Tender Enquiry No	**1920-004**
Enquiry date	06.04.2019
Last time and date of tender submission	15:00, 30.04.2019
Tender opening time and date	15:30, 30.04.2019
Quotation Parts	*Two-part*
Item Description	*FASTENERS GVFST*
Delivery schedule (In days)	As per tender term Sr. No. 5
Validity of offer (In days)	*90 days from date of tender opening*
Validity of Rate Contract	*Till 31.05.2020*
Counter Offer	*Applicable 60:40* (as per tender term sr. no. 7)
Quantity Variation	*+10%* may be acceptable with prior consent of BHEL in writing
Documents required along with supply of material	
Test Certificate and other Quality related documents	*Required as per BPS/IS /TDCs/Drawings mentioned in Annexure-II & III*

PRE-QUALIFICATION TERM

P1.

Bidders should primarily be engaged in ***manufacturing of fasteners*** (grade B7/B8M/B8MA). BHEL may carry out evaluation of bidder's capability. BHEL reserves the right to accept / reject any offer based on evaluation of bidder's capability. For verification of data presented for pre-qualification bid, BHEL may decide to visit the bidder(s) works. Any fact found deviating from bids during evaluation shall make the bidder liable to be dis-qualified. ***"Vendor has to submit any customer PO of Fasteners (grade B7/B8M/B8MA) along with tax invoice with minimum cumulative value of Rs. 40,00,000.00 (Forty lakh Only) as proof. PO date should be 01.04.2016 or afterwards"***.

1. INVITING TENDERS:

Tenders in two part bids are invited from '***MICRO & SMALL ENTERPRISES (MSE's)***' only for supply of ***'Fasteners'*** as per BHEL drawings/specifications on '***Rate contract basis'.***

The two bids should be submitted in separate sealed inner envelopes duly mentioning the detail as follows:

Bid	Bid description	Superscribing on envelope	*** Should contain ***
Part I in First sealed envelope	Techno-Commercial Offer	Part-I (Techno-Commercial) bid against tender enquiry no: 1920-004 dated	1. Acceptance of all terms and conditions of tender enquiry. (Preferred is submitting signed copy of terms and conditions; if nothing is mentioned for any term, it shall be summarily concluded that the same is

		30.04.2019.	acceptable and no representation whatsoever shall be entertained later on).
			2. **Un-priced** bid as per format attached. **All details, i.e. whether quoted for item, duties and taxes etc. should be filled**.
Part II in Second sealed envelope	Price Bid	Part-II (Price) bid against tender enquiry No: 1920-004 dated 30.04.2019..	***Price bid in the format attached***.
			Anything other than prices mentioned in the price bid shall be considered invalid

Both/All the sealed envelopes should be put in outer sealed envelope superscribing all details i.e. Enquiry Number, Date, Supplier's Name and Address and Item.

2. SCOPE OF SUPPLY:

Material shall be supplied as per the applicable latest Technical Delivery Conditions (TDC)/ Material Standard requirements/BPS/Drawing and other requirement as given in the Purchase Order/list of items(Annexure-II). National & International material Standards shall have to be arranged by vendors themselves. **Comparison and procurement shall be done for SET/No. (as per Unit of Measure mentioned in Annexure-II), i.e. fastener along with required number of nuts. For the items where corresponding Bolts/Studs/Screws are listed along with nuts, quotation where bidders have quoted for both shall only be considered. If the item is appearing more than once then the minimum of rate will be considered. And material should supply in assembled condition wherever unit of measurement is set.**

Material shall be offered to third party inspection (TPI).The QAP is also attached. The material shall be dispatched by vendor only after dispatch clearance from BHEL IVP (based on TPI report). TPI inspection charges will be borne by BHEL. The vendor has to arrange their own gauges for inspection.

Note that these Items are reserved for MSEs. Order will be released only after receiving of required MSE documents as per clause G14 of GCC.

3. PACKAGING & SUPPLY:

All material has to be dispatched in packing boxes only i.e. wooden or carton or cardboards with material code, description, grade and quantity. Preferable is to supply no of packing boxes with small quantities e.g. if 500 Bolts are to supplied then it may be supplied in 10 boxes containing 50Pcs. Box must have TAG containing Purchase Order No., Material Code, Material Description (as mentioned in PO) along with Unit weight of each item and Total weight of Box and Total Quantity in Box. No cost for these boxes will be given separately and must be included in prices only.

It should be noted that where Bolts/Studs/Screws are mentioned in sets with Nuts, Supply must be done in sets and in assembled condition only otherwise BHEL can reject the material. Gate receipt

will be given to transporter if Test Certificates and Invoices with proper material identification are supplied.

4. VALIDITY OF OFFERS AND CONTRACT:

The offers shall be kept open for acceptance for ***90 days*** from the date of opening of the tender. In case of extension of tender opening date, the validity shall be suitably revised.

VALIDITY OF RATE CONTRACT:

The rate contract will be applicable upto ***31.05.2020*** and may vary three months from this rate contract period. However, BHEL reserves the right to terminate the contract earlier also if the performance of the VENDOR is not satisfactory. The rate contract can be again extended for one more year on mutual agreement. BHEL reserves the right to short close rate contract earlier. All Purchase orders will be released in this rate contract period only. **Items indicated in annexures are tentative which may increase or decrease during the contract time. Supplier has to supply material as per PO. During rate contract period BHEL may not release PO for all items indicated in annexures. Supplier may supply + 10% of ordered quantity with the prior approval of BHEL**.

5. DELIVERY SCHEDULE:

50% of the ordered quantity within 8 weeks from the date of Purchase Order and Balance 50% within 11 weeks from the date of Purchase Order which will be released from time to time as per BHEL requirement.

The above quantity is for single item not for the total tender qty.

If supplier fails to supply items within PO delivery date, BHEL reserves the right to cancel the PO and this shall be procured from other suppliers. And risk purchase will be initiated against failed supplier. Further, BHEL may release delivery schedule from time to time based upon our requirement. Vendor shall be required to complete the order as per the BHEL schedule requested.

6. IMPORTANT GUIDELINES:

1. Documents submitted with the offer shall be signed and stamped in each page by authorised representative of the bidder.
2. On the due date of tender opening, only technical bids will be opened. The opened technical bids will be evaluated by us and clarifications required, if any, will be called for from the bidders on technical and commercial points. If no reply is received from the vendor for the clarification raised by BHEL with in the final cut-off date those vendors offer will be processed with the documents available / submitted against this tender. Offers not meeting the required specification and technical condition will be summarily rejected. The price bids of technically suitable bidders will be opened on a later date with prior intimation to techno-commercially suitable bidders. All qualifying bidders shall be notified for date of opening of Price bids by email/fax/post/courier. If any difference is found in the terms in the Techno-commercial bid and price bid, the terms mentioned in the Techno-Commercial Bid will be considered.
3. BHEL reserves the right to negotiate with L1 vendor or re-float the tender for items where, L1 price is not the lowest acceptable price; BHEL reserves the right to increase or decrease the tender quantity.

4. The contract shall be in force up to 31.05.2020 from the date of this agreement and may be extended for further period on mutual acceptance.
5. Basic price, Taxes and Duties as indicated above are applicable. The Price stipulated will be ON FOR BHEL GOINDWAL stores and FIRM and no revision will be entertained for the complete duration of the Contract i.e. up to 31.05.2020 from the date of this Rate Contract.5
6. The quantities indicated in the Enquiry are approximate and tentative. **BHEL does not guarantee to place purchase order for the full quantity.**
7. There is no minimum quantity for placement of purchase orders under the Rate Contract.
8. BHEL Reserves the right to short close or reduce the quantity mentioned in the Enquiry / PO.
9. Any other condition which might have been quoted by the supplier and or in contravention to the terms prescribed in the Enquiry that have not been specifically accepted in writing by the purchaser will not be applicable to this Frame work agreement.
10. Conditional offers are likely to be rejected.
11. In case of failure in supplying the items as per PO terms and conditions within the delivery period, BHEL reserves the right to short close the PO and share the Pending quantity among other vendors as per Clause 7 of the tender terms and conditions. Also such failed vendors will be removed from Rate Contract of this Enquiry and their share quantity will be distributed equally among other qualified vendors as per the split up ratio.
12. In case the bidder withdraws the offer submitted by him/her after it is accepted by BHEL and fails to supply the goods as per the terms and conditions of the contract, or at any time repudiate the contract wholly or in part, BHEL shall be at liberty to cancel the purchase order and to recover from the bidder the extra cost and the other loss incidental to the breach of contract on the part of the bidder.
13. All test certificates are required before /with the material at BHEL Goindwal; Otherwise BHEL may or may not receive the material. Test certificates may be send on email as mentioned on Purchase orders in scanned form. In no case material will be accepted at BHEL without test certificates.

7. COUNTER OFFER/RATE ACCEPTANCE:

BHEL reserves the right to negotiate with L1 or re-float the tender in case the quoted prices are not acceptable. **BHEL will give counter-offer to vendors other than L1 & except highest bidder, only when the individual item quantity is more than 1000 Units (Set/No.).**

Loading criteria	L1	L2	Remarks
For the items where RC quantity ≤ 1000 Unit (Set/No.)	Full quantity will be ordered as per the BHEL requirement	--	*For the qualified suppliers (other than L1) 'Rate Acceptance' will be taken. *if they accept L1 rates and If in any case L1 fails to supply the material as per the BHEL requirement, then only the PO will be placed on other suppliers who so ever accepted the 'L1 Rates' based on their Ranking.
For the items where RC quantity > 1000 Unit (set/no.)	60% quantity will be ordered as per the BHEL requirement	40% quantity will be ordered as per the BHEL requirement	*For the qualified suppliers (other than L1 and L2) 'Rate Acceptance' will be taken *If they accept L1 rates and If in any case L1/L2 fails to supply the material as per the BHEL requirement, then only the PO will be

		if L2 accepts L1 rates.	placed on other suppliers who so ever accepted the 'L1 Rates' based on their Ranking.

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	Material specification in drg	one sample per heat	Annex 1 of TDC	P	W
			Mechanical testing for nut		10% or 20 nos hardness check at manufacturer end, one sample each type per heat for TPIA or BHEL**			
			Hardness					
		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

433, इंडस्ट्रियल काम्पलैक्स, गोइन्दवाल 143423 (जिला अमृतसर) पंजाब 433, Industrial Complex, Goindwal 143423 (Distt. Amritsar) Punja
TELEPHONE : 01859-222002, 036, 039, 041. FAX : 01859-222061

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

Documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder.

G1. INSTRUCTION TO BIDDER

Quotations shall be submitted before due date and time. Late offers are liable to be rejected, so please ensure to submit bid well within due date and time. Techno-commercial part will be opened on due date.

Based on evaluation of techno-commercial offers, Price bids of bidders who qualify from techno-commercial evaluation shall be opened. BHEL may decide to open the Price bid same day at 1700 hrs. If not opened on the same day, all qualifying bidders shall be notified for date of opening of Price bids by email/fax/post/courier/E-procurement system generated email.

G1.1 INSTRUCTION TO BIDDER (In case of Non-E-Procurement / Paper/ Manual/ Hard Copy based tenders)

Sealed Tenders can be dropped in the tender box labeled as 'Tender box for MM contracts'. This tender box is located at the entrance of Admin block BHEL Goindwal. Fax (01859-222061) / E-Mail (**tendermm_ivp@bhel.in**) offers received in time shall be considered only when such offers are complete in all respects. In case of bulky tender please handover quotation to Sh Rakesh Kumar/ SDGM/Head-MM or Sh Gurcharan Singh / AGM-Operations & MM. [Contact: 01859 224 615/631]. Bid can be send to following address:

BHEL, Industrial Valve Plant,
#433, Industrial Complex,
Goindwal Sahib, Distt. Tarn Taran,
Punjab-143422.

G1.2 INSTRUCTION TO BIDDER (In case of E-Procurement)

Interested bidders/Suppliers shall submit their offer through e-Procurement mode at https://bhel.abcprocure.com. **Offers in any other mode will not be accepted.**

For Enterprise Procurement System (EPS) Bidders/Suppliers are requested to follow these steps:

a. Requirements

1. Computer with good Internet Connection.
2. Operating System should be Windows Vista / Windows 7 and above.
3. Web Browsers: Internet Explorer 9.0 (32-bit Browser only) & above

b. Mandatory Requirements:

Suppliers interested for registration for BHEL Open Tenders should have a valid DSC (Digital Signature Certificate) before Proceeding forward for Registration. Herein a Valid DSC refers to a Class-II/III Digital Signature Certificate (DSC) for Signing & Encryption (Required both digital signature certificate: Signing & Encryption) of bids issued by any of the valid Certifying Authorities (approved by Controller of Certifying Authorities) in India. Valid Digital Signature Certificate (DSC) must be installed in a computer system from where you want to access the website.

For Unregistered Suppliers in EPS:

Procedure for Online Registration in EPS for Open Tender Suppliers for BHEL. Please follow the below steps for registration: -

1. Click Register Button (Top of the Screen).

05/01/19

2. Please input your organization PAN No (in case of Indian supplier) or select your "country" in case you are an overseas Supplier.
3. Select Units to participate in.
4. Fill up Company details.
4. Key in your desired login id If you have registered by keying in PAN No. then your desired login id will be prefixed by "OTI", In case of overseas suppliers it will be also prefixed with "OTI".
5. Fill in the Captcha code & agree to the terms & conditions and privacy policy of this website and click SUBMIT.

Once the above steps are completed, contact to M/s eProcurement Technologies Limited for ID Activation. M/s e Procurement Technologies limited, Ahmedabad will activate your ID within 2 business hours. After registering, follow the steps provided in "For Registered Supplier" to view RFQ.

NB: - 1 BHEL Administrator or user will have no role for approving Registration and Open Tenders and DSC for any supplier who has registered himself from the front END which is in case of OT.

For Registered Supplier in EPS:

1. Supplier visits EPS home page
2. Supplier Login in with their user id and password
3. Search the RFQ ID and views it.
4. Attaches themselves to the RFQ by clicking the "I/We wish to participate".
5. Supplier fills the bid template and makes necessary attachments
6. Supplier submits their bid by clicking Sign, Encryption & Save button.

In any problem is faced by supplier while login/registration in EPS (**https://bhel.abcprocure.com**) and any other assistance, please contact the support team of M/s e Procurement Technologies limited, Ahmedabad as per details mentioned in table below: -

Name	Contact Nos.	e-mail ID	Role	Location
Mukunthan	+91 6353215001	Trichy.bhel@eptl.in	Support Executive	Trichy
Swapnil Hamilton	+91 7940270549	swapnil.h@eptl.in	Support Executive	HO – Ahmedabad
Hardik Oza	+91 7940270560	Hardik.oza@eptl.in	Support Executive	HO – Ahmedabad
Ankur Bhatt	+91 7940270590	ankur.bhatt@eptl.in	Support Executive	HO – Ahmedabad
Prashant Rajyaguru	+91 7940270545	prashant@eptl.in	Asst. Manager – Implementation & Support	HO – Ahmedabad
Dharam Rathod	+91 7940270596	dharam@eptl.in	Manager – Implementation & Support	HO – Ahmedabad
Pradip Parmar	+91 7940270532	pradip@eptl.in	Sr Mgr – Implementation & Support	HO – Ahmedabad
Devang Patel	+91 7940270576	devang@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad

G2 OTHER IMPORTANT INFORMATION RELATED TO E-PROCUREMENT TENDERS

1. The bidder has to keep track of any changes by viewing the addendum / Corrigendum's issued by the Purchaser on time-to- time basis in the E-Procurement platform. The Company calling for tenders shall not be responsible for any claims/problems arising out of this.
2. The user should complete all the processes and steps required for bid submission. The successful bid submission can be ascertained once acknowledgement is given by the system through bid submission number after completing all the processes and steps. BHEL and M/s e Procurement Technologies limited will not be responsible for incomplete bid submission by users. Users may also note that the incomplete bids will not be saved by the system and are not available for the Purchaser for processing.
3. Before uploading scanned documents if any, the bidders shall sign on all the statements, documents, certificates uploaded by him, owning responsibility for their correctness / authenticity.
4. On the due date of tender opening, only technical bids will be opened. The opened technical bids will be evaluated by us and clarifications required, if any, will be called for from the bidders on technical and commercial points. If no reply is received from the vendor for the clarification raised by BHEL with in the final cut-off date, those vendors offer will be processed with the documents available / submitted against this tender. Offers not meeting the required specification and technical condition will be summarily rejected. The price bids of technically suitable bidders will be opened on a later date with prior intimation to techno-commercially suitable bidders.
5. Ranking L-1, L-2 etc. shall be done for individual item for the techno-commercially acceptable offers on landed cost to BHEL, IVP Goindwal basis and BHEL reserves the right to place order for individual items with different vendors. In the event of more than one vendor becoming L1 for the item, the enquiry quantity will be shared equally among all the L1 vendors.
6. BHEL reserves the right to negotiate with L1 vendor or re-float the tender for items where, **L1** price is not the lowest acceptable price; BHEL reserves the right to increase or decrease the tender quantity.
7. **If supplier is mentioning delivery destination within state/ outside state depending upon his location of factory, Free On Road etc these are assumed as on FOR Goindwal. If supplier is wishing to give delivery on Ex works basis, then he has to clearly mention about it.**

G3 PRICE BASIS

a. Order of enquiry item sl. No. shall be maintained in the quotation.
b. The rates quoted shall be firm and fixed. No price variation is proposed and allowed.
c. Rates quoted should be F.O.R Goindwal basis. If bidder has quoted Ex Works, loading shall be done as per BHEL discretion for tender evaluation.

Variation in GST or any other statutory levies during contractual delivery period shall be to BHEL's account

G4 VALIDITY OF OFFERS:

The offers shall be kept open for acceptance 'for number of days mentioned in special terms and conditions' from the date of opening of the tender. In case of extension of tender opening date, the validity shall be suitably revised.

G5 SCOPE OF SUPPLY

Material shall be supplied as per the applicable latest Technical Delivery Conditions (TDC)/ Material Standard requirements/BPS/Drawing and other requirement as given in the Tender

Enquiry. National & International material Standards shall have to be arranged by vendors themselves.

G6 REPLACEMENT OF REJECTION

If the material is rejected due to defective workmanship during inspection or at the time of actual use, within the guarantee period (i.e. as per clause 13), the rejected material shall be replaced by the supplier. Corresponding quantity shall be treated as unsupplied against respective purchase order till replacement is received at BHEL. If the material is found defective and rejected during use for which payment has already been released the rejected quantity shall be supplied free of cost by the vendor within a month of intimation of the rejection by BHEL.

Lifting of rejected material is under Supplier's scope. BHEL will inform related invoice, qty etc to supplier. Supplier is expected to give the plan to lift and advance intimation when visiting to lift the material. Material should be lifted within one month from date of intimation. After one month BHEL will not be responsible for rejected material. BHEL may decide to send the rejected material on to Pay basis to supplier. Any leniency/ unresponsiveness/delay on part of supplier may lead to appropriate action by BHEL. Any request to postpone in written may be considered but replacement should not be linked with lifting of material.

G7 SUPPLIED MATERIAL ADJUSTMENT

Item/s pending in previous PO has to be billed in previous PO only. Otherwise BHEL will be free to adjust the supplies in previous PO. Any implication of tax will be on supplier's account. For this it is desirable to reconcile the pending PO statement every month/frequently. BHEL will give pending PO statement every month. This can also be viewed at Portal (http://vis.bheltry.co.in/mm/index.jsp).

G8 DELIVERY SCHEDULE

Supplies shall be affected and completed as per schedule mentioned in special terms and conditions. **Further, BHEL may release delivery schedule from time to time based upon our requirement with mutual understanding.** Vendor shall be required to complete the order as per the BHEL schedule requested.

G9 ACCESS TO MANUFACTURING PREMISES:

While Purchase Orders placed on the vendor are under execution, authorized representatives of BHEL shall be allowed free access to the manufacturing facilities for the purpose of inspection or monitoring the progress of purchase orders. This access will also be extended to representatives of BHEL's customers accompanying the authorized representative/s of BHEL (which shall be intimated in advance), if our contractual requirements with our customers call for the same.

G10 TERMS OF PAYMENT:

a. Due payment against supplies received shall be due after 30 days of receipt and acceptance of material and shall be paid within next 15 days' period. In case of any deviation from standard payment term mentioned, BHEL at its discretion may load on the item price at "Base rate of SBI (as applicable on the date of bid opening; Techno-commercial bid opening) + 6% shall be considered for loading for the period of relaxation sought by bidders.
b. Documents to be submitted (if applicable)
    i. Tax invoice (Invoice shall be GST compliant and should contains all the required information such as GST No, HSN code etc.)
    ii. Transporter copy along with material/consignment.
    iii. Material Test Certificates (MTC) and
    iv. Compliance Certificate.
c. GST registration number is to be submitted by qualified vendor as per GST law.
d. It is mandatory to mention proper material codes in the invoices and separate invoices to be raised for different POs.

*e. **BHEL releases payment through EFT mode ONLY. Necessary details may please be submitted by filling required format before release of payment.***

*f. **Conditions relating to release of GST portion:***

Payment of GST portion will be released to vendor only upon completion of statutory requirement and further subject to following:

The reimbursement of GST portion of invoice shall be released only upon: -

1. vendor declaring such invoice in his GSTR-1 and
2. receipt of goods and Tax invoice by BHEL and
3. Confirmation of payment of GST thereon by vendor on GSTN portal.
4. Above is subject to receipt of goods/service and tax invoice thereof along with vendor declaring invoice in his return and paying GST within timeline prescribed for availing ITC by BHEL.

- In case GST credit is delayed/denied to BHEL due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from vendor along with interest levied / leviable on BHEL.

- In case vendor delays declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from vendor/contractor alongwith interest levied / leviable on BHEL.

G11 AVAILING INPUT TAX CREDIT (ITC) BY BHEL:

1. Since ITC can be availed only when BHEL is in possession of GST Tax invoice and after receipt of goods. Thus, vendor to ensure timely dispatch of goods and Tax invoice. It may be noted that in case of any delay in receipt of Tax Invoice and/or receipt of goods, the ITC availment by BHEL will get delayed thus entailing additional cash outflow & may even get denied if ITC availment timelines are breached.

2. Further ITC can be availed only when vendor has declared such invoice in his outward supply Return GSTR-1 and after GST thereon has been paid by him at the time of filing of monthly Return.

3. If GST credit is delayed/denied to BHEL due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from vendor along with interest levied/leviable on BHEL.

4. Further, in case vendor delays declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from vendor/contractor along with interest levied/leviable on BHEL.

G12 LIABILITY UNDER REVERSE CHARGE (RCM)

Any GST liability arising on BHEL under Reverse Charge (RCM) before actual receipt of goods and/ or Invoice thereof would be subject to recovery of Interest leviable for the period between the date of such liability and actual date of eligibility of ITC based on receipt of goods, receipt of Invoices and other conditions specified in GST Law as applicable.

G13 INSPECTION

a. All required tests as called in referred material standard/BHEL/TDC/drawing etc shall be carried out by vendor at no extra cost. **BHEL may decide to inspect itself/arrange third party at vendors' works itself as and when necessary with prior intimation to the vendor.** No additional charges shall be claimed for such inspections.

b. Third party inspection charges will be borne by BHEL. Moreover, all required infrastructure (testing, tools etc) have to be arranged by supplier.

c. **Vendor will give inspection call sufficiently in advance considering the delivery period stipulated in the purchase order.**

d. Material Test Certificates (MTC), Inspection reports and Compliance/Guarantee Certificate are to be provided along with the supplies.

e. Latest applicable revisions of standards/procedures to be referred. International/National standards are to be arranged by vendor.

f. Any inspection carried out before supply by vendor/incoming stage at BHEL notwithstanding, if any defect/non-conformity is noted during processing, the same shall be attended/replaced by vendor at no extra cost.

g. Necessary tooling including thread gauges etc. have to be arranged by vendor. Only in exceptional cases, based on BHEL discretions item/nature, BHEL may consider request to provide gauges if available with BHEL. But in no case this shall be linked with delivery of material.

h. BHEL representative from unit or CQ is authorized to carry out audits along with TPIA at vendor's works before clearing the items for dispatch.

G14 PREFERENCES FOR MSE's

Preferences as mentioned in "Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012" & "Public Procurement Policy for Micro and Small Enterprises (MSEs) Amendment Order, 2018", shall be given to Micro and Small enterprises.

Main points which are mentioned in the above orders are as follows:

- 25% Procurement of the tender value shall be made from MSE (Micro, Small Enterprises) firms.
- 25% of the 25% quantity (i.e. 6.25% of the tender quantity) offered to the MSE's shall be reserved for MSE's owned by SC/STs. Failure to participate by any MSE owned by SC/ST's; this 6.25% quantity shall be procured from other MSEs.
- 3% from within the 25% quantity offered to the MSE's shall be reserved for women owned MSE's. Failure to participate by any MSE owned by women; this 3% quantity shall be procured from other MSEs.
- EMD shall be exempted for MSE's. All these benefits are subject to production of all statutory documents
- In tender, participating Micro and Small Enterprises quoting price within price band of L1+15 per cent shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a Micro and Small Enterprise and such Micro and Small Enterprise shall be allowed to supply up to 25 per cent of total tendered

value. In case of more than one such Micro and Small Enterprise, the supply shall be shared proportionately (to tendered quantity).

"MSE suppliers can avail the intended benefits only if they submit along with the offer UAM (Udyog Aadhaar Memorandum), attested copies of either EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with attested copy of a CA certificate (Format enclosed at Annexure -1 where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents is not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.

G15 GUARANTEE/WARRANTEE

Vendor shall give a guarantee of 18 months from the date of dispatch or 12 months from date of receipt, against manufacturing defects, whichever is earlier. In case of non-acceptance of this term bid will be rejected.

G16 PENALTY FOR LATE DELIVERY

'Time is the essence of the contract'. As such, delivery of goods specified in the Purchase Orders released under the scope of this contract shall be made within the time limit prescribed therein. Penalty for late delivery will be applicable @ 0.5% per week or part thereof subject to a maximum of 10.0 %.

If any vendor does not accept LD **½% of the supply for each week of delay subject to a maximum of 5%,** their offer is likely to be rejected by BHEL and the price bid shall not be opened. Bidders accepting for 10% LD shall not be loaded on account of LD. However, bidders who offer any other % LD [between 5% to 10%] shall be loaded @ % deviation from 10% and their accepted %. e.g. If a bidder accepts for a max of 7% LD only, their offer would be loaded @ 3% (10 – 7 = 3).

BHEL reserves the right to receive or not receive the material after the due date of PO. Applicable GST shall also be recovered from suppliers/contractors on LD amount. For this Debit note will be issued by BHEL indicating the respective supply invoice number.

G17 RISK PURCHASE

BHEL shall be entitled to terminate the contract/pending POs at any stage and to purchase elsewhere at the risk and cost of the vendor, either the whole of the goods or any part thereof which the supplier has failed to deliver or dispatch within the time stipulated as aforesaid. Vendor shall be liable for the losses, which BHEL may sustain by way of such risk purchase.

G18 SUB-CONTRACT

The purchase order or any part thereof shall not be sub-contracted, assigned or otherwise transferred without previously obtaining the BHEL's consent in writing.

G19 FORCE MAJEURE

If at any time during the continuance of the contract, the performance in which or in any part by either party of any obligations under the contract are prevented or delayed by reason of any war, hostilities, acts of public enemy, civil commotion, sabotage, fires, explosions, epidemics, quarantine restrictions, or acts of God (hereinafter referred to "an events" then provided the notice of happening of any such event is given by either party to the other within 21 days of the occurrence thereof, neither party shall by reason of such event be entitled to terminate the contract nor shall either party have any claim for damages against the other in respect of such non-performance and delay in performance and delivery under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist. If the performance in whole or part of any obligation under the contract is prevented or delayed by reason of any such event, claims of extension of time shall be granted for periods considered reasonable by BHEL subject to prior notification by the vendor to BHEL of the particulars of the event and supply to BHEL, if required, of any supporting evidence. Any waiver of time in respect of partial installment shall not be deemed a waiver of time in respect of remaining deliveries.

G20 DISPUTES

In the event of any dispute and/or difference arising between the Vendor and BHEL as to interpretation and/or execution of the contract and/or the respective rights and liabilities of the parties, such disputes and/or differences shall be referred to the sole arbitrator nominated by BHEL. The provisions of the Indian Arbitration Act and the rules there under shall apply to such arbitration. The award passed by the arbitrator shall be final and conclusively binding on all the parties.

G21 JURISDICTION

The court of the place from where the purchase order is issued during the contractual period shall alone have jurisdiction to decide any dispute arising out of or in connection with the purchase order.

G22 CLARIFICATIONS

The correspondence exchanged against the tender from both tenderer and BHEL through email/e-procurement are considered as valid document legally though it is not signed. It is treated as valid confirmations made on behalf of the respective company and very much comes under the legal ambit of the business transaction and hence it is binding on both the parties to the business. Any transaction pertaining to the tender from both the parties of business done round the clock irrespective of the office or business hours of the companies, are valid legally and binding on both the parties. This applies to the extent only in such cases where deadline time for transaction is not specifically declared by either or both the parties to the business.

G23 LOI (Letter of Intent)

BHEL may issue LOI prior to the PO for any reason whatsoever. The LOI in such cases is to be treated as PO for all practical purposes and all the Terms & Conditions of the tender shall be applicable from the date of issue of LOI.

G24 WORDS AND FIGURES

a. If, in the price structure quoted for the required goods/ services/ works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity}, the unit price shall prevail and the total price

corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.

b. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
c. If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject of (a) and (b) above.
d. If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.
e. Bids should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else shall be liable for rejection.
f. All overwriting/cutting, etc will be numbered by bid opening officials and announced during bid opening.

G25 GENERAL

a. BHEL will not be bound by any power of attorney granted by the vendors or by changes in the composition of the firm made subsequent to the execution of the contract. They may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the vendor concerned.
b. BHEL reserves the right to extend the due date of opening, which shall be informed. Validity of offer shall be deemed to be revised accordingly.
c. BHEL reserves the right to accept or reject any part or whole of the tender of a bidder by assigning a valid reason thereof. BHEL reserves the right to cancel the tender without assigning any reason thereof and without any obligation before any commitment.
d. If possible, please submit soft copy of price quotation [copied on a blank CD of standard make] put in the sealed offer.
e. Acceptance of all terms and conditions, in the form of signed copy of T&C or confirmation separately written, shall be submitted along with quotation. If nothing is mentioned, it shall be concluded that terms and conditions are acceptable.
f. BHEL may increase/decrease item/s based on BHEL requirement before price bid opening. Suitable price implication may be asked from suppliers.
g. BHEL may drop item/items from tender at any stage of tender before placing PO. BHEL may also delete PO with consent with supplier within delivery date of PO.
h. After releasing PO, it is assumed that supplier has accepted PO if we do not receive acknowledgement from supplier within 5 days of date of PO.
i. Any term is special tender terms and conditions will supersede the GCC.
j. BHEL reserves the right to negotiate with L1 bidder/s.

G26 BANNED FIRMS

The offers of the bidders who are on the banned list as also the offer of the bidders, who engage in the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com.

G27 DISCLAIMER CLAUSE: (Only for E procurement)

Neither the Organization (Bharat Heavy Electricals Ltd.) nor the service provider (M/s e Procurement Technologies limited) is responsible for any failure of submission of bids due to failure of internet or other connectivity problems or reasons thereof.

G28 FRAUD PREVENTION POLICY

The Bidder along with its associate / collaborators / sub-contractors / sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL management about any fraud or suspected fraud as soon as it comes to their notice.

G29 REVERSE AUCTION

BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.
If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

G30 SUSPENSION OF BUSINESS DEALINGS WITH DEFAULTERS

The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site **www.bhel.com.**

1.0 Integrity commitment, performance of the contract and punitive action thereof:

1.1. Commitment by BHEL:
BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

1.2. Commitment by Bidder/ Supplier/ Contractor:

1.2.1. The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence

punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

1.2.2. The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.
1.2.3. The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extant guidelines of the company available on www. bhel.com and/or under applicable legal provisions

G31 PREFERENCE TO MAKE IN INDIA

For the procurement, Public Procurement (Preference to make in India), order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by respective Nodal Ministry shall be applicable even if issued after issue of this NIT before finalisation of contract/PO/WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable.

Annexure – I

Certificate by Chartered Accountant on letter head

This is to Certify that M/S ....., (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part-11) ..... dtd:....., Category:..... (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year ..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost **excluding land and building and the items specified by the Ministry of Small Scale Industries vide its** notification No.S.0.1722(E) dated October 5, 2006 :
   Rs.....Lacs
2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and **furniture, fittings and other items not direCtly related to the service rendered or as may be notified under the MSMED** Act, 2006:
   Rs.....Lacs

(Strike off whichever is not applicable)

The above investment of Rs.....Lacs is within permissible limit of Rs.....Lacs for .....Micro / Small (Strike off which is not applicable) Category under MSMED Act 2006.

Or

The company has been graduated from its original category {Micro/ Small) (Strike off which is not applicable) and the date of graduation of such enterprise from its original category is ..... (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:
(Signature)

Name-

Membership number-
Seal of Chartered Accountant

Annexure-II : Unprice Bid format for Enquiry No.1920-004 Dated 06.04.2019 Due date of opening 30.04.2019.

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Quoted
1A	412371205000	BOLT-M12x50 -8.8-IS1364P1	600	Set			41237	Yes/No
1B	413200001200	NUT -M12 -CL8-IS1364P3	600				41320	Yes/No
2A	412371206000	BOLT-M12x60.-8.8-IS1364P1	3000	Set			41237	Yes/No
2B	413200001200	NUT -M12 -CL8-IS1364P3	3000				41320	Yes/No
3A	964562600000	BOLT-1/2"x55 -B7-N073	4000	Set	3VN07306881/04	TDC:5:164/07		Yes/No
3B	964562790000	NUT -1/2" -2H-N073	4000		3VN07306876/03	TDC:5:164/07		Yes/No
4A	964562610000	BOLT-5/8"x60 -B7-N033	4000	Set	3VN03306881/04	TDC:5:164/07		Yes/No
4B	964562800000	NUT -5/8" -2H-N025	4000		3VN02506876/03	TDC:5:164/07		Yes/No
5A	964562620000	BOLT-5/8"x70 -B7-N001	5000	Set	3VN00106881/04	TDC:5:164/07		Yes/No
5B	964562800000	NUT -5/8" -2H-N025	5000		3VN02506876/03	TDC:5:164/07		Yes/No
6A	964562310000	BOLT-5/8"x80 -B7-N224	700	Set	3VN22406881/03	TDC:5:164/07		Yes/No
6B	964562800000	NUT -5/8" -2H-N025	700		3VN02506876/03	TDC:5:164/07		Yes/No
7A	412371607000	BOLT-M16x70 -8.8-IS1364P1	500	Set			41237	Yes/No
7B	413200001600	NUT -M16 -CL8-IS1364P3	500				41320	Yes/No
8A	412371608000	BOLT-M16x80 -8.8-IS364P1	300	Set			41237	Yes/No
8B	413200001600	NUT -M16 -CL8-IS1364P3	300				41320	Yes/No
9A	964535270000	BOLT-M16x60 -B7-V105	800	Set	3VV10521152/01	TDC:5:164/07		Yes/No
9B	413190001600	NUT -M16 -2H	800				41319	Yes/No
10A	964523140000	BOLT-M20x55 -B7-0009	1000	Set	3V000920723/03	TDC:5:164/07		Yes/No
10B	413190002000	NUT -M20 -2H	1000				41319	Yes/No
11A	412212008000	BOLT-M20x80 -4.6-IS1363P1	300	Set			41221	Yes/No
11B	413190002000	NUT -M20 -2H	300				41319	Yes/No
12A	964521970000	BOLT-M24x90 -B7-0006	300	Set	3V000620723/03	TDC:5:164/07		Yes/No
12B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	300				41319	Yes/No
13A	964655100000	BOLT - M24x3	100	Set	3V001520723/00	TDC:5:164/07		Yes/No
13B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	100				41319	Yes/No
14A	930596020000	STUD M8X30 -S833	2000	Set	3VS83309338/00	TDC:5:164/07		Yes/No
14B	413190000800	NUT -M 8 -2H	4000				41319	Yes/No
15A	931071830000	STUD M8X80 -N210	300	Set	3VN21009338/00	TDC:5:164/07		Yes/No
15B	413200000800	NUT -M 8 -CL8-IS1364P3	600				41320	Yes/No
16A	930595160000	STUD M10X45-2899	500	Set	3V113403661/01	TDC:5:164/07		Yes/No
16B	413200001000	NUT -M10 -CL8-IS1364P3	1000				41320	Yes/No
17A	930608660000	STUD-1076 M10X55	1500	Set	3V107603661/00	TDC:5:164/07		Yes/No
17B	413200001000	NUT -M10 -CL8-IS1364P3	3000				41320	Yes/No
18A	411011296000	DE STUD-M12x60 -6.6-IS1862-A-TL72-	2600	Set			41101	Yes/No
18B	413040001200	NUT -M12 -CL4-IS1363P3	5200				41304	Yes/No
19A	411171208000	FT STUD-M12x80 -B7	1200	Set			41117	Yes/No
19B	413190001200	NUT -M12 -2H BPS 41319	2400				41319	Yes/No
20A	964562680000	FT STUD-1/2"x80 -B7-N081	5000	Set	3VN08106875/02	TDC:5:164/07		Yes/No
20B	964562790000	NUT -1/2" -2H-N073	10000		3VN07306876/03	TDC:5:164/07		Yes/No
21A	964536650000	FT STUD-1-1/2"x220 -B7-N827	400	Set	3VN82706875/00	TDC:5:164/07		Yes/No
21B	964536680000	NUT -1-1/2" -2H-N827	800		3VN82706876/00	TDC:5:164/07		Yes/No
22A	964653420000	FT STUD-1-1/2"x260 -B7-NE97	150	Set	3VNE9706875/00	TDC:5:164/07		Yes/No
22B	964536680000	NUT -1-1/2" -2H-N827	300		3VN82706876/00	TDC:5:164/07		Yes/No
23A	964562690000	FT STUD-5/8"x86 -B7-N025	9000	Set	3VN02506875/02	TDC:5:164/07		Yes/No
23B	964564840000	NUT -5/8" -GR7-M357	18000		3VM35795178/03	TDC:5:164/07		Yes/No
24A	964562710000	FT STUD-5/8"x105 -B7-N009	30000	Set	3VN00906875/02	TDC:5:164/07		Yes/No
24B	964562800000	NUT -5/8" -2H-N025	60000		3VN02506876/03	TDC:5:164/07		Yes/No
25A	964565250000	FT STUD-5/8"x105 -B16-N228	200	Set	3VN22895180/01	TDC:5:164/07		Yes/No
25B	964564840000	NUT -5/8" -GR7-M357	400		3VM35795178/03	TDC:5:164/07		Yes/No
26A	961620930000	FT STUD-5/8"x110 -B7-5734-PHOS	500	Set	3V573409598/06	TDC:5:164/07		Yes/No
26B	964562800000	NUT -5/8" -2H-N025	1000		3VN02506876/03	TDC:5:164/07		Yes/No
27A	964562720000	FT STUD-5/8"x118 -B7-N017	6000	Set	3VN01706875/02	TDC:5:164/07		Yes/No
27B	964564840000	NUT -5/8" -GR7-M357	12000		3VM35795178/03	TDC:5:164/07		Yes/No
28A	964567490000	DE STUD-5/8"x115 -B7-N435	700	Set	3VN43506884/01	TDC:5:164/07		Yes/No
28B	964562800000	NUT -5/8" -2H-N025	1400		3VN02506876/03	TDC:5:164/07		Yes/No
29A	931017180000	STUD M16X50-S661	1400	Set	3VS66109338/00	TDC:5:164/07		Yes/No
29B	413020001600	THIN NUT-M16 -CL5-IS1364P4	2800				41302	Yes/No
30A	411011605000	DE STUD-M16x50 -6.6-IS1862-A-TL66	500	Set			41101	Yes/No

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Quoted
30B	413200001600	NUT -M16 -CL8-IS1364P3	1000	Set			41320	Yes/No
31A	930595170000	STUD M16X55 -1135	2000	Set	3V113503661/01	TDC:5:164/07		Yes/No
31B	413190001600	NUT -M16 -2H	4000				41319	Yes/No
32A	931019960000	STUD-M16X70 -2961	500	Set	3V296103661/00	TDC:5:164/07		Yes/No
32B	413200001600	NUT -M16 -CL8-IS1364P3	1000				41320	Yes/No
33A	411171609000	FT STUD-M16x90 -B7	3000	Set			41117	Yes/No
33B	413190001600	NUT -M16 -2H	6000				41319	Yes/No
34A	411171612000	FT STUD-M16x120 -B7	15000	Set			41117	Yes/No
34B	413020001600	NUT -M16 -CL8-IS1364P3	30000				41302	Yes/No
35A	411179620500	FT STUD-M16x205 -B7-CAD	200	Set			41117	Yes/No
35B	413020001600	THIN NUT-M16 -CL5-IS1364P4	400				41302	Yes/No
36A	964562740000	FT STUD-3/4"x120 -B7-N041	2000	Set	3VN04106875/02	TDC:5:164/07		Yes/No
36B	964562810000	NUT -3/4" -2H-N057	4000		3VN05706876/03	TDC:5:164/07		Yes/No
37A	964562750000	FT STUD-3/4"x133 -B7-N089	12000	Set	3VN08906875/02	TDC:5:164/07		Yes/No
37B	964562810000	NUT -3/4" -2H-N057	24000		3VN05706876/03	TDC:5:164/07		Yes/No
38A	964565270000	FT STUD-3/4"x133 -B16-N230	500	Set	3VN23095180/01	TDC:5:164/07		Yes/No
38B	964564860000	NUT -3/4" -GR7-M359	1000		3VM35995178/03	TDC:5:164/07		Yes/No
39A	931026230000	STUD M20X65 -P208	800	Set	3VP20803661/00	TDC:5:164/07		Yes/No
39B	413190002000	NUT -M20 -2H	1600				41319	Yes/No
40A	411152008000	DE STUD-M20x80 -B7-TL100	200	Set			41115	Yes/No
40B	413190002000	NUT -M20 -2H	400				41319	Yes/No
41A	411012010000	DE STUD-M20x100 -6.6-IS1862-A-TL120	100	Set			41101	Yes/No
41B	413190002000	NUT -M20 -2H	200				41319	Yes/No
42A	411172012000	FT STUD-M20x120 -B7	5500	Set			41117	Yes/No
42B	413190002000	NUT -M20 -2H	11000				41319	Yes/No
43A	411172013000	FT STUD-M20x130 -B7	2400	Set			41117	Yes/No
43B	413190002000	NUT -M20 -2H	4800				41319	Yes/No
44A	411172013900	FT STUD-M20x130 -B7-CAD	4000	Set			41117	Yes/No
44B	413010092000	NUT -M20 -CL6-IS1364P3-CAD	8000				41301	Yes/No
45A	411172014000	FT STUD-M20x140 -B7	9000	Set			41117	Yes/No
45B	413010002000	NUT -M20 -CL6-IS1364P3	18000				41301	Yes/No
46A	931073250000	STUD M20X140 -N436	200	Set	3VN43606619/01	TDC:5:164/07		Yes/No
46B	413190002000	NUT -M20 -2H	400				41319	Yes/No
47A	411172015000	FT STUD-M20x150 -B7	100	Set			41117	Yes/No
47B	413190002000	NUT -M20 -2H	200				41319	Yes/No
48A	411172009000	FT STUD-M20x90 -B7	100	Set			41117	Yes/No
48B	413020002000	THIN NUT-M20 -CL5-IS1364P4	200				41302	Yes/No
49A	964526850000	FT STUD-M20x197 -B7-0005	100	Set	3V000520729/02	TDC:5:164/07		Yes/No
49B	413190002000	NUT -M20 -2H	200				41319	Yes/No
50A	931097630000	INDICATOR STUD-N846	100	Set	4VN84606800/00	TDC:5:164/07		Yes/No
50B	413190002000	NUT -M20 -2H	200				41319	Yes/No
51A	931029250000	STUD-K247	100	Set	4VK24790375/00	TDC:5:164/07		Yes/No
51B	413190002000	NUT -M20 -2H	200				41319	Yes/No
52A	964564300000	FT STUD-7/8"x125 -B7-N207	400	Set	3VN20706875/02	TDC:5:164/07		Yes/No
52B	964564310000	NUT -7/8" -2H-N206	800		3VN20606876/02	TDC:5:164/07		Yes/No
53A	964564560000	FT STUD-7/8"x150 -B7-N212	3000	Set	3VN21206875/02	TDC:5:164/07		Yes/No
53B	964564310000	NUT -7/8" -2H-N206	6000		3VN20606876/02	TDC:5:164/07		Yes/No
54A	964568820000	FT STUD-7/8"x150 -B16-F522	300	Set	3VF52223248/01	TDC:5:164/07		Yes/No
54B	964568880000	NUT -7/8" -GR7-F522	600		3VF52223249/02	TDC:5:164/07		Yes/No
55A	964653110000	FT STUD-M24x130 -B16-3201	100	Set	3V320121094/00	TDC:5:164/07		Yes/No
55B	413240002400	NUT -M24 -GR7	200				41324	Yes/No
56A	411172414000	FT STUD-M24x140 -B7	2000	Set			41117	Yes/No
56B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	4000				41319	Yes/No
57A	411172415000	FT STUD-M24x150 -B7	3000	Set			41117	Yes/No
57B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	6000				41319	Yes/No
58A	964564270000	FT STUD-1"x135 -B7-1387	3000	Set	3V138706875/02	TDC:5:164/07		Yes/No
58B	964562820000	NUT -1" -2H-N065	6000		3VN06506876/03	TDC:5:164/07		Yes/No
59A	964562760000	FT STUD-1"x158 -B7-N065	3000	Set	3VN06506875/02	TDC:5:164/07		Yes/No
59B	964562820000	NUT -1" -2H-N065	6000		3VN06506876/03	TDC:5:164/07		Yes/No
60A	964562290000	FT STUD-1"x170 -B7-N224	8000	Set	3VN22406875/02	TDC:5:164/07		Yes/No

