| INTERPLANT STANDARD – STEEL INDUSTRY | | |
|---|---|---|
| IP SS | SPECIFICATION FOR<br>FORGED CRANE HOOKS | **IPSS:1-08-004-18**<br>*(Second Revision)* |
| | Based on IS:3815 -1969 and IS 15560 | *Formerly-:*<br>*IPSS: 1-08-004-94*<br>*(First Revision)* |

## 0. FOREWORD

0.1 This Interplant Standard discussed by the Standards committee on Lifting and Hoisting Equipment, IPSS 1:8 with the active participation of the representatives of all the steel plants and established manufacturers and was adopted with first revision in year 1994.

0.2 The Standard discussed again in presence of experts from SAIL, RINL, TATA STEEL, ESSAR, JSPL and Consultants of MECON, HEC & DASTURCO and revised with second revision in **August, 2018**.

0.3 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and assemblies used in steel plant equipment and provide guidance in indenting stores or equipment by individual steel plants. For exercising effective control on inventories, it is advisable to select a fewer number of sizes/types from those mentioned in this standard. These limited sizes/types can be adopted as Plant Standards for an individual steel plant. It is not desirable to make deviations in technical requirements.

0.4 This standard was first published in February 1976. An Amendment was issued in 1983 for the clause in material and some dimensional changes were made to correct the discrepancy in the printed standard. This revision incorporates the amendment so that the requirement of the amendment are not lost sight of.

## 1. SCOPE

1.1 This Interplant Standard, which covers the requirements of crane hooks used in steel industry is generally based on IS 3815:1969 `Specification for point hooks with shank for general engineering purposes'. The stipulations made in IS 15560 regarding terminology, workmanship, proof testing, destruction test, inspection, certificate of test and examination and marking shall remain essentially the same for this Interplant Standard.

1.2 Other technical aspects, required for meeting the special needs of the steel industry are given in this document.

1.3 This standard covers hooks up to a capacity of 80 T. For higher capacity hooks conforming to IPSS: 1-08-008-18 `Forged ramshorn hooks' or IPSS:1-08-009-18 `Laminated ladle hooks', shall be used.

## 2. MATERIAL

2.1 The material used in manufacturing the crane hooks shall be the steel of designation 20C15 conforming to Table-1 of IS 4367:1991 `Alloy steel forgings for general industrial use - Specification (first revision)'.

2.2 The chemical composition of the steel shall be as follows:

| Constituent | Material 20C15 (IS 4367:1991) |
|---|---|
| Carbon | 0.16 to 0.24 |
| Manganese | 1.30 to 1.70 |
| Silicon | 0.10 to 0.35 |
| Sulphur, Max | 0.030 % (MAX) |
| Phosphorus, Max | 0.030 % (MAX) |

2.3 The steel shall be silicon killed / aluminum treated (fine grain). When the steel is Aluminum killed, total Aluminum content shall be between 0.02 - 0.05%.

2.3.1 The steel shall not have Austenitic grain size index less than 5, when tested as per IS 4748:1988 `Method for estimating average grain size of metals (first revision)'.

2.4 The steel shall have mechanical properties as specified below:

a) Ultimate tensile strength 60-70 kg/mm$^2$

b) Yield stress (Min) 40 kg/mm$^2$

c) Elongation (Min) 18 percent

2.5 On request, the manufacturer shall supply the analysis of cast or heat of the material for its chemical composition.

## 3. FORM AND DIMENSIONS

3.1 The hook shall be of standard trapezoidal section. The dimensions shall be as given in Table-1 and Fig-1. The tolerances on dimensions and other details shall conform to relevant clauses of IS 3815:1969.

3.2 To check the hook metal for mechanical properties, the hook shall be manufactured with an allowance provided in the shank portion for making the test samples.

