



Condenser & Heat Exchanger Engg. Division

Technical Specification for

Carbon Steel Plain and Hot Dip Galvanized Fasteners

Document No.

CDE - 09 - 3255

Rev. No. 06

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1.0 Scope

This specification covers the technical requirements of Carbon Steel Fasteners (both plain and Galvanized) for Pressure vessels, Heat exchangers & other application.

2.0 Technical Requirements

2.1 Material

2.1.1 Carbon steel bars - rolled / forged & shall confirm to the respective material specification requirements / as per respective drawing.

2.1.2 Bars shall be free from injurious defects and shall have a workman like appearance confirming compliance to designated finish requirements.

2.1.3 Bars for manufacturing of fasteners of size M42 & above shall be subjected to Ultrasonic examination as per Cat-2 of BHEL Specification AA-0850118 or QL-1 of ASTM A-745.

2.1.4 If Hot Dip Galvanizing is applicable, same to be as per IS 1367 Part-XIII meeting thickness of galvanizing as indicated in the drawing. Minimum thickness of galvanizing as achieved is required to be a part of inspection reports.

2.2 Manufacturing

- Required fasteners shall be machined / formed from the accepted material.
- Before thread forming, bar needs to be proof machined throughout its length to 6.3 microns or better.

2.3 Size & Quantity

Size & quantity of each component shall be as indicated in the Enquiry / Purchase Order.

3.0 Heat Treatment

All carbon steel fasteners shall be supplied in heat treated condition as per the requirements as indicated in the respective material specification to meet the property class as specified.

4.0 Repair

No repair of threads shall be attempted on any fastener.

However cutting of internal threads of nut after galvanizing is allowed to suit the assembly requirement.

5.0 Tolerances

Dimension Tolerances shall be as indicated in the respective standards / drawing.

6.0 Testing(s) :

6.1 **Product Analysis** shall be performed to ensure its chemical properties, meeting the requirements as specified in the respective material specifications.

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05.05.2017

Specification revised and redrafted. Requirement of Hot Dip Galvanized Fasteners added as new.

Prepared by

Checked by

Approved by

Original document prepared on 17.12.09

-Sd/-
Asnani L.

-Sd/-
Taurani M.L.

-Sd/-
Taurani M.L.

Prepared by

Checked by

Approved by



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6.2 Mechanical Test

Fasteners shall be subjected to all the mechanical tests (e.g. Tensile Strength, Yield Strength, Hardness, Stress under Proof Load, etc. – as applicable) as specified in IS-1367 Part-3 (for fasteners with external threads) and IS-1367 Part-6 / ASTM A194 / other national or international standard – as applicable (for fasteners with internal threads).

Mechanical test of galvanized Fasteners to be done after galvanization only.

Note-1 Sampling for both Product Analysis and Mechanical Test : 01 No. from each shape, size and heat batch (selected at random by BHEL-IA) for a lot size of less than 1000 Nos. Lot size of more than and equal to 1000 Nos., sample quantity shall be read as 02 nos.

Note-2 Mechanical & Chemical testing to be done at any Govt. / NABL approved / manufacturer's Lab having instruments duly calibrated by NABL / NABL approved agency. Traceable to NABL is not at all acceptable. *In case of spectrometer for chemical testing, calibration by OEM is also acceptable*

7.0 Inspection & Certification

7.1 All the fasteners shall be subjected to inspection by BHEL / BHEL appointed inspection agency & customer (if specified in PO) as per the standard QAP of BHEL (as mentioned in the enquiry / PO) or the QAP duly approved by BHEL.

7.2 All Test Certificates & inspection reports shall be co-related with respective fasteners and shall be duly signed by inspecting authority.

7.3 Plain fasteners to be checked by using calibrated plug / ring gauges only.

Galvanized fasteners to be checked by assembling nut with corresponding bolts / studs and ensure fasteners get tightened in full threaded length. *Ensure proper fitment.*

7.4 Important Instruction for vendors :

Fasteners received at our works may be subjected to random sampling destructive / non-destructive test (mechanical, chemical, acid dipping to ensure galvanizing, galvanizing coating thickness, etc.) to ensure compliance as per drawing & specification requirements.

Acceptance/ rejection of fasteners shall be done based on the test results of sampling test.

8.0 Protection & Packing

8.1 **Plain Fasteners:** Threaded portion of each fastener (Bolt/Stud/Screw/Nut etc) shall be protected by applying **graphite grease** to prevent from corrosion attack. Balance (unthreaded areas) shall be protected by applying oil based rust preventive.

Galvanised fasteners: Protection by graphite grease is not required

Alpa Topra
15/5/17

05/05/2017

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8.2 **Bolts / Studs / Nuts / washers independently or as a unit** (i.e. with nuts / washers on the respective bolts/studs), shall be packed item wise separately in appropriate boxes / bags with proper identification marking to avoid mixing & damage of threads due to rubbing during handling, transportation & storage. **Preferably each unit shall be protected by bubble sheet / corrugated sheet etc.**

Fasteners of size above M30 shall be packed in wooden boxes/crates.

9.0 **Test Certificates**

All inspection reports incl. material Test certificates, Galvanized Coating Thickness check report (if applicable), etc. shall be as per BHEL approved QAP. Vendor to ensure that all reports shall be arranged in sequential manner as per the QAP with proper index sheet at top.

10.0 **Identification Marking**

Each fastener (Bolt/Stud/nut etc.) shall be stamped as per the respective code requirements. Material property class along-with manufacturer's identification marking shall be essentially stamped on each fastener. *For size M10 and below, marking on individual fastener is not required.*

Each packing case of fasteners shall also be identified with following markings;

- Manufacture's name.
- BHEL purchase order number.
- Item Description : Bolt/Nut, Size & Property Class.

- Note : 1. Vendor shall clearly spell out the details of the deviation(s), if any during enquiry stage only.
2. For conflict if any between Drawing/QAP & other documents, same to be brought to the notice of BHEL for clarification/confirmation.

Alpa Topiwala
5/5/17

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25/05/2017

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