

Revision Record: Rev:00:15.05.94: Fresh

Rev:01:Text re-written, Specifications altered to suit ASTM.,UT reqmt. altered.

Rev:02:Dt 07.07.03:Details of material AISI 410 added in CL 1.0, 2.0, 4.0, 5.0. Stamping requirements added in CL.9.0.

Rev 03: Double tempering for AISI 410 removed.For sizes > or =140 is coverage shifted to TDC 0: 404 as it is procured as forged components..

1.0 MATERIAL

Specification:ASME{Latest on date of Purchase Order (PO)}:

ASTM A182 F6a Cl. 3, A276 Type 410 & 420, A565 Grade 616 - condition HT

ASTM A582 Type 416, ASTM A 479 Type 410 - condition 2

AISI 410 for TOA Gland and bushings.

Additional Requirement: As listed below (supplementary to Specification)

Size and Qty.: As per Purchase order & Drawing.

2.0 CHEMICAL COMPOSITION & PROCESS

Process: Steel shall be of fully killed quality & Bars shall be hot finished.

Chemistry: Product analysis per heat.

A276 Type 420: C = 0.3 to 0.4%

AISI-410: C = 0.15% max, Mn = 1.00% max, Si = 1.0% max, P
= 0.040 max, S = 0.030 max, Cr - 11.5 to 13.5.**3.0 DIMENSIONS AND TOLERANCES**

Tolerances as per ASTM A484.

4.0 HEAT TREATMENT (HT)

A182 F6a Cl.3: supply: Normalised(N) & tempered(T) to produce hardness as per specification.

A276 Type 410: supply: Hardened(H) and tempered condition to produce a hardness of 24 - 30 HRC (247 - 286 BHN). Minimum tempering temperature: 565 deg.C.

1 test bar per size/melt/HT batch to be oil quenched(Q) at 980-1010 deg.C & tempered at 400-510 deg.C to produce a hardness of 37 HRC (344 BHN) minimum.

A second test bar per size/melt to be annealed(A) and used for mechanical testing.

A276 Type 420: supply: Annealed condition to produce a hardness as per specification.

1 test bar per size/melt/HT batch to be oil quenched at 1010 deg.C and tempered at 455 deg.C to produce a hardness of 50 - 53 HRC (482 - 525 BHN).

A565 Grade 616 condition HT: supply: Annealed condition to produce hardness as per specification.

1 test bar per size/melt/HT batch to be oil quenched and tempered as per specification. to produce hardness as per specification.

A582 Type 416: supply: Annealed condition to produce a hardness as per specification.

1 test bar per size/melt/HT batch to be oil quenched at 980-1010 deg.C and tempered to produce hardness as per specification (Condition T).

A479 Type 410 Condition 2: supply: Normalised & tempered or quenched & tempered as per specification to produce hardness as per specification. Tempering temperature: 600-760 deg.C.

AISI 410 - Supply in Quenched & Tempered condition as below to produce a hardness of 197 - 235 BHN.

Quenching at 955-1010 degC in air or water or oil or polymer/ soaking 30 mts/inch max thick

Tempering at 663 degC. min/ soak 60 mts/inch max. thick/ Air cool

5.0 MECHANICAL TESTS in HT conditions as above.

Extent of test: for each size/heat/HT batch from sample product or identical test coupon.

Mechanical test as per Specification in HT condition as above wherever indicated in specification.

Hardness test as per cl. 4.0.

Impact test : SA 370: for SA 182 F6a Cl.3 (N&T condn): 2mm. Charpy U-notch, at Room temperature:

Acceptance: Average: 4 Kg.M / sq.cm.

for A565 Gr. 616 condition HT(Q&T): Charpy V-notch, at Room temperature: Acceptance: Min: 11J

Mechanical properties for AISI 410 :

Y.S = 75 ksi min. T.S = 95 ksi min, % E (on 2" G.L) = 18 min, % R.A = 35 min

6.0 NON DESTRUCTIVE TEST

Extent of test: for each product. Stage of test: After heat treatment.

UT: Diameter \geq 50mm: 100% : SA 388. Acceptance: AM 203.2, ASME Sec.VIII Div. 2.

7.0 WORKMANSHIP AND FINISH

As per ASTM A 484. Items to be free of scales & defects like laps, seams, folds, cracks etc.

8.0 REPAIR

Repairs by fusion welding are prohibited. Surface defects can be removed by mechanical means and defective areas smoothly dressed up with the adjacent surface. Minimum thickness after repair to meet drawing / Specification.

9.0 MARKING AND PACKING

Details of stamping on each item with low stress stamps and border by paint: Heat number, Specification & grade, Maker's emblem/code & Inspection Authority's seal. Items to be Paint stenciled with above details and UT number where applicable.

The material specification and grade may be stamped/punched with the following abbreviated specification on bars/rounds.

A182 F6a CL3	-	F6aCL3
A276 Type 410	-	A410
A276 Type 420	-	A420
A565 Grade 616	-	A616
A582 Type 416	-	A416
A479 Type 410 condition 2	-	A410 CN2
AISI 410	-	410

Items to be bundled for safe transit using metal strap in weights < 2 tonnes. Metal / Plastic tag with above detail to be fixed to each bundle.

10.0 INSPECTION AND CERTIFICATION

For IBR items: inspection & tests to be witnessed by an IBR approved inspecting agency, in case the mill is not recognised as a "Well known Steel maker" under IBR.

Test certificate countersigned by applicable inspection agency for each product with following details shall accompany the product (in format approved by Boiler inspectorate for IBR items).

1. Purchase Order No.(BHEL),TDC No. & Test certificate number
2. Specification, Grade with applicable year of code, Heat Number, Drawing No.,Quantity & Size
3. Steel making & finishing process,Chemistry including incidental elements - Heat wise.
4. Heat treatment details of the material and test bars.

5. Mechanical test results, NDE test results with reference & acceptance standard.

11.0 END USE

High pressure Valves and Pressure parts in boilers working at high temperature & pressure meeting IBR, ASME Section I, ANSI B16.34 requirements.

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