

# Operating instructions for hose assemblies:

RUBBER- AND  
PLASTIC TECHNOLOGY

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## General information

Note: In accordance with the law regarding safety and health protection when using work equipment, the hose assembly can be both work equipment and a system part requiring monitoring (German Ordinance on Industrial Safety and Health, the Betriebssicherheitsverordnung or BetrSichV). The guidelines of the BetrSichV must be observed by the owner/operator and a risk assessment must be created for the hose assembly in use.

## Proper use

- **Pressure:** Do not allow the pressure to exceed the maximum permitted positive operating pressure of the hose assembly.
- **Vacuum:** Do not allow the pressure to drop below the maximum permitted negative operating pressure of the hose assembly.
- **Temperature:** Do not allow the temperature to exceed the maximum permitted operating temperature of the hose assembly based on the medium. This must be checked for all hose assembly components using the available list of resistance characteristics.
- **Resistance:** Hose assembly materials must be resistant to the flowing media under operating conditions. This must be checked using the available list of resistance characteristics. Changes to the medium concentration, the duration of operation and the temperatures affect the safe operation of the hose assembly. This absolutely must be taken into account during operation.
- In the event of any **abrasion**, the wear on the hose assembly must be taken into account and checked regularly.
- If the ordering party has not provided any specific operating parameters that can be used by the manufacturer to perform a conformity assessment in accordance with the Pressure Equipment Directive (2014/68/EU), then the classification from the manufacturer shall apply.
- So that hose assemblies can be operated safely, technical, organizational and personal protective measures must be carried out. Technical and organizational measures are always take priority. If this does not make it possible to avoid all dangers, effective personal protective equipment must be provided and used.

## Responsibility of the employer (owner/operator)

Hose assemblies are work equipment where the testing requirements and inspection intervals must be determined by the employer (owner/operator) in a risk assessment (see BetrSichV).

The hose assembly and fittings must fit together in a functional way and functional safety must be confirmed with a suitable test procedure (e.g. hydrostatic requirements in accordance with DIN EN ISO 1402).

Observe the trade association data sheet T002 (= DGUV information 213-053) of the Raw Material and Chemical Industry Trade Association (BG RCI), issued 9/2014.

## Transport and storage

**Hose assemblies must not be damaged during transport or because of storage.** It is particularly important to make sure that

- they are stored in a cool, dry and dust-free place out of direct sunlight or UV light and shielded from nearby heat sources. Hose assemblies must not come into contact with substances that could cause have a damaging effect.
- Hose assemblies are stored lying down at all times with no tension or kinks. If stored wound in rings, the radius of the hose must not be less than the minimum bending radius specified by the hose manufacturer.
- Hoses ends are sealed with protective caps to protect the inside of the hose from contamination, the effects of ozone and corrosion (after complete discharge or cleaning and after the hose assembly has cooled down).
- Influencing factors that could damage the hose assemblies (e.g. effects of halides, extraneous rust or flash rust, mechanical stress) are eliminated.
- Appropriate transport packaging is used.

DIN 7716, T002 (DGUV Information 213-053) and DGUV regulation 113-015 (formerly BGR 237) are among the regulations to be observed.

## Installation and commissioning

In order to ensure the functional capability of the hose assemblies and to avoid reducing their operating life through excessive stress, the following are to be observed:

- Perform "testing before commissioning" (in accordance with T002, §§ 14 and 15 BetrSichV).
- Do not operate the hose assembly if there is visible damage.
- Do not operate hose assemblies that have exceeded their inspection intervals.
- Hose assemblies must be installed in such a way that their natural positioning and movement are not impaired.
- Hose assemblies must never be subjected to tension, torsion or compression unless they were specifically designed for such use.
- The radius of the hose must not be less than the minimum bending radius specified by the hose manufacturer.
- Hose assemblies must be protected against damage due to mechanical, thermal or chemical effects.
- All separable connections must be checked to ensure that they are firmly seated.
- Before commissioning, hose assemblies must be cleaned in an appropriate manner if necessary.
- TRBS 2153, regarding electrostatic hazards, "Avoiding danger of ignition from the build-up of electrostatic charges" is to be observed and followed.

## Maintenance, repair and inspection

**Cleaning:** The hose assembly is to be cleaned properly after use and before every inspection. In the event of cleaning with steam or chemical additives, the resistance characteristics of the hose assembly components must be observed. Note: The use of steam lances is prohibited.

**Inspection intervals:** The inspection intervals for hose assemblies with mandatory inspections are to be set by the employer (owner/operator) in accordance with BetrSichV guidelines as part of the risk assessment in accordance with § 3 BetrSichV. The work-safe condition of hose assemblies with mandatory testing is to be checked on a recurring basis by an individual qualified to perform the tests in accordance with BetrSichV § 2, Paragraph 6:

- At regular intervals after the initial commissioning: The inspection interval is determined by the risk assessment of the employer, e.g. at least once per year for thermoplastic and elastomer hose assemblies, at least twice per year for steam hoses. Higher use (e.g. mechanical, dynamic, thermal, and chemical) requires shorter inspection intervals.
- Regardless of inspection intervals, the hose assembly is always to be inspected after a repair.

