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Steel door frames — Specification

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Contents

Page

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 412 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 standards:

1) SANS 1129:2008, (Edition 1.4) *Steel door frames*

2) IS 4351:2003, *Steel door frames — Specifications*

3) ZS 357: 1996, *Pressed Steel Door Frames — Specification*

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

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.

GALFATOLES

HEROCEAN LTD

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MOTA ENGIL

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TKEA ENGINEERING

University of Rwanda/College of Science and Technology (UR/CST)

Rwanda Standards Board (RSB) – Secretariat

Steel door frames — Specification

1 Scope

This Committee Draft Rwanda -Standard lays down requirements regarding material, dimensions construction and sampling of steel door frames for internal and external use.

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.

RS ASTM A1008/A1008M: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

ASTM A580 / A580M-18 Standard Specifications for Stainless Steel Wire

RS ISO 4998 Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of structural quality

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

RS ISO 3574 Cold-reduced carbon steel sheet of commercial and drawing qualities

RS ISO 3575 Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of commercial and drawing qualities

ISO 12944-5 Paints and varnishes -- Corrosion protection of steel structures by protective paint systems -- Part 5: Protective paint systems

RS EAS 11 Galvanised plain and corrugated steel sheets — Specification

RS EAS 134 Cold rolled steel sections — Specification

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1

door frame

frame in which door leaf is hung

3.2

door leaf

single, independently moving panel of a door. The single-leaf door is the most common variety of doors. It features a single panel that fills an entire doorway space. Double-leaf doors, also known as French doors, have two panels that each open outward.

3.3

lot

not less than 10 and not more than 150 assembled door frames of the same type, materials, dimensions, construction, and (when relevant) handing, from one manufacturer, submitted at any one time for inspection

3.4

modular sizes

standard size as specified for example in Figure 1

3.5

profile

generic term used to describe the cross section shape of the frame

3.6

rebate

deep groove that is cut into the edge of a door frame to allow a tighter fit

Note: single rebate frame is a frame that has one of these grooves, and a dual rebate frame is a frame that has more than one. Dual rebate frames are much thicker (for example 50% thicker for composite doors) and offer the owner more security.

3.7

jamb

vertical steel door frame to which a door is hinged

3.8

transom

horizontal crossbar across the top of a door frame

Note: A transom is usually a decorative glass window at the top of the door.

3.9

slip-on drywall frame

term describing a 3-sided frame designed to be installed after the wall is erected and finished

3.10

grout

mixture of water, cement, and sand which is used to fill gaps or used as reinforcement in existing structures

3.11

mortar

mixture of sand, water, and cement or lime that is used to fix bricks, stones to each other when building walls or to fix a door frame to walls

Note: Grout differs from mortar in the quantity of cement and aggregates such as sand, stones, etc.. Refer to clauses 6.3 and 9.2.

3.12

sill

part of the door frame which runs along the bottom and sits directly on the floor foundation

Note: Sill is also known as threshold

4 Requirements

4.1 Materials

Steel door frames shall be manufactured from the materials conforming to at least one of the following standards given in Table 1. If steel other than specified above is used, it shall be agreed upon between the purchaser and the manufacturer

Table 1 — Material for door frames

S/N	Material	Reference
1	Mild steel sheet (cold rolled)	RS ISO 3574 or ASTM A1008 / A1008M
2	Galvanized steel sheets — Plain grade — Lock forming (GPL), Zinc coating 120 g/m^2 inclusive of both sides	RS EAS 11 or RS ISO 3575

4.2 Dimensions and Tolerances

4.2.1 Dimensions

4.3.1.1 The overall sizes and types of the door frames shall generally conform to the modular sizes as shown in Figure 1. However, sizes, types, other than those shown in Figure 1 as agreed to between the manufacturer and the purchaser are also permitted.

4.3.1.2 The sizes shown in Figure 1 are overall heights and widths to the outside of steel door frame. These sizes are derived after allowing a 5mm clearance on all four sides for the purpose of fitting the frame into modular openings.

