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Technical Rules for Hazardous Substances	Asbestos Demolition, reconstruction or maintenance work	TRGS 519
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The Technical Rules for Hazardous Substances (TRGS) reflect the state of technology, occupational safety and health and occupational hygiene as well as other scientific knowledge relating to activities involving hazardous substances, including their classification and labelling. The

Committee on Hazardous Substances (AGS)

establishes the rules and adapts them to the current state of development accordingly.

The TRGS 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

(1) This TRGS 519 applies to the protection of workers and other people who work with asbestos and asbestos-containing hazardous substances during demolition, reconstruction or maintenance work and waste disposal. TRGS 517 applies to activities involving asbestos-containing mineral raw materials, and preparations and articles manufactured from them.

(2) This TRGS does not apply to activities involving other fibrous dusts. TRGS 521 applies to activities where carcinogenic inorganic fibrous dusts are released.

(3) TRGS 519 concretizes the general requirements for the protection of workers and other people according to the Hazardous Substances Ordinance and in particular in its annex III No. 2.4 "Supplementary asbestos safety measures". If there is a deviation from these regulations, at least equivalent protective measures must be taken. The deviation must be justified in the risk assessment document.

(4) Even if the asbestos fibre concentration at the workplace ($15\ 000\ \text{F}/\text{m}^3$) as given in 2.8 is adhered to, there is still a cancer risk. Further measures to reduce the asbestos fibre concentration are therefore to be aimed at.

2 Definitions and remarks

2.1 Demolition work

Demolition work covers the demolition of physical structures or parts thereof, the scrapping of vehicles including ships, the disassembly of plants or equipment etc., including the necessary ancillary work.

2.2 Reconstruction work

(1) Reconstruction work includes the preparation and performance of measures to eliminate dangers which have arisen due to weakly bound asbestos-containing hazardous substances, including the necessary ancillary work.

(2) According to the Asbestos Directive (see number 17 No. 13 of this TRGS) reconstruction is needed for example in the case of physical structures with weakly bound asbestos products. Reconstruction measures include removal, coating and spatial separation.

2.3 Maintenance work

Maintenance work embraces all measures to maintain the target condition (maintenance), to ascertain and assess the actual condition (inspection) and to restore the target condition (maintenance). Maintenance work includes the necessary ancillary work and also preliminary constructional measures within the sense of the Asbestos Directive (see number 17), such as coating, repairing damage, closing gaps as well as measures to be taken as per number 16 of this TRGS.

2.4 Ancillary work

Ancillary work contains for example

- entering rooms which are contaminated with asbestos dust,
- sampling (material samples, measurement of air),
- clearing rooms contaminated by asbestos dust,
- setting up construction sites where it is not possible to prevent the release of asbestos fibres,
- cleaning of rooms or objects which are contaminated with asbestos dusts,
- in-company transport and storage of asbestos-containing hazardous substances.

2.5 Waste disposal

Besides deposition, waste disposal also includes the treatment processes related to deposition (e.g. solidification, surface treatment and packaging) and of the destruction of asbestos fibres.

2.6 Asbestos-containing hazardous substances

- (1) Asbestos-containing hazardous substances are asbestos-containing substances, preparations and articles, during the use of which asbestos-containing fibre dust occurs or may be released.
- (2) Asbestos-containing preparations are mixtures to which asbestos has been added in a controlled fashion, e.g. spray asbestos.
- (3) Asbestos-containing articles have been manufactured from asbestos, asbestos-containing materials or asbestos-containing preparations (e.g. asbestos-containing brake linings, asbestos cement panels) or contain asbestos-containing parts (e.g. storage heaters, machines with asbestos-containing seals).

2.7 Persons with expert knowledge

- (1) Persons with expert knowledge are persons who, by virtue of their professional training and experience, have adequate knowledge with regard to activities involving asbestos-containing hazardous substances and who are familiar with the relevant national protective regulations, accident prevention regulations, directives and the state of the art, thus enabling them to assess the necessary protective measures when working with asbestos-containing hazardous substances.
- (2) Evidence of expert knowledge is provided by attendance at an officially recognised course on the subject matter activities with asbestos-containing hazardous substances (for syllabus see annexes 3 and 4 to this TRGS). Successful attendance must be demonstrated by passing an examination.

(3) In deviation from paragraph 2, for work involving low exposure according to number 2.8, evidence of expert knowledge may also be provided in the form of attendance at sector-specific, courses lasting at least five hours and which are organised as a self-contained teaching unit by guilds, chambers or associations with the participation of accident insurance institutions or occupational safety and health authorities (for syllabus see annex 5 to this TRGS). Such courses do not need to be officially recognised. The authority must be notified of the course. Evidence of expert knowledge according to sentence 1 is also deemed to have been provided if the relevant expert knowledge according to annex 5 to this TRGS has demonstrably been taught in the context of the occupational training.

(4) Attendance at an officially recognised course according to annex 3 includes acquisition of the expert knowledge according to annexes 4 and 5. The expert knowledge according to annex 4 also covers that according to annex 5. By attendance of course according to annex 5 the expert knowledge can only be acquired for the work expressly specified for the course.

2.8 Work with low-exposure levels

Work with low-exposure level of the workers applies if there is an asbestos fibre concentration at the workplace below 15 000 fibres/m³ (see also 2.10).

2.9 Work of minor extent

(1) Work of minor extent applies if the duration of work for the whole measure being taken with the assignment of not more than two workers does not exceed four hours, including the ancillary work according to number 2.4 required on the spot, but not including any release measurements according to number 14.4, while at the same time a layer-related fibre concentration of 100 000 F/m³ is kept below (for examples see 14.2).

(2) When asbestos cement panels are removed in the exterior domain, the work concerned is of a minor extent if the surface is less than 100 m².

2.10 Determination of the asbestos fibre concentration

(1) The determination that the asbestos fibre concentration is below 15 000 fibres/m³ is performed according to the criteria set by the AGS (see annex 6).

(2) The concentration of asbestos fibres is indicated in fibres/m³ (F/m³). Here, a fibre has the following dimensions: length greater than 5 µm, diameter less than 3 µm with a ratio of length to diameter of greater than 3:1.

(3) The determination of the asbestos fibre concentration at workplaces is monitored by suitable scanning electron microscope techniques according to BGI 505-46. The statistical detection limit of the technique under standard conditions is 15 000 fibres/m³.

(4) The rules in para. 1 must be applied in analogous form in order to determine whether the asbestos fibre concentration is below 100 000 F/m³.

(5) If measurements are necessary, they may only be carried out by measuring bodies which have the necessary specialist knowledge and the necessary installations. The

employer who commissions an accredited measuring body may proceed from the assumption that the findings ascertained by such measuring body are correct¹.

(6) The results measured must be recorded and kept by the employer as personnel records. In the case of the closure of a company the measuring results must be submitted to the competent accident insurance institution.

(7) Measuring results of comparable work can be used for the risk assessment if

- the information gathering, the measuring method and the measuring result have been recorded according to TRGS 402²,
- the employer has the record in his possession,
- its working procedure is comparable and
- this working procedure is stipulated in the work schedule.

(8) The occupational safety and health institute of the Berufsgenossenschaften (institutions for statutory accident insurance and prevention) (BGIA) establishes the assessment criteria on the basis of the criteria according to para. 1 and then checks and publishes working processes (BGI 664 contains the latest additions³) where an asbestos fibre concentration at the workplace is below 15 000 F/m³ because of the specified work sequence. With this tested method it is ensured that rooms are not contaminated when the work is concluded (asbestos fibre concentration < 500 F/m³, upper Poisson value < 1000 F/m³).

(9) Employers can also use the assessment criteria established by the BGIA if evidence must be provided that work is carried out at low exposure levels or is of a minor extent.

2.11 Weakly bound asbestos products

Weakly bound asbestos products, e.g. spray asbestos, lightweight, asbestos-containing panels, asbestos cardboard, sealing cords, generally have a raw density below 1000 kg/m³. Exceptions for building products are described in the Asbestos Directive.

2.12 Asbestos cement products

Asbestos cement products are pre-fabricated, cement-bound articles with an asbestos content generally below 15 weight per cent and a bulk density of more than 1400 kg/m³. They are considered as firmly bound asbestos products.

¹ Accredited measuring bodies see <http://www.bua-verband.de/gefahrstoffmessstellen.html>

² TRGS 402 – Identification and assessment of airborne concentration of hazardous substances in working areas

³ see www.hvbg.de

2.13 Other asbestos products

With regard to other asbestos products which do not correspond to the definitions as per number 2.11 or 2.12 the fibre release potential must be evaluated by way of comparison. Vinyl asbestos panels (so-called flex panels) and IT seals (rubber-asbestos seals) are considered, for example, to be firmly bound products.

2.14 State of the art

The state of the art is the state of development of advanced processes, installations or modes of operation which reveal the practical suitability of a measure for protection of the health of the workers to be secure. To determine the state of the art, comparable processes, installations or modes of operation should be referred to in particular which have successfully been tested in practice. The same applies with respect to the state of occupational medicine and workplace hygiene.

3 Authorisation and notification

3.1 Authorisation

Demolition and reconstruction work on weakly bound asbestos products, with the exception of low-level exposure, may only be carried out by specialist companies which have been authorised by the competent authority to perform such work. Within the framework of the authorisation procedure, evidence of adequate personnel and safety equipment must be provided.

3.2 Notifying the authority

(1) The competent authority must be informed of the activity involving asbestos-containing hazardous substances at the latest 7 days prior to commencement of work (for template see annexes 1.1 and 1.2 to this TRGS). The workers and the works or staff council must be granted access to the notification. Copy of this notification must be sent to the competent statutory accident insurance institution.

(2) These notifications can be company-related or object-related. Company-related notifications must be addressed to the head office of the competent occupational safety and health authority, object-related notifications to the occupational safety and health authority competent for the location of the work site. A copy of the company-related notification must be kept at the work site.

(3) The notification must include the following information in particular:

1. the location of the work site
2. the type and quantities of asbestos used or handled
3. the activities and processes involved
4. the number of workers involved
5. the starting date and duration of the work

6. measures taken to limit the exposure of workers to asbestos and further protective measures
7. measures and location of waste treatment

If the 7-day deadline cannot be complied with because of urgent work, the competent authority can agree to shorten the deadline. The employer's works or staff council must be involved in such a case.

(4)) An object-related notification is required for changing work sites (e.g. building site). In deviation from this

- for work with low exposure,
- for maintenance work according to number 16 of this TRGS
- for work of minor extent,

a one-off, company-related notification is sufficient.

(5) In the case of work of minor extent, the place and date of the work to be carried out must be communicated to the occupational safety and health authority responsible for the work site in addition to the company-related notification. This can be done informally and at short notice by fax or e-mail (for template see annex 1.2).

(6) Company-related notifications must also be communicated for stationary work sites.

(7) Company-related notifications must be submitted anew if there is a change in experts or in the case of major modifications

1. of the working procedures and/or
2. of the protective measures.

(8) In the case of demolition, reconstruction or maintenance work with asbestos products, the notification must provide evidence that the personnel and safety equipment of the company are appropriate for the performance of such work. This also applies to operators of waste disposal facilities. In deviation from this, for authorised companies it may be sufficient for the authorisation to be attached to the notification.

(9) The risk assessment with work schedule (see annexes 1.4 and 1.5 to this TRGS) as well as the working instructions (for template see annexes 1.6 and 1.7 to this TRGS) must be submitted together with the notification.

3.3 Subcontractors

(1) If subcontractors (third-party companies) are engaged to perform activities involving demolition, reconstruction or maintenance work with asbestos, it is the client's responsibility to ensure that only specialist companies which have the personnel and safety equipment are involved for the work.

(2) The employer must ensure that, prior to commencement of the work, the subcontractor is informed about the other company-specific danger sources and rules of conduct.

(3) Subcontractors who work under subcontract are, as an employer, subject in full to the requirements of this TRGS. This also applies to subcontractors (one-man companies) who have no workers.

4 Prohibitions of use

(1) The following asbestos-containing hazardous substances must not be used according to Annex IV No. 1 GefStoffV:

1. asbestos,
2. preparations and articles with a mass content of more than 0.1 % asbestos.

This also applies, for example, to reprocessed asbestos-containing blasting abrasive. The prohibitions of use also apply to private consumers.

