



European Technical Approval ETA-12/0385

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Gussasphalt-Dichtschicht "DEUGUSS-S"
Mastic asphalt sealing layer "DEUGUSS-S"

Zulassungsinhaber
Holder of approval

DEUTAG GmbH & Co. KG
Hauptverwaltung
Linzhausenstraße 20a
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DEUTSCHLAND

Zulassungsgegenstand
und Verwendungszweck
*Generic type and use
of construction product*

DEUTAG-Flächenabdichtungssystem SÜD zur Verwendung in LAU-
Anlagen
*DEUTAG Sealing system SOUTH used in facilities for storage, filling
and handling of liquid chemicals (substances hazardous to water)*

Geltungsdauer:
Validity: vom
from
bis
to

9 August 2012
30 April 2013

Herstellwerk
Manufacturing plant

S-MW-1-12 und S-MW-2-12

Diese Zulassung umfasst
This Approval contains

25 Seiten einschließlich 10 Anhänge
25 pages including 10 annexes

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12

² Official Journal of the European Communities L 220, 30 August 1993, p. 1

³ Official Journal of the European Union L 284, 31 October 2003, p. 25

⁴ *Bundesgesetzblatt Teil I 1998*, p. 812

⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178

⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product/ products and intended use

1.1 Definition of the construction product

(1) The mastic asphalt sealing layer "DEUGUSS-S" (in the following called sealing layer) is a part of the DEUTAG sealing system SOUTH for areas (in the following called sealing system), see Annex 1.

(2) The sealing layer consists of mastic asphalt made of a defined composition (recipe/ composition). The mastic asphalt mixture for the sealing layer is a special mix consisting of

- bitumen as binder
- mineral aggregates and
- mineral fillers

(3) The sealing layer is manufactured in the following different types to drainage liquid chemicals (substances hazardous to water)

- Type 1: MA 0/8 and
- Type 2: MA 0/11.

The dewatering and/or drainage occur by means of the slope drain (sloping areas).

(4) In regard to the reaction-to-fire performance the sealing layer satisfies the class "B_{FL}" according to EN 13501-1. In case of sealing constructions with integrated joint sealing systems, the reaction-to-fire performances shall be additionally taken into account depending on the selected joint sealing system.

1.2 Intended use

(1) The sealing system may be used in facilities for the storage, filling and handling (SFH-facilities) of liquid chemicals (substances hazardous to water) and petrol stations. It can be used both inside the buildings and outdoors over a specified period of time and/or frequencies with

- time limited effects in case of leakage (storage) and/or
- intermittent stress (filling and handling)

by liquid chemicals (substances hazardous to water). At the same time they are exposed to combinations of simultaneous and/or consecutive effects (e.g. chemicals, temperature, weather conditions, trafficability).

(2) The sealing layer made of mastic asphalt mixtures with the binder BIGUMA-Hbit 6 may only be used inside the buildings.

(3) The sealing layer is installed at normal environmental and material temperatures (usually within a range of + 5 °C to + 40°C) and be used at temperatures between - 20°C and + 60°C, without being adversely affected with regard to its sealing function. The temperature of the liquid chemicals (substances hazardous to water) during the contact with the sealing layer shall not exceed 30°C.

(4) Taking into account the specific design requirements, the sealing layer as a part of the sealing system may be accessible and/or trafficable by vehicles.

(5) The joint sealing to other sealing constructions and installations may only be performed by suitable joint sealing systems which are approved for the respective intended use (e.g. in accordance with national or European technical approvals). The provisions of these approvals shall be considered.

(6) The provisions referred to in this European technical approval have been written based upon the assumed working life of the sealing layer of at least 15 years, provided that the conditions for the transport/storage/installation/use/servicing/correction of the defect/utilization are met. The indications given on the working life cannot be interpreted as a guarantee given by the ETA holder, but are regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of the product and methods of verification

2.1 Characteristics of the product

2.1.1 General

(1) The sealing system shall correspond to the drawings and indications given in the Annexes to this approval.

(2) The characteristics of the material, the dimensions and tolerances which are not declared in this approval correspond to the information laid down in the technical documentation⁷ of this European technical approval.

2.1.2 Properties

The sealing layer

- is impermeable and resistant to the liquids listed in Annex 2,
- is resistant to aging and weathering and, in case of frost, insensitive to freeze-thaw cycles,
- is in case of a correct installation on a determined load-spreading basis according to Annexes 4 and 5 accessible by pedestrians and trafficable by vehicles with pneumatic tyres and/or by vehicles with vulkollan wheels and by movable single loads under certain conditions.,
- can accept certain movable single loads and is able to discharging stress into the basis without damages (see Annex 6, Table 1).

2.1.3 Composition

(1) The mastic asphalt sealing layer is made of a void-free mastic asphalt of a defined composition (recipe/composition). For the mastic asphalt mixture of the sealing layer specific bitumen are used as binders, mineral aggregates (high-grade grit, high-grade crushed stone sand and where necessary natural sand) from natural sources and industrial processes as well as specific fillers from natural sources. As binder only bitumen with a BaP⁸ content lower than 5 ppm is used.

(2) The compositions of the respective sealing layer are deposited with DIBt.

(3) The chemical composition or the mastic asphalt mixture for the sealing layer, the binder, the aggregates and the filler shall comply with the information deposited and the requirements of this approval.

(4) The mastic asphalt shall show a binder surplus.

⁷ The technical documentation of this European technical approval is deposited with Deutsches Institut für Bautechnik and shall be made available to the approved bodies, who are involved in the procedure of conformity attestation, for the fulfilment of their tasks.

⁸ Benzo[a]pyren (BaP)

2.2 Methods of verification

(1) The assessment of the fitness of the sealing layer for the intended use with regard to the essential requirements No 2 to 4 and the general use requirements was performed following the Common Understanding of Assessment Procedure for sealing systems made of liquid-tight mastic asphalt used in facilities for the storage, filling and handling of liquid chemicals (substances hazardous to water).⁹

(2) According to the applicant's declaration taking account of the EU¹⁰ database the sealing layer does not contain any dangerous substances.

(3) In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive these requirements need also, if applicable, to be complied with.

(4) There may be other requirements applicable to the products resulting from other applicable national regulations and administrative provisions. These requirements need also to be complied with.

3 Evaluation and attestation of conformity and CE marking

3.1 General

The evaluation and the attestation of conformity of the mastic asphalt mixture of the sealing layer with the provisions of this European technical approval is performed for each factory of the mixture on the basis of the provisions of section 3.2 related to the respective system of attestation of conformity (e.g. system 2+: initial type-testing by the manufacturer and a factory production control).

3.2 Conformity of the sealing layer

3.2.1 System of attestation of conformity

(1) According to the Decision 2003/656/EC of the European Commission the System 2+ of attestation of conformity is to be used in reference to hygiene, health and the environment (ER 3), safety in use (4) and general aspects of the mastic asphalt mixture.

Additionally according to the Decision 2001/596/EC of the European Commission¹¹ the System 1 of attestation of conformity is to be taken into account in relation to the reaction-to-fire performance. These systems of attestation of conformity are described in the following:

(2) System 2+

Declaration of conformity by the manufacturer with reference to ER 3, 4 and general aspects for the mastic asphalt mixture on the basis of:

(a) Tasks for the manufacturer:

- (1) initial type-testing of the product;
- (2) factory production control;
- (3) testing of samples taken at the factory in accordance with a control plan.

⁹ Common Understanding of Assessment Procedure for sealing systems made of liquid-tight mastic asphalt used in facilities for the storage, filling and handling of liquid chemicals (substances hazardous to water), ETA request No 06.05/17, version January 2008

¹⁰ References in Guidance Paper H: A harmonised approach with regard to the handling of dangerous substances according to the Construction Products Directive, Brussels 18 February 2000.

¹¹ Official Journal of the European Communities L 209/33 of 02.08.2001.

