

TECHNICAL DELIVERY CONDITION



BH205E- CASTINGS

ANNEXURE-A

01) PART DETAILS:

SI NO	DESCRIPTION	CASTING DRG. NO.	MACHINING DRG.NO.
1	FRONT STRUCT CASTING- RH	992 MF 30137	992 MF 30145
2	FRONT STRUCT CASTING- LH	992 MF 30112	992 MF30129
3	CENTER CASTING	992 MF 30023	992 MF 30048
4	CENTER CAP	992 MF 30072	992 MF30089
5	REAR TAIL CASTING	992 MF 30015	992 MF 30035

02) MATERIAL :

ASTM A148 , 90-60 Grade , Equivalent to BIS 2644 Grade 1

03) HEAT TREATMENT : Normalized and Tempered Condition

04) IMPACT STRENGTH : Charpy test shall be performed as per ASTM A370 for each casting. Minimum energy level shall be 27Jolules @ -30 degree C.

05) SURFACE QUALITY REQUIREMENT :

Roughness Grade No.11 with value Rs 25 Micron(min), surface quality as per
QY 1024-C Class A

06) NON-DESTRUCTIVE TEST : Requirements as per Company Standard QY1018-C

6A) RADIOGRAPHIC TEST : **QY 1018-C CLASS -B** (for both proto./ production casting)

Test Condition:

Proto-Type Casting – RT test shall be carried out 100% area for first 10 Nos castings till the process parameters is stabilized to get the sound casting.

Production Casting

Production casting shall be carried out after the process parameters are stabilized.

Sampling : RT test shall be carried out 100% area, as per **QY1018- C Class B**
(Based on a lot size- Normal condition)

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Note that: Casting vendor shall submit the radiography shooting sketch with details like source and film position. Shooting sketch should be approved from M/s. BEML QE for the further process.

6B) MAGNETIC PARTICLE INSPECTION:

QY1018-C CLASS –A (for both proto./prod. casting)

Test Condition: MPI test shall be carried out 100% area compulsory for the all castings.(prototype and production castings). Test shall be carried out as per ASTM E709/ ASTM E125-Level1 by wet particle method only.

Note : Discontinuities like shrinkage and inclusion rate up-to level 3(ASM degree) is acceptable, but all other discontinuities shall be level 1 only. **Cracks of any length not permitted**

6C) ULTRASONIC INSPECTION:

QY1018-C CLASS –A (for both proto./prod. casting)

As supplementary to Radiography Test, UT test shall be carried out for non feasible areas of RT only. Test shall be conducted as per ASTM A609 –Level 1.

Material thickness calibration range, normal beam scans shall be in accordance with ASTM A 609 inspection report shall conform to ASTM A609 section 19 & S1.3

Note that: *The RT non-feasible area approval shall be obtained from BEML QE, otherwise the casting will be not accepted.*

07) GENERAL QUALITY REQUIREMENTS

7A) DISCONTINUITIES : Not permissible to any degree :

- Linear Discontinuities : Cracks and Hot tears
- Shrinkage Cavities
- Surface Grooves : Orange Peel, Sand Erosion, Flow Marks
- Stress Raisers and notches due to weld repairs.

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Note that : These discontinuities, if present ,shall be eliminated before despatch of castings by the supplier.

- 7B) For each consignment, it is mandatory that all the related quality tests (**Mechanical Properties Test**, NDT test, Chemical Test and Metallurgical test) reports and other Documents like dimension study etc shall be provided to M/s. BEML Quality Dept.
- 7C) **PROOF MACHINED SURFACE:**
Proof machined surfaces shall be properly protected with rust preventative oil as per the company standard C6001-10. Tolerances applicable as specified in drawings.
- 7D) Integral test samples are required for the testing. Test samples shall be process in accordance with ASTM A781A, S15 and location of sample based on joint decision. The test sample along with casting shall be supplied, without the test sample the casting will be not accepted at any condition.
- 7E) Supplier need to ensure completion of visual inspection and related certification by BEML-SIT before painting.
- 7F) Casting features dimensioned with ☐ are datum features. The association datum simulator(Inspection tooling) shall be of such quality that the X, Y & Z datum planes derived from them are considered theoretically perfect(Non-tolerance)
- 7G) Datum pads to be diameter 40mm raised bosses. The entire surface can be used as the locator and must be free of projections.
- 7H) Unspecified tolerance $\pm 2.5\text{mm}$
- 7I) Unspecified max. draft angle 2° and unspecified fillets and corners radii 6.0mm
- 7J) Emboss /Punch Vendor code , heat no , part no. and BEML logo of suitable size at * marked area(Un-machined area)

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8) CASTING REPAIR CONDITIONS

- The welding operators shall be certified in all positions that they will be used to produce the repair welds on the specified casting.
- Records of the welding operator certifications shall be made available to the customer upon request.

Filler Material:

- All filler metals used to complete the required repairs on this particular grade of casting shall conform to the AWS requirements for an E90XX, minimum, class of filler metal.
- If it is found that the E90XX filler metal will not provide the minimum required UTS, then it is recommended that an E100XX filler metal be used.

Defect Removal:

- Each identified defect may be removed by grinding, burning or Arc Air methods. If any other method is desired for the defect removal operation, approval for the use of that method shall be obtained prior to the use of that method.
- The final contour of the excavated region shall be such to allow for an easy "tie in" of the welding filler metal to the adjacent casting material. It is suggested that the ends and sides of the excavated region have a radii to allow for this condition to be met.
- Any repair weld that requires the removal of more than 50% of the material section shall be followed with a complete Normalize and Temper heat treatment.
- All major welds that exceed 20% of the wall thickness or 25 mm (1) in., whichever is smaller, or exceed 6450 mm² (10) in² per area welded must be mapped and submitted to Engineering for approval before such weld repair is commenced.

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- Welding shall continue until the entire cavity is filled and sufficient material is present to allow for the repaired area to be blended into the adjacent casting material.
- After all repairs have been completed, the repaired region shall be blended into the casting material, restoring the surface to the original contour or surface condition.

Each weld bead shall be inspected to assure that no slag or contaminates remain and that a satisfactory bead contour is present to allow for the tie-in of the additional weld beads.

Post Weld Treatment

Any repairs that are completed in an area of the casting that is deemed to be critical on the appropriate drawing shall have a complete Normalize and Temper heat treatment after the welding repair process is completed.

No localized thermal stress relieving is permitted on these castings.

All repair welds shall be inspected by NDT means that will ensure that the resulting repair is free from defects or discontinuities.

9) ADVISORY INFORMATION

Foundry suppliers are responsible to insure patterns are handled and stored appropriately to insure structural and dimensional fortitude. Foundry supplier is liable to notify the customer whenever a pattern is found to have structural and dimensional issues that will negatively affect any aspect of casting quality.

10) APPLICATION OF VISUAL STANDARDS

The Visual-tactile comparators created by the Steel Castings Research and Trade Association (SCRATA). These comparators have been adopted for easy comparison to accept or reject

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ACCEPTABLE SURFACE FINISH A1 to A3 (AS CAST CONDITION)

Photo 1 - A1 Surface Roughness



Photo 2 - A2 Surface Roughness



Photo 3 - A3 Surface Roughness



NOT ACCEPTABLE SURFACE FINISH (A4 & A5) (AS CAST CONDITION)

Photo 4 - A4 Surface Roughness



Photo 5 - A5 Surface Roughness



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