Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 4351 (2003): Steel Door Frames - [CED 11: Doors, Windows and Shutter]

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartrhari—Nitisatakam
“Knowledge is such a treasure which cannot be stolen”
Indian Standard
STEEL DOOR FRAMES — SPECIFICATION
(Second Revision)

ICS 77.140.01; 91.060.50
FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Doors, Windows and Shutters Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1967 and revised in 1976. Major modifications made in this revision are given below:

a) Provision has been made for use of galvanized steel sheets,

b) 1.60 mm thick mild steel sheets have been permitted,

c) Two additional profiles have been introduced,

d) Powder coatings have been permitted, and

e) Other modifications based on the prevailing practices in the country have been made.

Recommendations for the installation of steel door frames are given in Annex A for guidance of the user.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2:1960 ‘Rules for rounding off numerical values (revised)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.
Indian Standard
STEEL DOOR FRAMES — SPECIFICATION
(Second Revision)

1 SCOPE
This standard lays down the requirement regarding material, dimensions and construction of steel door frames for internal and external use.

2 REFERENCES
The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the latest editions of the standards.

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>205 : 1992</td>
<td>Specification for non-ferrous metal butt hinges (fourth revision)</td>
</tr>
<tr>
<td>206 : 1992</td>
<td>Specification for tee and strap hinges (fourth revision)</td>
</tr>
<tr>
<td>277 : 1992</td>
<td>Galvanized steel sheets (plain and corrugated) — Specification (fifth revision)</td>
</tr>
<tr>
<td>362 : 1991</td>
<td>Specification for parliament hinges (fifth revision)</td>
</tr>
<tr>
<td>513 : 1994</td>
<td>Cold-rolled low carbon steel sheets and strips (fourth revision)</td>
</tr>
<tr>
<td>1341 : 1992</td>
<td>Specification for steel butt hinges (sixth revision)</td>
</tr>
<tr>
<td>1365 : 1978</td>
<td>Slotted countersunk head screws (third revision)</td>
</tr>
<tr>
<td>1477</td>
<td>Code of practice for painting of ferrous metals in buildings:</td>
</tr>
<tr>
<td>(Part 1) : 1971</td>
<td>Pretreatment (first revision)</td>
</tr>
<tr>
<td>(Part 2) : 1971</td>
<td>Painting (second revision)</td>
</tr>
<tr>
<td>2074 : 1992</td>
<td>Ready mixed paint, air drying, red oxide, zinc chrome, priming — Specification (second revision)</td>
</tr>
<tr>
<td>4043 : 1969</td>
<td>Recommendations for symbolic designation of direction of closing and faces of doors, windows and shutters</td>
</tr>
<tr>
<td>4905 : 1968</td>
<td>Methods for random sampling</td>
</tr>
<tr>
<td>6911 : 1992</td>
<td>Stainless steel plate, sheet and strip (first revision)</td>
</tr>
<tr>
<td>9106 : 1979</td>
<td>Specification for rising butt hinges</td>
</tr>
<tr>
<td>10428 : 1983</td>
<td>Glossary of terms relating to doors</td>
</tr>
<tr>
<td>12817 : 1997</td>
<td>Specification for stainless steel butt hinges (first revision)</td>
</tr>
<tr>
<td>13871 : 1993</td>
<td>Powder coatings — Specification</td>
</tr>
</tbody>
</table>

3 TERMINOLOGY
For the purpose of this standard, the definitions given in IS 10428 shall apply.

4 HANDLING
For the purpose of hinges provisions to the door frames and hardware fittings handing and direction of closing of doors shall be designated in accordance with IS 4043.

5 MATERIAL
Steel door frames shall be manufactured from the materials conforming to relevant Indian Standards as given in Table 1.

