


INTERPLANT STANDARD - STEEL INDUSTRY		
	<b>SPECIFICATION FOR DEE-SHACKLES</b>	<b>IPSS:1-07-022-14</b> <b><i>(Third Revision)</i></b>
	BASED ON IS:6132 (PTS 1 & 2)	Formerly: IPSS:1-07-022-03 <i>(second revision)</i>

## 0. FOREWORD

- 0.1 This Inter Plant Standard, prepared by the Standards Committee on Paints and Portable Maintenance Equipment, IPSS 1:7, with the active participation of the representatives of all the steel plants and established manufacturers of shackles and was adopted with revision in September 2003. It revised third time again in July, 2014 keeping in view of latest developments.
- 0.2 This Inter Plant Standard was earlier formulated in year 1984 and was based on IS 6132 (Part 1):1971 'General requirements of shackles' and IS 6132 (Part 2):1972 'Dimensions of Dee-shackles'. The earlier IPSS envisaged use of Grade 30 as Material for Dee-Shackle. The revision of this standard has been carried out as steel plant application needs material of Grade 63 for Dee-shackles instead of Grade 30. Comparative study between IPSS & IS is given at Appendix-A.

## 1. SCOPE

- 1.1 This Inter Plant Standard covers the requirements of Dee-Shackles used for lifting purposes in steel plants.

## 2. GENERAL REQUIREMENTS

- 2.1 The shackle shall be solid forged without any weld.
- 2.2 The dee-shackle shall comply in all respect with IS 6132 (Part 1):1971 regarding terminology, workmanship and finish and inspection and examination.

## 3. DIMENSIONS

- 3.1 The dimensions shall be in accordance with the requirements of Table-1.
- 3.2 Tolerances on Dimensions

- a) The dimensions of the body of a shackle except the pin hole shall not be less than nominal dimensions and shall not exceed by more than 5%.
- b) The diameter of the pin hole shall have the following tolerances:  

Up to and including 20 mm dia hole	+ 1.0 mm, - 0 mm
Over 20 mm and up to 45 mm dia hole	+ 1.2 mm, - 0 mm
Over 45 mm dia hole	+ 1.6 mm, - 0 mm
- c) The diameter of the pin (dimension D) shall have the following tolerances:  

Up to and including 50 mm dia pin	- 0.08 mm to - 0.25 mm
Over 50 mm dia pin	- 0.13 mm to - 0.50 mm

#### 4. MATERIAL

- 4.1 The steel used in the manufacture of shackle and pin shall be produced by the open hearth or electric process or by any of the oxygen blown processes and shall have a minimum tensile strength of 80 kgf/mm<sup>2</sup>. The steel used shall be fully killed and shall contain not less than 0.020% of aluminium, sulphur and phosphorus content shall not exceed 0.050% & 0.045% respectively.
- 4.2 The material of Grade 63 shackles shall be one of the following:
  - a) Steel conforming to following designations:
    - i) 40Cr4 / 40Cr4Mo3 / 35Ni5Cr2 conforming to IS 4367:1991 'Alloy steel forgings for general industrial use (first revision' for use in normal temperature conditions.
    - ii) 13Ni13Cr3 or 15Ni16Cr5 conforming to IS 4367:1991 for use in high temperature conditions.
  - b) Hardness - Hardness of the body and pin after heat treatment shall be between 248-302 BHN when tested in accordance with IS 1500:2005 'Method for Brinell hardness test for steel'.

#### 5. SCREW THREADS

- 5.1 The screw threads shall conform to IS 4218 (Part 1 to 6) 'Specification for ISO metric screw threads'.

## **6. HEAT TREATMENT**

6.1 All shackles shall be subjected to one of the following heat treatment:

- a) Normalizing by heating to a temperature within 50oC above the upper critical point of the steel used followed by cooling in still air.
- b) Hardening and tempering by heating to a temperature within 50oC above upper critical point of the steel used followed by quenching in oil, brine or water and tempering.

## **7. TEST**

7.1 Each shackle, when subjected to a proof load as given in Table-1, shall be capable of withstanding without any deformation and shall be free from visible flaws or defects.

## **8. TEST CERTIFICATE**

8.1 Inspection, test and examination shall be carried out in accordance with IS 6132 (Part 1):1971 and a test certificate submitted.

