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दरवाजे और खिड़की में प्रयुक्त सामान्य फिटिंग/ हार्डवेयर

Common Fittings/Hardware Used in Door and Window



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Foreword

Indian railway holds the major chunk of civil engineering assets in the country. It is looked at as a premier organization in respect of quality and workmanship. It has been observed that various fittings/hardware used in door and window and the requirements of such fittings are available in staggered form.

CAMTECH has made a nice attempt to provide all the information about the common fittings/ hardware used in door and window at a glance for the field engineers. Efforts have been made to cover the codal requirements of such common fittings/ hardware.

I hope this handbook will certainly prove to be a valuable source of technical knowledge and will be quite helpful for civil engineering personnel not only in Indian Railway but also all over the country.

CAMTECH/Gwalior ***(Jitendra Singh)***
27 March, 2023 ***Principal Executive Director***

Preface

Indian Railway having a lot of stations, buildings, offices and residential accommodations is vast network spread all over India. Various fittings/ hardware were used in doors and windows of such assets. The requirements of such fittings are available in staggered form.

Objective of this handbook is to provide all information about the common fittings/ hardware used in door and window at a glance for the field engineers. Every effort has been made to make this handbook useful to civil engineering personnel.

This hand book does not supersede any existing information from Railway Board, RDSO, IRWM and Indian standards available on the subject. This book is not statutory& contents are for the purpose of guidance only. Most of the data, sketch and information mentioned here in available in some form or the other in various books or printed matter.

This handbook is the result of sincere efforts of Shri D.K.Shrivastava, SSE/CAMTECH, who collected and compiled information, data, etc. from different sources, and went through the complete text.

We welcome valuable suggestions from our readers for further improvements.

CAMTECH/Gwalior ***(Deepak Mehra)***
27 March, 2023 ***Director/Civil***

CONTENTS

SN	Description		Page No.
	Foreword		*i*
	Preface		*ii*
	Contents		*iii*
	Correction Slip		*iv*
1.0	**Common Fittings For Fixing Arrangement**		**1**
1.1	Butt Hinges (Non Ferrous)		1
1.2	Butt Hinges Ferrous		7
1.3	Parliament Hinges		10
1.4	Tee And Strap Hinges		13
1.5	Piano Hinges		19
2.0	**Common Fittings For Locking Arrangement**		**21**
2.1	Sliding Door Bolts		21
2.2	Tower Bolts Non Ferrous		27
2.3	Tower Bolts Ferrous		31
2.4	Flush Bolt		36
2.5	Hasps And Staples		38

2.6	Sliding Locking Bolts		41
2.7	Mortise Lock		43
2.8	Cupboard Lock		45
3.0	**Common Fittings For Handling Arrangement**		51
3.1	Handles		51
3.2	Handles For Mortise Lock		56
4.0	**Common Fittings For Controlling the Opening and Closer of Doors**		57
4.1	Hydraulic Door Closer		58
4.2	Floor Door Stopper		62
4.3	Hooks And Eye		65
4.4	Windows Stays		67
4.5	Chain With Hook		68
4.6	Fan Light Catch		71
4.7	Ball Catches		72
	References		74

संशोधन पर्चियों का प्रकाशन
ISSUE OF CORRECTION SLIPS

इस हस्तपुस्तिका के लिए भविष्य में प्रकाशित होने वाली संशोधन पर्चियों को निम्नानुसार संख्यांकित किया जाएगा :

The correction slips to be issued in future for this handbook will be numbered as follows:

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1.0 COMMON FITTINGS FOR FIXING ARRANGEMENT

Hinges are commonly used to fix the shutter with the frames. This is the most common fittings/hardware to be used. Various type of hinges may be used like butt, parliament, piano and Tee and strap hinges.

- Butt Hinges: These are used for hanging doors and windows. They may be ferrous or non ferrous.
- Parliament Hinges: If a door is to be open by 180 degree against the wall, Parliament hinges are used.
- Piano Hinges: These are used to fix shutters usually made of block board in cup boards and cabinets etc.
- Tee Hinges: These hinges are made for use with ledged braced and battened doors and other wide doors.

1.1 BUTT HINGES (NON FERROUS)

Butt hinges are essential fittings to fix the doors and windows properly. A brief about the requirements for butt hinges made from non-ferrous metals has been presented below.



1.1.1 Types of Butt hinges (Non Ferrous):

According to material used butt hinges are classified into following categories:

a) Extruded Aluminum Alloy Butt Hinges
b) Extruded Brass Butt Hinges
c) Cast Brass Butt Hinges
d) Sheet Brass Butt Hinges.

1.1.2 Dimensional Requirement and Tolerance of Butt Hinges (Non Ferrous):

Dimensional requirements and tolerance of each type of butt hinges (non ferrous) is described in tables below.

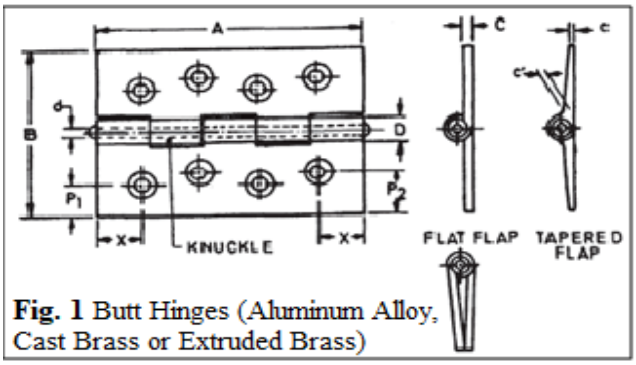


Fig. 1 Butt Hinges (Aluminum Alloy, Cast Brass or Extruded Brass)

Table-1 Dimensions of Extruded Aluminum Alloy Butt Hinges (Refer Fig. 1)

Hinge Designation	Length	Breadth	Butt Dia	Pin Dia	Thickness of Flap		Holes for Screw Designation	Nos. of Screw Hole
	A	B	D	d	C	C1		
150A22	150	75	14	5.60	4.0	4.8	12	12
125A22	125	75	14	5.60	4.0	4.8	12	10
125B21	25	63	13	5.60	4.0	4.8	10	10
125 B22	125	63	11	5.0	4.0	4.8	10	10
125 C22	125	63	10	3.55	3.2	4.0	10	10
100 A22	100	75	14	5.60	4.0	4.8	12	8
100 B21	100	63	13	5.60	4.0	4.8	10	8
100 B 22	100	63	11	5.0	4.0	4.8	10	8
100 C22	100	63	10	3.55	3.2	4.0	10	8
90 C22	90	63	10	3.55	3.2	4.0	10	8
75 C21	75	63	13	5.60	4.0	4.8	10	6
75 C22	75	63	11	5.0	4.0	4.8	10	6
75 D 22	75	63	10	3.55	3.2	-	9	6
75 F22	75	45	7	2.50	3.2	-	6	6
75 F 22	75	40	7	2.50	2.5	-	6	6
65 E 22	65	45	7	2.50	3.2	-	6	6
65 F 22	65	45	7	2.50	2.5	-	6	6
50 E 22	50	45	7	2.50	3.2	-	6	4
50 F22	50	40	7	2.50	2.5	-	6	4

Table- 2 Dimensions of Extruded Brass Butt Hinges (Refer Fig. 1)

Hinge Designation	Length	Breadth	Butt Dia	Pin Dia	Thickness of Flap	Holes for Screw Designation	Nos. of Screw Hole
	A	B	D	d	C		
150A11	150	75	11.5	5.0	5.0	12	12
150 A 12	150	75	9.5	4	4	11	12
125A11	125	75	11.5	5	5	12	10
125A 12	125	75	9.5	4	4	11	10
125 B11	125	65	9.5	4	4	10	10

125 B 12	125	65	7.5	3	3	10	10
125 C11	125	65	9.5	4	4	10	10
125C 12	125	65	7.5	3	3	10	10
125 C 21	125	60	9.5	4	4	10	10
125C21	125	65	7.5	3	3	10	10
100 A11	100	65	11.5	5	5	12	8
100A 12	100	65	9.5	4	4	11	8
100B11	100	65	9.5	4	4	10	8
100B 12	100	60	7.5	3	3	10	8
100 C11	100	55	9.5	4	4	10	8
100 C12	100	50	7.5	3	3	10	8
100 C22	100	60	7.5	3	3	10	8
100 C 32	100	55	7.5	3	3	10	8
100 D11	100	50	7.5	3	3	9	8
90 C11	90	55	7.5	3	3	10	8
90 D 11	90	50	7.5	3	3	9	8
75 C11	75	55	7.5	3	3	10	6
75 D 11	75	50	7.5	3	3	9	6
75 E 11	75	40	7.5	3	3	10	6
75 E 12	75	40	4.5	1.5	1.5	9	6
75 F 11	75	30	4.5	1.5	1.5	10	6
65 E 11	65	40	7.5	3	3	9	6
65 E 12	65	40	4.5	2	1.5	6	6
65 F 11	65	30	4.5	2	1.5	6	6
50 E 11	50	40	7.5	3	3	8	4
50 E 12	50	40	4.5	2	1.5	6	4
50 F11	40	40	4.5	2	1.5	6	4
40 F 11	40	40	4.5	2	1.5	6	4

Table-3 Dimensions of Cast Brass Butt Hinges (Refer Fig. 1)

Hinge Designation	Length	Breadth	Butt Dia	Pin Dia	Thickness of Flap	Holes for Screw Designation	Nos. of Screw Hole
	A	B	D	D	C		
150A11	150	85	12.5	5.5	5.5	12	12
150 A 12	150	85	11.5	5	5	12	12
125A11	125	85	12.5	5.5	5.5	12	10
125A 12	125	85	11.5	5	5	12	10
125 B11	125	75	11.5	5	5	12	10
125 B 12	125	75	9.5	4	4	10	10
125 C11	125	70	11.5	5	5	12	10
125C 12	125	70	9.5	4	4	10	10
125 C 21	125	65	11.5	5	5	12	10
125C22	125	65	9.5	4	4	10	10
100 A11	100	85	12.5	5.5	5.5	12	8
100A 12	100	85	11.5	5	5	12	8
100B11	100	75	11.5	5	5	12	8
100B 12	100	75	9.5	4	4	10	8
100 C11	100	70	11.5	5	5	12	8
100 C12	100	70	9.5	4	4	10	8
100 C21	100	65	11.5	5	5	12	8
100 C 22	100	65	9.5	4	4	10	8
100 C23	100	65	7.5	3	3	10	8
100 D11	100	55	9.5	4	4	10	8
90 C11	90	65	9.5	4	4	10	8
90 D 11	90	55	9.5	4	4	10	8
75 C11	75	65	9.5	4	4	10	6
75 D 11	75	55	9.5	4	4	10	6
75 E 11	75	40	8.0	3.5	3.5	8	6
75 E 12	75	40	6.5	2.5	2.5	6	6
75 F 11	75	35	6.5	2.5	2.5	6	6
65 E 11	65	60	8.0	3.5	3.5	8	6

65 E 22	65	40	6.5	2.5	2.5	6	6
65 F 11	65	35	6.5	2.5	2.5	6	6
50 E 11	50	40	8	3.5	3.5	8	4
50 E 12	50	40	6.5	2.5	2.5	6	4
50 F11	40	35	6.5	2.5	2.5	6	4
40 F11	40	35	6.5	2.5	2.5	6	4
30 F 11	30	25	6.5	2.5	2.5	4	4
25 F11	25	25	6.5	2.5	2.5	4	4

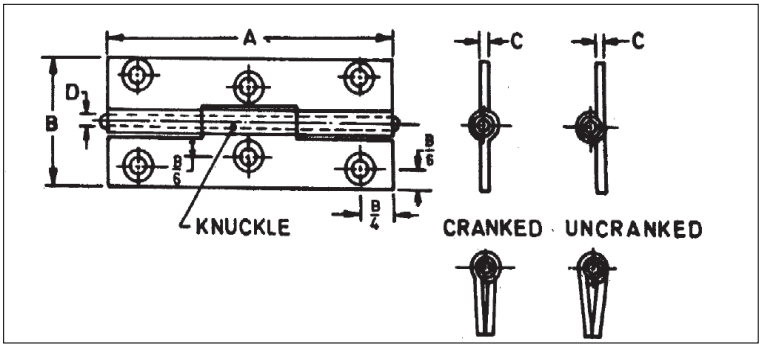


Fig-2 Sheet Brass Butt Hinge

Table- 4 Dimensions of Sheet Brass Butt Hinges (For Cabinet) (Refer Fig. 2)

Hinge Designation	**Length**	**Breadth**	**Thickness of Flap**	**Dia of Hinge Pin**	**Holes for Screw Designation**	**Nos. of Screw Hole**
	A	B	D	d		
25 SB	25	15	1.0	1.8	2	4
30 SB	30	15	1.0	1.8	4	4
40SB	40	20	1.25	2.0	4	6
50SB	50	25	1.25	2.0	4	6

Table-5 Tolerance of Dimensions of Hinges

SN	**Type**	**Length**	**breadth**	**But dia**	**Pin dia**	**Thickness of flap**
		A	B	D	d	C
1	Extruded aluminum alloy hinges	± 1	*Accordance with IS 2525:1982,or IS 3965:1981 or Is 280;1978			

2	Brass butt hinges	± 1	± 1	± 0.3	± 0.10	± 0.3
3	Cast brass butt hinges	± 1	± 1	± 0.3	± 0.10	± 0.3
4	Sheet brass butt hinges	± 1	± 1	± 0.3	± 0.10	± 0.3

1.1.3 General requirements:

- The hinge pin shall be made of mild steel or brass or stainless steel, in the case of brass hinges.
- It may also be made of phosphor bronze.
- The hinge pin shall be of aluminium alloy or mild steel (galvanized) or stainless steel in case of aluminium alloy hinges.
- The aluminium alloy hinge pin shall be hard anodized to a minimum thickness of 0.015 mm and sealed with oil, wax or lanolin.
- The hinge pin shall be firmly riveted or suitably notched and shall be properly finished.
- The movement of the hinges shall be free, easy and square, and shall not have any play or shake.
- Washers shall be provided between the knuckles and these shall be of the same diameter as the butt and shall be made of nylon, plastic, stainless steel or other suitable material.
- Hinges shall be free from all defects. All sharp edges shall be rounded.
- Brass hinges shall have bright or satin finish and shall be suitably protected against discoloration.
- Aluminium alloy hinges shall be anodized and the quality of anodized finish shall not be less than Grade AC 10 of IS 1868 :1982
- All screw holes shall be countersunk. The screw holes shall be suitable for countersunk head wood screws conforming to IS 6760: 1972.
- The size of the holes shall be such that when it is countersunk it shall be able to accommodate the full depth of countersunk head of the wood screw specified
- The number of knuckles in each hinge specified in Tables 1 to 4 shall not be less than five.
- The number of knuckles in case of cast brass hinges (see Table 3) of sizes less than 40 mm and in the case of sheet brass hinges specified in Table 4 shall not be less than three.

1.1.4 Scale of sampling and criteria of conformity:

Scale of sampling and criteria of conformity is given in Table-6.

Table-6 Scale of Sampling and Criteria of Conformity

Lot size	Sample size	Permissible nos. of defective hinges
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	55	3

1.1.5 References:

- Indian standard IS 205:1992
- CPWD DSR item no.378,379.381,382,383,384,687 to 694

1.2 STEEL BUTT HINGES



As mentioned earlier, butt hinges are essential fittings to fix the doors and windows properly. Steel butt hinges are also commonly used. Brief information about the requirements for Steel butt hinges has been given below.

.

1.2.1 Type of Steel Butt Hinge: Mild steel butt hinges shall be of the following types:

a)	Light weight hinges	(Table 1)
b)	Medium weight hinges	(Table 2)
c)	Broad type hinges	(Table 3)
d)	Square type hinges	(Table 4)
e)	Heavy type I and II hinges	(Tables 5 and 6)

1.2.2 Dimensional Requirements and Tolerance of Steel Butt Hinges:

Dimensional requirements and tolerance of each hinges are given in following tables.

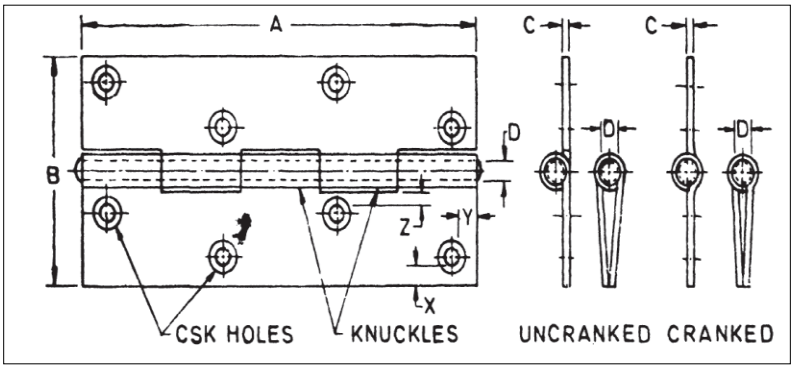


Fig-1

Table-1 Dimensions and Tolerance of Light Weight Mild Steel Butt Hinges (Refer Fig-1)

Size	Length	Breadth	Thickness of Flap	Dia. of Hinge Pin	Nos. of Knuckles	No. Of Screw Holes	Holes for Screw No.
	A	B	C	D			
15	15±0.50	18±1	0.63±0.04	2.0±0.08	3	4	2
25	25±0.50	22±1	0.71±0.04	2.0±0.08	3	4	2
40	40±0.50	25±1	0.80±0.04	2.50±0.08	3	4	3
50	50±0.50	30±1	0.90±0.04	2.80±0.08	3	4	3

65	65±0.50	35±1	1.00±0.04	3.15±0.08	5	6	4
75	75±0.50	40±1	1.12±0.04	3.15±0.08	5	6	5
100	100±0.50	50±1	1.25±0.06	3.55±0.08	5	8	6

Table-2 Medium Weight Mild Steel Butt Hinges (Refer Fig-1)

Size	Length	Breadth	Thickness of Flap	Dia. of Hinge Pin	Nos. of Knuckles	No. of Screw Holes	Holes for Screw No.
	A	B	C	D			
20	20±0.50	20±1	1.20±0.06	2.0±0.08	3	4	3
25	25±0.50	25±1	1.25±0.06	2.24±0.08	3	4	4
40	40±0.50	30±1	1.40±0.06	2.50±0.08	3	4	5
50	50±0.50	37±1	1.50±0.06	3.15±0.08	3	4	6
65	65±0.50	42±1	1.60±0.06	3.55±0.08	5	6	6
75	75±0.50	47±1	1.70±0.06	4.0±0.08	5	6	7
90	90±0.50	52±1	1.80±0.06	5.0±0.08	5	6	7
100	100±0.50	58±1	1.90±0.06	5.60±0.08	5	8	8
125	125±0.50	65±1	2.12±0.08	5.60±0.08	5	8	9
150	150±0.50	75±1	2.24±0.08	6.30±0.08	5	8	10

Table-3 Broad Type Mild Steel Butt Hinges (Refer Fig-1)

Size	Length	Breadth	Thickness Of Flap	Dia. of Hinge Pin	Nos. of Knuckles	No. of Screw Holes	Holes for Screw No.
	A	B	C	D			
50	50±0.50	45±1	1.50±0.06	4.0±0.08	3	4	6
75	75±0.50	60±1	1.70±0.06	5.0±0.08	5	6	7
100	100±0.50	70±1	1.90±0.06	5.60±0.08	5	8	8
125	125±0.50	80±1	2.12±0.08	6.30±0.08	5	8	10
150	150±0.50	100±1	2.24±0.08	7.10±0.08	5	8	10

Table-4 Square Type Mild Steel Butt Hinges (Refer Fig-1)

Size	Length	Breadth	Thickness of Flap	Dia. of Hinge Pin	Nos. of Knuckles	No. of Screw Holes	Holes for Screw No.
	A	B	C	D			
50	50±0.50	50±1	1.70±0.06	5.0±0.08	3	4	6
65	65±0.50	65±1	1.80±0.06	5.60±0.08	5	6	8
75	75±0.50	75±1	2.00±0.06	5.90±0.08	5	6	8
90	90±0.50	90±1	2.25±0.06	5.90±0.08	5	6	9
100	100±0.50	100±1	2.50±0.06	6.30±0.08	5	8	9

Table-5 Heavy Weight Type I Mild Steel Butt Hinges (Refer Fig-1)

Size	Length	Breadth	Thickness of Flap	Dia. of Hinge Pin	Nos. of Knuckles	No. of Screw Holes	Holes For Screw No.
	A	B	C	D			
50	50±0.50	40±1	2.50±0.06	4.0±0.08	3	6	8

65	65±0.50	50±1	2.80±0.06	5.0±0.08	3	6	8
75	75±0.50	60±1	3.15±0.06	5.00±0.08	5	6	9
90	90±0.50	65±1	3.15±0.06	5.0±0.08	5	6	9
100	100±0.50	75±1	3.55±0.08	6.30±0.08	5	8	12
125	125±0.50	90±1	4.00±0.08	7.10±0.08	5	8	12
150	150±0.50	100±1	4.50±0.10	8.0±0.08	5	8	12
175	175±0.50	115±1	5.0±0.10	9.0±0.08	5	10	14
200	200±0.50	130±1	6.0±0.10	10.0±0.08	5	10	11

Table -6 Heavy Weight Type II Mild Steel Butt Hinges (Refer Fig-1)

Size	**Length**	**Breadth**	**Thickness Of Flap**	**Dia Of Hinge Pin**	**Nos. Of Knuckles**	**No. Of Screw Holes**	**Holes For Screw No.**
	A	B	C	D			
50	50±0.50	38±1	2.0±0.06	3.15±0.08	3	6	6
65	65±0.50	43±1	2.10±0.06	3.55±0.08	5	6	6
75	75±0.50	48±1	2.45±0.06	4.00±0.08	5	6	7
90	90±0.50	53±1	2.50±0.06	5.0o±0.08	5	6	7
100	100±0.50	59±1	2.60±0.08	5.60±0.08	5	8	8
125	125±0.50	65±1	2.80±0.08	5.60±0.08	5	8	9
150	150±0.50	75±1	2.80±0.10	6.30±0.08	5	8	10
175	175±0.50	80±1	3.20±0.10	6.30±0.08	5	10	11
200	200±0.50	90±1	3.50±0.10	6.30±0.08	5	10	11

1.2.3 General Requirements for Steel Butt Hinges:

- Hinges shall be well made and shall be free from flaws and defects of all kinds.
- All hinges shall be cut clean and square and shall be provided with mild steel hinge pins.
- The hole for the hinge pin shall be central and square to the knuckles.
- All sharp edges and corners shall be removed.
- Unless otherwise specified hinges shall be finished bright with smooth surfaces.

1.2.4 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is given in table -7

Table-7 Scale of Sampling and Criteria of Conformity

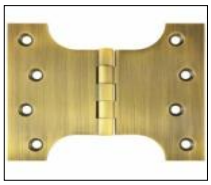
Lot size	**Sample size**	**Permissible nos. of defective steel hinges**
Up to 150	5	0
151 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	80	5

1.2.5 References:

- Indian standard 1341:1992
- CPWD DSR no. 642, 643, 644, 9.55.1 to 9.55.4

1.3 PARLIAMENT HINGE

Parliament hinges are used for fixing the doors, if a door is to be opened by 180 degree against the wall.



1.3.1 Type: Depending upon the material, parliament hinges are of the following types.

a) Aluminium Alloy Parliament Hinge
b) Cast Brass Parliament Hinge
c) Mild Steel Parliament Hinge

1.3.2 Dimensional Requirement and Tolerance of Parliament Hinge: Dimensional requirement and tolerance are given in following tables and reference Fig-1.

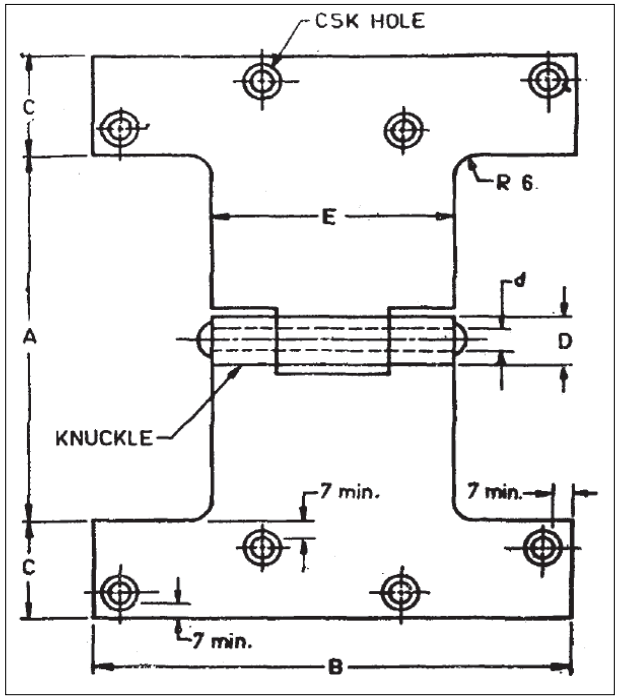


Fig- 1 Parliament Hinge

Table-1 Aluminium Alloy Parliament Hinges (Refer Fig-1)

Size of Hinges	Width Between Flange	Length	Width	Dia. of Butt	Dia. of Pin	Length of Joint	Thickness of Flap	Nos. of Screw Holes	Hole for Screw Designation
50	50±1	100±1	20±1	10.5	4.5	48	3	6	8
65	65±1	100±1	20±1	10.5	4.5	48	3	6	8
75	75±1	100±1	20±1	10.5	4.5	48	3	6	8
100	100±1	125±1	27±1	16.5	6.3	63	5	8	10

125	125±1	125±1	27±1	16.5	6.3	63	5	8	10
150	150±1	125±1	27±1	16.5	6.3	63	5	8	10
175	175±1	125±1	27±1	16.5	6.3	63	5	8	10
200	200±1	125±1	27±1	16.5	6.3	63	5	8	10

* The hinge pin shall be of mild steel or aluminium alloy in the case of aluminium alloy hinges.

