

How to link between existing risk management advice for workers and REACH exposure scenarios?

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Overview on BAuA Research Project 513472 contributing to IR/CRS Roadmap (workpackage 2.3B)

Intended results of the project were

- 1. Overview of available systems of risk management measures (RMM-systems)**
- 2. Systematic description of RMM systems**
- 3. Options to link between RMM systems and ES under REACH**
- 4. Necessary modifications of existing RMM guidelines to create such links**
- 5. Formulation of proposals to allow for such links in the future**

Pilot project with
exemplarily chosen
RMM-systems

Overview on BAuA Research Project 513472

Structure of the project

1. **Selection of systems of RMM documents and analysis of their meta-structure**
2. **ES input parameters provided by different RMM- systems**
3. **Approach for linking RMM-guidance to Exposure Scenarios**
4. **Elaborate examples for linking RRM-guidance to ES – structure**
5. **Annexes with lists and descriptions of evaluated documents**

Selection of systems of RMM documents

RMM guidance systems that were exemplarily evaluated

- **Control Guidance Sheets (CGS)**
BAuA EMKG / COSHH Essentials / ILO
- **Diverse Guidance Sheets by German social accident insurance institutions, especially “GISBAU”**
- **Process+substance-specific criteria (VSK) according to German TRGS 420**
- **Guidelines by LASI (German federal states)**
- **Generic Exposure Scenarios (GES) by industry associations: ESIG - AISE**

- CGS might resemble ES
- German documents exemplarily and for reasons of convenience, GES because of REACH relevance

Systematic description of systems – features for meta-structure

1. Provenance and availability

nearly all for free download.

2. Fields of application

diverse branches, activities, processes and substances. Many target SME.

3. Volume / document size

Lengths varies from 2 to 69 pages. Control Guidance Sheets, and GISBAU - AISE - GEIS on average consist of two pages only.

4. Structure/format

Brochures often differ in structure. Control Guidance Sheets by BAuA, COSHH, or GISCODE and industry AISE ESIG have homogeneous structures and formats.

5. Relevance

All except one systems describe “best practice”.

6. Reference to exposure data

Most systems indicate exposure data, either from measurements or from model results. Some systems like BAuA, COSHH, ILO, GISCODE do not explicitly quote the data against which they benchmark

7. Support

For about 50% of the guidance systems support is available.

Schedule for structured inventory of workplace Risk Management guidance Systems (9 questions)

	Give Information freetext information	Explanation / Examples
Name of System		
1. Provenance		
Author / Editor		
Source		Internet, paper
Availability		publically available ?
Language/s		
2. Fields of Applicaton		
Users; target groups		OSH or REACH responsables, others
Industry sector		industrial sector adressed
3. Scope		processes, activities, substances
4. Volume		
Quantity (of documents)		singular guidances within the system
Page number(of single document)		average number of pages
5. Structure/format		of single documents
standardised		High-little-not standardised
Variability		Uniform structure or even templates ?
6. Relevance		
7. Authoritative		by law or others?
8. Reference to exposure data		
Exposure relevant?		Hight of exposure mentioned ?
Exposure only qualitatively?		exposure high- medium-low
Exposure as range?		range of values or band
Exposure as an exact Value?		target value, measured or calculated
Exposure by measurement?		
Expo by modelling?		Type/name of model
9. Support		
Help available		
Type of help		Manual , examples
Source of help		
Others		Add rows if necessary

To be further tested !

Single activity documents are more easily correlated with the PROC-concept of worker exposure scenarios.

Single activity documents

describe one activity in one document

They follow often a common structure and format

RMM systems with single activity documents are

- BAuA EMKG Control Guidance Sheets
- HSE/COSHH Essentials Guidance Sheets
- ILO Guidance sheets
- BGBAU/GISBAU "GISCODE documents"
- AISE GEIS
- ESIG GES

Multi activity documents

describe in one document a set of activities.

They describe activities of a sector or multistage process.

They describe diverse activities with one substance or diverse activities with several substances .

Structure and format may be different even within one system

Are Exposure determinants from models provided by different RMM- guidance systems ?

