

IVD-Instruction Sheet No. 4

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Sealing of outside Wall Joints in building construction with Elastomeric Joint Tapes

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0 Policy Statements on Standardization and Quality



Legal Framework

The following statements refer to the standard EN 15651 anticipated to come into force in 2012.

The following requirements resulting from the standard (e.g. use of CE-marking) are also expected to come into force in 2012 together with the standard.

Sealants as a construction product succumb to the European Construction Products Directive, CPD (in Germany transposed into national law by the Construction Products Act). Building products are by definition intended to remain permanently in the building. The Construction Products Directive forms the legal basis for defining the requirements for a general fitness of the products and the elimination of technical barriers to trade within the EU.

The directive itself only states targets, but not how to achieve them. These targets are summarized in the six essential requirements:

1. Mechanical resistance and stability
2. Fire Protection
3. Hygiene, health and environmental protection
4. Safety in use
5. Sound insulation
6. Energy saving and thermal protection

These essential requirements provide the basis for the creation of so-called "harmonized" standards. Such standards are prepared on the basis of a mandate from the European Commission, by CEN. The necessary compliance of a construction product with the harmonized standard is documented by the CE-mark. Without CE-mark a product must not be placed onto the market!

In developing the harmonized standards, the different circumstances of member states have to be taken into account via the introduction of classes, so that local products can still be placed on the market, i.e. the CE-mark only indicates suitability for distribution in the EU, which does not necessarily imply a high quality standard.

The harmonized standards are created as EN standards and then adopted as DIN EN standards in Germany. Possibly conflicting national standards shall be withdrawn from that date. However, some further parts of the national standards continue to exist as a so-called "residual rules". Thus, if essential national building code regulations are

affected, a product not compliant with these rules may not be used in this country, despite the CE-mark.

1 Preamble

The reconstruction with (coloured) joint tapes is a possibility for elastic joint sealing if sprayable sealants for various reasons cannot be used.

As for example:

- Too narrow joints
- Too wide joints
- Strong joint offset
- Contaminated joint edges

2 Scope

This instruction sheet applies to the sealing of new and the repair of damaged joints in building construction between components made from in-situ concrete, concrete and reinforced concrete elements (including washed-out and aerated concrete) as well as unplastered or plastered masonry, metal, ceramic facades and natural stone. This instruction sheet also applies to joints where movements of over 25% of joint width occur, eg building partitions and also for joints with a width of more than 35 mm. The instruction sheet does not apply to joints where the joint tape is exposed unprotected to mechanical stress, eg in traffic areas and does not apply to Elastomeric Joint Tapes according to DIN 7865 or DIN 18541.

Elastomeric Joint Tapes are no sealants according to DIN 52 460, DIN EN ISO 26 927 and DIN EN ISO 11600.

3 General Requirements

3.1 Surface of the components in the area of the adhesive Surfaces

In the area of the glued surfaces, the surface of the components has to be sufficiently dense, firm, dry and stable and free of contaminants. It must also be free of such surface treatments, coatings (paints), sealants and impregnations that affect the adhesion and curing of the adhesive. Mortar for the repair of damaged spots in the area of the bonding surfaces must be sufficiently stable and free from cracks, have a largely non-porous surface and have adequate adhesion to the concrete. Such repairs shall not affect the adhesive properties of primer and adhesive.

3.2 Chemical Compatibility with other substances

Other materials that come into contact with the joint tape, the adhesive or the primer and sealer, for example Coatings (paints), sealants, impregnations, repair mortars, are to be tested with respect to the mutual compatibility according to DIN 52 452. Here according to VOB DIN 1961, Part B § 3 and § 4 No. 13 No. 3, the subsequent trade has to prove the compatibility, to undertake appropriate tests and raise any concerns in writing if deemed necessary.

4 Constructive Design

4.1 Dimensioning

The width of the non-profiled motion zone of the joint tape goes by the values of Table 1. These must not be exceeded. For dimensioning and processing additionally the manufacturer's instructions are to be adhered to.

