

Technical Rules for Biological Agents	Protective measures for activities involving microbially contaminated archival materials	TRBA 240
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The Technical Rules for Biological Agents (TRBA) reflect the state of technology, occupational health and occupational hygiene as well as other sound knowledge for activities involving biological agents including their classification. The

Committee on Biological Agents (ABAS)

establishes the rules and adapts them to the current state of development accordingly. The TRBA rules are announced by the Federal Ministry of Labour and Social Affairs (BMAS) in the Joint Ministerial Gazette (GMBI.).

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1. Scope

The present TRBA applies when biological agents are released or may be released during activities involving contaminated archival materials and workers may come into contact with these biological agents. Activities where this is the case are non-specific activities within the meaning of the Biological Agents Ordinance (BioStoffV).

2. Definitions

2.1 Archival materials

Archival materials encompass in particular documents, files, official and business books, printed material, maps and plans, drawings and posters, pictorial and sound documents, electronic data media, seals, signets, stamps, bequests and collections. Within the meaning of the present TRBA non-assessed documents are also considered to be archival materials.

2.2 Archives

Archives are facilities or parts of facilities which are concerned primarily with the logging, acceptance, storage, preservation and utilisation of written material which is to be safeguarded permanently. Within the meaning of the present TRBA interim archives and (old) registries which only store written material temporarily are also subsumed under the term "archives".

2.3 Stores

The term store describes the part of an archive or administrative building in which archival materials are stored.

2.4 Contamination

Contamination is regarded as the level of biological agents going beyond the background level which is harmless to health.

2.5 Decontamination

Reduction of the level of biological agents to the background level which is harmless to health.

2.6 Disinfection processes

Measures ensuring that by physical and/or chemical processes materials and objects are in such a condition that they are no longer infectious.

2.7 Sterilisation

Killing or deactivating all biological agents including their dormancy phases by means of physical and/or chemical processes.

2.8 Water content

The water content of the paper, also called material moisture or substrate moisture, is the absolute percentage of water in relation to the total mass of the paper.

2.9 Near-surface relative humidity

The near-surface relative humidity is the relative humidity directly at the object, in this case directly at the paper.

Furthermore the definitions of § 2 of BioStoffV shall apply.

3. General remarks/ objectives

The aim of the present TRBA is to protect workers against a hazard to their health and safety during non-specific activities involving biological agents in archives. For this purpose it gives the employer the necessary information to enable him to establish whether non-specific activities involving biological agents are performed or may be performed in an archive and to conduct the risk assessment.

The TRBA lays down the measures to protect workers against risks due to exposure to biological agents in archives. The employer takes the protective measures required on the

basis of the type, extent and duration of the exposure identified within the framework of the risk assessment. Implementation of these measures must take account of the actual circumstances in the archive.

4. Risk assessment

With activities involving archival materials there is no need to expect health risks to workers from biological agents if archival materials are stored in a proper fashion under conditions which are suitable structurally and in terms of indoor climate.

If modified storage conditions lead, for example due to building damp combined with temperature increases, to contamination of archival materials because of favourable growth and reproduction conditions for biological agents, they may have health risk consequences for workers in archives. Health risks may also arise if archival materials contaminated by biological agents have to be worked on by employees.

If the risk assessment according to § 5 of the Occupational Safety and Health Act has revealed that the archival materials are contaminated with biological agents (mould, as well as possible yeast, bacteria and viruses), the risk assessment for non-specific activities involving biological agents in archives must be conducted in accordance with § 7 et seq. BioStoffV. A risk may arise due to sensitizing or toxic effects of biological agents and due to infectious effects.

Biological agents are mostly introduced by airborne means or by the incorporation of archival materials already contaminated.

The main causes of massive growth and reproductive processes of moulds, yeast and bacteria in archives are structural deficiencies (for example building damp, thermal bridges, leaky roofs, insufficient air exchange rates, difficult to clean rooms), excessively high room temperatures and indoor relative humidity, inadequate cleanliness and excessive water levels in the archival materials¹ and/or excessive near-surface relative humidity at the archival materials² [1].

4.1 Classification of biological agents into risk groups and consideration of existing sensitising or toxic effects

Moulds and bacteria:

Moulds grow in the form of microscopically small, branched threads (hyphens). They can form meshworks (mycelia) visible to the naked eye of partially considerable size. Water and mildew stains, powdered or furry coating combined with discolorations and material degradation indicate infestation.

