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Drinking water supply systems
Prevention of corrosion and scaling
(DVGW Code of practice)

DIN 1988 Part 7

Technische Regeln für Trinkwasser-Installationen (TRWI);
Vermeidung von Korrosionsschäden und Steinbildung
(Technische Regel des DVGW)

This standard, together with DIN 1988 Parts 1 to 6, and Part 8, December 1988 editions, supersedes DIN 1988, January 1962 edition.

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 prepared in agreement with *DVGW Deutscher Verein des Gas- und Wasserfaches e.V.* (German Society of Gas and Water Engineers). It has been included in the body of DVGW Codes of practice for water.

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1 Scope and field of application

This standard, in conjunction with DIN 1988 Parts 1 to 6 and Part 8, applies to drinking water supply systems inside buildings and their curtilages ('supply systems', for short). It is intended to minimize the risk of corrosion damage and scaling in such systems by providing information for designers and installers with regard to the design, installation and operation of water supply systems and to the materials to be used.

Corrosion of any type is a natural phenomenon which does not necessarily lead to damage (cf. DIN 50900 Part 1).

Corrosion occurs in water supply systems as a result of the interaction of water, material and product surface, operating and installation conditions.

The assessment of corrosion damage requires sound knowledge and experience (cf. DIN 50930 Part 1 and Parts 3 to 5).

2 Concepts

For the purposes of this standard, the definitions set out in DIN 50900 Part 1, DIN 4046, DIN 50929 Parts 1 and 2 and DIN 50930 Part 1 and Parts 3 to 5 shall apply.

3 Prevention of internal corrosion

3.1 System design

To minimize the risk of corrosion damage, the following shall be taken into account in system design.

a) The selection of pipe materials shall be based on the specifications given in subclauses 3.2 and 3.3.

b) The components and appliances to be used shall comply with product standards (cf. DIN 1988 Part 2). Where no such standards or codes of practice exist, only those products shall be used for which proof of suitability, including adequate corrosion protection, has been provided.

c) It shall be checked whether and to what extent treatment of cold or hot drinking water is required (cf. subclause 3.5 and and clause 4), with due consideration being given to the materials used.

Note. The effectiveness of water treated to prevent corrosion shall be assessed on the basis of observations made on removable pipe sections, not less than 0,5 m in length, of the same material and having the same properties as the pipes used in the system, and installed as part of the system.

d) The pipes shall be routed so as to ensure regular renewal of the water under normal service conditions.

e) Water heaters shall be selected giving due consideration to the requirements specified in DIN 4753 Parts 1 to 7 and Parts 9 and 10 with regard to materials and corrosion protection.

f) The temperature of the water in (hot-dip) galvanized steel pipes shall not be higher than 60 °C.

The flow velocity in hot water circulating pipes shall not be higher than 0,5 m/s (cf. DIN 1988 Part 3).

3.2 Selection of materials

The designer should preferably refer to any practical experience gained with regard to the particular water supplied. If no such experience is available, the designer shall contact the responsible water supplier in order to obtain data permitting assessment, in accordance with DIN 50930 Parts 3, 4 and 5, of the corrosion behaviour of the materials that will be in contact with the water supplied.

Furthermore, the water supplier shall be consulted with regard to the use of certain materials and to any expected changes in supply conditions or water composition as described in *DVGW-Arbeitsblatt* (DVGW Instruction sheet) W 216.

The information on the water quality to be provided by the water supplier (cf. subclause 2.3 of DIN 1988 Part 1) shall be regarded as a guidance only. In the actual selection of materials, additional factors influencing the corrosion behaviour (e.g. natural inhibitors) shall be considered.

3.3 Composite systems

In supply systems consisting of galvanized steel pipes, the use of dissimilar metals is practically inevitable, since valves, fittings, etc. are made predominantly from copper alloys; however, this is accepted practice and thus permitted.

3.3.1 Contact corrosion

Contact corrosion may occur at or near the points of contact between galvanized ferrous materials and copper alloys, the risk of corrosion damage being a function of the water quality (cf. DIN 50 930 Part 3). An increased risk of contact corrosion is likely where

a) the ratio $\dfrac{\dfrac{c(Cl^-)}{35{,}5} + \dfrac{c(SO_4^{2-})}{48}}{K_{S4,3}}$

is more than 3, or

b) the acid capacity, $K_{S4,3}$, is less than 1, or

c) the pH value is less than 7.

