SELF LOCKING HEXAGONAL NUT WITH SPRING STEEL STRIP INSERT

1.0 SCOPE

This standard covers the requirements of self locking hexagonal nut with spring steel strip insert in the size range M8 to M20.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig 1 and Table 1 of this standard	
Tolerance	Product Grade	A
	Indian Standard	IS 1367 Part-2
Thread	Pitch	Coarse
	Tolerance	6H
	Indian Standard	IS 4218(Part 3,5 & 6)
Material of Nut	Steel	
	Property class	6
	Indian Standard	IS 1367 (Part 6)
Insert Material	Suitable spring steel	
Surface protection	Cadmium plating (Thickness 10-15 microns)	
Sampling and acceptability	According to IS 1367 (Part 17)	
Fitting of spring insert	Vendor shall design and supply the nut with spring insert in such a way that the spring insert shall prevent unscrewing under screwed and tightened condition.	
General requirements	Nuts shall comply with relevant parts of **IS 1367** in respect of requirements not covered in this standard.	

2.1 Referred Standards (Only current versions are applicable)

IS 1367 (Part 2, 6 & 17) Technical supply conditions for threaded steel fasteners.
IS 4218 (Part 3, 5 & 6) ISO metric screw threads.

3.0 DESIGNATION

A Grade A self locking hexagonal nut with spring insert of thread size M10 shall be designated as :

3.1 On drawings

i)	Material spec column	-------
ii)	Description column	**SELF LOCKG HEX NUT M10**
iii)	Drawing number column	**BPS 417508**
iv)	Material code column	**417508 0010**

4.0 ORDERING DESCRIPTION

4.1 For placing indents, issuing enquiries and on purchase order, the ordering description given below shall be followed.

SELF LOCKING HEX. NUT WITH SPRING INSERT M10 to BPS 417508

5.0 ADDITIONAL INFORMATION

5.1 Copies of this standard shall be sent along with the purchase order.

FIGURE - 1

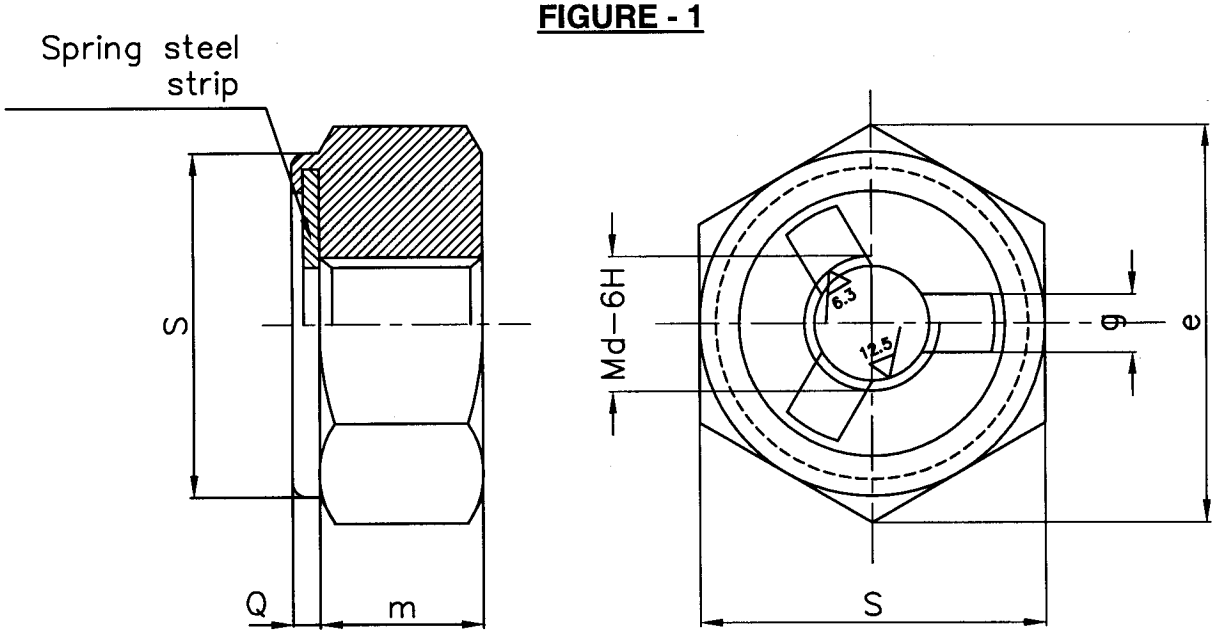


TABLE - 1

(All dimensions are in millimetres)

Md		M8	M10	M12	M16	M20
S		13.00	17.00	19.00	24.00	30.00
e	Min	14.38	18.90	21.10	26.75	33.53
	Max	--	--	--	--	--
m		6.50	8.00	10.00	13.00	16.00
Q		2.00	2.00	2.00	3.00	3.00
g		3.00	3.00	4.00	5.00	6.00
Weight (Kg)		5.71	13.09	20.00	40.00	75.76