The idea behind:

1. **Parameters of RMM documents might be same as in exposure models (and as a consequence in the exposure scenario).**
2. **Find the parameters in the guidance.**
3. **Look whether values match with parameters in an existing exposure scenario.**
4. **Add the more detailed RMM-recommendations from the guidance to the already existing ES.**

1. Substance identity
2. Substance group
3. Scale of use
4. Concentration
5. 15 min peak exposure
6. Duration of process/task
7. Process temperature
8. PROC
9. Application on large surfaces
10. Type of setting
11. Room Size
12. Level of general ventilation
13. Local exhaust ventilation
14. Type of enclosure
15. Suppression techniques
16. Types of PPE

Parameters of tier 1 models. From
“BAuA conference on eTEAM project”

Existing RMM-guidance does not readily proliferate the parameters for all exposure models on the market !

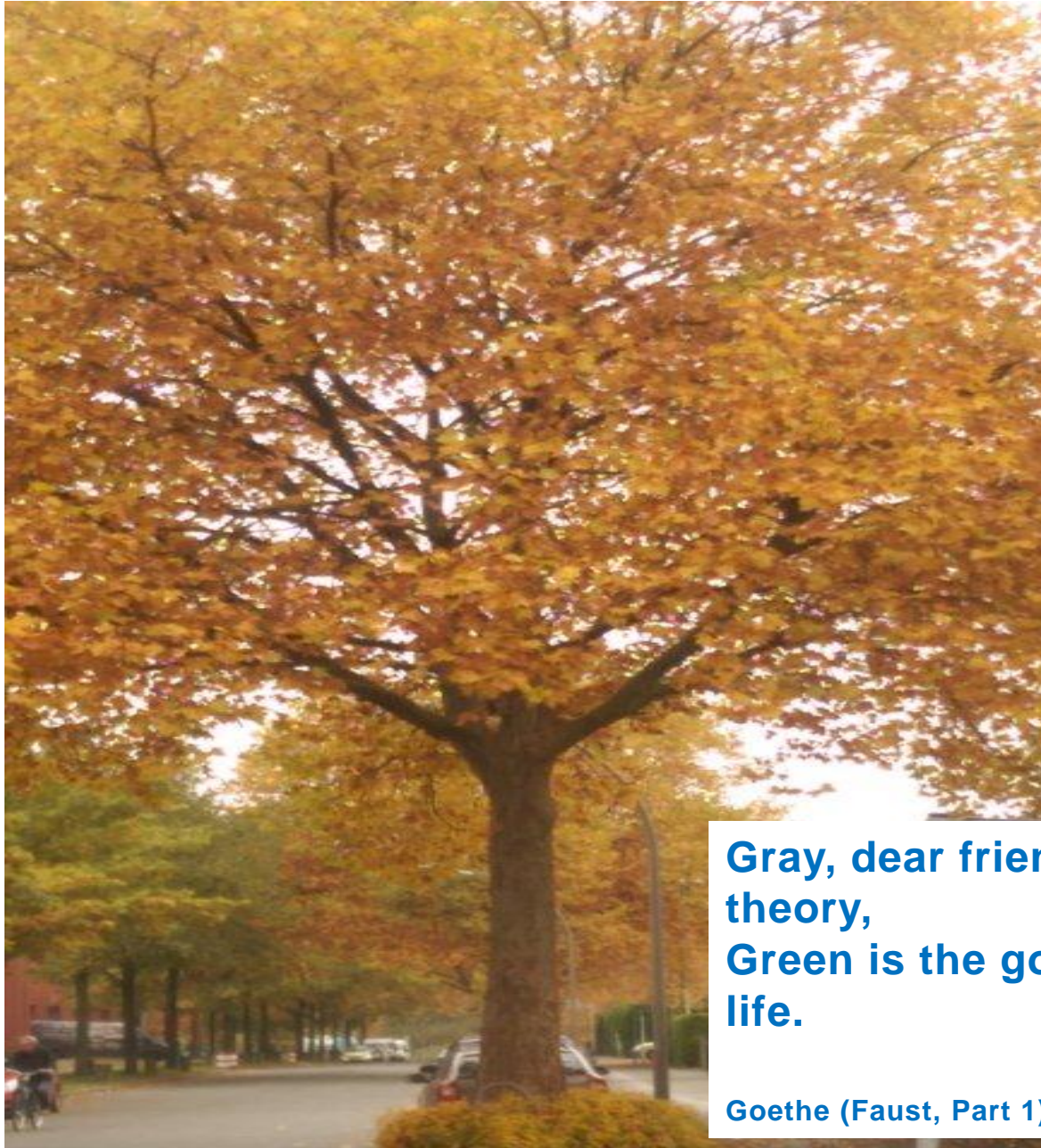
- Result from formal approach: There are many blank fields for most of the RMM-guidances. ☹️
- Factors that were available only implicitly were not taken into account.
- All systems except ESIG lack the PROC field.
- But PROC might be readily added.
- Other amendments possible with more expertise?

