
Električne naprave, priključene na vodovod - Preprečevanje povratnega vodnega udara in odpovedi cevne sestava - Dopolnilo A11

Electric appliances connected to the water mains - Avoidance of backsiphonage and failure of hose-sets

Elektrische Geräte zum Anschluss an die Wasserversorgungsanlage - Vermeidung von Rücksaugung und des Versagens von Schlauchsätzen

Appareils électriques raccordés au réseau d'alimentation en eau - Exigences pour éviter le retour d'eau par siphonnage et la défaillance des ensembles de raccordement

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Ta slovenski standard je istoveten z: EN 61770:2009/A11:2018

ICS:

91.140.60	Sistemi za oskrbo z vodo	Water supply systems
97.030	Električni aparati za dom na splošno	Domestic electrical appliances in general

SIST EN 61770:2009/A11:2018**en,fr**

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EUROPEAN STANDARD

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Electric appliances connected to the water mains - Avoidance of backsiphonage and failure of hose-sets

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN 61770:2009/A11:2018 (E)**European foreword**

This document (EN 61770:2009/A11:2018) has been prepared by CLC/TC 61 "Safety of household and similar electrical appliances" in collaboration with CEN/TC 164 "Water Supply".

It was generated to overcome occurring uncertainties in checking the appliances since extension of the scope for all EN 60335-2 parts having the necessity to be connected to the water mains.

Significant changes are the adoption of the EN 1717 approach of evaluating the risk categories and providing provisions / backflow prevention devices to realise prevention against the evaluated risks and to offer a choice of relevant backflow prevention devices which are already described by separate EN-Standards but with easing the requirements at points, where definitions which are not safety-relevant for the use in Electrical Appliances connected to the water mains prohibit industrialised realisation. Examples are requirements regarding size, stability and markings which are well-grounded for the use in house installation, but not for the realisation inside an electric appliance.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-11-18
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2021-05-18

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This amendment supplements or modifies the corresponding clauses of EN 61770:2009.

There are no special national conditions causing a deviation from this amendment.

There are no national deviations from this amendment.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 61770:2008 are prefixed "Z".

1 Scope

Replacement:

This European Standard specifies requirements for appliances for household and similar purposes to prevent the backflow of non-potable water into the water mains. It also specifies requirements for hose sets used for connecting such appliances to the water mains that supply water at a pressure not exceeding 1 MPa.

NOTE 1 Examples of similar purposes are the installation of appliances in canteens, restaurants, launderettes and communal flats.

NOTE 2 The connection of the appliance to the water mains may be temporary or permanent.

NOTE 3 When reference is made to the water mains, water supplied from a cistern or similar system is also included.

This standard does not apply to

- a) appliances used for dry cleaning;
- b) appliances for medical purposes;
- c) appliances intended for industrial purposes;
- d) water heaters that are an integral part of the water supply system;
- e) water coolers that are an integral part of the water supply system;
- f) backflow prevention devices for general purposes.

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3 Terms and definitions

3.3 Delete the NOTE.

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Replace 3.4 by the following: [standards.iteh.ai/catalog/standards/sist/0999e429-8ddf-42ad-929a-d0f6ae3edfa0/sist-en-61770-2009-a11-2018](#)

3.4 airgaps

3.4.Z1 airgap (general)

backflow prevention device with unobstructed free distance between the water inlet or the end of the feed pipe and the critical water level

3.4.Z2 airgap AA

visible unobstructed and complete air gap placed permanently and vertically between the lowest point of the inlet feed orifice and any surface of the receiving vessel that determines the maximum water level at which the device overflows

3.4.Z3 airgap AB

permanent and vertical distance between the lowest point of the inlet orifice and the critical water level and having a non-circular overflow

3.4.Z4 airgap AD

horizontal and permanent distance between upstream feed orifice and downstream receiving orifice

3.4.Z5 airgap AF

permanent and vertical distance between the lowest point of the inlet orifice and the critical water level or the top of the overflow having a circular overflow

EN 61770:2009/A11:2018 (E)**3.4.Z6****airgap AG**

permanent and vertical distance between the lowest point of the inlet orifice and the critical water level having an overflow capable of draining the maximum inflow of water under fault condition

Replace 3.6 by the following:

3.6 Void

Add the following new definitions after 3.6:

3.6.Z1**pipe interrupter with movable parts**

backflow prevention device having air inlets which are generally open to the atmosphere in no flow conditions and air inlets are closed at a measurable water flow rate through the device

3.6.Z2**dynamic air inlet device**

device to prevent pollution by backflow equipped with at least one obturator that opens the air inlet(s) to atmosphere in case of vacuum at the feed orifice

Note 1 to entry: In some related IEC standards this device may be called "dynamic backflow preventer".