- (b) Tasks for the approved body:

Inspection body:

- (4) Initial inspection of the factory and of factory production control,
(5) continuous surveillance, assessment and approval of factory production control

Certification body:

- (6) Certification of conformity of the product

(3) **System 1**

Declaration of conformity by the manufacturer with reference to the reaction-to-fire performance of the mastic asphalt mixture on the basis of:

- (a) Tasks for the manufacturer:

- (1) factory production control;
(2) further testing of samples taken at the factory in accordance with a prescribed test plan

- (b) Tasks for the approved bodies:

Testing laboratory:

- (3) Initial type-testing
(4) Audit-testing of samples taken at the factory, on the open market or on the construction side

Inspection body:

- (5) Initial inspection of factory and of factory production control,
(6) continuous surveillance, assessment and approval of factory production control

Certification body:

- (7) Certification of the conformity of the product

Note: Approved bodies are also named "notified bodies"

3.2.2 Responsibilities

3.2.2.1 Tasks for the manufacturer

3.2.2.1.1 Factory production control

(1) The manufacturer of the mixture (manufacturing plant S-MW-1-12 and manufacturing plant S-MW-2-12) shall exercise permanent internal control of production. All the information, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. The factory production control shall ensure that the product conforms to this European technical approval.

(2) The manufacturer of the mixture shall only use basic materials and components (binder, mineral aggregates and fillers) which are listed in the technical documentation of this ETA.

(3) The manufacturers of the mixture shall have the manufacturers of the binder, the aggregates and the filler confirm that the requirements in accordance with this ETA and the control plan are met, e.g. by CE-marking and/or an acceptance certificate 3.1 according to EN 10 204:2005-01.

The manufacturer of the mixture shall inspect or control the initial materials in the context of the incoming goods inspection according to the prescribed test plan.

(4) The factory production control shall be in accordance with the "Control plan of August 2012 relating to the European technical approval ETA-12/0385 issued on 9 August 2012 which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.¹² The factory production control follows the properties given in the Common Understanding of Assessment Procedure. They are specified in the technical documentation.

(5) The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan. The records shall include at least the following information:

- Designation of the product, of the initial materials,
- type of inspection or test,
- date of the manufacture of the product, batch N° (if relevant) and date of the inspection or test of the product / the initial materials,
- results of the inspections or tests and, if applicable, comparison with the requirements and
- signature of the person responsible for the factory production control.

(6) The records shall be kept for at least (a minimum of) five years. On request they shall be presented to Deutsches Institut für Bautechnik.

(7) Details concerning extent, type and frequency of the tests or inspections to be performed within the scope of the factory production control shall correspond to the prescribed test plan which is part of the technical documentation to this ETA.

3.2.2.1.2 Other tasks for the manufacturer

(1) The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.2 in the field of mastic asphalt mixtures in order to undertake the actions laid down in section 3.2.2.2. For this purpose, the "control plan" part 2 referred to in section 3.2.2.1.2 shall be handed over by the manufacturer to the approved bodies involved.

(2) The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA-12/0385 issued on 9 August 2012.

3.2.2.2 Tasks for the approved bodies

(1) The approved bodies shall perform the following tasks in accordance with the provisions of the "control plan":

- initial type-testing of the product (for system 1),
- initial inspection of factory and of factory production control (for systems 1 and 2+),
- continuous surveillance, assessment and approval of factory production control (for systems 1 and 2+).

(2) The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European technical approval.

(3) The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of

- the product (for system 1) or
- the factory production control (for system 2+)

stating the conformity with the provisions of this European technical approval.

¹²

The "control plan" is a confidential part of the European technical approval and only handed over to the approved bodies involved in the procedure of attestation of conformity. See section 3.2.2.

(4) In cases where the provisions of the European technical approval and its "control plan" are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.2.3 CE marking

The CE marking of the mixture shall be affixed on the delivery. The letters "CE" shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacturer),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product (only system 1),
- the number of the EC certificate of conformity for the factory production control,
- "Mixture for DEUTAG Sealing-system SOUTH according to ETA-12/0385."

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

(1) For the manufacture of the sealing layer, the mastic asphalt mixture and the components of the mixture (binder, aggregates, filler) the provisions of this approval shall apply.

(2) The preparation of the mastic asphalt mixture for the mastic asphalt may only be performed by the manufacturing plant S-MW-1-12 and to manufacturing plant S-MW-1-12 according to the information deposited.

(3) The European technical approval is issued for the product on the basis of agreed information, deposited with Deutsches Institut für Bautechnik, which identifies the product which has been assessed and judged.

(4) Changes to the sealing layer, the mixture, the components of the mixture or production process, which could result in this deposited information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Installation

4.2.1 Conditions for the installation

(1) Planning of a sealing construction (drainage surface) shall be carried out by expert designers only. The controllable design drawings shall be made by an expert designer taking account of the requirements at national level of the respective Member States for this field of application and the expected installation conditions.

(2) The design of a facility for the storage, filling and handling of liquid chemicals (substances hazardous to water) shall take into account that with this approval does not regulate the altogether necessary retaining volume and also the other necessary parts of the facility for ensuring this volume (e.g. storage space, pipe systems) are not regulated.

(3) The sealing system may be installed with slopes of $\leq 7\%$, longitudinal -, traverse and/or inclined slope, taking into account the respective provisions of the Member States, e.g. G.: ZTV Asphalt StB¹³. Furthermore the requirements for the drainage and the control of atmospheric water applicable to the installation have to be considered.

(4) The requirements concerning industrial safety regulations and the dangerous chemicals ordinance remain unaffected.

(5) For the closing of the joints to other sealing surfaces or installations the joint sealing systems are deemed to be appropriate with European technical approval and/or national approval used in facilities for storage, filling and handling of liquid chemicals (substances hazardous to water) according to the provisions of the respective Member States for this field of application which compared to liquids the penetration behaviour of which is evaluated as being positive according to Annex 2 are tight and resistant.

(6) The joints shall be designed and documented in a joint plan. In the design the moving directions of the intended joint sealing systems (compression, extension, shearing) shall be taken into special consideration.

(7) Installations (inlets, gutters, pipes) shall meet the requirements of Annex 3, Table 1.

(8) The verifications of serviceability and tightness of the Type 1 sealing layer (mastic asphalt 0/8): 35 ± 5 mm and Type 2 (mastic asphalt 0/11): 40 ± 5 mm are furnished. This applies only provided the entire base (bed) meets the requirements of this approval.

(9) For the design of movable single loads on the sealing layer the provisions of Annex 6, Table 1 and the information of the approval holder shall be taken into consideration.

4.2.2 Processing

(1) The installation of the sealing system is carried out by firms according to section 4.2.5 only.

(2) For the proper installation the holder of approval shall draw up an installation and assembling instruction.

(3) The conditions of installation given in the approval and by the applicant shall be observed. The installation shall occur in accordance with the design drawings according to section 4.2.1 and the installation and assembling processing instructions.

(4) The installing company shall hand over to the operator of the facility a copy of this approval as well as the installation and assembling instructions of the approval holder.

(5) The sealing system may only be installed, if the adjacent or connected constructions and/or surfaces are not adversely affected during the installation of hot mastic asphalt, e.g. by deformations as a result of temperature.

(6) The joint sealing shall be carried out according to the joint plan (see section 4.2.1) and in accordance with the provisions of the ETA or national approval of the respective joint sealing system appropriate for this application in SFH facilities.

4.2.3 Base

(1) The sealing layer is installed on a load-bearing base using the multi-layer-system of the asphalt road construction, in the course of which the sealing layer is arranged as a top-layer on an asphalt-binder-layer, e.g. in G.: according to the RSTO¹⁴. The respective modulus of elasticity (E_{V2}) of the layers of the base has to meet the requirements of Annex 6, Table 1.

