Tape and shrinkable materials for the corrosion protection of buried or underwater pipelines without cathodic protection for use at operating temperatures up to 50 °C

DIN 30672

ICS 23.040.99

Supersedes DIN 30672-1, September 1991 edition.

Organische Umhüllungen für den Korrosionsschutz von in Böden und Wässern verlegten Rohrleitungen für Dauerbetriebstemperaturen bis 50 °C ohne kathodischen Korrosionsschutz – Bänder und schrumpfende Materialien

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

This standard has been jointly prepared by *DIN Deutsches Institut für Normung* and *DVGW Deutscher Verein des Gas-und Wasserfaches e.V.* (German Associaton of Gas and Water Engineers) and has been adopted into the DVGW Codes of practice on gas and water.

Contents

References to DIN EN 12068 are to the March 1999 edition.

Foreword

DIN 30675-1 deals with corrosion protection for steel pipelines using coatings both with and without cathodic protection, while DIN 30675-2 deals with coatings for ductile cast iron pipelines. Both these standards provide for tape and shrinkable materials conforming to DIN 30672. Whereas coatings for buried and underwater steel pipelines with cathodic protection are now covered in DIN EN 12068, the present standard deals with coatings for steel pipelines without such protection.

Continued on pages 2 to 6.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

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Amendments

This standard differs from the September 1991 edition of DIN 30672-1 in that:

a) requirements for thickness, tensile strength and tensile strain at break are no longer included;

b) the required saponification number has been changed;

c) the required indentation hardness for stress classes A and B has been increased and the residual thickness is now the same for all types of material;

d) requirements for impact strength are more stringent;

e) requirements for peel strength have been amended;

f) the shear strength test has been extended to cover operating temperatures of up to 30 °C, except for petrolatum tapes of stress class B;

g) methods of test for determining the resistance of the substrate to ageing at elevated temperatures and the coating's freedom from pores are no longer included.

Previous editions

DIN 30672: 1976-09, 1979-08; DIN 30672-1: 1991-09.

1 Scope

This standard specifies requirements and test methods for coatings made from tape or shrinkable material and for repair patches for the corrosion protection of buried or underwater steel or ductile cast iron pipelines and intended for use at operating temperatures of up to 50 °C, without additional cathodic protection. The standard also specifies requirements for coated flexible socket joints.

NOTE: Use of this standard for materials designed for service temperatures above 50 °C is subject to agreement.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 2460	Steel water pipes
DIN 28603	Push-in joints in ductile iron pressure pipelines – Mating dimensions and mass
DIN 30675-1	External corrosion protection of buried pipes – Corrosion protection systems for steel pipes
DIN 30675-2	External corrosion protection of buried pipes – Corrosion protection systems for ductile iron pipes
DIN 50928	Testing and assessment of corrosion protection of coated metallic materials in contact with aqueous corrosive media
DIN EN 545	Ductile iron pipes, fittings, accessories and their joints for water pipelines – Requirements and test methods
DIN EN 598	Ductile iron pipes, fitting, accessories and their joints for sewerage application – Requirements and test methods
DIN EN 969	Ductile iron pipes, fittings, accessories and their joints for gas pipelines – Requirements and test methods
DIN EN 12068	External organic coatings for the corrosion protection of buried or immersed steel pipelines used in conjunction with cathodic protection – Tapes and shrinkable materials
DIN EN ISO 8044	Corrosion of metals and alloys – Basic terms and definitions (ISO 8044 : 1999)

DVGW-Geschäftsordnung für die nationale Zertifizierung von Produkten der Gas- und Wasserversorgung (DVGW rules of procedure for the certification of gas and water pipework) [1])

DVGW-Merkblatt (DVGW Code of practice) GW 14 *Ausbesserung von Fehlstellen in Korrosionsschutzumhüllungen von Rohren und Rohrleitungen aus Eisenwerkstoffen* (Repairing corrosion protection coatings (tape and sleeving) on steel pipes) [1])

[1]) Obtainable from *Wirtschafts- und Verlagsgesellschaft Gas und Wasser mbH*, Josef-Wirmer-Str. 1–3, 53123 Bonn, Germany.

3 Concepts

In addition to those specified in DIN 2460, DIN 50928, DIN EN 545, DIN EN 598, DIN EN 969, DIN EN 12068 and DIN EN ISO 8044, the following concepts apply.

3.1 Piping

System of pipes, fittings, valves and joint assemblies, intended for the transport of gaseous, liquid or solid substances.

3.2 Repair material

One or more layers of tape or heat-shrinkable material applied to repair faults in coatings on pipes, or heat-activated adhesive patches, used with primers or fillers as necessary (cf. DIN EN 12068 and *DVGW-Merkblatt* GW 14)

3.3 Flexible socket joint

Joint between two pipes or fittings with a seal, allowing deflection and axial offset; designated by M.

