibition of use apply to nwm MWF and wm MWF at their conditions at delivery.
The omnipresent concentration of 10 ppm indicated for some prohibited substances must not be a result of admixture.

3.1b Substances with restrictions of use or undesirable substances

Despite their use is not prohibited by law these substances may be used only up to the respective concentration limit and/or in agreement with the user. There will also be substances included which may cause non-justifiable technical risks during application.

3.2 Substances with threshold values / concentration limits

Beside the threshold values for air according to TRGS 900, List 3.2 also contains the following threshold values in the column “metal working fluids”:

- Threshold values from the waste oil regulation (Altölverordnung)
- Concentration limits according to ATP (EU Adaptation Directives to the technical progress according to Annex VI of EU Directive 1272/2008), however only if the individual concentration limit for a substance deviates from the standard concentration limit
- Substances with labeling H 334 (may cause allergy or asthma symptoms or breathing difficulties if inhaled) must strictly be reported.

- Concentration limits according manufacturers‘ specification
- Biocidal substances can be found in Appendix IIa

Any deviating threshold values of the Senate Commission on the Investigation of Health Hazards of Chemical Compounds in the Work Area of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) (MAK Commission) are indicated in the “Comments” column.
Note on EUH 208:
“Contains (name of sensitizing substance). May cause allergic reactions.”

3.3 Declarable substances (with occupational medicine/toxicology or ecological relevance)

Regarding list 3.3 it must be noted that according to this list manufacturers’ specifications are reported, which might be of occupational medicine/toxicology or ecological relevance.
All products (preparations, mixtures) containing sensitizing substances with R 43 (H 317) with a concentration above 0,1 % must according to the supplemental labelling element EUH 208 contain a reference on the label “Contains (*name of substance)*. May cause allergic skin reactions*”.*

3.4 Declarable substances (due to process related reasons)

According to List 3.4, metal working fluid manufacturers will provide information on substances of significance for the process technology.

Appendices

Appendix I Substances with no final occupational medicine/toxicology or technical assessment

In this appendix constituents which have not been finally assessed scientifically regarding their classification/labeling and/or air threshold value have been registered.

Regulation (EC) No. 1907/2006 of the European Parliament and the Council on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) stipulates that certain minimum data on toxicity and environmental behaviour of chemicals must be provided for the assessment of their hazards. Preempting these requirements, important metal working fluid constituents are included in the Annex with existing data gaps.
As benchmark, 6 minimum requirement tests are defined as basis (acute toxicity, irritation of the mucous membrane, skin irritation, mutagenicity, skin sensitization, repeated application), whereby alternatively other findings from the fields of toxicology or occupational medicine are taken into consideration to decide whether a substance should be included. The designation of a substance in this list does not imply a declaration duty at present and is intended for information only.
Substances listed in the Appendix will be regularly reviewed to that extent if they will be transferred to lists 3.1, 3.2 or 3.3 or may not be transferred. Reasons for such decisions will be provided.

Appendix IIa Biocidal substances for metalworking fluids (“Article 95 list”) - information gathering Classification acc. CLP regulation EC No. 790/2009, annex VI

Appendix IIb Biocidal products for metalworking fluids

List IIb is represented by the classification of biocidal products for PA 13 (metal working fluids), which are approved for use by national authorities (in Germany: BAuA).

Appendix IIc Biocides for metalworking fluids – “use, application and details”

This table summarizes application related data and expert knowledge on biocides. Unless not explicitly reported otherwise it is assumed that the standard classification limits according to CLP (regulation (EC) No. 1272/2008) must be applied. When selecting a biocide a trade-off between effectiveness, stability and hazard potential must be made.
An important question of the biocide user relates to classification and labeling of the water mixed MWF, if there are several biocidal active substances contained. With no exception the CLP regulation must be applied, if the active substances have specific classification limits. In the specific case of formaldehyde depots the contents of formaldehyde must be calculated and added or the total formaldehyde concentration must be determined analytically.
Pre-mixture of biocide concentrates is also to be avoided. For example most of the N-formals must not be mixed with CMI/MI (different pH-values lead to neutralization combined with an intense chemical reaction).

Should you require up-to-date information, please contact:

Für den VKIS:
Dr. Reinhard Baumgärtner Reinhard.Baumgaertner@ps.rolls-royce.com

Für den VSI: www.vsi-schmierstoffe.de
Dr. Stephan Baumgärtel stephan.baumgaertel@vsi-schmierstoffe.de

Für die IG Metall: ags@igmetall.de

Für den FB HM: www.dguv.de/fb-holzundmetall
Dr. Jens Manikowski jens.manikowski@bghm.de

List 3.1a: Prohibited substances (Processing fluids acc. to DIN 51385)

Component ***(CAS-No.)***	Air limit value TRGS 900 *Schwanger-schaftsgruppe*	Concentration limit MWF	Legal foundations, sources, notes	Comments
Amines, secondary, forming carcinogenic N-nitrosamines of category 1B		≤ 0,2 % (wm)	TRGS 611	
Compounds, splitting off secondary Amines (e.g. Amides) → Amines, secondary			TRGS 611	
Barium salts, with the exception of barium sulphate		≤ 10 ppm (wm) ≤ 2 ppm (wg)	AbwV annex 40 Waste water regulation	
Benzo-(a)-pyrene (BaP) ***(50-32-8)***, as indicator for polycyclic aromatic hydrocarbon (PAH/PAK)	Accepted Con-centration: 70 ng/m³ Tolerated Con-centration: 700 ng/m³ (BekGS 910)	≤ 50 ppm BaP ≤ 3 % DMSO-extract for the base oil (PAH/PAK)	BekGS 910 TRGS 905	Method: IP 346 C1B, M1B, R_E1B, R_F1B
Bis-(2-ethylhexyl)-phthalate (DEHP) ***(117-81-7)***	2 mg/m³ *Y*	≤ 0,5 %	SVHC-substances list candi-date (REACH annex XIV)	R_E1B, R_F1B Duty of declaration from 0,1%
Chlorinated paraffin, short-chain (C_{10}-C_{13}, SCCPs) ***(85535-84-8)***			EG2019/1021 annex I (POP-regulation)	PBT-substance, not registered under REACH; CLP: H351
Diethanolamine (2,2´-Iminodiethanol) ***(111-42-2)***		≤ 0,2 % (wm)	TRGS 611	decision at UA III: 0,5 mg/m³
2-methylamino-2-methyl-1-propanol (MAMP, secondary amine) ***(27646-80-6)***		≤ 0,2 % (wm)	TRGS 611	Contamination in 2-Amino-2-methyl-1-propanol (AMP) ***(124-68-5***), → AMP see below
Morpholine ***(110-91-8)*** and morpholine releasing compounds (e.g. Methylene-bis-morpholine / Bis-morpholino-methane) ***(5625-90-1)***	36 mg/m³	≤ 0,2 % (wm)	TRGS 611	

Component ***(CAS-No.)***	Air limit value TRGS 900 *Schwanger-schaftsgruppe*	Concentration limit MWF	Legal foundations, sources, notes	Comments
Nitrite releasing compounds (e.g. Nitrite, 4-(2-nitrobutyl)-morpholine ***(2224-44-4)*** 2-bromo-2-nitro-1,3-propanediol ***(52-51-7)***, Tri-hydroxymethylnitromethane) ***(126-11-4)***		Prohibition (wm) ≤ 20 mg nitrite/l (wg)	GefStoffV § 16 Annex II Nr. 4 TRGS 611	Refer to table 3.1b
Nonylphenol ***(25154-52-3),*** Nonylphenol, ethoxylated ***(9016-45-9)***		≤ 0,1 %	EU-Water Framework Directive 2000/60/EG REACH annex XVII	REACH annex XIV
Polychlorobiphenyles - PCB ***(1336-36-3)***		≤ 4 ppm	Waste oil regulation (AltölV) PCB/PCT waste regulation	C2, R_E1B, R_F1B
Sum „TEQ“ Polychlorodibenzodioxins and poly-chlorodibenzofurans; lead component 2,3,7,8-TCDD „Dioxin“ ***(1746-01-6)***		≤ 2 ppb in raw materials	TRGS 905, TRGS 557	(MAK of DFG: 10 pg/m³)
Terphenyl, chlorinated – PCT ***(61788-33-8)***		≤ 4 ppm	Waste oil regulation (AltölV)	

List 3.1b: Substances with restrictions of use (Processing fluids acc. to DIN 51385)

