

This translation from the original German text has not been authorised by the German Institute for Construction Technology (DIBt).

**General
construction
product approval notice**

**Certification Centre for construction industry
products and techniques**

Construction industry testing authority

A legally recognized institution supported by both the
Federal State and the individual Länder

Member of EOTA, UEAtc and WFTAO

Date: 26.09.2011 Registration n°:
III 54-1.53.5-2/11

**Certificate n°:
Z-53.5-461**

Period of validity:
from: **31.12.2011**
to: **31.12.2016**

Applicant(s):

**ERGELIT
TROCKENMÖRTEL UND FEUERFEST GMBH**
Wolfsweg 10-11
36304 Alsfeld-Schwabenrod
Germany

HERMES Technologie GmbH & Co. KG
Bürenbrucher Weg 1a
D 58239 Schwerte
Germany

Subject of the application:

**'ERGELIT KS 1' coating mortar and 'ERGELIT KBi' injection mortar for the rehabilitation of
wastewater collection tanks and inspection shafts, using the M-Coating process.**

The above-named products are hereby approved for general use in the construction industry.
This document comprises seven pages and five appendices.
This general approval certificate replaces the general approval certificate n° Z-53.5-461
issued 23.03.2009

DIBt

I GENERAL PROVISIONS

1. The granting of a general product approval certificate under the German building regulations is an indication that the product has satisfied the product suitability requirements laid down in the construction industry ordinances of the German Länder.
2. Since general product approval under the German building regulations contains requirements relating to the specialist knowledge and experience of persons commissioned to manufacture construction products and to develop construction techniques as per §17 para 5 of the German Standard Building Regulations (*Musterbauordnung*), care must be taken to provide evidence of this specialist knowledge and experience in the form of qualifications and documentation of equivalent standing in other member states of the European Union. The same requirement applies to qualifications and documentation submitted in the framework of European Economic Area agreements or other bilateral agreements.
3. General construction product approval under the German building regulations does not replace the legally prescribed building permits, authorizations and certificates required for the execution of building projects.
4. General construction product approval under the German building regulations is issued without prejudice to the rights of third parties and in particular of private proprietary rights.
5. The manufacturer and distributor of a product which has been approved for use in the construction industry must (irrespective of any further rights set out in the "Special Provisions" section) make copies of this general approval notice available to users of the product and inform them that the approval notice must be displayed on the site where the product is to be used. A copy of this approval notice must be made available to the relevant supervisory authorities on request.
6. The general product approval notice may only be reproduced in full. Any reproduction of a part or parts of the approval notice requires the consent of the DIBt. Texts and illustrations used in advertising material must not differ from those contained in the approval notice. Translations of the general product approval notice must contain the warning "This translation from the original German text has not been authorised by the German Institute for Construction Technology (DIBt)".
7. A general construction product approval notice may be revoked at any time. The provisions contained in a general construction product approval notice may subsequently be extended or amended, in particular if new technical developments make this necessary.

II SPECIAL PROVISIONS

1 Subject of approval notice and area of application

The subjects of this approval notice are “ERGELIT KS1” dry mortar and “ERGELIT KBi” injection mortar. Both mortars are all-in-one cementitious mortars improved with organic and inorganic additives. “ERGELIT KBi” injection mortar has a fluid to plastic consistency and is used for initial plugging where there is water ingress.

The corrosion resistant mortar “ERGELIT KS1” may be used for rehabilitating concrete shafts (as DIN V 4034-1¹), or brick shafts, as well as wastewater collection pits made of concrete rings and brick shafts measuring between 500mm and 2000mm for the disposal of mainly domestic effluent.

When used with the M-Coating process (see Appendix 1) “ERGELIT KS1” dry mortar is mixed with water on site and projected by centrifuge spray onto the surfaces of the shaft. Coating is carried out using a semi-automatic apparatus consisting basically of three components: a mixer, a pump and a centrifuge.

Shafts and collection pits which cannot be rehabilitated because of water ingress are sealed using “ERGELIT KBi” injection mortar before being coated. Holes are first bored in the walls and then a lance is used to force “ERGELIT KBi” injection mortar through to the outside.

2 Specifications for building products

2.1 Characteristics, composition and environmental impact

2.1.1 Characteristics and composition

The composition of “ERGELIT KS1” and “ERGELIT KBi”, mixed on site, must correspond to the formulation lodged with the DIBt.