(2) Para. 1 does not apply, among other things, to

1. demolition work,
2. reconstruction or maintenance work with the exception of
 - covering work of asbestos cement roofs,
 - cleaning work of uncoated asbestos cement roofs,
 - coating work on uncoated asbestos cement roofs,
 - work that lead to an erosion of the surface of asbestos products, such as abrasion, pressurized cleaning or brushing, unless these are low-emission processes recognized by authorities or Berufsgenossenschaften,
3. materials that are used as backfilling material in underground mining and in which asbestos is incorporated by means of hydraulic bonding with cement or other equivalent substances in moulds or in containers where release of asbestos fibres is prevented,
4. waste disposal conducive to the general good.

(3) The prohibition of use also includes the mounting of photovoltaic and thermo-solar installations on asbestos cement roofs because this is not demolition, reconstruction or maintenance work.

5 Risk assessment, management and supervision of work

Demolition, reconstruction or maintenance work may only be carried out if it is guaranteed that the personnel and safety equipment of the company are appropriate for the performance of such work. The personnel is only adequate if persons with expert knowledge are employed. These requirements also apply with respect to waste disposal.

5.1 Assessment of the risk with activities involving asbestos

(1) To assess the working conditions according to section 7 of the Hazardous Substances Ordinance, the employer must, prior to commencement of demolition, reconstruction and maintenance work, first ascertain whether the workers carry out activities with asbestos-containing hazardous or whether such substances are released during these activities. It must be ascertained in particular whether asbestos in weakly bound form is present. To this end, he must as a matter of priority obtain the corresponding information from the client or owner of the construction project. In cases of

doubt material samples must be examined where relevant. The requisite information includes

- type and name of the existing asbestos-containing products as well as
 - their mechanical state and relevant contaminations, where relevant.
- (2) The risk assessment must be conducted by a knowledgeable person on an activity-related basis. The following points must be considered in this respect:
- extent and duration of the inhalative exposure,
 - working conditions and processes including work equipment and the quantity of asbestos products,
 - required protective measures,
 - specifications relating to the effectiveness check of the protective measures taken.
- (3) In addition to the workers directly carrying out activities involving asbestos-containing hazardous substance, other workers or other persons must also be included in the assessment as far as their health and safety may be at risk as a direct consequence of the activity and their presence in the danger area is absolutely essential.
- (4) The risk assessment must be documented prior to commencement of the activity. The protective measures must be stated in the documentation. The risk assessment must be updated where there are major modifications.
- (5) The risk assessment should be established in connection with the work schedule. Annexes 1.4 and 1.5 to this TRGS provide templates for this procedure.

5.2 Working instructions and instruction of workers

- (1) With consideration of the risk assessment, the employer must establish workplace-related written working instructions in an understandable form and language and make them accessible to the workers.
- (2) The working instructions must at least contain information about:
1. the asbestos-containing hazardous substances occurring at the workplace as well as the health risks,
 2. adequate precautionary arrangements and measures that the worker must carry out for his own protection and the protection of other workers at the workplace. These include in particular
 - a) hygiene measures,
 - b) information about exposure-reducing measures,
 - c) information about carrying and use of protective equipment and clothing.
 3. measures to be taken in the case of operational disturbances, accidents and emergency cases and first-aid,
 4. proper treatment and removal of occurring asbestos waste.
- (3) The working instructions must be updated with each major change in the working conditions.

(4) The employer must give the workers oral instruction on the risks occurring and the corresponding protective measures with reference to the working instructions. The course of instruction must be given prior to commencement of the activity and then at least once every year in relation to the individual workplace. The course of instruction must be given to the workers in an understandable form and language. The content and time of the course of instruction must be recorded in writing and confirmed by signature of the person receiving the instruction. Evidence of the course of instruction should be kept until the next course of instruction is given.

(5) The course of instruction must teach the following matter in particular:

1. properties of asbestos and its effects to health including the aggravating effect of smoking; where relevant a physician must be involved,
2. trade-specific asbestos-containing products,
3. activities where exposure to asbestos may occur and the significance of measures to be taken to reduce exposure,
4. proper use of safe methods and personal protective equipment,
5. measures to be taken in the case of disturbances of the operational sequence,
6. proper waste disposal,
7. occupational health care.

(6) The working instructions and course of instruction must be harmonised with the work schedule according to number 5.3 (for template for working instructions see annexes 1.6 and 1.7 to this TRGS).

(7) In the case of extensive work according to number 14.1, workers must also be informed of risks and protective measures on an object-related basis.

5.3 Work schedule

(1) The employer must establish a work schedule prior to commencement of demolition, reconstruction and maintenance work involving asbestos and waste disposal.

(2) The work schedule must contain the following:

1. procedure and working techniques to be adopted when removing asbestos and asbestos-containing materials, as well as installations for the protection and decontamination of the workers and other persons who work in the danger area,
2. indications with regard to personal protective equipment,
3. checking whether there is no longer a risk of asbestos in the working area of interior rooms after termination of demolition, reconstruction or maintenance work.
4. indications relating to the provided proper waste disposal.

The work schedule must be updated in the case of major modifications.

(3) The work schedule should be established in connection with the risk assessment. Templates for this procedure are given in annexes 1.4 and 1.5 to this TRGS.

5.4 Personnel requirements

5.4.1 Person responsible

Each company that carries out demolition, reconstruction or maintenance work or removes asbestos-containing waste must have a responsible person with expert knowledge. According to number 3.1 companies subject to authorisation must have in addition a deputy with expert knowledge. The requirements regarding expert knowledge are in line with the nature and scope of work to be carried out (see number 2.7 of this TRGS). The person responsible must ensure that the requirements of this TRGS have already been considered during planning of the work and are implemented during the performance of the work. The person responsible or his deputy can also assume the functions according to number 5.4.2 or 5.4.4.

5.4.2 Supervisor

(1) Prior to commencement of the work the employer must assign in writing as supervisor a reliable person familiar with the work and the risks occurring and the necessary protective measures (see also annex 1 of BGV A 1 "Principles of Prevention"). The supervisor must have expert knowledge.

(2) The supervisor must satisfy himself that the workers

- have been instructed according to working instructions,
- have undergone precautionary occupational medical examinations, if required according to number 10
- have been trained in the wearing of respiratory protective equipment.

In particular, he must ensure that

1. work is only started if the protective measures stipulated in the risk assessment and the work schedule have been taken,
2. the working procedures based on the working instructions and work schedule have not changed
3. the workers observe the protective measures provided for during the work and make use of the personal protective equipment,
4. the place of work is marked and shut off, if necessary, and unauthorised persons are kept away from the work location,
5. the work location is cleaned after termination of the work and remains marked and shut off until released.

(3) The supervisor must be present on the building site constantly during such work.

(4) In the case of work with low-exposure levels and ancillary work as per number 2.4 it is sufficient that one person with expert knowledge is responsible for the workplaces spatially separated from each other to fulfil the requirements according to number 5.4.1 and number 5.4.2, and supervises them.

5.4.3 Knowledgeable personnel

(1) The company must have a sufficient number of knowledgeable personnel who are able to both carry out the work properly and safely and operate and monitor the required safety equipment, such as for example the extraction and waste disposal systems and the airlock systems.

(2) Companies carrying out extensive work according to number 14.1 must have a qualified person (person with knowledge of equipment) to check the safety work equipment. The qualified person must have sufficient knowledge of activities involving asbestos-containing hazardous substances and must be so familiar with the operation and maintenance of safety work equipment that he is able to reliably assess the safe working condition and the functioning of the safety work equipment. The necessary expertise can for example be demonstrated by a certificate showing the attendance of corresponding courses of instruction conducted by the manufacturer.

5.4.4 Co-ordinator

(1) If an employer (client) conveys work to other employers (contractor), he must nominate a co-ordinator so far as this is required to avoid a possible reciprocal hazard. The co-ordinator must ensure that all those involved in the risk assessment work together and come to an agreement. He must have the authority to direct in matters of safety.

(2) If an employer assumes orders the performance of which coincides in time and place with jobs of other employers or third parties he is obliged to come to an agreement with the other employers, the subordinated site management or third parties if this is necessary for the avoidance of reciprocal risk.

(3) According to para. 1 the co-ordinator must ensure that everyone who has to enter the working areas which are governed by this TRGS must be informed about the hazard arising from asbestos fibres and about the necessary protective measures.

(4) The co-ordinator must obtain advice from knowledgeable persons if he himself does not have expert knowledge.

6 Organisational measures

(1) Prior to commencement of demolition work, asbestos-containing products must be removed according to the state of the art and disposed of properly.

(2) In the case of activities involving asbestos-containing hazardous substances at the workplace the following measures must be taken in particular:

1. The number of workers in the working areas concerned must be reduced to the lowest possible figure that is necessary to carry out the work planned.
2. Working areas where activities with asbestos-containing hazardous substances are carried out must be clearly separated from other working areas and access to them may only be granted such workers who have to enter them to perform their work or certain tasks. Access by unauthorised persons must be prevented by means of a prohibition sign

“Halt, Zutritt verboten“ [Stop, no entry]

according to BGV A 8 "Safety and Health Signs and Labels at Work" with the additional indication "asbestos fibres" (for template see annex 2 to this TRGS). The working areas concerned must be arranged in such a way that they can be cleaned at any time.

3. Partitioned-off working areas where activities are carried out with asbestos-containing hazardous substances must be marked by adequate warning and safety symbols as well as by the signs "Do not smoke" and "Do not eat and drink".
4. Waste that contains asbestos-containing hazardous substances must be collected, stored, transported and disposed of in suitable containers labelled according to number 9.3 para. 2 without causing any danger to human health and the environment.
5. It must be ensured that all rooms, plants and installations are regularly cleaned.

(3) The employer must ensure that the asbestos fibres cannot reach other workplaces, pass into asbestos-free zones or escape into the atmosphere in accordance with the following rules (see also numbers 7, 14, 15 and 16 of this TRGS and the Asbestos Directive).

7 Safety measures

7.1 (1) The working process must be arranged such that asbestos fibres are not released and that the spread of asbestos dust is prevented as far as this is possible according to the state of art.

(2) If it is not possible to avoid the release of asbestos fibres in line with the measures taken according to para. 1, they must be captured at the outlet or at source and then be disposed of according to the state of art without causing any danger to human health and the environment

(3) If it is not possible to completely capture them according as per para. 2, corresponding ventilation measures must be taken according to the state of art.

7.2 (1) Extracted air must be guided or cleaned in such a way that asbestos fibres cannot also pass into the air breathed by other workers.

(2) The asbestos fibre content discharged in the air outside must not exceed 1000 F/m³. Compliance with this figure for the ventilation systems must be demonstrated by measurements according to VDI 3861 sheet 2

- during the initial commissioning of the plants,
- at least at three-year intervals,

where no type approval according to para. 6 has been conducted.

(3) It must be ensured that the working room is provided with sufficient outdoor air (fresh air) (see for example VDI 2262 sheet 3).

(4) In the case of activities involving asbestos-containing hazardous substances it is not permitted for discharged air to be fed back into the working room.

(5) In the case of activities involving asbestos-containing hazardous substances clean air return is permissible in deviation from para. 4 for the following jobs if it is possible to

take up any asbestos fibres arising only with portable dust removal devices or industrial vacuum cleaners:

- demolition, reconstruction or maintenance work on building parts and installations and machines and devices in closed rooms if such work is only of minor extent or of low exposure,
- ancillary work according to number 2.4.

(6) Portable dust removers or industrial vacuum cleaners which may be used according to para. 5 must meet the following requirements:

- The devices must be recognised by the Berufsgenossenschaften (type approval) or by authorities.
- The filtration efficiency of the filter must be 99.995 % at minimum. The filtration efficiency is attained with devices of dust class H (see for example DIN EN 60335-2-69 Appendix AA) in connection with the "Additional requirements for asbestos vacuum cleaners" (published by the occupational safety and health institute of the Berufsgenossenschaften – BGIA, February 1996). Such extractors also fulfil the requirements of para. 2.
- The devices must meet other safety requirements in accordance with their use, e.g. on building sites of protection type IP 54 according to DIN 40 050. Exceptions are devices with a power input of up to 1.2 kW and collector motor (single-phase devices) which must satisfy protection type IP X4.
- In the case of older devices of use category K 1 in combination with a C filter connected upstream in the device which have passed a type approval according to ZH 1/487, experience shows that the filtration efficiency described is also maintained. These devices must also correspond to "the additional requirements for asbestos vacuum cleaners". Such vacuum cleaners meet the requirements set out in para. 2.
- In the case of older devices which passed a type approval according to ZH 1/487 prior to 2002 and which have a power input up to 1 kW, use category K1 is sufficient with single-stage filtering.

(7) The ventilation systems (dust removers, industrial vacuum cleaners and devices used for ventilation or maintaining negative pressure) must be serviced as required, and at least once a year, if necessary repaired and inspected by a person knowledgeable in equipment (for qualifications see number 5.4.3 para. 2) or by a maintenance company. The inspection result must be submitted on request.