## 4. RATING

4.1 The hook shall be rated for medium duty (M) and heavy duty (H) as per Table-1. Hooks of medium duty shall be used in cranes of classification No. 1 and 2 and hooks of heavy duty shall be used in cranes of classification No. 3 and 4 as per IS 807:1976 `Code of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists' (first revision).

## 5. SHANK

5.1 Length - The length of the shank portion shall depend upon the type of hook block. The hook shall be short shank (type A) or long shank (type B) as per Table-1.

5.2 Threads - The threads shall be metric or trapezoidal depending upon the capacity of the hook as given in Table-1.

5.2.1 Details of trapezoidal threads shall as per Fig-2 (read with Table-2).

5.2.2 The threaded portion of the shank shall be clean and free of burrs, stripped threads, cuts and dents.

## 6. HOOK NUT

6.1 Each hook shall be supplied in assembled condition with the nut and its locking arrangement. The nut shall be locked to prevent its unscrewing by any suitable arrangement as specified by the purchaser.

6.2 If the shank and nut which secures it are drilled to take a fixing or retaining pin or for any other purpose, there shall remain a continuous length of the shank engaged by the nut on the load side at least equal to the diameter of the shank.

6.3 The hook nut shall be made of Steel 45C8 as per IS 1570 (Part 2/Section I):1979 `Schedules for wrought steels - Part 2 - carbon steels (unalloyed steels) - Section I wrought products (other than wires) with specified chemical composition and related properties (first revision).

6.4 The dimensions of the hook nut shall be specified by the purchaser at the time of placing the order.

## 7. WORKMANSHIP AND FINISH

7.1 The hook shall have a total minimum reduction in area of 80% if forged out of ingots or a total minimum reduction in area of 50% if forged out of blooms.

7.2 The hooks shall be free from defects. Elimination of defects by welding or any other method shall not be allowed.

## 8. HEAT TREATMENT

8.1 The maximum hardness in soft annealed condition shall be HB 200 as given in Table -3 of IS 4367:1991 for 20C15.

## 9. TESTING

9.1 In addition to all tests specified in IS 3815:1969, the following tests and examinations shall also be conducted for each hook:

a) Visual inspection

b) Checking the dimensions of machined portion of the hooks and its shank.

c) Determination of the physical properties of the hook metal, and

d) Test for hardness

e) Die penetration test on every forging for detection of cracks.

9.1.1 Certificates for tests and examinations conducted as per 9.1 shall be supplied along with the proof load test certificate.

9.2 The manufacturer shall, if so directed by the purchaser, ensure that all forgings are free from laminations and other internal and external defects by subjecting each hook to radiographic examination as per IS 2595:1978 ‘ Code of practice for radio graphic testing (first revision) and written reports should be submitted as per clause 14.2 of IS 2595:1978, If so desired by the purchaser.

## 10. MARKING

10.1 Each hook shall have its quality marking identifications, Safe Working Load (SWL) etc. stamped on it as shown in Fig-3.

## 11. PACKING

11.1 After inspection and testing, each hook shall be painted with corrosion resistant paint. The machined portion of the shank shall be coated with an anti-corrosive grease. While transporting the hook, the machined portion of shank shall be properly packed to protect it from any external damage.

**TABLE 2**

**DETAILS OF TRAPEZOIDAL THREADS**
**(Clause 5.2.1)**

| Pitch of Thread `S' | Depth of Thread `$h_1$' | Working Length of Profile `h' | Clearance `Z' | Radius `r' |
|---|---|---|---|---|
| 10 | 5.5 | 5 | 0.5 | 0.25 |
| 12 | 6.5 | 6 | 0.5 | 0.25 |
| 16 | 9.0 | 8 | 1.0 | 0.50 |