After 28 days storage under standard conditions (DIN EN 196-1²), the following values for mechanical/physical characteristics must be reached:

Mechanical characteristics	“ERGELIT KS1”	“ERGELIT KBi”
Bending tensile strength	$\geq 5 \text{ N/mm}^2$	$\geq 3.5 \text{ N/mm}^2$
Compressive strength	$\geq 60 \text{ N/mm}^2$	$\geq 40 \text{ N/mm}^2$
Adhesive bond strength	$\geq 2 \text{ N/mm}^2$	---

2.1.2 Environmental impact

This building product complies with the requirements of the DIBt policy document “Evaluating the effects of building products on soil and groundwater” (May 2009 edition). This assertion is only valid as long as the Special Provisions of this general product approval notice are complied with.

1 DIN V 4034-1 (Draft standard) Concrete, steel fibre concrete and reinforced concrete precast components for sewer pipes and channels – Types 1 & 2 Part 1: Specifications, testing and assessment of conformity: August 2004 edition.
 2 DIN EN 196-1 Testing procedures for cement – Part 1: Determining strength values. German version EN 196-1:2005; May 2005 edition

2.2 Manufacture, packaging, transport, storage and labeling

2.2.1 Manufacture

Manufacture of the mortars must be carried out in compliance with the standards set out in §2.1.1 and according to the formulations lodged with the DIBt, at the manufacturing plant of ERGELIT Trockenmörtel und Feuerfest GmbH.

2.2.2 Packaging, transport and storage

Packaging, transport and (dry) storage of the bags must be carried out in such a way that the product's fitness for purpose is not affected.

2.2.3 Labelling

The manufacturer must show the conformity symbol on the delivery slip, in accordance with the conformity regulations issued by the Federal states (Länder), together with the general product approval notice code Z-53.4-461. This labelling is permitted only if the preconditions in §2.3 have been satisfied.

In addition, the following information must be given:

- Name and address of manufacturing plant
- Name of product
- Date of manufacture

2.3 Certificate of conformity

2.3.1 General

For each manufacturing plant, confirmation that the product components conform with the requirements of this general product approval notice must take the form of a certificate of conformity based on internal quality control and regular external quality control including initial testing of the system components in accordance with the following conditions.

The manufacturer must engage a recognized certification office as well as a recognized supervisory authority, to issue the certificate of conformity and to carry out the external quality control and the necessary product tests.

The manufacturer must indicate that a certificate of conformity has been issued, by affixing a conformity symbol to the product, together with an indication of the product's designated use.

The certification office must provide the DIBt with a copy of the certificate of conformity.

The DIBt must also be provided with a copy of the initial test report.

2.3.2 Internal factory quality control

In each manufacturing plant, an internal production control system must be set up and operated. By an internal production control system is meant the continuous inspection of production that the manufacturer must perform in order to ensure that the building products manufactured correspond to the provisions of this general building product approval notice.

The internal production controls must include at least the following measures:

- Characteristics of the fresh mortar
The mortar to be tested must be made up using a power mixer, with water content and mixing time being specified. Consistency to be established by a flow table test (15 to 20cm in the case of "ERGELIT KS 1")

- Bending tensile strength and compressive strength values for 3 prisms (4cm x 4cm x 16cm) after 28 days, as per DIN EN 196-1²

Each batch, or at least one batch per production day, must be tested for conformity with the specifications set out in §2.1.1.

The results of the internal production control checks must be recorded. These records must contain the following information:

- Name of product or of the basic material and its ingredients
- Type of control or test
- Date of manufacture and testing of the product or the basic materials or ingredients
- Result of the controls and tests, and comparison with specifications as appropriate
- Signature of the person responsible for the internal production control.

Records must be retained for at least five years. They must be submitted to the DIBt and to the highest competent building control authority on demand.

Where test results are unsatisfactory, the manufacturer must immediately take the necessary steps to remedy the deficiency. Building products that do not meet specifications must be dealt with in such a way that they cannot be confused with products that do conform. When the deficiency has been remedied the appropriate test must immediately be repeated, as far as is technically possible and as is necessary to demonstrate that the problem has been solved.

2.3.3 External quality control

In each plant where the dry mortar is manufactured, the internal production control must be regularly checked by external monitoring, at least once a year. Random sample checks must be part of the external quality control. Sampling and testing are the responsibility of the recognized inspection body.

The results of third party certification and external quality control must be retained for at least 5 years. The certifying body or external quality control centre must submit these results to the DIBt and to the highest competent building control authority, on demand.

3 Operational provisions

Operatives must not enter the shaft that is to be rehabilitated until testing has established that there are no flammable gases present. The relevant body of rules (e.g. GUV-R 126³) and the appropriate health and safety regulations must be observed.

Before rehabilitation procedures begin, the state of damage in the structure to be rehabilitated (e.g. Appendix 2) must be recorded and assessed in the light of the rehabilitation procedures to be used. The structure must be cleaned (Appendix 3) and the abrasion resistance of the substrate must then be determined. The average value should not be below 0.5 N/mm² for brickwork and 1.0 N/mm² for concrete, or correspond to the values given in DWA-M 143-17⁴. Compressive strength must be tested with the Schmidt hammer and may be used as an alternative to bond strength when assessing the substrate.