(8) During erection and dismantling and during maintenance (e.g. change of filter) of the devices and systems during demolition, reconstruction or maintenance work the relevant specifications of this TRGS must be complied with.

(9) Industrial vacuum cleaners used in the black area may only be used after careful cleaning, especially of the motor casing in the white area.

7.3 Electric motors should preferably be used to drive the machines used for the demolition and reconstruction work indoors. If gasoline- or diesel-driven units are to be used and discharge of the exhaust fumes outdoor is not possible, the exposures indoor must be reduced as far as possible by ongoing maintenance and by means of exhaust fume filtering systems or by catalytic converters.

7.4 If the work is terminated, equipment, including suction lines, machines and the working area (workroom) must be thoroughly cleaned. Parts contaminated with asbestos fibres which cannot be cleaned must be wetted and properly disposed of according to number 13, e.g. fitted carpets. Adequate ventilation must be ensured.

8 Personal protective equipment

8.1 (1) The employer must

1. provide effective and personal protective equipment which is suitable with regard to its wearing properties and must keep it in a ready-to-use, hygienic impeccable state and
2. ensure that the workers only work as long as is absolutely necessary for the working procedure and as is compatible with health protection.

(2) The workers must use the personal protective equipment provided.

(3) Prior to commencement of work the employer must determine which personal protective equipment is to be used.

8.2 (1) If respiratory protective equipment is used, the wearing time limits must be complied with according to BGR 190 "Use of respiratory protective equipment".

(2) The following may be regarded as suitable, for example, provided there is no reason to fear oxygen deficiency according to points 1 and 2:

1. with a fibre concentration of up to 150,000 F/m³, e.g. for work on asbestos cement products, work of minor extent and sampling
 - half-face masks with P2 filter,
 - particle-filtering half-face masks FFP2
 - masks with blower and particle filter TM1P.
2. when working with increased fibre concentration
 - full-face masks with particle filter P3. As far as possible use should be made of masks TM3P with blower support – where necessary with warming of inhaled air.
3. when working with fibre concentrations larger than 6 000 000 F/m³ (if, for example, dry removal of spray asbestos cannot be avoided)
 - insulation devices with full-face mask or mouthpiece fitting.

Respiratory protective equipment must be type-approved⁴.

(3) The employer must ensure that

- a) respiratory protective equipment is adequately stored, cleaned and maintained,
- b) the workers are trained accordingly and are well familiar with the use of respiratory protective equipment.

⁴ BGI 693 List of certified respiratory protective equipment

(4) Respiratory protective equipment may only be taken on and off outside the area endangered by asbestos fibres.

(5) In the case of activities according to number 16.2 paragraphs 1, 6 and 7, number 16.3 para. 8, number 16.4 para. 8, landfill work according to number 13.3 para. 2 as well as general work during which the shortfall below 15 000 F/m³ is proven according to 2.10 (work activities at low exposure), the wearing of respiratory protective equipment can be waived. But even in these cases the use of, for example, a P2 mask may be appropriate, depending on the nature and frequency of the work, especially if exposure peaks occur. Under no circumstances with the activities mentioned, however, may workers be assigned without respiratory protective equipment to jobs where an increased intake of asbestos fibres may occur via the respiratory tracts because of the working process, the work organisation or the spatial or climatic conditions at the workplace.

8.3 (1) The workers must be given suitable protective suits and these must be worn by them. This does not include maintenance work according to numbers 16.2 para 1 and para 7, 16.3 para 8, 16.4 para 8, landfill work according to number 13.3 para 2 and general work during which a figure below 15 000 F/m³ is demonstrated according to number 2.10 if there is no body contact with asbestos-containing material. Disposable protective suits must be disposed of according to number 13 after end of the shift. Multiple-use protective suits must be regularly maintained and cleaned according to number 9.3.

(2) Protective suits are suitable if they are chosen according to BGR 189 and labelled with CE. For this, protective suits of category III type 4-6 are suitable and if spray mist and moisture arise type 3-4. When working in the vicinity of live electrical parts multiple-use protective clothing is not permissible.

(3) If there is a danger of other injuries or health hazards, relevant personal protective equipment must be worn in addition, e.g. safety helmet, eye protection, gloves, protective shoes, protective boots.

9 Hygiene measures

9.1 Workers performing activities with asbestos-containing hazardous substances are not permitted to ingest food or beverages in working rooms or at their workplaces outdoors. For these workers areas (break areas) must be set up at which food or beverages can be ingested without impairing their health as a result of hazardous substances.

9.2 (1) Workers must be provided with washrooms and rooms with separate storage facilities for street and working clothes when they work with asbestos-containing hazardous substances.

(2) A shower facility must be provided at the place of work where work is carried out with asbestos-containing hazardous substances. This requirement is satisfied, for example, with the use of personal airlocks with wet cell according to number 14.1.4. The requirement of sentence 1 no longer applies for work at low exposure levels, for work on asbestos cement products outdoors if such work does not take any more than three days and in the case of work of minor extent (see number 14.2 para. 6 of this TRGS).

(3) Work and protective clothes must be cleaned by the employer. It must if necessary be properly disposed of and replaced by the employer.

9.3 (1) If single-use protective suits are not worn, the employer must ensure that the multiple-use protective clothing or the working clothes are cleaned at regular intervals. The multiple-use protective clothing and working clothes must be thoroughly cleaned when there is an interruption of the work, during breaks, at the end of the work and when the area subject to asbestos hazard is left (washing of washable multiple-use protective clothing, otherwise vacuum cleaning).

(2) If multiple-use protective or working clothes are handed over for washing purposes according to para. 1, they must be collected in appropriately labelled containers. The containers are to be labelled as follows (Fig. see annex II "Special regulations for the labelling of asbestos-containing articles" of Directive 76/769/EEC):



In addition, the laundry must be informed specifically on the health risk involved when breathing in asbestos fibres.

10 Occupational health care

10.1 Mandatory examinations

If during the activities involving asbestos-containing materials the detection limit of the asbestos fibre concentration is exceeded according to BGI 505-46 (15 000 F/m³ under standard conditions), the employer must arrange for precautionary occupational medical examinations. The examinations are a prerequisite for employment or continued employment for these activities. The examinations are performed as

- initial examinations prior to commencement of the activity,
- follow-up examinations at regular intervals during the activity,
- final examinations at termination of the activity.

10.2 Voluntary examinations

If during the activities involving asbestos-containing materials the detection limit of the asbestos fibre concentration falls below the value according to BGI 505-46 (15 000 F/m³ under standard conditions) or if tested processes are used involving low exposure levels, the employer must offer workers

- initial examinations prior to commencement of the activity,
- follow-up examinations at regular intervals during the activities.

10.3 Follow-up examinations as subsequent precautionary occupational medical examination

(1) Owing to the long latency of asbestos illnesses for activities involving exposure to asbestos according to number 10.1 subsequent examinations must also be offered by the employer after the end of the employment (subsequent examinations).

(2) The subsequent precautionary occupational medical examinations can also be offered by the accident insurance institution. In this case, the employer must submit the necessary staff and exposure information to the accident insurance institution.

10.4 Deadlines for follow-up examinations

The deadlines for follow-up examinations comply with the generally recognised rules of occupational medicine and are stipulated by the examining doctor. The interval for the examinations which the employer has to arrange for is indicated in the examination certificate issued for the follow-up examination.

10.5 Precautionary examinations when respiratory protective equipment is used

The occupational health care of wearers of respiratory protective equipment is geared to the regulations of the Berufsgenossenschaften. The use of respiratory protective equipment does not nullify the obligation according to number 10.1.

11 Employment restrictions

The employment restrictions are valid to protect certain groups of people, see Ordinance on the Protection of Mothers at the Workplace and the Young People's Labour Act.

12 Instruction of workers

- (1) The employer must ensure that the workers or their representatives
 1. can verify whether the regulations of the Hazardous Substances Ordinance and the provisions of this TRGS with regard to the risk assessment and stipulation of the measures – especially with regard to protective clothing and protective equipment – are applied,
 2. can consult the records in relation to the exposure level – if any - and obtain information on their significance

when they work with asbestos-containing hazardous substances

- (2) The employer must inform the workers immediately if, in the case of operating conditions which deviate from normal operation, they may be exposed to unusually high concentrations of hazardous substances. This can in particular happen in the case of operational disturbances, certain maintenance work or accidents.
- (3) Further information rights for works and staff councils as well as for the workers are contained in section 14 GefStoffV.
- (4) According to the Occupational Safety and Health Act the workers must immediately inform the employer or the competent superior about any considerable danger to safety and human health they have detected and about any defect found on the protective systems.

13 Waste

- (1) Asbestos-containing waste must be collected, stored and removed in suitable, securely lockable and labelled containers without any danger to human health and the environment.
- (2) It is not permitted for asbestos-containing waste to be crushed into small pieces before being dumped and this may not be requested by those delivering it. An exception here are asbestos cement pipes, provided a breaking into small pieces is necessary and this is done in such a way that no asbestos fibres are released.

(3) Reference should be made to the regulations under waste law issued by the federal government and the states (Recycling and Waste Act, "TA Abfall" (waste directives), "TA Siedlungsabfall" (household waste directives), and the LAGA factsheet "Disposal of asbestos-containing waste").

13.1 Collection of waste

(1) Asbestos-containing waste must be collected in suitable containers at the workplace in such a way that refilling is avoided.

(2) Suitable containers are for example

- for granular, woven or lumpy waste: adequately strong plastic bags,
- for coarse or panel-type asbestos cement waste: e.g. Big-Bags,
- for stackable asbestos cement products: Big-Bags, panel Big-Bags, stacking on pallets in dust-proof packaging
- for spray-asbestos-containing waste: the disposal device itself. For small quantities a barrel is sufficient.

(3) When collecting waste and providing transport, the release of dusts must be prevented by means of suitable measures in line with the state of the art – e.g. extraction, solidification, wetting or covering. Asbestos dusts, e.g. from filter systems, must be solidified with binders (e.g. cement). Reference should be made to numbers 14.1.7 para. 3 and 14.1.8.

(4) Where asbestos-containing waste has to be put into intermediate storage until removal, it must be kept wet or covered with suitable materials or stored in sealed containers and safeguarded to prevent unauthorised access.

(5) The containers must be labelled according to number 9.3.

(6) The loading of asbestos-containing waste into containers or onto the loading platform of the transport vehicle – where relevant on pallets – must be carried out carefully. Waste must neither be thrown nor poured.

13.2 Transport

(1) Asbestos or asbestos-containing materials and waste must be secured for transport in such a way that asbestos fibres are not released during transport and unloading.

(2) For the transport of asbestos-containing waste, containers according to number 13.1 are to be used to avoid fibre emissions. Transport may only be carried out commercially only by specialist waste management companies certified for the purpose or companies with a collection and transport authorisation taking due account of waste law. Such authorisations are not required if an entrepreneur collects or transports waste in fulfilment of the company's purpose without being a commercial collector or transporter (information can be obtained from the competent waste disposal authority).

(3) If asbestos-containing waste is subject to the statutory regulations governing hazardous goods (e.g. the Hazardous Goods Ordinance for Road Transport and Rail Transport), the corresponding regulations must be adhered to in addition.

13.3 Deposition

(1) Asbestos or asbestos-containing materials and waste must be deposited at specially approved landfills in such a way that the release of asbestos fibres is avoided. Regardless of this the landfill operator must implement the organisational measures of this TRGS, in particular the acquisition of expert knowledge, notification, working instructions and a course of instruction.

(2) The requirement of para. 1 sentence 1 can be fulfilled if the requirements according to number 13.1 are met and during dumping

- the containers are not destroyed before sealing,
- are covered,
- are compressed only after covering.

13.4 Other methods of waste disposal

If with other waste disposal processes, e.g. chemical or thermal waste treatment, it is not possible to prevent the release of asbestos fibres, the employer must take the adequate protective measures according to this TRGS on a case-to-case basis. These procedures require the permission in accordance with the Federal Pollution Control Act (Bundes-Immissionsschutzgesetz).

14 Special regulations for demolition and reconstruction work on weakly bound asbestos products

14.1 Requirements for extensive work

14.1.1 (1) Extensive work normally applies if buildings or building parts must be cleared of waste or refurbished over a large area, for example

- removal of weakly bound asbestos products on roof trusses, walls and ceilings or similar,
- solidification and coating of weakly bound asbestos products.

The delimitation of work of minor extent can be seen in number 2.9 in combination with number 14.2 para. 1 of this TRGS.

