

Annexure-2

The details of process & facility that shall be available with Carbon steel manufacturer are as given below. Supplier to furnish compliance/details as detailed below along with offer unless otherwise mentioned.

Sl. no.	Details of Process / Facility	Complied/ Not complied	Supporting relevant document to be submitted
1.0	General:		
1.1	A list of approved vendors or sub-contractors exists for all the important foundry inputs and the same is periodically up-dated.		Not required
1.2	There are comprehensive specifications for all the important bought-out materials.		Specification of sand, binder for mould sand and mould paint
1.3	Supplier to confirm use of sand of AFS 40-50 or fine.		Supporting documents along with consignment for use of AFS 40-50 sand or fine sand
1.4	There is an operating system of the important incoming materials and inputs being inspected and cleared prior to their issue to the floor and the authority for clearing such materials is defined and the results of such inspection are documented.		Not required
2.0	Process Engineering (Methods)/Patterns:		
2.1	There is a person working exclusively in this area satisfying the following requirement: a) At least a Bachelor's degree in Mechanical/Metallurgical/ Foundry Engineering, and having not less than 5 years relevant experience. or b) A Diploma in Mechanical/Metallurgical/ Foundry Engineering with at least 10 years relevant experience.		Details of persons in support shall be furnished
2.2	For each job (concerning each pattern number), the following exist duly documented: a) Pattern design b) Gating and risering design c) Molding materials and methods d) Pouring temperature e) Heat treatment cycle f) Applicable test piece, where relevant g) Casting identification h) Special instructions, where relevant, concerning shakeout, gas cutting, welding procedure etc.		Sample process sheet
2.3	A procedure exists providing for decision making and written instructions concerning corrective actions to be taken against deviations in dimensions and quality, after the sample or pilot		Not required

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	casting is made and the implementation of such instructions is also recorded.		
2.4	The pattern to be used for the manufacturing of carbon steel castings shall be made from Teakwood/Aluminium/steel.		Photographs of pattern used shall be provided along with consignment
3.0	Melting:		
3.1	For Carbon steel castings: i) In-house melting facility for carbon steel.		Furnace make, model, capacity etc. along with photograph
3.2	An immersion pyrometer exists for measuring temperature of liquid metal.		Photograph of facility
3.3	Temperature of the liquid metal is actually measured before tapping and is recorded for each melt.		Not required
3.4	The temperature measuring equipment is calibrated at least once in three months or more often.		Calibration record
3.5	Each melt is analysed and ensured to be in compliance with the specification before tapping.		Not required
4.0	Casting:		
4.1	A satisfactorily operating system of identifying each piece of casting, where relevant, so as to be able to trace it back to its melt number or heat-treatment batch number, exists.		Not required
5.0	Heat Treatment:		
5.1	Adequate capacity exists for in-house heat treatment of all the castings produced in the foundry.		Make, model, capacity etc. along with photograph
5.2	The heat-treatment furnaces are equipped with multi-point automatic continuous temperature recording arrangement, covering the different relevant furnace zones.		Not required
5.3	Each of the heat-treatment furnaces has been calibrated using a sufficient number of thermocouples to know the prevailing temperatures in different zones at different temperature ranges.		Calibration record
5.4	The thermocouples, temperature indicators and the recorders are calibrated at a frequency of at least once in 6 months.		Calibration record

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5.5	Test bars accompany the relevant castings during heat treatment, and the log sheet or other documents concerning each heat treatment batch reflect the particulars of such test bars accompanying the batch.		Log sheet / other supporting document
6.0	Fettling:		
6.1	Shot blasting equipment exists which has a size and capacity commensurate with the type and quantity of the product range handled.		Make, model, capacity etc. along with photograph
7.0	Final Inspection:		
7.1	The following in-house facilities exist for carrying out the necessary inspection/testing: a) Magnetic particle inspection in accordance with IS 10724 : 1990		Make, model, capacity etc. along with photograph of each facility
7.2	The inspection personnel conducting the above non-destructive testing is adequately trained and qualified by a recognized agency and has adequate experience.		Not required
7.3	Separate standardized forms exist for recording the results of different kinds of non-destructive tests carried out, including a provision for indicating the deviations on a sketch of the relevant part of the castings.		Sample NDT reports
8.0	Metallurgical & Laboratory:		
8.1	The person in-charge of the metallurgical area is at least a Graduate Metallurgical Engineer with not less than 5 years of relevant experience.		Details of persons in support shall be furnished
8.2	The staff conducting tests like chemical analysis, sand testing, testing of mechanical properties etc. have adequate skill and competence and have undergone sufficient training to give them reasonable reliability.		Not required
8.3	The following testing facilities exists: a) Direct reading vacuum emission spectrometer, or any other equipment with at least equivalent speed and accuracy. b) Tensile testing equipment with a minimum of 20 tonne of load capacity. c) Fixed bench type or other heavy type equipment for carrying out hardness testing, that is, BHN/ HRC/ VPN. d) Portable hardness tester of at least one type, other than Poldi. e) Satisfactory photomicrography equipment.		Make, model, capacity etc. along with photograph of each facility
8.4	Adequate standard samples are available for daily calibration of the method of chemical analysis followed.		Photograph of samples

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Notes:

1. Compliance of all the points in above document is mandatory. In absence of compliance of above & non-submission of documents required against annexure 2, the vendor's offer is liable to be rejected.
2. Information / compliance / documents submitted by vendor shall be authentic in all aspects. In case any deviation / false information / forged documents are observed, BHEL is free to initiate appropriate punitive proceeding against the supplier.
3. BHEL reserves the right to visit vendor work's to ensure compliance of annexure-2.

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