- ³ GUV-R 126 Safety regulations: Working in enclosed spaces in wastewater structures (formerly GUV 17.6): Sept 2008 edition
- ⁴ DWA-M 143-17 DWA (German Association for Water, Wastewater and Refuse)
 - Technical sheet 143: Rehabilitating drainage systems outside buildings
 - Part 17: Coating sewer pipes, channels and shafts with cementitious mineral mortars: Dec 2006 edition

Cleaning is carried out with a turbo cleaning jet (TSSR) and a high-pressure water pump. This involves a slowly rotating bar equipped with two opposed and rotating jet nozzles, slowly lowered and raised within the shaft by means of a winch.

The shaft sections and collection pits to be rehabilitated must be inspected by an expert with regard to their external condition, including their stability.

Rehabilitation can proceed if there is no ingress of water under pressure, from the outside. Small or sporadic leaks should be sealed off (refer to manual). In the case of more serious leaks/ water penetration, the structures must first be sealed permanently, using "ERGELIT KBi" injection mortar. For this, the points of entry (cracks, defects, wet patches) must be marked on the outer walls of the structure. Then 25mm boreholes must be made at the points marked. They may be only 12mm diameter holes, as long as the first 4 cm are bored out to 25mm. Injection is carried out using an injection lance, forced into the prepared borehole. A pressure gauge is attached to the lance in order to monitor pressure. The grout pump and injection lance are securely connected by hoses. The grout pump is positioned outside the structure being rehabilitated. Gaps are filled with "ERGELIT KBi" injection mortar, sealing cracks and defects. (Appendix 4). If the pressure gauge indicates a sudden rise in pressure, the lance is removed and the borehole closed off by means of plugs that are later removed. Injection then continues at the next borehole. The grout remains workable for approx 3 hours. Once the injection grout has hardened or infiltration has been halted, coating can proceed (see Appendix 5).

"ERGELIT KS1" mortar, mixed on site, is applied via a centrifuge with a constant speed of 5000rpm. The apparatus is winched up and down within the shaft. The spray-head rotates clockwise and anti-clockwise alternately.

The bonding coat, injection mortar and finishing coat form one. The mortar can be processed by hand within approx 45 minutes.

Particular care must be taken with the following points:

- Adding correct amount of water
- Observing processing times when applying mortar by machine and when processing by hand

Information sheets and a technical handbook shall be drawn up and included with the product, documenting how to handle the materials as well as the separate stages of the rehabilitation process. Firms may only contract to carry out this rehabilitation if they have been trained in this activity. Care should be taken where there is a change of personnel.

The floor of the shaft is rehabilitated by brushing fresh mortar into the surface of the floor, and the coating is then applied with a trowel and float. The junction of the wall and the floor is given an angled profile.

A coating layer must be at least 8mm thick.

The surface is water-resistant in approx 4 hours at an ambient temperature of $\geq 10^{\circ}\text{C}$

4 Quality control and recording

The person in charge of rehabilitation, or his representative, must be present throughout the rehabilitation process. He is responsible for ensuring the work is carried out as specified in this general building product approval notice. Checks must be made, and results recorded, with regard to the professional execution and quality control of the materials used and the

impermeability of the coating (hydraulic pressure test as per § 5.2.4 of DIN4261-1⁵ or DIN 1986-30⁶ fluid level test). The records must be kept for at least 5 years. They must be submitted to the DIBt and to the appropriate authority on demand.

5 Provisions regarding use, servicing and maintenance

For each collection pit rehabilitated, operation and maintenance guidelines must be supplied and the person responsible must be advised that effluent removal must be carried out correctly by a specialist firm. The amount of effluent removed as well as the length of time between emptyings must be recorded and kept for at least 5 years. In addition, the condition of the pit e.g. as regards deterioration and leak-tightness must be monitored.