Component ***(CAS-No.)***	Air limit value TRGS 900 *Schwanger-schaftsgruppe*	Concentration limit MWF	Legal foundations, sources, notes	Comments
1,3-Bis-(hydroxymethyl)-urea ***(140-95-4)***			EC-Biocides regulation, Ruling of the commission 2008/809/EC	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation
Carbendazim (2-(Methoxycarbonylamino)-benzimidazole) (***10605-21-7***)	10 mg/m³ *Z*		Ruling of the commission 2008/809/EC	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation
N-cyclohexyl-hydroxydiazen-1-oxide, potassium salt ***(66603-10-9)*** (N-cyclohexyl-N-nitroso-hydroxylamine, potassium salt, K-HDO)			Ruling of the commission 2012/78/EC Hazardous substances regulation	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation .
Ethylenediaminetetraacetic acid and its salts (EDTA) ***(60-00-4)***		see comment	Waste water regulation annex 40	Must not enter sewage Recommendation: don't use at all
Formaldehyde ***(50-00-0)*** *(as impurity or by re-lease from formaldehyde depot compounds)*	0,37 mg/m³)	0,1 %	Decision of the commission 2008/681/EC 7. ATP of CLP	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation From January 1, 2016: C1B, M2 As release from formaldehyde depot compounds refer to DGUV FB HM-29
Glutardialdehyde ***(111-30-8)***	0,2 mg/m³ *Y*		Cannot be registered due to H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled)	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation
1,3,5-Tris-(2-hydroxypropyl)-hexahydro-1,3,5-triazine(HPT) (***25254-50-6)***				Single substance not registered for prod-uct type 13; may still be used in a mixture of a biocidal preparation

Component ***(CAS-No.)***	Air limit value TRGS 900 *Schwanger-schaftsgruppe*	Concentration limit MWF	Legal foundations, sources, notes	Comments
4-(2-Nitrobutyl)-morpholine (2224-44-4)			Decision of the commission 2013/85/EU	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation Nitrosating Agent
1-phenoxy-2-propanol ***(770-35-4)*** 2-Phenoxy-1-propanol ***(4169-04-4)*** (Mixture or single components)			Ruling of the commission 2008/809/EC	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation
Silicon oils (Polydimethylsiloxanes, PDMS) ***(63148-62-9)***		see comment		May cause technical problems if surface treatment succeeds, e.g. washing, crack testing, nitriding, painting, plating, adhesive bonding. Recommendation: don't use at all
Thiabendazol (2-(thiazole-4-yl)benzimidazole) ***(148-79-8)***	20 mg/m³ *Y*		Ruling of the commission 2011/391/EC	Prohibited from use as biocidal active substance for product type 13 based on missing dossier acc. to EC-Biocidal Products Regulation

List 3.2: Substances with limit values / concentration limits
(Processing fluids acc. to DIN 51385); Biocides see Appendix IIa

Component ***(CAS-No.)***	Air limit value TRGS 900 *Schwanger-schaftsgruppe*	Concentration limit MWF	Legal foundations, sources, notes	Comments
2-Amino-1-butanol (96-20-8)	3,7 mg/m3 Z			May be absorbed through skin (H)
2-aminoethanol (Monoethanolamine) ***(141-43-5)***	0,5 mg/m³ Y			May be absorbed through skin (H), May cause skin sensitisation (Sh) Recommended inhibitor according TRGS 611. CoRAP concluded without further changes
2-(2-aminoethoxy)-ethanol (Diglycolamine) ***(929-06-6)***	0,87 mg/m³			May be absorbed through skin (H), may cause skin sensitisation (Sh)
2-amino-2-methyl-1-propanol (AMP) ***(124-68-5)***	3,7 mg/m³ Y			May be absorbed through skin (H) Check for absence of 2-Methylamino-2-methyl-1-propanol (MAMP) ***(27646-80-6)***, there is also a version with < 0,8 % MAMP available
1-aminopropan-2-ol (Isopropanolamine) ***(78-96-6)***	5,8 mg/m³			
Boric acid [1] ***(10043-35-3)*** Orthoboric acid, Sodrium salt [2] ***(13840-56-7)*** Sodiumtetraborates [3] [4] [5] ***(1330-43-4, 12179-04-3, 1303-96-4)***	0,5 mg/m³ boron (= 2,6 mg/m³ boric acid) Y	[1] ≤ 5,5 % (wm) [2] ≤ 4,5 % (wm) [3] ≤ 4,5 % (wm) [4] ≤ 6,5 % (wm) [5] ≤ 8,5 % (wm)	Ruling of the commission 2008/809/EC	Use of the MAK of DFG (2010) 1,8 mg/m³ boron, Schwangerschaftsgruppe B is not recommended. No classification if concentration limits are adhered to. More information see guidance document DGUV FB HM-030 Duty of declaration above 0,1% (REACH candidate list) According the 17th ATP of CLP regulation the specific concentration limits will be omitted from December 17, 2022. Thereby a concentration limit of 0,3% free boric acid for labelling of mixtures as Reprotox. 1B will be in force.
2-butoxyethanol (Butyl glycol) ***(111-76-2)***	49 mg/m³ Y			May be absorbed through skin (H)
2-(2-butoxyethoxy)-ethanol (Butyl diglycol) ***(112-34-5)***	67 mg/m³ Y			May be absorbed through skin (H) Restriction acc. Appendix XVII for spray application in spray paints and cleaner sprays, not applicable here
Chlorinated paraffin, medium chain (C_{14}-C_{17}, MCCPs) ***(85535-85-9)***	6 mg/m³ Y			May be absorbed through skin (H) Application only if technically necessary (e.g. deformation of stainless steel) and upon agreement Under scrutiny at CoRAP for vPvB properties

Component ***(CAS-No.)***	Air limit value TRGS 900 Schwanger-schaftsgruppe	Concentration limit MWF	Legal foundations, sources, notes	Comments
Distillates (petroleum), hydrotreated light ***(64742-47-8)***				MAK: 5 mg/m³ (E), measured as respirable aerosol propor-tion respectively 350 mg/m³ (vapor)
Distillates (petroleum), hydrotreated heavy ***(64742-48-9)***				MAK: 300 mg/m³
2,6-di-tert-butyl-p-cresol (Butylhydroxytoluol (BHT)) ***(128-37-0)***	10 mg/m³ Y			
Dicyclohexylamine ***(101-83-7)***	5 mg/m³ Y			May be absorbed through skin (H) More information see guidance document DGUV FB HM-031 “Dicyclohexylamine – DCHA - guid-ance document for risk assessment”
Diethylene glycol (2,2´-oxydiethanol) ***(111-46-6)***	44 mg/m³ Y			
Dipropylene glycol (Oxydipropanol, mixture of isomers) ***(25265-71-8)***	100 mg/m³ Y			
2-ethylhexyl oleate ***(26399-02-0)***				MAK: 5 mg/m³ (A)
Isotridecan-1-ol ***(27458-92-0)***	21 mg/m³ Y			
Coconut oil ***(8001-31-8)***	5 mg/m³ Y			
2-methylpentane-2,4-diol (Hexylene glycol) ***(107-41-5)***				MAK: 49 mg/m³
4-methyl-1,3-dioxolan-2-one ***(108-32-7)***	8,5 mg/m³ Y		CLP: H319 Eye Irrit.2	
4,4'-methylene bis(dibutyldithiocarbamate) ***(10254-57-6)***	5 mg/m³ (A) 20 mg/m³ (E)			
Mineral oil (Crude), severely refined ***(92062-35-6,72623-83-7, 92045-45-9, 92045-44-8)***	5 mg/m³ Y			Very rarely used in MWF; potential presence to be checked via SDS
N-1-naphthylaniline ***(90-30-2)***	2 mg/m³ (E)			may cause skin sensitisation (Sh)
Petroleum sulphonate, calcium salts (***61789-86-4)***	5 mg/m³		CLP: H317 Skin Sens.1B	Substance has not been finally evaluated regarding Sh-properties
N-2-naphthylaniline ***(135-88-6)***			CLP: H317 Skin Sens.1B	MAK: May be absorbed through skin (H), May cause skin sensitisation (Sh)
Polyethylene glycols (medium molar mass 200-400 or 600)	1000 mg/m³ Y			

Component ***(CAS-No.)***	Air limit value TRGS 900 *Schwanger-schaftsgruppe*	Concentration limit MWF	Legal foundations, sources, notes	Comments
Poly-α-olefins ***(68649-12-7)***	5 mg/m³ *Y*			
Polytetrafluorethylene ***(9002-84-0)***				MAK: 0,3 mg/m³ (A); 4 mg/m³ (E); relevance for lubricating oils, not for MWF!
Silver ***(7440-22-4)***	0,1 mg/m³			
Silver compounds, inorganic	0,01 mg/m³			Related to silver content
Thiodiethylene bis[3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate] ***(41484-35-9)***	2 mg/m³			
Triglycerides (lard oil, palm oil, rapeseed oil, soybean oil)				MAK: 5 mg/m³ (A)
Triethylen glycol (2,2'-(ethylenedioxy)diethanol) ***(112-27-6)***	1000 mg/m³ *Y*			
Triethanolamine (2,2',2''-nitrilotriethanol) ***(102-71-6)***	1 mg/m³ *Y*			
O,O,O-triphenyl phosphorothioate ***(597-82-0)***	20 mg/m³ (E)			
Triphenyl phosphate ***(115-86-6)***	12,5 mg/m³ (E) *Y*			

