

**TECHNICAL DELIVERY CONDITION**Product : **HP CASTINGS**Document No: **TDC:HMM 2 Rev No : 00**Effective Date: **07.07.2023**

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**1.0 MATERIAL:**

As Per ASTM standard: A 297 HP.

Size, Qty, Grade/Class: As per Purchase order &amp; Drawing

**2.0 CHEMICAL COMPOSITION:**

Melting: As per the Specification, Fully Killed

Chemical Specification:

C	Mn	Si	P	S	Cr	Ni	Mo
0.35-	2 Max	2.5	0.04	0.04	24.0 –	33.0 –	0.5
0.75		Max	Max	Max	28.0	37.0	Max

Product Analysis on test bar for each melt including residual elements shall be carried out.

**3.0 DIMENSION & TOLERANCES**

Tolerances as per the Drawing

**4.0 HEAT TREATMENT :(HT)**

No Heat treatment required, to be supplied in as cast condition.

**5.0 MECHANICAL TESTS:**

Test bars to be cast integral with the casting. Test bar size shall be 30mm X 30mm. Test bar will be detached from the casting at SSTP/STORES for our reference. Following tests to be conducted by vendor as per ASTM A370.

S. NO	TEST	Material specification
		SA/ASTM A297 HN
1	Tension Test	As per the Specification
2	Hardness Test	170 BHN
3	Bend Test Specimen 1"x 3/4"	Not applicable
4	Charpy- U Impact	Not applicable
5	Charpy- V Impact	Not applicable

**6.0 FETTLING, DRESSING & CLEANING:**

Dressing of castings- Free from risers, in gates, notches, undercuts and deep marks etc.

- Fused wires, parting line fins, chills etc. shall be removed by grinding.
- Castings shall be blast cleaned both inside and outside for the removal of fused sand, scales etc.
- Visual inspection of castings for surface quality.
- Paint/Rust preventive oil should not be applied over the surface of casting

**7.0 NON DESTRUCTIVE TESTING (NDT) AFTER HEAT TREATMENT:**

Castings shall be free from visual surface defects like cracks and porosity. Internal defects like porosity, inclusion shall be within Level II, shrinkage CA within Level-I and other type shrinkage with level –II cracks, Hot tear, inserts not acceptable. All castings shall be of Radiographic Quality.

Radiographic Testing Procedure: As per ASTM E 94

Acceptance standard: ASTM E 446

1 No. random sample shall be selected by BHEL from the supply lot, which shall be subjected to RT for acceptance of the lot. RT will be carried out by the casting supplier.

**8.0 REPAIR:**

Castings with unacceptable cracks, hot tears, shrinkage, etc. to be rectified by grinding & if required by Welding. Welding to be done by qualified welder and qualified procedure as per ASME Section IX. Acceptance standard for retest by radiography after heat treatment – ASME Sec 8 Div -1 UW 51

**9.0 SURFACE TREATMENT:**

SS castings to be pickled & passivated as per ASTM A380. Satisfactory passivity of the surface to be checked using SS passivity test kit (Free iron test). After passivation, rinsing & test, the rinsed demineralized water to be checked for chloride with 1% Silver nitride, which shall not exceed 0.5 PPM.

**10.0 MARKING AND PACKING:**

Following details to be stamped on each casting raised from the surface. The purpose of marking is to identify the castings after using in the furnace at 1000 Deg. So the marking should be permanent unaffected by service temperature of furnace.

- Last 5 digits of drawing number.

Castings shall be suitably packed to avoid damage during transit.

**11.0 INSPECTION AND CERTIFICATION:**

Test certificates shall contain the following details.

- Purchase Order No. (BHEL), TDC No. & Test certificate number
- Specification and Grade with applicable year of code, Heat Number, Quantity & Size
- Steel making process, Chemistry including incidental elements - Heat wise.
- Mechanical test results, NDT test results with reference & acceptance standard.
- Repair details, Cleaning & Surface treatment details.
- Any other information like clearance of sample casting.
- Dimensional Inspection Report
- Chemical Composition test certificate only from NABL approved lab.