¹³ ZTV Asphalt StB: Zusätzliche Technische Vertragsbedingungen und Richtlinien für den Bau von Verkehrsflächenbefestigungen aus Asphalt (Supplementary Technical Conditions of Contract, Specifications, and Guidelines to build pavements structures made of asphalt)

¹⁴ RSTO – Richtlinie zur Standardisierung des Oberbaus von Verkehrsflächen (Guideline to standardize the pavement structure of traffic areas)

(2) When using "DEUSTAB" as part of the base (asphalt binder layer as load-spreading substratum) the provisions according to Annex 6 of this approval shall be taken into account.

4.2.4 Installation of the sealing layer

(1) The installation is possible manually or mechanically on big surfaces with a paver screed plate.

(2) The adhesion between layers, seams (joints), the edge design and the connections including the corresponding joints shall be installed according to Annex 7 and/or 8 taking into consideration the national requirements of the Member States, e.g. in G.: Information sheet M SNAR (*Merkblatt M SNAR*¹⁵).

(3) The surface of the sealing layer shall be roughened or blunted after installation.

4.2.5 Installing firm

(1) The installation of sealing layers is carried out by firms only who (including their specialists) are authorised and trained by the holder of the approval. Further requirements for the installing firm can result from national provisions of the Member States, e.g. in G.: *Fachbetriebspflicht* ('obligation of a specialist firm').

(2) The confirmation of the conformity of the installed sealing system with this approval shall be given with a declaration by the installing firm on the basis of the following controls:

- Control, whether the right system components for the sealing system were used as well as their marking according to section 3.2.3.
- Control that only joint sealing systems with national and /or European technical approval were installed, which meet the criteria of sections 1.2(5) and 4.2.1.
- Control that only draining devices for absorbing and draining used in facilities for the storage, filling and handling of liquid chemicals (substances hazardous to water) installed on the basis of national approvals, which meet the criteria of the section 4.2.1(7).
- Control of the execution according to section 4.2.6.

(3) The results of controls shall be recorded and evaluated by the installing firm. The records shall include at least the following information:

- Sealing system: <<Mastic asphalt sealing layer "DEUGUSS-S" Type 1 (*and/or Type 2*) as part of the DEUTAG sealing system SOUTH>>
- Approval-number: ETA-12/0385
- Approval holder: *Name, Address*
- Installation on: *Date*
- Installing firm: *Name, Address*
- Type of control or test (see section 4.2.6)
- Date of the test
- Result of the control and tests and comparison with the requirements
- Provisions to which the sealing system conforms:
 - reaction-to-fire class (sealing layer/ joint sealing)
 - indication of levels of trafficability (sealing layer/ joint sealing)
 - indication of single load (load contact area, temperature) and
 - the resistance to media shall be described with the wording "*in accordance with Annex 2 of the ETA-12/0385*".

¹⁵

Merkblatt für Schichtenverbund, Nähte, Anschlüsse und Randausbildung von Verkehrsflächen aus Asphalt (Information sheet M SNAR: Information sheet for the layer adhesion, joints, connections and edge construction of traffic areas made of asphalt)

- Special notes applicable to the use of the product:
"Repair work /retrofitting is admissible only according to this approval or with repair systems which are approved for the respective intended use (see section 1.2) in accordance with national and/or European technical approvals. Furthermore the corresponding instructions of the manufacturer shall be taken into account."
 - Name of, and position held by, the person empowered to sign the declaration on behalf of the installing firm or of his authorized representative.
- (4) During the installation of the sealing system the verification of the correct installation shall be documented by the construction manager or his authorized representative. The documentation and the declaration of the installing firm shall be kept with the construction file of the respective object. They shall be laid out ready during the period of construction. On request they shall be presented to the approval body, the relevant construction supervision authority and the expert personnel in accordance with the national regulations of the Member States.
- (5) If there are insufficient test results the installing firm shall immediately take the necessary actions to stop the deficiency. After the corrective action the controls shall be repeated immediately – as far as technically possible - to verify that the rectification of deficiencies.

4.2.6 Control of the execution

- (1) The perfect nature of the base as well as the permissibility of the occurring base stresses shall be tested separately for every object. The sufficient compaction of the free base (see Annexes 6, Table 1) shall be verified before installing the sealing layer. The admissible characteristic values of the base may not be below the allowed values (see Annex 6, Table 1) and/or shall not differ from the determinations given in the installation and assembling instructions of the approval holder.
- (2) The verification of the characteristic penetration depth per object shall be performed with the reference test liquid Diesel fuels according to EN 590:2004-3 with a maximum of 5 Vol.-% bio-diesel (Media group DF 3a). The extraction of the drilling cores is carried out immediately after completion of the sealing surface from an area of the sealing layer which will probably not be directly stressed but installed together with the entire sealing layer and/or, if that is not possible, from plates separately produced (thickness of the plate = thickness of the sealing layer). The boreholes shall be closed after the core extraction according to section 4.2.2.
- (3) The determination of the penetration behaviour shall be performed on 3 test specimens each per object however at least once on 3 test specimens per installation day by an asphalt test laboratory. The duration of the stress to be applied of the test specimens shall be 144 hours. Furthermore in the individual case the operating conditions and the concepts for the impact shall be taken into account. An equivalent unique test period based on conclusion by analogy (e.g. based on tests) may be determined, see Annex 10.
- (4) Controls of the correct installation of the mixture, in particularly of the area of the connection to other sealing constructions.
- (5) The control of the execution of joint sealing system shall be according to the requirements of the respective national and/or European technical approval of the joint sealing system. The joint-position shall be checked according to section 4.2.1 of the joint plan.

4.3 Repair work

- (1) The repair works shall only be carried out by firms in accordance with section 4.2.5.
 - (2) Repair works at the sealing layer may be performed on the following basic principles:
 - According to the provisions of this approval and/or
 - According to the provisions of national approvals for the repair work, which are suitable for this field of application (SFH-facilities).
- The additionally applicable provisions of the Member States for the repair work shall be taken into account, e.g. in G.: ZTV BEA-StB¹⁶.
- (3) The area to be repaired shall be separated by cold milling of the complete installation height from the intact area. The dimension of this area shall be determined taking the provisions of section 4.2 of this approval into account.
 - (4) The defective material shall be removed completely. The base shall be cleaned from dust. Unevenness of the base bigger than 5 mm (e.g. defects, edges) shall be shaped anew by a levelling layer. Spraying the base is not permitted.
 - (5) The mixture may be installed in the area to be repaired by a finishing machine and/or manually (depending on the size of the damaged spot) flush to the all-embracing surface. The provisions of sections 4.2.1 and 4.2.2 shall be taken into account.
 - (6) The connection to the intact areas shall be, for example, according to the provisions of section 4.2 by a circulating cut joint.

4.4 Responsibilities for the holder of the approval

It is the responsibility of the holder of the approval to make sure that all those who use his surface sealing system will be appropriately informed about the specific conditions according to sections 1, 2, 4, and 5 including the annexes to this ETA, the installation and processing instructions by the holder of the approval and the not confidential parts of the technical documentation to this ETA.

This information can be given by reproduction of the corresponding parts of the European technical approval.

5 Indications to the holder of the approval

5.1 Transport and storage

- (1) The mastic asphalt for the sealing layer is delivered as prepared asphalt mixture.
- (2) During the minimum dwell time of the mastic asphalt in the truck mixer of about 1.5 hours, the dwell temperature of 240 °C may not be exceeded. The processing should be carried out within 6 hours at the most after producing in the mixing facility.
- (3) The transportation to the installation site should be with suitable transport vehicles.

5.2 Use, maintenance, rectification of deficiencies

- (1) In order to ensure the fitness for use of the sealing system, the measures described in the following sections are recommended. It is the task of the approval holder to make sure that all parties involved are adequately informed.