List 3.3: Declarable substances (with occupational medicine/toxicology or ecological relevance)
(Processing fluids acc. to DIN 51385)

Component ***(CAS-No.)***	Legal foundations, sources, notes	Comments
Adsorbable organic halogen compounds (AOX)	AbwV annex 40	Waste water limit value 1 mg/l
Amines, secondary, which do not form carcinogenic N-nitrosamines category 1 or 2 (e.g. dicyclohexylamine ***(101-83-7)***)	TRGS 552, 611	
1-(N,N-bis(2-ethylhexyl)aminomethyl)-1,2,4-triazole ***(91273-04-0)***	CLP: H314 Skin Corr. 1B H317 Skin Sens. 1 H318 Eye Dam. 1 H411 Aqu.Chron. 2	DNEL: 1,76 mg/m³
Calcium bis(dinonylnaphthalenesulphonate) ***(57855-77-3)***	CLP: H315 Skin Irrit. 2 H317 Skin Sens. 1 H319 Eye Irrit. 1	
Chlorinated paraffin, medium and long chain (MCCP, LCCP and vLCCP) ***(85535-85-9, 85535-86-0)***	AltolV ≤ 0,2 %	Application only if technically necessary (e.g. deformation of stainless steel) and upon agreement. Limit for disposal as used oil; otherwise as “dangerous waste for elimination”
Dipropylene glycol (1,1´-oxy-dipropan-2-ol, 2,2´-dihydroxydipropylether) ***(110-98-5)***		Compliance with MAK of DFG of 200 mg/m³ is recommended.
Fragrances (masking products)	TRGS 401	Skin sensitizing effects of some fragrances /masking products
Glycerol ***(56-81-5)***		Compliance with MAK of DFG of 50 mg/m³ is recommended.
1-hydroxyethane-1,1-diphosphonic acid and its sodium and potassium salts, HEDP ***(2809-21-4, 7414-83-7)***		up to now no MAK and BAT limits
3-iodo-2-propynyl-n-butylcarbamate (IPBC) ***(EC 259-627-5, CAS 55406-53-6)***		DIN EN ISO 9562 method for AOX determination should be revised as in presence of IPBC too high results (regarding Cl and Br) are pretended. Biocidal active substance. The classification with H331 applies for the active substance as powder. In MWF (and biocidal products) there is the dissolved active compound only. More: see list of biocidal substances.
Benzothiazole-2-thiol ***(149-30-4)***	CLP: H317 Skin Sens. 1 H400 Aqu. Acute 1 H410 Aqu.Chron. 1	MAK: skin sensitisation (Sh) DNEL 8,8mg/m³
2-methyl-2,4-pentanediol (Hexylene glycol) ***(107-41-5)***		Air limit value withdrawn based on insufficient substantiation
Octylphenol ***(140-66-9),*** Octylphenol ethoxylates		Ecological aspects (biological degradability, fish toxicity) Nonylphenol ethoxylates shall not be replaced by Octylphenol ethoxylates (UBA recommendation)

Component ***(CAS-No.)***	Legal foundations, sources, notes	Comments
Phenols		Ecological aspects (biological degradability, fish toxicity)
Heavy metals and heavy metal compounds	AbwV annex 40	Consider waste water limit value Ecological aspects (fish toxicity, bacteria toxicity). E. g. Cu: waste water limit value 0,5 mg/l. Causes corrosion via local cell
Tall oil distillates (distilled tall oil, DTO) ***(8002-26-4)***		Formation of skin sensitizing oxidation products

List 3.4: Declarable substances (due to process-related reasons)
(Processing fluids acc. to DIN 51385)

Component ***(CAS-No.)***	Legal foundations, sources	Comments
Boron compounds, organic		May lead to bonding in single cases Residues may remain despite degreasing with organic solvents
Dipropylene glycol ***(110-98-5)***		May impair ultra-filterability
Dyes		Potentially unintended discoloration of product, equipment and sewage
Complexing agents, relevant for waste water treatment (except EDTA)		Complexing agents with relevance to waste water treatment may impair precipitation of heavy metals and dissolve heavy metals from sludge. For EDTA pls. refer to list 3.1.b
Organomodified Siloxanes		Application only upon consultation with user; may modify wettability of surfaces

Appendix I: Substances with no final occupational medicine/toxicology or technical assessment (specified DNEL refer to the chronic inhalational exposition)

Component ***(CAS-No.)***	Legal foundations, sources	Comments
Alkanolamine salts (primary/tertiary) of carboxylic acids and boric acid (Boric acid with mono- and triethanol amine) ***(68512-53-8)***	H315 Skin Irrit. 2 H319 Eye Irrit. 2	
Alkylamine-mono/diphosphate (Amines, C_{11-14} branched alkyl, monohexyl and dihexyl phosphates) ***(80939-62-4)***	H315 Skin Irrit. 2 H319 Eye Irrit. 2 H411 Aqu. Chron. 2	DNEL 200 µg/m³
2-amino-2-ethyl-1,3-propandiol (AEPD) ***(115-70-8)***	H318 Eye Dam.1	DNEL 58,8 mg/m³
Azelaic acid (Nonandiacid, 1,7-heptandicarbon acid) ***(123-99-9)***	MAK IIb H315 Skin Irrit. 2 H319 Eye Irrit. 2	DNEL 17632 mg/m³
2-dibutylaminoethanol ***(102-81-8)***	H302 Acute Tox. 4 H312 Acute Tox. 4 H314 Skin Corr. 1C H318 Eye Dam. 1 H335 STOT SE 3	DNEL 2,22 mg/m³
Dibutyl hydrogen phosphate ***(107-66-4)***	MAK IIb H318 Eye Dam. 1 H314 Skin. Corr. 1B H351 Carc. 2	DNEL 1.25 mg/m³ (carc.) DNEL 1 mg/m³ (irritation resp.)
2-dimethylaminoethanol ***(108-01-0)***	H226 Flam. Liq. 3 H302 Acute Tox. 4 H312 Acute Tox. 4 H314 Skin Corr. 1C H332 Acute Tox. 4	DNEL 1,76 mg/m³ H335 STOT SE 3; C ≥ 5%
1-(dimethylamino)propan-2-ol ***(108-16-7)***	H226 Flam. Liq. 3 H302 Acute Tox. 4 H314 Skin Corr. 1C	DNEL 2 mg/m³
Fatty alcohols, C_{12-18} ***(67762-25-8)***	H315 Skin Irrit. 2 H319 Eye Irrit. 2	
Fatty alcohol ethoxylates (Alcohols, C16-18 and C18-unsatd., ethoxylated ; 1 - 2.5 moles ethoxylated ***(68920-66-1)***	H315 Skin Irrit. 2 H411 Aqu. Chron. 2	DNEL 294 mg/m³

Component (CAS-No.)	Legal foundations, sources	Comments
2-piperidinoethanol ***(3040-44-6)***	H290 Met. Corr. 1 H302 Acute Tox. 4 H314 Skin Corr. 1 H318 Eye Dam. 1 H335 STOT SE 3	DNEL 1.85 mg/m³
Isononanoic acid ***(26896-18-4, Mixture)***	MAK IIb H302 Acute Tox. 4 H315 Skin Corr. 2 H318 Eye Dam. 1	DNEL 10,6 mg/m³ DNEL: 7mg/m^3 ***(3302-10-1)*** ***3302-10-1*** currently in CoRAP process (suspected R)
Octylamine ***(111-86-4)***	H226 Flam. Liq. 3 H301 Acute Tox. 3 H311 Acute Tox. 3 H314 Skin Corr. 1A H318 Eye Dam. 1 H332 Acute Tox. 4 H335 STOT SE 3 H400 Aqu. Acute 1 H411 Aqu. Chron. 2	DNEL 4,6 mg/m³
2,2'-(octylimino)bisethanol ***(15520-05-5)***	H302 Acute Tox. 4 H315 Skin Irrit. 2 H318 Eye Dam. 1 H412 Aqu. Chron. 3	DNEL 4,9 mg/m³
N,N,N',N'-tetramethylhexamethylenediamine ***(111-18-2)***	H301 Acute Tox. 3 H311 Acute Tox. 3 H314 Skin Corr. 1A H318 Eye Dam. 1 H331 Acute Tox. 3 H335 STOT SE 3 H373 STOT RE 2 H411 Aqu. Chron. 2	DNEL 2,35 mg/m³
(4-nonylphenoxy)acetic acid ***(3115-49-9***)	MAK IIb H304 Acute Tox. 4 H314 Skin Corr. 1B H317 Skin Sens. 1A H318 Eye Dam. 1 H400 Aqu. Acute 1 H410 Aqu. Chronic 1	DNEL 1.76 mg/m³
Petroleum sulphonate, sodium salt ***(68608-26-4)***	H315 Skin Irrit. 2	DNEL: 0,66 mg/m³

