Deutsches Institut für Bautechnik

Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts

Zulassungs- und Genehmigungsstelle für Bauprodukte und Bauarten

Allgemeine Bauartgenehmigung

Datum:	Geschäftszeichen:
26th March 2025	II 24-1.65.30-5/25

Nummer:
Z-65.30-487

Geltungsdauer
vom: **15 April 2025**
bis: **15 April 2030**

Antragsteller:
Fenotec GmbH
Bahnhofsweg 2
14547 Beelitz

Gegenstand dieses Bescheides:
Leak protection lining
Type "fenosafe U", type "fenosafe U1" and type "fenosafe blue"

The above-mentioned subject matter is hereby approved by the building authorities. This decision comprises nine pages and one annex.
"Translation of the original German version not approved by Deutsches Institut für Bautechnik"

I GENERAL PROVISIONS

1 The general type approval proves the applicability of the subject matter of the regulation within the meaning of the state building regulations.

2 This notice does not replace the authorisations, approvals and certificates required by law for the implementation of building projects.

3 This notification is issued without prejudice to the rights of third parties, in particular private property rights.

4 Notwithstanding any further provisions in the "Special Provisions", the user of the subject matter of the regulation must be provided with copies of this notice. In addition, the user of the subject matter of the regulation must be informed that this notification must be available at the point of application. Copies must also be made available to the authorities involved on request.

5 This notice may only be reproduced in full. Publication of extracts requires the approval of Deutsches Institut für Bautechnik. Texts and drawings of promotional literature may not contradict this notice; translations must contain the note "Translation of the original German version not approved by Deutsches Institut für Bautechnik".

6 This notice is issued on a revocable basis. The provisions may be supplemented and amended at a later date, in particular if new technical findings make this necessary.

7 This decision refers to the information and documents submitted by the applicant in the authorisation procedure for the subject matter of the regulation. Any changes to these authorisation bases are not covered by this decision and must be disclosed to Deutsches Institut für Bautechnik without delay.

II SPECIAL PROVISIONS

1 Subject matter and scope of application

(1) The subject of this notice is leak protection linings:
- Type "fenosafe U",
- Type "fenosafe U1",
- Type "fenosafe blue",

which, as part of a leak detection device, serve to create an interstitial space together with a container wall.

(2) The leak protection linings may be used in containers in accordance with paragraph (5) and, depending on the type, for the storage of the following liquids with flash points > 55 °C:

1. Diesel fuel according to DIN EN 5901, for use as a fuel for vehicles,
2. Mixtures of diesel fuel and a total of max. 20 % fatty acid methyl ester (FAME) according to DIN EN 142142, for use as a fuel for vehicles,
3. unused combustion engine oils and unused motor vehicle transmission oils,
4. used combustion engine oils and used motor vehicle transmission oils (origin and flash point must be verifiable by the operator),
5. Fatty acid methyl ester according to DIN EN 14214,
6. Rapeseed oil, cold-pressed (not for food),
7. Mixtures of saturated and aromatic hydrocarbons with an aromatic content of ≤ 20 % by weight,
8. Liquid fertiliser (ammonium nitrate urea solution) and NOx reducing agent AUS 32 (AdBlue) in accordance with DIN 700703.

(3) Each leak protection lining consists of a prefabricated insert (inner cover), a polyvinyl chloride (PVC) protective plate, an intermediate layer and the accessories, fastening devices, connection lines and angled hose nozzles (see Appendix 1 for an example of the arrangement of the leak protection lining).

(4) The interstitial space is monitored by a negative pressure leak detector with an alarm switching pressure of at least 30 mbar negative pressure (≤ -30 mbar) and a pump-out pressure, depending on the intermediate position, of
maximum 100 mbar ± 15 mbar negative pressure (≥ -100 mbar) or
maximum 450 mbar± 15 mbar negative pressure (≥ -450 mbar).
A leak in the walls of the interstitial space is detected by an increase in pressure and signalled visually and acoustically.

