SLOVENSKI STANDARD
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Pokrovi za odtoke in jaške na voznih površinah in površinah za pešce - 4. del: Pokrovi za odtoke in jaške iz armiranega betona

Gully tops and manhole tops for vehicular and pedestrian areas - Part 4: Gully tops and manhole tops made of steel reinforced concrete

Aufsätze und Abdeckungen für Verkehrsflächen - Teil 4: Aufsätze und Abdeckungen aus stahlbewehrtem Beton

Dispositifs de couronnement et de fermeture pour les zones de circulation utilisées par les piétons et les véhicule - Partie 4: Dispositifs de couronnement et de fermeture en béton armé d'acier

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93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations

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EUROPEAN STANDARD

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Gully tops and manhole tops for vehicular and pedestrian areas - Part 4: Gully tops and manhole tops made of steel reinforced concrete

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 124-4:2015) has been prepared by Technical Committee CEN/TC 165 “Wastewater engineering”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2015 and conflicting national standards shall be withdrawn at the latest by March 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Together with EN 124-1:2015, EN 124-2:2015, EN 124-3:2015, EN 124-5:2015 and EN 124-6:2015, this document will supersede EN 124:1994.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the Regulation (EU) No. 305/2011.

For relationship with EU Regulations, see informative Annex ZA, which is an integral part of this document.

EN 124, *Gully tops and manhole tops for vehicular and pedestrian areas*, consists of the following parts:

— *Part 1: Definitions, classification, general principles of design, performance requirements and test methods*;

— *Part 2: Gully tops and manhole tops made of cast iron*;

— *Part 3: Gully tops and manhole tops made of steel or aluminium alloys*;

— *Part 4: Gully tops and manhole tops made of steel reinforced concrete*;

— *Part 5: Gully tops and manhole tops made of composite materials*;

— *Part 6: Gully tops and manhole tops made of polypropylene (PP), polyethylene (PE) or unplasticized poly(vinyl chloride) (PVC-U)*.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard is applicable to precast gully tops and manhole tops made of steel reinforced concrete with a clear opening up to and including 1 000 mm for covering gullies, manholes and inspection chambers for installation within areas subjected to pedestrian and/or vehicular traffic.

It is applicable to manhole tops and gully tops for use in

— areas which can only be used by pedestrians and pedal cyclists (at least class A 15),

— pedestrian areas and comparable areas, car parks or car parking decks (at least class B 125),

— the area of kerbside channels of roads which, when measured from the kerb edge, extends a maximum of 0,5 m into the carriageway and a maximum of 0,2 m into the pedestrian area (at least class C 250),

— carriageways of roads (including pedestrian streets), hard shoulders and parking areas, for all types of road vehicles (at least class D 400),

— areas imposing high wheel loads, e.g. docks, aircraft pavements (at least class E 600),

— areas imposing particularly high wheel loads, e.g. aircraft pavements (Group 6, class F 900).

This European Standard is not applicable in isolation but only in combination with EN 124-1 and gives guidance for combinations of covers/gratings made of steel reinforced concrete with frames according to EN 124-2, EN 124-3, EN 124-5 and EN 124-6.

This European Standard is not applicable to:

— concave gratings for class D 400 installed in carriageways of roads or hard shoulders and concave gratings for classes F 900 and E 600;

— gratings/covers as part of prefabricated drainage channels according to EN 1433;

— floor and roof gullies in buildings which are specified in EN 1253 (all parts); and

— surface boxes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 124-1:2015, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 1: Definitions, classification, general principles of design, performance requirements and test methods*

EN 124-2:2015, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 2: Gully tops and manhole tops made of cast iron*

EN 124-3:2015, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 3: Gully tops and manhole tops made of steel or aluminium alloys*

EN 124-5:2015, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 5: Gully tops and manhole tops made of composite materials*

EN 124-6:2015, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 6: Gully tops and manhole tops made of polypropylene (PP), polyethylene (PE) or unplasticized poly(vinyl chloride) (PVC-U)*

EN 206:2013, *Concrete — Specification, performance, production and conformity*

EN 1339:2003, *Concrete paving flags — Requirements and test methods*

EN 1992-1-1:2004, *Eurocode 2: Design of concrete structures — Part 1-1: General rules and rules for buildings*

EN 13369:2013, *Common rules for precast concrete products*

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods (ISO 1461)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 124-1:2015 apply.

4 Materials

4.1 General

Precast manhole tops and gully tops according to this European Standard shall be made from steel reinforced concrete. The concrete quality of any element shall be dense, homogenous and conform to the requirements given in 4.2 to 4.6. For general aspects, constituent materials of concrete and reinforcing steel, EN 13369:2013, 4.1, shall apply.

Any element made of the materials specified in Clause 4 can be used in combination with elements of materials specified in EN 124-2, EN 124-3, EN 124-5 or EN 124-6. In such cases the manhole tops or gully tops shall comply with the relevant design and performance and testing requirements as listed in Table 1.

In addition, elements shall comply with the requirements for the material related EN 124-2, EN 124-3, EN 124-5 or EN 124-6, as applicable. Each element shall be marked accordingly. The load class to be declared for the combined product shall be restricted to the lower class determined for any constituent element according to the relevant part of EN 124 series.