Table 1: Minimum sizes and dimensioning of Elastomeric Joint Tapes for joints in building construction and for joint repair

-for components of mineral building materials*

- Minimum Sizes and Dimensioning -				
Joint Distance = Component length	Open joint width	Laid flat movement zone	Width of adhesive zones	Width of joint tape
m	mm	mm	mm	mm
bis 2,0	3	14	2 x 8	30
über 2,0 bis 3,5	4	19	2 x 8	35
über 3,5 bis 5,0	6	24	2 x 8	40
über 5,0 bis 6,5	7	30	2 x 10	50
über 6,5 bis 8,0	9	36	2 x 12	60
über 8,0 bis 10,5	11	48	2 x 16	80
über 10,5 bis 13,5	14	60	2 x 20	100
- for Metal Components**				
Joint Distance = Component length	Open joint width	Laid flat movement zone	Width of adhesive zones	Width of joint tape
m	mm	mm	mm	mm
bis 2,0	4	19	2 x 8	35
über 2,0 bis 3,5	7	30	2 x 10	50
über 3,5 bis 5,0	10	42	2 x 14	70
über 5,0 bis 6,5	12	48	2 x 16	80
über 6,5 bis 8,0	15	60	2 x 20	100

In building partitions the minimum dimensions should not be less than 80 mm for the movement area and 2x20 mm for the adhesive zones. With joint movements of more than 25% of the joint width, the total width of the Elastomeric Joint Tape is to be determined by the planner.

Calculation base:

- * Concrete
- ** Aluminum

5 Options for Joint Sealings

Elastomeric joint tapes are suitable for sealing joints in new buildings and for the repair of damaged joint seals.

Applications for the use of Elastomeric Joint Tape:

- Undersized joint widths
- Oversized joint widths (greater than 35 mm)
- Strong joint offset
- Non-parallel joint design
- Insufficient joint depth for backing-up material and sealant
- Highly variable joint widths
- Firmly adherent old sealant
- Insufficient strength of the joint edges
- Wrong sealants in the joint

6 Requirements for the Substrate

For substrates with sufficient inherent strength, e.g. concrete, metal, ceramic, masonry, plaster or mortar groups PII, PIII, PIV a, b, c and PV Elastomeric Joint Tapes can be laid flat (see Figure 1). For substrates with low inherent strength, e.g. plaster with less than 2N/mm^2 compressive resistance (plaster of groups PI a, b, c and PIV d) and aerated concrete the band application, either flat over the joint or in loops in the joint must be executed according to the manufacturer's application instructions.

7 Joint Sealing with Elastomeric Joint Tapes

7.1 Preparing a suitable adhesive Surface

In the area of joint surfaces, the surface of the components is cleaned and primed according to the manufacturer's recommendations with a primer or sealer. In particular, the maximum use temperatures, the required airing time and wet time of the primer or substrate barrier are to be observed. The bearing capacity of the substrate and the compatibility must be proven (see Section 3.1 and 3.2).

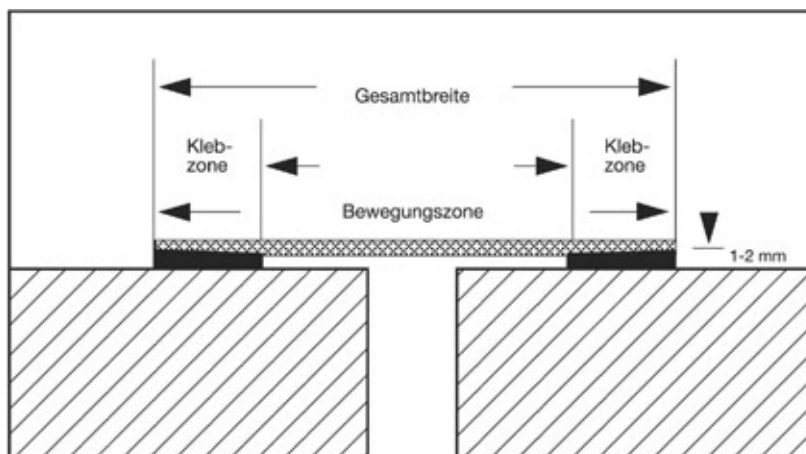
7.2 Application of the Adhesive

The adhesive is applied evenly and free of bubbles onto the prepared, and possibly on the outer edges limited by glossy masking tape, component surfaces. The adhesive may only be applied onto the predetermined adhesion area of the component.

