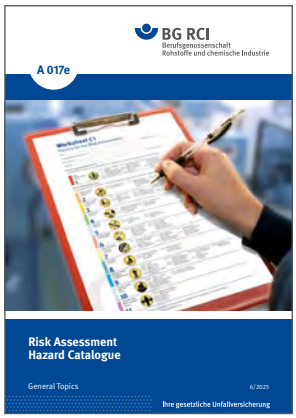
BG RCI
Berufsgenossenschaft
Rohstoffe und chemische Industrie

General Topics

Risk Assessment Hazard Catalogue



A 017e
Edition: 6/2023

VISION ZERO.

ZERO ACCIDENTS – HEALTHY WORK

VISION ZERO is the vision of a world without occupational accidents and work-related illnesses. In this connection the avoidance of lethal and severe occupational accidents and illnesses is given highest priority. The goal of a comprehensive culture of risk prevention is VISION ZERO.

Further information concerning the VISION ZERO Prevention Strategy is available at: http://visionzero.global/

This Code of Practice particularly deals with the Golden Rule **"Identify Hazards – Control Risks"**

Table of Contents

The Codes of Practice A 016e and A 017e, the latter including a hazard catalogue, can be used for the implementation and documentation of the risk assessment. The basic hazard catalogue A 017e allows the systematic recording of risks and stresses (see Overview pp. 6 and 7). Further information is presented in special catalogues (see selected papers and Codes of Practice in Appendix 7, No. 3).

The hazard catalogue contains (partly complemented with explanatory notes):
› Risk and stress factors
› Examples of safeguard measures and
› Relevant regulations and technical rules.

As far as possible, references to the legal basis are indicated for the examples of measures given (Column 2 in the lists). The boxes “Source/Information” present a selection of common legal references, technical rules and mention further literature sometimes. Examples of safeguard measures in Column 2 are described in more detail, if regulations and technical rules contain general measures only or none of them.

This catalogue supports the systematic collection and evaluation of risk and stress factors in the context of risk assessments without claiming to be exhaustive. An adaptation to operational conditions may be necessary.

An option how to perform and document a risk assessment is shown in Code of Practice A 016e and realised in the file “Gefährdungsbeurteilung – Arbeitshilfen“.

Code of Practice A 016e lists the following options of documenting risk assessments:
1. Forms for hand-written documentation in the file “Gefährdungsbeurteilung – Arbeitshilfen”
2. “GefDok light”: forms as EXCEL sheets or WORD files
3. “GefDok KMU”: a small, intersectoral database, developed for small and medium-sized enterprises (SME) as well as for sections of large companies
4. Kits for specific sectors, e.g. building materials or plastics industry
5. Papers to support small-sized enterprises in different industrial sectors (“K-Reihe”).

The overall supply to perform risk assessments is found on the BG RCI homepage at
https://www.bgrci.de/fachwissen-portal/themenspektrum/gefaehrdungsbeurteilung.

Guidance for the implementation and documentation of risk assessments developed by Accident Insurance Institutions is listed on the DGUV homepage
www.dguv.de (web code d40131).

Guidance and further information on risk assessments of national and European institutions are available at the community portal of the Federal Institute for Occupational Safety and Health (BAuA), the European Agency for Safety and Health at Work (EU-OSHA) and the Joint German Occupational Safety and Health Strategy (GDA) at
www.gefaehrdungsbeurteilung.de.

Additionally, within the framework of GDA several questionnaires concerning main topics are available at
www.gda-portal.de.

Factors for the Risk Assessment

Basic Organisational Factors

In this section you can check off organisational regulations, which you already apply in the company.

Basic Organisational Factors

1

- ☐ 1.1 Workplace-Related Training
- ☐ 1.2 Workplace-Related Operating Instructions
- ☐ 1.3 Coordination of Work
- ☐ 1.4 Hazardous Work
- ☐ 1.5 Use of Personal Protective Equipment
- ☐ 1.6 First-Aid Systems
- ☐ 1.7 Alarm and Rescue Measures
- ☐ 1.8 Hygiene
- ☐ 1.9 Organisation of Occupational Safety and Health, Management Systems
- ☐ 1.10 General Communication
- ☐ 1.11 Mandatory Testing of Work Equipment and Plants
- ☐ 1.12 Groups of Persons with Special Needs

Risk and Stress Factors

In this overview you can select risk and stress factors, which are true for the company.

Hazards related to Workplace Design

2

- ☐ 2.1 Working Spaces
- ☐ 2.2 Traffic Routes
- ☐ 2.3 Falling on Even Ground, Slipping, Stumbling, Twisting one's Ankle, Missteps
- ☐ 2.4 Falling from a Height
- ☐ 2.5 Containers, Silos and Confined Spaces
- ☐ 2.6 Working close to Water

Hazards related to Ergonomic Factors

3

- ☐ 3.1 Heavy Physical Work
- ☐ 3.2 Physical Work Straining on one Side
- ☐ 3.3 Lighting
- ☐ 3.4 Climatic Conditions
- ☐ 3.5 Information Intake
- ☐ 3.6 Extent of Perception
- ☐ 3.7 Impeded Handling of Work Equipment
- ☐ 3.8 Standing Workplaces
- ☐ 3.9 Workstations

Mechanical Hazards

4

- ☐ 4.1 Unprotected Moving Parts of Machinery
- ☐ 4.2 Parts with Hazardous Surfaces
- ☐ 4.3 Means of Transport
- ☐ 4.4 Parts Moving Uncontrolled

Electrical Hazards

5

- ☐ 5.1 Principles
- ☐ 5.2 Hazardous Body Currents
- ☐ 5.3 Electric Arcs
- ☐ 5.4 Electromagnetic Fields

6 Hazards related to Substances

- ☐ 6.1 Harmful Effects of Gases, Vapours, Aerosols, Dusts, Liquid and Solid Substances
- ☐ 6.2 Skin Exposure
- ☐ 6.3 Other Effects and hazardous Interactions due to Substance Mix-Ups

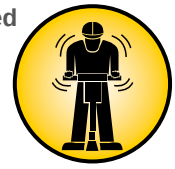
7 Hazards related to Fire and Explosion

- ☐ 7.1 Fire Hazards related to Solids, Liquids and Gases
- ☐ 7.2 Hazards due to Explosive Mixtures
- ☐ 7.3 Thermal Explosions (Runaway Reactions)
- ☐ 7.4 Physical Explosions and Boiling Delays
- ☐ 7.5 Explosive Substances (Explosives)
- ☐ 7.6 Miscellaneous Explosive Material (e.g. Peroxides)

8 Biological Hazards

- ☐ 8.1 Targeted Activities
- ☐ 8.2 Non-Targeted Activities
- ☐ 8.3 Infection Hazards caused by Epidemic/Pandemic

9 Hazards related to Special Physical Impacts



- ☐ 9.1 Noise
- ☐ 9.2 Ultrasound
- ☐ 9.3 Whole-Body Vibrations
- ☐ 9.4 Hand-Transmitted Vibrations
- ☐ 9.5 Non-Ionising (Optical) Radiation
- ☐ 9.6 Ionising Radiation
- ☐ 9.7 Electromagnetic Fields (see Section 5)
- ☐ 9.8 Hot or Cold Media – Cold or Hot Workplaces
- ☐ 9.9 Electrostatic Hazards
- ☐ 9.10 Overpressure/Partial Vacuum

10 Hazards related to Mental Stress

- ☐ 10.1 Work Content/Work Task
- ☐ 10.2 Work Organisation
- ☐ 10.3 Working Hours
- ☐ 10.4 Social Relations
- ☐ 10.5 Work Equipment
- ☐ 10.6 Work Environment

11 Miscellaneous Risk and Stress Factors

- ☐ 11.1 Travel, Driving and Steering Activities
- ☐ 11.2 Humans
- ☐ 11.3 Animals
- ☐ 11.4 Plants

1 Basic Organisational Factors

This Section considers the basic organisational factors before starting the risk assessment itself. In individual cases specific operational additions may be required. The "GDA-ORGAcheck" (www.gda-orgacheck.de) or the INQA company check "Guter Mittelstand" (www.inqa-unternehmenscheck.de) can be used in order to prepare the handling of basic organisational factors for occupational safety and health. Detailed information about the development of an occupational safety and health management is given in the file for practical assistance "Arbeitsschutz mit System" of BG RCI.

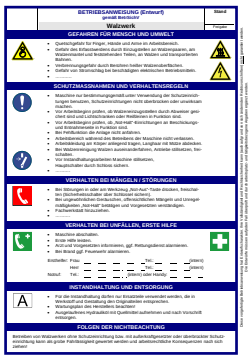
1.1 Workplace-Related Training

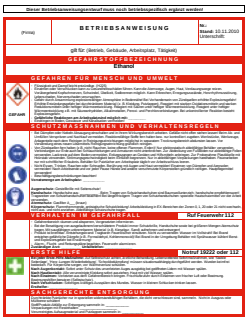
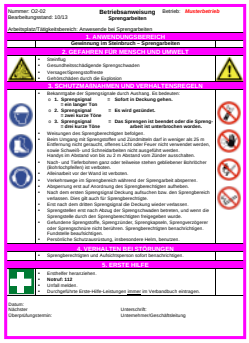
Factors (Overview)	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Information on Activities and Work Environment**  *Source: Evonik Degussa GmbH, Essen*	➜ **Training before performing a task for the first time. This measure shall include in particular:** **> Behaviour during normal operation,** **> Safety and Health labelling (meaning of labels and duty to observe the respective precautions),** **> An emergency plan and a rescue plan,** **> Action in case of service failure, accident, emergency or fire,** **> Limits of individual competences.** ➜ **Short recurrent training, as often as possible but at least once a year, in particular** **> When changing the workplace.** **> After a long absence from work (e.g. parental leave, voluntary year of social service).** **> For people in particular need of protection (e.g. people with different abilities; people returning to work after a severe accident; women in childbearing age carrying out activities with hazardous material, genetically modified organisms or ionised radiation).** **> For employees of temporary employment agencies.** ➜ **Short, recurrent training of youths, as often as possible but at least every six months** (§ 29 Section 2 JArbSchG).
■ **Execution of Training**	➜ **Select time for training in due consideration of the learning capacity of the participants (e.g. do not give instructions at the end of the shift).** ➜ **Execution of training:** **> In groups and with active contribution of the participants,** **> Taking into account the results of the risk assessment and operating instructions,** **> Also in combination with e-learning[1],** **> Support of training via electronic media (e.g. see Codes of Practice A 026, File for Practical Assistance "Aus Arbeitsunfällen lernen" of BG RCI as well as films about occupational safety and health at www.arbeitsschutzfilm.de).** ➜ **Communication of training contents** **> Related to activity and workplace,** **> Presented in an intelligible form and language.** ➜ **Include specific deviations from normal operation.** ➜ **Regular training in safe behaviour and emergency measures.** ➜ **Documentation of training including the participants' signatures.**
■ **Event-Based Training**	➜ **Training of employees in case of new insights or discoveries related to hazards or contaminations (e.g. accidents, near misses, work-related illnesses, pandemics).** ➜ **Training of employees when new hazards or contaminations exist (e.g. new or modified machines, procedures, activities, or substances).** ➜ **Training after modifications of emergency, rescue or alarm systems.**

1 When handling hazardous materials a verbal training is mandatory (§ 14 Section 2 GefStoffV and/or § 14 Section 2 BioStoffV).

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Control of Implementation**	➜ **Make sure that the work is carried out according to training; i.e..:** **> Testing the success of learning,** **> Control of employees' behaviour in the company by superiors, OSH Professionals, Occupational Physicians or Safety Delegates.**
Source/Information: DGUV Regulations, e.g. Section 4 DGUV Regulation 1; DGUV Regel 100-001; §14 GefStoffV; TRGS 526; TRGS 555; § 14 Section 3 BioStoffV; § 12 ArbSchG; § 12 BetrSichV; § 81 BetrVG; § 29 Sections 1,2 JArbSchG; § 12 Section 3 GenTSV; § 63 StrlSchV; DGUV Information 211-005; A 024; A 027; A 038; IfSG	

1.2 Workplace-Related Operating Instructions

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Compilation**	➜ **Operating instructions based on risk assessments for** **> Hazardous substances according to GefStoffV,** **> Biological Substances according to BioStoffV,** **> Machines, plants and equipment according to BetrSichV.** ➜ **It is possible to create collective operating instructions for hazardous substances with similar risks and comparable safeguard measures.** ➜ **Key contents of operating instructions for hazardous substances and biological agents are:** **> Designation of the hazardous substance** **> Hazards for human beings and the environment** **> Safeguard measures and rules of conduct** **> Conduct in the event of hazardous situation** **> First Aid** **> Proper removal** ➜ **Key contents of operating instructions for machines are:** **> Range of application (machine or plant)** **> Hazards for human beings and the environment** **> Safeguard measures and rules of conduct** **> Behaviour in case of defects or disturbances** **> Behaviour in case of accidents, First Aid** **> Maintenance and removal**
■ **Contents**  BETRIEBSANWEISUNG (Entwurf) gemäß Betriebsord Wuzwerk GEFAHREN FÜR MENSCH UND UMWELT SCHUTZMAßNAHMEN UND VERHALTENSREGELN VERHALTEN BEI MÄNGELN / STÖRUNGEN VERHALTEN BEI UNFÄLLEN, ERSTE HILFE INSTANDHALTUNG UND ENTSORGUNG FOLGEN DER NICHTBEACHTUNG	➜ **Description of actions and measures referring to risks and stresses in normal operation, specific deviations, and in case of emergency:** **> Assembly/Disassembly** **> Testing** **> Operation, including start-up and shutdown** **> Maintenance** **> Cleaning** **> Elimination of faults** **> Disposal** **> Transport** **> Deviations from intended use** **> Case of Emergency** ➜ **Include risks and stresses for the environment, for assets and for third parties.** ➜ **Give advice for people who are particularly at risk (e.g. carriers of pacemakers, pregnant women, female employees in childbearing age).** ➜ **List emergency and first-aid measures.**

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
 	➜ **Formulation of operating instructions:** > **Form and language must be intelligible for employees (in foreign languages if necessary),** > **Statements must be clear and as precise as possible (Example: Do not write “appropriate” protective gloves).** ➜ **Update operating instructions regularly, e.g. in case of procedural changes, use of different or new devices or new personal protective equipment, new insights.** ➜ **Describe safety and auxiliary devices and, if necessary, obligatory personal protective equipment for maintenance and repair work.** ➜ **Determine measures to control deviations from normal operation.**
■ **Announcement**	➜ **Operating instructions (optionally in electronic form) have to be available at the workplace** (§ 14 Section 1 GefStoffV, § 14 BioStoffV).

Source/Information: § 12 BetrSichV; § 14 Section 1 GefStoffV; TRGS 555; § 14 Section 1 BioStoffV; A 010; DGUV Information 211-010; DGUV Information 213-016

1.3 Coordination of Work

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Internal Coordination** ■ **Cooperation with External Companies**	➜ **Draw up a workflow plan.** ➜ **Assign responsibilities and competences to persons with management functions.** ➜ **Responsibilities and tasks of coordinator agreed by contract.** ➜ **When collaborating with contractors or planning projects with several companies involved, a coordinator with the authority to issue directives to all employees should be designated (e.g. as part of the working contract).** ➜ **Consider occupational safety when placing orders to contractors.** ➜ **Before starting work, check the activity-related risk-assessment and operating instructions of the contractor.** ➜ **Mutual consultation, coordination and information of all employees and superiors (see also Section 1.10 “General Communication” herein).** ➜ **Provide and use alarm or communication systems.** ➜ **Delimit working areas** ➜ **Secure main switch against restart, and assure the interruption of energy and feed lines. (LOTO Principle: Lockout/Tagout).** ➜ **Fill in and sign work permits and release notes.** ➜ **Assure a reliable registration/checkout system for third party workers.** ➜ **Brief third party workers on local conditions and safeguard measures.**

Source/Information: Section 6 DGUV Regulation 1; DGUV Regel 100-001; § 8 ArbSchG; § 15 GefStoffV; § 3 BaustellV incl. RAB; A 009; A 029; DGUV Information 211-006; DGUV Information 215-830; KB 035; FBORG-002

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Coordination at Construction Sites**[2]	➜ **As a general rule take into account Occupational Safety and Health already when planning a construction project.** ➜ **Check if the following measures are required:** > **Advance notice** (RAB 10) > **Safety coordinator (SiGeKo)** (RAB 30) > **Safety and Health plan (SiGePlan)** (RAB 31) > **Documentation for subsequent work on construction sites** (RAB 32)
Source/Information: §§ 2, 3 BaustellV; Appendices I and II BaustellV	

1.4 Hazardous Work

Hazardous work is defined as work which implies an increased risk based on the working procedure, the kind of activity, the substances in use or the environment, as no adequate safeguard measures can be implemented.

Hazardous work is listed in Section 2.7 of DGUV Regel 100-001.
Examples of hazardous work are:
> Work bearing the danger of falling,
> Working in silos, containers or confined spaces,
> Welding in confined spaces,
> Open flame operations in fire risk or explosion-hazardous areas or at closed hollow bodies,
> Gas pressure tests and leakage tests at containers,
> Trials of technical large scale plants like boiler plants,
> Blasting work,
> Working in the vicinity of rail systems during ongoing railway operation,
> Service in the fire brigade,
> Driving work during tunnel constructions,
> Working at open filler inlets of baling presses, which are charged with steady-flow conveyors, and their unsecured feeding points,
> Working at lifting devices when the crane operator cannot watch the load,
> Dealing with extremely hazardous substances, e.g. in a chemical, physical or medical laboratory,
> Working with biological substances of risk category IV.

Additionally, Appendix II of the „Baustellenverordnung“ lists extremely hazardous work.

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Hazardous Work according to DGUV Regulation 1/DGUV Regel 100-001** ■ **Tasks performed by Several Persons** ■ **Individual Workplaces**[3]	➜ **Employ supervising persons** (Section 8 (1) DGUV Regulation 1; No. 2.7.1 DGUV Regel 100-001). ➜ **Determine personal protection measures, e.g. personal emergency signalling systems** (Section 8 (2) DGUV Regulation 1; No. 2.7.2 DGUV Regel 100-001; DGUV Regel 112-139). ➜ **Work equipment with special hazards should be used only by specially trained and authorised persons** (§§ 10, 12 BetrSichV).
■ **Particularly Hazardous Tasks according to BaustellV** ■ **Tasks in Containers, Silos, Confined Spaces** ■ **Tasks in Wastewater Engineering Plants**	➜ **Draw up a Safety and Health plan according to § 2 Section 3 and Appendix II BaustellV; DGUV Regel 112-139.** ➜ **See Section 2.5 “Containers, Silos and Confined Spaces”.**

2 For the execution of construction work the German Social Accident Insurance Institution for the Building Trade (BG BAU) offers information and tools. The web site www.bgbau-medien.de provides various information for download. Several Info-CDs are available (only partly free of charge).
3 Assessing criteria see also Appendices 1 and 3 in DGUV Regel 112-139.

1.4 Hazardous Work (continued)

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Missing Work Permits (e.g. Open Flame Operations, Working in Containers, Electric Work, Opening of Closed Systems, Excavations, Scaffolding Work)**	➜ **Define rules, which tasks require special permits and how to proceed** (e.g. TRGS 741; Chapter 2.26 Section 3.8.2, Chapter 2.29 Section 3.15.1 DGUV Regel 100-500; DGUV Rule 113-004). ➜ **Issue of work permits only by qualified or authorised employees on site.** ➜ **Restrict permission to a defined time period.** ➜ **Execution and control of measures given in work permits.** ➜ **Ensure a clear notice on termination of work.**

Source/Information: DGUV Regulations

1.5 Use of Personal Protective Equipment

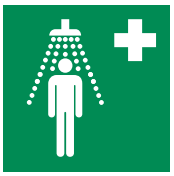
Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
Design of working conditions preferably in such a way that personal protective equipment is needless. Personal safeguard measures are subordinated to technical or organisational protective measures (PSA-BV; § 4 ArbSchG; § 9 GefStoffV).	
■ **Selection and Use**  *M004 Eye Protection Must be Worn*  *M014 Safety Helmet Must be Worn*	➜ **Provide suitable and effective personal protective equipment (e.g. according to safety data sheets, operating instructions).** ➜ **A clear designation of the required personal protective equipment given in the operating instructions.** ➜ **Examination whether the use of personal protective equipment can imply additional risks and stresses, e.g. do not use protective gloves when working at rotating machine parts.** ➜ **Participation of employees in selection and trial of protective equipment.** ➜ **Appropriate cleaning, maintenance and storing of personal protective equipment.** ➜ **Before using protective equipment, check condition and report deficiencies** (Section 30 (2) DGUV Regulation 1; No. 4.12.2 DGUV Regel 100-001). ➜ **The use of a respiratory protection device and protective equipment against falls and for handling hazardous chemicals requires specific training including practical exercises** (Section 31 DGUV Regulation 1; No. 4.13 DGUV Regel 100-001). ➜ **Mandatory or optional health care for employees using a respiratory protection device according to Annex Part 4 Section 1 No. 1 and/or Section 2 No. 2 ArbMedVV.** ➜ **Observe the maximum daily wearing time of protective equipment** (Section 30 (1) DGUV Regulation 1; No. 4.12.1 DGUV Regel 100-001; DGUV Regel 112-190). ➜ **Clear identification of working areas with mandatory signs** (ASR A1.3). ➜ **Consider and evaluate possible additional risks associated with personal protective equipment when making a selection, and take additional measures if necessary.**
Source/Information: Sections 29–31 DGUV Regulation 1; DGUV Regel 100-001; DGUV Regel 112-189 until 112-201; DGUV Information 212-515; A 008; ArbMedVV; KB 022	
■ **Hygiene of Personal Protective Equipment**	➜ **Ensure proper functioning and hygienic conditions of personal protective equipment by appropriate storage, maintenance, repair and replacement** (§ 2 Section 4 PSA-BV).
Source/Information: DGUV Regulation 1; DGUV Regel 100-001; PSA-BV; A 008	

1.6 First-Aid Systems

Factors (Overview)

E003 First Aid

E013 Stretcher



E012 Safety Shower

E011 Eyewash

Examples for Safeguard Measures (Specific Legal Bases)

- **Establish an alarm system for accidents.**
- **Ensure that the reporting and alarm centre is always occupied.**
- **Provide first aid rooms according to Section 25 (4) DGUV Regulation 1, if necessary.**
- **Appropriately provide, complement and renew suitable first-aid materials** (Section 25 (2) DGUV Regulation 1).
- **Nominate and train an adequate amount of first-aiders (1 first-aider for companies with up to 20 employees; for 20 employees or more: in administration and commercial enterprises, 5 %, otherwise 10 % of the staff as first-aiders** (Section 26 (1) DGUV Regulation 1)**); first aid advanced training within 2 years** (Section 26 (3) DGUV Regulation 1).
- **Employ or train in-house paramedics according to Section 27 DGUV Regulation 1 (required above 250/1500 employees depending on risk potential); advanced training after 3 years at least.**
- **Instruct employees on how to proceed in the event of accidents – as well as on accident reporting by telephone: Who reports? Where did the accident occur? What happened? How many injured? What type of injuries?**
- **Even small accidents (e.g. eye irritation, cuts and bruises) must be reported, documented (first-aid log) and treated immediately.**

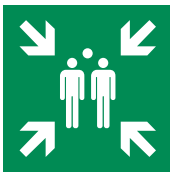
Type of business	Number of insured persons	Small first-aid kit	Large first-aid kit*
Administrative and commercial companies	1–50	1	
	51–300		1
	from 301		2
	For every 300 additional insured persons, one additional large first-aid kit		
Manufacturing, processing and similar companies	1–20	1	
	21–100		1
	from 101		2
	For every 100 additional insured persons, one additional large first-aid kit		
* Two small first-aid kits replace one large first-aid kit			

Source: No. 4.7.2 DGUV Regel 100-001

- **Make the following information available to all employees:**
  - > **Emergency call number**
  - > **First-aid personal**
  - > **First-aid and emergency installations**
  - > **Nearby hospitals**
  - > **Accident insurance consultants**
- **Label first-aid installations** (ASR A1.3).
- **Provide medical treatment and suitable transport after an accident.**
- **Do not forget (remote) working places of single individuals.**
- **Record first-aid actions** (Section 24 (6) DGUV Regulation 1).
  A first-aid log (DGUV Information 204-020) **or a writing pad for reports** (DGUV Information 204-021) **can be used for documentation.**
- **Install eye and emergency showers in laboratories and check them regularly for proper function** (DIN EN 15 154; DGUV Information 213-850).
- **Provide emergency showers, if there is a risk of exposure to irritating, corrosive or toxic substances or to fires** (Section 25 (3) DGUV Regulation 1; No 4.7.3 DGUV Regel 100-001) **and implement alerting systems in remote parts of the company, if appropriate.**
- **Provide eye rinsing devices (preferably eyewashes running on water) if there is a risk of eye contact with irritating substances.**
- **If the handling of hazardous substances possibly induce injuries, which need a special treatment (e.g. hydrofluoric acid) an agreement with the first hospital providing care has to be made beforehand.**
- **In case of an accident including hazardous substances give all documents to the treating physician, which allow a risk assessment, e.g. safety data sheets.**

Source/Information: § 10 ArbSchG; § 4 Section 4, § 6 and Appendices No. 3.5, 4.3 ArbStättV; ASR A4.3; § 13 Section 1 GefStoffV; § 13 BioStoffV; Sections 24–28 DGUV Regulation 1; Nos. 4.6–4.10 DGUV Regel 100-001; DGUV Information 213-850

1.7 Alarm and Rescue Measures

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
 *E007 Assembly Point*	➜ **Establish an alarm plan** (Section 22 (1) DGUV Regulation 1; No. 4.4.1 DGUV Regel 100-001). ➜ **Establish escape and rescue plans** (Section 22 (1) DGUV Regulation 1; No. 4.4.1 DGUV Regel 100-001; § 4 Section 4 ArbStättV; Section 10 ASR A2.3). ➜ **Additional requirements for people with different abilities are described in Appendix A 2.3 of ASR V3a.2.** ➜ **Define assembly points taking into account main wind direction.** ➜ **Instruct employees on escape and rescue measures** (Section 4 (1) DGUV Regulation 1; No. 2.3.1 DGUV Regel 100-001). ➜ **Practice escape and rescue measures** (Section 22 (1) DGUV Regulation 1; No. 4.4.1 DGUV Regel 100-001; § 4 Section 4 ArbStättV; § 13 Section 1 GefStoffV). ➜ **Instruct an adequate number of employees on fire extinguishing equipment** (Section 22 (2) DGUV Regulation 1; No. 4.4.2 DGUV Regel 100-001). In general, a share of 5 % of employees is sufficient according to ASR A2.2.

Source/Information: § 13 GefStoffV; § 13 BioStoffV; Section 21 (2) DGUV Regulation 1; No. 4.3.2 DGUV Regel 100-001; DGUV Information 205-001; File for Practical Assistance “Gerüstet für den Notfall”

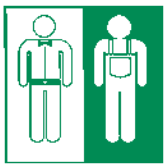
1.8 Hygiene

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Cleanness of Workplace**	➜ **Clean the workplaces regularly according to hygiene requirements, remove immediately contaminants and deposits that can lead to hazards** (§ 4 Section 2 ArbStättV; § 8 Section 1 No. 5 GefStoffV; Section 4 TRGS 500; § 9 Section 1 BioStoffV). ➜ **Provide waste bins in the working area (use lockable waste containers, if waste is easily flammable, malodorous or unhygienic).**

Source/Information: ArbStättV; TRGS 500; TRGS 401; BioStoffV; TRBA 500

■ **Hygiene when Handling Hazardous Materials or Biological Substances**   *P022 Eating and Drinking Forbidden*	➜ **Provide separate lockers for working suits or protective clothing on one hand and casual clothing on the other hand, if activities could result in a risk through contaminated working clothes** (§ 9 Section 5 GefStoffV; § 9 Section 3 BioStoffV). ➜ **Before breaks and after work adequate measures of skin cleansing and skin care should be taken.** ➜ **Food and stimulants must not be stored with hazardous material or biological substances (e.g. no storage in the same refrigerator)** (§ 8 Section 5 GefStoffV, § 9 Section 3 BioStoffV). ➜ **No filling of hazardous material or biological substances into containers if form or labelling bears the danger of being mixed-up with food** (§ 8 Section 5 GefStoffV, § 9 Section 4 BioStoffV). ➜ **In working areas bearing the risk of contamination through hazardous substances or biological substances, no consumption of food and stimulants is permitted. Provide suitable locations, e.g. break rooms** (§ 8 Section 3 GefStoffV, § 9 Section 3 BioStoffV). ➜ **No wearing of arm- or hand jewellery as germs are spread and their growth is favoured or there is a risk absorbing hazardous substances, which are harmful to the skin if they are absorbed for a longer period or unnoticed.**

Source/Information: GefStoffV; BioStoffV

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Changing Rooms** 	➜ **Provide separate lockers for working suits (black) and casual clothing (white), if employees are exposed to infectious, toxic, harmful, corrosive, irritating or malodorous substances, or to a strong contamination** (§ 9 Section 5 GefStoffV; § 9 Section 3 BioStoffV). ➜ **Design changing rooms which are easy to clean, e.g. with washable walls and floors.** ➜ **In workplaces with highly soiling activities, provide, if necessary, a facility for cleaning shoes in front of the changing rooms.**
Source/Information: ASR A4.1	
■ **Washing Facilities, Lavatories** 	➜ **Install washing facilities with running water near the workplaces.** ➜ **If the type of activity or health care considerations require, provide lavatories with hot and cold running water.** ➜ **Provide lavatories with facilities that allow all employees cleaning and washing according to hygiene requirements.** ➜ **Showers are mandatory in case of strongly contaminating work** (No. 6.2 Section 2 ASR A4.1). ➜ **Provide the products required for cleaning (and disinfection, if necessary) as well as for drying hands.**
Source/Information: § 6 Section 2 and Appendix No. 4.1 ArbStättV; ASR A4.1	
■ **Toilets** 	➜ **Install toilets near the workplaces** (see Section 5.2 of ASR A4.1). ➜ **Install washbasins with soap dispensers and disposable hand towels (or dispensers for textile hand towels) in toilet facilities.** ➜ **Provide toilets close to** **> break rooms,** **> duty rooms,** **> changing rooms,** **> cleaning rooms.** ➜ **Use material for floors and walls that can be wet-cleaned (e.g. tiles, plastics).** ➜ **The provision of hygienic bins is described in Section 5.4 of ASR A4.1.**
Source/Information: § 6 Section 2 and Appendix No. 4.1 ArbStättV; ASR A4.1	

1.9 Organisation of Occupational Safety and Health, Management Systems

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
See also Section 1.10 and Appendix 4 in this Code of Practice	
■ **Responsibilities**	➜ **Assign responsibilities for safety and health in written form[4] and legally effective to the management staff** (§ 13 ArbSchG; Section 13 DGUV Regulation 1; No. 2.12 DGUV Regel 100-001). ➜ **Define areas of responsibility and ensure coordination** (Section 13 DGUV Regulation 1). ➜ **Participation of management staff in plant tours, safety discussions, and accident investigations in the respective working areas.**
Source/Information: ArbSchG; DGUV Regulation 1; DGUV Regel 100-001	

4 Forms on CD-ROM belonging to practical assistance file “Arbeitsschutz mit System”

Factors (Overview)	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Support by the OSH Professional** 	➜ **Ensure consultation/support of the entrepreneur and the persons in charge of Occupational Safety and Health (including humanitarian design of workplaces)** (§§ 5, 6 ASiG; Section 2 (1–3) DGUV Vorschrift 2). **For companies having less than 50 employees: Optional participation in the external alternative medical treatment and safety support (former "Unternehmermodell")** (Section 2 (4) DGUV Vorschrift 2). ➜ **Provide the OSH Professional with sufficient resources to fulfill the required deployment time** (§ 5 Section 2 ASiG). ➜ **Document the amount of working hours dedicated to Occupational Safety and Health plus the number and results of site visits** (Section 5 DGUV Vorschrift 2).
Source/Information: ASiG; Section 19 DGUV Regulation 1; No. 4.1 DGUV Regel 100-001; DGUV Vorschrift 2	
■ **Consultation through Occupational Physician**  *E009 Doctor*	➜ **Ensure consultation (support of entrepreneur and persons in charge) with respect to Occupational Safety and, particularly, Health Protection** (§§ 2, 3 ASiG; Section 2 (1–3) DGUV Vorschrift 2). **For companies having less than 50 employees: Optional participation in the external alternative medical treatment and safety support (formerly "Unternehmermodell")** (Section 2 (4) DGUV Vorschrift 2). ➜ **Give sufficient time to the Occupational Physician to perform the required tasks** (§ 2 Section 2 ASiG). ➜ **Regular written reports on the completion of delegated tasks and the collaboration with OSH Professionals** (see DGUV Vorschrift 2). ➜ **Involve the Occupational Physician in site visits.** ➜ **Establish consulting hours (occupational medicine) for employees.** ➜ **Provide preventive medical checks-ups and medical advice to employees** (§ 3 ASiG). ➜ **Medical examination for particular occupational requirements** (DGUV Information 250-010)**.** ➜ **Occupational health care according to ArbMedVV: e.g. for tasks with hazardous substances, biological substances including genetic engineering of human pathogenic organisms, physical impact (extreme heat or cold, noise, vibrations, non-coherent artificial optical radiation, diving work, physical load endangering the musculoskeletal system), activities requiring a respiratory protective device, activities in foreign countries with extreme climatological conditions and infection hazards, activities at workstations.** ➜ **Carry out occupational health care on demand of employees** (optional health care) (§ 5a ArbMedVV). ➜ **Arrange follow-up preventive health care for persons potentially being exposed to carcinogenic substances** (Annex Part 1 Section 3 ArbMedVV). ➜ **Occupational health care according to GesBergV** ➜ **Occupational health care according to KlimaBergV**
Source/Information: ASiG; ArbMedVV; Section 19 DGUV Regulation 1; No. 4.1 DGUV Regel 100-001; DGUV Vorschrift 2; GesBergV; KlimaBergV	
■ **Support by Safety Delegates** 	➜ **Employ an adequate number of Safety Delegates** (Section 20 (1)DGUV Regulation 1). ➜ **Allow Safety Delegates to fulfil their task, i.e. support of superiors through identification and reporting of potential accident causes** (Section 20 (3) DGUV Regulation 1; § 22 SGB VII). ➜ **Communicate the names of Safety Delegates through written notice.** ➜ **Involve Safety Delegates in inspections and accident investigations.** ➜ **Provide Safety Delegates with an adequate qualification and include them in a systematic information system** (Section 20 (6)DGUV Regulation 1).
Source/Information: SGB VII; DGUV Regulation 1; DGUV Regel 100-001; A 004-1	

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
■ **Involvement of the Works Council**	➜ **Support measures against accident and health hazards** (§§ 89–91 BetrVG). ➜ **Perform monitoring duties in matters of Occupational Safety and Health** (§ 80 BetrVG). ➜ **Participation in site visits, accident investigations and training events on Safety and Health** (§ 89 BetrVG). ➜ **Participation in assigning Safety Delegates, OSH Professionals and Occupational Physicians.** ➜ **Receive hand-written documents of investigations, visits and meetings the council is to involve in** (§ 89 BetrVG).
Source/Information: BetrVG	
■ **Industrial Safety Committee, Management Systems for** **> Corporate Reintegration** **> Health Promotion** **> OSH** 	➜ **Hold meetings at least quarterly with participation of the entrepreneur or assigned representative, two works council members, the Occupational Physician, the OSH Professional and the Safety Delegate** (§ 11 ASiG). ➜ **Perform site visits.** ➜ **Use a management system, e.g. Praxishilfe-Ordner "Arbeitsschutz mit System"** ➜ **Draw up protocols of meetings with assigned responsibilities.** ➜ **Carry out checks on effectiveness of the matters discussed.**
Source/Information: ASiG; File for Practical Assistance "Arbeitsschutz mit System"; DIN ISO 45001	
■ **Precaution against Pandemics**	➜ **Preparing an operational pandemic plan based on the handbook "Betriebliche Pandemieplanung".**
Source/Information: Handbook "Betriebliche Pandemieplanung"; IfSG; A 038; A 040; KB 030; KB 031; KB 032	

1.10 General Communication

Factors (Overview)	Examples for Safeguard Measures (Specific Legal Bases)
See also Sections 1.1, 1.2, 1.3, 1.9 and 10 herein	
■ **Communication Style** 	➜ **Exemplary behaviour of the management (e.g. willingness to communicate, use of personal protective equipment, proper use of equipment and installations).** ➜ **Give clear, distinct, and emphatic messages to employees.** ➜ **Involve employees into decision-making and do not just present accomplished facts.** ➜ **Inform employees as soon as possible – avoid scattering of rumours.** ➜ **Appreciate safety-conscious behaviour.** ➜ **Allow open discussions of mistakes without putting emphasis on liability issue in the first place.** ➜ **Recognise employees' statements and proposals for improvement.** ➜ **Give feedback to employees swiftly.**
Source/Information: A 012; A 025-1; A 025-2; A 025-3	
■ **Regular Communication**	➜ **Inform employees regularly on issues related to Occupational Safety and Health.** ➜ **Inform employees on the content of the risk assessment and the fundamental requirements of safeguard measures related to maternity protection.** ➜ **Provide information material (in print or in electronic form) such as regulations, standards, specialist magazines and brochures.** ➜ **Provide information about other working areas and on general business development.** ➜ **Set up and maintain an appealing information board/screen, make sure that it is up to date.** ➜ **Edit a company magazine.**

Factors (Overview)	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Hold regular meetings with agenda items on Safety and Health (safety circles, health circles).** ➜ **Publish regularly statistical information (e.g. accidents, sick leaves, absenteeism, first-aid cases).**
■ **Event-Related Communication, e.g. with regard to the Task, in case of Changes, Deficiencies, Accidents, Incidents, and Near Misses**	➜ **When assigning a task ensure that all details relevant to hazards are known and taken into consideration during implementation.** ➜ **Advise employees on their responsibilities to report accidents immediately.** ➜ **Accidents, near misses, property damages or events that pinpoint high-risk potential should be reported and investigated. The conclusions should be published and discussed.** ➜ **Establish reporting procedures (form, channel of communication, and time).** ➜ **Record, evaluate and publish incident reports.** ➜ **Investigate causes of accidents and near misses in a team-based meeting to derive measures.** ➜ **Inform on operational changes, new regulations and on incidents in comparable plants or working environments.** ➜ **Establish a corporate suggestion scheme to contribute the employees' experience to Occupational Safety and Health.**

1.11 Mandatory Testing of Work Equipment and Plants

Test specifications are described in detail in §§ 14–17 plus Annexes 2 (plants subject to inspection) and 3 (certain work equipment) of the Ordinance on Industrial Safety and Health (Betriebssicherheitsverordnung – BetrSichV).

When testing machines "Checklisten Maschinen" ("Checklists for Machinery") belonging to Code of Practice T 008 can be used:
> T 008-1 "Checklisten Maschinen – Prüfung vor Erstinbetriebnahme"
> T 008-2 "Checklisten Maschinen – Wiederkehrende Prüfung"
> T 008-3 "Checklisten Maschinen – Elektrische, hydraulische und pneumatische Ausrüstung"

Additional tool: Application Software "Maschinencheck"

For further details on the inspection of work equipment and reliable inspection periods see Appendix 3 "Mandatory Inspections of Work Equipment" herein.

Factors (Overview)	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Work Equipment such as Ladders, Hand Tools** ■ **Work Equipment such as Cranes, Vehicles, Scaffolds** ■ **Safety Devices (e.g. Emergency Lighting, Fire Extinguishing Systems, Extraction Systems)** ■ **Machines with Integrated Safety Devices** ■ **Electrical Installations and Resources** ■ **Pressure Equipment** ■ **Plants Subject to Inspection** ■ **Installations, Work Equipment and Technical Measures in Explosive Atmospheres**	➜ **Testing tools** (§§ 3, 14, 15, 16, 17 plus Appendices 2 and 3 BetrSichV) **> before commissioning,** **> before return to service after changes subject to mandatory testing,** **> recurrently.** ➜ **Define type, scope and deadlines of inspections** (§ 3, § 14, § 16 BetrSichV; Advice see Appendix 3 herein). ➜ **Evaluate and define qualifications that must be met by Competent Persons for inspections** (TRBS 1203). **> Generally: § 2 Section 6 BetrSichV** **> For explosion hazards: Annex 2 Section 3 No. 3 BetrSichV** **> For pressure systems: Annex 2 Section 4 No.3 BetrSichV** ➜ **Documentation of tests** (§§ 14 and 17 BetrSichV).

Source/Information: BetrSichV; TRBS 1111; TRBS 1201; TRBS 1201 Teil 1 up to Teil 4; TRBS 1203; 9. ProdSV; 11. ProdSV; DGUV Vorschrift 3

1.12 Groups of Persons with Special Needs

The legislator places some groups under special protection, such as pregnant or breastfeeding women, as well as individuals with disabilities.