4 Classification and designation

4.1 Classification

Coatings as covered in this standard are classified into mechanical resistance classes, A, B and C, and maximum continuous operating temperature (i.e. service temperature) classes 30 and 50 (cf. DIN EN 12068).

4.2 Designation

Designation of a coating conforming to this standard, having class B mechanical resistance, for use at service temperatures up to 30 °C:

Coating DIN 30672 – B 30

Designation of a coating conforming to this standard, having class C mechanical resistance, for use at service temperatures up to 50 °C:

Coating DIN 30672 – C 50

Designation of a coating conforming to this standard, having class B mechanical resistance, for use at service temperatures up to 30 °C (Class 30), and for use with a flexible socket joint (M):

Coating DIN 30672 – B 30 M

5 Requirements

5.1 General requirements

Coatings shall fulfil the requirements set out in tables 1 and 2 of DIN EN 12068, allowing for the following modifications to table 1 for coatings without cathodic protection:

– for mechanical resistance class C, only the third column applies;

– the requirements set out in tables 1 and 2 of DIN EN 12068 do not apply for repair material used in close proximity to filler material used for padding.

5.2 Further requirements

5.2.1 Basic materials

5.2.1.1 Petrolatum tape

The use of petrolatum tape is only permitted if it is covered on one side with plastic film.

5.2.1.2 Primers, fillers, coating materials, backing of corrosion protection tape and shrinkable materials

The saponification number of primers, fillers, coating materials and backing of tape, and shrinkable material shall be no greater than 25 mg KOH per gram of initial mass. The coating material and backing shall fulfil this requirement independently of each other. In the case of primers, this requirement applies for the dry mass. If the backing of corrosion protection tape and shrinkable material does not fulfil this requirement when tested as in subclause 6.2.2, they shall be considered as complying with this standard if the requirements set out in subclause 5.2.1.3 are fulfilled.

NOTE: The saponification number requirement will remain valid until the microbial resistance requirements set out in Annex M of DIN EN 12068 have been specified.

5.2.1.3 Corrosion protection tape and shrinkable material

If the backing of tape and shrinkable material does not fulfil the requirements set out in subclause 5.2.1.2, it shall be resistant to sodium hydroxide. This requirement shall be considered to be fulfilled if, following conditioning in water and sodium hydroxide solution at 50 °C for 100 days:

a) when testing unreinforced tape and shrinkable material as in subclause 6.2.3, the E_{NaOH}/E_{H_2O} and the S_{NaOH}/S_{H_2O} ratios are from 0,75 to 1,25;

b) when testing reinforced material as in subclause 6.2.3, the B_{NaOH}/B_{H_2O} ratio is from 0,75 to 1,25;

c) when testing as in Annex A of DIN EN 12068, the ratio of values determined after 100-day exposure to those determined after 70-day exposure is not less than 0,8.

5.2.2 Coating

5.2.2.1 Repair patches

When tested as in subclause 6.3.1, the lap shear strength shall be at least 0,25 N/mm^2.

5.2.2.2 Coatings for flexible socket joints

Coatings for flexible socket joints shall fulfil the requirements for specific electrical insulation resistance*) (class C) as given in table 1 of DIN EN 12068, when tested as in subclause 6.3.2.

6 Testing

6.1 General requirements

Testing shall be carried out in accordance with Annexes A to Q of DIN EN 12068, omitting the test for indentation resistance using a high voltage detector (cf. Annex G of DIN EN 12068).

6.2 Further requirements

6.2.1 Petrolatum tape

Tape shall be inspected for the presence of plastic film on one side.

6.2.2 Saponification number

Testing shall be carried out as in Annex L of DIN EN 12068.

6.2.3 Resistance to sodium hydroxide solution

Ten specimens, prepared as specified in Annex A of DIN EN 12068 shall be suspended freely at (50 ± 2) °C in distilled or deionized water and in 0,1 mol/l sodium hydroxide solution.

After 70 and 100 days five specimens shall be removed, rinsed with distilled or deionized water and suspended in distilled or deionized water for 24 hours at (23 ± 2) °C. The specimens shall then be conditioned for at least 48 hours in air at a temperature of (23 ± 2) °C before testing their tape strength, elongation at break and bursting strength as in Annex A of DIN EN 12068.

In the case of tape and shrinkable material without reinforcement, the resistance index for elongation at break, Q_E, shall be calculated as follows:

$$Q_E = E_{NaOH}/E_{H_2O}$$

In the case of tape and shrinkable material without reinforcement, the resistance index for tape strength, Q_S, shall be calculated as follows:

$$Q_S = S_{NaOH}/S_{H_2O}$$

In the case of tape and shrinkable material with reinforcement, the resistance index for bursting strength, Q_B, shall be calculated as follows:

$$Q_B = B_{NaOH}/B_{H_2O}$$

where, in the above equations:

E_{NaOH} is the elongation at break after conditioning in sodium hydroxide solution, as a percentage;
E_{H_2O} is the elongation at break after conditioning in water, as a percentage;
S_{NaOH} is the tape strength after conditioning in sodium hydroxide solution, in N/mm width;
S_{H_2O} is the tape strength after conditioning in water, in N/mm width;
B_{NaOH} is the bursting strength after conditioning in sodium hydroxide solution, in newtons;
B_{H_2O} is the bursting strength after conditioning in water, in newtons.