(2) The safety measures must meet the following requirements. The aim of the requirements is to fall below an asbestos fibre concentration of 1000 F/m³ in the white area of airlocks and the area around of the working area.

(3) Control measurements may be required if for example

- in the area around airlocks in the case of work that lasts longer,
- where there is a disturbance of the scheduled operational sequence,
- where the bulkhead partitioning is damaged.

14.1.2 The working area (black area) must be separated off in a dust-proof form from the surrounding area in accordance with the state of art (bulkhead partitioning). The bulkhead partitioning must be stable and resistant to the suction force of the negative pressures and other strains. Reusable bulkheads should be used. The working area should be kept as small as possible. Bulkheads must be erected in such a way that fibres are not released. A bulkhead partition plan must be drawn up, and it must be submitted in outline together with the notification according to number 3.2.

14.1.3 (1) The use of an adequately dimensioned ventilation system with exhaust air filter must ensure that

- the working area is sufficiently ventilated to reduce the asbestos fibre concentration and
- an adequate negative pressure is maintained if the bulkhead partitioning cannot be made dust-proof.

The cleaning of the exhaust air must comply with the requirements according to number 7.2 para. 2.

(2) Ventilation is sufficient if at least a five-fold air exchange (fresh air) per hour is obtained in the working area. The necessary air output can be calculated from the rated output of the ventilation system in relation to the room volume (without internal fittings). The supply air must be guided via defined supply air openings to guarantee efficient flow through the working area. The air flow must be checked for example by means of smoke tubes. The supply air openings must automatically close if there is a pressure drop.

(3) Negative pressure is generally sufficient if it is 20 Pa (Pascal) in relation to the adjacent room during the work. A negative pressure of 50 Pa should not be exceeded. After the end of the shift the ventilation system must continue to operate for at least one hour at the same output. Then a negative pressure of 10 Pa may be sufficient. The negative pressure must be measured and recorded continuously. Record strip charts must be kept at least until the full completion of the measure.

(4) If the negative pressures drops, an optical or acoustic alarm must automatically be triggered. In individual cases the connection of the ventilation system to an emergency power supply may be required.

(5) The need for a filter change must be monitored and indicated optically or acoustically.

(6) Ventilation systems may normally not be set up in the working area and air lines between the suspended particle filter and suction device may not pass through the working area.

14.1.4 (1) The working area may only be entered or left through adequately dimensioned personnel decontamination facilities (personnel airlocks). It is not permitted to transport material through the personnel airlock.

(2) A multi-chamber system consisting of three chambers with antechamber or four chambers in modular form or as a fixed installation in the container, for example according to Figure 1, must fulfil the major requirements:

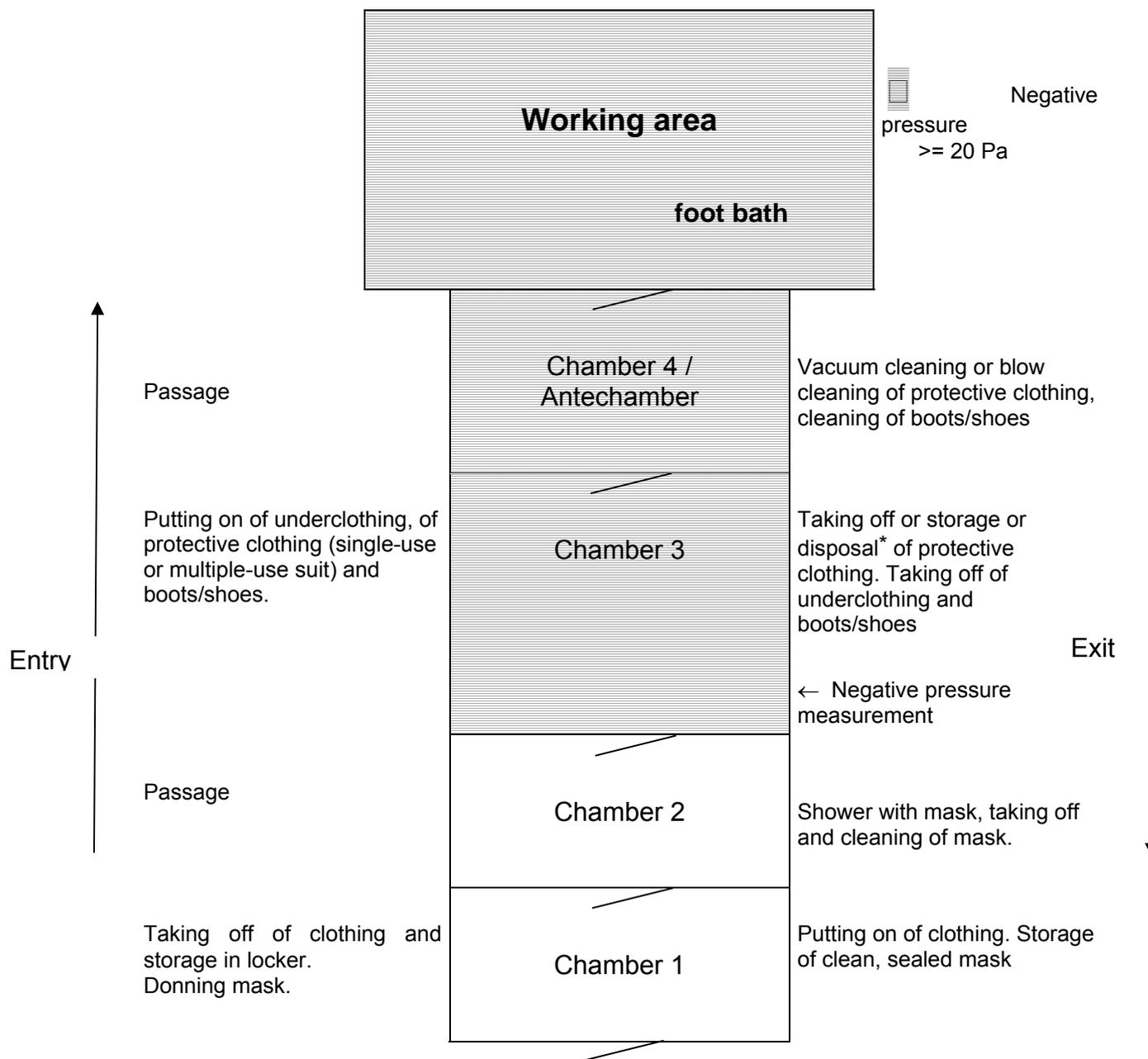
- floors, walls and ceilings of tight, washable, smooth material,

- wet cell with automatic shower passage and hand shower unit,
- automatically closing chamber doors,
- directed air guidance through the airlock in the direction of the black area; this can be achieved for example by maintaining negative pressure in chamber 3 and the antechamber or chamber 4 with negative pressure measurement in chamber 3, where the negative pressure may not be higher than in the black area (working area),
- diagonal ventilation of all chambers with at least 10-fold air exchange per hour in chamber 3 and the antechamber or chamber 4; it must be ensured that no drafts arise,
- guarantee of sufficient room air and water temperatures,
- discharge of the shower water into the effluent system.

As an antechamber or chamber 4 an air shower can also be used for pre-cleaning. Air showers may only be used in the place of wet showers if they have been approved by the authorities or Berufsgesnossenschaft (institution for statutory accident insurance and prevention).

(3) According to para. 2 a three-chamber airlock is sufficient for a fibre concentration of more than 100 000 F/m³ provided the working time is not more than two shifts when not more than three workers are assigned. A 3-chamber airlock is also adequate if the fibre concentration is less than 100 000 F/m³.

(4) If there is electrical equipment in the proximity of the personnel airlock, thus meaning that a wet cell in the airlock must be dispensed with, the workers must be vacuum cleaned dry in the airlock and there must be shower available in the proximity.

Fig. 1 Personnel airlock (general sketch)

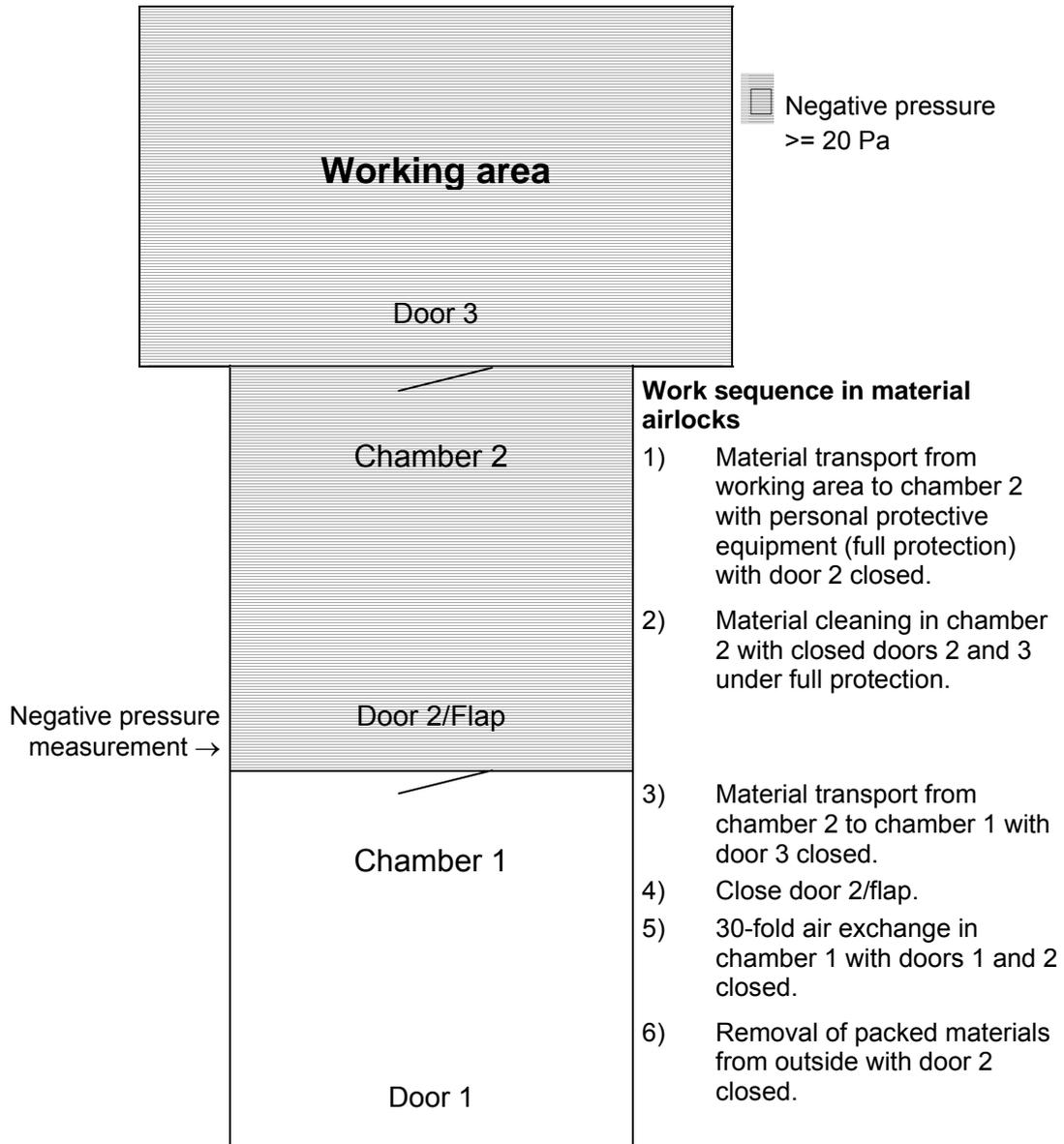
14.1.5 Material decontamination facilities (material airlocks) must for example be designed according to Fig. 2 so that objects and materials can properly be transported, cleaned, packed and temporarily stored. It is not permitted to enter and leave the working area through the material airlock. Major requirements for the material airlock are

- controlled maintenance of negative pressure in chamber 2; the negative pressure may not be higher than in the working area,
- ventilation and venting of the chambers (10-fold air exchange per hour and diagonal through-flow in chamber 2),
- prior to material removal at least 30-fold air exchange in chamber 1,

* Single-use suits may be used at most for the length of a shift and must be disposed of after the end of the shift.

- automatically closing chamber doors,
- locking of doors so that the doors 1 and 2, or 2 and 3 cannot be opened simultaneously,
- discharge of water in the effluent system.

Fig. 2 Material airlock (general sketch)



14.1.6 Airlocks must be thoroughly cleaned wet after the end of every shift. If, in accordance with number 14.1.4 para. 4, a wet cell must be dispensed with in the personnel airlock, the airlock must be thoroughly vacuum cleaned after the end of every shift with a suitable and approved industrial vacuum cleaner.