7.3 Application of the Elastomeric Joint Tape

The joint tape must be placed and pressed on within the skin formation time of single-component or the pot life of a multi-component adhesive. The joint tape must lie well in the adhesive with the complete adhesive area so that the adhesive layer thickness is at least 1 – 2 mm at all points of the adhesive area. The pressing takes place from the center to the edge, so that the excess glue emerges on the glossy masking tape. During the pressing of the Elastomeric joint tape caution has to be taken that no adhesive is distributed into the movement zone. The distribution of the adhesive to the middle of the tape should be avoided. Adhesive leaked at the side has to be removed before hardening by removing the masking tape. Thereafter, the edge areas of the tape are smoothed chamferlike if adhesive is still leaking.

7.4 Examples of Joint Tape lying



Total width
Adhesive area
Movement zone

Fig. 1: Basic principle of a joint sealing with Elastomeric Joint Tape

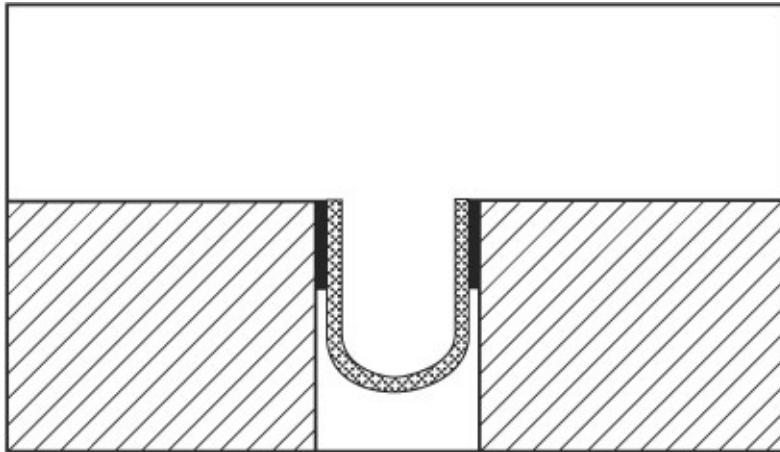


Fig. 2: Example of a building with Elastomeric Joint Tape, execution as a loop

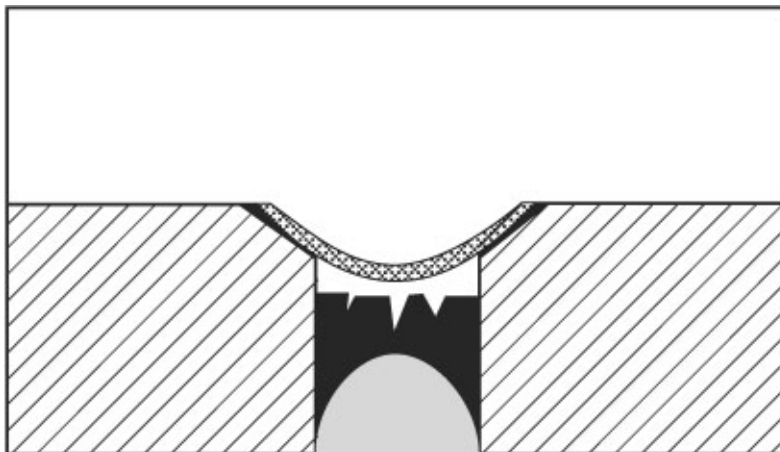


Fig. 3: Example for the repair of a damaged joint sealing

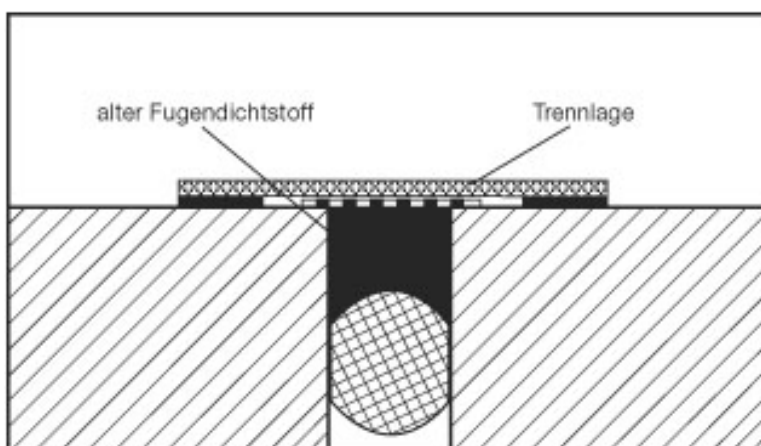


Fig. 4: Example for the repair of a building joint with a separating layer, laid flat on the component edges