Table-2 Cast Brass Parliament Hinges (Refer Fig-1)

Size of Hinges	Width Between Flange	Length	Width	Dia. of Butt	Dia. of Pin	Length of Joint	Thickness of Flap	Nos. of Screw Holes	Hole for Screw Designation
50	50±1	100±1	20±1	8±0.3	4.5±0.10	48±1	3.5±0.3	6	8
65	65±1	100±1	20±1	8±0.3	4.5±0.10	48±1	3.5±0.3	6	8
75	75±1	100±1	20±1	8±0.3	4.5±0.10	48±1	3.5±0.3	6	8
100	100±1	125±1	27±1	12.5±0.3	6.5±0.10	63±1	5±0.3	8	10
125	125±1	125±1	27±1	12.5±0.3	6.5±0.10	63±1	5±0.3	8	10
150	150±1	125±1	27±1	12.5±0.3	6.5±0.10	63±1	5±0.3	8	10
175	175±1	125±1	27±1	12.5±0.3	6.5±0.10	63±1	5±0.3	8	10
200	200±1	125±1	27±1	12.5±0.3	6.5±0.10	63±1	5±0.3	8	10

Table-3 Mild Steel Parliament Hinges (Refer Fig-1)

Size of Hinges	Width Between Flange	Length	Width	Dia. of Butt	Dia. of Pin	Length of Joint	Thickness of Flap	Nos. of Screw Holes	Hole for Screw Designation
50	50±2	100±1	20±1	-	6.3±0.06	48±1	2.24±0.08	6	8
65	65±2	100±1	20±1	-	6.3±0.06	48±1	2.24±0.08	6	8
75	75±2	100±1	20±1	-	6.3±0.06	48±1	2.24±0.08	6	8
100	100±3	125±1	27±1	-	8±0.06	63±1	2.5±0.06	8	10
125	125±3	125±1	27±1	-	8±0.06	63±1	2.5±0.06	8	10
150	150±3	125±1	27±1	-	8±0.06	63±1	2.5±0.06	8	10
175	175±3	125±1	27±1	-	8±0.06	63±1	2.5±0.06	8	10
200	200±3	125±1	27±1	-	8±0.06	63±1	2.5±0.06	8	10

1.3.3 General Requirements for Parliament Hinge:

- Hinges shall be well made and shall be free from flaws and defects of all kinds.
- All hinges shall be cut clean and square and shall be provided with hinge pins.
- The hole for the hinge pin shall be central and square to the knuckles. All sharp edges and corners shall be removed.
- The sides of the knuckle shall be straight and at right angles to the flap.
- The movement of the hinges shall be free, easy and square and shall not have any play or shake.
- Washer shall be provided between the knuckles for Cast Brass and Extruded Aluminium Alloy Parliament Hinges.
- The washer shall be of the same diameter as the butt and shall be made of nylon, plastic or any other suitable material.
- The hinge pins shall fit inside the knuckle firmly.
- The riveted head shall be well formed so as not to allow any play or shake, and shall allow easy movement of the hinge, but shall not cause looseness.

- The hinge pin shall be made of mild steel or brass. In the case of brass hinges, however, the hinge pin may be made of phosphor bronze.
- All screw holes shall be clean and countersunk.
- The screw holes shall be suitable for countersunk head wood screws *(see* IS 6760: 1972) of the numbers specified in Tables 1 to 3 for different sizes elf hinges. The number of holes to be punched in hinges of different sizes shall be as specified in Tables 1 to 3.
- The centre line of the holes shall be parallel to the pin.
- When only three screw holes are provided in each flap, they shall be in one line but when more than three holes are provided in each flap they shall be distributed in zig-zag manner as shown in Fig, 1.
- The minimum distance from the ends of the flap, either parallel to the pin or across it, shall not be less than 7 mm.
- The distance of the end of hole nearest to inner edge, where holes are provided in zig-zag manner from the inner edge of the flap, shall also be not less than 7 mm.
- All screw holes in each flap shall be equidistant from one another.
- Brass parliament hinges shall have either bright or satin finish and shall be suitably protected against discoloration.
- Aluminum alloy hinges shall be anodized to a bright, natural, mat or satin finish or dyed.
- For exterior use- the thickness of anodic coating shall not be less than Grade AC 25 of IS 1868: 1982.
- Mild steel parliament hinges shall be finished bright or electro-galvanized.

1.3.4 Scale of Sampling and Criteria for Conformity: Scale of sampling and criteria for conformity is given in table-4.

Table -4 Scale of Sampling and Criteria for Conformity

Lot size	Sample size	Permissible no. of defective
Up to150	13	0
151 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	80	5

1.3.5 Reference:

- Indian standard 362:1991
- CPW DSR no. 385,386,387,644,645,646,649

1.4 TEE AND STRAP HINGE

Tee hinges are used with ledged braced and battened doors and other wide doors.

Strap hinges are typically used for door hinges such as barn doors, shed doors, and garage doors, cabinet hinges.



1.4.1 Type: Tee hinges are classified into following categories:

a)	Light weight (Type 1)	(Table-1)
b)	Light weight (Type 2)	(Table-2)
c)	Medium weight (Type 1)	(Table-3)
d)	Medium weight (Type 2)	(Table-4)
e)	Heavy weight (Type 1)	(Table-5)
f)	Heavy weight (Type 2)	(Table-6)
g)	Heavy weight (Type 3)	(Table-7)

1.4.2 Dimensional Requirement and Tolerance of Tee Hinges: Dimensional requirement and tolerance of Tee hinges are given in following tables.

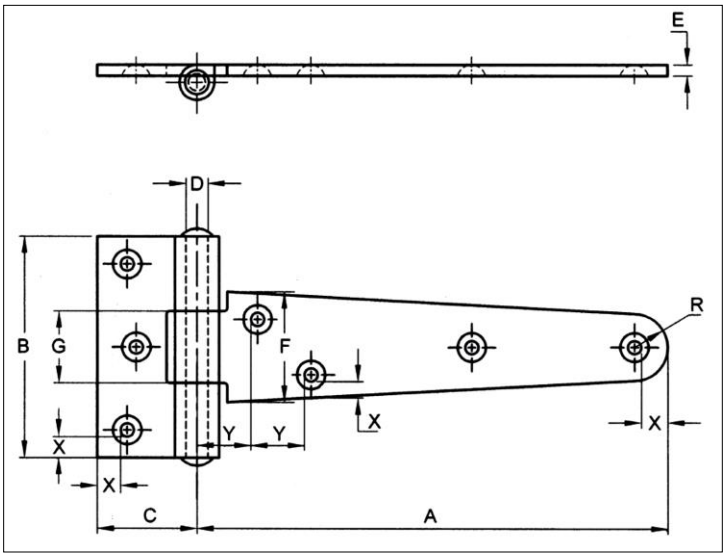


Fig-1 Mild Steel Tee Hinge

Table-1 Light Weight Tee Hinges Type I (Refer Fig-1)

	Size								
	75	100	125	150	200	250	300	350	400
A	75±2	100±2	125±2	150±2	200±2	250±2	300±2	350±2	400±2
B	60±1	65±1	65±1	65±1	70±1	80±1	100±1	105±1	120±1
C	20±1.5	20±1.5	20±1.5	20±1.5	25±1.5	30±1.5	30±1.5	35±1.5	35±1.5
D	2.80±0.05	3.15±0.05	3.15±0.05	3.15±0.05	4.0±0.05	4.0±0.05	5.0±0.05	5.0±0.05	5.60±0.06
E	1.60±0.10	1.60±0.10	1.60±0.10	1.60±0.10	1.60±0.10	2.00±0.10	2.0±0.10	2.0±0.10	2.24±0.10

F	25±2	30±2	30±2	30±2	30±2	35±2	40±2	50±2	50±2
G	20±1	25±1	25±1	25±1	25±1	30±1	35±1	45±1	45±1
R	5±1	6±1	6±1	6±1	8±1	8±1	8±1	9±1	9±1
Size Designation of Screw Hole	6	6	6	6	8	8	8	9	9
Nos. of Hole in Straps	3	3	5	5	5	6	6	7	7
Nos. of Hole in Tee	3	3	3	3	3	3	3	4	4
X Min	4	4	4	4	5	6	8	8	8
Y Min	10	10	10	10	10	15	20	20	25

Table-2 Light Weight Tee Hinges Type II (Refer Fig-1)

	Size				
	100	150	200	250	300
A	100±2	150±2	200±2	250±2	300±2
B	65±1	70±1	80±1	80±1	100±1
C	18±1.5	20±1.5	25±1.5	25±1.5	25±1.5
D	4±0.05	4±0.05	4.5±0.05	4.5±0.05	5.6±0.05
E	1.20±0.10	1.40±0.10	1.40±0.10	1.40±0.10	1.60±0.10
F	25±2	35±2	35±2	35±2	45±2
G	24±1	24±1	28±1	28±1	35±1
R	6±1	6±1	8±1	8±1	8±1
Size Designation of Screw Hole	6	6	6	6	6
Nos. of Hole in Straps	3	3	3	3	3
Nos. of Hole in Tee	3	4	4	4	4
X Min	4	5	5	6	8
Y Min	10	10	10	15	20

Table-3 Medium Weight Tee Hinges Type I (Refer Fig-1)

	Size										
	75	100	125	150	200	250	300	350	400	450	500
A	75±2	100±2	125±2	150±2	200±2	250±3	300±3	350±3	400±3	450±3	500±3
B	65±1	70±1	75±1	75±1	90±1	100±1	115±1	120±1	135±1	140±1	150±1
C	20±1.5	20±1.5	25±1.5	25±1.5	30±1.5	30±1.5	35±1.5	35±1.5	35±1.5	45±1.5	50±1.5
D	3.15±0.05	3.15±0.05	4.0±0.05	4.0±0.05	5.0±0.05	5.60±0.06	6.30±0.06	6.30±0.06	6.30±0.06	8.0±0.06	10±0.06
E	1.60±0.10	1.60±0.10	1.60±0.10	1.60±0.10	2.00±0.10	2.24±0.10	2.24±0.10	2.50±0.10	2.50±0.10	2.50±0.10	3.15±0.10
F	25±2	30±2	35±2	40±2	45±2	45±2	50±2	55±2	60±2	60±2	65±2
G	20±1	25±1	30±1	35±1	40±1	40±1	45±1	50±1	55±1	55±1	60±1
R	5±1	6±1	6±1	6±1	8±1	8±1	8±1	8±1	8±1	9±1	9±1
Size Designation of Screw Hole	6	6	8	8	8	9	9	10	10	12	12

Nos. of Hole in Straps	3	3	4	4	4	5	5	7	7	7	8
Nos. of Hole in Tee	3	3	3	3	3	3	3	4	4	4	4
X Min	4	4	4	4	5	6	8	8	8	10	10
Y Min	10	10	10	10	10	15	20	20	20	25	25

Table -4 Medium Weight Tee Hinges Type II (Refer Fig-1)

	Size											
	100	125	150	200	250	300	350	380	400	450	500	600
A	100±2	125±2	150±2	200±2	250±2	300±2	350±2	380±2	400±2	450±2	500±2	500±2
B	65±1	75±1	75±1	80±1	90±1	100±1	115±1	115±1	125±1	30±1	150±1	150±1
C	20±1.5	25±1.5	25±1.5	25±1.5	25±1.5	30±1.5	30±1.5	30±1.5	35±1.5	35±1.5	50±1.5	50±1.5
D	4.0 ±0.05	4.5 ±0.05	4.5 ±0.05	5.6 ±0.06	5.6 ±0.06	5.6 ±0.06	6.3 ±0.06	6.3 ±0.06	7.0 ±0.06	8.0 ±0.06	10 ±0.06	10 ±0.06
E	1.5 ±0.10	1.6 ±0.10	1.6 ±0.10	1.7 ±0.10	1.7 ±0.10	1.7 ±0.10	1.7 ±0.10	1.8 ±0.10	2.2 ±0.10	2.2 ±0.10	2.3 ±0.10	2.3 ±0.10
F	30±2	35±2	35±2	40±2	45±2	50±2	55±2	55±2	55±2	55±2	60±2	70±2
G	25±1	29±1	30±1	35±1	35±1	40±1	48±1	48±1	48±1	48±1	60±1	60±1
R	6±1	8±1	8±1	9±1	9±1	9±1	10±1	10±1	10±1	12±1	12±1	12±1
Size Designation of Screw Hole	8	8	8	8	8	8	8	8	10	10	12	12
Nos. of Hole in Straps	3	3	3	3	3	3	4	4	4	4	4	4
Nos. of Hole in Tee	3	3	3	4	4	4	4	5	5	5	6	6
X Min	4	4	4	6	6	8	8	8	8	10	10	10
Y Min	10	10	10	15	15	20	20	20	25	25	25	25

Table -5 Heavy Weight Tee Hinges Type I (Refer Fig-1)

	Size								
	150	200	250	300	350	400	450	500	600
A	150±2	200±2	250±2	300±2	350±4	400±4	450±4	500±4	600±4
B	100±1	115±1	115±1	125±1	125±1	135±1	135±1	150±1	165±1
C	30±1.5	40±1.5	40±1.5	45±1.5	45±1.5	50±1.5	50±1.5	65±1.5	70±1.5
D	8.0±0.06	10±0.06	10±0.06	10±0.06	10±0.06	12±0.06	12±0.06	12±0.06	12±0.06
E	3.15±0.10	3.15±0.10	3.15±0.10	3.15±0.10	3.15±0.10	4.15±0.10	4.15±0.10	5.0±0.10	5.0±0.10
F	50±2	55±2	60±2	60±2	60±2	65±2	65±2	70±2	75±2
G	40±1	45±1	50±1	50±1	50±1	55±1	55±1	60±1	65±1
R	8±1	8±1	8±1	9±1	9±1	9±1	10±1	10±1	10±1
Size Designation of Screw Hole	10	10	10	10	10	12	12	14	14
Nos. of Hole in Straps	4	4	4	6	6	7	7	8	8
Nos. of Hole in Tee	3	3	4	4	4	4	4	4	4
X Min	6	6	8	8	8	8	10	10	10
Y Min	10	10	20	20	20	20	25	25	25

Table -6 Heavy Weight Tee Hinges Type II (Refer Fig-1)

	Size								
	150	200	250	300	350	400	450	500	600
A	150±2	200±2	250±2	300±2	350±4	400±4	450±4	500±4	600±4
B	100±1	115±1	115±1	125±1	125±1	135±1	135±1	150±1	165±1
C	30±1.5	40±1.5	40±1.5	45±1.5	45±1.5	50±1.5	50±1.5	65±1.5	70±1.5
D	8.0±0.06	10±0.06	10±0.06	10±0.06	10±0.06	12±0.06	12±0.06	12±0.06	12±0.06
E	3.15±0.10	3.15±0.10	3.15±0.10	3.15±0.10	3.15±0.10	4.15±0.10	4.15±0.10	5.0±0.10	5.0±0.10
F	50±2	55±2	60±2	60±2	60±2	65±2	65±2	70±2	75±2
G	40±1	45±1	50±1	50±1	50±1	55±1	55±1	60±1	65±1
R	8±1	8±1	8±1	9±1	9±1	9±1	10±1	10±1	10±1
Size Designation of Screw Hole	10	10	10	10	10	12	12	14	14
Nos. of Hole in Straps	4	4	4	6	6	7	7	8	8
Nos. of Hole in Tee	3	3	4	4	4	4	4	4	4
X Min	6	6	8	8	8	8	10	10	10
Y Min	10	10	20	20	20	20	25	25	25

Table 7 Heavy Weight Tee Hinges Type III (Refer Fig-1)

	Size		
	350	400	450
A	350±4	400±4	450±4
B	145±1	160±1	175±1
C	48±2	48±2	48±2
D	10±.08	10±.08	10±.08
E	3.15±0.10	3.15±0.10	3.15±0.10
F	75±2	75±2	85±2
G	68±1	68±1	78±1
R	10±1	12±1	12±1
Size Designation of Screw Hole	14	14	14
Nos. of Hole in Straps	4	4	4
Nos. of Hole in Tee	5	5	5
X Min	8	8	10
Y Min	20	20	25

1.4.3 Type of Strap Hinges: Strap hinges are classified into following categories,

a) Light weight (Table-8)
b) Medium weight (Type 1) (Table-9)
c) Medium weight (Type 2) (Table-10)
d) Heavy weight (Table-11)

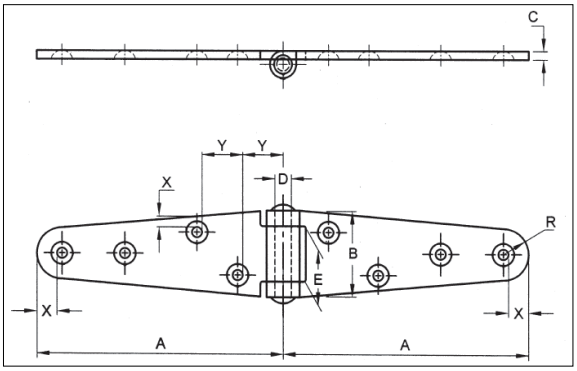


Fig-2 Strap Hinge

1.4.4 Dimensional Requirements and Tolerance for Strap Hinges: Dimensional requirement and tolerance of Strap hinges are given in following tables.

Table 8 Light Weight Straps Hinges (Refer Fig-2)

	Size								
	75	100	125	150	200	250	300	350	400
A	75±2	100±2	125±2	150±2	200±2	250±2	300±2	350±2	400±2
B	25±1	30±1	30±1	30±1	30±1	35±1	40±1	50±1	50±1
C	1.60±0.10	1.60±0.10	1.60±0.10	1.60±0.10	1.60±0.10	2.0±0.10	2.0±0.10	2.0±0.10	2.24±0.10
D	2.80±0.05	3.15±0.05	3.15±0.05	3.15±0.05	4.0±0.05	4.0±0.05	5.0±0.05	5.0±0.05	5.0±0.05
E	10±1	15±1	15±1	15±1	15±1	15±1	20±1	25±1	25±1
R	5±1	6±1	6±1	6±1	8±1	8±1	8±1	8±1	8±1
Size Designation of Screw Hole	6	6	6	6	8	8	8	9	9
Nos. of Hole in Straps	3	3	4	4	4	5	5	7	7
X Min	4	4	4	4	6	6	6	8	8
Y Min	10	10	10	10	20	20	25	25	25

Table-9 Medium Weight Straps Hinges Type I (Refer Fig-2)

	Size										
	75	100	125	150	200	250	300	350	400	450	500
A	75±2	100±2	125±2	150±2	200±2	250±2	300±2	350±2	400±2	450±2	500±2
B	25±1	30±1	35±1	40±1	45±1	45±1	50±1	55±1	60±1	60±1	65±1
C	1.60 ±0.10	1.60 ±0.10	1.60 ±0.10	1.60 ±0.10	2.0 ±0.10	2.24 ±0.10	2.24 ±0.10	2.50 ±0.10	2.50 ±0.10	2.50 ±0.10	3.15 ±0.10
D	3.15 ±0.05	3.15 ±0.05	4.0 ±0.05	4.0 ±0.05	5.0 ±0.05	5.60 ±0.05	6.30 ±0.05	6.30 ±0.05	6.30 ±0.05	8.0 ±0.05	10.0 ±0.05
E	10±1	15±1	15±1	20±1	20±1	20±1	25±1	25±1	30±1	30±1	30±1
R	5±1	6±1	6±1	6±1	8±1	8±1	8±1	8±1	8±1	9±1	9±1
Size Designation of Screw Hole	6	6	8	8	8	9	9	10	10	12	12
Nos. of Hole in Straps	3	3	4	4	4	5	5	7	7	7	8
X Min	4	4	4	4	6	6	6	8	8	8	10
Y Min	10	10	10	10	20	20	20	25	25	25	30

Table-10 Medium Weight Straps Hinges Type II (Refer Fig-2)

	100	150	200	250	300
A	100±2	150±2	200±2	250±2	300±2
B	35±1	45±1	45±1	55±1	65±1
C	1.60±0.10	1.90±0.10	2.0±0.10	2.50±0.10	2.80±0.10
D	4.50±.05	6.30±.06	6.30±.06	6.30±.06	8.0±.06
E	15±1	20±1	20±1	30±1	30±1
R	6±1	8±1	8±1	12±1	12±1
Size Designation of Screw Hole	6	8	8	10	10
Nos. of Hole in Straps	3	4	4	5	5
X Min	4	4	6	6	6

Y Min	10	10	20	20	20	

Table-11 Heavy Weight Straps Hinges (Refer Fig-2)

	Size								
	150	200	250	300	350	400	450	500	600
A	150±2	200±2	250±2	300±2	350±2	400±2	450±2	500±2	600±2
B	50±1	55±1	60±1	60±1	60±1	65±1	65±1	70±1	75±1
C	3.15±0.10	3.15±0.10	3.15±0.10	3.15±0.10	3.15±0.10	4.0±0.10	4.0±0.10	5.0±0.10	5.0±0.10
D	8.0±0.05	10.0±0.05	10.0±0.05	10.0±0.05	10.0±0.05	12.0±0.05	12.0±0.05	12.0±0.05	12.0±0.05
E	25±1	25±1	30±1	30±1	30±1	30±1	30±1	35±1	35±1
R	8±1	8±1	8±1	9±1	9±1	9±1	10±1	10±1	10±1
Size Designation of Screw Hole	10	10	10	10	10	12	12	14	14
Nos. of Hole in Straps	4	4	5	6	6	7	7	8	8
X Min	6	8	8	8	10	10	10	10	10
Y Min	20	20	20	20	25	25	25	25	25

1.4.5 General Requirements for Tee and Strap Hinges:

- Hinges shall be well made, free from burrs, flaws and defects of any kind.
- The movement shall be square, and the working shall be free and easy, without any play or shake.
- The hole for the hinge pin shall be central to the boss; firm and riveted over, so that the heads are well formed.
- All screw holes shall be clean and countersunk and shall be suitable for countersunk head wood screws (*see* IS 6760) of the numbers specified in Tables 12 to 11 for different types and sizes of hinges.
- Tee and strap hinges shall be either bright finished or stove enamelled black.

1.4.6 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is as per table-12.

Table-12 Scale of sampling

SN	Lot Size	Sample size	Permissible no. of defective hinges
1	Up to 200	15	0
2	201 to 300	20	1
3	301 to 500	30	2
4	501 to 800	40	2
5	801 and above	55	3

1.4.7 References: Indian Standard 206:2010

1.5 PIANO HINGE



Piano hinge also known as continuous hinge is used to fix shutters usually made of block board in cup boards and cabinets etc.

1.5.1 Type: Piano hinges may be classified as followings.

a) Type I (Table-1& Fig-1)
b) Type II (Table-1& Fig-1)
c) Type III (Fig-2)
d) Type IV (Table-2 &Fig-3)

1.5.2 Dimensional Requirements and Tolerance for Piano Hinges: Dimensional requirement and tolerance for piano hinges are given in following tables.

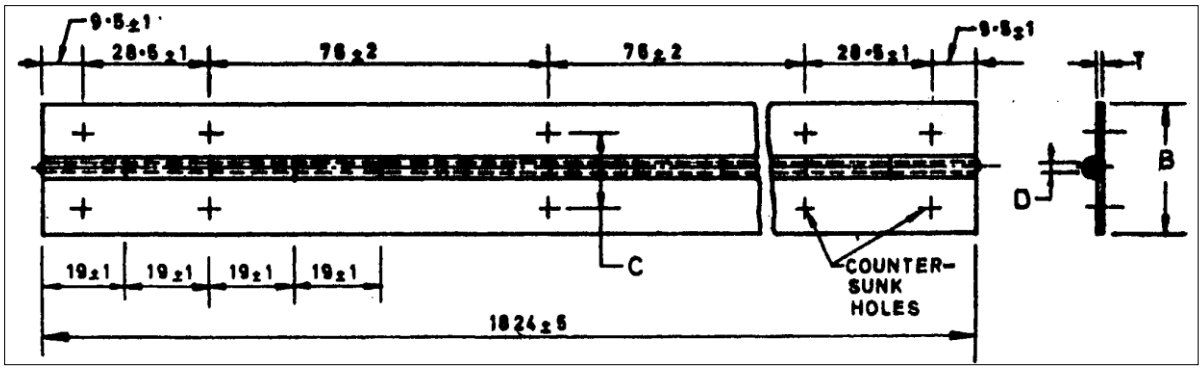


Fig 1 Piano Hinges Type I & II

Table 1 Dimensions And Tolerances For Piano Hinges Type I & II (Refer Fig-1)

Type	Nominal Size	B	C	D Pin Dia.	T	Csc Screw No.	Uses
Type I	25	25±1	15±1.5	2.0	0.8 To 1	3	Light Fixtures Like Electrical Panels In Railway Coaches
	30	30±1	18±1.5	2.0	0.8 To 1	3	
Type II	35	35±1	20±1.5	2.50	0.8 To 1.5	5	Cup Board And Light Flush Doors
	40	40±1	22±1.5	2.50	0.8 To 1.5	5	
	50	50±1	27±1.5	2.80	0.8 To 1.5	5	

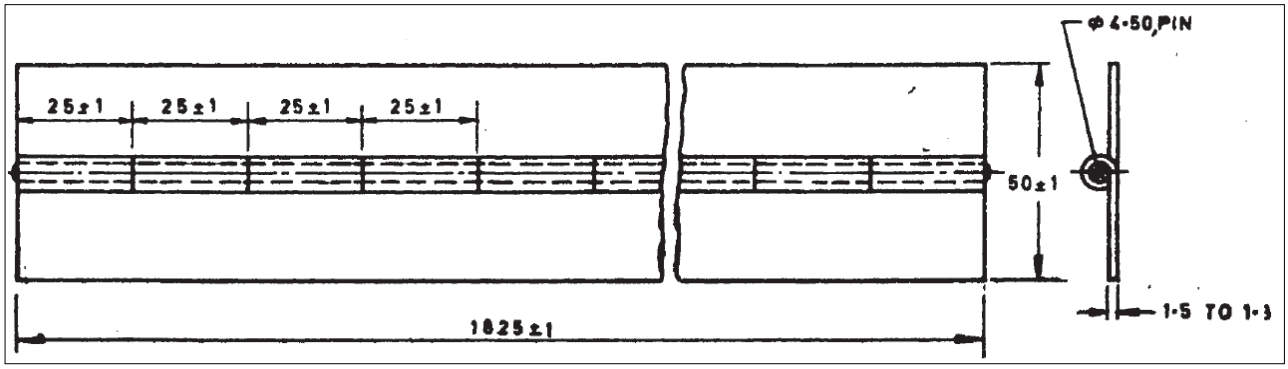


Fig-2 Dimensions and Tolerance of Piano Hinge Type III (50 mm Nominal Size)

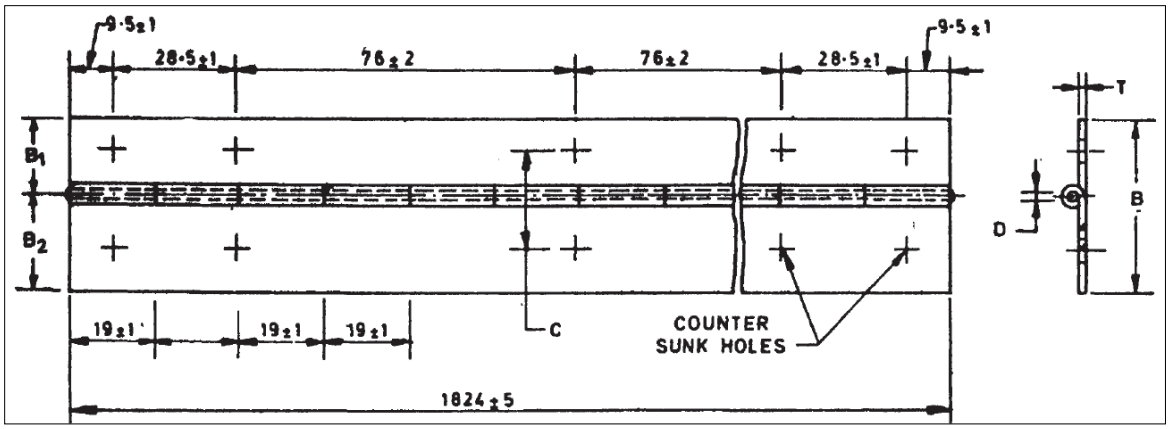


Fig-3 Piano Hinges Type IV

Table- 2 Dimensions and Tolerance for Piano Hinge Type IV(Refer Fig-3)

Type	Nominal Size	B	B1	B2	C	D Pin Dia.	T	Csc Screw No.	Uses
Type IV	30	30±1	12.50±1	17.50±1	18.00±1.5	2.50	0.8 to 1.0	5	Cup board shutters and light furniture
	40	40±1	17.50±1	22.50±1	22.00±1.5	2.50	0.8 to 1.50	5	

1.5.3 General requirements:

- Hinges shall be well made and the hole for the hinge pin shall be central and square to the knuckles.
- The sides of the-knuckles shall be straight and at right angle to the flap.
- The movement of hinge shall be free and easy and working shall not have any play or shake.
- The hinge pin shall be of mild steel in the case of mild steel hinges.
- The hinge pin shall be of mild steel (galvanized) or aluminium alloy in the case of aluminium alloy hinges.
- The aluminium alloy hinge pin shall be hard anodized to a minimum thickness of 0·025 mm and sealed with oil wax or lanolin.
- The hinge pin shall fit in the knuckle firmly so as not to allow any play or shake and shall allow easy movement of hinge, but shall not cause looseness.
- All screw holes shall be clean and countersunk suitably for screws conforming to IS 6760: 1972.
- Mild steel hinges shall be protected with anti-corrosive treatment, such as bright polished, and chromium plated or oxidized finish.
- Aluminium hinges shall be anodized and the quality of anodized finish shall not be less than that of Grade AC 10 of IS 1868: 1982.