Add the following new definitions:

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3.Z1**anti-pollution check valve**

single safety device, consisting of one closing element, which permits flow in one direction only and opens automatically when the pressure in the direction of flow upstream the valve is greater than the pressure downstream

3.Z2**anti-vacuum valve**

safety device which provides protection against backsiphonage by opening air inlets to the atmosphere

3.Z3**backflow preventer with reduced pressure zone**

safety device which artificially provides disconnection by the action or the reaction of one or more hydromechanical closing and venting devices activated by pressure differences

Note 1 to entry: Device which uses reduced intermediate pressure zone for action.

3.Z4**combination of protection devices**

series combination of an anti-pollution check valve and an anti-vacuum valve respectively located in downstream direction

3.Z5**protection point**

location in a hydraulic circuit where a backflow prevention device is installed

3.Z6**diameter of feed pipe (bore D)**

maximum internal diameter (or calculated from the equivalent cross sectional area) found within the last metre of the supply pipe to the backflow prevention device or the DN of the inlet connection

Note 1 to entry: The dimension of the diameter "D" is in mm.

3.27**non-controllable anti-pollution double-check valve**

mechanical protection device, equipped with two independent acting anti-pollution check valves, to permit flow in one direction only

3.28**flow pressure**

gauge pressure at a measuring point in the system under flow condition

4 General requirements

Add the following new subclause before 4.1:

4.21 All materials coming into contact with water intended for human consumption shall present neither health risk nor cause any change of the drinking water in terms of quality, appearance, smell or taste.

Products intended for use in drinking water supply systems shall comply, when existing, with national regulations and testing arrangements that ensure fitness for contact with drinking water.

NOTE Many countries have requirements concerning the prevention of contamination of potable water as a result of contact with unsuitable materials upstream of a **backflow prevention device**.

4.1 *Replace the text by the following:*

Appliances shall be provided with a **backflow prevention device**.

Components presenting a **potable water** hazard, such as dispensers for adding cleaning, rinsing, softening or similar agents to the water, shall not be located upstream of the backflow prevention device.

Pipework containing **potable water** located upstream of a **backflow prevention device** shall not pass through **non-potable water** in the appliance.

An appliance connected to a water main may have several safety devices. Every safety device shall be able to protect against the risk for which it is foreseen (see Annex ZA). If a common protection to several **protection points** is sought, it is necessary to consider the technical parameter presenting the highest risk value in the most unfavourable fluid category to all associated parts of the appliance.

Compliance is checked by inspection.

NOTE For a given point in a hydraulic system, "upstream" indicates the side from which the water flows and "downstream" indicates the side to which the water flows.

4.2 *Replace the text by the following:*

Suitable backflow prevention devices shall be incorporated in, or fixed to the appliance or they shall be integrated in a **hose set**.

If the **backflow prevention device** is integrated in the hose set then the connection to the appliance shall be fixed permanently and not be detachable without any irreversible damage.

Backflow prevention devices shall be constructed so that

- their functional characteristics cannot be changed, even intentionally;
- they can only be removed with the aid of a tool;
- if omitted, the appliance is rendered inoperable or manifestly incomplete;
- its selection of the necessary safety level is in compliance with Annex ZA.

Compliance is checked by inspection.

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5 General conditions for the tests**5.1** *Title the subclause as “5.1 Normal conditions”*

3rd dashed item: replace “dynamic pressure” by “flow pressure”

Add the following “NOTE Z1”:

NOTE Z1 Components or products previously being tested and shown to comply with the relevant product standard need not be re-tested on functionality and endurance.

5.2 *Title the subclause as: “5.2 Fault conditions”***5.3** *Title the subclause as “5.3 Tests”*

Replace in the first dashed item “pipe interrupters and dynamic backflow preventers” by “backflow prevention devices”.

Replace subclause 5.4 by the following:

5.4 Tests on backflow prevention devices

Backflow prevention devices are tested as installed, unless this is impracticable or is otherwise specified.

Components that have not been separately tested and found to comply with the relevant EN product standard and components that are not marked or not used in accordance with their marking are tested in accordance with the conditions occurring in the appliance. The number of samples being that required by the relevant EN product standard.