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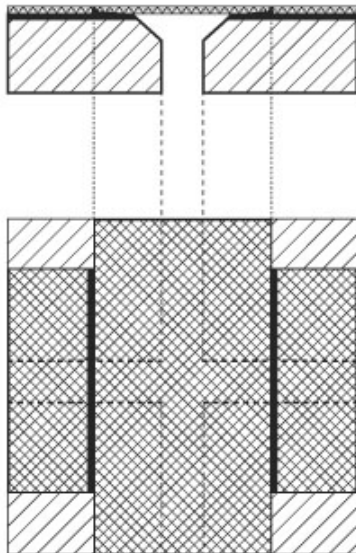


Fig. 5: Example of the design of the fire ports in the area of a joint cross

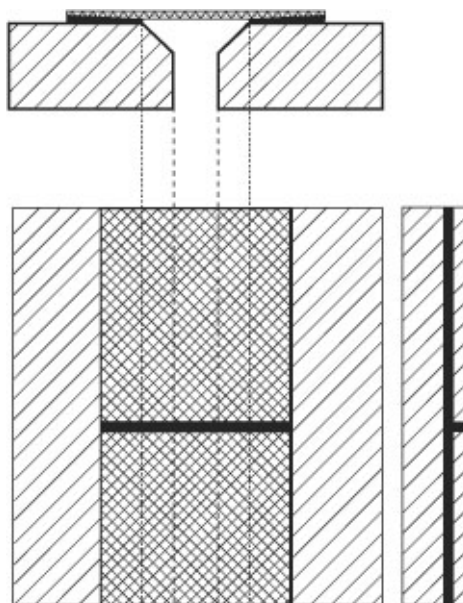


Fig. 6: Example of the execution of a butt joint connection in the area of fire ports

Collisions and intersection points of the tape must be formed so that the free movement of the joint tape is given and the tightness is guaranteed (see Fig. 5 and 6). To avoid three-point adhesion in collision or crossing areas a separating layer will be laid before gluing. The movement areas must remain unglued at the ends of the joint tapes glued vertically in order to enable moisture balancing.

7.5 Documentation of the Work Execution

The processor is required to prepare records of the sealing which must contain the following information:

- Building project, exact address
- Date of execution
- Material temperature
- Weather conditions (outside temperature, component temperature, dew point, humidity, rainfall)
- Location and description of work performed
- Brand and batch number of primer, sealer, adhesive and Elastomeric Joint Tape
- Name of the responsible processor with regard to his training, e.g. certified layer

8 Requirements for Joint Tape Systems

8.1 Early Stress

When tested in accordance with Section 9.1 the tape may not shift or sag by early stress or come off the substrate in the adhesive area.