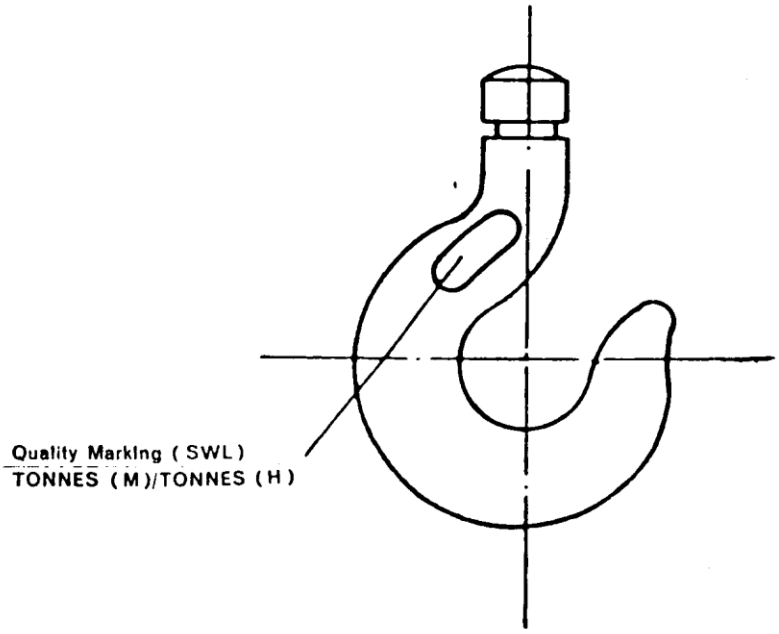


FIG. 3 POSITION OF QUALITY MARKING IDENTIFICATION

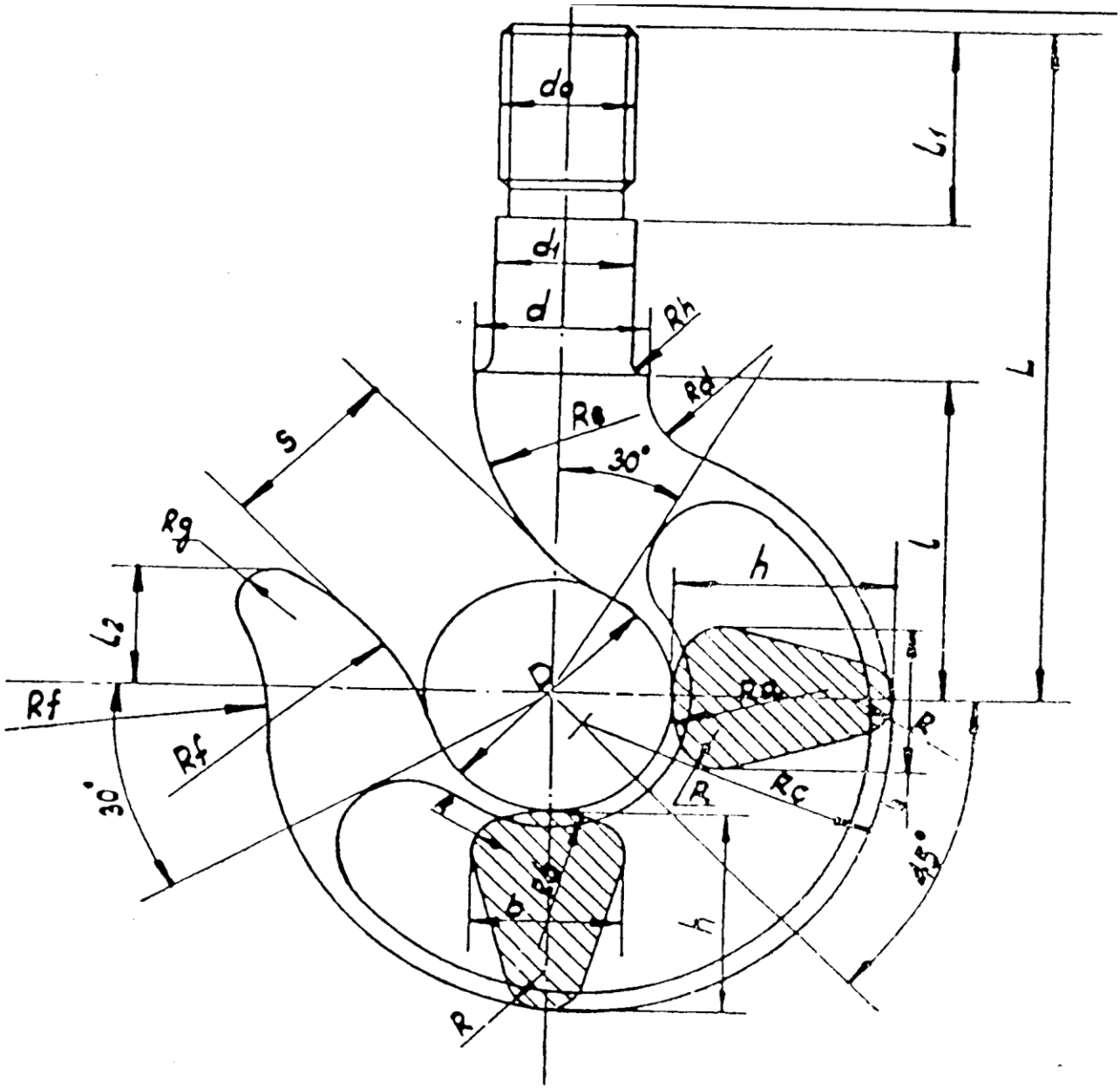


FIG. 1 SHAPE AND DIMENSIONS OF CRANE HOOKS

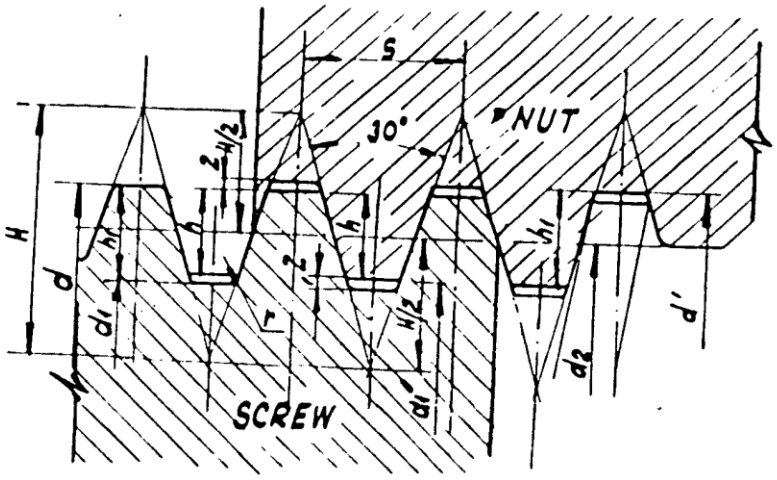


FIG. 2 TRAPEZOIDAL THREADS OF CRANE HOOKS

IPSS

# SPECIFICATION FOR FORGED CRANE HOOKS

IPSS : 1-08-004-94

BASED ON IS : 3815-1969

TABLE 1 DIMENSIONS OF CRANE HOOKS

( Clauses 3.1, 4.5.1 and 5.2 ) ( All dimensions, unless otherwise specified are in millimetres )