Rudolf Kerrsten
Head of Section

Certified

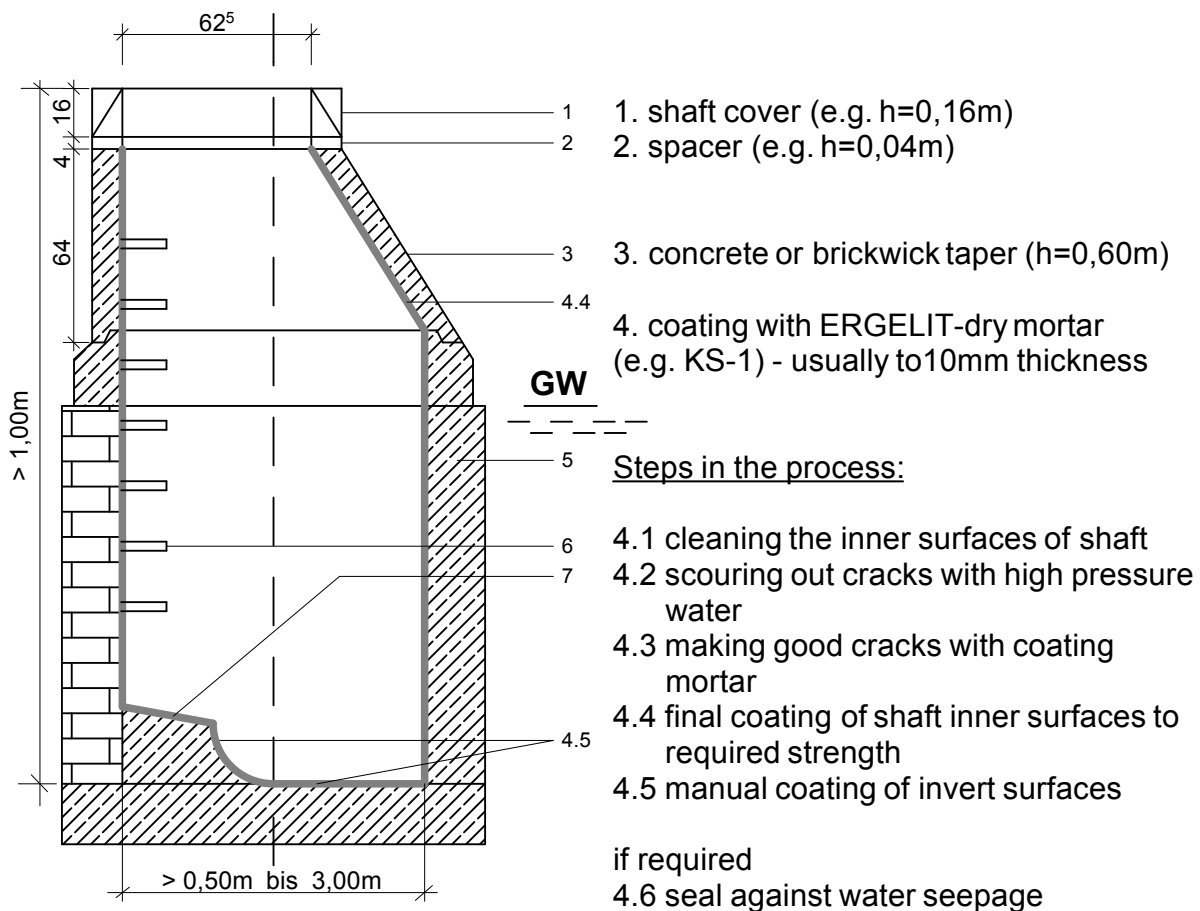
5 DIN 4261-1

Small water treatment plants – Part 1: Foul-water conditioning facilities - October 2010 edition

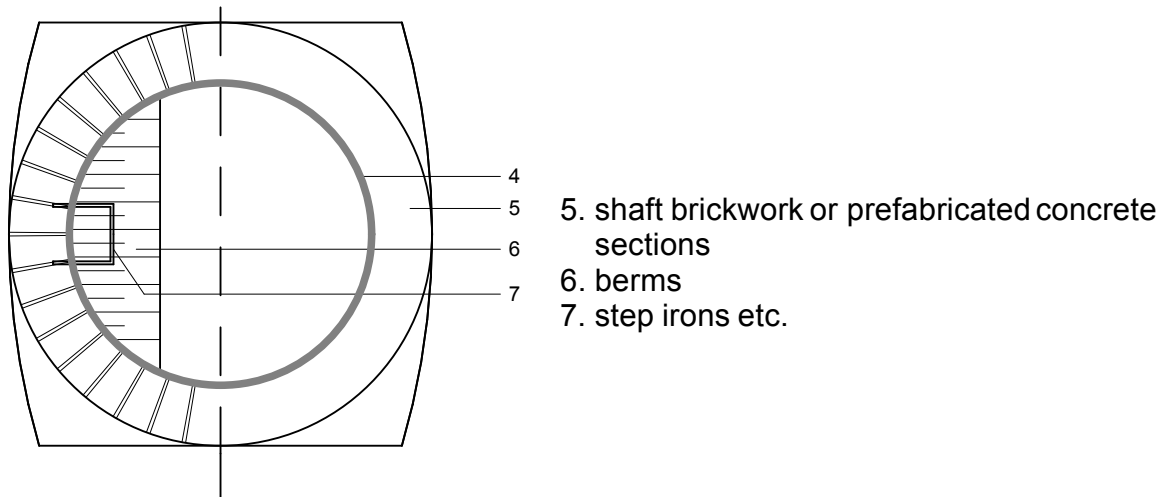
6 DIN 1986-340

Drainage systems for buildings and private ground – Part 30: Maintenance. February 2003 edition