1.5.4 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is given in Table-3.

Table-3 Scale of Sampling and Criteria of Conformity

Nos. of Hinges in a Lot	Sample Size	Permissible No. of Defective
Up to 150	13	0
151 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	80	5

1.5.5 Reference:

- Indian standard 3818: 1992
- CPWD DSR no. 9.61.1, 9.61.3

2.0 COMMON FITTINGS FOR LOCKING ARRANGEMENT

Common fittings/hardware for locking is as under:

1. Sliding Door Bolt
2. Tower Bolts
3. Flush Bolt
4. Hasps And Staples
5. Sliding Locking Bolts
6. Mortise Lock
7. Cupboard Lock

2.1 SLIDING DOOR BOLT (MILD STEEL)

Mild steel Sliding bolt is a most common building fittings/hardware used in building to close the door and for locking arrangement.



2.1.1 Type of Sliding Bolt: Mild steel sliding door bolts shall be of the following two types:



a) Type I: Plate Type (See Fig. 1A and 1B): Mild steel sliding door bolts (Plate type sliding bolts) are available in following sizes. 150, 200, 250, 300, 375 and 450 mm.

b) Type II: Clip or Bolt Type: Clip or bolt type sliding bolts are available in following size 200, 250. 300, 375 and 450 mm.

- Clip or bolt type with single flap hasp (see Fig. 2A), and
- Clip or bolt type with Double flap hasp (see Fig. 2B),

2.1.2 Dimensional Requirement of Mild Steel Sliding Door Bolt Type I Plate Type: Dimensional requirements and tolerance for plate type (type I) mild steel sliding door bolts are given in Table -1 with refer to Fig 1A and 1B.

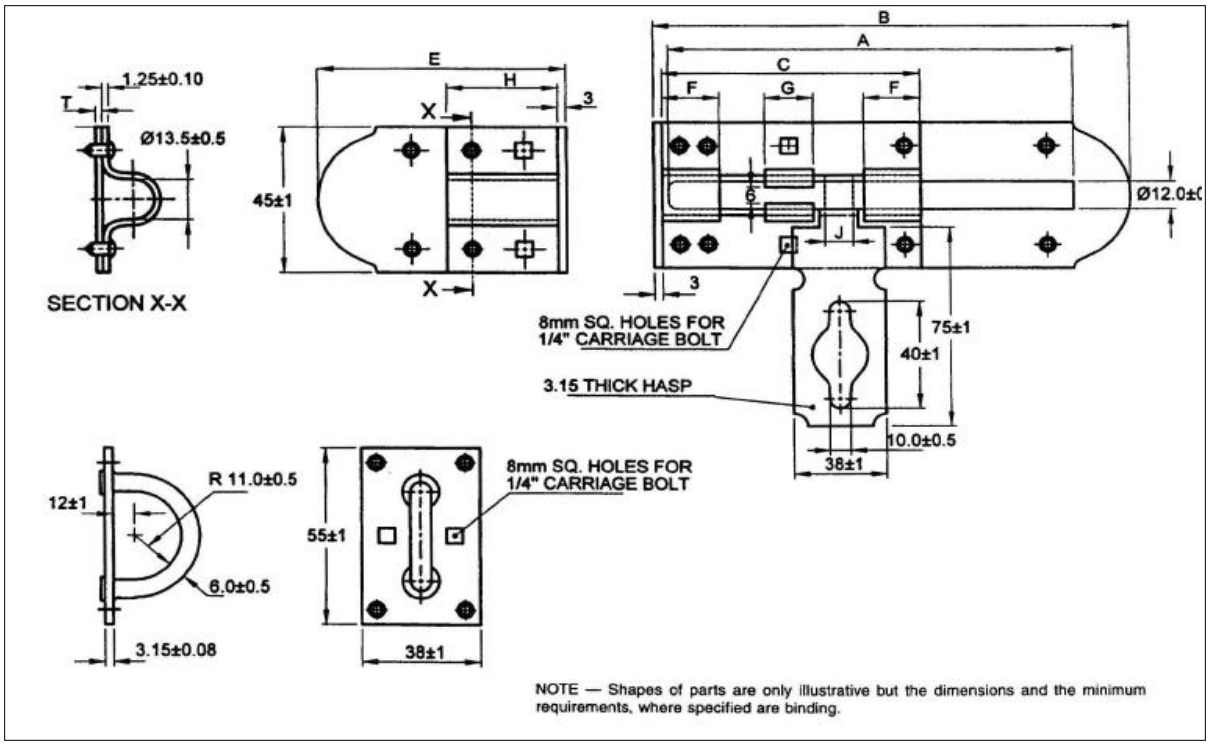


Fig-1A Hasp Design

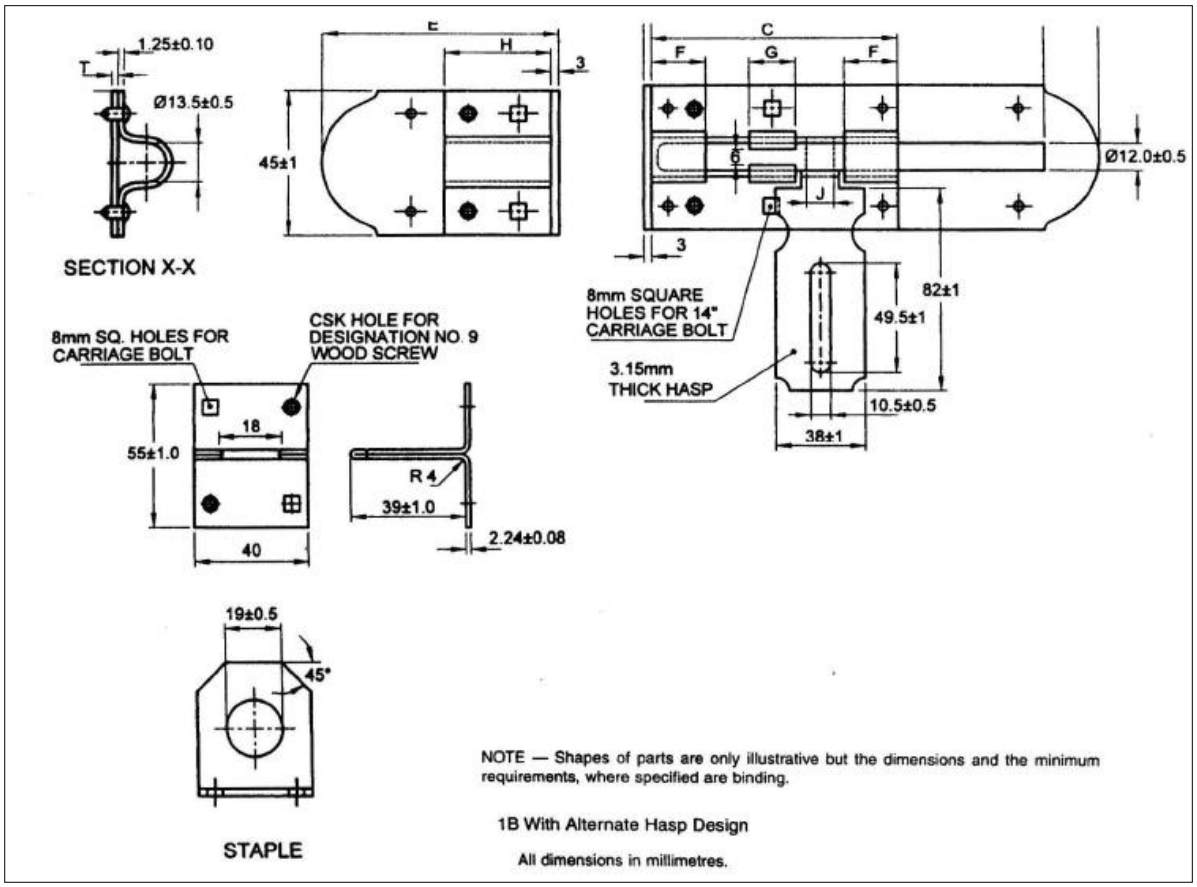


Fig-1B Alternate Hasp Design

Table-1 Dimensions of Mild Steel Sliding Door Bolts Plate Type

	Size					
	150	200	250	300	375	450
A	150 ±2	200±2	250±2	300±2	375±3	450±3
B	170±3	220±3	280±3	330±3	405±3	480±3
C	110±2	135±2	180±2	200±2	200±2	200±2
E	75±2	75±2	100±2	100±2	100±2	100±2
F	25±1	32±1	32±1	38±1	38±1	38±1
G	20±1	25±1	32±1	38±1	38±1	38±1
H	34±1	34±1	64±1	64±1	64±1	64±1
J	12	12	18	18	18	18
T	1.60	1.60	2.0	2.0	2.0	2.0

Holes drilled & Countersunk to accommodate Wood Screw Designation		9	9	9	9	9	9
Nos. of Rivets	Bolt Plate	4	4	4	6	8	8
	Socket	2	2	4	4	4	4
Nos. of Screw Holes	Bolt	4	6	6	6	8	8
	Socket	2	2	4	4	4	4
	Staple	4	4	4	4	4	4
Nos. of 8 mm Square Holes for Cartage Box	Plate And Socket	4	4	4	4	4	4
	Staple	2	2	2	2	2	2

2.1.3 General Requirements for Plate Type Sliding Bolt:

- Back plate, Straps and hasp shall be made from mild steel sheets.
- Sliding bolt shall be made from round mild steel bar. Hasp shall be cut to shape.
- Finished and securely riveted in the bolt.
- The plate for the staple shall have holes for the staple and countersunk at the back.
- Staple shall be firmly riveted. In case the staple rod is not undercut at the ends for the purposes of riveting.
- it shall be so constructed as to form a check on the upper side to prevent its sliding. Alternatively, staples shall be manufactured in one piece design out of mild steel sheet as shown in Fig. l B, 2A and 2B.
- The screw holes on the staple shall be so positioned that they are completely covered by the hasp in the closed position. Square holes 8 mm in size for the purpose of fixing carriage bolts shall be provided on the plate.
- Back plate, straps and staple plate shall be stove enamelled black before assembling.
- Hasp and bolt shall be finished bright or copper oxidized in accordance with IS 1378 or shall be plated with nickel or chromium in accordance with IS 1068.
- When the sliding bolts is to be finished bright, a thin coaling of rust preventive shall be given.

2.1.4 Dimensional Requirement of Mild Steel Sliding Door Bolt Type II Clip or Bolt Type: Dimensional requirements and tolerance for Clip or bolt type (type II) mild steel sliding door bolts are given in Fig 2A and 2B.

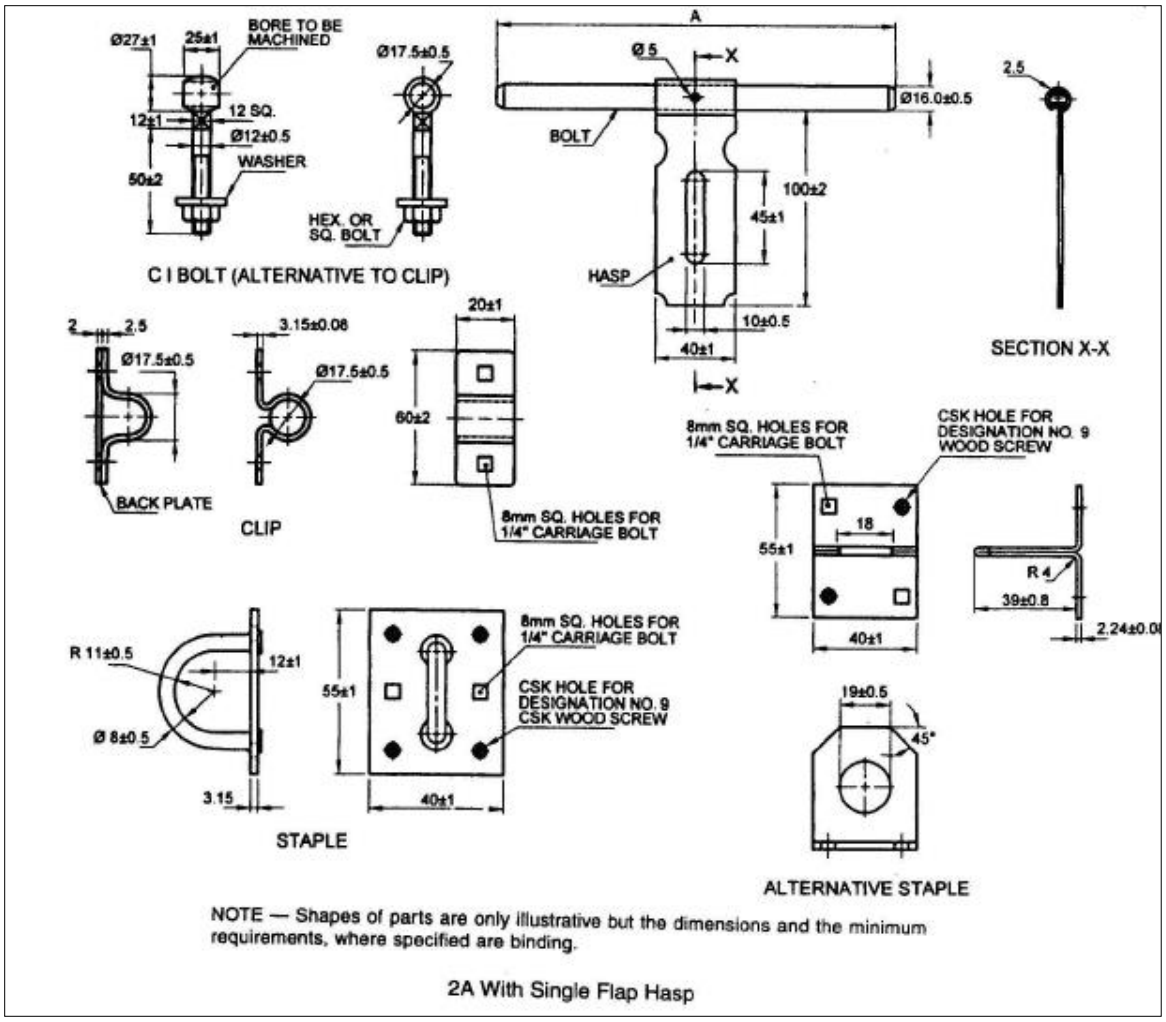

Ø27±1
25±1
BORE TO BE MACHINED
12±1
12 SQ.
Ø12±0.5
WASHER
50±2
Ø17.5±0.5
HEX. OR SQ. BOLT
C I BOLT (ALTERNATIVE TO CLIP)
A
Ø5
X
BOLT
Ø16.0±0.5
100±2
45±1
HASP
10±0.5
40±1
X
2.5
SECTION X-X
2
2.5
Ø17.5±0.5
BACK PLATE
3.15±0.08
Ø17.5±0.5
CLIP
20±1
60±2
8mm SQ. HOLES FOR 1/4" CARRIAGE BOLT
8mm SQ. HOLES FOR 1/4" CARRIAGE BOLT
CSK HOLE FOR DESIGNATION NO. 9 WOOD SCREW
18
55±1
40±1
R 4
39±0.8
R 11±0.5
12±1
Ø 8±0.5
3.15
55±1
8mm SQ. HOLES FOR 1/4" CARRIAGE BOLT
CSK HOLE FOR DESIGNATION NO. 9 CSK WOOD SCREW
40±1
STAPLE
19±0.5
45°
ALTERNATIVE STAPLE
NOTE — Shapes of parts are only illustrative but the dimensions and the minimum requirements, where specified are binding.
2A With Single Flap Hasp

Fig-2 A

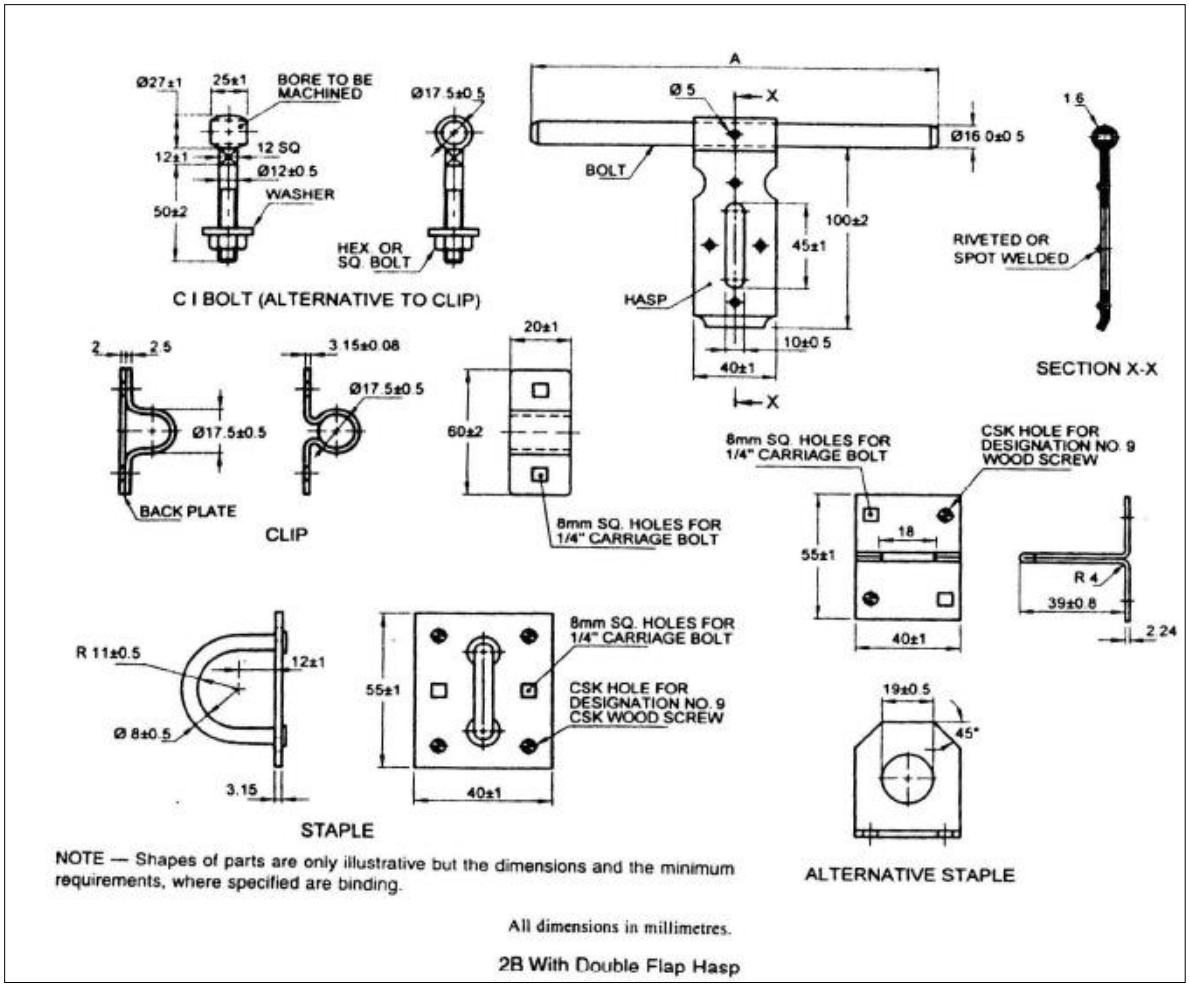


Fig-2B
Mild Steel Sliding Door Bolt Clip or Bolt Type

Table-2 Tolerance of clip or bolt type sliding door bolts

Size of Sliding Bolts. Clip or Bolts Type (see Fig. 2A and 2B)	Length of Sliding Bolt
1	2
200	200±2
250	250±2
300	300±2
375	375 ± 3
450	450±3

2.1.5 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is shown in Table below.

Table-3 Scale of Sampling and Criterion for Acceptance

SN	Lot size	Sample size	Permissible No. of Defective Door Bolts
i	Up to 200	15	0
ii	201 to 300	20	1
iii	301 to 500	30	2
iv	501 to 800	40	2
v	801 & above	55	3

NOTE - The sampling plan given here is such that lots with 1.5 percent or less defectives will be accepted most of the times.

2.1.6 References:

- Indian standard 281:2009
- CPWD DSR No. 660, 661

2.2 TOWER BOLT (NON FERROUS)



Tower bolts are used to lock the doors. According to material tower bolts are made of following material.

a) Aluminium Tower Bolt
b) Brass Tower Bolt
c) Zink Tower Bolt

2.2.1 Types of Tower Bolt: Tower bolts classified into two types.

a) Barrel Type
b) Skelton Type

2.2.2 Dimensional Requirement for Tower Bolt:



2.2.2.1 Barrel Tower Bolts: Barrel made from sheet shall be properly pressed to shape; Cast barrel shall be free from casting and other surface defects. Brass bolt shall be made from rolled or drawn brass rod. Extruded sections of aluminium alloy and brass shall be free from defects. Non-ferrous metal tower bolts shall each be provided with a small spring and a ball on the inside of barrel to enable smooth working

Following are the barrel tower bolt of different materials. Leading Dimensions and tolerances for item 1 to 5 are given in Table-1 (Refer Fig-1).

1. Brass barrel tower bolts with cast brass barrel and rolled or cast brass bolts.

2. Brass barrel tower bolts with barrel of extruded sections of brass and Tolled or down brass.
3. Brass barrel tower bolts with brass sheet barrel and rolled or drawn brass bolt.
4. Aluminium barrel tower bolts with barrel and bolt of extruded sections of aluminium alloys.
5. Zinc barrel tower bolts with barrel and bolt of die-cast zinc alloy.

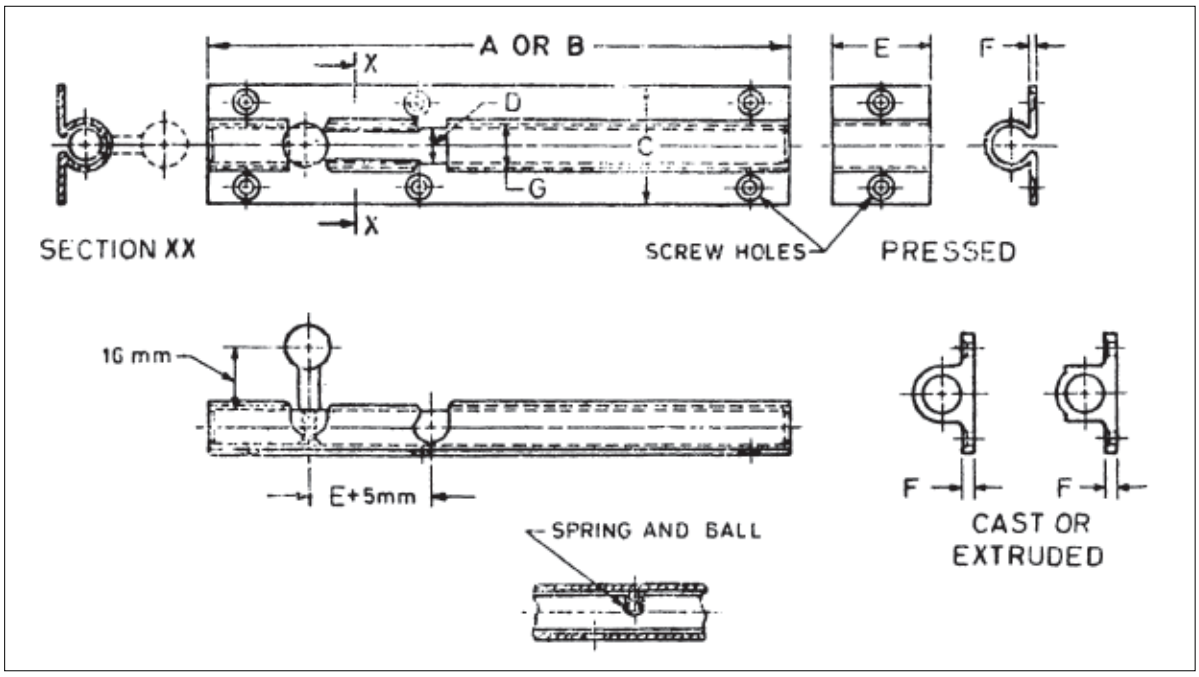
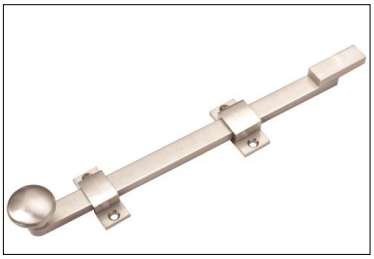


Fig-1 Barrel Tower Bolt (1 to 5)

Table 1 (Barrel Tower Bolt 1 to 5 Above)

Size	Length of barrel or bolt (A or B)	Width of barrel (C)		Dia. of bolt (D)	Length of Skelton (E)	Thickness of metal of barrel (F)				Dia. of bore of barrel (G)	Minimum No. of equally Spaced Holes in Barrel & Socket for Wood Screw No.
						Brass or Zink alloy	Aluminum alloy		Sheet brass		
75	75	32 mm if dia. is 10 mm	38 mm if dia. is 12 mm	10 or 12 mm	25 mm	1.5	1.60	2.40	1 to 1.25	0.7 to 1.5 mm more than dia. of bolt	6
100	100					1.5					6
125	125					2.0					6
150	150					2.0					8
175	175					2.0					8
200	200					2.0					8
225	225					2.0					8
250	250					2.0					10
275	275					2.0					10
300	300					2.0					
Tolerance	+3 -1	±1	±1	±0.3	±1	+0.5 -0.2	±0.25	±0.25	±0.15	-	-

2.2.2.2 Skeleton Tower Bolts: Skelton tower bolts are as follows.



6. Brass skeleton tower bolts with cast brass plate and staples and rolled or drawn brass bolt.
7. Brass skeleton tower bolts with staples and plate of extruded sections of brass and rolled or drawn brass bolt.
8. Aluminium skeleton tower bolts with plate. Staples and bolt of extruded sections of aluminium alloy.
9. Zinc skeleton tower bolts with plate staples and bolts of die-cast zinc alloy.