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Quoted
60B	964562820000	NUT -1" -2H-N065	16000	Set	3VN06506876/03	TDC:5:164/07		Yes/No
61A	964536990000	DE STUD-1"x200 -B7-N827	100	Set	3VN82706884/01	TDC:5:164/07		Yes/No
61B	964562820000	NUT -1" -2H-N065	200		3VN06506876/03	TDC:5:164/07		Yes/No
62A	411172718000	FT STUD-M27x180 -B7	600	Set			41117	Yes/No
62B	413190002700	NUT -M27 -2H	1200				41319	Yes/No
63A	964562780000	FT STUD-1-1/8"x140 -B7-N106	2500	Set	3VN10606875/02	TDC:5:164/07		Yes/No
63B	964562830000	NUT -1-1/8" -2H-N105	3000		3VN10506876/03	TDC:5:164/07		Yes/No
64A	964562770000	FT STUD-1-1/8"x180 -B7-N105	10000	Set	3VN10506875/02	TDC:5:164/07		Yes/No
64B	964562830000	NUT -1-1/8" -2H-N105	20000		3VN10506876/03	TDC:5:164/07		Yes/No
65A	964565730000	FT STUD-1-1/8"x180 -B16-N309	700	Set	3VN30995180/01	TDC:5:164/07		Yes/No
65B	964565800000	NUT -1-1/8" -GR7-N309	1400		3VN30995178/02	TDC:5:164/07		Yes/No
66A	964564360000	FT STUD-1-1/8"x205 -B7-C329	1000	Set	3VC32917140/02	TDC:5:164/07		Yes/No
66B	964562830000	NUT -1-1/8" -2H-N105	2000		3VN10506876/03	TDC:5:164/07		Yes/No
67A	964566810000	FT STUD-1-1/8"x220 -B7-F506	1400	Set	3VF50606875/01	TDC:5:164/07		Yes/No
67B	964562830000	NUT -1-1/8" -2H-N105	2800		3VN10506876/03	TDC:5:164/07		Yes/No
68A	964568860000	FT STUD-1-1/8"x220 -B16-F526	300	Set	3VF52623248/01	TDC:5:164/07		Yes/No
68B	964568920000	NUT -1-1/8" -GR7-F526	600		3VF52623249/02	TDC:5:164/07		Yes/No
69A	964567040000	FT STUD-1-1/4"x150 -B7-N361	1400	Set	3VN36106875/01	TDC:5:164/07		Yes/No
69B	964566830000	NUT -1-1/4" -2H-F505	2800		3VF50506876/01	TDC:5:164/07		Yes/No
70A	964568850000	FT STUD-1-1/4"x215 -B16-F525	200	Set	3VF52523248/01	TDC:5:164/07		Yes/No
70B	964568910000	NUT -1-1/4" -GR7 -F525	400		3VF52523249/02	TDC:5:164/07		Yes/No
71A	964566800000	FT STUD-1-1/4"x215 -B7-F505	1000	Set	3VF50506875/01	TDC:5:164/07		Yes/No
71B	964566830000	NUT -1-1/4" -2H-F505	2000		3VF50506876/01	TDC:5:164/07		Yes/No
72A	964566820000	FT STUD-1-1/4"x250 -B7-F507	400	Set	3VF50706875/02	TDC:5:164/07		Yes/No
72B	964566830000	NUT -1-1/4" -2H-F505	800		3VF50506876/01	TDC:5:164/07		Yes/No
73A	964524410000	FT STUD-M30x3x185 -B7-0001	1300	Set	3V000120729/02	TDC:5:164/07		Yes/No
73B	964606450000	NUT -M30x3 -2H-0008-H30	2600		3V000820717/00	TDC:5:164/07		Yes/No
74A	964659010000	FT STUD-1-5/8"x270 -B7-NK44	100	Set	3VNK4406875/00	TDC:5:164/07		Yes/No
74B	964659040000	NUT -1-5/8" -2H -NK44	200		3VNK4406876/00	TDC:5:164/07		Yes/No
75A	964659050000	FT STUD-2"x 275-B7-NK45	100	Set	3VNK4506875/00	TDC:5:164/07		Yes/No
75B	964659060000	NUT -2" -2H -NK45	200		3VNK4506876/00	TDC:5:164/07		Yes/No
76A	964653100000	FT STUD-M30x3.5x190 -B16-3208	100	Set	3V320821094/00	TDC:5:164/07		Yes/No
76B	413240003000	NUT -M30 -GR7	200				41324	Yes/No
77A	964608300000	FT STUD-M30x3x200 -B7-Z022	1300	Set	3VZ02222667/00	TDC:5:164/07		Yes/No
77B	964606450000	NUT -M30x3 -2H-0008-H30	2600		3V000820717/00	TDC:5:164/07		Yes/No
78A	964654870000	FT STUD-M30x3.5X240-B7	700	Set	3VNH5120729/00	TDC:5:164/07		Yes/No
78B	413190003000	NUT -M30 -2H	1400				41319	Yes/No
79A	964527060000	FT STUD-M30x3x270 -B16-0031	300	Set	3V003120729/02	TDC:5:164/07		Yes/No
79B	964523100000	NUT -M30x3 -GR7-0010-H24	600		3V001020717/01	TDC:5:164/07		Yes/No
80A	964655080000	FT STUD-M33x3.5x220 -B7-0025	400	Set	3V002520729/00	TDC:5:164/07		Yes/No
80B	964652740000	NUT -M33x3.5 -2H-3234-H33	800		3V323420717/00	TDC:5:164/07		Yes/No
81A	964567430000	FT STUD-1-3/8"x190 -B7-N437	200	Set	3VN43706875/01	TDC:5:164/07		Yes/No
81B	964536670000	NUT -1-3/8" -2H -N848	400		3VN84806876/00	TDC:5:164/07		Yes/No
82A	964653120000	FT STUD-M36x3x220 -B7-3204	200	Set	3V320421094/00	TDC:5:164/07		Yes/No
82B	413193003600	NUT -M36x3 -2H	400				41319	Yes/No
83A	964527260000	FT STUD-M36x3x270 -B7-0007	200	Set	3V000720729/02	TDC:5:164/07		Yes/No
83B	413193003600	NUT -M36x3 -2H	400				41319	Yes/No
84A	964653130000	FT STUD-M36x3x220 -B16-3205	100	Set	3V320521094/00	TDC:5:164/07		Yes/No
84B	413243003600	NUT -M36x3 -GR7	200				41324	Yes/No
85A	964653440000	FT STUD-M39x3x240 -B7-0020	200	Set	3V002020729/00	TDC:5:164/07		Yes/No
85B	413193003900	NUT -M39x3 -2H	200				41319	Yes/No
86A	964652610000	FT STUD-M39x3x240 -B16-0045	200	Set	3V004520729/00	TDC:5:164/07		Yes/No
86B	964657640000	HEX.NUT-M39x3 -GR7	200		4V324527272/00	TDC:5:164/07		Yes/No
87A	964653450000	FT STUD-M39x3x280 -B7-0021	100	Set	3V002120729/00	TDC:5:164/07		Yes/No
87B	413193003900	NUT -M39x3 -2H	100				41319	Yes/No
88A	964652620000	FT STUD-M39x3x280 -B16-0046	100	Set	3V004620729/00	TDC:5:164/07		Yes/No
88B	964657640000	HEX.NUT-M39x3 -GR7	100		4V324527272/00	TDC:5:164/07		Yes/No
89A	412350691000	SOC SET SCRU-M 6x10 -45H-IS6094-	2500	Set			41235	Yes/No
89B	413020090600	THIN NUT-M 6 -CL5-IS1364P4-GALV	2500				41302	Yes/No
90A	964656370000	FT STUD-5/8"-11UNC-2A-105-B8M	3500	Set	3V000323248/00	As per standard		Yes/No

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Quoted
90B	964656490000	HEX NUT-5/8"-11UNC-2B-GR.8M	7000	Set	3V000223249/00	As per standard		Yes/No
91A	964656380000	FT STUD-5/8"-11UNC-2A-118-B8M	2000	Set	3V000423248/00	As per standard		Yes/No
91B	964656490000	HEX NUT-5/8"-11UNC-2B-GR.8M	4000		3V000223249/00	As per standard		Yes/No
92A	964656350000	FT STUD-1/2"-13UNC-2A-80-B8M	2000	Set	3V000123248/00	As per standard		Yes/No
92B	964656480000	HEX NUT-1/2"-13UNC-2B-GR.8M	4000		3V000123249/00	As per standard		Yes/No
93A	964656410000	FT STUD-7/8"-9UNC-2A-150-B8M	1000	Set	3V000723248/00	As per standard		Yes/No
93B	964656510000	HEX NUT-7/8"-9UNC-2B-GR.8M	2000		3V000423249/00	As per standard		Yes/No
94A	964656440000	FT STUD-1"-8UNC-2A-170-B8M	2000	Set	3V001023248/00	As per standard		Yes/No
94B	964656520000	HEX NUT-1"-8UNC-2B-GR.8M	4000		3V000523249/00	As per standard		Yes/No
95A	964656360000	FT STUD-5/8"-11UNC-2A-86-B8M	2000	Set	3V000223248/00	As per standard		Yes/No
95B	964656490000	HEX NUT-5/8"-11UNC-2B-GR.8M	4000		3V000223249/00	As per standard		Yes/No
96A	964656420000	FT STUD-1"-8UNC-2A-135-B8M	1400	Set	3V000823248/00	As per standard		Yes/No
96B	964656520000	HEX NUT-1"-8UNC-2B-GR.8M	2800		3V000523249/00	As per standard		Yes/No
97A	964656430000	FT STUD-1"-8UNC-2A-158-B8M	1000	Set	3V000923248/00	As per standard		Yes/No
97B	964656520000	HEX NUT-1"-8UNC-2B-GR.8M	2000		3V000523249/00	As per standard		Yes/No
98A	964656460000	FT STUD-1-1/4"-8UN-2A-215-B8M	300	Set	3V001223248/00	As per standard		Yes/No
98B	964656540000	HEX NUT-1.1/4"-8UN-2B-GR.8M	600		3V000723249/00	As per standard		Yes/No
99A	964656450000	FT STUD-1-1/8"-8UN-2A-180-B8M	800	Set	3V001123248/00	As per standard		Yes/No
99B	964656530000	HEX NUT-1.1/8"-8UN-2B-GR.8M	1600		3V000623249/00	As per standard		Yes/No
100A	964656390000	FT STUD-3/4"-10UNC-2A-120-B8M	2000	Set	3V000523248/00	As per standard		Yes/No
100B	964656500000	HEX NUT-3/4"-10UNC-2B-GR.8M	4000		3V000323249/00	As per standard		Yes/No
101A	964656400000	FT STUD-3/4"-10UNC-2A-133-B8M	1500	Set	3V000623248/00	As per standard		Yes/No
101B	964656500000	HEX NUT-3/4"-10UNC-2B-GR.8M	3000		3V000323249/00	As per standard		Yes/No
102A	964656470000	FT STUD-1-1/4"-8UN-2A-250-B8M	200	Set	3V001323248/00	As per standard		Yes/No
102B	964656540000	HEX NUT-1.1/4"-8UN-2B-GR.8M	400		3V000723249/00	As per standard		Yes/No
103A	964658310000	FT STUD-M20x2.5x130 -B8M	200	Set	3V000325897/00	As per standard		Yes/No
103B	964658390000	NUT -M20 -8M	400		4V000227368/00	As per standard		Yes/No
104A	964658930000	FT STUD-M24x3x150 -B8M	100	Set	3V000725897/00	As per standard		Yes/No
104B	964658960000	NUT -M24x3 - 8M	200		4V000727368/00	As per standard		Yes/No
105A	964658340000	FT STUD M27X3 X180-B8M	500	Set	3V000525897/00	As per standard		Yes/No
105B	964658400000	NUT -M27 -8M	1000		4V000327368/00	As per standard		Yes/No
106A	964658330000	FT STUD-M30x3x185 -B8M	100	Set	3V000625897/00	As per standard		Yes/No
106B	964658410000	NUT -M30 -8M	200		4V000427368/00	As per standard		Yes/No
107A	964658920000	HEX.BOLT-M12 X1.75X60-B8M	200	Set	3V000225708/00	As per standard		Yes/No
107B	964658440000	NUT-M12-8M	400		4V000527368/00	As per standard		Yes/No
108A	964657860000	FT STUD-1/2"x80 -B8MA	200	Set	3V000131170/00	As per standard		Yes/No
108B	964657870000	NUT -1/2" - B8MA	400		3V000131171/00	As per standard		Yes/No
109A	964658150000	FT STUD-5/8"x86 -B8MA	200	Set	3V000231170/00	As per standard		Yes/No
109B	964657980000	NUT -5/8" -B8MA	400		3V000231171/00	As per standard		Yes/No
110A	964657970000	FT STUD-5/8"x105 -B8MA	100	Set	3V000331170/00	As per standard		Yes/No
110B	964657980000	NUT -5/8" - B8MA	200		3V000231171/00	As per standard		Yes/No
111A	964658160000	FT STUD-5/8"x118 -B8MA	50	Set	3V000431170/00	As per standard		Yes/No
111B	964657980000	NUT -5/8" - B8MA	100		3V000231171/00	As per standard		Yes/No
112A	964658170000	FT STUD-3/4"x120 -B8MA	200	Set	3V000531170/00	As per standard		Yes/No
112B	964658260000	NUT -3/4" - B8MA	400		3V000331171/00	As per standard		Yes/No
113A	964658180000	FT STUD-3/4"x133 -B8MA	200	Set	3V000631170/00	As per standard		Yes/No
113B	964658260000	NUT -3/4" - B8MA	400		3V000331171/00	As per standard		Yes/No
114A	964658040000	FT STUD-1"x135 -B8MA	100	Set	3V000931170/00	As per standard		Yes/No
114B	964658020000	NUT -1" - B8MA	200		3V000531171/00	As per standard		Yes/No
115A	964658210000	FT STUD-1"-8UNC-2A-158-B8MA	100	Set	3V001031170/00	As per standard		Yes/No
115B	964658020000	NUT -1" - 8MA	200		3V000531171/00	As per standard		Yes/No
116A	964658010000	FT STUD-1-1/8"x140 -B8MA-NJ95	50	Set	3V001231170/00	As per standard		Yes/No
116B	964658030000	NUT -1-1/8" - B8MA	100		3V000631171/00	As per standard		Yes/No
117A	964658810000	FT STUD-1-1/4"x180 -B8MA	200	Set	3V001631170/00	As per standard		Yes/No
117B	964658280000	NUT -1-1/4" - 8MA	400		3V000731171/00	As per standard		Yes/No
118A	964658870000	DE STUD M20X100X26X50-B8MA-Z11	200	Set	3VZ11622457/00	As per standard		Yes/No
118B	964658290000	NUT -M20 -8MA	200		4V000327341/00	As per standard		Yes/No
119A	G96110160000	STUD M16 X 57 (Var-05)	1000	Set	3-45-320-01264			Yes/No
119B	413010001600	NUT -M16 -CL6-IS1364P3	2000				41301	Yes/No
120A	G96110170000	STUD M16 X 80 (Var-03)	200	Set	3-45-320-01264			Yes/No

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Quoted
120B	413010001600	NUT -M16 -CL6-IS1364P3	400	Set			41301	Yes/No
121A	G96110150000	STUD M16 X 100	200	Set	3-45-320-01264			Yes/No
121B	413010001600	NUT -M16 -CL6-IS1364P3	400				41301	Yes/No
122A	964658550000	FT STUD-5/8"x86 -B7M-M836	200	Set	3V001823248/00	TDC:5:164/07		Yes/No
122B	964658480000	NUT -5/8" -Gr.2HM-M836	400		3V000923249/00	TDC:5:164/07		Yes/No
123A	964658540000	FT STUD-1/2"x80 -B7M-M836	200	Set	3V001723248/00	TDC:5:164/07		Yes/No
123B	964658470000	NUT -1/2" -Gr.2HM-M836	400		3V000823249/00	TDC:5:164/07		Yes/No
124A	412162410000	HEX HD SCRU M24X100-6.8 IS:1364(P-2)	200	Set			41261	Yes/No
124B	413220002400	HEX NUT M24-10 IS:1364(P-3)/LATEST	400				41322	Yes/No
125	964657840000	HEX.BOLT-M12 X1.75X100-B8M	100	No	3V000125708/00			Yes/No
126	412152009000	BOLT-M20x90 -6.8-IS1364P1	500	No			41215	Yes/No
127	964657700000	HEX. BOLT-M16x2x55-0001	100	No	3V000125679/00	TDC:5:164/07		Yes/No
128	964521920000	BOLT-M 8x30 -B7-0001	200	No	3V000120723/03	TDC:5:164/07		Yes/No
129	412370807500	BOLT-M 8x75 -8.8-IS1364-P1	4000	No			41237	Yes/No
130	964521930000	BOLT-M10x16 -B7-0002	300	No	3V000220723/03	TDC:5:164/07		Yes/No
131	964522410000	BOLT-M16x50 -B7-0008	400	No	3V000820723/03	TDC:5:164/07		Yes/No
132	412211605000	BOLT-M16x50 -4.6-IS1363P1	100	No			41221	Yes/No
133	412371605000	BOLT-M16x50 -8.8-IS1364P1	300	No			41237	Yes/No
134	412371606000	BOLT-M16x60 -8.8-IS1364P1	3000	No			41237	Yes/No
135	964524380000	BOLT-M16x70 -B7-0001	1200	No	3V000120728/02	TDC:5:164/07		Yes/No
136	964533300000	BOLT-M16x90 -B7-0010	1500	No	3V001020723/02	TDC:5:164/07		Yes/No
137	964655120000	BOLT - M20X2.5	200	No	3V001620723/00	TDC:5:164/07		Yes/No
138	964535300000	BOLT-M20x55 -B16-V084	100	No	3VV08421152/01	TDC:5:164/07		Yes/No
139	412152006000	BOLT-M20x60 -6.8-IS1364P1	200	No			41215	Yes/No
140	964521960000	BOLT-M20x60 -B7-0005	400	No	3V000520723/03	TDC:5:164/07		Yes/No
141	964529810000	BOLT-M20x70 -B7-0006	1100	No	3V000620728/02	TDC:5:164/07		Yes/No
142	412212408000	BOLT-M24x80 -4.6-IS1363P1	100	No			41221	Yes/No
143	412152408000	BOLT-M24x80 -6.8-IS1364P1	200	No			41215	Yes/No
144	964531720000	BOLT-M24x85 -B7-0009	100	No	3V000920728/03	TDC:5:164/07		Yes/No
145	412152409000	BOLT-M24x90 -6.8-IS1364P1	150	No			41215	Yes/No
146	964528590000	BOLT-M30x3.5x80 -B7-0005	200	No	3V000520728/02	TDC:5:164/07		Yes/No
147	964521980000	BOLT-M30x3.5x110 -B7-0007	100	No	3V000720723/03	TDC:5:164/07		Yes/No
148	412350692500	SOC SET SCRU-M 6x25 -45H-IS6094-	2500	No			41235	Yes/No
149	412350692000	SOC SET SCRU-M 6x20 -45H-IS6094-	1300	No			41235	Yes/No
150	412100600800	SLT GRUB SCRU-M 6x8 -22H-IS2388-C	5000	No			41210	Yes/No
151	412100601200	SLT GRUB SCRU-M 6x12 -22H-IS2388-C	1000	No			41210	Yes/No
152	412100601600	SLT GRUB SCRU-M 6x16 -22H-IS2388-C	2000	No			41210	Yes/No
153	412100801000	SLT GRUB SCRU-M 8x10 -22H-IS2388-C	2000	No			41210	Yes/No
154	413200000400	NUT -M 4 -CL8-IS1364P3	5000	No			41320	Yes/No
155	413200000800	NUT -M 8 -CL8-IS1364P3	500	No			41320	Yes/No
156	413190001000	NUT -M10 -2H	2000	No			41319	Yes/No
157	964657900000	NUT -M10 - B8MA	100	No	4V000127341/00	0		Yes/No
158	413040001200	NUT -M12 -CL4-IS1363P3	1000	No			41304	Yes/No
159	413200091600	NUT -M16 -CL8-IS1364P3-GALV	3000	No			41320	Yes/No
160	413240001600	NUT -M16 -GR7	500	No			41324	Yes/No
161	413190001600	NUT -M16 -2H	20000	No			41319	Yes/No
162	413040001600	NUT -M16 -CL4-IS1363P3	2000	No			41304	Yes/No
163	964536670000	NUT -1-3/8" -2H -N848	300	No	3VN84806876/00	TDC:5:164/07		Yes/No
164	964568890000	NUT -3/4" -GR7-F523	400	No	3VF52323249/02	TDC:5:164/07		Yes/No
165	413243003600	NUT -M36x3 -GR7	100	No			41324	Yes/No
166	413200002000	HEX NUT M20X2.5 P.CL 8GR B IS1	100	No			41320	Yes/No
167	931148320000	DISC NUT-L705	100	No	3VL70522026/01	TDC:5:164/07		Yes/No
168	931140380000	DISC NUT-L803	60	No	3VL80322026/01	TDC:5:164/07		Yes/No
169	931191430000	INDICATOR STUD-W084	100	No	4VW08406800/00	TDC:5:164/07		Yes/No
170	417508001200	SELF LOCK NUT-M12 -SPR-GALV	1500	No			41750	Yes/No
171	417508001600	SELF LOCK NUT-M16 -SPR-GALV	1500	No			41750	Yes/No
172	417508002000	SELF LOCK NUT-M20 -SPR-GALV	1500	No			41750	Yes/No
173	413020090600	THIN NUT-M 6 -CL5-IS1364P4-GALV	2500	No			41302	Yes/No
174	413020000800	THIN NUT-M 8 -CL5-IS1364P4	1800	No			41302	Yes/No

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Quoted
175	413020001600	THIN NUT-M16 -CL5-IS1364P4	4000	No			41302	Yes/No
176	413182003600	THIN NUT-M36x2 -CL5	3000	No			41318	Yes/No
177	964658460000	THIN NUT-M36x2 - 2HM	100	No	4V000127401/00			Yes/No
178	413182004200	THIN NUT-M42x2 -22H	400	No			41318	Yes/No
179	413182005200	THIN NUT-M52x2 -22H	900	No			41318	Yes/No
180	413182006000	THIN NUT-M60x2 -22H	900	No			41318	Yes/No
181	964657950000	THIN NUT-M60x2 - B8MA	50	No	4V000227342/00	0		Yes/No
182	964657890000	THIN NUT-M42x2 - B8MA	50	No	4V000127342/00	0		Yes/No
183	931006770000	PLUG-5144	500	No	3V514406413/02	TDC:5:164/07		Yes/No
184	931007480000	PLUG-5152	500	No	3V515206413/03	TDC:5:164/07		Yes/No
185	931177660000	PLUG-Z021	500	No	3VZ02122675/01	TDC:5:164/07		Yes/No
186	931065960000	PLUG-5198	500	No	3V519806958/00	TDC:5:164/07		Yes/No
187	931006780000	PLUG-5150	800	No	3V515006413/02	TDC:5:164/07		Yes/No
188	931665020000	PLUG-M305	1500	No	4VM30506587/00	TDC:5:164/07		Yes/No
189	931068450000	PLUG-5196	400	No	3V519606413/02	TDC:5:164/07		Yes/No
190	931068440000	PLUG-5199	400	No	3V519906413/01	TDC:5:164/07		Yes/No
191	931103950000	SCREW PLUG - 1/2-F604	400	No	4VF60426385/01	TDC:5:164/07		Yes/No
		Total Indent value						

GST rate	Whether GST is applicable? (kindly tick)	Applicable / Not applicable
	If GST is applicable, kindly tick whether it is Extra / Inclusive	Extra / Inclusive
	% age rate of GST (if applicable)	*Please mention clearly>>*

Delivery destination (FOR Goindwal Sahib basis)	*Please accept>>*
Validity of offers (As per BHEL terms 90 days validity from date of tender opening is required)	*Please accept>>*

The above prices are Firm, without any price esclation; are Rs. per unit Basis; and are on FOR Goindwal Sahib basis.

We accept all terms and conditions of the Tender Enquiry No. 1718-135 Dated 28.03.2018 .

For Items (e.g. nuts) which are appearing more than once, the minimum of rates will be considered, so please quote only single rate for those items. The bidder only will be liable if quotes differenet rates for same item appearing more than once.

Annexure-III : Price Bid format for Enquiry No.1920-004 Dated 06.04.2019 Due date of opening 30.04.2019.

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Unit Basic Price in Rs.
1A	412371205000	BOLT-M12x50 -8.8-IS1364P1	600	Set			41237	"To be filled by vendor"
1B	413200001200	NUT -M12 -CL8-IS1364P3	600				41320	"To be filled by vendor"
2A	412371206000	BOLT-M12x60.-8.8-IS1364P1	3000	Set			41237	"To be filled by vendor"
2B	413200001200	NUT -M12 -CL8-IS1364P3	3000				41320	"To be filled by vendor"
3A	964562600000	BOLT-1/2"x55 -B7-N073	4000	Set	3VN07306881/04	TDC:5:164/07		"To be filled by vendor"
3B	964562790000	NUT -1/2" -2H-N073	4000		3VN07306876/03	TDC:5:164/07		"To be filled by vendor"
4A	964562610000	BOLT-5/8"x60 -B7-N033	4000	Set	3VN03306881/04	TDC:5:164/07		"To be filled by vendor"
4B	964562800000	NUT -5/8" -2H-N025	4000		3VN02506876/03	TDC:5:164/07		"To be filled by vendor"
5A	964562620000	BOLT-5/8"x70 -B7-N001	5000	Set	3VN00106881/04	TDC:5:164/07		"To be filled by vendor"
5B	964562800000	NUT -5/8" -2H-N025	5000		3VN02506876/03	TDC:5:164/07		"To be filled by vendor"
6A	964562310000	BOLT-5/8"x80 -B7-N224	700	Set	3VN22406881/03	TDC:5:164/07		"To be filled by vendor"
6B	964562800000	NUT -5/8" -2H-N025	700		3VN02506876/03	TDC:5:164/07		"To be filled by vendor"
7A	412371607000	BOLT-M16x70 -8.8-IS1364P1	500	Set			41237	"To be filled by vendor"
7B	413200001600	NUT -M16 -CL8-IS1364P3	500				41320	"To be filled by vendor"
8A	412371608000	BOLT-M16x80 -8.8-IS364P1	300	Set			41237	"To be filled by vendor"
8B	413200001600	NUT -M16 -CL8-IS1364P3	300				41320	"To be filled by vendor"
9A	964535270000	BOLT-M16x60 -B7-V105	800	Set	3VV10521152/01	TDC:5:164/07		"To be filled by vendor"
9B	413190001600	NUT -M16 -2H	800				41319	"To be filled by vendor"
10A	964523140000	BOLT-M20x55 -B7-0009	1000	Set	3V000920723/03	TDC:5:164/07		"To be filled by vendor"
10B	413190002000	NUT -M20 -2H	1000				41319	"To be filled by vendor"
11A	412212008000	BOLT-M20x80 -4.6-IS1363P1	300	Set			41221	"To be filled by vendor"
11B	413190002000	NUT -M20 -2H	300				41319	"To be filled by vendor"
12A	964521970000	BOLT-M24x90 -B7-0006	300	Set	3V000620723/03	TDC:5:164/07		"To be filled by vendor"
12B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	300				41319	"To be filled by vendor"
13A	964655100000	BOLT - M24x3	100	Set	3V001520723/00	TDC:5:164/07		"To be filled by vendor"
13B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	100				41319	"To be filled by vendor"
14A	930596020000	STUD M8X30 -S833	2000	Set	3VS83309338/00	TDC:5:164/07		"To be filled by vendor"
14B	413190000800	NUT -M 8 -2H	4000				41319	"To be filled by vendor"
15A	931071830000	STUD M8X80 -N210	300	Set	3VN21009338/00	TDC:5:164/07		"To be filled by vendor"
15B	413200000800	NUT -M 8 -CL8-IS1364P3	600				41320	"To be filled by vendor"
16A	930595160000	STUD M10X45-2899	500	Set	3V113403661/01	TDC:5:164/07		"To be filled by vendor"
16B	413200001000	NUT -M10 -CL8-IS1364P3	1000				41320	"To be filled by vendor"
17A	930608660000	STUD-1076 M10X55	1500	Set	3V107603661/00	TDC:5:164/07		"To be filled by vendor"
17B	413200001000	NUT -M10 -CL8-IS1364P3	3000				41320	"To be filled by vendor"
18A	411011296000	DE STUD-M12x60 -6.6-IS1862-A-TL72-	2600	Set			41101	"To be filled by vendor"
18B	413040001200	NUT -M12 -CL4-IS1363P3	5200				41304	"To be filled by vendor"
19A	411171208000	FT STUD-M12x80 -B7	1200	Set			41117	"To be filled by vendor"
19B	413190001200	NUT -M12 -2H BPS 41319	2400				41319	"To be filled by vendor"
20A	964562680000	FT STUD-1/2"x80 -B7-N081	5000	Set	3VN08106875/02	TDC:5:164/07		"To be filled by vendor"
20B	964562790000	NUT -1/2" -2H-N073	10000		3VN07306876/03	TDC:5:164/07		"To be filled by vendor"
21A	964536650000	FT STUD-1-1/2"x220 -B7-N827	400	Set	3VN82706875/00	TDC:5:164/07		"To be filled by vendor"
21B	964536680000	NUT -1-1/2" -2H-N827	800		3VN82706876/00	TDC:5:164/07		"To be filled by vendor"
22A	964653420000	FT STUD-1-1/2"x260 -B7-NE97	150	Set	3VNE9706875/00	TDC:5:164/07		"To be filled by vendor"
22B	964536680000	NUT -1-1/2" -2H-N827	300		3VN82706876/00	TDC:5:164/07		"To be filled by vendor"
23A	964562690000	FT STUD-5/8"x86 -B7-N025	9000	Set	3VN02506875/02	TDC:5:164/07		"To be filled by vendor"
23B	964564840000	NUT -5/8" -GR7-M357	18000		3VM35795178/03	TDC:5:164/07		"To be filled by vendor"
24A	964562710000	FT STUD-5/8"x105 -B7-N009	30000	Set	3VN00906875/02	TDC:5:164/07		"To be filled by vendor"
24B	964562800000	NUT -5/8" -2H-N025	60000		3VN02506876/03	TDC:5:164/07		"To be filled by vendor"
25A	964565250000	FT STUD-5/8"x105 -B16-N228	200	Set	3VN22895180/01	TDC:5:164/07		"To be filled by vendor"
25B	964564840000	NUT -5/8" -GR7-M357	400		3VM35795178/03	TDC:5:164/07		"To be filled by vendor"
26A	961620930000	FT STUD-5/8"x110 -B7-5734-PHOS	500	Set	3V573409598/06	TDC:5:164/07		"To be filled by vendor"
26B	964562800000	NUT -5/8" -2H-N025	1000		3VN02506876/03	TDC:5:164/07		"To be filled by vendor"
27A	964562720000	FT STUD-5/8"x118 -B7-N017	6000	Set	3VN01706875/02	TDC:5:164/07		"To be filled by vendor"
27B	964564840000	NUT -5/8" -GR7-M357	12000		3VM35795178/03	TDC:5:164/07		"To be filled by vendor"
28A	964567490000	DE STUD-5/8"x115 -B7-N435	700	Set	3VN43506884/01	TDC:5:164/07		"To be filled by vendor"
28B	964562800000	NUT -5/8" -2H-N025	1400		3VN02506876/03	TDC:5:164/07		"To be filled by vendor"
29A	931017180000	STUD M16X50-S661	1400	Set	3VS66109338/00	TDC:5:164/07		"To be filled by vendor"
29B	413020001600	THIN NUT-M16 -CL5-IS1364P4	2800				41302	"To be filled by vendor"
30A	411011605000	DE STUD-M16x50 -6.6-IS1862-A-TL66	500	Set			41101	"To be filled by vendor"
30B	413200001600	NUT -M16 -CL8-IS1364P3	1000				41320	"To be filled by vendor"
31A	930595170000	STUD M16X55 -1135	2000	Set	3V113503661/01	TDC:5:164/07		"To be filled by vendor"

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Unit Basic Price in Rs.
31B	413190001600	NUT -M16 -2H	4000	Set			41319	"To be filled by vendor"
32A	931019960000	STUD-M16X70 -2961	500	Set	3V296103661/00	TDC:5:164/07		"To be filled by vendor"
32B	413200001600	NUT -M16 -CL8-IS1364P3	1000				41320	"To be filled by vendor"
33A	411171609000	FT STUD-M16x90 -B7	3000	Set			41117	"To be filled by vendor"
33B	413190001600	NUT -M16 -2H	6000				41319	"To be filled by vendor"
34A	411171612000	FT STUD-M16x120 -B7	15000	Set			41117	"To be filled by vendor"
34B	413020001600	NUT -M16 -CL8-IS1364P3	30000				41302	"To be filled by vendor"
35A	411179620500	FT STUD-M16x205 -B7-CAD	200	Set			41117	"To be filled by vendor"
35B	413020001600	THIN NUT-M16 -CL5-IS1364P4	400				41302	"To be filled by vendor"
36A	964562740000	FT STUD-3/4"x120 -B7-N041	2000	Set	3VN04106875/02	TDC:5:164/07		"To be filled by vendor"
36B	964562810000	NUT -3/4" -2H-N057	4000		3VN05706876/03	TDC:5:164/07		"To be filled by vendor"
37A	964562750000	FT STUD-3/4"x133 -B7-N089	12000	Set	3VN08906875/02	TDC:5:164/07		"To be filled by vendor"
37B	964562810000	NUT -3/4" -2H-N057	24000		3VN05706876/03	TDC:5:164/07		"To be filled by vendor"
38A	964565270000	FT STUD-3/4"x133 -B16-N230	500	Set	3VN23095180/01	TDC:5:164/07		"To be filled by vendor"
38B	964564860000	NUT -3/4" -GR7-M359	1000		3VM35995178/03	TDC:5:164/07		"To be filled by vendor"
39A	931026230000	STUD M20X65 -P208	800	Set	3VP20803661/00	TDC:5:164/07		"To be filled by vendor"
39B	413190002000	NUT -M20 -2H	1600				41319	"To be filled by vendor"
40A	411152008000	DE STUD-M20x80 -B7-TL100	200	Set			41115	"To be filled by vendor"
40B	413190002000	NUT -M20 -2H	400				41319	"To be filled by vendor"
41A	411012010000	DE STUD-M20x100 -6.6-IS1862-A-TL120	100	Set			41101	"To be filled by vendor"
41B	413190002000	NUT -M20 -2H	200				41319	"To be filled by vendor"
42A	411172012000	FT STUD-M20x120 -B7	5500	Set			41117	"To be filled by vendor"
42B	413190002000	NUT -M20 -2H	11000				41319	"To be filled by vendor"
43A	411172013000	FT STUD-M20x130 -B7	2400	Set			41117	"To be filled by vendor"
43B	413190002000	NUT -M20 -2H	4800				41319	"To be filled by vendor"
44A	411172013900	FT STUD-M20x130 -B7-CAD	4000	Set			41117	"To be filled by vendor"
44B	413010092000	NUT -M20 -CL6-IS1364P3-CAD	8000				41301	"To be filled by vendor"
45A	411172014000	FT STUD-M20x140 -B7	9000	Set			41117	"To be filled by vendor"
45B	413010002000	NUT -M20 -CL6-IS1364P3	18000				41301	"To be filled by vendor"
46A	931073250000	STUD M20X140 -N436	200	Set	3VN43606619/01	TDC:5:164/07		"To be filled by vendor"
46B	413190002000	NUT -M20 -2H	400				41319	"To be filled by vendor"
47A	411172015000	FT STUD-M20x150 -B7	100	Set			41117	"To be filled by vendor"
47B	413190002000	NUT -M20 -2H	200				41319	"To be filled by vendor"
48A	411172009000	FT STUD-M20x90 -B7	100	Set			41117	"To be filled by vendor"
48B	413020002000	THIN NUT-M20 -CL5-IS1364P4	200				41302	"To be filled by vendor"
49A	964526850000	FT STUD-M20x197 -B7-0005	100	Set	3V000520729/02	TDC:5:164/07		"To be filled by vendor"
49B	413190002000	NUT -M20 -2H	200				41319	"To be filled by vendor"
50A	931097630000	INDICATOR STUD-N846	100	Set	4VN84606800/00	TDC:5:164/07		"To be filled by vendor"
50B	413190002000	NUT -M20 -2H	200				41319	"To be filled by vendor"
51A	931029250000	STUD-K247	100	Set	4VK24790375/00	TDC:5:164/07		"To be filled by vendor"
51B	413190002000	NUT -M20 -2H	200				41319	"To be filled by vendor"
52A	964564300000	FT STUD-7/8"x125 -B7-N207	400	Set	3VN20706875/02	TDC:5:164/07		"To be filled by vendor"
52B	964564310000	NUT -7/8" -2H-N206	800		3VN20606876/02	TDC:5:164/07		"To be filled by vendor"
53A	964564560000	FT STUD-7/8"x150 -B7-N212	3000	Set	3VN21206875/02	TDC:5:164/07		"To be filled by vendor"
53B	964564310000	NUT -7/8" -2H-N206	6000		3VN20606876/02	TDC:5:164/07		"To be filled by vendor"
54A	964568820000	FT STUD-7/8"x150 -B16-F522	300	Set	3VF52223248/01	TDC:5:164/07		"To be filled by vendor"
54B	964568880000	NUT -7/8" -GR7-F522	600		3VF52223249/02	TDC:5:164/07		"To be filled by vendor"
55A	964653110000	FT STUD-M24x130 -B16-3201	100	Set	3V320121094/00	TDC:5:164/07		"To be filled by vendor"
55B	413240002400	NUT -M24 -GR7	200				41324	"To be filled by vendor"
56A	411172414000	FT STUD-M24x140 -B7	2000	Set			41117	"To be filled by vendor"
56B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	4000				41319	"To be filled by vendor"
57A	411172415000	FT STUD-M24x150 -B7	3000	Set			41117	"To be filled by vendor"
57B	413190002400	Hex Nut Gr B M24 T425 BPS 41319	6000				41319	"To be filled by vendor"
58A	964564270000	FT STUD-1"x135 -B7-1387	3000	Set	3V138706875/02	TDC:5:164/07		"To be filled by vendor"
58B	964562820000	NUT -1" -2H-N065	6000		3VN06506876/03	TDC:5:164/07		"To be filled by vendor"
59A	964562760000	FT STUD-1"x158 -B7-N065	3000	Set	3VN06506875/02	TDC:5:164/07		"To be filled by vendor"
59B	964562820000	NUT -1" -2H-N065	6000		3VN06506876/03	TDC:5:164/07		"To be filled by vendor"
60A	964562290000	FT STUD-1"x170 -B7-N224	8000	Set	3VN22406875/02	TDC:5:164/07		"To be filled by vendor"
60B	964562820000	NUT -1" -2H-N065	16000		3VN06506876/03	TDC:5:164/07		"To be filled by vendor"
61A	964536990000	DE STUD-1"x200 -B7-N827	100	Set	3VN82706884/01	TDC:5:164/07		"To be filled by vendor"
61B	964562820000	NUT -1" -2H-N065	200		3VN06506876/03	TDC:5:164/07		"To be filled by vendor"
62A	411172718000	FT STUD-M27x180 -B7	600	Set			41117	"To be filled by vendor"

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Unit Basic Price in Rs.
62B	413190002700	NUT -M27 -2H	1200	Set			41319	"To be filled by vendor"
63A	964562780000	FT STUD-1-1/8"x140 -B7-N106	2500	Set	3VN10606875/02	TDC:5:164/07		"To be filled by vendor"
63B	964562830000	NUT -1-1/8" -2H-N105	3000		3VN10506876/03	TDC:5:164/07		"To be filled by vendor"
64A	964562770000	FT STUD-1-1/8"x180 -B7-N105	10000	Set	3VN10506875/02	TDC:5:164/07		"To be filled by vendor"
64B	964562830000	NUT -1-1/8" -2H-N105	20000		3VN10506876/03	TDC:5:164/07		"To be filled by vendor"
65A	964565730000	FT STUD-1-1/8"x180 -B16-N309	700	Set	3VN30995180/01	TDC:5:164/07		"To be filled by vendor"
65B	964565800000	NUT -1-1/8" -GR7-N309	1400		3VN30995178/02	TDC:5:164/07		"To be filled by vendor"
66A	964564360000	FT STUD-1-1/8"x205 -B7-C329	1000	Set	3VC32917140/02	TDC:5:164/07		"To be filled by vendor"
66B	964562830000	NUT -1-1/8" -2H-N105	2000		3VN10506876/03	TDC:5:164/07		"To be filled by vendor"
67A	964566810000	FT STUD-1-1/8"x220 -B7-F506	1400	Set	3VF50606875/01	TDC:5:164/07		"To be filled by vendor"
67B	964562830000	NUT -1-1/8" -2H-N105	2800		3VN10506876/03	TDC:5:164/07		"To be filled by vendor"
68A	964568860000	FT STUD-1-1/8"x220 -B16-F526	300	Set	3VF52623248/01	TDC:5:164/07		"To be filled by vendor"
68B	964568920000	NUT -1-1/8" -GR7-F526	600		3VF52623249/02	TDC:5:164/07		"To be filled by vendor"
69A	964567040000	FT STUD-1-1/4"x150 -B7-N361	1400	Set	3VN36106875/01	TDC:5:164/07		"To be filled by vendor"
69B	964566830000	NUT -1-1/4" -2H-F505	2800		3VF50506876/01	TDC:5:164/07		"To be filled by vendor"
70A	964568850000	FT STUD-1-1/4"x215 -B16-F525	200	Set	3VF52523248/01	TDC:5:164/07		"To be filled by vendor"
70B	964568910000	NUT -1-1/4" -GR7 -F525	400		3VF52523249/02	TDC:5:164/07		"To be filled by vendor"
71A	964566800000	FT STUD-1-1/4"x215 -B7-F505	1000	Set	3VF50506875/01	TDC:5:164/07		"To be filled by vendor"
71B	964566830000	NUT -1-1/4" -2H-F505	2000		3VF50506876/01	TDC:5:164/07		"To be filled by vendor"
72A	964566820000	FT STUD-1-1/4"x250 -B7-F507	400	Set	3VF50706875/02	TDC:5:164/07		"To be filled by vendor"
72B	964566830000	NUT -1-1/4" -2H-F505	800		3VF50506876/01	TDC:5:164/07		"To be filled by vendor"
73A	964524410000	FT STUD-M30x3x185 -B7-0001	1300	Set	3V000120729/02	TDC:5:164/07		"To be filled by vendor"
73B	964606450000	NUT -M30x3 -2H-0008-H30	2600		3V000820717/00	TDC:5:164/07		"To be filled by vendor"
74A	964659010000	FT STUD-1-5/8"x270 -B7-NK44	100	Set	3VNK4406875/00	TDC:5:164/07		"To be filled by vendor"
74B	964659040000	NUT -1-5/8" -2H -NK44	200		3VNK4406876/00	TDC:5:164/07		"To be filled by vendor"
75A	964659050000	FT STUD-2"x 275-B7-NK45	100	Set	3VNK4506875/00	TDC:5:164/07		"To be filled by vendor"
75B	964659060000	NUT -2" -2H -NK45	200		3VNK4506876/00	TDC:5:164/07		"To be filled by vendor"
76A	964653100000	FT STUD-M30x3.5x190 -B16-3208	100	Set	3V320821094/00	TDC:5:164/07		"To be filled by vendor"
76B	413240003000	NUT -M30 -GR7	200				41324	"To be filled by vendor"
77A	964608300000	FT STUD-M30x3x200 -B7-Z022	1300	Set	3VZ02222667/00	TDC:5:164/07		"To be filled by vendor"
77B	964606450000	NUT -M30x3 -2H-0008-H30	2600		3V000820717/00	TDC:5:164/07		"To be filled by vendor"
78A	964654870000	FT STUD-M30x3.5X240-B7	700	Set	3VNH5120729/00	TDC:5:164/07		"To be filled by vendor"
78B	413190003000	NUT -M30 -2H	1400				41319	"To be filled by vendor"
79A	964527060000	FT STUD-M30x3x270 -B16-0031	300	Set	3V003120729/02	TDC:5:164/07		"To be filled by vendor"
79B	964523100000	NUT -M30x3 -GR7-0010-H24	600		3V001020717/01	TDC:5:164/07		"To be filled by vendor"
80A	964655080000	FT STUD-M33x3.5x220 -B7-0025	400	Set	3V002520729/00	TDC:5:164/07		"To be filled by vendor"
80B	964652740000	NUT -M33x3.5 -2H-3234-H33	800		3V323420717/00	TDC:5:164/07		"To be filled by vendor"
81A	964567430000	FT STUD-1-3/8"x190 -B7-N437	200	Set	3VN43706875/01	TDC:5:164/07		"To be filled by vendor"
81B	964536670000	NUT -1-3/8" -2H -N848	400		3VN84806876/00	TDC:5:164/07		"To be filled by vendor"
82A	964653120000	FT STUD-M36x3x220 -B7-3204	200	Set	3V320421094/00	TDC:5:164/07		"To be filled by vendor"
82B	413193003600	NUT -M36x3 -2H	400				41319	"To be filled by vendor"
83A	964527260000	FT STUD-M36x3x270 -B7-0007	200	Set	3V000720729/02	TDC:5:164/07		"To be filled by vendor"
83B	413193003600	NUT -M36x3 -2H	400				41319	"To be filled by vendor"
84A	964653130000	FT STUD-M36x3x220 -B16-3205	100	Set	3V320521094/00	TDC:5:164/07		"To be filled by vendor"
84B	413243003600	NUT -M36x3 -GR7	200				41324	"To be filled by vendor"
85A	964653440000	FT STUD-M39x3x240 -B7-0020	200	Set	3V002020729/00	TDC:5:164/07		"To be filled by vendor"
85B	413193003900	NUT -M39x3 -2H	200				41319	"To be filled by vendor"
86A	964652610000	FT STUD-M39x3x240 -B16-0045	200	Set	3V004520729/00	TDC:5:164/07		"To be filled by vendor"
86B	964657640000	HEX.NUT-M39x3 -GR7	200		4V324527272/00	TDC:5:164/07		"To be filled by vendor"
87A	964653450000	FT STUD-M39x3x280 -B7-0021	100	Set	3V002120729/00	TDC:5:164/07		"To be filled by vendor"
87B	413193003900	NUT -M39x3 -2H	100				41319	"To be filled by vendor"
88A	964652620000	FT STUD-M39x3x280 -B16-0046	100	Set	3V004620729/00	TDC:5:164/07		"To be filled by vendor"
88B	964657640000	HEX.NUT-M39x3 -GR7	100		4V324527272/00	TDC:5:164/07		"To be filled by vendor"
89A	412350691000	SOC SET SCRU-M 6x10 -45H-IS6094-	2500	Set			41235	"To be filled by vendor"
89B	413020090600	THIN NUT-M 6 -CL5-IS1364P4-GALV	2500				41302	"To be filled by vendor"
90A	964656370000	FT STUD-5/8"-11UNC-2A-105-B8M	3500	Set	3V000323248/00	As per standard		"To be filled by vendor"
90B	964656490000	HEX NUT-5/8"-11UNC-2B-GR.8M	7000		3V000223249/00	As per standard		"To be filled by vendor"
91A	964656380000	FT STUD-5/8"-11UNC-2A-118-B8M	2000	Set	3V000423248/00	As per standard		"To be filled by vendor"
91B	964656490000	HEX NUT-5/8"-11UNC-2B-GR.8M	4000		3V000223249/00	As per standard		"To be filled by vendor"
92A	964656350000	FT STUD-1/2"-13UNC-2A-80-B8M	2000	Set	3V000123248/00	As per standard		"To be filled by vendor"
92B	964656480000	HEX NUT-1/2"-13UNC-2B-GR.8M	4000		3V000123249/00	As per standard		"To be filled by vendor"
93A	964656410000	FT STUD-7/8"-9UNC-2A-150-B8M	1000	Set	3V000723248/00	As per standard		"To be filled by vendor"