Moulds are normally classified according to their infection risk in the risk groups 1 or 2 (see Table 1). Of secondary importance in terms of epidemiology with respect to frequency are infectious diseases (such as aspergilloma) due to moulds. These occur in particular when there is already a general or local weakening of the immune system as a result of other serious diseases.

¹ The water content with 50 % relative humidity is between 6 and 10% depending on the type of paper. It can be determined by applying suitable instruments on the basis of conductivity measurements (moisture measuring instruments for paper and cardboard).

² The near-surface relative humidity at the archival materials may deviate considerably from the relative humidity in the room and should not be more than 60 %. It can be determined using relative humidity measuring instruments with a sword sensor which is inserted into the paper stack.

Table 1: Classification of biological agents verified in contaminated archives:

Biological agent	Transmission route	Risk group	Remarks on toxic (t) or sensitising (s) effects
moulds e.g. <i>Aspergillus</i> , like - <i>A. fumigatus</i> - <i>A. niger</i> <i>Penicillium</i> <i>Alternaria</i> <i>Mucor</i>	inhalation of contaminated dust	1 and 2	t: mycotoxins; glucans s: mould spores hyphen
<i>Actinomyces</i>	inhalation	1	s

Moulds can cause sensitisation. Extended, intensive contact with moulds in high concentrations, especially with an existing predisposition (atopy) can lead to a sensitisation through to serious allergic disorders. The allergens adhering to mould spores or mould threads are responsible for this in particular. The allergens can also be given off to the ambient dust.

According to current knowledge mycotoxins do not play any role in activities involving contaminated archival materials. There are indications of a possible inhalation intake of single mycotoxins, but the concentrations needed for this are not reached in archives.

Among the bacteria types a number of types of actinomycetes have allergenic potential.

In individual cases it may be possible that rodents or birds penetrate an archive due to structural deficiencies. Through their excreta or parasites (e.g. fleas and ticks) these may themselves transmit pathogens. Infections with these pathogens probably occur very rarely.

4.2 Activity-related risks

In the identification of type, extent and duration of the exposure of workers to sensitising or toxic biological agents the following activities involving direct skin contact and/or aerosol formation are to be rated as hazardous:

- The logging, assessment, segregation, accounting, acceptance, retention and preservation (cleaning, decontamination, packaging, filming, digitisation, conservation and restoration), digging out or repositioning, making accessible, rendering usable and researching of archival materials contaminated with biological agents in a moist or still unclean state
- Taking samples of micro-organisms
- Cleaning of rooms (including furniture) which contain or have contained archival materials
- Inspection, maintenance and repair of ventilation systems (e.g. extraction devices or indoor ventilation systems).

It must be pointed out that after sterilization the allergenic potential of moulds normally remains.

4.3 Allocation to a protection level

Non-specific activities involving biological agents in archives due to the handling of contaminated archival materials must normally be allocated under § 7 (2) of the BioStoffV to protection level 1.

In addition to the general hygienic measures of protection level 1 suitable protective measures related to the sensitising effects of the biological agents must be taken into account.

With the implementation of the measures according to the present TRBA the employer may assume that he fulfils the requirements of BioStoffV.

4.4 Other risks

In the risk assessment account should also be taken of dusts and any sensitising house dust and storage mites which they contain, their excrement and decomposition products [2; 3; 4].

Dusts which contain moulds, house dust mites and storage mites, their excrement and decomposition products are rated as sensitising for the respiratory tracts under TRGS 907 [2] (see No. 4.2. (4) and No. 4.4).

5. Protective measures

5.1 General remarks

(1) The application of technical protective measures invariably has priority over the use of organisational measures. Personal protective equipment, such as respirators, must only be worn if technical and organisational protective measures cannot guarantee that the protective goal is reached.

(2) The protective measures must be adjusted to the state of the art within a reasonable period.

(3) The number of workers who perform hazardous non-specific activities involving biological agents must be limited to a minimum. The duration of these activities must be reduced to a minimum.

(4) Under § 12 (1) and (2) of BioStoffV an operating manual must be drawn up and the workers must receive instruction. The operating manual shall contain in particular provisions covering the following items:

- effect of biological agents / possible health hazards,
- instructions on the behaviour of workers relating to activities involving biological agents,
- necessary protective measures including first-aid measures.

If required a hygiene plan must be drawn up.

(5) If workers of other employers work in the archive (e.g. cleaning or waste disposal companies, companies engaged in structural reconstruction) the employers are obliged to collaborate in the implementation of the safety and health provisions (§ 8 Occupational Safety and Health Act). Where necessary for the safety and health of workers at work the employers shall inform one another and their workers, depending on the nature of the activities, of the hazards to safety and health involved in the work and shall agree on measures to prevent such hazards.