When determining the **critical water level** of appliances having more than one water inlet, and a programme permitting simultaneous filling, each water inlet is closed in turn, other water inlets being open.

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Unless otherwise specified, the tests are carried out at an ambient temperature of 20 °C ± 5 °C.

Replace 5.5 and 5.6 by the following:

5.5 Void.

5.6 Void.

6 Airgaps

Replace the text by the following:

6 Airgaps**6.Z1 General**

This clause specifies the characteristics and the requirements of **air gaps** for fluid category of risk 3, 4 and 5 for nominal flow velocity not exceeding 3 m/s.

6.Z2 Overflow arrangements

All **overflow** arrangements subsequently connected to a drain shall meet the requirements as detailed in ZA.5.

6.Z2.1 AB air gap overflow

Shall be of non-circular design, shall discharge immediately into free air and shall be totally unobstructed.

The height of the **overflow** arrangement O_w is $\geq 2D + h$ and never less than 20 mm (see Figure Z2, Figure Z3 and Figure Z4).

6.Z2.2 AF air gap overflow

Shall be of circular design having a minimum cross sectional area throughout its length equal to four times the cross sectional area of the feed pipe (D) (see Figure Z6)

6.Z2.3 AG air gap overflow

Shall be of circular design having a minimum internal diameter of 19 mm throughout its length (see Figure Z7).

6.Z3 Requirements

6.Z3.1 Water inlet device

Every water inlet device and its pipework shall be securely and rigidly fixed to prevent moving or bending in order to maintain the **air gap**.

The water feed pipe, inlet device and its outlet shall not come into contact in any way with a fluid from downstream of the **airgap**.

For **air gaps AA** the direction of flow shall be downward and not be more than 15° from the vertical.

6.Z3.2 Backflow/back pressure

If the receiving vessel can be subject to positive pressure backflow, the inlet orifice shall be positioned so that the ascending/returning backflow fluid cannot contaminate it.

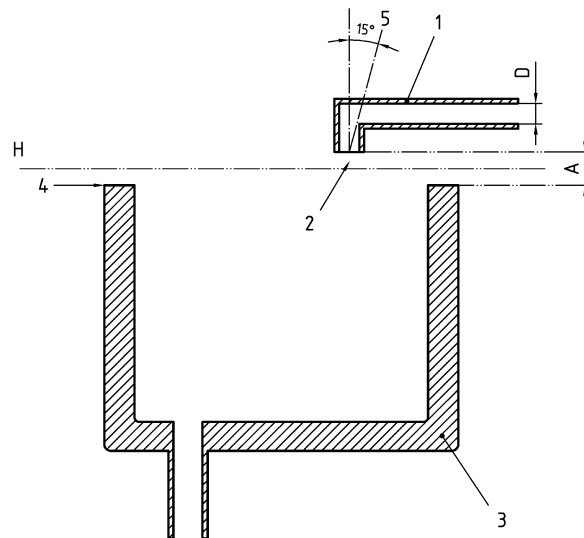
When the **air gap** is part of an installation which can generate positive pressure backflow, a means of limiting the flow rate to a rate which shall not compromise the overflow arrangement is incorporated, i.e. non-return valve fitted upstream of the pressurisation unit.

For multiple water inlets, **potable water** inlets shall terminate at a higher level than **non-potable water** inlets (fluid category 5) and never closer than 2 D measured horizontally and vertically downward.

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6.Z4 Characteristics

6.Z4.1 Air gap AA



Key

- A Air gap
- H Maximum level
- D Internal diameter of feed pipe (bore)
- 1 Feed pipe
- 2 Feed orifice
- 3 Receiving vessel
- 4 Spillover level
- 5 15° maximum from the vertical

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Figure Z1 — Dimensions air gap AA

6.Z4.1.1 Single supply

In the case of a single supply pipe to a single vessel having a continuous, unobstructed **overflow** around the top, the distance A, shall not be less than the value $A \geq 2D$ but not less than 20 mm. (see Figure Z1).