In the above equation

$c(Cl^-)$ is the chloride ion concentration, in mg/l;

$c(SO_4^{2-})$ is the sulfate ion concentration, in mg/l;

$K_{S4,3}$ is the acid capacity up to pH value 4,3, in mmol/l.

Where, in composite systems, stainless steel is used with copper or copper alloys, neither material is susceptible to contact corrosion, but galvanized ferrous materials are when in contact with stainless steel.

Note. The extent of contact corrosion may be reduced by installing a copper alloy component (e.g. a stop-valve) between a stainless steel pipe and a galvanized steel pipe.

3.3.2 Copper-induced pitting corrosion

In supply systems, components and appliances with copper surfaces likely to come into contact with water shall not be located upstream of galvanized steel parts (cf. DIN 50930 Part 3), except where such surfaces are tinned and nickel-plated.

Experience has shown that, when copper fittings as specified in DIN 1988 Parts 2 and 4 are installed upstream of galvanized steel parts, they do not corrode to such an extent as to present a health hazard. However, there is an increased risk of pitting corrosion where an excessive number of copper parts is used in the system (cf. DIN 50930 Part 3).

Recirculation of water from pipes, components and appliances made of copper into pipe sections made of galvanized steel shall be prevented by appropriate measures (e.g. by providing expansion loops, gravity breaks or check valves).

Stainless steel parts are not susceptible to copper-induced pitting corrosion.

3.4 Work on site

3.4.1 Inspection

Where product standards exist, only components which comply with such standards shall be installed. The pipes used shall be subject to third party inspection, this being indicated by a test mark.

Prior to installation, the marking of components shall be inspected for compliance with the requirements specified in the relevant standards or codes of practice (cf. Supplement 1 to DIN 1988 Part 2).

3.4.2 Storage

All components shall be stored so as to prevent contamination of their inside (cf. subclause 2.3 of DIN 1988 Part 2). Before assembly, all piping and fittings shall be cleaned internally and any loose particles (e.g. sand, soil, metal filings, chips) removed. Care shall be taken to prevent the ingress of contaminants during assembly. Should foreign substances nonetheless enter the system during assembly, these shall be removed by flushing with filtered water (cf. subclause 3.7). Filters complying with DIN 19632 shall be installed to prevent solid matter from entering the system.

3.4.3 Jointing of galvanized steel pipes

After pipes have been cut to length, the inner cut faces shall be deburred. Thread cutting emulsions shall meet the requirements specified in *DVGW-Arbeitsblatt* W 521. Such emulsions are water-soluble, free from petroleum products, and their packaging bears the DVGW test mark and registration number. Where adjustable dies are used to cut tapered pipe threads, the dies shall be set to the specified nominal thread size. Pipes and fittings shall be screwed together over their effective thread length, with allowance being made for the tolerances specified in DIN 2999 Part 1. Thread sealants shall comply with the requirements specified in DIN 30660, and their packaging shall bear the DIN/DVGW test mark and registration number.

For brazing, L-CuZn 40 and L-CuZn 39 Sn brazing alloys complying with DIN 8513 Part 1 and F-SH 2 type fluxes complying with DIN 8511 Part 1 shall be used.

3.4.4 Jointing of copper pipes

Copper pipes shall be jointed as specified in *DVGW-Arbeitsblatt* GW 2.

3.4.5 Jointing of stainless steel pipes

Brazing and soldering of stainless steel pipes used in domestic installations is not permitted. Welded joints shall be made by inert gas welding (cf. DIN 50930 Part 4), taking care to prevent the access of oxygen.

The manufacturer's instructions shall be followed when making mechanical joints in stainless steel pipes.

3.5 Water treatment

If the designer cannot state with certainty that the risk of damage no longer exists despite the above specifications having been complied with, he shall see whether this risk can be reduced by taking one of the following measures.

a) Addition of alkaline substances

The addition of alkaline substances to water reduces its carbon dioxide concentration and increases its pH value. In the case of galvanized steel pipes, this leads to a reduction in the corrosion rate (cf. DIN 50930 Part 3). In copper pipes, this measure can stop type 2 pitting corrosion and reduce copper solubility.

Where the particular water has a low pH value and high content of calcium carbonate and hydrogen carbonate ions, an increase in the pH value to improve corrosion protection of galvanized steel systems is not always possible since it causes the water to become calcifying. Softening the water and adjusting the calcium ion concentration to approximately 1,5 mol/m^3, however, allows the pH value to be increased by the addition of alkaline substances, without causing the precipitation of calcium carbonate, provided that small quantities of polyphosphates are added at the same time.

b) Addition of orthophosphates

The addition of orthophosphates to a water reduces the risk of corrosion owing to a protective film forming on galvanized ferrous materials.

c) Addition of polyphosphates

In addition to reducing the risk of scaling as described in clause 4, polyphosphates dissolved in hot water degrade to orthophosphates, thus enabling the risk of corrosion to be reduced owing to a protective film forming on galvanized ferrous materials.