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Material</th>
<th>Thickness mm</th>
<th>Ref to, Indian Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>i)</td>
<td>Mild steel sheet (cold rolled)</td>
<td>1.25/1.60</td>
<td>IS 513</td>
</tr>
<tr>
<td>ii)</td>
<td>Galvanized steel sheets — Plain grade — Lock forming (GPL), Zinc coating 120 g/m² inclusive of both sides</td>
<td>1.00/1.25/1.60</td>
<td>IS 277</td>
</tr>
<tr>
<td>iii)</td>
<td>Stainless steel Grade — X07Cr17 (430) or X04Cr19N9 (304 S1)</td>
<td>1.00</td>
<td>IS 6911</td>
</tr>
</tbody>
</table>

6 STANDARD SIZES, TOLERANCES AND DESIGNATIONS

6.1 Sizes
The overall sizes and types of the door frames shall generally conform to the modular sizes as shown in Fig. 1. However, sizes, types, other than those shown in Fig. 1 as agreed to between the manufacturer and the purchaser may also be permitted.

6.1.1 The sizes shown in Fig. 1 are overall heights and widths to the outside of pressed steel door frame. These sizes are derived after allowing 5 mm clearance on all the four sides for the purpose of fitting the frame into modular openings.
6.2 Tolerances
The sizes indicated in Fig. 1 for door frames shall not vary by more than ± 2 mm.

6.3 Designation
Door frames shall be designated by symbols denoting width, type, profile and height on the following basis:
   a) P for pressed steel door frames; and
   b) A, B, C, D and E denoting profile.

6.3.1 The width and height will be denoted by the number of module, width being given at the beginning and height at the end, for example, 8-PA-21.

7 PROFILE
Steel door frames with or without fanlight shall be made in the five profiles as given in Table 2 (see Fig. 2).

7.1 Tolerance of ± 1 mm on all the dimensions of profile shall be permissible.

7.1.1 Any of the five profiles may be supplied to suit doors of either hand, opening inwards or outwards, as required by the purchaser.

Table 2 Profiles for Door Frames
(Clauses 7)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Profile</th>
<th>Size</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X mm</td>
<td>Y mm</td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>A</td>
<td>90</td>
<td>60</td>
</tr>
<tr>
<td>(4)</td>
<td>B</td>
<td>105</td>
<td>60</td>
</tr>
<tr>
<td>(5)</td>
<td>C</td>
<td>125</td>
<td>60</td>
</tr>
<tr>
<td>(6)</td>
<td>D</td>
<td>125</td>
<td>60</td>
</tr>
<tr>
<td>(7)</td>
<td>E</td>
<td>165</td>
<td>60</td>
</tr>
</tbody>
</table>

8 CONSTRUCTION
Each door frame shall consist of hinge jamb, lock jamb, head and steel base ties at the bottom of the door frames. The whole frame shall be welded or rigidly fixed together by mechanical means.

9 BASE TIES
Base ties shall be pressed mild steel angle of size 20 mm x 20 mm x 1.25 mm thick to suit floor thickness of 25, 30, 35 or 40 mm either screwed or welded as shown in Fig. 3.
* $T$ is the thickness of the shutter.

All dimensions in millimetres.

**FIG. 2 PROFILES OF PRESSED STEEL DOOR FRAMES**

**FIG. 3 ARRANGEMENT AT BASE OF DOOR FRAME**
10 FITTINGS

10.1 Fixing Lugs (Holdfasts)
There shall be three adjustable lugs (see Fig. 4A) with split end tail to each jamb without fanlight and four for jamb with fanlight.

10.1.1 The head of the fixing lug shall be of one of the following lengths:

- a) 85 mm long for use with profile A,
- b) 100 mm long for use with profile B,
- c) 120 mm long for use with profile C and D, and
- d) 160 mm long for use with profile E.

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

10.1.2 The tail of the lugs for use with profiles A, B, C, D and E shall be 200 mm long and shall be made of steel strip not less than 40 mm wide and having nominal thickness of 1.25 mm.

10.1.3 Frame shall be fixed to the R.C.C. column side by using fixing lugs/holdfasts as shown in Fig. 4B. The specification of these fixing lugs are same as per above fixing lugs/holdfasts (see Fig. 4A) except length of tail shall be minimum 300 mm, with holes for the plumbing nails of suitable size to fix the door frame with R.C.C. column.