Factors (Overview)	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Activities with Hazardous Substances which are Carcinogenic, Germ Cell Mutagenic or Toxic to Reproduction (CMR Substances)** ■ **Activities involving Ionising Radiation**	➜ **Keep in compliance with work restrictions and regulations:** > **Within the frame of the risk assessment activities with CMR substances must be evaluated and specific safeguard measures including the prohibition of use** (§ 10 GefStoffV)**. This is true in principle for all employees irrespective of age and gender.** (For further details see Section 6 herein.) > **Special maximum limits in radiation exposure** (§ 55 StrlSchV).
■ **Protection of Young People at Work: Employees under the Age of 18**  *Source: Evonik Degussa GmbH, Werk Rheinfelden*	➜ **Observe restrictions of working hours** (§§ 8 to 21b JArbSchG). ➜ **Observance of work restrictions and regulations** (§§ 22 to 24 JArbSchG) **with reference to:** > **Chemical, biological or physical hazards (e.g. handling hazardous substances or biological substances, noise, vibrations, radiation, heat, cold),** > **Hazards through tasks that exceed physical or psychic capacities,** > **Tasks with increased accident risk due to lack of safety awareness or lack of experience,** > **Ethical or moral threats,** > **Any other hazards (e.g. piecework or working in mines).** ➜ **Additional health care** (§§ 32 to 46 JArbSchG). ➜ **Observe special regulations for employees under 15 years of age** (§ 5 JArbSchG).
■ **Maternity Protection: Pregnant or Breastfeeding Women** 	➜ **The basic requirements related to maternity protection must be defined within the frame of the general risk assessment.** ➜ **Perform a special risk assessment according to the Maternity Protection Act for each workplace where a pregnant or breastfeeding woman is employed. Templates for risk assessments according to MuSchG are available at the homepages of competent state authorities for occupational safety** (e.g. in Baden-Württemberg: guidance document for risk assessment at https://gewerbeaufsicht.baden-wuerttemberg.de/mutterschutz3) ➜ **Observe further advice in Code of Practice A 027.** ➜ **Inform supervising authorities (when pregnancy becomes evident)** (§ 27 MuSchG). **Homepages of competent state authorities for occupational safety offer forms for downloading** (an example from Baden-Württemberg see “Musterformular für die Beschäftigung schwangerer oder stillender Frauen...” at https://gewerbeaufsicht.baden-wuerttemberg.de/mutterschutz3). **The official notification can be made online.** ➜ **Internal information on the result of the risk assessment** (§ 14 MuSchG). ➜ **Observe restrictions of working hours (e.g. deadlines of maternity leave, restrictions of weekly working hours, prohibition of work during night and weekend) (**§§ 3–8 MuSchG). **Homepages of competent state authorities for occupational safety offer forms for downloading** (an example for Baden-Württemberg at https://gewerbeaufsicht.baden-wuerttemberg.de/mutterschutz3). **The official notification can be made online.** ➜ **Observe compliance with work restrictions and regulations** (§§ 3, 11, 12 MuSchG) **regarding:** > **Chemical hazards (hazardous substances, atmosphere with reduced oxygen concentration), especially for hazardous substances which are carcinogenic, germ cell mutagenic or toxic to reproduction (CMR):** • **pregnant women: no exposition at all or measurement in accordance with § 11 MuSchG,** • **breastfeeding mothers: observe occupational exposure limits,** > **Biological hazards (targeted and non-targeted activities),** > **Physical hazards (e.g. damaging effects of falls, vibrations, noise, radiation, overpressure),** > **Ergonomic hazards (e.g. permanent standing, lifting and carrying heavy loads; provide a place to have a lie-down),** > **Any other hazards (e.g. design of workplaces, piecework and assembly line work).**

Factors (Overview)	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **People with Different Abilities**	➜ **Consider specific hazards for people with different abilities when implementing risks assessments** (§ 4 ArbSchG)**. These hazards can result from:** **> Hearing, see or speech impairment** **> Motor impairment** **> Cognitive impairment** ➜ **Involve people with different abilities at an early stage as "experts in matters" during the implementation of risk assessments.** ➜ **When giving instructions consider specific concerns of people with different abilities.Examples are:** **> instructions given in sign language** **> illustrations** **> easily accessible information on occupational safety and health in simple language** ➜ **Observe the specific concerns of people with different abilities regarding occupational safety and health when establishing and operating workplaces** (§ 3a Section 2 of Occupational Workplace Regulations, ASR V3a.2)**. This is even more true for the barrier-free design of workplaces including doors, traffic and escape routes, emergency exits, stairs, orientation systems, washing facilities and toilet rooms.**
Source/Information: JArbSchG; MuSchG; StrlSchV; ASR V3a.2; several Accident Prevention Regulations, e.g. DGUV Vorschrift 68, DGUV Vorschrift 52, DGUV Vorschrift 70, DGUV Vorschrift 73, DGUV Vorschrift 77; A 024; KB 004; A 027; A 027-1; Handbook "Betriebliche Pandemieplanung"; IfSG	

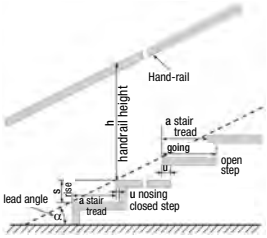
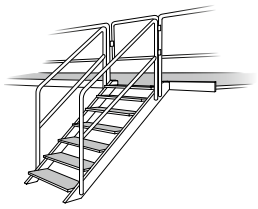
2 Hazards Related to Workplace Design

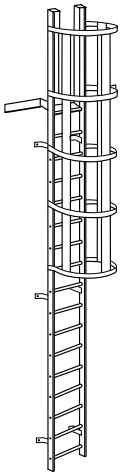
2.1 Working Spaces

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Room Dimensions**	➜ **Check if area and clear height of workplaces are adequately designed** (§ 6 Section 1 and Appendix No. 1.2 ArbStättV) **– According to ASR A1.2: 8 m² and 2.5 m at least.** ➜ **Additional requirements for people with different abilities are described in Appendix 1.2 of ASR V3a.2.**
■ **Movement Area**	➜ **Check if sufficient movement area is available** (Appendix No. 3.1 ArbStättV) **– According to ASR A1.2: 1.5 m² at least and a minimum width of 1 m.** ➜ **Check if a safe access and a sufficient movement area are available for maintenance work** (§ 6 Section 1 and § 11 Section 2 BetrSichV). ➜ **Keep the working space clean and tidy.** ➜ **Additional requirements for people with different abilities are described in Appendix 1.2 of ASR V3a.2.**
Source/Information: BetrSichV	
■ **Air Volume**	➜ **Check if an adequate air volume is available** (§ 6 Section 1 and Appendix No. 1.2 ArbStättV) **– According to ASR A1.2: Minimum recommendation for each employee being permanently present:** **> 12 m³ for tasks predominantly carried out while sitting,** **> 15 m³ for all remaining tasks except heavy physical labour,** **> 18 m³ for heavy physical labour.**
Source/Information: ASR V3; ASR A1.2; ASR V3a.2	

2.2 Traffic Routes

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **In Rooms and in the Open Air**  *Pedestrians Crossing (Sign 133)*	➜ **Mark traffic routes clearly and keep them free of obstacles.** ➜ **Keep traffic routes clean and tidy.** ➜ **Define width of pedestrian routes according to escape routes given in ASR A2.3 depending on the number of employees concerned. The minimum width is 0.9 m** (see Section 4 of ASR A1.8). ➜ **Observe a minimum distance of 1 m for traffic from doors, gates and walkways** (ASR A1.8). ➜ **Pathways for vehicle traffic with a safe distance of 0.5 m on both sides towards the boundaries** (ASR A1.8). ➜ **Create pathways for vehicle traffic that are wide enough to provide a safety distance of at least 0.5 m on both sides from the boundaries** (Table 3 ASR A1.8). ➜ **Collision protection for pressure vessels, pipes and storage racks (e.g. bollards, crash barriers, separating elements, distance regulations)** (Section 4.1.1.1 TRBS 3151/TRGS 751; DGUV Regel 108-007). ➜ **Take special measures for high-rise storage and narrow corridors** (§§ 28–36 DGUV Vorschrift 68). ➜ **Mark traffic routes if they are not clearly recognisable from the arrangement of installations and stored goods** (ASR A1.8). **Observe the duty to ensure road safety according to § 823 BGB, e.g. at excavations or shafts.** ➜ **Provide an appropriate lighting** (ASR A1.8; ASR A3.4). ➜ **Check if a safety lightning is required and if necessary arrange appropriately** (Appendix No. 3.4 ArbStättV; ASR A3.4; ASR A1.3). ➜ **Additional requirements for people with different abilities regarding areas for traffic routes are described in Appendix A1.8 of ASR V 3a.2.** ➜ **For employees using a wheelchair the minimum distance must be 0.90 m in order to avoid full-body contusion.** See also Section 3.3 herein.
Source/Information: § 4 Section 4 and Appendix No. 1.8 ArbStättV; ASR A1.8; ASR A1.3; ASR V3a.2	

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ Doors and Gates  *W014 Warning Industrial Vehicles*	**➜ Provide doors reserved for pedestrians near gates which are specifically dedicated to vehicles.** **➜ Prevent sliding-doors and gates from unhinging.** **➜ Prevent unintended closing of doors and gates opening upside.** **➜ Use transparent swinging doors and gates only or provide them with windows. Keep material or windows transparent or replace them if necessary.** **➜ Use fracture-proof materials for transparent areas in doors and gates or protect them against rupture.** **➜ Protect against danger points of power-operated doors and gates.** **➜ Additional requirements for people with different abilities regarding doors and gates are described in Appendix A1.7 of ASR V3a.2.**
Source/Information: Appendix No. 1.7 ArbStättV; ASR A1.7; ASR V3a.2	
■ Loading Ramps  *W008 Warning Drop*	**➜ The width of the loading ramp is determined by Table 3 of ASR A1.8. The width must not be less than 0.8 metres.** **➜ One exit from ramp** at least (For ramps › 20 m one exit at each end is recommended). **➜ If ramp height > 1 m, provide a guard rail against falling, if technical operations allow.** **➜ For ramps more than 0.80 m above neighbouring railway tracks: provide free space below the ramp to offer shelter in case of emergency** (§ 7 DGUV Vorschrift 73).
Source/Information: Appendices No. 1.8 and 1.10 ArbStättV; ASR A1.8	
■ Stairs  *Terms of stair sections*	**➜ Dimension of stairs according to the formula: Step width + 2 x rise = 62 ± 3 cm** (Section 3.2.2 DGUV Information 208-005). **➜ 1 m minimum railing height vertically above the step front edge; in case of falling-height > 12 m: a minimum height of 1.1 m** (Section 3.3.1 DGUV Information 208-005). **➜ The railing height of machinery is depending on the lead angle 0.9–1.1 m** (see DIN EN ISO 14122 Part 3). **➜ A handrail is mandatory for stairs with more than 4 steps; in downward direction on the right side; if width of the stairs > 1.5 m provide rails on both sides** (Section 3.4.4 DGUV Information 208-005). **➜ For machinery 2 handrails have to be installed from a vertical height of > 0.5 m.** **➜ The railings must have a knee rail.** **➜ Instruct employees to use the handrail.**
Source/Information: ASR A1.8; DGUV Information 208-005; Appendix No. 1.8 ArbStättV; DIN EN ISO 14122-3	
■ Step Ladder/ Industrial Stairs 	**In cases where access to machinery via stairs cannot be implemented for operational reasons, check access by step ladder/industrial stairs.** **➜ lead angle > 45°–75°** **➜ width 0.5–0.8 m** **➜ railing height 0.9 m** **➜ vertical height > 0.5 m 2 handrails** **➜ railings have to have knee rails** **➜ exit has to be secured by a self-locking door (barrier), consisting of handrail and knee rail**
Source/Information: DIN EN ISO 14122-3	

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Staircase Ladders, Manhole Steps** 	➜ **Staircase ladders and manhole steps are only permitted if an installation of stairs is not possible.** ➜ **The top rung must be located at the upper exit.** ➜ **Provide a two-part handrail at the upper exit of staircase ladders leading out at least 1.1 m above the exit area. For manholes at least 1 m.** ➜ **If a back guard is present, it must be carried along at least 1 m above the upper edge of the exit area.** ➜ **The upper exit of machinery must be secured by a self-locking door (barrier), consisting of handrail and knee rail.** ➜ **Staircase ladders consisting of a drop height of more than 3 m (for entrances leading to machinery) or 5 m must be – depending on the field of application – equipped with safety devices (fall arrester, rope protection, continuous back guard) for preventing falls of individuals.** ➜ **At drop heights higher than 10 m only PPE against falling (e.g. fall arresters) are allowed.** ➜ **To enable the rescue of persons out or across staircase ladders with fall arresters, an additional back guard must not be installed in general.** ➜ **Manhole steps and staircase ladders must be equipped with suitable platforms for rest with distances of not more than 10 m.**
Source/Information: Appendices No. 1.8 and 1.11 ArbStättV; ASR A1.8; Section 4.4 DGUV Regel 103-008; DGUV Information 208-032; DIN EN ISO 14122-4	
■ **Escape Routes, Emergency Exits**  *E002 Escape Route/ Emergency Exit to the Right with Additional Symbol (Direction Arrow)*	➜ **Escape routes and emergency exits must be labelled permanently and must lead directly to the open air or to safe areas (e.g. other fire compartments)** (Appendix No. 2.3 ArbStättV). ➜ **Escape routes and emergency exits must not be narrowed and must be kept free of obstacles** (§ 4 Section 4 ArbStättV). ➜ **Maximum length of escape routes: 35 m (linear distance), they must be shorter in case of special hazards** (Section 5 ASR A2.3). ➜ **Emergency exits/escape doors must be opened easily from the inside at any time without special tools (install panic locks) as long as people are present in the room** (Appendix No. 2.3 ArbStättV). ➜ **Doors of emergency exits must open to the outside** (Appendix No. 2.3 ArbStättV). ➜ **If an increased risk is present due to local or operational conditions, provide escape routes with a safety guidance system** (Section 8.4 ASR A2.3). **Take into account the special needs of people with visual impairments. In addition, information can be provided by tactile signs or switch symbols.** ➜ **Escape routes must be equipped with an emergency lighting system, if an escape cannot be ensured in case of failure of the general power supply** (Section 8 of ASR A2.3). **Minimum illuminance of emergency lighting: 1 Lux** (No. 4.3 of ASR A3.4). ➜ **Doors/Gates in the course of escape routes:** > **Use of automatic sliding doors only if these open automatically and remain open in case of power failure.** > **Revolving doors, sliding doors or gates and roll-up gates are permitted only with a wicket door.** > **Power-operated doors must be unlocked and opened easily by hand and without tools.** ➜ **In the event of fire: Do not use elevators!** ➜ **Additional requirements for people with different abilities regarding escape routes are described in Appendix A2.3 of ASR V3a.2.** ➜ **Additional requirements for people with different abilities regarding emergency lighting and optical safety guidance systems are described in Appendix A2.3 of ASR A2.3.**
Source/Information: Section 21 (2) DGUV Regulation 1; ArbStättV; ASR A2.3; ASR A3.4; Annex I No. 1.3 GefStoffV	

2.3 Falling on Even Ground, Slipping, Stumbling, Twisting One's Ankle, Missteps

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Contamination (e.g. Oil, Grease, Granular Material, Leakage)** ■ **Weather-Related Slipperiness** ■ **Ground Unevenness, Height Differences (> 4 mm)**  *W011 Warning Danger of Skidding* ■ **Devices lying about** ■ **Inadequate Form and Size of Tread** ■ **Unsuitable Shoes**	➜ **Keep floors dry and clean.** ➜ **Provide binding agents for spilled liquids.** ➜ **Provide a suitable industrial vacuum cleaner** (IFA-Handbuch 510 210; TRGS 560). ➜ **Use an anti-skid treatment of floors of an appropriate R Group (R9–R13) and use suitable cleaning agents** (Section 8 and Appendix 2 ASR A1.5). ➜ **Eliminate tripping points immediately (e.g. damaged floors, objects lying about) or cordon them off** (Appendix No. 1.5 ArbStättV). ➜ **Cover up drain openings, discharge chutes and similar depressions in order to create tilt-proof and floor-levelled areas which support the foot** (Section 5 ASR A1.5). ➜ **Install cables and pipes correctly (minimum height: 2 m above floor level –** ASR A1.8 **– or below a cable bridge).** ➜ **Regular checks if grates are secured against lifting or shifting** (DGUV Information 208-007, DGUV Information 208-008). ➜ **Ensure an adequate lighting** (Appendix No. 3.4 ArbStättV, ASR A3.4) **– see also Section 3.3 herein.** ➜ **Wear suitable shoes** (see also DGUV Regel 112-191). ➜ **Attentive walking, no running, no jumping.**

Source/Information: ArbStättV; ASR A3.4; ASR A1.5; ASR A1.8; A 021; DGUV Regel 108-003

2.4 Falling from a Height

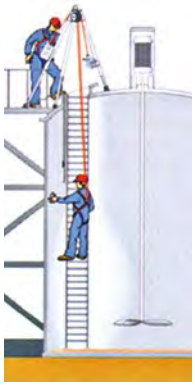
Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Breakdown or Tilting of the Object Mounted** ■ **Sliding from the Object Mounted** ■ **Overstepping the Margins of Elevated Areas**	➜ **Provide measures against falling (collective safeguard measures such as handrails, solid covers of openings, lock rails) according to the risk of falling evaluation. The critical height for such collective measures depends on:** **> Type of the potential falling edge (horizontal, covering of scaffolding),** **> Type of the surfaces below (bulk materials, liquids, concrete, equipment/machinery),** **> Type and duration of tasks,** **> Weather,** **> Ambient conditions,** **> Visibility conditions.**
■ **Breaking through Roofs**  *W008 Warning Drop*  *M018 Safety Harness Must be Worn*	**Stationary installations being higher than 1 m should be provided with handrails[5].** ➜ **Secure roof areas, which are too dangerous to step on (e.g. skylights) against falling by using collective measures (minimum distance for cordoning = 2 m, safety nets).** ➜ **Secure bottom openings with railings or cordoning.** ➜ **Ensure safe access to elevated workplaces (stairs, platforms, SZP[6]).** ➜ **Use of temporarily elevated workplaces only by instructed or well-trained personnel.** **> Use scaffolds only after inspection and release by a Competent Person.** **> Perform Rope-assisted Access and Positioning Techniques (SZP) only under surveillance of a specially assigned technician.** **> Use elevating work platforms only after intensive education** (DGUV Grundsatz 308-008)

5 For buildings observe State Construction Regulation
6 SZP – Rope-Assisted Access and Positioning Techniques

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Falling into Bottom Openings**  *P024 Access to Surface Prohibited*	➜ **Use ladders only for small tasks limited in time. Due to the danger of falls and a higher ergonomic load portable ladders are only permitted as a workplace for work at a height if the employee stands with both feet on a step or platform and he or she is not higher than 5 m above installation surface.** ➜ **When using ladders, PPE against falling should be applied.** ➜ **PPE must be used if there is no fall protection or a fall-arrest system. The correct use of PPE must be trained intensively including practical exercises. Safety and function tests must be performed before using PPE. A Competent Person must test PPE regularly (at least once a year).** ➜ **Certain PPE against falling must only be used in the presence of a second person** (see also guideline of the subcommittee „PSA gegen Absturz“ of the DGUV expert committee „Persönliche Schutzausrüstungen“, www.dguv.de/medien/fb-psa/de/regelwerk/leitlinien/praevleit_risiko.pdf).

Source/Information: Annex 1 No. 3 BetrSichV; DGUV Vorschrift 38; ASR A2.1; TRBS 2121 including Part 1 to Part 4; DGUV Regel 112-198; DGUV Information 208-016; DGUV Information 212-001; A 008; KB 009; KB 022; Portal “Prevention of Falls” of BG RCI at www.bgrci.de/absturzpraevention

2.5 Containers, Silos and Confined Spaces

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Tasks in Containers, Silos, Apparatuses, Boilers, Tanks, Ditches, Shafts, Wastewater Engineering Plants etc.** ■ **Space between Fixed Machine Parts**  	➜ **Make sure that the size and distribution of access openings (e.g. manholes) are such that entrance, exit and rescue of persons are ensured at any time** (Section 5.1 DGUV Regel 113-004). ➜ **Define written safeguard measures in work permits** (Section 4.2.6 DGUV Regel 113-004). ➜ **Control of safeguard measures by the supervisor** (Section 4.2.4 DGUV Regel 113-004). ➜ **Presence of a safety guard** (Section 4.2.5 DGUV Regel 113-004). ➜ **Containers and confined spaces must be empty and clean when starting the work** (Section 4.3.1 DGUV Regel 113-004). ➜ **Block supply lines to containers effectively** (Section 4.3.2 DGUV Regel 113-004). ➜ **Assure a sufficient oxygen concentration (in particular if containers are inerted in normal operation)** (Sections 2 No. 12 and 4.3.3 DGUV Regel 113-004). ➜ **Assure an adequate rinse or ventilation to avoid gas, vapours or dust to be present in concentrations hazardous to health** (Section 4.3.3 DGUV Regel 113-004). ➜ **Control the effectiveness of the ventilation (e.g. concentration measures using self-indicating devices)** (Section 4.3.3.5 DGUV Regel 113-004). ➜ **Before starting a task, measure the concentration of oxygen and hazardous substances in breathing air (“clearance measurement”) and document the result** (Section 4.3.5 DGUV Regel 113-004). ➜ **Make sure that for clearance measurement the necessary expertise is present** (DGUV Grundsatz 313-002). ➜ **Silos: Standing under set or adhesive bulk goods is not permitted; remove set or adhesive bulk goods only from above** (Section 4.12.4 DGUV Regel 113-004). ➜ **Work on bulk materials only with silo access installations.** ➜ **Secure against starting of moving parts or facilities, such as stirrers, avoid starting due to accumulated energy** (Section 4.9 DGUV Regel 113-004). ➜ **Secure stirrers additionally, if appropriate (e.g. mechanically).** ➜ **When using electrical resources special measures are required (protective measures in a conductive environment with limited freedom of movement), e.g. extra-low voltage (SELV) or protective separation** (Section 4.10.1 DGUV Regel 113-004). ➜ **Before performing a task, switch off heating and cooling units and secure them against starting. This measure also applies to installed fire fighting and explosion suppression systems** (Sections 4.8.1 and 7.2 DGUV Regel 113-004); **make sure that no unhealthful cold or heat stress is present** (see DGUV Information 215-510).

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Use suitable personal protective equipment** (see also Code of Practice A 008). ➜ **Define suitable access- or positioning techniques** (see Section 5.2 DGUV Regel 113-004 and DGUV Information 213-055). ➜ **Only apply rope-assisted access- and positioning techniques if all participants involved have the necessary qualification** (see DGUV Information 212-001). ➜ **Prepare rescue concept, provide PPE for rescue (rescue lifting device, anchor device, full body rescue harness or emergency slide), carry out regular rescue trainings, regular visual inspections and function tests of rescue PPE** (see DGUV Regel 112-199).
Source/Information: DGUV Regel 113-004; DGUV Vorschrift 38; T 010; T 020; TRGS 507; TRBS 2121 including Part 1 to Part 4	

2.6 Working Close to Water

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
Examples: ■ **Port Installations** ■ **Water Tanks for Fire Fighting** ■ **Sewage Treatment Plants**  *Quayside or River Bank (Symbol 129)*	➜ **Install a fixed fall protection device** (§ 33 DGUV Vorschrift 21). ➜ **Provide an adequate rescue equipment (e.g. life rings)** (Section 25 (3) DGUV Regulation 1; No. 4.7.3 DGUV Regel 100-001). ➜ **Wear life jackets** (§ 33 DGUV Vorschrift 21; DGUV Regel 112-201). ➜ **Install fixed emergency exits in the basin at adequate locations** (§ 9 DGUV Vorschrift 21). ➜ **Provide a safe access to ships** (§ 39 DGUV Vorschrift 36). ➜ **Secure workplaces on ships** (§ 43 DGUV Vorschrift 36).

3 Hazards Related to Workplace Design

What is Ergonomics?

Ergonomics is concerned with the examination and design of the system Man – Work – Technique.

What is the Objective of Ergonomics?

The goal is a humanitarian design of work in order to improve:
> Health protection,
> Safety,
> Productivity,
> Well-being,
> Contentment of employees.

What Does Ergonomics Deal with?

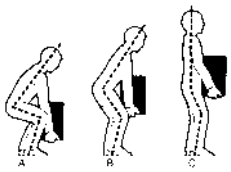
Important topics are:
> Workplace – in particular dimensions, posture and forces of the working person, space for arms and legs, field of vision,
> Work equipment (tools, devices, machines, plants) – and above all control actuators, indicating devices, signalling devices, work tables and seats,
> Work environment – notably the impact of noise, climate, lighting, hazardous substances, mechanical vibrations,
> Work structure – notably the contents, distribution and organisation of work,
> Working time – notably flexibility (e.g. flexible hours), shift rhythm, breaks.

Several ordinances in relation to the Act on Occupational Safety and Health (Arbeitsschutzgesetz – ArbSchG) explicitly demand the consideration of ergonomic factors, among others the Ordinance on Industrial Safety and Health (BetrSichV), Occupational Workplace Regulations (Arbeitsstättenverordnung – ArbStättV) and Ordinance on the Manual Handling of Loads at Work (Lastenhandhabungsverordnung – LasthandhabV). Essential principles of humanitarian design of work are listed in § 6 BetrSichV.

Various key indicator methods are available for the data collection and evaluation of physical workload during manual handling operations and manual work processes:
› manual lifting, holding and carrying of loads
› manual pushing and pulling of loads
› manual working processes
› whole-body forces
› locomotion of the body
› forced posture.

The homepage of the Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BAuA) offers specific forms and further information at www.baua.de/DE/Themen/Arbeitsgestaltung-im-Betrieb/Physische-Belastung/Leitmerkmalmethode/Leitmerkmalmethode.

3.1 Heavy Physical Work

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Handling of Loads (e.g. Lifting, Dropping, Pushing, Pulling, Carrying)**  *Source: Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit, München*	➜ **Avoid manual handling of loads by technical measures (e.g. by transfer of input substances through pipes).** ➜ **Check if the recommended values for lifting and carrying are not exceeded** (see Key Indicator Method). ➜ **Make transport and carrier tools available.** ➜ **Lower the load weights (e.g. smaller packages).** ➜ **Make the load available at ergonomic height (e.g. lifting equipment, scissor lifts).** ➜ **Ensure that the load can be grabbed safely (e.g. handles, recesses for hands).** ➜ **Instruct employees** (§ 4 LasthandhabV). ➜ **Pay attention to a healthy posture (e.g. lifting with a straight spinal column, keep load close to trunk, avoid lifting and carrying with a twisted body).** ➜ **Evaluation of the strain by using key indicator methods** **> Manual lifting, holding, and carrying of loads** **> Manual pulling and pushing of loads** **> Whole-body forces** **> Body movement**

Source/Information: LasthandhabV; § 3 and Annex 1 No. 2 BetrSichV; DGUV Information 208-033; DGUV Information 208-053; T 028; BKV; A 031

3.2 Physical Work Straining on One Side

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Permanently Repetitive Processes** ■ **Recurrent Movements of Small Finger Muscles, Hands or Arms with Relatively High Frequency** ■ **Forced Postures (Cowering, kneeling, standing, sitting, laying, twisted turning, bending, stretching (working overhead))** ■ **Narrow Spatial Relations** ■ **Holding** ■ **Pushing** ■ **Physical Inactivity**	➜ **Avoid frequent and permanent activities with a high movement frequency and high efforts:** **> uniform conventional assembly,** **> frequent handling of hand-operated lever presses, scissors.** ➜ **Evaluation of the strain by using the key indicator method "Manual Work Processes".** ➜ **Avoid forced or unfavourable postures through design of:** **> Workplace (e.g. working height, vision distance and vision angle adequate for task, hand reach envelope),** **> Work equipment (e.g. configuration of handling elements on machines),** ➜ **Evaluation of the strain by using the key indicator method "Forced Body Posture"** ➜ **Change posture (e.g. between sitting and standing).** ➜ **Carry out potential change of tasks.** ➜ **Provide suitable chairs and standing aids.** ➜ **Avoid static work of long duration without load change. Allow and plan ergonomic breaks.** ➜ **Consider the usage of working aids and assistance systems.**

Source/Information: BKV; DGUV Information 208-033; DGUV Information 208-053; T 041

3.3 Lighting

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Illuminance** 	➜ **Meet the minimum requirements of ASR A3.4 Examples of minimum illuminance levels:** **> Traffic area or hallways without vehicle traffic at least 50 lx,** **> process technology plants with occasional manual intervention at least 150 lx,** **> permanent workplaces in process technology plants at least 300 lx,** **> offices (except technical drawing studios) at least 500 lx.**

Source/Information: ArbStättV; ASR A3.4; DGUV Information 215-210; DGUV Information 215-442

■ **Daylight**	➜ **Use only rooms as workspaces which have a view to the outside.** ➜ **Ratio of the surface area of transparent windows, doors, walls or roof light to the floor area should be at least 1:10.** ➜ **Light walls and ceilings support the usage of daylight.** ➜ **Workspaces close to windows should preferred.** ➜ **Avoid disturbing glare by solar radiation by using e.g. shutters, roller blinds and slat blinds.**

Source/Information: ArbStättV; ASR A3.4; DGUV Information 215-210; DGUV Information 215-211

■ **Luminance Distribution in the Field of Vision (Contrast)**	➜ **Avoid eye fatigue due to high contrasts (no frequent change of vision between very bright and very dark surfaces).** ➜ **Maximum difference of luminance at workplace 3:1, in surrounding area 10:1.**

Source/Information: ArbStättV; ASR A3.4; DGUV Information 215-210; DGUV Information 215-442

■ **Uniformity of Illumination Level**	➜ **A higher uniformity can be achieved e.g. by using many luminaires with lower power instead of using a few luminaires with high power.** ➜ **Avoid dark areas (e.g. at hall entrances, passages, stairs, gates).** ➜ **The uniformity of lightning U_0 is calculated as the ratio of the minimal illumination level E_{min} divided by the average illumination level $\bar{E}$ ($U_0 = E_{min} : \bar{E}$). This ratio shouldn't be below 0.6 at any spot of the workplace. The lowest value must not be in the area of the main task.**

Source/Information: ASR A3.4; DGUV Information 215-210; DGUV Information 215-442

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Flicker and Pulsation**	➜ **Avoid flickering or stroboscopic effects.**
Source/Information: ArbStättV; ASR A3.4; DGUV Information 215-210; DIN EN 12464	
■ **Glare and Reflection**	➜ **Avoid glare sources (interferences caused by excessive brightness or excessive differences in luminance) in principal line of vision.** ➜ **Don't use insufficiently shielded luminaires and lamps.** ➜ **Avoid disturbing reflections caused by bright light sources on working equipment, on bright surfaces, e.g. on computer screens, blank workpieces or bright machine parts (reflected glare).** ➜ **Use working equipment and devices which consist of matte and preferably light surfaces.** ➜ **Position screens at right angle to window and lightning.**
Source/Information: ArbStättV; ASR A3.4; DGUV Information 215-210; DGUV Information 215-442	
■ **Light Direction and Shadiness**	➜ **Enable the recognition of objects and their shapes and surface structure by clearly determinable light direction and appropriate shadiness.** ➜ **Avoid shading of potential hazards.** ➜ **Arrange a number of lamps in a way that their light is emitted in various directions.**
Source/Information: ASR A3.4; DGUV Information 215-210; DGUV Information 215-442; DIN EN 12464	
■ **Colour Appearance and Colour Rendering**	➜ **Use only lamps with appropriate and same colour appearance for each room.** ➜ **Use illuminants which ensure a colour perception as true as possible: Colour rendering index R_a in accordance with ASR A3.4 and ≥ 40 (information on illuminants).** ➜ **Use illuminants which don´t affect the recognisability of safety marks.** ➜ **In case of missing or insufficient daylight and shift work consider the recommendations concerning light colour.**
Source/Information: ASR A3.4; DGUV Information 215-210; DGUV Information 215-220; DGUV Information 215-442; DIN EN 12464	
■ **Health Impact of Lightning**	➜ **Appropriate consideration of non-visual (biological) effects of light concerning health, motivation and performance.** ➜ **Stabilisation of the internal clock (circadian rhythm) by appropriate selection of light colour, in particular in the event of night work and missing daylight at work.**
Source/Information: ArbStättV, ASR A3.4; DGUV Information 215-210; DGUV-Information 215-220; DGUV-Information 215-211	
■ **Risk of Accidents in Case of Light Failure**	➜ **Establish safety lightning to ensure safe leaving of work and prevention of accidents** **> for escape and rescue routes,** **> at workplaces with special hazards.**
Source/Information: ArbStättV; ASR A2.3 (requirement); ASR A3.4 (execution)	

3.4 Climatic Conditions

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Room Temperature is Too High (> 26 °C)** ■ **Technically Conditioned Influence of Heat**	➜ **Examination, if a heat-stressed workplace (Air temperature > 26 °C and relative humidity > 50 %) is present** (see Appendix 5a herein). ➜ **Examination, if a hot workplace exists according to Section 9.8 herein** (see Appendix 5b herein). ➜ **If the room temperature is > 35 °C the working space is only adequate for activities corresponding to hot workplaces** (see Section 9.8 herein). ➜ **Localisation and elimination of sources of heat or hot air.** ➜ **Insulation of hot surfaces.** ➜ **Local extraction of hot air.** ➜ **Adiabatic cooling (as long as the humidity limit is not exceeded)** (see Appendix 5a of this Code of Practice). ➜ **Adequate ventilation preferably through windows (avoid draught).** ➜ **Reducing internal thermal load (electrical devices only if necessary).** ➜ **Reduction of work intensity and/or working speed wherever possible.**
■ **Thermal Radiation**	➜ **Reduction of radiating surfaces.** ➜ **Use of reflective shielding.** ➜ **Insulation or treatment of radiating surfaces.** ➜ **Arrangement of the workplace far from radiating surfaces.** ➜ **Use of special protective equipment reflecting radiation.**
■ **Midsummer Outdoor Temperatures**	➜ **Use of adequate sun protection appliances like outside blinds, awnings, or blinds mounted between the windows.** ➜ **Avoid physically demanding or hard work wherever possible.** ➜ **An earlier or later start of work (if flexible working hours are possible).** ➜ **Move work or stay into cooler areas where possible.** ➜ **Use of cool air at nighttime for intensive ventilation of the working space during the night and in the morning.** ➜ **Adjust garments; light clothes, breathable material, light footwear, lift tie obligation where possible.** ➜ **Supply with adequate beverages, e.g. drinking and mineral water (with little carbon dioxide); inadequate are alcoholic and caffeinated beverages as well as very cold beverages.**
■ **Room Temperature is Too Low** **Predominant Posture** / **Work intensity**: Low / Medium / High Sitting: +20 °C / +19 °C / – Standing, Going: +19 °C / +17 °C / +12 °C *Minimum temperatures dependent on work intensity according to ASR A3.5*	➜ **Examination, if a cold-stressed workplace is present** (see Section 9.8 herein). ➜ **Check the adjustment of the heating.** ➜ **Workplace-related technical measures (e.g. radiant heater, heating pads).** ➜ **Localising the source of cold air.** ➜ **Check, if constructional changes of the building or the room are suitable.** ➜ **Reducing the length of stay in cool areas.** ➜ **Arrange warm-up phases** (see also Section 9.8 herein). ➜ **Wearing clothes with a higher insulation (however, be careful – do not wear too warm clothes!)**
■ **Air Humidity is Too Low (Dry Air < 30%)**	➜ **In winter: Check the number of airing and reduce if necessary.** ➜ **Observe drinking in a sufficient quantity.** ➜ **Consultation of the occupational physician, if physical complaints exist.** ➜ **Adequate air humidifier, e.g. bearing the DGUV-PRÜFZERT label, if reduction of dust load is required or for electrostatic reasons.**

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ Air Humidity is Too High **Air Temperature / Relative Air Humidity** + 20 °C — 80 % + 22 °C — 70 % + 24 °C — 62 % + 26 °C — 55 % *Maximum values for air humidity according to ASR A3.6*	**➜ Elimination of vapour or water leakages.** **➜ Extraction of moist or steamy air.** **➜ Encapsulation of surfaces filled with water or areas of evaporation.** **➜ Check constructional elements for the formation of mildew at the outer walls.** **➜ Observe adequate ventilation or ensure regular airing.**
Source/Information: ASR A3.5; ASR A3.6; DGUV Information 215-444; DGUV Information 215-510; DGUV Information 215-520; Portal “Luftbefeuchtung” of BG ETEM	
■ Air Circulation (Draught) **> Max. 0.24 m/s in offices (in summer)** **> Max. 0.1 m/s in offices (in winter)** **> Dependent on the degree of turbulences**	**➜ Check the difference of temperature between supply air and indoor air (Δt < 6 °C).** **➜ Measure the air velocity.** **➜ Adapt supply air temperature to ventilation and air conditioning systems.** **➜ Adjust air transfer devices in air conditioning plants (A/C plants) as specified by the manufacturer.** **➜ Laminar air flow where possible – avoid turbulent flows.** **➜ Reduction or avoidance of draught, e.g. close opened windows and doors.** **➜ Move workplace out of the draught area.** **➜ Installation of curtains (e.g. vertical blinds) or vestibules for local protection against draught.** **➜ Check windows and seal them, if necessary.**
Source/Information: DGUV Information 215-510; DIN EN ISO 7730; DIN EN 15251	
■ Air Quality **> Content of CO_2** **• “Good” Indoor Air < 1000 ppm** **• Conspicuous Indoor Air < 2000 ppm** **• Alarming with regard to Hygiene > 2000 ppm** **> Additional Substances like** **•Volatile Organic Compounds (VOC)** **•Formaldehyde** **•Fibres** **•Odours** **•Ventilation and Air Exchange Rate**	**➜ Additional measures are unnecessary (unless an increase of concentration over 1000 ppm is expected due to the use of space).** **➜ Check and improve the ventilation behaviour.** **➜ Establish a ventilation plan (e.g. determine responsibilities).** **➜ Ventilation measures (e.g. increase the volume flow of outside air or the air exchange rate).** **➜ Additional measures are required (e.g. reinforced ventilation, reduction of the number of people in the room).** **➜ Determine the air exchange rate (min. 0.3 m³/h).** **Variants of Ventilation / Air Exchange Rate (Exchange of Indoor Air per Hour)** Windows and doors closed — 0 up to 0.3 Window in tilted position (slit ventilation) — 0.3 up to 1.5 Windows completely opened for a short period (intermittent ventilation) — 0.3 up to 4 Windows completely opened all the time — 9 up to 15 Windows being opposite completely opened all the time — Up to 40 **➜ Use of emission-free or low-emission construction products and furnishing devices.** **➜ Ensure that breathing air conducive to health is available in sufficient quantity in smoker’s corners/rooms for smokers near the workplaces.**
Source/Information: ASR A3.6; DGUV Information 215-520; DGUV Report “Innenraumarbeitsplätze”	
■ Air Conditioning Plants (A/C Plants)	**➜ Establishment of a hygiene plan and regular cleaning of plants at defined intervals (e.g. comparison with VDI 6022).** **➜ If complaints in relation to the air conditioning plant occur, consult the occupational physician.** **➜ Service and hygiene controls or inspections of the air conditioning plant according to VDI 6022.** **➜ Check of the air conditioning plant if complaints occur, e.g. functional tests or measurements of the air volume.** **➜ Assign a Service Delegate and, if necessary, a Hygiene Delegate for the air conditioning plant** (see also VDI 6022).