The manufacturer of the dosing apparatus shall be responsible for providing recommendations on the selection of dosing agents as a function of water quality, the materials used in the system and the service conditions.

Note. Experience gained with the use of dosing agents in new systems cannot be applied to existing pipework damaged by corrosion.

3.6 Cathodic protection

In water supply systems, only storage water heaters are provided with cathodic protection (cf. DIN 4753 Part 10).

The use of cathodic protection requires particular attention to be paid to the manufacturer's instructions in respect of design, installation operation and maintenance of the supply system.

3.7 Completion of installation work

To minimize the risk of corrosion, the pipework shall be flushed as soon as possible after pressure testing, as specified in DIN 1988 Part 2, and the system operated and inspected as specified in DIN 1988 Part 8.

4 Prevention of scaling

The tendency of water to precipitate calcium carbonate increases in direct proportion to the service temperature (i.e. scaling almost never occurs in cold water pipes). For this reason, the method used for water heating shall be consistent with the local water quality (e.g. hardness) and the intended operating conditions of the supply system.

4.1 Reduction in temperature

If it is known that scaling is likely, given the water heating system, local water quality and operating conditions, the temperature may be reduced or water heaters with a large effective heating surface used.

4.2 Water treatment

Where the measures specified in subclause 4.1 are inadequate for the water concerned, the water may be treated as described in subclauses 4.2.1 and 4.2.2.

The manufacturer of the water treatment equipment shall be responsible for providing recommendations on the selection of the treatment measures as a function of water quality, the materials used in the system and the service conditions.

4.2.1 Addition of polyphosphates

The addition of polyphosphates to a water prevents scaling. However, if the water remains in the water heater at temperatures exceeding 60 °C for prolonged periods, and if the water has a marked tendency to precipitate calcium carbonate, the use of polyphosphates is frequently ineffective.

4.2.2 Softening by ion exchange

Scaling may be prevented by softening the water, which means that the calcium ions are replaced by sodium ions by means of a cation exchanger. Water softening is not a corrosion protective measure.

Note. The corrosion behaviour of copper, galvanized steel and stainless steel pipes is generally not affected by softening treatments. However, total softening may result in the water in galvanized steel pipes turning brown and water in copper pipes turning green (cf. subclause 3.5 for preventive measures).

4.3 Recommendations for water treatment

The type of water treatment for water heaters shall be selected, in accordance with table 1, as a function of the calcium ion concentration in the cold water and the mean hot water temperature, ϑ.

5 Prevention of external corrosion

The most significant source of damage caused by external corrosion is the contact of external metallic surfaces with water (cf. DIN 50929 Parts 1 to 3).

5.1 Buried pipework

To prevent damage due to external corrosion, buried pipework shall be protected in accordance with subclauses 5.1.1 to 5.1.5.

5.1.1 Steel pipes

The following types of coating are suitable for the protection of steel pipes.

a) DIN 30670 polyethylene coating;

b) DIN 30673 bitumen coating;

c) DIN 30671 epoxy resin coating;

d) DIN 30671 polyurethane-tar coating.

The recommendations on the application of such coatings as given in DIN 30675 Part 1 shall be observed.

Service pipes may be provided with cathodic protection in accordance with DIN 30676, if they are separated from the installed pipework by a DIN 3389 – W isolating joint bearing the DVGW test mark (cf. subclause 3.4.1.8 of DIN 1988 Part 2).

5.1.2 Ductile cast iron pipes

The following types of coating are suitable for the protection of ductile cast iron pipes:

a) DIN 30674 polyethylene coating;

b) DIN 30674 cement mortar coating;

c) DIN 30674 zinc coating with protective covering;

d) DIN 30674 bitumen coating;

e) DIN 30674 polyethylene sleeving.

The recommendations for application given in DIN 30675 Part 2 shall be observed.

5.1.3 Copper pipes

Copper pipes shall be given a plastics coating to avoid cell formation (cf. DIN 50929 Part 3).

In the factory, copper pipes shall be provided with a plastics coating which meets the requirements for quality class B as specified in DIN 30672.