NOTE :

1. Weights given in Kg per 1000 numbers.

STEEL BALL

1. Component : Steel Ball 5/32" (4 mm)

2. Material code : 550173970000

3. Application : Used in Wall Deslagger (Wall Blower-WB) and Rotary Blower (RB)

4. Specification :
   (i) As per drawing No.: 4-V-0000-04046 (SL. No.1)
   (ii) Material : BS 970 EN31/ A295 GRADE 52100. Hardened and tempered.
   (iii) Finished balls shall be protected against rust by a suitable grease or oil.

5. Inspection : Inspection to be carried out by BHEL Inspectors at BHEL works for dimensions, finish, hardness and material used.

6. Quantity : 2 Nos per Wall Deslagger and Rotary Blower.

7. Spares : 10% extra to be added as manufacturing reserve and destructive testing.

8. Packing : To be packed and despatched neatly to protect from

9. Weight(~) : 0.26 kg/1000 Nos.

Rev:03 Dt.10/02/2021	Material details updated.
Prepared By(J SANKAR)	Approved By (R RAKESH)

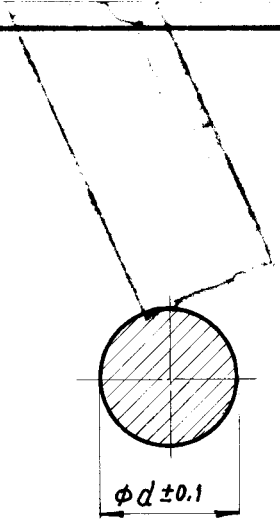
REV.	DATE	ALTERED / CHECKED
1	23-9-75	D.V. Kumar / CHECKED

ZONE: 1. DRG. REDRAWN.
2. IN SL. NO.3. REQUIREMENT FOR 2½" & 4"- 5000 PSI ADDED

REV.	DATE	ALTRD / APPD
2	11.6.75	ALTRD: S.S. Sadana / APPD: Babu

0.4 SURFACE FINISH IS ADDED.

0.4



SV - STOP VALVE

RV - REGULATING VALVE

FBV - FULL BORE VALVE

SL.NO.	DRAWING NOS.	MATL. CODE	φd ±0.1	Wt. PER 1000 NOS (kg)	NO.OFF/VALVE	APPLICABLE VALVES
1	4-V-2253-04046	55017397	4	0,26	1	2 WAY & 3 WAY PR. GAUGE VALVE
					10	15/100/III SV & RV
					12	25/100/III SV & RV
					16	40/100/III SV & RV
2	4-V-2242-04046	55017555	5,5	0,70	11	32, 40, 50/40/III SV & RV.
					12	65, 80/40/III SV & RV
					14	100/40/III SV & RV
3	4-V-2410-04046	55017700	7	1,40	13	125, 150/40/III SV & RV
					16	200/40/III SV & RV
					1	2½", 4"-5000 PSI FBV, 2" FBV

NOTE:

1. COMMON FOR ALL BASIC & ALLIED TYPE NOS. OF RESPECTIVE SIZES OF VALVES.
2. BALLS SHALL BE SUITABLY RUST-PROOFED
3. HARDENED & TEMPERED.

00527 363

NO. OF PIECES	DESCRIPTION	SEM.PRD./SEQ.NO.	INT. MAT. / SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET wt.(kg)	GROSS wt.(kg)	DRAWING NO.	ITEM NO.
			HARDENED & TEMPERED.	EN 31 BS 970					

FIRST ANGLE	SCALE: NTS	DRAWN	D.V. Kumar	TOTAL wt. (kg.)	
		CHECKED	D.K. Pujar 23.9	TYPE	
		APPROVED	C.G		
ALL DIMENSIONS IN MILLIMETRES		DATE	23/9/75	NEW/OLD DRG. No.	