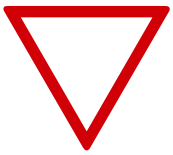
Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
	➜ **Establish operational instructions, which inter alia regulate the work to be carried out and the use of disinfectants.** ➜ **Restriction of the number of people who carry out service activities and hygiene controls.** ➜ **Provide adequate waste containers for the removal of germridden material (e.g. filters, dip slides).** ➜ **Use cleaning methods free of dust and aerosols if possible.**
Source/Information: DGUV Information 215-510, VDI 6022; Portal “Luftbefeuchtung” of BG ETEM	

3.5 Information Intake

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Monitors, Displays**	➜ **Adjust symbols/letters to an adequate size, contrast and brightness.** ➜ **Use dark letters on a bright background.** ➜ **Use displays which have a sufficiently large viewing angle.** ➜ **In exterior areas install anti-glare displays and ensure sufficient brightness.**
■ **Visual Signals (Displays)** 	➜ **Visual warning devices and displays must be adequately recognisable. Form informational content in an understandable way.** ➜ **Assort information elements according to function and meaning.** ➜ **Place the information requiring high attention in the central field of vision.** ➜ **Adjust the size of symbols adequately to the position of the observer.** ➜ **Ensure distinctness (limited number of colours, forms, positions of indicators, length of lines).** ➜ **Distinct labelling.** ➜ **Illuminated signs with safety messages:** > **Luminance must be clearly distinct from vicinity,** > **Take design principles into account,** > **Flashing only in case of risk or necessary notification.**
Source/Information: ArbStättV; TRBS 1151; ASR A1.3; BGHM-I 101; DIN EN 981	
■ **Audible Signals** 	➜ **Adequately recognisable audible warning devices, informational content must be presented in an intelligible form.** ➜ **Take limits of differentiation into account (maximum 5 pitches, 5 volumes).** ➜ **Audible signals with safety statement:** > **Clearly audible** > **Determine the meaning of signals**
Source/Information: ArbStättV; TRBS 1151; ASR A1.3; DIN EN ISO 7731; DIN EN 981	
■ **Danger Signals**	➜ **Danger signals must be clearly recognisable.** ➜ **Combine visual and acoustical signals.**
Source/Information: DIN EN ISO 7731; DIN EN 842; DIN 33404-3	

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Hazard Symbols**  *W001 Warning General Danger (use only in combination with an additional symbol specifying the hazard)*	➜ **Install hazard symbols permanently and clearly visible.** ➜ **Pay attention to adequate lighting.** ➜ **Use material which is resistible against environmental influences and easy to clean.** ➜ **Protect symbols against contamination and dirt and clean them, if appropriate.** ➜ **Take design principles into account.** ➜ **Additional requirements for people with different abilities regarding hazard symbols and health signs are described in Appendix A1.3 of ASR V3a.2.** ➜ **The hazard symbols and health signs must consider the concerns of employees with different abilities and communicate safety-relevant information in an intelligible form. To compensate insufficient sensory capability the "two-senses principle" must be observed:** **> for employees who cannot recognise visual signs, tactile or acoustic signs must be installed as an alternative and/or** **> for employees who cannot recognise acoustic signs, tactile or visual signs must be installed as an alternative.** ➜ **For wheelchair users and people of small stature hazard symbols must be recognisable at their eye level.**
Source/Information: ASR A1.3; ASR V3a.2	
■ **Hand Signals**	➜ **Use the signals defined in ASR A1.3 in a clear and recognisable way.** ➜ **Establish clear agreements between the observer (e.g. driver) and the guide giving the hand signals.** ➜ **In case of greater distance or interruption of visual contact, use auxiliary tools (e.g. torch, walkie-talkie).** See also Section 10.1 herein.
Source/Information: ASR A1.3	

3.6 Extent of Perception

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **High Information Density**  *Give Way (Symbol 205)*	➜ **Omit unimportant information.** ➜ **Make information well-structured.** ➜ **Support perception through systematic use of colours.**
■ **Fatigue or Reduced Concentration due to Monotonous Work**	➜ **Set active tasks and breaks to interrupt monotonous, uniform or repetitive continuous stimulation (routine, monotonous tasks, monitoring and control tasks).** ➜ **Increase the perceptibility of signals.** ➜ **Avoid mental underload or overload.**
■ **Exceptional Situations**	➜ **Practise the correct behaviour in exceptional situations (e.g. disturbances, accidents).** ➜ **Take special measures, if employees' perception could be overstrained, e.g. in case of disturbances, distractions or accidents.**

3.7 Impeded Handling of Work Equipment

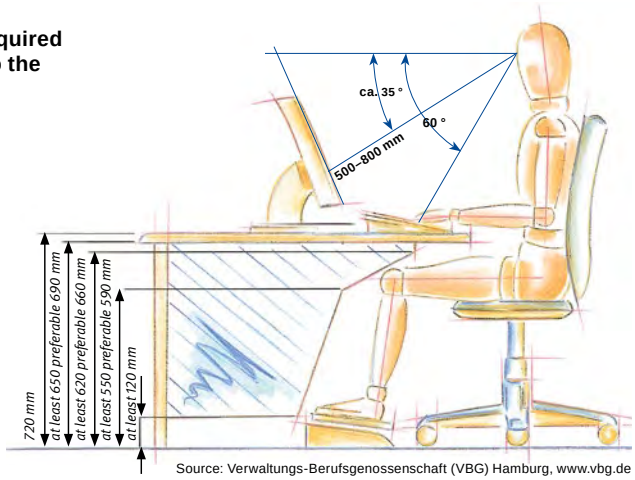
Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Controls (Control Actuators)**	➜ **Ensure an easy handling (small regulating power, short switch actuation ways, small adjustable set squares).** ➜ **Ensure an easy access to controls and arrange them in a suitable manner (placement according to the importance, taking handreach envelope and foot space into account).** ➜ **Assign the movement direction of control actuators to machine movements and displays clearly.** ➜ **Provide an adequate gripping for handles (e.g. ribbed surfaces).** ➜ **Secure against unintentional operation.** ➜ **Clear labelling of control actuators.**
Source/Information: § 8 BetrSichV; TRBS 1151; BGHM-I 101; DIN EN 894; DIN EN 61310-3; DIN 33411-1	
■ **Hand-Guided Tools, Hand Tools**	➜ **Use of ergonomically designed tools and hand tools.** ➜ **Ensure a safe and easy handling (e.g. protection against unintentional starting or sliding).** ➜ **Consideration of right-/left-handedness for personally assigned tools as far as possible.**
Source/Information: T 041	

3.8 Standing Workplaces[7]

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Strain of Spinal Column and Legs**	➜ **Use ergonomic footmats or mats to stand on.** ➜ **Wearing suitable shoes (comfortable length and width, width regulation through lacing or buckles; good grip in heel area; heel height approx. 2 cm to max. 4 cm; flexible soles).** ➜ **Make standing or sitting aids available.** ➜ **Offer back-training programmes or compensatory gymnastics.**
■ **Working Height**	➜ **Use work tables/workbenches with working heights as flexible as possible.** ➜ **Change table height/working height depending on the type of work (low or high input of physical strength, motoric tasks).**
■ **Position of the Head**	➜ **Work with a slight downward angle of vision (angle between viewing direction and horizontal line between 23° and 37°).**
■ **Hand Reach Envelope** (space reachable with stretched arms)	➜ **Define the effective hand reach envelope approx. 10 % less than the space which is theoretically reachable.** ➜ **Arrange all means required within hand reach envelope.**

7 References: B. Hartmann: “Prävention arbeitsbedingter Rücken- und Gelenkerkrankungen – Ergonomie und arbeitsmedizinische Praxis”, ISBN: 978-3-609-51830-5; Leitlinie LV 50 “Bewegungsergonomische Gestaltung von andauernder Steharbeit” des Länderausschusses für Arbeitsschutz und Sicherheitstechnik (LASI) unter http://lasi-info.com/publikationen/lasi-veroeffentlichungen/; W. Lange & A. Windel: “Kleine Ergonomische Datensammlung” (Hrsg.: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin), ISBN: 978-3-8249-1659-7.

3.9 Workstations

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Screen/Glare**	➜ **Arrange the screen at right angles to the window area.** ➜ **Adjust table and chair such that the top line on the screen is clearly below eye level.** ➜ **Comply with the required viewing distance to the screen (50–80 cm, depending on screen size).**  Source: Verwaltungs-Berufsgenossenschaft (VBG) Hamburg, www.vbg.de
■ **Keyboard**	➜ **Keyboards must be separate from the screen and the characters on the keys must be clear and legible.**
■ **Connecting Leads, Cable Routing**	➜ **Install cables in cable ducts.** ➜ **Avoid tripping points through secure cable routing (e.g. cable bridges).**
■ **Working Surface**	➜ **Provide height-adjustable tables with a sufficiently large working surface being free of reflectance.** ➜ **Pay attention to sufficient legroom.**
■ **Work Chair/ Posture when Sitting**	➜ **Provide office chairs with in-depth suspension and an adjustable backrest and give instructions how to use.** ➜ **Dynamic sitting.** ➜ **Arrange dynamic workflows (i.e. switching between standing and sitting positions and movement).**
Source/Information: Appendix of ArbStättV, Section 6; ASR V3	
■ **Software Ergonomics**	➜ **Intuitive menu navigation.** ➜ **Clear display of buttons.** ➜ **Colour design.**
Source/Information: DGUV Regel 115-401; DGUV Information 215-410; DGUV Information 215-450	

4 Mechanical Hazards

Machines are subject to the machine directive (Directive on machinery 2006/42/EC; for machines put into service before 29.12.2009: Directive for machines 98/37/EC), in which the basic safety and health requirements are defined for the placing of machines on the market. These basic requirements are specified in harmonised standards for specific machines. For selection, operation and inspection of machines, the Ordinance on Industrial Safety and Health (BetrSichV) and, if necessary, Accident Prevention Regulations (UVV; see legal bases or source/information in Sections 4.1 to 4.4) must be considered.

For check-ups of machines the "Checklisten Maschinen" of the Code of Practice T 008 (T 008-1 up to T 008-3) can be used.

With regard to retrofitting of machines to the state of the art it is referred to the announcement of the Federal Ministry of Labour and Social Affairs (BMAS) EmpfBS 1114 "Anpassung an den Stand der Technik bei der Verwendung von Arbeitsmitteln", which demands to consider the appropriateness of means for retrofitting.

If machines are modified it must be proven whether these modifications are "essential ones" (see also Section 6.1 in Code of Practice T 008-0). Such modifications turn the operator of the machine into its manufacturer and the conformity declaration expires.

Examples for an essential modification:
› Extension of a machine by implementing additional functions.
› Change of use according to the regulations.

The homepage of BG RCI presents an interactive document for the evaluation of modifications at www.bgrci.de, page ID: #9S1J.

4.1 Unprotected Moving Parts of Machinery

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Pinching Points** ■ **Shear Points** ■ **Points of Impact** ■ **Cutting Points** ■ **Piercing points** ■ **Entry Points** ■ **Snatching Points**  *W019 Warning Hazard of Crushing*  *W025 Warning Rollers Opposite in Rotation*	➜ **Comply with safety distances** (DIN EN ISO 13857). ➜ **Secure dangerous points by protective equipment:** > **Separating protective equipment (e.g. coverings, cowls, fencing, railings)** > **Remote-hold protective devices (e.g. two-hand controls, safety mats)** > **Repellent protective equipment (e.g. hand guards)** > **Protective equipment with proximity alarm (e.g. multiple infra-red beam barrier, light grids, photoelectric beam detectors, safety switch strips)** (§ 8 BetrSichV) ➜ **Check if dangerous points can result from special situations or operating conditions (e.g. maintenance, installation).** ➜ **Prevent an unintentional starting of machines** (§ 8 BetrSichV). ➜ **Make sure that the danger zone is only accessible after the hazardous movement has come to a full stop** (§§ 8, 9 BetrSichV). ➜ **Use faultless tools and clamping fixture.** ➜ **Wear tight working clothes.** ➜ **In case of long hair, wear hair protection.** ➜ **Use the personal protective equipment prescribed** (Sections 29, 30 DGUV Regulation 1). ➜ **No wearing of watches, necklaces, rings or big earrings.**

Source/Information: BetrSichV; TRBS 2111; DIN EN 349; DIN EN ISO 12100; DIN EN ISO 13857; DGUV Regel 113-605; DGUV Regel 113-011; Chapter 2.11 DGUV Regel 100-500; T 008; T 009

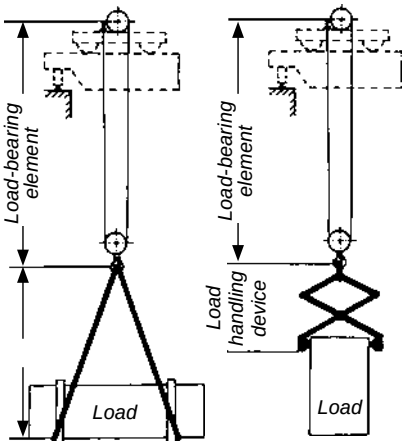
4.2 Parts with Hazardous Surfaces

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Corners, Edges** ■ **Tips, Blades** ■ **Roughness** ■ **Glass Breakage**  *W024 Warning Hand Injuries*	➜ **Use separating protective equipment (e.g. covering, cowls, fencing).** ➜ **Use technical auxiliaries (e.g. chip removing hook).** ➜ **Deburring edges.** ➜ **Upholstering corners and edges.** ➜ **Application of safety knives.** ➜ **Keep pointed or sharp objects (e.g. knives, scissors) in a safe place (e.g. quivers).** ➜ **Provide marked disposal containers, e.g. for blades and cannulae.** ➜ **Use stab-resistant and cut-resistant protective gloves and protective clothing, if appropriate.**

Source/Information: BetrSichV; TRBS 2111; A 008; DIN EN 388

4.3 Means of Transport (e.g. Industrial Trucks, Wheel Loaders, Railways, Cranes, Steady-Flow Conveyors, Vehicles, Transportable Silos and Containers)

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Collisions, Clashes** ■ **Running Over** ■ **Tipping** ■ **Falling** ■ **Pinching**  *W014 Warning Industrial Vehicles*	➜ **Provide sufficiently broad transport routes, keep them free of obstacles, mark and light them and ensure safety of pedestrians** (see Section 2.2 herein). ➜ **Provide suitable means of transport.** ➜ **Compliance with permitted loading of means of transport.** ➜ **Compliance with maximum loading capacity of transport routes.** ➜ **Ensure static stability** (§§ 8, 17 DGUV Vorschrift 68). ➜ **Use of safety restraint systems** (§ 6 DGUV Vorschrift 68; Annex 1 No. 1.4 BetrSichV). ➜ **Ensure that the driver can permanently see the material loaded as unrestricted as possible.** ➜ **Technical measures against risks caused by starting, running over or jamming due to travel motions of mobile resources, particularly when reversing** (see Section 3.2.1 of TRBS 2111 Teil 1). ➜ **Use vehicles with driver assistance systems, e.g. assistance systems for reverse driving, brake assistants, adaptive forward lighting system. Apart from legally required systems (for freight traffic specific systems for certain vehicles are partly required), an increasing number of driver assistance systems can be ordered in the procurement. It must be decided which of them make sense for a particular scope of application of the intended purpose** (see DGUV Regel 114-615, DGUV Information 214-083 and **www.bg-verkehr.de** Web-Code: 20880411). ➜ **Ask a signal man for help** (§ 46 DGUV Vorschrift 70 and ASR A1.3). ➜ **Assign only suitable, trained and authorised persons to drive means of transport.** ➜ **Make sure that no persons are present within the operating range of industrial trucks.** ➜ **Secure vehicles, which are loaded or unloaded by industrial trucks, against rolling; solely pulling the parking brake is not sufficient.** ➜ **Comply with a safety distance of 0.5 m between power-operated parts of cranes, steady-flow conveyors (e.g. conveyor belts) to neighbouring installations** (§ 11 DGUV Vorschrift 52). ➜ **Avoid entry points that result from rotation of a traction element or a load carrier or from movement of thrust elements at steady-flow conveyors**. ➜ **Install automatic overtravel limit switches which restrict power-operated movements of cranes** (§ 15 DGUV Vorschrift 52). ➜ **Provide suitable lifting accessories and check them regularly (e.g. ropes, chains, crossbars).**

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	 *Lifting Accessories* ➜ **Prevent use by unauthorised personnel**. ➜ **Arrange regular checks and inspections of the equipment by competent Persons.** ➜ **Establish operating instructions (see Section 1.2 herein).**

Source/Information: Annex 1 No. 1 BetrSichV; TRBS 2111; TRBS 2111 Teil 1; DGUV Vorschrift 52; DGUV Vorschrift 68; DGUV Vorschrift 70; DGUV Vorschrift 73; §§ 3a, 4 and Appendix No. 1.8 ArbStättV; ASR A1.8; ASR A3.4; ASR A2.3; DGUV Regel 109-005; DGUV Regel 109-006; Chapter 2.9 DGUV Regel 100-500; DGUV Regel 113-005; DGUV Information 209-061; T 013; DGUV Information 209-012

4.4 Parts Moving Uncontrolled

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Tilting Parts (e.g. Pallets, Loads, Stacks)**	➜ **Ensure the stability of tools.** ➜ **Stabilise parts (e.g. stack sacks in cross order). Make sure that the centre of gravity is as low as possible.** ➜ **Observe compliance with permitted stack height depending on the staple** (method for calculation see Appendix 1 of DGUV Regel 108-007). ➜ **Load evenly using tight fitting or form fitting/interlocking stackable warehouse equipment (pallets, stackable containers)** (DGUV Regel 108-007). ➜ **Load Securing (see also DGUV Information 214-083)** > **Loads must always be arranged on the cargo area, so that they comply with the maximum permitted axle load and with the permitted vehicle dimensions.** > **Loading at the boundaries of the cargo area wherever possible or insert barriers, which are tightly connected with the vehicle body (positively locked load securing).** > **Ensure a high friction coefficient by using e.g. non-slip material (anti-slip mats).** > **Tie down the load (force-closed load securing), only appropriate for dimensionally stable load.** > **Check lashing material. Use edge protectors to protect lashing straps.** > **Fill out the load securing protocol (DIN EN 12195-1).**
■ **Hanging Parts (e.g. Crane Loads)**  *W015 Warning Suspended Load*	➜ **Keep a safe distance to suspended load** (Section 18 DGUV Regulation 1; DGUV Vorschrift 52). ➜ **Do not linger below suspended load.**

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Rolling or Sliding Parts (e.g. Barrels)**	➜ **Secure mobile tools against unintended movement**. ➜ **Use auxiliaries (stacking support or storage devices with a special design) to catch rolling or sliding parts (e.g. put barrels on drum pallets).**
■ **Falling Parts (e.g. Tools, Loads), Loosening Parts**  *M014 Safety Helmet Must be Worn*	➜ **Secure parts hinged upwards against closing.** ➜ **Keep tools and work equipment in a safe place; provide catching devices or safety walls. Use safety shoes and a protective helmet** (Appendix No. 2.1 ArbStättV; DGUV Regel 108-007). ➜ **Ensure the stability of stacks and shelves** (DGUV Regel 108-007). ➜ **Secure stored goods against falling** (DGUV Regel 108-007). ➜ **Secure load hooks against accidental detachment of the load (e.g. mounting a latch)**. ➜ **Observe the load set for vacuum lifters.** ➜ **Observe the surface structure and surface stability.** ➜ **Do not move loads over human beings or parts of the body.** ➜ **Do not step below suspended load.**
Source/Information: DGUV Vorschrift 68; ASR A2.1; BetrSichV; TRBS 2111	
■ **Exploding or Flying Parts (e.g. Small Parts, Chips, Abrasive Particles)**  *M013 Face Protection Must be Worn*	➜ **Maintain pressure vessels, pipes, hoses and other pressurised equipment under overpressure or partial vacuum (vacuum) in proper condition and check them regularly.** ➜ **Install pressure relief devices on pipes containing fluid which can be closed on both ends and are heated or exposed to sunlight.** ➜ **Use chip protection** (DGUV Regel 112-192)**; observe the speed of grinding wheels; use protective hoods, safety glasses or face protection.**
Source/Information: BetrSichV	
■ **Media Released under Pressure (e.g. Gas, Liquids)**	➜ **Use splash protection.** ➜ **Decompress and discharge pipes and hose assemblies under pressure before opening.** ➜ **Release hazardous media out of pressure relief devices into a safe area** (§ 9 Section 1 No. 4 BetrSichV). ➜ **Use suitable hose couplings** (T 002). ➜ **Check hose assemblies regularly** (T 002). ➜ **Use face shields and body protection.**
■ **Unauthorised Starting of Machines**	➜ **Machines with lockable main switch: Before starting the task lock up main switch in off-position; the person carrying out the task keeps the key.** ➜ **Machines operating with steam, compressed air or hydraulic liquids: Close and lock valves of supply lines and decompress the pressure tank; the person carrying out the task keeps the key.** ➜ **Machines without lockable main switch: Unplug and secure connector or remove fuses or open disconnection switch; secure against restart and commissioning test on site or separate drive and machine mechanically.** ➜ **Execute safety procedure for maintenance work (Logout/Tagout)** (KB 035).
Source/Information: BetrSichV	

5 Electrical Hazards

5.1 Principles

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
 *P006 No Access for Unauthorised Persons*	➜ **An electrically skilled person must be involved in the assessment of electrical hazards.** ➜ **Establish adequate organisational structures for the electrical engineering sector** (DGUV Vorschrift 3; DIN EN 50110-1, DIN EN 50110-2, DIN VDE 1000-10, VDE 0105-100, DGUV Information 203-001)**.** ➜ **Use only resources bearing the CE sign.** ➜ **Pay attention to test seals of renowned institutions** (vds, TÜV, DGUV Test …). ➜ **Inventory of electric resources for identification.** ➜ **Select resources according to operating conditions and external factors, e.g. IP protection classes, mechanic protection** (see DGUV Information 203-005, DGUV Information 203-006). ➜ **Proper use of electrical resources according to the regulations.** ➜ **Check electrical installations and resources before commissioning, before restarting after changes subject to mandatory testing and recurrently** (Section 5 DGUV Vorschrift 3)**.** ➜ **Documentation of the check.** ➜ **Access to the electric operation room and installation space (e.g. equipment cabinets, terminal boxes) only for authorised persons (electrically skilled person, persons instructed in electrical engineering – EuP).**

Source/Information: DGUV Vorschrift 3; DGUV Regel 103-011; DIN VDE 0105-100; DGUV Information 203-001

5.2 Hazardous Body Currents

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Contact with Live Parts** ■ **Contact with Conduc-tive Parts, being live in case of an error**  *P010 Do not Touch*	➜ **Work on electrical installations and resources must be carried out only by electrically skilled persons** (DGUV Vorschrift 3; DIN EN 50110-1, DIN EN 50110-2). ➜ **Visual checks of portable electrical resources before starting the activity.** ➜ **Protection against direct (basic protection) or indirect contact (error protection) must exist (e.g. insulation, covering and safety distance).** ➜ **Preferably use residual-current devices (RCD) with a nominal residual current < 30 mA.** ➜ **When working on electrical installations observe 5 safety regulations:** **> Disconnect from power supply,** **> Secure against unintended restarting/reconnecting,** **> Ascertain all terminals to be de-energised,** **> Earthing and short-circuiting,** **> Protect adjacent live parts by covers and barriers.** ➜ **Use a certified voltage detector only.** ➜ **Observe safety distances when working close to live installations.** ➜ **Only specifically trained electrical skilled personnel are entitled to carry out work at live parts (Arbeiten unter Spannung – AuS) taking special safeguard measures.** ➜ **Use insulated tools only.** ➜ **Use suitable personal protective equipment** (DGUV Information 203-077). ➜ **In case of an increased electrical risk (e.g. conductive areas with a restricted freedom of movement) apply the safeguard measures "extra-low voltage" and "protective separation with a consumable".**

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **During construction or assembly work connect resources only at assigned feeding points like electricity distributors, emergency power generators or transformers with separate windings.** ➜ **Construction or installation sites require additional protection like an electricity distributor or the mobile Switched Protective Earth – Portable Residual Current Device against fault currents (PRCD-S).**

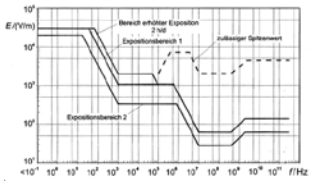
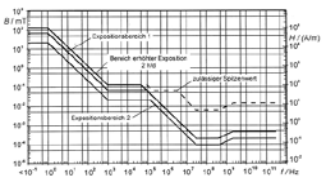
Source/Information: DGUV Vorschrift 3; DGUV Regel 103-011; §§ 8 and 14 BetrSichV; DIN EN 50110-1; DGUV Regel 113-004; DGUV Information 203-001; DGUV Information 203-004; DGUV Information 203-071; DGUV Information 203-077

5.3 Electric Arcs

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Short Circuits** ■ **Switching Operations under Load**  *W012 Danger: Electricity*	➜ **Observe safety rules.** ➜ **Use adequate measuring instruments (CAT III, IV).** ➜ **Only trained personnel using PPE and tools must work at fuse cartridges.**

Source/Information: DGUV Regel 103-011; DGUV Information 209-010

5.4 Electromagnetic Fields

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **High-Voltage Plants** ■ **Installations, Laboratories with High Magnetic Flux Densities** ■ **High-Frequency Fields (e.g. HF Welding Machines, HF Drying Systems)** ■ **Low-Voltage Installations, Switch Rooms**  *W005 Warning Non-Ionising Radiation*	➜ **Evaluate electromagnetic fields and adjust limit values (measurements or manufacturer's instructions). Limit values depend on frequency and duration of stay (see graphs below from Appendix 1 of DGUV Vorschrift 15)**  *Permissible values of the electrical field strength in exposure areas 1 and 2 as well as in the range of increased exposure*  *Permissible values of the flux density in exposure areas 1 and 2 as well as in the range of increased exposure* ➜ **Optimise shielding of high frequency welding units (minimise indispensable clearance and/or determine the exposure).** ➜ **Delimit and mark danger zones.** ➜ **Off limits to unauthorised personnel.**

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
 *P007 No Access for Persons with Electronic Implants (Pacemaker, Defibrillator)*  *P014 No Access for Persons with Metallic Implants*	➜ **Take safeguard measures for persons with medical implants (e.g. insulin pumps, pacemakers)** (DGUV Information 203-043). ➜ **Labelling (e.g. prohibition signs P007 and P014, hazard symbol W005 according to ASR A1.3).** ➜ **Consider the hazard of getting jammed between magnets.** ➜ **Observe special touchproof protection for high frequency facilities (high voltage) at the workplace and for the power generation (generator).**
Source/Information: DGUV Vorschrift 15; DGUV Regel 103-014; VDE 0848; EMVG; IFA-Report 5/2011; DGUV Information 203-043; Literatur: H. Brüggemeyer: „Hochfrequente elektromagnetische Strahlung – Grenzwerte, Richtwerte und Vorsorgewerte“ unter www.gewerbeaufsicht.niedersachsen.de (Suche: „Elektromagnetische Felder (EMF)“)	

6 Hazards Related to Substances

The hazards for employees caused by activities with hazardous substances must also be competently determined within the frame of risk assessments (§ 6 GefStoffV, TRGS 400). The Chemicals Act (ChemG), the Ordinance on Hazardous Substances (GefStoffV) including specific Technical Rules (TRGS), the Chemicals Prohibition Order (ChemVerbotsV) as well as the European Directives REACH and CLP are the legal basis for activities with hazardous substances. The risk assessment of hazardous substances requires specific expertise. This expertise required in addition to the professional qualification can be acquired by a seminar according to DGUV Grundsatz 313-003.

Use of Hazardous Substances

Many hazardous substances are specifically labelled: substances and mixtures which are classified according to the CLP Directive, must normally be provided with a H Statement at least, very often complemented by a hazard pictogram and/or a signal word (“Attention” or “Danger”). If the hazardous substance is transported as dangerous goods, danger labels can – according to Transportation Law – replace hazard pictograms of the CLP Directive.

Genesis of Hazardous Substances

It is important to bear in mind that hazardous substances can also originate and/or be released during use or manufacturing processes (e.g. welding fumes, diesel engine emissions, particulate matter of quartz).

Other Substances and Mixtures Treated as Hazardous Substances

These hazardous substances are not labelled, however, they must not be forgotten when implementing risk assessments. Due to their physicochemical, chemical or toxic characteristics and the method they are used at the workplace or existent they are a danger to the safety and health of employees and therefore regarded as hazardous substances, too. Examples: water steam under high pressure or at high temperatures, gases and steams at high concentrations which displace atmospheric oxygen or air with a reduced oxygen concentration in a storage space.

Important sources of information for risk assessments are:
› Safety Data Sheets of the supplier
› Online databases of accident insurance institutions, e.g. GisChem, GESTIS, WINGIS online
› Concerning substances: Databases of ECHA at http://echa.europa.eu/information-on-chemicals
Many suggestions concerning the risk assessment of hazardous substances are available in DGUV Information 213-080 „Arbeitsschutzmaßnahmen bei Tätigkeiten mit Gefahrstoffen“.

The worksheet “Complementary Assessment of Activities with Hazadous Substances” is a suitable template to document the specific evaluation of hazardous substances (see Appendix 6 herein).

When establishing operating instructions the module “GisChem-Interaktiv” of the Hazardous Substance Information System “Chemikalien” simultaneously allows to implement and document the complementary assessment of activities with hazadous substances.

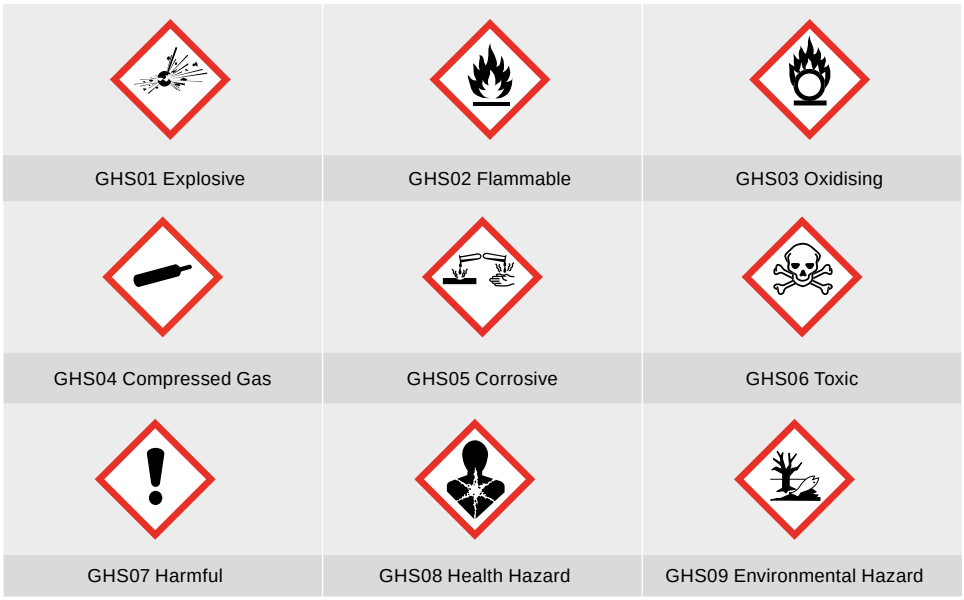
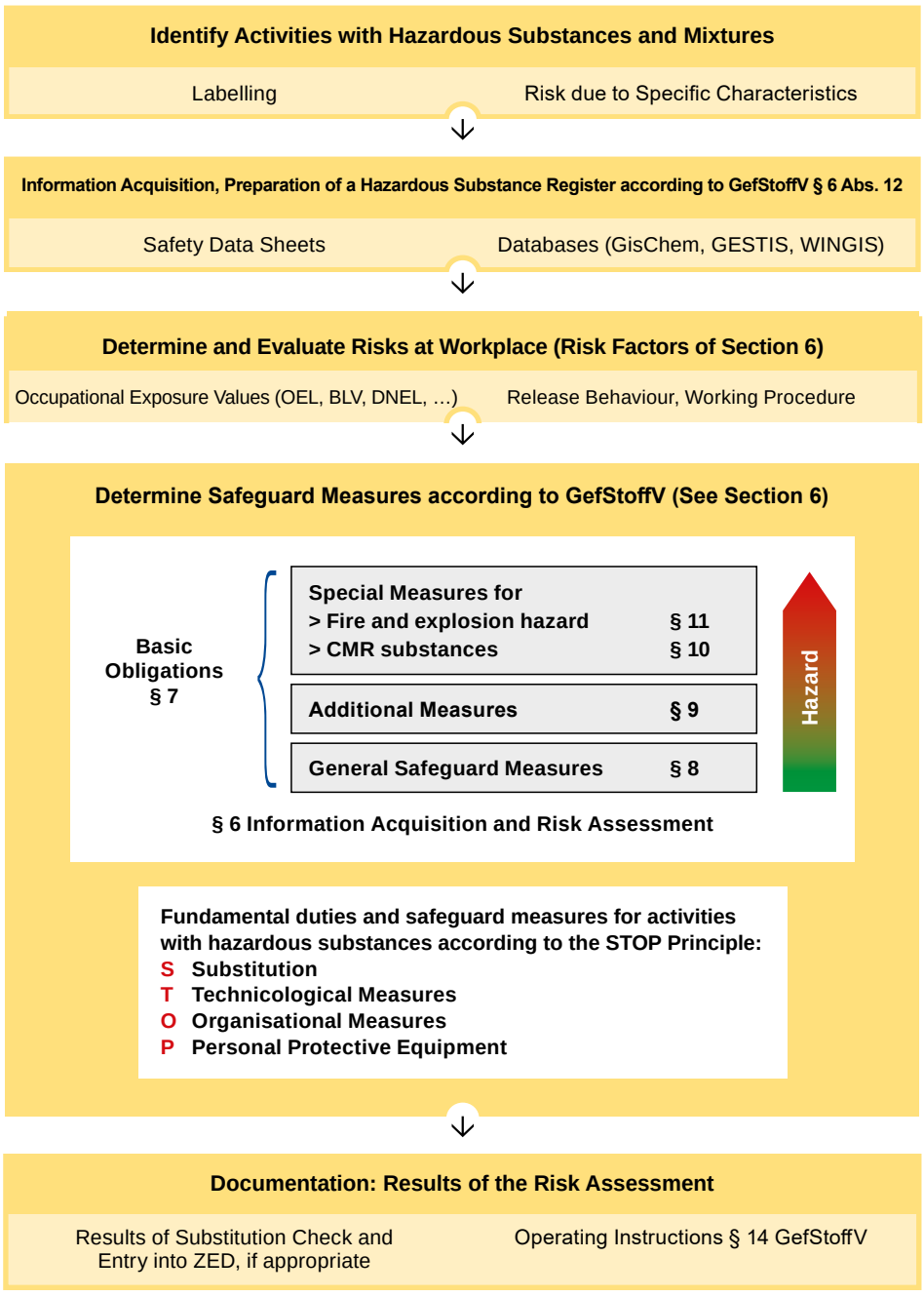


Figure 1: Hazard pictograms according to CLP Directive



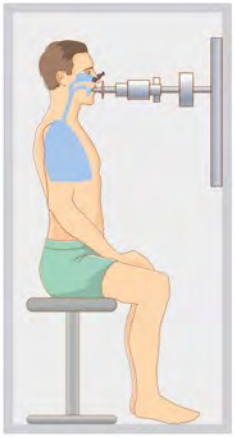
6.1 Harmful Effects of Gases, Vapours, Aerosols, Dusts, Liquid and Solid Substances (Input Substances, Intermediate, End and Decomposition Products)

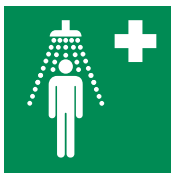
Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Inhalation** ■ **Impact on Eyes, Skin, Respiratory Tract and Lungs** ■ **Swallowing** 	Basic obligations (§ 7 GefStoffV) ➜ **Implementation of a risk assessment before starting the activity.** ➜ **Consideration of Technical Rules on Hazardous Substances, in particular TRGS 400–402, 406, 407 and TRGS 500, TRGS 600. See also the "Easy-to-use Workplace Control Scheme for Hazardous Substances (EMKG)" at https://www.baua.de. The GESTIS-Stoffenmanager at www.dguv.de/ifa/gestis-stoffenmanager (Web-Code: d117179) supports the implementation of risk assessments for activities handling with hazardous substances according to TRGS 400 and 402.** ➜ **Substitution check (replacement of hazardous substance), see also the GHS Column Model at www.dguv.de/ifa/Praxishilfen/Praxishilfen-Gefahrstoffe (Web-Code: d124774), IFA publication „Das GHS-Spaltenmodell 2020" or TRGS 600, respectively.** ➜ **Implementation of suitable procedures according to the state of the art in order to exclude or minimize risks:** **> Low-emission and/or emission-free forms of use,** **> Implementation of technical measures (e.g. ventilation),** **> Determination of suitable organisational protective measures (e.g. restriction of exposure time),** **> Use of personal protective equipment (no long-term measure, limited application to the minimum required); appropriate acquisition, storage, inspection and repair of personal protective equipment.** ➜ **Regular inspection on effectiveness of technical protective measures following risks assessments (Minimum: every three years; see also Section 1.11 herein).** ➜ **Proof of compliance with occupational exposure limit values[8].** ➜ **Proof via workplace measurements or any other suitable method** (see also BIA-Report 3/2001) **or a non-metrological estimation of exposition according to TRGS 402 via GESTIS-Stoffenmanager at www.dguv.de/ifa/gestis-stoffenmanager (Web-Code: d117179).**
Source/Information: GefStoffV and several TRGS, particularly TRGS 400, 401, 402, 500, 527, 600 and 900; BetrSichV and TRBS; DGUV Regulation 1; DGUV Vorschrift 13; ArbMedVV; § 22 JArbSchG; §§ 11, 12 MuSchG; WHG; AwSV; Codes of Practice: Series M; A 013; A 027; T 015; T 025; T 026; T 040; T 045; DGUV Information 213-850	
	**General Safeguard Measures** (§ 8 GefStoffV) ➜ **Suitable design of workplace/suitable work organisation.** ➜ **Make suitable tools available and ensure regular service.** ➜ **Restrict the number of exposed employees.** ➜ **Limit the duration and degree of exposure.** ➜ **Perform adequate hygienic measures.** ➜ **Restrict the quantity of hazardous substances at the workplace according to the minimum capacity required for the continuity of activities (minimisation requirement).** ➜ **Minimisation requirement also applies to the storage and transport of hazardous substances.** ➜ **Hazardous substances and preparations must be identified internally according to the Technical Rule for Hazardous Substances TRGS 201. It differentiates between complete and simplified labelling. Based on the result of the risk assessment it must be specified if simplified labelling is sufficient for portable containers.** ➜ **Substances and preparations produced in the plant itself, such as intermediate products and wastes, must be labelled, too. Since classification is the basis of labelling here as well, the entrepreneur himself is obligated to determine. For assistance see TRGS 201, the mixture calculator at www.gischem.de can be used as well.** ➜ **Unambiguous labelling of equipment and pipes in order to make the hazardous content and the resulting hazards clearly recognisable.**

8 The definition of different limit values are found in the limit value glossary app at www.grenzwertglossar.de.

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Simplified labelling in laboratories according to Section 8 of Code of Practice M 060.** ➜ **Don't fill hazardous substances into containers, which can be mistook by their form or labelling for food containers** (§ 8 Section 5 GefStoffV)**.** ➜ **Do not eat, drink or smoke in case of exposure to hazardous substances.** ➜ **Store hazardous substances safely. Observe the limited quantity regulation and joint storage prohibition** (see TRGS 510). ➜ **Acutely toxic hazardous substances of the Categories 1–3 must be accessible only for competent and responsible persons.** ➜ **Make carcinogenic or germ cell mutagenic substances and mixtures of the Categories 1A and 1B accessible only for competent and responsible persons.**
Source/Information: TRGS 500; TRGS 201; TRGS 510; DIN 2403; M 060	
  	**Additional Safeguard Measures** (§ 9 GefStoffV) **Additional safeguard measures are obligatory if basic measures according to § 8 GefStoffV are not sufficient. This applies in particular if limit values are exceeded or if hazardous substances are absorbed through the skin or are harmful to the skin or eye.** ➜ **Produce or use hazardous substances in closed systems or limit the exposure of employees according to the state of the art.** ➜ **Repeat the risk assessment if the occupational exposure limit value is exceeded.** ➜ **Instant supply of personal protective equipment, if the occupational exposure limit is exceeded despite technical and organisational protective measures.** ➜ **Separated storage of working and casual clothes.** ➜ **Restricted access to areas with increased exposure hazards.** ➜ **Additional safeguard measures are required for employees working alone with hazardous substances** (DGUV Regel 112-139).
Source/Information: TRGS 500	
  *M017 Respiratory Equipment Must be Worn*  *M010 Safety Overalls Must be Worn*	**Special Safeguard Measures** (§ 10 GefStoffV) **in work activities involving substances which are carcinogenic, germ cell mutagenic or toxic to reproduction (CMR substances).** ➜ **Limited use for CMR substances, in case that the properties have been clearly demonstrated on human beings (Category 1A) and in experiments with animals (Category 1B)** (Annex II GefStoffV, TRGS 905, 906, 910). ➜ **Prove compliance with existing occupational exposure limits by measurements or any other suitable procedure.** ➜ **Application of an adequate risk-related concept of measures** (TRGS 910) **for CMR substances without occupational exposure limit, however, with acceptable and tolerable concentrations, in order to accomplish the minimisation requirement** (§ 7 Section 4 GefStoffV). ➜ **Perform activities according to process- and substance-specific criteria (verfahrens- und stoffspezifische Kriterien – VSK), see TRGS 420.** ➜ **Delimit and mark risk areas and prohibit access to these areas.** ➜ **Minimise the duration of exposure for employees and provide personal protective equipment that must be used during increased exposure.** ➜ **No return of extracted air into working areas, except after cleaning of exhaust air according to approved procedures** (TRGS 560). ➜ **Keeping a register about employees, who are exposed to hazards of carcinogenic or germ cell mutagenic substances (Categories 1A or 1B) including values and duration of exposition. Storage of data until 40 years after the exposition has ended** (§ 14 Section 3 GefStoffV and/or TRGS 410)**. See also the "Zentrale Expositionsdatenbank" (ZED) at zed.dguv.de.**[9] ➜ **Offering follow-up preventive health care via organisation services of the accident insurance institutions, e.g. ODIN, GVS, BONFIS.**
Source/Information: Annex Part 1 Section 3 ArbMedVV	

9 The database for the central collection of data about employees exposed to carcinogenic or germ cell mutagenic hazardous substances of the categories 1A or 1B – Central Exposition Database (ZED) – is an offer how to implement this duty easily.