Note. Since there is no standard specifying requirements and test methods for plastics coating on buried copper pipes, the requirements for quality class B coatings regarding freedom from imperfections, coating resistivity, indentation resistance, impact strength, elongation at break and tensile strength specified in DIN 30672 shall be complied with.

Buried copper pipes shall be protected against mechanical damage.

5.1.4 On-site protection

For on-site protection of pipes and fittings, anti-corrosive tapes and heat-shrink sleeving, which satisfy the requirements for the following quality classes as defined in DIN 30672, shall be used:

a) quality class C for steel pipes;

b) quality classes B and C for ductile cast iron pressure pipes;

c) quality class A for copper pipes laid in non-corrosive soil, or B for those laid in corrosive soil;

d) quality classes A and B for valves, joints and fittings (heat- shrink sleeving may also belong to quality class C), irrespective of their material.

Note: Use of stainless steel for buried pipework is not accepted practice.

Table 1. **Type of water treatment as a function of calcium ion concentration and temperature**

Calcium ion concentration, in mg/l	Treatment at ϑ not exceeding 60 °C	Treatment at ϑ above 60 °C
Less than 80 (corresponding to hardness levels 1 and 2) *)	None	None
80 to 120 (corresponding to hardness level 3) *)	None or stabilization **), or softening	None or stabilization **), or softening
> 120 (approximately equal to hardness level 4) *)	None or stabilization **), or softening	Stabilization or softening

*) See article 7 of the *Waschmittelgesetz* (German Detergents Law).
**) E.g. addition of polyphosphate (cf. subclause 4.2.1).
Note. Cf. clause 8 of DIN 1988 Part 2, December 1988 edition.

5.1.5 Electrical insulation

To avoid the formation of corrosion cells between impressed current cathodes (e.g. reinforced concrete foundations) and buried metal pipes forming an electrical connection with these, each metal pipe shall be provided with a DIN 3389 – W isolating joint both before leaving one building and after entering another (cf. subclause 3.4.1.8 of DIN 1988 Part 2).

5.2 Exposed pipework

Exposed pipework shall be protected as specified in subclause 5.1. In addition, adequate protection against mechanical damage and frost shall be provided.

Steel pipes may, as an alternative, also be provided with a zinc coating or corrosion protection complying with DIN 55 928 Parts 1 to 7 and Part 9.

Any anti-corrosive tapes and heat-shrink sleeving used for the protection of valves, joints and fittings shall meet the requirements for quality classes B and C as specified in DIN 30 672.

5.3 Pipework inside buildings

Measures shall be taken on site to prevent pipework from coming into contact with moisture over prolonged periods (cf. DIN 18 195 Parts 1 to 6 and Parts 8 to 10). Pipework installed in damp rooms shall be insulated against moisture.

Where galvanized steel pipes are laid on concrete floors, sheeting, approximately 1 m wide, shall be placed between pipe and floor in addition to providing the pipe with a coating as specified in subclause 5.1.

Thermal insulation of copper pipes shall be free from nitrites, its content by mass of ammonia not exceeding 0,2%. [1] The content by mass of water-soluble chloride ions in insulating material used for stainless steel pipes shall not exceed 0,05% (cf. *AGI-Arbeitsblätter* (AGI Instruction sheets) Q 15 and Q 135).

Where galvanized steel pipes are laid in floor channels, measures shall be taken on site to ensure that such channels are protected against the ingress of water and flooding, or can be vented and reliably drained. The accumulation of moisture in excess of normal construction moisture shall be avoided.

Where a protective coating is required, this shall be applied in a thick layer, be free from pinholes and damage and shall be sufficiently resistant to heat and ageing.

Where pipes are laid on or in walls, corrosion protection is generally not necessary.

Where concealed galvanized steel pipes are locally fixed using gypsum plaster, the pipes shall be protected at the fixing points using anti-corrosive tape or film.

Note. For concealing of cold and hot water galvanized steel pipes and hot water stainless steel pipes, the plaster used shall contain only additives that have been granted a building inspectorate approval and marked accordingly.

Stainless steel pipes carrying hot water are resistant for only a few days to pitting corrosion and stress-corrosion cracking when laid in damp construction material containing chlorides. However, when exposed to such material over prolonged periods with the pipe wall temperature exceeding 45 °C, such a corrosion damage cannot be precluded.

