IPSS

DESIGN PARAMETERS FOR IRON LADLES

IPSS : 2-01-002-83

CORRESPONDING INDIAN STANDARD DOES NOT EXIST

0. Foreword

0.1 Interplant standardization activity in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This Interplant Standard prepared by the Working Group on Steel Plant Ladles and Rolling Stock, IPSS 2 : 1 with the active participation of the representatives of the steel plants, established manufacturers of iron ladles and reputed consulting organizations, was adopted by the Approval Committee on Design Parameters, IPSS 2, on 15 March 1983.

0.2 Interplant Standards on design parameters primarily aim at achieving rationalization and unification of parts and assemblies of process and auxiliary equipment used in steel plants and these are intended to provide guidance to the steel plant engineers, consultants and manufacturers in their design activities.

0.3 This standard attempts at prescribing uniform overall dimensions and other parameters for design of iron ladles so that the complementary equipment, such as the lifting beam or traverse of the EOT cranes, the iron ladle cars, etc, could be designed in harmony. Broad guidance in material selection has also been given in this standard. However, for the details of manufacturing practices, including heat treatment and testing, good manufacturing practices and/or the relevant Indian Standards are applicable.

0.4 This standard is essentially futuristic in nature and as such the developments in technology have been incorporated in it to the extent possible. For new steel plants and in the expansion programmes of the existing steel plants, deviations from the stipulations of this standard are not desirable. However, if the present situation in any existing steel plant so demands, the designer may deviate from the stipulation of this standard to the minimum extent.

---

1. Scope — This International Standard covers the design parameters and related aspects of iron ladles up to 140 t capacity intended for transporting hot metal from blast furnace to steel melting shop or pig casting bay.

2. Capacity — The capacity of iron ladles shall be 70, 90, 100 or 140 tonnes.

3. Dimensions — The basic dimensions of iron ladles shall be as given in Table 1 read with Fig. 1. For deciding tolerance on linear dimensions, the 'Coarse' class of deviation conforming to IS : 2102 (Part 1)-1980 'General tolerances for dimensions and form and position : Part I General tolerances for linear and angular dimensions (*second revision*)' shall apply.

4. Design and Construction

4.1 The ladle shall be so designed as to avoid all possible chances of accidents in various conditions of service.

4.2 In case of welded construction the cast paw shall be welded with plate segments to form the cylindrical shell.

4.3 In case of riveted construction, the trunnion casting shall be riveted to the welded steel shell.

4.4 The trunnion shall be designed with a minimum factor of safety of 8. The steel casting of the paw shall be annealed and subjected to ultrasonic testing.

Amendments Issued (*to be filled up by the user department*) :

No.	Date of Issue	No.	Date of Issue
1		3	
2		4	

UDC 621·746 32 [669·1] : 669 18

4.5 Electrodes and welding methods selected for the welded joints shall be such that the strength of the welded joints is not less than that of the parent metal. All important welded joints shall be subjected to ultrasonic tests.

4.6 The shell plate shall be designed for a maximum operating condition of 350°C; the refractory lining shall be designed accordingly.

4.7 The trunnion shall be provided with replaceable steel sleeves.

5. Material of Construction — The recommended materials to be used for construction of different parts of iron ladles are given below:

a) Cast paw and sleeve for trunnion — Steel CS-23-45 conforming to IS : 1030-1974 'Specification for carbon steel casting for general engineering purposes (*second revision*)'.

b) Shell plate and dished bottom — Steel Fe 410-W conforming to IS : 2062-1980 'Specification for structural steel (fusion welding quality) (*second revision*)' or steel St Gr 2A or St Gr 2B conforming to IS : 2002-1962 'Specification for steel plates for boilers'. However, in both these steels, the tensile strength shall be 48-52 kgf/mm² and the carbon content shall not be more than 0·20 percent.

c) Flat bottom (in case of riveted design only) — Steel Fe 410-W conforming to IS : 2062-1980 or steel St Gr 2A or conforming to St Gr 2B (with carbon content not exceeding 0·22 percent).