Leading dimensions and tolerances for item 6 to 9 above are given in Table-2 (Refer Fig-2)

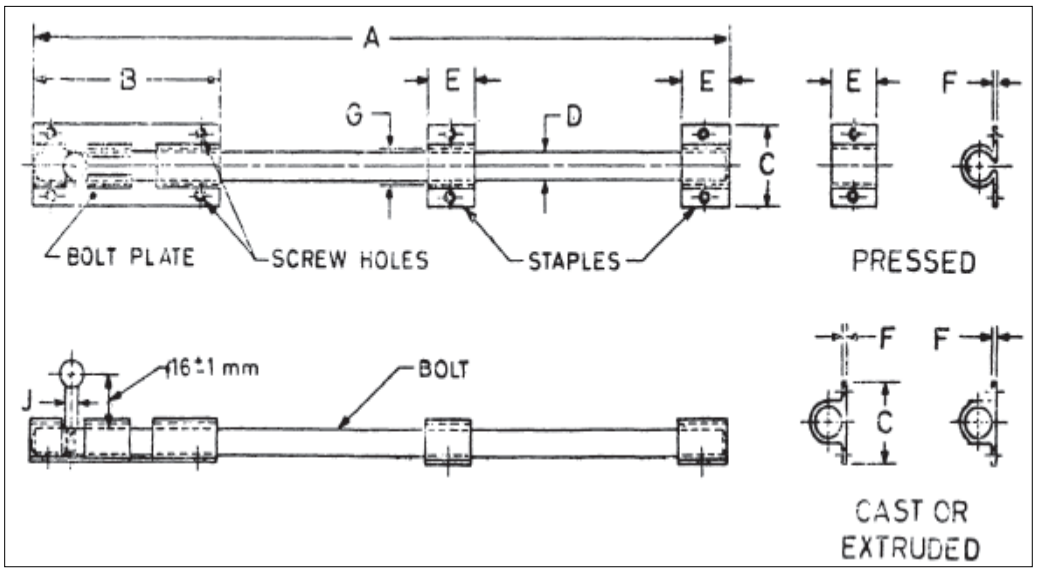


Fig-2 Skeleton Tower Bolt

Table 2 (Skelton Tower Bolt 6 To 9 Above)

Size	Length of bolt plate (A)	Length of bolt plate (B)	Width of bolt plate or staple (C)		Dia. of bolt (D)	Length of staple (E)	Thickness of plate or socket (F)		Dia. of bore plate or staple (G)	Dia. if shank of knob	No. of staples	Minimum No. of Screw Holes for wood screw no.4
							Brass	Alumi-nium or Zink alloy Sheet brass				
375	375	100 mm	32 mm if dia. 10 mm	38 mm if dia. 12 mm	10 or 12 mm	22 mm if dia. 10 mm and 25 mm if dia. 25 mm	1.2 mm for dia. 10 mm & 1.60 for dia. 12 mm	1.60 for dia. 10 mm and 2.4 for dia. 12 mm	11mm for dia. 10 mm and 13 mm for dia. 12 mm	5 mm for dia. 10 mm and 6 mm for dia. 12 mm	3	10
450	450										4	12
600	600										4	12
750	750										5	14
900	900										6	18
Tolera nce	±1	±0.5	±0.5	± 0.5	± 0.5	± 0.5	+ 0.25	+0.25	±0.5	+ 0.5	-	-

2.2.3 General Requirements for Tower Bolt

- Tower bolts shall be well made and shall be free from defects.
- The bolts shall be finished to the correct shape and shall have a smooth action.
- All tower bolts made with sheets 1.2 mm thickness and above, shall have countersunk screw holes to suit countersunk head wood screw (see IS 6760: 1972).
- All sharp edges and corners shall be removed and hardware finished smooth.
- Tower bolts, wherever possible, shall have knob integral with the bolt.
- In case it is not possible to provide a single piece construction of bolt, the knob may preferably be fitted to the bolt with a pin or alternatively, screwed and riveted to the bolt and its shape may be round, half round, spherical or conical, of robust construction.
- Unless otherwise specified the bolts shall have finish as given below:
  - Bolt and barrel polished or plated in case of Brass tower bolts (Types 1 to3)
  - Bolts and barrel anodized in case of Aluminium alloy tower bolts (Type 4). The anodic film may be either transparent or dyed. The quality of anodized finish shall not be less than Grade AC 10 of IS 1868 : 1982
  - Bolt and barrel oxidized, bronzed or plated in case of Zinc alloy tower bolts (Type-5)
  - Bolt, plate and staples bright finished in case of Brass skeleton tower bolts (Types 6 and 7).
  - Bolt, plate and staples anodized in case of Aluminium alloy skeleton tower bolts (Type 8). The anodic film may be either transparent or dyed. The quality of anodized finish shall not be less than Grade AC10 of IS]868 :1982.
  - Bolt, plate and staples oxidized, bronzed or plated in case of Zinc alloy skeleton tower bolts.

2.2.4 Scale of Sampling: Scale of sampling is as per table 3 given below.

Table -3 Scale or Sampling and Criterion for Conformity

Lot Size	Sample Size	Permissible Number of Defective Tower Bolts
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	55	3

2.2.5 References:

- Indian Standard 204 part 2:1992
- CPWD DSR No. 400,401,402,698,699700,702

2.3 TOWER BOLT (FERROUS MATERIAL)

Ferrous Tower bolt is a common building hardware and used to close the doors and windows shutters.



2.3.1 Types of Ferrous Tower Bolt: Ferrous tower bolts may be classified as under.

i) Barrel Tower Bolt
ii) Semi Barrel Tower Bolt
iii) Riveted or Spot Welded Tower Bolt
iv) Skeleton Tower Bolt

2.3.2 Dimensional Requirement and Tolerance of Tower Bolts: Leading dimensions and tolerance are shown in following Fig and Tables.

2.3.2.1 Barrel Tower Bolt

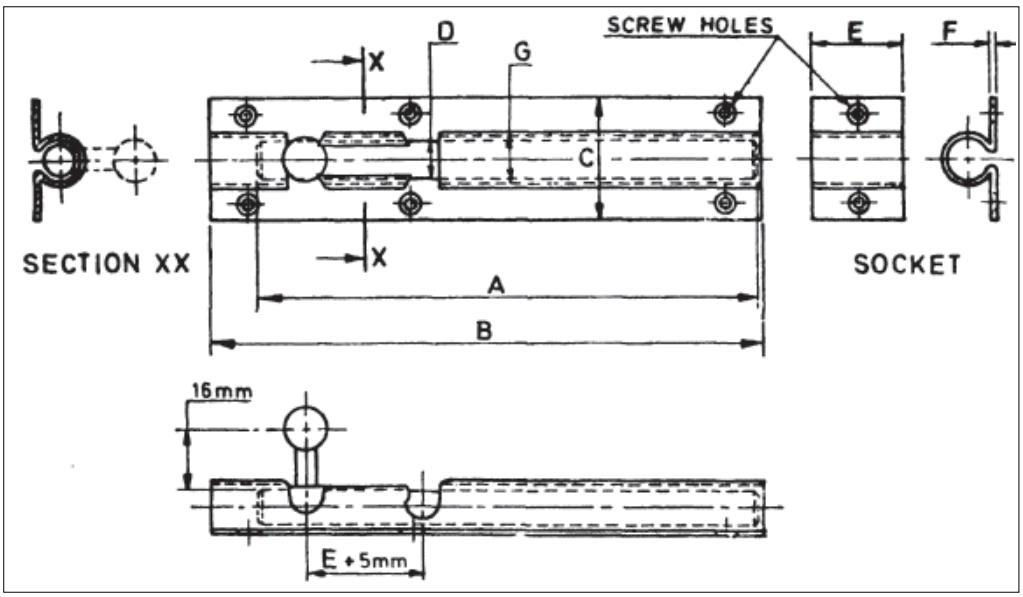


Fig-1 Barrel Tower Bolt

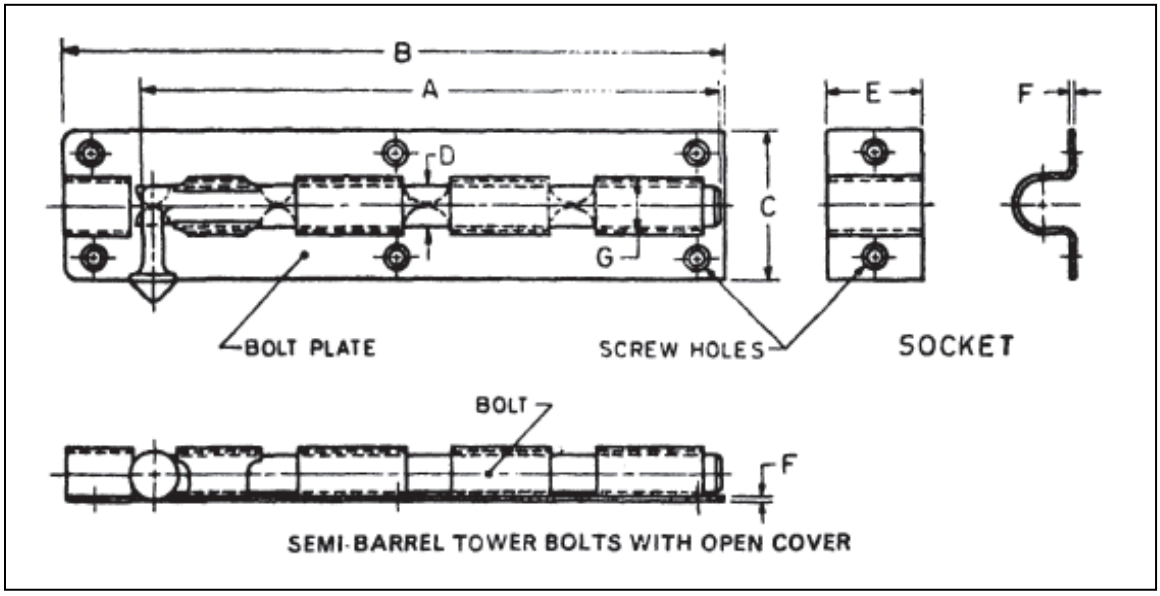
Table 1Barrel Tower Bolt (Refer Fig-1)

Size	Length of bolt (A)	Length of barrel (B)	Width of barrel (C)		Dia. of bolt (D)	Length of socket (E)	Thickness of mild steel sheet for barrel (F)	Dia. of bore of barrel or socket (G)	Minimum nos. of equally spaced screw hole
			When Dia. is 10 mm	When Dia. is 12 mm					
75	75	95	32	38	10 or 12	25	1.25	0.7 to 1.5 mm more than dia.	6
100	100	120							6
125	125	145							6
150	150	170							8
175	175	195							8
200	200	220							8
225	225	245							8
250	250	270							10
300	300	320							10
Tolerance	+3 -1	+3 -1	+3 -1	+3 -1	± 0.5	± 1	± 0.15	-	-

2.3.2.1.1 General Requirements for Barrel Tower Bolt:

- Barrel made from sheet shall be properly pressed to shape.
- Cast barrel shall be free from casting and other surface defects.
- Mild steel bolt shall be made from mild steel round bar.
- Cast iron bolts shall be cast to correct shape and shall be free from casting and other surface defects.
- Unless otherwise ordered for, the bolts shall be bright finished or bright, stain finished, Ni- Cr-plated as per IS 1068 : 1985, copper oxidized as per IS 1376 : 1987 or zinc plated as per IS 1573 : 1986.

2.3.2.2 Semi Barrel tower Bolt



SEMI-BARREL TOWER BOLTS WITH OPEN COVER

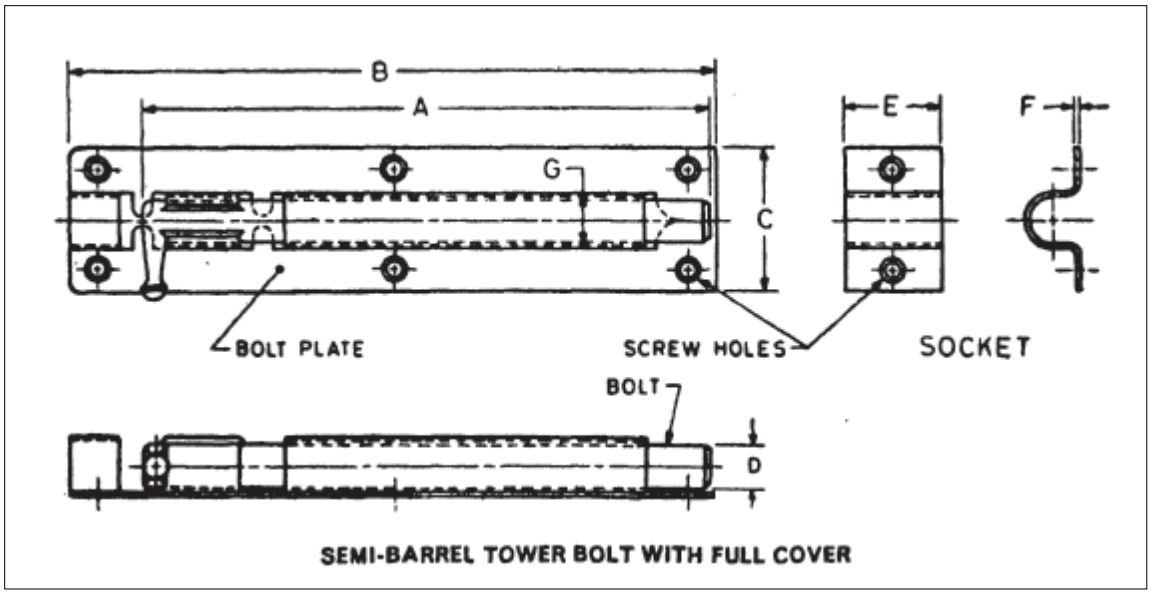


Fig-2 Semi Barrel Tower Bolt

Table 2 (Semi Barrel Type Tower Bolt) All Dimensions in mm (Refer Fig-2)

Size	Length of bolt (A)	Length of bolt plate (B)	Width of bolt plate (C)	Dia. of bolt (D)	Length of socket (E)	Thickness of mild steel sheet for barrel (F)	Dia. of bore of bore plate or socket (G)	Minimum nos. of equally spaced screw hole
75	75	95	38	10	25	1.25	0.7 to 1.5 mm more than dia	6
100	100	120	38	10				6
125	125	145	42	10				6
150	150	170	42	12				8
175	175	200	42	12				8
200	200	225	42	12				8
225	225	250	42	12				8
250	250	275	42	12				10
300	300	325	42	12				10
375	375	400	42	12				10
450	450	475	42	12				10
Tolerance	+3 -1	+3 -1	± 2	± 0.5	± 1	± 0.15	-	-

2.3.2.2.1 General Requirement for Semi Barrel Tower Bolt:

- Mild steel bolts shall be made from mild steel round bars and finished to shape and polished bright before assembly.
- The cast iron bolts shall be cast to correct shape and shall be free from casting and other surface defects.
- Shall be polished bright before assembly.

- Unless otherwise ordered for, the bolts shall be bright finished or bright, stain finished, Ni- Cr-plated as per IS 1068: 1985, copper oxidized as per IS 1376 : 1987 or zinc plated as per IS 1573 : 1986.

2.3.2.3 Riveted or Spot Welded Tower Bolts:

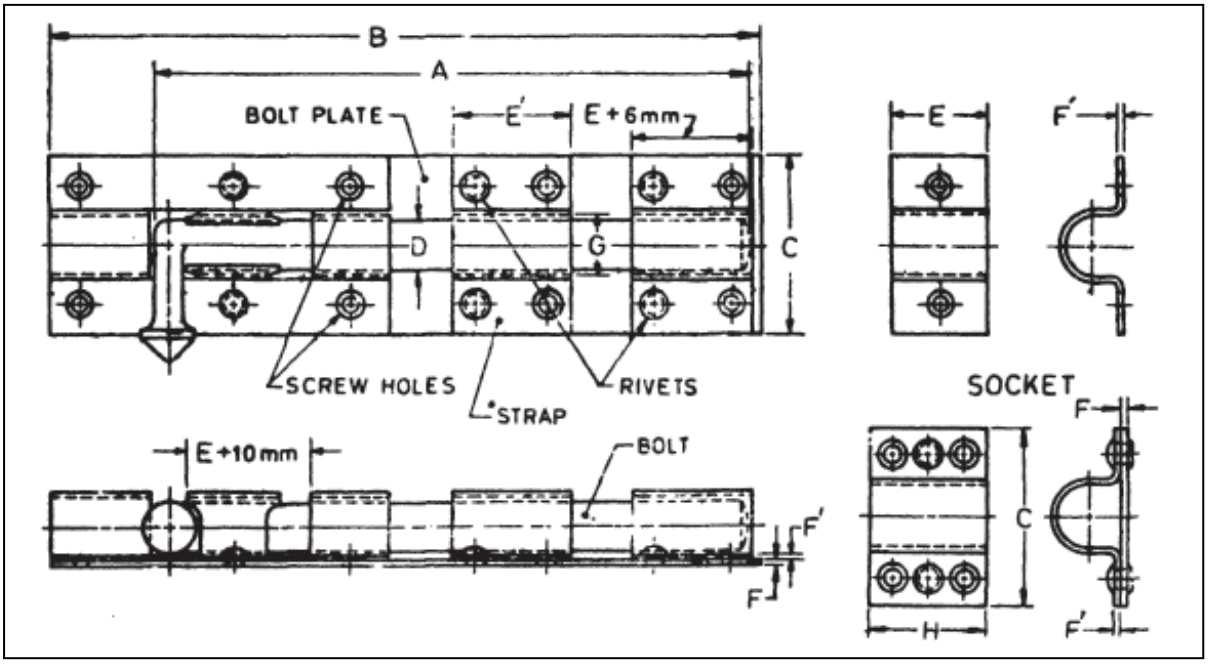


Fig.- 3 Riveted or Spot Welded Tower Bolts

Table 3 (Riveted or Spot Welded Tower Bolts) All Dimensions in mm (Refer Fig-3)

Size	Length of bolt (A)	Length of bolt plate (B)	Width of bolt plate (C)	Dia. of bolt (D)	Length of socket (E)	Length of straps (E')	Thick-ness of back plate (F')	Thick-ness of socket or upper plate and straps (F')	Dia. of bore of bolt or socket (G)	Length of alternative socket (H)	Minimum nos. of equally spaced screw hole
100	100	120	40	10						30	8
125	125	145	40	10						30	8
150	150	180	45	12						35	8
175	175	205	45	12						35	8
200	200	230	45	12						35	8
225	225	255	45	12						35	8
250	250	280	45	12	25	31	1.60	1.25	1.0 to 1.5 mm more than dia	35	10
300	300	330	45	12						35	10
375	375	405	45	12						35	10
450	450	480	45	12						35	12
600	600	630	45	12						35	14
750	750	780	45	12						35	16
900	900	930	45	12						35	16
Tolrean ce	+3 -1	+3 -1	± 1	± 0.5	± 1	-	± 0.15	± 0.15	-	-	-

2.3.2.3.1 General requirements for Riveted or Spot Welded Tower Bolts:

- Mild steel bolts shall be made from mild steel round bars and finished to shape and polished bright before assembly.
- The cast iron bolts shall cast to correct shape and polished bright before assembly.
- The plates and straps after assembly shall be- firmly riveted or spot welded.
- Unless otherwise ordered for, the bolts shall be bright finished or bright, stain finished, Ni- Cr-plated as per IS 1068 : 1985, copper oxidized as per IS 1376 : 1987 or zinc plated as per IS 1573 : 1986.

2.3.2.4 Skeleton Tower Bolt:

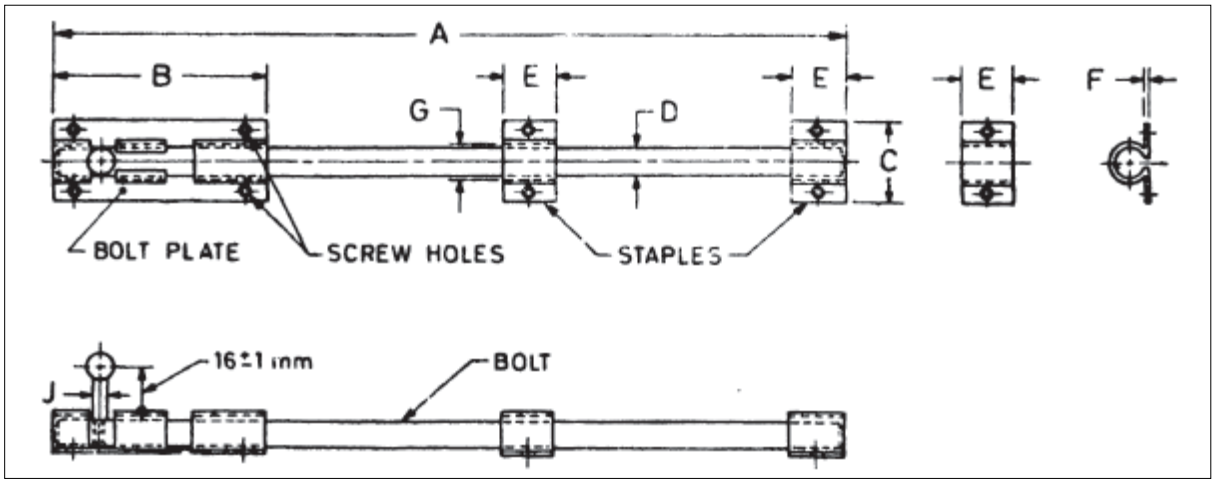


Fig - 4 Skeleton Tower Bolt

Table 4 Skeleton Tower Bolts (Refer Fig-4)

Size	Length of bolt (A)	Length of bolt plate (B)	Width of bolt plate or staple (C)	Dia. of bolt (D)	Length of staples (E)	Thickness of plate or staples (F)	Dia. of bore of plate or staples (G)	Dia. of shanks (J)	No. of staples	Minimum nos. of equally spaced screw hole
375	375	170	32	10	25	1.25	1.0 to 1.5 mm more than dia.	5.0	3	14
450	450								3	14
600	600								4	16
750	750								5	18
900	900								6	20
Tolerance	± 3	± 2	± 2	± 0.5	-	± 1	-	± 0.15	-	-

2.3.2.4.1 General Requirement for Skeleton Tower Bolt:

- The staples and plate in case of mild steel skeleton tower bolls shall be made from mild steel sheet.

- Unless otherwise ordered for, the bolts shall be bright finished or bright, stain finished, Ni- Cr-plated as per IS 1068: 1985, copper oxidized as per IS 1376: 1987 or zinc plated as per IS 1573: 1986.

2.3.3 Scale of Sampling: Scale of sampling is as per table 5 given below.

Table 5 Scale or Sampling and Criterion for Conformity

Lot Size	Sample Size	Permissible Number of Defective Tower Bolts
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	55	3

2.3.4 References:

- Indian Standard 204 part 1:1991
- CPWD DSR No. 664 to 667.

2.4 FLUSH BOLT



Flush bolt is used for locking the doors.

2.4.1 Type: Flush bolt may be classified in two types:

i) Type I (Fig-1)
ii) Type II. (Fig-1)

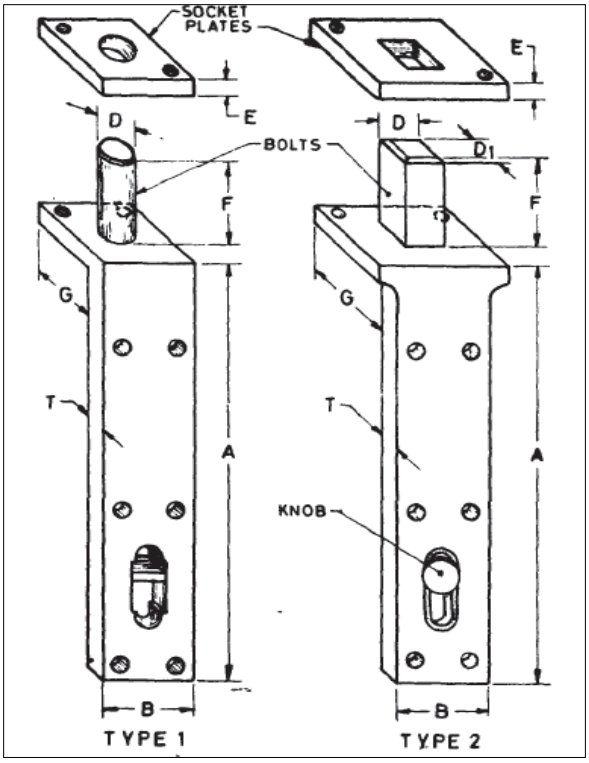


Fig-1 Flush Bolt Type I & II

2.4.2 Dimensional Requirements and Tolerance of Flush Bolt: Dimensional requirements of flush bolt of Type I and Type II is given in following tables.

Table-1 Dimensional Requirements and Tolerances of Type I Flush Bolt:

	SIZE	100	150	200
Face Plate	Length(A)	100	150	200
	Breadth (B)	20	20	20
	Thickness (T)	4	4	4
Throw of Bolt	F	20	25	30
Bolt Dia.	D	8±1.0	8±1.0	8±1.0
Lip Extension	G	20	30	50
Nos. of Screw Holes	Bolt plate	4	4	4
	Socket plate	2	2	2
Size of Screw Holes		6	6	6
Socket Plate	Thickness (E)	4	4	4
	Length and breadth	The minimum dimensions shall not be less than lip extension of face plate.		

Table-2 Dimensional Requirements and Tolerances of Type II Flush Bolt

	SIZE	100	150	200	250	300
Face Plate	Length(A)	100	150	200	250	300
	Breadth (B)	20	20	20	20	20
	Thickness (T)	4	4	4		
Throw of Bolt	F	15	15	15	15	15
Lip Extension	G	20	30	30	30	30
Dimensions of Bolt	D	8±1.0	8±1.0	8±1.0	8±1.0	8±1.0
	D1	8±1.0	8±1.0	8±1.0	10±1.0	10±1.0
Nos. of Screw Holes	Bolt plate	4	4	4	5 (Min)	5 (Min)
	Socket plate	2	2	2	2	2
Size of Screw Holes		6	6	6	6	6
Socket Plate	Thickness (E)	4	4	4	4	4
	Length and breadth	The minimum dimensions shall not be less than lip extension of face plate.				

2.4.3 General Requirements for Flush Bolt:

- When the rod is completely in its maximum bolting position it shall be retained in that position by the spring and the working shall be ensured in continuous usage.
- The length of the bolt shall be such that, when the bolt is pulled down, the top of the bolt shall be either flush or not more than half the thickness of lip down than the top of lip face.
- The top of the bolt shall be given a taper of 45 degree to enable easy pull or push.
- Flush bolts when assembled shall have smooth and easy working. Brass flush bolts shall be satin or bright-polished. Alternatively they may be nickel or chromium plated as specified in 1S: 4827·1968· or copper oxidized in accordance with IS: 1378-1967.
- Aluminium flush bolt shall be anodized and the quality of anodized finish shall be not less than Grade AC 10 of IS: 1868:1968.