Standards and other documents referred to

DIN 1988 Part 1	Drinking water supply systems; general (DVGW Code of practice)
DIN 1988 Part 2	Drinking water supply systems; materials, components, appliances, design and installation (DVGW Code of practice)
Supplement 1 to DIN 1988 Part 2	Drinking water supply systems; summary of standards and other technical rules relating to materials, components and appliances (DVGW Code of practice)
DIN 1988 Part 3	Drinking water supply systems; pipe sizing (DVGW Code of practice)
Supplement 1 to DIN 1988 Part 3	Drinking water supply systems; pipe sizing; examples of calculation (DVGW Code of practice)
DIN 1988 Part 4	Drinking water supply systems; drinking water protection and drinking water quality control (DVGW Code of practice)
DIN 1988 Part 5	Drinking water supply systems; pressure boosting and reduction (DVGW Code of practice)
DIN 1988 Part 6	Drinking water supply systems; fire fighting installations (DVGW Code of practice)
DIN 1988 Part 8	Drinking water supply systems; operation (DVGW Code of practice)
DIN 2999 Part 1	Pipe threads for tubes and fittings; parallel internal threads and taper external threads; thread dimensions
DIN 3389	Isolating joints for gas and water service pipes; requirements and testing
DIN 4046	Water supply; terminology (DVGW Code of practice)
DIN 4753 Part 1	Hot water supply systems for drinking water and service water; design, equipment and testing
DIN 4753 Part 2	Hot water supply systems for drinking water and service water; certification procedure
DIN 4753 Part 3	Hot water supply systems for drinking water and service water; corrosion protection on the water side by enamelling; requirements and testing
DIN 4753 Part 4	Hot water supply systems for drinking water and service water; corrosion protection on the water side by means of thermosetting resin bonded lining materials; requirements and testing
DIN 4753 Part 5	Hot water supply systems for drinking water and service water; corrosion protection on the water side by natural or synthetic rubber coatings; requirements and testing
DIN 4753 Part 6	Hot water supply systems for drinking water and service water; cathodic corrosion protection of enamelled steel vessels; requirements and testing

DIN 4753 Part 7	Hot water supply systems for drinking water and service water; corrosion protection on the water side by corrosion-resistant metallic materials; requirements and testing
DIN 4753 Part 9	Hot water supply systems for drinking water and service water; corrosion protection on the water side by thermoplastic coatings; requirements and testing
DIN 4753 Part 10	Hot water supply systems for drinking water and service water; cathodic corrosion protection for uncoated steel vessels; requirements and testing
DIN 8511 Part 1	Fluxes for soldering and brazing metallic materials; brazing fluxes
DIN 8513 Part 1	Hard solders; brazing copper alloys; composition, application and technical delivery conditions
DIN 18 195 Part 1	Waterproofing of buildings and structures; general and terminology
DIN 18 195 Part 2	Waterproofing of buildings and structures; materials
DIN 18 195 Part 3	Waterproofing of buildings and structures; processing of materials
DIN 18 195 Part 4	Waterproofing of buildings and structures; damp-proofing against moisture from the ground; design and workmanship
DIN 18 195 Part 5	Waterproofing of buildings and structures; waterproofing against water that exerts no hydrostatic pressure; design and workmanship
DIN 18 195 Part 6	Waterproofing of buildings and structures; waterproofing against water that exerts hydrostatic pressure from the outside; design and workmanship
DIN 18 195 Part 8	Waterproofing of buildings and structures; waterproofing over movement joints
DIN 18 195 Part 9	Waterproofing of buildings and structures; penetrations, transitions and closures
DIN 18 195 Part 10	Waterproofing of buildings and structures; protective layers and protective measures
DIN 19 632	Mechanical filters for drinking water supply systems; requirements and testing (DVGW Code of practice)
DIN 30 660	Sealants for gas and water applications; plastic sealants for metal threaded pipes in domestic installations
DIN 30 670	Coating of steel pipes and fittings with polyethylene
DIN 30 671	Coating of buried steel pipes with thermosetting plastics
DIN 30 672	Coating of buried pipes with anti-corrosive tape and heat-shrink sleeving
DIN 30 673	Coating and lining of steel pipes, fittings and vessels with bitumen
DIN 30 674 Part 1	Coating of ductile iron pipes with polyethylene
DIN 30 674 Part 2	Coating of ductile iron pipes with cement mortar
DIN 30 674 Part 3	Coating of ductile iron pipes; zinc coating with protective covering
DIN 30 674 Part 4	Coating of ductile iron pipes with bitumen
DIN 30 674 Part 5	Coating of ductile iron pipes with polyethylene sheeting
DIN 30 675 Part 1	External corrosion protection of buried pipes; protection of steel pipes
DIN 30 675 Part 2	External corrosion protection of buried pipes; protection of ductile cast iron pipelines
DIN 30 676	Design and application of cathodic corrosion protection of external surfaces
DIN 50 900 Part 1	Corrosion of metals; general concepts
DIN 50 929 Part 1	Probability of corrosion of metallic materials when subject to corrosion from the outside; general
DIN 50 929 Part 2	Probability of corrosion of metallic materials when subject to corrosion from the outside; service components inside buildings
DIN 50 929 Part 3	Probability of corrosion of metallic materials when subject to corrosion from the outside; buried and underwater pipes and structural components
DIN 50 930 Part 1	Corrosion behaviour of metallic materials in contact with water; general
DIN 50 930 Part 3	Corrosion behaviour of metallic materials in contact with water; assessment criteria for hot dip galvanized ferrous materials
DIN 50 930 Part 4	Corrosion behaviour of metallic materials in contact with water; assessment criteria for stainless steel
DIN 50 930 Part 5	Corrosion behaviour of metallic materials in contact with water; assessment criteria for copper and copper alloys
DIN 55 928 Part 1	Corrosion protection of steel structures by the application of organic or metallic coatings; general, concepts and corrosion loads
DIN 55 928 Part 2	Corrosion protection of steel structures by the application of organic or metallic coatings; designing for the prevention of corrosion
DIN 55 928 Part 3	Corrosion protection of steel structures by the application of organic or metallic coatings; planning of corrosion protection work
DIN 55 928 Part 4	Corrosion protection of steel structures by the application of organic or metallic coatings; preparation and testing of surfaces
DIN 55 928 Part 5	Corrosion protection of steel structures by the application of organic and metallic coatings; coating materials and protective systems
DIN 55 928 Part 6	Corrosion protection of steel structures by the application of organic and metallic coatings; execution and inspection of corrosion protection work