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Unit Basic Price in Rs.
93B	964656510000	HEX NUT-7/8"-9UNC-2B-GR.8M	2000	Set	3V000423249/00	As per standard		"To be filled by vendor"
94A	964656440000	FT STUD-1"-8UNC-2A-170-B8M	2000	Set	3V001023248/00	As per standard		"To be filled by vendor"
94B	964656520000	HEX NUT-1"-8UNC-2B-GR.8M	4000		3V000523249/00	As per standard		"To be filled by vendor"
95A	964656360000	FT STUD-5/8"-11UNC-2A-86-B8M	2000	Set	3V000223248/00	As per standard		"To be filled by vendor"
95B	964656490000	HEX NUT-5/8"-11UNC-2B-GR.8M	4000		3V000223249/00	As per standard		"To be filled by vendor"
96A	964656420000	FT STUD-1"-8UNC-2A-135-B8M	1400	Set	3V000823248/00	As per standard		"To be filled by vendor"
96B	964656520000	HEX NUT-1"-8UNC-2B-GR.8M	2800		3V000523249/00	As per standard		"To be filled by vendor"
97A	964656430000	FT STUD-1"-8UNC-2A-158-B8M	1000	Set	3V000923248/00	As per standard		"To be filled by vendor"
97B	964656520000	HEX NUT-1"-8UNC-2B-GR.8M	2000		3V000523249/00	As per standard		"To be filled by vendor"
98A	964656460000	FT STUD-1-1/4"-8UN-2A-215-B8M	300	Set	3V001223248/00	As per standard		"To be filled by vendor"
98B	964656540000	HEX NUT-1.1/4"-8UN-2B-GR.8M	600		3V000723249/00	As per standard		"To be filled by vendor"
99A	964656450000	FT STUD-1-1/8"-8UN-2A-180-B8M	800	Set	3V001123248/00	As per standard		"To be filled by vendor"
99B	964656530000	HEX NUT-1.1/8"-8UN-2B-GR.8M	1600		3V000623249/00	As per standard		"To be filled by vendor"
100A	964656390000	FT STUD-3/4"-10UNC-2A-120-B8M	2000	Set	3V000523248/00	As per standard		"To be filled by vendor"
100B	964656500000	HEX NUT-3/4"-10UNC-2B-GR.8M	4000		3V000323249/00	As per standard		"To be filled by vendor"
101A	964656400000	FT STUD-3/4"-10UNC-2A-133-B8M	1500	Set	3V000623248/00	As per standard		"To be filled by vendor"
101B	964656500000	HEX NUT-3/4"-10UNC-2B-GR.8M	3000		3V000323249/00	As per standard		"To be filled by vendor"
102A	964656470000	FT STUD-1-1/4"-8UN-2A-250-B8M	200	Set	3V001323248/00	As per standard		"To be filled by vendor"
102B	964656540000	HEX NUT-1.1/4"-8UN-2B-GR.8M	400		3V000723249/00	As per standard		"To be filled by vendor"
103A	964658310000	FT STUD-M20x2.5x130 -B8M	200	Set	3V000325897/00	As per standard		"To be filled by vendor"
103B	964658390000	NUT -M20 -8M	400		4V000227368/00	As per standard		"To be filled by vendor"
104A	964658930000	FT STUD-M24x3x150 -B8M	100	Set	3V000725897/00	As per standard		"To be filled by vendor"
104B	964658960000	NUT -M24x3 - 8M	200		4V000727368/00	As per standard		"To be filled by vendor"
105A	964658340000	FT STUD M27X3 X180-B8M	500	Set	3V000525897/00	As per standard		"To be filled by vendor"
105B	964658400000	NUT -M27 -8M	1000		4V000327368/00	As per standard		"To be filled by vendor"
106A	964658330000	FT STUD-M30x3x185 -B8M	100	Set	3V000625897/00	As per standard		"To be filled by vendor"
106B	964658410000	NUT -M30 -8M	200		4V000427368/00	As per standard		"To be filled by vendor"
107A	964658920000	HEX.BOLT-M12 X1.75X60-B8M	200	Set	3V000225708/00	As per standard		"To be filled by vendor"
107B	964658440000	NUT-M12-8M	400		4V000527368/00	As per standard		"To be filled by vendor"
108A	964657860000	FT STUD-1/2"x80 -B8MA	200	Set	3V000131170/00	As per standard		"To be filled by vendor"
108B	964657870000	NUT -1/2" - B8MA	400		3V000131171/00	As per standard		"To be filled by vendor"
109A	964658150000	FT STUD-5/8"x86 -B8MA	200	Set	3V000231170/00	As per standard		"To be filled by vendor"
109B	964657980000	NUT -5/8" -B8MA	400		3V000231171/00	As per standard		"To be filled by vendor"
110A	964657970000	FT STUD-5/8"x105 -B8MA	100	Set	3V000331170/00	As per standard		"To be filled by vendor"
110B	964657980000	NUT -5/8" - B8MA	200		3V000231171/00	As per standard		"To be filled by vendor"
111A	964658160000	FT STUD-5/8"x118 -B8MA	50	Set	3V000431170/00	As per standard		"To be filled by vendor"
111B	964657980000	NUT -5/8" - B8MA	100		3V000231171/00	As per standard		"To be filled by vendor"
112A	964658170000	FT STUD-3/4"x120 -B8MA	200	Set	3V000531170/00	As per standard		"To be filled by vendor"
112B	964658260000	NUT -3/4" - B8MA	400		3V000331171/00	As per standard		"To be filled by vendor"
113A	964658180000	FT STUD-3/4"x133 -B8MA	200	Set	3V000631170/00	As per standard		"To be filled by vendor"
113B	964658260000	NUT -3/4" - B8MA	400		3V000331171/00	As per standard		"To be filled by vendor"
114A	964658040000	FT STUD-1"x135 -B8MA	100	Set	3V000931170/00	As per standard		"To be filled by vendor"
114B	964658020000	NUT -1" - B8MA	200		3V000531171/00	As per standard		"To be filled by vendor"
115A	964658210000	FT STUD-1"-8UNC-2A-158-B8MA	100	Set	3V001031170/00	As per standard		"To be filled by vendor"
115B	964658020000	NUT -1" - 8MA	200		3V000531171/00	As per standard		"To be filled by vendor"
116A	964658010000	FT STUD-1-1/8"x140 -B8MA-NJ95	50	Set	3V001231170/00	As per standard		"To be filled by vendor"
116B	964658030000	NUT -1-1/8" - B8MA	100		3V000631171/00	As per standard		"To be filled by vendor"
117A	964658810000	FT STUD-1-1/4"x180 -B8MA	200	Set	3V001631170/00	As per standard		"To be filled by vendor"
117B	964658280000	NUT -1-1/4" - 8MA	400		3V000731171/00	As per standard		"To be filled by vendor"
118A	964658870000	DE STUD M20X100X26X50-B8MA-Z11	200	Set	3VZ11622457/00	As per standard		"To be filled by vendor"
118B	964658290000	NUT -M20 -8MA	200		4V000327341/00	As per standard		"To be filled by vendor"
119A	G96110160000	STUD M16 X 57 (Var-05)	1000	Set	3-45-320-01264			"To be filled by vendor"
119B	413010001600	NUT -M16 -CL6-IS1364P3	2000				41301	"To be filled by vendor"
120A	G96110170000	STUD M16 X 80 (Var-03)	200	Set	3-45-320-01264			"To be filled by vendor"
120B	413010001600	NUT -M16 -CL6-IS1364P3	400				41301	"To be filled by vendor"
121A	G96110150000	STUD M16 X 100	200	Set	3-45-320-01264			"To be filled by vendor"
121B	413010001600	NUT -M16 -CL6-IS1364P3	400				41301	"To be filled by vendor"
122A	964658550000	FT STUD-5/8"x86 -B7M-M836	200	Set	3V001823248/00	TDC:5:164/07		"To be filled by vendor"
122B	964658480000	NUT -5/8" -Gr.2HM-M836	400		3V000923249/00	TDC:5:164/07		"To be filled by vendor"
123A	964658540000	FT STUD-1/2"x80 -B7M-M836	200	Set	3V001723248/00	TDC:5:164/07		"To be filled by vendor"
123B	964658470000	NUT -1/2" -Gr.2HM-M836	400		3V000823249/00	TDC:5:164/07		"To be filled by vendor"
124A	412162410000	HEX HD SCRU M24X100-6.8 IS:1364(P-2)	200	Set			41261	"To be filled by vendor"

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Unit Basic Price in Rs.
124B	413220002400	HEX NUT M24-10 IS:1364(P-3)/LATEST	400	Set			41322	"To be filled by vendor"
125	964657840000	HEX.BOLT-M12 X1.75X100-B8M	100	No	3V000125708/00			"To be filled by vendor"
126	412152009000	BOLT-M20x90 -6.8-IS1364P1	500	No			41215	"To be filled by vendor"
127	964657700000	HEX. BOLT-M16x2x55-0001	100	No	3V000125679/00	TDC:5:164/07		"To be filled by vendor"
128	964521920000	BOLT-M 8x30 -B7-0001	200	No	3V000120723/03	TDC:5:164/07		"To be filled by vendor"
129	412370807500	BOLT-M 8x75 -8.8-IS1364-P1	4000	No			41237	"To be filled by vendor"
130	964521930000	BOLT-M10x16 -B7-0002	300	No	3V000220723/03	TDC:5:164/07		"To be filled by vendor"
131	964522410000	BOLT-M16x50 -B7-0008	400	No	3V000820723/03	TDC:5:164/07		"To be filled by vendor"
132	412211605000	BOLT-M16x50 -4.6-IS1363P1	100	No			41221	"To be filled by vendor"
133	412371605000	BOLT-M16x50 -8.8-IS1364P1	300	No			41237	"To be filled by vendor"
134	412371606000	BOLT-M16x60 -8.8-IS1364P1	3000	No			41237	"To be filled by vendor"
135	964524380000	BOLT-M16x70 -B7-0001	1200	No	3V000120728/02	TDC:5:164/07		"To be filled by vendor"
136	964533300000	BOLT-M16x90 -B7-0010	1500	No	3V001020723/02	TDC:5:164/07		"To be filled by vendor"
137	964655120000	BOLT - M20X2.5	200	No	3V001620723/00	TDC:5:164/07		"To be filled by vendor"
138	964535300000	BOLT-M20x55 -B16-V084	100	No	3VV08421152/01	TDC:5:164/07		"To be filled by vendor"
139	412152006000	BOLT-M20x60 -6.8-IS1364P1	200	No			41215	"To be filled by vendor"
140	964521960000	BOLT-M20x60 -B7-0005	400	No	3V000520723/03	TDC:5:164/07		"To be filled by vendor"
141	964529810000	BOLT-M20x70 -B7-0006	1100	No	3V000620728/02	TDC:5:164/07		"To be filled by vendor"
142	412212408000	BOLT-M24x80 -4.6-IS1363P1	100	No			41221	"To be filled by vendor"
143	412152408000	BOLT-M24x80 -6.8-IS1364P1	200	No			41215	"To be filled by vendor"
144	964531720000	BOLT-M24x85 -B7-0009	100	No	3V000920728/03	TDC:5:164/07		"To be filled by vendor"
145	412152409000	BOLT-M24x90 -6.8-IS1364P1	150	No			41215	"To be filled by vendor"
146	964528590000	BOLT-M30x3.5x80 -B7-0005	200	No	3V000520728/02	TDC:5:164/07		"To be filled by vendor"
147	964521980000	BOLT-M30x3.5x110 -B7-0007	100	No	3V000720723/03	TDC:5:164/07		"To be filled by vendor"
148	412350692500	SOC SET SCRU-M 6x25 -45H-IS6094-	2500	No			41235	"To be filled by vendor"
149	412350692000	SOC SET SCRU-M 6x20 -45H-IS6094-	1300	No			41235	"To be filled by vendor"
150	412100600800	SLT GRUB SCRU-M 6x8 -22H-IS2388-C	5000	No			41210	"To be filled by vendor"
151	412100601200	SLT GRUB SCRU-M 6x12 -22H-IS2388-C	1000	No			41210	"To be filled by vendor"
152	412100601600	SLT GRUB SCRU-M 6x16 -22H-IS2388-C	2000	No			41210	"To be filled by vendor"
153	412100801000	SLT GRUB SCRU-M 8x10 -22H-IS2388-C	2000	No			41210	"To be filled by vendor"
154	413200000400	NUT -M 4 -CL8-IS1364P3	5000	No			41320	"To be filled by vendor"
155	413200000800	NUT -M 8 -CL8-IS1364P3	500	No			41320	"To be filled by vendor"
156	413190001000	NUT -M10 -2H	2000	No			41319	"To be filled by vendor"
157	964657900000	NUT -M10 - B8MA	100	No	4V000127341/00	0		"To be filled by vendor"
158	413040001200	NUT -M12 -CL4-IS1363P3	1000	No			41304	"To be filled by vendor"
159	413200091600	NUT -M16 -CL8-IS1364P3-GALV	3000	No			41320	"To be filled by vendor"
160	413240001600	NUT -M16 -GR7	500	No			41324	"To be filled by vendor"
161	413190001600	NUT -M16 -2H	20000	No			41319	"To be filled by vendor"
162	413040001600	NUT -M16 -CL4-IS1363P3	2000	No			41304	"To be filled by vendor"
163	964536670000	NUT -1-3/8" -2H -N848	300	No	3VN84806876/00	TDC:5:164/07		"To be filled by vendor"
164	964568890000	NUT -3/4" -GR7-F523	400	No	3VF52323249/02	TDC:5:164/07		"To be filled by vendor"
165	413243003600	NUT -M36x3 -GR7	100	No			41324	"To be filled by vendor"
166	413200002000	HEX NUT M20X2.5 P.CL 8GR B IS1	100	No			41320	"To be filled by vendor"
167	931148320000	DISC NUT-L705	100	No	3VL70522026/01	TDC:5:164/07		"To be filled by vendor"
168	931140380000	DISC NUT-L803	60	No	3VL80322026/01	TDC:5:164/07		"To be filled by vendor"
169	931191430000	INDICATOR STUD-W084	100	No	4VW08406800/00	TDC:5:164/07		"To be filled by vendor"
170	417508001200	SELF LOCK NUT-M12 -SPR-GALV	1500	No			41750	"To be filled by vendor"
171	417508001600	SELF LOCK NUT-M16 -SPR-GALV	1500	No			41750	"To be filled by vendor"
172	417508002000	SELF LOCK NUT-M20 -SPR-GALV	1500	No			41750	"To be filled by vendor"
173	413020090600	THIN NUT-M 6 -CL5-IS1364P4-GALV	2500	No			41302	"To be filled by vendor"
174	413020000800	THIN NUT-M 8 -CL5-IS1364P4	1800	No			41302	"To be filled by vendor"
175	413020001600	THIN NUT-M16 -CL5-IS1364P4	4000	No			41302	"To be filled by vendor"
176	413182003600	THIN NUT-M36x2 -CL5	3000	No			41318	"To be filled by vendor"
177	964658460000	THIN NUT-M36x2 - 2HM	100	No	4V000127401/00			"To be filled by vendor"
178	413182004200	THIN NUT-M42x2 -22H	400	No			41318	"To be filled by vendor"
179	413182005200	THIN NUT-M52x2 -22H	900	No			41318	"To be filled by vendor"
180	413182006000	THIN NUT-M60x2 -22H	900	No			41318	"To be filled by vendor"
181	964657950000	THIN NUT-M60x2 - B8MA	50	No	4V000227342/00	0		"To be filled by vendor"
182	964657890000	THIN NUT-M42x2 - B8MA	50	No	4V000127342/00	0		"To be filled by vendor"
183	931006770000	PLUG-5144	500	No	3V514406413/02	TDC:5:164/07		"To be filled by vendor"
184	931007480000	PLUG-5152	500	No	3V515206413/03	TDC:5:164/07		"To be filled by vendor"

S. No.	Material code	Description	Tender QTY	Unit of measurement	DRG No/Rev No	TDC No/Rev No	BPS	Unit Basic Price in Rs.
185	931177660000	PLUG-Z021	500	No	3VZ02122675/01	TDC:5:164/07		"To be filled by vendor"
186	931065960000	PLUG-5198	500	No	3V519806958/00	TDC:5:164/07		"To be filled by vendor"
187	931006780000	PLUG-5150	800	No	3V515006413/02	TDC:5:164/07		"To be filled by vendor"
188	931665020000	PLUG-M305	1500	No	4VM30506587/00	TDC:5:164/07		"To be filled by vendor"
189	931068450000	PLUG-5196	400	No	3V519606413/02	TDC:5:164/07		"To be filled by vendor"
190	931068440000	PLUG-5199	400	No	3V519906413/01	TDC:5:164/07		"To be filled by vendor"
191	931103950000	SCREW PLUG - 1/2-F604	400	No	4VF60426385/01	TDC:5:164/07		"To be filled by vendor"

Nothing except prices will be entertained in part-II of tender.

For Items (e.g. nuts) which are appearing more than once, the minimum of rates will be considered, so please quote only single rate for those items. The bidder only will be liable if quotes differenet rates for same item appearing more than once.

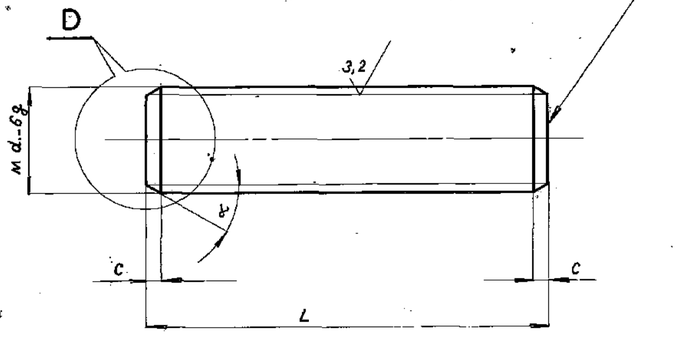
FOR TOL. OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP/QAP.

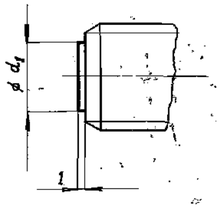
SL.NO	NEW DRG. NO.	COMP. CODE	RAW MATERIAL DETAILS. MATL. SPECN. & GRADE / HEAT TREATMENT	MATL. SIZE	MATL. CODE	TYPE OF CERTIFICATION	WT IN Kg. GROSS	WT IN Kg. NET	M d-6g	ϕ d1	L	C	∝ IN DEGREES	SCRAP SORT	STUD SIZE	APPLICABLE TYPE NO.	SL.NO
1	2-V-1370-01897	—	ASTM A 193 Gr.B7 QUENCHED AND TEMPERED.	BAR ϕ 16 x 75	15039115	CERTIFY	0/2	0,052	M12	—	70	2,2	30	20	M 12 X 70	1370, 1383, 1455, 1505.	1
2	2-V-1477-01897	—	ASTM A 193 Gr.B 16 QUENCHED AND TEMPERED.		15039159					9						1477.	2
3	2-V-1377-01897	—	ASTM A 193 Gr.B7 QUENCHED AND TEMPERED.	BAR ϕ 16 x85	15039115		0,134	0,071	M12	—	80				M 12 x80	1377, 1465.	3
4	2-V-1487-01897	93104543 0000	ASTM A 193 Gr.B 16 QUENCHED AND TEMPERED.		15039159					9						1487.	4
5	2-V-1371-01897	—	ASTM A 193 Gr.B. 7 QUENCHED AND TEMPERED.	BAR ϕ 20x 95	15039084		0,234	0,142	M16	—	90				M 16 X 90	1371, 1390, 1456, 1506.	5
6	2-V-1478-01897	—	ASTM A 193 Gr. B 16 QUENCHED AND TEMPERED.		15039161					13						1478.	6
7	2-V-1372-01897	—	ASTM A 193 Gr.B 7 QUENCHED AND TEMPERED.	BAR ϕ 20 x105	15039084		0,259	0,158	M16	—	100				M 16 X 100	1372, 1373, 1374, 1391, 1393, 1394, 1467, 1458 1459, 1497, 1503, 1504, 1507, 1502, 1509	7
8	2-V-1479-01897	93104 338 0000	ASTM A 193 Gr.B 16 QUENCHED AND TEMPERED		15039161					13						1479, 1480, 1481, 1488	8
9	2-V-1378-01897	—	ASTM A 193 Gr. B 7 QUENCHED AND TEMPERED	BAR ϕ 20 x 115	15039084		0,284	0,174	M16	—	110	2,5			M 16 X 110	1378, 1466, 1467	9
10	2-V-1488-01897	—	ASTM A 193 Gr. B 16 QUENCHED AND TEMPERED.		15039161					13						1488, 1489	10
11	2-V-1380-01897	—	ASTM A 193 Gr. B. 7 QUENCHED AND TEMPERED.	BAR ϕ 20 x 125	15039084		0,309	0,190	M16	—	120				M 16 x 120	1380, 1468	11
12	2-V-1490-01897	93100 132.0000	ASTM A 193 Gr.B 16 QUENCHED AND TEMPERED.		15039161					13						1490.	12
(A) 13	2-V-1381-01897/1	—	ASTM A 193 Gr.B7 QUENCHED AND TEMPERED	BAR ϕ ~~20 x 105~~ ϕ25 x 135	~~15039084~~ 15039 086		~~0,333~~ 0.52	0,205	M16	—	130	3			M 16 x 130	1381.	13
14	2-V-1375-01897	—		BAR ϕ 22 x 125	15039094		0,373	0,236	M20		120				M 20 x 120	1375, 1376, 1510, 1550, 1382, 1395, 1508	14
15	2-V-9997-01897	—		BAR ϕ 22 x 135	15039094		0,403	0,321	M20		130				M 20 x 130	1381, 1469	15
(C) → 16	2-V-1491-01897/1	93103 677 0000	ASTM A 193 Gr.B 16 QUENCHED AND TEMPERED.	BAR ϕ 25 x ~~135~~ 145	15039162		~~0,52~~ 0.66	0.345		15	140				M 20 X 140	1491	16
17	2-V-1382-01897	—	ASTM A 193 Gr.B7 QUENCHED AND TEMPERED.	BAR ϕ 22 x155	15039094		0,463	0,371	M20	—	150	3,5			M 20 x 150	1382	17
18	2-V-9999-01897	—		BAR ϕ 28 x 155	15039095		0,75	0,533	M24		150				M 24 X 150	1382	18
19	2-V-1512-01897	—		BAR ϕ 28 x 185	15039095		0,895	0,640	M24		180				M 24 x 180	1512	19
20	2-V-1388-01897	—		BAR ϕ 32 x 195	15039087		1,169	0,81	M27		180		45		M 27 X 180	1388, 1383.	20
21	2-V-9998-01897	—		BAR ϕ 32 x 145	15039087		0,916	0,777	M30		140	4			M 30 x 140	1388, 1512.	21
21A	2-V-8004-01897/1	93102 683 0000		BAR ϕ 32x200	15 039 087		1·26	1.05	M30		190				M30 X 190	8004	21A
21B	2-V-M307-01897	93103380 0000		BAR ϕ32X220	15039087		1·45	1·16	M30		210				M30X 210	M307	21B

DETAIL - D

STAMP MATL. GRADE (B7/B16) AND MANUFACTURER'S MARK.

PHYSICAL IDENTIFICATION FOR GRADE B 16 MATERIAL ONLY





12·5 / 3·2

NOTE:-
1. FOR SL.No. 21A, CADMIUM PLATING TO BE DONE AS PER LATEST APPLICABLE QUALITY PROCEDURE.

NO. OF PIECES	DESCRIPTION	SEM-PROJ SEQ. NO.	INT. MAT. / SEQ NO.	FINAL MATERIAL	SCRAP SORT	NET WT. (Kg.)	GROSS WT. (Kg.)	DRAWING No.	ITEM NO.

NOTE: FOR SL. NO. 22 & ABOVE REFER TRACING NO. 2-V-0000-01927.

MICROFILMED ON ROLL 005391 FRAME 263

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI - 14

FIRST ANGLE	SCALE: NTS	DRAWN: R.SESHADRI	TOTAL NET WT. (Kg.)
		CHECKED: A.JAYARAMAN.	TYPE
ALL DIMENSIONS IN MILLIMETRES		APPROVED: B.JAGADEESAN.	NEW/OLD DRG. No.
		DATE: 10-7-75	

CAUTION
THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD., BOILER PLANT UNIT TIRUCHY- 620014 AND SHALL NOT BE USED WITHOUT THEIR EXPRESS WRITTEN PERMISSION IN ANY FROM OR PART THEREOF FOR ANY OTHER PURPOSE THAN FOR WHICH IT IS SENT TO YOU.

05-228.

TITLE: STUD

DRAWING No. 2-V-0000-01897

REVISION 05

REV.	DATE	ALT. / CHR. / APPD.	
04	8.8.98	R.L. / M.R.K.	CADMIUM PLATING INTRODUCED FOR SL. No. 21A. DCN No. HM 0331.
03	15-11-91	ALTERED: N.DHANABALAN / CHECKED:	(E) 1. IN SL NO. 16 'L' LENGTH IS INCREASED TO 140
02	25-2-91	ALTERED: N.A / CHECKED:	(B) 1. SL-NO-21B INCLUDED
01	4.8.89	ALTERED: L.Ranganathan / CHECKED: S.Kumar	ZONE (@) 1. SL.No.13 RAW MATL. SIZE CORRECTED. 2. SL.No. 21A INCLUDED. 3. DCN. No. GW/89/0079

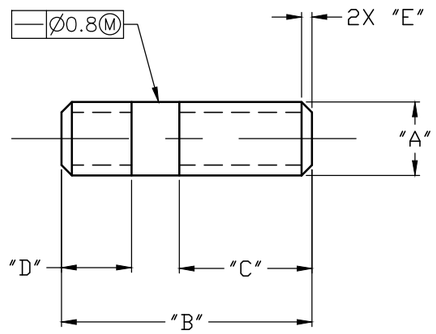
DRAWING NO: 3-45-320-01264

FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD.NO TP 023 0299

VER. NO.	A	B	C	D	E	MAT'L. ITEM NO.
1	M16	57	32	19	2	275
2	M16	80	32	42	2	275
3	M16	80	49	26	2	275
4	M16	54	26	22	2	275
5	M16	57	32	22	2	275
6	M16	100	FULL THREAD		2	275

GENERAL NOTES:

1. DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994
   UNLESS OTHERWISE SPECIFIED:
   a. ALL DIMENSIONS ARE IN MILLIMETERS.
   b. TOLERANCES ON DIMENSIONS ±1.0
   c. TOLERANCES ON ANGULAR DIMENSIONS ±1°00'



VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	GS
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	06	ROD ø16X100				150043410000			0.199	
						IS2062FE410GRA			1	
	05	ROD ø16X57				150043410000			0.114	
						IS2062FE410GRA			1	
	04	ROD ø16X54				150043410000			0.108	
						IS2062FE410GRA			1	
	03	ROD ø16X80				150043410000			0.159	
						IS2062FE410GRA			1	
	02	ROD ø16X80				150043410000			0.159	
						IS2062FE410GRA			1	
	01	ROD ø16X57				150043410000			0.114	
						IS2062FE410GRA			1	

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355–055

	NAME	SIGNATURE	DATE
DRN	BIMAL.C	–sd–	10.03.11
CHD	J.V.V.A.K	–sd–	10.03.11
APPD	M.T.P	–sd–	10.03.11

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
FS(FB)			N.T.S		B–902–1881/R5
CODE 129					

TITLE: STUDS

DRAWING NO : 3–45–320–01264

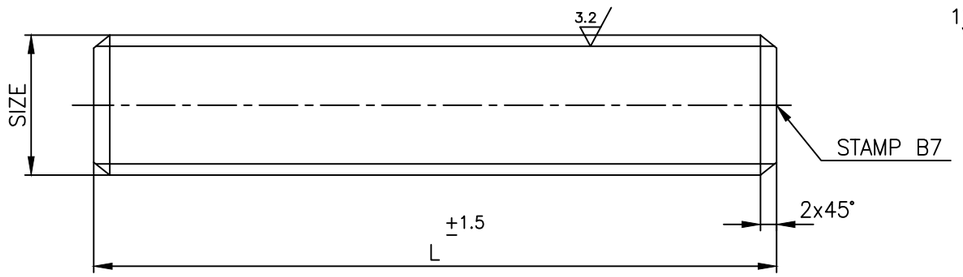
REV 00

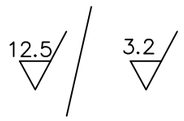
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. CORPORATE DRG ID:TP-DG-3-V-0000-06875/13

SL.No	DRAWING No.	MATERIAL	MATL. CODE	SIZE	L	WEIGHT IN Kgs.	SIZE/RATING
01	3-V-N073-06875/02	ASTM A193 B7, HT, CERTIFY	964562670000	1/2"-13UNC-2A	68	0.07	2"-150
02	3-V-N081-06875/02		964562680000	1/2"-13UNC-2A	80	0.08	2"-300
03	3-V-N025-06875/02		964562690000	5/8"-11UNC-2A	86	0.13	3"-150
04	3-V-N001-06875/02		964562700000	5/8"-11UNC-2A	94	0.15	4"-150 6"-150
05	3-V-N009-06875/02		964562710000	5/8"-11UNC-2A	105	0.16	8"-150 3",4"-300
06	3-V-N017-06875/02		964562720000	5/8"-11UNC-2A	118	0.18	6"-300
07	3-V-N057-06875/02		964562730000	3/4"-10UNC-2A	112	0.25	10"-150
08	3-V-N041-06875/02		964562740000	3/4"-10UNC-2A	120	0.27	12"-150
09	3-V-N089-06875/02		964562750000	3/4"-10UNC-2A	133	0.30	8"-300
10	3-V-N065-06875/02		964562760000	1"-8UNC-2A	158	0.63	10"-300
11	3-V-N105-06875/02		964562770000	1.1/8"-8UN-2A	180	0.91	12"-300
12	3-V-N106-06875/02		964562780000	1.1/8"-8UN-2A	140	0.71	12"-300
13	3-V-N224-06875/02		964562290000	1"-8UNC-2A	170	0.71	20"-150
14	3-V-1387-06875/02		964564270000	1"-8UNC-2A	135	0.54	16"-150
15	3-V-N204-06875/02		964564280000	3/4"-10UNC-2A	105	0.25	6"-150

SL.No	DRAWING No.	MATERIAL	MATL. CODE	SIZE	L	WEIGHT IN Kgs.	SIZE/RATING
16	3-V-N206-06875/02	ASTM A193 B7, HT, CERTIFY	964564290000	7/8"-9UNC-2A	115	0.35	10"-150
17	3-V-N207-06875/02		964564300000	7/8"-9UNC-2A	125	0.38	12"-150
18	3-V-N212-06875/02		964564560000	7/8"-9UNC-2A	150	0.45	8"-300
19	3-V-F505-06875/01		964566800000	1.1/4"-8UN-2A	215	1.34	8"-600
20	3-V-F506-06875/01		964566810000	1.1/8"-8UN-2A	220	1.41	10"-600
21	3-V-F507-06875/02		964566820000	1.1/4"-8UN-2A	250	1.74	12"-600
22	3-V-N361-06875/01		964567040000	1.1/4"-8UN-2A	150	0.94	24"-150& 16"-300
23	3-V-N437-06875/01		964567430000	1.3/8"-8UN-2A	190	1.44	20"-300
24	3-V-N847-06875		964536630000	1.1/4"-8UN-2A	195	1.23	28"-150
25	3-V-N848-06875		964536640000	1.3/8"-8UN-2A	210	1.58	30"-150
26	3-V-N827-06875		964536650000	1.1/2"-8UN-2A	220	1.96	32"-150
27	3-V-N846-06875/01		964536660000	1.3/4"-8UN-2A	240	2.9	36"-150
28	3-V-NE97-06875		964653420000	1.1/2"-8UN-2A	260	2.32	26"-300
29	3-V-NK44-06875		964659010000	1.5/8"-8UN-2A	270	2.84	28"-300
30	3-V-NK45-06875		964659050000	2"-8UN-2A	275	4.38	28"-600





NOTE:-

FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE TDC:5:164

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

REV	DATE	ALTERED	REV	DATE	ALTERED
13	08.12.18	CHD & APPD R.P.SINGH SSK & KRS	12	31.12.09	CHD & APPD : VB SSK & MRK
		SL.No 29 & 30 INCLUDED.			SL.No 28 INCLUDED.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

365-121

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		31.12.09	
CHD	S.SATHEESHKUMAR		31.12.09	
APPD	K.RAJASEKARAN		31.12.09	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S		CAD .3-V-0000-06875-0-0	
CODE 320				

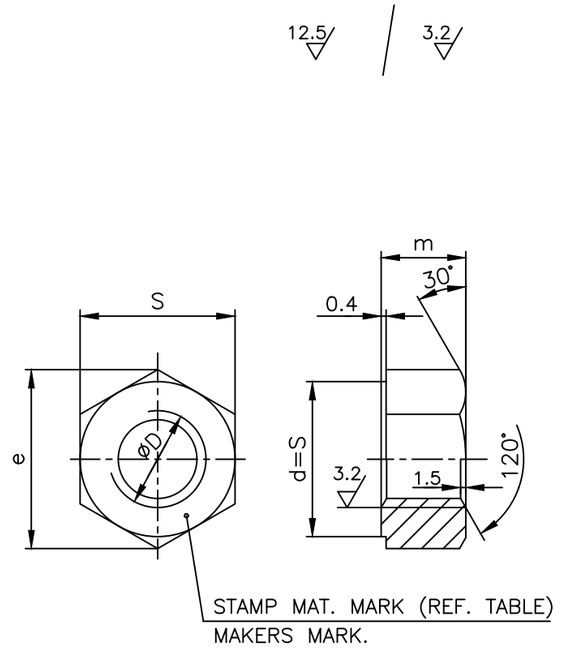
TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-06875	13

Size A3

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

DRAWING NO. 3-V-0000-06876

SL. No.	DRAWING No.	COMP. CODE	MATL. SPECN.	S		e		m		øD	MATL. MARK	NET WT. (Kg.)
				MAX.	MIN.	MAX.	MIN.	MAX.	MIN.			
01	3.V.N073.06876/03	96 456 279	ASTM A194 – 2H, CERTIFY	22.22	21.59	25.65	24.61	12.80	11.79	1/2"–13 UNC –2B	2H	0.02
02	3.V.N025.06876/03	96 456 280		26.97	26.19	31.17	29.85	16.03	14.91	5/8"–11 UNC –2B	2H	0.03
03	3.V.N057.06876/03	96 456 281		31.75	30.78	36.65	35.10	19.25	18.03	3/4"–10 UNC –2B	2H	0.08
04	3.V.N065.06876/03	96 456 282		41.28	40.01	47.65	45.62	25.70	24.28	1"–8 UNC –2B	2H	0.17
05	3.V.N105.06876/03	96 456 283		46.02	44.60	53.16	50.85	29.93	27.41	1.1/8"–8 UN –2B	2H	0.27
06	3.V.N206.06876/02	96 456 431		36.52	35.41	42.16	40.37	22.47	21.16	7/8"–9 UNC –2B	2H	0.11
07	3.V.N204.06876/02	96 456 453	SA 307 Gr.B CERTIFY	31.75	30.78	36.65	35.10	19.25	18.03	3/4"–10 UNC –2B	307 B	0.08
08	3.V.N207.06876/02	96 456 454		36.52	35.41	42.16	40.37	22.47	21.16	7/8"–9 UNC –2B	307 B	0.11
09	3.V.F505.06876/01	96 456 683	ASTM A194 – 2H, CERTIFY	50.8	49.23	58.65	56.11	31.78	30.15	1.1/4"–8 UN –2B	2H	0.22
10	3.V.N848.06876	96 453 667		55.57	53.8	64.16	61.37	35.0	33.27	1.3/8"–8 UN –2B	2H	0.42
11	3.V.N827.06876	96 453 668		60.33	58.42	69.65	66.59	38.23	36.40	1.1/2"–8 UN –2B	2H	0.52
12	3.V.N846.06876/01	96 453 669		69.85	67.61	80.65	77.09	44.68	42.65	1.3/4"–8 UN –2B	2H	0.81
13	3.V.NK44.06876	96 465 904		65.07	63.02	75.15	71.84	41.45	39.53	1.5/8"–8 UN –2B	2H	0.68
14	3.V.NK45.06876	96 465 906		79.37	76.84	91.64	87.61	51.13	48.90	2"–8 UN –2B	2H	1.36



RETRACED WITH REV. 09 ON 26.11.18

NOTE:

1. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE STANDARD(TDC:5:164).

REV	DATE	ALTERED R.P.SINGH
09	26.11.18	CHD & APPD SSK & KRS
		SL. No.13 & 14 INCLUDED.

–	–	–	–	–	–	–	–	–	–
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M.SRINIVASAN		22.04.96	
CHD	N.DHANAPAL		22.04.96	
APPD	A.VISWANATHAN		22.04.96	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF. TABLE	CAD: C306876	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
HEX NUT	U 01	3-V-0000-06876	09

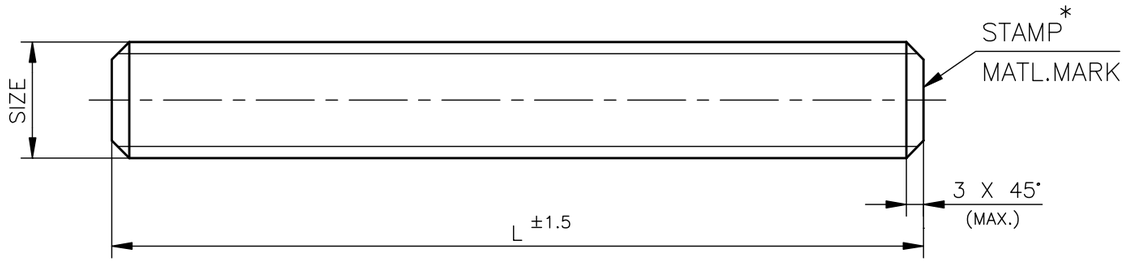
Size A3

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

DRAWING NO. 3-V-0000-09598

3.2

SL.No	DRAWING No.	MATERIAL	MATL. CODE	MATL. MARK *	SIZE	L	WEIGHT IN Kgs.	REMARKS
01.	3-V-5732-09598/06	ASTM A193-B7	96 162 112	B7	1/2"-13UNC-2A	95	0.10	
02.	3-V-H962-09598	ASTM A193-B8	96 465 349	B8				
03.	3-V-5734-09598/06	ASTM A193-B7	96 162 093	B7	5/8"-11UNC-2A	110	0.17	
04.	3-V-H964-09598	ASTM A193-B8	96 465 351	B8				
05.	3-V-5737-09598/06	ASTM A193-B7	96 162 113	B7	7/8"-9UNC-2A	140	0.43	
06.	3-V-H967-09598	ASTM A193-B8	96 465 353	B8				
07.	3-V-5610-09598/06	ASTM A193-B7	96 162 167	B7	3/4"-10UNC-2A	130	0.29	
08.	3-V-5203-09598/06	ASTM A193-B7	96 162 169	B7	7/8"-9UNC-2A	155	0.50	
09.	3-V-5990-09598/06	ASTM A193-B7	96 162 168	B7	1/2"-13UNC-2A	80	0.08	
10.	3-V-Y013-09598/06	ASTM A193-B7	96 452 873	B7	7/16"-14UNC-2A	70	0.05	
11.	3-V-Y012-09598/06	ASTM A193-B7	96 452 872	B7	3/8"-16UNC-2A	51	0.03	
12.	3-V-Y047-09598/06	ASTM A193-B7	96 452 875	B7	5/8"-11UNC-3A	80	0.12	
13.	3-V-Y019-09598/06	ASTM A193-B7	96 452 874	B7	5/8"-11UNC-3A	89	0.13	



–	–	–	–	–	–	–	–	–	–
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

REV	DATE	ALTERED	
07	12.02.10	CHD & APPD	S.V.NATHAN / M.RAJAKUMAR

DRAWING No. 3-V-H962-09598, 3-V-H964-09598 AND 3-V-H967-09598 INCLUDED.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M.SRINIVASAN		20.07.92	
CHD	N.P.ESWARAN		20.07.92	
APPD	N.NAGARAJAN		20.07.92	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF TABLE	CAD: F309598	
CODE 320			DR DRG. 454,2369	

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-09598	07

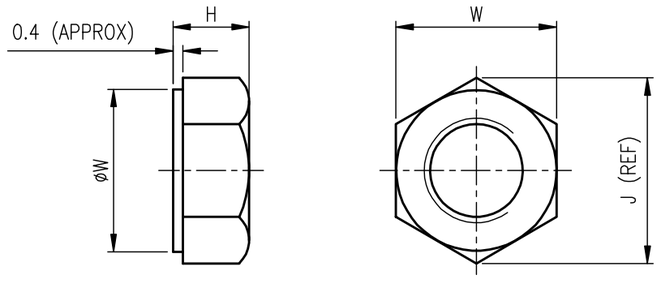
Size A3

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

DRAWING NO. 3-V-0000-09808

3.2

SL.NO.	DRAWING NO.	SIZE	MATERIAL	MATERIAL CODE	W		J		H		WEIGHT IN KGS
					MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	
01	3-V-5732-09808/02	1/2"-13 UNC-2B	ASTM A194-2H	96 162 110	19.05	18.69	22.00	21.34	11.38	10.85	0.02
02	3-V-H962-09808		ASTM A194-Gr.8	96 465 350							
03	3-V-5734-09808/02	5/8"-11 UNC-2B	ASTM A194-2H	96 162 176	23.83	23.42	27.51	26.70	14.20	13.59	0.04
04	3-V-H964-09808		ASTM A194-Gr.8	96 465 352							
05	3-V-5737-09808/02	7/8"-9 UNC-2B	ASTM A194-2H	96 162 111	33.32	32.23	38.51	36.75	19.71	18.39	0.10
06	3-V-H967-09808		ASTM A194-Gr.8	96 465 354							
07	3-V-5904-09808/02	5/16"-18 UNC-2B	ASTM A194-2H	96 162 082	12.70	12.42	14.66	14.15	6.93	6.55	0.01
08	3-V-Y032-09808/01		ASTM A194-Gr.8	96 452 853							
09	3-V-5907-09808/02	3/8"-16 UNC-2B	ASTM A194-2H	96 162 083	14.27	14.00	16.51	15.95	8.56	8.13	0.01
10	3-V-5610-09808/02	3/4"-10 UNC-2B	ASTM A194-2H	96 162 170	28.58	27.64	32.99	31.50	16.89	15.67	0.07
11	3-V-5990-09808/02	5/8"-11 UNC-2B	ASTM A194-2H	96 162 171	26.97	26.19	31.17	29.85	16.03	14.91	0.06
12	3-V-Y034-09808/01		ASTM A194-Gr.8	96 452 855							
13	3-V-5999-09808/02	1/2"-13 UNC-2B	ASTM A194-2H	96 162 172	22.23	21.59	25.65	24.61	12.80	11.79	0.03
14	3-V-Y035-09808/01		ASTM A194-Gr.8	96 452 856							
15	3-V-5292-09808/02	5/16"-18 UNC-2B	ASTM A194-2HM	96 452 270	12.70	12.42	14.66	14.15	6.93	6.55	0.01
16	3-V-5712-09808/02	1/4"-20 UNC-2B	ASTM A194-2H	96 452 399	11.13	10.87	12.83	12.40	5.74	5.38	0.01
17	3-V-Y011-09808/02	3/8"-16 UNC-2B	ASTM A194-2H	96 452 857	17.45	16.99	20.17	19.38	9.58	8.66	0.01
18	3-V-Y031-09808/01		ASTM A194-Gr.8	96 452 852							
19	3-V-Y013-09808/02	7/16"-14 UNC-2B	ASTM A194-2H	96 452 858	19.05	18.49	22.00	21.08	11.20	10.24	0.02
20	3-V-Y033-09808/01		ASTM A194-Gr.8	96 452 854							



NOTES

01. NUTS OF ASTM A194-2H & 2HM SHALL BE PHOSPHATED.
02. THIS DRG. REPLACES EXISTING DRG. No. 3-V-0000-09597.
03. HARDNESS SHALL NOT EXCEED RC22 FOR 2HM NUTS.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

REV	DATE	ALTERED	REV	DATE	ALTERED
04	17.02.10	S.V.NATHAN CHD & APPD M.RAJAKUMAR	02	01.4.95	A.S.PANDY CHD & APPD P.BOOMINATHAN
	DRAWING No. 3-V-H962-09808, 3-V-H964-09808 AND 3-V-H967-09808 INCLUDED.		DCN:FS:0320	IN NOTE 1 PHOSPHATED WAS GALVANISED.	
03	05.01.07	A.S.PANDY CHD & APPD P.BOOMINATHAN	01	20.6.88	A.S.PANDY CHD & APPD P.BOOMINATHAN
	DRG.CONVERTED IN ACAD			SL.NOS. 08, 12, 14 & 17 TO 20 INCLUDED REFERENCE 220/EX 082 (8922)	

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

365-121

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	EOL/VAD		04.01.07	
CHD	M.SRINIVASAN		05.01.07	
APPD	P.BOOMINATHAN		05.01.07	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S	REFER TABLE	3-V-0000-09597 CAD.REF.F309808	

CODE	TITLE	CARD CODE	DRAWING NO.	REV
	HEX NUT	U 01	3-V-0000-09808	04

Size A3

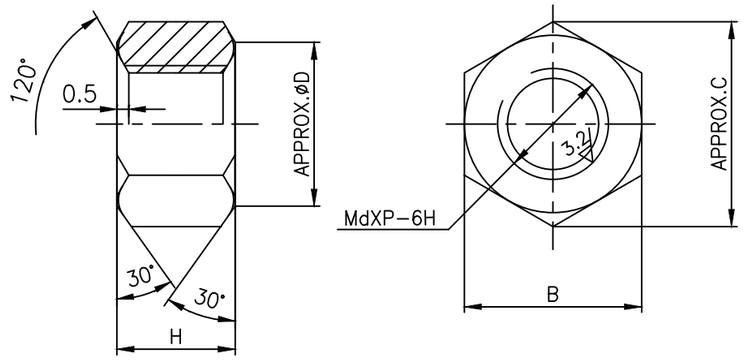
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

12.5 / 3.2

DRAWING NO. 3-V-0000-20717

SL. NO.	DRAWING NO.	MATL. SPECN.	COMP.CODE	DIMENSIONS						FINISHED WT(kg)
				Md	P	H	B	C	øD	
01.	3-V-0001-20717	A194-2H, CERTIFY	96 452 160 0000	M22	2.5	18	32	37	31	0.07
02.	3-V-0002-20717		96 452 161 0000	M30	3	24	46	53.1	44	0.21
03.	3-V-0003-20717		96 452 312 0000	M42	3	42	65	75	62	0.29
04.	3-V-0004-20717/1		96 452 450 0000	M39	4	32	60 (6)	65	55	0.24
05.	3-V-0005-20717		96 452 688 0000	M5	0.8	4	8.3	9.2	7	0.01
06.	3-V-0006-20717		96 452 932 0000	M48	3	48	75	86.5	72	0.94
07.	3-V-0007-20717		96 453 057 0000	M52	3	52	80	92.4	77	1.2
08.	3-V-0008-20717		96 460 645 0000	M30	3	30	46	53.1	44	0.23
17.	3-V-0017-20717		96 453 358 0000	M22	2.5	22	32	37	31	0.09
18.	3-V-0018-20717/1		96 466 008 0000	M39	3	39	60 (6)	65	55	0.29
20	3-V-3234-20717		96 465 274 0000	M33	3.5	33	50	57.7	49	0.32

SL. NO.	DRAWING NO.	MATL. SPECN.	COMP.CODE	DIMENSIONS						FINISHED WT(kg)
				Md	P	H	B	C	øD	
09.	3-V-0009-20717/1	A194-Gr.7, CERTIFY	96 452 309 0000	M22	2.5	18	32	37	31	0.07
10.	3-V-0010-20717/1		96 452 310 0000	M30	3	24	46	53.1	44	0.21
11.	3-V-0011-20717/1		96 452 311 0000	M42	3	42	65	75	62	0.29
12.	3-V-0012-20717/1		96 453 058 0000	M52	3	52	80	92.4	77	1.2
13.	3-V-0013-20717/1		96 460 647 0000	M30	3	30	46	53.1	44	0.23
14.	3-V-0014-20717/2		96 453 203 0000	M39	4	32	60 (6)	65	55	0.24
15.	3-V-L793-20717/1		96 460 741 0000	M42	4.5	42	65	75	62	0.29
16.	3-V-0016-20717/1		96 453 357 0000	M22	2.5	22	32	37	31	0.09
19.	3-V-0019-20717/1		96 466 009 0000	M39	3	39	60 (6)	65	55	0.29
21	3-V-3237-20717		96 465 275 0000	M33	3.5	33	50	57.7	49	0.32



NOTES:-

01. LATEST APPLICABLE QUALITY WORK INSTRUCTION SHALL BE FOLLOWED IN ALL RESPECTS.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE
DRN	Y.ARTHUR		17.3.07
CHD	K.RAJASEKARAN		17.3.07
APPD	M.RAJAKUMAR		17.3.07

NO.OF VAR.

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S		CAD REF: T320717 PT40	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
NUT	U 01	3-V-0000-20717	06

REV	DATE	ALTERED	REV	DATE	ALTERED
06	04.11.17	R.P.SINGH CHD & APPD SSK & KRS	05	10.05.08	M.SRINIVASAN CHD & APPD K.S.RAMAN

DIMENSIONS 60 WAS 56 FOR M39

DCP NO.802298

SL.NO. 20 & 21 INCLUDED.

