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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 607-4 was prepared by Technical Committee RSB/TC 47, *Steel, aluminium and related products*.

In the preparation of this standard, reference was made to the following standard:

1) BS EN 124-4:2015 Gully tops and manhole tops for vehicular and pedestrian areas — Part 4: Gully tops and manhole tops made of steel reinforced concrete

The assistance derived from the above source is hereby acknowledged with thanks.

DRS 607 consists of the following parts, under the general title *Gully tops and manhole tops for vehicular and pedestrian areas — Specification*:

— *Part 1: Classification, general design and performance requirements;*

— *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; and*

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

Committee membership

The following organizations were represented on the Technical Committee on Steel, aluminium and related products (RSB/TC 47) in the preparation of this standard.

All City Rwanda Ltd

Asante Steel ® Ltd

Eastern hope Ltd

King Lion Rwanda Investment Ltd

OBOR TECHNOLOGY(RWANDA) LTD

Rwanda Engineering and Manufacturing Corporation (REMCO)

Rwanda Inspectorate, Competition and Consumer Protection (RICA)

S & H Industries Ltd (Rwanda)

TKAE Ltd

Rwanda Standards Board (RSB) – Secretariat

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

1 Scope

This Draft Rwanda Standard specifies requirements, sampling and test methods for precast gully tops and manhole tops made of steel reinforced concrete with a clear opening up to and including 1 000 mm.

It is applicable to manhole tops and gully tops for use in areas subjected to pedestrian and/or vehicular traffic of class A 15, B 125, C 250, D 400, E 600 and F 900.

This Standard does not apply 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;

— floor and roof gullies in buildings; and

— surface boxes.

NOTE This part 4 of DRS 607 is not applicable in isolation, but only in combination with DRS 607-1 and gives guidance for combinations of covers/gratings made of steel reinforced concrete with frames according to DRS 607-2, DRS 607-3, DRS 607-5 and DRS 607-6.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DRS 607-1, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 1: Definitions, classification, general principles of design, performance requirements and test methods*

DRS 607-2, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 2: Gully tops and manhole tops made of cast iron*

DRS 607-3, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 3: Gully tops and manhole tops made of steel or aluminium alloys*

DRS 607-5, *Gully tops and manhole tops for vehicular and pedestrian areas — Part 5: Gully tops and manhole tops made of composite materials*

DRS 607-6, *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)*

RS 142, *Design of concrete structures — General rules and rules for buildings — Code of practice*

RS 503, *Precast concrete products — Performance requirements.RS ISO 1920-4, Testing of concrete — Part 4: Strength of hardened concrete*

RS ISO 1920-4, *Testing of concrete — Part 4: Strength of hardened concrete*

RS ISO 22965-1, Part 1: *Methods of specifying and guidance for the specifier.*

RS ISO 22965-2, *Concrete — Part 2: Specification of constituent materials, production of concrete and compliance of concrete.*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in DRS 607-1 apply.

4 Materials

4.1 General

Precast manhole tops and gully tops made of steel reinforced concrete shall be made from. 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, RS 503, 5.1, shall apply.

Any element made of the materials specified in Clause 4 can be used in combination with elements of materials specified in DRS 607-2, DRS 607-3, DRS 607-5 or DRS 607-6. 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 DRS 607-2, DRS 607-3, DRS 607-5 or DRS 607-6, 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 DRS 607 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 DRS 607-4 and the class to be declared for the combined product is the class of the frame according to DRS 607-3 for steel.

4.2 Exposure classes

Manhole tops and gully tops made of steel reinforced concrete 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 RS ISO 22965-1 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 RS ISO 22965-1.

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

4.3 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 B 35 according to RS ISO 22965-2, except for class A 15 covers, where the minimum compressive strength shall not be less than B25 according to RS ISO 22965-2.

4.4 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.

4.5 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.

4.6 Chloride content of concrete

The maximum amount of chloride ion in the concrete shall be evaluated by calculation in accordance with ISO 22965-2, 6.1.4.