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

10.1.2 The tail of the lugs for use with profiles A, B, C, D and E shall be 200 mm long and shall be made of steel strip not less than 40 mm wide and having nominal thickness of 1.25 mm.

10.1.3 Frame shall be fixed to the R.C.C. column side by using fixing lugs/holdfasts as shown in Fig. 4B. The specification of these fixing lugs are same as per above fixing lugs/holdfasts (see Fig. 4A) except length of tail shall be minimum 300 mm, with holes for the plumbing nails of suitable size to fix the door frame with R.C.C. column.

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

10.1.2 The tail of the lugs for use with profiles A, B, C, D and E shall be 200 mm long and shall be made of steel strip not less than 40 mm wide and having nominal thickness of 1.25 mm.

10.1.3 Frame shall be fixed to the R.C.C. column side by using fixing lugs/holdfasts as shown in Fig. 4B. The specification of these fixing lugs are same as per above fixing lugs/holdfasts (see Fig. 4A) except length of tail shall be minimum 300 mm, with holes for the plumbing nails of suitable size to fix the door frame with R.C.C. column.

All dimensions in millimetres.

* Tolerance on dimension 'Y' shall be ±mm.

FIG. 4 FIXING LUGS (HOLDFASTS) TO THE FRAME

4
10.1.4 The material of steel strips used for fixing lugs/holdfasts shall conform to IS 513 or IS 277.

10.1.5 The fixing lugs/holdfasts shall be painted with red oxide zinc chromate primer paint (see IS 2074) by brushing, spraying or dipping method.

10.2 Hinges

Frames shall be provided with any one type of the hinges, conforming to the relevant Indian Standards as given in Table 3.

Table 3 Hinges for Door Frames
(Clause 10.2)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Description</th>
<th>Size (in mm)/Designation</th>
<th>Ref to Indian Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Steel butt hinge—medium weight</td>
<td>100</td>
<td>1341</td>
</tr>
<tr>
<td>ii)</td>
<td>Stainless steel butt hinges medium weight</td>
<td>100</td>
<td>12817</td>
</tr>
<tr>
<td>iii)</td>
<td>Steel rising butt hinges</td>
<td>100</td>
<td>9106</td>
</tr>
<tr>
<td>iv)</td>
<td>Non-ferrous metal butt hinges</td>
<td>100C22</td>
<td>205</td>
</tr>
<tr>
<td>v)</td>
<td>Mild steel parliament hinges</td>
<td>75</td>
<td>362</td>
</tr>
<tr>
<td>vi)</td>
<td>Mild steel light weight tee hinges</td>
<td>300</td>
<td>206</td>
</tr>
</tbody>
</table>

10.2.1 For mild steel and galvanized plain steel sheet door frames, medium weight hinges of size 100 mm conforming to IS 1341, shall be used. For stainless steel frame, stainless steel butt hinges of size 100 mm conforming to IS 12817 shall be used. Hinges other than above as specified by the purchaser may be provided.

10.2.2 Hinges shall be provided as follows:

a) Frames for doors 1000 mm wide and below:
   Three hinges screwed to one jamb

b) Frames for doors more than 1000 mm wide:
   Six hinges for double leaf door, three screwed to each jamb or four hinges for single leaf door

10.2.3 In all cases the hinges shall be so fixed that the distance from the inside of the head rebate to the top of the upper hinges is about 200 mm and the distance from the bottom of the door frame to the bottom of the bottom hinge is also kept about 200 mm. The middle hinges shall be at equal distance from lower and upper hinges or as agreed to between the purchaser and the supplier.