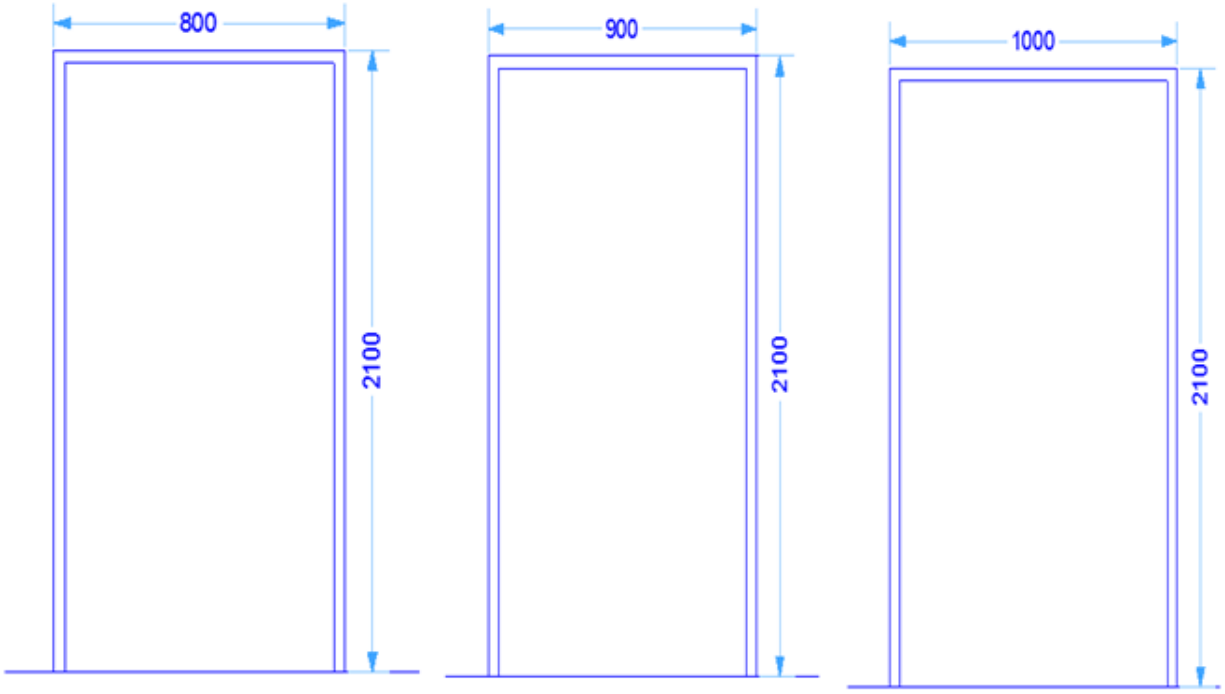

Figure 1 — Size of steel door frames

4.2.2 Tolerances

The sizes indicated in Figure 1 for steel door frames shall not vary by more than ± 2mm.

4.2.3 Profiles

Steel door frames profile (either single rebate or double rebate) shape, size, physical properties and tolerances shall be in accordance with the provision of RS EAS 134. It shall not be less than 1.2mm nominal thickness

5 Construction

5.1 Each door frame shall consist of hinge jamb, lock jamb and head, the whole of which shall be welded together or rigidly fixed by mechanical means. Two base ties shall be applied to the frame as shown in Figure 2.

5.2 The base ties of internal frames shall be braced with adjustable or rigidly fixed base ties to hold the frames rigid during transit and erection. The base ties may be fitted to suit the thickness of floor finish which should be stated when ordering.