TITLE

STEEL BALL

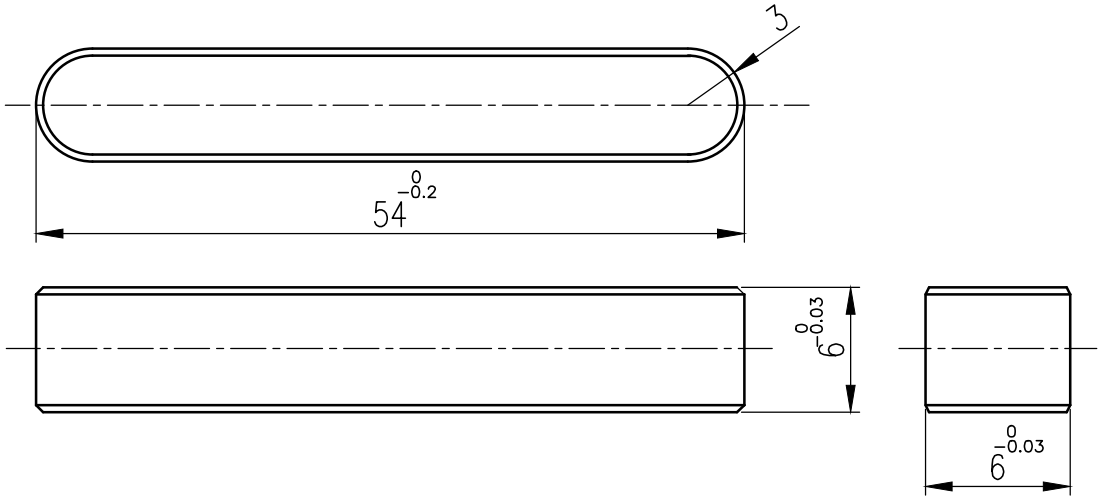
CARD CODE	DRAWING No.	REVISION
U01	4-V-0000-04046	2

TP-DG-4-V-0000-04046
CORPORATE DRG ID

ALL DIMENSIONS ARE IN MILLIMETRES.

FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP/QP

REV	DATE	ALTERED
		CHD & APPD



NOTES:

1. KEY IS PARALLEL & TYPE 'A' OF IS:2048.
2. KEY SHOULD COMPLY TO STANDARD IS:2048.
3. FOR SAMPLING METHOD IS:6821 TO BE FOLLOWED.
4. FOR QUALITY REQUIREMENTS REFER APPLICABLE LATEST QUALITY PROCEDURE.

PART CODE: 963536461000

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
01	PARALLEL KEY (TYPE 'A') (6X6X54)	–	–	–	–	0.015	–	–	–

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365–127

	NAME	SIGN	DATE
DRN	J.SANKAR	J.S	01.10.20
CHD	J.SANKAR	J.S	01.10.20
APPD	R.RAKESH	R.R	01.10.20

NO.OF VAR

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
SB	NTS	0.015	BPS–41501	
CODE 330				

TITLE	CARD CODE	DRAWING NO.	REV
PLAIN KEY (TYPE A)	U 01	4–20–201–03669	00

Size A4

Product: CARBON & ALLOY STEEL FASTENERS (STUDS, BOLTS & NUTS) FOR VALVES, OIL FIELD EQUIPMENT (OFE) AND OTHER APPLICATIONS

Revision Record: 00: 17.01.90: First issue. Rev: 01:21.06.90 Editorial corrections. Rev 02:21.04.91 TC for studs/bolts added. Rev 03: 04.04.96: Annexure I amended. Cl 3.3.3 & 5.3 modified. Rev 04:20.10.96: NDT, Acid pickling added & re-written. Rev 05: 28.04.98: Cl 3 modified to include MPI, certificate modified & Cl 7.4 deleted. Rev 06:15.06.99: Title, Cl 1 to 5 & 7.1 modified. Cl 7.2 changed to Cl 7.3. Cl 7.3 changed to 7.4 and modified. Cl 7.2 Galvanizing added. Test certificate sample format modified.
Rev 07: 15/06/2017: TDC: 5:166 for CS & AS Nuts has been merged with this TDC. Totally revised in line with changed requirements and Xylan coating requirements added.
Rev 08: 14/09/2019: Cl 1.0, 2.0, 3.0, 4.0, 5.0 modified in line with API 6A 21st Ed 2018 Errata 1 and for better clarity.
Rev.09: 19/02/2021: Latest version of the referred Standards/Specifications indicated thoughtout TDC; Cl.2.0 iid added; Cl.4.1 added; Annexure-1 modified;

1.0 MATERIAL SPECIFICATIONS:

All the codes, standards, specifications, drawings & procedures, etc., referred in this TDC shall be of latest revision as on the date of Purchase Order, unless specified otherwise.

Studs/Bolts - Alloy Steel	:	ASME SA 193-*19* /ASTM A 193-*20* Gr B7, B7M & B16.
Nuts - Carbon Steel	:	ASME SA 194-*19* /ASTM A 194-*20A* Gr 2H & 2HM
Alloy Steel	:	ASME SA 194-*19* /ASTM A 194-*20A* Gr 4 & 7
Additional Requirements	:	As listed below (Supplementary to the above material specifications)
Size and Quantity	:	As per Purchase Order (PO) & Applicable Drawing

2.0 GENERAL REQUIREMENTS:

i. This TDC is applicable for Valves, OFE (API 6A 21st Ed 2018 Errata 3 Addendum 1 & API 16C 2nd Ed 2015 Addendum 1 Errata 4) and other applications including NACE MR0175 / ISO 15156:2015 Parts 1, 2 & 3. The products shall be manufactured to the relevant requirements specified in the applicable drawings, specifications, PO & this TDC.