(6) All workers, including workers of external companies and temporary workers in the archive (e.g. trainees, craftsmen and cleaning personnel), who perform activities in areas where there is contaminated archival materials shall be given verbal and workplace-related instruction before commencement of their activities and subsequently once a year on the hazards arising during their activities involving biological agents and the requisite protective measures. The instruction shall be given on the basis of the operating manual. Any change in the activities must be taken into account here. The content of all courses of instruction their timing must be recorded in writing and confirmed by signature of those receiving the instruction. For all workers performing activities involving microbially contaminated archival materials a general occupational-medical consultation (see No. 7.2) must be provided as part of the instruction.

(7) It is possible to deviate from the provision of the present TRBA in individual cases if the result of the risk assessment permits this. This may be the case if equivalent protective measures are taken. The equivalence of the protection level must be verified in each individual case if demanded by the competent authority.

(8) Basically the requirements of TRBA 500 [5] must be implemented.

5.2 Structural and technical protective measures

Indoor climatic conditions

The measures described below help on the one hand to protect archival materials [6] and on the other to minimise the growth and reproductive processes of microorganisms.

This is achieved in stores with the following indoor climatic parameters:

Room temperature	$18 \pm 2^{\circ}\text{C}$
Relative humidity	$50 \pm 5 \%$.

Regular measurement of room temperature and relative humidity at representative locations in stores is essential in order to regulate via the heating and ventilation system if these parameters are exceeded. Where there is so-called natural ventilation the aim must be a complete exchange with outside air where its climatic values are suitable for achieving the above indoor climatic parameters [7].

Further requirements relating to the protection of the archival materials must be complied with.

Any influence on the archival materials from heat as a result of solar radiation must be avoided. In order to protect material stored in the area of windows from excessive heating it is recommended that sunshade facilities (e.g. external blinds etc.) be installed.

Where an indoor ventilation system is present or is to be installed, it must be inspected and serviced annually by knowledgeable personnel to check adequate retention capacity with respect to biological agents [8]. It must be set according to the parameters of this section. Air outlets of the system may not be located in the proximity of air inlets to other rooms, window openings of doors. It must be prevented that biological agents be discharged into other working rooms by installing and regularly changing filters. Used filter elements must be disposed of in sealed containers.

In rooms with natural ventilation or to supplement an existing indoor ventilation system operation of a dehumidifier with suitable air filter systems may help optimise the relative humidity.

Stationary air circulation devices and dehumidifiers may only be set up and operated in such a way that they do not swirl up dust.

Room design

Fittings, equipment and materials must be selected to ensure that dust deposits are kept as low as possible. Walls, surfaces and floors must be easy to clean. As a preventive measure, for example, difficult to access angles and corners, structural depressions, apertures, pipes and ducts, fitted carpets, curtains, other textile coverings, open-pore wood, unplastered brickwork with joints, so-called facing concrete, roughcast, structural plaster, claddings with open-pore plastic or synthetic foam panels and other porous surfaces, as well as surfaces of statically chargeable material, lined wall claddings which encourage the depositing of biological agents (e.g. mould spores), should be avoided.

Existing shelf systems must be checked with respect to their ease of cleaning and their arrangement in relation to the windows. Adequate ventilation must also be ensured. Any inappropriate use of the storage rooms, in particular for the storage of objects not belonging to the archive, must be prohibited.

No permanent workstations may be set up in storage rooms.

Where building damp is present it may be necessary to perform a structural reconstruction of the building [9], where relevant in order to achieve the technical parameters specified.

Technical occupational safety and health equipment

If regular activities involving heavy aerosol formation are performed extraction systems must be installed which guarantee the protection of persons by means of a flow of air through the working opening in the direction of the interior of the technical protective device. These requirements are fulfilled, for example, by microbiological safety workbenches (MSW) of class I [10]. The air extracted may not be returned unfiltered into the room air.

These extraction devices must be inspected and serviced regularly (once a year) by knowledgeable personnel.

5.3 Organisational measures

General organisational measures

Incoming archival materials should invariably be checked for microbial contamination and archival stocks already in store should be spot-checked for microbial contamination. Such checks must be conducted visually.