*M. Moorthy*  
01/08/2023

*M. Ashok Raja Kumar*  
01/08/2023

Approved By M.Moorthy  DGM/Maintenance	Approved BY M.Ashok Raja Kumar  Deputy Manager /Hot Mill Maintenance
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**TECHNICAL DELIVERY CONDITION**Product : **HN CASTINGS**Document No: **TDC:HMM1003** Rev No : **03**Effective Date: **27.09.22**

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**1.0 MATERIAL:**

Specification: Heat resistant alloy steel casting Grade 11 as per IS 4522  
 Equivalent ASTM standard: A 297 HN.  
 Size, Qty, Grade/Class: As per Purchase order & Drawing

**2.0 CHEMICAL COMPOSITION:**

Melting: As per the Specification, Fully Killed  
 Chemical Specification:

C	Mn	Si	P	S	Cr	Ni	Mo
0.2- 0.5	1.5 Max	1.2 – 1.8	0.025 Max	0.015 Max	19.0 – 23.0	23.0 – 27.0	0.5

Product Analysis on test bar for each melt including residual elements shall be carried out.

**3.0 DIMENSION & TOLERANCES**

Tolerances as per the Drawing

**4.0 HEAT TREATMENT :(HT)**

No Heat treatment required, to be supplied in as cast condition.

**5.0 MECHANICAL TESTS:**

Test bars to be cast integral with the casting. Test bar size shall be 30mm X 30mm. Test bar will be detached from the casting at SSTP/STORES for our reference. Following tests to be conducted by vendor as per ASTM A370.

S. NO	TEST	Material specification
		SA/ASTM A297 HN
1	Tension Test	As per the Specification
2	Hardness Test	170 BHN
3	Bend Test Specimen 1"x ¾"	Not applicable
4	Charpy- U Impact	Not applicable
5	Charpy- V Impact	Not applicable

**6.0 FETTLING, DRESSING & CLEANING:**

Dressing of castings- Free from risers, in gates, notches, undercuts and deep marks etc.

- Fused wires, parting line fins, chills etc. shall be removed by grinding.
- Castings shall be blast cleaned both inside and outside for the removal of fused sand, scales etc.
- Visual inspection of castings for surface quality.
- Paint/Rust preventive oil should not be applied over the surface of casting

**7.0 NON DESTRUCTIVE TESTING (NDT) AFTER HEAT TREATMENT:**

Castings shall be free from visual surface defects like cracks and porosity. Internal defects like porosity, inclusion shall be within Level II, shrinkage CA within Level-I and other type shrinkage with level –II cracks, Hot tear, inserts not acceptable. All castings shall be of Radiographic Quality.

Radiographic Testing Procedure: As per ASTM E 94

Acceptance standard: ASTM E 446

1 No. random sample shall be selected by BHEL from the supply lot, which shall be subjected to RT for acceptance of the lot. RT will be carried out by the casting supplier.

TECHNICAL DELIVERY CONDITION

Product : **WBF Charging roller assy castings/WBF beam & Kick off casting/WBF support casting**

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**8.0 REPAIR:**

Castings with unacceptable cracks, hot tears, shrinkage, etc. to be rectified by grinding & if required by Welding. Welding to be done by qualified welder and qualified procedure as per ASME Section IX. Acceptance standard for retest by radiography after heat treatment – ASME Sec 8 Div -1 UW 51

**9.0 SURFACE TREATMENT:**

SS castings to be pickled & passivated as per ASTM A380. Satisfactory passivity of the surface to be checked using SS passivity test kit (Free iron test). After passivation, rinsing & test, the rinsed demineralized water to be checked for chloride with 1% Silver nitride, which shall not exceed 0.5 PPM.

**10.0 MARKING AND PACKING:**

Following details to be stamped on each casting raised from the surface. The purpose of marking is to identify the castings after using in the furnace at 1000 Deg. So the marking should be permanent unaffected by service temperature of furnace.

- Last 5 digits of drawing number.

Castings shall be suitably packed to avoid damage during transit.

**11.0 INSPECTION AND CERTIFICATION:**

Test certificates shall contain the following details.

- Purchase Order No. (BHEL), TDC No. & Test certificate number
- Specification and Grade with applicable year of code, Heat Number, Quantity & Size
- Steel making process, Chemistry including incidental elements - Heat wise.
- Mechanical test results, NDT test results with reference & acceptance standard.
- Repair details, Cleaning & Surface treatment details.
- Any other information like clearance of sample casting.
- Dimensional Inspection Report
- Chemical Composition test certificate only from NABL approved lab.

<u>Record of Revision</u>	<u>Revision Note</u>
Rev -01 Date: 04/03/2017 Rev -02 Date: 04/09/2018 Rev - 03 Date: 27/09/2022	Heat Treatment clause and NDT clause modified. NDT acceptance standard included WBF support castings included

*M. Moorthy*  
01/10/2022

*M. Ashok Raja Kumar*  
01/10/2022

Approved By M.Moorthy DGM/Maintenance	Approved BY M.Ashok Raja Kumar Deputy Manager /Hot Mill Maintenance
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