Component (CAS-No.)	Legal foundations, sources	Comments
Polybutene ***(9003-29-6)***	MAK IIb H315 Skin Irrit. 2 H304 Asp. Tox. 1	
Tolyltriazole, sodium salt ***(64665-57-2)***	H314 Skin Corr. 1B H318 Eye Dam. 1 H411 Aqu. Chron. 2 H302 Acute Tox. 4	DNEL: 8,8 mg/m³
Benzotriazole ***(95-14-7)***	MAK: Canc. Cat. 3B Skin resorptive H H302 Acute Tox. 4 H319 Eye Irr. 2 H411 Aqu. Chron. 2	DNEL: 19 mg/m³
Benzotriazoles, substituted (e. g. 6-methylbenzotriazole ***(136-85-6)***)	H314 Skin Corr. 1B H318 Eye Dam. 1	

Appendix II a: Biocidal substances usable in Germany for metalworking fluids ("Article 95 list" acc. BPR) – information gathering
Classification acc. CLP regulation EC No. 790/2009 appendix VI

Substance name				Classification		Labelling			Specific Concentration limits, M-factors	Air thresh-old limit TRGS 900 mg/m³ ÜF(Kat)
Active sub-stance class	Abbreviation	Chemical identification (active substance)	***CAS-No.*** EC-No.	Hazard class and category code(s)	Hazard statement code(s)	Picto-gram, signal word code(s)	Hazard statement code(s)	Supple plemen men-tary hazard state-ment code(s)		
Isothiazolinones	CIT/MIT (CMI/MI)	5-Chlor-2-methyl-isothiazolin-3-one and 2-Methyl-isothiazolin-3-one, mixture in ratio 3:1	***55965-84-9*** (mixture) 247-500-7 / 220-239-6 (single substances)	Acute Tox. 2 Acute Tox. 3 Skin Corr. 1B Eye Dam. 1 Skin Sens. 1A Acute Tox, 2 Aquatic Acute 1 Aquatic Chronic 1	H310 H301 H314 H318 H317 H330 H400 H410	GHS06 GHS05 GHS09 Dgr	H310 H301 H314 H317 H330 H410		Eye Dam. 1; H318: C ≥ 0,6 % Eye Irrit. 2; H319: 0,06 % ≤ C < 0,6 % Skin Corr.1C; H314: C ≥ 0,6 % Skin Irrit. 2; H315: 0,06 % ≤ C < 0,6 % Skin Sens. 1A; H317: C ≥ ,0015 % M = 100 (acute) M = 1 (chromic)	MAK: 0,2 (E) 2 (I) Sh
	MIT (MI)	2-Methyl-isothiazolin-3-one	***2682-20-4*** 220-239-6	Acute Tox. 3 Acute Tox. 2 Skin Corr. 1B Eye Dam. 1 Skin Sens. 1A Aquatic Acute 1 Aquatic Chronic 1	H301/311 H330 H314 H318 H317 H400 H410	GHS06 GHS05 GHS09 Dgr	H301/311 H330 H314 H317 H410		Skin Sens. 1 ; H317 : C ≥ 0,0015 % M = 10 (acute) M = 1 (chronic	
	OIT	2-Octyl-2H-isothiazolin-3-one	***26530-20-1*** 247-761-7	Acute Tox. 3 Skin Corr. 1 Eye Dam. 1 Skin Sens. 1A Acute Tox. 2 Aquatic Acute 1 Aquatic Chronic 1	H301/311 H314 H318 H317 H330 H400 H410	GHS06 GHS05 GHS09 Dgr	H301/H311 H314 H317 H330 H410		Skin Sens. 1A; H317: C ≥ 0,0015 % M = 100 M =100 (chronic) **inhalation:** ATE = 0.27 mg/L (dusts/mists) **dermal:** ATE = 311 mg/kg (-) **oral:** ATE = 125 mg/kg (-)	0,05 E 2 (I) H Sh

Substance name				Classification		Labelling				Air threshold limit TRGS 900 mg/m³ ÜF(Kat)
Active substance class	Abbreviation	Chemical identification (active substance)	***CAS-No.*** EC-No.	Hazard class and category code(s)	Hazard statement code(s)	Pictogram, signal word code(s)	Hazard statement code(s)	Supplementary hazard statement code(s)	Specific Concentration limits, M-factors	
Isothiazolinones	BIT	1,2-Benzisothiazolin-3-(2H)-one	***2634-33-5*** 220-120-9	Acute Tox. 4 Skin Irrit 2 Eye Dam. 1 Skin Sens. 1 Aquatic Acute 1	H302 H315 H318 H317 H400	GHS05 GHS07 GHS09 Dgr	H302 H315 H318 H317 H400		Skin Sens. 1 H 317: C ≥ 0,05 %	
	BBIT	n-Butyl-1,2-benzisothiazolin-3-one	***4299-07-4*** 420-590-7	Skin Corr. 1B Skin Sens. 1 Aquatic Acute 1 Aquatic Chronic 1	H314 H317 H400 H410	GHS06 GHS05 GHS09 Dgr	H314 H317 H410			
Formaldehyde depot compounds	EGForm. EDDM	Reaction products of ethylene glycol with paraformaldehyde ((Ethylendioxy)dimethanol , 1,6-Dihydroxy-2,5-dioxahexane ((Ethylenedioxy)dimethanol)	***3586-55-8*** ***222-720-6***	Acute Tox. 4 Skin Irrit 2 Eye Dam. 1	H302 H315 H318	GHS05 GHS07 Dgr	H302 H315 H318			
	HHT	1,3,5-Tris-(2-hydroxyethyl)-hexahydro-1,3,5-triazine (2,2',2''-(Hexahydro-1,3,5-triazine-1,3,5-triyl)-triethanol)	***4719-04-4*** 225-208-0	Acute Tox. 4 (*) Skin Sens. 1	H302 H317	GHS07 Wng	H302 H317		Skin Sens. 1; H 317: C ≥ 0,1 %	
	MBO	3,3'-Methylen-bis-(5-methyloxazolidine)	***66204-44-2*** 266-235-8	Acute Tox 4 Skin Corr. 1B Skin Sens. 1A Muta. 2 Carc. 1B (2) STOT RE 2 Aquatic Chronic 3	H302/332 H314 H317 H341 H350 H373 H412	GHS05 GHS06 GHS08 Dgr	H302/332 H314 H317 H341 H350 H373 H412			
	TMAD	Tetrahydro-1,3,4,6-tetrakis(hydroxymethyl)imidazo[4,5-d]imidazole-2,5(1H,3H)-dione	***5395-50-6*** 226-408-0	Skin Sens. 1 Carc. 1B (2) Aquatic Chronic 2	H317 H350 H411	GHS09 GHS08 GHS07 Dgr	H317 H350 H411			