2.4.4 Scale of Sampling and Criteria of Conformity: Scale of sampling is given in Table -3 below.

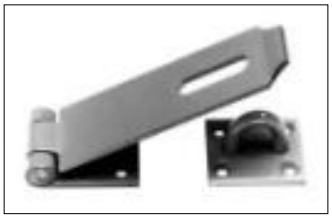
Table-3 Scale of Sampling and Criteria of Conformity

Lot size	Sample size	Permissible nos. of defective flush bolt
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	55	3

2.4.5 Reference: Indian standard 5187:1972

2.5 HASP AND STAPLE

Hasp and staples may be used in cabinet and drawers for locking arrangement.



2.5.1 Type: Hasp and staples are following types.

i) Type I: Mild steel, brass or aluminium alloy hasps and staples safety type (see Fig. 1)
ii) Type II: Mild steel hasps and staples wire type (see Fig. 2)

2.5.2 Dimensional Requirements and Tolerance for Hasp and Staples: Dimensional requirements of Hasp and staples are mentioned in following Tables.

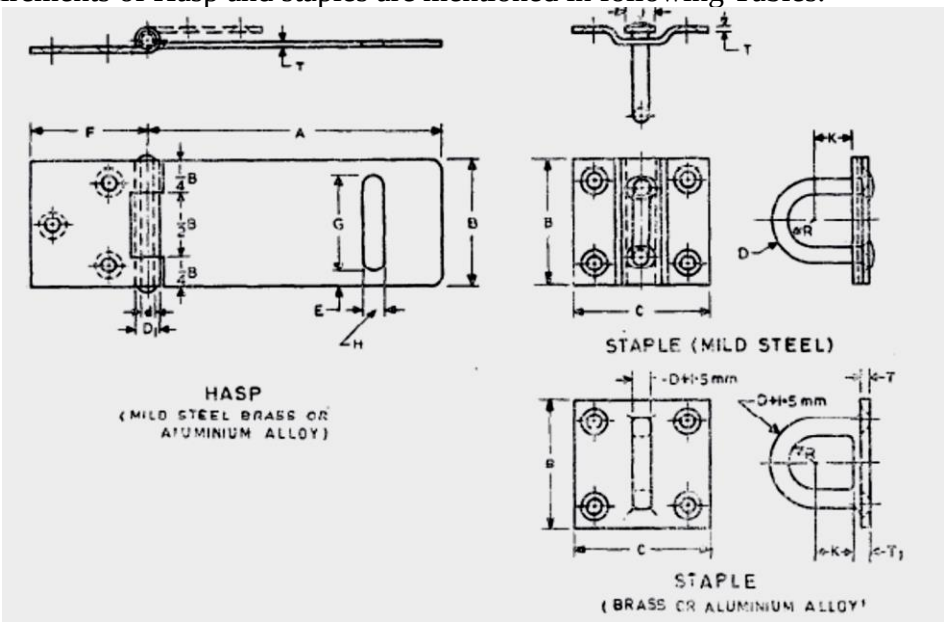


Fig-1 Mild Steel or Brass or Aluminium Alloy Hasps and Staples (Safety Type)

Table-1 Dimension and Tolerance for Type I Mild Steel Hasp and Staples Safety Type

		SIZE			
		90	115	150	175
A		90±2.0	115±2.0	150±2.0	175±2.0
B		38±1.5	38±1.5	45±1.5	45±1.5
C		46±2.0	46±2.0	60±2.0	60±2.0
D		5±0.10	5±0.10	6.30±0.10	6.30±0.10
E		5±0.50	5±0.50	6±0.50	6±0.50
F		35±1.50	55±1.50	65±1.50	65±1.50
G		28±0.50	28±0.50	33±0.50	33±0.50
H		8±0.50	8±0.50	10±0.50	10±0.50
J		12±1.0	12±1.0	15±1.0	15±1.0
K		8±1.0	8±1.0	14±1.0	14±1.0
R		8±0.50	8±0.50	9±0.50	9±0.50
(T)	**Thickness of sheet**	2.0±0.10	2.0±0.10	2.24±0.10	2.24±0.10
(d)	**Dia. of hinge pin**	4±0.05	4±0.05	5±0.06	5±0.06
Screw holes	**Nos. on hasp**	3	3	4	4
	Nos. on staples	4	4	4	4
	For wood screw no.	8	8	10	10

Table-2 Dimension and Tolerance for Type I Brass or Aluminium Alloy Hasp and Staples Safety Type

		SIZE			
		90	115	150	175
A		90±2.0	115±2.0	150±2.0	175±2.0
B		40±1.5	40±1.5	46±1.5	46±1.5
C		42±1.5	42±1.5	48±1.5	48±1.5
D		5±0.25	5±0.25	6±0.25	6±0.25
E		6±0.50	6±0.50	7±0.50	7±0.50
F		35±1.0	45±1.0	65±1.0	65±1.0
G		28±0.50	28±0.50	32±0.50	32±0.50
H		10±0.50	10±0.50	11±0.50	11±0.50
K		8±1.0	11±1.0	14±1.0	14±1.0
R		6.5±0.50	6.5±0.50	7.5±0.50	7.5±0.50
(T)	**Thickness of sheet**	2.0±0.25	2.0±0.25	3.0±0.25	3.0±0.25
(T1)		3.0±0.25	3.0±0.25	4.0±0.25	4.0±0.25
(d)	**Dia. of hinge pin**	3.15±0.10	3.15±0.10	4±0.10	4±0.10
(D1)	**Dia. of butt**	6±0.20	6±0.20	8±0.20	8±0.20
Screw holes	**Nos. on hasp**	3	3	4	4
	Nos. on staples	4	4	4	4
	For wood screw no.	5	5	8	8

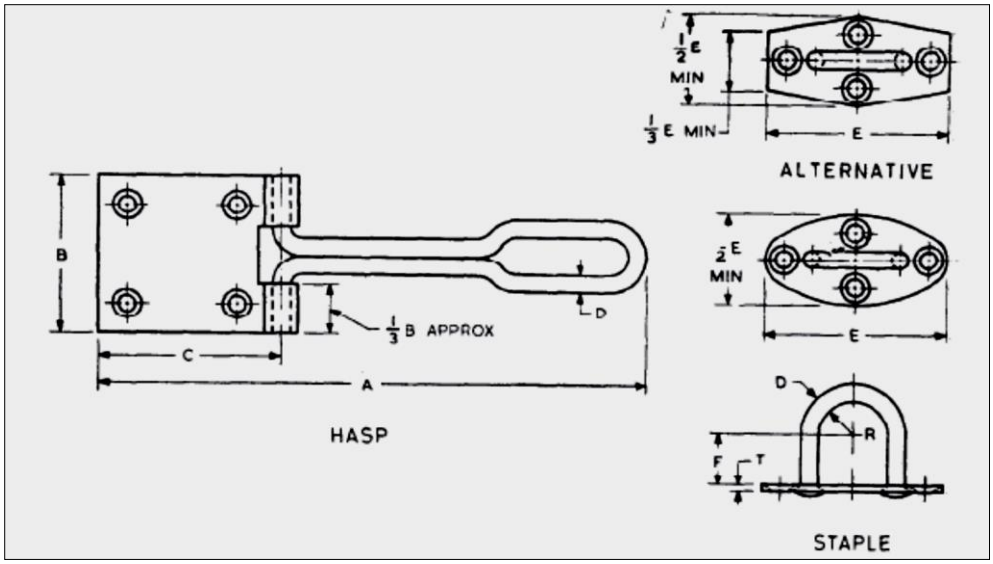


Fig-2 Mild Steel Hasps and Staples Wire Type (Type II)

Table-3 Dimension and Tolerance for Type II Mil Steel Hasp and Staples Wire Type

		SIZE						
		65	75	90	100	125	150	175
A		65±2.0	75±2.0	90±2.0	100±2.0	125±2.0	150±2.0	175±2.0
B		25±1.5	25±1.5	25±1.5	32±1.5	38±1.5	45±1.5	50±1.5
C		22±1.5	25±1.5	28±1.5	38±1.5	48±1.5	55±1.5	55±1.5
D		3.15±0.05	3.15±0.05	3.15±0.05	4.0±0.05	5.0±0.06	6.30±0.06	6.30±0.06
E		38±1.50	38±1.50	38±1.50	42±1.50	55±1.50	55±1.50	55±1.50
F		8±0.50	8±0.50	8±0.50	11±0.50	14±0.50	14±0.50	14±0.50
R		5±0.50	5±0.50	5±0.50	6±0.50	7±0.50	7±0.50	8±0.50
(T)	**Thickness of sheet**	1.25±0.10	1.25±0.10	1.25±0.10	1.60±0.10	1.60±0.10	2.00±0.10	2.0±0.10
Screw holes	**Nos. on hasp**	2	2	2	3	4	4	4
	Nos. on staples	2	2	2	2	3	3	3
	For wood screw no.	6	6	6	6	6	10	10

2.5.3 General Requirements for Hasp and Staples:

- Hasps and staples shall be well made and free from defects.
- The hinge pin shall be of mild steel in the case of mild steel hasps and staples, and of mild steel or brass in the case of brass or aluminum alloys hasps and staples.
- The hinges pin in the case of brass hasps and staples may also be of phosphor bronze.
- The movement of the hinge shall be free, easy and square, and shall not have play or shake.
- The hasps shall fit the staple correctly. The staple, except in the case of cast one, shall be riveted properly to its plate.
- The ends of the hinge pin for the safety type hasps shall be riveted and properly finished.

- All screw holes shall be clean and countersunk to suit countersunk wood screw of number specified in Tables 1 to 3.
- All sharp edges and corners shall be removed.

2.5.4 Scale of sampling and criteria of conformity: Scale of sampling and criteria of conformity is shown in Table 4 given below.

Table-4 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective Hasp and Staples
Up to 100	13	0
101 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	80	5

2.5.1 Reference:

- Indian Standard 363:1993
- CPWD DSR No. 431 to 433, 679 to 681

2.6 SLIDING LOCKING BOLTS



Sliding locking bolt is used to for locking the doors.

2.6.1 Type: Sliding locking bolts are of two types:

i) Type I - With Straight Locking Plate (Fig-1)
ii) Type II - With Curved Locking Plate (Fig-2)

2.6.2 Dimensional requirements and tolerance for Sliding Locking Bolts: Dimensional requirements and tolerance are given in following Tables.

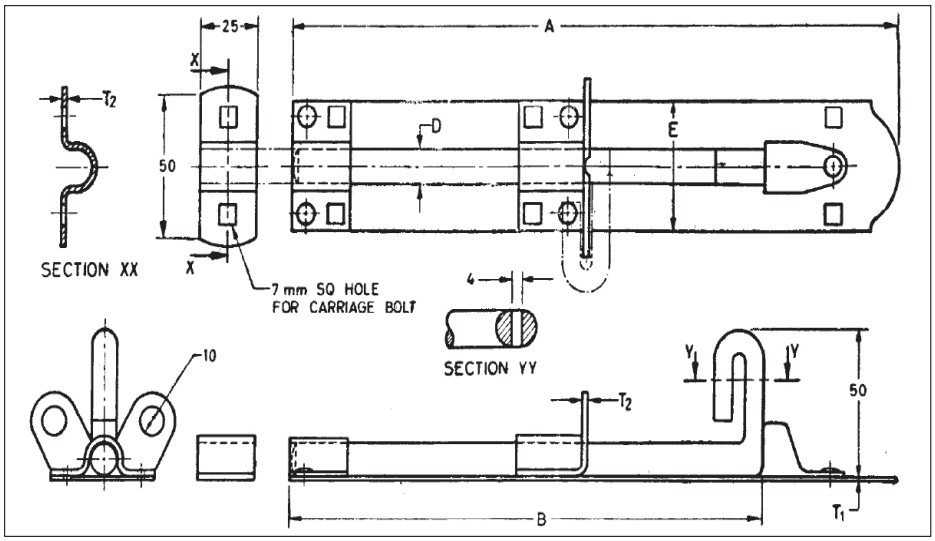
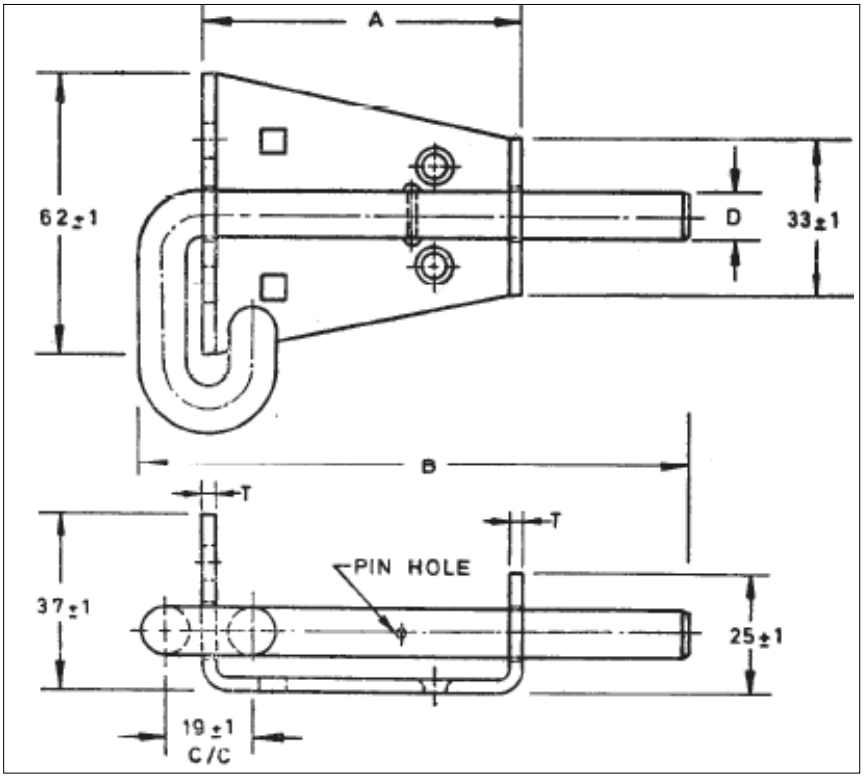


Fig-1 Typical Sketch of Locking Bolt Wire Straight Locking Plate (Type I)

Table-1 Dimensions and Tolerance Requirement for Type I (Refer Fig-1)

Type	Size	Length of bolt plate (A)	Length of bolt (B)	Dia. of bolt (D)	Width of bolt plate (E)	Thickness of bolt plate (T1)	Thickness of plate carrying holes for locking	Screw holes	
								Nos. in plate and locking plate	Size designation
Type I	150	210±1	150±2	10 ±0.5 or 12 ±0.5	45±1	2±0.10 for mild steel & 3±0.10 for aluminum	2±0.10 for mild steel & 3±0.10 for aluminum	8	9
	200	260±1	200±2						
	250	310±1	250±2						
	300	360±1	300±2						



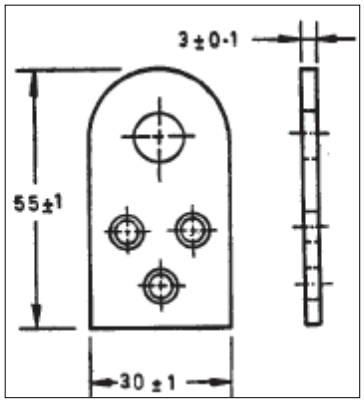


Fig-2 Sliding Locking Bolt with Curved Locking Plate (Type II) **Fig-3 Receiving Plate**

Table-2 Dimensions and Tolerance Requirement for Type II (Refer Fig-2)

Type	Size	Length of bolt plate (A)	Length of bolt (B)	Dia. of bolt (D)	Width of bolt plate (E)	Thickness of bolt plate (T1)	Thickness of plate carrying holes for locking	Screw holes	
								Nos. in plate and locking plate	Size designation
Type II	110	65±1	110±2	10±0.5	-	3±0.10	-	4	9

2.6.3 General Requirements for Sliding Locking Bolts:

- The locking bolts shall have smooth sliding action.
- All sharp edges and corners shall be removed and finished smooth.
- All screw holes shall be countersunk to suit the countersunk head wood screws.

- Mild steel locking bolts shall be copper oxidized, electro galvanized or stove enamelled black. Aluminium alloy bolt shall be anodized to *a* bright, natural mat or satin finish or dyed.
- The anodic coating shall not be less than Grade AC 10 of IS1868:1982.
- All bolts shall be finished bright.

2.6.4 Scale of Sampling and Criteria for Conformity: Scale of sampling and criteria of conformity is shown in Table-3.

Table-3 Scale of Sampling and Criteria for Conformity:

Lot Size	Sample Size	Permissible Defective Nos. of Sliding Locking Bolt
Up to 150	13	0
151 to 300	20	1
301 to 500	32	2
501 and above	50	3

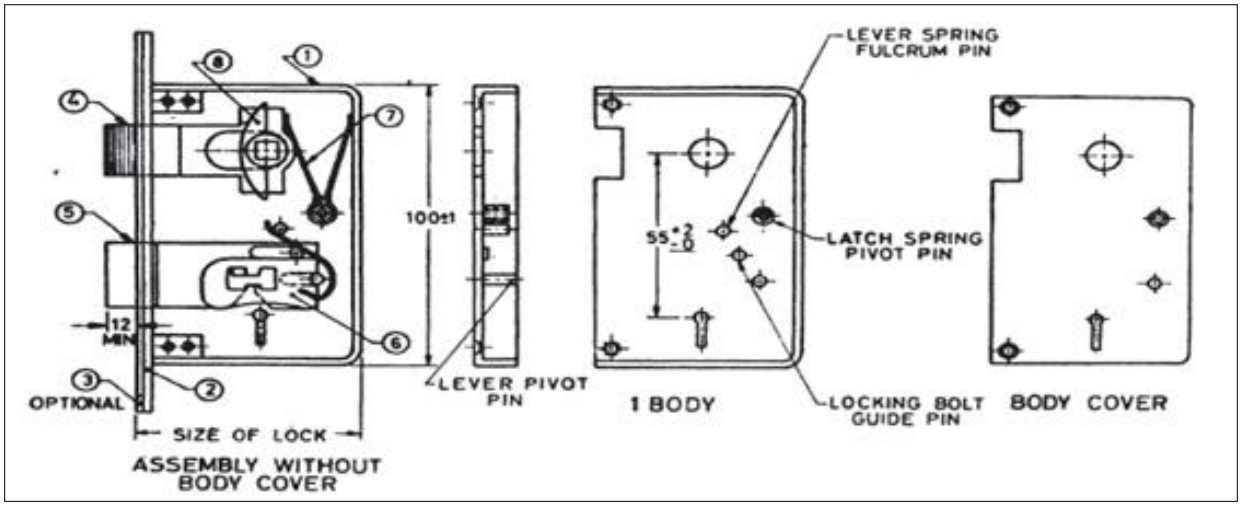
2.6.5 Reference: Indian standard IS 7534:1985

2.7 MORTISE LOCK

Mortise lock is commonly used to lock the doors. Mortise locks are available in 65 mm, 75 mm and 100 mm size.



2.7.1 Components of Mortise Lock: The main component and parts of mortise lock is shown in Fig-1.



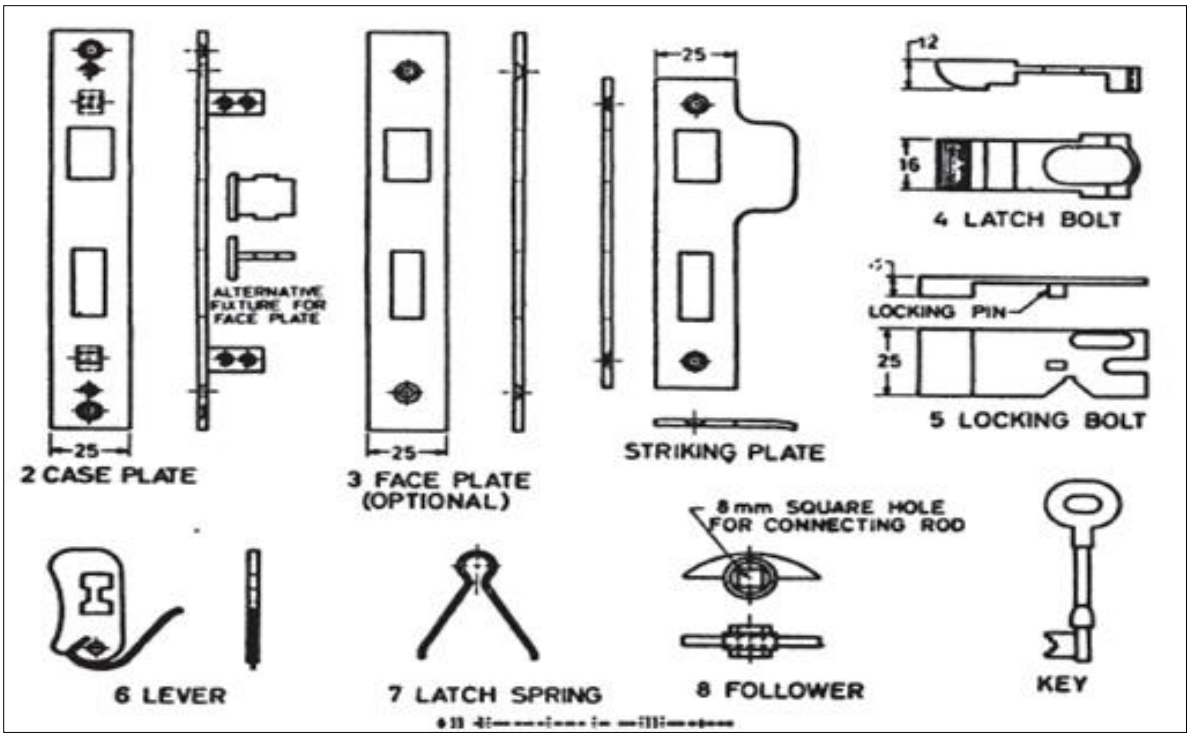


Fig-1 Design of Mortise Lock

2.7.2 General Requirement for Mortise Lock:

- Brass body shall be finished smooth. Steel body shall be given a suitable protective coating, such as paintings.
- Aluminium allot body may be anodized.
- Anodic coating shall not be inferior to grade AC10.
- Face plate and skirting plate shall be finished smooth and polished bright stain.
- Requirement of thickness of various parts of mortise lock is given in table-1 below.

Table-1 Thickness of Various Parts

SN	Component	Material	Minimum Thickness in mm
1	Body and Body cover plate	Cast brass	2.5 mm
		Aluminium alloy (pressure die casting)	2.5 mm
		Aluminium alloy sheet	1.5 mm
		Zink base alloy(pressure die casting)	2.5 mm
		Steel sheet	1.25 mm
2	Case plate	Cast brass	2.5 mm
		Steel sheet	1.25 mm
3	Face plate and striking plate	Aluminium alloy sheet	2.5 mm
		Steel sheet	1.25 mm

2.7.3 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is as per Table-2 given below.

Table-2 Scale of Sampling

Lot Size	Sample Size	Permissible Nos. of Defective
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	50	3

2.7.4 Reference:

- Indian standard IS 2209:1976
- CPWD DSR No. 413

2.8 CUP BOARD /DRAWER LOCK



As its name it is used to locking of cup boards and drawers. Following sizes are available 40, 50, 65 and 75 mm.

2.8.1 Components of Drawer Lock: Components of Drawer lock, Cupboard lock and Box lock is given in Fig 1 to 3.

Drawer lock may be divided into two grades like, Grade I (heavy) and Grade II (light).