4.7 Water absorption of concrete

When determined in accordance with RS 503, 6.1.2, 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 DRS 607-1, as listed in Table 1.

Table 1 — Design, performance and testing requirements specified in DRS 607–1 for gully tops and manhole tops made of steel reinforced concrete

Characteristic	Requirements acc. to DRS 607-1, Clause	Testing acc. to DRS 607-1, Clause	Relevant for class					
			A 15	B 125	C 250	D 400	E 600	F 900
Related to the design								
Vents in covers	7.1	9.4.1	x	x	x	x	x	x
Clear opening of manhole tops for man entry	7.2	9.4.2	x	x	x	x	x	x
Depth of insertion	7.3	9.4.3	–	–	–	x	x	x
Clearance	7.4	9.4.4	x	x	x	x	x	x
Compatibility of seatings	7.5	9.4.5	–	–	–	x	x	x
Handling ofcovers and gratings	7.7	9.4.7	x	x	x	x	x	x
Slot dimensions of gratings	7.8	9.4.8	x	x	x	x	x	x
Dirt pans and dirt buckets	7.9	9.4.9	x	x	x	x	x	x
Positioning of covers and gratings	7.10	9.4.10	x	x	x	x	x	x
Flatness of manhole covers and gratings	7.11	9.4.11	–	–	–	x	x	x
Concaveness of gratings	7.12	9.4.12	x	x	x	x	x	x
Surface conditions	7.13	9.4.13	x	x	x	x	x	x
Manhole tops with sealing features	7.14	Visual inspection of presence of anchors	x	x	x	x	x	x
Frame bearing area	7.15	9.4.14	x	x	x	x	x	x

Characteristic	Requirements acc. to DRS 607-1, Clause	Testing acc. to DRS 607-1, Clause	Relevant for class					
			A 15	B 125	C 250	D 400	E 600	F 900
Frame depth	7.16	9.4.15	–	–	–	x	x	x
Opening angle of hinged covers/ gratings	7.17	9.4.16	x	x	x	x	x	x
Appearance	8.1	Visual inspection	x	x	x	x	x	x
Related to the performance								
Load bearing capacity	8.2	9.3	x	x	x	x	x	x
Permanent set	8.3	9.2	x	x	x	x	x	x
Securing of the cover/grating within the frame	7.6	9.4.6	x	x	x	x	x	x
Skid resistance	8.4	9.4.13	x	x	x	x	x	x
Child safety	8.5	9.5	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 DRS 607-1, 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 RS 142 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, cmin, 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 RS 142, 7.4.1.2, 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 ≥ B40/50 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 B50/60 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 RS 503, 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 Decision1).

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 seating 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 DRS 607-1, 8.2 and 8.3 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 DRS 607-1, 9.4.6.

5.2.5.4 Durability of skid resistance

Durability of skid resistance is ensured by meeting the requirements of DRS 607-1, 8.4, in conjunction with the use of the relevant exposure class and the stable resistance of the material itself against loss of grip.

5.2.5.5 Durability of effectiveness of child safety characteristics

Durability of the child safety characteristics concerning the resistance of manhole tops and gully tops against the removal by children is ensured by re-inspecting the weight or the locking accessory or the securing feature, as appropriate, is still functional after testing the securing in accordance with DRS 607-1, 9.4.6.

5.2.6 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets. In the

absence of test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

6 Testing

6.1 General

Gully tops and manhole tops according to this standard shall be tested as complete units in their intended position of use where cover/grating is suitably positioned within the frame in accordance with DRS 607-1, Clause 9, as listed in Table 1. In addition, manhole tops and gully tops made of steel reinforced concrete shall be tested according to 6.2 to 6.4. All tested products shall be visually inspected without magnification.

6.2 Concrete strength

The compressive strength shall be determined in accordance with, RS ISO1920-4

6.3 Edge and contact surface protection

The thickness of edge and contact surface protection shall be measured to the nearest 0,1 mm. The thickness

of the hot-dipped galvanizing shall be measured in accordance with RS ISO 1461.