Substance name				Classification		Labelling				Air threshold limit TRGS 900 mg/m³ ÜF(Kat)
Active substance class	Abbreviation	Chemical identification (active substance)	***CAS-No.*** EC-No.	Hazard class and category code(s)	Hazard statement code(s)	Pictogram, signal word code(s)	Hazard statement code(s)	Supplementary hazard statement code(s)	Specific Concentration limits, M-factors	
Formaldehyde depot compounds		Benzyl alcohol-mono(poly)-hemi formal (Benzyloxy-methanol)	***14548-60-8*** 238-588-8	Acute Tox 4 Acute Tox 4 Eye Irrit. 1 STOT SE 3 Skin Irrit. 2	H312 H302 H318 H335 H315	GHS05 GHS07	H312 H302 H318 H335 H315			
	DMDMH	1,3-Bis-(hydroxymethyl)-5,5-dimethyl-imid-azolidine-2,4-dione	***6440-58-0*** 229-222-8	Acute Toc. 4	H302	GHS07 Wng	H302			
	EDHO	7a-ethyldihydro-1H,3H,5H-oxazolo[3,4-c]oxazole)	***7747-35-5*** 231-810-4	Skin Irrit. 2 Skin Sens. 1 Eye dam. 1 Acute Tox. 4 Aquatic Chronic 3	H315 H317 H318 H332 H412	GHS05 Dgr	H315 H317 H318 H332 H412			
	MBM	N,N'-methylenbismorpholine	***5625-90-1*** 227-062-3	Carc. 1B (2) Muta. 2 (3) Acute Tox 4 Acute Tox 4 Acute Tox 4 Eye Dam. 1 STOT RE 2 (4) Skin Corr. 1B Skin Sens. 1	H350 H341 H332 H312 H302 H318 H373 H314 H317	GHS08 GHS07 GHS05 Dgr	H350 H341 H332 H312 H302 H318 H373 H314 H317		Carc 1B H350: C ≥ 0,6% (4) Muta 2 H341: C ≥ 6% (4) Skin Sens 1 H317: C ≥ 0,1%	
	DBNPA	2,2-dibromo-2-cyanoacetamide	***10222-01-2*** 233-539-7	Acute Tox. 3 Skin Irrit. 2 Skin Sens. 1 Eye Dam. 1 Acute Tox. 2 Aquatic Acute 1	H301 H315 H317 H318 H330 H400	GHS09 GHS05 GHS06 Dgr	H301 H315 H317 H318 H330 H400			
		Chlorocresol	***59-50-7*** 200-431-6	Acute Tox. 4 Skin Sens. 1B Skin Corr. 1C Eye Dam. 1 STOT SE 3 Aquatic Acute 1 Aquatic Chronic 3	H302 H317 H314 H318 H335 H400 H412	GHS07 GHS09 GHS05 Dgr	H302 H317 H314 H318 H335 H400 H412		M = 1	

Substance name				Classification		Labelling			Specific Concentration limits, M-factors	Air threshold limit TRGS 900 mg/m³ ÜF(Kat)
Active substance class	Abbreviation	Chemical identification (active substance)	***CAS-No.*** EC-No.	Hazard class and category code(s)	Hazard statement code(s)	Pictogram, signal word code(s)	Hazard statement code(s)	Supplementary hazard statement code(s)		
	cis CTAC	cis-1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantanechloride	***51229-78-8*** 426-020-3	Flam. Sol. 2 Acute Tox. 4 Skin Irrit. 2 Skin Sens. 1 Repr. 2 Aquatic Chronic 2	H228 H302 H315 H317 H361d H411	GHS07 GHS02 GHS09 GHS08 Wng	H228 H302 H315 H317 H361d H411			
	CTAC	Methenamine 3-chloroallylochloride	***4080-31-3*** ***223-805-0***	Acute Tox. 3 Skin Irrit. 2 Eye Irrit. 2	H301/311 H315 H319	GHS06 Dgr	H301/311 H315 H319			MAK: 2 (E) 2 (I) Sh
	NaPy	Pyridin-2-thiol-1-oxid, Na-salt (Sodium-pyrithion)	***3811-73-2*** ***15922-78-8*** 223-296-5 240-062-8	Acute Tox. 4 Acute Tox. 3 Skin Irrit. 2 Eye Irrit. 2A Acute Tox. 4 Aquatic Acute 1 Aquatic Chronic 1	H302 H311 H315 H319 H332 H400 H410	GHS 09 GHS 06 Dgr	H302 H311 H315 H319 H332 H400 H410		M = 100 M = 10 (chronic) *expert opinion on exposure of women in conjunction with the Maternity Protection Act regarding sodium pyrithion* (1)	0,2 E 2(II) Y H
	IPBC	3-Iod-2-propinyl-butylcarbamate Guidance document: www.vsi-schmierstoffe.de	***55406-53-6*** 259-627-5	Acute Tox 3 Acute Tox 4 STOT RE 1 Eye Dam. 1 Skin Sens.1 Aquatic Acute 1 Aquatic Chronic 1	H331 H302 H372 H318 H317 H400 H410	GHS06 GHS08 GHS05 GHS09 Dgr	H331 H302 H372 H318 H317 H410		M = 10 M (chronic) =1	0,058 2(I) Y Sh
	EGPhE	2-Phenoxyethanol (Ethylenglycol-phenylether)	***122-99-6*** 204-589-7	Acute Tox. 4 (*) Eye Dam. 1 STOT SE 3	H 302 H 318 H335	GHS 05 GHS07 Dgr	H302 H318 H335			5,7 1(I) Y
	OPP	O-phenylphenol (Biphenyl-2-ol, 2-Hydroxybiphenyl)	***90-43-7*** 201-993-5	Eye Irrit. 2 STOT SE 3 Skin Irrit. 2 Aquatic Acute 1	H319 H335 H315 H400	GHS07 GHS09 Wng.	H319 H335 H315 H400			5 E 1(I)
		Potassium 2-biphenylate	**13707-65-8** 237-243-9	Acute Tox. 4 Skin. Corr. 1B	H302 H314	GHS 05 GHS 07 Dgr	H302 H314			

Substance name				Classification		Labelling			Specific Concentration limits, M-factors	Air threshold limit TRGS 900 mg/m³ ÜF(Kat)
Active substance class	Abbreviation	Chemical identification (active substance)	***CAS-No.*** EC-No.	Hazard class and category code(s)	Hazard statement code(s)	Pictogram, signal word code(s)	Hazard statement code(s)	Supplementary hazard statement code(s)		
		Sodium 2-biphenylate	**132-27-4** 205-055-6	Acute Tox. 4 * Skin Irrit. 2 Eye Dam. 1 STOT SE 3 Aquatic Acute 1	H302 H315 H318 H335 H400	GHS05 GHS07 GHS09 Dgr	H302 H315 H318 H335 H400			2 E 1(I)
		N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine	***2372-82-9*** 219-145-8	Acute Tox. 3 Skin Corr. 1B STOT RE 2 (kidney) Aquatic Acute 1 Aquatic Chronic 1	H301 H314 H373 H400 H410	GHS09 GHS08G HS05 GHS06 Dgr	H301 H314 H373 H400 H410			MAK: 0,05 (E) 8 (I)

The minimum classification regarding a category is marked with „*" in column „classification". Manufacturer classifications.

(1) http://www.dguv.de/fb-holzundmetall/sg/sg_maf/kss/index.jsp
(2) Classification as carcinogen is not compulsory, if it can be proven, that the theoretical maximum concentration of released formaldehyde, independent of the source, is less than 0,1% in the mixture placed on the market
(3) Classification as mutagenic is not compulsory, if it can be proven, that the theoretical maximum concentration of released formaldehyde, independent of the source, is less than 1% in the mixture placed on the market
(4) The total formaldehyde content of the donator will be considered (MBO: 48% HCHO, MBM: 16,4 % total-HCHO)

Appendix II b: Biocidal products for metal working fluids

The list of approved biocidal products can be retrieved from:

https://www.biozid-meldeverordnung.de/offen/

Concentration limits must be retrieved from CLP regulation.

Contact manufacturer for biocidal products, which have not yet been listed by BAuA.

Appendix II c: Biocides for metalworking fluids (selection) – use, application and details

Use and application								Details	
	Effect			Typical application with concentration of active substances **[ppm]**			Analytical method	Behaviour in MWF	Comments
Active substance	Bacteria	Fungi	Algae	Pre-conservation of concentrate	Preventive conservation wg-MWF	Shock conservation (* = emergencies) wg-MWF			
CIT/MIT	+++	++	+	no	Possible 10 – 15	15 * 15-30	HPLC	In case of infection 90% degradation of CIT within 72 h; chloride und nitrate contents increase, pH-value drops	Potential for sensitisation at >15 ppm. Do not use in areas where workers are sensitized already. Stabilises among other with magnesium nitrate and sodium nitrate, relevant nitrate source according TRGS 611. Commercially available as 12-14% product and 1,5% product; for post-dosing the 1,5% product is recommended.
MIT	++	-	-	no	50-150 Preferred in combined products	-	HPLC	n. s.	Potential for sensitisation at >1000 ppm. Do not use in areas where workers are sensitized already.
OIT	-	+++	++	possible 500	50-100	100	HPLC	Can impair negatively on foam behaviour, poor solubility in fully synthetic systems	Potential for sensitisation at >500 ppm. Do not use in areas where workers are sensitized already. For post-dosing the <25% product is recommended.
BBIT	+	+++	+++	1000-3000	70-100	100-200	HPLC	Little application experience so far	Potential for sensitisation at >500 ppm. Do not use in areas where workers are sensitized already. Main application as fungicide, also as bactericide in hot systems.
BIT	++	-	-	possible 500	Preferred in combined products		HPLC	n. s.	Potential for sensitisation at >500 ppm. Do not use in areas where workers are sensitized already. Also stable in hot systems. Weakness when used against pseudomonads. Combined product with other active substances enhances effect.
EDDM/ EGForm	+++	+	+	1–3 %	Preferred in combined products		Water steam distillation, Photometer, HPLC	Intensive smell	
HHT	+++	-	-	2-6%	1500-2500	2000-3000	Water steam distillation, Photometer, HPLC	Increases pH-value	Potential for sensitisation at >15 ppm. Do not use in areas where workers are sensitized already. Indications from practical applications suggest a weak allergenic potential of HHT. There is only little information on diseases at concentrations up to 3000 ppm available. Main application as bactericide.
MBO	++	+	-	2-3%	1000-2000	1500-2500	Water steam distillation, Photometer, GC, HPLC	Increases pH-value, intensive smell	