Renovation of wastewater interceptor pits and inspection shafts in supply and drainage networks



shaft profile: round or rectangular

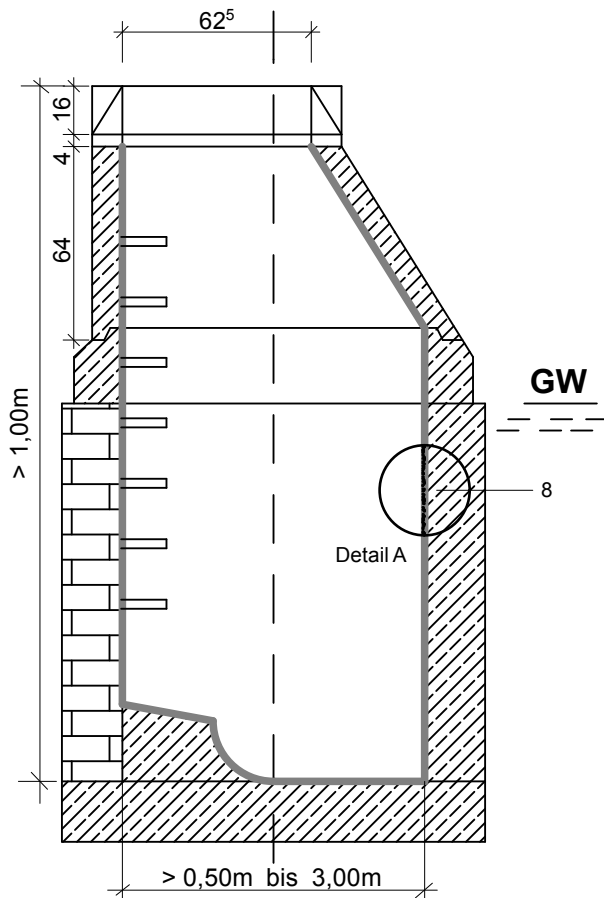


M-Coating with ERGELIT for renovating wastewater interceptors and shafts

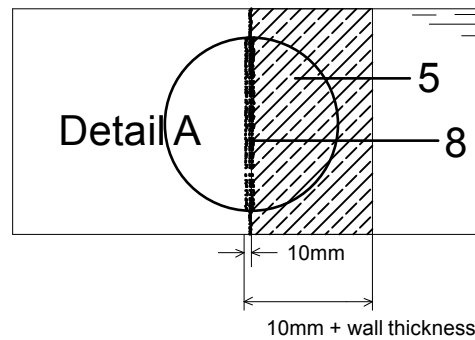
HERMES Technologie, Bärenbrucher Weg 1a, D-58239 Schwerte

Diagramm 1
General view

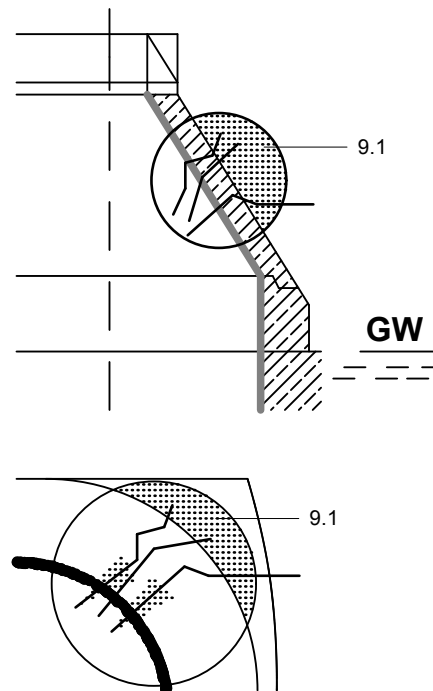
Corrosion in wastewater interceptor pits and inspection shafts in supply and drainage networks



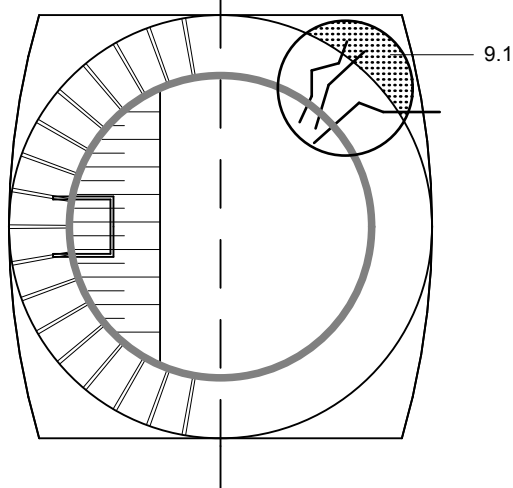
- 5. shaft brickwork or prefabricated concrete sections
- 8. corrosion and deposits