10.2.4 Fixing of Hinges to the Frame

Hinges shall be screwed to the frame (see Fig. 5) by any one of the following method:

a) Mild steel plate of size 120 mm × 30 mm × 6 mm thick shall be welded inside to the frame. The plate shall be threaded to the required size of machine screw [M5 × 20 CSK] conforming to IS 1365 (see Fig. 5A),

b) Mild steel plate of size 120 mm × 30 mm × 6 mm thick shall be welded inside to the frame. The plate shall be threaded to the required size of machine screw [M5 × 20 CSK] conforming to IS 1365 (see Fig. 5A), and

c) Mild steel flat of size 150 mm × 30 mm × 2 mm thick shall be welded inside the pre-punched slot of the frame. The threaded inserts/nut M5 shall be fixed to the mild steel flat. The hinges shall be screwed with the machine screw M5 × 20 CSK conforming to IS 1365. Mortar guard made out of sheet 1.25 mm thick shall be welded from inside to each hinge (see Fig. 5B).

10.3 Mortar Guards

Mortar guard sheet 1.25 mm thick or of any other thickness shall be welded to the frame at the head of the frame having tower bolt holes. It shall also be welded to the frame behind the hinges, mortise locks and latches slots, aldrop and sliding bolts and tower bolt holes.

10.4 Aldrops, Sliding Bolts and Tower Bolts

Provisions shall be made for aldrops, sliding bolts and tower bolts in the frames as per the positions given by the purchaser. Necessary mortar guards/metallic or nylon bushes shall be provided inside the frames for aldrops, sliding bolts and tower bolts.

10.5 Lock Strike Plate

Provision shall be made to fix lock strike plates of mortise locks or latches, complying with the relevant Indian Standards. A slot suitable for lock strike plate shall be pierced into the rebate of the frame and necessary fixing arrangement and mortar guard from the inside of the frame shall be provided (see Fig. 6A).

10.6 Shock Absorbers

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

11 FINISH

11.1 Pre-treatment and Phosphating

11.1.1 Door Frames of Mild Steel (Cold Rolled)

The surface of the door frames manufactured from the
FIG. 5 Fixing of Hinge to the Frame

5A Fixing of Hinge to the Frame — Screwed to the M.S. Flat

5B Fixing of Hinge to the Frame — Screwed to the Nut

6A Side Hung Door Frame

All dimensions in millimetres.

Fig. 6 Location of Shock Absorbers, Lock-Strike Plate and Aldrop
material mild steel cold rolled shall be thoroughly cleaned free from rust, dirt, oil, etc, either by mechanical means, for example sand or shot blasting or by chemical means, for example pickling, and phosphating conforming to IS 1477 (Part 1), then finished with either painting or powder coating as may be agreed to between the purchaser and the manufacturer.

11.1.2 Door Frames of Galvanized Plain Steel Sheets
The surface of the door frames manufactured from the material galvanized plain steel sheet shall be pre-treated and phosphated by chemical means conforming to IS 1477 (Part 1). No pickling is required for galvanized surface. Then frames shall be finished with either painting or powder coating as may be agreed to between the purchaser and the manufacturer.

11.1.3 Stainless Steel Door Frames
The surface of the stainless steel frames shall be pre-treated as per the procedure laid down in IS 1477 (Part 1) in which pickling shall be carried out by using mixed acid of nitric plus hydrofluoric and then passivate the surface by using nitric acid followed by water rinsing and drying. Generally stainless steel door frames need no painting but if any purchaser require painted or powder coated frames to blend with the interior decor, this can be done by spray painting or by powder coating.

11.2 Painting
After pre-treatment and phosphating of the surface of the frames, two coats of any of the ready mixed paint, air drying, red oxide zinc chrome, priming (see IS 2074) shall be applied by brushing, spraying or dipping method as per procedure laid down in IS 1477 (Part 2).

Paint other than above may be used as agreed to between the purchaser and the manufacturer.

11.3 Powder Coatings
After pre-treatment and phosphating the surface of the frame shall be powder coated conforming to IS 13871. The colour, taken from colour shade card of indigenous powder manufacturer shall be used as agreed to between the purchaser and the manufacturer.

12 MARKING
12.1 Each door frame shall be marked with the name of the manufacturer or trade-mark, if any.

12.2 BIS Certification Marking
The product may also be marked with the Standard Mark.

12.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

13 SAMPLING
The method of drawing representative samples of steel door frames and the criteria for conformity shall be as given in Annex B.