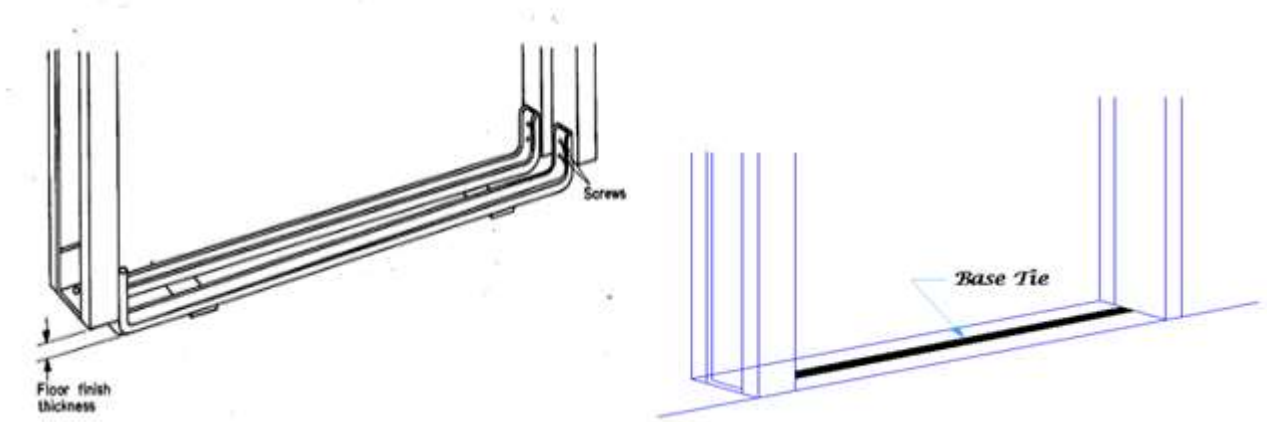

Figure 2 — adjustable base ties

6 Fittings

6.1 Fixing lugs

6.1.1. There shall be three adjustable lugs for each jamb to fix the door frame into the drywall. Additional fixing may be required by the Manufacturer or Engineer. The fixing lug shall be composed of the head and tail as shown on Figure 3.

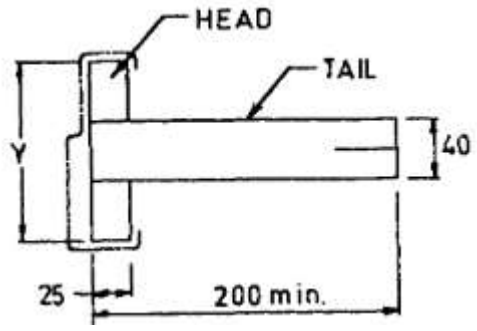

Figure 3 — fixing lugs dimensions

6.1.2. The head shall be made from flat steel strip 25mm wide and having nominal thickness of 1.25mm

6.1.3 The tail of the lugs shall be 200mm long and shall be made of steel strip not less than 40mm wide and having nominal thickness of 1.25mm.

6.2 Hinges

6.2.1 General

Hinges shall be made of mild steel sheet not less than 2.5mm nominal thickness. They shall have five knuckles and shall be fitted with a removable pin of minimum diameter 6mm. The leaves, pin and screws (where used) shall be zinc coated after manufacture, the method to be at the manufacturer's discretion. The leaves for screwing to the door shall have four countersunk holes.

6.2.2 Number of hinges required

Two (2) hinges shall be used for a 1.52m height steel door frame. One (1) additional hinge shall be used for each 0.52m additional height as shown in Figure 4.

Note: For a door frame of 2.04m (it has an additional 0.52m height which means 1.52m+0.52m), therefore, this door frame shall have three hinges.

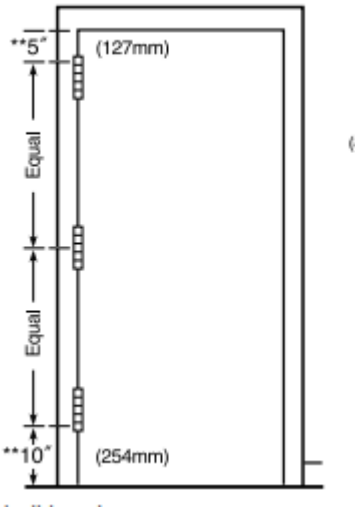

Figure 4 — Hinge(s) location on a steel door frame

6.2.3 Hinge fixings

Hinges shall be welded or screwed to the frame at the purchaser's discretion. The outer surface of the hinge leaf fitted to the frame shall not project above the surface of the rebate. Where screwed on hinges are used, there shall be a reinforcing plate fixed to the frame to which the hinge shall be screwed. The plate shall be of mild steel sheet not less than 2.5mm nominal thickness. The length of the plates shall not be less than 70mm greater than the length of the hinge. The edge of the holes shall be not less than the diameter of the hole from the edge of the plate.

6.3 Lock strike plate

Provision shall be made to fix lock strike plates of door locks or latches, a slot suitable for lock strike plate shall be pierced into the rebate of the frame and necessary fixing arrangement shall be provided as shown on Figure 5.

Note: There are different types of door locks (keyless entry system, mortise lock, etc.) and latches (night latch, etc.).