9.1 Ingress of seepage water / groundwater



shaft profile: round or rectangular

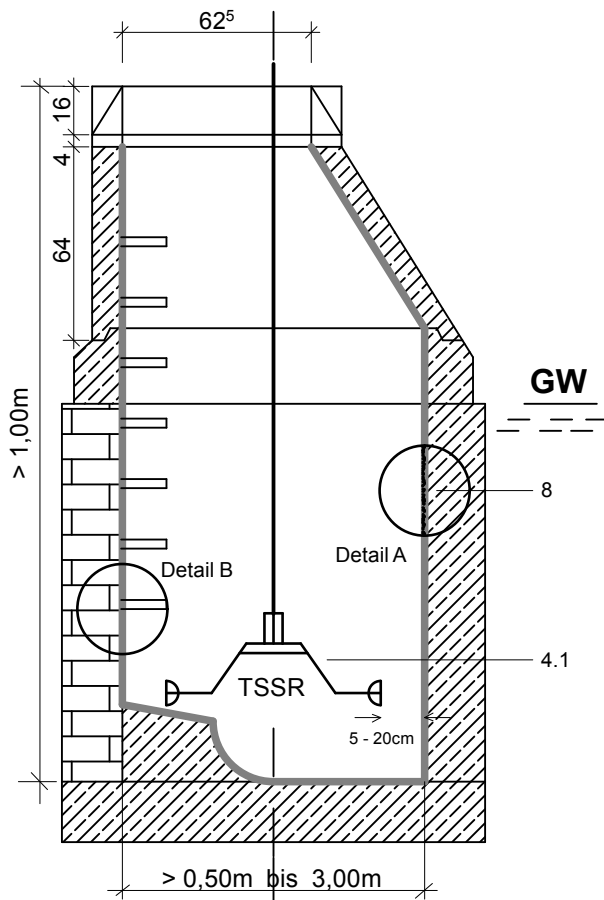


M-Coating with ERGELIT for renovating wastewater interceptors and shafts

HERMES Technologie, Bärenbrucher Weg 1a, D-58239 Schwerte

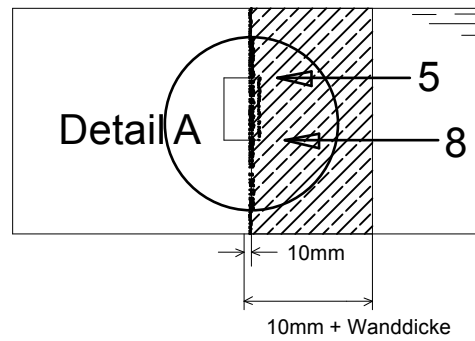
Diagram 2
Corrosion

Cleaning wastewaterinterceptor pits and inspection shafts in supply and drainage networks

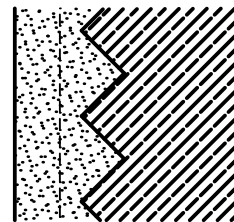


4.1 Special shaft cleaning turbo jet (TSSR) approx 300 bar and 24 l / min

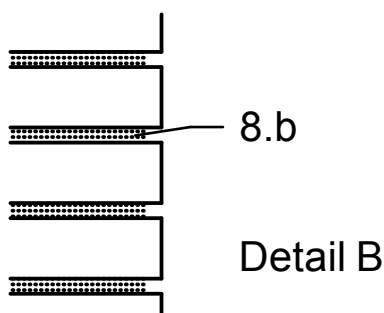
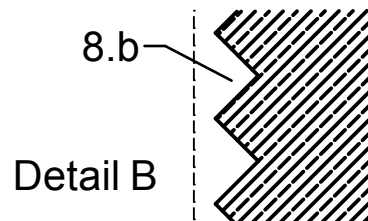
5. shaft brickwork or prefabricated concrete sections