Size A3

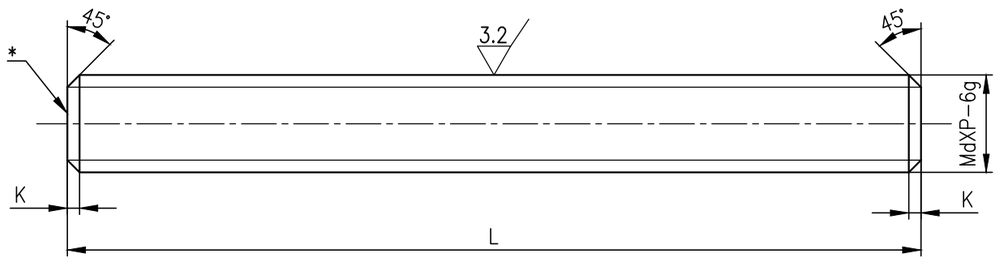
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

12.5 / 3.2

DRAWING NO. 3-V-0000-20721

SL.NO.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS Md	P	L	K	NET WT. (IN KGS.)
1.	3-V-0001-20721/02	964521620000	A 193 - B7, CERTIFY	M16	2	140	2	0.20
2.	3-V-0002-20721/02	964521630000		M20	2.5	180	2.5	0.41
3.	3-V-0003-20721/02	964521640000		M22	2.5	170	2.5	0.47
4.	3-V-0004-20721/02	964521650000		M22	2.5	200	2.5	0.60
5.	3-V-0005-20721/02	964521660000		M22	2.5	210	2.5	0.62
6.	3-V-0006-20721/02	964521670000		M22	2.5	220	2.5	0.65
7.	3-V-0007-20721/02	964521680000		M24	3	240	3	0.82
8.	3-V-0008-20721/02	964521690000		M24	3	270	3	0.95
9.	3-V-0009-20721/02	964521700000		M24	3	280	3	0.99
10.	3-V-0010-20721/02	964521710000		M24	3	290	3	1.02
11.	3-V-0011-20721/02	964521720000		M24	3	315	3	1.08
12.	3-V-0012-20721/02	964521730000		M30	3	245	3	1.33
13.	3-V-0013-20721/02	964521740000		M30	3	260	3	1.38
14.	3-V-0014-20721/02	964521750000		M30	3	315	3	1.72
15.	3-V-0015-20721/02	964521760000		M30	3	340	3	1.89
16.	3-V-0016-20721/02	964521770000		M30	3	385	3	2.10
17.	3-V-0017-20721/02	964521780000		M36	3	295	3	2.23
18.	3-V-0018-20721/02	964521790000		M36	3	300	3	2.31
19.	3-V-0019-20721/02	964521800000		M36	3	335	3	2.64
20.	3-V-0020-20721/02	964521810000		M36	3	350	3	2.80
21.	3-V-0021-20721/02	964521820000		M36	3	410	3	3.27
22.	3-V-0022-20721/02	964521830000		M36	3	435	3	3.44
23.	3-V-0023-20721/02	964521840000		M36	3	485	3	3.83
47.	3-V-0047-20721/02	964523210000		M24	3	205	3	0.70
49	3-V-0049-20721	964660230000		M36	3	370	3	2.95
51	3-V-3234-20721	964652720000		M33	3.5	155	3.5	0.90
53	3-V-SIJA-20721	966000220000		M22	2.5	240	2.5	0.705
55	3-V-SFJA-20721	966000260000		M16	2	158	2	0.245

SL.NO.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS Md	P	L	K	NET WT. (IN KGS.)
24.	3-V-0024-20721/02	964522040000	A 193 - B16, CERTIFY	M16	2	140	2	0.20
25.	3-V-0025-20721/02	964522050000		M20	2.5	180	2.5	0.41
26.	3-V-0026-20721/02	964522060000		M22	2.5	170	2.5	0.47
27.	3-V-0027-20721/02	964522070000		M22	2.5	200	2.5	0.60
28.	3-V-0028-20721/02	964522080000		M22	2.5	210	2.5	0.62
29.	3-V-0029-20721/02	964522090000		M22	2.5	220	2.5	0.65
30.	3-V-0030-20721/02	964522100000		M24	3	240	3	0.82
31.	3-V-0031-20721/02	964522110000		M24	3	270	3	0.95
32.	3-V-0032-20721/02	964522120000		M24	3	280	3	0.99
33.	3-V-0033-20721/02	964522130000		M24	3	290	3	1.02
34.	3-V-0034-20721/02	964522140000		M24	3	315	3	1.08
35.	3-V-0035-20721/02	964522150000		M30	3	245	3	1.33
36.	3-V-0036-20721/02	964522160000		M30	3	260	3	1.38
37.	3-V-0037-20721/02	964522170000		M30	3	315	3	1.72
38.	3-V-0038-20721/02	964522180000		M30	3	340	3	1.89
39.	3-V-0039-20721/02	964522190000		M30	3	385	3	2.10
40.	3-V-0040-20721/02	964522200000		M36	3	295	3	2.23
41.	3-V-0041-20721/02	964522210000		M36	3	300	3	2.31
42.	3-V-0042-20721/02	964522220000		M36	3	335	3	2.64
43.	3-V-0043-20721/02	964522230000		M36	3	350	3	2.80
44.	3-V-0044-20721/02	964522240000		M36	3	410	3	3.27
45.	3-V-0045-20721/02	964522250000		M36	3	435	3	3.44
46.	3-V-0046-20721/02	964522260000		M36	3	485	3	3.83
48.	3-V-0048-20721/02	964523220000		M24	3	205	3	0.70
50	3-V-0050-20721	964660240000		M36	3	370	3	2.95
52	3-V-3237-20721	964652730000		M33	3.5	155	3.5	0.90
54	3-V-SIJM-20721	966000210000		M22	2.5	240	2.5	0.705
56	3-V-SFJM-20721	966000270000		M16	2	158	2	0.245



NOTES :

1. * PUNCH MATERIAL MARK B7 FOR A193 – B7
   B16 FOR A193 – B16
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC 5 : 164

REV	DATE	ALTERED DRS
05	23.10.15	CHD & APPD DRS & KRS

SL. NO. 53, 54, 55 & 56 INCLUDED.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		01.02.08	
CHD	K.RAJASEKARAN		01.02.08	
APPD	M.RAJAKUMAR		01.02.08	

DEPT VL
CODE 320
SCALE NTS
WEIGHT (KG).
REFERENCE INFORMATIONS PT – 39a
NO. OF ITEMS

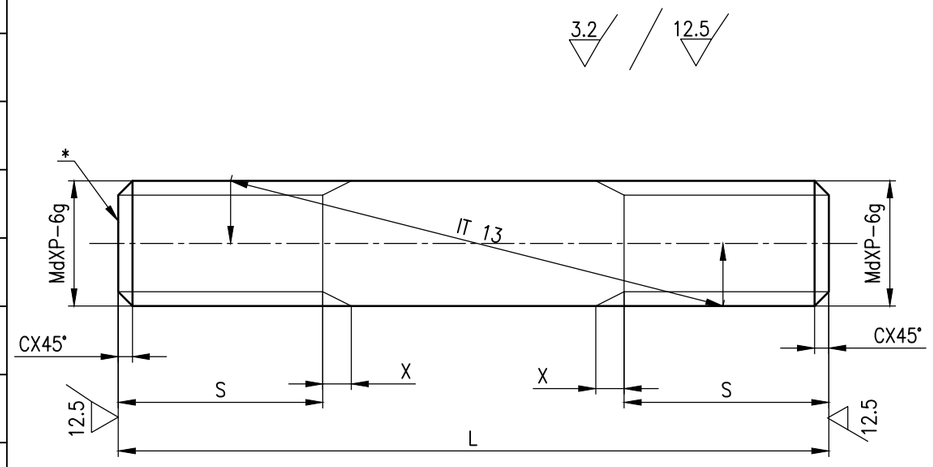
TITLE: STUD
CARD CODE: U 01
DRAWING NO. 3-V-0000-20721
REV 05

Size A3

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

DRAWING NO. 3-V-0000-20722/3

SL.NO.	DRAWING NO.	MATL. SPECN.	DIMENSIONS							FINISHED WT.(KGS)	COMPONENT CODE
			Md	P	L	S	X	C	IT 13		
1.	3-V-0001-20722/02	A 193 - B 7, CERTIFY	M22	2.5	125	36	5	2.5	0.33	0.35	96 452 185 0000
2.	3-V-0002-20722/02		M22	2.5	135	36	5	2.5	0.33	0.38	96 452 186 0000
3.	3-V-0003-20722/02		M24	3	140	40	6	3	0.33	0.49	96 452 187 0000
4.	3-V-0004-20722/02		M24	3	150	40	6	3	0.33	0.53	96 452 188 0000
5.	3-V-0005-20722/02		M30	3	180	50	6	3	0.33	0.94	96 452 189 0000
6.	3-V-0006-20722/02		M30	3	190	50	6	3	0.33	0.99	96 452 190 0000
7.	3-V-0007-20722/02		M36	3	200	56	6	3	0.39	1.51	96 452 191 0000
8.	3-V-0008-20722/02		M36	3	215	50	6	3	0.39	1.72	96 452 429 0000
9.	3-V-0009-20722/02		M20	2.5	125	35	5	2.5	0.33	0.31	96 452 687 0000
10.	3-V-0010-20722		M30	3	210	50	6	3	0.33	1.165	96 466 067 0000



NOTES:

01. * PUNCH MATL MARK B7 FOR A 193-B7.
02. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC 5:164

REDRAWN WITH REV:3, ON 20.12.12

REV	DATE	ALTERED VB
3	20.12.12	CHD & APPD SSK&KRS
SL.NO.10 INCLUDED		

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: TA

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		20.12.12	
CHD	S.SATHEESH		20.12.12	
APPD	K.RAJASEKARAN		20.12.12	

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

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-20722	3

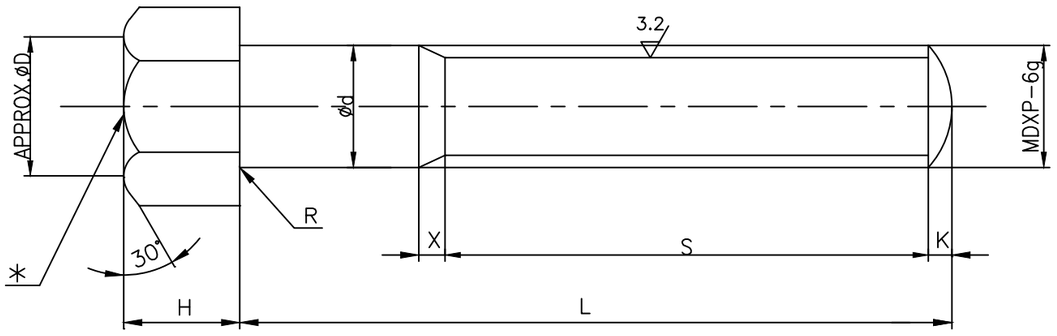
Size A3

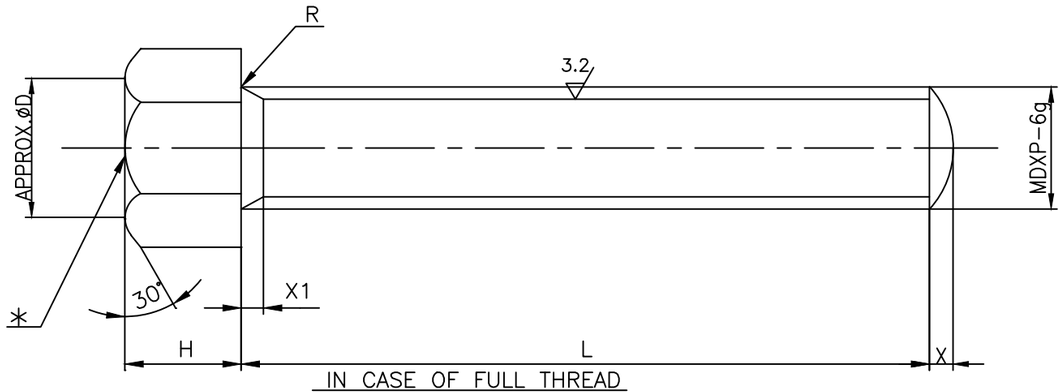
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-0000-20723/8

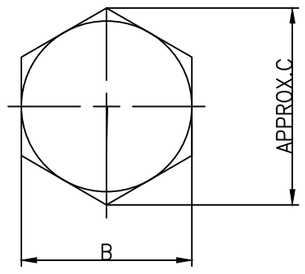
12.5 / 3.2

SL No.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS													FINISHED WT IN KGS
				Md	P	L	S	H	K	X	X1	R	ød	øD	B	C	
01	3-V-0001-20723/3	964521920000	ASTM A193 B7, CERTIFY	M8	1.25	30	30	5.5	–	2.5	3.5	0.4	8	12.6	13	15	0.02
02	3-V-0002-20723/3	964521930000		M10	1.5	16	16	7	–	3	4.5	0.4	10	16.5	17	19.6	0.02
03	3-V-0003-20723/3	964521940000		M10	1.5	20	20	7	–	3	4.5	0.4	10	16.5	17	19.6	0.02
04	3-V-0004-20723/3	964521950000		M12	1.75	20	20	8	–	3.5	5	0.6	12	18	19	21.9	0.03
05	3-V-0005-20723/3	964521960000		M20	2.5	60	46	13	5	5	–	0.8	20	29	30	34.6	0.23
06	3-V-0006-20723/3	964521970000		M24	3	90	54	15	6	6	–	0.8	24	34	36	41.6	0.45
07	3-V-0007-20723/3	964521980000		M30	3.5	110	66	19	7	7	–	1.0	30	44	46	53.1	0.88
08	3-V-0008-20723/3	964522410000		M16	2	50	38	10	4	4	–	0.6	16	23	24	27.7	0.10
09	3-V-0009-20723/3	964523140000		M20	2.5	55	46	13	5	5	–	0.8	20	29	30	34.6	0.22
10	3-V-0010-20723/2	964533300000		M16	2	90	60	10	4	4	–	0.6	16	23	24	27.7	0.16
11	3-V-0011-20723/2	964568210000		M20	2.5	85	46	13	5	5	–	0.8	20	29	30	34.6	0.31
12	3-V-0012-20723/2	964533560000		M20	2.5	126	70	13	5	5	–	0.8	20	29	30	34.6	0.43
13	3-V-0013-20723/1	964535750000		M30	3.5	120	76	19	7	7	–	1.0	30	44	46	53.1	0.95
14	3-V-0014-20723	964655090000		M16	2	75	38	16	4	4	–	0.6	16	23	24	27.7	0.14
15	3-V-0015-20723	964655100000		M24	3	141	40	15	6	6	–	0.8	24	34	36	41.6	0.64
16	3-V-0016-20723	964655120000		M20	2.5	70	25	14	5	5	–	0.8	20	26	30	34.6	0.27





IN CASE OF FULL THREAD



NOTES:

1. * PUNCH MATERIAL MARK B7 FOR A193-B7.
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC 5:164.

REDRAWN WITH REV.7 ON 12.04.08

REV	DATE	ALTERED	REV	DATE	ALTERED
8	04.03.13	DEEPAKRAJ CHD & APPD M.RAJAKUMAR	7	12.04.08	VB CHD & APPD KRS & M.R.K
	SL.No.15 AND 16 INCLUDED.			DRAWING CONVERTED AS SOFT COPY DCP No.800813	

NO OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		12.04.08	
CHD	M.RAJASEKARAN		12.04.08	
APPD	M.RAJAKUMAR		12.04.08	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	–	PT-42	

CODE 320

TITLE	CARD CODE	DRAWING NO.	REV
BOLT	U 01	3-V-0000-20723	8

Size A3

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

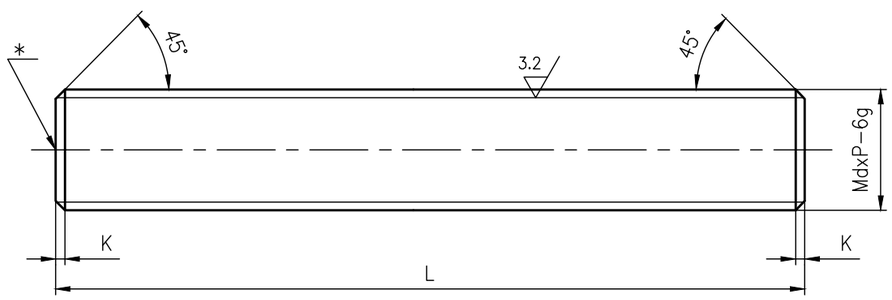
DRAWING NO. 3-V-0000-20729

SL No.	DRAWING No.	COMP. CODE	MATL. SPECN.	DIMENSIONS MDxP-6g	L	K		WT(KG)
01	3-V-0001-20729/02	964524410000	A193 B7, CERTIFY	M30x3	185	3		1.03
02	3-V-0002-20729/02	964524420000		M30x3	280	3		1.55
03	3-V-0003-20729/02	964524430000		M42x3	440	3		4.79
04	3-V-0004-20729/02	964524440000		M48x3	520	3		7.39
05	3-V-0005-20729/02	964526850000		M20x2.5	195	2.5		0.48
06	3-V-0006-20729/02	964527050000		M30x3	270	3		1.49
07	3-V-0007-20729/02	964527260000		M36x3	270	3		2.04
08	3-V-0008-20729/02	964527270000		M36x3	500	3		3.78
09	3-V-0009-20729/02	964527280000		M36x3	310	3		2.34
10	3-V-0010-20729/02	964527290000		M20x2.5	165	2.5		0.52
11	3-V-0011-20729/02	964527300000		M22x2.5	180	2.5		0.54
12	3-V-0012-20729/02	964527310000		M24x3	190	3		0.68
13	3-V-0013-20729/02	964527320000		M24x3	210	3		0.75
14	3-V-0014-20729/02	964527330000		M24x3	250	3		0.89
15	3-V-0015-20729/01	964534230000		M12x1.75	90	2		0.09
16	3-V-0016-20729/01	964534240000		M16x2	125	2		0.20
17	3-V-0017-20729/01	964534250000		M20x2.5	150	2.5		0.47
18	3-V-0018-20729	964651670000		M42x3	220	3		2.4
19	3-V-0019-20729	964660060000		M39x3	480	3		4.5
20	3-V-0020-20729	964653440000		M39x3	240	3		2.2
21	3-V-0021-20729	964653450000		M39x3	280	3		2.6
22	3-V-0022-20729	964654080000		M42x3	340	3		3.5
23	3-V-0023-20729	964655060000		M48x3	300	3		4.20
24	3-V-0024-20729	964654870000		M30	240	3		1.3
25	3-V-0025-20729	964655080000		M33	220	3.5		1.5
26	3-V-0026-20729/02	964524450000	A193 B16, CERTIFY	M30x3	185	3		1.03
27	3-V-0027-20729/02	964524460000		M30x3	280	3		1.55
28	3-V-0028-20729/02	964524470000		M42x3	440	3		4.79
29	3-V-0029-20729/02	964524480000		M48x3	520	3		7.39
30	3-V-0030-20729/02	964526860000		M20x2.5	195	2.5		0.48
31	3-V-0031-20729/02	964527060000		M30x3	270	3		1.49
32	3-V-0032-20729/02	964527340000		M36x3	270	3		2.04
33	3-V-0033-20729/02	964527350000		M36x3	500	3		3.78
34	3-V-0034-20729/02	964527360000		M36x3	310	3		2.34
35	3-V-0035-20729/02	964527370000		M20x2.5	165	2.5		0.52
36	3-V-0036-20729/02	964527380000		M22x2.5	180	2.5		0.54
37	3-V-0037-20729/02	964527390000		M24x3	190	3		0.68
38	3-V-0038-20729/02	964527400000		M24x3	210	3		0.75
39	3-V-0039-20729/02	964527410000		M24x3	250	3		0.89
40	3-V-0040-20729/01	964534260000		M12x1.75	90	2		0.09
41	3-V-0041-20729/01	964534270000		M16x2	125	2		0.20
42	3-V-0042-20729/01	964534280000		M20x2.5	150	2.5		0.47
43	3-V-0043-20729	964651700000		M42x3	220	3		2.4
44	3-V-0044-20729	964660070000		M39x3	480	3		4.5
45	3-V-0045-20729	964652610000		M39x3	240	3		2.2
46	3-V-0046-20729	964652620000		M39x3	280	3		2.6
47	3-V-0047-20729	964654090000		M42x3	340	3		3.5
48	3-V-0048-20729	964654150000		M27x3	180	3		0.8
49	3-V-0049-20729	964655740000		M33	220	3.5		1.5

12.5 / 3.2

NOTES:-

1. QUALITY REQUIREMENTS SHALL BE AS PER LATEST APPLICABLE QUALITY WORK INSTRUCTION.
* 2. PUNCH MATL.MARK B7 FOR A193-B7 AND B16 FOR A193-B16



NO OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

REV	DATE	ALTERED GANESH	REV	DATE	ALTERED GANESH
13	28.05.13	CHD & APPD K.RAJASEKARAN	12	14.03.13	CHD & APPD M.RAJAKUMAR
	SL. No. 49 INCLUDED.			SL. No. 25 INCLUDED.	

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		15.3.04	
CHD	K.RAJASEKARAN		15.3.04	
APPD	M.RAJAKUMAR		15.3.04	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF. TABLE	CAD REF:-T320729	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-20729	13

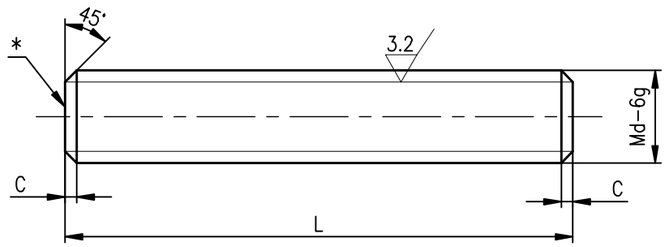
Size A3

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

DRAWING NO. 3-V-0000-21094

12.5 / 3.2

SL.NO.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS			NET WT. (IN KGS.)
				Md-6g	L	C	
1.	3-V-5178-21094	96 456 983 0000	ASTM A193-B7, QT, CERTIFY	M16	90	3	0.14
2.	3-V-2891-21094	96 456 984 0000		M16	100	3	0.15
3.	3-V-5176-21094	96 456 985 0000		M20	120	3	0.28
4.	3-V-B102-21094	96 456 986 0000		M20	140	3	0.33
5.	3-V-5174-21094	96 456 987 0000		M24	140	3	0.46
6.	3-V-0026-21094	96 453 449 0000	ASTM A193-B16, QT, CERTIFY	M22x2.5	170	2.5	0.51
7.	3-V-3208-21094	96 465 310 0000		M30	190	4	1.02
8.	3-V-3201-21094	96 465 311 0000		M24	130	3	0.46
9.	3-V-3204-21094	96 465 312 0000	ASTM A193-B7, QT, CERTIFY	M36x3	220	4	1.75
10.	3-V-3205-21094	96 465 313 0000	ASTM A193-B16, QT, CERTIFY	M36x3	220	4	1.75
11.	3-V-3318-21094	96 465 362 0000	ASTM A193-B16, QT, CERTIFY	M36x3	235	4	1.88
12	3-V-P566-21094	96 465 421 0000	ASTM A193-B16, QT, CERTIFY	M24	150	3	0.5



NOTE:

1. * PUNCH MATERIAL MARK B7 FOR A193 – B7 & B16 FOR A193 – B16.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI _620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		05.03.99	
CHD	K.RAJASEKARAN		06.03.99	
APPD	M.RAJAKUMAR		10.03.99	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF.TABLE	CAD REF: C321094	

CODE 320

TITLE: STUD

CARD CODE: U 01

DRAWING NO.: 3-V-0000-21094

REV: 04

REV	DATE	ALTERED	REV	DATE	ALTERED
04	05.07.11	CHD & APPD SSK & MRK	03	24.02.10	CHD & APPD : M.R.K
	SL.No.12 INCLUDED			SL. No. 11 INCLUDED.	

Size A3

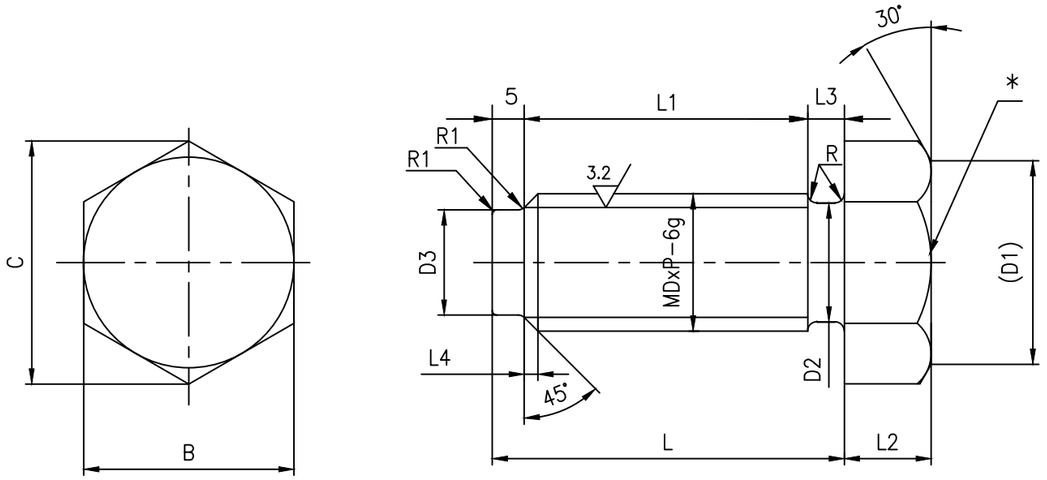
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-0000-21150

14000 12.5 3.2

SL No.	DRAWING No.	MATL. SPECN.	DIMENSIONS												WT(KG)
			MDxP-6g	(øD1)	øD2	øD3	L	L1	L2	L3	L4	R	C	B	
01	3-V-V401-21150 / 964535110000	A193 B7,CERTIFY	16x3	23	13.5	13	50	39	10	6	2	1.5	27.7	24	0.11
02	3-V-V417-21150 / 964535120000		24x3	34	20.5	19	70	55	15	10	3	2	41.6	36	0.36
03	3-V-V449-21150 / 964535130000		30x3	44	26.5	25	90	75	19	10	3	2	53.1	46	0.7
04	3-V-V465-21150 / 964535140000		36x3	53	32.5	31	120	105	23	10	3	2	63.5	55	1.33
09	3-V-V688-21150/1 / 964665230000		22X2.5	31	19.5	18	75	64	14	6	2	1.5	37	32	0.27

SL No.	DRAWING No.	MATL. SPECN.	DIMENSIONS												WT(KG)
			MDxP-6g	øD1	øD2	øD3	L	L1	L2	L3	L4	R	C	B	
05	3-V-V404-21150 / 964535150000	A193 B16,CERTIFY	16x3	23	13.5	13	50	39	10	6	2	1.5	27.7	24	0.11
06	3-V-V420-21150 / 964535160000		24x3	34	20.5	19	70	55	15	10	3	2	41.6	36	0.36
07	3-V-V452-21150 / 964535170000		30x3	44	26.5	25	90	75	19	10	3	2	53.1	46	0.7
08	3-V-V468-21150 / 964535180000		36x3	53	32.5	31	120	105	23	10	3	2	63.5	55	1.33
10	3-V-V566-21150/1 / 964660570000		22X2.5	31	19.5	18	75	64	14	6	2	1.5	37	32	0.27
11	3-V-V730-21150 / 964665510000		36x3	53	32.5	31	170	155	23	10	3	2	63.5	55	1.73



NOTES:-

1. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC 5:184
* 2. PUNCH MATL.MARK B7 FOR A193-B7
B7 FOR A193-B16

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

REDRAWN WITH REV. 03 ON 03.10.18

REV	DATE	ALTERED R.P.SINGH
03	03.10.18	CHD & APPD SSK & KRS

SL. No. 11 INCLUDED

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		22.10.15	
CHD	S.SATHEESH		22.10.15	
APPD	K.RAJASEKARAN		22.10.15	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S		CAD REF:-T321150	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
BOLT	U 01	3-V-0000-21150	03

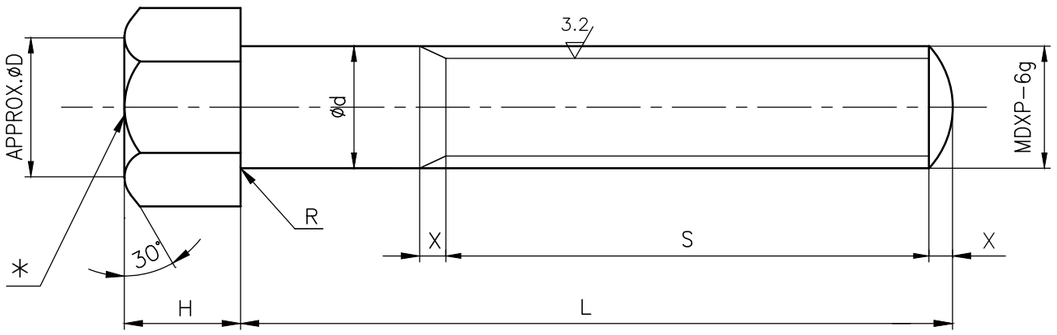
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

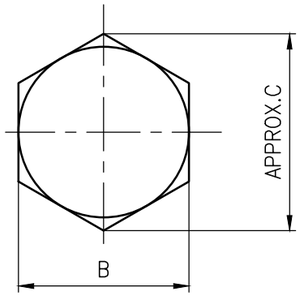
DRAWING NO. 3-V-0000-21152/4

12.5 / 3.2

SL No.	DRAWING No. / COMP.CODE	MATL. SPECN.	DIMENSIONS MDxP-6g	L	S	ød	øD	X	H	R	B	C	Wt(kg)
01	3-V-V105-21152/1 / 964535270000	A193-B7,CERTIFY	16x2	60	38	16	23	4	10	0.6	24	27.7	0.12
02	3-V-V145-21152/1 / 964535310000		22x2.5	70	36	22	31	5	14	0.8	32	37	0.26
03	3-V-V449-21152/1 / 964535330000		30x3.5	105	66	30	44	7	19	1	46	53.1	0.75
04	3-V-V297-21152/1 / 964535450000		22x2.5	65	36	22	31	5	14	0.8	32	37	0.25
05	3-V-V465-21152/1 / 964535600000		36x4	115	56	36	53	8	23	1	55	63.5	1.32
15	3-V-V679-21152 / 964663590000		36x4	125	70	36	53	8	23	1	55	63.5	1.45

SL No.	DRAWING No. / COMP.CODE	MATL. SPECN.	DIMENSIONS MDxP-6g	L	S	ød	øD	X	H	R	B	C	Wt(kg)
06	3-V-V108-21152/1 / 964535280000	A193-B16,CERTIFY	16x2	60	38	16	23	4	10	0.6	24	27.7	0.12
07	3-V-V084-21152/1 / 964535300000		20x2.5	55	32	20	29	5	13	0.8	30	34.6	0.21
08	3-V-V148-21152/1 / 964535320000		22x2.5	70	36	22	31	5	14	0.8	32	37	0.26
09	3-V-V452-21152/1 / 964535340000		30x3.5	105	66	30	44	7	19	1	46	53.1	0.75
10	3-V-V300-21152/1 / 964535460000		M22x2.5	65	36	22	31	5	14	0.8	32	37	0.25
11	3-V-V180-21152/1 / 964535560000		M24x3	90	54	24	34	6	15	0.8	36	41.6	0.43
12	3-V-V201-21152/1 / 964535570000		M16x2	50	38	16	23	4	10	0.6	24	27.7	0.10
13	3-V-V433-21152/1 / 964535580000		M24x3	75	54	24	34	6	15	0.8	36	41.6	0.37
14	3-V-V468-21152/1 / 964535590000		M36x4	115	56	36	53	8	23	1	55	63.5	1.32





NOTES:-

1. * PUNCH MATL MARK B7 FOR A193-B7
   B16 FOR A193-B16
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST APPLICABLE QUALITY WORK INSTRUCTIONS.

REDRAWN WITH REV.3 ON 12.04.08

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

365-121

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		12.04.08	
CHD	K.RAJASEKARAN		12.04.08	
APPD	M.RAJAKUMAR		12.04.08	

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

TITLE	CARD CODE	DRAWING NO.	REV
BOLT	U 01	3-V-0000-21152	4

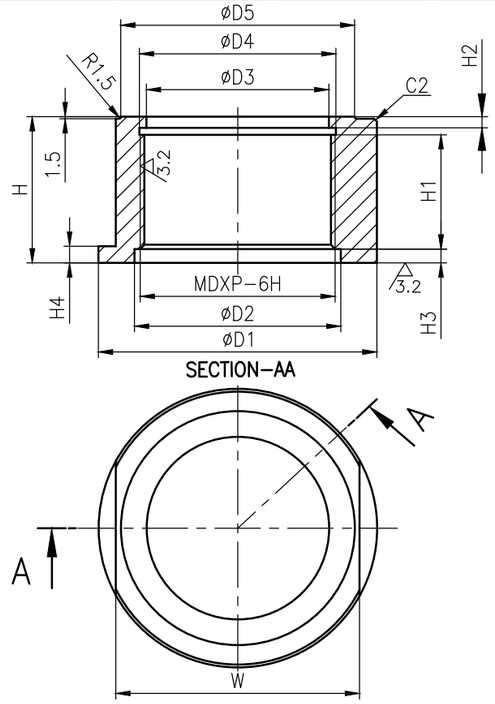
REV	DATE	ALTERED VB	REV	DATE	ALTERED VB
4	03.03.16	CHD & APPD SSK & KRS	3	12.04.08	CHD & APPD KRS & M.R.K
ZONE	SL. No.15 INCLUDED.		DRAWING CONVERTED AS SOFT COPY		
			DCP No.800813		

Size A3

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

DRAWING NO. 3-V-0000-22026

SL. No.	DRAWING No.	MATL. SPECN.		COMP. CODE	NET WT(kg)	SCRAP SORT	DIMENSIONS												SIZE/RATING	SUGGESTED SIZE (RAW MATL)	GROSS WT	TOA DRG.NO.
							MDXP-6H	øD1	øD2	øD3	øD4	øD5	H	H1	H2	H3	H4	W				
01	3-V-L802-22026/1	SA105-NR	PRODUCT ATTEST	931140370000	1.51	10	M48 X 3	88	53	41	49	58	50	33	5	7	8	75	12"/150C	ø90 X 57	2.9	4-E46697
02	3-V-Z080-22026	A182 F316 SH		932032770000	1.51	46														ø90 X 57	2.9	
03	3-V-L803-22026/1	SA105-NR		931140380000	2.1	10	M56 X 3	98	61	51	57	70	58	38	6	9	10	85	16"/150C	ø100 X 65	4.0	4-E46698
04	3-V-L804-22026/1			931140390000	5.57	10	M80 X 3	140	85	71	81	95	76	56	6	9	10	120	24"/150C	ø140 X 85	10.3	4-E46702
05	3-V-L805-22026/02	SA182-F22 CL3 NT		931140400000	2.7	20	M64 X 3	110	72	56	65	85	63	43	6	9	10	95	18"/600C	ø110 X 70	5.2	4-E70594
06	3-V-L801-22026/02			931140360000	0.76	20	M36 X 3	68	41	31	37	45	40	23	5	7	0	60	8"/300C	ø70 X 47	1.2	4-E46696
07	3-V-L808-22026/01			931145410000	2.1	20	M56 X 3	98	61	51	57	70	58	38	6	9	10	85	16"/150C	ø100 X 65	4.0	4-E46698
08	3-V-L807-22026/01			931145490000	1.51	20	M48 X 3	88	53	41	49	58	50	33	5	7	8	75	12"/150C	ø90 X 58	2.9	4-E46697
09	3-V-L809-22026/01			931145500000	5.57	20	M80 X 3	140	85	71	81	95	76	56	6	9	10	120	24"/150C	ø140 X 84	10.2	4-E46702
10	3-V-L806-22026	SA105 NR		931145510000	0.76	10	M36 X 3	68	41	31	37	45	40	23	5	7	0	60	8"/300C	ø70 X 47	1.4	4-E46696
11	3-V-L705-22026/01			931148320000	1.69	10	M60 X 3	105	61	51	61	70	60	40	6	9	10	90	20"/150C,300C	ø105 X 67	4.6	4-E46699
12	3-V-L706-22026/02	A182-F22 CL3 NT		931148330000	1.69	20	M60 X 3	105	61	51	61	70	60	40	6	9	10	90	16"/300C	ø105 X 67	4.6	
13	3-V-L751-22026/02			931148340000	7.4	20	M90 X 2	155	96	81	91	105	88	68	6	9	10	135	24"/600C	ø155 X 95	14.1	4-E68415
14	3-V-L793-22026/01			931171810000	9.0	20	M120 X 3	170	128	111	121	135	105	82	8	10	12	155	32"/600C	ø170 X 112	20.0	-
15	3-V-L791-22026/01			931172440000	9.1	20	M120 X 3	180	128	111	121	135	115	92	8	10	12	160	32"/150C	ø180 X 122	24.4	-
16	3-V-L789-22026	A105 NR		931172430000		10																



12.5 / 3.2

NOTE:

01. SHARP CORNERS ARE TO BE ROUNDED OFF.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

REV	DATE	ALTERED	
08	6.3.14	CHD & APPD	S.SARANYA S.S.K&K.R.S

DRAWING No.3-V-Z080-22026 INCLUDED

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

DRAWING REDRAWN ON. 06.03.2014

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M.P.S		06.08.92	–
CHD	P.R.K		06.08.92	
APPD	S.K		06.08.92	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS.	REF.TABLE		–
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
DISC NUT	U 01	3-V-0000-22026	08

Size A3

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

DRAWING NO. 3-V-0000-22457

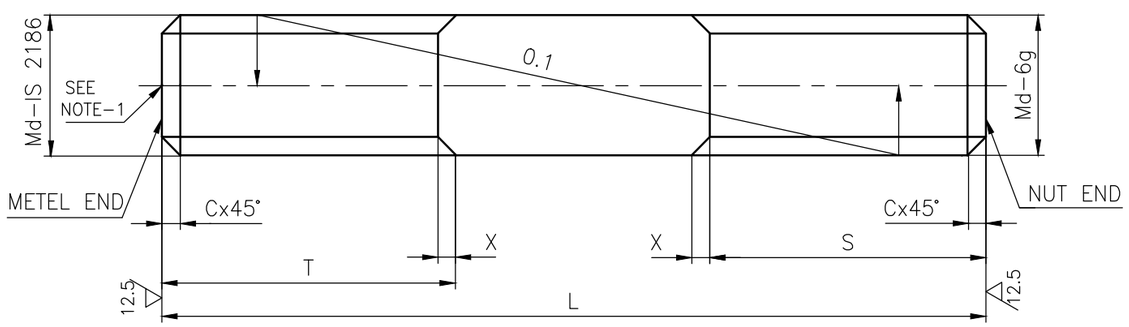
SL NO	DRAWING NO	MATL SPECN	DIMENSIONS						WT IN Kg	COMP CODE	ALT CODE	DESCRIPTION
			Md	L	T	S	X	C				
01	3-V-L850-22457/02	A193-B16-QT-CERT	M16X2	65	21	30	3	2	0.102	964620090000	931147910000	M16x65x21x30
02	3-V-L801-22457/03	A193-B16-QT-CERT	M20x2.5	110	26	50	3.75	2.5	0.234	964621040000	931147920000	M20x110x26x50
03	3-V-L841-22457/03	A193-B7-QT-CERT	M22X2.5	120	28	54	3.75	2.5	0.313	964605170000	–	M22x120x28x54
04	3-V-L842-22457/02	A193-B7-QT-CERT	M16X2	65	21	30	3	2	0.102	964605130000	–	M16x65x21x30
05	3-V-L857-22457/02	A193-B7-QT-CERT	M16X2	70	21	30	3	2	0.111	964605140000	–	M16x70x21x30
06	3-V-L803-22457/03	A193-B7-QT-CERT	M24X3	130	32	53	4.5	3	0.603	964605180000	–	M24x130x32x53
07	3-V-L805-22457/02	A193-B16-QT-CERT	M16X2	80	21	30	3	2	0.134	964620100000	931147930000	M16x80x21x30
08	3-V-L809-22457/02	A193-B16-QT-CERT	M30x3	150	38	48	4.5	3	0.832	964621060000	931147940000	M30x150x38x48
09	3-V-L825-22457/03	A193-B7-QT-CERT	M20X2.5	100	26	50	3.75	2.5	0.209	964605350000	–	M20x100x26x50
10	3-V-L833-22457/03	A193-B16-QT-CERT	M20X2.5	100	26	50	3.75	2.5	0.209	964621070000	931147950000	M20x100x26x50
11	3-V-L849-22457/03	A193-B16-QT-CERT	M22X2.5	120	28	54	3.75	2.5	0.313	964620560000	931147960000	M22x120x28x54
12	3-V-L858-22457/02	A193-B7-QT-CERT	M24X3	120	32	43	4.5	3	0.426	964605380000	–	M24x120x32x43
13	3-V-L866-22457/02	A193-B16-QT-CERT	M24X3	120	32	43	4.5	3	0.426	964621080000	931147970000	M24x120x32x43
14	3-V-L889-22457/03	A193-B7-QT-CERT	M36x3	200	44	59	4.5	3	1.478	964605400000	–	M36x200x44x59
15	3-V-L897-22457/03	A193-B16-QT-CERT	M36x3	200	44	59	4.5	3	1.478	964620550000	931147980000	M36x200x44x59
16	3-V-L865-22457/02	A193-B16-QT-CERT	M16X2	70	21	30	3	2	0.110	964620610000	931147990000	M16x70x21x30
17	3-V-L890-22457/02	A193-B7-QT-CERT	M16X2	75	21	30	3	2	0.118	964605430000	–	M16x75x21x30
18	3-V-L898-22457/02	A193-B16-QT-CERT	M16X2	75	21	30	3	2	0.118	964621090000	931148000000	M16x75x21x30
19	3-V-L794-22457/04	A193-B16-QT-CERT	M24X3	165	30	70	4.5	3	0.585	964621100000	931171880000	M24x165x30x70
20	3-V-L793-22457/02	A193-B16-QT-CERT	M16X2	85	20	30	3	2	0.134	964620540000	931171890000	M16x85x20x30
21	3-V-L790-22457/03	A193-B16-QT-CERT	M30x3	185	38	63	4.5	3	0.942	964621110000	931172170000	M30x185x38x63
22	3-V-L789-22457/03	A193-B7-QT-CERT	M30x3	185	38	63	4.5	3	0.942	964607020000	–	M30x185x38x63
23	3-V-L979-22457/02	A193-B7-QT-CERT	M12X1.75	48	13	25	3.5	2	0.420	964607030000	–	M12x48x13x25
24	3-V-L529-22457/01	A193-B7-QT-CERT	M27x3	145	40	55	4.5	2	0.720	964608150000	–	M27x145x40x55
25	3-V-L603-22457/01	A193-B7-QT-CERT	M16x2	55	16	21	3	2	0.086	964621120000	931223550000	M16x55x16x21
26	3-V-L604-22457/01	A193-B16-QT-CERT	M16x2	55	16	21	3	2	0.086	964621130000	931223560000	M16x55x16x21
27	3-V-Z116-22457	A193-B8MA-QT-CERT	M20X2.5	100	26	50	3.75	2.5	0.209	964658870000	–	M20x100x26x50

3.2 / 12.5

15&17

NOTES

01. PUNCH MATL MARK B7 FOR A193-B7, B16 FOR A193-B16 & B8MA FOR A193-B8MA.
02. LATEST APPLICABLE QUALITY PROCEDURE SHALL BE FOLLOWED
03. BLACKENING TO BE DONE



REV	DATE	ALTERED R.P.SINGH
12	19.02.19	CHD & APPD SSK & KRS

SL No. 27 INCLUDED.
NOTE SL No. 01 ALTERED.

REV	DATE	ALTERED JALAL
11	19.12.15	CHD & APPD ATHIANNAVI

MATL CODE 96462009 WAS 96462103 IN S.NO. 1
MATL CODE 96462010 WAS 96462105 IN S.NO. 7

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M P S	M P S	16.06.97	
CHD	P R K	P R K	16.06.97	
APPD	S C S	S C S	16.06.97	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N.T.S	– –	———	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-22457	12

Size A3

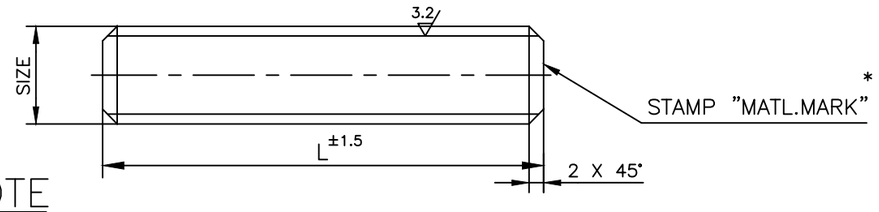
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-0000-23248

SL.No	DRAWING No.	MATERIAL	MATL. CODE	SIZE	L	WEIGHT IN Kgs.	MATL.MARK *
01	3-V-F522-23248/01	ASTM A193 Gr. B16	96 456 882 0000	7/8"-9UNC-2A	150	0.45	B16
02	3-V-F523-23248/01		96 456 883 0000	3/4"-10UNC-2A	133	0.30	B16
03	3-V-F524-23248/01		96 456 884 0000	1"-8UNC-2A	170	0.71	B16
04	3-V-F525-23248/01		96 456 885 0000	1.1/4"-8UN-2A	215	1.34	B16
05	3-V-F526-23248/01		96 456 886 0000	1.1/8"-8UN-2A	220	1.41	B16
06	3-V-F527-23248/02		96 456 887 0000	1.1/4"-8UN-2A	250	1.74	B16
07	3-V-0001-23248	ASTM A193 Gr. B8M	96 465 635 0000	1/2"-13UNC-2A	80	0.08	B8M
08	3-V-0002-23248		96 465 636 0000	5/8"-11UNC-2A	86	0.13	B8M
09	3-V-0003-23248		96 465 637 0000	5/8"-11UNC-2A	105	0.16	B8M
10	3-V-0004-23248		96 465 638 0000	5/8"-11UNC-2A	118	0.18	B8M
11	3-V-0005-23248		96 465 639 0000	3/4"-10UNC-2A	120	0.26	B8M
12	3-V-0006-23248		96 465 640 0000	3/4"-10UNC-2A	133	0.29	B8M
13	3-V-0007-23248		96 465 641 0000	7/8"-9UNC-2A	150	0.45	B8M
14	3-V-0008-23248		96 465 642 0000	1"-8UNC-2A	135	0.53	B8M
15	3-V-0009-23248		96 465 643 0000	1"-8UNC-2A	158	0.62	B8M
16	3-V-0010-23248		96 465 644 0000	1"-8UNC-2A	170	0.67	B8M
17	3-V-0011-23248		96 465 645 0000	1.1/8"-8UN-2A	180	0.90	B8M
18	3-V-0012-23248		96 465 646 0000	1.1/4"-8UN-2A	215	1.32	B8M
19	3-V-0013-23248		96 465 647 0000	1.1/4"-8UN-2A	250	1.54	B8M
20	3-V-0014-23248		96 465 769 0000	7/8"-9UNC-2A	120	0.36	B8M
21	3-V-0016-23248		96 465 830 0000	1.1/8"-8UN-2A	140	0.87	B8M

SL.No	DRAWING No.	MATERIAL	MATL. CODE	SIZE	L	WEIGHT IN Kgs.	MATL.MARK *
22	3-V-0017-23248	ASTM A193 Gr. B7M	96 465 854 0000	1/2"-13UNC-2A	80	0.08	B7M
23	3-V-0018-23248		96 465 855 0000	5/8"-11UNC-2A	86	0.13	B7M
24	3-V-0019-23248		96 465 856 0000	5/8"-11UNC-2A	105	0.16	B7M
25	3-V-0020-23248		96 465 857 0000	5/8"-11UNC-2A	118	0.18	B7M
26	3-V-0021-23248		96 465 858 0000	3/4"-10UNC-2A	120	0.26	B7M
27	3-V-0022-23248		96 465 859 0000	3/4"-10UNC-2A	133	0.29	B7M
28	3-V-0023-23248		96 465 860 0000	7/8"-9UNC-2A	150	0.45	B7M
29	3-V-0024-23248		96 465 861 0000	1"-8UNC-2A	135	0.53	B7M
30	3-V-0025-23248		96 465 862 0000	1"-8UNC-2A	158	0.62	B7M
31	3-V-0026-23248		96 465 863 0000	1"-8UNC-2A	170	0.67	B7M
32	3-V-0027-23248		96 465 864 0000	1.1/8"-8UN-2A	180	0.90	B7M
33	3-V-0028-23248		96 465 865 0000	1.1/4"-8UN-2A	215	1.32	B7M
34	3-V-0029-23248		96 465 866 0000	1.1/4"-8UN-2A	250	1.54	B7M
35	3-V-0030-23248		96 465 867 0000	7/8"-9UNC-2A	120	0.36	B7M
36	3-V-0031-23248		96 465 868 0000	1.1/8"-8UN-2A	140	0.87	B7M

12.5 / 3.2



NOTE

01. FOR QUALITY REQUIREMENTS: REFER LATEST APPLICABLE PROCEDURE.

REV	DATE	ALTERED		REV	DATE	ALTERED	
06	09.06.18	R.P.SINGH CHD & APPD	SSK & KRS	05	26.03.18	RPS CHD & APPD	SSK KRS
		SL. No. 22 TO 36 INCLUDED				SL. Nos. 21 INCLUDED	

–	–	–	–	–	–	–	–	–	–
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF CUSTOMER/PROJECT

REDRAWN WITH REV.5 ON 26.03.18

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M.SRINIVASAN		18.05.98	
CHD	K.S.RAMAN		18.05.98	
APPD	N.NAGARAJAN		18.05.98	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF.TABLE	B16 & B7M CAD :C323248	

CODE	TITLE	CARD CODE	DRAWING NO.	REV
320	STUD	U 01	3-V-0000-23248	06

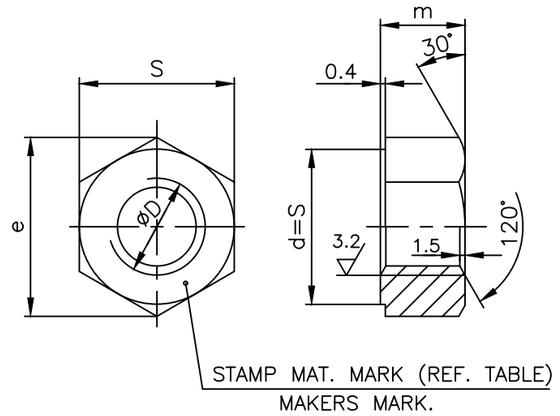
Size A3

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

DRAWING NO. 3-V-0000-23249

SL. No.	DRAWING No.	COMP. CODE	MATL. SPECN.	S		e		m		øD	MATL. MARK	NET WT. (Kg.)
				MAX.	MIN.	MAX.	MIN.	MAX.	MIN.			
01	3-V-F522-23249/02	96 456 888 0000	ASTM A194 – Gr.7	36.52	35.41	42.16	40.37	22.47	21.16	7/8"-9 UNC -2B	GR.7	0.11
02	3-V-F523-23249/02	96 456 889 0000	ASTM A194 – Gr.7	31.75	30.78	36.65	35.10	19.25	18.03	3/4"-10 UNC -2B	GR.7	0.08
03	3-V-F524-23249/02	96 456 890 0000	ASTM A194 – Gr.7	41.28	40.01	47.65	45.62	25.70	24.28	1"-8 UNC -2B	GR.7	0.17
04	3-V-F525-23249/02	96 456 891 0000	ASTM A194 – Gr.7	50.80	49.23	58.65	56.11	31.78	30.15	1.1/4"-8 UN -2B	GR.7	0.27
05	3-V-F526-23249/02	96 456 892 0000	ASTM A194 – Gr.7	46.02	44.60	53.16	50.85	29.93	27.41	1.1/8"-8 UN -2B	GR.7	0.22
06	3-V-0001-23249	96 465 648 0000	ASTM A194 – Gr.8M	22.22	21.59	25.65	24.61	12.80	11.79	1/2"-13 UNC -2B	GR.8M	0.02
07	3-V-0002-23249	96 465 649 0000	ASTM A194 – Gr.8M	26.97	26.19	31.17	29.85	16.03	14.91	5/8"-11 UNC -2B	GR.8M	0.03
08	3-V-0003-23249	96 465 650 0000	ASTM A194 – Gr.8M	31.75	30.78	36.65	35.10	19.25	18.03	3/4"-10 UNC -2B	GR.8M	0.08
09	3-V-0004-23249	96 465 651 0000	ASTM A194 – Gr.8M	36.52	35.41	42.16	40.37	22.47	21.16	7/8"-9 UNC -2B	GR.8M	0.11
10	3-V-0005-23249	96 465 652 0000	ASTM A194 – Gr.8M	41.28	40.01	47.65	45.62	25.70	24.28	1"-8 UNC -2B	GR.8M	0.17
11	3-V-0006-23249	96 465 653 0000	ASTM A194 – Gr.8M	46.02	44.60	53.16	50.85	29.93	27.41	1.1/8"-8 UN -2B	GR.8M	0.22
12	3-V-0007-23249	96 465 654 0000	ASTM A194 – Gr.8M	50.80	49.23	58.65	56.11	31.78	30.15	1.1/4"-8 UN -2B	GR.8M	0.27
13	3-V-0008-23249	96 465 847 0000	ASTM A194 – Gr.2HM	22.22	21.59	25.65	24.61	12.80	11.79	1/2"-13 UNC -2B	GR.2HM	0.02
14	3-V-0009-23249	96 465 848 0000	ASTM A194 – Gr.2HM	26.97	26.19	31.17	29.85	16.03	14.91	5/8"-11 UNC -2B	GR.2HM	0.03
15	3-V-0010-23249	96 465 849 0000	ASTM A194 – Gr.2HM	31.75	30.78	36.65	35.10	19.25	18.03	3/4"-10 UNC -2B	GR.2HM	0.08
16	3-V-0011-23249	96 465 850 0000	ASTM A194 – Gr.2HM	36.52	35.41	42.16	40.37	22.47	21.16	7/8"-9 UNC -2B	GR.2HM	0.11
17	3-V-0012-23249	96 465 851 0000	ASTM A194 – Gr.2HM	41.28	40.01	47.65	45.62	25.70	24.28	1"-8 UNC -2B	GR.2HM	0.17
18	3-V-0013-23249	96 465 852 0000	ASTM A194 – Gr.2HM	46.02	44.60	53.16	50.85	29.93	27.41	1.1/8"-8 UN -2B	GR.2HM	0.22
19	3-V-0014-23249	96 465 853 0000	ASTM A194 – Gr.2HM	50.80	49.23	58.65	56.11	31.78	30.15	1.1/4"-8 UN -2B	GR.2HM	0.27

12.5 / 3.2



NOTE:

1. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE QUALITY PROCEDURE.
2. SUITABLE OIL PRESERVATIVE SHALL BE APPLIED.