When moist, discoloured, damaged and moldy smelling archival materials are discovered it must be stored in a separate place from non-infested archival materials. In cases of doubt concerning a possible contamination and for the measures required in this connection suitable specialists (e.g. restorers) must be engaged. The causes of the finding must be identified. Sources of moisture must be located and eliminated. Furthermore in such cases the water content of the archival materials or the near-surface relative humidity at the archival materials on reception or discovery must be identified.

Protective clothing (see section 5.5) is necessary in the case of skin contact with contaminated archival materials or the formation of aerosols of microbially contaminated dusts, e.g. when mould-bearing dust is brushed off, heavily contaminated archival materials are transported and packaged, and in the case of filming, digitalisation or the moisture treatment of contaminated archival materials.

Street clothing must be kept separate from protective clothing. The employer is responsible for the provision, appropriate storage, regular cleaning and repair of the personal protective equipment (§ 11 (1) BioStoffV in combination with § 2 PPE User Ordinance).

Where no extraction devices are available, to process the contaminated archival materials suitable protective overalls (long sleeves, closed collar) and protective gloves must be provided, as must individual, tight-fitting half-face masks at least with particle filters of the class P2 or particle-filtering half-face masks at least FFP2 with exhalation valve must be provided.

A hand-washing facility must be installed for use before work breaks and after work and it must be provided with a skin washing agent. In addition skin protection and skin care agents must be made available at this facility.

It is not permitted to wet the finger when leafing.

When archival materials are being stored, appropriate measures must be taken to ensure that moisture can escape from the archival materials (e.g. with the use of breathable materials).

In all rooms where archival materials are stored and processed (e.g. stores, workshops) eating and drinking must be prohibited. For this purpose recreation rooms must be used.

In storerooms and workshops it is not permitted to keep plants (risk of contamination from the soil and an increase in relative humidity).

If rodents or birds appear in the archive rooms measures must be taken to exclude them from these rooms.

The shredding of contaminated archival materials involves the risk of an increased release of biological agents and so it must be limited to the necessary level while providing suitable personal protective equipment (air-permeable single-use suits with hood type 5, individual, tight-fitting, particle-filtering half-face masks FFP3 or blower filtering devices with hoods (TH3P) and protective gloves).

Cleaning

For the initial rough cleaning of massively contaminated archive rooms and the archival materials single-use suits with closely fitting hoods (hair protection) type 5 and individual, tight-fitting half-face masks with at least particle filter of class P2 or particle-filtering half-face masks of at least FFP2 with exhalation valve as well as suitable protective gloves (e.g. nitrile gloves) must be used.

Individual, tight-fitting half-face masks with particle filter of class P3 or particle-filtering half-facemasks FFP3 with exhalation valve are to be worn if it is suspected that the dust or the archival materials are covered with pigeon or rodent excretions or if dead animals are found. The personal protective equipment must be supplemented if necessary by sock liners. After the protective gloves have been removed the hands must be disinfected in such cases. Hand disinfectants must be provided.

Rooms in which contaminated archival materials are stored or processed must be cleaned regularly, ideally every week, in a way that does not create dust. All surfaces (floors, shelves, tables etc.) must be disinfected if necessary by wiping or scrubbing while wearing suitable personal protective equipment (e.g. protective overalls and protective gloves).

Reference should be made to the BG rule “Exposure to cleaning and care products” BGR 209 [11] and the valid list of disinfectants [12].

Archival materials should invariably be cleaned by non-dust-forming means prior to working.

Regardless of any contamination, floors and open surfaces (shelves/tables) of stores must be cleaned by non-dust-forming means at least every quarter.

In-house transport

In-house transport of contaminated archival materials must be avoided as far as possible. If such transport is necessary it must be performed in suitable, sealed and disinfectable transport containers.

Decontamination measures

Contaminated objects, moist and dry, must be treated before workers have to handle them within the usual archive working sequences or before they are finally placed in store.

– Decontamination of moist archival materials

Contaminated archival materials of paper with a water content of more than 10 % or a near-surface relative humidity of more than 60 % must be dried in isolation from other written material in a cool, dry atmosphere to a maximum of 10 % water content (60 % near-surface relative humidity) before it is placed in store or processed by workers.

If there is greater water damage reference should be made to the relevant emergency regulations [13; 14] for archives.

Stores in which the archival materials also exhibit a water content of more than 10 % or a near-surface relative humidity of more than 60 % under normal conditions are unsuitable.

If during these activities with the objects bioaerosols are released suitable technical occupational safety and health or the wearing of personal protective equipment is necessary. As soon as there is a visible contamination cleaning must be performed after drying.