8.a area of corrosion before cleaning



8.b area of corrosion after cleaning

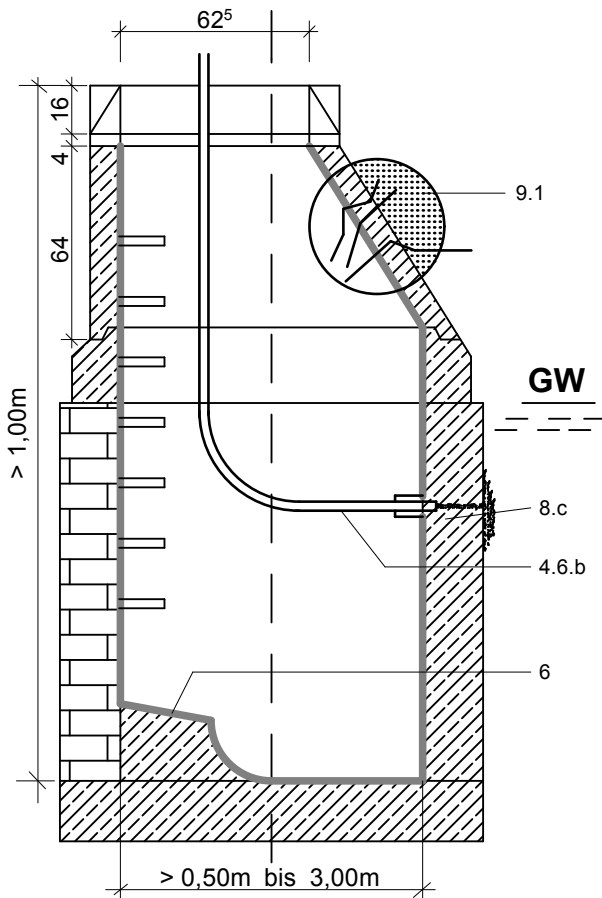


M-Coating with ERGELIT for renovating wastewater interceptors and shafts

HERMES Technologie, Bürenbrucher Weg 1a, D-58239 Schwerte

Diagram 3
Cleaning

Sealing wastewater interceptor pits and inspection shafts in supply and drainage networks



9.1 Ingress of seepage water / groundwater

4.6 sealing of seepage water / groundwater

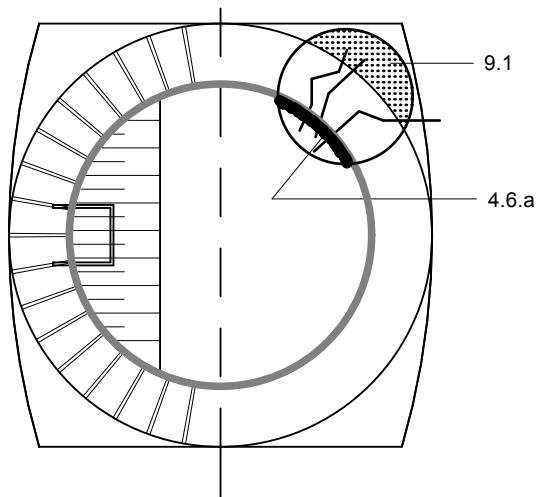
a) leaks are spot-sealed:

e.g. with ERGELIT-10 F rapid
or ERGELIT- 10 SD

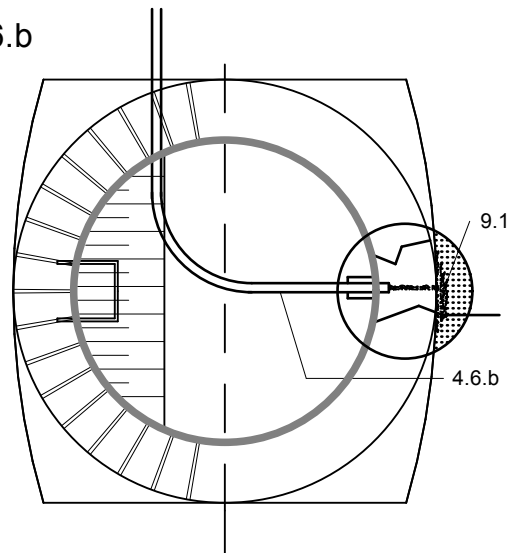
b) sealing by injection:
with ERGELIT-KBi