DIN 55 928 Part 7 Corrosion protection of steel structures by the application of organic or metallic coatings; reference areas

DIN 55 928 Part 9 Corrosion protection of steel structures by the application of organic or metallic coatings; composition of binders and pigments for coating materials

DVGW-Arbeitsblatt W 216[1]) *Versorgung mit unterschiedlichen Wässern* (Supply with various types of water)

DVGW-Arbeitsblatt W 521[1]) *Gewindeschneidmittel; Anforderungen und Prüfung* (Thread cutting emulsions; requirements and testing)

DVGW-Arbeitsblatt GW 2[1]) *Verbinden von Kupferrohren für die Gas- und Wasserinstallation innerhalb von Grundstücken und Gebäuden* (Jointing of copper pipes for domestic gas and water supply systems)

AGI-Arbeitsblatt Q 15[1]) *Voraussetzungen für Dämmarbeiten* (Conditions for insulation work)

AGI-Arbeitsblatt Q 135[1]) *Dämmarbeiten; Bestimmung von wasserlöslichen Chloriden in Mineralfaserdämmstoffen* (Determination of the water-soluble chlorides content of mineral fibre insulating materials)

Waschmittelgesetz, as of 20 August 1975, *BGBl.* (German Federal Law Gazette) I, p. 2255

[1] *Bestimmung von extrahierbarem Ammonium und Nitrit in Dämmstoffen* (Determination of the extractible ammonia and nitrite content of insulating materials), *gwf-wasser/abwasser*, 1985: **126** (9), p. 498.

Other relevant standards

DIN 2000 Central drinking water supply; basic requirements for drinking water; design, construction and operation of systems

DIN 19 635 Dosing apparatus for drinking water treatment; operation; requirements and testing (DVGW Code of practice)

DIN 19 636 Water softeners for use in drinking water supply systems; requirements, testing and operation (DVGW Code of practice)

Previous editions

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Amendments

In comparison with the January 1962 edition of DIN 1988, the content of the standard has been supplemented, completely revised and is now dealt with in eight separate Parts.

Explanatory notes

This standard has been prepared jointly by Technical Committee IV 7 of the *Normenausschuß Wasserwesen* (Water Practice Standards Committee), the *DVGW Deutscher Verein des Gas- und Wasserfaches e.V.* and the *Bundesvereinigung der Firmen im Gas- und Wasserfach (FIGAWA)* (German Federal Association of Public Gas and Water Suppliers).

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[1]) Obtainable from *Deutsches Informationszentrum für Technische Regeln (DITR) im DIN*, Burggrafenstraße 6, D-1000 Berlin 30.