– Decontamination of dry archival materials:

Any contaminations on the archival materials (e.g. loose or weakly adhering mould) must be removed mechanically as thoroughly as possible before the material is placed in store or subjected to further processing steps, while observing the safety regulations.

Contaminated archival materials must be cleaned, for example, using suitable dust-removal machines (e.g. industrial vacuum cleaners of dust class H (14) or comparable vacuum cleaners with filtering degrees of 0.005 % max. for the whole device (vacuum cleaner and filter)) [15] or with dust-binding cloths.

For blade-by-blade cleaning brushes or sponges may be used under an MSW.

If the archival materials are so severely damaged that the individual leaves of paper can no longer be turned over and cleaned individually (blocking, dissolution of the paper structure), the biological agents must be removed by mechanical means by specialist personnel trained in restoration techniques. If viable microorganisms are detected sterilisation of the contaminated object using suitable and approved procedures may be inserted into the process.

5.4 Sterilisation

Sterilisation is a method for the treatment of contaminated archival materials which is only to be applied in exceptional cases. It does not replace the dry cleaning needed for contamination.

Sterilisation kills biological agents which are present, but the allergenic and toxic effects of the biological agents are not affected. Moist archival materials may not be sterilised.

Decontamination by cleaning (see 5.3) is always to be given priority over sterilisation. Only for these special cases mentioned (blocking, dissolution of the paper structure) and only where a positive result has been obtained from a test for microbial activity in the archival materials can sterilization by irradiation with cobalt 60 or fumigation with ethylene oxide according to TRGS 513 [13; 14; 16] in a mass procedure be justified. It may only be performed by specialist companies who have the appropriate expert knowledge. After sterilisation it is necessary to remove the biological agents (see 5.3 Decontamination of dry archival materials). When fumigating with ethylene oxide it is not possible to discount a health hazard to workers from residues adsorbed on the material. For single units a modified procedure for steam sterilisation may be applied using suitable devices with exhaust air filtration [17].

A microbiological examination is not necessary to conduct a post-check of the sterilisation if sterilisation indicators have been used to monitor and the measures have been seen to be effective.

5.5 Personal protective equipment

In accordance with the risk assessment personal protective equipment (PPE) must be made available to the workers. The personal protective equipment provided must be used (§ 15 (2) Occupational Safety and Health Act).

At least the following PPE must be made available to the workers who handle contaminated archival materials:

- suitable protective overalls (long arms, sealed at the collar)
- suitable protective gloves according to DIN EN 455 [18]
- individual, tight-fitting half-face masks with at least particle filter of class P2 or particle-filtering half-face masks of at least FFP2 with exhalation valve or blower filtering devices with hoods (TH2P) with a warning device in the case of the failure or weakening of the blower and particle filter of class 2, for instructions on the selection and use of respiratory protective equipment see BGR 190 [19].

Depending on the risk of the activities to be performed in section 5.3 the PPE must be supplemented as follows:

- air-permeable single-use suits with tight-fitting hood according to the specification CEN TC 162/WG 3/N250 (type 5)
- individual, tight-fitting half-face masks with at least particle filter of class P3 or particle-filtering half-face masks of at least FFP3 with exhalation valve or blower filtering devices with hoods (TH3P) with warning device in the case of failure or weakening of the blower as well as particle filter of class 3, for instructions for the selection and use of respiratory protective equipment see BGR 190 [19].

6. Determination of microorganisms in the air at the workplace

There is no measuring obligation combined with the performance of the risk assessment according to § 7 BioStoffV. Measurements may make sense to check the success of a protective measure.

Measurements must be taken in accordance with TRBA 405 "Application of measuring procedures and control values for airborne biological agents" [20] and the measuring procedures 9420 "Procedures for determining the mould concentration in the air at the workplace" [21; 22] as identified in the BGIA work folder. A differentiation of the moulds may be necessary for a better estimation of risks. For checking purposes other measuring methods can also be involved if validated procedures are used.

For the cultivation of microorganisms the provisions of TRBA 100 [23] are applied.

7 Occupational medical prevention

7.1 Participation in the risk assessment

Occupational medical expertise is to be recommended in the risk assessment

- where there are indications of contamination with
 - moulds,
 - yeast,
 - bacteria
- and indications of risks as a consequence of infestation by animals such as
 - mites,
 - rats,
 - mice,
 - birds and their parasites

e.g. by the involvement of the medical company doctor engaged.