14.1.7 (1) Working procedures according to the latest state of art must be applied in order to prevent the release of asbestos fibres as far as possible. Basically asbestos spray plaster and other weakly bound asbestos-containing products must be soaked and

then removed by suction or taken off their sub-structure. Resulting asbestos-containing water may not be discharged into the sewage system, but must be taken up using a heavy-duty vacuum suction device or a suitable industrial vacuum cleaner.

(2) When spray asbestos is removed in large quantities a heavy-duty vacuum suction device must be used that can generate a negative pressure of at least 35 kPa and that consists of a collecting vessel, a main and safety filter (pure air concentration < 1000 F/m³) and pump, as far as possible in a single block.

(3) Asbestos-containing or asbestos-contaminated materials that cannot be taken up by suction must be treated or packed in the working area in such a way that a release of asbestos fibres is prevented from the place where it arises to the landfill or to a central treatment facility. It is not permitted to shred asbestos-containing materials, except for processes according to number 13.4 of this TRGS.

14.1.8 Spray asbestos must be bound with cement or another suitable binder according to the state of the art at the place where it arises in order to prevent fibre release. This can for example be done using a combined treatment and filling technique in a closed system

- which is kept under negative pressure and
- where material discharge without fibre release is ensured.

If it is not possible to work in a closed treatment system, the room chamber for material discharge must be equipped as a black area with personnel and material airlock.

14.1.9 There must be a means of voice communication from the working area to the outside.

14.1.10 As a deviation to number 14.1.4, for work performed by a maximum of two workers in a maximum of two hours, including packing, cleaning, where relevant the binding of residual fibres and subsequent 30-fold air exchange (fresh air), it is possible to dispense with personnel airlocks. Before the work is concluded, including disposal of the single-use suit, the partitioned off working area may not be left. The access must be kept closed and dust-proof during the work. Negative pressure measurement can be dispensed with.

14.2 Special regulations for work of minor extent

(1) Work of minor extent (for definition see number 2.9) on weakly bound asbestos products may for example be

- removal of asbestos cardboard beneath window sills,
- removal of seals, e.g. on gas burners or doors,
- coating of bulkhead partitions, e.g. on cable ducts or on penetrations in ventilation ducts or smoke tubes,
- coating of weakly bound asbestos-containing plates in good condition by rolling.

(2) Basically working areas must be partitioned off in a dust-proof form and ventilated throughout by means of a venting device to maintain negative pressure. As far as possible, work should be performed wet. For cleaning work a type-approved vacuum cleaner according to number 7.2 para. 6 must be used.

(3) In the case of small working areas it may also be sufficient, in deviation from para. 2, to make sole use of a type-approved vacuum cleaners (dispensing with an additional venting device), provided the vacuum cleaner is kept constantly in operation and the exhaust air conducted to the outside.

(4) In general a single-chamber airlock is sufficient as a connection to the working area. It is only possible to dispense with the airlock if the exposure time is two hours as a maximum. Persons and objects may in such a case not leave the working area before the reconstruction work is complete, including cleaning work, and subsequent adequate air change. Access must be sealed and dust-proof during the work.

(5) The bulkhead partitioning may only be dismantled after completion of the work, thorough cleaning, where relevant subsequent binding of residual fibres and adequate ventilation (30-fold. It is normally possible to dispense with a release measurement according to number 14.4.

(6) In the case of work of minor extent there must be a shower on the spot or at the depot. There must invariably be a washing facility on the spot.

14.3 Additional exceptions for processes at low exposure

It is only permissible to dispense with the bulkhead partitioning of the working area with demolition and reconstruction work for a working procedure with low exposure if

- openings to adjacent rooms are kept closed,
- uninvolved third parties do not enter the room (working area) prior to termination of work (including cleaning and venting),
- the working area is thoroughly cleaned using a type-approved vacuum cleaner according to number 7.2 para. 6 and wiped wet after termination of the activities involving asbestos. In rooms with floor-covering which cannot be wiped off wet, the floor must be covered with stuck-down sheeting so as to be fibre-proof prior to commencement of work, thus making it possible to clean the covered floor wet after the work and before reuse. After wet cleaning the stuck-down sheeting must be removed and the floor covering must be cleaned using a type-approved vacuum cleaner according to number 7.2 para. 6.
- subsequently there is a multiple air exchange.

In such cases a release measurement according to number 14.4 is dispensed with.

14.4 Cancellation of protective measures (release)

The employer may only cancel the protective measures specified if the activities involving asbestos and other asbestos-containing hazardous substances are terminated, including cleaning. After extensive work the protective measures may only be cancelled in the working area if

- a visual inspection has confirmed that there are no visible asbestos particles,
- a measurement according to VDI 3492 sheet 2 detected an asbestos fibre concentration in the room of below 500 F/m³ and
- the upper limit of the confidence level of 95% calculated according to the Poisson distribution for the asbestos fibre concentration is below 1000 F/m³. During this measurement the maintenance of negative pressure in the measuring area must be suspended.

The measuring result can where relevant be used to monitor success according to the asbestos guidelines.

15 Special regulations for demolition work on asbestos cement products

15.1 General requirements

- (1) If in individual cases hand-operated, portable machines and units have to be used to work on asbestos cement products and if dust is released at the same time, only slow-running machines and units with vacuum suction facility may be used.
- (2) Dismantled asbestos cement products may not be re-used. (For exceptions in the case of maintenance measures see under the latter.)
- (3) Asbestos-containing corrugated panel roofs are not penetration-proof and according to section 11 of the BG regulation "Construction work" (BGV C 22) they may only be walked on with the use of load-spreading covers or catwalks. With a fall height of more than 3 m anti-fall safeguards must be provided (section 12 BGV C 22 and BG rules "Roof work" BGR 203).

15.2 Work in the open

- (1) On weather-exposed surfaces uncoated asbestos cement products must either
 - a) be sprayed prior to abrasion or dismantling with dust-binding agents, e.g. stone or plaster solidifier, residual fibre binder or
 - b) must be kept wet at the surface when eroded, dismantled and removed. The surfaces must be wetted by a fine spray. The water must be drained off like rainwater.
- (2) Coated asbestos cement products may only be dismantled in a dry state where the coating is not has not been weathered over large areas.
- (3) Detachable fasteners must be removed in such a way that the asbestos cement products are not broken into pieces as far as possible. The fasteners must be collected in suitable, tight containers. Panels and plates with fasteners let into the reverse must be hung out.
- (4) If it is not possible to loosen the fastenings in the case of nailed, small-format panels, the panels must be levered out individually.
- (5) Asbestos cement products must be detached and removed from the substructure against the direction of installation, in the case of roofs from the ridge to the eaves, in the

case of walls from top to bottom. When fasteners are being removed, the products must be secured to prevent them from slipping. Products to be dismantled must be lifted and not broken out. They may not be pulled over edges and adjacent products or pulled out through coverings.

(6) Asbestos cement pipes must be pulled as far as possible manually without destruction from the plug connections and dismantled. If this is not possible the pipes must be cut using suitable devices (e.g. slow-running pipe saws) using spraying agents. Fractures must be sprayed. Asbestos cement pipes laid in the ground and moistened by the ground may be dismantled by machine. If it is still not possible to avoid any fracture, the release of dust must be prevented by an earth covering.

(7) After dismantling and until placement in store in containers uncoated asbestos cement products must be kept moist according to number 13.1 if they are not treated according to para. 1 letter a). Asbestos cement products must be transported in such a way that release of asbestos fibres is prevented. Bulk material chutes may not be used. Reloading may only be carried out manually or with the use of hoists; the material must not be thrown.

(8) Immediately after the removal of asbestos cement products, the surfaces of the substructure contaminated by asbestos-containing dust, e.g. slats, rafters, purlins, shuttering, must be thoroughly cleaned either by vacuum cleaning using type-approved vacuum cleaners according to number 7.2 para. 6 or by wet wiping. The dismantling of the substructure and heat insulation is normally not necessary.

(9) For work on outer wall claddings of asbestos cement products suitable tarpaulins or sheeting must be laid out to catch and collect any falling fragments.

(10) During the work it must be ensured that building openings of rooms in the immediate working area are closed.

(11) After work on roofs, roof gulleys must be cleaned and then rinsed. The rinsing water is to be disposed of in the sewage system.

(12) Protective suits and respirators must be taken off outdoors (see also number 9).

15.3 Work in interior rooms

(1) For work in interior rooms 15.2 applies as appropriate. Special attention must be paid to fracture-free and dust-free working procedures.

(2) Asbestos cement products in interior rooms may be dismantled in a dry state if they have not been destroyed.

(3) If it is not possible in individual cases to prevent the fracture of asbestos cement products, special measures must be taken to prevent the release of dust, e.g. by careful wetting or the application of wet cloths.

(4) The rooms affected may not be used during the work and up to the completion of the cleaning. Ventilation systems must be shut down at this time. Work rooms must be kept closed and transport operations are to be limited.

(5) After termination of the work all surfaces must be

- vacuum cleaned using devices approved for asbestos or
- cleaned wet (e.g. tile or plastic surfaces).

Before the room is released a multiple air exchange must be carried out.

(6) With a working procedure with low exposure bulkhead partitioning and release measurement according to number 14.4. can be dispensed with under the conditions of number 14.3.

(7) In the case of higher fibre concentrations the protective measures according to number 14.2 must be applied in addition to those according to paras. 1 to 5. This can be expected in particular when asbestos cement products are destroyed during dismantling (drilled, fractured, cut open).

16 Special regulations for maintenance work on asbestos products

(1) The following requirements describe certain technical measures to be taken aimed at staying below an asbestos fibre concentration of 15 000 F/m³ as far as possible. If this target is not attained, the requirements according to number 14.2 must be complied with in addition, and where relevant also the requirements according to number 14.1, e.g. with large units on ships or in power plants. Under the conditions of number 14.3 a bulkhead partitioning and release measurement according to number 14.4 can be dispensed with.

(2) During maintenance work it must be checked whether there are tested procedures of low exposure according to BGI 664 available for this purpose.

16.1 General requirements

(1) Maintenance work must be planned in such a way that a release or entrainment of asbestos fibres is prevented to the greatest possible extent. In principle work must be carried out without causing any destruction. If this is not possible, the asbestos-containing parts must be wetted as far as possible (use penetrating liquids, for example). The use of fast-running machines, such as grinders and drills, is not permissible. Any asbestos fibres which may be released must be extracted using a type-approved vacuum cleaner (see number 7.2 para. 6). Any dust resulting must be transported in dust-proof containers. Re-filling is not permitted. Disposal of asbestos-containing waste must be performed according to the rules and regulations for waste disposal.

(2) During maintenance work care must be taken to ensure that people and adjacent areas are not put at risk. This can be achieved, for example, by taking the following measures:

- cover place of work or surrounding area, e.g. using plastic sheeting; where relevant install bulkhead partitioning,
- close building openings such as windows and doors in the immediate working area,
- keep place of work wet,
- extract any dust arising at the point where it arises using a type-approved vacuum cleaner according to number 7.2 para 6,
- leave place of work as far as possible only after completion of the work,
- clean place of work carefully after work has been finished.

16.2 Maintenance work on asbestos cement products

(1) Maintenance work also includes the controlled dismantling, removal and replacement of only single asbestos cement products selected for urgent reasons and minor work on asbestos cement products. Such maintenance work includes, for example:

- the dismantling of individual defective asbestos cement panels in a roof covering or outer wall cladding and their replacement by asbestos-free products,
- the mounting, implementation or removal of single scaffolding anchors, fastenings, lines, masts or roof standards in connection with asbestos cement products,
- the destruction-free dismantling, removal or remounting of only single asbestos cement panels, pipes or fittings to inspect, maintain or repair building parts, installations, devices or systems located under them,
- the washing off and coating of outer wall surfaces.

(2) If the jobs given in para. 1 are only carried out in individual cases and if the requirements according to the numbers 15 and 16.1 are complied with, personal protective measures can be dispensed with taking due account of number 8.2 para. 5 and number 8.3 para. 1. If these jobs are performed more frequently, it is only possible to dispense with personal protective measures, if the requirements according number 15 and number 16.1 are fulfilled and if use is made of procedures with concentration below 15 000 F/m³ which have been announced by the occupational safety and health institute of the Berufsgenossenschaften (BGIA) as set out in number 2.10 para. 7.

(3) Individual asbestos cement products removed undamaged for these jobs may be remounted provided this can be done without damage or work on them.