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
 *Pulmonary Function Test*	**Additional safeguard measures in work activities involving exposure to alveolar or inhalable dust** (§ 8 Section 8 in conjunction with Annex I No. 2 GefStoffV): ➜ **Consider the behaviour of dust.** ➜ **The occupational exposure limit valid for the inhalable dust is 10 mg/m³.** ➜ **For the respirable part of slightly soluble and insoluble dust the General Dust Limit Value (Allgemeiner Staubgrenzwert – ASGW) of 1.25 mg/m³ must be held, based on an average density = 2.5 g/cm³.** ➜ **Additionally, substance specific exposure limit values or substance specific criteria like acceptable concentration and tolerable concentration must be applied.** ➜ **Select and operate machines and equipment in order to keep the release of dust as low as possible.** ➜ **Install an effective exhaust system around dust emitting installations, machines and equipment or prevent the release of dust through other measures.** ➜ **Prevent the expansion of dust into uncontaminated working areas.** ➜ **Collect and dispose dust at the emerging point or point of origin as completely as possible and dispose safely. When removing extracted air make sure that as little dust as possible enters the breathing air of the employees. The return of extracted air into the working areas is only permitted after adequate cleaning.** ➜ **The effectiveness of equipment for the purpose of separating, collecting and deposition of dust has to be proven during initial commissioning.** ➜ **Avoid dust deposits. If this is not possible, remove dust deposits with moisture or wet processes or with a suitable vacuum cleaner or dust arrester. Dry sweeping or blowing off dust deposits with compressed air is not permitted.** ➜ **Check this equipment at least once a year for proper functioning, carry out maintenance and repair, if necessary; document inspections.** ➜ **For activities generating large amounts of dust:** > **Keep the exposition period as low as possible.** > **If occupational exposure limit values are not met, supply with suitable personal protective equipment, in particular respiratory protection.** > **Employees must use the protective equipment available.** > **Provide separate storage vessels for working and casual clothes and lavatories.** ➜ **Regard additional regulations to protect against risks related to asbestos exposure** (Annex I No. 2.4 GefStoffV, TRGS 519).
Source/Information: TRGS 500; TRGS 900	
	Special Safeguard Measures (§ 11 GefStoffV) **against physico-chemical impact, particularly against fire and explosion hazards see Section 7 herein.** **Exemplary Additional Special Measures** **in work activities involving explosive substances and organic peroxides** (see Sections 7.5 and 7.6 herein). > **Perform a risk assessment taking into account in particular procedural, organisational and constructional safeguard measures, including safety distances which must be complied with.** > **Take regulations of the Explosives Act (Sprengstoffgesetz – SprengG) and related legislations into account.** **Restrictions for Production and Use** **For substances, preparations and products according to Annex II GefStoffV, according to Chemicals Prohibition Order or Annex XIV (Authorisation Requirement) and/ or Annex XVII (Restrictions) of REACH Directory, and biocidal products** (see also Regulation (EU) No. 528/2012)**.** **Informing the Authority** (§ 18 GefStoffV) > **Accidents and operational failure which have led to severe health damage, as well as illness and death caused by activities with hazardous substances must be reported immediately.** > **Provide the following information at request of the authority:** • **Result of the risk assessment including documentation** • **If CMR substances of Categories 1A or 1B are involved, the result of the substitution check** • **Expert knowledge for issuing safety data sheets according to Annex II of REACH Regulation**

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
 *E011 Eyewash*  *E012 Safety Shower*	**Additional Measures for Activities with Liquids** ➜ **See Code of Practice T 025 "Umfüllen von Flüssigkeiten" of BG RCI.** Further measures: ➜ **Follow the restrictions for young people as well as for pregnant or breastfeeding women/observe period of rest due to exposure** (§ 22 JArbSchG; §§ 9–12 MuSchG; M 039). See also Section 1.12 herein. ➜ **Arrange or offer occupational health care (mandatory or optional health care)** (§§ 3–5 ArbMedVV plus Annex Part 1–Part 4). ➜ **Provide first-aid facilities (e.g. eyewashes and safety showers, suitable antidotes)** (Section 25 DGUV Regulation 1, see also Section 1.6 herein). ➜ **Use suitable material for containers, hose assemblies, pipes and seals.** ➜ **Keep adequate containers ready for damaged packages (overpack/salvage barrel).**

Source/Information: ArbMedVV

6.2 Skin Exposure

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Use of Sensitizing Substances (H 317) e.g. Epoxy Resins, Isocyanates, Preservatives** ■ **Break-Through of Hazardous Substances in Glove Materials (Permeation)** ■ **Strong Contamination** ■ **Wetness** ■ **Abrasive Skin Cleaning** ■ **Cooling Lubricants, Fats**  *M009 Safety Gloves Must be Worn*  *Protection against Chemical Hazards (requirements according to EN 374-1: 2003, 5.2.1 and 5.3.2)*	➜ **Avoid skin contact with substances such as solvents, coating materials, adhesive substances, and skin exposure to moisture/wet work.**[10] > **For the evaluation and definition of measures required include substance properties, extent and duration of exposure through skin contact with substances, mixtures and products as well as working in wet conditions** (TRGS 401; A 023). > **In the event of a serious risk of contamination: Use disposable full body protective suits.** > **Change clothes immediately which are soaked or strongly stained.** > **Find out the selection and wearing period of protective gloves according to the safety data sheet and operational conditions of use.** > **Use suitable products of skin protection, skin cleaning and skin care.** > **Establish a skin protection plan**[11]**.**  *Skin Protection*  *Skin Cleaning*  *Skin Care* ➜ **Use personal protective equipment.** ➜ **Consider material resistance and limits of wearing time, e.g. change protective gloves in time.** ➜ **Avoid the accumulation of moisture within gloves: Wear protective gloves with an inner absorbent fabric or an inner glove made of cotton.** ➜ **Selection and control of cooling lubricants** (DGUV Regel 109-003; TRGS 611). ➜ **Mandatory or optional occupational health care according to Annex Part 1 Section 1 No. 2a and No. 2e ArbMedVV**.

Source/Information: TRGS 401; DGUV Regel 112-195; DGUV Information 212-007; ArbMedVV

10 "Wet work" refers to activities in which employees have a significant part of their working time skin contact with water or aqueous liquids, or frequently wash their hands, or perform these activities alternately with wearing liquid-tight protective gloves. The exclusive use of liquid-tight protective gloves does not qualify as "wet work".

11 The download centre of BG RCI offers interactive plans of skin and hand protection at downloadcenter.bgrci.de (search word: Handschutz).

6.3 Other Effects and hazardous Interactions due to Substance Mix-Ups

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Adverse Reactions due to Confusion of Chemicals during the Filling of Storage Tanks or Containers.** **> Formation and Release of Toxic Gases (e.g. Bleaching Lyes + Acids)** **> Decomposition and Pressure Build-up (e.g. Peroxides + Metal Oxides)** **> Reaction and Energy Release (e.g. for Acids + Lyes)**	**The confusion of chemicals can lead to severe damages for persons and/or the environment.** **The danger of confusion can occur at any point of the logistical chain, from the manufacturer up to the user. The following potential mistakes and deficits during delivery and provision must be born in mind:** **> Confusion or change of documents of transport.** **> Confusion or change of analytical results.** **> Labelling which is difficult to read or easily to be confused with.** **> Incorrect, missing or insufficient labelling.** **> Storage or provision in the wrong place.** **> Orientation towards putatively unambiguous sub-criteria like e.g. the colour of packages.** **The measures listed below can reduce human errors regarding confusion but cannot completely eliminate them. Therefore, employees who are well trained, attentive and sensitive for this topic are essential to ensure a high degree of safety.** **➜ Release analysis (representative sampling and a reasonable target for the substances to be analysed, particularly in case of contamination).** **➜ Attachment of machine readable codes, e.g. bar codes (fundamental requirement: attaching labels correctly filled at the right package).** **➜ Controls using the dual-control principle, with signature if necessary.** **➜ Use of locking systems for liquid or gaseous substances e.g. substance-specific couplings.** **➜ Unambiguous labelling of filling stations.** **➜ Unmistakable labelling (pay special attention to the complete removal of old labels if packages are multiply used for different chemicals).** **➜ Complete draining and cleaning of hoses and pipes which are used for different substances.** **➜ Sufficient lighting and easy access of the filling stations.**
Source/Information: ISSA-03	
■ **Interaction of Chemicals with Material of the Container** ■ **Corrosion of Containers and Pipes (e.g. Metallic Materials and Chloride Ions)** ■ **Decomposition of Chemicals (e.g. Rusty Material and Peroxides)**	**➜ Consideration of indications to “Interaction with Material” in the Safety Data Sheet of the substances used when selecting and/or acquiring containers and pipes.** **➜ Consideration of the formation and/or release of corrosive media during the mixing of chemicals (e.g. dilution of water-free acids).** **➜ Consideration of the interaction of chemicals, e.g. in “dead” ends of pipes or siphons.**
Source/Information: ISSA-03	
■ **Stress due to Odours**	**➜ Replace odour intensive substances.** **➜ Cover open containers.** **➜ Provide an effective extraction system or ventilation** (Appendix No. 3.6 ArbStättV; ASR A3.6). **➜ Use respiratory protection** (DGUV Regel 112-190).
Source/Information: DGUV Regel 113-004; DGUV Regel 112-139; DGUV Regel 112-190	

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Oxygen Deficiency**  *Carbon Dioxide Extinguishing System*	**In order to prevent fires in storage and EDP areas, the oxygen concentration in the room can be reduced to 13–15 Vol.-% by using nitrogen.** ➜ **Technical and organisational measures according to the Risk Classifications 0–3 in DGUV Information 205-006 must be determined. In some cases a self-containing breathing apparatus must be additionally used in areas with an oxygen concentration below 17 Vol.-%. Requirements and safeguard measures see DGUV Information 205-006.** ➜ **Protection of employees against oxygen deficiency at plants for the manufacturing, storage and application of ultra-cold, liquefied gases, which could have a suffocating effect.** ➜ **Protection of employees against an atmosphere with > 21 Vol.-% oxygen (considerable increase of fire hazards).**
Source/Information: DGUV Regel 113-004; DGUV Regel 112-139; DGUV Regel 112-190; DGUV Information 205-006	

7 Hazards Related to Fire and Explosion

Since the Ordinance for Revision of Requirements for Occupational Safety regarding the Use of Work Equipment and Hazardous Substances (Verordnung zur Neuregelung der Anforderungen an den Arbeitsschutz bei der Verwendung von Arbeitsmitteln und Gefahrstoffen) from February 3rd, 2015 the Ordinance on Hazardous Substances regulates requirements and measures for fire and explosion hazards. The Ordinance on Industrial Safety and Health prescribes the requirements for inspections, the inspector and the allowable inspection periods.

7.1 Fire Hazards Related to Solids, Liquids and Gases

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Fire Load** ■ **Fire Emergence** ■ **Fire Spread** For flammable substances subject to the Ordinance on Hazardous Substances see also Section 6 herein.  *GHS 02 Extremely Flammable, Highly Flammable or Flammable*  *W021 Warning Flammable Material*	➜ **Risk assessment for fire hazards** (§ 6 GefStoffV) ➜ **Determination of all factors regarding ignition, spreading and impact of fire, in particular during maintenance work**(TRGS 800 “Fire protection measures”). ➜ **Determination of characteristic numbers and properties, e.g. the combustibility index, flash point** (Chapter 3.2.2 TRGS 800). ➜ **Determine and avoid ignition sources** (Chapter 3.2.3 and Annex 2 TRGS 800). ➜ **Assessing of the fire hazard** (Section 3.3, TRGS 800): > **Normal fire hazard, e.g. offices** > **Increased fire hazard** > **High fire hazard** ➜ **For determination of fire precautions see Section 4 and Table 1 TRGS 800.** ➜ **Establish a concept of fire protection, if necessary (vfdb 01-01).** ➜ **Appointment and training of Fire Protection Officers** (DGUV Information 205-003) **and Fire Protection Assistants** (DGUV Information 205-023). ➜ **Construction of buildings/rooms with regard to fire precautions technology (adequate fire classification, e.g. F30/F90, and building material classification, e.g. A1, A2, B1, B2, B3)** (DIN 4102 or DIN EN 13501-1)[12]. ➜ **Minimisation of the fire load** (Annex I No. 1.2 GefStoffV). ➜ **Observe safeguard measures for the storage of hazardous substances** (Annex I No. 1.5 GefStoffV in conjunction with TRGS 509 and 510). ➜ **Cleaning cloths contaminated with flammable substances must be collected, stored and transported in resistant, tightly closed containers, e.g. containers made of metal or high-molecular polyethylene** (Chapter 2.2 Section 3.1 DGUV Regel 100-500). ➜ **Avoid the use of dangerous mixtures of hazard substances** (Annex I No. 1.2 GefStoffV). ➜ **Install a sufficient number of fire detectors properly and protected against damage.** ➜ **Install fire extinguishing systems with an adequate fire classification (consider water-miscibility of flammable liquids), label and recurrently test the installations, keep the access clear** (§ 4 Section 3 and Appendix No 2.2 ArbStättV; ASR A2.2). ➜ **Establish and mark access routes of fire fighting in order to enable an unimpeded and easy approach with fire fighting and work equipment** (Annex I No. 1.3 GefStoffV). ➜ **Observe fire water retention required depending on the water hazard class.** ➜ **Consider the suffocating effect of extinguishing media, notably carbon dioxide.** ➜ **Establish alarm and escape route plans (including assembly points for employees).** ➜ **Keep the escape route free from obstacles.** ➜ **Perform training and/or emergency exercises for employees.** ➜ **Perform extremely dangerous activities, e.g. open flame operations, only with written permit (permit-to-work system)** (Annex I No. 1.4 GefStoffV, Chapter 2.26 Section 3.8.2 DGUV Regel 100-500). ➜ **Provide a self-contained breathing apparatus/escape equipment** (Section 4.5.2 DGUV Regel 112-190).

Source/Information: § 6 and Annex I No. 1 GefStoffV; TRGS 800; MIndBauRL; Building Regulations of Federal Lands; ASR A2.2; DGUV Information 205-001; DGUV Information 205-023; M 062; M 063; T 049; T 050; T 051; T 053; T 054; KB 028-1; DIN EN ISO 19353

12 For details see also Building Regulation of the Federal Land concerned.

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Lithium-Ion Batteries**	➜ **Avoid strong external heating.** ➜ **Secure batteries against external short circuits, e.g. by protecting the terminal caps.** ➜ **Store batteries in a safety cabinet or container.** ➜ **Store mechanically damaged batteries in fire-resistant containment systems. Dispose them immediatlely and properly in accordance with the manufacturer's instructions.** ➜ **Charge batteries under supervision and using a charger intended for this purpose.**
Source/Information: Section 2.4 DGUV Information 213-030; FBFHB-018; FBFHB-024	

7.2 Hazards due to Explosive Mixtures

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Gas-Air Mixture** ■ **Vapours-Air Mixture, Mist-Air Mixture** ■ **Dust-Air Mixture** ■ **Hybrid Mixtures** ■ **According to GefStoffV Oxidising Agents other than Air or if Ambient Pressure < 0.8 bar or > 1.1 bar or if Ambient Temperature < –20 °C or > 60 °C** ■ **Unstable Gases**  *D-W021 Warning Hazardous Explosive Atmosphere*  *W021 Warning Flammable Material*  *W029 Warning Flammable Gas in Cylinders*	➜ **Risk assessment for explosion hazards and the formation of explosive mixtures or hazardous explosive atmospheres (–20 °C up to + 60 °C/from 0.8 to 1.1 bar with air as oxidising agent)** (TRGS 720/721; TRBS 1112 Teil 1). ➜ **Determine safety characteristics for the existing conditions (atmospheric or non-atmospheric):** > **Gases, vapours, mist (e.g. flash point, explosion points, sustained combustion[13], ignition temperature, explosion limits, density ratio, limiting oxygen concentration)[14].** > **Dust (e.g. fire point, particle size distribution, minimum ignition energy and -temperature, lower explosion limit, limiting oxygen concentration, dust explosion class)[15].** ➜ **Choose flammable liquids or create processes in order to keep ambient and process temperature below Lower Explosion Point** (Section 4.2.2 Section 3 TRGS 722). **Avoid the formation of aerosols.** ➜ **Prevent the formation of hazardous explosive atmospheres or mixtures (e.g. replacement of flammable substances, inertisation, technical ventilation, or technically leak-proof plants, removal of dust deposits). Monitoring of atmosphere with gas detectors.** ➜ **Remove dust deposits in working areas in adequate time intervals (vacuuming – do not blow dust away); industrial vacuum cleaners must comply with test requirements for dust explosion protection (IFA-Handbuch 510 220).** ➜ **When monitoring technical measures by measurement and control technology: ensure the quality of monitoring according to TRGS 725.** ➜ **Inspection of work equipment and technical measures in potentially explosive areas by a Competent Person according to Appendix 2 Section 3 BetrSichV.** ➜ **Determination of potential explosive areas including classification into explosion hazard zones according to Appendix I No. 1.7 GefStoffV: Gases and vapours in zones 0, 1 or 2; dust in zones 20, 21 or 22. For comprehensive classification examples see DGUV Regel 113-001 (EX-RL).** ➜ **Effective ignition sources corresponding to the explosion zones must be avoided (e.g. flames and hot gas, mechanically induced sparks, plants, static electricity, lightning stroke** (TRGS 723)**). TRGS 727 gives concrete hints how to avoid ignition hazards due to electrostatic charging.** ➜ **Use of electrical devices and safety systems according to Appendix I No.1.8 GefStoffV and Directive 2014/34/EU; for old appliances Directive 94/9/EC according to classification into explosion hazard zones pursuant to Appendix I No. 1.7 GefStoffV.** ➜ **Evaluate work equipment which does not fall within Directive 2014/ 34/EU for their suitability with regard to the use in explosion-hazardous areas. The same applies for hazardous explosive atmospheres when no hazard zone is established, e.g. for maintenance work or explosive mixtures under non-atmospheric conditions.**

13 See Section 4 in Code of Practice R 003e of BG RCI

14 E.g. Physikalisch-Technische Bundesanstalt (PTB), Postfach 3345, 38023 Braunschweig; CHEMSAFE database www.dechema.de/Datenbanken. References: E.g. Nabert/Schön/Redeker: "Sicherheitstechnische Kennzahlen brennbarer Gase und Dämpfe", ISBN 978-3-8064-9956-8.

15 E.g. Institution for Occupational Safety and Health of the DGUV (IFA), 53754 St. Augustin; GESTIS-STAUB-EX database at http://staubex.ifa.dguv.de/ and CHEMSAFE database at www.dechema.de/Datenbanken and GSBL – Gemeinsamer Stoffdatenpool Bund/Länder at https://gsbl.de/. References e.g. IFA-Handbuch (ISBN 978-3-503-13083-2) Section 140 260 to 140 279 "Brenn- und Explosionskenngrößen von Stäuben".

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Apply constructive measures limiting the impact of an explosion to a safe level (e.g. explosion pressure resistant construction, explosion decoupling, pressure relief devices, and measures for explosion suppression)** (TRGS 724). ➜ **Establish an explosion protection document**[16] (§ 6 Section 9 GefStoffV). ➜ **Mark potentially explosive areas.** ➜ **Store ignitable liquids according to TRGS 509, TRGS 510 and TRBS 3151/TRGS 751, in laboratories according to TRGS 526.** ➜ **Store ignitable liquids in work-rooms within safety storage cabinets (**Annex 1 TRGS 510, DIN EN 14470-1). **For zone classification see DGUV Regel 113-001** (EX-RL anthology of examples)**.** ➜ **Store and hold ignitable gases according to TRGS 510 and TRBS 3145/TRGS 745.** ➜ **Store and hold compressed gas cylinders in work-rooms within safety storage cabinets** (DIN EN 14470-2). **For zone classification see DGUV Regel 113-001** (EX-RL anthology of examples)**.** ➜ **Store compressed gas containers and compressed gas cartridges according to TRGS 510.** ➜ **For different storage classes, observe storage bans above quantity thresholds. Deviations permitted up to a total storage quantity of 400 kg, with a maximum of 200 kg per storage class, provided that co-storage does not pose an increase in risk** (Section 13 TRGS 510). ➜ **Measures for the storage of small quantities of hazardous substances see Table 1 and Section 4 of TRGS 510.** ➜ **Perform extremely dangerous activities, e.g. open flame operations, with written permission only (Permit-to-work system)** (Annex I No. 1.4 GefStoffV, Chapter 2.26 Section 3.8.2 DGUV Regel 100-500, DGUV Information 205-001)

Source/Information: §§ 2, 11 and Annex I No. 1 GefStoffV; DGUV Regel 113-001 (EX-RL); TRBS/TRGS; Annex 2 Section 3 Betr-SichV; DIN EN 1127-1; DGUV Information 213-106; VDI 2263; R 003e; T 021; T 023e; T 033; T 049; T 053; T 054; T 055; KB 028-1; KB 028-2

7.3 Thermal Explosions (Runaway Reactions)

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
 *Source: Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin* ■ **Decomposition of Thermal Unstable Substances and Mixtures** ■ **(Uncontrolled) Exothermal Reaction with Great Heat Release** ■ **Accumulation of Reactants**	➜ **Evaluation of reactions and procedures through systematic methods, e.g. PAAG/ HAZOP.** ➜ **Determination of safety characteristics e.g.:** **> Thermal stability,** **> Reaction enthalpy,** **> Adiabatic behaviour.** ➜ **Replace thermally unstable substances.** ➜ **Minimise the reaction potential through continuous or semi-continuous operations. (Advice: Avoid spreading of reaction potential into subsequent parts of plant.)** ➜ **Limit the temperature increase through dilution of reaction potential. (Advice: Observe kinetics of chemical reaction).** ➜ **Avoid the accumulation of reactive substances through control of:** **> Mixing,** **> Dosing speed,** **> Minimum temperature,** **> Amount and concentration of input substances, catalysers, inhibitors.** ➜ **Avoid an increased heat production through control of:** **> Maximum temperature,** **> Amount and concentration of input substances, solvents, catalysers, inhibitors,** **> External energy supply.** ➜ **Avoid a decrease of the cooling effect through control of:** **> Cooling,** **> Viscosity,** **> Mixing up.**

16 Example of explosion protection document see Appendix 1; DGUV Information 213-106

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Monitoring of safety-related process parameters with PCE safety devices** (DIN EN 61511; VDI/VDE 2180)**.** ➜ **Emergency functions in line with operating conditions (e.g. emergency cooling, emergency run-off, emergency stop systems, pressure relief system, quenching).**

Source/Information: GefStoffV; TRAS 410; R 001; R 003e; R 004; R 005; R 007; R 008; R 009; KB 017; Brochure ISSA-01: „Das PAAG-/HAZOP-Verfahren und weitere praxisbewährte Methoden – Risikobeurteilung in der Anlagensicherheit“

7.4 Physical Explosions and Boiling Delays

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Colder Liquids get in Contact with Hot Media or Surfaces** ■ **Sudden Mixing Up of Colder Liquids with Hot Media** ■ **Feed of Moist/Wet Solids into Hot Melts** ■ **Inrush of Cooling Water into Areas with High Temperature (Spontaneous Flash Evaporation)** ■ **Feed of Thermal Transfer Media into Colder Liquids that can evaporate spontaneously** ■ **Spontaneous Boiling of Overheated Liquids**	➜ **Separate safely high-boiling melts, oil baths and heat transfer media from low-boiling liquids (e.g. water).** ➜ **Ensure leakproofness of installations carrying cooling water in areas (e.g. container) holding hot media.** ➜ **Ensure leakproofness of installations containing heat transfer media in areas (e.g. container) holding cold low-boiling liquids.** ➜ **Only add dry solids into melts.** ➜ **Ensure mixing during the heating phase (e.g. by stirring).**

Source/Information: TRBS 2141; KB 025

7.5 Explosive Substances (Explosives)

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
 *W002 Warning Explosive Material*	➜ **Special safeguard measures against fire and explosion hazards: See § 11 Ordinance on Hazardous Substances (GefStoffV) combined with Explosives Act (Sprengstoffgesetz – SprengG) and subsequent legal regulations.** ➜ **Certificate according to Explosives Act** (§ 20 SprengG). ➜ **Permissions according to Explosives Act** (§§ 7, 27 SprengG). ➜ **Designate persons in charge** (§§ 19, 21 SprengG). ➜ **Compliance with structural requirements for buildings, observe safety and working distances** (§ 24 SprengG ; SprengLR 210, 220; DGUV Regel 113-017; see also 1. and 2. SprengV). ➜ **Classification of explosive substances into risk groups/storage groups; if appropriate, classification of pyrotechnical devices, semi-finished products and objects** (2. SprengV; DGUV Regel 113-017; DGUV Regel 113-008). ➜ **Compliance with maximum quantity permissible of explosive substances**. ➜ **Limit the number of employees.** ➜ **Meet product requirements for:** > **Machines**, > **Electrical installations,** > **Lightning protection system,** > **Vehicles in plants handling with explosive substances,** > **Fire extinguishing equipment**, > **Rescue routes,** > **Tools and devices,** > **Working clothes and personal protective equipment,** > **Facilities for treatment of waste water and exhaust air,** > **Special vessels for explosive waste.**

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Special operating instructions, training every six months**: > **Assessing explosive substances according to mechanical, thermal or electrical sensitivity as well as assessments of burnout behaviour and explosive impact**. > **Written definition of work processes, which must be performed under safe conditions.** ➜ **Definition of organisational protective measures for repair work in hazardous rooms.** ➜ **Secure access to hazardous operating parts (e.g. fencing).** ➜ **Control prohibitions randomly (bringing lighters and metallic objects, ban of smoking).** ➜ **Observe safeguard measures during blasting work.** ➜ **Indicate blasting work in time** (3. SprengV).

Source/Information: DGUV Regel 113-017; DGUV Regel 113-008; DGUV Regel 113-006; DGUV Regel 113-003; DGUV Information 213-110; T 036; T 059; SprengG; 1. SprengV; 2. SprengV; 3. SprengV; SprengLR; SprengTR 310

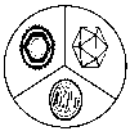
7.6 Miscellaneous Explosive Material (e.g. Peroxides)

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
  	**When working with organic peroxides observe § 11 GefStoffV and additionally Annex III GefStoffV.** **Observe requirements of 2. Ordinance belonging to Explosives Act** (2. Verordnung zum Sprengstoffgesetz – 2.SprengV) **for the storage of explosive organic peroxides.** ➜ **Implementation of a risk assessment adapted for peroxides including classification into risk groups (OP I–IV).** ➜ **Observe the working and safe distances required (dependent on quantity, risk group and type of building).** ➜ **Avoid ignition sources.** ➜ **Avoid entrapments of peroxides (e.g. in pipes between shut-off devices).** ➜ **Check if less dangerous substances can be used.** ➜ **Keep stored quantities as low as possible.** ➜ **Avoid contamination; do not put substances removed from storage back into the original packages.** ➜ **Compliance with maximum permissible storage temperature.** ➜ **Observe the banning of joint storage.** ➜ **Handling Peroxides with harmful effects: see safeguard measures in Section 6.1 herein.** ➜ **If there is a risk of runaway reactions: see safeguard measures in Section 7.3 herein.**

Source/Information: CLP-Verordnung; SprengG; 2. SprengV; TRGS 741; M 001; M 001-1; M 058

8 Biological Hazards

8.1 Targeted Activities

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
Work in Laboratories, Laboratory Animals, Biotechnology and selected Activities of Health Service: ■ **Natural Biological Substances (Viruses, Bacteria, Fungi, Parasites, Cell Cultures)**  *W009 Warning Biological Risk*	➜ **Collect information** (§ 4 BioStoffV), **see also classification lists and databases[17].** ➜ **Risk determination and assessment in particular classification of the biological substances into one out of four risk groups** (§§ 3 and 4 BioStoffV): > **Risk Group 1** > **Risk Group 2** > **Risk Group 3** > **Risk Group 4** ➜ **Determine protection level safeguard measures according to risk group** (§§ 5, 9–11 plus Appendices II and III BioStoffV). ➜ **If appropriate, permission according to § 15 Ordinance on Biological Substances (Biostoffverordnung – BioStoffV) or notification according to § 16 BioStoffV, permission according to §§ 44 et seqq. of Protection against Infection Act (Infektionsschutzgesetz – IfSG).**
Source/Information: DGUV Regulation 1; B 002 up to B 007; B 009; B 012; Appendices II, III BioStoffV; TRBA 100; TRBA 110; TRBA 120; TRBA 200; TRBA 400; TRBA/TRGS 406; TRBA 450; TRBA 460; TRBA 462; TRBA 464; TRBA 466; TRBA 468; TRBA 500	
■ **Genetically Modified Microorganisms (Viruses, Viroids, Bacteria, Fungi, Small Microscopic Single Cell or Multicellular Algae and Lichens, other Eukaryotic Single Cells, Small Microscopic Multicellular Organisms, Animal and Plant Cell Cultures)** 	➜ **Safety classification** (§§ 4–8 as well as Appendix 1 GenTSV). ➜ **Assign genetic engineering into one out of four safety levels** (§§ 9–10 GenTSV; § 7 GenTG). ➜ **Determine safeguard measures** (§§ 13–14, 17–19 as well as Appendix 2 GenTSV). ➜ **Registration/licence according to §§ 8–12 Genetic Engineering Law (Gentechnikgesetz – GenTG), permission according to §§ 44 et seqq. IfSG.** ➜ **Observe registration forms and licensing procedures (of the respective Federal State authority).**
Source/Information: DGUV Regulation 1; B 002 up to B 007; Sections 2, 3 and Appendices 1–2 GenTSV	
■ **Animals Intentionally Infected with Biological Substances**	➜ **Collect information** (§ 4 BioStoffV). ➜ **Risk determination and assessment, in particular classification of the biological substances used for the infection into one out of four risk groups** (§§ 3 and 4 BioStoffV; §§ 4–6 GenTSV). ➜ **Assign working area and animal housing to one out of four safety or protection levels** (§ 5 BioStoffV; § 7 GenTG; § 11 GenTSV). ➜ **Determine safeguard measures** (§§ 9 and 10 BioStoffV; §§ 13, 17–19 as well as Appendix 4 GenTSV). ➜ **If appropriate, permission according to § 15 BioStoffV or notification according to § 16 BioStoffV, registration/licence according to §§ 8–12 GenTG, permission according to §§ 44 et seqq. IfSG; consider the provisions of law on animal health.**
Source/Information: DGUV Regulation 1; B 002 up to B 007; B 012; Appendices II, III BioStoffV; Sections 2, 3 and Appendices 1 and 4 GenTSV; TRBA 100; TRBA 120; TRBA 200; TRBA 400; TRBA/TRGS 406; TRBA 450; TRBA 460; TRBA 462; TRBA 464; TRBA 466; TRBA 500	

17 E.g. list of organisms of Central Commission for Biological Safety (ZKBS) at http://www.zkbs-online.de (keyword: ZKBS); TRBA of Committee for Biological Substances (ABAS) at www.baua.de/DE/Angebote/Rechtstexte-und-Technische-Regeln/Regelwerk/TRBA/TRBA.html; GESTIS-Biological Substances Database at www.dguv.de/ifa/gestis/gestis-biostoffdatenbank/index.jsp

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Genetic Engineering Operations on Animals and Plants**	➜ **Risk determination and assessment (**§§ 4–5 and 11 GenTSV). ➜ **If appropriate, assign tasks and animal housing to one out of four safety levels** (§ 7 GenTG; §§ 13–19 GenTSV). ➜ **Determine safeguard measures** (§§ 13, 15–19 as well as Appendices 3 and 4 GenTSV). ➜ **Registration/licence according to §§ 8–12 GenTG.** ➜ **Observe registration forms and licensing procedures (of the respective Federal State authority).**
Source/Information: Sections 2, 3 and Appendices 3 and 4 GenTSV	
■ **Health Risk caused by Biological Substances including Genetic Engineering Operations with Human Pathogenic Organisms**	➜ **In case of activities with biological substances including genetic engineering operations with human pathogenic organisms: Arrange or offer mandatory or optional occupational health care according to Annex Part 2 ArbMedVV.**
Source/Information: ArbMedVV	

8.2 Non-Targeted Activities

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
Example: ■ **Diagnostics**	➜ **Collect information** (§ 4 BioStoffV). ➜ **Risk determination and assessment** (§§ 4–6 BioStoffV). ➜ **Determine safeguard measures** (§§ 9–10 BioStoffV). ➜ **Further treatment according to the risk group of the agent** (see Section 8.1 herein). ➜ **For BSE/TSE diagnostics observe Resolution 603 of the ABAS.**
Source/Information: B 004 up to B 007; B 009; Appendix II BioStoffV; TRBA 100; TRBA 130 Appendix 3; TRBA 200; TRBA 250; TRBA 400; TRBA/TRGS 406; TRBA 460; TRBA 462; TRBA 464; TRBA 466; TRBA 468; TRBA 500	
■ **Dealing with Animals (Infection with Biological Substances, Allergens, Toxins, Bites, Punches, Scratches and Kicks)**	➜ **Collect information** (§ 4 BioStoffV). ➜ **Risk determination and assessment** (§§ 4–6 BioStoffV). ➜ **Determine safeguard measures** (§§ 9–10 BioStoffV). ➜ **In case of activities with an exposure causing health risks by dust of laboratory animals in rooms and facilities for animal keeping: Arrange mandatory or optional occupational health care according to Annex Part 1 Section 1 No. 2 and/or Section 2 No. 2 ArbMedVV.**
Source/Information: B 012; Appendix II BioStoffV; TRBA 120; TRBA 200; TRBA 260; TRBA/TRGS 406; TRBA 500; ArbMedVV	
■ **Sorting of Recyclable Material**	➜ **Collect information** (§ 4 BioStoffV). ➜ **Risk determination and assessment** (§§ 4 and 6 BioStoffV). ➜ **Determine safeguard measures** (§ 9 BioStoffV).
Source/Information: B 004 up to B 007; TRBA 200; TRBA 214; TRBA 400; TRBA 405; TRBA/TRGS 406; TRBA 460; TRBA 462; TRBA 464; TRBA 466; TRBA 500	
■ **Contaminated Ventilating Systems**	➜ **Assess contamination and determine the risks** (for ventilating installations: TRBA 405).
Source/Information: TRBA 200; TRBA 400; TRBA/TRGS 406; TRGS 500	
■ **Cooling Lubricants Contaminated with Microbiological Agents**	➜ **Avoid leakage or spread of biological substances that can have an infectious, sensitizing or toxic impact (e.g. through regular maintenance or control).**
Source/Information: DGUV Information 209-051; TRBA 200; TRBA 400; TRBA/TRGS 406; TRBA 500	
■ **Contaminated Ground**	➜ **Risk determination and assessment.** ➜ **Establish safeguard measures.**
Source/Information: DGUV Information 201-005; TRBA 400; TRBA/TRGS 406; TRBA 500	
■ **Waste Water Installations**	➜ **Risk determination and assessment.** ➜ **Establish safeguard measures.**
Source/Information: TRBA 200; TRBA 220; TRBA 400; TRBA 500	

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Waste Collection and Treatment**	➜ **Risk determination and assessment.** ➜ **Establish safeguard measures.**
Source/Information: TRBA 200; TRBA 213; TRBA 214; TRBA 400; TRBA/TRGS 406; TRBA 500	
■ **Agriculture**	➜ **Risk determination and assessment.** ➜ **Establish safeguard measures.**
Source/Information: TRBA 200; TRBA 230; TRBA 400; TRBA/TRGS 406; TRBA 500; Resolution 608 of ABAS	
■ **Health Risk caused by Biological Substances including Genetic Engineering Operations with Human Pathogenic Organisms**	➜ **In case of activities with biological substances including genetic engineering operations with human pathogenic organisms: Arrange or offer mandatory or optional occupational health care according to Annex Part 2 ArbMedVV.**
Source/Information: ArbMedVV	

8.3 Infection Hazards caused by Epidemic/Pandemic

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Infectious agents, e.g. corona viruses**	➜ **Detailed information can be obtained from the “Medienpaket Pandemie” of the BG RCI, the Robert Koch Institute and the BAuA.**
Source/Information: IfSG; A 038; A 040, KB 030; KB 031; KB 032, KB 038, Handbook “Betriebliche Pandemieplanung”	

9 Hazards Related to Special Physical Impacts

9.1 Noise

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)

M003 Ear Protection Must be Worn

- **Ear-Damaging Effect of Noise**
- **Psychological Effect of Noise**
- **Vegetative Effect of Noise**

➜ **Determine whether the action levels are respected:**

	Daily noise exposure level $L_{EX,8h}$	C-weighed Peak $L_{C, peak}$
Lower action levels	80 dB(A)	135 dB(C)
Upper action levels	85 dB(A)	137 dB(C)

➜ **Maximum allowable criterion levels according to ASR A3.7:**
> **During the exercise of activities out of the Category I (high concentration or speech intelligibility is required, e.g. scientific or creative activities) a criterion level of 55 dB(A) must not be exceeded.**
> **During the exercise of activities out of the Category II (medium concentration or speech intelligibility is required, e.g. activities in a control room) a criterion level of 70 dB(A) must not be exceeded.**
> **During the exercise of activities out of the Category III (low concentration or speech intelligibility is required, e.g. simple assembly work) the criterion level must be reduced as far as possible in consideration of operational measures for noise mitigation.**

➜ **A good speech intelligibility and an adequate sound absorption in workrooms is achieved when the sound absorption factor α of the boundary surfaces is 0.3. Particularly in working areas where activities of Category I are executed and in noise sectors which must be labelled room acoustical measures (e.g. sound-absorbing ceilings) are required to reduce reverberation.**

➜ **Use active noise cancelling/reduction headphones to reduce background noises if there is no risk of ignoring warning signals.**

➜ **Use hearing protectors with an electronic auxiliary unit which enables level-dependent attenuation, especially if communication in noise sectors or open-plan offices/call centres is necessary.**

➜ **Avoidance of subjectively disturbing or vegetatively impairing noise** (see TRLV Lärm Teil Allgemeines and Section 10.4 herein).

➜ **The design of low-noise workplaces should already be considered during the planning phase** (Section 8.2 in ASR A3.7).

➜ **Select low-noise equipment** (9. ProdSV).

➜ **The noise must be prevented at the source of emission or reduced as far as possible. Technical measures have priority to organisational measures** (§ 7 Section 1 LärmVibrationsArbSchV).

➜ **Application of alternative working processes, selection and use of low-noise work equipment** (§ 7 Section 2 LärmVibrationsArbSchV).

➜ **Low-noise design of workplaces, technical measures to reduce air-borne noise such as shielding or encapsulation** (§ 7 Section 2 LärmVibrationsArbSchV).

➜ **Make hearing protection available above 80 dB (A) and work towards in the use** (§ 8 Section 1 LärmVibrationsArbSchV, see also DGUV Regel 112-194 and DGUV Information 212-024).

➜ **Hearing protection is required above 85 dB (A), control of the use is required** (§ 8 Section 3 LärmVibrationsArbSchV).

➜ **For employees with existing pre-damage or hearing impairment, check the use of adapted hearing protection or hearing protection including a hearing device feature.**

➜ **Marking the area where noise exceeds 85 dB (A)** (§ 7 Section 4 LärmVibrationsArbSchV).

➜ **Establish a noise reduction programme for areas where noise exceeds 85 dB (A)** (§ 7 Section 5 LärmVibrationsArbSchV). **If hearing protection is necessary a training including exercises must be executed** (PPE Cat. III).

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
	➜ **Instruct employees** (§ 11 Section 1 LärmVibrationsArbSchV). ➜ **Occupational Health Care** > **Above 80 dB(A) optional examinations** (§ 5 incl. Annex Part 3 ArbMedVV), > **Above 85 dB (A) mandatory examinations** (§ 4 incl. Annex Part 3 ArbMedVV).
Source/Information: LärmVibrationsArbSchV; ArbStättV; T 011; ArbMedVV; ASR A3.7; DIN EN ISO 11690 Teil 1	

9.2 Ultrasound

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Sound Conducted in Air, in Liquids and in Solids**	➜ **Shielding or encapsulation of ultrasonic sources.** ➜ **Do not touch ultrasonic baths.** ➜ **If the formation of aerosol might be dangerous, encapsulated ultrasonic baths are required or the baths must run in a fume hood** (see TRGS 526). ➜ **Make suitable hearing protection available, instruct and control the use** (Sections 29–31 DGUV Regulation 1). ➜ **Determine and assess exposure occurring at the workplace** (§ 3 Section 1 LärmVibrationsArbSchV).

9.3 Whole-Body Vibrations

Whole-body vibrations can occur on vehicles and means of transportation dependent on type, effective daily driving time and road condition.