6.3 Further requirements

6.3.1 Shear resistance of repair patches

Testing shall be carried out at a temperature of (50 ± 2) °C as in Annex D of DIN EN 12068.

The shear resistance of repair patches made from corrosion protection tape shall be tested as in subclause D.1 of DIN EN 12068. Hot-workable material shall be tested as in subclause D.2 of DIN EN 12068.

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*) Translator's note. By which is meant the resistivity of the coating.

6.3.2 Specific electrical insulation resistance of coated flexible socket joints

Specimens shall be three joint assemblies of size DN 100 pipes with a type B socket joint as in subclause 3.2.1 of DIN 28603 (i.e. with a socket depth of (115 ± 10) mm), with the pipe sections joined so that they are conductive. The specimens shall be provided with a coating as specified by the manufacturer and then conditioned, with the joint in its working position, at (23 ± 2) °C for 24 hours.

At a rate of 10 mm per minute, pull the joint assembly 30 mm apart and then push the pipe sections back in to a point 30 mm beyond the original position. Carry out this procedure ten times in all, finally returning the assembly to its original position.

The assembly shall then be deflected by 3° five times in both directions at a rate of 1° per minute.

After returning the assembly to its original position, determine the specific electrical insulation resistance over a period of 100 days as in Annex J of DIN EN 12068.

7 Certification and quality assurance

7.1 Certification

Certification and marking of corrosion protection material with the DIN-DVGW-test mark shall be undertaken in accordance with the *DVGW-Geschäftsordnung für die nationale Zertifizierung von Produkten der Gas- und Wasserversorgung*.

7.2 Conformity assessment and quality assurance

Conformity assessment (type testing) and quality assurance shall be in accordance with DIN EN 12068.

Internal control testing shall be carried out as specified in table 1. Third-party inspection of certified products shall be carried out in accordance with the *DVGW-Geschäftsordnung für die nationale Zertifizierung von Produkten der Gas- und Wasserversorgung*.

Table 1: Scope and frequency of testing

Product	Minimum frequency of testing	Property to be checked
Petrolatum tape	Once a day Once every three months Once every three months Once every three months	Thickness, or mass per unit area Indentation resistance Impact resistance Drip resistance
Bitumen tape	Once a day Once every three months Once every three months Once every three months	Thickness, or mass per unit area Peel strength (coating/pipe surface) Indentation resistance Impact resistance
Synthetic tape	Once a day Once a day Once a day Once every three months Once every three months Once every three months	Tensile strength, elongation at break, modulus at 10 % elongation Thickness Peel strength (layer to layer) Peel strength (coating/pipe surface) Indentation resistance Impact resistance
Shrinkable material	Once a day Once a day Once a day Once a day Once every three months Once every three months Once a day	Tensile strength, elongation at break, modulus at 10 % elongation Thickness Peel strength layer to layer for tape or peel strength (coating/pipe surface) Shrinkage Indentation resistance Impact resistance Shear strength
Primers	Once a day	Consistency/viscosity, solid matter content or density
Repair patches	Once a day Once a day Once a day Once a day	Tensile strength, elongation at break, modulus at 10 % elongation Thickness Peel strength (coating/pipe surface) Shear strength

Other test methods may be used if they yield similar results.

Other relevant standards

DIN 28601 Screwed socket joint assemblies for gas and water ductile iron pressure pipelines – Assembly and components

DIN 28602 Bolted-gland joint assemblies for gas and water ductile iron pressure pipelines – Assembly and components

DIN 30670 Polyethylene coatings for steel pipes and fittings – Requirements and testing

DIN 30671 Thermoset plastic coatings for buried steel pipes

DIN 30673 Bitumen coatings and linings for steel pipes, fittings and vessels

DIN 30674-1 Polyethylene coatings for ductile iron pipes – Requirements and testing

DIN 30674-2 Cement mortar coatings for ductile iron pipes – Requirements and testing

DIN 30677-1 External corrosion protection of buried valves – Normal duty thermoset plastic coatings

DIN 30677-2 External corrosion protection of buried valves – Heavy-duty thermoset plastic coatings

DIN 30678 Polypropylene coatings for steel pipes

DIN 50929-2 Probability of corrosion of metallic materials when subject to corrosion from the outside – Service components inside buildings

DIN 50929-3 Probability of corrosion of metallic materials when subject to corrosion from the outside – Buried and underwater pipelines and structural components

DIN EN 805 Water supply – Requirements for external systems and components