ii. Studs / Bolts / Nuts used for OFE application:

a. Studs / Bolts / Nuts shall be qualified and manufactured in accordance with BSL 1 of API 20E. The qualification & requalification records as per API 20E *Ed 2017 Addendum 2* shall be maintained by the Supplier. The supplier shall prepare Manufacturing Process Specification(MPS) to include as a minimum allowable levels for all Studs/Bolts/Nuts manufacturing parameters including process control variables and heat treatment parameters as per API 20E *Ed 2017 Addendum 2* and this TDC.

b. Raw material shall be fully wrought. Reduction ratio based on starting material diameter shall be a minimum of 4:1. The steel shall conform to the respective material specifications. Intentional addition of Boron is not allowed. All elements intentionally added to the heat shall be reported in the Test Certificate.

c. Furnace calibration shall be in accordance with API 6A *21st Ed 2018* Annex M; SAE AMS 2750 *Rev.F*; or SAE AMS H6875 *Rev.C*. For induction or direct resistant heat treatment, calibration shall be in accordance with manufacturer's written procedure. For forging furnaces, calibration shall be in accordance with manufacturer's written procedure

d. *Heat lot:*
- *Batch furnace: bolting or raw material of a single heat and diameter, heat treated together as a single austenitizing, quenching, tempering, and stress-relieving charge.*
- *Continuous furnace: bolting or raw material of a single heat and diameter heat treated without interruption in a continuous charge*

iii. Nuts shall be hot/cold forged or manufactured from hot rolled/cold drawn bars. If made from

hexagonal bars, 100% MT is to be done on bars as per ASTM E709-*15* to ensure freedom from surface/sub-surface defects.

iv. Hot rolled & cold drawn bars, if used (for studs/bolts or nuts), shall be machined at least 2 mm (minimum) in radius (i.e. 4 mm in diameter) to remove the seams completely. After machining, at least 10% of the bars shall be tested by MPI as per ASTM E709-*15* to ensure freedom from surface/sub-surface defects.

v. Heat treatment of finished studs/bolts shall be carried as per the material specification requirements for corresponding grades. For heat treatment of finished components, salt bath or controlled atmosphere furnace shall be used. After heat treatment, the threads shall be thoroughly cleaned to remove all deposits. If acid pickling is done for cleaning, it shall be as per Cl. 6 (v) of this TDC.

vi. Cadmium Plating (Cl 6 (i) of this TDC), Electroplating (Cl 6 (ii) of this TDC) and/or Xylan Coating (Cl 6 (iii) of this TDC) shall be done on the fasteners if specified in Drawing/PO. For all other cases, rust preventive coating (Cl 6 (iv) of this TDC) shall be done.

3.0 CHEMICAL, MECHANICAL PROPERTIES & NDE:

i. Mill certificate from steel manufacturer for conformance to chemistry heat-wise shall be submitted. Additionally, product analysis shall be done on one sample/heat by the stud/bolt/nut manufacturer. Methods and practices for chemical analysis shall be in accordance with ASTM A 751-*20*.

ii. The microstructure and macrostructure shall conform to the requirements of the respective material specifications.

iii. **Tensile Testing for Studs/Bolts:** One tensile test/heat/size/ HT batch shall be carried out in the finished heat treated condition as per SA / A 193 and shall meet the material specification requirements for corresponding grades.

iv. Hardness Testing for Studs/Bolts:

Hardness testing, including specimen preparation, shall be performed in accordance with ASTM A 370-*20* including Annex A3, except that testing shall also be in conformance with ASTM E10-*18* or ASTM E18-*20*.

a) **For ASME SA 193-*19* / ASTM A 193-*20* Gr B7 & B16:** Hardness check shall be carried out on finished stud/ bolt as per ASME SA 193-*19* / ASTM A 193-*20*, at least on 10% of the finished studs/bolts.
Gr B7: Hardness: 25 to 34 HRC or 253 to 319 HBW.
Gr B16: Hardness: 25 to 35 HRC or 253 to 321 HBW.

b) **For ASME SA 193-*19* / ASTM A 193-*20* Gr B7M:**
Hardness check on 100% of studs/bolts as per SA193.
Gr B7M: Hardness: 94 to 99 HRB or 201 to 235 HBW.

v. Mechanical Testing for Nuts:

a) **For ASME SA 194-*19* / ASTM A 194-*20A* Gr 2H, Gr 4, & Gr 7:**
Hardness check on finished nuts shall be as per ASME SA 194-*19* / ASTM A 194-*20A* (including quantum of testing).
Gr 4: Hardness: 24 to 35 HRC or 248 to 327 HBW.
Gr 2H & Gr 7: Hardness: 24 to 34 HRC or 248 to 319 HBW.

b) **For ASME SA 194-*19* / ASTM A 194-*20A* Gr 2HM:**
Hardness check on 100% of finished nuts shall be carried out as per ASME SA 194-*19* /

ASTM A 194-*20A*.
Gr 2HM: Hardness: 159 to 235 HBW.

c) **Proof load test shall be done as per ASME SA 194-*19* / ASTM A 194-*20A* for all grades of nuts** and shall meet the requirements of corresponding grades of the material specification.

d) After final heat treatment, sample nuts shall be heat treated as per Table 1 and meet the corresponding hardness requirements.