Use and application								Details	
	Effect			Typical application with concentration of active substances **[ppm]**			Analytical method	Behaviour in MWF	Comments
Active substance	Bacteria	Fungi	Algae	Pre-conservation of concentrate	Preventive conservation wg-MWF	Shock conservation (* = emergencies) wg-MWF			
HPT	+++	-	-	2-3 %	1500	3000	Water steam distillation, Photometer, HPLC	Increases pH-value intensive smell	Single substance not registered for product type 13; may still be used in a mixture of a biocidal preparation Potential for sensitisation at > 1 %. Do not use in areas where workers are sensitized already. Main application as bactericide.
TMAD	+	-	-	2–3 %	Preferred in combined products		Water steam distillation, Photometer, HPLC	No smell, no foam	Slower reactions than other N-formals, Use only in combined products. Determination of formaldehyde content simulates too high effectiveness.
Benzylalcohol-mono(poly)-hemiformal	++	++	n. s.	n. s.	500 - 1500	1500-2000	Water steam distillation, Photometer, HPLC	Lowers pH-value, very intensive smell	
DMDMH	++	-	n. s.	n. s.	1500-5000	n. s.	Water steam distillation, Photometer, HPLC	Lowers pH-value	
NaPy	-	++	-	0,1–1%	80-300	80-300	HPLC	Forms with iron a hardly soluble black precipitation	Discharge of active substance, may block filters. Combination with soft complexing agents necessary. Also suitable for oil-free systems. A new classification is expected with the 18th ATP to the CLP regulation
IPBC	--	+++	-	0,1–1%	30-150	150	HPLC Titration	Quick degradation at pH > 9 and bacterial attack possible	Potential for sensitisation at > 10.000 ppm. Do not use in areas where workers are sensitized already. Can simulate too high AOX and chloride values. Not suitable for oil-free systems (because of solubility).
EGPhe	+	-	-	10 %	0,5 - 1 %	no	GC, HPLC	Brown discolouration when machining cast iron	
OPP	+	++	-	1,5-2 %	600-900	800-1000	Photometer, HPLC	Red discolouration from formation of iron complex, phenol smell	High affinity to oil, discharge via oil scimmer. Separation from sewage when splitting emulsion. Too high ratio of non-ionic tensides can result in loss of effectiveness
N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine	++	++	n. s.	1-4 %	500-2000	n. s.	GC, HPLC		Anionic substances can cause efficacy losses. Formation of foam possible.

Glossar
Glossary

Abkürzungen und Begriffe :
Abbreviations and terms & definitions:

AGS	Ausschuss für Gefahrstoffe
AGS	Committee on Hazardous Substances (AGS)
AGW	Arbeitsplatzgrenzwert (staatlich, TRGS 900)
AGW	Occupational Exposure Limit (OEL, acc. TRGS 900)
Akzeptanzgrenze	Schwellenwert für ein Risiko in Höhe von 4:10 000, unterhalb dessen ein Risiko akzeptiert und oberhalb dessen ein Risiko unter Einhaltung der im Maßnahmenkatalog spezifizierten Maßnahmen toleriert wird (TRGS 910).
Akzeptanzgrenze	Threshold for a risk in the order of 4:10 000, below which a risk will be accepted and above which a risk will be tolerated, provided measures specified in the measures catalogue will be adhered to (TR910).
ATP	Anpassungsrichtlinie an den technischen Fortschritt (Progress)
ATP	Adaptation to technical progress (ATP)
BAuA	Bundesanstalt für Arbeitsschutz und Arbeitsmedizin
BAuA	Federal Institute for Occupational Safety and Health (BAuA)
BekGS	Bekanntmachung Gefahrstoffe (des BMAS)
BekGS	Public notice on hazardous substances (of the Fed. Min. of Labour and social affairs)
Biozider Wirkstoff	Wirkstoff gemäß EG-Biozid-Verordnung, Artikel 2
Biocidal substance	Substance acc. EC Biocidal Products Regulation (BPR), article 2
BPR	Biocidal Products Regulation EU 528/2012
CLP	Classification labelling and packaging
CORAP	Community rolling action plan
DFG	Deutsche Forschungsgemeinschaft
DFG	German Research Foundation
DGUV Information	Information der Unfallversicherungsträger, ehem. BGI/UV-I
DGUV-Information	Information of the German Statutory Accident Insurance Association, formerly BGI/GUV-I
DGUV Regel	Regel der Unfallversicherungsträger, ehem. BGR/GUV-R
DGUV Rule	German Statutory Accident Insurance Association standard, formerly BGR/GUV-R
DMSO	Dimethylsulfoxide (organic solvent)
DNEL	Derived no-effect level (air threshold limit according REACH)
ECHA	European chemicals agency
FB HM	Fachbereich Holz und Metall
FB HM	Department Wood and Metal (of the German Statutory Accident Insurance Association)
FoBiG	Forschungs- und Beratungsinstitut Gefahrstoffe GmbH
FoBiG	Research and consultation institute for hazardous substances Ltd.
GHS	Globally harmonized system
GMBl	Gemeinsames Ministerialblatt
GMBl	Joint ministerial release
H	hautresorptiv (TRGS 900, MAK)
H	may be absorbed through skin (TRGS 900, MAK)
IGM	Industriegewerkschaft Metall
IGM	Labour union „Metals“
IVDK	Informationsverbund dermatologischer Kliniken

IVDK	Information network of dermatological clinics
IP 346	Method 346, released by the Institute of Petroleum
KSS (= MWF)	Kühlschmierstoff
MWF (= KSS)	Metal working fluid (also: coolant)
wm	wassermischbar (Konzentrat)
wm	water miscible (concentrate)
wg	wassergemischt (Lösung, Emulsion)
wg	water mixed (e.g. solution, emulsion)
nw	nicht wassermischbar (Öl)
nw	non water miscible (neat oil)
KW	Kohlenwasserstoff
HC (= KW)	Hydrocarbon
MAK	Maximale Arbeitsplatzkonzentration (DFG)
MAC (= MAK)	Maximum allowable concentration (set by DFG)
PBT-Stoffe	persistente, bioakkumulierbare und toxische Stoffe
PBT substances	persistent bio-accumulative and toxic substances
PT13	Product-types: Produktarten für Biozide in der Verordnung über Biozidprodukte. Produktart 13 sind die „Schutzmittel für Bearbeitungs- und Schneideflüssigkeiten
PT13	Product-types of the Biocidal Products Regulation: : PT 13 lists working or cutting fluid preservatives
Sh	hautsensiblisierend (TRGS 900, MAK)
Sh	may cause skin sensitisation (TRGS 900, MAK)
SVHC	Substances of very high concern (besonders besorgniserregende Stoffe nach REACH, Artikel 33)
SVHC	Substances of very high concern (REACH, article 33)
Toleranzgrenze	Schwellenwert für ein Risiko in Höhe von 4:1 000, oberhalb dessen ein Risiko nicht tolerabel ist (TRGS 910).
Toleranzgrenze	Threshold for a risk in the order of 4:1 000, above which a risk is not tolerable (TRGS 910).
TRGS	Technische Regel für Gefahrstoffe
TRGS	Technical Rules for Hazardous Substances (TRGS)
UBA	Umweltbundesamt
UBA (FEA)	Federal Environment Agency (Germany)
VKIS	Verbraucherkreis Industrieschmierstoffe
VKIS	Consumer network industrial lubricants
vPvB-Stoffe	sehr persistente und sehr bioakkumulierbare Stoffe
vPvB-substances	very persistent and very bio-accumulative substances
VSI	Verband Schmierstoff-Industrie e. V.
VSI	Lubricant manufacturers association
WGK	Wassergefährdungsklasse
WGK	water hazard class
Y	Ein Risiko der Fruchtschädigung ist bei Einhaltung des AGW oder des BGW nicht zu befürchten (TRGS 900, MAK)
Y	A risk of fetal damage is ceased to fear if AGW and BGW will be complied with (TRGS 900, MAK)
Z	Ein Risiko der Fruchtschädigung kann auch bei Einhaltung des AGW und des BGW nicht ausgeschlossen werden (TRGS 900)
Z	A risk of fetal damage cannot be eliminated even when AGW and BGW will be complied with (TRGS 900)
Schwangerschaftsgruppe	A rating system, introduced by the MAK Commission of DFG, allowing a conclusion whether or not there is a risk of fetal impairment, provided the concentration limits have been adhered to