7.2 Content of the general occupational medical consultation

For activities involving microbially contaminated archival materials the sensitising effects of biological agents are the prime consideration. In the general occupational medical consultation the workers must in particular be given information or advice on:

1. the possibility of sensitisation and allergic disorders due to mould-bearing dusts and the symptoms which may occur with such a disorder, such as
 - in the eyes: conjunctivitis with reddening, tears, swelling of eyelids, sensation of a foreign body and irritation,
 - in the upper respiratory tracts (nose): runny nose, nasal congestion, sneezing, impairment of sense of smell,
 - in the lower respiratory tracts: wheezing and difficulty in breathing, feeling of tightness in the chest, coughing, expectoration, lack of breath, overs-sensitivity in the respiratory tracts (bronchial hyperreactivity), impairment of the pulmonary function,
 - on the skin and oral mucosa: skin rash with reddening and swellings (wheals), irritation on the gums, skin or in the auditory canal, swollen lips and inflammation of the oral mucosa,

2. the possible health risks which in particular a family predisposition to allergy or an existing allergic disorder (e.g. hay fever, allergic asthma, chronic disorders of the respiratory/pulmonary system) and the presence of infections (e.g. colds) may have and the measures which must be taken in such a case (e.g. use of desired examinations, change of activity)
3. the specific activities for which personal protective equipment must be worn and instructions for its use. The need for measures should be explained in order to ensure that they are accepted.
4. the problems of wet work including measures of skin protection and skin care – where relevant
5. the right, when an allergic disorder arises, to take advantage of a voluntary examination according to § 5 (2) ArbMedVV if activities according to 4.2 are being performed
6. possible mandatory examinations – where relevant

The doctor involved in the risk assessment must be involved in the general occupational medical consultation.

7.3 Occupational health care

7.3.1 Preventive medical examinations

Mandatory examinations

Mandatory examinations according to the annex part 2 (1) ArbMedVV are not to be instigated within the scope of the present TRBA.

Reasons for mandatory examinations according to ArbMedVV may arise in the following cases:

- wet work of regularly four hours or more per day
- activities which require the wearing of respiratory protective equipment of group 2 (e.g. FFP-3 masks).

Voluntary examinations

Voluntary examinations according to annex part 2 (2) ArbMedVV are not to be offered within the scope of the present TRBA since normally there is no need to assume the risk of infection.

Reasons for voluntary examinations may arise from other possible risks, however, such as:

- wet work of regularly more than two hours per day,
- activities which require the wearing of respiratory protective equipment of group 1 (e.g. FFP-2 masks).

If health disorders arise there is a possibility of a causal link between with the activity involving sensitising or toxic agents or if there is a suspicion of an infection (e.g. aspergillosis), a precautionary occupational medical examination according to § 5 (2) ArbMedVV must be offered.

Desired examinations

The employer shall enable workers according to § 11 ArbSchG to undergo regular precautionary occupational medical examinations where it is not possible to discount harm to health. Within the scope of the present TRBA this may be the case with exposure to aerosols with sensitising and toxic properties.

8. More extensive literature and links

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http://www.baua.de/nn_16816/de/Themen-von-A-Z/Gefahrstoffe/TRGS/pdf/TRGS-907.pdf

[3] Technical Rules for Biological Agents / Technical Rules for Hazardous Substances 406, Sensitising substances for respiratory tracts (TRBA/TRGS 406), Edition: June 2008

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[6] DIN ISO 11799 Information and documentation — Document storage requirements for archive and library materials, edition June 2005, <http://www.beuth.de>

[7] Umweltbundesamt: Leitfaden zur Vorbeugung, Untersuchung, Bewertung and Sanierung von Schimmelpilzwachstum in Innenräumen (Schimmelpilzleitfaden) [*Federal Environmental Protection Agency: Guidelines for the prevention, examination, assessment and clearance of mould growth in interior rooms (mould guidelines)*], Berlin (2002)

http://www.apug.de/archiv/pdf/Schimmelpilze_Leitfaden.pdf

[8] VDI 6022 Hygiene-Anforderungen an Raumluftechnische Anlagen and – Geräte [*Hygiene requirements for indoor ventilation systems and devices*], HLH vol. 57, edition April 2006, <http://www.beuth.de>

[9] Umweltbundesamt: Leitfaden zur Ursachensuche und Sanierung bei Schimmelpilzwachstum in Innenräumen (Schimmelpilzsanierungsleitfaden) [*Federal Environmental Protection Agency: Guidelines on the establishment of causes and clearance where there is mould growth in interior rooms (mould clearance guidelines)*], Dessau 2005