Table 1.

Grade	Temperature (°C)	Soaking Time (Hr)	Cooling	Minimum Hardness (HBW) at room temperature
2H	540	24	Slow Cool	179
2HM	540	24	Slow Cool	159
4, 7	590	24	Slow Cool	201

e) **Cone Stripping Test:** This test shall be performed as per ASME SA 194-*19* / ASTM A 194-*20A* in case of visible surface discontinuities. On such cases Proof load shall be as per ASME SA 194-*19* / ASTM A 194-*20A*.

vi. **NDE:**
Magnetic particle inspection shall be carried out as per ASTM E709-*15* in at least 10% of the finished studs/bolts of all grades. Cracks, linear indications (length ≥ 3 times its width) are unacceptable.

4.0 SAMPLING INSPECTION:

All inspection shall be in accordance with relevant drawing or BPS (Boiler Plant Standard), PO, this TDC and ASME SA 193-*19* / ASTM A 193-*20* for studs/bolts and ASME SA 194-*20* / ASTM A 194-*20A* for nuts. The threads shall be checked with calibrated ring gauges for studs/bolts & plug gauges for nuts in the final heat treated condition for black variety and *prior to* final plated/coated condition for the cadmium plated/electroplated/ xylan coated items.

Visual, dimensional checks and their acceptance shall be as per applicable drawing and ASME SA 193-*19* / ASTM A 193-*20* for studs/bolts & ASME SA 194-*20* / ASTM A 194-*20A* for nuts.

4.1 *Gauging Requirements for Xylan along with Zinc Coated Fasteners*

i. Studs
- *a. No under sizing is allowed*
- *b. Prior to Xylan and Zinc Coating, Class 2A Gauge to be used for inspection*
- *c. After coating, No Gauge inspection is required*

ii. Nut
- *a. Under sizing is allowed to maximum of 0.2mm in the internal diameter of threads*
- *b. Prior to under sizing, Class 2B Gauge to be used for inspection*
- *c. After under sizing, a gauge having an allowance as per Class 2B along with 0.2mm under sizing allowance to be made and inspected thereof*

iii. Assembly of Stud and Nut
- *a. Free run of nut over stud to be ensured*
- *b. No play is allowed*
- *c. After free run of nut over stud, Xylan coating should not get peeled off.*

5.0 MARKING & PACKING:

i. Punch/emboss each finished component with applicable material grade (B7/ B7M/ B16 for studs/bolts; 2H/2HM/4/7 for nuts) and supplier's emblem. Studs/bolts of grade B7M and nuts of Gr 2HM shall have a line under the grade symbol.

ii. Punch/emboss serial number also in B7M studs/bolts and Gr 2HM nuts in addition to the above, to correlate with hardness. Protect the threaded ends with plastic end caps. Pack in wooden

box/ gunny bag of convenient size for easy handling and transportation. Mark quantity in each box/gunny bag.

iii. In addition to the above, studs / Bolts / Nuts for OFE applications shall marked with unique heat lot identification and followed by "20E1". Each piece 1 in. nominal diameter and larger shall be marked. For studs / Bolts / Nuts less than 1 in. nominal diameter, the studs / Bolts / Nuts shall be securely containerized to maintain heat lot identification and traceability. Multiple heat lots shall not be mixed in a single container. Containers used in the processing, storing, and shipping of studs / Bolts / Nuts not individually marked shall be clearly labeled with all marking information required by the relevant material specifications and API 20E *Ed 2017 Addendum 2.*

6.0 SPECIAL REQUIREMENTS:

i. CADMIUM PLATING:

a) Clean the fasteners to make them free from rust, grease, oil, scale, etc., before plating. When pickling is considered essential, it shall be done as per Cl 6 (v) of this TDC.
b) Apply Cadmium Plating to the specified thickness on specified areas. Thickness shall be measured on 5% of the PO quantity of fasteners.
c) After plating, bake the parts at 175^{0}C to 205^{0}C for a minimum period of 3 hours. The elapsed time between plating and baking shall not exceed 8 hours.
d) Apply a Chromate Conversion coating after plating and baking.