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
 Source: German Social Accident Insurance Institution for Trade and Merchandise Distribution Industry (BGHW).	➜ **If compliance with action levels and exposure limit values are uncertain, measurements are required** (§ 3 Section 1 LärmVibrationsArbSchV) > **Exposure limit value A(8) = 1.15 m/s² in X- and Y-direction and A(8) = 0.8 m/s² in Z-direction,** > **Action level A(8) = 0.5 m/s².** ➜ **In case of exceeding the action levels a programme must be designed assuring the minimisation of exposure to vibration** (§ 10 Section 4 LärmVibrationsArbSchV). ➜ **Vibrations must be prevented or reduced as far as possible at the source** (§ 10 Section 1 LärmVibrationsArbSchV). ➜ **Selection and use of tools that cause low vibrations, e.g. vehicles with low intensity of vibration** (§ 10 Section 2 LärmVibrationsArbSchV). ➜ **Supply with supplementary equipment, e.g. vibration-damped seats or elastic tyres** (§ 10 Section 2 LärmVibrationsArbSchV). ➜ **Ensure even and shock-free traffic ways (remove potholes).** ➜ **Observe driving style (slowly, adapted to traffic road conditions).** ➜ **Pay attention to a healthy posture.** ➜ **Keep the exposition period as short as possible.** ➜ **Occupational health care** > **Mandatory health care if the following exposure limit values for activities implying whole-body vibrations are reached or exceeded:** • **A(8) = 1.15 m/s² in X- or Y-direction** • **A(8) = 0.8 m/s² in Z-direction for activities** (§ 4 and Annex Teil 3 ArbMedVV) > **Optional health care if the exposure limit value of A(8) = 0.8 m/s² for activities implying whole-body vibrations is reached or exceeded** (§ 5 and Annex Teil 3 ArbMedVV).
Source/Information: LärmVibrationsArbSchV; DIN EN 14253; VDI 2057; References[18]	

18 E. Christ, S. Fischer, U. Kaulbars, D. Sayn: “Vibrationseinwirkung an Arbeitsplätzen – Kennwerte der Hand-Arm- und Ganzkörper-Schwingungsbelastung”, IFA-Report 6/2006, ISBN: 3-88383-709-1.

9.4 Hand-Transmitted Vibrations

Hand-transmitted vibrations can occur using hand directed tools depending on the type and effective daily operating time.

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Determine and evaluate the exposure at the workplace** (§ 3 Section 1 LärmVibrationsArbSchV). ➜ **If compliance with action levels and exposure limit values are uncertain, measurement is obligatory** (§ 3 Section 1 LärmVibrationsArbSchV). > **Exposure limit value A(8) = 5 m/s²,** > **Action levels A(8) = 2.5 m/s².** ➜ **In case of exceeding the action levels a programme must be designed assuring the minimisation of exposure to vibration** (§ 10 Section 4 LärmVibrationsArbSchV). ➜ **Vibrations must be prevented at the source or must be reduced as far as possible** (§ 10 Section 1 LärmVibrationsArbSchV). ➜ **Selection and use of tools causing low vibrations as possible, e.g. vibration-damped hand-held machinery** (§ 10 Section 2 LärmVibrationsArbSchV). ➜ **Avoid low frequency vibrations (10–30 Hz) because they lead to resonant vibration of the hand-arm-system.** ➜ **Avoid frequencies between 30 and 150 Hz, they are absorbed by skin and muscle areas of the hand and can cause peripheral damages.** ➜ **Use vibration-damped tools.** ➜ **Use handles with absorption or cushioning.** ➜ **Reduce working hours on devices.** ➜ **Establish an active counterpressure to cushion repulsions.** ➜ **Avoid cold equipment handles as far as possible.** ➜ **Use anti-vibration gloves.** ➜ **Occupational health care** > **Mandatory health care if the exposure limit value of A(8) = 5 m/s² for activities implying whole-body vibrations is reached or exceeded** (§ 4 and Annex Teil 3 ArbMedVV). > **Optional health care if the exposure limit value of A(8) = 2.5 m/s² for activities implying whole-body vibrations is reached or exceeded** (§ 5 and Annex Teil 3 ArbMedVV).

Source/Information: LärmVibrationsArbSchV; DIN EN 28662-1; DIN CEN/TR 15350; VDI 2057; References[19]

9.5 Non-Ionising (Optical) Radiation

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Natural UV Radiation (Solar Radiation)** ■ **Artificial UV Radiation** ■ **IR Radiation** ■ **Laser Radiation**  *W004 Warning Laser Beam*	➜ **Measures when UV Index ≥ 3[20] and working hours > 60 min** > **Go to or use sources of shade: e.g. baldachins, tents, roofs** > **Avoid the most intense solar radiation or reduce outdoor work around noon.** • **Execute work exposed to the south in the morning.** • **Execute work exposed to the north at noon.** > **Spend lunch hour and breaks in the shade.** > **Instruction about protection against solar radiation.** > **Headgear with neck guard.** > **Sunglasses with UV filter. Recommendable UV filters for occupational eye protection are the protection levels 5-2; 6-2; 5-2.5; 6-2.5 according to DIN EN 172.** > **Clothes protecting against the sun: long-sleeved outer garments with dense fabric in the area of the shoulders.** > **Use sun cream with a high protection factor (≥ 30) for uncovered places on the body and cream again regularly.**

19 U. Kaulbars: “Technischer Vibrationsschutz bei Hand-Arm-Schwingungseinwirkung”. IFA-Handbuch “Sicherheit und Gesundheitsschutz am Arbeitsplatz” 230 302, ISBN: 978-3-503-13083-2.

20 The daily forecast of the UV Index can be found at www.bfs.de (menu: “UV-Prognose”). It is also included in several weather apps.

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Encapsulation of or shielding from the radiation source.** ➜ **Assign laser products to laser classes 1–4 and operate according to the corresponding safety requirements; if appropriate, employ a Laser Protection Officer.** ➜ **Marking of danger zones.** ➜ **Off limits to unauthorised personnel.** ➜ **In areas with high IR radiation avoid the impact of heat sources on persons.** ➜ **Make personal protective equipment available (e.g. eye protection against laser radiation), and check the use** (DGUV Regel 112-192). ➜ **Labelling** (e.g. hazard symbol W004 according to ASR A1.3). ➜ **Occupational health care if activities include exposure of non-coherent artificial optical radiation** (For mandatory or optional health care see Annex Part 3 Section 1 and/or 2 ArbMedVV). ➜ **Observe fire hazard caused by high-energy radiation.**

Source/Information: OStrV; Chapter 2.26 Section 3.3 DGUV Regel 100-500; StrlSchV; DIN EN 60825; TROS IOS; see References for Section 9.2; ArbMedVV; KB 015

9.6 Ionising Radiation

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **X-Ray Radiation** ■ **Radioactive Radiation**  *W003 Warning Radioactive Material or Ionising Radiation*	➜ **Check if the operation of installation is approved (see certificate in type approval).** ➜ **Check integrity of the shielding of radiation source according to official authorisation or inspection report.** ➜ **Delimit and mark danger zones. Off limits to unauthorised personnel.** ➜ **Optimise duration of stay, safety margins (between radiation source and human being) and shielding.** ➜ **Make personal protective equipment available (e.g. lead apron) and control its use.** ➜ **Appointment of a Radiation Protection Officer.** ➜ **Labelling** (ASR A1.3; DIN 25430). ➜ **Mandatory occupational health care of personnel exposed to radiation plus follow-up preventive health care as an option** (StrlSchV).

Source/Information: DGUV Information 203-008; StrlSchV

9.7 Electromagnetic Fields

See Chapter 5 “Electrical Hazards”

9.8 Hot or Cold Media – Cold or Hot Workplaces

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Open Flames** ■ **Hot Surfaces (e.g. Smooth Metal Surfaces > 60 °C, Wood > 110 °C)** ■ **Hot Liquids (e.g. Running Water > 60 °C)** ■ **Hot Vapours (e.g. Water Vapour)** ■ **Hot Gases (e.g. Hot Air Blower)**	➜ **Avoid contact (e.g. insulation, separating guards).** ➜ **When working with vapours or hot water, use suitable hose assemblies with suitable couplings only.** ➜ **Ensure leakproofness of systems (apparatus, pipes and fittings).**

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Cryogenic Media, Coolants and Refrigerants (e.g. Liquefied Nitrogen, Dry Ice)**  *W017 Warning Hot Surfaces*	➜ **Use personal protective equipment.** ➜ **Labelling of danger points** (e.g. hazard symbol W017 according to ASR A1.3).
Source/Information: § 9 BetrSichV; § 6 GefStoffV; Chapter 2.35 DGUV Regel 100-500; DIN EN ISO 13732-1	
■ **Cold Workplaces**	➜ **Local radiant heating at stationary workplaces.** ➜ **Textile air distribution systems or laminar air ducting systems in order to avoid draught.** ➜ **Switch off air distribution systems during phases of work.** ➜ **Heated seats or driver's cabins for industrial trucks.** ➜ **Seats made of insulating material.** ➜ **Insulating flooring/bases at stationary workplaces.** ➜ **Heatable control elements.** ➜ **Workplace-related technical measures, e.g. radiant heating, warm air devices and heating plates (warming of hands and feet).** ➜ **Use two pairs of shoes in order to enable an alternative drying and warming in a cabinet dryer.** ➜ **Provision of hot beverages.** ➜ **Avoid frequent changes between cold and warm working areas.** ➜ **Select protective clothing against cold under consideration of the temperature range, work intensity and wear comfort** (see Appendix 5d herein) **(too intense insulation leads to perspiration and increases the impact of coldness).** ➜ **Determine warm-up phases in a climatically comfortable environment (min. 21 °C) corresponding to the exposure time and temperature range** (see table in the left column). ➜ **Adequate head protection against local cooling (nape, chin, nose, ears).** ➜ **Insulating gloves and shoes.** ➜ **Occupational health care – mandatory care at temperatures below –25 °C.** ➜ **Establish operational instructions for cold workplaces.** ➜ **No single workplace in refrigerator rooms, if the danger of hypothermia exists.**
■ **Hot Workplaces**	➜ **Check if a hot workplace is given** (see Appendix 5b herein). ➜ **Check the temperature range of the activity** (see Appendix 5c herein). ➜ **Determine the climate index "Normaleffektivtemperatur" (NET), if no thermal radiation exists** (see Section 5.1 of DGUV Information 213-002). ➜ **Determine the climate index "WBGT-Index", if thermal radiation exists** (see Section 5.2 of DGUV Information213-002). ➜ **Provide an adequate ventilation and venting.** ➜ **Air Shower.** ➜ **Air cooling, e.g. an air-conditioned control room.** ➜ **Protection against thermal radiation, e.g. insulation, protective screens.** ➜ **Establish operational instructions for hot workplaces.** ➜ **Sufficient acclimatisation to the hot workplace (Acclimatisation period ca. a fortnight).** ➜ **Reduction of the duration of stay in the hot working area.** ➜ **Activities which do not require a stay in the hot working area must be carried out outside this area.** ➜ **Reduction/Interruption of physical work.**

Range of Coldness	Air Temperature [°C]	Maximum Time Length of Continuous Exposure to Coldness [min]	Minimum Duration of Warm-up Phase [min]
I	+15 up to +10	150	10
II	< +10 up to -5	150	10
III	< -5 up to -18	90	15
IV	< -18 up to -30	90	30
V	< -30 up to -40	60	60
	< -41	20	60

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
	➜ **Sufficient warm-up phases in cooler areas** (see Appendix 5c herein). ➜ **Several short recovery phases have a higher recreational value than few long ones.** ➜ **Adequate working clothes and, if necessary, personal protective equipment, e.g. heat protection suit, cooling vest.** ➜ **Regular instruction, at least once a year.** ➜ **Provision of cold beverages.** ➜ **Occupational health care "Hitzearbeiten" according to the Ordinance on Occupational Health Care (ArbMedVV).** ➜ **Reduction of radiating surfaces.** ➜ **Use of reflective screens.** ➜ **Insulation or treatment of radiating surfaces.** ➜ **Location of the workplace far from radiating surfaces.** ➜ **Use of special protective clothes reflecting radiation.**

Source/Information: ArbMedVV; AMR 13.1; Chapter 2.35 DGUV Regel 100-500; DGUV Information 213-002; DGUV Information 213-022; DIN 33403-5; Ergonomische Gestaltung von Kältearbeitsplätzen (T 32), BAuA 2003

9.9 Electrostatic Hazards

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Shock Reactions**	➜ **Use electrostatically dissipative materials for floor coverings and floors.** ➜ **Wear shoes with electrostatically dissipative soles.** ➜ **Earth all conductive or dissipative objects (potential equalisation).** ➜ **Preferably use tools made of electrostatically dissipative materials.** ➜ **Keep air humidity above 40 %, if possible.**

Source/Information: T 033; TRGS 727

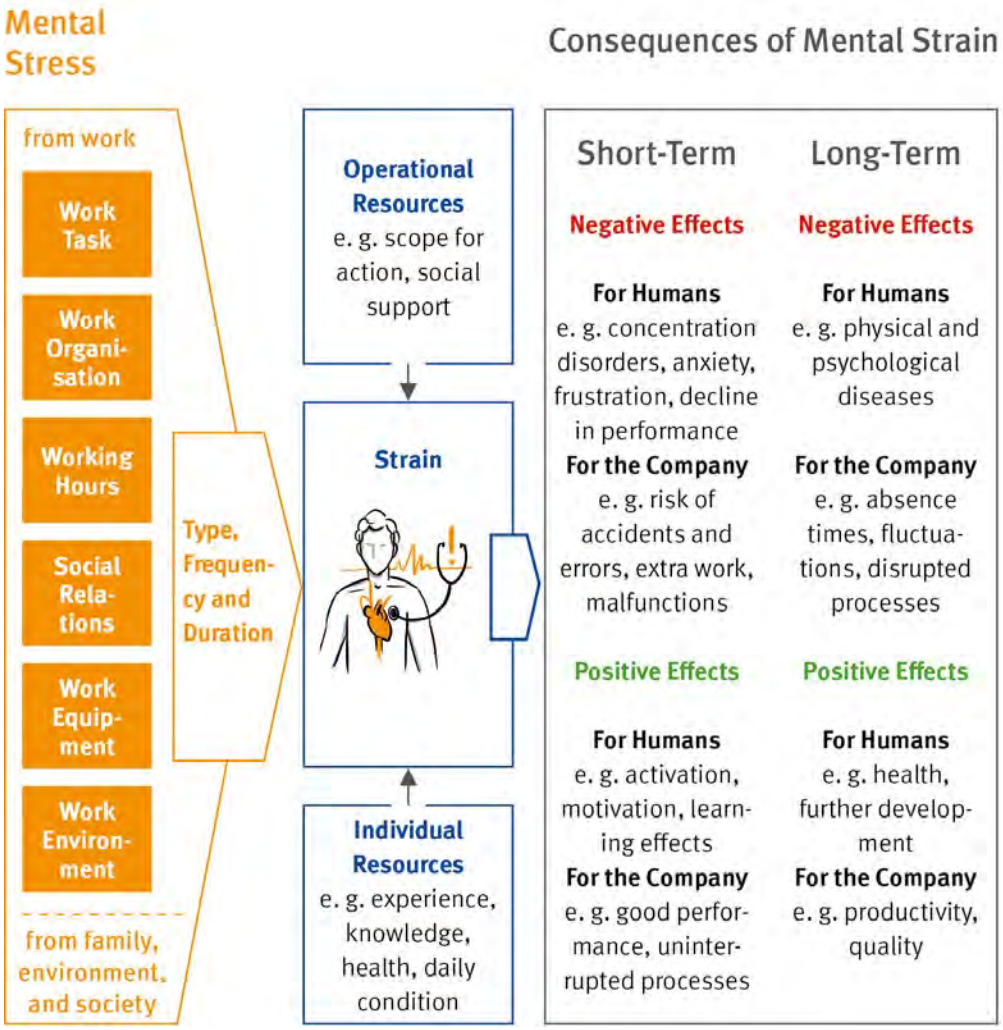
9.10 Overpressure/Partial Vacuum

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Failure of Pressure-retaining Walls** ■ **Burst of Containers** ■ **Implosion of Containers** ■ **Leakages of Installation Parts**	➜ **Construction principles, e.g. according to Pressure Equipment Directive.** ➜ **Sufficient pressure relief including risk-free dissipation.**
■ **Release of Media e.g. Liquid Blasters, Compressed-Air Pistols**	➜ **Use curtains, shields or cabins.** ➜ **Use personal protective equipment (e.g. protective suits, nonslip protective gloves, eye and face protection).** ➜ **Do not direct the compressed-air jet or jet of liquid to human bodies.**

Source/Information: Directory 2014/68/EU; Chapter 2.36 DGUV Regel 100-500

10 Hazards Related to Mental Stress

Mental stress is understood as the totality of all influences coming from the outside that affect a person's thinking, feeling, and behavior.

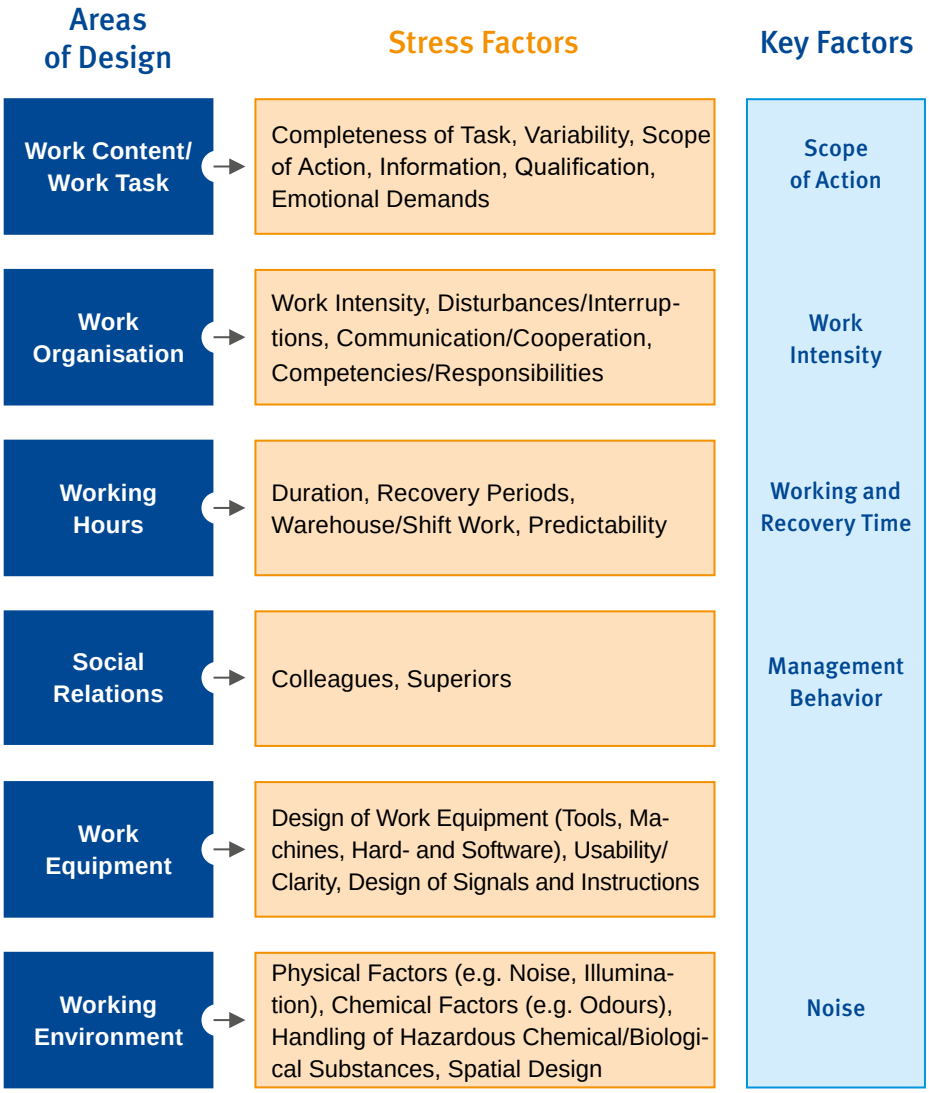


Mental stress occurs in every work context and, in itself, it does not constitute a health hazard for the individual. It is only the type of the stress, its intensity, and duration which can lead to a physical strain response.

The aim of the risk assessment is to identify hazards caused by mental stress at an early stage in order to prevent working conditions that promote illness through the activity. Stress from the family as well as environmental conditions are not part of the risk assessment. The potential consequences of mental strain (e.g. sleep disturbances, anxieties, stress reactions) are also not included in the risk assessment. In the risk assessment, the focus is not on assessing the psyche of individual employees but rather on evaluating the working conditions.

The stress situation in the company should be optimized in such a way that an adequately trained and motivated person in the workplace is neither overburdened nor underchallenged for the respective task. The Joint German Occupational Safety and Health Strategy (Gemeinsame Deutsche Arbeitsschutzstrategie – GDA) has defined which stress factors must be considered in a risk assessment of mental stress. Not all stress factors play a role in every activity and in every company. The GDA has therefore defined so-called key factors, that occur in all industries and have been proven to have a clear negative effect on the health of employees. These 5 key factors must be queried in every risk assessment.

Further information on the content and procedure for the risk assessment of mental stress can be found in the Code of Practice A 019 “Psychische Belastung erkennen – gesunde Arbeitsbedingungen gestalten – Psychische Belastung in der Gefährdungsbeurteilung”.



For the identification of hazards caused by mental stress, there are three different methods/procedures. BG RCI provides an instrument for two of these methods that fully complies with the guidelines of GDA:

- written employee survey using a questionnaire (e.g. psyBel survey)
- moderated workshop/group procedures (e.g. psyBel Team)
- observational interviews using checklists

Criteria for the selection of the method can be found on our website www.bgrci.de/psybel.

Information on hazards and protective measures are described in Appendix 3 of Code of Practice A 019 in relation to the key factors. In Appendix 4 of the Code of Practice A 019 you will also find a collection of examples of measures from BG RCI member companies.

10.1 Work Content/Work Task

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Completeness** > **Incomplete, fragmented Tasks e.g.** • **only preparing,** • **only executing,** • **only controlling Actions**	➜ **If possible, assign extensive and complete tasks, that means preparatory, executive, and control activities.** ➜ **Participation of employees in operational decision-making processes and in planning of workflows as far as possible.** ➜ **Motivate employees to act independently, reduce heteronomy.**
■ **Variability** > **Monotonous Tasks (e.g. few or similar Work Contents)** > **One-sided Demands (frequent Repetition of similar Actions) or** > **Simultaneous Tasks (Multitasking)**	➜ **Avoid frequent repetitive tasks.** ➜ **Regular rotation of tasks between different persons.** ➜ **Combining activities with a similar level of requirement to extend the original scope of task.** ➜ **Offer employees tasks with changing requirements in view of physical and cognitive demands.** ➜ **Enrichment of work through additional mental and movement-promoting tasks.**
■ **Scope of Action** > **Limited Influence on** • **Order of Activities** • **Work Content** • **Work Processes** • **Workload** • **Work Pace** • **Work Equipment** • **Work Objectives** > **High cycle Commitment**	➜ **Together with the employees, examine and adapt the implementation of work processes (e.g. determining the work pace, order of processing, selection of tools) to the resources of the employees and the company.** ➜ **Motivate employees to act on their own responsibility, reduce heteronomy.** ➜ **As part of the job description, define possible scope of action.** ➜ **Granting executives sufficient scope of action to carry out their leadership tasks.**
■ **Information** > **is missing** > **is insufficient or incomplete** > **is presented inadequately (e.g. linguistically)** > **is too extensive**	➜ **Regular, preferably personal exchange of important and current information.** ➜ **Define information channels, e.g. by defining information chains (who needs what information).** ➜ **Separate relevant information from less relevant information.** ➜ **Store information systematically and maintain it regurlarly.** ➜ **Provide information in an understandable form and language; possibly use simple language or visual elements.**
■ **Qualification** > **Activities do not correspond to Employees' Qualifications** > **Instructions/Training in Activities are inadequate**	➜ **Deploy employees according to their qualification.** ➜ **Adequately instruct or qualify employees for the performance of tasks.** ➜ **Use of concepts for the integration of new employees (e.g. induction plan, mentoring systems, mentorship programs, etc.).** ➜ **Regular instructions, qualification/training measures, and job-related professional training.** ➜ **Continuous identification of needs for personnel development measures.** ➜ **Support lifelong learning by providing continuous offers.** ➜ **See also Section 1.1 herein.**
■ **Emotional Demands** > **Dealing with emotionally touching Events and Situations (e.g. serious Illness, dying Processes, social Issues)** > **Constantly responding to the Needs of other People** > **Permanent display of required emotions regardless of own feelings (e.g. constant smile)**	**Take preventive measures to avoid traumatising incidents** (see Code of Practice A 022 "Extremereignis – Was tun?"). ➜ **Provide an external advisory service for occupational or private problematic situations** (EAP: Employee Assistance Programme). ➜ **Workplace agreement or regulations on dealing with internal violence (e.g. mobbing, sexual harassment or assaults, verbal or physical violence, intercultural conflicts)** (see Code of Practice A 035 "Fair geht vor! Mobbing im Betrieb"). ➜ **Establishing of a central reporting office (e.g. person of trust) to document internal acts of violence and initiate measures.** ➜ **Report traumatised employees to the occupational accident insurance after an incident (accident report) and, if necessary, ask for psychosocial emergency care.** ➜ **Keep an eye on indirect involved persons in the days following the incident** (see Section 4.5.2 of Code of Practice T 056).

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
> Frequent/heated Discussions, Disputes, Conflicts with other Individuals > Violence, Aggression, Threats, and Assaults by other Individuals > Traumatic Events at Work (e.g. Accidents, Violence)	➜ See also Section 11.2 of this Code of Practice

Source/Information: DGUV Grundsatz 306-001; TRBA 400; TRBS 1151; A 022; A 035

10.2 Work Organisation

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ Work Intensity > Imbalances of Workload, Task Variety and Complexity and available Time (excessive Work Intensity, Time Pressure)	➜ Set and limit workload and tasks, while allowing for time buffers. ➜ Ensure sufficient personnel resources and review continuously. ➜ Set priorities for tasks, e.g. question the urgency of (customer-) appointments. ➜ Optimise/streamline processes, for example, reduce duplicate work. ➜ Ensure effective coordination in order planning. ➜ Involve employees in the coordination of orders and optimisation of processes, e.g. by using regular quality circles (see ideas meetings). ➜ Enable support in case of time pressure (e.g. organise system of stand-by workers). ➜ Distribute work tasks considering the requirements and personal abilities/skills.
■ Disturbances/Interruptions > Frequent or long-lasting Interruptions and Disturbances of the work > Absence of Transparency in Work Processes	➜ Determine the causes of technical disruptions. ➜ Identify the causes of work interruptions. ➜ Work together with employees to establish regulations for a smooth workflow, such as defining uninterrupted periods for intellectual tasks. ➜ In the event of frequent disruptions, schedule time buffers for task completion. ➜ Ensure a sufficiently qualified workforce to address and prevent disruptions. ➜ Simulate operational disruptions, practice employee behaviour.
■ Communication/Cooperation > Insufficient Opportunities for Professional Exchange, Coordination, Collaboration, and Support (e.g. individual Workplace, Mobile Work, Home Office).	➜ For mobile work or decentralized teams, define communication structure and rules (e.g. regular exchange, use various forms of exchange in a targeted way) and make time available for this. ➜ Prioritization of forms of communication: In-person before video call, before telephone call, before e-mail. ➜ Promote direct personal communication within the team and between work units (e.g. topic-specific exchanges).
■ Competencies/Responsibilities > Missing or too narrowly defined Responsibilities/ Authorities. > Unclear Permissions, Authorities, Responsibilities, Areas of Responsibility, and Roles > Contradicting Work Requirements	➜ Clear definition of responsibilities and authorities. Regular updates – preferably in writing, such as in job descriptions or organisational charts. ➜ Clarify uncertainties through personal conversation. ➜ Definition of job requirements and assignments, thereby defining scope and limits.

Source/Information: TRBA 400; TRBS 1151; DGUV Information 206-007; A 025-5

10.3 Working Hours

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Duration** **> Over 8 Hours a day, especially in cases of** **• Exposure to Hazards for which Limit Values have been defined (e.g. Noise, Hazardous Substances)** **• Permanently high Demands on Concentration (e.g. in the Monitoring of Machines)** **• High Cycle Commitment** **• Increased Physical Stress (e.g. due to Load Handling, forced Posture, Heat/Cold)** **• High Interaction Density (e.g. with Customers, Patients, Clients, Pupils, Suppliers)** **> Over 10 Hours daily** **> Over 40 Hours in a 5-day Workweek or over 48 hours in a 6-day Workweek**	**➜ Ensuring compliance with the maximum working hours, for example, through documentation.** **➜ Workplace agreement on working time regulations.** **➜ Control overtime and analyze the reasons for increased workload.** **➜ Determine personal requirements, including considerations for personnel changes.** **➜ Limit exceeding the daily and weekly working time.** **➜ Enable and monitor compensatory time off as promptly as possible.**
■ **Recovery Times** **> Inadequate Break Regulations (related to the Timing of Breaks, their Shortening, or Omission).** **> Shortening of Rest Periods (below 11 hours)** **> Extended job-related availability (e.g. on-call Duty, Mobile Work)**	**➜ Regular, if possible, self-determined breaks and coordinated break management.** **➜ Additional short breaks (3–5 minutes), especially for activities with high concentration requirements, such as online meetings and when transitioning between tasks.** **➜ Ensure sufficient recovery time between work shifts and assignments.** **➜ Define clear boundaries between working hours and leisure time (regulate accessibility, especially in the case of mobile work).** **➜ Facilitate physical and mental recovery and adequate relaxation, for example, through appealing break rooms (lighting, temperature, noise, air quality).** **➜ Enable timely recovery periods after high levels of stress.**
■ **Warehouse/Shift Work** **> Work on Sundays and Public Holidays** **> Night Work** **> Inappropriately designed Shift Work and Schedules (e.g. Split Shifts)**	**➜ Optimise Shift System** (see DGUV Information 206-024). **> The number of consecutive night shifts should be kept as small as possible (maximum 3).** **> Allow as many free weekends as possible.** **> Rotate in the forward direction whenever possible (i.e. morning-afternoon-night).** **> Plan the duration of shifts based on the intensity of the workload.** **➜ Involve employees in the creation/selection of the shift system.** **➜ When changing shifts, carry out pilot tests in individual departments or plants.** **➜ Complete challenging tasks during the daytime.** **➜ Ensure occupational medical care/advisory support** (see also Section 1.9 of this Code of Practice). **➜ Organize transportation for employees working in shifts.** **➜ Inform employees how shift work can be made less stressful, e.g. ways to improve** **> Sleep (noise, light, warmth)** **> Dietary habits** **> Physical activity/health** **> Leisure behavior/social relationships**

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Predictability/Plannability** **> Lack of Predictability and Plannability of Working Hours (e.g. short-notice Overtime required due to Substitution, Deadline Pressure).** **> Insufficient Influence on Duration, Schedule or Flexibility of Working Hours (e.g. On-Call work)**	**➜ Publish shift schedules or fixed dates well in advance.** **➜ Consideration of personal appointments in shift planning (e.g. vacation periods).** **➜ Consideration of private commitments (e.g. family caregiving) in working hour design or when planning binding work appointments.** **➜ Organisation of working hours depending on the phase of life or ability to work.** **➜ Flexibility in the realisation and exchange of work appointments.**

Source/Information: ArbZG; TRBS 1151; DGUV Information 206-024; DGAUM Leitlinie: Gesundheitliche Aspekte und Gestaltung von Nacht- und Schichtarbeit (002-030)

10.4 Social Relations

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Colleagues** **> Insufficient Opportunities for Social Exchange** **> Lack of Social Support (e.g. Absence of Assistance, Lack of Encouragement)** **> Frequent Disputes, Conflicts, Aggression, and Violence** **> Destructive Behavior (Degradation, Humiliation, verbal Abuse, social Exclusion, Discrimination, Harassment)** **> Allowing destructive Behaviour**	**➜ Establish and communicate rules for respectful, appreciative interaction with each other.** **➜ Fair treatment of all employees regardless of possible limitations.** **➜ Raise awareness among and provide training for executives on the topic of "fair treatment".** **➜ Enable social exchange (also for mobile work, decentralised work teams).** **➜ Encourage and promote collegial support, e.g. set up work teams for specific tasks or projects.** **➜ Addressing the lack of social support and collegiality.** **➜ Appreciate and celebrate shared successes.**
■ **Superiors** **> Missing Feedback and Acknowledgment** **> Insufficient Opportunities for Social Exchange** **> Insufficient Social Support (e.g. Lack of Help, no Encouragement)** **> Frequent Disputes, Conflicts, Aggression and Violence** **> Destructive behaviour (Degradation, Exposure, Verbal Abuse, Social Marginalisation, Discrimination, Harassment)** **> Allowance of Destructive Behavior**	**➜ Conduct regular conversations with employees (e.g. documented annual reviews). Thematise aspects of mental stress and opportunities to improve working conditions, too.** **➜ Communicate the availability of the manager (e.g. regular office hours).** **➜ Allow managers sufficient time for management tasks and further professional training.** **➜ Prompt resolution of conflicts involving all parties concerned.** **➜ Constructive handling of mistakes.** **➜ Appreciative feedback on positive as well as negative work results or work behavior.** **➜ Workplace agreements on addictive behaviour, mobbing and violence in the workplace.** **➜ Training for managers on addictive behaviour, mobbing and violence in the workplace** (see Code of Practice A 035).

Source/Information: TRBA 400; A 035, VZ 002-1; VZ 002-7; KB 026

10.5 Work Equipment

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Work Equipment** **> Unsuitable, missing Work Equipment** **> Poorly designed Work Equipment** **> Excessive Complexity or poor Usability of Work Equipment** **> Inadequate Design of Signals and Instructions** **> Inadequate Design of Human-Machine Interaction**	➜ **When procuring work equipment, consider the mental stress it may cause.** ➜ **Labelling, displays and signals:** **> Arrange with high attention: place in the central field of vision.** **> Make it clearly recognisable, e.g. through optimising acoustic and visual signals.** **> Ensure clear and understandable presentation of information, grouped according to function and significance** (see also Sections 3.5 and 3.6 of this Code of Practice). ➜ **Analysis of the strain (including cognitive) in the design of human-machine interactions involving employees.**
■ **Protective Equipment** **> Adverse Strain newly arising from the use of Personal Protective Equipment (PPE)**	➜ **Involvement of employees in the selection of personal protective equipment (PPE).** ➜ **Adequate testing of personal protective equipment** (see also Section 1.5 of this Code of Practice).

Source/Information: BetrSichV; TRBS 1151

10.6 Work Environment

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Physical, chemical, and biological Impacts** **> Noise, unfavourable or disturbing Background Sounds** **> Unfavourable climatic Working Environment** **> Insufficient/unfavourable Lighting** **> Disruptive or impairing Odours** **> Inadequate Influence on Environmental Conditions (e.g. Noise, Room Climate, Lighting, Air Quality)** **> Fears when dealing with dangerous biological or chemical Substances**	➜ **Avoid subjectively disturbing or vegetatively impairing noises** (see section 9.1 of this Code of Practice and ASR A3.7). **> Involvement of employees in the search for noise-reducing solutions.** **> Spatial or temporal separation for tasks with high concentration requirements.** **> Determination of times for focused work.** **> Increase in breaks during disruptive noises.** **> Define rules for noise-reducing behaviour and inform about the origin and effects of noise.** ➜ **Minimize any unpleasant odours.** ➜ **Sufficient supply of fresh air; can be influenced by the employees themselves.** ➜ **Ensure favourable and comfortable climatic conditions** (see section 3.4 of this Code of Practice). ➜ **Adequate lighting (daylight if possible), taking into account individual perception, the task to be performed and the time of day (ASR A3.4)** (see section 3.3 of this Code of Practice). ➜ **Provide sufficient knowledge about hazards associated with substances and their protective measures. Take fears associated with handling substances seriously. Communicate existing workplace measurements.**
■ **Ergonomic Factors** **> Limited Space, poorly dimensioned Workspaces and Workplaces** **> Unfavourable ergonomic Design**	➜ **See section 2 of this Code of Practice.** ➜ **See section 3 of this Code of Practice.**

Source/Information: ASR A1.2; ASR A3.4; ASR A3.5; ASR A3.6; ASR A3.7; TRBA 400; TRBS 1151

11 Miscellaneous Risk and Stress Factors

11.1 Travel, Driving and Steering Activities

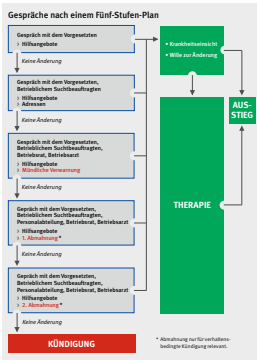
Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Vehicles**	➜ **Ensure technical safety, e.g. inspections prescribed by manufacturer.** ➜ **Equipment according to the state of the art.** ➜ **Use vehicles with driver assistance systems, e.g. assistance systems for reverse driving, brake assistants, adaptive forward lighting system. Apart from legally required systems (for freight traffic, specific systems for certain vehicles are partly required), an increasing number of driver assistance systems can be ordered in the procurement. It must be decided which of them make sense for a particular scope of application of the intended purpose** (see DGUV Regel 114-615, DGUV Information 214-083 and www.bg-verkehr.de Web-Code: 20880411). ➜ **Observe good visibility.** ➜ **Inspection according to DGUV Vorschrift 70.**
■ **Road Traffic**	➜ **Anticipatory driving, adapt speed to road and weather conditions, compliance with safety distance.** ➜ **Perform a traffic safety training.** ➜ **No telephone calls when driving not even if a hands-free system is available.** ➜ **Do not use any electrical means of communication when driving.** ➜ **Allow sufficient driving time.** ➜ **Plan and execute regular breaks.** ➜ **Comply with driving times and rest periods.** ➜ **Regular check of the driving licence.**
■ **Unsecured Load**	➜ **Consider load security** (see Section 4.4 herein). ➜ **Goods in the vehicle interior such as bags or drinking bottles must only be transported if they are secured.**
■ **Transport of Dangerous Goods**	➜ **Set up emergency management in the event of dangerous goods leakage.** ➜ **Check if loading area is clean.** ➜ **Control intactness and cleanliness of packaging.** ➜ **Pay attention to the permitted period of use of plastic packaging.** ➜ **Control if the correct goods are loaded and unloaded.** ➜ **Pay attention to special precautions for the transport of gases.** ➜ **When excepted quantities and facilitations are applied pay attention to their specific limit of amount and terms.** ➜ **Check if all required items of equipment (e.g. fire extinguisher, safety vest) are carried along.** ➜ **Consider specific traffic restrictions regarding dangerous goods.** ➜ **Consider existing smoking and alcohol ban.**
■ **Places to Stay Overnight and Places of Activity**	➜ **Make yourself familiar with the emergency plan and escape route.** ➜ **Carry respiratory protection device for self-rescue/escape devices.** ➜ **Collect information on specific hazards at the place of operations.**

Risk and Stress Factors	**Examples for Safeguard Measures** (Specific Legal Bases)
■ **Assignment Abroad** **> Travel Preparations**	➜ **Collect information about the destination, e.g. from the Foreign Office, the Robert-Koch-Institute or from a medical doctor specialised on travel medicine.** ➜ **Consider language barriers** ➜ **Revise company regulations for assignments abroad (e.g. periodically or before each journey).** ➜ **Take the planned duration of the stay into account (e.g. visa, immunization, required and additional (private) insurances in case of illness/accident, check registration for social insurances).** ➜ **Check special events during the travel period (public holidays, elections).** ➜ **Especially in the event of business trips of individuals, have contact details ready, plan itineraries, arrange dates of contact.** ➜ **Note restrictions in the destination area (physical, gender-specific, cultural particularities, language barriers).** ➜ **Identify group of persons at risk (nationality, sex, religious sensitivities etc.).** ➜ **Check validity of travel documents (validity of passports, vaccination cards, tickets) and have copies ready where applicable.**
> Occupational Safety Abroad	➜ **Know and respect local health and safety regulations.** ➜ **Prepare risk assessment for the stay at the operation site and for occupational activities.** ➜ **Provide personal protective equipment for the activity on-site** ➜ **Consider climatically particularities (heat, cold, humidity, UV radiation).** ➜ **Arrange on-site trainings (machines, hazardous substances, dangerous tasks etc.).**
> Travel Safety	➜ **Define travel safety rules within the destination country (determine rules of conduct in general and in emergency cases, choose on-site security service providers, identify addresses for emergency assistance).** ➜ **Collect information about country-specific particularities, e.g. culture and nutrition.** ➜ **Consider current country information (immigration laws, import/export regulations).** ➜ **Identify particularities of road traffic (driving licence, traffic volume, roadside assistance).** ➜ **Check necessity of special protection services (after risk assessment concerning criminality).** ➜ **Explore safety conditions in the hotel (escape routes, valuables, hygiene, nutrition, communication opportunities).** ➜ **Check security (emergency plans, evacuation measures) during events (business meetings, congresses, conferences).** ➜ **Have contact addresses ready on-site (embassy/consulate).** ➜ **Sort out communication opportunities (phone, phone cards, internet connections, agree on rules on conduct in case of disrupted communication, check tracking of individuals.).**
> Health Issues	➜ **Ask for medical travel advice before departure.** ➜ **Evaluate the occurrence of infections in the destination country.** ➜ **Complete immunization.** ➜ **Update vaccination card. Prepare copies.** ➜ **Check import regulations for medicinal products.** ➜ **Inspect food hygiene and the usage of drinking water.** ➜ **Check occupational-medical care during the stay.** ➜ **Carry out special occupational healthcare (stay in the tropics).** ➜ **If needed, compile and provide first-aid kit.** ➜ **Consider pre-existing conditions and provide the required drugs supply for chronic conditions where necessary.** ➜ **Check the on-site availability of medical consultation and treatment options.** ➜ **Prepare plan for return** (medical emergency response plan). ➜ **Find out and provide contact addresses of hospitals, doctors and emergency services.**

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
	➜ **Check on-site rescue system (professional rescue chain available, training of first aiders).** ➜ **Prepare medical care centres/local hospitals to get in touch with business travellers.** ➜ **Determine process of cost coverage for treatments, transfers etc.** ➜ **Check and organize repatriation for health reasons (e.g. air emergency).**

Source/Information: A 020 plus A 020-1 up to A 020-10; A 013, A 014; AETR; “Purchasing Guide for Company Vehicles” ISSA and BG Verkehr; BERUFLICHE AUSLANDSREISEN UND ENTSENDUNGEN – Leitfaden zur Erstellung der Gefährdungsbeurteilung www.internationalsosfoundation.org

11.2 Humans

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Use of addictive drugs like** **> Alcohol** **> Medication** **> Nicotine** **> Inhalants** **> Illegal Drugs**  *Source: BG RCI* *Example of a diagram of stages*	➜ **Perform information events and campaigns on stimulants (for superiors, delegates, and the entire workforce).** ➜ **Ensure the protection of non-smokers.** ➜ **Exemplary behaviour of management staff.** ➜ **Establish works agreements on addictive substances.** ➜ **Exclude employees under addictive substances from work.** ➜ **Establish an operational work group “Addictive Substances“.** ➜ **Reduction of working conditions, which foster stimulants and drugs.** ➜ **Intervention of superiors in case of misuse at an early stage.** ➜ **Contact a drugs advice centre.** ➜ **Initiation of therapies, therapy support as well as reintegration after a successful therapy.** ➜ **Clear and graduated procedures in dealing with employees who misuse or are dependent on addictive substances** (see diagram of 5 stages in the Code of Practice A 003 “Suchtmittelkonsum im Betrieb” of BG RCI).