EXAMPLE Where a cover is made of steel reinforced concrete, class D 400, and the frame is made of steel, class C 250, the manhole top or gully top is marked with EN 124-4 and the class to be declared for the combined product is the class of the frame according to EN 124-3 for steel.

4.2 Exposure classes

Manhole tops and gully tops according to this standard shall be at least suitable for use in “wet and dry” conditions and a slightly aggressive chemical environment, i.e. normal conditions for domestic sewage and treated industrial effluent, and for most natural soils and ground-waters. If more severe conditions are expected, additional requirements for corrosion protection can be necessary.

The exposure class determined in accordance with EN 206:2013 shall be a minimum of XC2.

Where resistance against freeze/thaw or chemical attack on concrete is required, the composition and properties of the concrete shall meet the requirements for XF, XD or XA classes taking into account the relevant description of the environment in accordance with EN 206:2013.

If more severe conditions are expected higher exposure classes can be necessary. In such cases the higher class shall be declared.

4.3 Resistance against freeze - thaw with de-icing salts

When manhole tops and gully tops are used in specific conditions of use (corresponding to frequent contact of a surface, partially or entirely made with concrete, with standing water containing de-icing salts in frost conditions) the concrete shall not show a mean mass loss higher than 1,5 kg/m^2 with no individual result higher than 2,0 kg/m^2 when tested according to 6.4. Products complying with this requirement shall be marked with "+R".

4.4 Compressive strength

The compressive strength class of the concrete shall conform to the specific environmental conditions in accordance with 4.2 but not be less than C35/45 according to EN 13369, except for class A 15 covers, where the minimum compressive strength shall not be less than C25/30 according to EN 13369.

4.5 Water content of concrete

The ratio of water to cement plus any pozzolanic or latent hydraulic addition in the fully compacted state shall not be greater than 0,5 and shall conform to the specific environmental conditions in accordance with 4.2.

4.6 Cement content of concrete

Concrete shall have such a composition that the minimum content of cement plus any pozzolanic latent addition in the fully compacted state is consistent with the serviceability conditions of 4.2 and 4.7 for the exposure classes.

4.7 Chloride content of concrete

The maximum amount of chloride ion in the concrete shall be evaluated by calculation in accordance with EN 206:2013, 5.2.8.

4.8 Water absorption of concrete

When determined in accordance with EN 13369:2013, 5.1.2, the water absorption of concrete shall not exceed 6 % by mass.

5 Requirements

5.1 Design and performance requirements

Manhole tops and, gully tops made of concrete shall comply with the design and performance and testing requirements in accordance with EN 124-1, as listed in Table 1.

Table 1 — Design, performance and testing requirements specified in EN 124–1 for gully tops and manhole tops made of steel reinforced concrete

Characteristic	Requirements acc. to EN 124-1: 2015 Clause	Testing acc. to EN 124-1: 2015 Clause	Relevant for class					
			A 15	B 125	C 250	D 400	E 600	F 900
Related to the design								
Vents in covers	6.1	8.4.1	x	x	x	x	x	x
Clear opening of manhole tops for man entry	6.2	8.4.2	x	x	x	x	x	x

Characteristic	Requirements acc. to EN 124-1: 2015 Clause	Testing acc. to EN 124-1: 2015 Clause	Relevant for class					
			A 15	B 125	C 250	D 400	E 600	F 900
Depth of insertion	6.3	8.4.3	–	–	–	x	x	x
Clearance	6.4	8.4.4	x	x	x	x	x	x
Compatibility of seatings	6.5	8.4.5	–	–	–	x	x	x
Handling of covers and gratings	6.7	8.4.7	x	x	x	x	x	x
Slot dimensions of gratings	6.8	8.4.8	x	x	x	x	x	x
Dirt pans and dirt buckets	6.9	8.4.9	x	x	x	x	x	x
Positioning of covers and gratings	6.10	8.4.10	x	x	x	x	x	x
Flatness of manhole covers and gratings	6.11	8.4.11	–	–	–	x	x	x
Concaveness of gratings	6.12	8.4.12	x	x	x	x	x	x
Surface conditions	6.13	8.4.13	x	x	x	x	x	x
Manhole tops with sealing features	6.14	Visual inspection of presence of anchors	x	x	x	x	x	x
Frame bearing area	6.15	8.4.14	x	x	x	x	x	x
Frame depth	6.16	8.4.15	–	–	–	x	x	x
Opening angle of hinged covers/ gratings	6.17	8.4.16	x	x	x	x	x	x
Appearance	7.1	Visual inspection	x	x	x	x	x	x
Related to the performance								
Load bearing capacity	7.2	8.3	x	x	x	x	x	x
Permanent set	7.3	8.2	x	x	x	x	x	x
Securing of the cover/grating within the frame	6.6	8.4.6	x	x	x	x	x	x
Skid resistance	7.4	8.4.13	x	x	x	x	x	x
Child safety	7.5	8.5	x	x	x	x	x	x
x To be applied.								