(4) When individual asbestos cement products are removed, they may, if inevitable, be pulled out from under coverings as a deviation from number 15.2 para. 5.

(5) If, during maintenance work, asbestos cement plates have to be removed over a large area, the regulations of number 15 apply.

(6) Outer wall surfaces may be cleaned. If cleaning devices are used, only low-emission procedures and equipment may be employed which are approved by the authorities or Berufsgenossenschaften. If cleaning is done manually, the outer wall surfaces must be kept wet section by section using an unpressurized water jet, as far as possible with low-surface-tension water and soft objects, e.g. sponge, cleaned and then rinsed off with an unpressurized water jet. The water arising from the cleaning process must be collected and disposed of as waste water.

(7) When pipe fractures in asbestos cement pipes are repaired by replacement of pipe parts or installation of sealing clips and installing branches in existing asbestos cement pipings, suitable equipment must be used (slow-running asbestos cement pipe saws, pipe chain cutters). During sawing the interface must be adequately wetted with low-surface-tension water. Pipe end faces and pipe fragments must be sprayed if necessary with binders for residual fibres.

16.3 Maintenance work on seals and packings

(1) Asbestos-containing seals and packings must as far as possible be removed from their installation locations without destroying them.

(2) After an extended period of installation seals may stick or be burnt into the flange surfaces at the point of installation. If such seals are removed, asbestos fibres may be released through the destruction of the seal if the fibres are weakly bound (e.g. seal cords). Asbestos fibres can also be released when dismantling packings if these cannot be removed in one piece bushing. Fibre release can be avoided or reduced by using

1. penetrating liquids (observe disposal regulations) and
2. coarsely cutting tools (scrapers, chisels).

(3) Asbestos fibres released during removal of seals and packings must be taken up using a type-approved dust removal device (see number 7.2 para. 6).

(4) The cohesive seal and packing parts must be packed and transported away in dust-proof containers, which serve at the same time as transport containers.

(5) The seal residues removed and the extracted dust must be taken to the landfill in dust-proof packaging and so as to give out only low emissions.

(6) During disposal the regulations for binders and additives of seal materials must be observed.

(7) If asbestos-containing seals and packings have to be re-installed because substitute substances are not available, the following procedure must be adopted:

- use finished seals,
- avoid damage,
- collect residues and waste during adaptation work and dispose of it.

(8) If seals and packings (except for sealing cords) are replaced in individual cases and the requirements according to number 16.3 are fulfilled, personal protective measures may be dispensed with in accordance with number 8.2 para. 5 and number 8.3 para. 1. If such work is carried out frequently, personal protective measures may only be dispensed with if the requirements of number 16.3 are fulfilled and if procedures involving concentrations below $15\,000\text{ F/m}^3$ are applied which have been announced by the occupational safety and health institute of the Berufsgenossenschaften according to number 2.10 para. 8.

16.4 Maintenance work on braking systems and clutches

(1) When removing worn friction linings the erosion dust must be taken up using a type-approved vacuum cleaner according to number 7.2 para. 6. It is not permissible to blow using compressed air. A dust-binding wet cleaning method is also possible provided the cleaning agent does not adversely affect the braking action.

(2) If it is necessary when cleaning brake blocks, callipers, disks and drums or other brake parts to use a brush, vacuum devices as per para. 1 must be used. Once again wet cleaning should be applied. The cleaning agent may not adversely affect the braking action.

(3) Worn linings should as far as possible be unriveted as whole parts from their carriers without destroying them. And once again vacuum suction devices according to para. 1 should be used.

- (4) Dismantled residues of linings and friction linings and extracted dust must be packed in dust-proof form and disposed of without emissions (see number 13).
- (5) When friction linings are being disposed of, the relevant regulations for other contaminant components of the friction materials must be complied with where necessary.
- (6) When changing linings on drum brakes, an adaptation of dimensions should be undertaken as far as possible by working on the drums. If asbestos-containing brake linings are adjusted in size when installed, only slow-running diameter-turning devices may be used. On account of the major release of fibres, overgrinding is not permitted. When turning diameter, type-approved dust removal devices must be used. Stationary brake lining machine tools must be set up in rooms which are separated off in dust-proof fashion from other rooms and which have to be kept under negative pressure during the machining time.
- (7) In the case of maintenance work on clutches, the same procedure as for brake systems should be adopted as appropriate. Prior to dismantling of the clutch bell, the erosion dust must be bound wet as far as possible. Tools powered by compressed air may not be used as a basic principle.
- (8) If friction linings are only replaced in individual cases and the requirements according to number 16.4 are fulfilled, personal protective equipment may be dispensed with in accordance with number 8.2 para. 5 and number 8.3 para. 1. If such work is carried out frequently, personal protective measures may only be dispensed with provided the requirements under number 16.4 have been fulfilled and procedures with a concentration below 15 000 F/m³ are applied which have been announced by occupational safety and health institute of the Berufsgenossenschaften according to number 2.10 para. 8.

16.5 Provisional measures

If, when provisional measures are being taken, it cannot be prevented in accordance with number 2.3 that asbestos fibres will be released, the employer must stipulate the adequate protective measures required according to this TRGS on a case to case basis.

17 Further regulations

1. Act concerning protection against hazardous substances (ChemG) of 20.6.2002, (BGBl. I No. 40 of 27.6.2002 P. 2090)
2. Act concerning protection against adverse environmental effects due to air pollutants, noise, shocks and similar processes (BlmSchG - Bundes-Immissionsschutzgesetz) of 26.9.2002 (BGBl. I No. 71 P. 3830)
3. Act concerning the promotion of the recycling economy and securing the environmentally sound disposal of waste (Kreislaufwirtschafts- and Abfallgesetz) of 27.9.1994,
4. Second general administrative regulations to the Waste Act Part 1: Technical directives on the storage, chemical/physical, biological treatment, incineration and

- deposition of waste subject to special inspection requirements TA Abfall; of 12.3.1991 (GMBI P. 139, corr. P. 467)
5. Technical directives on the utilization, treatment and other disposal of household waste (Third administrative regulations to the Waste Act) of 14.5.1993 (BAnz. No. 99a of 29.5.1993)
 6. Ordinance on protection against hazardous substances (Gefahrstoffverordnung - GefStoffV) of 23.12.2004 (BGBl. I P. 3759)
 7. Ordinance on safety and health protection in the provision of work equipment and its use at work, on safety of the operation of installations subject to special inspection requirements and on the organisation of corporate occupational safety and health (Construction Sites Ordinance – BetrSichV)“ of 27.9.2002 (BGBl. I P. 3777)
 8. Ordinance on workplaces (Workplaces Ordinance – ArbStättV) – of 12.8.2004 (BGBl. I P. 2179)
 9. Ordinance on safety and health protection on construction sites (Baustellenverordnung - BaustellV) of 10.6.1998 (BGBl. I P. 1283)
 10. TRGS 500: Protective measures: Minimum standards; Edition: March 1998.
 11. TRGS 555: Working instructions and information for workers according to section 20 of the Hazardous Substances Ordinance, Edition December 1997
 12. TRGS 560: Air return when handling carcinogenic substances; Edition: May 1996
 13. Directive on the evaluation and reconstruction of weakly bound asbestos products in buildings (Asbestos Regulations); Institut für Bautechnik, Berlin, Edition January 1996
 14. BG Regulation: Principles of prevention (BGV A 1)
 15. BG Regulation: Construction work: (BGV C 22)
 16. BG Rule: Principles of prevention (BGR A 1)
 17. BG Rule: Use of protective clothing (BGR 189)
 18. BG Rule: Use of respiratory protective equipment (BGR 190)
 19. BG Rule: Operation of work equipment (BGR 500)
 20. BG Information: Separate determination of the concentration of inorganic fibres in working areas – scanning electron microscopic procedure (BGI 505-46)
 21. BG Information: List of certified respiratory protective equipment (BGI 693)
 22. BG Information: Processes with lower exposure to asbestos during demolition, reconstruction or maintenance work (BGI 664)
 23. VDI Directive 2262 Sheet 2: Condition of air at the workplace – reduction of exposure to foreign substances in the air – process engineering and organisational measures
 24. VDI Directive 2262 Sheet 3: Condition of air at the workplace – reduction of exposure to foreign substances in the air; ventilation-related measures
 25. VDI Directive 3492: Measurement of inorganic, fibrous particles – scanning electron microscopic procedure

26. VDI Directive 3861: Measurement of emissions – measurement of inorganic, fibrous particles in flowing pure gas - scanning electron microscopic procedure
27. VDI Directive 3866: Determination of asbestos in technical products – Basics – Taking and preparation of samples
28. DIN 31051: "Maintenance, terminology and measures".
29. Factsheet: "Disposal of asbestos-containing waste", Länderarbeitsgemeinschaft Abfall (LAGA)
30. Factsheet: "Asbestos in electrical storage heaters" Vereinigung Deutscher Elektrizitätswerke e.V.
31. Factsheet: "Asbestos in electrical storage heaters", Social Ministry of Mecklenburg-Vorpommern.
32. Factsheet: "Asbestos products in buildings in the new federal states“, Verbraucherzentrale Bundesverband e.V. (VZBV)

Annexes:

- Annex 1: Notifications, risk assessment, work schedule and working instructions
- 1.1 Company-related notification concerning activities involving asbestos-containing hazardous substances
 - 1.2 Subsequent notification of place and time for company-related notification concerning activities of minor extent involving asbestos-containing hazardous substances
 - 1.3 Object-related notification concerning activities involving asbestos-containing hazardous substances
 - 1.4 Risk assessment with work schedule
 - 1.5 Supplementary details for work schedule for extensive demolition and reconstruction work on weakly bound asbestos products according to No. 14.1 TRGS 519
 - 1.6 Working instructions – Dismantling of facade panels
 - 1.7 Working instructions - Removal of fire protection panels
- Annex 2: Labelling of working areas
- Annex 3: Course for the acquisition of expert knowledge according to No. 2.7 of TRGS 519 relating to demolition, reconstruction or maintenance work
- Annex 4: Course for the acquisition of expert knowledge according to No. 2.7 of TRGS 519 concerning demolition and maintenance work on asbestos cement products or demolition, reconstruction or maintenance work of minor extent
- A Asbestos cement products
 - B Demolition, reconstruction or maintenance work of minor extent
 - C Integrated course covering demolition, reconstruction or maintenance work

- Annex 5: Short course for the acquisition of expert knowledge according to No. 2.7 (3) sentence 1 of TRGS 519 relating to work involving lower exposure of workers
- Annex 6: Determination of asbestos fibre concentration within the framework of TRGS 519

Annex 1.1 to TRGS 519

Company-related notification concerning activities involving asbestos-containing hazardous substances

(according to Annex III No. 2.4.2 GefStoffV and number 3.2 TRGS 519)
(tick or make entry where applicable)

To the Occupational safety and health authority 	Sender (name, address, phone, fax, e-mail)
---	--

1. Notification is communicated for:

<input type="checkbox"/> Activity with low exposure, e.g. BGI 664 No.	<input type="checkbox"/> Stationary establishment, address of the establishment
<input type="checkbox"/> Activity of minor extent, weakly bound	
<input type="checkbox"/> Activity of minor extent, asbestos cement <input type="checkbox"/> Maintenance acc. to No. 16 TRGS 519	<input type="checkbox"/> Other activities:

2. Description of activity:

3. Name of person(s) with expert knowledge:

4. Number of workers working with asbestos:

5. Measures to limit asbestos exposure

- Risk assessment with work schedule acc. to Annex 1.4 of TRGS 519 is enclosed
- Working instructions are enclosed
- Supplementary details to work schedule according to Annex 1.5 to TRGS 519 are enclosed (may be necessary for activities acc. to number 14.1 TRGS 519 in the case of stationary installations)

6. Procedure/place of waste disposal

- Specialist waste management company is engaged to dispose of waste
- Removal (disposal) by performing company at following landfill approved for asbestos:
- Other type of waste disposal: ...

7. Copies of notification sent to

- the Berufsgenossenschafton.....
- the workers/works/staff council concerned

(place, date)

(works manager responsible)

Annex 1.2 to TRGS 519

Supplementary notification concerning place and date
in the case of company-related notification concerning activities of minor extent
involving asbestos-containing hazardous substances
(according to number 3.2 para. 3 TRGS 519)

to be addressed to
the **occupational safety and health authority responsible for the place of the activity**

To the Occupational safety and health authority 	Sender (name, address, phone, fax, e-mail)
--	--

In accordance with the company-related notification of:.....(date)

to the occupational safety and health authority:

We inform you in addition that we intend to perform work of minor extent on asbestos-containing materials on:.....(date).