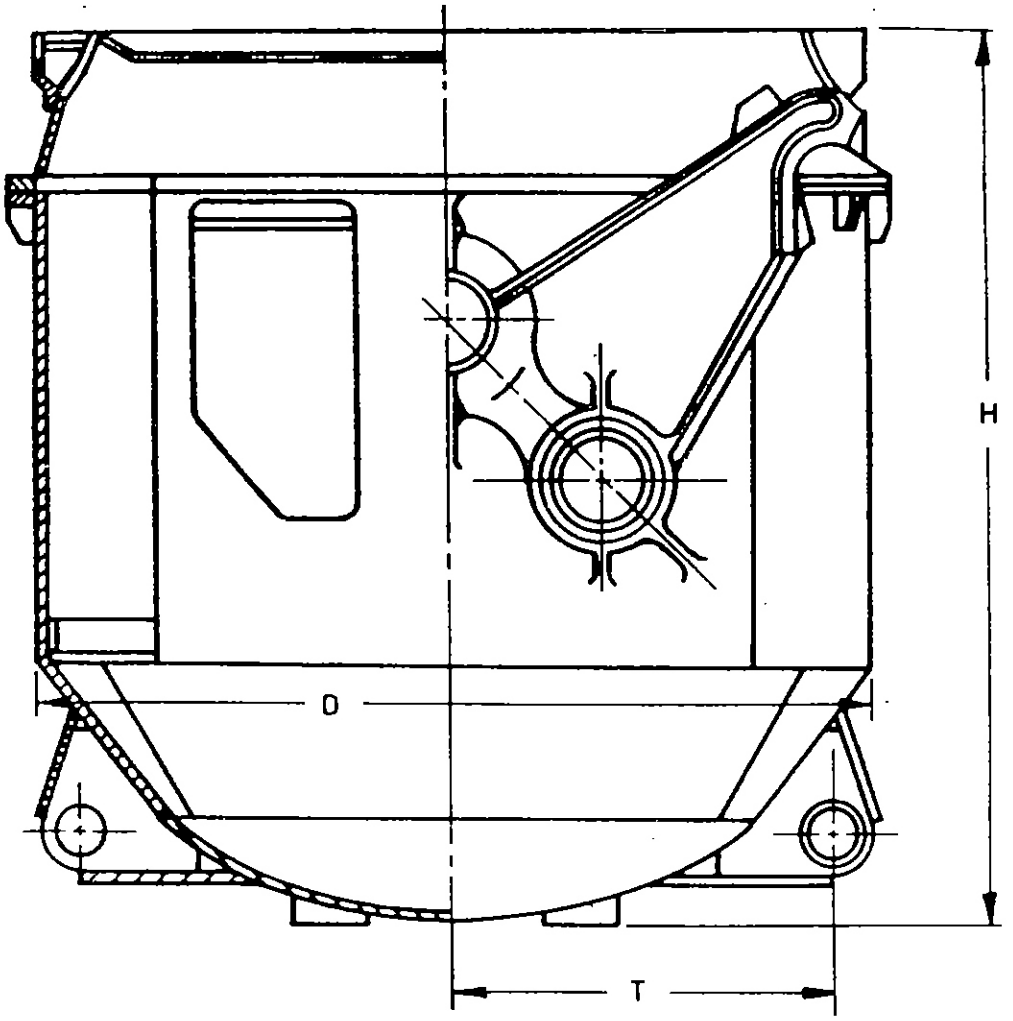
Note — The manufacturer shall furnish test certificate for each casting paw to guarantee the mechanical properties, chemical composition and soundness of material.

TABLE 1 DIMENSIONS OF IRON LADLE

(*Clause* 3)

All dimensions in millimetres.

Nominal Capacity in Tonnes	*D*	*C*	*d*	*l*	*H*	*T*	Remarks
70	2 970 top 2 710 bottom	3 700	300	362	3 750	1 530	—
90	3 213	4 064	304	203	3 480	1 676	—
100	040	3 630	305	222	3 530	1 650	Distance between cl of horns—2 820
140	3 620	4 300	390	242	3 830	1 650	Distance between cl of horns—3 400



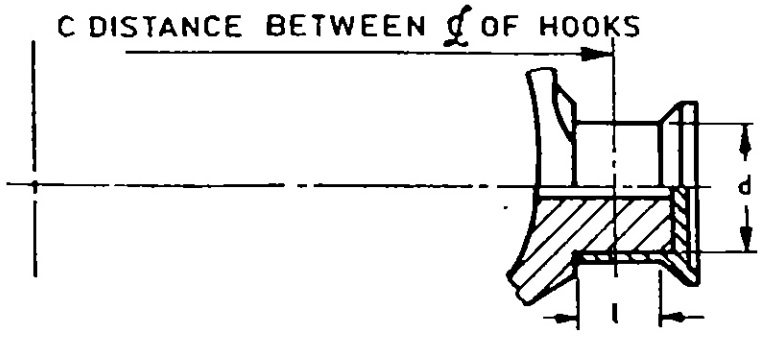


FIG. 1 MAIN FEATURES OF IRON LADLES

Printed at Gulab Printers, New Delhi, India