Regelwerk :
Regulations:

Europäische Gemeinschaft (EG) :
European Community (EC):

EG 1907/2006	Verordnung des europäischen Parlaments und des Rates zur Registrierung, Bewertung, Zulassung und Beschränkung chemischer Stoffe (REACh) (in der jeweils gültigen Fassung) ABl. EG L 396/1 vom 30.12.2006 zuletzt geändert durch EG-V 453/2010
EC 1907/2006	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (in their current version) Off. Journal EC L 396/1 dated 2006-12-30, last amended by EC-V 453/2010
EG 1272/2008	Verordnung des europäischen Parlaments und des Rates über die Einstufung, Kennzeichnung und Verpackung von Stoffen und Gemischen (CLP/GHS) ABl. EG L 353/1 vom 31.12.2008
EC 1272/2008	Regulation of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP/GHS) Off. Journal EC L 353/1 dated 2008-12-31

1. ATP-CLP	EU-V 790/2009 ABl. EG L 235/1 vom 05.09.2009
1st ATP-CLP	EC Directive 790/2009 Off. Journal EC L 235/1 dated 2009-09-05
2. ATP-CLP	EU-V 286/2011 ABl. EG L 83/1 vom 30.03.2011
2nd ATP-CLP	EC Directive 286/2011 Off. Journal EC L 83/1 dated 2011-03-30
3. ATP-CLP	EU-V 618/2012 ABl. EG L 179/3 vom 11.07.2012
3rd ATP-CLP	EC Directive 618/2012 Off. Journal EC L 179/3 dated 2012-07-11
4. ATP CLP	EUG-V 487/2013 ABl. EG L 149/1 vom 01.06.2013
4th ATP-CLP	EC Directive 487/2013 Off. Journal EC 149/1 dated 2013-06-01
5. ATP CLP	EU-V 944/2013 ABl. EG L 261/5 vom 02.10.2013
5th ATP-CLP	EC Directive 944/2013 Off. Journal EC L 261/5 dated 2013-10-02
6. ATP CLP	EU-V 605/2014 ABl. EG L 167/36 vom 06.06.2014
6th ATP CLP	EC Directive 605/2014 Off. Journal EC L 167/36 dated 2014- 06-06
7. ATP CLP	EU-V 2015/1221 ABl EG L 197/10 vom 25.7.2015
7th ATP CLP	EC Directive 2015/1221 Off. Journal EC L 197/10 dated 2015-07-25
8. ATP CLP	EU-V 2015/1221 ABl. EG L 156/1 vom 14.06.2016
8th ATP CLP	EC Directive 2015/1221 Off. Journal EC L 156/1 dated 2016- 06-14
9. ATP CLP	EU-V 2015/1221 ABl EG L 195/11 vom 20.7.2016
9th ATP CLP	EC Directive 2015/1221

	Off. Journal EC L 195/11 dated 2016-07-20
10. ATP CLP	EU-V 2017/776 –
	ABl EU L 116/1 vom 05.05.2017
10th ATP CLP	EC Directive 2017/776
	Off. Journal EC L 116/1 dated 2017- 05-05
11. ATP CLP	EU-V 2018/669 -
	ABl. EU L 115/1 vom 16.04.2018
11th ATP CLP	EC Directive 2018/669 -
	Off. Journal L 115/1 dated 16.04.2018
12. ATP CLP	EU-V 2019/521
	ABl. EU L 86/1 vom 28.03.2019
12th ATP CLP	EC Directive 2019/521
	Off.Journal L 86/1 dated 28.03.2019
13. ATP CLP	EG-U 2018/1480
	ABl. EU L 251/1 vom 05.10.2018
13th ATP CLP	EC Directive 2018/1480
	Off. Journal L 251/1 dated 05.10.2018
14. ATP CLP	EU-V 2020/217
	ABl. EU L 44/1 vom 18.02.2020
14th ATP CLP	EC Directive 2020/217
	Off. Journal L 44/1 dated 18.02.2020
15. ATP CLP	EU-V 2020/1182
	ABl. EU L 261/2 vom 11.08.2020
15th ATP CLP	EC Directive 2020/1182
	Off. Journal L 261/2 dated 11.08.2020
16. ATP CLP	EU-V 2021/643 -
	ABl. EU L 133/5 vom 20.04.2021
16th ATP CLP	EC Directive 2021/643
	Off. Journal L 133/5 dated 20.04.2021
17. ATP CLP	EU-V 2021/849
	ABl. EU L 188/27 vom 28.05.2021
17th ATP CLP	EC Directive 2021/849
	Off. Journal L 188/27 dated 28.05.2021

EU 528/2012	Verordnung des europäischen Parlament und des Rates über die Bereitstellung auf dem Markt und die Verwendung von Biozidprodukten
	ABl. EG L 167/1 vom 27.06.2012
EU 528/2012	Regulation of the European Parliament and of the Council concerning the making available on the market and use of biocidal products
	Off. Journal EC L 167/1 dated 2012-06-27
2000/60/EG	Wasserrahmenrichtlinie WRRL
	ABl. EG L 327 vom 22.12.2000
2000/60/EG	Water Framework Directive
	Off. Journal EC L 327 dated 2000-12-22
2001/2445/EG	Liste prioritärer Stoffe zur WRRL
	ABl. EG L 331/1 vom 15.12.2001
2001/2445/EC	List of priority substances for Water Framework Directive
	Off. Journal EC L 331/1 dated 2001-12-15
2003/53/EG	26. Änderungsrichtlinie zur 76/769/EG
	ABl. EG L 178/24 vom 17.07.2003
2003/53/EC	26th Amendment Directive for 76/69/EC
	Off. Journal EC L 178/24 dated 2003-07-17
EU 2019/1021	Verordnung über persistente organische Schadstoffe (POP-Verordnung)
	ABl. EG L 169, S. 45 vom 20.06.2019
EU 2019/1021	Regulation (EU) 2019/1021 on persistent organic pollutants
	ABl. EC L 169, p. 45 dated 2019-06-20

Deutschland :
Germany:

AbwV Anhang 40	Abwasser-Verordnung Anhang 40 : Metallverarbeitende Industrie BGBl. I 2004 S.1159
AbwV Anhang 40	Waste water regulation annex 40: Metalworking Industry BGBl. I 2004 p.1159
AltölV	Altölverordnung in der Fassung der Bekanntmachung vom 16. April 2002 (BGBl. I S. 1368), die zuletzt durch Artikel 5 Absatz 14 des Gesetzes vom 24. Februar 2012 (BGBl. I S. 212) geändert worden ist
AltölV	Waste oil regulation with the terms of the publication dated 16th April 2002 (BGBl. I S. 1368), which has last been amended by article 5 paragraph 14 of the law on 24th February 2012 (BGBl. I p. 212)
DGUV-Regel 109-003	Regel "Tätigkeiten mit Kühlschmierstoffen" Früher: BGR/GUV-R 143; Stand März 2011
DGUV-Regel 109-003	BGR/GUV-Rule "Tätigkeiten mit Kühlschmierstoffen“ („Activities involving metal working fluids“) Previous: BGR/GUV-R 143; Status March 2011
DIN 51385	Bearbeitungsmedien für die Umformung und Zerspanung von Werkstoffen – Begriffe Beuth-Verlag, Berlin (11.2013)
DIN 51385	Processing media for deformation and machining of materials - Terms Beuth-Verlag, Berlin (11.2013)
GefStoffV	Gefahrstoffverordnung zum Schutz vor Gefahrstoffen vom 26. November 2010 (BGBl. I S 1643, 1644), die zuletzt durch Artikel 2 der Verordnung vom 21. Juli 2021 (BGBl. I S. 3115) geändert worden ist.
GefStoffV	Gefahrstoffverordnung; Regulation on Hazardous substances dated 26th November 2010 (BGBl. I S 1643, 1644), which has last been amended by article 2 of the regulation on July 21st, 2021 (BGBl. I p. 3115)
TRGS 401	Gefährdung durch Hautkontakt - Ermittlung, Beurteilung, Maßnahmen; Ausgabe Juni 2008 GMBl 818-845vom 19.08.2008 [Nr.40/41], zuletzt berichtigt GMBl 2011 S.175 vom 30.03.2011 [Nr. 9]
TRGS 401	Skin contact hazard – evaluation, assessment, provisions; issue June 2008 GMBl 818-845 dated 19.08.2008 [Nr.40/41], last corrected: GMBl 2011 p.175 dated 30.03.2011 [No. 9]
TRGS 552	Krebserzeugende N-Nitrosamine der Kat 1A und 1B, Ausgabe September 2018; GMBl 2018 S. 913-934 vom 26.10.2018 [Nr. 48].
TRGS 552	Carcinogenic N-Nitrosamines Cat 1A and 1B, issue September 2018; GMBl 2018 p. 913-934 dated 26.10.2018 [No. 48]
TRGS 557	Dioxine; Ausgabe August 2008 GMBl Nr. 46/47 S. 990-998 vom 22.09.2008
TRGS 557	Dioxines; Issue August 2008 GMBl Nr. 46/47 p. 990-998 dated 22.09.2008
TRGS 611	Verwendungsbeschränkungen für wassermischbare bzw. wassergemischte Kühlschmierstoffe, bei deren Einsatz N-Nitrosamine auftreten können; Ausgabe Mai 2007 GMBl Nr. 27/28 S. 564 (15.06.2007)
TRGS 611	Restrictions in the use of water-miscible and water-mixed coolants which may give rise to N-nitrosamines during use; Issue May 2007 GMBl Nr. 27/28 p. 564 (15.06.2007)