(5) The leak protection linings may be installed in cylindrical tanks made of steel, glass fibre reinforced plastic (GRP), rectangular tanks made of steel and spherical tanks made of glass fibre reinforced plastic or reinforced concrete with a plastic lining (e.g. polyamide).

(6) The containers must not be higher than:
- 5 m when using type "fenosafe U" or type "fenosafe U1" and
- 3 m when using the "fenosafe blue" type.

(7) The leak protection linings may only be installed in containers where diffusion of the storage liquid through the container walls is impossible.

[1]	DIN EN 590:2022-05	Fuels - Diesel fuel - Requirements and test methods; German version EN 590:2022
[2]	DIN EN 14214:2019-05	Liquid petroleum products - Fatty acid methyl esters (FAME) for use in Diesel engines and as heating oil - Requirements and test methods
[3]	DIN 70070:2005-08	Diesel engines - NOx reducing agents AUS 32 - Quality requirements

(8) The containers must be demonstrably suitable for the storage of the liquids specified in paragraph (1) and must be operated under atmospheric pressure at a maximum temperature of 30 °C.

(9) This notification provides proof of the functional safety of the control object within the meaning of paragraph (1).

(10) The decision is issued without prejudice to the provisions and the review or authorisation reservations of other areas of law.

(11) This decision takes into account the water law requirements for the regulated object. Pursuant to Section 63 (4) nos. 2 and 3 WHG4 , the regulated object is therefore deemed suitable under water law.

(12) The period of validity of this notice (see page 1) refers to the use in the sense of installation of the regulated object and not to the use in the sense of subsequent utilisation.

2 Provisions for planning and execution

2.1 Planning

2.1.1 General information

The leak protection linings and their parts must comply with the Special Provisions and the annex to this certificate as well as the specifications deposited with the Deutsches Institut für Bautechnik.

2.1.2 Composition and properties of the building products to be used or Components

(1) To produce the inlay for the leak protection lining

- Type "fenosafe U" is the
  PVC film type "Sikaplan WP6100-08H blue-silver"
  with the general building inspectorate approval no. Z-65.30-326. The type "fenosafe U" may be used for the storage of liquids 1. to 6. according to section 1 (2).
- Type "fenosafe U1" is the
  PVC-P film type "TechnoLine Tank 7258-08"
  with the general building inspectorate approval no. Z-65.30-510. The type "fenosafe U1" may be used for the storage of liquids 1. to 7. according to section 1 (2).
- Type "fenosafe blue" is the
  PVC film of the type "Sikaplan WP6120"
  with the general building inspectorate approval no. Z-65.30-441.
  The "fenosafe blue" type may be used for the storage of liquids in 8. accordance with section 1 (2).

(2) The protective plate consists of the material of the film type "Sikaplan WP6100-08H blue-silver" or type "TechnoLine Tank 7258-08" or type "Sikaplan WP6120" and has a thickness of 3 mm.

[4] Water Resources Management Act (Wasserhaushaltsgesetz - WHG), 31 July 2009 (BGBl. I p. 2585), last amended by Article 7 of the Act of 22 December 2023 (BGBl. 2023 I No. 409)

(3) Plastic nonwoven sheets may be used as an intermediate layer for all liquids in accordance with section 1 (2) as follows:

− Type "LSV 2", basis weight: 400 to 425 g/m², thickness: 5.0 to 5.5 mm for containers with a maximum height of 5 metres,
Pump-off pressure of the leak detector max. 450 mbar± 15 mbar negative pressure, double-layer installation.

The following exceptions are possible:
- For container heights> 3 m, the upper 2 m area on the container wall may be single-layered,
- For tank heights≤ 3 m, the upper half may be laid in a single layer on the tank wall.

For containers that are more than 30 cm below ground level or are installed above ground in buildings at a maximum temperature of 40 °C and are equipped with leak detectors with a pump-out pressure of max. 100 mbar± 15 mbar negative pressure, the fleece may be laid as follows:
- for container heights> 3 m double-layered on the floor and on the container wall up to a height corresponding to the container height minus 3 m, above that single-layered,
- single layer for container heights≤ 3 m.