¹⁶ ZTV BEA-StB: Zusätzliche Technische Vertragsbedingungen und Richtlinien für die bauliche Erhaltung von Verkehrsflächen – Asphaltbauweisen (Supplementary Technical Conditions of Contract, Specifications, and Guidelines for the structural maintenance of traffic surfaces – asphalt construction methods)

(2) The operator of the respective installation establishes operating instructions including the description of the necessary measures

- for the control of the proper condition
- for ensuring proper operation
- for maintenance and cleaning

of the surface sealing system as well as the description of measures to be taken in case of damage. The inspection intervals are specified according to the stress levels given in Annex 2 in conjunction with Annex 9 of this ETA. The inspection results are documented.

(3) Drip losses and/or accumulations of already slight liquid quantities shall directly be removed.

(4) Leaked out substances hazardous to water will immediately be bound with suitable means. The polluted bonding agent is taken up duly and without loss recycled or is disposed of. Appropriate materials and/or employment devices are specified in the operating instructions and are constantly on store in sufficient quantity. For the disposal and treatment, respectively, of the materials resulting in waste reference is made to the applicable regulations of the respective Member State (e.g. in G: Abfallgesetz (*Waste Management Law*)).

(5) The operator charges only firms with repair work, maintenance and cleaning of the surface sealing system according to section 4.2.5 of this approval.

(6) Before placing into operation and, if necessary, after every repair work and if necessary after required rectification of deficiencies, the inspections for the putting into operation are carried out as follows:

- The inspection for the putting into operation is carried out by expert personnel only. Further requirements for the individuals can result from national regulations of the Member States.
- The person in charge of the inspection will constantly be kept informed on the process of the work. The person is given the possibility to participate in the controls of the surface sealing system before and after the installation according to section 4.2.6 and to evaluate the results of the controls.
- Checking the condition of the installed surface sealing system is done via visual inspection of the sealing construction.
- Checking of the installed joint sealing system and/or draining devices is done according to the provisions of the relevant European technical approval or the national approval according to the provisions of the respective Member States for this field of application.
- The person in charge of the inspection examines the intended control intervals of the operating instructions by the operator of the respective installation (see section 5.2(2)).

(7) One year after every inspection for the putting into operation and then every five years recurring inspections shall be performed as follows:

- The recurring inspections are carried out by expert individuals. Further requirements for the individuals can result from national regulations of the Member States.
- The investigation of the tightness is done via visual check of the surface of all storage-, filling- and handling-areas. If doubts arise about the tightness of the sealing layer (for example due to softening and detaching respectively of the bitumen surface or due to settlements) further examinations become necessary. For that purpose samples (drilling cores) will be taken from the section concerned, if need be. It can be done without the taking of samples from the soil underneath surface the sealing system, if it can be proven that no complete penetration of the sealing layer occurred by liquid chemicals (substances hazardous to water).

- Furthermore the sealing layer is considered to be tight and trafficable if the sum from removal (e.g. due to taking away) and the 1.5fold single value of the measured maximum penetration depth is smaller than 35 mm (Type 1) and/or smaller than 40 mm (Type 2).
 - If the damaged area is deeper (equal or bigger) than 35 mm (Type 1) and/or 40 mm (Type 2) it shall be removed at least up to the base and/or to the undamaged area and after that repaired according to section 4.3.
 - The examination of the protection effect of the joint sealing system and/or draining devices are carried out according to the requirements of the relevant European technical approval or the national approval according to the provisions of the respective Member State for this field of application.
 - On the basis of the documentation in accordance with section 5.2(2) it is checked whether
 - the check intervals were kept,
 - the specifications of the operating instructions are observed, and
 - whether no longer contact has occurred between the sealing layer and the liquids hazardous to water in the course of use. Comparison shall be done to the admissible stress levels of the respective approvals of the surface sealing system and/or the joint sealing system.
- (8) If during the start-up inspection or recurring inspections the defects have been determined, they are to be repaired immediately. The factory charged with the correction of defects according to section 4.2.5 and the materials in accordance with this approval shall meet the instructions of the installation and assembling instructions of the approval holder and the requirements of this approval. Damaged areas or defects are repaired according to section 4.3.
- (9) Deficiencies at the joint sealing system or the draining devices of the sealing construction shall be corrected taking into account the requirements of this approval and the relevant approval of the joint sealing system and/or draining devices.
- (10) If a correction of the deficiency is necessary, the testing shall be repeated in either case by an expert person according to section 5.2(7). Further national regulations of the Member States shall remain unaffected.

6 Recommendations for the operator of an SFH-facility

- (1) Reference is made to the necessity of a continuous surveillance of the tightness and functional capability of the surface sealing system by the operator of the installation according to the national provisions of the respective Member States.
- (2) An operating instruction is prepared by the operator of the respective installation which takes the following points into account:
- The contents of the regulations to be applied by the employee working in these fields will be presented in the operating instructions in a comprehensible and clear way and be laid out or put up at a suitable place of the plant. The operating instruction can be part of operating instructions in accordance with other fields of law of the respective Member States.
 - The employees working in these fields will be instructed about the possible water threats concerning storing, filling and handling of liquid chemicals (substances hazardous to water) as well as on the measures of hazard control prior to the beginning of the work and after that at least once per year.
 - All essential measures of control by the operator, the repair work, the maintenance and the cleaning will be specified in the operating instructions. The realization of the measures will be noted in the operating journal in each case.

- In this operating instruction the operator lays down his inspection intervals in accordance with Annex 2 in conjunction with Annex 9. These records are ready and will be presented to the person responsible according to the national regulations in force of the respective Member State.
- (3) The operator of a facility for the storage, filling and handling of liquid chemicals (substances hazardous to water) commissions enterprises only with repair work, maintenance and cleaning of the sealing construction according to section 4.2.5.
- (4) If after the start-up check removal of defect is necessary, the start-up check shall be repeated in either case according to section 5.2(7), taking into account the applicable national regulations of the respective Member State.
- (5) The surface sealing system may only be driven on with vehicles according to the provisions according to Annex 6, Table 1.

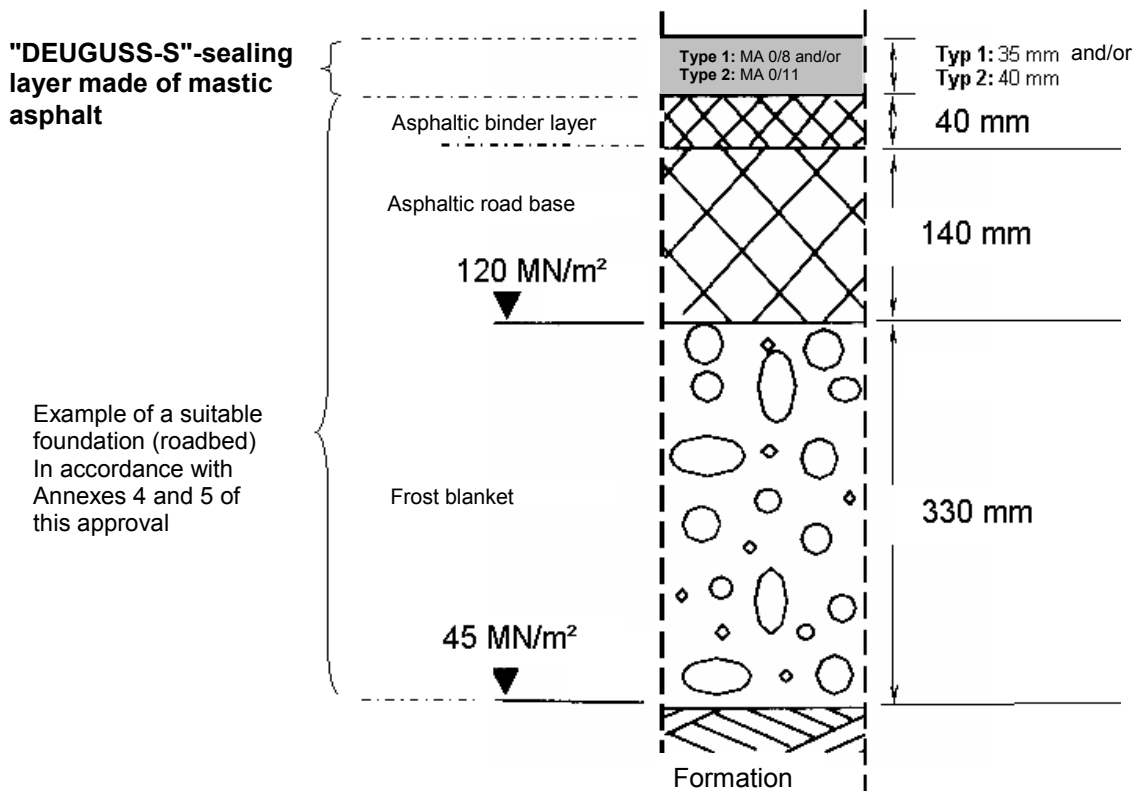
Uwe Bender
Head of Department

beglaubigt:
Dr.-Ing. Kluge

Mastic asphalt sealing layer "DEUGUSS-S"

as a part of the DEUTAG sealing system SOUTH

for use in facilities to deal with liquid chemicals (substances hazardous to water)
(SFH-Facilities)



The verification of tightness of the sealing layer shall be supplied for the respective object by the penetration test with the representative test liquid according to annex 4.

