

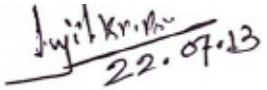



|  Heat Exchanger Group BHEL Bhopal | | STANDARD QUALITY ASSURANCE PLAN (SQAP) | | | | | | | QAP No. | | CDE-09-2706 | | |
|--|--------------------------------|---|-----------------------------|------------------------|-------------------------|----------------------|-------------------------|-------------------|--------------|---------------|-------------|---|--|
| | | | | | | | | | Revision No. | | 01 | | |
| | | ITEM | CRIMPED FINNED TUBES | | | | | | | Date of Issue | | 22.07.2013 | |
| | | | | | | | | | | Page | | Page 1 of 2 | |
| S.No. | Components & Operations | Characteristics | Category | Type / Method of Check | Quantum of check | Reference Document | Acceptance Norms | Format of Records | Agency | | | Remarks | |
| | | | | | | | | | 1 | 2 | 3 | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 | |
| 1 | MATERIAL | | | | | | | | | | | | |
| 1.1 | BASE TUBE (90-10 Cu/Ni) | Chemical Properties (Product Analysis) | Major | T | Sample as Per Spec. | AA12130 REV 06 | AA12130 REV 06 | MTC | W | W | - | See note-5 | |
| | | Mechanical Properties | | | | | | | | | | | |
| | | • Tensile • Yield | Major | T | Sample as Per Spec. | --DO-- | --DO-- | --DO-- | W | W | - | See note-5 | |
| | | • Flattening & Drifting Test | Major | T | Sample as Per Spec. | --DO-- | --DO-- | --DO-- | W | W | - | See note-5 | |
| | | • Expansion Test • Hardness Test | Major | T | Sample as Per Spec. | --DO-- | --DO-- 85 – 105 HV-5 | --DO-- | W | W | - | See note-5 | |
| | | Hydraulic test | Critical | I | 100% | --DO-- | --DO-- | --DO-- | W | W | - | See note-6 | |
| | | Eddy current test | Critical | I | 100% | --DO-- | --DO-- | --DO-- | W | W | - | See note-6 | |
| | | Mercurous Nitrate test / Ammonia vapor cracking test | Major | T | Sample as Per Spec. | AA12130 REV 06 | --DO-- | --DO-- | W | W | - | See note-5 | |
| | | • Microscopic Examination • Surface Finish | Major | T I | Sample as Per Spec. | --DO-- | --DO-- | --DO-- | W | W | - | See note-5 | |
| | | Dim. check with respect to tolerance | Major | I + Visual | 100% | --DO-- | --DO-- | --DO-- | W | W | - | • See note-6. • Thickness to be ensured. | |
| Heat Treatment - Bright Annealed (O61) Temper | Critical | T | 100% | --DO-- | --DO-- | --DO-- | W | W | - | See note-6 | | | |
| 1.2 | Cu. Fin | Chemical (Purity Check) | Major | T | One Sample per batch | As per specification | As per specification | MTC | W | W | - | See note-5 | |
| | | Conductivity | Major | T | Sample as per spec/ lot | IS-191 | 97 % | TCR | W | W | - | | |

LEGEND: 1: Base / Crimped Finned Tube Supplier, 2: BHEL IA, 3: Customer; P-Perform, W-Witness, R-Record review, MTC : Manufacturer test Certificates, TCR : Test Certificate Report, QCR : Quality Control Records, IA : Inspection Agency, I : Instrument to be used for check, T : Testing (Lab.) to be done for check.


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|  BHEL Bhopal | | Heat Exchanger Group | | STANDARD QUALITY ASSURANCE PLAN (SQAP) | | | | | QAP No. | | CDE-09-2706 | | | |
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| 2 IN PROCESS INSPECTION | | | | | | | | | | | | | | |
| 2.1 | FINNED TUBES <ul style="list-style-type: none"> Fins not to be Loose Fin thickness No of Fins Fin OD Fin secured with tube to be ensured | <ul style="list-style-type: none"> Dimensional check (Complete winding formula). | Major | I + Visual | 100% | BHEL Drg. | BHEL Drg. | QCR | P | W | - | See note-6 | | |
| | | Fin adhesion test | Major | Visual | Sample at random | BHEL Drg. | BHEL Drg. | QCR | P | W | - | | | |
| | | Hydraulic test at 20 kg/cm ² for 10 sec. minimum | Critical | I | 100% | BHEL Drg. | BHEL Drg. | QCR | P | W | - | See note-6 | | |
| | | Final inspection & packing | Major | Visual | 100% | BHEL Drg. | BHEL Drg. | QCR | P | W | - | Inspection agency to also ensure the compliance of Note 01 to 07 as mentioned below. | | |
| NOTE :- <ol style="list-style-type: none"> Fins shall not be loose wounded, this is to be ensured. Inside surface of tubes to be cleaned to remove dirt, oil, carbon deposit, etc. Tube end edge to be smooth without burrs, to be protected by end caps before dispatch. BHEL IA to ensure the same. Base tube will be procured from B.H.E.L approved sources only, as mentioned in the enquiry checklist. Material to be tested at NABL Approved Lab / BHEL Bhopal TSD. In case of testing in BHEL Bhopal TSD, record shall be reviewed by BHEL IA. 30% Tubes at random (selected by BHEL IA) to be witnessed by BHEL IA [100% to be witnessed by QC Inspector of Base / Crimped Finned Tube Supplier]. BHEL IA to ensure (for 100%) the correlation between the bare tubes & copper fins with the finished tubes. | | | | | | | | | | | | | | |
| Approval does not relieve supplier from meeting our requirements as per the drawing / specification. | | | | | | | | | | | | | | |
| | | | | | | Prepared by : | Reviewed by : | Approved by : | | | | | | |
| | | | | | |  ARUN KUMAR SINGH Engineer (D) CDE |  S.K.BISWAS DGM (D) CDE |  Rajeev Shrivastava. Addl. Gen. Mgr. (D) CDE | | | | | | |