<http://www.apug.de/archiv/pdf/Schimmelpilzsanierungsleitfaden.pdf>

[10] B 011 Sicheres Arbeiten an mikrobiologischen Sicherheitswerkbänken (BGI 863), Merkblatt zur Reihe „Sichere Biotechnologie“ der Berufsgenossenschaft Rohstoffe and

chemische Industrie (BG RCI) [*Safe working on microbiological safety workbenches (BGI 863), Factsheet for the series "Safe biotechnology" of the Berufsgenossenschaft for Raw Materials and the Chemical Industry*] -Sept. 2004

[11] BGR 209 BG Rule – Rule on exposure to cleaning and care products, DGUV, Carl Heymanns Verlag KG Köln, edition 10/2001

[12] List of disinfectants of the association Verbund für Angewandte Hygiene (VAH) in the relevant valid version, mph-Verlag GmbH, Ostring 13, 65205 Wiesbaden
<http://www.vah-online.de>

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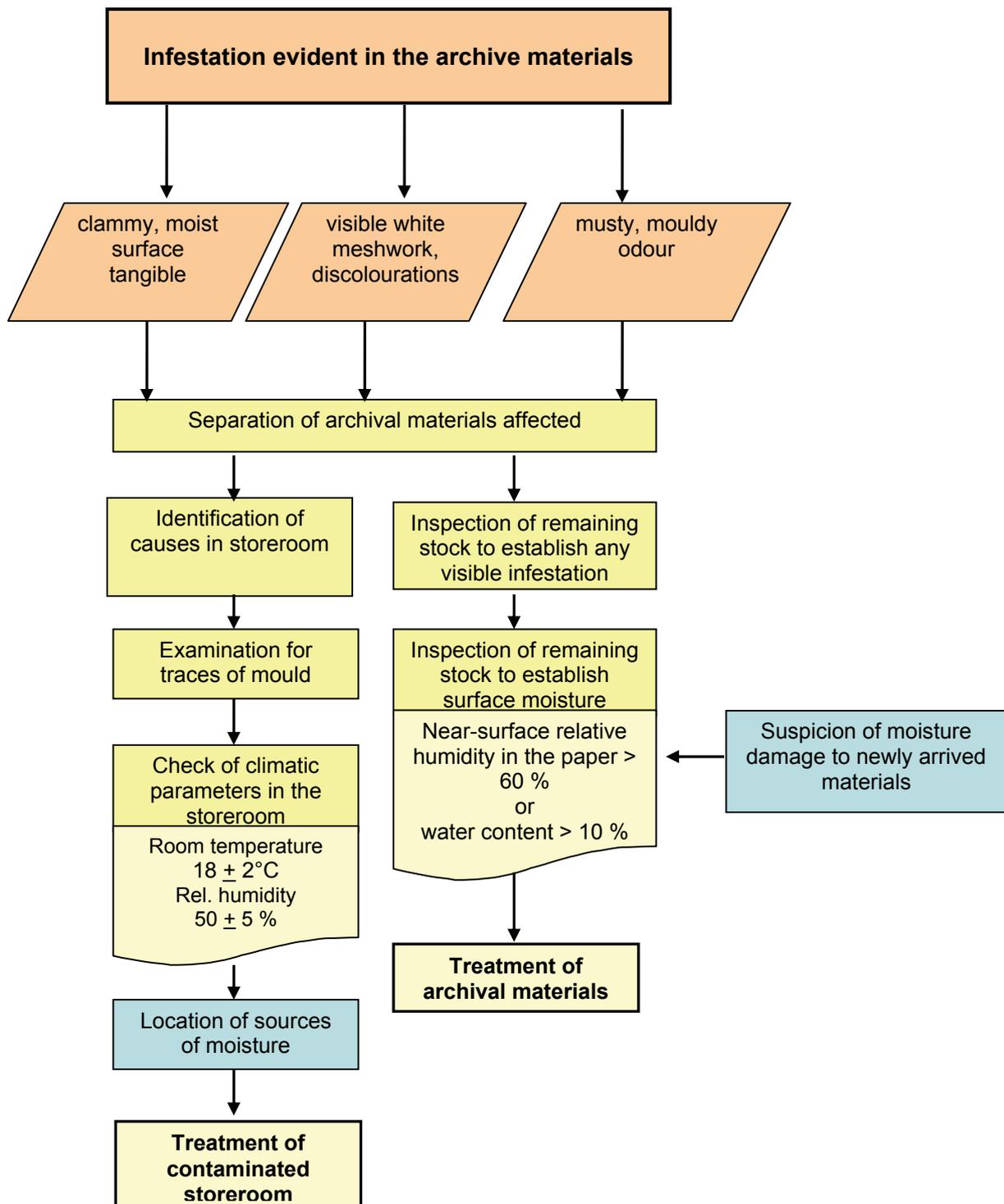
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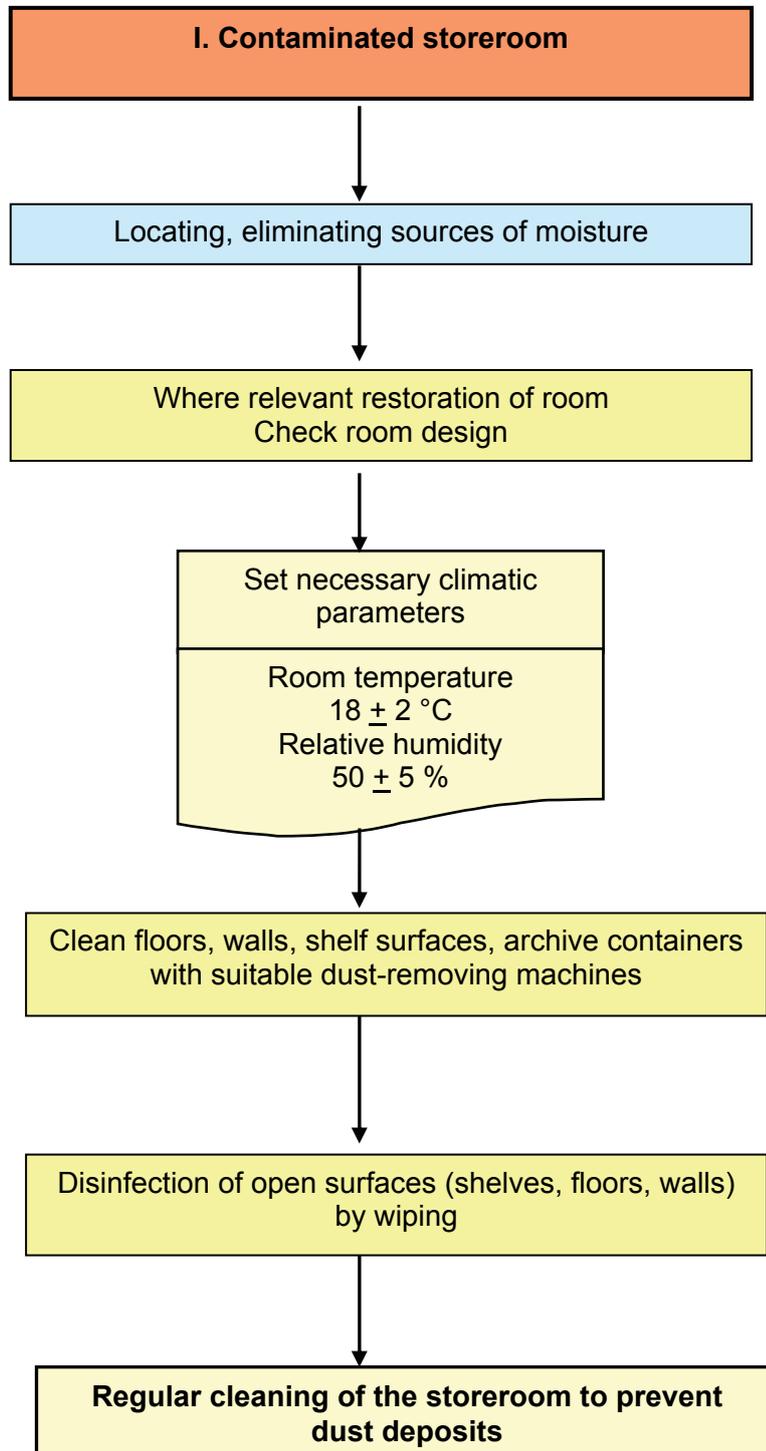
Note: Berufsgenossenschaft regulations can be examined in the database of the Deutsche Gesetzliche Unfallversicherung (DGUV - German Social Accident Insurance) at <http://www.dguv.de/publikationen>.

Annex A: Flow chart for the determination of mould infestation in archives



Annex B: Flow charts for the treatment of mould infestation in archives

B 1: Flow chart for the treatment of the microbially contaminated store-room



Annex B: Flow charts for the treatment of mould infestation in archives

B2: Flow chart for the treatment of microbially contaminated archival material