## Testing pressures for the strength test (medium: cold water):

- Hose assemblies (excluding steam hose assemblies): max. permissible pressure (PS) x 1.5
- Steam hose assemblies made of elastomers: max. permissible pressure (PS) x 5

In the case of metal corrugated tubes, the chlorine content of the test water must not exceed the level specified by DIN EN ISO 10380.

**Scope of testing:** Type and scope of testing (strength test, visual check, test of electric conductivity, etc.) are regulated in BetrSichV, TRBS 1201 and T002 (DGUV Information 213-053). The test is to be performed in accordance with BetrSichV § 14, Paragraph 2, by an individual qualified to perform the test in accordance with TRBS 1203. The result of the test is to be documented.

**Repairs:** In the event of damage (leaks, cracks in the cover, kinks, abrasion points, etc.), the hose assembly must be taken out of operation immediately and further use must be prevented. Repairs to hose assemblies must be performed only using original replacement parts from the hose assembly manufacturer and by its qualified personnel and must be followed by testing by an individual qualified to perform the testing in accordance with the BetrSichV. The result of the test is to be documented.

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## Expected useful life

Hose assemblies are wearing parts with a limited service life. The expected useful life is influenced by storage conditions, the amount of strain placed on each hose assembly and the operating factors. It is impossible to make a general statement regarding the expected useful life. Depending on the hazard potential, load and economic relevance, the determination of fixed recurrent testing and replacement intervals is strongly recommended.

The extent to which a hose assembly is still usable under given operating conditions is decided as part of recurrent testing performed by an individual qualified to perform such testing. If damage is detected on a hose assembly between testing intervals, the hose assembly must be taken out of operation immediately and further use must be prevented.

## Damage prevention

- Hose assemblies may be used only in accordance with their intended purpose and must not be misused (e.g. used as pulling cables, climbing aids, etc.).
- Hose assemblies must not be disconnected while under pressure (exception: coupling systems intended for this use, e.g. dry clutches).
- Heat sources must be kept away from hose assemblies.
- Hose assemblies must be properly cleaned before a change of medium to avoid cross-contamination.
- Do not place hose assemblies in the path of vehicles (protect them from being driven over).
- Movable loading and tanks must be fixed and secured for the loading process (e.g. tank cars, ships, tanker vehicles).
- Only valves permitted by the DIN EN 14423 are to be used for steam hose assemblies made of elastomers.
- Classification systems can be used to eliminate any confusion of hose assemblies (e.g. lock-and-key principle, encoding, color-coding, engravings).
- Hose assemblies must be subjected to recurring testing at regular intervals in accordance with their risk assessments.

## Disposal

Hose materials and valves that are no longer usable must be disposed of properly in accordance with the regulations of the respective municipality.

## The following hose assembly types are a selection of hose assemblies requiring special considerations:

### Steam hose assemblies

- Ensure complete emptying of condensation in order to prevent structural damage to the elastomer hose (popcorning), which is caused by water penetrating into the inner layer and evaporating when steam is applied to the hose assembly again.
- Do not use steam hose assemblies for other media.
- Avoid the negative pressure that occurs from the cooling of a hose assembly closed off on both ends.
- Take protective measures with respect to surface temperatures (risk of burns).
- Narrowing cross-sections are to be avoided (risk of overheated steam).

### Metal corrugated tubes

- For metal corrugated tubes that are not furnished with a heat-insulating exterior shell, there is an increased risk of injury at higher temperatures due to heat conductivity.
- Metal corrugated tubes are sufficiently conductive without additional measures.
- Pay particular attention to damage to the wire braid and to deformation of the tube, e.g. kinks.
- There must never be any exposure to halogens, extraneous rust or flash rust at any time.

### Food hose assemblies

- Food hose assemblies must always be properly cleaned before use.
- Only cleaning agents suitable for the inside and outside of the hose assemblies may be used (pay attention to resistance characteristic, temperature and cleaning duration). The provisions of the hose assembly component manufacturer must be observed.
- Food hose assemblies must be steamed exclusively in open systems.

For the proper use of hose assemblies, the comprehensive notes in the trade association data sheet T002 (DGUV Information 213-053), the Pressure Equipment Directive (PED), the German Ordinance on Industrial Safety and Health (BetrSichV) and the TRBS 1201 "Tests of work equipment and systems requiring monitoring" must be observed.

For hose assemblies of special construction or for intended uses that could not be covered here, the separate manufacturer provisions must be observed (e.g. sandblasting, liquid gas, heating hose assemblies).

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Errors and alterations expected

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