Source/Information: Section 15 DGUV Regulation 1; § 7 DGUV Vorschrift 36; DGUV Information 206-009; A 003; References[21]

■ **Infectious Diseases such as flu, cold, Covid**	➜ **Check if hygiene plans should be prepared.** ➜ **Prepare cleaning schedule.** ➜ **Offer protective vaccination.** ➜ **Check test capabilities.** ➜ **In case of known infectious diseases don´t arrive at work.** ➜ **Hand hygiene.** ➜ **Sneeze etiquette.** ➜ **Keep distance.** ➜ **Regular ventilation.**

Source/Information: IfSG; A 038

■ **Sabotage (e.g. intentional disturbance of electronic installations via Internet)**	➜ **Securing of an adequate or minimum security level for information technology.** ➜ **Implementation of a security audit.** ➜ **Report of safety-relevant occurrences to Federal Agency for Safety of Information Technology (BSI).**

Source/Information: IT-Sicherheitsgesetz

21 File “Alkoholsucht und Suchtprophylaxe am Arbeitsplatz”, Sozia-Verlag GmbH, Jägerhäusleweg 20, 79104 Freiburg; K. Dietze: “Alkohol und Arbeit: Erkennen – Vorbeugen – Behandeln”, ISBN: 3-280-02163-4.

11.3 Animals

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Zoonosis (e.g. Rabies, Ornithosis, Toxoplasmosis)** ■ **Allergies to Animal Hair, Epidermis, Insect Bites, Excrements** ■ **Punching, Pushing, Kicking, Stinging, Biting** ■ **Intoxication**	➜ **Control the state of health of animals.** ➜ **In case of illness apply veterinary medical measures and additional safeguard measures for employees (e.g. avoid contact with animals and excrements).** ➜ **Marking and cordoning off danger zones.** ➜ **Offer preventive vaccination, if appropriate.** ➜ **Provide antidotes (e.g. in case of snake bites).** See also Section 8 herein.

Source/Information: B 004 up to B 007; B 012; TRBA 120; TRBA 260; TRBA/TRGS 406

11.4 Plants

Risk and Stress Factors	Examples for Safeguard Measures (Specific Legal Bases)
■ **Plant Allergies** ■ **Phototoxic or Photoallergic Reactions** ■ **Toxic Plant Agents (intake through the respiratory system, gastrointestinal tract or skin, e.g. aconite)** ■ **Prick Injuries and Stab Wounds** 	➜ **Selection of adequate employees for individual activities** (Section 7 DGUV Regulation 1). ➜ **Avoid direct contact with the skin. Wear long-sleeved clothes and/or gauntlets.** ➜ **List phone numbers of information centres on toxic effects in operating instructions.** ➜ **Provide and use personal protective equipment (e.g. protective gloves, protective clothing, respiratory protection)** (Sections 29–30 DGUV Regulation 1). See also Section 8 herein.

Source/Information: TRBA/TRGS 406; References[22]

22 E.g. L. Roth, M. Daunderer: “Giftliste”, ISBN: 978-3-609-48050-3.

Appendix 1: Explosion Protection Document – Example for Solvent Storage

Explosion Protection Document according to § 6 Section 9 GefStoffV	Date: *15.07.2021*
Plant: *Solvent storage in a room with filling point*	Emergency Telephone: *112*
Building/Room: *New building, Solvent Storage* (e.g. reference to site plan, building plan, arrangement plan, escape and rescue plan)	
Working Steps and/or Activities	
Brief Description of Procedure: *Storage/retrieval of drums, hobbocks, cans und canisters with industrial trucks , transfer from larger into smaller canisters (maximum volume 10 l), ventilation is installed* (Parameters such as pressure, temperature, or throughput should be included, and, if necessary, reference to a flow diagram or a R/ Ischeme)	
Special Operational Conditions: *As personnel is always present, occurring leakages would be immediately noticed and eliminated.* (e.g. Start-up and shutdown processes, cleaning work, trouble-shooting)	

Substances Causing Hazardous Explosive Atmospheres[1] and their Safety-Relevant Characteristics[2]			
Extremely flammable and highly flammable liquids	*Flash Point:* *Upper/Lower Explosion Limit:* *Vapour Pressure (at 20 °C):* *Ignition Temperature:*	*< 23 °C* *1-15 Vol%* *250-560 °C*	*Explosion Group: IIA/ IIB*

Evaluation of Explosion Hazard

No.	Plant Area/Plant Component	Explosive Zones[3] (Expansion/Height)		
1	*Insite of drums and canisters*	Zone 0 Zone 1 Zone 2	☒ ☐ ☐	
2	*Immediate area around filling point*	Zone 0 Zone 1 Zone 2	☐ ☒ ☐	*0.5 m around filling point*
	(according to No. 2.3.1.2 b 2) in DGUV Regel 113-001)	Zone 0 Zone 1 Zone 2	☐ ☐ ☒	*another 1 m around Zone 1*

Plan of Explosive Zones[4]:

(Appendix to the Explosion Protection Document or reference to the plan of explosive zones)

The Explosion Protection Document can be downloaded as editable WORD file at the Explosion Prevention Portal: https://www.bgrci.de/exinfode/dokumente/explosionsschutzdokument.

Explosion Protection Measures[5]			
No.	**Plant Area/Plant Component**		**Selected Protection Principle**[6]
1	*The inside of the drum*		☐ Prevention of Hazardous Explosive Atmospheres (no Zone) ☒ Prevention of Effective Ignition Sources ☐ Constructive Explosion Protection
	Zone	**Measures**	
	0	*Use of explosion-proof drum pumps of Category 1G/2G according to Directory 2014/34/EU (ATEX)*	
2	*Filling Area*		☐ Prevention of Hazardous Explosive Atmospheres (no Zone) ☒ Prevention of Effective Ignition Sources ☐ Constructive Explosion Protection
	Zone	**Measures**	
	1	*> Fire, Naked Light and Smoking are prohibited* *> Use of an explosion-proof industrial truck, the category of which complies with the Zone determined according to Directory 2014/34/EU (ATEX)* *> Earthing of the plant by means of an earth cable (connected with an earth terminal)* *> Technical ventilation (fivefold air change according to Appendix 5 in TRGS 510) is automatically activated if somebody enters the store room* *> Temporary wake flow of the ventilation after completion of the work* *> Use of electrostatic dissipative protective footwear* *> Conductive ground according to TRGS 727/T 033 (DGUV Information 213-060)*	
	2	*> Operation of elektrical and non-elektrical resources of Category 3G (11. Verordnung zum ProdSG)*	

Organisational Measures	**Explanation/Document**	**Competent**
Marking Explosion-Hazardous Areas:	*Marking the store*	*Master: Ludwig*
Operating Instructions:	*Operating instructions for storage/retrieval and filling*	*Master: Ludwig*
Training:	*Once a year at least according to operating instructions*	*Master: Ludwig*
Inspection Rounds:	*Each day at the start of the shift*	*Foreman / Shift*
Determination/Monitoring of Inspections:	*Commission of a specialised company*	*Master: Ludwig*
Release for Hazardous Activities:	*Release form for open flame operations in the store, only if the measures required are taken*	*Master: Ludwig*
Updating the Explosion Protection Documents[7]:	*e. g . use of another solvent or changes of facility (inspection once a year)*	*Master: Ludwig*

Appendices to the Explosion Protection Document

☐ Plans (e g. site plan, arrangement plan):
☐ Process Flow Diagram, R/I-Scheme:
☒ Safety Data Sheets/Register of Hazardous Substances: *issued at 12.02.2015/ Effective 05.07.2021 foreman's office*
☐ Plan of Explosive Zones:
☐ EC Type Examination Certificates (device, work equipment):
☐ Miscellaneous:

Person Responsible for Plant: *Master Ludwig*	Signature: *H. Ludwig*

Explanations Regarding the Explosion Protection Document

(1) A hazardous explosive atmosphere is a mixture of air with flammable gases, vapours, mist or dust under atmospheric conditions, in which the burning process spreads over the entire unburned mixture after ignition.

(2) Depending on the specific case not all safety characteristics listed are required for the assessment.
[The example given above is restricted to liquids. Dust requires detailed information about particle distribution, explosiveness, lower explosion limit, minimum ignition temperature of a dust cloud and a dust layer (glow temperature), combustion factor, smouldering point if appropriate and, depending on the concept for explosion protection, further safety-relevant characteristics, which must be possibly determined with a specific dust sample.]
The safety characteristics can be taken from:
- Safety data sheets/information of the manufacturer
- Databases (e.g. GESTIS, Deutsche Gesetzliche Unfallversicherung)
- Tables (e.g. “Sicherheitstechnische Kenngrößen, Band 1, Brennbare Flüssigkeiten und Gase”, Wirtschaftsverlag NW, Verlag für Wissenschaft)

(3) The “Explosion Protection-Rules” (EX-RL, DGUV Regel 113-001) with a collection of examples for the classification of explosion zones. The normal operation, as well as start-up and shut-down processes, cleaning, plant malfunction, etc. have to be taken into account. In the explosion protection document the arguments for the zone classification selected should be documented (e.g. collection of examples EX-RL No. ...).

(4) The explosion zone plan should indicate the zones for each area (e.g. the inside of a container, the vicinity). A drawing like a building layout plan or an apparatus flow sheet is useful.

(5) The explosion protection measures are described in TRGS 722, 723, 724, 725 and 727 (these are also included in DGUV Regel 113-001).

(6) Examples for measures according to the safety concept selected:
a. Prevention of hazardous explosive atmospheres, e.g.:
   - Limiting of quantities to undercut the lower explosion limit.
   - Keeping flammable liquids/mixtures permanently 15 degrees below flash-point.
   - Adequate ventilation, where appropriate including monitoring of concentration (e.g. gas detector/gas alarm units).
   - Technically controlled inertisation.

b. Avoid all imaginable effective ignition sources in explosion zones, e.g.:
   - Selection of suitable electrical devices with category fit for zone
   - Avoidance of hot surfaces, open flames and mechanically generated sparks
   - Earthing

c. Constructional explosion protection, e.g.:
   - Explosion-resistant design
   - Pressure relief
   - Explosion suppression
     (always combined with explosive decoupling)

(7) To keep the explosion protection document up-to-date, trigger events for updates should be defined sensibly. It is most relevant to identify changes and modifications which require a re-assessment of the existing protection concept.

Appendix 2: Assigned Representatives for Occupational Safety and Health (Overview)

~~Source: File for~~ Practical Assistance “Arbeitsschutz mit System” of BG RCI

Designation	Legal Basis	Appointment obligatory on	Tasks	Qualification
OSH Professional	ASiG §§ 5–7 DGUV Vorschrift 2	Each entrepreneur employing insured persons. Exceptions: > Up to 10 employees: Consultation only for risk assessment and in specific cases. > Up to 50 employees: Participation in alternative consultation according to ASiG.	Support of the entrepreneur in all questions regarding occupational safety and health including the humanitarian workplace design (consultation, safety-relevant audits, observing, information).	Engineer, technician or master with at least 2 years of professional experience and additional training organised by the government institutions or a German Social Accident Insurance Institution. Regular advanced training courses.
Occupational Physician	ASiG §§ 2–4 DGUV Vorschrift 2	Each entrepreneur employing insured persons. Exceptions: see OSH Professional	Support of the entrepreneur in terms of occupational safety and accident prevention regarding all matters of health protection.	Authorisation to perform the medical profession; expert in occupational medicine (DGUV Vorschrift 2). Participation in suitable occupational health courses.
Safety Delegate	SGB VII § 22 DGUV Regulation 1	Companies with more than 20 employees. Companies with special accident hazards require at least one Safety Delegate per shift, even with less than 20 employees.	Support of the entrepreneur in the implementation of measures to prevent occupational accidents and illnesses. Continuous control of availability and correct use of compulsory safety installations and personal protective equipment. Calling attention to accident and health hazards.	Employee with excellent professional and leadership skills. The Safety Delegate should participate in basic and advanced and seminars, e.g. provided by a German Social Accident Insurance Institution.
Radiation Protection Officer	StrlSchG § 70	The handling, construction, or operation of units requiring a permit according to AtG, StrlSchV (for further obligations see laws and/or regulations cited herein).	Information of the Radiation Protection Supervisor. Training of persons exposed to radiation. Control of installations and avoidance of unnecessary exposure to radiation.	Various requirements regarding educational background: Normally technician, foreman, engineer, scientist plus course according to StrlSchV. Updating of specialist knowledge at least every 5 years (§ 48 StrlSchV).
Major Accidents Officer	BImSchG § 58 a–d 5. BImSchV 12. BImSchV	Installations in which substances are present or could be released according to Appendices II, III, and IV of 12. BImSchV. On request of the authority in any installation as well.	Coordination in the event of an incident: control, safety analysis, and annual report.	Studies in chemistry, physics or engineering. In individual cases the authority may approve e.g. a technician, a foreman etc. Two years’ professional experience in similar installations are required. In case of special appointments other requirements may apply. Refresher courses every 2 years at least.
Biological Safety Officer	GenTG § 6 GenTSV §§ 16–18	Plants in which Genetic Engineering is carried out or GMO are set free.	Counselling of the entrepreneur, managers, works council in matters of risk evaluation, planning, implementation, maintenance of facilities, and acquisition of installations, operational equipment, methods, selection and testing of personal protective equipment. Edition of the annual report.	Studies in natural sciences, medicine, or veterinary medicine; in production branch also engineering studies. In case of plant organisms also agronomic studies. 3 years’ professional experience is required.

Note: In specific cases additional obligations may exist due to certain regulations.

Designation	Legal Basis	Appointment obligatory on	Tasks	Qualification
Safety Advisor for the Transport of Dangerous Goods	GbV §§ 3 et seqq.	Facilities which are involved in transport of dangerous goods. Exceptions: carriage of goods exempted from dangerous goods rules; plants where dangerous goods are only received; transport quantities < 50 t per year.	Control and counselling of the entrepreneur and the responsible for transport. Edition of the annual report.	Training and advanced training authorised by the Chamber of Industry and Commerce (IHK).
Laser Protection Officer	OStrV § 5	Operation of laser equipment of classes 3R, 3B or 4 Exception: The entrepreneur proves to have the knowledge required and to control the laser installations.	Surveillance of laser operations. Support of the entrepreneur concerning safe operation and necessary safeguard measures. Cooperation with OSH Professionals and Occupational Physician.	Participation in a laser safety course is recommended.
Occupational Safety and Health Coordinator (“SiGeKo”)	§ 3 BaustellV RAB 30 RAB 31	Depending on > Number of employees > Number of working days > in consideration of particularly dangerous work one or several adequate Coordinators must be appointed for construction sites where employees of different entrepreneurs are active.	The Coordinator supports the collaboration of all persons involved in the construction with regard to integration of safety and health protection during planning and implementation of the construction project.	An adequate Coordinator has > Knowledge of construction > Knowledge of occupational safety and health > Knowledge of coordination > Experience in planning and/or performing construction projects

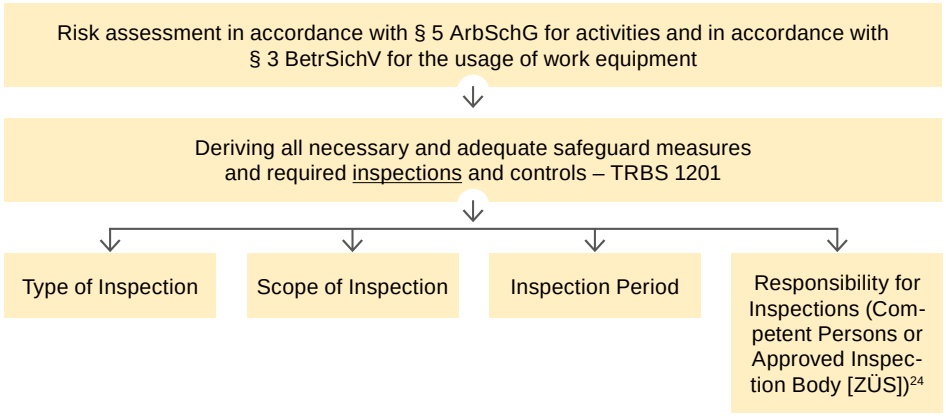
Note: In specific cases additional obligations may exist due to certain regulations.

Appendix 3: Mandatory Inspections of Work Equipment

Before the initial start-up, restart after changes subject to inspection and recurrently the management must check or to have checked the work equipment with respect to their safety. In addition to the risk assessment the management has to perform the following mandatory inspections, according to the Ordinance on Industrial Safety and Health (BetrSichV):

Selection of the inspector and inspection when using work equipment	§ 3 Section 6 BetrSichV
Work equipment after installation and changes subject to inspection, after extraordinary events[23] that can have damaging effects on their security, and recurrent inspections when damaging impacts occur	§ 14 BetrSichV
Installations subject to inspection (lift installations, plants in explosion-hazardous areas, pressure systems)	In addition §§ 15, 16 and Annex 2 BetrSichV
Certain work equipment (cranes, liquefied gas installations, work equipment of machine technology for event technology)	In addition Annex 3 BetrSichV

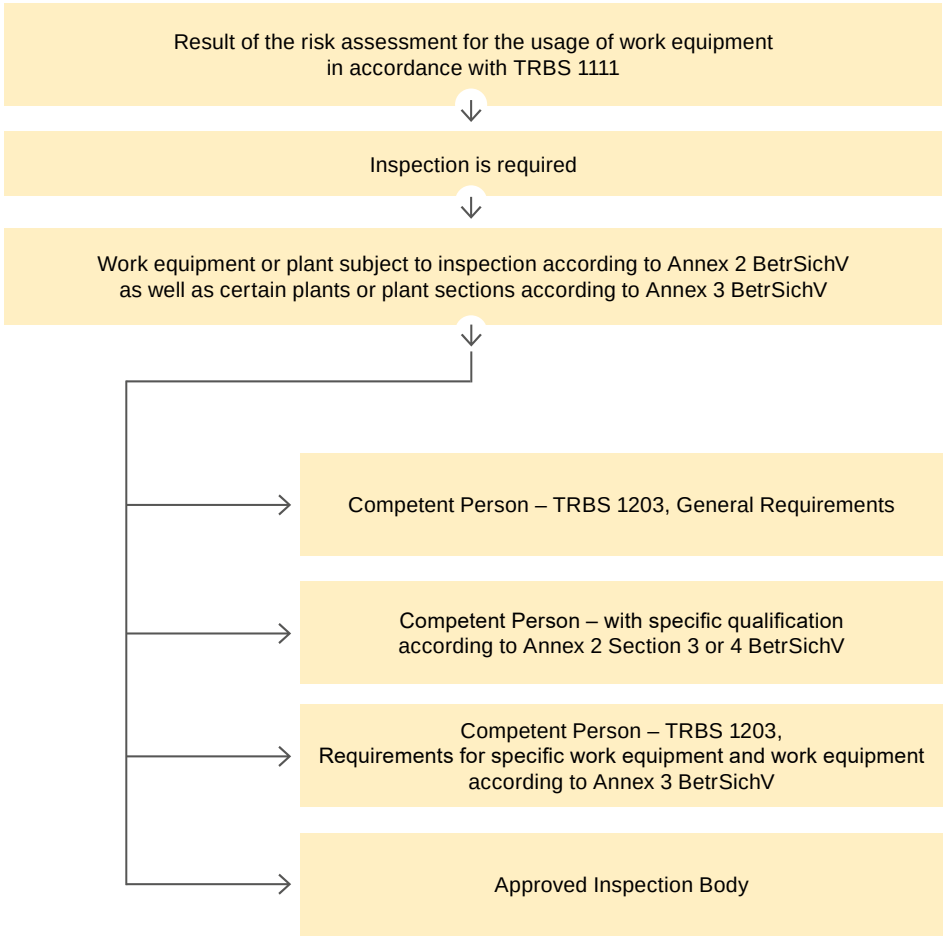
1. General Procedure for the Determination of Mandatory Inspections



23 Examples of extraordinary events that can have damaging effects on the safety of work equipment, see Appendix 1, Section 4, TRBS 1201 “Prüfungen und Kontrollen von Arbeitsmitteln und überwachungsbedürftigen Anlagen.”

24 The authorised person is the person designated by the entrepreneur to carry out the inspection, taking into consideration all necessary specific qualifications required. According to the Ordinance on Industrial Safety and Health the inspection can be assigned to an approved inspection body.

2. Selection of Persons Authorised to Inspect or Inspection Bodies according to BetrSichV



The Ordinance on Industrial Safety and Health (BetrSichV) describes inspection competences in concrete terms and they are listed in Section 5 of this Appendix.

3. TRBS 1201[25]: Annex 4 – Examples for Proven Inspection Periods (§ 14 Section 2 BetrSichV)

Work equipment which is exposed to damaging impacts leading to risks for employees are checked by Competent Persons for inspections according to appropriate inspection periods laid down by the entrepreneur. For work equipment operated during the usual working hours (e.g. single-shift operation) the inspection frequency once a year has proved effective. Depending on conditions of use and operating conditions (multi-shift operation) shorter time intervals can be required.

Exemplary recommendations for reliable inspection periods of selected work equipment are given in the table below. Further inspection periods can be found in DGUV rules and regulations.

Proven inspection periods for electrical equipment can be found in the implementing provisions of DGUV Vorschrift 3 and 4 as well as in additional DGUV rules and regulations.

When defining inspection periods for cranes according to § 14 Section 2 BetrSichV the maximum period according to Annex 3 Section 1 BetrSichV must be observed.

25 TRBS 1201 “Prüfungen und Kontrollen von Arbeitsmitteln und überwachungsbedürftigen Anlagen”, issued at March 2019 (“Gemeinsames Ministerialblatt” 2019, p. 229 [No. 13–16])

No.	Work Equipment	Inspection Period	Advice for Inspection
1	Slings, lifting accessories and loadbearing elements Addition: Hoisting belts with vulcanised coating; Round steel chains	Once a year Every 3 years Every 3 years	Condition of components, damages, safety-relevant labelling Broken wires and corrosion Freedom from cracks
2	Horizontally operating baling presses to compact waste or recyclable material	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices (e.g. emergency stop, tear ropes), access for fault removal, marking danger points
3	Builders hoists for the conveyance of goods	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices
4	Ironing and pressing machines and fusing presses in which the danger zone must be entered recurrently due to workflow	Every 6 months Once a year	Efficiency of the emergency stop device; for two-hand controls and safety devices with proximity function: observe overrun Safety devices, control systems and drive
5	Printing machines and paper converting machines (where the operator must reach between the machine parts regularly), e.g. guillotine cutter, semiautomatic screen-printing machines, label stamping machines	Every 3 years Every 5 years	Inspection according to applicable electrotechnical rules, when safety-related control is not redundant and without fault detection (as a rule 1988 models or older), if no further safety measures have been taken. Inspection according to applicable electrotechnical rules, when safety-related control is redundant including fault detection (“safe” control)
6	Earth-moving and road-making machinery, special civil engineering machines	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices
7	Industrial trucks	Once a year	Condition of components and installations, integrity and efficacy of control and safety devices
8	Lifting platforms	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices
9	Hydraulic platforms and telescopic handlers/ stacker trucks (telehandlers)	Once a year	Condition of components and installations, integrity and efficacy of control and safety devices
10	Leather and shoe presses, leather and shoe stamping machines, stamping machines for textiles where the operator recurrently must reach into the danger zone during workflow	Once a year Every 6 months	Hand protection, control, drive Efficacy of emergency stop device For two-hand controls and safety devices with proximity function: reaction time and after-running cycle of the machine and safe distance
11	Access equipment for the lifting of persons with a crane	Once a year	Condition of components and installations, safety-relevant labelling Access equipment should be checked together with the crane on which it is used (combination of crane and access equipment)

No.	Work Equipment	Inspection Period	Advice for Inspection
12	Metal working and metal processing presses where the operator must reach recurrently into the danger zone during workflow	Once a year	Condition of components and installations, integrity and efficacy of control and safety devices, e.g. hand protection, control, drive For emergency stop devices: reaction time and after-running cycle of the machine Observe test specifications of the manufacturer
13	Aisle stackers	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices
14	Storage racks (incl. power-driven ones)	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices, marking
15	Steady-flow conveyors	Once a year	Condition of components and installations, integrity and efficacy of emergency stop and safety devices
16	Scuba sets	Once a year	Condition and functioning of components, integrity and efficacy of safety devices

4. Further Inspection Periods according to DGUV Vorschrift 3 “Electrical installations and equipment”

Work Equipment	Inspection Period	Scope of Inspection
Electrical work equipment (stationary)	Every 4 years	Test according to the valid electrotechnical rules
Electrical work equipment (stationary in permanent establishments, rooms und plants of a special kind, e.g. DIN VDE 0100 Group 700)	Once a year	Test according to valid electrotechnical rules
Electrical work equipment (portable – if actually used) including extension and connecting cables	Every 6 months If error rate < 2 %: once a year at all production sites outside of offices In offices: every 2 years	Test according to valid electrotechnical rules If the error rate is less than 2 % during the test, the inspection period can be extended to the value given in the column “Inspection Period” (“Prüffrist”). When calculating the error rate attention should be paid that only work equipment from equal or comparable working areas can be used, e.g. workshop only, fabrication only, offices only.
Electrical work equipment at construction sites (portable – if actually used) including extension and connecting cables	Every 3 months If error rate < 2 %: once a year at least	Test according to valid electrotechnical rules If the error rate is less than 2 % during the test, the inspection period can be extended to the value given in the column “Inspection Period” (“Prüffrist”). When calculating the error rate attention should be paid that only work equipment from equal or comparable working areas can be used.

5. Further Examples for Inspection Duties according to the Ordinance on Industrial Safety and Health (BetrSichV)

Special test specifications for plants subject to inspection

Test Item	Authorised Person/Entity	Inspections/Reason for Inspection	Inspection Period	Source/ Information
Lift or Hoist Systems				
Lift or Hoist Systems	ZÜS[26]	› Before initial start-up › Before restart after changes subject to mandatory testing[27]		Annex 2 Section 2 BetrSichV
	ZÜS	› Recurrent (Main test)	Max. 2 years	
	ZÜS	› Recurrent (Intermediate test)	In the middle of main test period, i. e. max. 1 year	
Work Equipment and Technical Measures in Explosion-hazardous Areas according to § 2 Section 14 GefStoffV				
Systems in explosion-hazardous areas for explosion protection	› Systems requiring licence according to § 18 Section 1 No. 3–7 BetrSichV: ZÜS › Any other system: • ZÜS • Competent Person according to Annex 2 Section 3 No. 3.3 BetrSichV	› Before initial start-up › Before restart after changes subject to mandatory testing		Annex 2 Section 3 No. 4.1 and No. 3.3 BetrSichV, TRBS 1201 Teil 1, TRBS 1122 and TRBS 1123
		› Recurrent	Max. 6 years	Annex 2 Section 3 No. 5.1 and No. 3.3 BetrSichV, TRBS 1201 Teil 1
Ventilation systems, gas warning equipment and inertisation devices and equipment, protective systems and safety, control or regulating devices in terms of Directive 2014/34/EU as part of a system in explosionhazardous areas including connecting devices and interaction with other plant sections.	› For systems requiring licence according to § 18 Section 1 No. 3–7 BetrSichV: ZÜS › Any other system: • ZÜS • Competent Person according to Annex 2 Section 3 No. 3.1 BetrSichV	› Before initial start-up › Before restart after changes subject to mandatory testing		Annex 2 Section 3 No. 4.1 and No. 3.1 BetrSichV, TRBS 1201 Teil 1, TRBS 1122 and TRBS 1123
Equipment, protective systems and safety, control or regulating devices in terms of Directive 2014/34/EU	› ZÜS › Manufacturer › Competent Person according to Annex 2 Section 3 No. 3.2 BetrSichV	› Before restart after repair of a component which is essential for explosion protection		Annex 2 Section 3 No. 4.2 and No. 3.2 BetrSichV, TRBS 1201 Teil 3
Equipment, protective systems and safety, control or regulating devices in terms of Directive 2014/34/EU including connective elements, also as part of a system in explosionhazardous areas and plants according to § 18 Section 1 No. 3–7 considering interaction with other plant sections	› ZÜS › Competent Person according to Annex 2 Section 3 No. 3.1 BetrSichV	› Recurrent	Max. 3 years[28]	Annex 2 Section 3 No. 5.2 and No. 3.1 BetrSichV, TRBS 1201 Teil 1
Ventilation systems, gas warning equipment and inertisation devices, also as part of a system in explosion-hazardous areas and plants according to § 18 Section 1 No. 3–7 considering interaction with other plant sections	› ZÜS › Competent Person according to Annex 2 Section 3 No. 3.1 BetrSichV	› Recurrent	Max. 1 year[28]	Annex 2 Section 3 No. 5.3 and No. 3.1 BetrSichV, TRBS 1201 Teil 1

26 Zugelassene Überwachungsstelle (Approved Inspection Body) according to Annex 2 Section 1 BetrSichV

27 TRBS 1201 Part 4: “The inspection of changes subject to mandatory testing can be executed by a Competent Person (see § 2 Section 6 BetrSichV, TRBS 1203), if the change does not affect the design or the mode of operation of the hoist system (§ 15 Section 3 Sentence 3 BetrSichV)”.

28 According to Annex 2 Section 3 No. 5.4 BetrSichV recurrent inspections can be omitted if the management has determined a repair concept within the frame of the documentation of risk assessments which ensures that a safe state of the plants is maintained, and explosion protection is permanently guaranteed.

Test Item	Authorised Person/Entity	Inspections/Reason for Inspection	Inspection Period	Source/ Information
Pressure Systems Subject to Inspection (Systems and Process Units) according to Annex 2 Section 4 Nos. 2.1 and 2.2 BetrSichV				
Pressure systems subject to inspection	› ZÜS › Systems only consisting of process units, which may be tested by a Competent Person according to Annex 2 Section 4 Tables 2–12 BetrSichV: Competent Person according to Annex 2 Section 4 No. 3 BetrSichV	› Before initial start-up › Before restart after changes subject to mandatory testing		Annex 2 Section 4 No. 4, 6 and 7 BetrSichV
Pressure systems subject to inspection	› ZÜS › Systems only consisting of process units, which may be tested recurrently by a Competent Person according to Annex 2 Section 4 Tables 2–12 BetrSichV: Competent Person according to Annex 2 Section 4 No. 3 BetrSichV	› Recurrent	Max. 10 years	Annex 2 Section 4 No. 5, 6 and 7 BetrSichV
Pressure systems: Process units which are subject to inspection	› ZÜS › Process units, which may be tested by a Competent Person according to Annex 2 Section 4 Tables 2–12 BetrSichV: Competent Person according to Annex 2 Section 4 No. 3 BetrSichV	› Before initial start-up › Before restart after changes subject to mandatory testing		Annex 2 Section 4 No. 4, 6 and 7 BetrSichV
Process units subject to inspection of pressure systems	According to Annex 2 Section 4 Tables 2–12 BetrSichV: › ZÜS › Competent Person according to Annex 2 Section 4 No. 3 BetrSichV	› Recurrent (external test/internal test/strength test)	› Maximum periods see Annex 2 Section 4 Table 1 BetrSichV › Maximum periods for inspections executed by Competent Persons see Annex 2 Section 4 No. 5.9 BetrSichV	Annex 2 Section 4 No. 5, 6 and 7 BetrSichV

Special verification requirements for certain pressure systems or process units subject to inspection are listed in Table 12 of Annex 2 Section 4 No. 7 Betriebssicherheitsverordnung. Inspections before initial start-up, after changes subject to inspection and recurrent inspections according to Annex 2 Section 4 No. 4 and 5 BetrSichV must be executed in accordance with Table 12.

Test specifications for certain work equipment according to Annex 3 BetrSichV.

Test Item	Authorised Person/Entity	Inspections/Reason for Inspection	Inspection Period	Source/ Information
Cranes according to Annex 3 Section 1 No. 1.1 BetrSichV				
Cranes	According to Annex 3 Section 1 Tables 1–2 BetrSichV: › Expert inspector according to Annex 3 Section 1 No. 2 BetrSichV › Competent Person according to § 2 Section 6 BetrSichV	› After mounting or installation › Before initial start-up		Annex 3 Section 1 No. 3 BetrSichV, TRBS 1203
	According to Annex 3 Section 1 Tables 1–2 BetrSichV: › Expert inspector according to Annex 3 Section 1 No. 2 BetrSichV › Competent Person according to § 2 Section 6 BetrSichV	› Recurrent	Maximum periods according to Annex 3 Section 1 Tables 1–2 BetrSichV	Annex 3 Section 1 No. 3 BetrSichV, TRBS 1203
	› Expert inspector according to Annex 3 Section 1 No. 2 BetrSichV	› After changes subject to inspection		Annex 3 Section 1 No. 3.4 BetrSichV, TRBS 1203
	› Competent Person according to § 2 Section 6 BetrSichV	› After exceptional events		
Liquefied Gas Installations according to Annex 3 Section 2 No. 1.1 BetrSichV				
Liquefied Gas Installations	› Competent Person according to § 2 Section 6 BetrSichV[29]	› Before initial start-up › Before restarting following mandatory changes › Before restarting following extraordinary events		Annex 3 Section 2 No. 4 BetrSichV, TRBS 1203
		› Recurrent	Maximum periods according to Annex 3 Section 2 Table 1 BetrSichV	
Machine-based work equipment of event technology according to Annex 3 Section 3 No. 1.1 BetrSichV				
Machine-based work equipment of event technology	According to Annex 3 Section 3 Table 1 BetrSichV: › Expert inspector according to Annex 3 Section 3 No. 2 BetrSichV › Competent Person according to § 2 Section 6 BetrSichV	› After mounting or installation › Before initial start-up		Annex 3 Section 3 No. 3 BetrSichV, TRBS 1203
	According to Annex 3 Section 3 Table 1 BetrSichV: › Expert inspector according to Annex 3 Section 3 No. 2 BetrSichV › Competent Person according to § 2 Section 6 BetrSichV	› Recurrent	Maximum periods see Annex 3 Section 3 Table 1 BetrSichV	
	› Expert inspector according to Annex 3 Section 3 No. 2 BetrSichV	› After changes subject to inspection › After exceptional events		

29 Requirements for competent persons for the inspection of liquefied gas installations according to Annex 3 Section 2 BetrSichV, see Chapter 4.2 of TRBS 1203 “Zur Prüfung befähigte Personen”

Appendix 4: Questionnaires for the Collection of Data on Mental Stress

The table below is a comparative presentation of questionnaires for the collection of data on mental stress. The order does not express a list of ranks.

Questionnaire	Size (Number of Questions)	Format for Answers	Answer to Current/Ideal Situation	Expenses	Support of External Experts	URL
„Prüfliste Psychische Belastung“ of Unfallkasse des Bundes	19	Yes/No Questions	No	No	Not necessary	www.uv-bund-bahn.de/file-admin/Dokumente/Fachthe-men_Prävention_Dokumente/Psychologie/UVB_PrueflistePsychi-scheBelastung_2015.pdf
IMPULS-Test 2 Professional	25	Five Step Scale	Yes	Yes	When installing the online procedure	Only online available: www.impulstest2.info/
COPSOQ (Copenhagen Psycho-social Questionnaire)	95	Predomi-nantly Five Step Scale	No	Only for external evaluation and benchmarking		Available as PDF document as well as online: www.copsoq.de/copsoq-fragebogen/
SALSA (Salutogenetische subjek-tive Arbeitsanalyse)	61	Five Step Scale	No	Yes	Evaluation and Benchmarking	www.salsabefragung.com/Leis-tungen..1005,,,2.html

Appendix 5: Climate – Heat – Cold

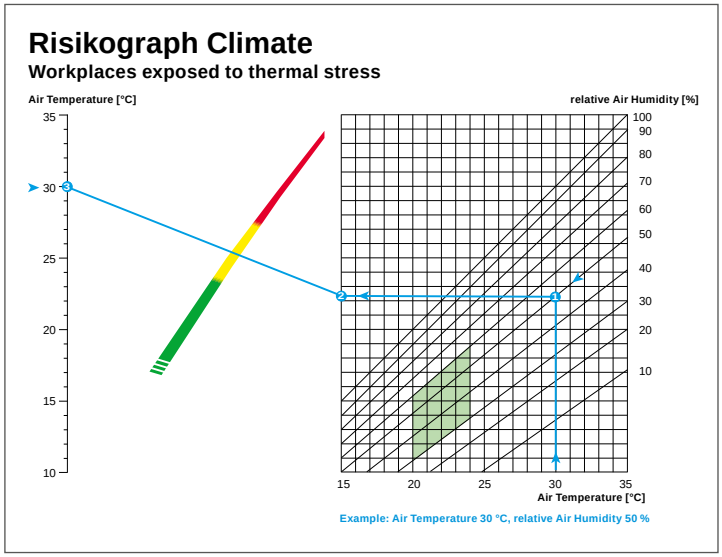
Appendix 5a: Determination of Workplaces Exposed to Thermal Stress by means of the Risikograph

If the air temperature is > 26 °C and the relative air humidity can exceed 50 % – generally or for long periods of time – workplaces exposed to thermal stress can occur.

With simple measurements of the air temperature and relative air humidity workplaces exposed to thermal stress can be detected by using the “Risikograph Climate”, however, without an indoor climate analysis.

The following conditions must be met at the same time:
- no or only low thermal radiation
- no draught
- physically light work
- light, non-insulating clothing

The air temperature and the relative air humidity are entered into the “Risikograph Climate”.



Example:
The measurements air temperature = 30 °C and relative air humidity = 50 % yield the Intersection Point 1. Intersection Point 2 is found by drawing a horizontal straight line from Intersection Point 1 to the left margin of the graph. Point 3 is the result of the given air temperature value (30 °C) on the left scale. If the Points 2 and 3 are connected with a straight line, this line runs through the area marked green-yellow-red.

Source: DGUV Information 215-510 „Beurteilung des Raumklimas“

Figure 1: Risikograph Climate

If the Intersection Point of this line lies in the yellow area, as demonstrated here, measures must be taken. Generally it will be necessary to reduce the air temperature and/or the relative air humidity.

If the Intersection Point is situated in the green area, no measurements must be taken.

If the Intersection Point is in the red area, a workplace exposed to thermal stress possibly exists. There is an increased need for action. A detailed indoor climate analysis involving experts might be required.

A blank form of the “Risikograph” is available in the downloadcenter of BG RCI at: downloadcenter.bgrci.de (keyword: Risikograph).

Moisture limit in accordance to ASR A3.5 at outdoor temperatures greater than 26 °C:

Air Temperature	Relative Air Humidity
+26 °C	55 %
+28 °C	50 %
+30 °C	44 %
+32 °C	39 %
+35 °C	33 %

Table 1: Maximum relative air humidity corresponding to an absolute air humidity of approx. 11.5 $g_W/kg_{tr.L}$ (g water per kg dry air)

Appendix 5b: Checklist Hot Workplace

The checklist below can be used as an orientation tool, whether a hot workplace exists.