Guidance System	Substance identity	Substance group	Scale of use	Concentration	15min peak exposures	Duration of process/task	Process temperature	PROC	Application on surfaces	Type of setting	Room size	Level of general ventilation	Local exhaust ventilation	Type of enclosure	Suppression techniques	Types of PPE
Expo GISBAU																
Gefahr GISBAU																
BG/BIA																
BG/BGIA																
IFA																
BGI/GUV																
BGHM																
LASI																
BG ETEM																
BG RCI																
VSK BAuA TRGS 420																
ESIG																

Existing RMM-guidance does not readily proliferate the parameters for the current exposure scenario format !

- Another try: Parameters for models and ES are very similar - but they are not always the same.
- There are less blank fields because parameters that were implicitly available were amended (if possible with medium expertise)
- Blank fields are not needed for certain models and scenarios. Might that help?

Documents	No. of documents	Exposure-relevant parameters										
		PROC	physical state	dustiness/vapor pressure/boiling point	substance	max. concentration in the product	quantity of the product	frequency of application (during a workshift)	duration of application	process	indoor/outdoor use	limit value
Expo GISBAU	27											
Gefahr GISBAU	7											
BG/BIA	9											
BG/BGIA	11											
IFA	2											
BGI/GUV	3											
BGHM	15											
LASI	3											
BG ETEM	14											
BG RCI	20											
VSK TRGS 420	10											
ESIG	22											



**Gray, dear friend is every
theory,
Green is the golden tree of
life.**

Goethe (Faust, Part 1)

Structural approach for linking RMM-guidance to existing exposure scenario format

Structure of ES as base for an interface/correlation to RMM (adapted from: ECHA, 2014)

ES TITLE Title of exposure scenario

1. TITLE SECTION

ES/use name Description of use

Scope List of PROCs (“contributing scenarios” - WCS)

2. CONDITIONS OF USE AFFECTING EXPOSURE

2.1 not relevant in this project

2.2 WORKER CONTRIBUTING SCENARIO

General product properties such as
physical state,

concentration etc. quantity of the product,

Frequency and/or duration of use

Technical and organisational conditions and measures

Personal protective equipment,

Characteristics of use (indoor/outdoor)

Other terms and conditions

More information on “good practice”

Taken from the project report-
might not be the most recent
version

Exemplary link of to ES “Production of CaCl₂ Pellets” to EMKG Control Guidance Sheet 230

Linking manually and with expertise

1. TITLE SECTION “Production of CaCl₂ Pellets”

PC: 9b

PROC: 14

SU: 3, 22

2. CONDITIONS OF USE AFFECTING EXPOSURE

General product properties

- Physical state: solid
- Dustiness: fine powder
- Substance: CaCl₂
- Quantity: kg - t
- Max. concentration in the product: 100 %
- Frequency (during a workshift): not applicable
- Duration of use: 8 h
- Process temperature: room temperature
- Outdoor/Indoor: indoor
- Predicted Exposure: 0.1–1 mg/m³(result from application of guidance sheets)
DNEL: 5 mg/m³ (local inhalative, long term exposure)