− Type "ARV 350", basis weight: 340 to 450 g/m², thickness: 4 to 5 mm
for containers with a maximum height of 3 m or
max. 2 m height for the storage of liquids in 8. section 1 (2), which are more than 30 cm below ground level or
are installed above ground in buildings at a maximum temperature of 40 °C,
pump-out pressure of the leak detector max. 100 mbar ± 15 mbar negative pressure, double-layer installation on the floor and
from there on the container wall minus 2 m or minus 1 m

− Type "ARV 600", basis weight: 590 to 610 g/m², thickness: 6 to 7 mm
for containers with a maximum height of 3 m or
max. 2 m height for the storage of liquids in 8. section 1 (2), which are more than 30 cm below ground level or
are installed above ground in buildings at a maximum temperature of 40 °C,
pump-out pressure of the leak detector max. 100 mbar ± 15 mbar negative pressure, single-layer installation.

(4) The internal diameter of the connecting lines between the leak detector and the monitoring room must be at least 4 mm for tanks that are at least 30 cm below ground level and for tanks in rooms, and at least 6 mm for other tanks. For connecting lines longer than 50 m, a correspondingly larger internal diameter must be selected.

2.1.3 Manufacture

(1) The plastic fleece for the intermediate layer may only be produced in the factory of Baur Vlies- stoffe GmbH, 91550 Dinkelsbühl or in the factory of Caruso GmbH, 96232 Ebersdorf.

(2) The polyvinyl chloride film may only be made up at the applicant's factory, FENOTEC GmbH in 14547 Beelitz.

(3) The joint seams of the insert must be produced in accordance with DVS guideline 2225-15. The person performing the weld seam or the person responsible for performing the weld seam must have a valid certificate in accordance with DVS guideline 2212-36.

2.1.4 Packaging, transport, storage

Packaging, transport and storage of the construction products or components in accordance with Section 1 (3) must be carried out in such a way that the fitness for use not impaired.

[5]	DVS 2225-1:2019-10	Welding of geomembranes made of polymeric materials in earth and water construction
[6]	DVS 2212-3:1994-10	Testing of plastics welders - Test group III - Sheeting in earthworks and hydraulic engineering

Building products or components damaged during transport and storage must be discarded from further use.

2.2 Execution

2.2.1 General information

(1) As part of the incoming inspection of the unassembled films, it must be ensured that they are labelled with the Ü mark. In addition, random checks must be carried out to ensure that the films have the required thicknesses and are not damaged.

(2) The routine test of the ready-made insert must include at least the following measures:

− Check for dimensional accuracy,

− Check for leaks,

− Testing of all joint seams in accordance with DVS guideline 2225-27.

(3) For each type of film used, the behaviour of the joint seam in the shear test and the joining factor must be tested four times a year on parallel samples for each welding process used under the following conditions:

Test according to DIN EN ISO 527-38, test speed: at least 100 mm/min, samples: Type 2

The test specimens are taken from two web sections joined together parallel to the longitudinal direction in such a way that the joint seam arranged in the centre of the measuring length and perpendicular to the tensile direction. The ratio of the tensile strength of the joined to the unjoined material gives the joining or welding factor. The test conditions must be the same for all samples to be compared.

The following requirements must be met:

− Breakage outside the joint seam,

− Joining factor≥ 0.65.

(4) As part of the incoming inspection of each layer pad, the result of the following test, which is documented in the factory of the manufacturer of the layer pad by acceptance test certificate 3.1 in accordance with DIN EN 102049, must be checked for completeness and documented in accordance with DIN EN 13160-710 section 5.1.4:

− A nonwoven test sample of 100 cm^2, square or circular, is taken from each batch at 1.3 x the highest possible pressure[x)], but at least 0.5 bar at room temperature so until the residual thickness does not change by more than 1 % from the initial thickness within 24 hours.
½ this pressure load on the nonwoven test samples must be carried out annually at 40°C ("ARV 350" double-layer and "ARV 600" single-layer) or at 60°C ("LSV2" double-layer).