8.2 Tear Behaviour

The tear resistance must be ≥ 7.0 N/mm when tested in accordance with Section 9.2.

8.3 Adhesion and Expansion behaviour

The following values for the tensile force at expansion of 100%, based on the movement area, must be maintained when tested in accordance with Section 9.3, while giving the average thickness out of three measurements in the movement area:

at +23 °C	50 N up to 120 N
at - 20 °C	50 N up to 120 N

The bonding must be maintained during the test.

8.4 UV-Resistance

The 300%-average tension value of the standardized rods from the irradiated tape may only differ from -5% up to +20% from the standardized rods from unirradiated joint tape.

8.5 Discolouration of adjacent Building Materials

When tested according to Section 9.5 neither the building material nor the adhesive may show a significant change in colour.

8.6 Paint compatibility

When tested in accordance with Section 9.6, the system must have compatibility according to the criteria of the test standard.

Elastomeric Joint Tapes must not be painted over, or only after passing the test according to DIN 52452-4/A3, with concurrent indication of the trade name of the coating.

8.7 Resilience

The resilience capability must be at least 70% when tested according to Section 9.8.

8.8 Reaction to Fire

Elastomeric Joint Tapes including joint tape adhesives and all additional materials must show at least normal flammability, building material class B2 according to DIN 4102. The test is carried out in accordance with Section 9.9.

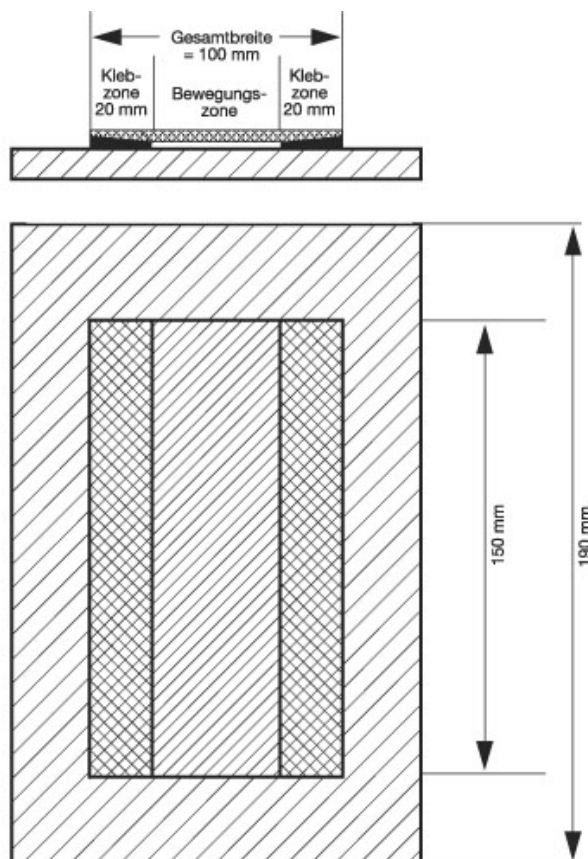
9 Tests of Joint Tape Systems

In tests with several samples, these are to be taken or prepared from a sufficiently large sample of a tape.

9.1 Early Stress

For the test, from a 100 mm wide band a sample of a 150 mm long section is glued onto a fiber cement board of 120 mm x 190 mm x 5 mm according to the manufacturer's work instructions as shown in Figure 7. Immediately thereafter, this sample is turned around so that the glued tape is facing down. In this position, the fiber cement board is placed with the protruding narrow sides on shorings of any height so that the tape is held only by the adhesive. For each test, a sample item is needed.

This is sample item stored during the test under standard conditions to DIN 50 014 at 23/50-2. The assessment takes place when the adhesive has reached its final strength after a minimum of 4 hours.



Total width = 100 mm

Adhesive area 20 mm

Movement zone

Fig. 7: Sample item, examination according to Section 9.1 - Early stress

9.2 Tear Behaviour

The test is carried out according to ISO 34-1, Method C.