REV	DATE	ALTERED / CHD & APPD	
04	09.06.18	ALTERED R.P.SINGH / CHD & APPD SSK & KRS	SL. No. 13 TO 19 INCLUDED
03	27.02.15	ALTERED A.MARIMUTHU / CHD & APPD MS & SSK	SL. No. 06 TO 12 INCLUDED
02	28.05.01	ALTERED T.R.R.MURTHY / CHD & APPD K.S.RAMAN	A194 Gr.4 REVISED TO A194 Gr.7 REFER DCN.CS:1147 (DCN:CS:1039)
01	27.09.99	ALTERED M.SRINIVASAN / CHD & APPD K.S.RAMAN	IN NOTE 2 GALVANISING ELIMINATED AND OIL PRESERVATIVE INCLUDED.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M.SRINIVASAN		22.04.96	
CHD	N.DHANAPAL		23.04.96	
APPD	A.VISWANATHAN		23.04.96	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL / CODE 320	NTS	REF. TABLE	CAD: F323249	

TITLE	CARD CODE	DRAWING NO.	REV
HEX NUT	U 01	3-V-0000-23249	04

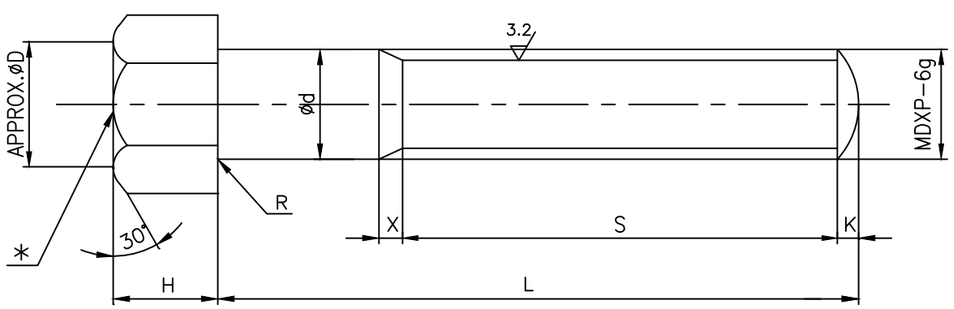
Size A3

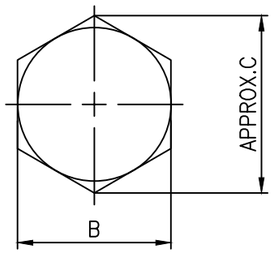
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-0000-25679

12.5 / 3.2

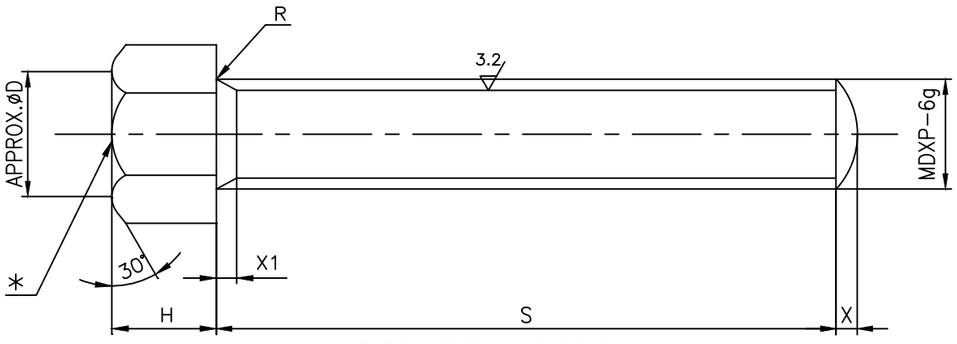
SL No.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS														NET WT (Kgs)	REMARKS
				MD	P	L	S	H	K	X	X1	R	ød	øD	B	C			
01	3-V-0001-25679	964657700000	ASTM A193 B8M CERTIFY	M16	2	55	55	10	–	4	6	0.6	16	23	24	27.7			0.116	





NOTES:

1. * PUNCH MATERIAL MARK B8M FOR A193 B8M.
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC.5:164



IN CASE OF FULL THREAD

REV	DATE	ALTERED	D.JEYASRI
01	08.08.17	CHD & APPD	SSK & KRS

DRAWING UPDATED

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.ANITHA		01.09.16	
CHD	S.SATHEESKUMAR		01.09.16	
APPD	K.RAJASEKARAN		01.09.16	

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

TITLE	CARD CODE	DRAWING NO.	REV
BOLT	U 01	3-V-0000-25679	01

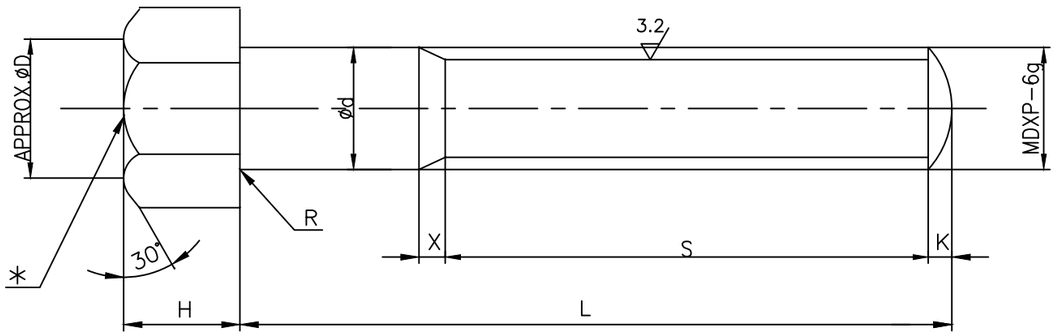
Size A3

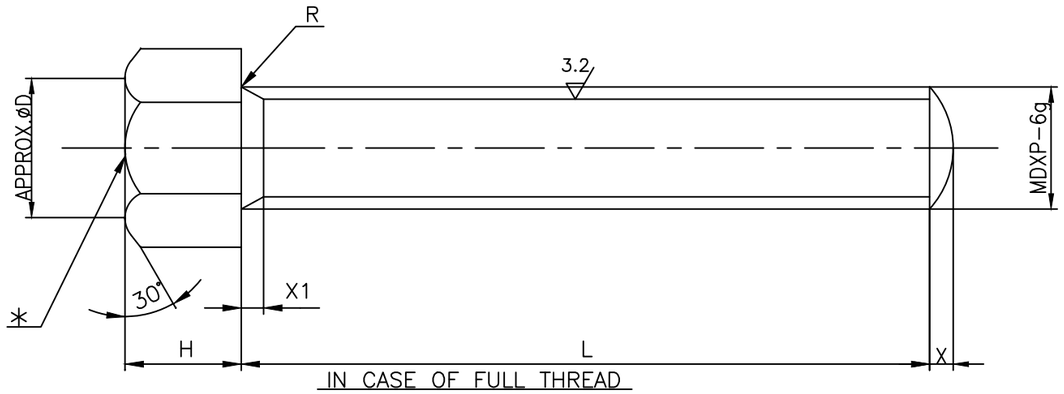
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-0000-25708

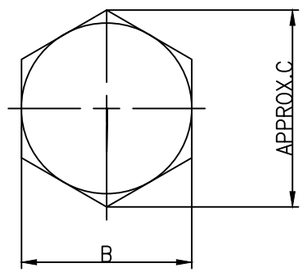
12.5 / 3.2

SL No.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS													FINISHED WT IN KGS
				Md	P	L	S	H	K	X	X1	R	ød	øD	B	C	
01	3-V-0001-25708	964657840000	ASTM A193 B8M, CERTIFY	M12	1.75	100	65	8	–	3.5	5	0.6	12	18	19	21.9	0.1
02	3-V-0002-25708	964658920000		M12	1.75	60	30	8	–	3.5	5	0.6	12	18	19	21.9	0.07





IN CASE OF FULL THREAD



NOTES:

1. * PUNCH MATERIAL MARK B8M FOR A193-B8M.
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC 5:164.

REV	DATE	ALTERED R.P.SINGH
01	31.08.18	CHD & APPD SSK & KRS

SL. No. 2 INCLUDED.

NO OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	T.SANGEETHA		02.02.17	
CHD	S.SATHEES		02.02.17	
APPD	K.RAJASEKARAN		02.02.17	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	–	PT-42	

CODE 320

TITLE	CARD CODE	DRAWING NO.	REV
HEX BOLT	U 01	3-V-0000-25708	01

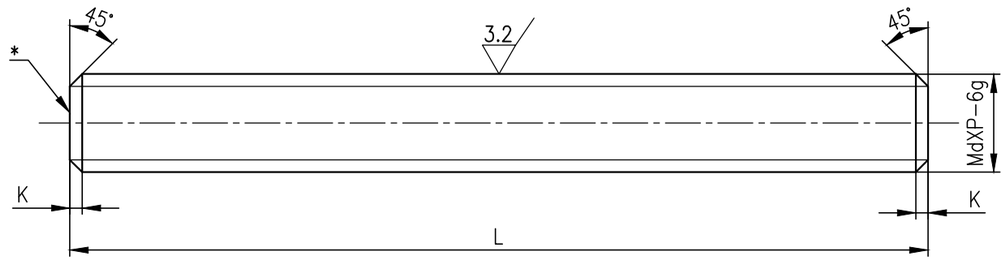
Size A3

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

DRAWING NO. 3-V-0000-25897
CORPORATE DRG ID:TP-DG-3-V-0000-25897/01

12.5 3.2

SL.NO.	DRAWING NO.	COMP. CODE	MATL. SPECN.		DIMENSIONS			NET WT. (IN KGS.)
				Md	P	L	K	
1.	3-V-0001-25897	964658350000	A 193-B8M, CERTIFY	M10	1.5	55	2	0.034
2.	3-V-0002-25897	964658360000		M16	2	55	2.5	0.087
3.	3-V-0003-25897	964658310000		M20	2.5	130	2.5	0.320
4.	3-V-0004-25897	964658320000		M20	2.5	150	2.5	0.370
5.	3-V-0005-25897	964658340000		M27	3	180	2.5	0.809
6.	3-V-0006-25897	964658330000		M30	3	185	2.5	1.027
7.	3-V-0007-25897	964658930000		M24	3	150	2.5	0.55
8.	3-V-0008-25897	964658940000		M33	3.5	220	2.5	1.5



NOTES :

1. * PUNCH MATERIAL MARK B8M FOR A193 – B8M
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST APPLICABLE QUALITY WORK INSTRUCTION.

REV	DATE	ALTERED	R.P.SINGH
01	29.10.18	CHD & APPD	SSK & KRS

SL.No.7 & 8 INCLUDED

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.P.SINGH		27.03.18	
CHD	S.SATHEES		27.03.18	
APPD	K.RAJASEKARAN		27.03.18	

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

TITLE: STUD
CARD CODE: U 01
DRAWING NO.: 3-V-0000-25897
REV: 1

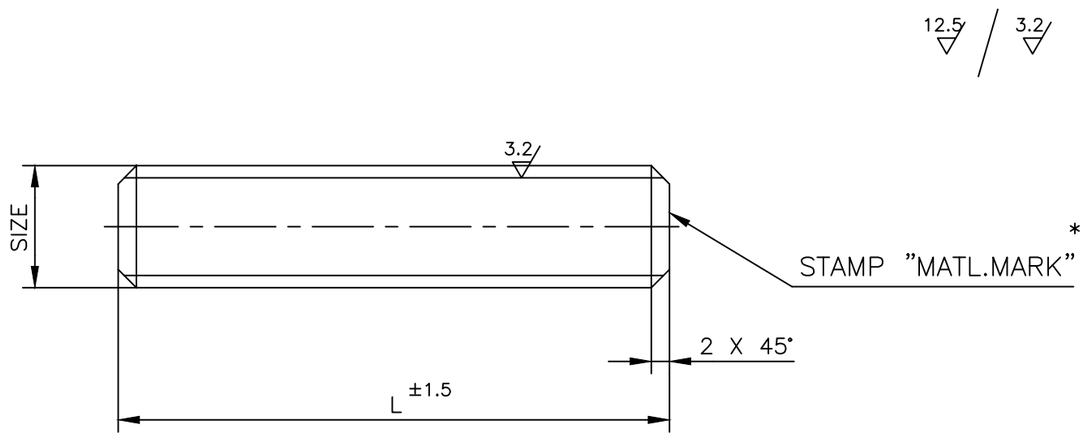
Size A3

CORPORATE DRG ID:TP-DG-3-V-0000-25897/01

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

DRAWING NO. 3-V-0000-31170

SL.No	DRAWING No.	MATL. CODE	MATERIAL	SIZE	L	WEIGHT IN Kgs.	MATL.MARK *
01	3-V-0001-31170	96 465 786 0000	ASTM A193 B8MA CERTIFY	1/2"-13UNC-2A	80	0.08	B8MA
02	3-V-0002-31170	96 465 815 0000		5/8"-11UNC-2A	86	0.13	
03	3-V-0003-31170	96 465 797 0000		5/8"-11UNC-2A	105	0.16	
04	3-V-0004-31170	96 465 816 0000		5/8"-11UNC-2A	118	0.18	
05	3-V-0005-31170	96 465 817 0000		3/4"-10UNC-2A	120	0.26	
06	3-V-0006-31170	96 465 818 0000		3/4"-10UNC-2A	133	0.29	
07	3-V-0007-31170	96 465 819 0000		7/8"-9UNC-2A	150	0.45	
08	3-V-0008-31170	96 465 820 0000		7/8"-9UNC-2A	120	0.36	
09	3-V-0009-31170	96 465 804 0000		1"-8UNC-2A	135	0.53	
10	3-V-0010-31170	96 465 821 0000		1"-8UNC-2A	158	0.62	
11	3-V-0011-31170	96 465 822 0000		1"-8UNC-2A	170	0.67	
12	3-V-0012-31170	96 465 801 0000		1 1/8"-8UN-2A	140	0.71	
13	3-V-0013-31170	96 465 823 0000		1 1/8"-8UN-2A	180	0.90	
14	3-V-0014-31170	96 465 824 0000		1 1/4"-8UN-2A	215	1.32	
15	3-V-0015-31170	96 465 825 0000		1 1/4"-8UN-2A	250	1.54	
16	3-V-0016-31170	96 465 881 0000		1 1/4"-8UN-2A	180	0.97	



NOTE

01. FOR QUALITY REQUIREMENTS: REFER LATEST APPLICABLE PROCEDURE.
02. SUITABLE OIL PRESERVATIVE SHALL BE APPLIED.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

REV	DATE	ALTERED R.P.SINGH
01	31.08.18	CHD & APPD SSK & KRS
		SL. No. 16 INCLUDED.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.P.SINGH		23.01.18	
CHD	S.SATHEESKUMAR		23.01.18	
APPD	K.RAJASEKARAN		23.01.18	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF.TABLE		

CODE	TITLE	CARD CODE	DRAWING NO.	REV
320	STUD	U 01	3-V-0000-31170	01

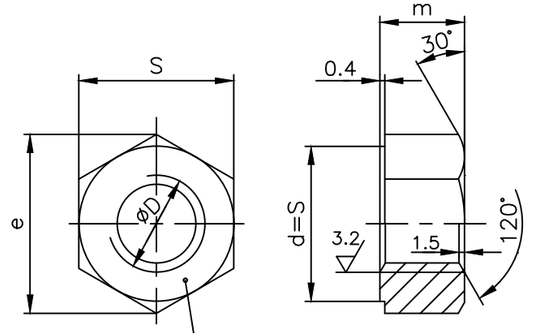
Size A3

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

DRAWING NO. 3-V-0000-31171

SL. No.	DRAWING No.	COMP. CODE	MATL. SPECN.	S		e		m		øD	MATL. MARK	NET WT. (Kg.)
				MAX.	MIN.	MAX.	MIN.	MAX.	MIN.			
01	3-V-0001-31171	96 465 787 0000	ASTM A194-B8MA CERTIFY	22.22	21.59	25.65	24.61	12.80	11.79	1/2"-13 UNC -2B	B8MA	0.02
02	3-V-0002-31171	96 465 798 0000		26.97	26.19	31.17	29.85	16.03	14.91	5/8"-11 UNC -2B		0.03
03	3-V-0003-31171	96 465 826 0000		31.75	30.78	36.65	35.10	19.25	18.03	3/4"-10 UNC -2B		0.08
04	3-V-0004-31171	96 465 827 0000		36.52	35.41	42.16	40.37	22.47	21.16	7/8"-9 UNC -2B		0.11
05	3-V-0005-31171	96 465 802 0000		41.28	40.01	47.65	45.62	25.70	24.28	1"-8 UNC -2B		0.17
06	3-V-0006-31171	96 465 803 0000		46.02	44.60	53.16	50.85	29.93	27.41	1 1/8"-8 UN -2B		0.22
07	3-V-0007-31171	96 465 828 0000		50.80	49.23	58.65	56.11	31.78	30.15	1 1/4"-8 UN -2B		0.27

12.5 / 3.2



NOTE:

1. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE QUALITY PROCEDURE.
2. SUITABLE OIL PRESERVATIVE SHALL BE APPLIED.

REV	DATE	ALTERED
		CHD & APPD

–	–	–	–	–	–	–	–	–	–
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	R.P.SINGH		23.01.18	
CHD	S.SATHEESKUMAR		23.01.18	
APPD	K.RAJASEKARAN		23.01.18	

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

TITLE	CARD CODE	DRAWING NO.	REV
HEX NUT	U 01	3-V-0000-31171	0

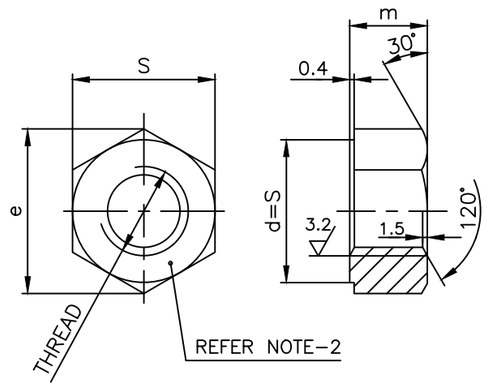
Size A3

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

DRAWING NO. 3-V-0000-95178/08

SL. No.	DRAWING No.	COMP. CODE	MATL. SPECN.	S		e		m		THREAD	MATL. MARK	NET WT. (Kg.)
				MAX.	MIN.	MAX.	MIN.	MAX.	MIN.			
01	3.V.M357.95178/03	96 456 484	ASTM A194 Gr.7,HT,CERTIFY	26.97	26.19	31.17	29.85	16.03	14.91	5/8"-11 UNC-2B	Gr.7	0.033
02	3.V.M359.95178/03	96 456 486	ASTM A194 Gr.7,HT,CERTIFY	31.75	30.78	36.65	35.10	19.25	18.03	3/4"-10 UNC-2B	Gr.7	0.076
03	3.V.N301.95178/02	96 456 578	ASTM A194 Gr.7,HT,CERTIFY	22.22	21.59	25.65	24.61	12.80	11.79	1/2"-13 UNC-2B	Gr.7	0.021
04	3.V.N304.95178/02	96 456 579	ASTM A194 Gr.7,HT,CERTIFY	41.28	40.09	47.65	45.62	25.70	24.28	1"-8 UNC-2B	Gr.7	0.165
05	3.V.N309.95178/02	96 456 580	ASTM A194 Gr.7,HT,CERTIFY	46.02	44.60	53.16	50.85	28.93	27.41	1-1/8"-8 UN-2B	Gr.7	0.266
06	3.V.M358.95178/03	96 456 485	ASTM A194 Gr.8,SH,CERTIFY	26.97	26.19	31.17	29.85	16.03	14.91	5/8"-11 UNC-2B	Gr.8	0.033
07	3.V.N363.95178/02	96 456 618	ASTM A194 Gr.8,SH,CERTIFY	22.22	21.59	25.65	24.61	12.80	11.79	1/2"-13 UNC-2B	Gr.8	0.021
08	3.V.M463.95178/02	96 456 654	ASTM A194 Gr.8,SH,CERTIFY	24.00	23.67	--	26.75	14.80	14.10	M16-6H	Gr.8	0.034
09	3.V.B001.95178/02	96 456 656	ASTM A194 Gr.8,SH,CERTIFY	--	19.00	--	21.10	--	10.00	M12-6H	Gr.8	0.018
10	3.V.N204.95178/02	96 456 657	ASTM A194 Gr.8,SH,CERTIFY	31.75	30.78	36.65	35.10	19.25	18.03	3/4"-10 UNC-2B	Gr.8	0.076
11	3.V.NH84.95178/00	96 465 629	ASTM A194 Gr.7,HT,CERTIFY	60.33	58.42	69.65	66.59	38.23	36.40	1-1/2"-8UN-2B	Gr.7	0.52

6.3 / 3.2



NOTES:

1. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE STANDARD.
2. PUNCH MATERIAL MARK(REFER TABLE) & MAKER'S MARK.

REV	DATE	ALTERED	
08	16.06.14	CHD & APPD	M.RAMESH MS&SSK

SL.No.11 INCLUDED

REV	DATE	ALTERED	
07	20.11.13	CHD & APPD	M.S SSK & KRS

DRAWING CONVERTED INTO AUTOCAD
ASTM A194 Gr.8 WAS AISI 304.
GALVANISING REMOVED FOR Gr.7
DCP:801645

REV	DATE	ALTERED	
06	28.05.01	CHD & APPD	TRR KSR

MATL.SPECN. A194 Gr.4 REVISED TO A194 Gr.7

REFER DCN. CS: 1147

REV	DATE	ALTERED	
05	13.06.96	CHD & APPD	K.P.L AVN

MATL. Gr.8 & Gr.D CHANGED AS SS 304.

REFER CS:DCN:CS: 0585

-	-	-	-	-	-	-	-	-	-
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

RETRACED WITH REV. 07 ON 20.11.2013

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	K.P.L		13.06.96	
CHD	N.D.P		13.06.96	
APPD	A.V.N		13.06.96	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF. TABLE	CAD: C395178	
CODE 320				

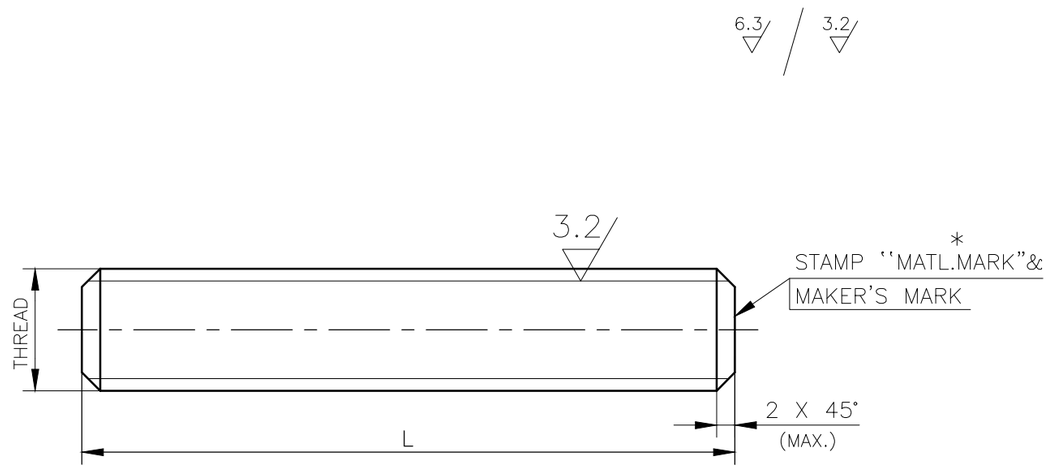
TITLE	CARD CODE	DRAWING NO.	REV
HEX. NUT	U 01	3-V-0000-95178	08

Size A3

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

DRAWING NO. 3-V-0000-95180

SL.No	DRAWING No.	MATERIAL CODE	MATERIAL SPECN.	DIMENSIONS		MATERIAL MARK *	FINISHED WEIGHT(Kgs.)	SIZE/RATING
				THREAD	L			
01.	3-V-M357-95180/02	96 456 481 0000	ASTM A320 Gr.L7,HT, CERTIFY	5/8"-11UNC-2A	105	L7	0.164	4"/300C
02.	3-V-M358-95180/02	96 456 482 0000		5/8"-11UNC-2A	118	L7	0.184	6"/300C
03.	3-V-M359-95180/02	96 456 483 0000		3/4"-10UNC-2A	133	L7	0.298	8"/300C
04.	3-V-N228-95180/01	96 456 525 0000	ASTM A193 -B16,QT, CERTIFY	5/8"-11UNC-2A	105	B16	0.164	4"/300C
05.	3-V-N229-95180/01	96 456 526 0000		5/8"-11UNC-2A	118	B16	0.184	6"/300C
06.	3-V-N230-95180/01	96 456 527 0000		3/4"-10UNC-2A	133	B16	0.298	8"/300C
07.	3-V-N306-95180/01	96 456 570 0000		5/8"-11UNC-2A	94	B16	0.146	6"/150C & 4"/150C
08.	3-V-N305-95180/01	96 456 571 0000		3/4"-10UNC-2A	112	B16	0.251	10"/150C
09.	3-V-N304-95180/01	96 456 572 0000		1"-8UNC-2A	158	B16	0.629	10"/300C
10.	3-V-N309-95180/01	96 456 573 0000		1 1/8"-8UNC-2A	180	B16	0.910	12"/300C
11.	3-V-N301-95180/01	96 456 574 0000		1/2"-13UNC-2A	68	B16	0.068	2"/150C
12.	3-V-N262-95180/01	96 456 575 0000		1/2"-13UNC-2A	80	B16	0.080	2"/300C
13.	3-V-N292-95180/01	96 456 576 0000		5/8"-11UNC-2A	86	B16	0.134	3"/150C
14.	3-V-N266-95180/01	96 456 577 0000		3/4"-10UNC-2A	120	B16	0.269	12"/150C
15.	3-V-N363-95180/01	96 456 616 0000	ASTM A193 -B8,SH, CERTIFY	1/2"-13UNC-2A	80	B8	0.080	2"/300C
16.	3-V-N364-95180/01	96 456 617 0000		5/8"-11UNC-2A	105	B8	0.164	3"/300C
17.	3-V-N204-95180/01	96 456 659 0000	SA307-Gr.B CERTIFY	3/4"-10UNC-2A	106	Gr.B	0.25	6"/150C
18.	3-V-N211-95180/01	96 456 660 0000		3/4"-10UNC-2A	125	Gr.B	0.27	6"/300C
19.	3-V-N622-95180/01	96 456 790 0000	ASTM A193 -B16,QT, CERTIFY	1 1/8"-8UN-2A	140	B16	0.7	14"/300C
20.	3-V-C537-95180/01	96 456 802 0000		1 5/8"-8UN-2A	300	B16	3.3	12"/900C
21.	3-V-C538-95180/01	96 456 803 0000		2"-8UN-2A	390	B16	6.3	14"/900C
22.	3-V-M768-95180/01	96 456 851 0000	ASTM A320 Gr.L7,HT, CERTIFY	5/8"-11UNC-2A	86	L7	0.13	3"/150C
23.	3-V-M769-95180/01	96 456 852 0000		5/8"-11UNC-2A	94	L7	0.15	4"/150C & 6"/150C
24.	3-V-NG10-95180	96 465 375 0000	ASTM A193 B16, QT CERTIFY	1 1/8"-8UN-2A	200	B16	0.98	20"/300C
25.	3-V-NH84-95180	96 465 628 0000		1 1/2"-8UN-2A	220	B16	1.96	32"/150C
26.	3-V-H972-95180	96 600 039 0000		1/2"-13UNC-2A	95	B16	0.09	1/2"/3000C



NOTE

01. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE QUALITY PROCEDURE.
02. SUITABLE RUST PREVENTIVE COATING SHALL BE APPLIED AFTER MACHINING.

DRAWING REDRAWN WITH REV.13 ON 06.06.2016

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	–	–	–	–	–	–	–	–	–

REV	DATE	ALTERED	
13	06.06.16	CHD & APPD	B.AJITH KUMAR MS & KRS

SL.NO: 26 INCLUDED

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CS

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	T.R.R.MURTHY		27.09.99	
CHD	N.DHANAPAL		27.09.99	
APPD	K.S.RAMAN		27.09.99	

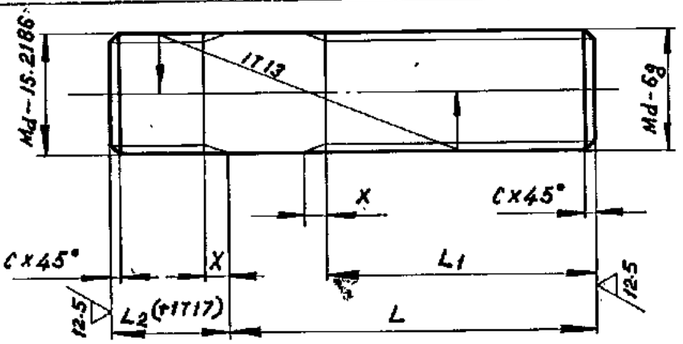
DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF TABLE	CAD: F395180	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-95180	13

Size A3

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

SL. No.	DRAWING No.	MATERIAL DETAILS					GROSS WT. (Kg)	DIMENSIONS							IT 13	NET WT. (Kg)	COMP. CODE	SL. No.
		SPECN.	SIZE	CODE	HEAT TREATMENT	SCRAP SORT		L	L_1	L_2 +IT17	X	C	M_d					
1	3.V.1134.03661/1	ASTM A193-B7, CERTIFY	ϕ16 x 65	15039115	HARDENED & TEMPERED	20	0.103	45	26	$13^{+1.8}$	3.5	1.5	M10		0.27	0.036	93059516 0000	1
2	3.V.1135.03661/1		ϕ20 x 85	15039084			0.210	55	38	$23^{+2.1}$	5	2	M16		0.27	0.123	93059517 0000	2
3	3.V.1132.03661/1		ϕ25 x 90	15039086			0.347	60	46	$23^{+2.1}$	6	2.5	M20		0.33	0.205	93059518 0000	3
4	3.V.2663.03661/1		ϕ20 x 75	15039084			0.185	46	35	$23^{+2.1}$	5	2	M16		0.27	0.12	93060 255 0000	4
5	3.V.1076.03661		ϕ16 x 80	15039115			0.13	55	35	$20^{+2.1}$	3.5	1.5	M10		0.27	0.05	93060 866 0000	5
6	3.V.1705.03661		ϕ25 x 100	15039086			0.386	70	46	$23^{+2.1}$	6	2.5	M20		0.33	0.21	93060 939 0000	6
7	3.V.5402.03661		ϕ20 x 118	15039084			0.29	85	38	$23^{+2.1}$	5	2	M16		0.27	0.19	93067 807 0000	7
8	3.V.2899.03661		ϕ25 x 110	15039086			0.424	75	30	$32^{+2.8}$	6	2.5	M20		0.33	0.26	93100 606 0000	8
9	3.V.2956.03661		ϕ16 x 70	15039115			0.11	45	25	$20^{+2.1}$	3.5	1.5	M10		0.27	0.04	93101 732 0000	9
10	3.V.2961.03661		ϕ20 x 100	15039084			0.25	70	40	$23^{+2.1}$	5	2	M16		0.27	0.15	93101 996 0000	10
11	3.V.P208.03661		ϕ25 x 110	15039086			0.42	65	35	$35^{+2.8}$	6	2.5	M20		0.33	0.25	93102 623 0000	11
12	3.V.B555-03661		ϕ25 x 95	15039086			0.36	50	35	$35^{+2.8}$	6	2.5	M20		0.33	0.21	93103 541 0000	12
13	3.V.5142-03661	A193 B16	Φ32 x 130	15039165			0.82	85	60	$35^{+2.8}$	6	2.5	M27		0.33	0.54	93103 719 0000	13
14	3.V.5618-03661	A193-87, CERTIFY	ϕ16 x 95	15039115	HARDENED, TEMPERED	20	0.15	67	25	$20^{+2.1}$	3.5	1.5	M10		0.27	0.05	93166 603 0000	14



6.3 / 12.5

NO. OF PIECES	DESCRIPTION	SEM PRO./SEQ.NO.	INT. MAT. / SEQ. NO.	FINAL MATERIAL	SCRAP SORT	NET WT (Kg)	GROSS (WT) Kg	DRAWING NO.	ITEM NO

RETRACED WITH REV. No. 10 ON 15.6.95 X01

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-14

REV.	DATE	ALTERED CHE & APPD.	REV.	DATE	ALTERED CHE & APPD.	REV.	DATE	ALTERED CHE & APPD.
REV.	DATE	ALTERED CHE & APPD.	REV.	DATE	ALTERED CHE & APPD.	REV.	DATE	ALTERED CHE & APPD.
						ZONE		

FIRST ANGLE	SCALE NTS	DRAWN	R.L.
ALL DIMENSIONS IN MILLIMETRES		CHECKED	R.L.
		APPROVED	M.R.K.
		DATE	15.6.95

TOTAL NET WT. (Kg)

TYPE

NEW/OLD DRG. NO

TITLE: STUD

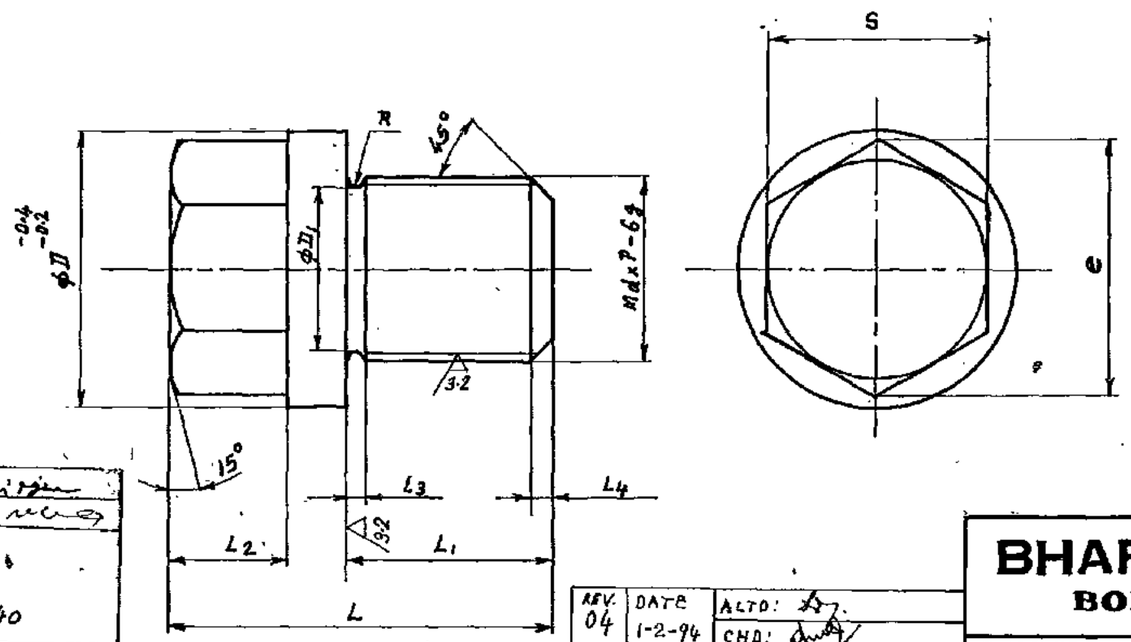
DRAWING NO: 3.V.0000.03661

REVISION: 10

33-115

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

SL NO	DRAWING NUMBER	RAW MATL DETAILS				WT [KG]		DIMENSIONS											COMPONENT CODE	REMARKS
		SIZE	SPECN	MATL CODE	SCRAP SORT	GROSS	NET	Md x P-6g	$\phi D^{-0.4}_{-0.2}$	ϕD_1	e	S	L	L_1	L_2	L_3	L_4	R		
01	3V 5144 06413/02	ϕ40 x 60	ASTM A193-B7, QUENCHED & TEMPERED, CERTIFY	15 039 116	20	0.59	0.27	M24x2	37	21	34.6	30	51	24	16	3	2	1.5	931006770000	—
02	3V 5150 06413/02	ϕ 50x70		15 039 137	20	1.11	0.33	M30x2	43	27	41.6	36	62	30	19	3	2	1.5	931006780000	—
03	3-V-5152-06413/02	ϕ 36 x 50		15 039 088	20	0.40	0.14	~~M 20X1.5 -M 20x2~~	30	16.5	28	24	40	20	13	3	2	1.5	93 100 748 0000	—
04	3-V-5186-06413/02	ϕ32X46		"	40	0.29	0.14	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	93104802000	3"-300c
05	3-V-5188-06413/02	ϕ40X57	ASME SA 182 - GR-F6a, HARDENED & TEMPERED, CERTIFY	-	40	0.56	0.27	M24x2	37	21	34.6	30	51	24	16	3	2	1.5	93104803000	4"&6"-300c
06	3-V-5189-06413/02	ϕ45X68		-	40	0.85	0.33	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	93104804000	8"-300c
07	3-V-1447-06413/01	ϕ 50 x 55	ASTM A193-B7, Q.T, CERTIFY	15 039 197	20	0.88	0.30	M30x1.5	43	27	41.6	36	46	14	19	3	2	1.5	931064790000	—
08	3-V-5199-06413/01	ϕ32X46	SA182 GR F316		46	0.29	0.14	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	93106844000	—
09	3-V-5196-06413/2	ϕ40X57	SOLUTION HEAT TREATED		46	0.56	0.27	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	93106845000	—
10	3-V-2001-06413/2	ϕ 50X~~55~~70	CERTIFY		46	0.88	0.3	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	93106846000	—



12.5 / 3.2

NOTES :-

1. UNSPECIFIED SHARP CORNERS TO BE CHAMFERED TO 0.5x45°.
2. HARDNESS - 26 TO 32 HRC FOR B7 MATL.

615390

REV	DATE	ALTD: R.Tiwari
07	9.12.96	CHD&APPD

NOTES UPDATED.

REFER DCN. CS. 0640

REV	DATE	ALTD: N.D.PBL
06	17.06.96	CHD&APP:

SL.NO. 8 TO 10 ARE INCLUDED.

REV.	DATE	ALT. R.L.
05	13.2.96	CHE.& APPD. A.V.

SL.No. 07 INCLUDED.

REV	DATE	ALTD:
04	1-2-94	CHD:

1) NOTE UNSPECIFIED TOL. REF. CHANGED TO SQP

2) DCN No. CS: 0260

REV	DATE	ALTD: N.DHANAPAL
03	5-1-94	CHKD:

1. SL NO 4 TO 6 INCLUDED.

REV.	DATE	ALTD: S.J.W
02	6.7.88	CHD: NNAGARAJ

IN SL.No 3 THE THREAD PITCH 2 IS CHANGE TO 1.5 DCN No. GW/88/0018

REV.	DATE	ALTERED S.J.WESLEY
01	25.10.85	CHECKED N.NAGARAJAN

ZONE

SL. No. 03 ADDED

REV	DATE	ALTD: T.C.K
08	21.05.98	CHD&APPD:

IN SL.NO. 09 & 10 DIMNS. M 24X1.5 & M 30X1.5 REVISED TO M 24X 2 & M 30X2 REFER DCN. CS. 0863

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-14

FIRST ANGLE	SCALE	DRAWN	N.P.ESWARAN	TOTAL NET Wt. (kg)	
	NTS	CHECKED	A.V	TYPE	
ALL DIMENSIONS IN MILLIMETRES		APPROVED	N.NAGARAJAN		
		DATE	13-08-85	NEW/OLD DRG. NO.	