Mastic asphalt sealing layer "DEUGUSS-S"
as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Example of an installation

Annex 1

Table 1:

Mastic asphalt sealing layer for use in SFH-facilities is impermeable and chemically resistant to the following liquids (stress level S1, F1, H1 "small" and S2, F2 and H2 "mean" according to [8], see Annex 9)

Liquids	Media group
<ul style="list-style-type: none"> - heating oil EL according to DIN 51603-1 - unused combustion engine oils - unused vehicle gear oils - mixtures from saturated and aromatic hydrocarbons with an aromatic content of ≤ 20 wt-% and a flash point of $> 55^{\circ}\text{C}$ 	DF 3
Diesel fuels according to EN 590 with a maximum of 5 vol.-% bio-diesel	DF 3a
used combustion engine oils and used vehicle gear oils with a flash point of $> 55^{\circ}\text{C}$	DF 4c
mono- and polyvalent alcohol (to a maximum of 48 vol.-% methanol), glycol ether	DF 5
All alcohols und glycol ether	DF 5a
all organic ester and ketones, without biodiesel (MG 7b)	DF 7
aromatic ester and ketones	DF 7a
biodiesel according to DIN EN 14214	DF 7b
aqueous solutions of aliphatic aldehydes up to 40 %	DF 8
aliphatic aldehydes and their aqueous solutions	DF 8a
aqueous solutions of organic acids (carboxylic acids except formic acid) up to 10 % and their salts (in aqueous solution)	DF 9
organic acids (carboxylic acids) and their salts (in aqueous solution) except formic acid	DF 9a
mineral acids up to 20 % as well as acidic hydrolyzing inorganic salts in aqueous solution ($\text{pH} < 6$), except hydrofluoric acid and acids with oxidizing effects and their salts	DF 10
inorganic lye as well as alkaline hydrolyzing salts in aqueous solution ($\text{pH} > 8$), except ammonia solutions and solutions with oxidizing effects of salts (e.g. hypochlorite)	DF 11
aqueous solutions of inorganic not oxidizing salts with a pH value between 6 and 8	DF 12
amine as well as their salts (in aqueous solution)	DF 13
aqueous solutions of organic surfactants	DF 14
cyclic and acyclic ethers	DF 15
acyclic ethers	DF 15a
aqueous ammonia solutions up to 32 %	-

Notice concerning all liquids:

Excluded are liquid chemicals (liquids hazardous to water) with a flash point of up to 55°C or those where explosive atmosphere can develop under conditions of use.

Mastic asphalt sealing layer "DEUGUSS-S" as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities	Annex 2
List of liquids	

Table 1: Material and properties

No.	Characteristic	Property
1	DEUGUSS-S-sealing layer:	Mastic asphalt according to the provisions of this approval, Annex 3, Table 2 and the requirements of the holder of the approval
2	Base (bed):	according to the Annexes 5 and 6 of this approval and the provisions of the holder of the approval
3	Joint sealing system	Joint sealing systems with national and/or European technical approval which are appropriate for the intended use in SFH facilities
4	Drainage installation:	Floor inlets with national approval which are appropriate for the intended use in SFH-facilities
4.1	– Floor inlets	
4.2	– Gutters, gutter systems	Gutters and/or gutter systems with national approval which are suitable for the intended use in SFH-facilities
4.3	– Pipes	– Austenitic stainless steel e.g. according to EN 1124-1 – High density polyethylene, PE-HD according to EN 12666-1

Table 2: DEUGUSS-S –sealing layer: Mixture and its components

No.	Components		Type 1: MA 0 / 8 mm	Type 2 MA 0 / 11 mm
1	Aggregates	according to the deposit compositions		
1.1	– impact crushing strength of aggregates	[M.-%]	< 18,0	
1.2	– fine and coarse aggregates, carbonate-free ²⁾	[mm]	0/2 or 0/3 and/or 2/5, 5/8	0/2 or 0/3 and/or 2/5, 5/8, 8/11
	– basalt	origin:	Basalt AG Plant Zeilberg	
2	Fillers	according to the compositions deposited		
2.1	– quartz powder, resistant to acid	origin:	Dorfner Plant Hirschau	
3	Binders³⁾	according to the compositions deposited		
3.1	– standard binder A	MEXPHALT 25 S or MEXPHALT 45 S		
	▪ needle penetration at 25 °C	[(1/10) mm]	20 to 30	25 to 40
	▪ softening point ring and ball	[°C]	75 to 79	66 to 70
3.2	– standard binder B	BIGUMA-Hbit 6		
	▪ needle penetration at 25 °C	[(1/10) mm]	-	2 to 6
	▪ softening point ring and ball	[°C]	-	90 to 100
3.3	– binder for small quantity production in exceptional cases, e.g. repair work according to section 5.3 of this ETA	bitumen ⁴⁾ 20/30 or 30/45 with 2,0 to 4,0 M.-% additives (compound)		
4	Mixture	S-MW-1-12 and S-MW-2-12 accord. to ETA section 4.1		
	– manufacturing plants	[M.-%]	≥ 90	
	– content of aggregates	[M.-%]	≤ 10	
	– soluble binder content	[M.-%]		

¹⁾ for top layers according to the information of the approval holder taking into account the national provisions of the Member States, e.g. in G.: according to TL "Gestein" (*Technical Delivery-conditions "aggregates"*)

²⁾ only if the sealing layer will be used in contact with acids

³⁾ according to the specification deposited with DIBt

⁴⁾ according to EN 12591

Mastic asphalt sealing layer "DEUGUSS-S"
as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Materials, properties, mixture and its components