The address of the establishment is:

Copy of this supplementary notification addressed to

the Berufsgenossenschafton.....

(place, date)

(works manager responsible)

Annex 1.3 to TRGS 519

Object-related notification for activities involving asbestos-containing hazardous substances

(according to Annex III No. 2.4.2 GefStoffV and number 3.2 TRGS 519)
(tick or make entry where applicable)

To the Occupational safety and health authority	Sender (name, address, phone, fax, e-mail)
.....
.....
.....
.....

1. **Address of the establishment:**
2. **Type/designation and quantity (kg/m³/m²) of the asbestos-containing product**
3. **Activity to be carried out**
 - Demolition/removal of firmly bound asbestos product
 - Demolition/reconstruction of weakly bound asbestos products
 - Removal Coating Spatial separation
 - Maintenance (extensive)
 - Other activities:
4. **Name of the person(s) with expert knowledge on site:**
5. **Number of the workers working with asbestos:**
6. **Start of activity:** **duration:** days/week
7. **Measures to limit asbestos exposure**
 - Risk assessment/work schedule according to Annex 1.4 of TRGS 519 is enclosed
 - Working instructions are enclosed
 - Supplementary details (in the case of extensive demolition/reconstruction work on weakly bound products acc. to number 14.1 TRGS 519) acc. to Annex 1.5 of TRGS 519 are enclosed
8. **Procedure/location of waste disposal**
 - Specialist waste management company is engaged to dispose of waste
 - Removal (disposal) by performing company at following landfill approved for asbestos:
 - Other type of waste disposal:
9. **Copies of the notification submitted to**
 - the Berufsgenossenschafton.....
 - the workers/works/staff council concerned

_____	_____
(place, date)	(works manager responsible)

Annex 1.4 to TRGS 519

Risk assessment with work schedule
 (according to Section 7 and Annex III No. 2.4.4 GefStoffV)
 (tick or make entry where applicable)

The annex can be used to document the risk assessment and the work schedule of demolition, reconstruction or maintenance work on asbestos products as an addition to the notification.

In the case of extensive work on weakly bound products according to number 14.1 TRGS 519 supplementary details according to Annex 1.5 are required.

Sender:

For company-related notification of:
 For object-related notification relating to object: of:

1. Type of the asbestos-containing material

<input type="checkbox"/> Spray asbestos	<input type="checkbox"/> Asbestos cement roof panels
<input type="checkbox"/> Lightweight building boards	<input type="checkbox"/> Asbestos cement facade panels
<input type="checkbox"/> Sealing cords	<input type="checkbox"/> Other AC products :
<input type="checkbox"/> Other weakly bound products:	<input type="checkbox"/> Flex panels
.....	<input type="checkbox"/> IT seals
.....	<input type="checkbox"/> Other firmly bound products
.....

2. Activity is carried out

- outside buildings inside buildings

3. Description of the activity

.....

4. Evaluation of the fibre release potential and/or the quantity of work

<input type="checkbox"/> Activity with low exposure, BGI 664 No.	<input type="checkbox"/> Maintenance acc. to No. 16 TRGS 519
<input type="checkbox"/> Activity of minor extent, weakly bound	
<input type="checkbox"/> Activity not of minor extent, weakly bound	<input type="checkbox"/> Evaluation of other asbestos products according to No. 2.13 TRGS 519
<input type="checkbox"/> Activity of minor extent, asbestos cement
<input type="checkbox"/> Activity not of minor extent, asbestos cement

5. Protective measures

5.1 Technical protective measures

- acc. to. Number 14.1 TRGS 519
 Number 14.2 TRGS 519
 Number 14.3 TRGS 519

- BGI 664 No. ...
- Number 15.2 TRGS 519
- Number 15.3 TRGS 519
- Number 16.2 TRGS 519
- Number 16.3 TRGS 519
- Number 16.4 TRGS 519

including necessary effectiveness checks.

The requirements are fulfilled partly fulfilled

If the requirements are only partly fulfilled, deviations and alternative measures must be described:

.....

.....

.....

.....

Safety equipment (e.g. K 1 vacuum suction unit, spray unit, airlocks and similar)

.....

.....

Details of anti-fall safeguards (especially with roof work):

.....

.....

.....

.....

5.2 Organisational protective measures

Precautionary examinations

- Mandatory examinations were carried out (according to number 10.1 TRGS 519)
- Precautionary occupational medical examinations were offered (acc. to number 10.2 TRGS 519) (for activities acc. to BGI 664 or number 16 TRGS 519)

Authorisation

- available, copy attached not required
- applied for from the following occupational safety and health authority
.....
- Working instructions, copy attached
Instruction/training of the workers on:.....

5.3 Personal protective measures

Respiratory protective equipment:

- Half-face mask P2
- Filtering half-face mask FFP2
- Full-face mask P3 with blower support
- Other respiratory protective equipment

Protective suit:

Single-use Type Multiple-use Type
Further personal protective equipment;

6. Measures taken in the case of operational disturbances, accidents and emergency cases

.....
.....

7. Waste treatment/waste provision at work site

.....
.....
.....

8. Release of the site of work after termination of work

- after final cleaning and visual check
- after final cleaning, visual check and multiple room air exchange
- after final inspection and release measurement

(place, date)

(works manager responsible)

Annex 1.5 to TRGS 519

**Supplementary details relating to work schedule for extensive
demolition/reconstruction work on weakly bound asbestos products
according to number 14.1 TRGS 519**
(tick or make entry where applicable)

If the risk assessment and work schedule are carried out according to Annex 1.4 to this TRGS, the following details relating to the work schedule are required in the case of extensive work on weakly bound asbestos products according to number 14.1 TRGS 519:

Sender:.....

1. Building / building part / activity

Further details of the location of the asbestos product in the building, condition of the asbestos product, extent/scope (possibly attach layout plan)

.....

2. Safety equipment provided for to protect and decontaminate the workers and to protect third parties in the danger area

- Room ventilation system with exhaust air filtration to maintain negative pressure
- Personnel decontamination system (requirements in number 14.1 and 14.2 TRGS 519)
- Material decontamination systems (requirements in number 14.1.5 TRGS)
- Heavy-duty vacuum suction unit
- Negative pressure monitoring unit
- Spray unit to apply fibre binder
- Industrial vacuum cleaner K1 or K1/C or H
- Other equipment:.....

Hygienic equipment:

- Equipment for cleaning protective work and under-clothing
- Recreational and sanitary area for breaks, changing, washing and showering

Explanatory remarks:.....

3. Co-ordinator according to number 5.4.4 TRGS 519

- available, name of co-ordinator:.....
- not required

4. Responsible person with expert knowledge

Name:.....

5. Treatment of waste at the work site

- solidification installation (in the case of spray asbestos)
- packed in dust-proof form

Annex 1.6 to TRGS 519

Working instructions (section 14 GefStoffV)
 (dismantling of facade panels)
- T e m p l a t e -

Note: The template can only be used for the purpose of general and non-binding orientation. The activity-related details must always be seen and established on a case to case basis in relation to the particular application.

Company:

Workplace: changing sites

Activity: dismantling of facade panels

Name of hazardous substance

asbestos (white asbestos)

Hazards to human health and environment

During machining, crushing, drilling, abrasion and similar activities, asbestos-containing dust arises which, when breathed in, can lead to serious health damage such as asbestosis or forms of cancer.

Protective measures and rules of conduct

The following measures must be observed:

- Start of work only after precautionary occupational medical examinations
- Labelling of working area with prohibition sign and shutting it off to prevent unauthorised access.
- Wearing of protective suit and respirator (e.g. FFP2)
- When there are interruptions to work/breaks, the protective suit and then respiratory protective equipment should be taken off in the open; the protective suit/respiratory protective equipment must be kept separately from working clothes and not in the recreation room
- During breaks hands must be thoroughly washed
- Disposal of single-use protective suit and single-use mask after end of shift (e.g. waste bag)
- Building openings in the working area to be kept closed
- To collect fragments, plastic sheeting must be laid along the building wall
- Panels must be sprayed in sections with dust binder and then dismantled as far as possible without breaking them
- After completion of the work, surfaces and scaffold fittings must be subjected to vacuum cleaning, window ledges must be wiped off wet, and wiping water must be poured into the sewage system

- Before the labelling and shutting off of the work site are removed, a further visual check must be made for any asbestos residues

Response in the case of danger

- Stop work if there is an unusually large proportion of broken material, and agree further procedure with the supervisor
- If there are any unscheduled events, always notify the supervisor and keep unauthorised persons away

First-Aid

- In the case of accidents keep unauthorised persons away
- Ensure that providers of first aid / paramedics are aware of the asbestos hazard and, if necessary, self-protection measures
- In the case of eye irritations, do not rub, but rinse with water

Nearest doctor / hospital Tel.:.....[are given for the construction site].....

Emergency tel. No.:.....

Proper disposal

Dismantled panels, contaminated small parts, fastenings and other waste must be put in storage in Big-Bags labelled asbestos. Before the Big-Bags are sealed the spray the top layer with dust binder.

Do not transfer dust from vacuum cleaners to another container, but ensure dust-free disposal in accordance with the device's operating instructions.

(place, date)

(works manager responsible)

Annex 1.7 to TRGS 519**Working instructions (section 14 GefStoffV)**
(removal of fire protection panels)**- T e m p l a t e -**

Note: The template can only be used for the purpose of general and non-binding orientation. The activity-related details must always be seen and established on a case to case basis in relation to the particular application.

Company:

Workplace: **changing sites**

Activity: removal of fire protection panels

Name of hazardous substance

asbestos (white asbestos)

Hazards to human health and environment

Fire protection panels belong to weakly bound asbestos products. Owing to the weak binding of the asbestos these products they may give off high asbestos concentrations into the room air if subjected to slight mechanical loads, such as impact, friction and in particular fracture.

The inhalation of asbestos fibres may lead to serious health damage such as asbestosis or cancers.

When the fire protection panels are removed, special care must therefore be taken to ensure that least dust possible is released.

Protective measures and rules of conduct

- Work in the reconstruction area (black area) may only be carried out after precautionary occupational medical examinations.
- The reconstruction area must only be entered with sufficient negative pressure and only through the personnel airlock with protective suit and respiratory protective equipment.
- When the reconstruction area is left, the protective clothing must be vacuum cleaned, taken off and stored on an intermediate basis in the first chamber. Single-use protective clothing must be put into a waste bag after the end of the shift.
- Respiratory protective equipment may only be taken off and thoroughly cleaned after showering.
- During the work at least two persons must be present in the black area.

- The limit on wearing time for respiratory protective equipment must be complied with.
- Wet plates and dismantle without destroying them as far as possible; pack in the black area in plastic bags.
- Packed asbestos may only be taken out through the material airlock (2-chamber airlock).
- Before transferring the packed waste to chamber 1, vacuum clean the packing and spray with dust binder.
- Place asbestos backs taken from chamber 2 from outside in labelled containers.
- After completion of the work vacuum clean surfaces, wipe off smooth surfaces such as window ledges wet.
- Before removing the partitioning conduct another visual check for asbestos residues.

Conduct in the case of danger

- Immediately leave the black area if the breathing air supply fails, if breathing becomes difficult or if the negative pressure decreases. The supervisor must be notified without delay of damaged partitions.
- If there are unscheduled events always notify the supervisor.

First-Aid

A person is available who can provide first aid.

- Injured persons who cannot leave the black area through the personnel airlock must be transported out through the material airlock.
- Where helpers have to enter the black area from outside, they must be fitted out with protective suit and FFP3 mask.

Nearest doctor / hospital Tel.:.....[are given for the construction site].....

Emergency tel. No.:.....

Proper disposal

Store any packed asbestos waste in containers. Do not transfer dust from vacuum cleaners to another container, but ensure dust-free disposal in accordance with the device's operating instructions. Keep containers closed.

Transport and removal of the waste must be carried out by a specialist waste management company.

(place, date)

(works manager responsible)

Annex 2 to TRGS 519

Labelling of working areas



Prohibition label (P06) according to BGV A8 "Safety and Health Signs and Labels at Work", minimum diameter 0.4 m.

Annex 3 to TRGS 519

Course for the acquisition of expert knowledge according to number 2.7 of TRGS 519 relating to demolition, reconstruction or maintenance work

The aim of this course is the acquisition of expert knowledge for demolition, reconstruction or maintenance work on all asbestos-containing hazardous substances including asbestos cement products. Reference should be made to number 2.7 para. 4 of TRGS 519.