TITLE

PLUG

DRAWING NO. 3V 0000 06413

REVISION 08

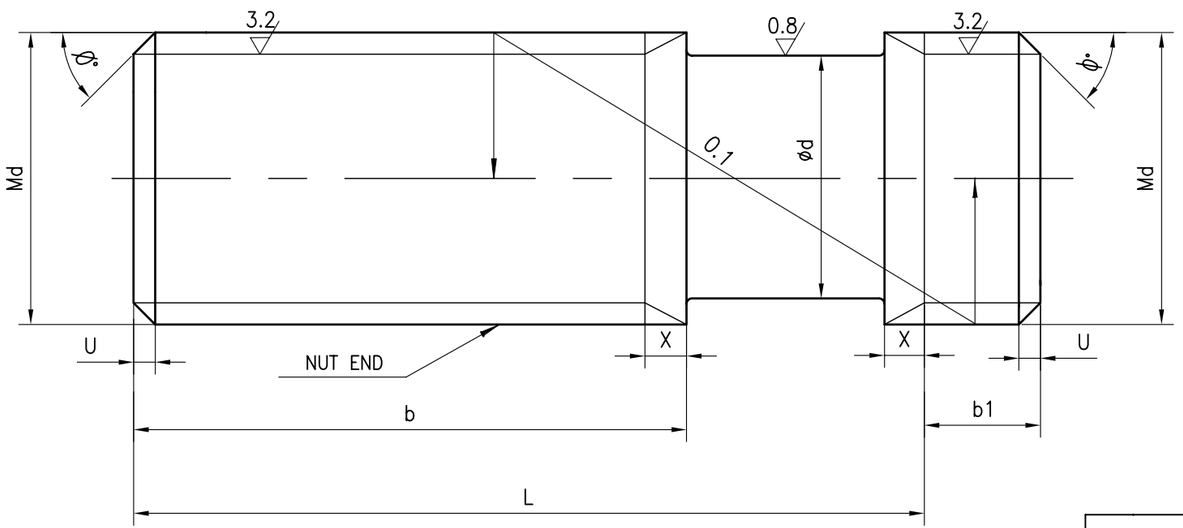
33-115

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

DRAWING NO. 3-V-0000-06619/03

SL No.	DRAWING No. / COMPONENT CODE	MATERIAL SPECN.	SUGG.SIZE	MATL.CODE	GROSS Wt. (KG)	DIMENSIONS								NET Wt. (KG)
						Md	b	b1	L	U (max)	X (max)	ø°	ød	
01	3-V-0352-06619/01 93 102 806 0000	ASTM A193-B7, QT,CERTIFY	ø32X108	15 039 087	0.68	M24	54	24	75	3	7	30°	19.7	0.33
02	3-V-0534-06619/01 93 103 209 0000		ø36X120	15 039 088	0.96	M30	64	30	85	3	7	45°	25.1	0.36
03	3-V-N436-06619/01 93 107 325 0000		ø25X170	15 039 086	0.66	M20	80	20	140	2.5	6	30°	16.3	0.39

12.5 / 3.2 / 0.8



NOTE:

1. ALL STUDS SHALL BE MARKED B7 ON ANY ONE SIDE.
2. STUDS SHALL COMPLY WITH LATEST APPLICABLE WORK INSTRUCTION IN RESPECT OF REQUIREMENTS NOT COVERED IN THIS DRAWING.
3. FOR OTHER DETAILS OF STUD REF TO BPS:41115

NO OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

REV	DATE	ALTERED	V.B
03	20.5.06	CHD & APPD	M.R.K

DIMENSION ød ADDED
DCP NO:800585

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

DRG.REDRAWN WITH REV.03 ON 20.5.06

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		20.5.06	
CHD	R.L.		20.5.06	
APPD	M.R.K.		20.5.06	

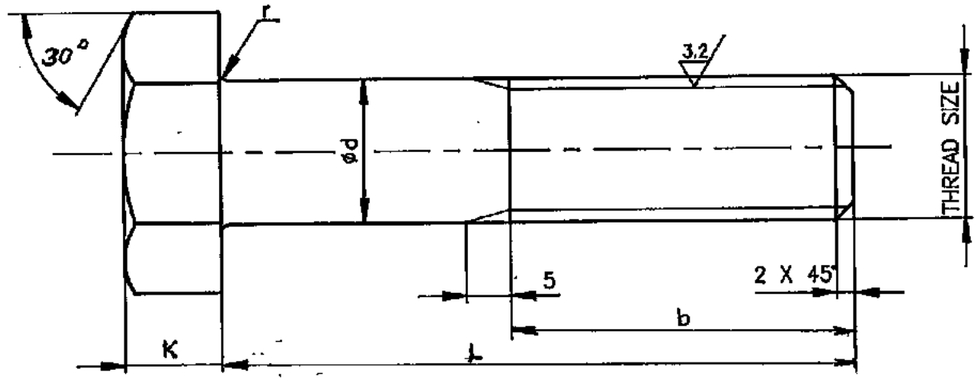
DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S			
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-06619	03

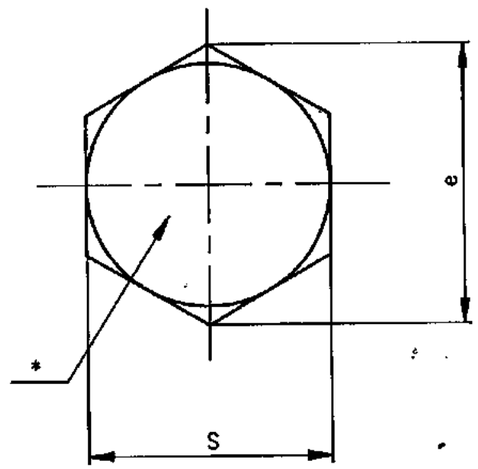
Size A3

FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT DCP/SP. ALL DIMENSIONS ARE IN MM

SL. No.	DRAWING No.	MATERIAL CODE	MATL. SPECN	THREAD SIZE	L	ød	b	k	S MAX	S MIN	e MAX	e MIN	r	FINISH Wt. (Kg)	MATL. MARK	SIZE/RATING
01	3-V-N073-06881/04	96 456 260 0000	ASTM A193-B7, HT, CERTIFY	1/2"-13UNC-2A	55	12.7	30	9	22.22	21.59	25.65	24.61	0.75	0.06	B7	2"-150, 2"-300 3"-150, 3"-300
02	3-V-N033-06881/04	96 456 261 0000		5/8"-11UNC-2A	60	15.875	38	10.7	26.97	26.19	31.17	29.85	1	0.10	B7	4"-150, 4"-300
03	3-V-N001-06881/04	96 456 262 0000		5/8"-11UNC-2A	70	15.875	38	10.7	26.97	26.19	31.17	29.85	1	0.14	B7	6", 8", 10", 12"/150 6", 8", 10"/300
04	3-V-N224-06881/03	96 456 231 0000		5/8"-11UNC-2A	80	15.875	38	10.7	26.97	26.19	31.17	29.85	1	0.16	B7	20"/150
05	3-V-C329-06881/03	96 456 433 0000		5/8"-11UNC-2A	75	15.875	38	10.7	26.97	26.19	31.17	29.85	1	0.15	B7	4"-C900
06	3-V-N204-06881/03	96 456 450 0000	SA 307 Gr. B CERTIFY	3/4"-10UNC-2A	85	19.05	30	12.7	31.75	30.78	36.65	35.10	1	0.27	307-B	6"-C150
07	3-V-N205-06881/03	96 456 451 0000		3/4"-10UNC-2A	90	19.05	35	12.7	31.75	30.78	36.65	35.10	1	0.28	307-B	8"-C150
08	3-V-N207-06881/03	96 456 452 0000		7/8"-9UNC-2A	105	22.225	40	14.7	36.52	35.41	42.16	40.31	1	0.43	307-B	10" & 12"-C150



(19) 12.5 / 3.2



NOTES:-

1. * PUNCH MATERIAL MARK.
2. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE TDC 5:164 OF
3. ~~THIS COMPONENTS SHOULD BE GALVANISED TO A DEPTH OF 8 TO 12 MICRONS~~

REV.	DATE	ALTD:- CHD & APPD.

REV.	DATE	ALTD:- CHE & APPD

REV	DATE	ALTERED
07	11.6.99	CHE & APPD. M.R.K

GALVANISING (NOTE 3) ELIMINATED.
DCN No. HM 0393

RETRACED WITH REV. 07 ON 11.6.99

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

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-620 014.

	NAME	SIGN	DATE
DRAWN			
CHECKED	J. R.L		11.6.99
APPROVED	M.R.K.		11/6/99

DEPT	GRADE OF	FIRST ANGLE	SCALE	WEIGHT (kg)	ITEM No
VL	UNTOL DIM		NTS	REFERTABLE	-
CODE 340	C/M/F				

TITLE: HEX. BOLT

DRG No. 3-V-0000-06881

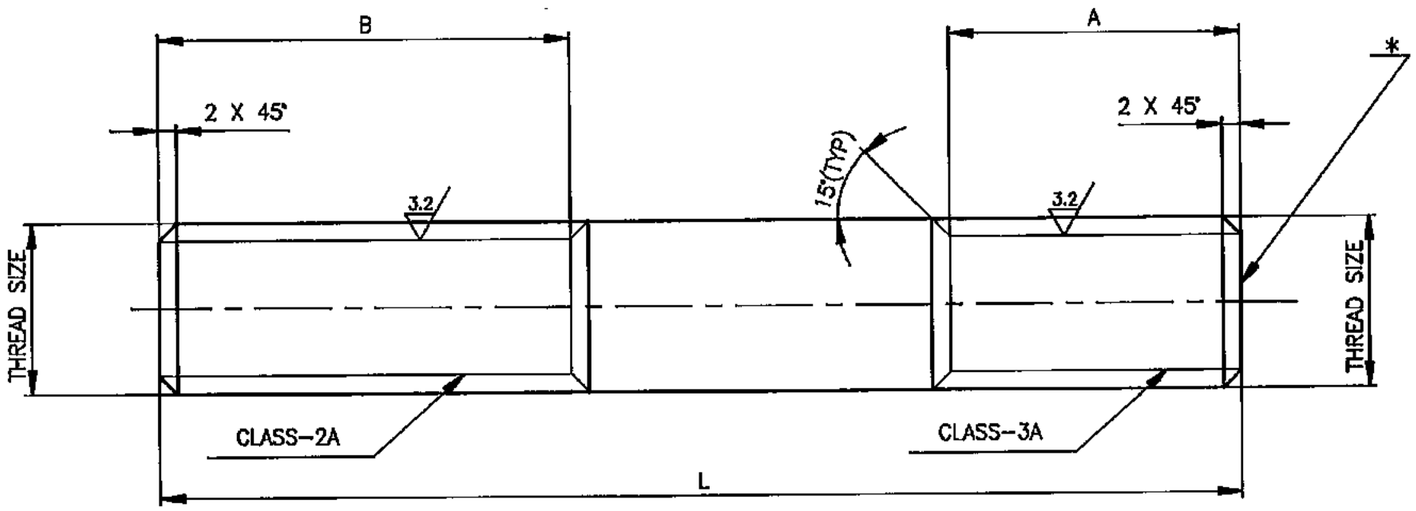
REVISION 07

CAUTION : The information on this is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.

FOR TOL. OF UNTOL. DIMENSIONS DURING MANUFACTURE REFER RELEVANT QAP / QP

ALL DIMENSIONS ARE IN MM

SL. No.	DRAWING No.	MATERIAL CODE	MATERIAL SPECIFICATION	DIMENSIONS					NET WT. (kg)	SIZE/RATING
				THREAD SIZE	$L^{\pm 1.5}$	$A^{+1.5}_{0}$	$B^{\pm 1.5}$			
01	3-V-N105-06884/02	96 456 259 0000	ASTM A193 GR. B7, HT, CERTIFY	5/8"-11UNC	93	23	40		0.13	12"/300C
02	3-V-N435-06884/01	96 456 749 0000		5/8"-11UNC	115	20	50		0.18	14"/300; 16"/300C
03	3-V-N437-06884/01	96456 750 0000		3/4"-10UNC	140	25	50		0.25	20"/300C
04	3-V-C537-06884/01	96 456 796 0000		5/8"-11UNC	140	23	65		0.22	12"/900C
05	3-V-C538-06884/01	96 456 7970000		3/4"-10UNC	185	25	80		0.41	20"/900C
06	3-V-N827-06884/01	96453 6990000		1"-8UNC	⚠5 200	30	90		0.8	32"/150C



(21) 12.5 / 3.2

NOTES:-

1. * PUNCH MATERIAL MARK – B7
2. FOR QUALITY REQUIREMENT REFER LATEST APPLICABLE TDC
5:164
⚠5 ~~3. THIS COMPONENT SHOULD BE GALVANISED TO A DEPTH OF 87/12 MICRON~~

REV.	DATE	ALT. / CHE.& APPD.	REV.	DATE	ALT. / CHE.& APPD.
06	11.11.99	ALT. R.L. CHE.& APPD. M.R.K.	05	16.10.99	ALT. R.L. CHE.& APPD. M.R.K.
IN SL.No.06, DIM. 200 WAS 190. DCN No. HM 0416			SL. No. 06 INCLUDED.		
04	11.6.99	ALT. R.L. CHE.& APPD. M.R.K.	02	29.10.96	ALT. R.L. CHE.& APPD. M.R.K.
GALVANISING (NOTE 3) ELIMINATED DCN No. HM 0393			SL.NOS. 02 & 03 INCLUDED.		
			03	20.3.97	ALT. RL. CHE.& APPD. M.R.K.
			SL.NOS. 04 & 05 INCLUDED.		

REV	DATE	ALTERED / CHECKED
01	27/04/95	ALTERED N.D. PAL M.R.K. CHECKED

ZONE

1. IN NOTE SL.NO.2 CHANGED TO APPLICABLE TDC.
2. NOTE SLNO.3 IS ADDED.
3. REFER DCN. SLNO:CS:0145

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

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-620 014.

	NAME	SIGN	DATE
DRAWN	M.P.S		9.10.92
CHECKED	A.V. NATHAN		9.10.92
APPROVED	S. Kumar		9/10/92

DEPT.	FIRST ANGLE	SCALE	WEIGHT (kg)	DRESSER DRG No: / DRESSER PART No: / DRESSER SL No:	ITEM No.
VL		NTS			
CODE 340					

TITLE: STUD

DRG No. 3-V-0000-06884

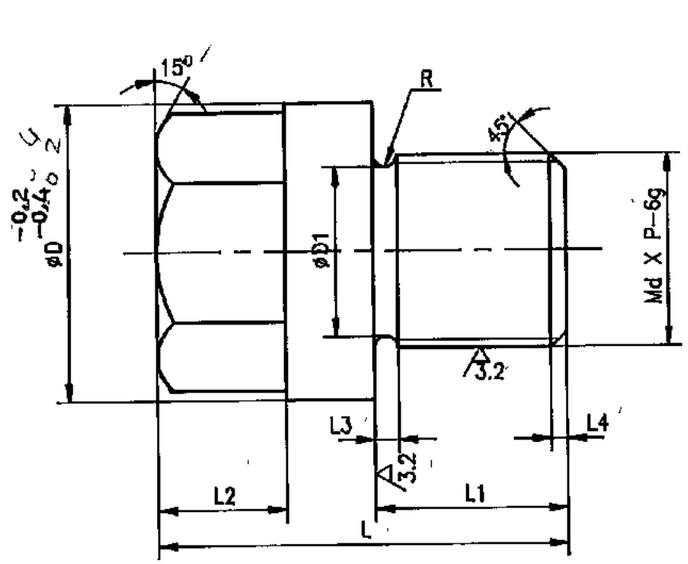
REVISION 06

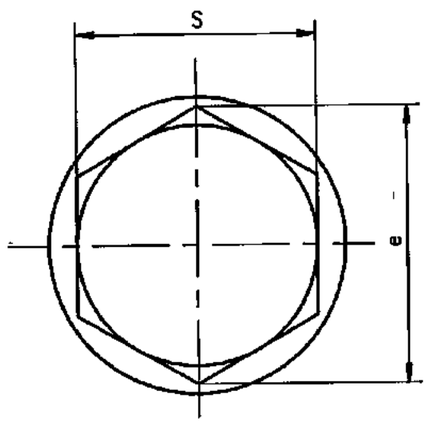
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QAP/QP

DRAWING NO. 3-V-0000-06958/02

ALL DIMENSIONS ARE IN MILLIMETRES

SL. NO.	DRAWING NO.	COMP. CODE	RAW MATERIAL				DIMENSION											NET WT.(KG)	REMARKS
			MATL. SPECN.	SUGGESTED SIZE	SCRAP SORT	GROSS WT.(KG)	MdXP--6g	øD	øD1	e	S	L	L1	L2	L3	L4	R		
01	3-V-5182-06958	931043270000	ASTM A193 B16 Q & T. CERTIFY	ø40 X 60	20	0.58	M24X2	37	21	34.6	30	51	24	16	3	2	1.5	0.27	
02	3-V-5195-06958	931061030000		ø50X70		1.11	M30X2	43	27	41.6	36	62	30	19	3	2	1.5	0.33	
03	3-V-5198-06958	931068960000		ø36X50		0.4	M20X1.5	30	16.5	28	24	40	20	13	3	2	1.5	0.14	





12.5 / 3.2

NOTE

1. UNSPECIFIED SHARP CORNERS TO BE CHAMFERED TO 0.5X45°

TOLERANCE FOR UNTOLERANCED DIMENSIONS

UPTO 6 MM	= ± 0.1 MM
> 6 UPTO 120 MM	= ± 0.2 MM
MORE THAN 120 MM	= ± 0.5 MM
ANGULAR TOLERANCE	= ± 0.5 Deg.
CHAMFER	= ± 5 Deg.

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

REV	DATE	ALTD: N.D. PAL	REV	DATE	ALTERED N.D. PAL
02	14-03-96	CHD & APPD:	01	6-11-95	CHECKED

1. SL.NO. 3 INCLUDED.

SL. NO. 2 IS INCLUDED

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
—	—	—	—	—	—	—	—	—	—

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGN	DATE	NO. OF VAR.
DRN	V.BAIRAVAN		17.6.93	—
CHD	N.DHANAPAL		28.6.93	
APPD	A.V.NATHAN		29.6.93	

DEPT	GRADE OF UNTOL DIM	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL		NTS	—	—	—
CODE 320	ø / M / F				

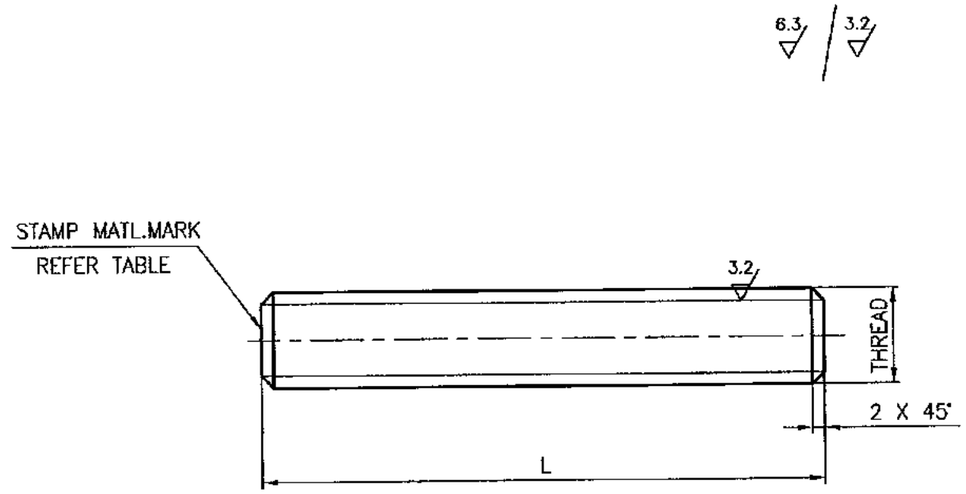
TITLE	CARD CODE	DRAWING NO.	REV
PLUG	U 01	3-V-0000-06958	02

Size A3

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

DRAWING NO. 3-V-0000-17140/05

SL No.	DRAWING No.	MATERIAL CODE	MATL. SPECN.	DIMENSIONS THREAD	DIMENSIONS L	MATERIAL MARK	FINISHED WEIGHT(Kgs.)	SIZE/RATING
01.	3-V-N025-17140/02	96 456 378 0000	ASTM A193-B7 HT CERTIFY	5/8"-11UNC-2A	86	B7	0.134	3"/150
02.	3-V-N001-17140/02	96 456 379 0000		5/8"-11UNC-2A	94	B7	0.146	4"/150 , 6"/150
03	3-V-N073-17140/02	96 456 382 0000		1/2"-13UNC-2A	68	B7	0.068	2"/150
04	3-V-N081-17140/02	96 456 383 0000		1/2"-13UNC-2A	80	B7	0.08	2"/300
05	3-V-N009-17140/02	96 456 384 0000		5/8"-11UNC-2A	105	B7	0.164	8"/150,3"/300,4"/300
06	3-V-N017-17140/02	96 456 385 0000		5/8"-11UNC-2A	118	B7	0.184	6"/300
07	3-V-N057-17140/02	96 456 386 0000		3/4"-10UNC-2A	112	B7	0.251	10"/150
08	3-V-N041-17140/02	96 456 387 0000		3/4"-10UNC-2A	120	B7	0.269	12"/150
09	3-V-N089-17140/02	96 456 388 0000		3/4"-10UNC-2A	133	B7	0.298	8"/300
10	3-V-N065-17140/02	96 456 389 0000		1"-8UNC-2A	158	B7	0.629	10"/300
11	3-V-N105-17140/02	96 456 390 0000		$1\frac{1}{8}$"-8UN-2A	180	B7	0.910	12"/300
12	3-V-N106-17140/02	96 456 391 0000		$1\frac{1}{8}$"-8UN-2A	140	B7	0.710	12"/300
13	3-V-5183-17140/02	96 456 437 0000		$1\frac{1}{4}$"-8UN-2A	195	B7	1.23	4"-900C FV
14	3-V-C329-17140/02	96 456 436 0000		$1\frac{1}{8}$"-8UN-2A	205	B7	1.05	4"/900
15	3-V-C538-17140/01	96 456 799 0000		$1\frac{5}{8}$"-8UN-2A	250	B7	2.7	20"/900
16	3-V-T419-17140/01	96 456 825 0000	ASTM A193-B7M, HT,CERTIFY	$1\frac{1}{8}$"-8UN-2A	170	B7M	0.90	3"-900C FV



NOTE

01. FOR QUALITY REQUIREMENTS REFER LATEST APPLICABLE QUALITY PROCEDURE.
02. SUITABLE OIL PRESERVATIVE SHALL BE APPLIED AFTER MANUFACTURE.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: CS

DRG. RETRACED WITH REV.05 ON 10.06.99

BHARAT HEAVY ELECTRICALS LTD.
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	T.R.R.MURTHY	T.R.R.	10.06.99	
CHD	R.VASANTH		10.06.99	
APPD	K.S.RAMAN		10.06.99	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF TABLE	CAD:C317140	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-17140	05

REV	DATE	ALTERED
05	10.06.99	CHD & APPD

GALVANISING REMOVED

REFER DCN.CS:1012

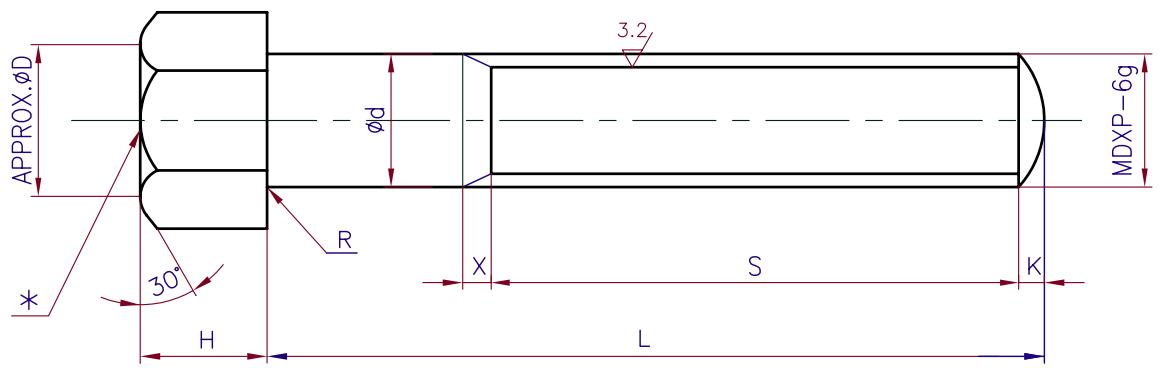
Size A3

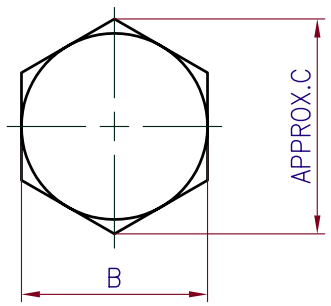
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

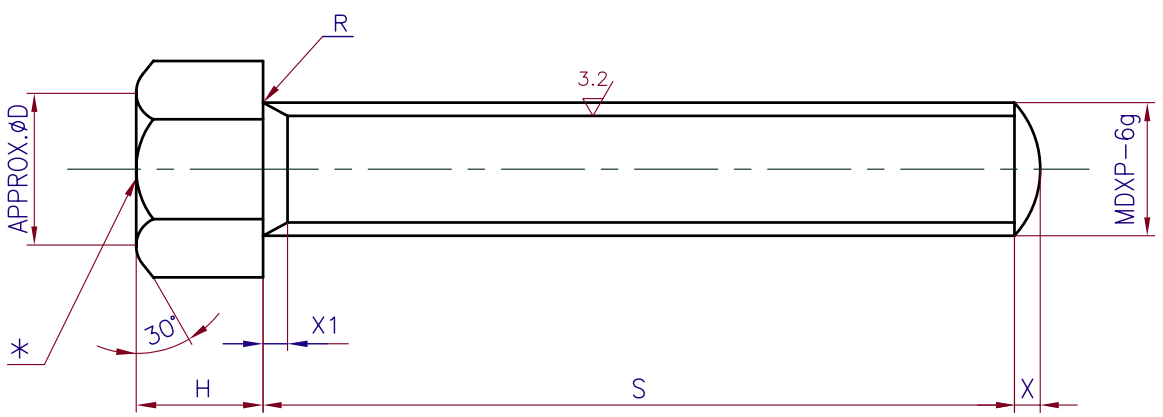
DRAWING NO. 3-V-0000-20728/11

12.5 / 3.2

SL No.	DRAWING NO.	COMP. CODE	MATL. SPECN.	DIMENSIONS														NET WT (Kgs)	REMARKS
				MD	P	L	S	H	K	X	X1	R	ød	øD	B	C			
01	3-V-0001-20728/02	964524380000	ASTM A193 B7 CERTIFY	M16	2	70	70	10	–	4	6	0.6	16	23	24	27.7			0.14	
02	3-V-0002-20728/02	964524390000		M39	4	120	80	25	4	8	–	1.2	39	57.5	60	69.3			1.73	
03	3-V-0003-20728/02	964524400000		M14	2	120	30	10	2	4	–	0.6	14	20	21	24.2			0.11	
04	3-V-0004-20728/02	964526840000		M5	0.8	25	25	3.5	–	2	2	0.2	5	7	8.3	9.2			0.01	
05	3-V-0005-20728/02	964528590000		M30	3.5	80	45	19	4	7	–	1.0	30	44	46	53.1			0.57	
06	3-V-0006-20728/02	964529810000		M20	2.5	70	50	13	5	5	–	0.8	20	29	30	34.6			0.27	
07	3-V-0007-20728/02	964530600000		M6	1	16	16	4	–	2	3	0.25	6	9.8	10	11.5			0.01	
08	3-V-0008-20728/02	964531710000		M20	2.5	95	40	13	5	5	–	0.8	20	29	30	34.6			0.33	
09	3-V-0009-20728/03	964531720000		M24	3	85	50	15	6	6	–	0.8	24	34	36	41.6			0.40	
10	3-V-0010-20728/02	964605960000		M8	1.25	20	20	5.5	–	2.5	3.75	0.5	8	12.6	13	15.0			0.011	
11	3-V-0011-20728/02	964605970000		M8	1.25	25	25	5.5	–	2.5	3.75	0.5	8	12.6	13	15.0			0.012	
12	3-V-0012-20728/02	964532250000		M24	3	120	60	15	6	6	–	0.8	24	34	36	41.6			0.55	
13	3-V-0013-20728/02	964533230000		M36	4	100	60	23	4	8	–	2	36	53	55	63.5			1.30	
14	3-V-0014-20728/01	964534120000		M16	2	120	70	10	4	4	–	0.6	16	23	24	27.7			0.22	
15	3-V-0015-20728	964535410000		M16	2	20	20	10	–	4	6	0.6	16	23	24	27.7			0.04	
16	3-V-0016-20728	964650030000		M24	3	75	40	15	6	6	–	0.8	24	34	36	41.6			0.34	
17	3-V-0017-20728	964535780000		M20	2.5	110	60	13	5	5	–	0.8	20	29	30	34.6			0.38	
18	3-V-0018-20728	964535900000		M36	4	130	80	23	4	8	–	2	36	53	55	63.5			1.54	







IN CASE OF FULL THREAD

NOTES:

1. * PUNCH MATERIAL MARK B7 FOR A193 B7.
2. QUALITY REQUIREMENTS SHALL BE AS PER LATEST TDC.5:164

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

REV	DATE	ALTERED VB
11	27.04.05	CHD & APPD KRS & MRK
		SL. NO.18 INCLUDED.

REV	DATE	ALTERED VB
10	01.02.03	CHD & APPD
		SL. NO.17 INCLUDED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

RETRACED WITH REV.10 DATED 01.02.03

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

	NAME	SIGN	DATE	NO.OF VAR.
DRN	V.BAIRAVAN		01.02.03	
CHD	K.RAJASEKARAN		01.02.03	
APPD	M.RAJAKUMAR		01.02.03	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	/	–	PT-42	
CODE 320			CAD REF.3V020728	

TITLE	CARD CODE	DRAWING NO.	REV
BOLT	U 01	3-V-0000-20728	11

Size A3

TP-DG-3-V-0000-20728
CORPORATE DRG ID

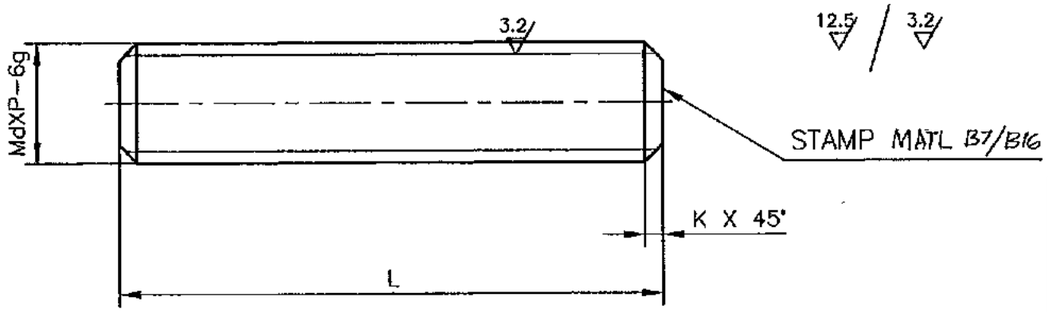
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO.

SL.No	DRAWING No.	MATERIAL SPECN.		MATL. CODE	DIMENSION				WEIGHT IN Kgs.
					Md	P	L	K	
01.	3-V-Z022-22667/00	ASTM A193 B7	QT, CERTIFY	964608300000	M30	3	200	3	1.108
02	3-V-Z029-22667/00	ASTM A193 B16		931178230000	M30	3	200	3	1.108

NOTE

01. FOR QUALITY REQUIREMENTS: REFER LATEST APPLICABLE PROCEDURE.



REV	DATE	ALTERED MPS
01	20.4.2k	CHD & APPD SCS

SL. NO. 02 ADDED

–	–	–	–	–	–	–	–	–	–
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT. (kg)	GROSS WT. (kg)	DRAWING NO	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

XAI

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	M P S	mps		
CHD	P R K			
APPD	S C S		13.7.99	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REF.TABLE	CAD :Q322667	

TITLE	CARD CODE	DRAWING NO.	REV
STUD	U 01	3-V-0000-22667	01

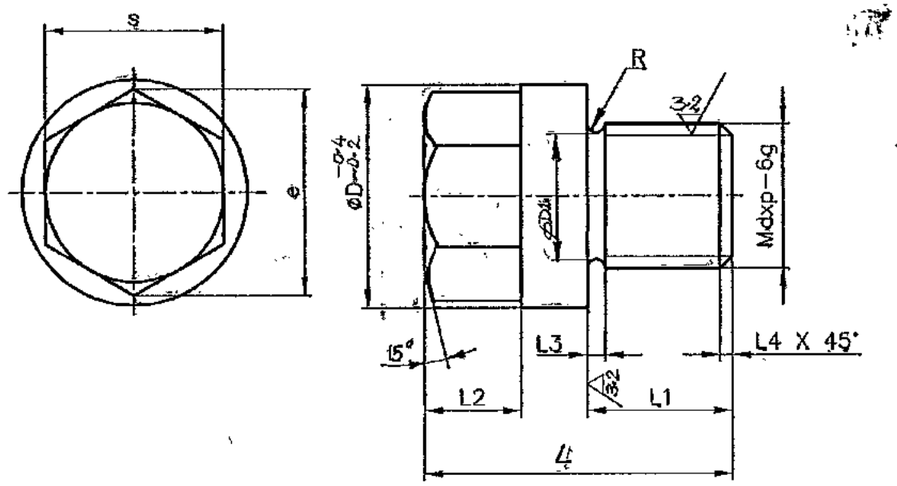
CODE 320

Size A3

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

DRAWING NO.	SL.No	DRAWING NUMBER	MATL. SPECN	DIMENSIONS											COMPONENT CODE	SCRAP SORT	WEIGHT
				Mdxp–6g	$\phi D_{-0.2}^{-0.4}$	$\phi D1$	e	s	L	L1	L2	L3	L4	R			
	01	3-V-2021-22675/01	ASTM A193 B7	M48×3	65	45	63·5	55	80	35	38	1.5	2	1·5	931177660000	10	1.68
	02	3-V-2029-22675	ASTM A193 B16	M48×3	65	45	63·5	55	80	35	38	1·5	2	1·5	93117850 0000	20	1·68

12·5 / 32



NOTES:–

1. UNSPECIFIED SHARP CORNERS TO BE CHAMFERED TO 0.5X45°.
2. HARDNESS – 26 TO 32 HRC FOR 67 MATL.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
365–121

	NAME	SIGN	DATE	NO. OF VAR.
DRN	MPS			
CHD	P.R.K.		17.9.99	
APPD	SCS		17.9.99	

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

TITLE: PLUG
CARD CODE: U 01
DRAWING NO.: 3–V–0000–22675
REV: 02

REV	DATE	ALTD: MPS	REV	DATE	ALTERED MPS
02	19.8.2000	CHD & APPD: P.R.K.	01	16-8-2000	CHD & APPD: P.R.K.

SL. No. 02 ADDED.

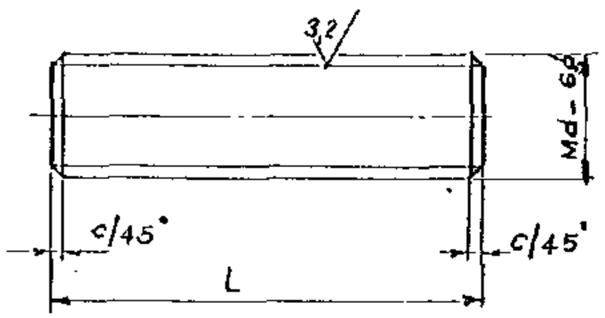
DIMN 'e' 63.5 WAS 54

DCN:RN:0684

Size A3

SL. No	DRG. No.	RAW MATERIAL				DIMENSIONS					FINISH WT. (kp)	APPLICABLE TYPE NOS.	SL. No
		SPECIFICATION	SIZE	CODE No.	WT. (kp)	L	Md-6g	c/45°					
1	3-V-S661-09338	ASTM-A-193 B7	BAR. ϕ 20X55	15039084	0.16	50	M16	2			0.09	S661 S665, S666, S964, S998	1
2.	3-V-S833-09338	ASTM-A193 B7	BAR ϕ 12x35	15039091	0.03	30	M8	1			0.01	S833, S834, S835, S836, S837, S838, S839, S840, S841, S842, S843, S844 S845, S846, S847, S848, S849, S850, S851, S852, S853, S854, S865, S866, S867, S868, S869, S860, S861, S862, S863, S864, S870, S882, S883, S884, S885	2
3	3-V-S858-09338	ASTM-A193 B7	BAR ϕ 12x35	15039091	0.03	40	M6	1			0.008	S858, S859	3
4	3-V-N204-09338 93104965 0000		BAR ϕ 12X60	15039091	0.53	55	M8	1			0.02	N204	4
5	3-V-N210-09338 93107183 0000	ASTM A193 B7	ϕ 10X80	-	0.80	80	M8	1			0.05	2.3.4" - 150C & 300C GV	5
6.	3-V-N645-09338 93108303 0000		ϕ 25X120	—	0.462	110	M20	2			0.27	N645	

12.5/ 3.2/



ASTM-A193-B7	Q & T	10	— CERTIFY
MATERIAL SPECIFICATION	HEAT TREATMENT	SCRAP SORT	TYPE OF CERTIFICATION

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-14

FIRST ANGLE	SCALE	DRAWN		TOTAL wt. (kg)
		CHECKED		TYPE
		APPROVED		
ALL DIMENSIONS IN MILLIMETRES		DATE	24.1.77	NEW/OLD DRG. No.

CAUTION

TITLE: STUD

DRAWING No.: 3-V-S000-09338 REVISION: 05

REV	DATE	ALTERATION
06	11-09-97	ALTD; N.D. PAL; CHD & APPD: SL NO. 6 IS INCLUDED
05	18-9-96	ALTD T. C.; CHD; SL NO: 05 INCLUDED.
03	26-3-74	ALTERED: N.D. PAL; CHECKED: ; SL. NO 4 IS INCLUDED
02	28/4/86	ALTERED: ; CHED: ; In Sl No: 3 Dimension L increased from 30 to 40
01	17.9.77	ALTERED: H. Dakshinamoorthy; CHECKED: ; SL. No. 2 INCLUDED.

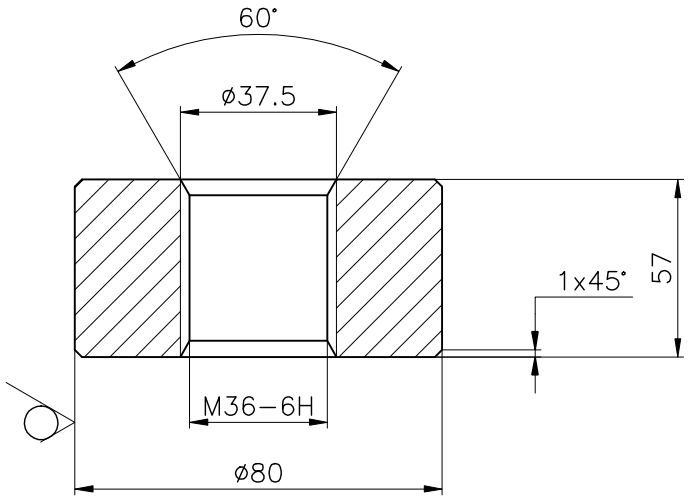
ALL DIMENSIONS ARE IN MILLIMETRES.

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

REV	DATE	ALTERED	JALAL
01	14.08.10	CHD & APPD	PRK

DRAWING REDRAWN IN ACAD.
MATL. SPEC A182 F22 CL3 WAS A182 F22

3.2



NOTE:

1. LATEST APPLICABLE QUALITY PROCEDURE SHALL BE FOLLOWED IN ALL RESPECTS.

SL.No	DRAWING No.	COMP. CODE	MATL. SPEC	SCRAP SORT
2	4–V–Z029–20283	931178360000	A182 F22 CL3 NT	20
1	4–V–Z021–20283	931178020000	A105 NR	10

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365–122

	NAME	SIGN	DATE	NO.OF VAR
DRN	M.KARTHIK	M.KARTHIK	14.08.10	
CHD	JALAL	JALAL	14.08.10	
APPD	PRK	PRK	14.08.10	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	1.1	———	
CODE 320				

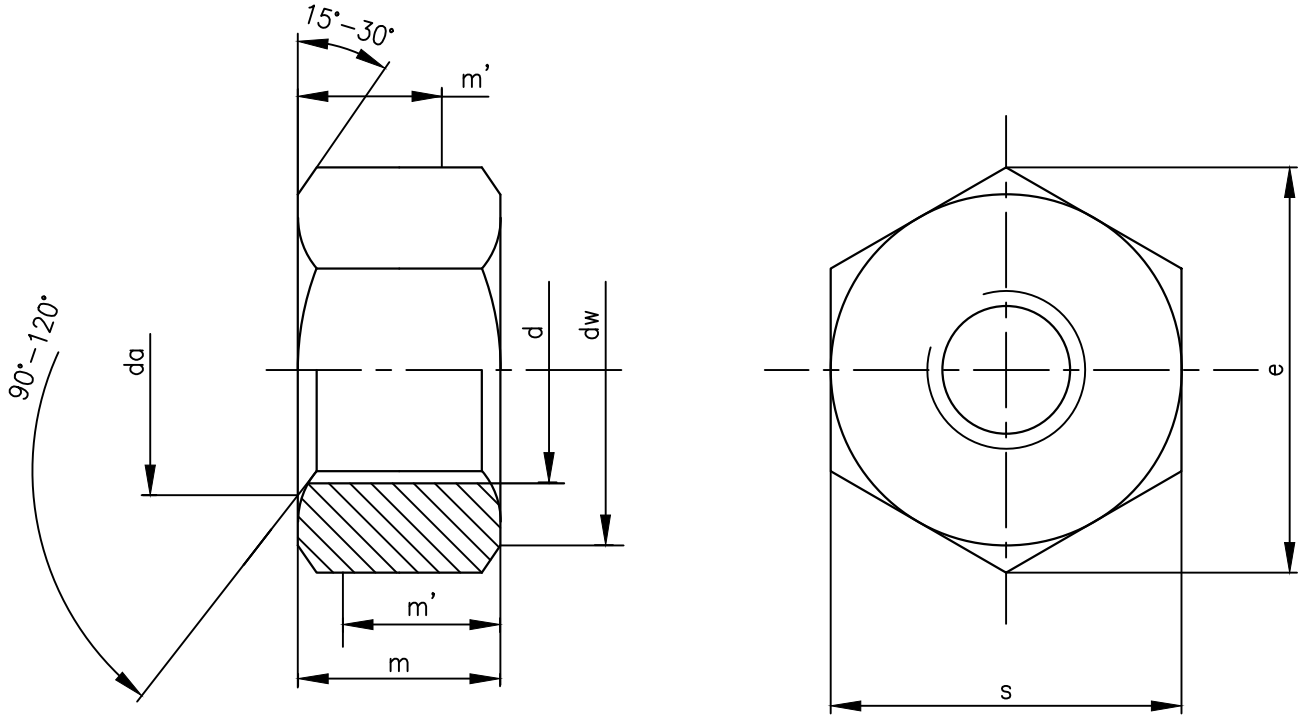
TITLE	CARD CODE	DRAWING NO.	REV
NUT (NRV)	U 01	4–V–0000–20283	01

Size A4

ALL DIMENSIONS ARE IN MILLIMETRES.

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

REV	DATE	ALTERED
		CHD & APPD



NOTE:– FOR OTHER DIMENSIONS/DETAILS REFER IS:1364.

MATERIAL CODE	DRAWING NO	Thread Size	da		dw	e	m		m'	S		WEIGHT
		d	Min	Max	Min	Min	Max	Min	Min	Max	Min	
964658290000	4–V–0003–27341	M20	20	21.6	27.7	32.95	20.7	19.40	15.5	30	29.16	0.0645
964657910000	4–V–0002–27341	M12	12	13.0	16.6	20.03	12	11.57	9.30	18	17.73	0.0165
964657900000	4–V–0001–27341	M10	10	10.8	14.6	17.77	10	9.64	7.7	16	15.73	0.0108

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
	HEXAGON NUT		ASTM A194 B8MA, CERTIFY						

365–122

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

	NAME	SIGN	DATE	NO.OF VAR
DRN	R.P.SINGH		24.01.18	
CHD	S.SATHEES		24.01.18	
APPD	K.RAJASEKARAN		24.01.18	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REFER TABULATION	– – –	
CODE 320				

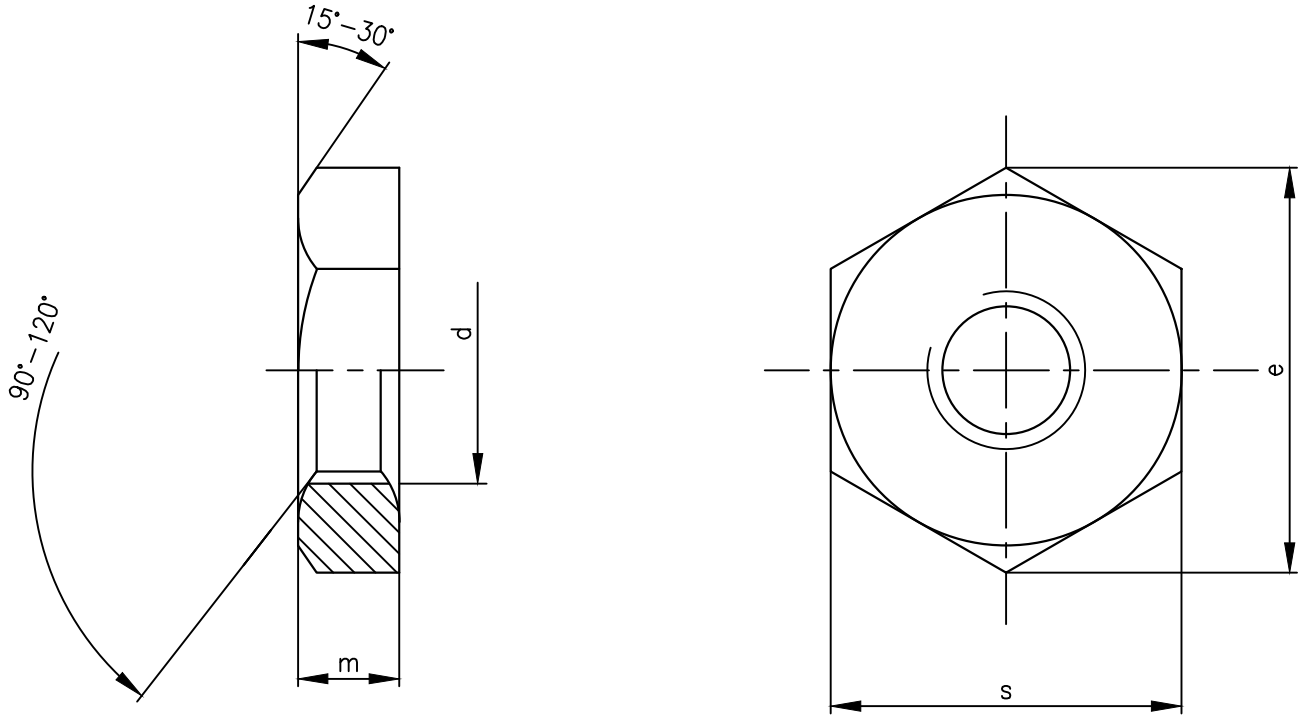
TITLE	CARD CODE	DRAWING NO.	REV
HEX NUT	U 01	4–V–0000–27341	0

Size A4

ALL DIMENSIONS ARE IN MILLIMETRES.

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

REV	DATE	ALTERED
		CHD & APPD



NOTE:– FOR OTHER DIMENSIONS/DETAILS REFER IS:1364.

MATERIAL CODE	DRAWING NO	Thread Size d	e Max	e Min	s Max	s Min	m	WEIGHT	
964657950000	4–V–0002–27342	M60x2	104	–	90.0	88.6	21	0.691	
964657890000	4–V–0001–27342	M42x2	75	–	65.0	63.8	16	0.285	

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
	THIN NUT		ASTM A194 B8MA, CERTIFY						

365–122

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

	NAME	SIGN	DATE	NO.OF VAR
DRN	R.P.SINGH		25.01.18	
CHD	S.SATHEES		25.01.18	
APPD	K.RAJASEKARAN		25.01.18	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REFER TABULATION	– – –	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
THIN NUT	U 01	4–V–0000–27342	0

Size A4

ALL DIMENSIONS ARE IN MILLIMETRES.

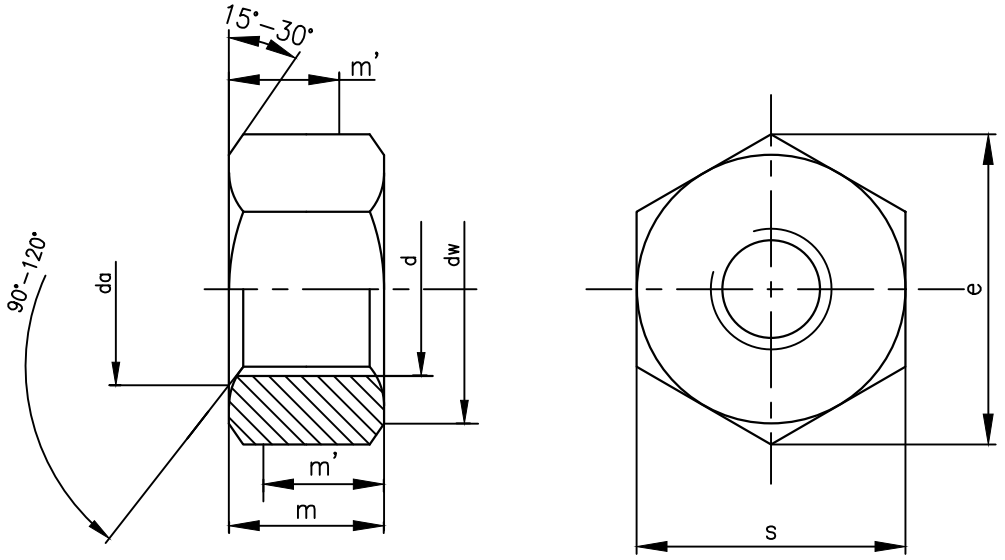
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP/QP

CORPORATE DRG ID:TP-DG-4-V-0000-27368/01

REV	DATE	ALTERED	REV	DATE	ALTERED
01	29.10.18	CHD & APPD SSK & KRS			CHD & APPD

MATERIAL SPECIFICATION
CHANGED FROM B8MA TO Gr.8M

GROUP No. 0006 & 0007 ADDED



NOTE:– FOR OTHER DIMENSIONS/DETAILS REFER IS:1364.