Annex 3

Table 1: Properties for design and use

No.	Property		Requirements	
			Type 1	Type 2
1	Sealing layer		MA 0/8	MA 0/11
1.1	– punching depth of indentation when using the standard binder A after 30 minutes ¹⁾ according to EN 12697-20	[mm]	max. 2,5	max. 2,0
1.2	– punching depth of indentation when using the standard binder B according to EN 12697-20 – at 40 °C, after 2 hours – at 22 °C, after 5 hours	[mm]	- -	max. 4,0 max. 1,0
1.3	bearing stress of movable single loads at a surface temperature:			
	–20°C ≥ T ≤ +20 °C	[N/mm ²]		≤ 1,0
	+20°C < T ≤ +40 °C	[N/mm ²]		≤ 0,8
	+40°C < T ≤ +60 °C	[N/mm ²]		≤ 0,6
1.4	– thickness of the sealing layer	[mm]	35 + 5	40 +5
1.5	– levels of trafficability bearing stress at temperatures of 50°C at the most:		t 0: pedestrians t 1: pneumatic-tyres, up to 60 kN/(0,4 x 0,4)m ² , single axle: wheel load 48 kN t 2: pneumatic-tyres, up to 120 kN/(0,4 x 0,4)m ² , single axle: wheel load 96 kN t 3: vulkollan, hard rubber wheels up to 0,8 N/mm ²	
1.6	– Ability for electrostatic charges derivation		Class 0 : not able to discharge	
1.7	– Reaction-to-fire class		Class B _{fl} –s1 If joint sealing systems are used in the sealing layers the reaction to fire of the respective joint sealing system shall be taken into account	
1.8	– Joint width	- trafficable - to be walked on only	10 to 20 mm ≤ 40 mm	
1.9	– referenz-test liquid		Diesel fuels (according to EN 590) with a maximum of 5 vol.-% bio-diesel (media group DF 3a)	
	– admissible characteristic penetration depth, "e _{144k} " after 144 hours impact in standard atmosphere	[mm]		≤ 23,0
2	Base (bed)*, e.g.:			
2.1	– load-spreading formation	[MN/m ²]		E _{v2} = 45
2.2	– load bearing frost blanket	[MN/m ²]		E _{v2} = 120
2.3	– crushed stone subbase	[MN/m ²]		E _{v2} = 180
3	Asphaltic binder layer (DEUSTAB-binder layer²⁾):			
3.1	– binder:		Bitumen 30/45 according to EN 12591	
	- binder content	[M.-%]		4,0 to 5,0
	- softening point ring and ball	[°C]		53 to 59
3.2	– aggregates:			
	- type: fine and coarse aggregates	[mm]		0/2 to 16/22
	- impact crushing strength of aggregates	[M.-%]		≤ 18
3.3	– mixture			
	- void content ³⁾	[M.-%]		5,0 bis 8,0
	- deformation behaviour ⁴⁾	[mm]		< 3,0

¹⁾ Increase of penetration depth after 60 minutes.

²⁾ According to the specification and requirements of the approval holder.

³⁾ at the Marshall-specimen

⁴⁾ during the wheel tracking test following EN 12697-22, Type B, test on air, with a small wheel, at 50°C test temperature

* furthermore see annexes 5 and 6

Mastic asphalt sealing layer "DEUGUSS-S"
as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Properties for design and use

Annex 4

Admissible bases (beds) for sealing layers Type 2 MA 0/ 11 (40 mm):

(Thickness data in cm; E_{v2} – Minimum value in MN/m², according to Annex 4, Table 1)

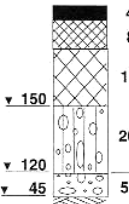
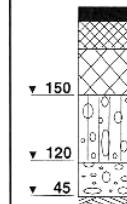
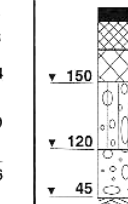
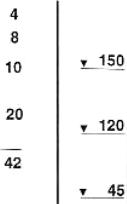

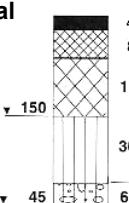
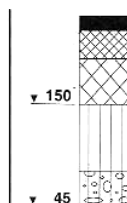
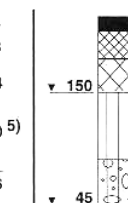
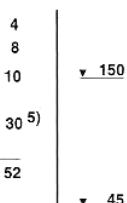
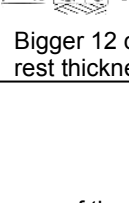
Zeile	Construction class		SV				I				II				III			
	Equivalent 10-t-crossings in Mill.	B	> 32				> 10 - 32				> 3 - 10				> 0,8 - 3			
	Thickness of the frost blanket ¹⁾		55	65	75	85	55	65	75	85	55	65	75	85	45	55	65	75
1	Asphalt road base on frost blanket																	
	Sealing layer																	
	Asphalt binder layer ⁷⁾																	
	Asphalt road base																	
	Frost blanket																	
	Thickness of the frost blanket		-	31 ²⁾	41	51	25 ³⁾	35	45	55	29 ³⁾	39	49	59	-	33 ²⁾	43	53
2.1	Asphalt road base and road base made of hydraulic binder on frost blanket and/or layer made of frost insensitive material																	
	Sealing layer																	
	Asphalt binder layer ⁷⁾																	
	Asphalt road base																	
	Road base made of hydraulic binder																	
	Thickness of the frost blanket		-	-	34 ²⁾	44	-	28 ³⁾	38	48	-	30 ²⁾	40	50	-	-	34 ²⁾	44
2.2	Sealing layer																	
	Asphalt binder layer ⁷⁾																	
	Asphalt road base																	
	Stabilisation																	
	Layer made of made of frost insensitive material- wide- or intermitted stepped																	
	Thickness of the layer made of frost insensitive material		10 ⁴⁾	20 ⁴⁾	30	40	14 ⁴⁾	24	34	44	18 ⁴⁾	28	38	48	12 ⁴⁾	22	32	42
2.3	Sealing layer																	
	Asphalt binder layer ⁷⁾																	
	Asphalt road base																	
	Stabilisation																	
	Layer made of made of frost insensitive material - narrow stepped																	
	Thickness of the layer made of frost insensitive material		5 ⁴⁾	15 ⁴⁾	25	35	9 ⁴⁾	19 ⁴⁾	29	39	13 ⁴⁾	23	33	43	7 ⁴⁾	17 ⁴⁾	27	37
3	Asphalt road base and road base made of coarse aggregates on frost																	
	Sealing layer																	
	Asphalt binder layer ⁷⁾																	
	Asphalt road base																	
	Road base made of coarse aggregates ⁸⁾ $E_{v2} \geq 150$ (120)																	
	Frost blanket																	
	Thickness of the frost		-	-	30 ²⁾	40	-	-	34 ²⁾	44	-	28 ³⁾	38	48	-	-	32 ²⁾	42

Mastic asphalt sealing layer "DEUGUSS-S" as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Examples of admissible bases (beds) for sealing layers, part 1

Annex 5

Count. admissible bases (beds) for sealing layers

Asphalt road base and road base made of gravel on frost blanket				
4	Sealing layer		4	77
	Asphalt binder layer		8	87
	Asphalt road base ⁷⁾		10	83
	Road base made of gravel E _{v2} ≥ 150 (120)		38	91
	Frost blanket		50	73
	Thickness of the frost blanket	- - 25 ³⁾	35	- - 29 ³⁾
		- - 33 ²⁾	43	- - 27 ³⁾
		37		
Asphalt road base and road base made of coarse aggregates and/or gravel on layer made of frost insensitive material				
5	Sealing layer		4	87
	Asphalt binder layer ⁷⁾		8	97
	Asphalt road base		10	93
	Road base made of coarse aggregates or gravel ⁸⁾ E _{v2} ≥ 150 (120)		30 ⁵⁾	48
	Layer made of made of frost insensitive material		60	56
		- - 45	52	- - 45

Bigger 12 cm it's made of frost insensitive material. The smaller rest thickness has to be compensated with the material laying

- 1) In case of different values the thicknesses of the frost blanket and or the frost insensitive material shall be determined by first differences time series
- 2) With round granular aggregates usable only with local reinforcement.
- 3) Only usable with crushed aggregates and with local reinforcement.
- 4) Only applicable if the frost-proof material and the material to be stabilized are installed as one layer.
- 5) In case of road base made of gravel in construction classes SV and I to III the installing thickness shall be 40 cm
- 6) Road base, according to the information by the approval holder taking into account the national provisions of the Member States, e.g. in G.: RStO.
- 7) As alternative the "DEUSTAB binder" may also be used as asphalt binder layer according to ETA-Annex 4, Table 1.
- 8) In accordance with the information of the approval holder taking into account the national provisions of the Member States, e.g. in G.: RStO.