TRGS 900	Arbeitsplatzgrenzwerte; BArbBl. Heft 1/2006 S. 41-55, zuletzt geändert und ergänzt in GMBl 2021 S. 893-894 vom 02.07.2021 [Nr. 39-40]
TRGS 900	Occupational exposure limit values; BArbBl. issue 1/2006 p. 41-55, last edited and amended in GMBl 2021 p. 893-894 dated 02.707.2021 [No. 39-40]
TRGS 905	Verzeichnis krebserzeugender, keimzellmutagener oder reproduktionstoxischer Stoffe; Ausgabe März 2016 GMBl 2016 S. 378-390 [Nr. 19] vom 03.05.2016; zuletzt geändert und ergänzt: GMBl 2021, S. 899 vom 13.07.2021 [Nr. 4]
TRGS 905	Register of substances classified as carcinogens, mutagens or toxic to reproduction; issue March 2016 GMBl 2016 p. 378-390 [No. 19] dated 03.05.2016; last edited and amended: GMBl 2021, p. 899 dated 13.07.2021 [No. 4]
TRGS 907	Verzeichnis sensibilisierender Stoffe und von Tätigkeiten mit sensibilisierenden Stoffen; Ausgabe November 2011 GMBl 2011 S. 1019 vom 19.12.2011 [Nr. 49-51]
TRGS 907	Register of sensitizing substances and occupations with sensitizing substances; issue November 2011 GMBl 2011 p. 1019 dated 19.12.2011 [No. 49-51]
TRGS 910	Risikobezogenes Maßnahmenkonzept für Tätigkeiten mit krebserzeugenden Gefahrstoffen; Ausgabe März 2014 GMBl 2014 S. 258-270 vom 02.04.2014 [Nr. 12]; zuletzt geändert und ergänzt: GMBl 2021 S. 895 vom 02.07.2021 [Nr. 39-40]
TRGS 910	Risk based workplace control scheme for activities with carcinogenic hazardous substances; issue March 2014 GMBl 2014 p. 258-270 of 02.04.2014 [No. 12], last edited and amended in GMBl 2021 p. 895 dated. 02.07.2021 [No. 39-40]

Einstufungen und R-Sätze (EG-Stoffrichtlinie, MAK-Kommission) **Classification and R-Phrases (EC substances directive, Maximum workplace concentration commission)**	**Einstufungen und H-Sätze (CLP-Verordnung)** **Classification and H-Statements (CLP directive)**
CMR-Stoffe Cancerogene, mutagene, reproduktionstoxische Stoffe CMR substances: carcinogenic, mutagenic, reproduction toxic substances	CMR-Stoffe Cancerogene, mutagene, reproduktionstoxische Stoffe CMR substances: carcinogenic, mutagenic, reproduction toxic substances
R_E2 Stoffe, die als fruchtschädigend (entwicklungsschädigend) für den Menschen angesehen werden sollten. R_E2 Substances which should be considered as teratogenic (damaging to embryological development) for humans. R_F2 Stoffe, die als beeinträchtigende für die Fortpflanzungsfähigkeit (Fruchtbarkeit) des Menschen angesehen werden sollten. R_F2 Substances which should be considered as adversely affecting humans‘ ability to reproduce (fertility).	R1B Wahrscheinlich reproduktionstoxischer Stoff. Die Einstufung eines Stoffes in die Kategorie 1B beruht weitgehend auf Daten aus Tierstudien. Solche Daten müssen deutliche Nachweise für eine Beeinträchtigung der Sexualfunktion und Fruchtbarkeit sowie der Entwicklung bei Fehlen anderer toxischer Wirkungen ergeben. R1B Probable reproduction toxic substance. The classification of a substance in category 1B mainly depends on data from animal studies. Such data must result in significant evidence for an impact on sexual function and fertility as well as for development in absence of other toxic effects.
R_E3 Stoffe, die wegen möglicher fruchtschädigender (entwicklungsschädigender) Wirkungen beim Menschen zur Besorgnis Anlass geben. R_E3 Substances giving cause for concern for potential teratogenic (developmental toxicity) effects for humans. R_F3 Stoffe, die wegen möglicher Beeinträchtigung der Fortpflanzungsfähigkeit (Fruchtbarkeit) des Menschen zur Besorgnis Anlass geben. R_F3 Substances giving cause for concern for potentially adversely affecting humans‘ ability to reproduce (fertility). K3 Stoffe, die wegen möglicher krebserregender Wirkung beim Menschen Anlass zur Besorgnis geben, über die jedoch nicht genügend Informationen für eine befriedigende Beurteilung vorliegen. Aus geeigneten Tierversuchen liegen einige Anhaltspunkte vor, die jedoch nicht ausreichen, um einen Stoff in Kategorie 2 einzustufen.	R2 Vermutlich reproduktionstoxischer Stoff. Stoffe werden dann als reproduktionstoxisch der Kategorie 2 eingestuft, wenn (eventuell durch weitere Informationen ergänzte) Befunde beim Menschen oder bei Versuchstieren vorliegen, die eine Beeinträchtigung der Sexualfunktion und Fruchtbarkeit oder der Entwicklung nachweisen, diese Nachweise aber nicht stichhaltig genug für eine Einstufung des Stoffes in Kategorie 1 sind. R2 Probable reproduction toxic substance. Substances are classified reproduction toxic class 2, if (potentially with complementary information) results for humans or test animals are available, which provide evidence for an adverse effect on sexual function and fertility or development, those however are not sound enough for a classification of the substance in category 1. K2 Verdacht auf cancerogene Wirkung beim Menschen. Die Einstufung eines Stoffes in Kategorie 2 erfolgt aufgrund von Nachweisen aus Studien an Mensch und/oder Tier, die jedoch nicht hinrei-

K3	Substances giving cause for concern based on potential carcinogenic effects on humans, for which however not sufficient information is available for satisfactory assessment. From adequate animal tests some indication is available, which however is insufficient to classify a substance into category 2.	chend genug für eine Einstufung des Stoffes in Kategorie 1A oder 1B sind. K2 Suspicion of carcinogenic effects on humans. The classification of a substance in category 2 is based on evidence from studies on humans and/or animals, which however are not sufficient for a classification of the substance in category 1A or 1B.
Y Y	Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden. (TRGS 900) There is no need to worry about a risk of foetal damage when complying with the occupational exposure limit value (AGW) and the biological limit (BGW). (TRGS 900)	Dgr = Danger („Gefahr“) Wng = Warning („Achtung“)
Z Z	Ein Risiko der Fruchtschädigung kann auch bei Einhaltung des AGW und des BGW nicht ausgeschlossen werden. (TRGS 900) A risk of foetal damage cannot be excluded even when complying with AGW and BGW. (TRGS 900)	
B B	Mit einer fruchtschädigenden Wirkung muss nach den vorliegenden Informationen auch bei Einhaltung des MAK- und BAT-Wertes gerechnet werden. (MAK) A teratogenic effect must be considered based on available information even when complying with MAK and BAT values. (MAK)	
C C	Eine fruchtschädigende Wirkung braucht bei Einhaltung des MAK- und BAT-Wertes nicht befürchtet zu werden. (MAK) There is no need to worry about a teratogenic effect when complying with the MAK- and BAT-values. (MAK)	
Sa Sa Sh Sh Sah Sah	Gefahr der Sensibilisierung der Atemwege Risk of respiratory sensitization Gefahr der Sensibilisierung der Haut Risk of skin sensitization Gefahr der Sensibilisierung der Atemwege und der Haut Risk of skin and respiratory sensitization	