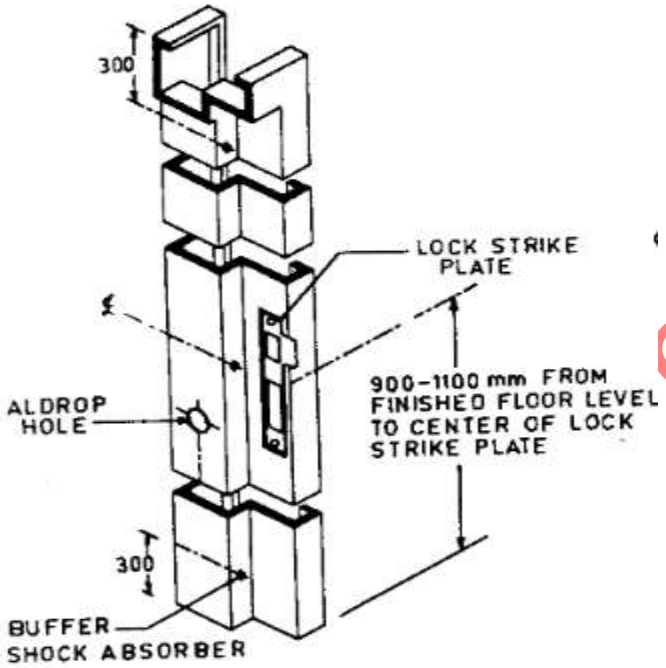

Figure 5 — Side hung door frame

6.4 Shock absorbers

For side-hung door, there should be not less than three buffers of rubber or other suitable material inserted in holes in the rebate in that case one shall be located at the centre of the lock jamb of frame and other two shall be 300mm from top and bottom of the frame as shown in Figure 4. For double leaf doors, two buffers shall be provided as shown in Figure 6.

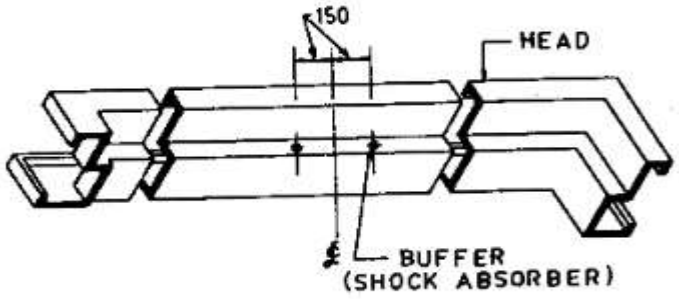

Figure 6 — Shock absorber for double leaf door frame

7 Finish

7.1 Pre-treatment

Methods to pre-treat the surface of the door frames, prior to painting or coating, shall be selected as per ISO 8504-1 to provide a cleaned surface free from rust, dirt, grease, oil, loose scale, weld spatter and any other foreign matter. Any other mechanical means such as sand and shot blasting or chemical means that can provide same degree of cleanliness may be applied.

7.2 Coatings

7.2.1 Galvanized coatings

7.2.1.1 Galvanized coatings on door frames and fittings made from pre-galvanized sheet shall comply with the coating requirement Z275 as referred to in ISO 4998.

7.2.1.2 Galvanized coatings on door frames and fittings (other than hinges) that are galvanized after manufacture shall comply with the relevant requirements of ISO 1461.

7.2.1.3 Galvanized coatings on hinges shall have been applied by hot-dipping or by another acceptable method, but in all cases the thickness of the coating shall be at least equal to the relevant value specified in ISO 1461.

7.2.1.4 Any small area of a galvanized coating that is impaired during welding or damaged in any other way shall be recoated with a zinc-rich epoxy-based primer.

7.2.2 Sprayed coatings

A sprayed zinc or aluminium coating shall comply with the relevant requirements of ISO 2063-1 and shall have a local thickness of at least 75 µm to all surfaces, including interior non-visible surfaces.

7.3 Paintings

7.3.1 All surfaces of the door frame, including interior non-visible surfaces, shall receive a factory prime coat complying with the provision of ISO 12944-5.

7.3.2 When specified, top coat and intermediate coats should be on all surfaces of the door frame exposed to view as part of paint finishing as per ISO 12944-5.

7.3.3 If door frames are not factory finish painted, a compatible coat of finish paint shall be applied in the field. The finish paint shall be of a type recommended for use on prime-painted steel. Consult the door and frame manufacturer's literature for description of primer used. The manufacturer of the finish paint should verify compatibility with the primer.

8 Workmanship

8.1 Door frames shall be free from:

a) dents

b) bends in the metal

c) Any other damage or defect (including scratches, chips, and runs in the coatings) that would impair their function, or serviceability or both.