The sample item needed for the test is stamped from the non-profiled movement zone of 100 mm wide Elastomeric Joint Tape parallel to the adhesive areas.

9.3 Tensile strength under Initial Load

The test is performed using a modified sample item and in accordance with DIN EN ISO 8340 with Method B.

For the test sample items are prepared using a standard 100 mm wide Elastomeric Joint Tape according to the manufacturer's processing instructions as shown in Fig. 8. For each system to be evaluated 6 sample items are needed.

3 sample items for testing at $(+23\pm 2)^{\circ}\text{C}$

3 sample items for testing at $(-20\pm 2)^{\circ}\text{C}$

After the testing the bonding has to be still in existence.

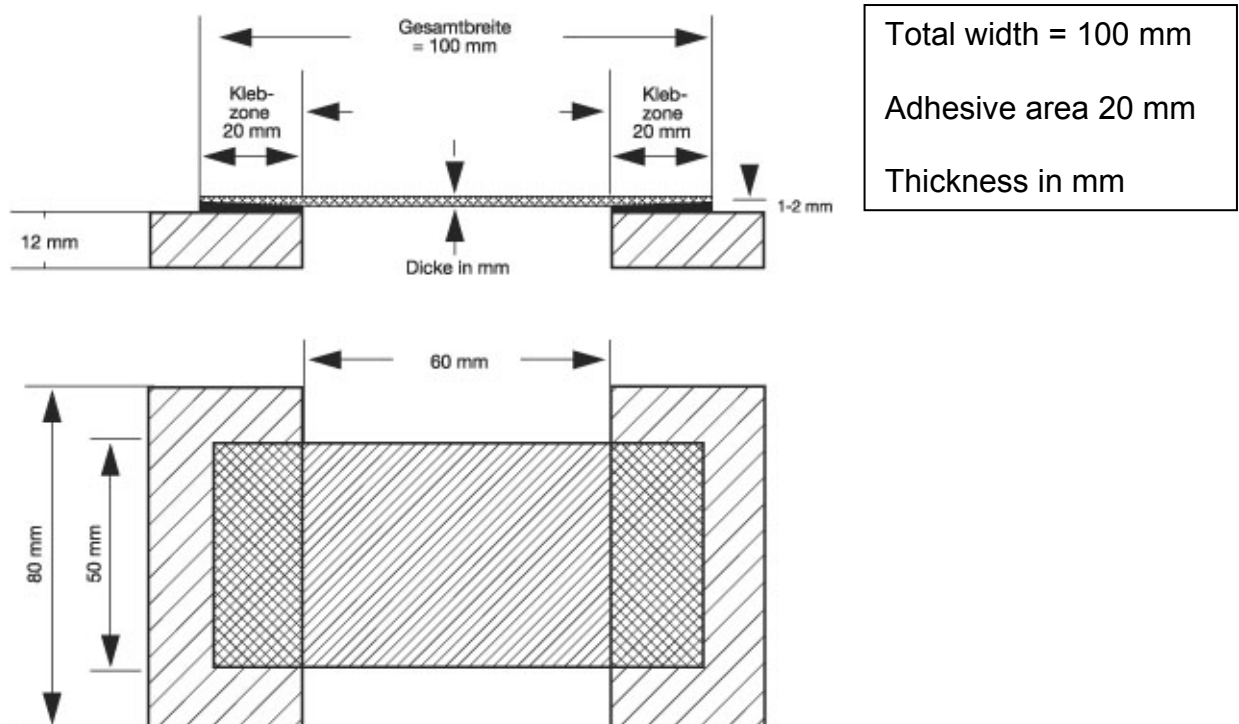


Fig. 8: Sample item, test according to Section 9.3 - Tensile strength -

9.4 UV-Resistance

The test is performed according to DIN 53 504 with standard rod S2. This is punched from the non-profiled movement zone of the Elastomeric Joint Tape to be tested parallel to the adhesive areas. For each joint tape to be tested 6 standard rods are needed.