- | | |
|---|------|
| 1. Properties and health risks | 2 TU |
| <ul style="list-style-type: none"> - Asbestos as a mineral - Health risks, occupational illnesses due to asbestos | |
| 2. Use of asbestos | 4 TU |
| <ul style="list-style-type: none"> - Asbestos products and their use (with demonstration) - Detection of asbestos incl. asbestos cement products - Removal and analysis of material samples - Evaluation of asbestos in buildings – Asbestos Regulations - | |
| 3. Rules and regulations for activities involving asbestos | 5 TU |
| <ul style="list-style-type: none"> - Chemikaliengesetz [Chemicals Act], Bundes-Immissionsschutzgesetz [Federal Pollution Control Act], Landes-Bauordnung [State Building Regulations], Wasserhaushaltsgesetz [Water Resources Management Act], Abfallgesetz [Waste Act], Gefahrgutrecht [Hazardous Goods Law] (overview, reciprocal correlation) - Hazardous Substances Ordinance - Plant Safety Ordinance - Construction Sites Ordinance - Technical Rules for Hazardous Substances - TRGS 400, 402, 440, 500, 554, 555, 560 - TRGS 519 - BG Regulations BGV A 1, BGV C 22, BGV A 8 - BG Rules BGR 190, BGR A 1, BGR 189, BGR 500 - Regulations concerning waste avoidance, recycling, transport and dumping - §§ 9, 130 Act Governing Misdemeanours, § 14 Criminal Code | |
| 4. Personnel requirements | 1 TU |
| <ul style="list-style-type: none"> - person responsible - supervisor - co-ordinator - knowledgeable worker; initial and further training - company occupational safety organisation | |

5. Safety measures

5.1	Preparatory measures	5 TU
-	risk assessment	
-	establishment of work schedule	
-	working instructions, instruction/training	
-	precautionary occupational medical examinations	
-	notifications	
-	agreement with authorities and Berufsgenossenschaften	
-	fire protection	
-	first aid	
-	conduct in the case of disturbances	
5.2	Personal protective equipment (with demonstration)	2 TU
-	respiratory protective equipment	
-	protective clothing	
-	foot protection	
-	head protection	
5.3	Site facilities (with demonstration)	2 TU
-	shutting off of site	
-	recreation and sanitary rooms	
-	storage bay	
-	bulkhead partitioning to adjacent rooms	
-	airlock installations	
-	room air filtering systems	
-	emergency power systems	
-	other technical equipment, e.g. scaffolding	
5.4	Working equipment	1 TU
-	heavy-duty vacuum suction units	
-	industrial vacuum cleaners	
-	low-pressure spraying devices	
-	other devices	
-	inspection and maintenance of working equipment	
5.5	Operation of room ventilation systems	1 TU
-	maintenance of negative pressure	
-	air guidance in working area	
-	air return	
5.6	Operation of airlocks	1 TU

5.7 Working procedures (with demonstration)	3 TU
- for removal	
- for coating	
- for spatial separation	
- for maintenance work	
5.8 Waste treatment (with demonstration)	2 TU
- packing	
- solidification with cement	
5.9 Waste disposal	1 TU
- transport	
- deposition	
- other disposal procedures	
6. Final work, performance check, release	2 TU
- cleaning	
- binding of residual fibres	
- air exchange	
- control measurement	

32 TU

7. Examination

The theoretical examination must be done in writing. In addition oral examination questions may be put. The examination must be taken before a representative of the competent authority in whose area the course is conducted, in the presence of a representative of the body responsible for the course. A record must be kept of the examination report and it must be signed as well by the representative of the competent authority. The applicant will be issued a certificate confirming successful participation in the course and it must show the nature of the knowledge acquired.

Duration of course: at least 32 teaching units (TU) of 45 minutes each plus the examination

Number of participants: up to approx. 20 persons

Teaching personnel: expert persons. The Rules and Regulations for Activities involving Asbestos (Number 3 of the course programme) should be taught by a representative of the authority or the Berufsgenossenschaft.

Annex 4 to TRGS 519

Course for the acquisition of expert knowledge according to Number 2.7 of TRGS 519 relating demolition, reconstruction or maintenance work on asbestos cement products or demolition, reconstruction or maintenance work of minor extent

A Asbestos cement products

1. Properties and health risks 1 TU

- Asbestos as a mineral
- Health risks, occupational illnesses due to asbestos

2. Use of asbestos 1 TU

- Asbestos products and their use
- Recognition of asbestos cement products; delimitation of in asbestos relation to weakly bound products

3. Rules and regulations for activities involving asbestos and asbestos cement 2 TU

- Chemikaliengesetz [Chemicals Act], Bundes-Immissionsschutzgesetz [Federal Pollution Control Act], Landes-Bauordnung [State Building Regulations], Wasserhaushaltsgesetz [Water Resources Management Act], Abfallgesetz [Waste Act], Gefahrgutrecht [Hazardous Goods Law] (overview, reciprocal correlation)
- Hazardous Substances Ordinance
- Plant Safety Ordinance
- Construction Sites Ordinance
- Technical Rules for Hazardous Substances, in particular TRGS 519
- BG Regulations BGV A 1, BGV C 22, BGV A 8
- BG Rules BGR 190, BGR A 1, BGR 189, BGR 500,
- BG Information BGI 664, BGI 665, BGI 693
- Regulations concerning waste avoidance, recycling, transport and dumping
- §§ 9, 130 Act Governing Misdemeanours, § 14 Criminal Code

4. Personnel requirements 1 TU

- person responsible
- supervisor
- co-ordinator
- knowledgeable worker; initial and further training
- company occupational safety organisation

5. Safety measures

5.1 Preparatory measures 5 TU

- risk assessment

- establishment of work schedule
- work schedule, working instructions, instruction/training
- precautionary occupational medical examinations
- notifications
- first aid, personal protective equipment

5.2 Site facilities

- shutting off of site
- recreation and sanitary rooms
- anti-fall safeguards
- requirements for scaffolding

5.3 Working equipment

- devices for working asbestos cement products
- hoists
- suction units

5.4 Demolition work

- binding of fibres on the surface
- destruction-free dismantling
- collection on site

5.5 Maintenance work

5.6 Special measures to be taken with asbestos cement in rooms

5.7 Final work

- inspection of substructure and, if necessary, cleaning

6. Waste disposal

1 TU

- transport
- deposition
- other methods of waste disposal

7. Summary/final discussion

1 TU

 14 TU

8. Examination

The theoretical examination must be done in writing. In addition oral examination questions may be put. The examination must be taken before a representative of the competent authority in whose area the course is conducted, in the presence of a representative of the body responsible for the course. A record must be kept of the examination report and it must be signed as well by the representative of the competent authority. The applicant will be issued a certificate confirming successful participation in the course and it must show the nature of the knowledge acquired.

Duration of course: at least 14 teaching units (TU) of 45 minutes each plus the examination

Number of participants: up to approx. 20 persons

Teaching personnel: expert persons. The Rules and Regulations for Activities involving Asbestos (number 3 of the course programme) should be taught by a representative of the authority or the Berufsgenossenschaft.

B Demolition, reconstruction or maintenance work of minor extent

For work of minor extent according to number 2.9 TRGS 519 courses of 14 TU can also be recognised with reference to the subject matter taught in course A; in such a case a wide range of asbestos products, and in particular weakly bound products according to number 2.11 TRGS 519, are dealt with. Account must also be taken of work involving low exposure according to number 2.8 TRGS 519 with fundamental examples from BGI 664.

The courses can also be conducted together with respect to the teaching matter under points 1., 2., 3., 4., 6., 7. and 8.; in the case of point 5. and the examination questions it is necessary to differentiate.

C Integrated course for demolition, reconstruction or maintenance work

An integrated ASI course can also be conducted from the course programmes A and B.

In such a case, under point 5. course programme A, the specific safety measures such as:

- bulkhead partitioning,
- single-chamber airlocks,
- maintenance of negative pressure,

and the working procedures with supplementary examples from BGI 664 and waste treatment must be taught in particular in at least 3 additional TUs, and the subjects must be considered in the examination questions (total course duration 17 TU, plus examination).

Annex 5 to TRGS 519

Short course for the acquisition of expert knowledge according to number 2.7 para. 3 sentence 1 of TRGS 519 relating to work involving low exposure of workers

These short courses for the acquisition of expert knowledge are only adequate for work for which evidence is provided within the meaning of numbers 2.8 and 2.10 (asbestos fibre concentration smaller than 15.000 F/m³). The body responsible for the course must have been given the evidence including the related working instructions. The activity must be clearly mentioned in the course title.

1. Properties and health risks

- Asbestos as a mineral
- Health risks, occupational illnesses due to asbestos

2. Use of asbestos

3. Rules and regulations for activities involving asbestos-containing products and articles in the working area

- TRGS 519 and the link to the Hazardous Substances Ordinance
- Protective measures for activities involving asbestos
 - for workers
 - to prevent contamination of the workplace and workroom

4. Corporate measures

- Risk assessment
- Working instructions, instruction/training
- Notification of work
- Duties of the person with expert knowledge
- Explanation of the working procedures
- Handling and maintenance of the required equipment and aids, e.g. vacuum cleaner K 1
- Cleanliness of the working area
- Waste; collection and disposal
- Waste water in wet procedure

5. Consequences of incorrect planning and working procedure

- Release of fibres
- Greater cleaning effort
- Cleaning of the workroom including measurement

6. Scheduling/teaching personnel

- | | |
|------------------|-------------------------------------|
| Points 1. to 3. | 2 teaching units of 45 minutes each |
| Points 4. and 5. | 3 teaching units of 45 minutes each |

Teaching personnel: expert persons

7. Certificate

A certificate will be issued to the participants by the body responsible for the course. The certificate must contain the following information as a minimum

- Name and date of birth of the participant
- Course as per Annex 5 to TRGS 519
- Exact title of the course
- Body responsible for the course (with signature)
- Date

Annex 6 to TRGS 519

Determination of the asbestos fibre concentration within the framework of TRGS 519

The following remarks describe the procedure for determining the asbestos fibre concentration within the framework of the TRGS and are thus intended to ensure uniform application of the TRGS.

TRGS 519 defines work with low exposure as work which is carried with asbestos fibre concentrations at the workplace below 15000 fibres/m³. This value is not a limit value. Within the meaning of TRGS 519 it is merely intended as an indication of a value below which certain protective and precautionary measures can be omitted. It is not necessary to determine that asbestos fibre concentration of 15 000 F/m³ is kept below according to general process-specific and substance-specific criteria or the specifications given here as applicable to the individual case if use is to be made of this opportunity for dispensing with such measures. Number 2.10 para. 1 of TRGS 519 states that the fact that the asbestos fibre concentration of 15000 F/m³ is kept below is determined according to the criteria laid down by the AGS; under para. 3 the asbestos fibre concentration is determined according here using the scanning electron microscope in accordance with BGI 505-46.

These criteria are as follows:

The asbestos fibre concentration is below 15000 F/m³, if the following is fulfilled:

- No measuring result may exceed 15000 asbestos fibres/m³. The reference time for the measuring result is the duration of exposure. Periods of extended exposure must also be taken into account in the measurement. If the daily exposure last less than one hour, the reference time is one hour.
- The measuring conditions selected must be such that the lowest possible detection limit is achieved. The detection limit must not exceed 15000 F/m³. To achieve an adequately low detection limit
 - the specific volume of sample air may not be smaller than 40 l/cm². This can be achieved by means of a correspondingly long sampling time or a greater volumetric flow (even higher than that recommended in BGI 505-46), provided the circumstances permit,
 - in the case of short-lived operations a number of these can be dealt with together on the same sample carrier,
 - the filter area to be assessed can be enlarged in deviation from the standard specifications of the regulation BGI 505-46.

If it is not possible to reach the detection limit of 15000 F/m³ or to evaluate the measuring filters because of an excessively dense covering of dust particulates, it is not possible to establish that 15000 asbestos fibres/m³ is fallen below.

- To determine by measurement that the asbestos concentration is below 15000 asbestos fibres/m³ the following must apply
 - for all measuring results MR from three successive measurements:
 - $MR < 1/4 \times 15000 \text{ F/m}^3$

or

- for all measuring results MR from six successive measurements:
- $MR < 1/2 \times 15000 \text{ F/m}^3$

or

- for all measuring results MR from twelve successive measurements:
- $MR < 0.9 \times 15000 \text{ F/m}^3$

“Successive measurements” must be performed on different days or can be carried out in different working areas where the special work with low exposure under examination is carried out.

- The working procedure to be evaluated must be described in detail.
- As soon as a measuring result exceeds the asbestos fibre concentration of 15000 F/m^3 , it is not possible to confirm work with low exposure.