## **9. DESIGNATION**

9.1 Designation of a dee-shackle with body dia 14 mm shall be designated as:

D-Shackle 14, IPSS:1-07-022-14

## **10. MARKING**

10.1 Dee-shackles shall be punched with the following markings:

- a) SWL,
- b) Manufacturer`s trade-mark,
- c) Designation on the body, and
- d) Identification on the pin.

## **11. INFORMATION TO BE SUPPLIED WITH THE ENQUIRY OR ORDER**

11.1 The enquiry or order should state:

- a) The type and size of shackle,
- b) The working load,
- c) Heat treatment desired, and
- d) Working condition [refer clause 4.2(a)].

TABLE 1

**DETAIL OF DEE-SHACKLES ( Dimensions, SWL, PL )**  
**(Read alongwith Fig 1 & 2)**

**[Refer standard IS 6132 (Part 2):1972, Table-2]**

**All dimensions in millimeters**

Body Dia d	Jaw Inside Width W	Inside Length S*	Pin Dia Dmin	Shackle Eye Outside Dia emin	Metric Thread Pitch P**	Safe Working Load (SWL Tonnes) Grade63	Proof Load (PL)	
							Tonnes	KN
10	18	40	12	24	1.75	1.00	2.00	20
14	22	49	16	32	2.00	1.60	3.20	32
19	32	70	22	44	2.50	3.20	6.30	63
24	40	88	28	56	3.00	5.00	10.00	100
30	50	110	35	76	4.00	8.00	16.00	160
38	63	139	44	88	4.00	12.50	25.00	250
43	70	154	50	100	5.00	16.00	32.00	315
54	90	198	62	124	5.50	25.00	50.00	500
60	100	220	69	138	6.00	32.00	59.00	600
66	107	236	76	152	6.00	40.00	70.00	700
71	117	258	82	164	6.00	50.00	85.00	850
79	130	286	91	182	6.00	63.00	100.00	1000
84	140	308	97	194	6.00	80.00	120.00	1200
93	153	337	110	220	6.00	-----	-----	-----

\* Value of 'S' is based on the formula,  $S=2.2 W$ , rounded off to the next higher mm.

\*\* Upto 69 mm pin dia the metric screw thread shall be of course pitch series, for 76 mm and above pin dia, the screw thread shall conform to fine pitch series.

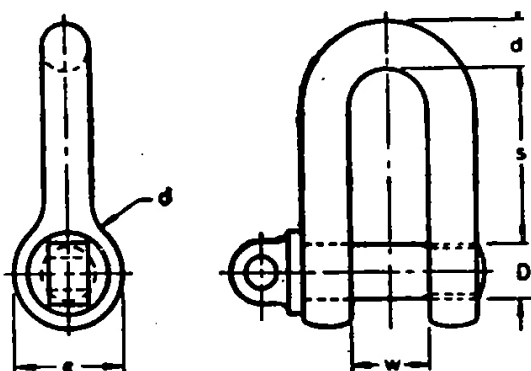


FIG. 1 DEE SHACKLE

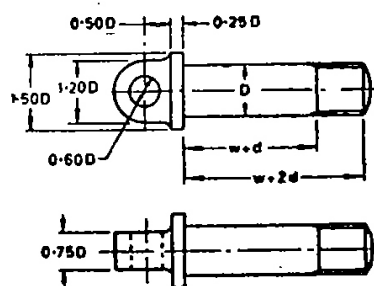


FIG. 2 SCREWED PIN WITH EYE &amp; COLLAR

## APPENDIX A

### (Refer Clause 0.2) COMPARATIVE STUDY OF

### IPSS:1-07-022-14 SPECIFICATION FOR DEE-SHACKLES ( THIRD REVISION ) AND IS 6132 (PART 1):1971 'GENERAL REQUIREMENTS OF SHACKLES' AND IS 6132 (PART 2):1972 'DIMENSIONS OF DEE-SHACKLES'

Requirements		Clause Reference in IPSS	Clause reference in IS
Requirements selected for steel plant use out of several choices given in IS	a) Material	4	4 (of Part 1)
	b) Sizes & dimensions	Table-1	Table-2 (of Part 2)
Deviation from IS	Nil	-	-

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