3 standard rods without irradiation:

These are punched out of the non-irradiated tape.

They are stored until to the tensile test for at least 24 hours in standard reference atmosphere according to DIN 50 014 at 23/50-2.

3 standard rods with irradiation:

The tape, lying and unstretched is irradiated for 500 h with artificial light source described in DIN 52455-3 on the surface. Only after that the 3 standard rods are punched from the movement zone as described earlier.

All expansion tests are performed at $(+23 \pm 2) ^\circ\text{C}$. The standard rods are stretched at a feed rate of 5 - 6 mm/min up to $\geq 300\%$. During the test, a force extensometer chart is to be recorded.

9.5 Discolouration of adjacent Building Materials

The test is performed in accordance with DIN 52452-1 with prestorage V4. The material wedge needed for the test on the white cement testing area is prepared using the adhesive prescribed for the bonding. After the prestorage and before the start of the alternating storage the sample item should be checked for the first time on visual changes.

9.6 Paint compatibility

The test is performed in accordance with DIN 52452-4. For the test methodology A1 only the adhesive is needed, probably with the use of a primer. For the test methodology A2 the complete system is applied. In both cases, during the preparation of the sample items, the manufacturer's processing instructions are to be adhered to.

9.7 Paintability

The test is performed in accordance with DIN 52452-4. For the methodology to A3, the entire system is to be applied (see also Section 8.6).

9.8 Resilience

The test is performed in accordance with DIN EN ISO 7389 Method B with a modified sample item. Standard rods S2 according to DIN 53 504, Section 5 are used. For each joint tape to be tested at least 5 standard rods are needed. Before punching the standard rods from the unprofiled movement area of the joint tape to be tested the unstretched tape is exposed to the pre-treatment described in DIN EN ISO 7389 paragraph 3.4. After that follows the manual stretching of the punched standard rods. They are fixed to a base, e.g. wooden board, on one side, taking into account the work

instruction in DIN 53 504 Section 6.3 - Implementation of the tensile test. The standard rods are individually stretched 100 % by hand. Measurement takes place at a gauge Lo predrawn according to DIN 53 504 Section 5.1.2-standard rods. The so stretched standard rods are fixed to the base.

The remaining process commensurates with DIN ISO 7389.

9.9 Reaction to Fire

The test is performed according to DIN 4102-1 and supplement 1 to DIN 4102. For the test sample items are used in accordance with Section 9.3, which use the complete systems (joint tape, adhesive, primer and any other auxiliaries). The sample items are to be prestored in accordance with DIN EN ISO 8340 Method B.

10 Test Report

The Elastomeric Joint Tapes are tested by a material-test body upon compliance with the IVD Instruction Sheet No. 4.

The in-house quality control ensures consistent quality and compliance with the test report. The test report must, with regard to the IVD Instruction Sheet, include the following information:

Trade name and raw material base of the joint tape

Batch from which the sample was taken

Dimensions: Width and thickness of the joint tape in the movement zone, calculated from 3 individual measurements

Information on the adhesive and the possibly used primer

Any deviation from the specified load or the test sequence

11 Terms

See DIN 52 460, DIN EN 26 927 and IVD Instruction Sheet No. 2. Definitions not in DIN 52 460 and DIN EN 26 927:

Masking tape

Single-sided adhesive tape which covers areas that shall be kept free from contamination, e.g. with adhesive.

Movement area

The movement area is the portion of the Elastomeric Joint Tape that compensates movements in the joint area (see Fig.1). This zone must be free of adhesives.

Elastomeric Joint Tape

Industrially manufactured, elastic joint tape with a certain form continuous over the full length, made from e.g. polysulfide, silicone, polyurethane. The movement zone can be formed not profiled or profiled. It consists of the central non-profiled or profiled movement zone and two, adhesive areas in the respective outer zones. (see Fig. 1).