5.2 Material specific characteristics for gully tops and manhole tops made of steel reinforced concrete

5.2.1 Edge and contact surfaces protection for manhole tops and gully tops

Edge and contact surface protection between frame and cover shall consist of either cast iron or hot-dipped galvanized steel. The minimum thickness of flake graphite iron, spheroidal graphite iron or steel is stated in Table 2. The thickness of edge and contact surface protection shall be measured in accordance with 6.3.

Table 2 — Thickness of edge and contact surface protection

Class	Minimum thickness [a] of trafficked edges and contact surfaces mm
A 15	2
B 125	3
C 250	5
D 400	6
E 600 and F 900	According to each design but not less than that required of class D 400

[a] Without the thickness of additional corrosion protection to steel.

5.2.2 Crack width

After the permanent set tests (2/3 of test load) according to EN 124-1:2015, Annex A, no cracks wider than 0,2 mm shall appear in the concrete. Crack widths shall be measured on the surface optically by magnifier or equivalent.

No loss of adhesion between concrete and reinforcement shall occur after the total load bearing.

5.2.3 Reinforcement and concrete cover

The dimensions, the position, spacing and jointing of the reinforcement shall be in accordance with the design. The concrete cover to steel reinforcement shall be based on the provisions valid in the place of use of the concrete as given in EN 1992-1-1:2004 specific to manhole tops and gully tops or, in their absence, applicable to related products (e.g. drainage channels, pipes or manholes).

Where provisions in places of use do not exist, the concrete cover to reinforcement, c_{min}, shall comply at least with the nominal maximum size of aggregate and be a minimum of 20 mm on all sides for class B 125 to F 900.

In applying EN 1992-1-1:2004, 4.4.1.2, the following conditions are recommended for class B 125 to F 900, unless other rules are given in its National Annex:

— if stainless steel or galvanized steel is used the concrete cover may be reduced by 5 mm;

— when the concrete class is ≥ C40/50 and its water absorption is less than 6,0 % (characteristic value) the concrete cover may be reduced by 5 mm;

— for concrete classes higher than C50/60 and water absorption less than 5,0 % (characteristic value) a reduction may be taken to 10 mm.

For class A 15, the concrete cover may be reduced in accordance with EN 13369:2013, Table A.2.

Where freeze-thaw or chemical attack on concrete is expected for class A 15 to F 900, exposure class and concrete composition shall be chosen accordingly.

5.2.4 Reaction to fire

Where use of manhole tops and gully tops in accordance with this standard is subject to national regulatory requirements on reaction to fire, their reaction to fire performance shall be declared. Manhole tops and gully tops made of steel reinforced concrete are classified as Class A1, regardless their cushioning insert, securing feature or coating without the need for testing (CWT), in accordance with the relevant Commission Decision[1)].

NOTE 1 Concrete, as homogeneously distributed materials for these products (whether in combination with concrete or not), is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material and consequently does not contribute to fire. Under these conditions it may be considered as Class A1 material.

NOTE 2 The class of reaction to fire performance of manhole tops and gully tops made of concrete is regarded as the class for the constituent material.

Conversely, where the use of manhole tops and gully tops is not subject to national regulatory requirements on reaction to fire, either the Class A1 (see above) or “No Performance Determined” (NPD) may be declared.

NOTE 3 Where the compatibility of seatings is achieved by the use of cushioning inserts, only a negligible area of the cushioning insert material would be exposed to fire, considering the end use situation. There is no relevance in relation to the reaction to fire performance and embedded cushioning inserts would not be able to ignite or to propagate fire there. Their contribution to fire spread is not of concern, nor is an influence expected on the fire behaviour of the neighbouring material and the contribution to fire propagation is negligible. Considering these aspects, separate testing and classification of cushioning inserts is not necessary.

5.2.5 Durability

5.2.5.1 General

Steel reinforced concrete is a material of known and stable behaviour with unchanging performance for the defined end use applications with respect to their application within the scope of this standard.

The durability of gully tops and manhole tops manufactured from steel reinforced concrete will depend upon design features and exposure conditions (see 4.2). The prescribed framework of requirements and test methods for the mandated performance characteristics according to Clause 5 will also reflect the durability of manhole tops and gully tops

5.2.5.2 Durability of load bearing capacity

Durability of load bearing capacity is ensured by meeting the requirements of EN 124-1:2015, 7.2 and 7.3 and the proportion between test load and maximum load to be expected in service and in conjunction with the stable material behaviour against weathering and environmental conditions in the place of use according to 4.2, 4.3 and 5.2.3.

5.2.5.3 Durability of securing of covers/gratings within the frame

Durability of securing of covers/gratings in the frame against unintended lifting is ensured by using materials with proven resistance against corrosion and passing the test according to EN 124-1:2015, 8.4.6.

1) See Decision of the Commission 96/603/EC of 1996-10-04 (*see OJEU L 267 of 1996-10-19*), as amended twice by 2000/605/EC of 2000-09-26 (*see OJEU L 258 of 2000-10-12*) and by 2003/424/EC of 2003-06-06 (*see OJEU L 144 of 2003-06-12*).