| Sl. No. | Safe Working Load of Hook ( in Tonnes ) | | Proof Load in Tonnes | D | S | b | h | d | $d_1$ | $d_2$ | L | | $l$ | $l_1$ | $l_2$ | R | $R_1$ | $R_2$ | $R_3$ | $R_4$ | $R_5$ | $R_6$ | Ball bearings as per IS : 5932 ( under revision ) ◆ Roller bearings as per IS : 5669 – 1987 ★ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Medium Duty | Heavy Duty | | | | | | | | | Type A | Type B | Min. | Min. | Min. | | | | | | | | Bore | Dimension Series | Outside Diameter | Height | Diameter | Diameter Series |
| 1 | 1.0 | 0.8 | 2.0 | 36 | 26 | 22 | 32 | 25 | 20 | M 20 | 105 | 130 | 50 | 75 | 30 | 18 | 5.5 | 18 | 45 | 13 | 36 | 40 | 6 | 2.5 | 20 | 11 | 35 | 10 | 0.5 | 1 |
| 2 | 1.25 | 1.0 | 2.5 | 40 | 30 | 24 | 36 | 25 | 20 | M 20 | 110 | 140 | 55 | 85 | 30 | 20 | 6 | 20 | 50 | 15 | 40 | 45 | 6.5 | 2.5 | 20 | 11 | 35 | 10 | 0.5 | 1 |
| 3 | 1.6 | 1.25 | 3.2 | 45 | 33 | 26 | 40 | 30 | 25 | M 24 | 130 | 160 | 65 | 95 | 35 | 22 | 6 | 30 | 56 | 17 | 45 | 50 | 7 | 2.5 | 25 | 12 | 47 | 15 | 1 | 2 |
| 4 | 2.0 | 1.60 | 4.0 | 50 | 36 | 30 | 45 | 35 | 30 | M 27 | 145 | 270 | 70 | 195 | 40 | 25 | 7 | 36 | 25 | 62 | 18 | 50 | 55 | 8 | 2.5 | 30 | 12 | 52 | 16 | 1 | 2 |
| 5 | 2.5 | 2.0 | 5.0 | 55 | 40 | 34 | 52 | 35 | 30 | M 30 | 165 | 320 | 85 | 240 | 45 | 30 | 8 | 38 | 28 | 70 | 20 | 55 | 60 | 10 | 2.5 | 30 | 13 | 60 | 21 | 1.5 | 3 |
| 6 | 3.2 | 2.5 | 6.4 | 60 | 45 | 38 | 55 | 40 | 35 | M 33 | 180 | 350 | 90 | 260 | 50 | 34 | 9 | 42 | 30 | 78 | 21 | 60 | 70 | 10 | 2.5 | 35 | 13 | 68 | 24 | 1.5 | 3 |
| 7 | 4.0 | 3.2 | 8.0 | 65 | 50 | 40 | 65 | 45 | 40 | M 36 | 195 | 445 | 95 | 345 | 55 | 36 | 9 | 45 | 35 | 90 | 22 | 70 | 80 | 10 | 2.5 | 40 | 13 | 78 | 26 | 1.5 | 3 |
| 8 | 5.0 | 4.0 | 10.0 | 75 | 55 | 48 | 75 | 52 | 45 | M 42 | 250 | 500 | 105 | 355 | 60 | 38 | 10 | 50 | 40 | 100 | 25 | 75 | 85 | 11 | 2.5 | 45 | 13 | 85 | 28 | 1.5 | 3 |
| 9 | 6.3 | 5.0 | 12.6 | 85 | 65 | 54 | 82 | 56 | 50 | M 48 | 280 | 560 | 120 | 400 | 70 | 42 | 12 | 60 | 45 | 110 | 28 | 85 | 95 | 12 | 2.5 | 50 | 13 | 95 | 31 | 2 | 3 |
| 10 | 8.0 | 6.3 | 16.0 | 95 | 75 | 60 | 90 | 62 | 55 | M 52 | 310 | 600 | 135 | 425 | 75 | 46 | 13 | 65 | 50 | 125 | 30 | 95 | 110 | 15 | 2.5 | 55 | 13 | 105 | 35 | 2 | 3 |