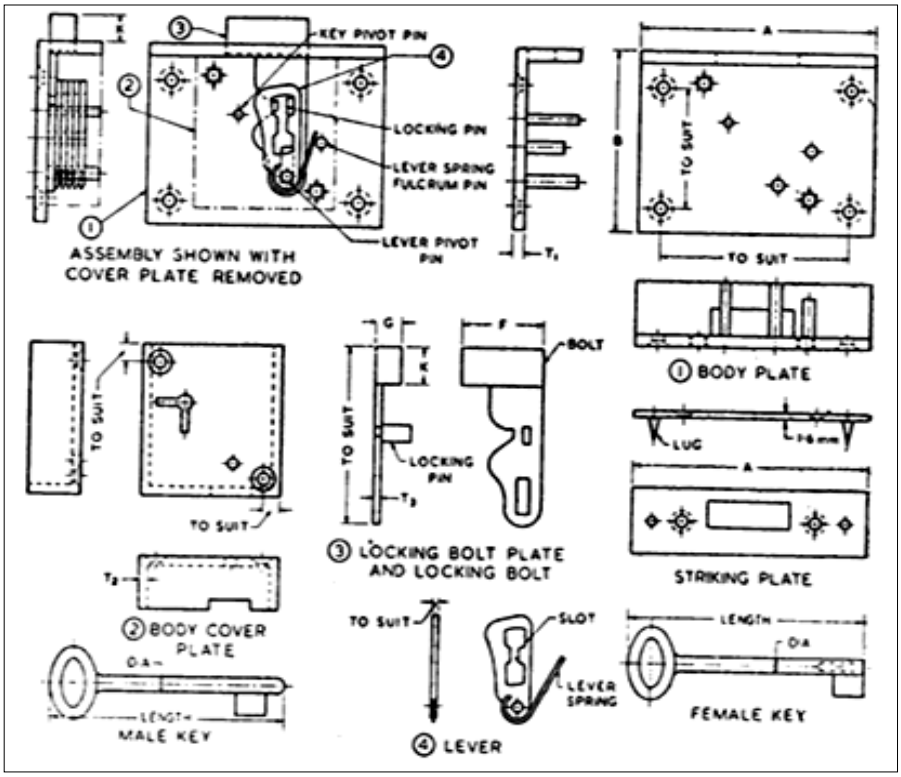


Fig-1 Design of Drawer Lock

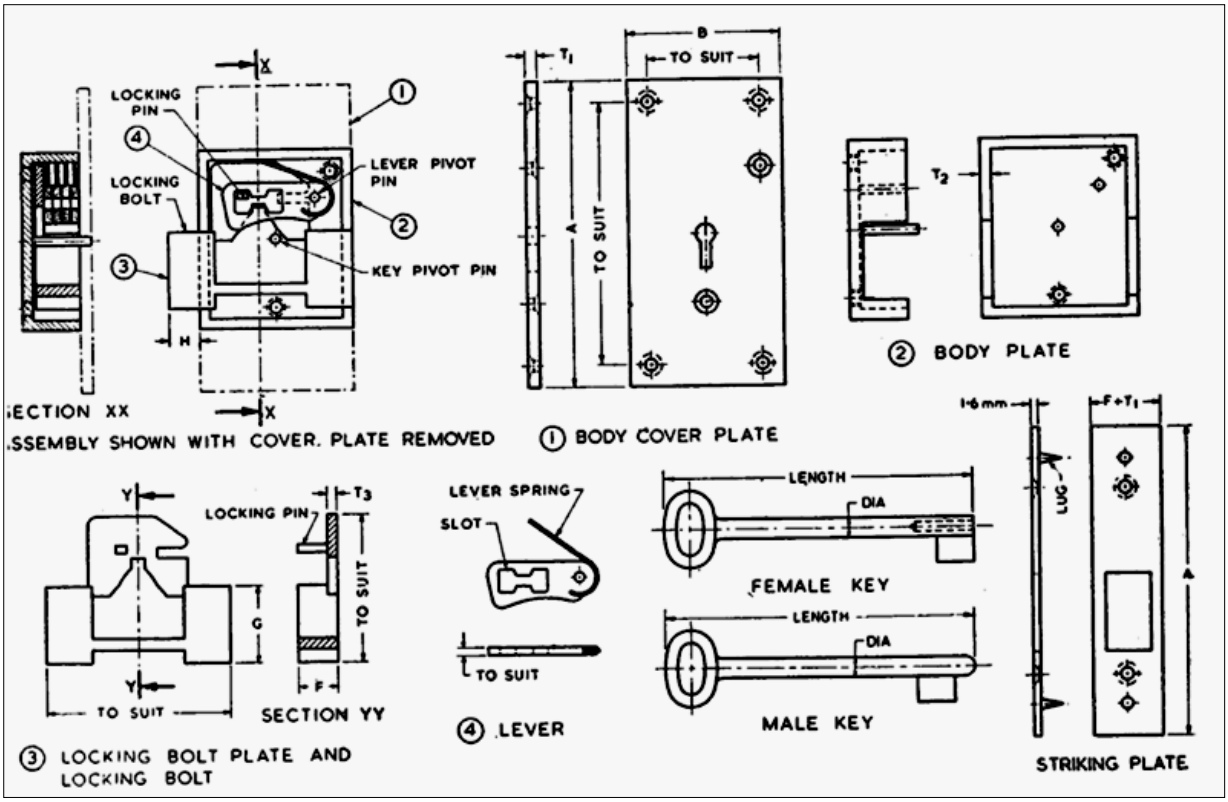


Fig-2 Design of Cup Board Lock

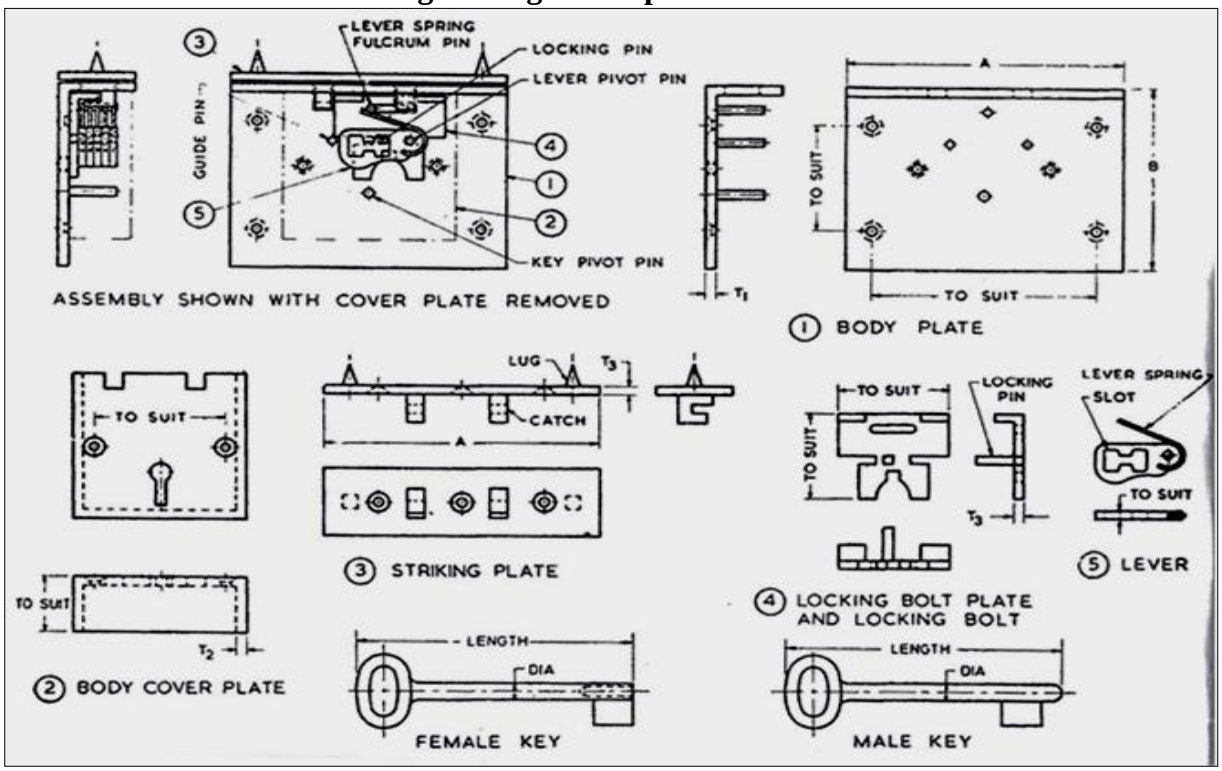


Fig-3 Design of Box Lock

2.8.2 Dimensional Requirement and Tolerance for Drawer Lock: Dimensional requirement and tolerance for Drawer lock, cupboard lock and box lock is given in following Tables.

Table-1 Dimensions for Drawer Lock for Grade I & II (All Dimensions in mm)

		Grade								Tolerance
		I	**II**	**I**	**II**	**I**	**II**	**I**	**II**	
Size		40		50		65		75		
A		40	**40**	50	**50**	65	**65**	75	**75**	±2
B		29	**29**	38	**36**	48	**38**	50	**41**	±1
F(Min)		14	**14**	17	**17**	22	**20**	24	**22**	-
G(Min)		5	**5**	6	**6**	7	**7**	8	**8**	-
K(Min)		5	**5**	6	**6**	7	**7**	8	**8**	-
T1(Min)	**Casting**	2	**2**	2	**2**	2	**2**	2.5	**2**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
T2 (Min)	**Casting**	2	**1.6**	2	**1.6**	2	**1.6**	2.5	**2.0**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
T3(Min)	**Casting**	1.6	**1.6**	2	**1.6**	2	**1.6**	2.5	**2.0**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
Thickness of spring wire (Min)		0.90	**0.90**	1.25	**1.25**	1.25	**1.25**	1.60	**1.25**	-
Holes to accommodate screw		4	**4**	4	**4**	6	**6**	6	**6**	-
Keys	**Thickness of ward**	1.6	**1.6**	1.8	**1.8**	2.0	**2.0**	2.2	**2.2**	±0.20
	Out side dia.	3.2	**3.2**	3.6	**3.6**	4.5	**3.6**	5.0	**4.5**	±0.30
	Length(Min)	40	**40**	50	**50**	65	**65**	75	**75**	-

Table-2 Dimensions for Cupboard Lock for Grade I & II (All Dimensions in mm)

		Grade								Tolerance
		I	**II**	**I**	**II**	**I**	**II**	**I**	**II**	
Size		40		50		65		75		
A		40	**40**	50	**50**	65	**65**	75	**75**	±2
B		29	**27**	32	**29**	35	**32**	38	**35**	±1
F(Min)		8	**7**	8	**7**	10	**8.5**	10	**8.5**	-
G(Min)		11	**9.5**	13	**11**	16	**14**	19	**16**	-
H(Min)		6	**5**	6	**5**	8	**7**	8	**7**	-
T1(Min)	**Casting**	2	**1.6**	2	**1.6**	2	**1.6**	2.50	**2.0**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
T2(Min) (Min)	**Casting**	2	**2**	2	**2**	2	**2**	2.50	**2**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
T3(Min)	**Casting**	1.6	**1.6**	2	**1.6**	2	**1.6**	2.5	**2**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
Thickness of spring wire (Min)		0.90	**0.90**	1.25	**1.25**	1.25	**1.25**	1.60	**1.60**	-
Holes to accommodate screw		4	**4**	4	**4**	6	**6**	6	**6**	-
Keys	**Thickness of ward**	1.6	**1.6**	1.8	**1.8**	2.0	**2.0**	2.2	**2**	±0.20
	Out side dia.	3.2	**3.2**	3.6	**3.6**	4.5	**4.5**	5.0	**5.0**	±0.30
	Length(Min)	40	**40**	50	**50**	65	**65**	75	**75**	-

Table-3 Box Lock Grade I & II

		Grade								Tolerance
		I	**II**	**I**	**II**	**I**	**II**	**I**	**II**	
Size		40		50		65		75		
A		40	**40**	50	**50**	65	**65**	75	**75**	±2
B		29	**29**	38	**36**	48	**38**	50	**41**	±1
T1(Min)	**Casting**	2	**2**	2	**2**	2	**2**	2.50	**2**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
T2(Min)	**Casting**	2	**1.6**	2	**1.6**	2	**1.6**	2.50	**2.0**	-
(Min)	**Sheet**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
T3(Min)	**Casting**	1.6	**1.6**	2.0	**1.6**	2.0	**1.6**	2.50	**2.0**	-
	Sheet	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	1.25	**1.25**	-
Thickness of spring wire (Min)		0.90	**0.90**	1.25	**1.25**	1.25	**1.25**	1.60	**1.60**	-
Holes to accommodate screw		4	**4**	4	**4**	6	**6**	6	**6**	-
Keys	**Thickness of ward**	1.6	**1.6**	1.8	**1.8**	2.0	**2.0**	2.20	**2.20**	±0.20
	Out side dia.	3.2	**3.2**	3.6	**3.6**	4.5	**4.5**	5.0	**5.0**	±0.30
	Length(Min)	40	**40**	50	**50**	65	**65**	75	**75**	-

2.8.3 General Requirements: The drawer locks, cupboard locks and box locks shall consist essentially of a body plate with cover, locking bolt, locking bolt plate, locking mechanism and striking plate.

i) Drawer Locks

- ***Body Plate*** **-** The mild steel body plate shall be zinc plated according to Designation FeZn5 of IS: 1573-1970.
- ***Body Cover Plate*** - The body cover plate shall be of either aluminium alloy casting or aluminium alloy sheet, or cast brass, or mild steel sheet or brass sheet.
  - The mild steel body cover plate shall be zinc plated according to Designation FeZn5 of IS : 1573-1970.
- ***Striking Plate*** **-** The striking plate shall be of either cast brass or brass sheet or aluminium alloy castings or aluminium alloy sheet.
  - The levers shall work without any appreciable friction or shake on the pivot pin. The holes and slots in the levers shall be free from burrs.
- ***Lever Spring***- The lever spring fitted into the lever shall withstand the following tests without showing any sign of permanent set.
  a) The lever spring shall be pressed down completely so as to touch the top edge of the lever and released. This shall be repeated 12 times, and
  b) The lever spring shall also stand a transverse load of 15 kgf (1.5 N) before failure of the joint between the lever and the spring takes place.
- ***Locking Bolt*** **-** The locking bolt shall be cast or fabricated integral with the locking bolt plate.
- ***Locking Bolt Plate*** **-** The locking bolt plate shall have a guide slot to suit the lever pivot pin and a cut on its side for engaging the key.
- ***Locking Pin*** **-** The locking pin shall be either square or rectangular in section and shall be of mild steel or brass. It shall pass through the locking bolt plate, shouldered

and countersunk riveted at the back. If specified by the purchaser, the locking pin may be cast integral with the locking bolt plate.

- ***Lever Pivot Pin, Lever Spring Fulcrum Pin and Key Pivot Pin –*** The lever pivot pin, the lever spring fulcrum pin and the key pivot pin shall be of mild steel in the case of brass body and of stainless steel in the case of aluminum alloy body, and fitted to the body plate by passing through it and countersunk riveted at the back. If specified by the purchaser, the pins of brass may be used and shall be cast integral with the body plate or shouldered and countersunk riveted. The lever pivot pin and the key pivot pin shall be finished smooth and truly round.
- ***Screws -*** Screws for fixing the body cover plate to the body plate shall be countersunk head machined screws conforming to IS: 1365-1968.
  - Screws shall be of mild steel and protected against corrosion. However, the screws may be of brass in case of aluminium alloy bodies.

ii) Cupboard Locks

- ***Body Plate -***. Mild steel body plate shall be zinc plated according to Designation FeZn5 of IS: 1573-1970.
  - The body cover plate, locking mechanism, levers, lever springs, locking bolt, locking pin, lever pivot pin, lever spring fulcrum pin, key pivot pin, striking plate and screws shall conform to their appropriate requirements laid down under (i) Drawer lock.
- ***Locking Bolt Plate -*** The locking bolt plate shall have a slot of suitable size at its centre for engaging the key and a cut on its side to suit the lever pivot pin.

iii) Box Locks

- ***Body Plate -*** Mild steel body plate shall be zinc plated according to Designation FeZn5 of IS : 1573:1970.
- ***Body Cover Plate -*** The body cover plate shall conform to the requirements is same as laid down under (i) Drawer lock. In addition, the top edge of the body cover plate shall be cut at two places to accommodate the catches.
- ***Striking Plate -*** The striking plate shall have two pointed lugs and shall have two or three holes drilled and countersunk on the front to facilitate fixing. The striking plate shall have two catches. The catches in the case of brass striking plate shall be of brass, cast integral with the catch plate or mild steel fitted accurately to the catch plate, square shouldered and riveted at the back of the plate and shall be of aluminium alloy in the case of aluminium alloy striking plate.
  - The locking mechanism, levers, lever spring, locking bolt, locking bolt plate, locking pin, lever pivot pin, lever spring fulcrum pin, key pivot pin and screws shall conform to their appropriate requirements laid down under (i) drawer lock.

iv) Keys

- Each lock shall be provided with a minimum of two keys.
  - The keys shall be either of the female or male type.
  - The keys shall function smoothly and without any appreciable friction in the lock.
  - The wards shall be evenly cut, clearly defined and free from burrs.
  - The engaging ends of the key wards shall be rounded. The mild steel or malleable cast iron keys shall be nickel and chromium plated and shall conform to Service Grade No.2 of IS : 1068:1968.
  - The keys may also be made out of stainless steel or brass.
  - The keys shall be suitably tied to the lock so that they are not lost or interchanged in transit.
- **Assembly -** The components of the lock in the finally assembled position shall not be able to move relative to each other, without the application of key.

Non Inter-changeability

❖ **Two-Lever Locks -** The drawer locks, cupboard locks and box locks shall be manufactured to have non-inter changeable keys in a batch consisting of a minimum of 24 locks. A master key may be supplied.

- For the purpose of testing non-interchangeability 6 locks from each batch of 24 locks shall he so selected that the wards of the keys differ from each other slightly. The locks shall then be tested for non-interchangeability. If key of any of the locks opens any other lock, amongst the 6 locks, the lot shall be rejected.

❖ **Lock with More Than Two Levers -** The drawer locks, cupboard locks and box locks shall be manufactured so as to have non-inter changeability in a batch consisting of a minimum of 100 locks. A master key may be supplied.

For the purpose of testing Non Inter-changeability, 12 locks from each batch of 100 locks shall be so selected that. the wards of the keys differ from each other slightly. These locks shall than be tested for Non Inter-changeability. If key of any of the locks opens any other lock amongst the 12 locks, the whole lot shall be rejected.

- Each lock shall be free from defects likely to prevent its correct fixing or affect adversely its reliability in use.
- Unless specified otherwise, brass locks and keys shall be finished bright.
- Aluminium alloy locks shall be anodized. The anodic coating shall not be less than the Grade AC15 of IS: 1868: 1968.
- The anodic film may be either transparent or dyed.
- Locks may also be lacquered or spirit polished.

2.8.4 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is as per Table -4 given below.

Table-4 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective
Up to 100	8	0
101 to 150	13	0
151 to 300	20	0
301to 500	32	1
501 to 1000	50	2
1001 and above	80	3

2.8.5 Reference:

- Indian standard IS 729:1979
- CPWD DSR No. 2468 to 2471

3.0 COMMON FITTINGS FOR HANDLING ARRANGEMENT

Common fittings for handling of doors and windows are as follows:

1. Door handles
2. Handles of mortise lock

3.1 DOOR HANDLE

Door handle is an essential fitting for the doors to operate properly.



3.1.1 Type: Doors handle shall be of the following types according to the materials used:

Type	Material used
Type 1 (Fig-1)	Cast
Type 2 (Fig-2)	Pressed oval
Type 3 (Fig-3)	Pressed half oval
Type 4 (Fig-4)	Fabricated

3.1.2 Dimensional Requirements for Door Handles: The dimensional requirements of each type door handles are given in following Tables and Figures.

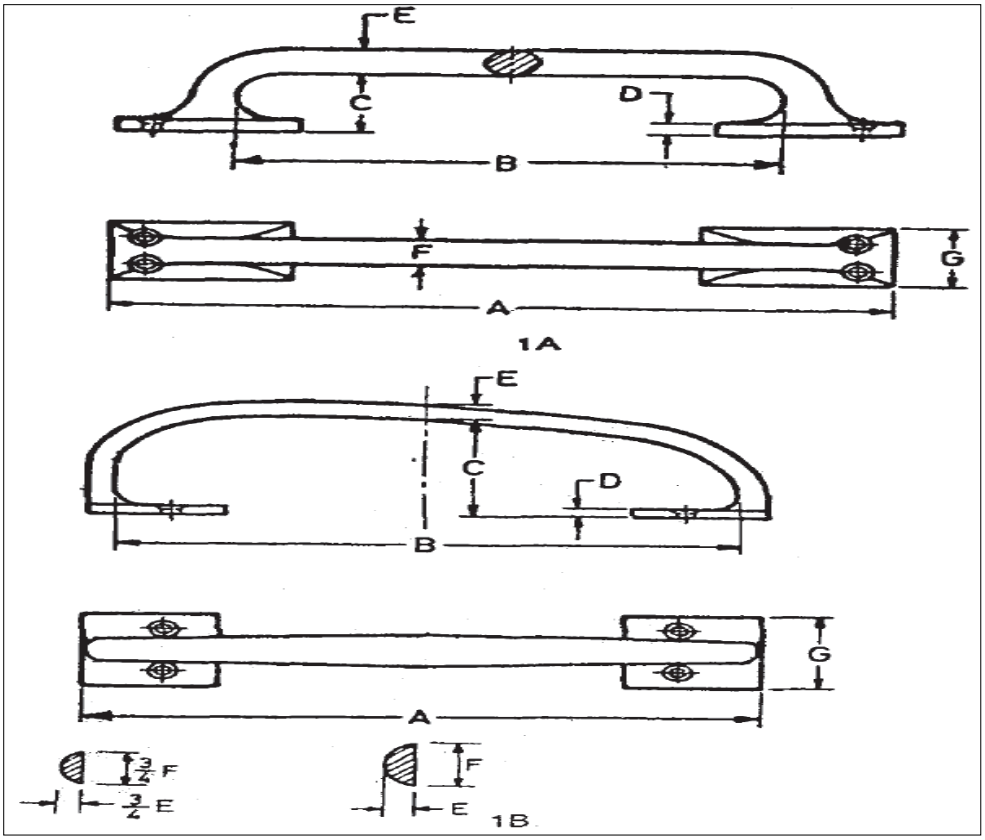


Fig-1 Door Handle (Type 1)

Table -1 Dimension for Type 1 Door Handle is as per Fig-1A and 1B (Refer Fig-1)

		Size			
Type	**Size >**	75	100	125	150
Type 1	**Reference Fig 1 A**				
A	Minimum	125	150	190	215
B		75	100	125	150
C	Minimum	20	25	25	30
D	Minimum	2.5	3.0	4.0	4.5
E	Minimum	5	8	10	12
F	Minimum	8	10	12	15
G	Minimum	25	25	30	30
H	Minimum	-	-	-	-
J	Minimum	-	-	-	-
Screw holes	Nos.of each lug	2	2	2	2
	Size Designation of Counter-sunk Head Wood Screws	6	6	6	8
Type 1	**Reference Fig 1 B**				
A	Minimum	85	110	140	165
B		75	100	125	150
C	Minimum	20	25	25	30
D	Minimum	2.5	3.0	3.0	4.0
E	Minimum	5	5	7.5	7.5
F	Minimum	8	10	12	15
G	Minimum	25	25	30	30

H	Minimum	-	-	-	-
J	Minimum	-	-	-	-
Screw holes	Nos.of each lug	2	2	2	2
	Size Designation of Counter-sunk Head Wood Screws	6	6	6	8

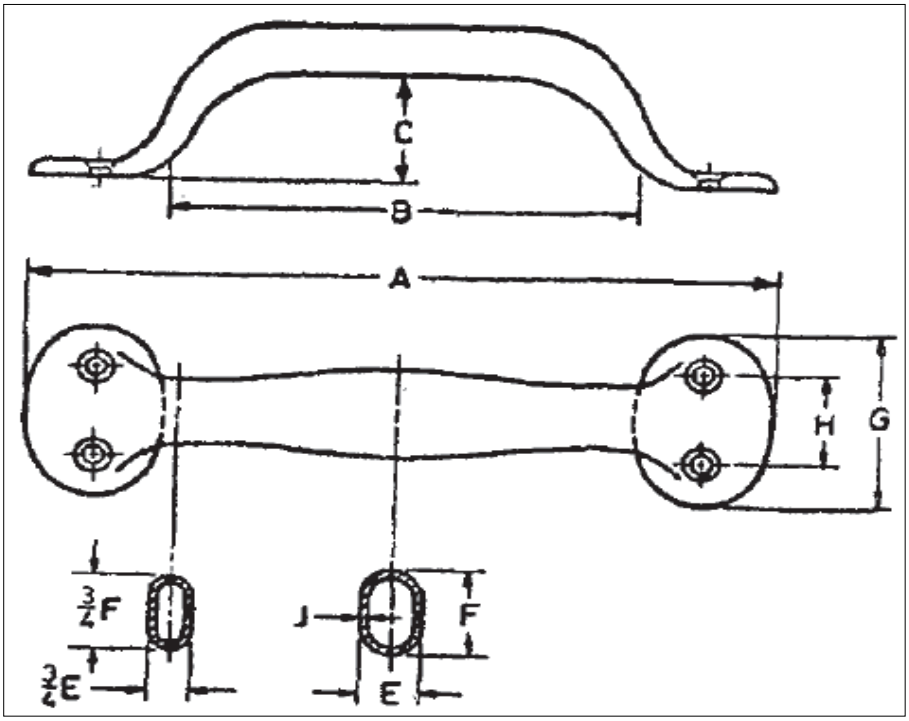


Fig-2 Door Handles (Type 2)

Table -2 Dimensions for Type 2 Door Handle is a (Refer Fig-2)

		Size			
Type 2	**Size>**	75	100	115	135
	Reference Fig 2				
A	Minimum	125	150	175	200
B		75	100	115	135
C	Minimum	20	25	28	30
D	Minimum	-	-	-	-
E	Minimum	10	11	13	14
F	Minimum	16	19	22	25
G	Minimum	32	38	45	50
H	Minimum	20	20	25	32
J	Minimum	1.0	1.0	1.0	1.25
Screw holes	Nos.of each lug	2	2	3	3
	Size Designation of Counter-sunk Head Wood Screws	6	6	8	8

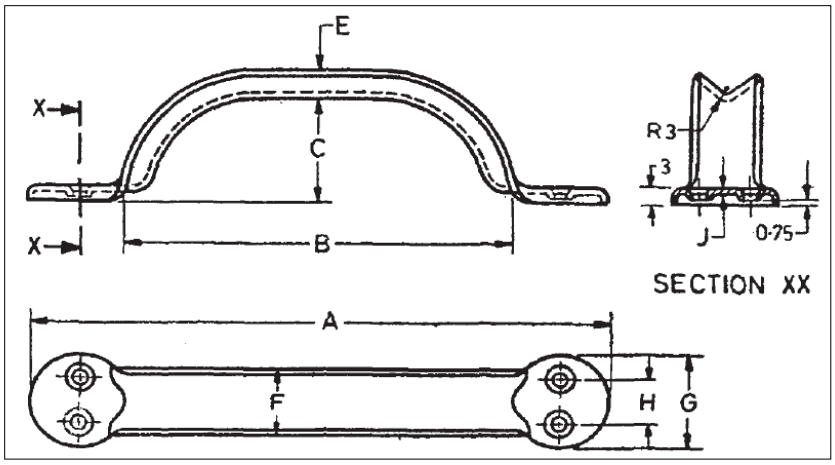


Fig-3 Door Handles (Type 3)

Table -3 Dimensions for Type 3 Door Handle (Refer Fig-3)

Type 3	**Size>**	75	90	100
	Reference Fig 3			
A	Minimum	100	125	150
B		75	90	100
C	Minimum	20	25	28
D	Minimum	-	-	-
E	Minimum	5	6	7
F	Minimum	14	16	18
G	Minimum	25	25	25
H	Minimum	8	10	12
J	Minimum	1.25	1.25	1.60
Screw holes	Nos.of each lug	1	2	2
	Size Designation of Counter-sunk Head Wood Screws	6	6	6

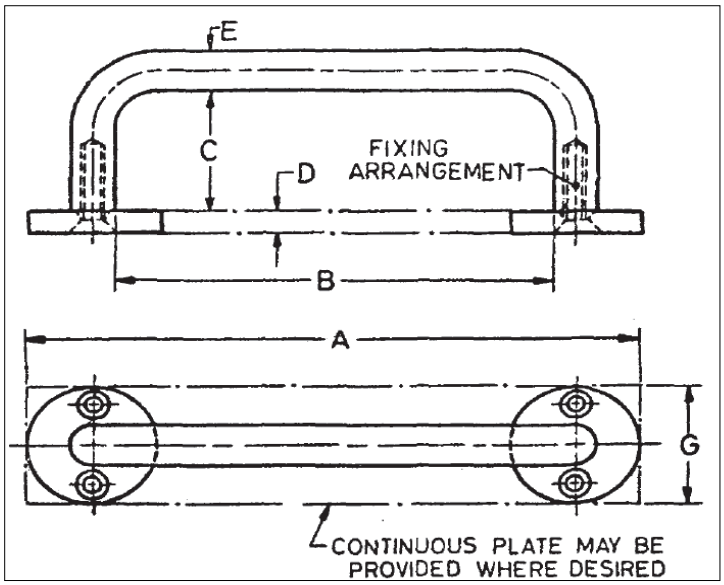


Fig-4 Door Handles (Type 4)

Table -4 Dimensions for Type 4 Door Handle (Refer Fig-4

		Size			
Type 4	**Size**	75	100	125	150
	Reference Fig 4				
A		115	150	175	200
B		75	100	125	150
C	Minimum	20	30	35	35
D		3± 0.2	3± 0.2	3± 0.2	3± 0.2
E		10± 0.3	10± 0.3	12± 0.3	12± 0.3
G	Width	30± 0.5	30± 0.5	35± 0.53	35± 0.5
	Nos.of each lug	2	2	3	3
Screw holes	No. in a plate when a continuous plate is used	4	4	6	6
	Size Designation of Counter-sunk Head Wood Screws	6	6	6	6

3.1.3 General Requirement:

- The door handles shall be well made and free from defects.
- They shall be finished correct to shape and dimensions.
- All sharp edges and corners shall be removed and finished smooth so as to facilitate easy handling.
- Cast handles shall be free from casting defects.
- Where the grip portion of the handle is joined with the base piece by mechanical means, the arrangement shall have adequate strength comparable to that of integrally cast type handles.