− These nonwoven test samples are then pressed together further until half the residual thickness (½ x s_2) is reached or they are compressed with 2.6 x the highest possible pressure[x)], but at least loaded with 1.0 bar. In this condition, the air flow resistance must be measured at a flow rate of 85 l/h.

− Requirement: The measured air flow resistance must be≤ 10 mbar.

x) The maximum possible pressure is to be determined from the max. pump-out pressure, the max. density of the liquid and the max. container height (including conversion factor 0.98 from cm liquid column to mbar), which result for the corresponding intermediate layer from this notice.

7	DVS 2225-2:2019-02	Welding of geomembranes made of polymeric materials - Site tests
8	DIN EN ISO 527-3:2019-02	Plastics - Determination of tensile properties - Part 3: Test conditions for films and boards
9	DIN EN 10204:2005-01	Metallic products, types of inspection certificates
10	DIN EN 13160-7:2016-12	Leak detection systems - Part 7: Requirements and test/assessment methods for Interstitial spaces, leak protection linings and leak protection jackets

2.2.2 Installation of the leak protection lining

(1) The leak protection lining must be installed and commissioned in accordance with the technical description[11] .

(2) The so-called unmanned installation of the leak protection lining (without inspection of the tank) may only be carried out by specialised companies in accordance with (1) who have been instructed accordingly by Fenotec GmbH Leckschutzsysteme. The camera inspection of the tank prior to unmanned installation may only be carried out by a DIBt-certified testing centre[12], see also Technical Description Section 2.2.2.

(3) The suction line must gas and liquid-tight and run between the intermediate layer and the tank wall from the dome, tank top or tank wall above the liquid level to the bottom of the tank. In the case of spherical tanks, the suction line runs from the inside of the dome cover via PVC weld-in grommets through the liner into the interstitial space to near the floor. A perforated hose (equalisation line) is connected to the respective suction line using a plastic plug-in connector and laid as follows, depending on the tank shape:

Cylindrical horizontal containers:	along the container base to the end of the container
rectangular containers:	diagonally on the container base,
spherical and Cylindrical, upright containers:	in a circular or spiral shape down to the lowest point.

(4) The installation of the leak protection lining is only permitted for rectangular steel tanks if they have no internal fittings or internal anchors.

(5) Edges and reinforcements or reinforcing rings in the containers must be padded separately with plastic fleece, see section 2.2 (3).

(6) The intermediate layers must be used depending on the container height in accordance with section 2.2 (3).

(7) The intermediate layer made of plastic fleece for spherical containers may also be installed in sewn form.

(8) If a tank that is already in operation is to be fitted with the leak protection lining, it must fulfil the following requirements:

- the condition of the inner wall of the tank must be sufficient at the time of refurbishment,
- Corrosion damage must be repaired,
- For cylindrical containers, deviations from roundness must be permissible.

(9) The leak protection lining may only be installed if the access opening (manhole) of the tank has a diameter of at least 500 mm. The bottom of the tank below the manhole must be generously protected against damage to the liner with a protective plate in accordance with section 1 (2).

(10) When installing a leak protection lining in containers made of GRP, it must be ensured that no more styrene escapes from the container material.

(11) After installation of the leak protection lining, the setting dimension (dimension x) for the limit value transmitter/overfill protection of the respective tank must be determined by the installing company or by an expert according to water law in accordance with the reduced filling volume and the limit value transmitter/overfill protection must be set accordingly. The changed setting dimension must be documented in the tank labelling or filed with the tank documents.

[11] Technical description tested by TÜV NORD Systems GmbH & Co. KG as of 05/2015 for the leak protection lining type "fenosafe blue" and "fenosafe U"

[12] Information available from DIBt

2.2.3 Labelling

(1) The applicant shall provide a nameplate that is clearly visible and permanently affixed to the container and contains at least the following information:

- Name, type or code of the product type,
- Z-65.30-487,
- Year of manufacture,
- Serial number.