6.4 Concrete cover for the reinforcement

The dimensions of the concrete cover shall be measured and the minimum recorded to the nearest 1 mm.

7 Assessment and verification of constancy of performance – AVCP

7.1 General

The compliance of gully tops and manhole tops with the requirements of this standard and with the performances declared by the manufacturer in the specifications shall be demonstrated by:

— determination of the product type on the basis of type testing;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

7.2 Type testing

7.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without

performing tests. (e.g., use of previously existing data, classified without further testing (CWFT) and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE 1 The same AVCP system means testing by an independent third party, when relevant, under the responsibility of a notified product certification body, when relevant.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

NOTE 2 Products can be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance

— at the beginning of the production of a new or modified gully top and manhole top (unless a member of the same product range), or

— at the beginning of a new or modified method of production (where this can affect the stated properties), or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the gully top or manhole top design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate specifications may be presumed to have the performances declared in the specifications, although this does not replace the responsibility on the manhole tops and gully tops manufacturer to ensure that the manhole tops and gully tops as a whole are correctly manufactured and its component products have the declared performance values.

7.2.2 Test samples, testing and compliance criteria

The number of samples of gully tops and manhole tops to be tested/assessed shall be in accordance with Table 3. Characteristics for which the performance is to be declared are written in bold letters

Table 3 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
for the declared performance:				
Reaction to fire	5.2.4	Classified without testing	-	DRS 607–4, 5.2.4, Class A1
Frame bearing area	5.1	DRS 607–1, 9.4.14	3	DRS 607–1, 7.15, calculated value $P_b \leq 7{,}5$ N/mm^2
Load bearing capacity	5.1	DRS 607–1, 9.3	3	DRS 607–1, 8.2, test load for the declared class
Permanent set	5.1	DRS 607–1, 9.2	3	DRS 607–1, 8.3, permissible value for the declared class
Securing of the cover/grating in the frame	5.1	DRS 607–1, 9.4.6	3	DRS 607–1, 7.6, declared method and either weight in kg or value F_V in kN and appropriate h in mm, as applicable
Child safety	5.1	DRS 607–1, 9.5	3	DRS 607–1, 8.5, declared method or weight
Skid resistance	5.1	DRS 607–1, 9.4.13 a)	3	DRS 607–1, 8.4.2 a), declared as "concrete surface" for the material used
Durability of:				
load bearing capacity[b] against mechanical failure	5.2.5	DRS 607–1, 9.2 DRS 607–1, 9.3	3	DRS 607–4, 4.1, DRS 607–1, 8.2 and 8.3 declared as "Pass" according to the material used and the test method applied.
securing[c] against unintended lifting	5.2.5	DRS 607–1, 9.4.6	3	DRS 607–1, 7.6, declared as "Pass" according to the material used and the test method applied.
skid resistance against loss of grip	5.2.5	DRS 607–1, 9.4.13 a)	3	DRS 607–1, 8.4, declared as "Pass" for the declared method and the material used and for USRV measured value declared
effectiveness of **child safety** characteristics	5.2.5	DRS 607–1, 9.4.6	3	DRS 607–1, 7.6, declared as "Pass" according to the material used and the method declared.
for the design:				
Vents in covers	5.1	DRS 607–1, 9.4.1	3	DRS 607–1, 7.1
Clear opening of manhole tops for man entry	5.1	DRS 607–1, 9.4.2	3	DRS 607–1, 7.2
Depth of insertion	5.1	DRS 607–1, 9.4.3	3	DRS 607–1, 7.3
Clearance	5.1	DRS 607–1, 9.4.4	3	DRS 607–1, 7.4
Compatibility of seatings	5.1	DRS 607–1, 9.4.5	3	DRS 607–1, 7.5
Handling of covers and gratings	5.1	DRS 607–1, 9.4.7	3	DRS 607–1, 7.7
Slot dimensions of gratings	5.1	DRS 607–1, 9.4.8	3	DRS 607–1, 7.8