MATERIAL CODE	DRAWING NO	Thread Size d	da Min	da Max	dw Min	e Min	m Max	m Min	m' Min	S Max	S Min	WEIGHT
964658380000	4–V–0001–27368	M10	10	10.8	14.6	17.77	10	9.64	7.7	16	15.73	0.0108
964658390000	4–V–0002–27368	M20	20	21.6	27.7	32.95	20.7	19.40	15.5	30	29.16	0.0645
964658400000	4–V–0003–27368	M27	27	29.16	38	45.2	24.7	22.6	18.1	41	40	0.185
964658410000	4–V–0004–27368	M30	30	32.4	42.7	50.85	30.7	29.10	23.3	46	45	0.253
964658440000	4–V–0005–27368	M12	12	13.0	16.6	20.03	12	11.57	9.30	18	17.73	0.0165
964658970000	4–V–0006–27368	M33	33	35.6	46.6	55.37	33	31.4	25.1	50	49	0.30
964658960000	4–V–0007–27368	M24	24	25.9	33.2	39.55	24.2	22.9	18.3	36	35	0.11

NO OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
	HEXAGON NUT		ASTM A194 Gr.8M, CERTIFY						

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-122

	NAME	SIGN	DATE	NO. OF VAR
DRN	R.P.SINGH		16.04.18	
CHD	S.SATHEES		16.04.18	
APPD	K.RAJASEKARAN		16.04.18	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS	REFER TABULATION	– – –	
CODE 320				

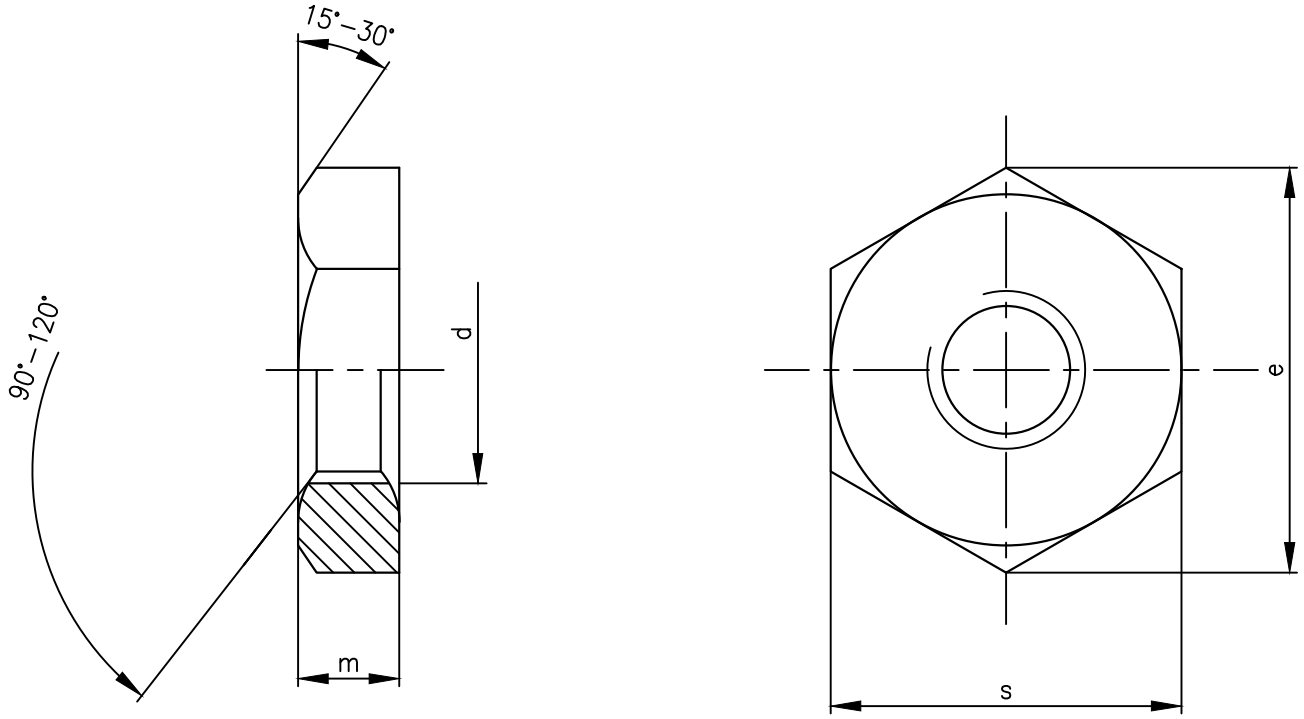
TITLE	CARD CODE	DRAWING NO.	REV
HEX NUT	U 01	4–V–0000–27368	01

Size A4

ALL DIMENSIONS ARE IN MILLIMETRES.

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

REV	DATE	ALTERED
		CHD & APPD



NOTE:– FOR OTHER DIMENSIONS/DETAILS REFER IS:1364.

SL.No	MATERIAL CODE	DRAWING NO	Thread Size	e		s		m	WEIGHT
			d	Max	Min	Max	Min		
01	964658460000	4–V–0001–27401	M36x2	–	60.79	55	53.8	14	0.121

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
	THIN NUT		ASTM A194 Gr.2HM, CERTIFY						

365–122

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

	NAME	SIGN	DATE	NO.OF VAR
DRN	R.P.SINGH		11.06.18	
CHD	S.SATHEES		11.06.18	
APPD	K.RAJASEKARAN		11.06.18	

DEPT VL			SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
CODE 320			NTS	REFER TABULATION	– – –	

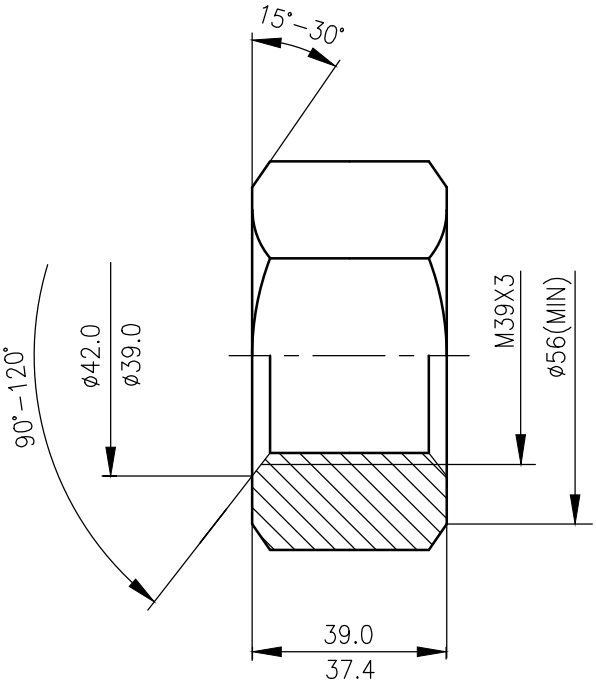
TITLE	CARD CODE	DRAWING NO.	REV
THIN NUT	U 01	4–V–0000–27401	0

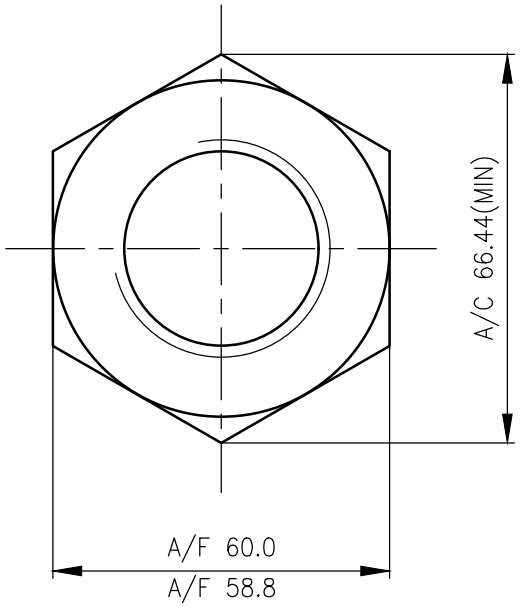
Size A4

ALL DIMENSIONS ARE IN MILLIMETRES.

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

REV	DATE	ALTERED
		CHD & APPD





NOTE:–

1. LATEST APPLICABLE QUALITY WORK INSTRUCTION SHALL BE FOLLOWED IN ALL RESPECTS.
2. FOR OTHER DIMENSIONS/DETAILS REFER IS:1364.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
–	––	964657640000	ASTM A194 Gr.7	–	–	0.48	–	4–V–3245–27272	–

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365–122

	NAME	SIGN	DATE	NO.OF VAR
DRN	K.NAVIN		02.04.16	
CHD	M.SRINIVASAN		02.04.16	
APPD	S.SATHEES		02.04.16	

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

TITLE	CARD CODE	DRAWING NO.	REV
HEX. NUT	U 01	4–V–3245–27272	00

Size A4

ALL DIMENSIONS ARE IN MILLIMETRES.

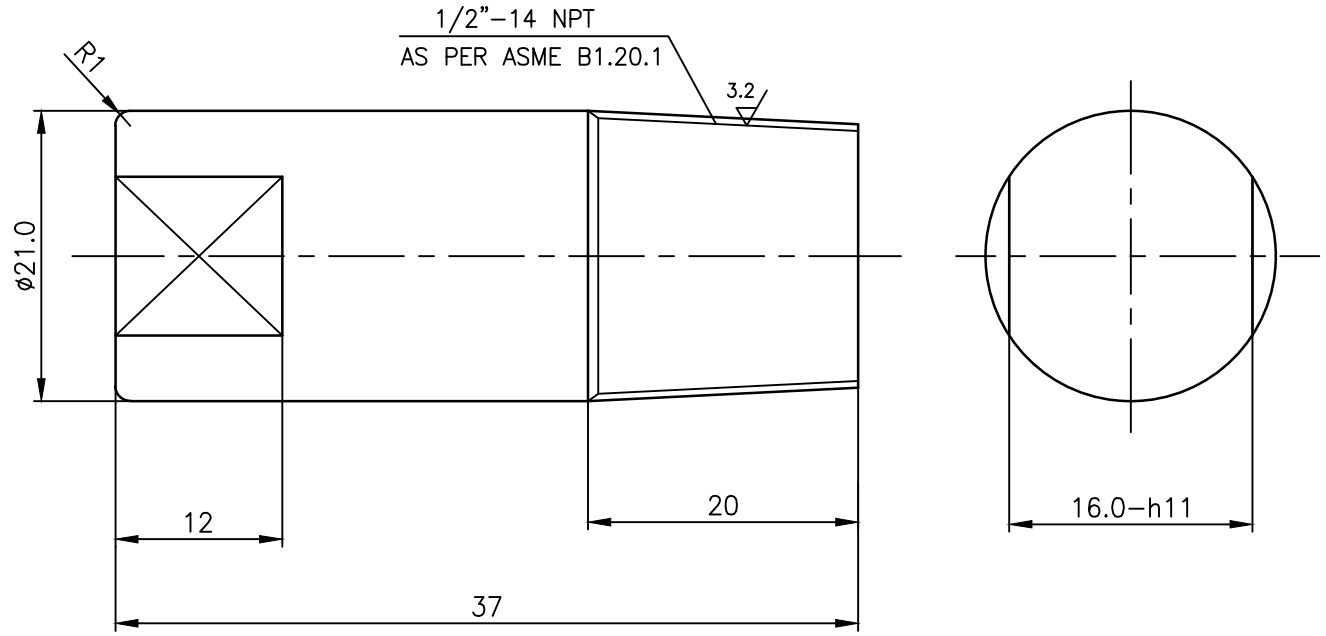
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP/QP

REV	DATE	ALTERED	R.P.SINGH
01	24.07.18	CHD & APPD	SSK & KRS

DIMENSION 37 & 12 WERE 55 & 15 RESPECTIVELY.

6.3 / 3.2

16.0−h11	0
	−0.11



NOTE:

1. ALL DIAMETERS CONCENTRIC WITHIN 0.1mm OF TOTAL INDICATOR READING.
2. ALL KEY SURFACES AT RIGHT ANGLES WITH CENTER−LINE WITHIN 0.1mm OF TOTAL INDICATOR READING.
3. BREAK ALL SHARP CORNERS.

NO OF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
01	SUGGESTED MIN SIZE BAR ø22X65	15 339 139	ASTM A105 CERTIFY	NORMALISED	10	0.14	0.19	--	--

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365−122

	NAME	SIGN	DATE	NO.OF VAR
DRN	M.SRINIVASAN		01.11.01	
CHD	P.BOOMINATHAN		01.11.01	
APPD	K.S.RAMAN		01.11.01	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	NTS.	0.14	COMP.CODE:− 93 110 395 0000	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
SCREW PLUG−1/2"	U 01	4−V−F604−26385	01

Size A4

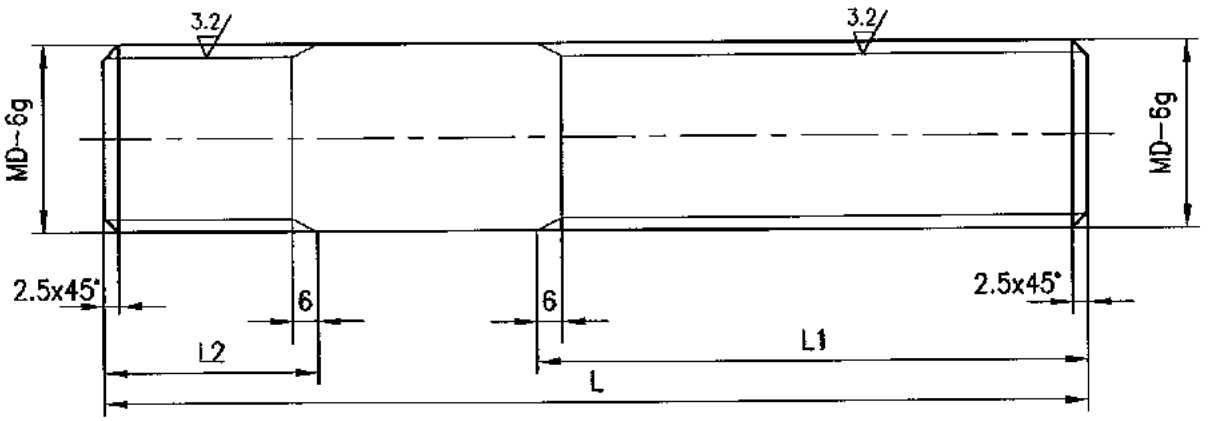
ALL DIMENSIONS ARE IN MILLIMETRES.

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

REV	DATE	ALTERED V.B
4	15.03.04	CHD & APPD M.R.K

SL.No.08 INCLUDED.

12.5 / 3.2



REDRAWN WITH REV.4 ON 15.03.04

SL. No.	COMP. CODE / DRAWING No.	MATL. CODE / SUGGESTED SIZE	MATL SPECN.	SCRAP SORT	NET WT(Kg)	GROSS WT(Kg)	L	L1	L2	MD-6g
							DIMENSIONS			
08	931301830000	153391390000	SA105, NR CERTIFY	10	1.10	1.70	440	120	20	M20
	4-V-NA06-06800	ø25x450								
07	931097630000	153391390000			0.80	1.20	300	120	20	M20
	4-V-N846-06800	ø25x310								
06	931191430000	153391390000			0.40	1.0	250	50	16	M16
	4-V-W084-06800	ø25x260								
05	931086530000	153391390000			0.50	0.85	210	100	20	M20
	4-V-N722-06800	ø25x220								
04	931055020000	153391390000			0.35	0.60	140	80	20	M20
	4-V-K591-06800	ø25x150								
03	931054810000	153391390000			0.70	1.10	270	120	20	M20
	4-V-N231-06800	ø25x280								
02	931054750000	153391390000			0.94	1.50	380	100	20	M20
	4-V-C434-06800	ø25x390								
01	931051010000	153391390000			0.42	0.72	170	100	20	M20
	4-V-N224-06800	ø25x180								

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI 620014.
365-122

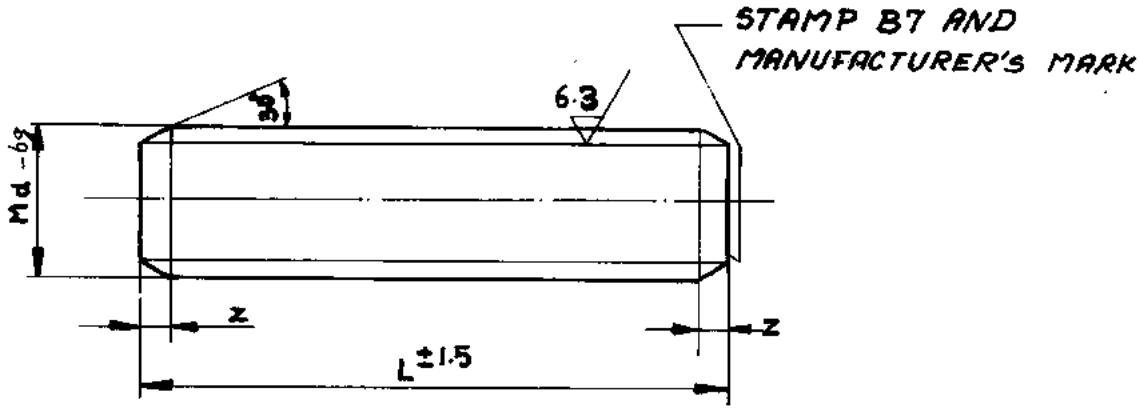
	NAME	SIGN	DATE	NO.OF VAR
DRN	V.BAIRAVAN		15.03.04	
CHD	R.L.NARAYANAN		15.03.04	
APPD	M.RAJAKUMAR		15.03.04	

DEPT	SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS	NO. OF ITEMS
VL	N T S		CAD REF. C406800	
CODE 320				

TITLE	CARD CODE	DRAWING NO.	REV
INDICATOR STUD	U 01	4-V-0000-06800	4

Size A4

6.3



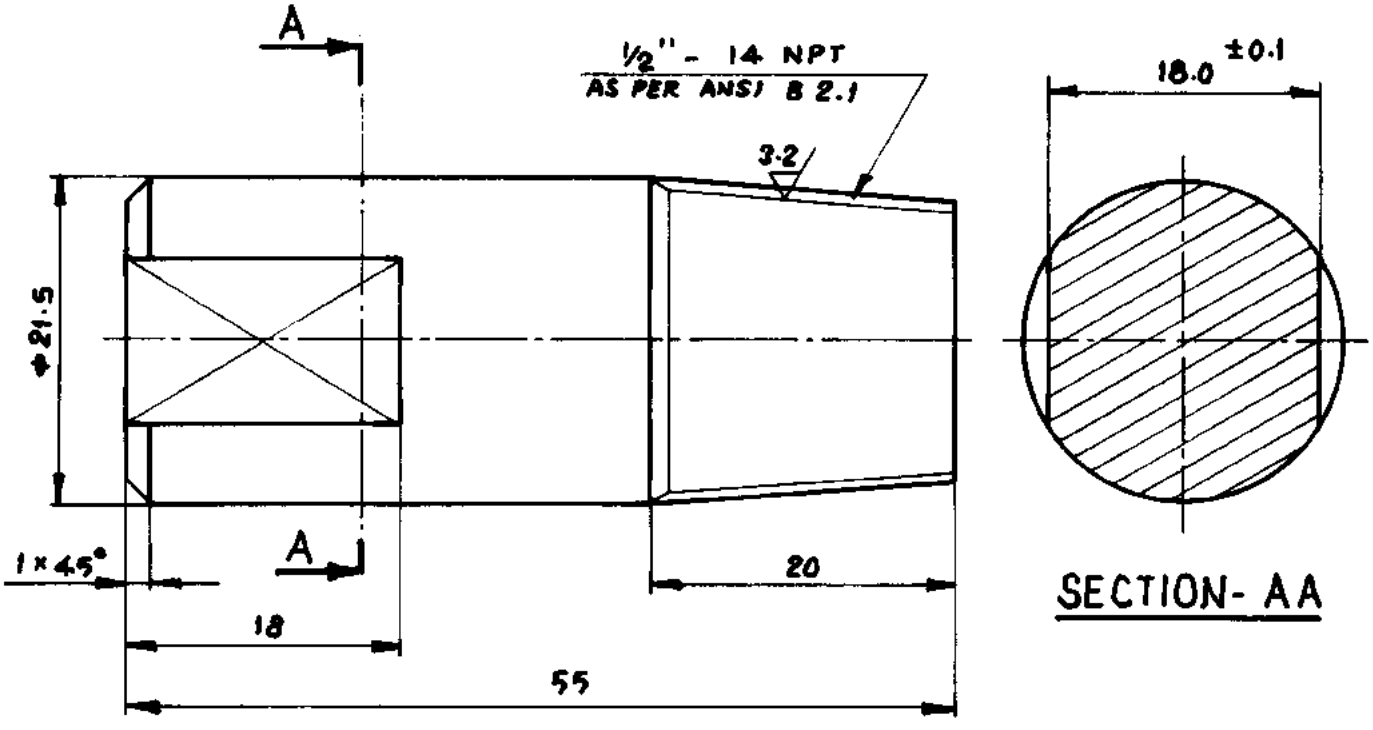
Sl. No.	CODE NO / DRAWING NO	MATL SIZE	MATL SPECN	MATL CODE	WT	L	Md	NET WT (KG)
07	93 102 930 0000 / 4-V-K252-90375	Ø 36×230	ASTM A193 B7 CERTIFY C&T	15039 088	1.85	220	4.0	M33	1.5
06	93 102 929 0000 / 4-V-K251-90375	Ø 36×225		15039 088	1.80	215	4.0	M33	1.45
05	93 102 928 0000 / 4-V-K250-90375	Ø 32×205		15039 087	1.30	195	3.5	M30	1.10
04	93 102 927 0000 / 4-V-K249-90375	Ø 32×180		15039 087	1.14	170	3.5	M27	0.71
03	93 102 926 0000 / 4-V-K248-90375	Ø 28×155		15039 095	0.75	145	3.5	M24	0.44
02	93 102 925 0000 / 4-V-K247-90375	Ø 22×135		15039 094	0.40	125	3.0	M20	0.31
01	93 102 924 0000 / 4-V-K246-90375	Ø 20×120		15039 084	0.39	110	2.5	M18	0.18

RAW MATL

SCALE			ALTERATIONS	DATE	SIGNATURE	ALTERATION INDEX
N.T.S	DRAWN	M. KARUNALAN				
	CHECKED	A.V. NATHAN				
	APPROVED	NSN MOHAN				
	STDS. OFFICER		TRANS. COPY NO.			
	DATE	11.01.90				

	TYPE	GROUP	OLD DRG.	NEW DRG
33-116	TITLE: STUD		DRAWING NO.: 4-V-0000-90375	

6.3 / 3.2



01	BAR ϕ 22 × 60	15339343	SA 105	NORMALISED	10	0.15	0.18	33 166 502 0000 4-V-M305-06587
NO. OF PIECES	DESCRIPTION	MATL. CODE	FINAL MATERIAL	HEAT TREATMENT	SCRAP SORT	NET wt (kg)	GROSS wt (kg)	COMPONENT CODE DRAWING No.

REMARKS

TOTAL NET WT (kg)

SCALE			
	DRAWN	M. [illegible]	
	CHECKED		
NTS	APPROVED	N. NAGARAJAN.	
	STDS. OFFICER		TRANS. COPY NO.
	DATE	14-11-90	

ALTERATIONS	DATE	SIGNATURE	ALTERATION INDEX

TYPE	GROUP	OLD DRG.	NEW DRG

TITLE: PLUG

DRAWING NO.: 4-V-M305-06587

33-116

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.

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 SA193 Gr B7, B7M & B16.
Nuts - Carbon Steel	:	ASME SA194 Gr 2H & 2HM
Alloy Steel	:	ASME SA194 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 & 16C) 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. 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 to ensure freedom from surface/sub-surface defects.

iii. 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 to ensure freedom from surface/sub-surface defects.

iv. 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.

v. 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.

ii. **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 193 and shall meet the material specification requirements for corresponding grades.

iii. **Hardness Testing for Studs/Bolts:**

a) **For SA 193 Gr B7 & B16:** Hardness check shall be carried out on finished stud/ bolt as per SA193, at least on 10% of the finished studs/bolts.

Hardness shall be between 25 HRC and 35 HRC or between 253 HBW and 321 HBW.

b) **For SA193 Gr B7M:**
Hardness check on 100% of studs/bolts as per SA193.
Hardness must be between 94 HRB and 99 HRB or between 201 HBW and 235 HBW.

iv. **Mechanical Testing for Nuts:**

a) **For SA194 Gr 2H, Gr 4, & Gr 7:**
Hardness check on finished nuts shall be as per SA194 (including quantum of testing). Hardness in the finished nut shall be between 24 HRC and 35 HRC or between 248 HBW and 327 HBW.

b) **For SA194 Gr 2HM:**
Hardness check on 100% of finished nuts shall be carried out as per SA194.
Hardness must be between 159 HBW and 235 HBW.

c) **Proof load test shall be done as per SA194 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 (^{0}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 SA194 in case of visible surface discontinuities. On such cases Proof load shall be as per SA194.

v. **NDE:**
Magnetic particle inspection shall be carried out as per ASTM E709 in at least 10% of the finished studs/bolts of all grades. Cracks, linear indications (length $\geq$ 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 SA193 for studs/bolts and SA194 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 in 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 SA193 for studs/bolts & SA194 for nuts.

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.

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.

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. 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 D-3359 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. 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. 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
vi. Heat treatment details (temperature, time, cooling medium, etc.)
vii. 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.

R. Venkanna 15/06/2017	15/06/17	15/6/17	R Dharmar 15/06/17	15/6/17	Revisankaran 15/06/17
Venkanna Rupani	G. Panneer Selvam	R. Elayaraja	R. Dharmar	K. Fayas Malik	U. Revisankaran
Sr. Engineer / QA	DGM/QA	Manager/ Engg/Valves	AGM / QC	Sr.Engineer/ Valves/ Purchase	AGM / QA & BE
Prepared By	**Reviewed By**				**Approved By**

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

TC No: Date:

Customer : PO No./ Amd :
TDC No./Rev.: DC No. :
Product : Drg. No./Rev :
Description : (Spec, dia, pitch, length) Thread Spec. :
Quantity :

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:
2.0 & 3.0	**a) Heat Treatment Details:** Hardening Temperature: ^{0}C; Soaking time: Cooling Medium: Tempering Temperature: ^{0}C; Soaking time: Cooling Medium: **b) Additional Tempering for Nuts (after final tempering):** Temperature: ^{0}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 and ASME SA193 for studs/bolts & SA194 for 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: ^{0}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.

STUDS – TYPE A

(AS PER IS: 1862 - 1975)

1.0 SCOPE: Covers the requirement of STUDS - TYPE A in the size range M3 to M39x3

2.0 SPECIFICATION AND REFERENCE STANDARDS

MATERIAL	STEEL
DIMENSION AND PREFERRED SIZES	FIG 1 & TABLE 1 OF THIS STANDARD
PREFERRED LENGTH, SIZE COMBINATION	TABLE 2 OF THIS STANDARD
THREAD	PITCH AS PER TABLE – 1,TOLERANCE 6g, STANDARD IS: 4218 PART - 3,5&6
MECHANICAL PROPERTIES	CLASS 6.6, AS PER IS:1367 PART-3
TOLERANCE	PRODUCT GRADE- A, AS PER IS:1367 PART-2
SAMPLING AND ACCEPTIBILITY	IS:2614
GENERAL REQUIREMENTS	STUDS SHALL COMPLY WITH IS: 1862 IN RESPECT OF REQUIREMENTS NOT COVERED IN THIS STANDARD.

2.1 Referred standards (Only current versions are applicable)

IS: 1862 Specification for Studs.
IS: 1367 Technical supply conditions for threaded steel fasteners.
IS: 2614 Methods for sampling of fasteners.
IS: 4218 ISO Metric screw threads.

3.0 Designation

A Grade A Stud to this standard of thread size M10 and nominal length 25 mm shall be designated as:

3.1 On Drawings

i) Material Specification column	IS: 1862 - A
ii) Description column	STUD A GR. A 6.6 M10x25
iii) Drawing number column	BPS 41101
iv) Material Code Column	41101 10025 00

3.2 Order Description

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

Stud A M10x25, IS: 1862 – A 6.6

4.0 ADDITIONAL INFORMATION

4.1 Property class 5.6 or 6.8 may also be accepted on agreement between the purchaser and supplier.

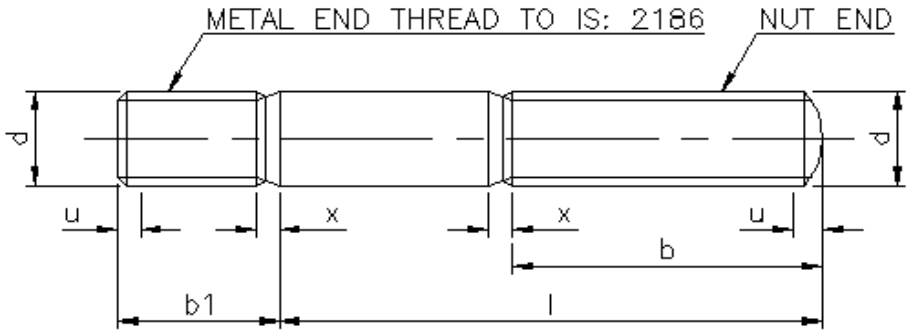
4.2 For Cadmium plated studs, refer BPS: 41141.

4.3 These studs are recommended for use in steel.

4.4 For studs for use in cast iron, refer BPS: 41102.

4.5 Studs with cut threads are also acceptable.

FIG. 1 DIMENSION FOR STUDS
(All dimensions are in millimeters)



u according to IS:1368 – Dimensions of ends of bolts and Screws

x according to IS:1369 – Dimensions of Screw thread runouts and undercuts

(Table 1. All dimensions are in millimeters)

Thread Size d (h13)	b^{+2p} *			b1 (js 16)		
	1≤125	125<1≤200	1>200	Nom	Max	Min
M3	12	-	-	3	3.3	2.7
M4	14	-	-	4	4.38	3.62
M5	16	-	-	5	5.38	4.62
M6	18	-	-	6	6.38	5.62
M8	22	-	-	8	8.45	7.55
M10	26	32	-	10	10.45	9.55
M12	30	36	-	12	12.55	11.45
M16	38	44	57	16	16.55	15.45
M20	46	52	65	20	20.65	19.35
M24	54	60	73	24	24.65	23.35
M30	66	72	85	30	30.65	29.35
M36x3	78	84	97	36	36.8	35.2
(M39x3)	84	90	103	39	39.8	38.2

Note:

1. Sizes in brackets are non-preferred.

* 2. P is pitch of thread.

Table 2 – Preferred length – size combinations for studs
(All dimensions are in millimeters)

Nominal Length'l'	M3	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30	M36X3	(M39x3)
14													
16													
20													
25						17.8							
30													
35						24.2							
40							41						
45						29.4			133				
50								92.7					
55													
60								108		259			
65													
70													
75													
80									224				
85													
90													
100									271				
110													
120													
130													
140													
150													
160													
170													
180													
190													
200													
225													
250													
275													
300													

NOTE:

1. Preferred lengths are between the bold stepped lines.
2. Weights are given in kg per 1000 numbers only.
3. For stocked sizes refer BPS components booklet.
4. For studs with length above the stepped bold line, thread length b ~ 1 – (x+3)

STUD FOR TEMPERATURE USE

(For Temperature of Medium upto 425°C)

1.0 SCOPE:

Covers the requirements for Studs for use in temperature of medium upto 425°C in the size range M8 to M30.

2.0 SPECIFICATION AND REFERENCE STANDARDS:

Dimensions and preferred sizes			Table 1 of this standard
Preferred length size combination			Table 2 of this standard
Tolerance	Product Grade		A
	Indian Standard		IS:1367 (Part 2)
Thread	Pitch		Table 1 of this Standard
	Tolerance	Metal End	IS:2186
		Nut End	6 g to IS:4218 (Part-3, 5 & 6)
Material	ASTM A193 -B7 Certified in quenched and tempered condition		
Manufacture	Thread rolling process upto M 24		
Mechanical Properties	As specified in ASTM A 193-B7		
Marking	All studs shall be marked `B7` on any one side		
General Requirements	Studs shall comply with TDC:5:164 in respect of requirements not covered in this standard except for Cadmium plating		

2.1 Referred Standards (Only current versions are applicable)

IS: 1367 (Part-2) Technical supply conditions for threaded steel fasteners.

IS: 2186 Dimensions for external interference fit threads.

IS: 4218 ISO Metric screw threads.

ASTM A 193 Specification for alloy steel and stainless steel bolting material for high temperature service.

TDC:5:164 TDC for studs to ASTM A193 Gr B7 and ASTM A193 Gr B16.

3.0 DESIGNATION:

A Grade A Stud to this standard of thread size M12 and nominal length 75 mm shall be designated as:

3.1 On Drawings:

i) Material Specification column: A 193-B7
ii) Description Column : STUD Gr A T425 M12X75
iii) Drawing Number Column : BPS 41115
iv) Material Code Column : 4111512075

3.2 Ordering Description:

For placing indents, issuing enquiries and on purchase order, the Ordering Description given below shall be followed.

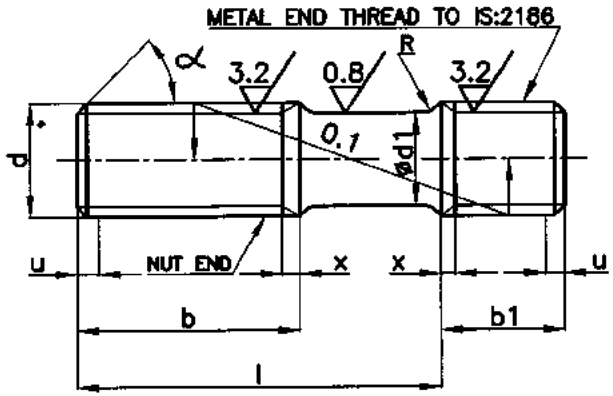
Stud M12x75 BPS:41115-A-ASTM-A193-B7

4.0 ADDITIONAL INFORMATION:

4.1 Copies of the following Standards shall be enclosed along with Purchase Order.

1. TDC:5:164
2. BPS:41115

TABLE 1 – DIMENSIONS AND PREFERRED LENGTH – SIZE COMBINATION FOR STUDS.



R = 2 X PITCH

ød1 = PITCH DIA

u ACCORDING TO IS:1368

x ACCORDING TO IS:1369 (PART–1)

THREAD SIZE d	ød1	α	b1	b	
				*	**
M8	7.188	30°	8	19	22
M10	9.026	30°	10	20	25
M12	10.863	30°	12	25	35
M16	14.701	30°	16	30	42
M20	18.376	30°	20	35	50
M24	22.051	30°	24	40	54
(M27)	25.051	45°	27	46	60
M30	27.727	45°	30	50	64

NOTE:–

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. PREFERRED LENGTHS ARE BETWEEN STEPPED BOLD LINES.
3. WEIGHTS ARE GIVEN IN KG/1000 NUMBERS.
4. FOR STOCKED SIZES REFER BPS COMPONENTS BOOKLET.
5. FOR TOLERANCES FOR UNTOLERANCED DIMENSIONS REFER TP 023 0299.

TABLE–2

NOMINAL LENGTH (l)																		
30	35	40	45	50	55	60	65	70	75	80	85	95	100	120	130	140	150	160
														WEIGHTS				
25.6																		
	41.8	46.2																
	80.5	88.4	96.4		112.1							175.3						
			155.6	172.9	185.3	197.6				247								
					303.2	323.4								554.4				708.4
						420.2		468.5		516.8								
									580									

* FOR SIZES LEFT SIDE OF THE STEPPED BROKEN LINE.

** FOR SIZES RIGHT SIDE OF THE STEPPED BROKEN LINE

IF NOMINAL LENGTH 'l' IS LESS THAN THREAD LENGTH 'b', THEN 'b' IS RECKONED AS b ≈ l–(x+3)

BHARAT HEAVY PLATES & VESSELS LTD

PLANT STANDARD

HPBP TIRUCHIRAPPALLI

BPS 41115

Rev. No. 02

PAGE 3 OF 3

STUD BOLTS FOR TEMPERATURE USE

(For medium of Temperature upto 425°C)

1.0 SCOPE

Covers the requirements for Stud Bolts for use in medium of temperature 425°C in the size range M12 to M39x3.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig 1 & Table 1 of this standard	
Preferred length size combination	Table 1 of this standard	
Tolerance	Product grade	A
	Indian Standard	IS: 1367 (Part 2)
Thread	Pitch	Table 1 of this standard
	Tolerance	6g
	Indian Standard	IS 4218 (Part 3, 5 & 6)
Material	Steel according to ASTM A193 - B7 Certified in quenched and tempered condition	
Manufacture	Thread rolling up to M24	
Mechanical Properties	As specified in ASTM A193-B7	
Marking	All studs shall be stamped B7 on any one side	
General requirements	Studs shall comply with TDC:5:164 in respect of requirements not covered in this standard except for cadmium plating.	

2.1 Referred standards (Only current versions are applicable)

IS 1367 Part 2	Technical supply conditions for threaded steel fasteners
IS 1368	Dimensions for ends of parts with external ISO metric threads
IS 4218 Part 3,5 & 6	ISO metric screw threads
ASTM A193	Specification for alloy steel and stainless steel bolting material for high temperature service
TDC:5:164	TDC for alloy steel studs to specification ASTM SA193 Gr B7 / B7m / B16 oil field equipment

3.0 DESIGNATION

A Grade 'A' Stud to this standard of thread size M16 and nominal length 90mm shall be designated as:

3.1 On Drawings

i) Material Specification column	A193 - B7
ii) Description Column	STUD BOLT GR A T425 M16x90
iii) Drawing Number Column	BPS 41117
iv) Material Code column:	4111716090

3.2 Ordering Description

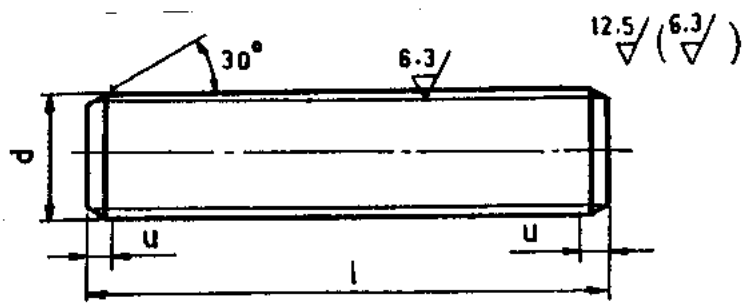
For placing indents, issuing enquiries and on purchase order, Ordering Description given below shall be followed.

Stud M16x90 - BPS: 41117 A - ASTM A193-B7

4.0 ADDITIONAL INFORMATION

4.1 Copies of this standard and TDC:5:164 shall be enclosed along with the purchase order

FIG. 1, DIMENSIONS FOR STUD BOLTS
(All dimensions are in millimetres)



'u' according to IS:1368

TABLE 1 PREFERRED LENGTH - SIZE COMBINATION FOR STUD BOLTS
(All dimensions are in millimetres)

Thread Size d	Nominal Length (l)																	
	60	70	80	90	100	110	120	130	140	150	160	170	180	200	225	240	250	280
	Weights																	
M12		62	70.9															
M16				135.9	151.7		183.3										357.1	
M20				221.9			280.9		303									
M24							390.4			496.9			603.4					
(M27)									591.4				770.8					
M30									722.9		832.4							
(M33)													1208.6					
(M39x3)														1875.7				

Note:

1. Preferred lengths are in between the stepped bold lines
2. Weights are given in Kg per 1000 numbers only
3. Sizes in brackets are non-preferred

Based on IS: 2269

HEXAGONAL SOCKET HEAD CAP SCREWS

1.0 SCOPE:

Covers the requirements of Hexagonal Socket Head Cap Screws in the size range M3 to M30.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes		Table 1 of this standard
Preferred length–Size combination		Table 2 of this standard
Tolerance	Product grade	A
	Indian standard	IS: 1367(part2)
Thread	Pitch	Coarse
	Tolerance	6g
	Indian standard	IS: 4218(part3,5&6)
Material		Steel
Mechanical Properties	Property class	8.8
	Indian standard	IS: 1367(part3)
Sampling and Acceptability	Indian standard	IS: 2614
General requirements	Screw shall comply with IS :2269 in respect of requirement not covered in this standards	

2.1 Reffered standards (only the relevant parts of current version are applicable)

IS: 1367 Technical supply conditions for threaded steel fasteners

IS: 2269 Specification for hexagon socket head cap screws

IS: 2614 Method for sampling of fasteners

IS: 4218 ISO Metric screw threads

3.0 DESIGNATION:

A Grade A Hexagon Socket Head Cap Screw to this standard of thread size M10 and nominal length 60mm shall be designated as:

3.1 On Drawings:

1) material specification column : IS: 2269
2) Description column : SCRU CAP SOC GR A –8.8–M10X60
3) Drawing number column : 4120210060
4) Material code column : 4120210060

3.2 Ordering Description:

For placing indents, issuing enquiries and on purchase order, the ordering Description given below shall be followed:

Hexagon Socket Head Cap Screw M10X60–IS: 2269–8.8

4.0 ADDITIONAL INFORMATION:

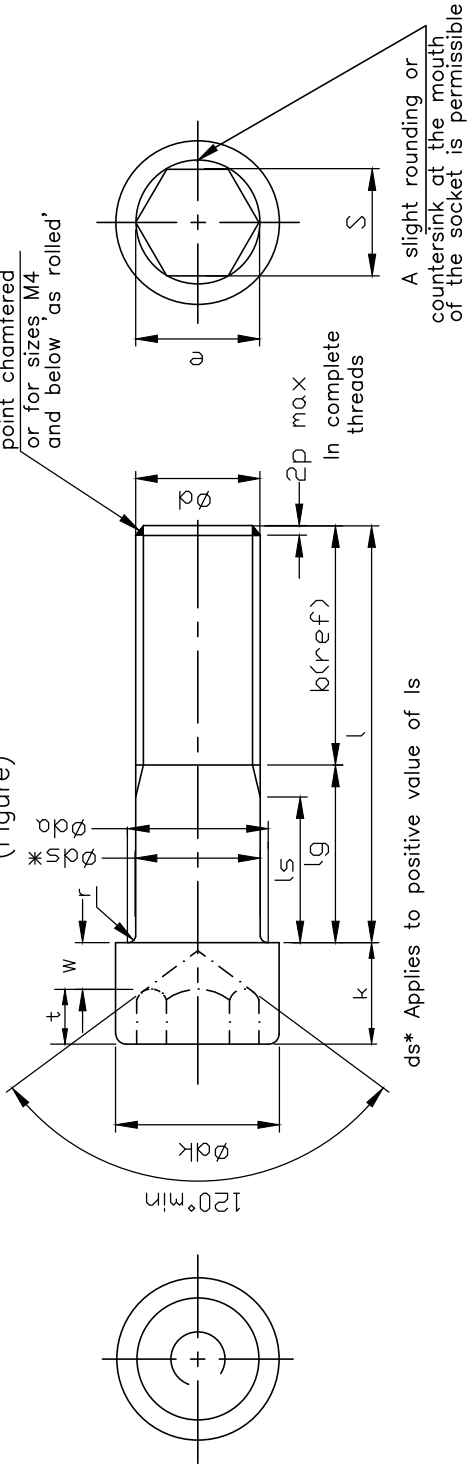
4.1 Property class 10.9 is also acceptable

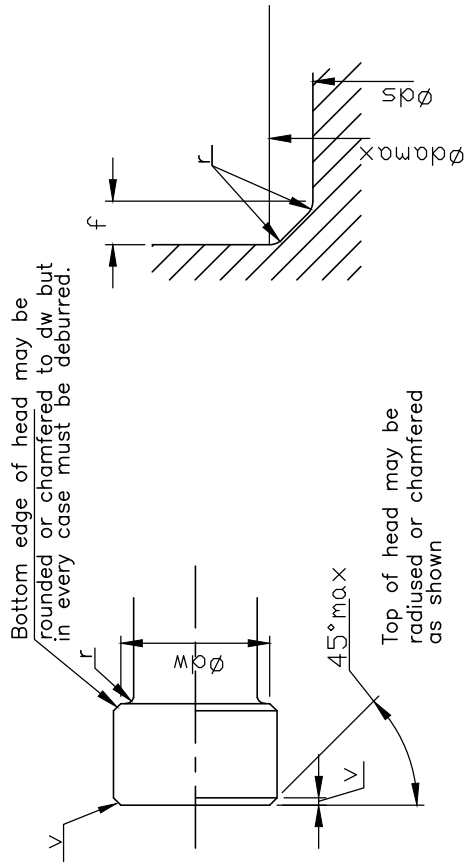
4.2 Cap screws supplied with knurled heads are acceptable

4.3 For cadium plated hexagon socket head cap screws, refer BPS: 41242.

HEXAGONAL SOCKET HEAD CAP SCREWS

(Figure)





MAXIMUM UNDER HEAD FILLET

Revisions			Approved Engg.Deupt.Manager		
Rev. No.	Amd. No.	Reaffirmed	Prepared Standards /EDC	Issued Standards /EDC	Dt of 1st Issue
Dt.	Dt.	Year			

TABLE 1– DIMENSIONS FOR HEXAGON SOCKET HEAD CAP SCREWS

(ALL DIMENSIONS ARE IN MILLIMERTERS)

Thread size d		M3	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30
pitch p		0.5	0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5
b	Ref	18	20	22	24	28	32	36	44	52	60	72
dk	* Max	5.5	7.0	8.5	10.0	13	16	18	24	30	36	45
	** Max	5.68	7.22	8.72	10.22	13.27	16.27	18.27	24.33	30.33	36.39	45.39
	Min	5.32	6.78	8.28	9.78	12.73	15.73	17.73	23.67	29.67	35.61	44.61
da	Max	3.6	4.7	5.7	6.8	9.2	11.2	14.2	18.2	22.4	26.4	33.4
d_s h13	Max	3	4	5	6	8	10	12	16	20	24	30
	Min	2.86	3.82	4.82	5.82	7.78	9.78	11.73	15.73	19.67	23.67	29.67
e	@ Min	2.87	3.44	4.58	5.72	6.86	9.15	11.43	16.00	19.44	21.73	25.15
f	Max	0.51	0.60	0.60	0.68	1.02	1.02	1.87	1.87	2.04	2.04	2.89
k h13/h14	Max	3	4	5	6	8	10	12	16	20	24	30
	Min	2.86	3.82	4.82	5.70	7.64	9.64	11.57	15.57	19.48	23.48	29.48
r	Min	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.8	0.8	1.0
s h13	Nom	2.5	3	4	5	6	8	10	14	17	19	22
	Min	2.52	3.02	4.02	5.02	6.02	8.025	10.025	14.032	17.05	19.065	22.065
	Max	2.58	3.071	4.084	5.084	6.14	8.175	10.127	14.159	17.216	19.275	22.275
t	Min	1.3	2	2.5	3	4	5	6	8	10	12	15.5
v	Max	0.3	0.4	0.5	0.6	0.8	1	1.2	1.6	2	2.4	3
d_w	Min	5.07	6.53	8.03	9.38	12.33	15.53	17.23	23.17	28.87	34.81	43.61
w	Min	1.15	1.4	1.9	2.3	3.3	4	4.8	6.8	8.6	10.4	13.1

* For plain head tol h13

** For knurled heads tol ± IT13

@ e Min= 1.14 s Min

Revisions

Rev. No.	Dt.	Amd. No.	Dt.	Reaffirmed	Year

Prepared	Approved	Issued	Dt of 1st Issue
Standards /EDC	Engg.Deupt.Manager	Standards /EDC	

PLANT STANDARD

HPBP TIRUCHIRAPALLI

BPS:41202

TABLE 2– PREFERRED LENGTH SIZE COMBINATION FOR HEXAGON SOCKET HEAD CAP SCREWS

(ALL DIMENSIONS ARE IN MILLIMERTERS)

size d			M3	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30
Nom	l Min	Max											
2.5	2.30	2.70											
3	2.80	3.20											
4	3.76	4.24											
5	4.76	5.24											
6	5.76	6.24											
8	7.71	8.29				4.4							
10	9.71	10.29											
12	11.65	12.35				5.1	9.5						
16	15.65	16.35			2.8	5.8	11.1						
20	19.58	20.42				6.5	12.7	21.3	32.4				
25	24.58	25.42						23.8					
30	29.58	30.42				8.8		26.3	41.1	81.7			
35	34.5	35.5					18.4		43.2				
40	39.5	40.5				10.9		32.7		100			
45	44.5	45.5					22.2	35.8	53.8		188		
50	49.5	50.5							57.9		182.2		
55	54.4	55.6					26.0						
60	59.4	60.6				13.2		44.9			224		
65	64.4	65.6							70.2				
70	69.4	70.6									266		
80	79.4	80.6						57.1			272		
90	89.3	90.7											
100	99.3	100.7											
110	109.3	110.7											
120	119.3	120.7											
130	129.2	130.8											
140	139.2	140.8											
150	149.2	150.8											
160	159.2	160.8											
180	179.2	180.8											

WEIGHTS

NOTE:

1. Preferred length are in between the stepped bold lines.
2. For stocked sizes and weights refer BPS components book–let.
3. Lengths above the dotted line are threaded to the head within 3xpitch lengths below the dotted line have values lg and ls according to the following formulas:

lg Max = l Nom – b ref.
ls Min = lg Max – 5P.