Technical and organisational conditions and measures:

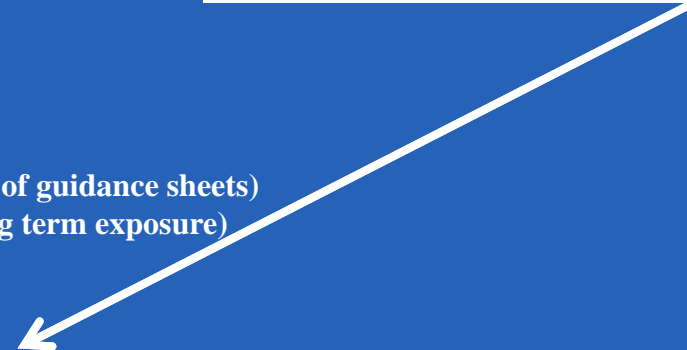
EMKG Control Guidance Sheets 230 (Pellet production)

Other terms and conditions

100 (General Ventilation), 101 (Storage), 110 (Organisation and Hygiene "Inhalation"),
pc-170 (General fire prevention measures - basic requirements (Draft)), 204 (Dust extraction from separators)

More information on “good practice”

These are 2 page documents based on standard phrases and could be rather easily consolidated into a readable common document



CGS 230 describes the keypoints to help reduce exposure to an adequate level.

Pelletising

Engineering control

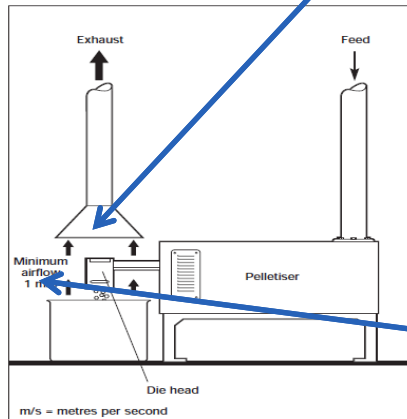
230

Access

- ✓ Restrict access to the work area to authorised staff only.

Design and equipment

- ✓ Position the exhaust hood close to and over the discharge point.
- ✓ If necessary, provide articulated joints in the exhaust duct to allow the hood to be moved, eg to allow good access to the pelletising head for maintenance or repair. Alternatively, a short section of flexible duct may be used.
- ✓ The airflow across the discharge chute should be at least 1 metre per second.
- ✓ Ensure that safeguards are provided to minimise the risks arising from other hazards, eg contacts with hot surfaces and ejection of liquid under high pressure.
- ✓ Provide good lighting. It should be suitable for the chemical(s) and task, eg dust tight or flameproof.
- ✓ Where possible, locate the work area away from doors, windows and walkways to stop draughts interfering with the ventilation and spreading dust or vapour.
- ✓ Provide an air supply to the workroom to replace extracted air.
- ✓ Keep ducts short and simple, and avoid long sections of flexible duct.
- ✓ Provide an easy way of checking the control is working, eg a manometer, pressure gauge or tell-tale.
- ✓ Discharge extracted air to a safe place away from doors, windows and air inlets.
- ✓ With dusts you can re-circulate clean, filtered air into the workroom.
- ✗ With vapours, re-circulation is not recommended.



Hood close to discharge field

No brushing/or compressed air

Exhaust air 1 m/s minimum

Maintenance

- ✓ Maintain the equipment as advised by the supplier/installer, in efficient and effective working order.

Examination and testing

- ✓ Get information on the design performance of the ventilation equipment from the supplier. Keep this information to compare with future test results.
- ✓ Visually check the ventilation equipment at least once a week for signs of damage.
- ✓ Have ventilation equipment examined and tested against its performance standard - generally at least every 14 months (see HSE publication HSG54).
- ✓ Keep records of all examinations and tests for at least five years.

Cleaning and housekeeping

- ✓ Clean work equipment and the work area daily. Clean other equipment and the workroom regularly - once a week is recommended.
- ✓ Deal with spills immediately.
- ✓ Store containers in a safe place and dispose of empty containers safely (see CGS 101).
- ✓ Put lids on containers immediately after use.
- ✗ Don't use dry brushing or cleaning with compressed air.