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
Dirt pans and dirt buckets	5.1	DRS 607–1, 9.4.9	3	DRS 607–1, 7.9
Positioning of covers and gratings	5.1	DRS 607–1, 9.4.10	3	DRS 607–1, 7.10
Flatness of manhole covers and gratings	5.1	DRS 607–1, 9.4.11	3	DRS 607–1, 7.11
Concaveness of gratings	5.1	DRS 607–1, 9.4.12	3	DRS 607–1, 7.12
Surface conditions	5.1	DRS 607–1, 9.4.13	3	DRS 607–1, 7.13
Manhole tops with sealing feature	5.1	Visual inspection of presence of anchors	3	DRS 607–1, 7.14
Frame depth	5.1	DRS 607–1, 9.4.15	3	DRS 607–1, 7.16
Opening angle of hinged covers/ gratings	5.1	DRS 607–1, 9.4.16	3	DRS 607–1, 7.17
Appearance	5.1	Visual inspection	3	DRS 607–1, 8.1

a
If one of the 3 samples fails, the specific test can be repeated with 5 new samples. All the 5 samples shall pass the test.

b
The proportion between the test load for the declared class and the maximum load to be expected in service in conjunction with the stable behaviour of the material specified in Clause 4 covers all effects which can influence the durability of the load bearing capacity.

c
Ensured by using materials with proven resistance against corrosion and passing the test according to DRS 607–1, 9.4.6.

7.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the gully top or manhole top to which they relate.

7.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted to transmit to the manufacturer the results and the

test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

— ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

— keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

7.3 Factory production control (FPC)

7.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

7.3.2 Requirements

7.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

7.3.2.2 Equipment

7.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

7.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

7.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection-scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

7.3.2.4 Traceability and marking

Individual products shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

7.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

For all materials in accordance with Clause 4, used for the manufacturing process of manhole tops and gully tops, specified in this standard the supplier's documentation shall be checked at every delivery for compliance with the manufacturer's specification. The documentation shall be retained for a period of 1 year.

NOTE For deliveries from suppliers having an established quality management system, the frequency of inspection can be reduced at the discretion of the manufacturer.

Raw materials and the manufacturing process of manhole tops and gully tops made of steel reinforced concrete shall be inspected according to Table 4.

Table 4 — FPC of manhole tops and gully tops made of steel reinforced concrete

Characteristic	Requirement Clause	Frequency of inspection	Compliance criteria	Document retention period
Receiving inspection:				
— constituent materials of concrete and reinforcing steel	4.1	Every delivery	RS 503:5.1[c]	1 year
Process control for concrete:				
— Compressive strength	4.3	Each 5 production days per concrete family used, according to the manufacturer process requirement	DRS 607–4, 4.3	5 years
— Water content of concrete	4.4	Daily for each composition used:	DRS 607–4, 4.4, ≤ 0,5	5 years

		— after each change — in case of doubt		
— Cement content of concrete	4.5	Daily for each composition used: — after each change	DRS 607–4, 4.5, +R declared if applicable	5 years
— Chloride content of concrete	4.6	In case of an increase in the chloride content of the constituents	DRS 607–4, 4.6	5 years
— Water absorption of concrete	4.7	Each production month per type of hardened concrete used	DRS 607–4, 4.7	5 years
— Positioning of Reinforcement	5.2.3	Daily (visual inspection): Depending on manufacturer's inspection instruction (measuring)	DRS 607–4, 5.2.3	5 years

a
When products are classified grade +R on the evidence of previous tests, they may be submitted to water absorption test with a mean value < 5 % and with no individual result > 6 % (in place of the initial type testing of freeze/thaw resistance).
b
If for a concrete family, the result of a type test is lower than 50 % of the required value, the test frequency as given in the present table may be reduced to once per two years, for as long as this condition is fulfilled. When this concrete family is also submitted to a water absorption test with a mean value < 5 % and with no individual result > 6 % then the test frequency as given in the present table may be halved.
c
Supplier's document in accordance with the manufacturer's specification.