9.2 plug formed to block seepage

4.6.a



4.6.b

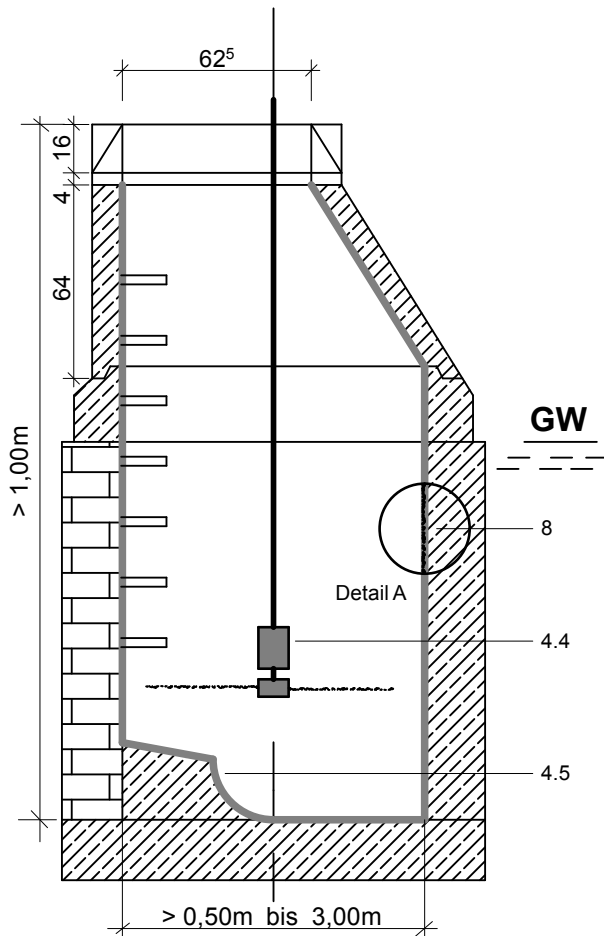


M-Coating with ERGELIT for renovating wastewater interceptors and shafts

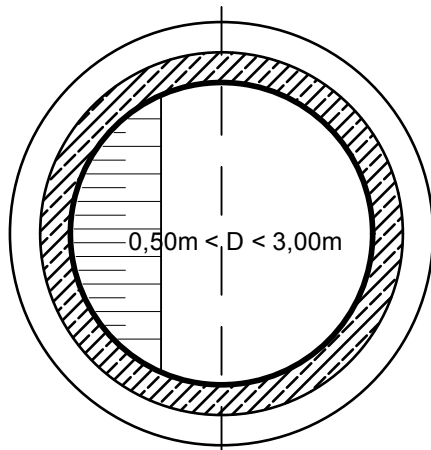
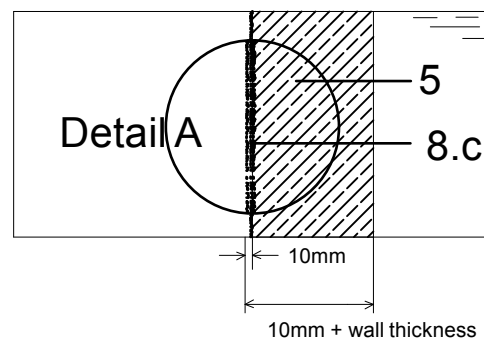
HERMES Technologie, Bürenbrucher Weg 1a, D-58239 Schwerte

Diagram 4
Sealing

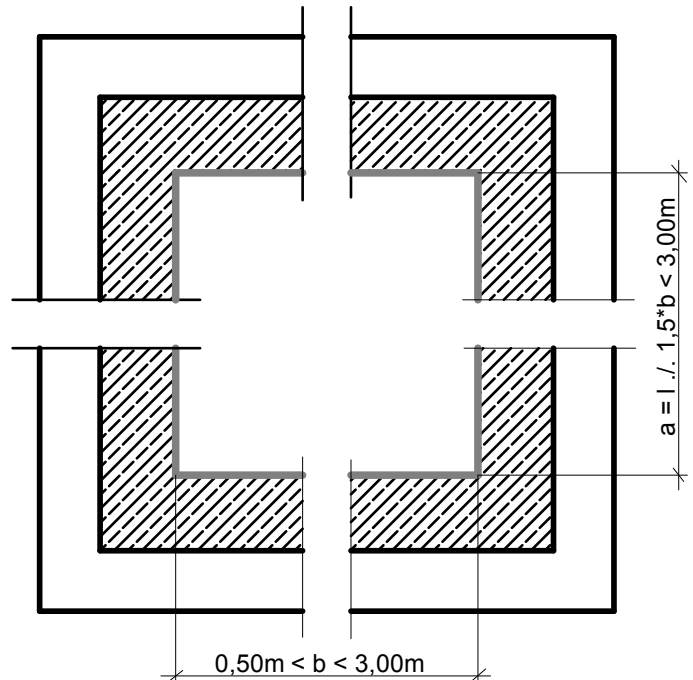
Coating wastewater interceptor pits and inspection shafts in supply and drainage networks



- 4.4 centrifuge spray-head:
5000 rpm, alternating direction of rotation
- 4.5 coating invert or berms (manually)
- 5. shaft brickwork or prefabricated concrete sections
- 8.c corroded area after coating with ERGELIT - KS1



shaft profile: round or rectangular



M-Coating with ERGELIT for renovating wastewater interceptors and shafts

HERMES Technologie, Bürenbrucher Weg 1a, D-58239 Schwerte

Diagram 5
Coating