Joint area

The joint area comprises of the joint and the adjacent surface of the joint-forming components, which are used to affix the joint tape and is identical to the total width of the Elastomeric Joint Tape (see Fig. 1).

Joint tape-System

The joint tape-system comprises of all system components necessary for sealing:

Primer

Adhesive

Elastomeric Joint Tape

Adhesive area

The adhesive areas are the border areas of the Elastomeric Joint Tape to be bonded. The adhesive area is also the surface of the joint area, which will be in direct contact with the adhesive.

Adhesives

Adhesives are substances compatible with the Elastomeric Joint Tape and the substrate, which connect them by surface bonding (adhesion) and internal strength (cohesion) and which are used system-oriented.

Separating layer

The separating layer is a film or similar, which is applied between pre-existing sealing and the moving area of the Elastomeric Joint Tape to prevent contact between the old joint sealant and the newly affixed Elastomeric Joint Tape (see Fig. 4).

Pretreatment of the adhesive areas

Pretreatment of adhesive areas to achieve optimum strength and durability of the joint sealing. Adhesive area pretreatment e.g. includes mechanical removal of impurities, degreasing, application of primer or sealer.

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Previous versions are no longer valid. The latest version is available at www.abdichten.de

12 Reference List

DIN 50 014

Climates and their technical application; standard atmospheres
Beuth-Verlag GmbH, 10787 Berlin

IVD-Merkblatt Nr. 2

Classification of Sealants
IVD INDUSTRIEVERBAND DICHTSTOFFE E.V.

DIN 52 452-1

Testing of building sealants for compatibility with construction materials
Beuth-Verlag GmbH, 10787 Berlin

DIN 52 452-4

Testing of sealing compounds in building constructions - Compatibility of sealing products– Part 4: Compatibility with other protection coatings
Beuth-Verlag GmbH, 10787 Berlin

DIN 52 455-3

Testing of sealants in building construction - Adhesion and extension test - Part 3:
Influence of light through glass
Beuth-Verlag GmbH, 10787 Berlin

DIN 52 460

Sealing and Glazing; Terms
Beuth-Verlag GmbH, 10787 Berlin

DIN 53 504

Testing of rubber - determination of tensile strength at break, tensile stress at yield, elongation at break and stress values in a tensile test
Beuth-Verlag GmbH, 10787 Berlin

DIN EN 26 927

Building construction; jointing products; sealants; vocabulary
Beuth-Verlag GmbH, 10787 Berlin

DIN EN ISO 7389

Building construction - Jointing products - Determination of elastic recovery of sealants
Beuth-Verlag GmbH, 10787 Berlin

DIN EN ISO 8340

Building construction - Sealants - Determination of tensile properties at maintained extension
Beuth-Verlag GmbH, 10787 Berlin

ISO 34-1

Rubber, vulcanized or thermoplastic - Determination of tear strength - Part 1: Trouser, angle and crescent test pieces
Beuth-Verlag GmbH, 10787 Berlin

DIN EN ISO 11600

Building construction - Jointing products - Classification and requirements for sealants
Beuth-Verlag GmbH, 10787 Berlin

DIN 7865

Elastomeric-Waterstops for sealant of joints in concrete
Beuth-Verlag GmbH, 10787 Berlin

DIN 18541

Thermoplastic water stops for sealing joints in in-situ concrete
Beuth-Verlag GmbH, 10787 Berlin

DIN 4102-1

Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests
Beuth-Verlag GmbH, 10787 Berlin

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In addition, **all information** about the **joint-sealing** in the areas of **soil, facade, windows, sanitary** and **water construction**.

As well as the **IVD term search**, the entire **sealant online lexicon** and continuously **updated news** about the topic.

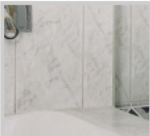
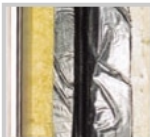
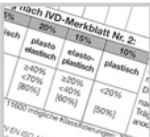
  

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