Checklist Hot Workplace	
A	**Air Temperature and Normal Air Humidity**
	☐ Predominantly ≤ 37 °C ☐ Predominantly > 37 °C up to 45 °C ☐ > 45 °C (Length of stay > 15 minutes)
B	**Air Temperature and Simultaneously High Air Humidity (Characterised e.g. by Moist/Wet Skin)**
	☐ Predominantly ≤ 26 °C with high Air Humidity ☐ Predominantly > 26 °C up to 30 °C with high Air Humidity ☐ Predominantly > 30 °C with high Air Humidity
C	**Fluid Intake**
	☐ Fluid intake ≤ 2 l per shift ☐ Fluid intake 2 up to 4 l per shift ☐ Fluid intake > 4 l per shift
D	**Thermal Radiation**
	☐ No thermal radiation noticeable ☐ Warm face after 2 or 3 minutes ☐ Unbearable in the face
E	**Subjective State of Health in Connection with Thermal Stress**
	☐ No complaints ☐ Complaints like a feeling of weakness, unwellness, ☐ Increased sensation of thirst, headache, sickness, dizziness

Source: DGUV Information 213-022, Expert Committee „Rohstoffe und chemische Industrie“ of DGUV, Subcommittee „Glas und Keramik“

Evaluation:

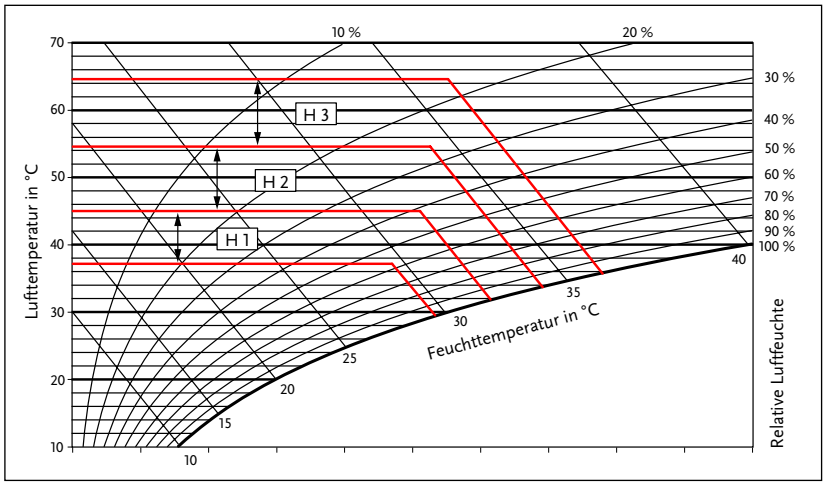
- All criteria marked **green**: No hints of an existing Hot Workplace.
- One criterion is marked **yellow** at least: A critical situation-specific evaluation perhaps including a more detailed workplace analysis can be necessary.
- One criterion is marked **red** at least: The existence of a Hot Workplace is probable. A critical situation-specific evaluation perhaps including a more detailed workplace analysis is required and further measures (technical, organisational, personal) must be started.

Appendix 5c: Cooling Phases Dependent on the Hot Working Area

If the evaluation shows that a hot workplace is existent, measures for health protection must be taken.

If a permanent stay in the hot working area is impossible, even after the work intensity had been reduced, cooling phases are required. During these cooling phases the human body has the opportunity to release heat. The stay in rooms with a low stressing climate serves for it, where light physical work can be carried out.

If the thermal stress is extremely high, heat breaks can be necessary without physical work within cooling phases. Cooling phases and heat breaks must be spent in areas with a temperature below 25 °C.



Copyright: Bux-BAuA*

Figure 2: Heat Areas H1 to H3 as a measure for stress

When using Figure 2 the following boundary conditions must be observed:

- No or low exposure to thermal radiation (< 35 W/m²),
- Light to moderately difficult work (up to ca. 200 W working energy transformation),
- Light to medium clothing insulation (ca. 0.6 up to 0.9 clo; see also Figure 6 in Appendix 5d),
- Low air velocity (up to 0.5 m/s).

The hot working area is defined by the intersection point of air temperature and air humidity. When working exposed to thermal stress the maximum duration of working phases should not be exceeded. The duration of working phases is defined by the heat area. Afterwards the length of cooling phases given in Figure 3 below should be observed. A shorter working phase due to individual sensibility or health problems can be necessary.

Hot Working Area	Cooling Phase
H1	15 Minutes
H2	30 Minutes
H3	45 Minutes
over H3	No reliable data

Source: According to DGUV Information 213-002

Table 2: Standard Duration of Cooling Phases per Hour

Appendix 5d: Selection of Clothing for Cold Working Areas Depending on the Work Intensity

The work intensity to be expected is an essential criterion for the selection and purchase of special clothing for cold working areas. Too warm clothing leads to perspiration, thus reducing the effect of insulation and local frostbites can occur.

The thermal insulation of working clothes is given in clo.

Proceeding: Firstly, the temperature range corresponding to Figure 3 must be determined. Secondly, considering the work intensity given in Table 3 the required clothing insulation can be deduced from Figure 3. Examples for insulation values of combined working clothes are given in Table 4.

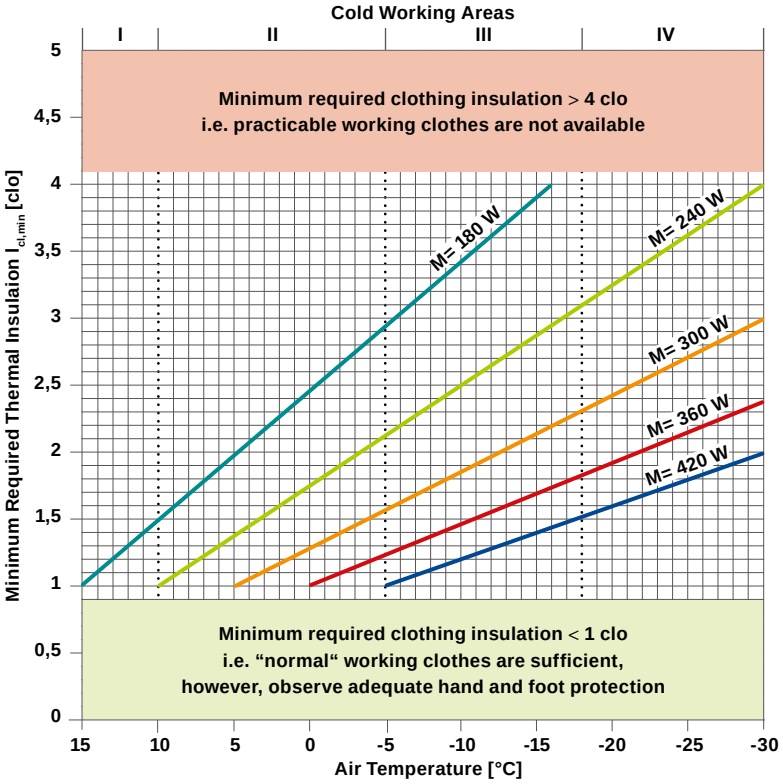


Figure 3: Selection of Clothing Insulation depending on Work Intensity and Ambient Temperature

Load Level	Gross Energy Transformation M [W]	Physical Activities	Examples for Cold Workplaces as an Orientation
1	180	Calm, Light Working with Hands; occasional Walking	Supervision of Plants; Control Activities
2	240	Light Working with Hands or Arms while Sitting or Walking	Operating Machines; Transportation of Frozen Food with an Industrial Truck
3	300	Permanent Working with Hands, Arms or Legs while Sitting, Walking or Standing	Transportation with manually operated industrial trucks; moderately difficult manual processing; packaging work; manual sorting; repairs
4	360	Predominantly Working with Hands, Arms, Legs and Trunk; Lifting and Carrying Medium Heavy Loads	Palletising and order picking moderately heavy units; heavy manual processing
5	420	Permanent Working with Arms, Legs and Trunk; Lifting and Carrying Heavy Loads	Predominantly manual Loading Activities; Palletising and order picking heavy units; Cleaning Work under difficult conditions

Table 3: Work Intensity

Combination of Working Clothes	Rough Insulation Values [clo]
Usual underwear (short) with shirt, trousers and work jacket, socks and usual working shoes	1.0
Long, thermal insulating underwear, shirt, light thermo suit, knee socks, shoes or boots	1.8
Long, thermal insulating underwear, shirt, working suit, thermo jacket, thermo trousers, knee socks, cold protection boots, cap and gloves	2.6
Long, thermal insulating underwear, shirt, working suit, thermo jacket and thermo trousers with a thick insulation layer, knee socks, cold protection boots, cap and gloves	3.4

Table 4: Examples for Thermal Insulation Values of different Working Clothes

Appendix 6: Complementary Evaluation of Activities with Hazardous Substances*

Specifications on Location and Hazardous Substances

Firm: .....

Working Area: .....
(Where the substance is used, e.g. production, storage, workshop, laboratory, repair etc.)

Workplace: .....

☐ Indoor ☐ Outside ☐ Different Locations

Name of Hazardous Substance: (From the register or hazardous substance which results from the work)

.....

Labelling:

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Potential Risks: Signal Word: .....

Classification of Substance or Mixture (Abbreviations) .....

.....

Classification of Substance or Mixture (Text) .....

.....

.....

.....

.....

Manner of Release: ..... (Gas, Vapour, Aerosol, Dust, Smoke etc.)

Carcinogenic (c) Category:	☐ 1 A	☐ 1B	☐ 2
Germ Cell Mutagenic (m) Category:	☐ 1 A	☐ 1B	☐ 2
Toxic to Reproduction (r) Category:	☐ 1 A	☐ 1B	☐ 2
Is the Substance Absorbed through the Skin:	☐ Yes	☐ No	
Is the Substance a Sensitising Agent:	☐ Skin (Sh)	☐ Respiration (Sa)	☐ both (Sah)

Occupational Exposure Value or Criterion:.....(mg/m³) .....(ppm) ..... (Type)

Biological Limit Value (BGW): .....(/) in ..... (Biological Material) ..... (Time when Samples are Taken)

Water Hazard Class: ..... Storage Class: .....

* This evaluation can be used as an applicable document for risk assessments.

Substitution (Tests of Substitutes/Procedure Test)

Information/Sources for Evaluation

Explanatory Notes

	Yes	No
1. Is TRGS 600 acquainted?	☐	☐
2. Is the substance omittable?	☐	☐
3. Are procedural modifications possible?	☐	☐

	Proved
TRGS on Substitutes (TRGS 600 et seqq.)	☐
EGU (Recommendations of Accident Insurance Institutions[30])	☐
Safety Data Sheet (Section 7)	☐
Technical Bulletins/Industry Regulations	☐

Explanatory Notes

How was the Test of Substitutes Executed?

Explanatory Notes

"Easy-to-use Workplace Control Scheme for Hazardous Substances" (EKMG)	☐
Column Model (TRGS 600)	☐
Any other Check	☐

Replacement Product/Substitute .....

Substitute Process .....

Result

Substitution is possible, Substitute/Substitute Process implemented on: .....

There is no chance of substitution, as: (for more selection see TRGS 600)

The alternative solution is technically inadequate	☐
The alternative solution does not sufficiently reduce the risk	☐
The alternative solution is inadequate for operational reasons or technically not reasonable	☐

30 Different recommendations of accident insurance institutions on the hazard identification can be found at www.dguv.de/ifa/praxishilfen/praxishilfen-gefahrstoffe/empfehlungen-gefaehrdungsermittlung-der-unfallversicherungstraeger-(egu)/index.jsp.

Handling and Risks

Risks

I Inhalation
S Skin Contact
F Fire/Explosion
M Miscellaneous Impacts (e.g. Lack of Oxygen)
R Reactions and/or Confusion with Other Substances Used in the Company

Ser. No.	Workflow/Operational Activity with Product/Hazardous Substance	Risk(s)

Mode and Extent of Exposure During Processing

Application

Number of Employees Working with the Substance/Product .....

Consumption in the Working Area: (in ml, l, m³, g, kg, t per hr, per Shift) .....

Duration of Activity: (Given in Hours or Minutes) .....

Frequency of Activity: (Number per Annum, Shift, Construction Site etc.) .....

Skin Contact is Possible: ☐ **No** ☐ **Yes**

(Short- or large-area, short-time or long-running skin contact) .....

Ser. No.	Exposure in the Air at the Workplace (Referred to the Shift Time)	Time Interval

Evaluation of Exposure in the Air at the Workplace

☐ By Measurement

☐ By Comparison .....

☐ Due to Empirical Values (e.g. from TRGS) .....

Measurement from ..... Result .....

KM from ..... Result .....

KM from ..... Result .....

KM from ..... Result .....

Finding:

☐ Measures are sufficient. This is the case when only this hazardous substance is used during the entire shift. If more than one hazardous substance is used a summated evaluation according to TRGS 402 must be executed.

☐ Measures are insufficient.

.....

.....

Safeguard Measures (T-O-P) for Employees

Ser. No.	Listing of Measures Regarding the Identified Hazard	EP or EM	Date or OI
	EP= Entrepreneur / EM = Employee / OI = Operational Instructions		

Final Settlement

Additional Measures

Date

- ☐ **Occupational Health Care must be arranged** .....
- ☐ **Occupational Health Care must be offered** .....
- ☐ **Inclusion in the Directory of c,m-Substances Category 1A/1B** .....
- ☐ **Report to the Authority, GefStoffV Anh. I Nr. 2.4.2 (Asbestos)** .....
- ☐ **Evaluation of the Occupational Physician is considered** .....
- ☐ **Biological Monitoring has been executed** (Biological Limit Value) .....
- ☐ **Indications of the last Employee Survey are considered** .....

Effectiveness Check

Type of Effectiveness Check: .....

Until (Date): .....

Result: .....

Competent Person:

....
Name Signature

This Risk Assessment Has Been Implemented for the Firm – Person in Charge

....
Date Name Signature

In Consultation with OSH Professional

....
Date Name Signature

Assisted by Occupational Physician

....
Date Name Signature

Entrepreneur/Person in Charge

....
Date Name Signature

Appendix 7: Bibliography

Laws, ordinances, and legal text of the Accident Prevention Regulations are **binding legal norms.** Deviations require permission of the competent authority or the competent Accident Insurance Institution respectively (e.g. German Social Accident Insurance Institution). Issuing a special dispensation requires compensation measures at the same safety level at least.

Technical rules affiliated to ordinances, execution instructions of Accident Prevention Regulations (DGUV Regulations), DGUV Rules, DGUV Informations, Codes of Practice, and DIN-/VDE-Standards are **not binding legal norms.** These are regarded as important standards of evaluation and rules of technology that do not need to comply with if the same safety level can be obtained otherwise.

Sources of information in the Internet

Codes of Practice of the German Social Accident Insurance Institution for the Raw Materials and Chemical Industry (Berufsgenossenschaft Rohstoffe und chemische Industrie – BG RCI) as well as a broad part of the occupational safety and health regulations issued by the German government and the German Social Accident Insurance Institutions (ca. 1,700 files – nearly all in German) can be found in the Compendium for Occupational Safety and Health of BG RCI (“Kompendium Arbeitsschutz”). The use is not free of charge. A free limited trial is available.
For further information see www.kompendium-as.de.

The homepage of BG RCI (www.bgrci.de/praevention) and fachwissen.bgrci.de offer a huge amount of relevant information.

Detailed information about publications and media of BG RCI and mail order: medienshop.bgrci.de

The downloadcenter of BG RCI offers numerous Codes of Practice, appendices and forms from Codes of Practice and DGUV Rules as well as additional guidance documents free of charge: downloadcenter.bgrci.de

Accident Prevention Regulations (Unfallverhütungsvorschriften), DGUV Rules (DGUV Regeln), DGUV Principles (DGUV Grundsätze) and many DGUV Informational Publications (DGUV Informationen) are available at the homepage of the German Social Accident Insurance (Deutsche Gesetzliche Unfallversicherung): publikationen.dguv.de

1. EU Publications in the Official Journal of the European Union

Supply Source: Bundesanzeiger-Verlag, Postfach 10 05 34, 50445 Köln.

Free download at http://eur-lex.europa.eu/de/index.htm

Machine Directive: Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery and amending Directive 95/16/EC (For machines placed on the market since 29.12.2009).

Machine Directive: Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machines (For machines placed on the market between 1.1.1995 and 28.12.2009).

Pressure Equipment Directive: Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 relating to the making available on the market of pressure equipment (New version; for pressure equipment placed on the market since 19.7.2016; Article 13 of the Directive with regard to the classification of fluids is to be used since 1.6.2015 already).

CLP-Regulation: Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, for amending and repealing the Directive 67/548/EEC and 1999/45/EC and amending the Regulation (EC) No. 1907/2006.

REACH: 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), establishing a Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93, Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

ATEX-Directive: Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast) (for equipment and protective systems placed on the market since 20.4.2016).

Biocide-Regulation: Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

2. Laws, Regulations, Technical Rules

Please note: Whenever an English translation of a publication is available, this version is cited here. However, it must taken into account that only the German version is legally binding.

Supply Source: Bookshops

Free download at www.gesetze-im-internet.de (Laws and Regulations) or www.baua.de (Technical Rules, Regulations)

Verordnung zur arbeitsmedizinischen Vorsorge (ArbMedVV) mit Arbeitsmedizinische Regeln (AMR) insbesondere

AMR Nr. 13.1: Tätigkeiten mit extremer Hitzebelastung, die zu einer besonderen Gefährdung führen können.

Gesetz über die Durchführung von Maßnahmen des Arbeitsschutzes zur Verbesserung der Sicherheit und des Gesundheitsschutzes der Beschäftigten bei der Arbeit (Arbeitsschutzgesetz – ArbSchG).

Verordnung über Arbeitsstätten (Arbeitsstättenverordnung[31] – ArbStättV) with Technical Rules for Workplaces (ASR), particularly:

ASR A1.2: Raumabmessungen und Bewegungsflächen
ASR A1.3: Sicherheits- und Gesundheitsschutzkennzeichnung
ASR A1.5: Fußböden
ASR A1.6: Fenster, Oberlichter, lichtdurchlässige Wände
ASR A1.7: Türen und Tore
ASR A1.8: Verkehrswege
ASR A2.1: Schutz vor Absturz und herabfallenden Gegenständen, Betreten von Gefahrenbereichen
ASR A2.2: Maßnahmen gegen Brände
ASR A2.3: Fluchtwege und Notausgänge
ASR A3.4: Beleuchtung
ASR A3.5: Raumtemperatur
ASR A3.6: Lüftung
ASR A3.7: Lärm
ASR A4.1: Sanitärräume
ASR A4.2: Pausen- und Bereitschaftsräume
ASR A4.3: Erste-Hilfe-Räume, Mittel und Einrichtungen zur Ersten Hilfe
ASR V3: Gefährdungsbeurteilung
ASR V3a.2: Barrierefreie Gestaltung von Arbeitsstätten

Arbeitszeitgesetz (ArbZG)

Gesetz über Betriebsärzte, Sicherheitsingenieure und andere Fachkräfte für Arbeitssicherheit (Arbeitssicherheitsgesetz – ASiG)

Verordnung über Sicherheit und Gesundheitsschutz auf Baustellen (Baustellenverordnung – BauStellV) with Regeln zum Arbeitsschutz auf Baustellen (RAB), in particular:

RAB 01: Subject, Origin, Structure, Application and Coming into Effect of RABs
RAB 10: Definitions (Specification of Terms in the Construction Sites Ordinance BaustellV)
RAB 25: Working in Compressed Air (Specification of the Compressed Air Ordinance)

31 Leitlinien zur Arbeitsstättenverordnung (LV 40) Länderausschusses für Arbeitsschutz und Sicherheitstechnik (LASI) at http://lasi-info.com/publikationen/lasi-veroeffentlichungen/

RAB 30: Suitable Co-ordinator (Specification of Section 3 BaustellV)

RAB 31: Safety and Health Plan – S & H Plan

RAB 32: Document for Subsequent Work (specification under Section 3 (2) No. 3 BaustellV)

RAB 33: General Principles according to Section 4 of the Occupational Safety and Health Act during application of the Construction Sites Ordinance

Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundes-Immissionsschutzgesetz, BImschG) mit sicherheitstechnischen Regeln der Kommission für Anlagensicherheit, in particular:

TRAS 410: Erkennen und Beherrschen exothermer chemischer Reaktionen.
(download at: https://www.kas-bmu.de/tras-endgueltige-version.html)

Verordnung über Sicherheit und Gesundheitsschutz bei der Verwendung von Arbeitsmitteln (Betriebssicherheitsverordnung – BetrSichV) with Technical Rules for Operational Safety (TRBS), particularly:

TRBS 1111: Gefährdungsbeurteilung

TRBS 1112: Instandhaltung

TRBS 1112 Teil 1: Explosionsgefährdungen bei und durch Instandhaltungsarbeiten – Beurteilungen und Schutzmaßnahmen

EmpfBS 1113: Beschaffung von Arbeitsmitteln (Empfehlungen zur Betriebssicherheit)

EmpfBS 1114: Anpassung an den Stand der Technik bei der Verwendung von Arbeitsmitteln (Empfehlungen zur Betriebssicherheit)

TRBS 1151: Gefährdungen an der Schnittstelle Mensch – Arbeitsmittel, Ergonomische und menschliche Faktoren, Arbeitssystem

TRBS 1201: Prüfungen und Kontrollen von Arbeitsmitteln und überwachungsbedürftigen Anlagen

TRBS 1201 Teil 1: Prüfung von Anlagen in explosionsgefährdeten Bereichen und Überprüfung von Arbeitsplätzen in explosionsgefährdeten Bereichen

TRBS 1201 Teil 2: Prüfungen und Kontrollen bei Gefährdungen durch Dampf und Druck

TRBS 1201 Teil 3: Instandsetzung an Geräten, Schutzsystemen, Sicherheits-, Kontroll- und Regelvorrichtungen im Sinne der Richtlinie 2014/34/EU

TRBS 1201 Teil 4: Prüfung von überwachungsbedürftigen Anlagen – Prüfung von Aufzugsanlagen

TRBS 1203: Zur Prüfung befähigter Personen

TRBS 2111: Mechanische Gefährdungen – Allgemeine Anforderungen

TRBS 2111 Teil 1: Mechanische Gefährdungen – Maßnahmen zum Schutz von Gefährdungen beim Verwenden von mobilen Arbeitsmitteln

TRBS 2121: Gefährdungen von Beschäftigten durch Absturz – Allgemeine Anforderungen

TRBS 2121 Teil 1: Gefährdungen von Beschäftigten durch Absturz bei der Verwendung von Gerüsten

TRBS 2121 Teil 2: Gefährdungen von Beschäftigten bei der Verwendung von Leitern

TRBS 2121 Teil 3: Gefährdungen von Beschäftigten durch Absturz bei der Verwendung von Zugangs- und Positionierungsverfahren unter Zuhilfenahme von Seilen

TRBS 2121 Teil 4: Gefährdungen von Beschäftigten durch Absturz – Ausnahmsweises Heben von Beschäftigten mit hierfür nicht vorgesehenen Arbeitsmitteln

TRBS 2141: Gefährdungen durch Dampf und Druck

TRBS 3145/TRGS 745: Ortsbewegliche Druckgasbehälter – Füllen, Bereithalten, innerbetriebliche Beförderung, Entleeren

TRBS 3151 /TRGS 751: Vermeidung von Brand-, Explosions- und Druckgefährdungen an Tankstellen und Gasfüllanlagen zur Befüllung von Landfahrzeugen

Betriebsverfassungsgesetz (BetrVG)

Bürgerliches Gesetzbuch (BGB)

Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundes-Immissionsschutzgesetz – BImSchG) mit Verordnungen zur Durchführung des Bundes-Immissionsschutzgesetzes (BImSchV), insbesondere:

Fünfte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über Immissionsschutz- und Störfallbeauftragte – 5. BImSchV)

Zwölfte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Störfall-Verordnung – 12. BImSchV)

Verordnung über Sicherheit und Gesundheitsschutz bei Tätigkeiten mit Biologischen Arbeitsstoffen (Biostoffverordnung – BioStoffV)

Technical Rules for Biological Agents (TRBA) and Resolutions (Beschlüsse) resolved by the Committee for Biological Agents (ABAS), and published by the Federal Ministry for Labour and Social Affairs in the “Gemeinsames Ministerialblatt” (ISSN 0939-4729), particularly:

TRBA 100: Protective Measures for Activities Involving Biological Agents in Laboratories

TRBA 110: Schutzmaßnahmen bei Tätigkeiten mit Biostoffen in der biotechnologischen Produktion von Biopharmazeutika, Diagnostika und Impfstoffen

TRBA 120: Versuchstierhaltung

TRBA 130: Occupational safety measures in acute biohazard situations

TRBA 200: Requirements for professional expertise in accordance with the Biological Agents Ordinance

TRBA 213: Abfallsammlung: Schutzmaßnahmen

TRBA 214: Anlagen zur Behandlung und Verwertung von Abfällen

TRBA 220: Safety and Health for Activities involving Biological Agents in Sewage Plants

TRBA 230: Protective Measures for Activities Involving Biological Agents in Agriculture and Forestry and Comparable Activities

TRBA 250: Biological Agents in Health Care and Welfare Facilities

TRBA 260: Schutzmaßnahmen bei Tätigkeiten mit biologischen Arbeitsstoffen in der Veterinärmedizin und bei vergleichbaren Tätigkeiten
TRBA 400: Guideline for Risk Assessment and for the Instruction of Employees in Relation to Activities with Biological Agents
TRBA 405: Anwendung von Messverfahren und technischen Kontrollwerten für luftgetragene Biologische Arbeitsstoffe
TRBA/TRGS 406: Sensibilisierende Stoffe für die Atemwege
TRBA 450: Criteria for the Classification of Biological Agents
TRBA 460: Einstufung von Pilzen in Risikogruppen
TRBA 462: Einstufung von Viren in Risikogruppen
TRBA 464: Einstufung von Parasiten in Risikogruppen
TRBA 466: Classification of Prokaryotes (Bacteria and Archaea) into Risk Groups
TRBA 468: Liste der Zelllinien und Tätigkeiten mit Zellkulturen
TRBA 500: Basic Measures to be Taken for Activities Involving Biological Agents
Beschluss 603: Schutzmaßnahmen bei Tätigkeiten mit Transmissibler Spongiformer Enzephalopathie (TSE) assoziierten Agenzien in TSE-Laboratorien
Beschluss 608: Empfehlung spezieller Maßnahmen zum Schutz der Beschäftigten vor Infektionen durch hochpathogene aviäre Influenzaviren (Klassische Geflügelpest, Vogelgrippe)
Berufskrankheiten-Verordnung (BKV)
Gesetz zum Schutz vor gefährlichen Stoffen (Chemikaliengesetz – ChemG)
Verordnung über Verbote und Beschränkungen des Inverkehrbringens und über die Abgabe bestimmter Stoffe, Gemische und Erzeugnisse nach dem Chemikaliengesetz (Chemikalien-Verbotsverordnung – ChemVerbotsV)
Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln (EMVG)
Verordnung über die Bestellung von Gefahrgutbeauftragten in Unternehmen (Gefahrgutbeauftragtenverordnung – GbV)
Verordnung zum Schutz vor Gefahrstoffen (Gefahrstoffverordnung – GefStoffV) with Technical Rules for Hazardous Substances (TRGS)[32], particularly:
TRGS 201: Einstufung und Kennzeichnung bei Tätigkeiten mit Gefahrstoffen
TRGS 400: Risk Assessment for Activities Involving Hazardous Substances
TRGS 401: Risks Resulting from Skin Contact – Identification, Assessment, Measures
TRGS 402: Identification and Assessment of the Risks from Activities Involving Hazardous Substances: Inhalation Exposure
TRBA/TRGS 406: Sensibilisierende Stoffe für die Atemwege
TRGS 407: Tätigkeiten mit Gasen – Gefährdungsbeurteilung
BekGS 409: Using REACH-information for health and safety at work
TRGS 410: Expositionsverzeichnis bei Gefährdung gegenüber krebserzeugenden oder keimzellmutagenen Gefahrstoffen der Kategorien 1A oder 1B
TRGS 420: Process- and substance-specific criteria (VSK) for identifying and assessing inhalation exposure
TRGS 500: Schutzmaßnahmen
TRGS 507: Oberflächenbehandlung in Räumen und Behältern
TRGS 509: Lagern von flüssigen und festen Gefahrstoffen in ortsfesten Behältern sowie Füll- und Entleerstellen für ortsbewegliche Behälter
TRGS 510: Storage of Hazardous Substances in Non-stationary Containers
TRGS 511: Ammoniumnitrat
TRGS 512: Fumigations
TRGS 513: Tätigkeiten an Sterilisatoren mit Ethylenoxid und Formaldehyd
TRGS 519: Asbestos: Demolition, reconstruction or maintenance work
TRGS 520: Errichtung und Betrieb von Sammelstellen und Zwischenlagern für Kleinmengen gefährlicher Abfälle
TRGS 526: Laboratorien
TRGS 555: Working Instruction and Information for Workers
TRGS 560: Luftrückführung bei Tätigkeiten mit krebserzeugenden, erbgutverändernden und fruchtbarkeitsgefährdenden Stäuben
TRGS 600: Substitution
TRGS 611: Restrictions on the Use of Water-miscible or Water-mixed Cooling Lubricants whose Use can Result in the Formation of N-Nitrosamines
TRGS 720: Gefährliche explosionsfähige Gemische – Allgemeines
TRGS 721: Gefährliche explosionsfähige Gemische – Beurteilung der Explosionsgefährdung
TRGS 723: Gefährliche explosionsfähige Gemische – Vermeidung der Entzündung gefährlicher explosionsfähiger Gemische
TRGS 724: Gefährliche explosionsfähige Gemische – Maßnahmen des konstruktiven Explosionsschutzes, welche die Auswirkung einer Explosion auf ein unbedenkliches Maß beschränken
TRGS 725: Gefährliche, explosionsfähige Atmosphäre – Mess-, Steuer- und Regeleinrichtungen im Rahmen von Explosionsschutzmaßnahmen
TRGS 727: Vermeidung von Zündgefahren infolge elektrostatischer Aufladungen

32 According to Announcement IIIb3 of BMAS from 15.06.2015 (www.baua.de) previous TRGS may be used in future as a support for interpretation and application of the modified GefStoffV despite of the revised version of BetrSichV and consequent changes of GefStoffV. It should be noted that Technical Rules, which are not revised yet, must not contradict this Ordinance. In these cases the respective determinations are to regard as irrelevant.

TRGS 741: Organische Peroxide

TRGS 745/TRBS 3145: Ortsbewegliche Druckgasbehälter – Füllen, Bereithalten, innerbetriebliche Beförderung, Entleeren

TRGS 751/TRBS 3151: Vermeidung von Brand-, Explosions- und Druckgefährdungen an Tankstellen und Füllanlagen zur Befüllung von Landfahrzeugen

TRGS 800: Fire Protection Measures

TRGS 900: Arbeitsplatzgrenzwerte

TRGS 903: Biologische Grenzwerte (BGW)

TRGS 905: Verzeichnis krebserzeugender, keimzellmutagener oder reproduktionstoxischer Stoffe.

TRGS 906: Verzeichnis krebserzeugender Tätigkeiten oder Verfahren nach § 3 Abs. 2 Nr. 3 GefStoffV

TRGS 910: Risk-related concept of measures for activities involving carcinogenic hazardous substances

Gesetz über die Beförderung gefährlicher Güter (Gefahrgutbeförderungsgesetz – GGBefG)

Verordnung über die innerstaatliche und grenzüberschreitende Beförderung gefährlicher Güter auf der Straße, mit Eisenbahnen und auf Binnengewässern (Gefahrgutverordnung Straße, Eisenbahn und Binnenschifffahrt – GGVSEB)

Verordnung über die Beförderung gefährlicher Güter mit Seeschiffen (Gefahrgutverordnung See – GGVSee)

Gesetz zur Regelung der Gentechnik (Gentechnikgesetz – GenTG)

Verordnung über die Sicherheitsstufen und Sicherheitsmaßnahmen bei gentechnischen Arbeiten in gentechnischen Anlagen (Gentechnik-Sicherheitsverordnung – GenTSV)

Bekanntmachung der Liste risikobewerteter Spender- und Empfängerorganismen für gentechnische Arbeiten vom 5. Juli 2013 (https://www.bvl.bund.de/SharedDocs/Downloads/06_Gentechnik/register_datenbanken/organismenliste_pdf.pdf?__blob=publicationFile&v=9)

Bergverordnung zum gesundheitlichen Schutz der Beschäftigten (Gesundheitsschutz – Bergverordnung – GesBergV)

Gesetz zur Verhütung und Bekämpfung von Infektionskrankheiten beim Menschen (Infektionsschutzgesetz – IfSG)

Gesetz zur Erhöhung der Sicherheit informationstechnischer Systeme (IT-Sicherheitsgesetz) (Bundesgesetzblatt 2015, Teil I, Nr. 31 pp. 1324 et seqq.)

Gesetz zum Schutz der arbeitenden Jugend (Jugendarbeitsschutzgesetz – JArbSchG)

Bergverordnung zum Schutz der Gesundheit gegen Klimaeinwirkungen (Klima-Bergverordnung – KlimaBergV)

Verordnung zum Schutz der Beschäftigten vor Gefährdungen durch Lärm und Vibrationen (Lärm- und Vibrations-Arbeitsschutzverordnung – LärmVibrationsArbSchV) mit Technischen Regeln zur Lärm- und Vibrations-Arbeitsschutzverordnung (TRLV)

TRLV Lärm Teil Allgemeines: Technische Regel zur Lärm- und Vibrations-Arbeitsschutzverordnung – TRLV Lärm – Allgemeines

TRLV Lärm Teil 1: Beurteilung der Gefährdung durch Lärm

TRLV Lärm Teil 2: Messung von Lärm

TRLV Lärm Teil 3: Lärmschutzmaßnahmen

TRLV Vibration Teil Allgemeines: Technische Regel zur Lärm- und Vibrations-Arbeitsschutzverordnung – TRLV Vibrationen – Allgemeines

TRLV Vibration Teil 1: Beurteilung der Gefährdung durch Vibrationen

TRLV Vibration Teil 2: Messung von Vibrationen

TRLV Vibration Teil 3: Vibrationsschutzmaßnahmen

Muster-Richtlinie über den baulichen Brandschutz im Industriebau (Muster-Industriebau-Richtlinie – MIndBauRL)

Gesetz zum Schutze der erwerbstätigen Mutter (Mutterschutzgesetz – MuSchG)

Gesetz über die Bereitstellung von Produkten auf dem Markt (Produktsicherheitsgesetz – ProdSG)

Neunte Verordnung zum Produktsicherheitsgesetz (Maschinenverordnung – 9. ProdSV)

Elfte Verordnung zum Produktsicherheitsgesetz (Explosionsschutzverordnung – 11. ProdSV)

Vierzehnte Verordnung zum Produktsicherheitsgesetz (Druckgeräteverordnung – 14. ProdSV)

Verordnung über Sicherheit und Gesundheitsschutz bei der Benutzung persönlicher Schutzausrüstungen bei der Arbeit (PSA-Benutzungsverordnung – PSA-BV)

Verordnung über Sicherheit und Gesundheitsschutz bei der manuellen Handhabung von Lasten bei der Arbeit (Lastenhandhabungsverordnung – LasthandhabV)

Siebtes Buch Sozialgesetzbuch – Gesetzliche Unfallversicherung (SGB VII)

Gesetz über explosionsgefährliche Stoffe (Sprengstoffgesetz – SprengG) mit Verordnungen zum Sprengstoffgesetz (SprengV) und Sprengstofflager-Richtlinien (SprengLR) as well as Technical Rules on Explosives Laws (SprengTR), particularly:

Erste Verordnung zum Sprengstoffgesetz (1. SprengV)

Zweite Verordnung zum Sprengstoffgesetz (2. SprengV)

Dritte Verordnung zum Sprengstoffgesetz (3. SprengV)

SprengLR 210: Richtlinie Bauweise und Einrichtung der Lager für Sprengstoffe und Zündmittel

SprengLR 220: Richtlinie Bauweise und Einrichtung der Lager für pyrotechnische Sätze und Gegenstände

SprengTR 310: Sprengarbeiten

Verordnung zum Schutz vor der schädlichen Wirkung ionisierender Strahlung (Strahlenschutzverordnung – StrlSchV)

Verordnung zum Schutz der Beschäftigten vor Gefährdungen durch künstliche optische Strahlung (Arbeitsschutzverordnung zu künstlicher optischer Strahlung – OStrV) mit Technischen Regeln zur Arbeitsschutzverordnung zu künstlicher optischer Strahlung (TROS IOS)

Gesetz zur Ordnung des Wasserhaushalts (Wasserhaushaltsgesetz – WHG)

Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV)

Europäisches Übereinkommen über die Arbeit des im internationalen Straßenverkehr beschäftigten Fahrpersonals (AETR)

3. Accident Prevention Regulations (DGUV Regulations), DGUV Rules, DGUV Principles, DGUV Informations and Codes of Practice

Supply Sources:

Selected papers: Berufsgenossenschaft Rohstoffe und chemische Industrie, Postfach 10 14 80, 69004 Heidelberg, medienshop.bgrci.de or Jedermann-Verlag GmbH, Postfach 10 31 40, 69021 Heidelberg, www.jedermann.de, verkauf@jedermann.de

Member companies of BG RCI may obtain the papers listed free of charge (until the next source is cited), as long as the quantity is appropriate to the size of company. Some publications are available at downloadcenter.bgrci.de (free download).