Personal protective equipment (PPE)

- ✓ Chemicals in **hazard group S** can damage the skin and eyes, or enter the body through the skin and cause harm. See CGS S100 and S101 for more specific advice. Check the safety data sheets to see what personal protective equipment is necessary.
- ✓ Ask your safety clothing supplier to help you select suitable protective equipment.
- ✓ Respiratory protective equipment should not be necessary for routine operations. It may be necessary for some cleaning and maintenance activities, eg cleaning up spills.
- ✓ Keep PPE clean, and replace it at recommended intervals.

Training

- ✓ Give your workers information on the harmful nature of the substance.
- ✓ Provide them with training on: handling chemicals safely; checking controls are working and using them; when and how to use any PPE you provide; and what to do if something goes wrong.

Supervision

- ✓ Have a system to check that control measures are in place and being followed.

Further information

Exemplary link of to ES “Hard Chrome Plating using CrO3” to IFA “Galvanotechnik und Eloxieren”

Linking manually and with expertise

) 1. TITLE SECTION : “Hard Chrome Plating using CrO3”

PC: 14 PROC: 13 SU: 3, 22

2. CONDITIONS OF USE AFFECTING EXPOSURE

General product properties

- Physical state: liquid (aqueous solution)
- Vapour pressure/boiling point: not applicable
- Substance: chromium trioxide
- Quantity: no information given (m3 – expert knowledge)
- Maximum concentration in the product: 240 bis 280 g/l
- Frequency (during a workshift): not applicable
- Duration of use: 8 h
- Process temperature: 55 – 80 °C
- Outdoor/Indoor: Indoor
- Predicted exposure: ca. 0.0246 mg/m³

Predicted exposure based on a good set of measurements

(95th percentil, 95% of personal measurements are below this value)
ca. 0,0026 mg/m³ 50th percentil

This comes from a multi-activity document – not all measures have been extracted

Technical and organisational conditions and measures:

- exhaust extraction system

These technical documents are far too extensive and general for recommendation in SDS

Other terms and conditions or More information on “good practice”

- o BGR 121 „Arbeitsplatzlüftung – Lufttechnische Maßnahmen“, VDI 2262 Blatt 3 „Luftbeschaffenheit am Arbeitsplatz, Minderung der Exposition“ and „Leitfaden zur Auslegung von Abluftanlagen an Galvanikanlagen“
- o TRGS 401 „Gefährdung durch Hautkontakt“, BGR 189 „Einsatz von Schutzkleidung“ and BGR 197 „Benutzung von Hautschutz“
- o TRGS 507 „Oberflächenbehandlung in Räumen und Behältern und BGR 117-1“
- o BGR 190 „Benutzung von Atemschutzgeräten“

Conclusions

- **Especially for older RMM systems in many cases relevant parameters are missing or can be retrieved by expert analysis only.**
- **Exemplarily it is shown that it is possible to fill data gaps with medium (to high) effort.**
- **Expert knowledge of the relevant branch is needed because “typical operational conditions” are often omitted (taken for granted).**
- **Not surprisingly recent “GES”, which have been developed in the REACH context show a good fit to ES parameters but are not detailed in terms of RRM.**

▪

Conclusions

- **It seems questionable to use existing systems as a “drop-in-extension” to existing exposure scenarios based on ECETOC-TRA or comparable models.**
- **To get ahead OSH RMM-documents should be amended by structured comprehensive lists of exposure relevant parameters and measures.**
- **Multi-activity RMM-guidance need splitting into single activity documents.**

Conclusions

A RMM-documents repository including structured comprehensive lists of exposure relevant parameters and measures

- **might be used under REACH to select appropriate OSH guidance documents to generate (higher tier) exposure scenarios**
- **or to provide additional (voluntary) advice to handling and use in existing ES.**
- **might be used under OSH to facilitate the usage of lengthy documents and might initiate EU-wide exchange of OSH-information.**

Thank you for your attention !

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