Unless otherwise ordered for, the finish shall be as follows:

- **Type 1 -** Bright satin finish, nickel chromium plated as per Grade I of IS 1068 :1993 or copper oxidized as per IS 1378: 1987 or bronze finish for cast brass and zinc die cast handles. Stove enamelled black or copper oxidized for cast iron and malleable cast iron handles. Aluminium anodized to a bright natural, mat or satin finish or dyed, the anodic coating shall not be less than Grade AC 10 of IS 1868 : 1982 for aluminium alloy handles.

- **Type 2 -** Stove enamelled black.

- **Type 3 -** Stove enamelled black.

- **Type 4 -** Bright satin finish, nickel plated or copper oxidized, bronze finish for brass handles. Aluminium anodized to a bright natural, mat or satin finish or dyed, the anodic coating shall not be less than Grade AC 10 of IS 1868: 1982 or as required by the purchaser for aluminium alloy handles.

3.1.4 Criteria for Conformity and Scale of Sampling: Scale of sampling and Criteria for conformity are as per Table No.5 given below.

Table-5 Scale of Sampling

Lot Size	Sample Size	Acceptance No.	Rejection No.
Up to 50	8	0	1
51 to 90	13	1	2
91 to 150	20	1	2
151 to 280	32	2	3
281 to 500	50	3	4
501 to 1200	80	5	6
1201 and above	125	7	8

3.1.5 Reference:

- Indian standard IS 208:1996
- CPWD DSR No. 408 to 410, 555 to 557

3.2 DOOR HANDLES FOR MORTISE LOCK

Door handles of mortise lock is used to operate the door properly. Doors handles of mortise lock are of two types that is handle type and knob type is used to handle the doors.



3.2.1 Dimensional Requirement for Mortise Lock Handle: The dimensions are illustrated in Fig-1.

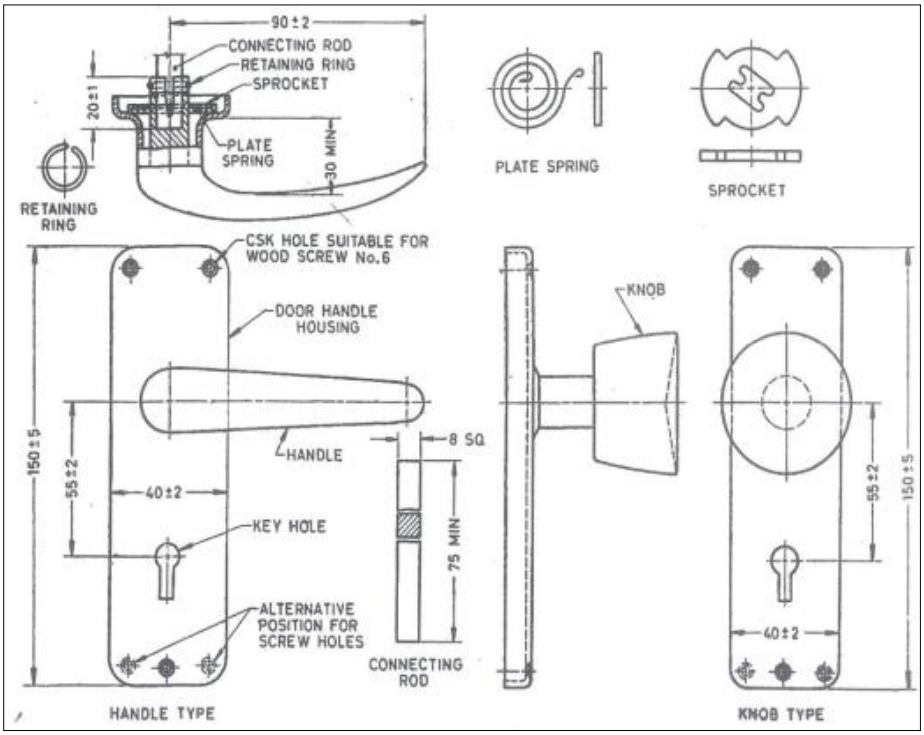


Fig-1 Door Handles for Mortise Lock

3.2.2 General Requirement:

- The door handles shall be suitable for fitting to the doors.
- The connecting rod shall fit snugly both in the follower in the mortise lock and the socket handle and when fitted shall work positively in combination with the follower.
- Door handles shall be free from all defects.
- All sharp edges shall be removed.
- Brass door handles shall have natural finish or shall be bright electro chromium plated. Aluminium alloy door handles shall be anodized and the quality of anodized finish shall not be less than that of Grade AC 10 of IS: 1868:1968.
- Zinc base alloy die cast handles and mild steel handles shall be bright chromium plated.

3.2.3 Performance Requirement: One sample of door handle picked out at random from a lot of 100 handles when fitted to a lock and operated 1 000 times shall not show any damage or ineffectiveness in working. When the door handle is in its extreme position in the lock and pulled horizontally with a load of 100 kg, it shall not develop cracks, lose shape or get damaged.

3.2.4 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is as per Table -1.

Table-1 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective Handles
Up to 100	5	0
101 to 150	8	0
151 to 300	13	0
301 to 500	20	1
501 to 1000	32	2
1001 and above	50	3

3.2.5 Reference: Indian Standard 4992:1975

4.0 COMMON FITTINGS FOR CONTROLLING THE OPENING AND CLOSER OF DOORS

Following are the common fittings/ hardware for controlling of opening and closing of doors and windows.

1. Hydraulic door closer
2. Floor door stopper
3. Hooks and eye
4. Windows stays
5. Chain with hook
6. Fan light catch
7. Ball catches

4.1 HYDRAULICALLY OPERATED DOOR CLOSER

Hydraulically operated door closer is used to automatically closing the door by the help of spring.



4.1.1 Designation of Door Closer: Designation of door closer is as under:

Table-1 Designation of Door Closer

SN	Designation of Closer	Mass of the Door in Kg	Width of the Door in mm	Remark
i	1	Up to 35	Up to 700	For light doors such as double leaved and toilet doors
ii	2	36 to 60	701 to 850	Interior door such as bed room, kitchen and store
iii	3	61 to 80	851 to 1000	Main doors such as entrance door

4.1.2 Type of Closer: Hydraulically regulated door closers shall be of the following types:

a) Type A Bottle Type (see Fig. 1, 1A & 1B)
b) Type B Tubular Type (see Fig. 2 & 3)

4.1.2.1 Type A-Bottle Type: Main component of bottle type door closer as shown in the Fig-1, 1A&1B.

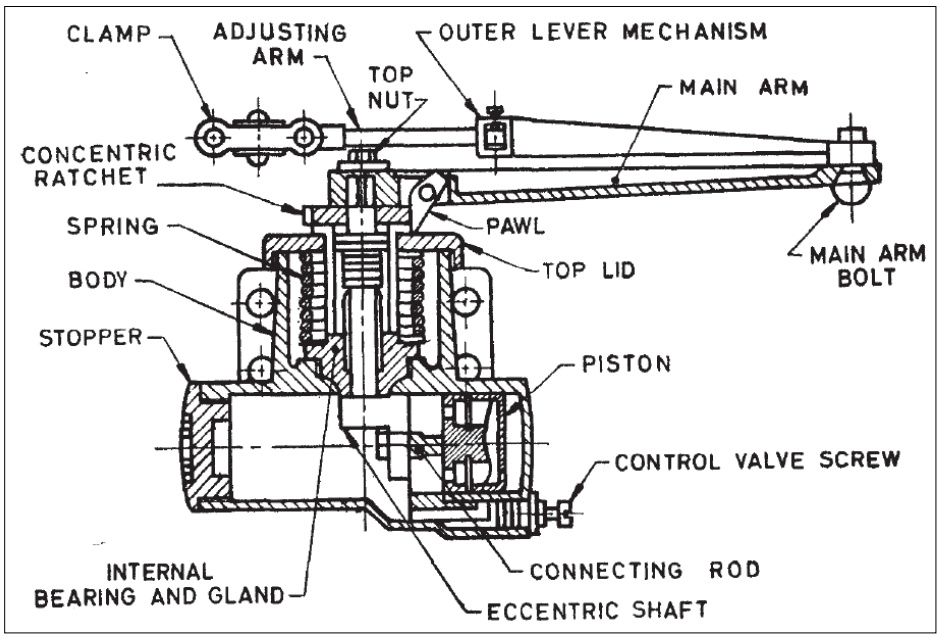


Fig-1 Components of Bottle Type Door Closer

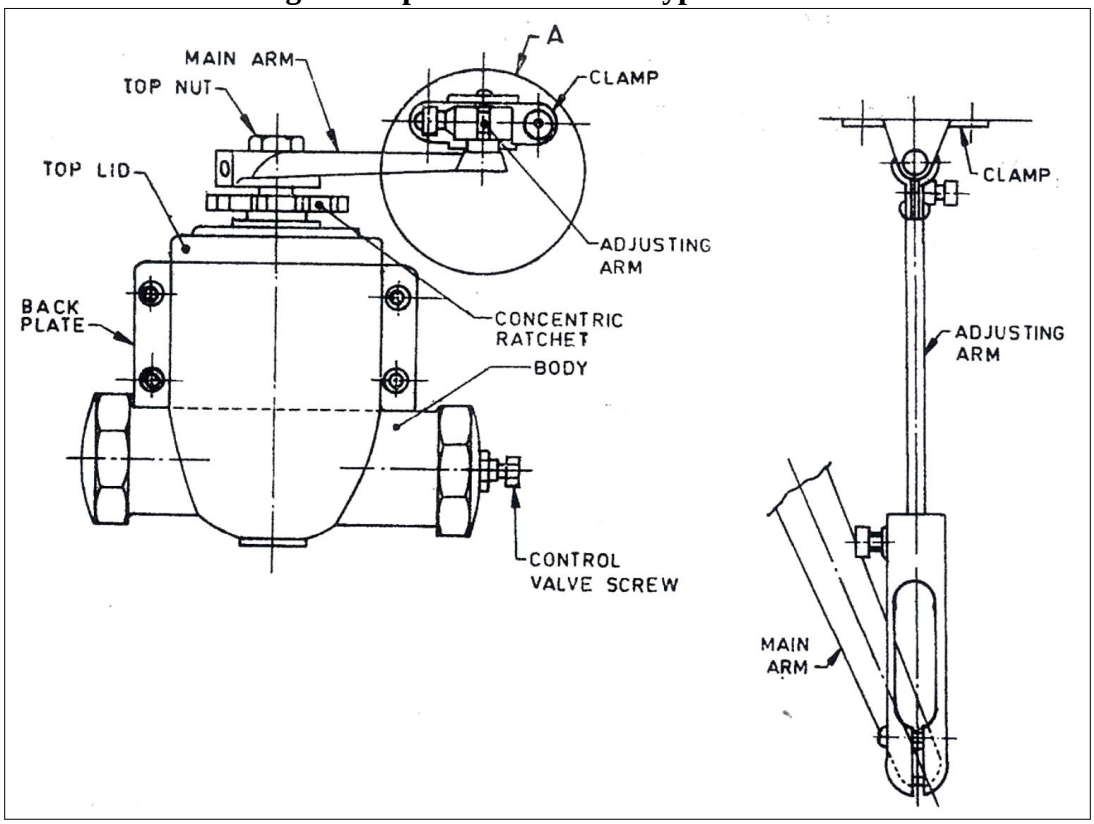


Fig-1A Bottle Type Door Closer

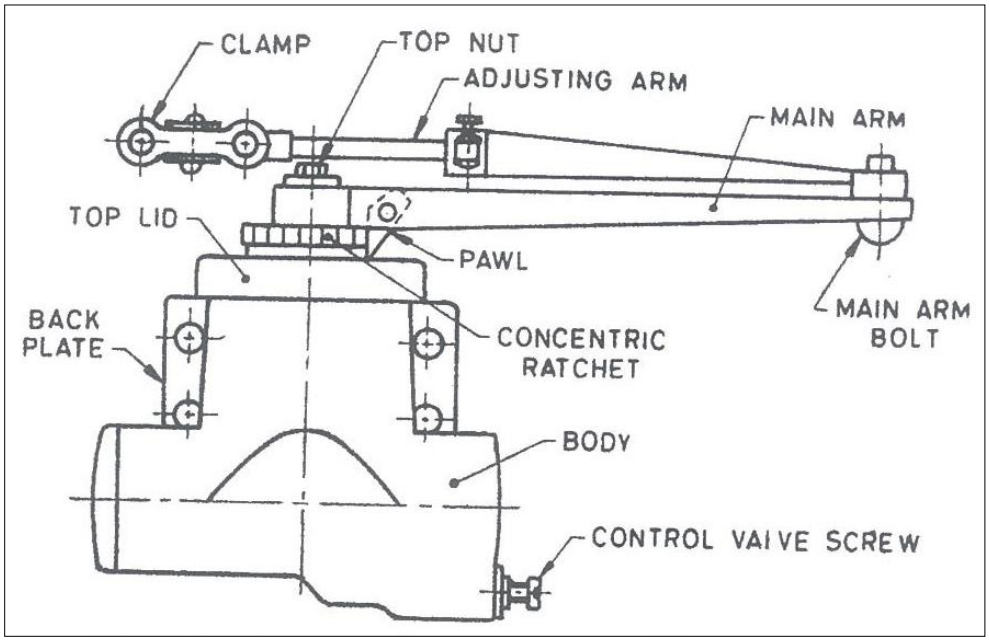


Fig-1B Bottle Type Door Closer

4.1.2.2 Type B-Tubular Type: Main components of tubular type door closer are shown in Fig- 2 & 3

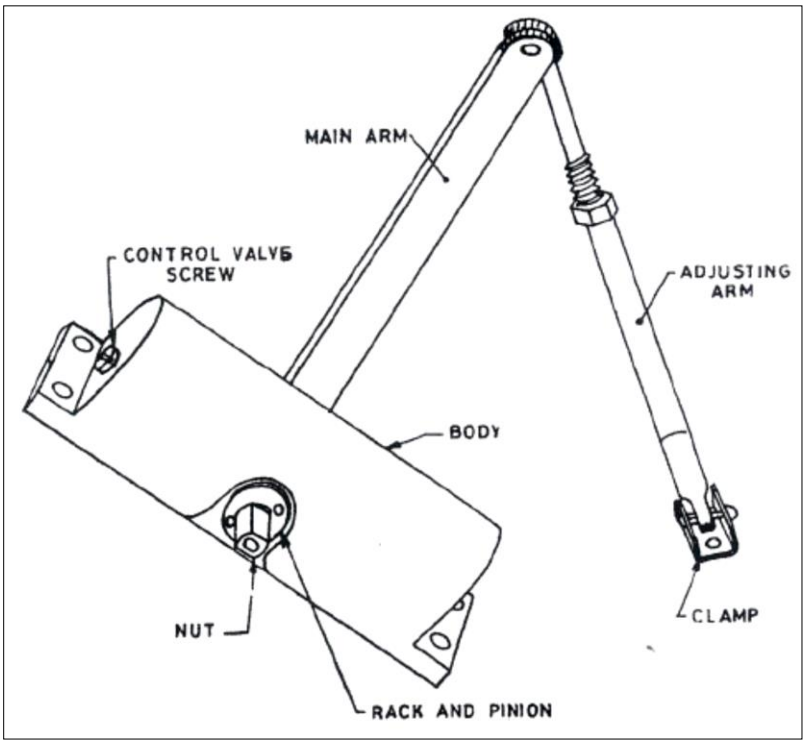


Fig-2 Tubular Type Door Closer

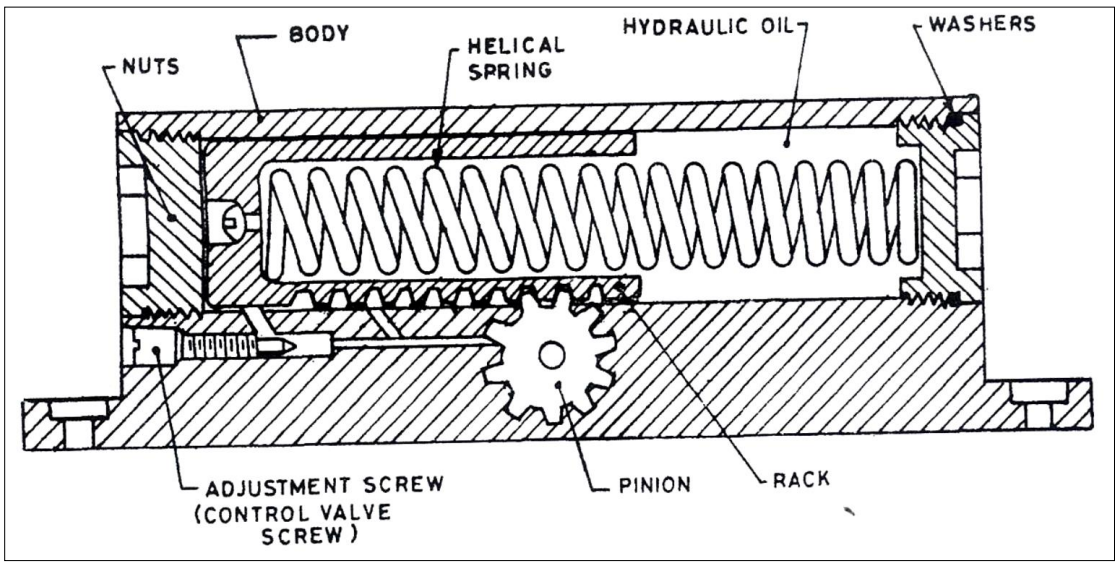


Fig-3 Tubular Type Door Closer

4.1.3 Requirement for Door Closer

- The door closer may be polished or painted and finished with lacquer in colours as agreed to between the purchaser and the manufacturer.
- In case of aluminium body, it may be anodized. In case anodizing is done, the thickness of the anodic coating shall not be less than Grade AC 15 of IS 1868 :1982.
- Mild steel parts shall be given the treatment as given below.
- All dents, burrs and sharp edges shall be removed from various components and they shall be pickled, scrubbed and rinsed to remove grease, rust, scale or any other foreign element.
- After pickling, all the mild steel parts shall be given phosphating treatment in accordance with IS 3618: 1966.

A) Essential Requirement:

i) The closer shall be manufactured in three sizes conforming to the requirements given in Table 1, in accordance with the direction of the opening of the door either clockwise or anticlockwise.

ii) The closing time shall be easily adjustable between 5 and 20 seconds by means of regulating screw.

iii) Hydraulic oil filling shall work satisfactorily at all temperatures between 50°C and -10°C without requiring any change except adjustment of the regulating screw. The closer shall be tested as given in (iv).

iv) The closer before testing shall be conditioned to a temperature of 50°C ± 2°C and - 10°C ± 2°C for not less than 3 hours separately. The conditioned closer shall be tested for its performance requirements as given in (ii) and 4.1.3 B (iii). The above performance requirements shall be checked within 15 minutes of its conditioning. At the end of the test the closer shall show no defects or leakage of oil.

v) The main arm shall be securely fitted to the shaft by a square or hexagonal profile or profile of any other suitable shape or by any other suitable means, and a nut and a washer.

vi) Provisions shall be made for securely fixing the door closer to the door frame and to the door panel.

vii) The nut/top lid of the assembly shall be fixed firmly on to the body and it shall be possible to remove the same whenever necessary for carrying out repairs, such as replacement of broken spring, oil seal, etc.

viii) The closer shall be capable to regulate the speed by extending spring or adjustment in control valve screw, as the case may be.

ix) Typical illustrations of bottle and tubular type door closers are given in Fig.1, 2 and 3, respectively.

B) Requirement for Test: The closets shall be tested according to the sequence of instructions given below,

i) **Visual Inspection:** The packing of the closers shall be inspected as per instruction of manufacturer packing.

ii) **Surface:** The surface of the closers shall be clean, without sharp edges, free from cracks, dents, burrs, or any other visible surface defect.

iii) **Performance Requirements:** After being fitted in its position when the door is opened through 90^0, the same should swing back to an angle of 20±5°C with normal speed, but thereafter the speed should get automatically retarded and in case of doors with latches, it should be so regulated that in its final position the door smoothly negotiates with the latch.

iv) **Endurance Test:** The closer selected in accordance with 14 shall be fitted to the test piece which shall be subjected to total 50000 operations against the maximum load specified for the type of closer.

- The number of operations that shall be carried out continuously at any time during the test shall not be less than 2500 to 3000. One opening and closing shall constitute one operation. The test shall be conducted at the rate of 4 to 6 operations per minute. At the end of the test, the closer shall show no defects, failure or leakage of oil, etc.

4.1.4 Reference: Indian standard IS 3564:1995

4.2 FLOOR DOOR STOPPER

Floor door stopper is used to control the doors operation.



4.2.1 Component of Door Stopper: Components are shown in Fig-1 below.

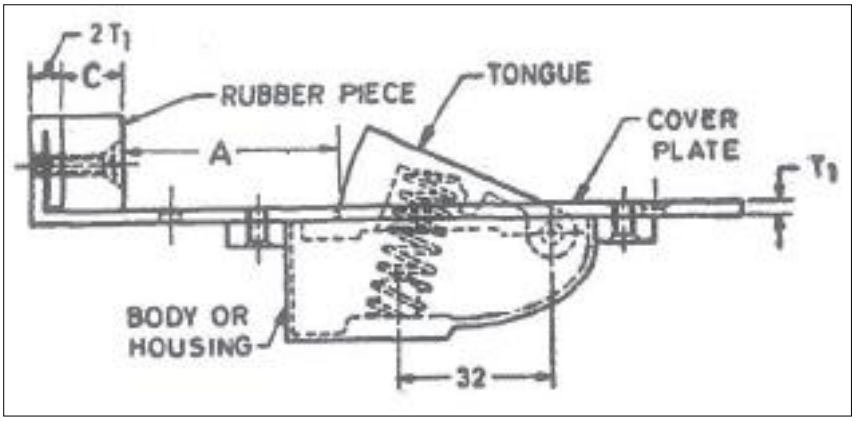


Fig-1A Cast Type Floor Door Stopper

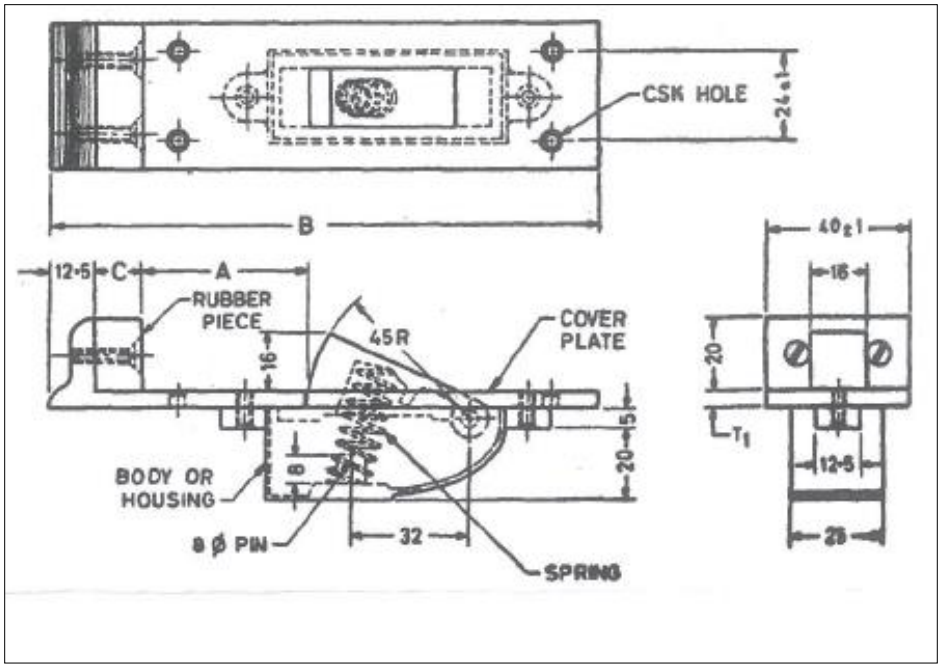


Fig-1B Cast Body or Housing with Sheet Metal Cover Floor Door Stopper

4.2.2 Dimensional Requirement and Tolerance for Floor Door Stopper: Dimensional requirement is given in Table-1 (Refer Fig-1)

Table -1 Dimensions and Tolerance for Floor Door Stopper (Refer Fig 1)

Thickness of door stopper	A	B	C (min)	TI		Counter sunk screw		
				Casting	Sheet	Screw designation for casting	Screw designation for sheet metal	Nos. of holes
30	35	140	13	4.5	3	9	8	4
35	40	140	8	4.5	3	9	8	4
40	45	150	13	4.5	3	9	8	4
45	50	150	8	4.5	3	9	8	4
Tolerance	±0.50	±0.50	-	+0.3	+0.3	-	-	-
	-	-	-	-	-	-	-	-

4.2.3 General Requirements:

- The floor door stoppers shall be well made and shall be free from defects likely to prevent its correct fixing or affect adversely its reliability in use.
- The body or housing of the door stopper shall be cast or manufactured in one piece and shall be fixed to the cover plate by means of brass or aluminium screws.
- The screw for fixing the cover plate to the body shall be countersunk head machined screws, conforming to IS 1365:1978.
- The body and the cover plate shall be either of aluminium alloy casting or aluminium alloy sheet, or cast brash or brass sheet.

- There shall be four countersunk holes for fixing the door stoppers to the floor.
- The screw holes shall be suitable for countersunk head wood screws conforming to IS: 6760:1972 and of sizes as specified in Table 1.
- The pin shall be either of brass or aluminium or mild steel.
- The tongue shall preferably be of the same material as used for the body housing except when the tongue is made of nylon or, plastics.
- The tongue which would be pressed while closing or opening of the door shall be connected to the lower part by means of a copper pin of suitable size as shown in Fig. 1.
- On the extreme end, a rubber piece shall be attached to absorb shocks due to the pulling action of the door as shown in Fig.1.
- The rubber used shall comply with the. Requirement given in Table-2

Table-2 Requirements for Rubber Used in Door Stopper

SN	Particular	Requirements	Resting Procedure
1	Relative density max	1.3	IS : 3400 (Part ix) 1978
2	hardness	60±5	IS : 3400 (Part II) 1965
3	Ageing for 24 hours at 100±1 degree	Change in initial hardness +5 -0	IS : 3400 (Part II) 1965
		Shall not develop brittleness or tackiness	IS : 3400 (Part V) 1978

- The rubber piece may be fixed to the cover plate by means of brass or mild steel screws.
- Door stoppers shall be free from flaws and defects of, all kinds.
- All burrs and sharp edges shall be removed.
- It shall be free from surface and casting defects.
- Aluminium door stopper shall be anodized and the anodic coating shall not be less than Grade AC 10 of IS 1868: 1968.
- Brass stoppers shall be finished smooth.
- Stoppers may also be chromium or nickel plated, anodized or oxidized.
- The exterior of the door stopper shall be in flush with the floor and shall be finished bright or satin.

4.2.4 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is shown in table-3 below.