8.2 The rebates of head members and transoms shall be correctly aligned with those of the jambs.

9 Storage and installation

9.1 Storage

8.1.1 Frames shall be stored vertically under cover. The units shall be placed on at least 102 mm high wood sills or in a manner that will prevent rust or damage.

8.1.2 The use of non-vented plastic or canvas shelters that can create a humidity chamber shall be avoided. A 6.3mm space between the door frames shall be provided with timber or similar blocking to promote air circulation.

8.1.3 Proper jobsite storage is extremely important in maintaining the quality and integrity of the factory applied paint.

8.1.4 Improper storage of material will have an adverse effect on the factory applied paint's ability to meet the requirements/criteria in Annex A.

9.2 Installation

8.2.1 All frames, other than drywall slip-on types, shall be fastened to the adjacent structure so as to retain their position and stability. Slip-on drywall frames shall be installed in prepared wall openings in accordance with manufacturer's instructions

8.2.2 Where grouting is required in masonry installations, frames shall be braced or fastened in such a way that will prevent the pressure of the grout from deforming the frame members. Grout shall be mixed to provide a 101.6mm maximum slump consistency and hand trowelled into place. Grout mixed to a thinner, "pumpable" consistency shall not be used. Excess water from thin consistency grout will cause premature rusting of steel frames and probable deformation or discoloration of certain wall constructions.

8.2.3 Steel frames, including fire rated-frames do not require grouting. Grouting shall not be used for frames installed in drywall walls.

10 Sampling

Sampling shall be done as per Annex A.

11 Marking

Each door shall be marked, in a non-permanently visible but accessible location, with the following:

a) The manufacturer's name or trade mark;

b) Any fire rating or other critical door performance information;

c) The certification mark of the standards body or certification body, if used.

Annex A
(normative)

Sampling of steel door frames

A.1 Scale of sampling

A.1.1 Lot in any consignment all the frames of the same size, designation, profile and manufactured under similar conditions of production shall be grouped together to constitute a lot.

A.1.2 Samples shall be selected and tested from each lot separately to determine its conformity or otherwise to the requirements of the standard.

A.1.3 The number of frames to be selected at random from a lot for inspection and testing shall depend upon the size of the lot and shall be in accordance with Table 1.

A.1.4 All frames selected in the sample shall be inspected for material (see 4.1), dimensions and tolerances (see 4.2), construction (see 5), fittings (see 6) finish (see 7) and marking (see 11)

Table 1 Sample size and permissible number of defective

S/N	Lot size	Sample size	Permissible number of defectives
1	1-15	3	0
2	16-25	5	0
3	26-50	8	0
4	51-100	13	1
5	101-150	20	2
6	151-300	32	3
7	301-500	50	5
8	Up to 500	80	7

A.2 Criteria for conformity

A frame which is found not meeting any one or more of these requirements inspected for (see A.1.5) shall be considered as defective

Annex B
(informative)

Ordering information and notes on fixing

B.1 When ordering a steel door frame, the purchaser should specify the following:

a) Handling of the door frame

b) Details of the profile

c) Dimensions of the door frame

d) Hinges type whether screwed or welded

e) Delivery conditions

B.2 The following instructions should be followed when fixing the door frames

f) Place the flame in position, ensuring that the base tie is set at correct height for appropriate finished floor level,

g) Plumb to ensure the flame is upright square and free from twist,

h) Fix temporary struts between the jambs to prevent them from bulging inwards due to the weight of the wall or partition,

i) Care should be taken not to distort the frame during construction,

j) Build the walls up each side at equal height,

k) Voids in back of frames should be filled in solid with mortar as the work proceeds,

l) The three lugs provided to each side should be spaced not more than 750mm apart,

m) Base ties should be removed after masonry has set and before finished floor is laid,

In instances where steel door frames are erected in pre-formed openings, or similar conditions resulting in a clearance between the joint face of the frame and the joint face of the wall partition, the clearance may be made up to suit the designer, with a filler piece architrave or other design solution.

Bibliography

[1] ANSI/ SDI A250.10, *Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames*

[2] Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames or ANSI/SDI A250.3

[3] BS EN 1245-1975 Standard (Pdf file): Specification for Metal door frames (steel)

[4] BS 1449-1.1:1991 Steel plate, sheet and strip. Carbon and carbon-manganese plate, sheet and strip. General specification

[5] Specifications for Standard Steel Doors and Frames (SDI-100) or ANSI/SDI A250.8-2017

[6] Methods for random sampling

DRS 402: 2019

ICS 91.060.50