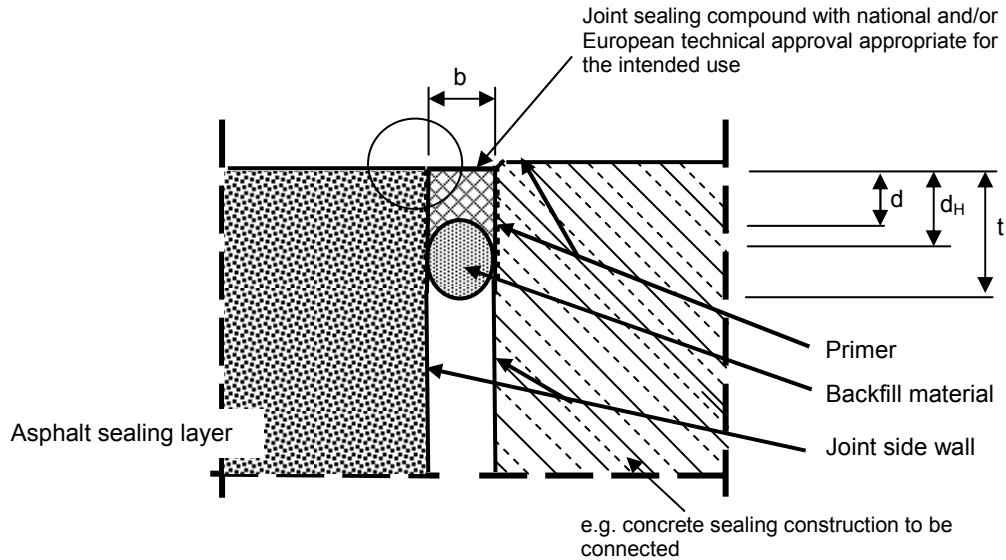
Mastic asphalt sealing layer "DEUGUSS-S" as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Examples of admissible bases (beds) for sealing layers, part 2

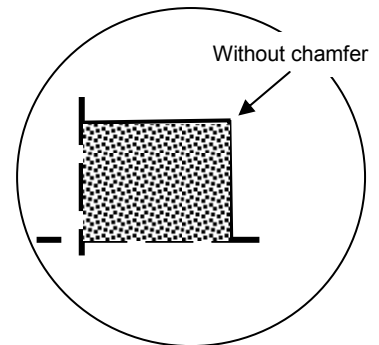
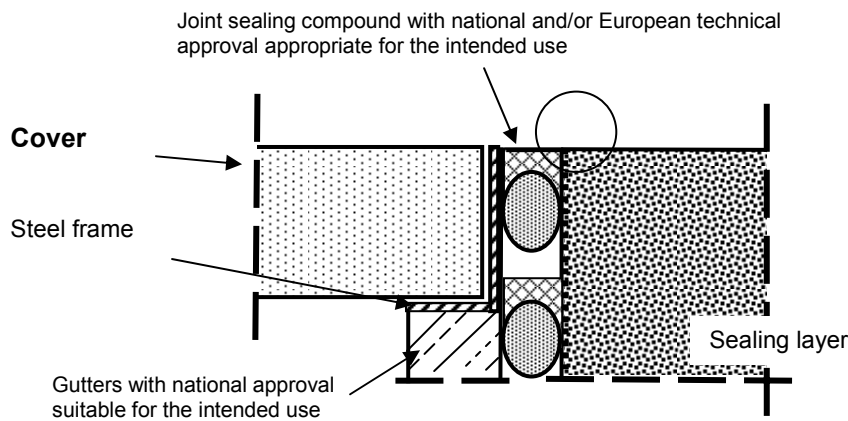
Annex 6

Examples of connections to sealing surfaces and/or -constructions

- Connection to sealing surfaces and/or installations made of concrete:



- Connection to gutters:



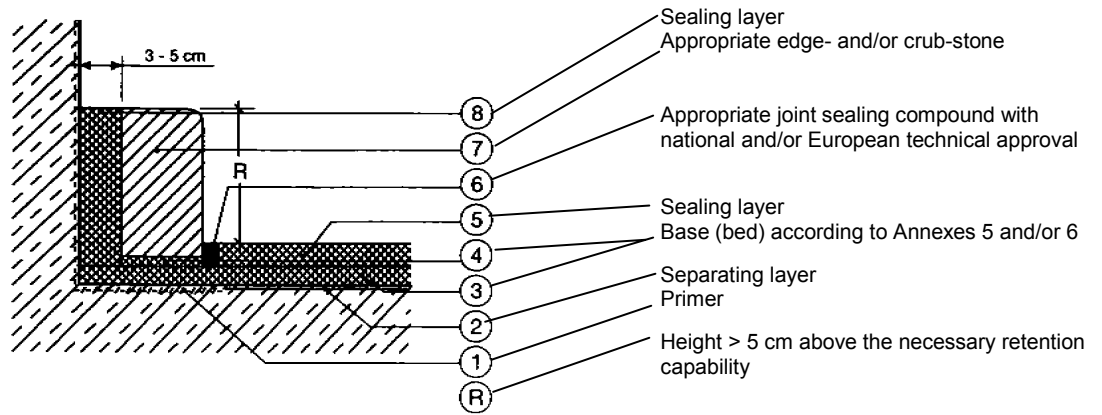
- b** = Joint width
- d** = Thickness of the joint sealing compound
- d_H** = Joint sealing compound bonding or contact surface on the joint side wall (protected joint side)
- t** = Depth of the joint chamber, it shall be ensured that the joint sides aligned parallel to one another

Mastic asphalt sealing layer "DEUGUSS-S"
as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

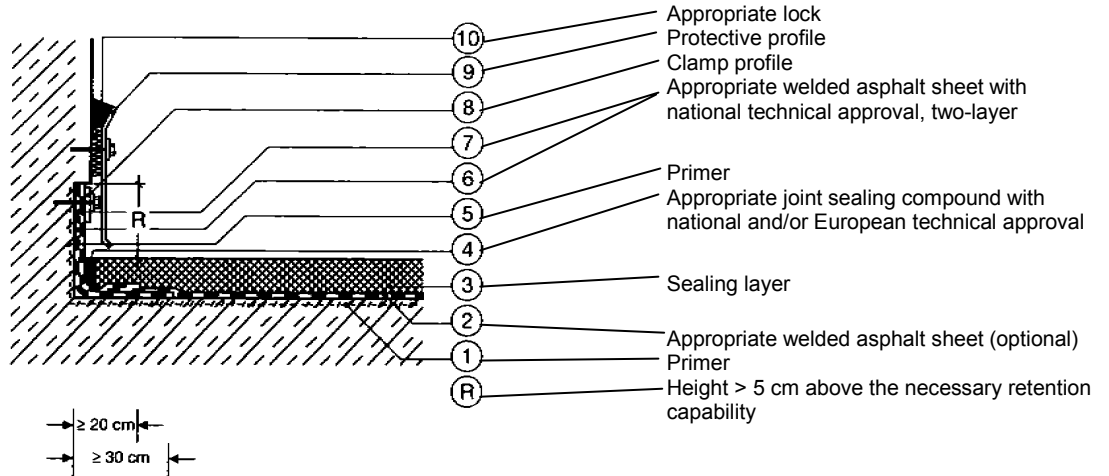
Examples of connections to sealing areas and gutters

Annex 7

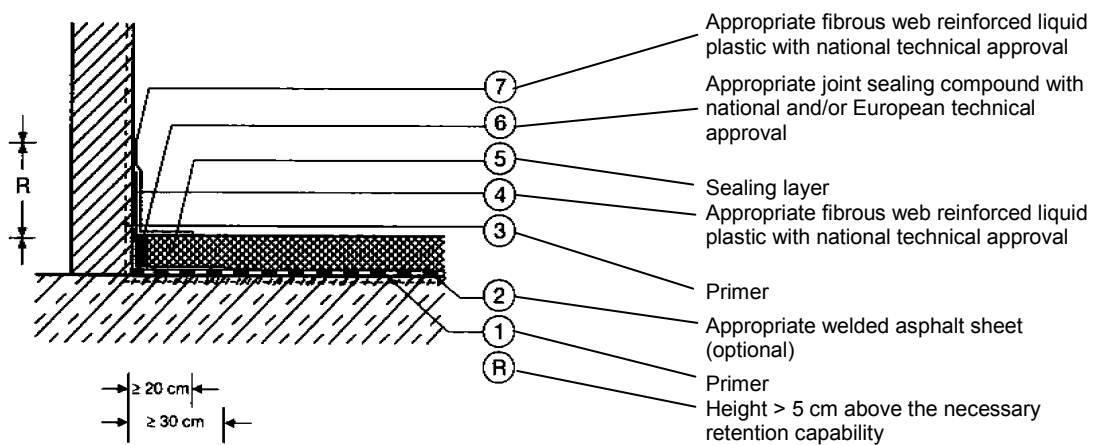
Connection to backfilled edge stones:



Connections to supports:



Connections to walls:



Mastic asphalt sealing layer "DEUGUSS-S" as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Examples of connections to edge stones, supports and walls

Annex 8

Stress levels for the impact

1 Sealing layers in the area for storage

The stress of the sealing layers when storing shall be determined in individual cases according to the operating conditions taking the relevant national provisions of the Member states into account. It is dependent amongst others on the duration of stress determined. Within this duration of stress determined the leaked liquids must be identified and removed from the sealing layer.

Table 1: Storing of substances hazardous to water

Abbreviation	Stress level	Duration of stress	Testing period
S ₁	low	Duration of stress up to 8 hours ¹⁾	8 hours
S ₂	mean	Duration of stress up to 72 hours ¹⁾	72 hours
S ₃	high	Duration of stress up to 3 months ^{1), 2)}	2200 hours

¹⁾ In this period of the duration of stress the stress is to be identified and removed, the sealant is to be cleaned and (if applicable, after the professional judgment) put into operation again.

²⁾ In case of a duration of stress over 3 months, a permanent impact shall be assumed and the determinations given in this CUAP shall not be applied.

2 Sealing layers in the area for filling and handling

The stress of the sealing layers when filling and handling will be determined in individual cases taking into account the operating conditions. It depends on the frequency of the filling procedures, on the infrastructure and on the national provisions of the Member States regarding the legal dangerous substances requirements for packing of substances hazardous to water.

Reloading and filling processes will constantly be visually checked for drip losses and leakages, so that the measures for their elimination can be taken immediately.

Table 2: Filling and Handling of substances hazardous to water

Abbreviation	Stress level	Frequency / measure	Testing period
F ₁ , H ₁	low	a) Filling of up to 4 x per annum. b) Handling of substances in appropriate packing ¹⁾	8 hours
F ₂ , H ₂	mean	a) Filling of up to 200 x per annum. b) Handling of substances in inappropriate packing ¹⁾	Impact cycle: 28 days per 5 hours ²⁾ each
F ₃	high	Filling and handling without restriction of the frequency	Impact cycle: 90 days per 5 hours ³⁾ each

¹⁾ According to the national provisions of the Member States regarding the legal dangerous substances requirements for packing of substances hazardous to water.

²⁾ Equivalent impact (same penetration depth) one-time 144 hours.

³⁾ Equivalent impact (same penetration depth) one-time 450 hours.

3 Safety factors for determining the characteristic penetration depth and the minimum component thickness:

Safety factor γ_s : Failing an agreement to the contrary, the safety factor for the static deviation from the individual values of the penetration depths is 1,35. As opposed to this it may be determined according to the provisions of the respective Member States.

Safety factor γ_e : Failing an agreement to the contrary, the safety factor for the penetration depth is 1,5 based on the specifications of the supervision and testing and during the use of the pre-fabricated components (installation surveillance). As opposed to this it may be determined according to the provisions of the respective Member States.

Mastic asphalt sealing layer "DEUGUSS-S"
as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Stress levels for the impact and safety factors

Annex 9

Annex A: Penetration of liquid chemicals into sealing layers made of mastic asphalt

A-1 Specimen

- (1) Test cores with a diameter of $d = 80$ mm shall be taken from the completed sealing layer in the manufacturing devices and built into the testing device (subsequent test surface corresponds to the manufacture top side).
- (2) The test shall be performed with a testing device according to Figures A-1.1 and A-1.3 with the aforementioned drilling cores sealed with a suitable material.
- (3) For each specimen (drilling core) the penetration depth e_{ti} shall be measured and given in millimetres with a recess of a 10 mm thick edge, see Figure A-1.2. At least three drilling cores shall be tested for each test liquid.

A-2 Test

- (1) The standpipe with a height of approx. 0.5 m is put on and sealed. Within approx. 1 minute at the most the standpipe shall be filled up to a height of approx. 0.4 m above the specimen surface with the respective liquid chemical (substance hazardous to water) and the initial height will be read off (initial value).
- (2) The tests are carried out at standard atmosphere (20/60).
- (3) The liquid chemical penetrated into the surface area of the sealing layer shall be read off and recorded daily during the test by means of the measuring scale at the standpipe at least in the mornings and in the evenings. If necessary, the liquid chemical shall be made up. After expiration of the test period (in accordance with Annex 9 and section 4.2.6(2) of this approval), the test specimen shall be removed. Within one hour the test specimen shall be split in the centre parallel to the longitudinal axel. Immediately thereafter, the visible penetration depth (limit wet/dry or dark/light) shall be marked with a pencil, see Figure A-1.2. In the case of substances with high vapour pressure it may occur that the penetration limit is not visible. In this case the penetration depth can be determined for example by
 - indicators added to the mastic asphalt for reasons of precaution,
 - gas analysis measurements on the fracture surface,
 - spraying with concentrated sulphuric acid and flaming immediately after splitting the specimen,
 - thermography.
- (4) For each test specimen the penetration depth e_{ti} shall be measured and given in mm according to Figure A-1.2 under recess of a 10 mm thick edge.

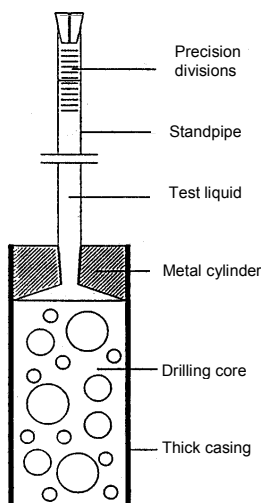


Figure A-1.1: Test apparatus

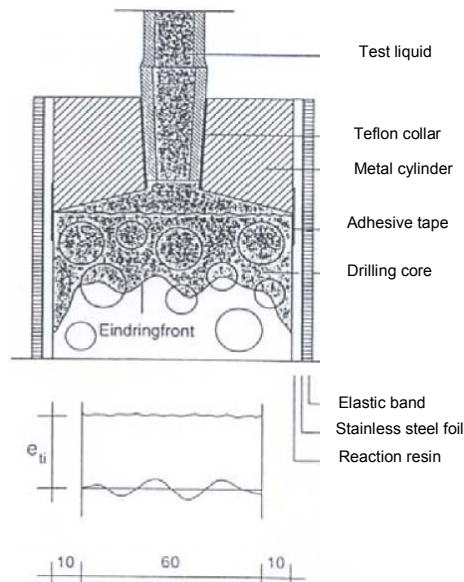


Figure A-1.2: Documentation of evaluation

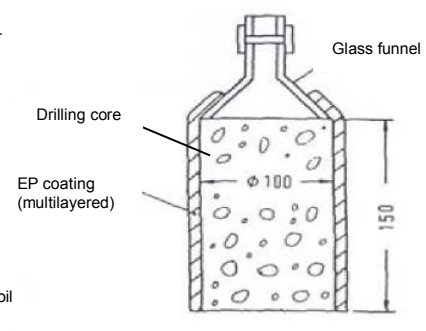


Figure A-1.3: Alternative test apparatus

Mastic asphalt sealing layer "DEUGUSS-S"
as a part of the DEUTAG sealing system SOUTH for use in SFH-facilities

Penetration of liquid chemicals into sealing layers made of mastic asphalt

Annex 10