ii. ELECTROPLATING OF ZINC CHROMATE:

a) Clean the fasteners to make them free from rust, grease, oil, scale, etc., by suitable organic solvents/ hand tool methods before electroplating. Then, pickling shall be done as per Cl 6 (v) of this TDC.
b) The fasteners shall then be electroplated as per the method and to the minimum coating thickness specified in the applicable drawing. Thickness shall be measured on 5% of the PO quantity of fasteners.
c) All electroplated parts (regardless of strength level) shall be baked within 2 hours after plating at 375 °F–425 °F (191 °C–218 °C) for 8 hours minimum at temperature

iii. XYLAN COATING:

a) Clean the fasteners by blast cleaning to Sa2.5 to make them free from rust, grease, oil, scales, etc., before xylan coating.
b) The fasteners shall then be xylan coated as per the requirements and to the minimum coating thickness specified in the applicable drawing.
c) **Tests for Xylan Coating:**
The following test shall be carried out on Xylan coated fasteners and results to be reported in the Test certificate (in addition to the Test Certificate for the fastener material and other inspections requirements):

i) **Thickness measurement:**
Dry film thickness of Xylan coating to be measured using a magnetic induction or Eddy current type electronic gauge and the reading shall meet the drawing/PO requirement for thickness of coating of Xylan 1070. The thickness measurements shall be made in accordance with ASTM D7091-*20*. Thickness shall be measured on 5% of the PO quantity of fasteners.

ii) **Cure Test:**
This test method is for ensuring the completeness of cure of Xylan 1070 coating by evaluating the resistance of the cured coating to a solvent known to attack uncured film. The testing method shall be as per Whitford test method 115B (as recommended by the Xylan coating supplier).
Acceptance criteria: No white precipitate or stain shall be available after the test.

iii) **Adhesion Test using Cross-hatch and Cello Tape:**

Test as per ASTM D3359-*17* Method B for measuring Adhesion by Tape Test.
Acceptance Criteria: No loss of adhesion (5B Classification).

iv) **Salt Spray Test:**
Xylan coated fasteners should pass a minimum requirement of 500 hours of salt spray test as per ASTM B117-*19*. Certificate of compliance for meeting the salt spray test requirements shall be provided.

iv. RUST PREVENTIVE FLUIDS/COATING REQUIREMENTS:

a) Clean the fasteners to make them free from rust, grease, oil, scale, etc., by hand tool/ manual cleaning method.

b) Apply one coat of rust preventive fluid, of any of the following brands of the suppliers (Table 2), to obtain dry film thickness of 20 microns minimum:

Table 2. Rust Preventive Fluid/Coatings Brands

Sl No	Brand/Chemical	Supplier Name and Address
1	BONITA-RPF	M/s Bonita Chemicals, 64, Industrial Estate, Nunhai, Agra-282 006
2	CHAMPION-RPF	M/s Guardian Chemicals, 8, Rajaji IInd st, West Lake Area, Nungambakkam, Madras-600 034
3	ECONOL RPF (non-drying type)	M/s Process Aids, Bangalore
4	TECTYL 506	M/s Plastipeel Chemicals and Plastics (P) Ltd, Thane-400 604
5	TRPF	M/s Sundaram Paints Pvt. Ltd., Thanjavur-613 004
6	TRPF	M/s Solar Paints, Pudukkotai.
7	WICOR-P	M/s Western India Paint and Color Co P. Ltd, Madras-600 017

Use of any other brand/chemical shall be done with the prior approval of BHEL.

v. ACID PICKLING:

a) Wherever pickling done, it shall be done using Hydrochloric acid of 5-10% concentration for a period of 5 to 10 minutes at room temperature with suitable inhibitor.
b) After pickling thorough rinsing shall be carried out with water to remove acid residues & further DM water rinsing. After thorough rinsing with DM water, the rinsing shall not show any red color (free acidity) when tested with methyl orange indicator.

7.0 CERTIFICATION:

The manufacturer shall provide Test Certificates (TC) duly countersigned by the Authorized Inspecting Authority nominated by BHEL in P.O. (if specified) along with raw material TC from Steel Maker. *The applicable versions of the referred Codes, Standards and Specifications shall be reported in the Test Certificates and NDE reports.* Manufacturer's TC shall contain the following details as per the sample format attached as Annexure-1 to this TDC:

i. BHEL PO No & PO Date
ii. Technical Delivery Condition (TDC) No & its Revision No, Drawing & its revision no
iii. Melt/Heat No, Serial No (if applicable)
iv. Raw Material TC Number and Date
v. Chemical and Mechanical properties for Studs/Bolts and Nuts *including the location and orientation of test specimens*
vi. Heat treatment details (temperature, time, cooling medium, etc.)
vii. *NDE reports with NDE Personnel qualification records, all relevant NDE operating parameters and* NDE Results with reference and acceptance criteria
viii. Type of Surface coating & its coating thickness – Cadmium Plating, Chromate conversion coating, Electroplating, Xylan Coating, Rust preventive coating, etc.
ix. Test methods and results on Xylan Coating
x. Baking details for cadmium plating, electroplating & Xylan coating
xi. Manufacturers' identification mark
xii. Certify soundness & confirmation to PO requirements.