All other publications: Deutsche Gesetzliche Unfallversicherung e. V., Glinkastraße 40, 10117 Berlin, www.dguv.de

Free download at publikationen.dguv.de

DGUV Regulation 1: Principles of prevention
DGUV Vorschrift 2: Occupational physicians and OSH professionals
DGUV Vorschrift 3: Electrical installations and equipment
DGUV Vorschrift 15: Elektromagnetische Felder
DGUV Vorschrift 21: Abwassertechnische Anlagen
DGUV Vorschrift 29: Steinbrüche, Gräbereien und Halden
DGUV Vorschrift 36: Hafenarbeiten
DGUV Vorschrift 38: Bauarbeiten
DGUV Vorschrift 52: Krane
DGUV Vorschrift 54: Winden, Hub- und Zuggeräte
DGUV Vorschrift 68: Flurförderzeuge
DGUV Vorschrift 70: Fahrzeuge
DGUV Vorschrift 73: Schienenbahnen
DGUV Vorschrift 77: Arbeiten im Bereich von Gleisen
DGUV Vorschrift 79: Verwendung von Flüssiggas
DGUV Regel 100-001: Grundsätze der Prävention
DGUV Regel 100-500: Betreiben von Arbeitsmitteln[33]
DGUV Regel 103-003: Arbeiten in umschlossenen Räumen von abwassertechnischen Anlagen
DGUV Regel 103-008: Steiggänge für Behälter und umschlossene Räume
DGUV Regel 103-011: Arbeiten unter Spannung an elektrischen Anlagen und Betriebsmitteln
DGUV Regel 103-013: Elektromagnetische Felder
DGUV Regel 108-003: Fußböden in Arbeitsräumen und Arbeitsbereichen mit Rutschgefahr
DGUV Regel 109-002: Arbeitsplatzlüftung – Lufttechnische Maßnahmen
DGUV Regel 109-003: Tätigkeiten mit Kühlschmierstoffen
DGUV Regel 109-005: Gebrauch von Anschlag-Drahtseilen
DGUV Regel 109-006: Gebrauch von Anschlag-Faserseilen
DGUV Regel 112-139: Einsatz von Personen-Notsignal-Anlagen
DGUV Regel 112-189: Benutzung von Schutzkleidung
DGUV Regel 112-190: Benutzung von Atemschutzgeräten
DGUV Regel 112-191: Benutzung von Fuß- und Knieschutz
DGUV Regel 112-192: Benutzung von Augen- und Gesichtsschutz
DGUV Regel 112-193: Benutzung von Kopfschutz
DGUV Regel 112-194: Benutzung von Gehörschutz
DGUV Regel 112-195: Benutzung von Schutzhandschuhen
DGUV Regel 112-198: Benutzung von persönlichen Schutzausrüstungen gegen Absturz
DGUV Regel 112-199: Retten aus Höhen und Tiefen mit persönlichen Absturzschutzausrüstungen
DGUV Regel 112-201: Benutzung von persönlichen Schutzausrüstungen gegen Ertrinken
DGUV Regel 113-001: Explosionsschutz-Regeln (EX-RL) mit Beispielsammlung
DGUV Regel 113-003: Zerlegen von Gegenständen mit Explosivstoff oder Vernichten von Explosivstoff oder Gegenständen mit Explosivstoff
DGUV Rule 113-004: Vessels, silos and confined spaces, Part 1: Work in vessels, silos and confined spaces, **incl. hazard catalogue**
DGUV Regel 113-005: Behälter, Silos und enge Räume – Teil 2: Umgang mit transportablen Silos
DGUV Regel 113-006: Einsatz von Fahrzeugen in Explosivstoffbetrieben
DGUV Regel 113-008: Pyrotechnik
DGUV Regel 113-009: Herstellen von Reinigungs- und Pflegemitteln, **incl. hazard catalogue**
DGUV Regel 113-010: Sicheres Arbeiten in der Gummiindustrie, **incl. hazard catalogue**
DGUV Regel 113-011: Sicheres Arbeiten in der Kunststoffindustrie, **incl. hazard catalogue**
DGUV Regel 113-017: Tätigkeiten mit Explosivstoffen
DGUV Regel 113-605: Herstellen von Beschichtungsstoffen
DGUV Regel 114-615: Branche Güterkraftverkehr – Gütertransport im Straßenverkehr
DGUV Regel 115-401: Branche Bürobetriebe

33 DGUV Regel 100-500 comprises contents of Accident Prevention Regulations withdrawn which are worthy of preservation. Source: publikationen.dguv.de

DGUV Information 201-005:	Handlungsanleitung zur Gefährdungsbeurteilung nach Biostoffverordnung (BioStoffV) – Tätigkeiten mit Boden sowie bei Grundwasser- und Bodensanierungsarbeiten
DGUV Information 203-001:	Sicherheit bei Arbeiten an elektrischen Anlagen
DGUV Information 203-004:	Einsatz von elektrischen Betriebsmitteln bei erhöhter elektrischer Gefährdung
DGUV Information 203-005:	Auswahl und Betrieb ortsveränderlicher elektrischer Betriebsmittel nach Einsatzbedingungen
DGUV Information 203-006:	Auswahl und Betrieb elektrischer Anlagen und Betriebsmittel auf Bau- und Montagestellen
DGUV Information 203-008:	Erste Hilfe bei erhöhter Einwirkung ionisierender Strahlung
DGUV Information 203-043:	Beeinflussung von Implantaten durch elektromagnetische Felder
DGUV Information 203-071:	Wiederkehrende Prüfungen ortsveränderlicher elektrischer Arbeitsmittel – Organisation durch den Unternehmer
DGUV Information 203-077:	Thermische Gefährdung durch Störlichtbögen
DGUV Information 205-001:	Betrieblicher Brandschutz in der Praxis
DGUV Information 205-003:	Aufgaben, Qualifikation, Ausbildung und Bestellung von Brandschutzbeauftragten
DGUV Information 205-006:	Arbeiten in sauerstoffreduzierter Atmosphäre
DGUV Information 205-023:	Brandschutzhelfer
DGUV Information 206-007:	So geht’s mit Ideen-Treffen – Tipps für Wirtschaft, Verwaltung und Dienstleistung
DGUV Information 206-009:	Suchtprävention in der Arbeitswelt – Handlungsempfehlungen
DGUV Information 206-017:	Gut vorbereitet für den Ernstfall! – Mit traumatischen Ereignissen im Betrieb umgehen
DGUV Information 206-018:	Trauma – Psyche – Job. Ein Leitfaden für Aufsichtspersonen
DGUV Information 206-024:	Schichtarbeit – (k)ein Problem?!
DGUV Information 206-026:	Psychische Belastung – der Schritt der Risikobeurteilung
DGUV Information 208-005:	Treppen
DGUV Information 208-007:	Roste – Auswahl und Betrieb
DGUV Information 208-008:	Roste – Montage
DGUV Information 208-016:	Handlungsanleitung für den Umgang mit Leitern und Tritten
DGUV Information 208-032:	Auswahl und Benutzung von Steigleitern
DGUV Information 208-033:	Muskel-Skelett-Belastungen – erkennen und beurteilen
DGUV Information 208-053:	Mensch und Arbeitsplatz – Physische Belastungen
DGUV Information 209-010:	Lichtbogenschweißer
DGUV Information 209-011:	Gasschweißen
DGUV Information 209-012:	Kranführer
DGUV Information 209-047:	Nitrose Gase beim Schweißen und bei verwandten Verfahren
DGUV Information 209-051:	Keimbelastung wassergemischter Kühlschmierstoffe
DGUV Information 209-061:	Gebrauch von Hebebändern und Rundschlingen aus Chemiefasern
DGUV Information 211-005:	Unterweisung – Bestandteil des betrieblichen Arbeitsschutzes
DGUV Information 211-006:	Sicherheit und Gesundheitsschutz durch Koordinieren
DGUV Information 211-010:	Sicherheit durch Betriebsanweisungen
DGUV Information 212-001:	Arbeiten unter Verwendung von seilunterstützten Zugangs- und Positionierungsverfahren
DGUV Information 212-007:	Chemikalienschutzhandschuhe
DGUV Information 212-024:	Gehörschutz
DGUV Information 212-515:	Persönliche Schutzausrüstungen
DGUV Information 213-002:	Hitzearbeit – Erkennen, beurteilen, schützen
DGUV Information 213-016:	Betriebsanweisungen nach der Biostoffverordnung
DGUV Information 213-022:	Gesund und fit im Kleinbetrieb; Beurteilung von Hitzearbeit, Tipps für Wirtschaft, Verwaltung, Dienstleistung
DGUV Information 213-030:	Gefahrstoffe auf Bauhöfen
DGUV Information 213-100:	Branchen- oder tätigkeitsspezifische Hilfestellung „Staub bei Elektroinstallationsarbeiten“
DGUV Information 213-101:	Branchen- oder tätigkeitsspezifische Hilfestellung „Keramische Industrie – Aufbereitung“ (Zerkleinern, Mischen, Fördern mineralischer Rohstoffe)
DGUV Information 213-102:	Branchen- oder tätigkeitsspezifische Hilfestellung „Natursteinindustrie“
DGUV Information 213-103:	Branchen- oder tätigkeitsspezifische Hilfestellung „Trockenmörtelindustrie“
DGUV Information 213-104:	Branchen- oder tätigkeitsspezifische Hilfestellung „Recycling-Baustoff-Industrie“
DGUV Information 213-105:	Branchen- oder tätigkeitsspezifische Hilfestellung „Kies-/Sand- und Quarzsand-Industrie“
DGUV Information 213-106:	Explosionsschutzdokument
DGUV Information 213-110:	Sprengarbeiten – Anwendungshinweise zur SprengTR 310
DGUV Information 213-500:	Von den Unfallversicherungsträgern anerkannte Analyseverfahren zur Feststellung der Konzentration krebserzeugender, erbgutverändernder oder fortpflanzungsgefährdender Stoffe in der Luft in Arbeitsbereichen
DGUV Information 213-850:	Sicheres Arbeiten in Laboratorien – Grundlagen und Handlungshilfen
DGUV Information 214-083:	Der sicherheitsoptimierte Transporter
DGUV Information 215-210:	Natürliche und künstliche Beleuchtung von Arbeitsstätten
DGUV Information 215-211:	Tageslicht am Arbeitsplatz – leistungsfördernd und gesund
DGUV Information 215-220:	Nichtvisuelle Wirkung von Licht auf den Menschen
DGUV Information 215-410:	Bildschirm- und Büroarbeitsplätze – Leitfaden für die Gestaltung
DGUV Information 215-442:	Beleuchtung im Büro – Hilfen für die Planung der künstlichen Beleuchtung in Büroräumen

DGUV Information 215-444: Sonnenschutz im Büro – Hilfen für die Auswahl von geeigneten Blend- und Wärmeschutzvorrichtungen an Bildschirm- und Büroarbeitsplätzen
DGUV Information 215-450: Softwareergonomie
DGUV Information 215-510: Beurteilung des Raumklimas – Handlungshilfe für kleine und mittlere Unternehmen
DGUV Information 215-520: Klima im Büro – Antworten auf die häufigsten Fragen
DGUV Information 215-830: Zusammenarbeit von Unternehmen im Rahmen von Werkverträgen
DGUV Information 250-010: Eignungsuntersuchungen in der betrieblichen Praxis
DGUV Grundsatz 306-001: Traumatische Ereignisse – Prävention und Rehabilitation
DGUV Grundsatz 308-002: Prüfung von Hebebühnen
DGUV Grundsatz 312-906: Grundlagen zur Qualifizierung von Personen für die sachkundige Überprüfung und Beurteilung von persönlichen Absturzschutzausrüstungen
DGUV Grundsatz 313-002: Auswahl, Ausbildung und Beauftragung von Fachkundigen zum Freimessen nach DGUV Regel 113-004
Fachbereich AKTUELL FBFHB-018: Hinweise zum betrieblichen Brandschutz bei der Lagerung und Verwendung von Lithium-Ionen-Akkus
Fachbereich AKTUELL FBFHB-024: Hinweise für die Brandbekämpfung von Lithium-Ionen-Akkus bei Fahrzeugbränden
Fachbereich AKTUELL FBGIB-001: Erkrankungsrisiken durch arbeitsbedingte psychische Belastung
Fachbereich AKTUELL FBGIB-005: Psychische Belastung und Beanspruchung von Beschäftigten während der Coronavirus-Pandemie
Fachbereich AKTUELL FBORG-002: Sicherheit und Gesundheit als Teil der Auftragsvergabe

**Selected papers: Berufsgenossenschaft Rohstoffe und chemische Industrie, Postfach 10 14 80, 69004 Heidelberg, medienshop.bgrci.de or Jedermann-Verlag GmbH, Postfach 10 31 40,
69021 Heidelberg, www.jedermann.de, verkauf@jedermann.de**

Member companies of BG RCI may obtain the papers listed free of charge (until the next source is cited) in quantities commensurate to the size of the company.

Merkblatt A 003: Suchtmittelkonsum im Betrieb; Risiken erkennen – vorbeugen und aktiv werden
Merkblatt A 004-1: Sicherheitsbeauftragte auswählen, qualifizieren und bestellen – Informationen der BG RCI für Unternehmerinnen und Unternehmer
Merkblatt A 008: Persönliche Schutzausrüstungen
Merkblatt A 009: Zusammenarbeit im Betrieb; Sicherheitstechnisches Koordinieren
Merkblatt A 010: Betriebsanweisungen für Tätigkeiten mit Gefahrstoffen (DGUV Information 213-051)
Merkblatt A 012: Mehr Sicherheit durch Kommunikation
Merkblatt A 013: Beförderung gefährlicher Güter (DGUV Information 213-052)
Merkblatt A 014: Gefahrgutbeförderung in Pkw und in Kleintransportern (DGUV Information 213-012)
Code of Practice A 016e: Risk Assessment – Seven Steps to the Goal
Code of Practice A 017e: Risk Assessment – Hazard Catalogue
Merkblatt A 019: Psychische Belastung erkennen – gesunde Arbeitsbedingungen gestalten
Code of Practice A 020e: Field Sales Forces, **incl. hazard catalogue** incl. 10 leaflets
Merkblatt A 021: Auf Nummer Sicher gehen! – Stolpern, Rutschen und Stürzen vermeiden, **incl. hazard catalogue**
Merkblatt A 022: Extremereignisse – Was tun?
Merkblatt A 023: Hand- und Hautschutz
Merkblatt A 024: Betriebsneulinge – Ein Leitfaden für Unternehmer und Führungskräfte
Merkblatt A 025-1: Das Sicherheitsgespräch – Psychologie im Arbeits- und Gesundheitsschutz
Merkblatt A 025-2: Sicheres Verhalten – Psychologie im Arbeits- und Gesundheitsschutz
Merkblatt A 025-3: Einführung in das Konfliktmanagement
Merkblatt A 025-5: Führen in der Krise
Merkblatt A 026: Gefährdungsorientiertes Unterweisen – Medien- und Gestaltungsvorschläge nach Gefährdungsfaktoren
Merkblatt A 027: Mutterschutz im Betrieb, **incl. hazard catalogue**
Merkblatt A 027-1: Beruf und Schwangerschaft – Arbeitsschutzinfos für Mitarbeiterinnen
Merkblatt A 029: Fremdfirmenmanagement – Ein Leitfaden für die Praxis
Merkblatt A 031: Rückenschmerzen ade! Wirbelsäulenerkrankungen vermeiden
Merkblatt A 034: Stress lass nach – Verhältnis- und Verhaltensprävention im Betrieb
Merkblatt A 035: Fair geht vor! Mobbing im Betrieb
Merkblatt A 038: Wegweiser Corona-Pandemie
Merkblatt B 002: Biologische Laboratorien – Ausstattung und organisatorische Maßnahmen (DGUV Information 213-086)
Merkblatt B 004: Viren – Einstufung biologischer Arbeitsstoffe (DGUV Information 213-088)
Merkblatt B 005: Parasiten – Einstufung biologischer Arbeitsstoffe; Besondere Schutzmaßnahmen für Tätigkeiten mit Parasiten (DGUV Information 213-089)
Merkblatt B 006: Prokaryonten (Bacteria und Archaea) – Einstufung biologischer Arbeitsstoffe (DGUV Information 213-090)
Merkblatt B 006-1: Prokaryonten (Bacteria und Archaea) – Einstufung biologischer Arbeitsstoffe – Ergänzungsliste (DGUV Information 213-091)
Merkblatt B 007: Pilze – Einstufung biologischer Arbeitsstoffe (DGUV Information 213-092)
Merkblatt B 009: Zellkulturen – Einstufung biologischer Arbeitsstoffe (DGUV Information 213-093)
Merkblatt B 012: Versuchstierhaltung (DGUV Information 213-108)
Merkblatt M 001: Organische Peroxide (DGUV Information 213-069)
Merkblatt M 001-1: Organische Peroxide – Arbeitsschutzinformationen für Beschäftigte
Merkblatt M 039: Fruchtschädigende Stoffe – Informationen für Mitarbeiterinnen und betriebliche Führungskräfte
Merkblatt M 053: Arbeitsschutzmaßnahmen bei Tätigkeiten mit Gefahrstoffen (DGUV Information 213-080)

Merkblatt M 058: Organische Peroxide – Antworten auf häufig gestellte Fragen (DGUV Information 213-096)
Merkblatt M 060: Gefahrstoffe mit GHS-Kennzeichnung – Was ist zu tun? (DGUV Information 213-082)
Code of Practice M 062e: Storage of Hazardous Substances (DGUV Information 213-084)
Merkblatt M 063: Lagerung von Gefahrstoffen – Antworten auf häufig gestellte Fragen (DGUV Information 213-085)
Merkblatt R 001: Exotherme chemische Reaktionen – Grundlagen (DGUV Information 213-063)
Code of Practice R 003e: Safety Characteristics – Measurement and Evaluation (DGUV Information 213-066)
Merkblatt R 004: Thermische Sicherheit chemischer Prozesse (DGUV Information 213-067)
Merkblatt R 005: Übertragung chemischer Synthesen vom Labor bis in den Betrieb (DGUV Information 213-068)
Merkblatt R 007: Lehren aus Ereignissen – Sicherheitstechnische Erkenntnisse für die Bewertung chemischer Reaktionen und thermisch sensibler Stoffe
Merkblatt R 008: Polyreaktionen und polymerisationsfähige Systeme (DGUV Information 213-097)
Merkblatt R 009: Reaktionen mit Ethylenoxid und andere Alkoxylierungen
Merkblatt T 002: Schlauchleitungen – Sicherer Einsatz, **incl. hazard catalogue** (DGUV Information 213-053)
Merkblatt T 008: Maschinen – Sicherheitskonzepte und Schutzeinrichtungen (DGUV Information 213-054)
Merkblatt T 008-0: Maschinen – Bau, Beschaffung und Bereitstellung
Merkblatt T 008-1: Checklisten Maschinen – Prüfung vor Erstinbetriebnahme
Merkblatt T 008-2: Checklisten Maschinen – Wiederkehrende Prüfung
Merkblatt T 008-3: Checklisten Maschinen – Elektrische, hydraulische und pneumatische Ausrüstung
Merkblatt T 009: Sicheres Betreiben von Spritzgießmaschinen **incl. hazard catalogue**
Merkblatt T 010: Arbeiten in Behältern, Silos und engen Räumen – Zugangs-, Positionierungs- und Rettungsverfahren (DGUV Information 213-055)
Merkblatt T 011: Wissenswertes über Lärm
Merkblatt T 015: Befüllen und Entleeren von Transporttanks für Flüssigkeiten – Eisenbahnkesselwagen, Tankfahrzeuge, Tankcontainer und Aufsetztanks
Merkblatt T 020: Rührwerke – Ausrüstung und Betrieb
Code of Practice T 021e: Gas Detection Equipment for Toxic Gases/Vapours and Oxygen – Use and Operation
Code of Practice T 023e: Gas Detection Equipment for Explosion Protection – Use and Operation
Merkblatt T 025: Umfüllen von Flüssigkeiten – vom Kleingebinde bis zum Container, **incl. hazard catalogue**
Merkblatt T 026: Probenahme – Flüssigkeiten, **incl. hazard catalogue**
Merkblatt T 028: Transport von Hand – Heben, Tragen, Schieben, Ziehen, **incl. hazard catalogue/Key Indicator Method**
Merkblatt T 033: Vermeidung von Zündgefahren infolge elektrostatischer Aufladungen (TRGS 727/DGUV Information 213-060)
Merkblatt T 036: Einsatz von Staubsaugern in explosivstoffgefährdeten Bereichen
Merkblatt T 040: Probenahme – Feststoffe, **incl. hazard catalogue**
Merkblatt T 041: Ergonomische Handwerkzeuge
Merkblatt T 049: Explosionsschutz – Antworten auf häufig gestellte Fragen
Merkblatt T 050: Explosionsschutz an Maschinen – Antworten auf häufig gestellte Fragen
Merkblatt T 051: Elektrostatik – Antworten auf häufig gestellte Fragen
Merkblatt T 053: Entzündbare Flüssigkeiten – Antworten auf häufig gestellte Fragen
Merkblatt T 054: Brennbare Stäube – Antworten auf häufig gestellte Fragen
Merkblatt T 055: Gaswarneinrichtungen und -geräte für den Explosionsschutz – Antworten auf häufig gestellte Fragen
Merkblatt T 058: Öffnen von Rohrleitungen
Merkblatt T 059: Abbrennen von Feuerwerken (DGUV Information 213-049)
Praxishilfe-Ordner: Arbeitsschutz mit System
Praxishilfe-Ordner: Aus Arbeitsunfällen lernen
Praxishilfe-Ordner: Aus Berufskrankheiten lernen
Praxishilfe-Ordner: Gerüstet für den Notfall
VISION ZERO-Leitfaden VZ 002-1: Leben Sie Führung
VISION ZERO-Leitfaden VZ 002-7: Motivieren durch Beteiligung
kurz & bündig KB 004: Der sichere Start in den Beruf – Infos für Auszubildende und Betriebsneulinge
kurz & bündig KB 006: Gefahrstoffkennzeichnung nach GHS – Grundzüge
kurz & bündig KB 009: Leitern und Tritte
kurz & bündig KB 015: Arbeiten im Freien – Gefährdung durch Sonnenstrahlung
kurz & bündig KB 017: Chemische Reaktionen und reaktive Chemikalien
kurz & bündig KB 022: Persönliche Schutzausrüstungen gegen Absturz
kurz & bündig KB 025: Druck und Druckentlastung – Gefährdungen in Prozessanlagen
kurz & bündig KB 026: Fehlerkultur
kurz & bündig KB 028-1: Brand- und Explosionsgefahren - Schutzmaßnahmen für sichere Tätigkeiten mit brennbaren Stoffen
kurz & bündig KB 028-2: Rechtlicher Wegweiser im Explosionsschutz
kurz & bündig KB 030: Corona-Pandemie – Schutz vor Infektionen durch SARS-CoV-2
kurz & bündig KB 031: Corona-Pandemie – Zusätzliche Gefährdungen und Belastungen durch außergewöhnliche betriebliche Bedingungen
kurz & bündig KB 032: Corona-Pandemie – Psychische Belastungen
kurz & bündig KB 035: LOCKOUT/TAGOUT, Sicherheit bei der Instandhaltung – mit System
kurz & bündig KB 038: Mobile Raumluftreiniger

Further References on Risk Assessments

File “Risk Assessment – Guidance Documents”
Merkblatt K 001: Gefährdungsbeurteilung für Kleinbetriebe – Allgemeiner Teil
Merkblatt K 002: Gefährdungsbeurteilung für Kleinbetriebe – Dekoration und innenliegender Sonnenschutz
Merkblatt K 003: Gefährdungsbeurteilung für Kleinbetriebe – Sonnenschutz im Freien
Merkblatt K 004: Gefährdungsbeurteilung für Kleinbetriebe – Bodenlegen
Merkblatt K 005: Gefährdungsbeurteilung für Kleinbetriebe – Ausbau Wand und Decke
Merkblatt K 006: Gefährdungsbeurteilung für Kleinbetriebe – Polsterei
Merkblatt K 007: Gefährdungsbeurteilung für Kleinbetriebe – Reitsportsattlerei
Merkblatt K 008: Gefährdungsbeurteilung für Kleinbetriebe – Fahrzeugsattlerei
Merkblatt K 009: Gefährdungsbeurteilung für Kleinbetriebe – Feintäschnerei
Merkblatt K 010: Gefährdungsbeurteilung für Kleinbetriebe – Gerbereien
Merkblatt K 013: Gefährdungsbeurteilung für Kleinbetriebe – Kies und Sand
CD 719 Baukasten Gefährdungsbeurteilung – Natursteinindustrie
CD 721 Baukasten Gefährdungsbeurteilung – Recycling
CD 722 Baukasten Gefährdungsbeurteilung – Kies und Sand
CD 724 Baukasten Gefährdungsbeurteilung – Betonfertigteile
CD 725 Baukasten Gefährdungsbeurteilung – Betonsteinindustrie
CD 726 Baukasten Gefährdungsbeurteilung – Transportbeton/Betonpumpen
CD 727 Baukasten Gefährdungsbeurteilung – Kunststoffindustrie
CD 728 Baukasten Gefährdungsbeurteilung – Kleinbaustellen
CD 729 Baukasten Gefährdungsbeurteilung – Natursteinbearbeitung
CD 730 Baukasten Gefährdungsbeurteilung – Betonrohre
Software GefDok light
Software GefDok KMU

4. Papers of other Accident Insurance Institutions

Supply Source: Berufsgenossenschaft Holz und Metall, Isaac-Fulda-Allee 18, 55124 Mainz, www.bghm.de

BGHM-Information 101: Mensch und Arbeitsplatz in der Holz- und Metallindustrie

5. DIN/EN Standards/VDE Regulations

Supply Source: Beuth Verlag GmbH, Burggrafenstraße 6, 10787 Berlin, www.beuth.de or VDE-Verlag GmbH, Bismarckstraße 33, 10625 Berlin, www.vde-verlag.de

DIN 2403:2018-10,	Identification of pipelines according to the fluid conveyed
DIN 4102 -1:1998-05,	Fire behaviour of building materials and building components – Part 1: Building materials, terminology, requirements and tests
DIN 25430:2016-10,	Sicherheitskennzeichnung im Strahlenschutz
DIN 33403-2:2000-08,	Klima am Arbeitsplatz und in der Arbeitsumgebung – Teil 2: Einfluss des Klimas auf den Wärmehaushalt des Menschen
DIN 33403-5:1997-01,	Klima am Arbeitsplatz und in der Arbeitsumgebung – Teil 5: Ergonomische Gestaltung von Kältearbeitsplätzen
DIN 33404-3:2016-04,	Gefahrensignale; Akustische Gefahrensignale – Teil 3: Einheitliches Notfallsignal
DIN 33411-1:1982-09,	Körperkräfte des Menschen; Begriffe, Zusammenhänge, Bestimmungsgrößen
DIN 33411-3:1986-12,	Körperkräfte des Menschen; Maximal erreichbare statische Aktionsmomente männlicher Arbeitspersonen an Handrädern
DIN EN 842:2009-01,	Safety of machinery – Visual danger signals – General requirements, design and testing
DIN EN 894-1:2009-01,	Safety of machinery – Ergonomics requirements for the design of displays and control actuators – Part 1: General principles for human interactions with displays and control actuators
DIN EN 894-2:2009-02,	Safety of machinery – Ergonomics requirements for the design of displays and control actuators – Part 2: Displays
DIN EN 894-3:2010-01,	Safety of machinery – Ergonomics requirements for the design of displays and control actuators – Part 3: Control actuators
DIN EN 894-4:2010-11,	Safety of machinery – Ergonomics requirements for the design of displays and control actuators – Part 4: Location and arrangement of displays and control actuators
DIN EN 981:2009-01,	Safety of machinery – System of auditory and visual danger and information signals
DIN EN 1005-2:2009-05,	Safety of machinery – Human physical performance – Part 2: Manual handling of machinery and component parts of machinery
DIN EN 1127-1:2019-10,	Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology
DIN EN 12195-1:2021-01,	Load restraining on road vehicles – Safety – Part 1: Calculation of securing forces
DIN EN 12464-1:2021-11,	Light and lighting – Lighting of work places – Part 1: Indoor work places
DIN EN 12464-2:2014-05,	Light and lighting – Lighting of work places – Part 2: Outdoor work places

DIN EN 13501-1:2019-05, Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
DIN EN 14253:2008-02, Mechanical vibration – Measurement and calculation of occupational exposure to whole-body vibration with reference to health – Practical guidance
DIN EN 14470-1:2022-01, Fire safety storage cabinets – Part 1: Safety storage cabinets for flammable liquids
DIN EN 14470-2:2006-11, Fire safety storage cabinets – Part 2: Safety storage cabinets for pressurised gas cylinders
DIN EN 15154-1:2006-12, Emergency safety showers – Part 1: Plumbed-in body showers for laboratories
DIN EN 15154-2:2006-12, Emergency safety showers – Part 2: Plumbed-in eye wash units
DIN EN 15154-3:2009-07, Emergency safety showers – Part 3: Non plumbed-in body showers
DIN EN 50110-1:2014-02, Operation of electrical installations – Part 1: General requirements (VDE 0105-1:2014-02)
DIN EN 50110-2:2021-11, Operation of electrical installations – Part 2: National annexe (VDE 0105-2:2019-10)
DIN EN 60825 Beiblatt 13:2013-04, Safety of laser products – Supplement 13: Measurements for classification of laser products (VDE 0837 Beiblatt 13:2014-04)
DIN EN 61310-1:2008-09, Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, acoustic and tactile signals (VDE 0113-101:2008-09)
DIN EN 61310-2:2008-09, Safety of machinery – Indication, marking and actuation – Part 1: Requirements for marking (VDE 0113-102:2008-09)
DIN EN 61310-3:2008-09, Safety of machinery – Indication, marking and actuation – Part 3: Requirements for the location and operation of actuators (VDE 113-103:2008-09)
DIN EN 61511-1:2019-02, Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and application programming Requirements (IEC 61511-1:2016 + COR1:2016 + A1:2017)
DIN EN 61511-2:2019-02, Functional safety – Safety instrumented systems for the process industry sector – Part 2: Guidelines for the application of IEC 61511-1 (IEC 61511-2:2016)
DIN EN 61511-3:2019-02, Functional safety – Safety instrumented systems for the process industry sector – Part 3: Guidance for the determination of the required safety integrity levels (IEC 61511-3:2016)
DIN EN ISO 7730:2006-05, Ergonomics of the thermal environment – Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria
DIN EN ISO 7731:2008-12, Ergonomics – Danger signals for public and work areas – Auditory danger signals
DIN EN ISO 12100:2011-03, Safety of machinery – General principles for design – Risk assessment and risk reduction
DIN EN ISO 13732-1:2008-12, Ergonomics of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces
DIN EN ISO 13857:2020-04, Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs
DIN EN ISO 14122-3:2016-10, Safety of machinery – Permanent means of access to machinery – Part 3: Stairs, stepladders and guard-rails
DIN EN ISO 19353:2019-06, Safety of machinery – Fire prevention and fire protection (ISO 19353:2015)
DIN ISO 45001:2018-06, Occupational health and safety management systems – Requirements with guidance for use
DIN CEN/TR 15350:2013-12, Mechanical vibration – Guideline for the assessment of exposure to hand-transmitted vibration using available information including that provided by manufacturers of machinery
DIN VDE 0105-100:2015-10, Operation of electrical installations – Part 100: General requirements
DIN VDE 1000-10:2021-06, Requirements for persons working in the field of electrical engineering

6. VDI Guidelines

Supply Source: Beuth-Verlag GmbH, Burggrafenstraße 6, 10787 Berlin, www.beuth.de

VDI 2057 Blatt 1:2017-08, Einwirkung mechanischer Schwingungen auf den Menschen – Ganzkörper-Schwingungen
VDI 2057 Blatt 2:2016-03, Einwirkung mechanischer Schwingungen auf den Menschen – Hand-Arm-Schwingungen
VDI 2263: 2018-07, Staubbrände und Staubexplosionen; Gefahren, Beurteilung, Schutzmaßnahmen
VDI/VDE 2180: Blatt 1:2022-03, Funktionale Sicherheit in der Prozessindustrie – Einführung, Begriffe, Konzeption
VDI 6022 Blatt 1:2018-01, Raumlufttechnik, Raumluftqualität – Hygieneanforderungen an Raumlufttechnische Anlagen und Geräte (VDI-Lüftungsregeln)

7. Other Publications and Media

Supply Source: Bundesamt für Bevölkerungsschutz und Katastrophenhilfe unter www.dguv.de/medien/inhalt/praevention/themen_a_z/biologisch/pandemieplanung/handbuch-betriebl_pandemieplanung.pdf

Handbuch Betriebliche Pandemieplanung, 2. extended and updated edition, Landesgesundheitsamt Baden-Württemberg im Regierungspräsidium Stuttgart und Bundesamt für Bevölkerungsschutz und Katastrophenhilfe

Supply Source: BG Verkehr, Ottenser Hauptstraße 54, 22765 Hamburg free download at https://www.bg-verkehr.de/medien/medienkatalog/broschueren/einkaufsratgeber-fuer-gewerblich-genutzte-fahrzeuge

Einkaufsratgeber für gewerblich genutzte Fahrzeuge (Materialnummer: 670-300-182)

Supply Source: BG Verwaltungs-Berufsgenossenschaft (VBG), Massaquoipassage 1, 22305 Hamburg, free download at https://cdn.vbg.de/media/8a1bc8ac72324a14b0cbfe7c27afad8b/dld:attachment/Factsheet_Erreichbarkeit.pdf

Factsheet „Erweiterte Erreichbarkeit gestalten“ of VBG

Supply Source: IVSS-Sektion Chemie, c/o Berufsgenossenschaft Rohstoffe und chemische Industrie, Kurfürsten-Anlage 62, 69115 Heidelberg, https://www.issa.int/prevention-chemistry and Berufsgenossenschaft Rohstoffe und chemische Industrie, Postfach 10 14 80, 69004 Heidelberg, medienshop.bgrci.de

ISSA-01: Das PAAG-/HAZOP-Verfahren und weitere praxisbewährte Methoden – Risikobeurteilung in der Anlagensicherheit

ISSA-03: Verwechslung von Chemikalien

ISSA-36: Praxishilfen zur Erstellung des Explosionsschutzdokumentes

Supply Source: Bookshops

Rothe, I.; Adolph, L.; Beerann, B.; Schütte, M.; Windel, A.; Grewer, A.; Lenhardt, U.; Michel, J.; Thomson, B.; Formazin, M.: Psychische Gesundheit in der Arbeitswelt – Wissenschaftliche Standortbestimmung. 1. Edition. Dortmund: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin 2017. ISBN: 978-3-88261-225-7, 260 pages, Number of project: F 2353, paper, PDF-file, DOI: 10.21934/baua:bericht20170421 or free download at www.baua.de, search term: baua:bericht20170421

Fachkonzept: Führung und psychische Gesundheit (Ed.: Deutsche Gesetzliche Unfallversicherung e. V.). ISBN: 978-3-86423-101-8 or free download at publikationen.dguv.de (Order No. 12224)

IFA-Handbuch – Sicherheit und Gesundheitsschutz am Arbeitsplatz. (Ed.: Deutsche Gesetzliche Unfallversicherung e. V.). ISBN: 978-3-503-13083-2

Datenjahrbuch “Betriebswacht” (Ed.: Deutsche Gesetzliche Unfallversicherung). ISBN: 978-389869-204-5

Lexikon Sicherheit und Gesundheit bei der Arbeit. ISBN: 3-89869-088-1

Praxishandbuch Zoneneinteilung – Einteilung explosionsgefährdeter Bereiche in Zonen. ISBN: 978-3-452-29164-6

Fachbuch: Gefährdungsbeurteilung psychischer Belastung – Erfahrungen und Empfehlungen (Ed.: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Erich Schmidt Verlag). ISBN: 978-3-503-15439-5

IFA-Report 5/2011: Elektromagnetische Felder an Anlagen, Maschinen und Geräten (Ed.: Deutsche Gesetzliche Unfallversicherung e. V.). ISBN: 978-3-86423-011-0 or free download at publikationen.dguv.de (Order No. 10814)

INQA-Unternehmenscheck “Guter Mittelstand”. Erfolg ist kein Zufall – Wie lassen sich Arbeitsgestaltung und Organisation verbessern? (Ed.: Vorsitzender der “Offensive Mittelstand – Gut für Deutschland”). ISBN 978-3-940506-22-1 or online at www.inqa-unternehmenscheck.de

Praxisanleitung 13: Umgang mit Expositionsszenarien – Hinweise für nachgeschaltete Anwender – Freier Download unter https://echa.europa.eu/de/practical-guides – https://echa.europa.eu/documents/10162/13655/du_practical_guide_13_de.pdf/675a22d1-1b9c-417f-905d-c3166532fae2

BIA-Report 3/2001: Berechnungsverfahren und Modellbildung in der Arbeitsbereichsanalyse (Ed.: Deutsche Gesetzliche Unfallversicherung e. V.). ISBN: 3-88383-588-9 or free download at publikationen.dguv.de (Order No. 10100)

BAuA-Forschungsbericht Fb 1058: Methoden zur Erfassung psychischer Belastungen – Erprobung eines Messinstrumentes (COPSOQ). ISBN: 3-86509-394-9 or free download at www.baua.de

Gebhardt, H.; Müller, B. H., Ergonomische Gestaltung von Kältearbeitsplätzen, 1. Edition. Dortmund: 2003. (Quartbroschüre: Technik, T 32 der BAUA), ISBN: 3-88261-430-7, *out of print*

Supply Source: Deutsche Gesetzliche Unfallversicherung (DGUV), Mittelstraße 51, 10117 Berlin, info@dguv.de

Innenraumarbeitsplätze – Vorgehensempfehlung für die Ermittlungen zum Arbeitsumfeld Das GHS-Spaltenmodell 2020 – Eine Hilfestellung zur Substitutionsprüfung nach Gefahrstoffverordnung

Supply Source: Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb), Postfach 1231, 48338 Altenberge

Richtlinie vfdb 01-01: Brandschutzkonzept

Supply Source: Geschäftsstelle der Nationalen Arbeitsschutzkonferenz, c/o Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BAuA), Nöldnerstraße 40–42, 10317 Berlin

Free Download at www.gda-portal.de

Leitlinie “Gefährdungsbeurteilung und Dokumentation” of Gemeinsame Deutsche Arbeitsschutzstrategie (GDA)

Leitlinie “Empfehlungen zur Umsetzung der Gefährdungsbeurteilung psychischer Belastung” der Gemeinsamen Deutschen Arbeitsschutzstrategie (GDA)

GDA-ORGAcheck “Arbeitsschutz mit Methode – zahlt sich aus” (Ed.: Direction of work pro-gramme “Organisation” of Joint German Occupational Safety and Health Strategy (GDA). ISBN: 978-3-940506-31-3 or online at www.gda-orgacheck.de

Supply Source: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Friedrich-Henkel-Weg 1–2,544149 Dortmund
Free Download at www.baua.de/DE/Themen/Arbeitsgestaltung-im-Betrieb/Physische-Belastung/Leitmerkmalmethode/Leitmerkmalmethode_node.html

Gefährdungsbeurteilung mit Leitmerkmalmethode mittels bearbeitbarer PDF-Dokumente:

> Leitmerkmalmethode zur Beurteilung und Gestaltung von Belastungen beim manuellen Heben, Halten und Tragen von Lasten ≥ 3 kg (LMM-HHT)
> Leitmerkmalmethode zur Beurteilung und Gestaltung von Belastungen bei manuellen Arbeitsprozessen (LMM-MA)
> Leitmerkmalmethode zur Beurteilung und Gestaltung von Belastungen bei Körperzwangshaltungen (LMM-KH)
> Leitmerkmalmethode zur Beurteilung und Gestaltung von Belastungen beim manuellen Ziehen und Schieben von Lasten (LMM-ZS)
> Leitmerkmalmethode zur Beurteilung und Gestaltung von Belastungen bei der Ausübung von Ganzkörperkräften (LMM-GK)
> Leitmerkmalmethode zur Beurteilung und Gestaltung von Belastungen bei Körperfortbewegung (LMM-KB)

Supply Sources: Berufsgenossenschaft Rohstoffe und chemische Industrie, Postfach 10 14 80, 69004 Heidelberg, medienshop.bgrci.de or Jedermann-Verlag GmbH, Postfach 10 31 40, 69021 Heidelberg, www.jedermann.de, verkauf@jedermann.de

"Kompendium Arbeitsschutz", available as an Online Database or DVD-ROM (both with costs): Rules and regulations, symbol library, software for implementation and documentation of risk assessments (GefDok light, GefDok KMU and GefDok Pro). Information and a temporary test access free of charge at www.kompendium-as.de

"Kompendium Maschinensicherheit" (on DVD) for the safety of machinery comprises important EU-Directives, Laws, Ordinances and Technical Rules, machine-specific publications of DGUV and Codes of Practice including checklists of BG RCI, Codes of Practice and guidance documents for risk assessments, publications about the subject "Maschinen der chemischen Industrie" of the division "Rohstoffe und chemische Industrie" of DGUV, short information on standards and guidance documents like e.g. different sets of transparencies for training purposes

DVD "Fit für Job und Leben"/Ausgabe 04: Sucht

DVD "Fit für Job und Leben"/Ausgabe 05: Ernährung

DVD "Fit für Job und Leben"/Ausgabe 10: Schichtarbeit/Schlaf und Gesundheit

8. Databases

GESTIS database on substances of DGUV at www.dguv.de/ifa/stoffdatenbank providing information on safe handling with hazardous substances and other chemical substances at work. The database informs on important physico-chemical data and specific rules regarding individual substances, particularly for classification and labelling according to GHS in compliance with CLP-Regulation. Information about ca. 9.400 substances is available.

GESTIS-Stoffenmanager® is an instrument, provided by the IFA, intended to support conducting a risk assessment. It is recommended in the TRGS 400, Section 5.1. The GESTIS-Stoffenmanager® consists of two modules:
– the module "Control banding"
– the module "Quantitative exposure assessment"
A valid email address is needed to create an account.

GESTIS database on biological agents of DGUV at www.dguv.de/ifa/gestis/gestis-biostoffdatenbank/index.jsp providing information on safe activities with biological agents at work. The database informs on important properties of individual biological agents and comprises details for more than 18.000 biological agents. Information about activities in different branches, where biological agents may occur, is available in specific activity data sheets.

GESTIS-STAUB-EX database at www.dguv.de/ifa/gestis-staub-ex is a project supported by the Commission of the European Union. The database comprises important fire and explosion characteristics of more than 6.000 dust samples from almost any branch and serves as a base for safe handling with flammable dust and planning of safeguards against dust explosions in plants generating or processing dust. The data have been determined by testing laboratories of: Bundesanstalt für Materialforschung und -prüfung (BAM), Berufsgenossenschaft Nahrungsmittel und Gastgewerbe (BGN), Institut für Arbeitsschutz der DGUV (IFA), DMT Gesellschaft für Forschung und Prüfung mbH, Fachstelle für Brand- und Explosionsschutz über Tage – Bergbau-Versuchsstrecke (BVS) – and Henkel KGaA.

GSBL Database "Stäube" at https://gsbl.de/eng_home.html, a joint information system of the German Federal Government and the Federal States on chemical substances including safety characteristics of dusts which are pooled in groups (based on the GESTIS-STAUB-EX Database). Ranges are given in which safety characteristics of the dust groups are allowed to vary, as well as their safety-relevant limit values. On the website https://recherche.chemikalieninfo.de offered by the information system "ChemInfo Public" a free limited access to the database is available. The search for the range of safety parameters of flammable dusts is free of charge.

Information system on hazardous chemical substances "GisChem" at www.gischem.de of the German Social Accident Insurance Institution for the Raw Materials and Chemical Industry (BG RCI) and German Social Accident Insurance Institution for the Woodworking and Metalworking Industries (BGHM) including different modules, e.g. "GisChem-Interaktiv" to create individual operating instructions and document the risk assessment-hazardous substances, "Gefahrstoffverzeichnis" ("register of hazardous substances") or "Gemischrechner" ("mixture calculator") for the classification of mixtures according to CLP-Regulation. GisChem particularly supports small and medium-sized enterprises for safe handling with and management of hazardous substances.

Portal www.gefaehrdungsbeurteilung.de of the Federal Institute for Occupational Safety and Health (BAuA) was developed in close coordination with responsible authorities of "Joint German Occupational Safety and Health Strategy" (GDA). It comprises basic knowledge about risk assessments, guidance documents for the implementation of risk assessments, expert knowledge about all relevant risk factors as well as additional helpful information and offers around the issue risk assessment.

CHEMSAFE database presenting evaluated safety characteristics for fire and explosion prevention of flammable gas, liquids and dust. The database comprises at present more than 3.000 pure substances and mixtures. This database is a collaborative project of the Gesellschaft für Chemische Technik und Biotechnologie e. V. (DECHEMA e. V.), the Physikalisch-Technische Bundesanstalt (PTB) and the Bundesanstalt für Materialforschung und -prüfung (BAM). CHEMSAFE can be licensed as in-house application or a fee-based online access is offered, too. A basic version of the database CHEMSAFE is available at www.chemsafe.ptb.de (free of charge) – a registration is required.

Portal Luftbefeuchtung of BG ETEM
The portal provides information related to technical air humidification.
Source: https://Luftbefeuchtung.bgetem.de