14 DELIVERY
The purchaser shall supply the information as given in Annex C, when ordering for steel door frames.

ANNEX A
( Foreword )

RECOMMENDATIONS FOR INSTALLATION OF PRESSED STEEL DOOR FRAMES

A-1 INSTRUCTIONS
A-1.1 While fixing the pressed steel door frame, following instructions shall be followed:
   a) Place the frame in position at correct height from finished floor level.
   b) Plumb to ensure that frame is upright, square and free from twists.
   c) Pressed metal door frames are liable to develop bow in the heights or sag in the widths either during fixing or during subsequent building work. To avoid this, fix temporary struts across the widths preventing sides bulging inwards by the weight of wall or partitions.
   d) Build the walls up solid on each side after placing in position the door frame filled previously with cement grout 1 : 3 : 6 by volume.
   e) Three lugs shall be provided on each jamb and the lugs shall not be placed more than 750 mm apart.
   f) Do not remove temporary struts till brick work is set.
   g) In case screwed base tie is provided, leave it in position until floor is laid when it shall be removed.

7
ANNEX B

(Clause 13)

SAMPLING OF STEEL DOOR FRAMES

B-1 SCALE OF SAMPLING

B-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.

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

B-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 4.

B-1.4 The samples from the lot shall be selected at random and to ensure the randomness of selection, procedures given in IS 4905 may be followed.

B-1.5 All the frames selected in the sample shall be inspected for material (see 5), dimensions and tolerances (see 6), construction (see 8), base ties (see 9), fittings (see 10) and finish (see 11).

<table>
<thead>
<tr>
<th>Table 4 Sample Size and Permissible Number of Defectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si No.</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>(1)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>(i)</td>
</tr>
<tr>
<td>(ii)</td>
</tr>
<tr>
<td>(iii)</td>
</tr>
<tr>
<td>(iv)</td>
</tr>
<tr>
<td>(v)</td>
</tr>
</tbody>
</table>

B-2 CRITERIA FOR CONFORMITY

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

ANNEX C

(Clause 14)

INFORMATION TO BE SUPPLIED BY THE PURCHASER WHEN ORDERING

C-1 When ordering metal door frames, the purchaser shall clearly indicate the following:

a) Designation, size and profile of door frame (see 6 and 7);

b) For external doors, state whether the door is required to open inwards or outwards;

c) The handing of the door;

d) Type and location of lock, aldrip, tower bolts, etc; and

e) Thickness of door shutter.
Bureau of Indian Standards

BIS is a statutory institution established under the Bureau of Indian Standards Act, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of ‘BIS Catalogue’ and ‘Standards: Monthly Additions’.

This Indian Standard has been developed from Doc: No. CED 11 (6050).

Amendments Issued Since Publication

<table>
<thead>
<tr>
<th>Amend No.</th>
<th>Date of Issue</th>
<th>Text Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BUREAU OF INDIAN STANDARDS

Headquarters:
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones: 2323 0131, 2323 33 75, 2323 9402

Regional Offices:

Central: Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110 002

Tel: 2323 7617, 2323 3841

Eastern: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi
KOLKATA 700 054

Tel: 2337 8499, 2337 8561, 2337 8626, 2337 9120

Northern: SCO 335-336, Sector 34-A, CHANDIGARH 160 022

Tel: 60 3843, 60 9285

Southern: C.I.T. Campus, IV Cross Road, CHENNAI 600 113

Tel: 2254 1216, 2254 1442, 2254 2519, 2254 2315

Western: Manakalaya, E9 MIDC, Marol, Andheri (East)
Mumbai 400 093

Tel: 2832 9295, 2832 7858, 2832 7891, 2832 7892

Branches: AHMEDABAD, BANGALORE, BHOPAL, BHUBANESHWAR, COIMBATORE, FARIDABAD, GHAZIABAD, GUWAHATI, HYDERABAD, JAIPUR, KANPUR, LUCKNOW, NAGPUR, NALAGARH, PATNA, PUNE, RAJKOT, THIRUVANANTHAPURAM, VISAKHAPATNAM.

Printed at Prahat Offset Press, New Delhi-2