Table-3 Scale of Sampling

Lot Size	Sample Size	Permissible Nos. Of Defective
Up to 100	5	0
101 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	80	5

4.2.5 Reference:

- Indian standard 1823:1980
- CPWD DSR NO.9.114.1&2

4.3 EYES AND HOOKS

Eyes and hooks for shutter are used to operate the doors.



4.3.1 Type: Hooks and eyes are classified into two types.

- Type-1 : Mild Steel and Hard Drawn Brass Hooks and Eyes (Refer Fig-1)
- Type-II : Cast Brass Hooks and Plates (Refer Fig-2)

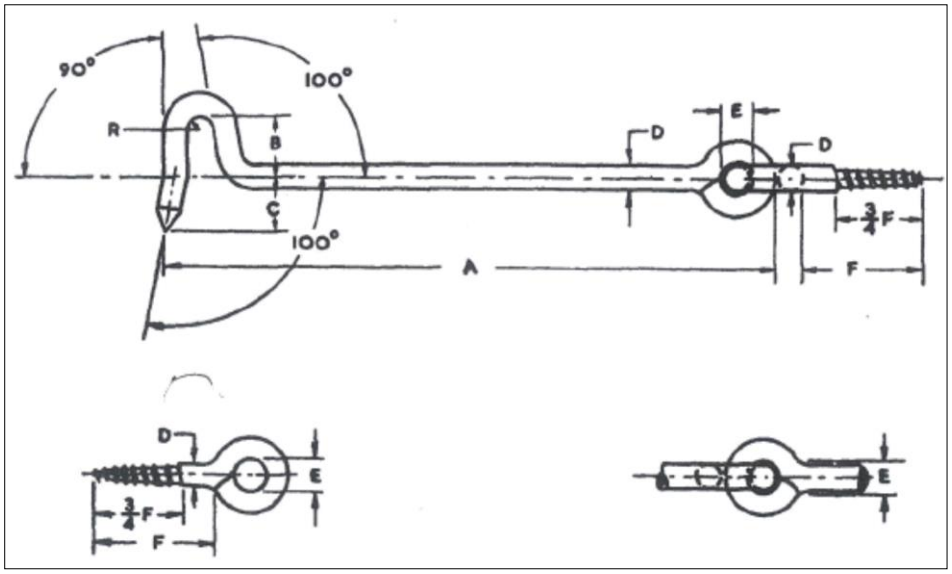


Fig-1 Mild Steel and Brass Gate and Shutters Hooks and Eyes

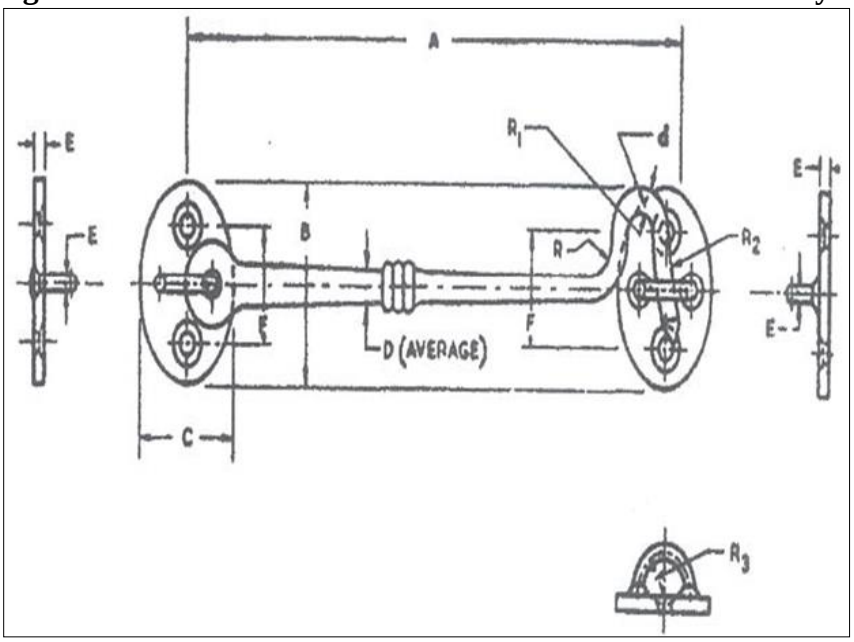


Fig-2 Cast Brass Hooks and Plates

4.3.2 Dimensional Requirement and Tolerance for Hooks and Eyes: Dimensional requirement and tolerance of gate & shutters hooks and eyes are shown in table below.

Table-1 Type I Mild Steel (Ref Fig-1) All Dimensions in mm

Size	A	B (App.)	C (App.)	D		E	F (App.)	R
				Screw Designation No.	Dia. of Unthreaded Shank			
65	65±2	10	9	8	4.17	5.7	14	2.2
75	75±2	11	10	9	4.52	6.0	15	2.4
100	100±2	13	12	11	5.23	6.7	17.5	2.8
125	125±2	15	14	12	5.59	7.1	18.5	3.0
150	150±2	15	14	12	5.59	7.1	18.5	3.0
200	200±2	16	14	14	6.30	7.8	20.5	3.4
250	250±2	17	15	14	6.30	7.8	20.5	3.4
300	300±2	17	15	16	7.01	8.5	23.0	3.7

Table-2 Type II Cast Brass Hooks and Plates (Ref Fig -2) All Dimension in mm

	Size				
	75	100	125	150	200
A	75±2	100±2	125±2	150±2	200±2
B	30±1	35±1	40±1	40±1	45±1
C	20±1	25±1	30±1	30±1	35±1
D (Average)	4±0.5	5±0.5	6.5±0.5	6.5±0.5	8±0.5
D	2.5±0.5	3.5±0.5	5±0.5	5±0.5	6.5±0.5
E	2.5±0.5	2.5±0.5	3.5±0.5	3.5±0.5	5±0.5
F	16±1	20±1	22±1	22±1	25±1
R	4±0.5	5±0.5	6±0.5	7±0.5	8±0.5
R1	2.5±0.5	2.5±0.5	3.5±0.5	3.5±0.5	4±0.5
R2	32±1	35±1	35±1	40±1	42±1
R3	5±0.5	6.5±0.5	8±0.5	8±0.5	11±0.5
Screw Holes for Wood Screw No.	6	8	8	8	10

4.3.3 General Requirement:

- Hooks, eyes and plates shall be well-made and free from defects.
- They shall be finished to the correct shape and dimensions so as to function properly when they are in use.
- Cast hooks and plates shall be free from casting and other defects.
- The screw thread and the *gimlet* point of hooks and eyes shall conform to the requirements laid down in IS 451:1961 Specification for Wood Screws (*Revised).*
- Unless otherwise specified, the articles shall be finished bright.

4.3.4 Scale of sampling and criteria of conformity: Scale of sampling and criteria of conformity are shown in Table-4 given below.

Table-4 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective Hooks
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	55	3

4.3.5 Reference: Indian standard 207:1964

4.4 PLASTIC WINDOW STAY

Window stays are items which support open windows and also maintain the security of closed windows.

4.4.1 Size and Shape: Size and shape of plastic window stay is given in Fig-1A & B.

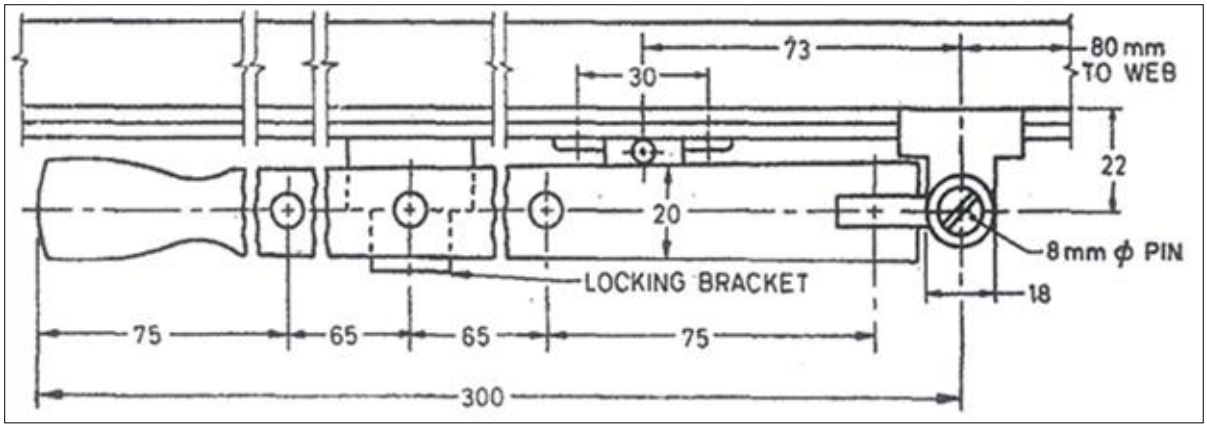


Fig-1A Window Stay

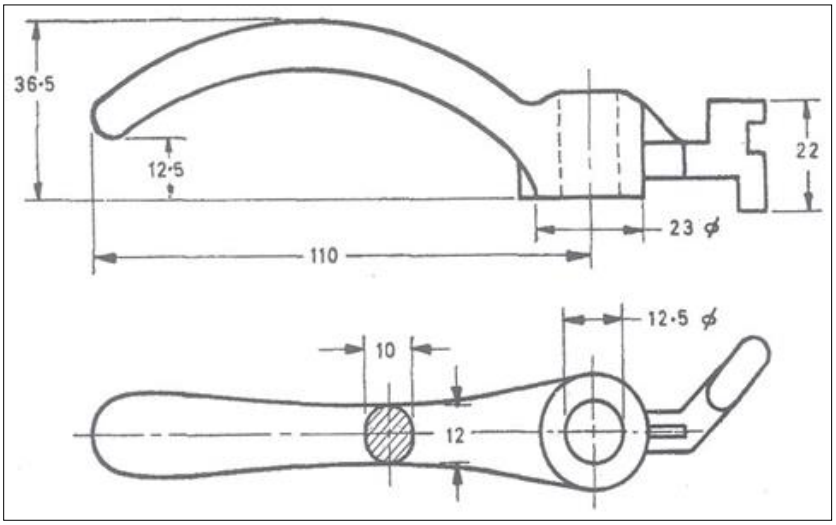


Fig-1B Window Fastener

4.4.2 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity is given in Table-1.

Table-1 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective
Up to 100	5	0
101 to 150	8	0
151 to 300	13	0
301 to 500	20	1
501 to 1000	32	2
1001 and above	50	3

4.4.3 Reference: Indian standards 6318:1971

4.5 EYE HOOKS USE WITH CHAIN



4.5.1 Grades of Hooks: Hooks can be classified into following grades:

i) L grade
ii) M grade
iii) S grade
iv) T grade

4.5.2 Shape and Dimensional Requirement: Shape and dimensional requirements are mentioned in Table-1 & Fig -1.

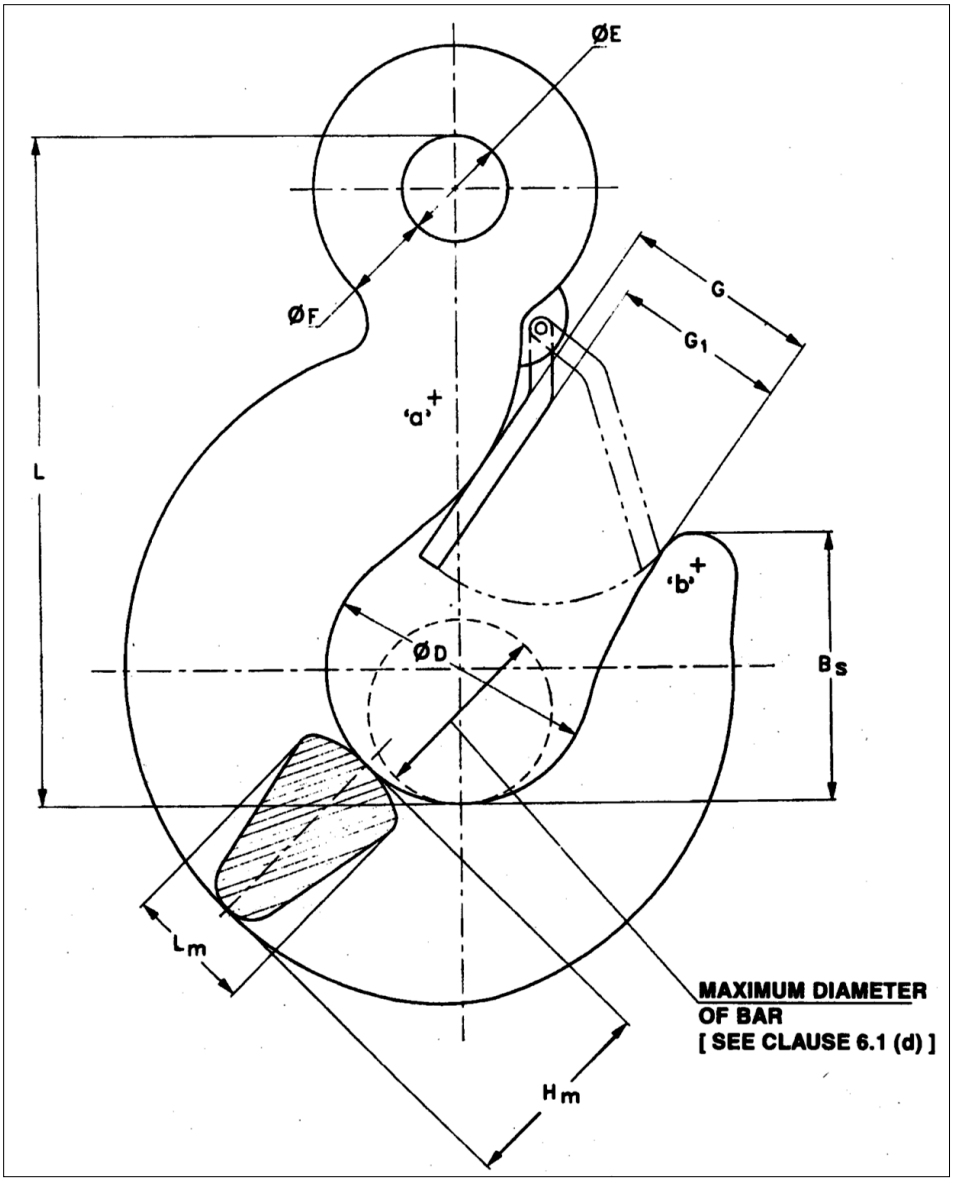


Fig 1 Dimensions of Hook

Table-1 Mechanical and Dimensional Characteristics of Eye Hook (All Dimensions in mm)

Nominal Dia. of Chain	**Lifting Capacity in Tones for Grades**				**Proof Load Fe in KN for Grades**				**Throat Opening 2.9 d_n min.**	**2.7 d_n**	**Seat dia. 3.8 d_n**	**Section Depth 4.3 d_n max**	**Section Width 2.9 d_n max**	**1.75 d_n min**	**1.8 d_n max**	**15.5 d_n max**
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	L	M	S	T	L	M	S	T								
6.0	0.50	0.63	1.0	1.25	10	12.5	20	25	17.40	16.20	22.80	25.80	17.40	10.50	10.80	93.0
7.1	0.63	0.80	1.25	1.60	12.5	16	25	31.5	20.60	19.20	27.0	30.50	20.60	12.40	12.80	110
8.0	0.80	1.0	1.60	2.0	16	20	31.5	40	23.20	21.60	30.40	34.40	23.20	14	14.40	124
9.0	1.0	1.25	2.0	2.50	20	25	40	50	26.10	24.30	34.20	38.70	26.10	15.80	16.20	139.50
10.0	1.25	1.60	2.50	3.20	25	31.5	50	63	29	27.0	38	43	29.0	17.50	18	155
11.0	1.60	2.0	3.20	4.0	31.5	40	63	80	31.90	29.70	41.80	43.70	31.90	19.30	19.80	170.50
12.0	2.0	2.50	4.0	5.0	40	50	80	100	34.80	32.40	45.60	51.60	34.80	21	21.60	186
14	2.50	3.20	5.0	6.30	50	63	100	125	40.60	37.80	53.20	60.20	40.60	24.50	25.20	279
16	3.20	4.0	6.30	8.0	63	80	125	160	46.40	43.20	60.80	68.80	46.40	28	28.80	248
18	4.0	5.0	8.0	10.0	80	100	160	200	52.20	48.60	68.40	77.40	52.20	31.50	32.40	279
20	5.0	6.30	10.0	12.50	100	125	200	250	58	54	76	86	58	35	36	310
22	6.30	8.0	12.50	16.0	125	160	250	315	65	59.40	83	95.60	63.80	38.50	39.60	341
25	8.0	10.0	16.0	20.0	160	200	315	400	72.20	67.50	95	107.50	72.50	43.80	45	387.50
28	10.0	12.50	20.0	25.0	200	250	400	500	81.20	75.60	106.40	120.40	81.20	49	50.40	434
32	12.50	16.0	25.0	32.0	250	315	500	630	92.80	86.40	121.60	137.60	92.80	56	57.60	496
36	16.0	20.0	32.0	40.0	315	400	630	800	104.40	97.20	136.80	154.80	104.40	63	64.80	558
40	20.0	25.0	40.0	50.0	400	500	800	1000	116	108	152	172	116	70	72	620
45	25.0	32.0	50.0	63.0	500	630	1000	1260	130.50	121.50	171	193	130.50	78.80	81	697.50

4.5.3 General Requirement

- The hooks shall be free from defects and shall be cleanly forged in one piece in such a manner that the macro etched flaw lines follow the body of the hook except at the eye.
- The finished hook shall be clean and free from coating of any description, unless otherwise specified

4.5.4 Reference: Indian Standard 3822:2002

4.6 FAN LIGHT CATCH

Fan light catch is used to operate the doors and windows.



4.6.1.1 Types of Fan Catch: Fan catch may be classified into following types according to material.

a) Mild Steel
b) Aluminium Alloy Fan Catch
c) Cast Brass Fan Light Catch

4.6.2 Dimensional Requirements and Tolerance for Fan Light Catch: Dimensions for fan light catch are shown in Fig-1 and tolerance given in Table-1 below:

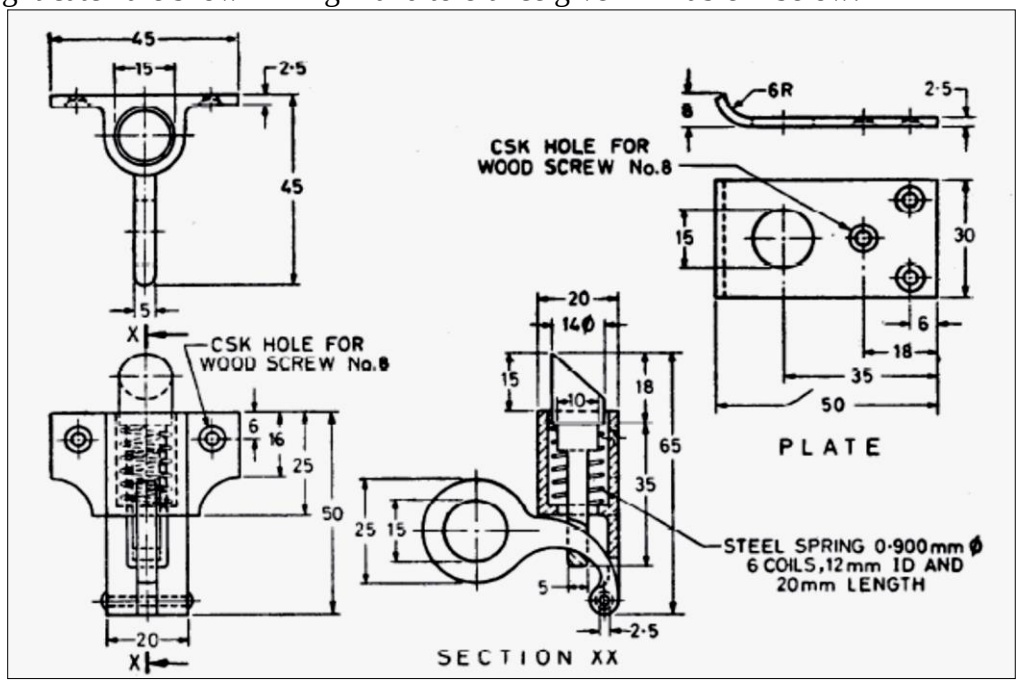


Fig-1 Design of Fan Light Catch

Table-1 Tolerance

Dimension in mm	Tolerance in mm
Up to and including 5 mm	±0.20
Above 5 mm and up to and including 25 mm	±0.50
Above 25 mm	±1.0

4.6.3 General Requirements for Fan Light Catch:

- Fanlight catches shall be well made, free from flaws and defects of any kind.
- The movement of the plunger shall be smooth, easy and square.
- The screw holes shall be clean and countersunk.
- The heads of the riveted hinge pin shall be well formed and shall allow the hook to function without any friction or undue play.
- All sharp edges and corners shall be removed.
- Aluminium alloy fanlight catches shall be anodized after the initial fabrication work. A coating not less than 0.015 mm is recommended for normal use.
- The anodic film may be transparent or dyed.
- For exterior use, where sunlight falls on the fittings, only light fast colours like light fast bronze or light fast gold or plain anodic finishes shall be employed and the thickness of the anodic film shall be not less than 0.025 mm.
- Brass fanlight catches shall have satin finish or other finish as specified by the purchaser.
- Mild steel fanlight catches may be stove enamelled to a colour and finish, as desired by the purchaser.

4.6.4 Scale of Sampling and Criteria of Conformity: Scale of sampling and criteria of conformity are shown in Table-2.

Table-2 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective
Up to 100	13	0
101 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	80	5

4.6.5 Reference: Indian Standard 364:1993

4.7 BALL CATCHES



Ball catch is a door fastening device in which a spring controlled ball, projecting through a hole of smaller diameter than the ball, engages with a striking plate. Ball catches are commonly used in wooden almirahs to keep their doors in closed position after the doors are pushed in fully.

4.7.1 Sizes: Ball catches are available in the following size 6, 7.5, 9.5 and 12.5 mm in size. The size shall be denoted by the external diameter (D) of the cylinder as shown in Fig. 1.

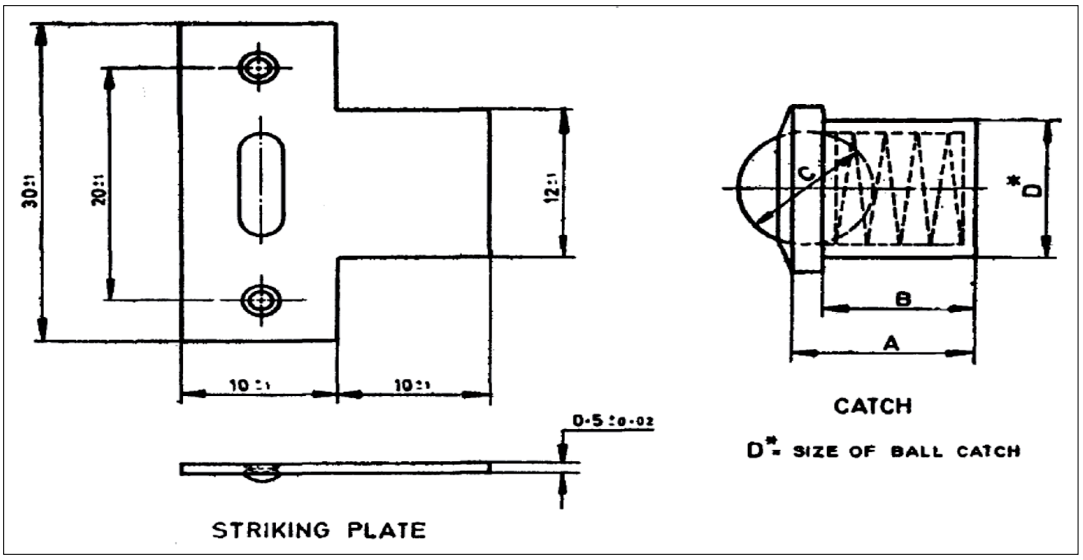


Fig-1 Ball Catches

4.7.2 Dimensions and Tolerance for Ball Catches: Dimensions and tolerance are shown in Table-1 and Fig-1.

Table-1 Dimensions and Tolerance

SN	A	B	C	D
i	14	11.5	10	12.5
ii	11	8.5	8	9.5
iii	10	8.5	6	7.5
iv	9	8.0	5	6
Tolerance	±0.20	±0.20	As per tolerances for respective diameters given in IS *: 2898-1976*	±0.20

4.7.3 General Requirement:

- When the almirah door is in closed position, it shall be retained in that position by the spring section of the ball catch and working shall be ensured in continuous usage.
- The door shall open only when it is pulled to open.
- Ball catches when assembled shall have smooth and easy working. The body and striking plate of ball catches shall be satin or bright polished.

4.7.4 Scale of sampling and criteria of conformity: Scale of sampling and criteria of conformity is shown in Table-2.

Table-2 Scale of Sampling and Criteria of Conformity

Lot Size	Sample Size	Permissible Nos. of Defective
Up to 200	15	0
201 to 300	20	1
301 to 500	30	2
501 to 800	40	2
801 and above	50	3

4.7.5 Reference: Indian standard 8756:1978.

***

REFERENCES

SN.	IS no.	Description
1.	Indian standard 8756:1978	Specification for ball catches for use in wooden almirah
2.	Indian Standard 364:1993	Fanlight catch - specification
3.	Indian Standard 3822:2002	Eye hooks for use with chains -specification
4.	Indian standards 6318:1971	Specification for plastic window stays and fasteners
5	Indian standard 207:1964	Specification for gate and Shutter hooks and eyes
6	Indian standard 1823:1980	Specification for Floor door stoppers
7.	Indian standard IS 3564:1995	Hydraulically regulated door Closers-specification
8.	Indian Standard 4992:1975	Specification for Door handles for mortice locks (vertical type)
9.	Indian standard IS 208:1996	Door handles - specification
10.	Indian standard IS 729:1979	Specification for drawer lock & cup board locks and box locks
11	Indian standard IS 2209:1976	Specification for Mortice locks (Vertical type)
12	Indian standard IS 7534:1985	Specification for Sliding locking bolts Use with padlocks
13	Indian Standard 363:1993	Hasps and staples – specification
14	Indian standard 5187:1972	Specification for Flush bolts
15	Indian Standard 204 part 1:1991	Tower bolts – specification Part 1 ferrous metals
16	Indian Standard 204 part 2:1992	Tower bolts – specification Part 2 non-ferrous metals
17	Indian standard 281:2009	Mild steel sliding door bolts for use with Padlocks - specification
18.	Indian standard 3818: 1992	Continuous (piano) hinges - Specification
19.	Indian Standard 206:2010	Tee and strap hinges -specification
20.	Indian standard 362:1991	Parliament hinges - specification
21	Indian standard 1341:1992	Steel butt hinges — specification
22	Indian standard IS 205:1992	Non ferrous Metal Butt hinges specification
23	CPWD DSR2018	
24	Unified specifications of Indian Railway	

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If at any point contradiction is observed, then Indian Standards, regulations issued by Government bodies, Railway Board/RDSO guidelines shall be referred.

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