7.3.2.6 7.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics for which he declares the performance given in Table 5 in bold letters, are maintained. The characteristics, and the means of control, shall be as given in Table 5.

Table 5 — Product testing of finished products

Characteristic	**Requirement Clause**	**Assessment method**	**Minimum frequency of inspection (units)**	**Document retention period**
for the declared performance:				
Reaction to fire	5.2.4	Classified without testing	–	–
Frame bearing area	5.1	Calculation acc. to DRS 607–1, 9.4.14	1:5 000 [a]	10 years
Load bearing capacity	5.1	DRS 607–1, 9.3	1:5 000 [a]	10 years
Permanent set	5.1	DRS 607–1, 9.2	1:5 000 [a]	10 years
Securing of the cover/grating within the frame	5.1	DRS 607–1, 9.4.6	1:5 000 [a]	10 years
Child safety	5.1	DRS 607–1, 9.5	1:5 000 [a]	10 years
Skid resistance	5.1	DRS 607–1, 9.4.13	1:5 000 [a]	10 years

Characteristic	Requirement Clause	Assessment method	Minimum frequency of inspection (units)	Document retention period
Durability of:				
— **load bearing capacity** against mechanical failure	5.2.5	DRS 607–1, 9.2 DRS 607–1, 9.3	1:5 000 [a]	10 years
— **securing** against mechanical failure	5.2.5	DRS 607–1, 9.4.6 (weighing) DRS 607–1, 9.4.6 (Inspection and test according Annex E)	1:5 000 [a]	10 years
— **skid resistance** against loss of grip	5.2.5	DRS 607–1, 9.4.13	1:5 000 [a]	10 years
for the design:				
Vents in covers	5.1	DRS 607–1, 9.4.1 Visible inspection	Every cover	5 years
Clear opening of manhole tops for man entry	5.1	DRS 607–1, 9.4.2 Measurement	1:5 000 [a]	5 years
Depth of insertion	5.1	DRS 607–1, 9.4.3 Measurement	1:5 000 [a]	5 years
Clearance	5.1	DRS 607–1, 9.4.4 Measurement	1:5 000 [a]	5 years
Compatibility of seatings	5.1	DRS 607–1, 9.4.5 Measurement	1:5 000 [a]	5 years
Handling of covers and gratings	5.1	DRS 607–1, 9.4.7	1:5 000 [a]	5 years
Slot dimensions of gratings	5.1	DRS 607–1, 9.4.8 Measurement	1:5 000 [a]	5 years
Dirt pans and dirt buckets	5.1	DRS 607–1, 9.4.9	1:5 000 [a]	5 years
Positioning of covers and gratings	5.1	DRS 607–1, 9.4.10	1:5 000 [a]	5 years
Flatness of manhole covers and gratings	5.1	DRS 607–1, 9.4.11	1:5 000 [a]	5 years
Concaveness of gratings	5.1	DRS 607–1, 9.4.12	1:5 000 [a]	5 years
Manhole tops with sealing feature	5.1	Visual inspection of presence of anchors	1:5 000 [a]	5 years
Frame depth	5.1	DRS 607–1, 9.4.15 Measurement	1:5 000 [a]	5 years
Opening angle of hinged covers/gratings	5.1	DRS 607–1, 9.4.16	1:5 000 [a]	5 years
Appearance	5.1	Visual inspection	1:5 000 [a]	5 years
Marking	Clause 9	Visual inspection	Every product	5 years
a At least every 6 months.				

7.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this Standard, the corrective measures taken to rectify the situation (e.g., a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

7.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

7.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

7.3.3 Product specific requirements

The FPC system shall address this Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan;

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters, etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

7.3.4 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 7.3.2 and 7.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this Standard are in place and correctly implemented; and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice; and

c) that the product complies with the product type samples, for which compliance of the product performance to that declared in the specifications has been verified.