Labelling may only be carried out if the requirements in section 2.2.4 are met.

(2) With regard to the labelling of containers fitted with a leak protection lining by the operator, see section 3 (1).

2.2.4 Testing during and after installation of the leak protection lining

(1) The installing company must carry out the following checks and tests:

- Checking the identity of the construction products intended for installation,
- Check the correct installation of the inserts and their labelling in accordance with section 2.2.3,
- Checking the tightness of the installed leak protection lining:

  The interstitial space is first evacuated to 600 mbar negative pressure and then ventilated to 300 mbar negative pressure. Maintaining the negative pressure of 300 mbar is then tested in a long-term test (up to a maximum of 7 days, depending on the volume of the interstitial space, but at least 30 minutes) by connecting a suitable measuring device. The measuring device is considered suitable if pressure changes of ≤ 1 mbar can be read.

  The examination is deemed to have been passed if the following condition is met:

$$0{,} \geq \frac{(p_B - p_E) \cdot V_1}{t} \qquad \text{in mbar} \cdot \text{l} \cdot \text{s}^{-1}$$

  This is

  p_B the pressure at the start of the test, in mbar

  p_E the pressure at the end of the test, in mbar

  V_1 the volume of the interstitial space, in litres

  T the test time in seconds

The temperature should not deviate by more than 1 K at the beginning and end of the test, otherwise the temperature difference must be taken into account in the test result.

The examination is also deemed to have been passed if the conditions in the following table are met:

Container volume [litres]	Test time [min]	$p_B - p_{(E)}$ [mbar]
≤ 1000	≥ 30	≤ 10
≤ 5000	≥ 30	≤ 3
≤ 10.000	≥ 60	≤ 4
≤ 16.000	≥ 60	≤ 3
≤ 30.000	≥ 90	≤ 3
≤ 60.000	≥ 150	≤ 3
≤ 80.000	≥ 180	≤ 3
≤ 100.000	≥ 240	≤ 3
≤ 200.000	≥ 300	≤ 3

(2) The results of the checks and tests must be recorded. The records must contain at least the following information:

- Designation of the leak protection lining,
- Date and result of the check,
- Signature of the person responsible for the execution control.

(3) The records must be kept in the operator's files. They must be submitted to the Deutsches Institut für Bautechnik, the competent supreme building supervisory authority and the expert under water law upon request.

(4) If the test result is unsatisfactory, the installing specialist company must immediately take the necessary measures to rectify the defect. Inlays that do not meet the requirements must be handled in such a way that confusion with matching ones is ruled out. Once the defect has been rectified, the existing test must be repeated without delay - if technically possible and necessary to prove that the defect has been rectified.

2.2.5 Declaration of conformity

(1) The executing company must submit a declaration of conformity to confirm the conformity of the type with this general type approval.

(2) This is based on the test results in accordance with section 2.2 of this notice.

3 Provisions for use, maintenance, servicing and inspections

(1) The operator has placed a sign on the tank with the inscription

"Attention! Storage container is equipped with inner cover and vacuum leak detector. Filling may only take place when the system is in proper operation."

to be attached.

(2) Before commissioning the containers fitted with the leak protection lining, the operator must affix a permanently visible sign at a suitable location, on which the stored liquid is indicated in accordance with section 1 (2). Labelling in accordance with other legal areas remains unaffected.

(3) The leak protection lining must be included in the container tests.

(4) Periodic inspections in accordance with other areas of law remain unaffected.