19/02/2021	19/2/21	19/2/21	19/2/21	19/02/2021
N Nagamuthu Pandian	P Arun kumar	S Lakshmi	A Wilfred Joseph	J V V Aruna Kumar
Manager/QA	DM / Valves Engg	DGM/QA	AGM / Valves/MM	SDGM / QA
Prepared By	**Reviewed By**			**Approved By**

Annexure-1. Test certificate for Studs/Bolts & Nuts– Sample format

TC No: Date:

Customer :
TDC No./Rev.:
Product :
Description : (Spec, dia, pitch, length)
Quantity :

PO No./ Amd :
DC No. :
Drg. No./Rev :
Thread Spec. :

Requirement : Records/ Observation

Size of bar - Before machining :
- After machining :

Type of furnace used for hardening :

TDC Clause no.										
	Raw Material mill TC No: TC Date: Melt/Heat Number: *Reduction Ratio:*									
2.0 & 3.0	**a) Heat Treatment Details:** Hardening Temperature: °C; Soaking time: Cooling Medium: Tempering Temperature: °C; Soaking time: Cooling Medium: **b) Additional Tempering for Nuts (after final tempering):** Temperature: °C; Soaking time: Cooling Medium:									
3.0	**a) Product analysis for chemistry**								**Report No & Date:**	
	Spec	C	Mn	P	S	Si	Cr	Mo	V	Ni	Others
	Min.										
	Max.										
	Actual										
	b) Tensile test after H & T and final drying (Finished heat treated condition) – **For Studs/Bolts**									
		UTS (MPa)			**YS (MPa)**			**%Elongation**		**%Red in Area**
	Reqd/Spec Value									
	Test result									
					Spec Value			**Test result**		**Remarks**
	c) Hardness Test Result (for Studs/Bolts, Nuts):									
	d) Hardness Test Result (for Nuts after 24 hrs of tempering):									
	e) Proof load (kN) for nuts & result									
	f) Result of Cone Stripping test for nuts									
	g) NDE Result for Studs/Bolts:									
4.0	Visual and dimensional checking as per applicable drawing for studs/bolts & nuts:									
5.0	Punching details (identification): End cap for threaded portion:									
6.0	**a) Type of coating:** Cadmium Plating /Chromate Conversion / Electroplating/ Xylan /Rust preventive coating **(Tick applicable coating)** **Coating thickness/DFT:**									
	b) Tests for Xylan Coating							**Results**		
	c) Pickling Acid: **Concentration:** Drying after pickling. Temperature: °C; Soaking time:									
This is to certify that the above results are correct and the parts meet specification and PO requirements.										
Signature with date Supplier: In-charge of Quality								Signature with date BHEL / Authorized Inspection Agency		

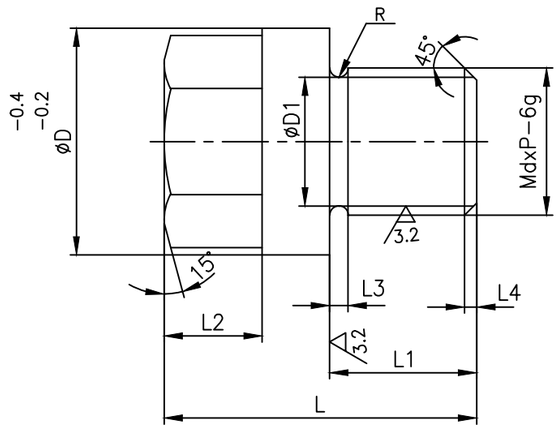
Note: Additional Sheets may be attached, if required.

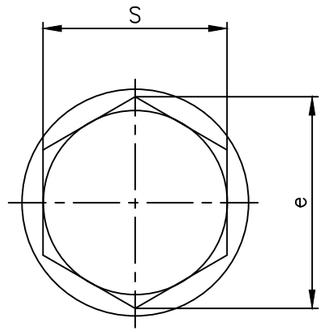
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-0000-06413