All locations where final assembly or at least final testing of the relevant product is performed shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

7.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

7.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 7.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

8 Designation

Where required for specification and documentation purposes, product designation in accordance with this Standard shall consist of:

a) name of product (manhole top or gully top);

b) Standard number (DRS 607-4);

c) load class (see 5.1);

d) code related to the number of the parts of DRS 607 series to which the cover and the frame complies according to Table 6;

Table 6 — Designation according to the material of frame and cover/grating

Designation	Cover/grating in accordance with	Frame in accordance with
4/4	DRS 607–4	DRS 607–4
4/2	DRS 607–4	DRS 607–2
4/3	DRS 607–4	DRS 607–3
4/5	DRS 607–4	DRS 607–5
4/6	DRS 607–4	DRS 607–6

e) clear opening (CO in mm), e.g., 600 indicates CO = 600 mm;

f) securing method:

1) securing feature (F);

2) mass per unit area (W);

3) other methods (O);

g) skid resistance:

1) concrete (CR);

2) defined raised pattern (RP);

3) measured value of USRV (e.g., 40);

h) freeze-thaw resistance (+R) (if applicable).

Manhole tops and gully tops consisting of a combination of elements in accordance with DRS 607-2, DRS 607-3, DRS 607-4, DRS 607-5 and DRS 607-6 shall be designated with the number of the standard for which the cover meets the requirements of the relevant standard.

EXAMPLE 1 Designation of a manhole top according to DRS 607–4, class D 400, cover and frame made of concrete according to DRS 607–4 (4/4), with a clear opening CO 600 mm (600), other securing method (O), skid resistance (RP)

Manhole Top DRS 607–4 — D 400 – 4/4 – 600 – O – RP

EXAMPLE 2 Designation of a manhole top according to DRS 607–4, class A 15, consisting of cover and frame made of concrete according to DRS 607–4 (4/4), with a clear opening CO 400 mm (400), securing feature (F), skid resistance by concrete surface (CR)

Manhole Top DRS 607–4 — A 15 – 4/4 – 400 – F – CR

EXAMPLE 3 Designation of a manhole top according to DRS 607–4, class B 125, cover made of concrete according to DRS 607–4 and frame made of steel according to DRS 607–3 (4/3), with a clear opening CO (550 mm × 240 mm) (550 × 240), securing method mass per unit area (W), skid resistance covered by the concrete surface (CR), freeze–thaw resistant (+R)

Manhole Top DRS 607–4 — B 125 – 4/3 – 550 × 240 – W – CR+R

NOTE The designation provides a standardized pattern of designation from which a rapid and unequivocal description of an item is communicated.

9 Marking

Covers, gratings and frames of manhole tops and gully tops according to this Standard shall be marked as follows:

a) number of this Standard, i.e., DRS 607-4:2025;

b) appropriate class (e.g., B 125);

c) name and/or identification mark of the manufacturer;

d) factory of manufacture which may be in code;

e) year of manufacture (coded or not coded);

In addition, gratings, covers and frames of manhole tops and gully tops according to this Standard can be marked with:

a) additional markings relating to the intended application of the user;

b) product identification (name and/or catalogue number);

c) nominal mass in kilograms (kg).

Markings a) to f) of covers, gratings and frames shall be clear, permanent and an integral part of it. These markings shall not be applied by chemical adhesives.

All markings shall, where possible, be visible on the upper side (visible from the trafficked area) after the unit is installed. If this is not possible they may be placed on the underside of each element.

Markings a) and b) shall always be on the upper side of cover/grating.

Where the above is not practical, concrete elements shall be marked indelibly by stamping, casting or printing, in a clearly legible manner.

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Bibliography

[1] EN 1253 (all parts), *Gullies for buildings*

[2] EN 1433, *Drainage channels for vehicular and pedestrian areas — Classification, design and testing requirements, marking and evaluation of conformity*

[3] ISO 9001, *Quality management systems — Requirements (ISO 9001*

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