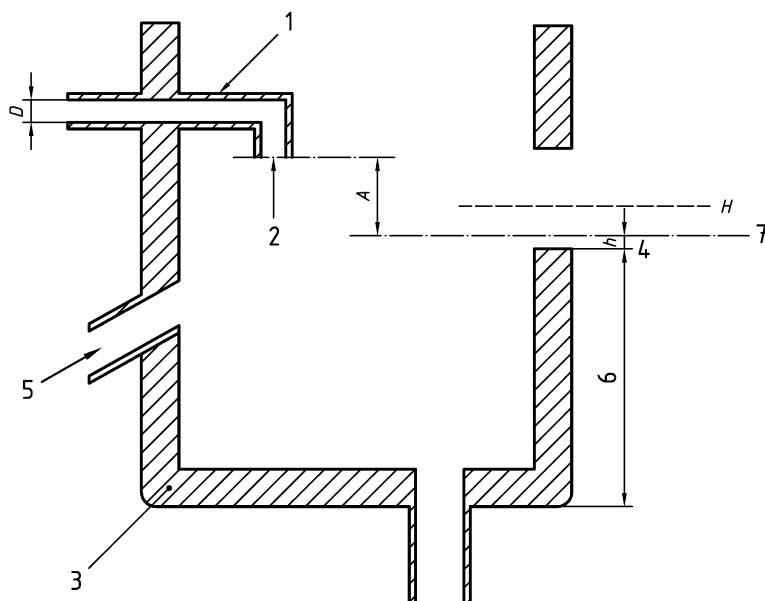
6.Z4.1.2 Multiple supplies

In the case of multiple feed pipes to a single vessel having a continuous unobstructed **overflow** around the spillover, the distance A, shall not be less than the value $A \geq 2$ times the total sum of all inlet bore diameters (D), but not less than 20 mm.

6.Z4.1.3 Vessels with variable height rim

Vessels having a variable height rim can be assessed against this standard only if they can be tested in a maximum positive fault condition, and the **air gap** between the maximum level and the inlet device outlet can be maintained. The maximum level is determined by measurement of the depth of water above the spillover level, with the inflow with all feed pipes discharging at an individual inflow calculated at $Q = 0,14D^2$ in litres per minute, or a flow pressure of 1 MPa (10 bar) if flow rate(s) Q cannot be achieved. Where D is the bore of the feed pipe and with all outlets including optional warning pipes closed, based on a velocity of 3 m/s or the maximum recommended flowrate for manufactured appliances when the flow rate is higher than Q .

6.Z4.2 Air gap AB



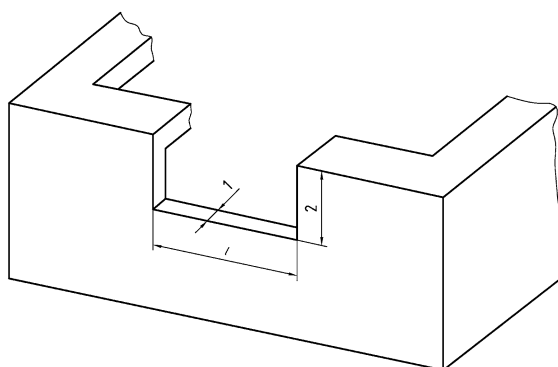
Key

- A Air gap (distance)
- D Internal diameter of feed pipe (bore)
- H Maximum level
- 1 Feed pipe
- 2 Feed orifice
- 3 Receiving vessel
- 4 Spillover level
- 5 Optional warning pipe
- 6 $Uw \geq 5h$
- 7 Critical water level (distance h)

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Figure Z2 — Dimensions Air gap AB

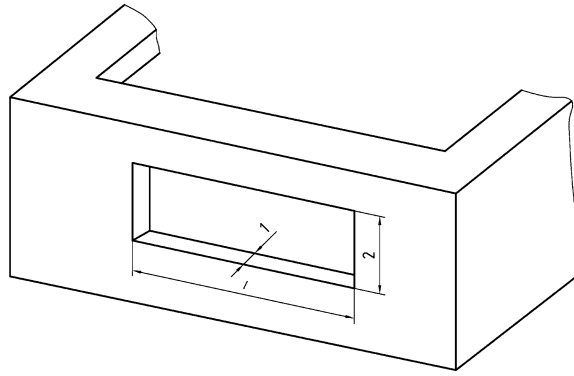


Key

- 1 $Cw \leq 5h$
- 2 $Ow \geq 2D + h$ and never less than 20 mm
- l $l \geq 10h$

Figure Z3 — Rectangular overflow arrangement

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**Key**

- 1 $C_w \leq 5h$
- 2 $O_w \geq 2D + h$ and never less than 20 mm
- l $l \geq 10h$

Figure Z4 — Letterbox overflow arrangement**6.Z4.2.1 Single supply**

For **air gaps AB** the critical water level (h) shall be established and the **air gap** distance A measured from the lowest point of the water inlet to the **critical water level** (see Figure Z2).