12.5 / 3.2

SL.No.	DRAWING NUMBER	COMPONENT CODE	RAW MATL DETAILS				WT(KG)		DIMENSIONS											REMARKS
			SIZE	MATL.SPECN	MATL. CODE	SCRAP SORT	GROSS	NET	MdxP-6g	$^{-0.4}_{-0.2}$ øD	øD1	e	S	L	L1	L2	L3	L4	R	
01	3-V-5144-06413/02	93 100 677 0000	ø40X60	A193-B7,QT CERTIFY	15 039 116	20	0.59	0.27	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	-
02	3-V-5150-06413/02	93 100 678 0000	ø50X70		15 039 197	20	1.11	0.33	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	-
03	3-V-5152-06413/02	93 100 748 0000	ø36X50		15 039 088	20	0.40	0.14	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	-
04	3-V-5186-06413/02	93 104 802 0000	ø32X46	A182-F6a Cl.3 HARDENDED& TEMPERED CERTIFY	-	40	0.29	0.14	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	3"-300C
05	3-V-5188-06413/02	93 104 803 0000	ø40X57		-	40	0.56	0.27	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	4"&6"-300C
06	3-V-5189-06413/02	93 104 804 0000	ø45X68		-	40	0.85	0.33	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	8"-300C
07	3-V-1447-06413/02	93 106 479 0000	ø50X55	A193-B7,QT CERTIFY	15 039 197	20	0.88	0.30	M30X1.5	43	27	41.6	36	46	14	19	3	2	1.5	-
08	3-V-5199-06413/02	93 106 844 0000	ø32X46	A182-F316, SH CERTIFY	-	46	0.29	0.14	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	-
09	3-V-5196-06413/02	93 106 845 0000	ø40X57		-	46	0.56	0.27	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	-
10	3-V-Z001-06413/02	93 106 846 0000	ø50X70		-	46	1.08	0.3	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	-
11	3-V-Z113-06413	93 204 759 0000	ø56X67	SA182 F60, SH CERTIFY	-	46	1.3	0.27	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	4"-150C





NOTES

1. UNSPECIFIED SHRAP CORNERS TO BE CHAMFERED TO 0.5X45°.
2. HARDNESS - 26 TO 32 HRC FOR B7 MATL.

REV	DATE	ALTERED R.P.SINGH
09	19.06.19	CHD & APPD SSK & KRS

SL. No. 11 INCLUDED

SL No.	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No / COMP. CODE	ITEM No

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CS

365-121

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.

	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.P.SINGH		06.10.18	
CHD	S.SATHEES		06.10.18	
APPD	K.RAJASEKARAN		06.10.18	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL				
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
PLUG	U 01	3-V-0000-06413	09

Size A3

बी एच ई एल

BHEL

भारत हैवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
इंडस्ट्रियल वाल्वस प्लाँट

Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)
Industrial Valves Plant

Quality Assurance Plan for Fasteners*:
NUT, BOLT (INCL EYE BOLT, LIFTING EYE BOLT), STUD

BHE:QAP:FAS:02
Dt:15.03.2019

SN	Stage of inspection	Inspection type		Ref doc	Quantum of check	Format of Record	Agency	
							M	BHEL/TPIA
1	Raw material	Chemical/Mechanical properties		Material test certificate	100%	MTC report	V	V
2	Finished product	Chemical Analysis	Chemical composition	Material specification in drg	one sample per heat	Annex 1 of TDC	P	W
		Mechanical Properties	Tensile strength Mechanical testing for nut	Material specification in drg	one sample per heat	Annex 1 of TDC	P	W
			Hardness		10% or 20 nos hardness check at manufacturer end, one sample each type per heat for TPIA or BHEL**			
		Dimension	As per drawing, Thread with GO/ NO GO Gauge	Material drg/BPS	10% or 20 nos/type.	Inspection report	P	P
		Visual	Free from burrs, physical damages		100%	Annex 1 of TDC	P	P
		MPI	ASTM E709	As per procedure	10% or 20 nos/type.	MPI report	P	W
		Marking/Identification	Material grade/supplier name or symbol	As per PO/Drawing/TDC	10%	Annex 1 of TDC	P	W

भारत हैवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
इंडस्ट्रियल वाल्वस प्लाँट
Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)
Industrial Valves Plant

3		Rust preventive oil		As per TDC:5:164	100%	Annex 1 of TDC	P	W
		Packing	Packed in wooden/cardboard box with layer to layer cushioning material.		10%	Annex 1 of TDC	P	W
		Test certificate	MTC	.		Annex 1 of TDC	P	V

M-Manufacturer, V-Verification, W-Witness, P-Perform

- * QAP IS PREPARED TO MEET REQUIREMENT OF TDC:5:164 (latest),.PLS REFER IT, IN CASE OF AMBIGUITY ARISES.
- ** TPIA/BHEL MAY INCREASE SAMPLE QTY UP TO 10%.

15/03/19	15/03/19	15/03/19
Vikas Kumar Sr. Engr / QM	Samir Shandilya Sr Mgr/ QM &HSE	S R Kenny AGM/QM, HSE, Engg,TEC & SM)
Prepared	Reviewed	Approved