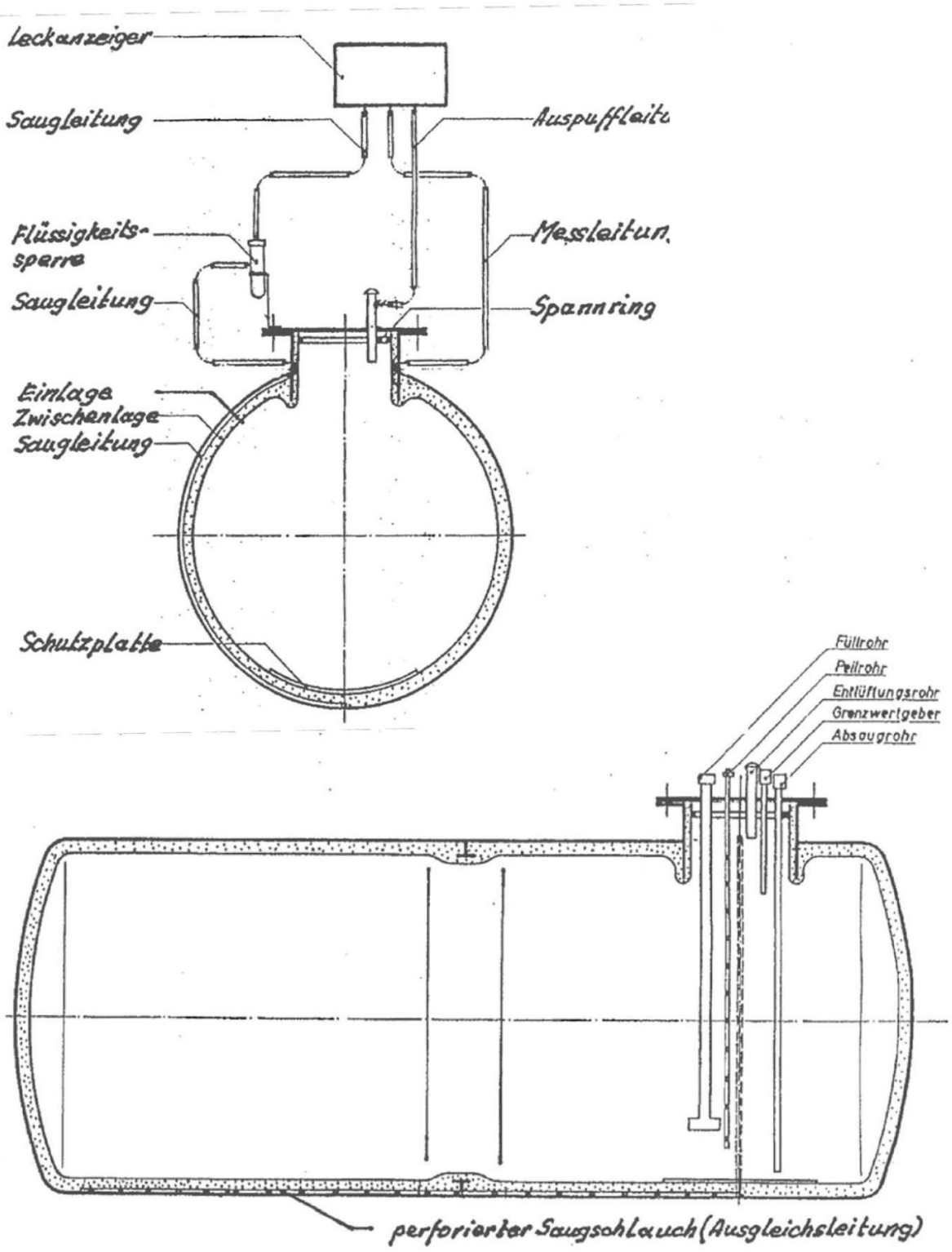
(5) The installing company must provide the user of the leak protection lining with the following documents:

- Copy of this decision,
- Declaration of conformity in accordance with section 2.2.5 (e.g. installation and test certificate),
- Installation instructions (part of the construction and functional description),
- Technical description and control texts of the leak detector / the equipment included in the scope of delivery.

Holger Eggert
Head of Unit

Certified
Hill

Deutsches Institut für Bautechnik DIBt



Leak protection lining Type "fenosafe U", type "fenosafe U1" and type "fenosafe blue"	Appendix 1
Overview	