The distance A is $\geq 2D$ and not less than 20 mm and h is determined either by:

- a) *Test, by determining the measurement of the depth of water above the spillover level of the **overflow** arrangement, 2 s after the inflow equal to $Q = 0,14D^2$ in litres per minute has stopped or a flow pressure of 1 MPa (10 bar) has stopped if the flow rate Q cannot be achieved, where D is the bore of the inlet, and with all outlets including optional warning pipe (except the **overflow** arrangement) closed, based on velocity of 3 m/s, or the maximum recommended flow rate for manufactured appliances, when the flow rate is higher than Q .*

or by:

- b) Calculation, by determining the depth of water above the spillover level of the **overflow** arrangement using the following equation:

$$h = 3 \sqrt[3]{\left(\frac{10^3 \times Q}{3,143 \times l}\right)^2}$$

where

Q is the inflow in litres per minute at 3 m/s ($Q = 0,14 D^2$);

l is the width of the **overflow** arrangement in millimetres. The calculation is only valid where:

- width (l) is greater than or equal to $10 h$ at the spillover level;
- crest thickness of the **overflow** arrangement (C_w) is less than or equal to $5 h$;
- upstream face of the **overflow** arrangement (U_w) is vertical to a depth greater than or equal to $5 h$;
- the depth of the **overflow** arrangement or notch (O_w) is greater than or equal to $2D+h$ and never less than 20 mm.

When the **overflow** is not rectangular in design it shall satisfy air gap dimension A by test detailed above.

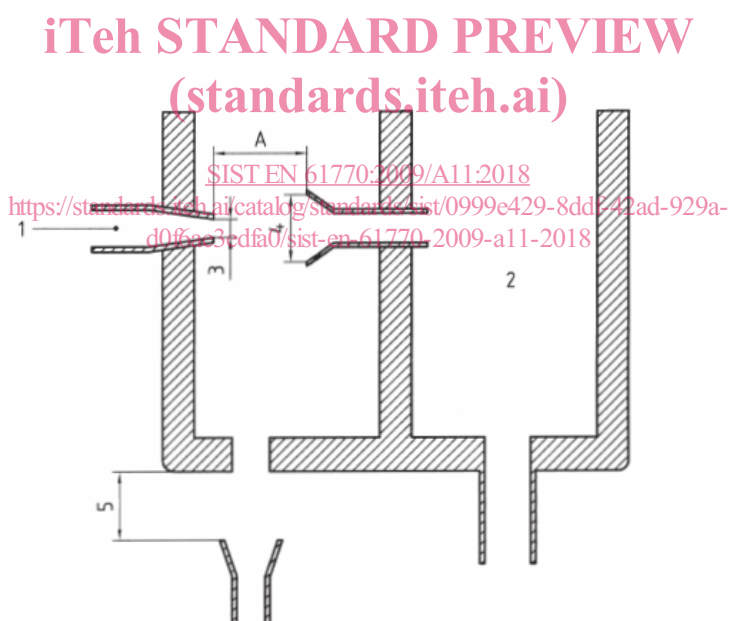
6.Z4.2.2 Multiple supplies

In the case of multiple feed pipes to a single vessel having a non-circular unrestricted **overflow**, the distance of the **air gaps** for the **potable water** supply shall be dimension A above the **critical water level**. The **critical water level** shall be determined 2 s after stopping the inflow with all feed pipes discharging at an individual inflow calculated at $Q = 0,14D^2$ in litres per minute. If the flow rate Q cannot be achieved, apply a flow pressure of 1 MPa (10 bar) on all inlets. No feed orifice shall be less than distance A above the **critical water level**. For calculating air gap distance A , use $A = 2 \sqrt{\sum D^2}$

6.Z4.3 Air gap AD

The receiving vessel shall be so positioned that wasted water is kept to an absolute minimum and to ensure that any water returning due to the maximum possible positive pressure backflow does not come into contact with the upstream feed orifice.

The airgap distance is the horizontal distance between the terminal end of the upstream orifice (injector) and the inlet end of the downstream receiving orifice. The distance, A , shall not be less than the value $A \geq 2D$ but not less than 20 mm (see Figure Z5).



Key

- A Air gap
- 1 injector
- 2 Receiving vessel
- 3 Upstream feed orifice (D)
- 4 Downstream receiving orifice
- 5 Air break to drain

Figure Z5 — Dimensions Air gap AD