| 11 | 10.0 | 8.0 | 20.0 | 110 | 85 | 65 | 100 | 68 | 60 | M 56 | 340 | 650 | 150 | 460 | 80 | 55 | 13 | 75 | 55 | 140 | 34 | 110 | 120 | 18 | 2.5 | 60 | 13 | 110 | 35 | 2 | 3 |
| 12 | 12.5 | 10.0 | 25.0 | 120 | 90 | 75 | 115 | 80 | 70 | M 64 | 415 | 680 | 165 | 430 | 90 | 60 | 14 | 84 | 62 | 155 | 36 | 120 | 125 | 20 | 2.5 | 70 | 13 | 125 | 40 | 2 | 3 |
| 13 | 16.0 | 12.5 | 32.0 | 130 | 100 | 80 | 130 | 85 | 75 | TRAP 70x10 | 440 | 720 | 180 | 460 | 95 | 62 | 16 | 90 | 70 | 170 | 40 | 130 | 140 | 21 | 2.5 | 75 | 13 | 135 | 44 | 2.5 | 3 |
| 14 | 20.0 | 16.0 | 40.0 | 150 | 115 | 90 | 150 | 95 | 85 | TRAP 80x10 | 480 | 850 | 210 | 580 | 100 | 75 | 18 | 105 | 75 | 200 | 45 | 150 | 170 | 22 | 2.5 | 85 | 13 | 150 | 49 | 2.5 | 3 |
| 15 | 25.0 | 20.0 | 50.0 | 170 | 130 | 102 | 164 | 110 | 100 | TRAP 90x12 | 535 | 900 | 230 | 595 | 115 | 80 | 20 | 120 | 100 | 220 | 50 | 170 | 190 | 30 | 2.5 | 100 | 13 | 170 | 55 | 2.5 | 3 |
| 16 | 32.0 | 25.0 | 60.0 | 190 | 145 | 115 | 184 | 125 | 110 | TRAP 100x12 | 580 | 900 | 260 | 580 | 130 | 95 | 23 | 135 | 110 | 245 | 60 | 190 | 210 | 32 | 5 | 110 | 13 | 190 | 63 | 3 | 3 |
| 17 | 40.0 | 32.0 | 70.0 | 210 | 160 | 130 | 205 | 135 | 120 | TRAP 110x12 | 675 | 960 | 280 | 565 | 140 | 110 | 25 | 150 | 120 | 270 | 60 | 210 | 230 | 35 | 5 | 120 | 13 | 210 | 70 | 3.5 | 3 |
| 18 | 50.0 | 40.0 | 85.0 | 240 | 180 | 150 | 240 | 160 | 140 | TRAP 120x16 | 730 | 1050 | 330 | 650 | 150 | 120 | 30 | 170 | 130 | 320 | 65 | 240 | 280 | 40 | 5 | 140 | 13 | 240 | 80 | 3.5 | 3 |
| 19 | 63.0 | 50.0 | 105.0 | 270 | 205 | 165 | 260 | 170 | 150 | TRAP 140x16 | 820 | 1100 | 360 | 640 | 175 | 135 | 35 | 190 | 140 | 350 | 65 | 270 | 300 | 44 | 7.5 | 150 | 13 | 250 | 80 | 3.5 | 3 |
| 20 | 80.0 | 63.0 | 135.0 | 300 | 230 | 190 | 290 | 190 | 170 | TRAP 160x16 | 840 | 1200 | 400 | 760 | 190 | 150 | 38 | 210 | 150 | 390 | 75 | 300 | 339 | 45 | 7.5 | 170 | 31 | 270 | 88 | 4.0 | 4 |
| 21 | 100.0 | 80.0 | 170.0 | 320 | 250 | 200 | 320 | 200 | 180 | TRAP 170x16 | 880 | 1300 | 440 | 880 | 220 | 160 | 40 | 230 | 165 | 420 | 100 | 340 | 370 | 45 | 7.5 | 130 | 31 | 350 | 96 | 4.0 | 4 |

TRAP - TRAPEZOIDAL
M - METRIC

◆ IS : 5932-(Under Rev.) Boundary dimensions for thrust ball bearings with flat seats for Sl. No. 1 to 9
★ IS : 5669-1987 General plan of boundary dimensions for radial rolling bearings for Sl. No. 10 and 11