Revisions			Approved Engg.Deupt.Manager		
Rev. No.	Amd. No.	Reaffirmed	Prepared	Issued	Dt of 1st Issue
Dt.	Dt.	Year	Standards /EDC	Standards /EDC	

SLOTTED GRUB SCREWS, TYPE C

(AS PER IS: 2388 - 1971)

1.0 SCOPE: Covers the requirement of Slotted Grub Screws in the size range M3 to M24

2.0 SPECIFICATION AND REFERENCE STANDARDS

MATERIAL	STEEL
DIMENSION AND PREFERRED SIZES	FIG 1 & TABLE 1 OF THIS STANDARD
PREFERRED LENGTH, SIZE COMBINATION	TABLE 2 OF THIS STANDARD
THREAD	PITCH - COARSE,TOLERANCE - 6g, STANDARD IS: 4218 PART - 3,5&6
MECHANICAL PROPERTIES	CLASS 22H, AS PER IS:1367 PART-5
TOLERANCE	PRODUCT GRADE- A, AS PER IS:1367 PART-2
SAMPLING AND ACCEPTIBILITY	IS:2614
GENERAL REQUIREMENTS	SCREWS SHALL COMPLY WITH IS: 2388 IN RESPECT OF REQUIREMENTS NOT COVERED IN THIS STANDARD.

2.1 Referred standards (Only current versions are applicable)

IS: 2388 Specification for Slotted Grub Screws.
IS: 1367 Technical supply conditions for threaded steel fasteners.
IS: 2614 Methods for sampling of fasteners.
IS: 4218 ISO Metric screw threads.

3.0 Designation

A Grade A Slotted grub screw, Type C to this standard of thread size M12 and nominal length 50 mm shall be designated as:

3.1 On Drawings

i) Material Specification column	IS: 2388
ii) Description column	SCRU GRB SLT C GR. A 22H M12x50
iii) Drawing number column	BPS 41210
iv) Material Code Column	412101205000

3.2 Order Description

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

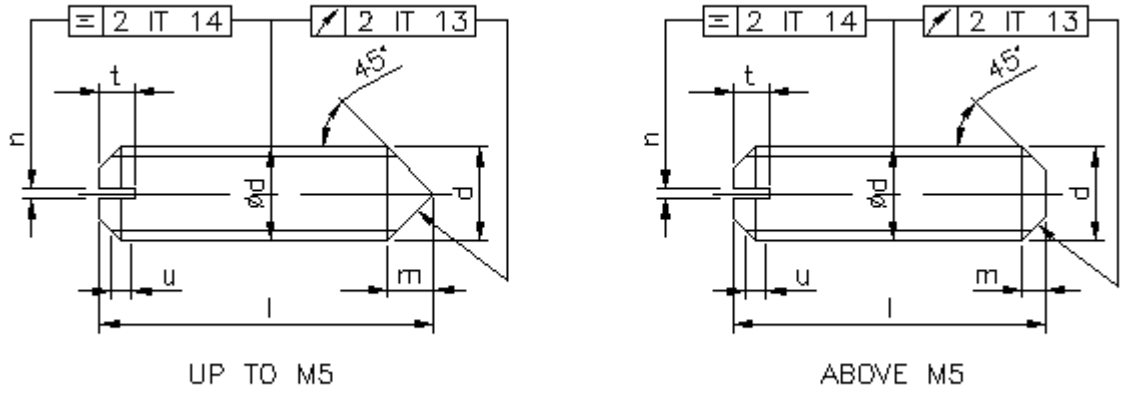
Grub Screw C M12x50 IS: 2388 – 22H

4.0 ADDITIONAL INFORMATION

4.1 Slotted grub screws to the following property class are also acceptable.

Size	Property class
Up to and including M10	6.6
M12 and above	4.8

FIG. 1 DIMENSIONS FOR SLOTTED GRUB SCREWS TYPE - C
(All dimensions are in millimeters)



UP TO M5 ABOVE M5

Note:
1. u and conical end according
IS: 1368 – Dimensions for ends of bolts and screws.

TYPC – C CONICAL END

(Table 1. All dimensions are in millimeters)

Thread Size d		M3	M4	M5	M6	M8	M10	M12	M16	M20	M24
n H14	Nom	0.5	0.6	0.8	1.0	1.2	1.6	2.0	2.5	3.0	4.0
	Max	0.65	0.75	0.95	1.15	1.45	1.85	2.25	2.75	3.25	4.3
	Min	0.50	0.60	0.80	1.0	1.2	1.6	2.0	2.50	3.0	4.0
t js15	Nom	1.2	1.4	1.8	2.0	2.5	3.0	4.0	4.5	5.0	6.0
	Max	1.4	1.6	2.0	2.2	2.7	3.2	4.24	4.74	5.24	6.24
	Min	1.0	1.2	1.6	1.8	2.3	2.8	3.76	4.26	4.76	5.76
m	Nom	1.5	2.0	2.5	2.5	3.0	4.0	5.0	6.0	7.0	8.0

Table 2 – Preferred length – size combinations for slotted grub screws
(All dimensions are in millimeters)

Nominal Length l (js 15)	**Thread Size d**									
	M3	M4	M5	M6	M8	M10	M12	M16	M20	M24
4										
5										
6										
8		0.5		1.1						
10					2.5					
12				1.8		4.6				
14										
16				2.5		6.6	9.6			
20					5.7	8.6				
25										
30				4.9			19.0			
35						16.1		55.2		
40							26.2			
45										
50							33.4	78.9		
55										
60										
65										
70										

NOTE:

1. Preferred lengths are between the bold stepped lines.
2. Weights are given in kg per 1000 numbers only.
3. For stocked sizes refer BPS components book-let.

HEXAGON HEAD BOLTS,PRODUCT GRADE 'B'

(Property Class 6.8)

1.0 SCOPE

Covers the requirements of hexagon head bolts in the size range M27,M33 and above.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig. 1 & Table 1 of this standard	
Preferred length size combination	Table 2 of this standard	
Tolerance	Product grade B	For products with d > M24 and l> 10d or 150mm whichever is shorter
	Indian Standard	IS: 1367 (Part 2)
Thread	Pitch	Table 1 of this standard
	Tolerance	6g
	Indian Standard	IS 4218 (Part 3,5 & 6)
Material	Steel	
Mechnical properties	Property class	6.8
	Indian Standard	IS: 1367 (Part 3)
Sampling and Acceptability	Indian Standard	IS: 1367 (Part 17)
General requirements	Bolts shall comply with IS: 1364 (Part 1) in respect of requirements not covered in this standard.	

2.1 Referred standards (Only current versions are applicable)

IS 1364 (Part 1)	Specification for hexagon head bolts, screws & nuts of product grade A&B
IS 1367 (Part 2,3 & 17)	Technical supply conditions for threaded steel fasteners
IS 4218 (Part 3,5 & 6)	ISO metric screw threads

3.0 DESIGNATION

A Grade 'B' Hexagon head bolt to this standard of thread size M36x3 and nominal length 180mm shall be designated as:

3.1 On Drawings

i) Material Specification column	---------
ii) Description Column	HEX BOLT GR B 6.8 M 36x3x180
iii) Drawing Number Column	BPS 41215
iv) Material Code column	4121536180

3.2 Ordering Description

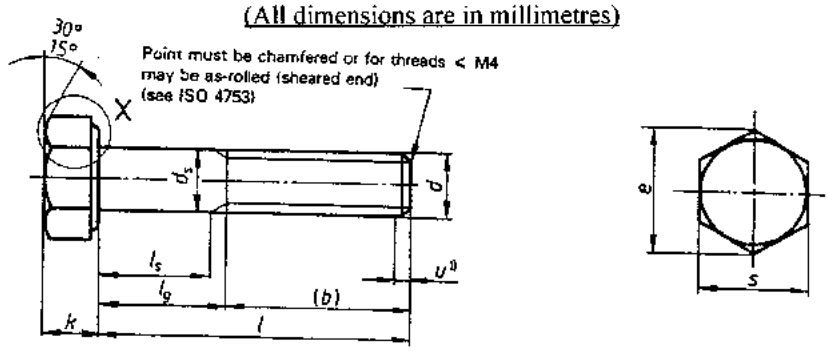
For placing indents, issuing enquiries and on purchase order,ordering description given below shall be followed.(Typical examples)

HEXAGON BOLT M27x120 to BPS:41215 - 6.8 for bolts with d = M27 and M33 and specified length
HEXAGON BOLT M36x3x150 to BPS: 41215-6.8 for bolts with d>= M36x3 and specified length

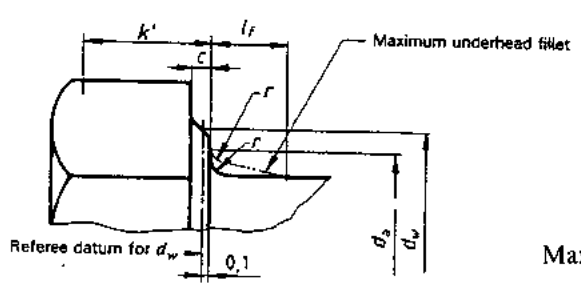
4.0 ADDITIONAL INFORMATION

4.1 Copies of this standard shall be enclosed along with the purchase order for thread sizes M27, M33 and above

FIG. 1 DIMENSIONS FOR HEXAGON HEAD BOLTS
(All dimensions are in millimetres)



X



Maximum & Minimum underhead fillet
DETAIL - X

u according to CE of IS:1368 k'= Effective gauging height
lg Max = l Nom - b , ls Min = l Max - 5 x Pitch

TABLE1
(All dimensions are in millimeters)

Thread Size d	b			c		d_a	d_s		d_w Min		e Min		f	k				k'	r	S		
														+		++					Min	
	1	2	3	Min	Max	Max	Max	Min	+	++	+	++	Max	Min	Max	Min	Max	Min	Min	ax	+	++
(M27)	60	66	79	0.5 approx		30.4	27	26.67	36.9	36.9	45.20	45.20	4	16.65	17.35	16.65	17.35	11.65	1	41	40	40
(M33)	72	78	91	0.5 approx		36.4	33	32.61	45.0	45.0	55.37	55.37	6	20.58	21.42	20.58	21.42	14.40	1	50	49	49
(M36x3)	78	84	97	0.2	0.8	39.4	36	35.61	51.1	51.1	60.79	60.79	6	22.08	22.92	22.08	22.92	15.5	1	55	53.8	53.8
(M39x3)	84	90	103	0.5 approx		42.5	39	38.61	54.0	54.0	66.44	66.44	6	24.58	25.42	24.58	25.42	17.21	1	60	58.8	58.8

1) For length l <= 125mm
+ For l <= 10d or 150mm;

2) For Nom length l > 125 and <= 200mm
++ For l > 10d or 150mm

3) For Nom length l > 200mm

TABLE - 2

PREFERRED LENGTH - SIZE COMBINATION FOR HEXAGON HEAD BOLTS

(All dimensions are in millimetres)

Length 'l'					Thread size d			
	l <= 10d or 150		l > 10d or 150		(M27)	(M33)	M36x3	(M39x3)
Nom	Min	Max	Min	Max				
20	19.58	20.42						
25	24.58	25.42						
30	29.58	30.42						
35	34.5	35.5	33.75	36.25				
40	39.5	40.5	38.75	41.25				
45	44.5	45.5	43.75	46.23				
50	49.5	50.5	48.75	51.25				
55	54.4	55.6	53.5	56.5				
60	59.4	60.6	58.5	61.5				
65	64.4	65.6	63.5	66.5				
70	69.4	70.0	68.5	71.5				
80	79.4	80.6	78.5	81.5				
90	89.3	90.7	88.25	91.75		907		
(95)	94.3	95.7	93.25	96.75	578			
100	99.3	100.7	98.25	101.75	600			
110	109.3	110.7	108.25	111.75				
120	119.3	120.7	118.25	121.75				1620
130	129.2	130.8	128	132				
140	139.2	140.8	138	142				
150	149.2	150.8	148	152			1611	
160	159.2	160.8	158	162				
180	179.2	180.8	178	182			1438	
200	199.02	200.92	197.7	202.3				
220	219.02	220.92	217.7	222.3				
240	239.02	240.92	237.7	242.3				2400
260	258.95	261.05	257.4	262.6				
280	278.95	281.05	277.4	282.6				
300	298.95	301.05	297.4	302.6				

NOTE:

1. Sizes in brackets are non-preferred
2. Preferred lengths are in between the stepped bold lines
3. Weights are given in Kg per 1000 numbers only.

Based on IS: 1364 (Part 2) - 1983

HEXAGON HEAD SCREWS, PRODUCT GRADES A & B

(Property Class 6.8)

1.0 SCOPE

Covers the requirements of Hexagon Head Screws in the size range M20 to M30.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes		Table 1 of this standard
Preferred length-size combination		Table 2 of this standard
Tolerance	Product grade	A - for products with $d \leq M24$ and $l \leq 10d$ or 150mm whichever is shorter B - for products with $d > M24$ or $l > 10d$ or 150mm whichever is shorter
	Indian Standard	IS: 1367(Part 2)
Thread	Pitch	Coarse
	Tolerance	6g
	Indian Standard	IS: 4218(Part 3, 5 & 6)
Material		Steel
Mechanical properties	Property class	6.8
	Indian Standard	IS: 1367 (Part 3)
General requirements	Screws shall comply with IS: 1364 in respect of requirements not covered in this standard	
Sampling and Acceptability	Indian Standard	IS: 2614

2.1 Referred Standards (Only the relevant parts of the current versions are applicable)

IS: 1364 (Part 2) Specification for hexagon head bolts, screws & nuts of product grade A&B. Part 2 Hexagon screws.

IS: 1367 Technical supply conditions for threaded steel fasteners

IS: 2614 Methods for sampling of fasteners

IS: 4218 ISO Metric screw threads

3.0 DESIGNATION

A Grade A Hexagon Head Screw to this standard of thread size M20 and nominal length 60mm shall be designated as:

3.1 On Drawings:

i) Material Specification column : IS: 1364
ii) Description column : SCRU HEX GR A 6.8-M20x60
iii) Drawing Number column : 4121620060
iv) Material Code column : 4121620060

3.2 Ordering Description

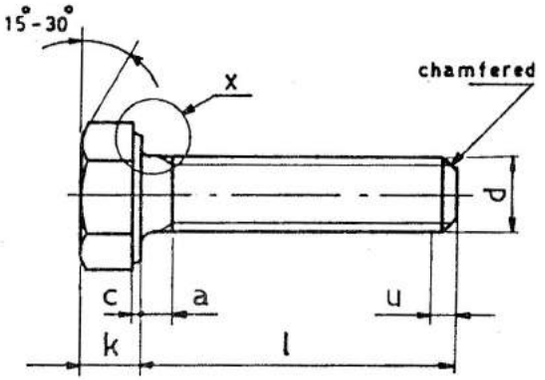
For placing indents, issuing enquiries and on purchase order, the Ordering Description given below shall be followed.

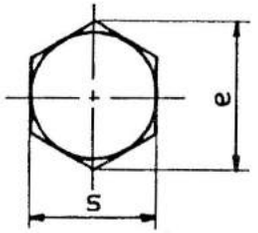
Hexagon head screw M20x60 IS:1364 (Part 2) - 6.8

4.0 ADDITIONAL INFORMATION

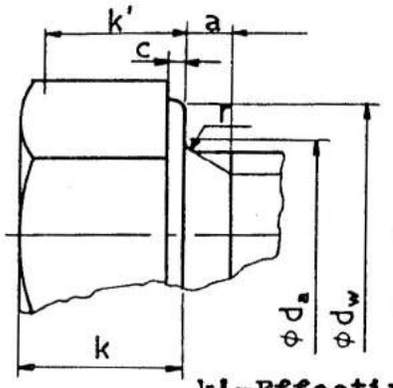
4.1 Property class 6.6 is also acceptable.

TABLE-1 DIMENSIONS FOR HEXAGON HEAD SCREWS



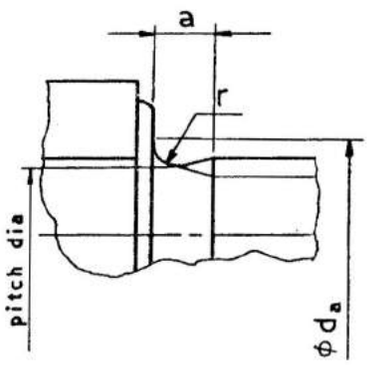


u - according to 'CE' of IS:1368 - 'Dimensions of ends of bolts and screws'.



DETAIL - X

k'=Effective gauging height.



Alternate shape

(All dimensions are in mm)

Thread size d	a* Max	c		da	d_w Min		e Min		k				k' Min	r Min	s		
									+		++				Max	Min	
		Min	Max	Max	+	++	+	++	Min	Max	Min	Max				±	++
M20	7.5	0.2	0.8	22.4	28.2	27.7	33.53	32.95	12.28	12.72	12.15	12.85	8.5	0.8	30	29.67	29.16
M24	9	0.2	0.8	26.4	33.6	33.2	39.98	39.55	14.78	15.22	14.65	15.35	10.3	0.8	36	35.38	35
M30	10.5	0.2	0.8	33.4	42.7	42.7	50.85	50.85	18.7 Nom		18.28	19.12	12.8	1	46	45	45

* a Min - Not less than 1P (Pitch)

\+ for $l \leq 10d$ or 150mm

++ for $l > 10d$ or 150mm

PLANT STANDARD
HPBP TIRUCHIRAPALLI

BPS: 41216

Dec, 198

TABLE-2 PREFERRED LENGTH-SIZE COMBINATIONS FOR HEXAGON HEAD SCREWS

(All dimensions are in mm)

Nominal length 'l'					Thread size d		
	≤10d or 150mm		>10d or 150mm		M20	M24	M30
Nom	Min	Max	Min	Max			
6	5.76	6.24					
8	7.71	8.29					
10	9.71	10.29					
12	11.65	12.35					
16	15.65	16.35					
20	19.58	20.42					
25	24.58	25.42					
30	29.58	30.42					
35	34.5	35.5	33.75	36.25	151		
40	39.5	40.5	38.75	41.25	162		
45	44.5	45.5	43.75	46.25			
50	49.5	50.5	48.75	51.25	184	278	
55	54.4	55.6	53.5	56.5			
60	59.4	60.6	58.5	61.5	211		827.6
65	64.4	65.6	63.5	66.5			
70	69.4	70.6	68.5	71.5		357	
80	79.4	80.6	78.5	81.5			
90	89.3	90.7	88.25	91.75			
100	99.3	100.7	98.25	101.75		463	

WEIGHTS

Note:

1. Preferred lengths are in between the stepped bold lines.
2. Weights are given in Kg per 1000 numbers only.
3. For stocked sizes refer BPS components book-let.

DEC 1986

HEXAGON HEAD BOLTS, PRODUCT GRADE 'C'

(Property Class 4.6)

1.0 SCOPE

Covers the requirements of Hexagon Head Bolts in the size range M36x3 and above.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Table 1 of this standard	
preferred length size combination	Table 2 of this standard	
Tolerance	Product Grade C	
	Indian Standard	IS 1367 (Part 2)
Thread	Pitch	Table 1 of this standard
	Tolerance	8g
	Indian Standard	IS 4218 (Part 3, 5 & 6)
Material	Steel	
Mechanical properties	Property class	4.6
	Indian Standard	IS 1367 (Part 3)
Sampling & Acceptability	Indian Standard	IS 1367 (Part 17)
General requirements	Hexagon Head bolts shall comply with **IS 1363** (Part 1) in respect of requirements not covered in this standard.	

2.1 Referred Standards (Only the relevant parts of current versions are applicable)

IS 1363(Part 1)	Specification for hexagon head bolts, screws and nuts of product grade C. Part 1 Hexagon Head bolts.
IS 1367 (Parts 2,3)	Technical supply conditions for threaded steel fasteners.
IS 1367 Part 17	Industrial fasteners - Threaded steel fasteners-Technical supply conditions:Part 17 - Inspection, sampling and acceptance procedure.
IS 4218	ISO Metric screw threads

3.0 DESIGNATION

A Grade C, Hexagon Head Bolt to this standard of thread size M36x3 and nominal length 180 mm shall be designated as:

3.1 On Drawings:

i) Description column : **BOLT HEX Gr C 4.6- M36x3 x 180**
ii) Drawing Number column : **BPS 41221**
iii) Material Code column : **4122136180**

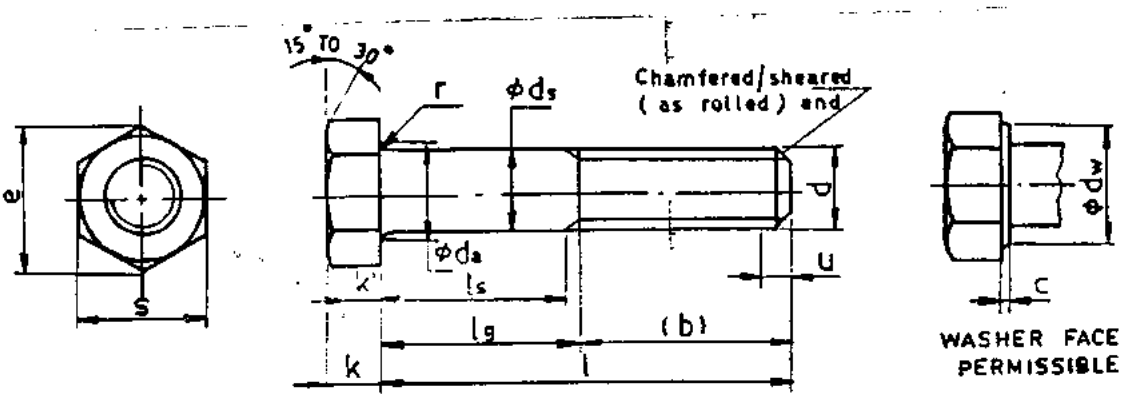
3.2 Ordering Description

For placing indents, issuing enquiries and on purchase order, ordering description given below shall be followed (typical examples).

Hexagon head bolt M36X3 x 180 - BPS: 41221-4.6

4.0 ADDITIONAL INFORMATION

4.1 Copies of this standard shall be enclosed along with the purchase order for thread sizes M36x3 and above.



k'=Effective gauging height.

Table - 1
DIMENSIONS FOR HEXAGON BOLT
(All dimensions are in millimetres)

Thread size d	Pitch P	b * ** ***	c Max	da Max	ds Max Min	dw Min	e Min	k Min Max	k' Min	r Min	s Max Min
M 36x3	3	78 84 97	0.8	42.4	37 35	51.1	60.79	21.45 23.55	15.0	1.0	55 53.8
(M39x3)	3	84 90 103		45.4	40 38		66.44	23.95 26.05		1.0	60 58.8

NOTE :

1. "u" according to "CE" of IS :1368- Dimensions of ends of bolts and screws.
2. * For nominal lengths 'l' ≤ 125 mm
   ** For nominal lengths 'l' > 125 and ≤ 200 mm
   *** For nominal lengths 'l' > 200 mm
3. lg Max (grip length) = l Nom - b
   ls Min (shank length) = lg Max - 5 x Pitch

TABLE 2
PREFERRED LENGTH- SIZE COMBINATION FOR HEXAGON HEAD BOLTS
(All dimensions are in mm)

Thread size d	M36x3	(M39x3)

Nom. Length ' l '

Nom	Min	Max
110	108.25	111.75
120	118.25	121.75
130	128	132
140	138	142
150	148	152
160	156	164
(170)	166	174
180	176	184
(190)	186	194
200	195.4	204.6
220	215.4	224.6
240	235.4	244.6
260	254.8	265.2
280	274.8	285.2
300	294.8	305.2

Note:

1. **Size in brackets are non-preferred.**
2. **Preferred lengths are in between the stepped bolt lines.**
3. **Weights are given in Kg per 1000 numbers only.**

Based on IS: 6094-1981

HEXAGON SOCKET SET SCREWS WITH CUP POINT

(Product grade A, Property class 45H)

1.0 SCOPE

Covers the requirements of hexagon socket set screws in the size range M3 to M16.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes		Table 1 of this standard
Preferred length-size combination		Table 1 of this standard
Tolerance	Product grade	A
	Indian Standard	IS: 1367 (Part 2)
Thread	Pitch	Coarse
	Tolerance	5g6g
	Indian Standard	IS: 4218(Part 3 & 5)
Material		Steel
Mechanical properties	Property class	45H
	Indian Standard	IS: 1367 (Part 5)
Sampling and Acceptability	Indian Standard	IS: 2614
General requirements	Set screws shall comply with IS: 6094 in respect of requirements not covered in this standard	

2.1 Referred Standards (Only the relevant parts of current versions are applicable)

IS: 1367 Technical supply conditions for threaded steel fasteners

IS: 2614 Methods for sampling of fasteners

IS: 4218 ISO metric screw threads

IS: 6094 Specification for hexagon socket set screws

3.0 DESIGNATION

A Grade A hexagon socket set screw to this standard of thread size M10 and nominal length 30mm shall be designated as:

3.1 On drawings:

i) Material specification column: IS: 6094
ii) Description column : SCRU SET SOC CP A 45H M10x30
iii) Drawing Number column : 4123510030
iv) Material code column : 4123510030

3.2 Ordering Description

For placing indents, issuing enquiries and on purchase order, the Ordering Description given below shall be followed.

Hexagon socket set screw M10x30 IS: 6094-CP*

4.0 ADDITIONAL INFORMATION

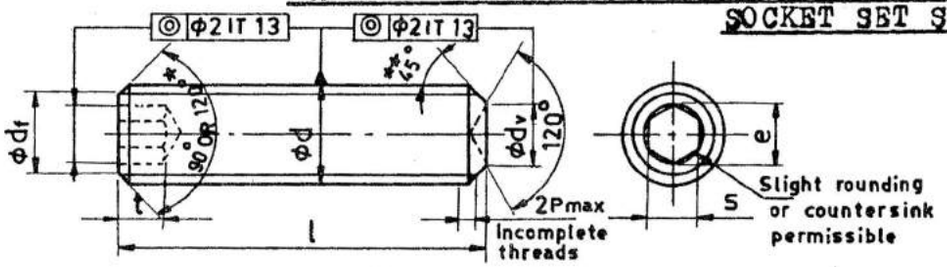
4.1 Property class 12.9 is also acceptable.

4.2 Set screws with knurled cup point are also acceptable.

4.3 For Cadmium plated set screws, refer BPS: 41275.

*4.4 The old type designation for 'CP' (cup point) was 'A'.

TABLE-1 DIMENSIONS & PREFERRED LENGTH SIZE COMBINATION FOR HEXAGON SOCKET SET SCREWS



Note:

1. Preferred lengths are in between the stepped bold lines.
2. Weights are given in Kg per 1000 numbers only.
3. For stocked sizes refer BPS components book-let.

* 120° is mandatory for screws above the dotted line.

** applies only to the portion fo the point below the minor dia of the thread.

(All dimensions are in mm)

Thread size d	e Min	s Min	s Max	t Min +	t Min ++	dv Max	dv Min	Nominal length 'l' 6	8	10	12	16	20	25	30	35	40	45	50	55	60
M6	3.44	3.02	3.08	2.0	3.5	3.0	2.75	0.9													
M8	4.58	4.02	4.095	3.0	5.0	5.0	4.70														
M10	5.72	5.02	5.095	4.0	6.0	6.0	5.70						8.6		14						
M12	6.86	6.02	6.095	4.8	8.0	8.0	7.64														
M16	9.15	8.025	8.115	6.4	10.0	10.0	8.64														

WEIGHTS

\+ For screws with nominal lengths left side of the dotted stepped line.

++ For screws with nominal lengths right side of the dotted stepped line.

PLANT STANDARD
HPBP TIRUCHIRAPALLI

BPS: 41235

DEC 1986

Based on IS: 1364(part–1)

HEXAGONAL HEAD BOLTS, PRODUCT GRADE A
(property class 8.8)

1.0 SCOPE:

Covers the requirements of Hexagonal Head Bolts in the size range M6 to M16.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes		Table 1 of this standard
Preferred length–Size combination		Table 2 of this standard
Tolerance	Product grade	A
	Indian standard	IS: 1367(part2)
Thread	Pitch	Coarse
	Tolerance	6g
	Indian standard	IS: 4218(part3,5&6)
Material		Steel
Mechanical Properties	Property class	8.8
	Indian standard	IS: 1367(part3)
Sampling and Acceptability	Indian standard	IS: 2614
General requirements	Bolts shall comply with IS :1364 in respect of requirement not covered in this standards	

2.1 Reffered standards (only the relevant parts of current version are applicable)

IS: 1364 (part–1) Specification for hexagon head Bolts,screws and nuts of grade A&B. Part 1 Hexagonal bolts.

IS: 1367 Technical supply conditions for threaded steel fasteners

IS: 2614 Method for sampling of fasteners

IS: 4218 ISO Metric screw threads

Revisions			Approved Engg.Deupt.Manager		
Rev. No.	Amd. No.	Reaffirmed	Prepared	Issued	Dt of 1st Issue
Dt.	Dt.	Year	Standards /EDC	Standards /EDC	

3.0 DESIGNATION:

A Grade A Hexagon Head Bolt to this standard of thread size M16 and nominal length 60mm shall be designated as:

3.1 On Drawings:

1) material specification column : IS: 1364
2) Description column : BOLT HEX GR A 8.8 M16X60
3) Drawing number column : 4123716060
4) Material code column : 4123716060

3.2 Ordering Description:

For placing indents, issuing enquiries and on purchase order, the ordering Description given below shall be followed:

Hexagon Bolt M16X60 IS: 1364(part-1)-8.8

Revisions			
Rev. No.	Amd. No.	Reaffirmed	Year
Dt.	Dt.		

Prepared	Issued	Dt of 1st Issue
Standards /EDC	Standards /EDC	

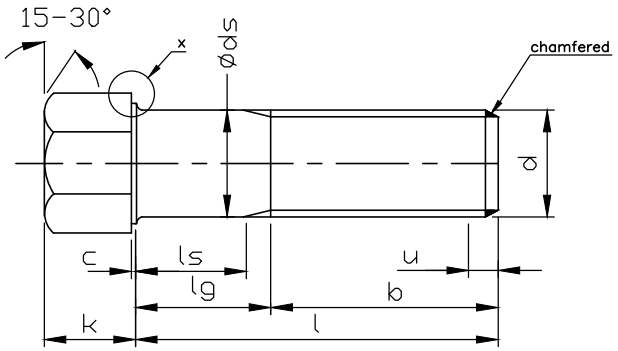
Approved
Engg.Deupt.Manager

PLANT STANDARD

HPBP TIRUCHIRAPALLI

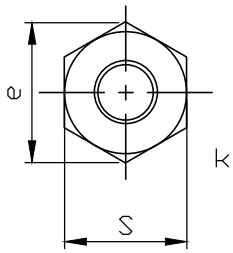
BPS:41237

TABLE 1 DIMENSIONS FOR HEXAGONAL HEAD BOLTS

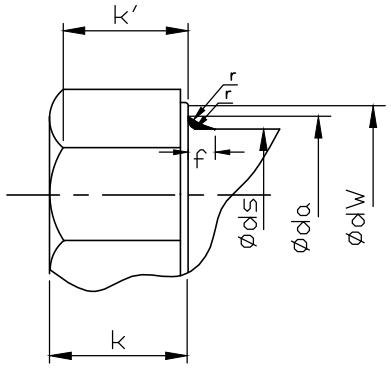


u according to CE of IS:1368 – ' Dimensions of ends of bolts and screws

lg Max=l Nom–b ; ls Min= l Max – 5xpitch



k'=Effective gauging height.



maximum & minimum underhead fillet

(ALL DIMENSIONS ARE IN MILLIMERTERS)

Thread size d	b			C		da	ds		dw Min		e Min		f	k				k'	r	s		
														+		++					Min.	
	1	2	3	Min.	Max.	Max.	Max.	Min.	+	++	+	++	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.	+	++
M6	18	–	–	0.15	0.5	6.8	6	5.82	8.9	8.7	11.05	10.89	1.4	3.85	4.15	3.76	4.24	2.63	0.25	10	9.78	9.64
M8	22	28	–	0.15	0.6	9.2	8	7.78	11.6	11.4	14.38	14.20	2	5.15	5.45	5.06	5.54	3.54	0.4	13	12.73	12.57
M10	26	32	–	0.15	0.6	11.2	10	9.78	14.6	14.4	17.77	17.59	2	6.22	6.58	6.11	6.69	4.28	0.4	16	15.73	15.57
M12	30	36	–	0.15	0.6	13.7	12	11.73	16.6	16.4	20.03	19.85	3	7.32	7.68	7.21	7.79	5.05	0.6	18	17.73	17.57
M16	38	44	57	0.2	0.8	17.7	16	15.73	22.5	22	26.75	26.17	3	9.82	10.18	9.71	10.29	6.8	0.6	24	23.67	23.16

1) For Nom length l ≤ 125mm; + for 1¯< 10d or 150mm;

2) For Nom length l >125 and ≤ 200mm; ++ for 1 < 10d or 150mm;

3) For Nom length l >200mm

TABLE 2– PREFERRED LENGTH–SIZE COMBINATION FOR HEXAGON HEAD BOLTS

(ALL DIMENSIONS ARE IN MILLIMERTERS)

Length 'l'					Thread size d				
	For 1 ≤ 10 d or 150		For 1 > 10 d or 150		M6	M8	M10	M12	M16
Nom	Min	Max	Min	Max					
20	19.58	20.42							
25	24.58	25.42							
30	29.58	30.42							
35	34.5	35.5	33.75	36.25					
40	39.5	40.5	38.75	41.25					
45	44.5	45.5	43.75	46.25	11.8				
50	49.5	50.5	48.75	51.25				58.7	
55	54.4	55.6	53.5	56.5				63.2	
60	59.4	60.6	58.5	61.5		28.2		67.6	123
65	64.4	65.6	63.5	66.5					
70	69.4	70.6	68.5	71.5			53.6		139
75	74.4	75.6	73.5	76.5		35.6			
80	79.4	80.6	78.5	81.5					155
90	89.3	90.7	88.25	91.75					171
100	99.3	100.7	98.25	101.75					
110	109.3	110.7	108.25	111.75					
120	119.3	120.7	118.25	121.75					
130	129.2	130.8	128	132					
140	139.2	140.8	138	142					
150	149.2	150.8	148	152					
160	159.2	160.8	158	162					
180	179.2	180.8	178	182					
200	199.08	200.92	197.7	202.3		WEIGHTS			
220	219.08	220.92	217.7	222.3					
240	239.08	240.92	237.7	242.3					
260	258.95	261.05	257.4	262.6					
280	278.95	281.05	277.4	282.6					
300	298.95	301.05	297.4	302.6					

NOTE:

1. Preferred length are in between the stepped bold lines.
2. Weights are given in Kg per 1000 numbers only.
3. For stocked sizes refer BPS components book–let.

Revisions			Approved Engg.Deupt.Manager		
Rev. No.	Amd. No.	Reaffirmed	Prepared	Issued	Dt of 1st Issue
Dt.	Dt.	Year	Standards /EDC	Standards /EDC	

HEXAGON NUTS, PRODUCT GRADE 'B'

(Property Class 6 & 22H)

1.0 SCOPE

Covers the requirements of hexagon nuts in the size range M27, M33 and above.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig. 1 & Table 1 of this standard	
Tolerance	Product grade	B
	Indian Standard	IS 1367 (Part 2)
Thread	Pitch	Table 1 of this standard
	Tolerance	6H
	Indian Standard	IS 4218 (Part 3, 5 & 6)
Material	Steel	
Mechanical Properties	Property class 6 H for nuts with d <= M39x3 22H for nuts with d > M39x3	
	Indian Standard IS: 1367 (Part 6) for nuts with d <= M39x3 IS: 1367 (Part 7) for nuts with d > M39x3	
Sampling and Acceptability	Indian Standard	IS: 1367 Part 17)
General requirements	Nuts shall comply with IS: 1364 (Part 3) in respect of requirements not covered in this standard.	

2.1 Referred standards (Only current versions are applicable)

IS 1364 Part 3	Specification for Hexagon head bolts & nuts of product grade A&B Part 3 Hexagon nuts.
IS 1367 Part 2,6,7 & 17	Technical supply conditions for threaded steel fasteners
IS 4218 Part 3,5 & 6	ISO metric screw threads
IS 3138	Hexagonal bolts and nuts

3.0 DESIGNATION

A Grade 'B' hexagon nut to this standard of thread size M36x3 shall be designated as :

3.1 On Drawings

i) Material Specification column	-------
ii) Description Column	HEX NUT M36x3-6
iii) Drawing Number Column	BPS 41301
iv) Material Code column:	4130100036

3.2 Ordering Description

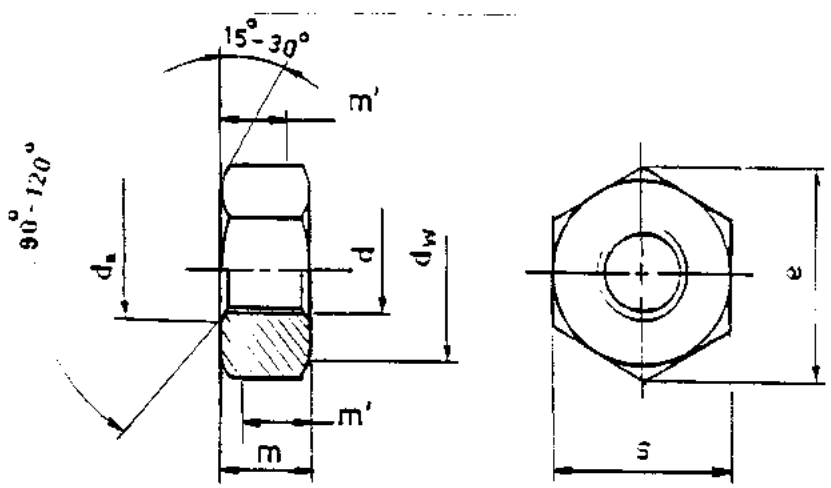
For placing indents, issuing enquiries and on purchase order, Ordering Description given below shall be followed.(Typical examples)

Hex Nut M27 to BPS : 41301 (for nuts with d=M27 & M33)
Hex Nut M36x3 to BPS : 41301 (for nuts with d=M36x3 & M39x3)
Hex Nut M42x3 to BPS : 41301 (for nuts with d=M42x3 & M48x3)

4.0 ADDITIONAL INFORMATION

4.1 The hardness values in Table 4 of IS: 1367 Part 6 (for coarse pitch series) shall be applicable for thread sizes M36x3 and M39x3 also.
4.2 The overall dimensions for thread sizes M42x3 and above are based on IS: 3138.
4.3 Copies of this standard shall be enclosed along with the purchase order.

FIG.1, DIMENSIONS FOR HEXAGON NUTS
(All dimensions are in millimetres)



'**m**' = Effective gauging height

TABLE 1
(All dimensions are in millimetres)

Thread Size	d_a		d_w	e		m		m'	s		Weight
d	Min	Max	Min	Max	Min	Max	Min	Min	Max	Min	
(M27)					45.20	22.0	20.7		41	40.0	166
(M33)					55.37	26.0	24.74		50	49.0	299
M36x3	36	38.9	51.1		60.79	31.0	29.4	23.52	55	53.8	364
(M39x3)					66.44	31.0	29.4		60	58.8	485
M42x3				75		34.0	33.0		65	63.8	569
M48x3				86.5		38.0	37.0		75	73.8	935

Note:

1. Sizes in brackets are non-preferred
2. Weights are given in Kg per 1000 numbers only

HEXAGON THIN NUTS, PRODUCT GRADE 'B'

(Product Class 05)

1.0 SCOPE

Covers the requirements of hexagon thin nuts in the size range M33, to M39x3.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig 1 & Table 1 of this standard	
Tolerance	Product grade	B for nuts with d > M16
	Indian Standard	IS: 1367 (Part 2)
Thread	Pitch	Table 1 of this standard
	Tolerance	6H
	Indian Standard	IS 4218 (Part 3, 5 & 6)
Material	Steel	
MechanicalProperties	Property class	05
	Indian Standard	IS: 1367 (Part 6)
Sampling and Acceptability	Indian Standard	IS: 1367 (Part 17)
General requirements	Nuts shall comply with IS: 1364 Part 4 in respect of requirements not covered in this standard.	

2.1 Referred standards (Only current versions are applicable)

IS 1364 (Part 4)	Specification for hexagon head bolts, screws and nuts of product grade A&B
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 'B' hexagon Thin Nut to this standdad of thread size M39x3 shall be designated as :

3.1 On Drawings

i) Material Specification column	--------
ii) Description Column	HEX THIN NUT GR B M39x3 - 05
iii) Drawing Number Column	BPS 41302
v) Material Code column	4130200039

3.2 Ordering Description

For placing indents, issuing enquiries and on purchase order, the Ordering Description given below shall be followed.(Typical example)

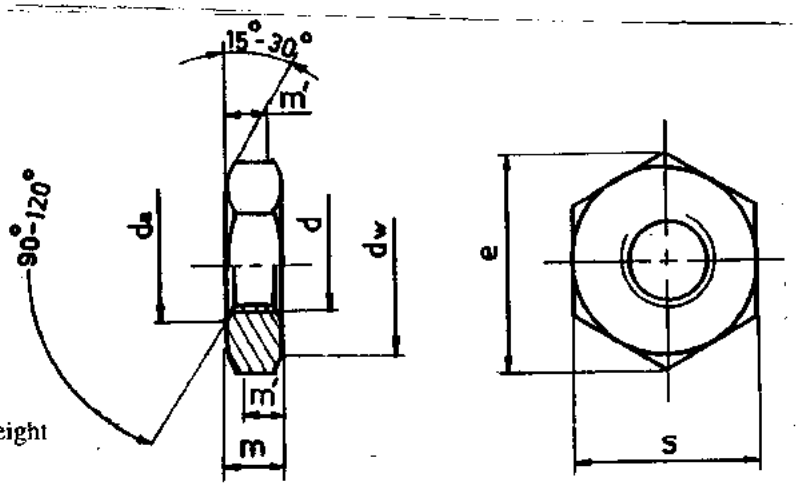
i)HEXAGON THIN NUT M33 BPS: 41302-05 for nuts with d = M33
ii)HEXAGON THIN NUT M39x3 BPS: 41302 for nuts with d >= M36x3

4.0 ADDITIONAL INFORMATION

4.1 The hardness value in Table 4 of IS: 1367 (Part 6) for coarse pitch series shall be applicable for thread sizes >= M36x3

4.2 Copies of this standard shall be enclosed along with purcfase order

FIG 1 DIMENSIONS FOR HEXAGON THIN NUTS
(All dimensions are in millimetres)



m' = Effective guaging height

TABLE 1
(All dimensions are in millimetres)

Thread Size d)	(M33)	M36x3	(M39x3)
P(Pitch)	3.50	3.00	3.00
d_a Min	33.00	36.00	39.00
Max	35.64	38.90	42.10
d_w Min	46.67	51.10	56.00
e Min	55.37	60.79	66.44
m Max	17.00	18.00	20.00
Min	15.90	16.90	18.70
m' Min	12.70	13.50	14.96
s Max	50.00	55.00	60.00
Min	49.00	53.80	58.80
Weight			251.00

NOTE:

1. Sizes in brackets are non-preferred
2. Weights are given in Kg per 1000 numbers only

HEXAGON NUTS, PRODUCTS GRADES 'B'& 'C'

(Property Class 4 & 14H)

1.0 SCOPE

Covers the requirements of hexagon nuts in the size range M27, M33 and above

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig 1 & Table 1 of this standard	
Tolerance	Product grade	C for nuts with d <= M64 B for nuts with d > M64
	Indian Standard	IS 1367 (Part 2) for nuts with d <= M39x3 IS: 3138 for nuts with d >= m42x3
Thread	Pitch	Table 1 of this standard
	Tolerance	7H for nuts with d <= M39x3 6H for nuts with d => M42x3
	Indian Standard	IS 4218 (Part 3, 5 & 6)
Material	Steel	
Mechanical properties	Property class	4 for nuts with d =< M39x3 14H for nutswith d=> M42x3
	Indian standard	IS: 1367 (Part 6&7)
Sampling and Acceptability	Indian Standard	IS: 1367 (Part 17)
General requirements	Nuts shall comply with IS: 1363 part 3 and IS: 3138 in respect of requirements not covered in this standard	

2.1 Referred standards (only current versions are applicable

IS: 1367 (Part 2 ,6 ,7 & 17)	Technical supply conditions for threaded steel fasteners
IS: 3138	Specification for hexagon bolts and nuts
IS: 4218 (Part 3, 5 & 6)	ISO Metric screw threads

3.0 DESIGNATION

A Grade 'C' hexagon nut to this standard of thread size M36x3 shall be designated as :

3.1 On Drawings

i) Material Specification column	-------
ii) Description Column	HEX NUT GR C M36x3-4
iii) Drawing Number Column	BPS 41304
iv) Material Code column:	4130400036

3.2 Ordering Description

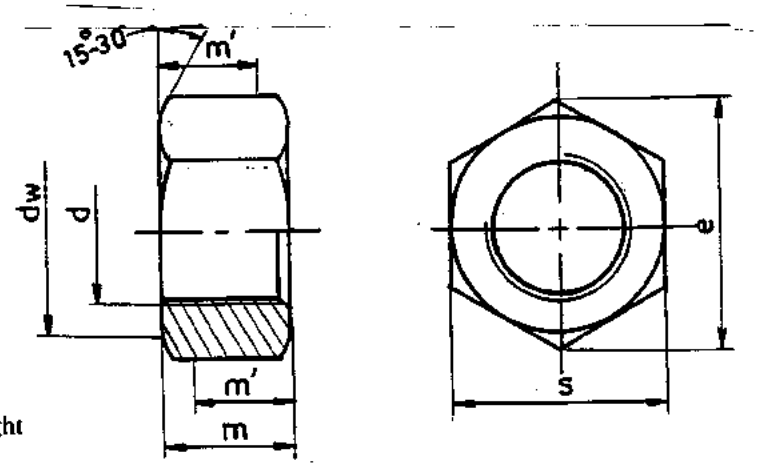
For placing indents, issuing enquires and on purchase order, ordering description given below shall be followed. (Typical examples)

i) HEXAGON NUT M33 TO BPS:41304 for nuts with d=M27 & M33
II) HEXAGON NUT M36x3 TO BPS:41304 for nuts with d>= M36X3

4.0 ADDITIONAL INFORMATION

Copies of this standard shall be enclosed alongwith the purchase order for thread sizes M27,M33 and above.

FIG. 1 DIMENSIONS FOR HEXAGON NUTS
(All dimensions are in millimetres)



'm' = Effective gauging height

TABLE 1
(All dimensions are in millimetres)

Thread Size d	d_w Min	m Max	m Min	m' Min	s Max	s Min	e Min	e Max	Weight
(M27)		22.65	21.35		41	40.0	45.20		166
(M33)		26.65	25.35		50	49.0	55.37		299
M36x3	51.1	31.5	29.4	23.5	55	53.8	60.79		364
(M39x3)		31.8	30.2		60	58.8	66.44		485
(M45x3)		36.0	35.0		70	68.8		80.8	750
M48x3		38.0	37.0		75	73.8		86.5	935
M56x4		45.0	44.0		85	83.6		98	1355
(M60x4)		48.0	47.0		90	88.6		104	1625
M72x4		58.0	56.8		105	103.6		121	2430
M80x4		64.0	62.8		115	113.6		133	3190

NOTE :

1. Sizes in brackets are non-preferred.
2. Weights are given in Kg per 1000 numbers only.

HEXAGON THIN NUTS, PRODUCT GRADE 'B'

(Property Class 05 & 22H)

1.0 SCOPE

Covers the requirements of hexagon thin nuts in the size range M30X2 to M60X2

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig. 1 & Table 1 of this standard	
Tolerance	Product grade	B
	Indian Standard	IS: 1367 (Part 2)
Thread	Pitch	Table 1 of this standard
	Tolerance	6H
	Indian Standard	IS 4218 (Part 3 & 5)
Material	Steel	
Mechanical properties	Property class	05 for nuts with d <= M39x2 22H for nuts with d >= M42x2
	Indian Standard	IS: 1367 (Part 6 & 7)
Sampling and Acceptability	Indian Standard	IS: 1367 (Part 17)
General requirements	Nuts shall comply with IS: 1364 (Part 4) in respect of requirements not covered in this standard	

2.1 Referred standards (Only current versions are applicable

IS 1364 (Part 4)	General requirements
IS 1367 (Part 2,6,7 & 17)	Technical supply conditions for threaded steel fasteners
IS 4218 (Part 3 & 5)	ISO metric screw threads

3.0 DESIGNATION

A Grade 'B' thin nut to this standard of thread size M36x2 shall be designated as :

3.1 On Drawings

i) Material Specification column	-------
ii) Description Column	HEX THIN NUT GR B-M36x2
iii) Drawing Number Column	BPS 41318
iv) Material Code column	4131820036

3.2 Ordering Description

For placing indents, issuing enquires and on purchase order, ordering description given below shall be followed. (Typical examples)

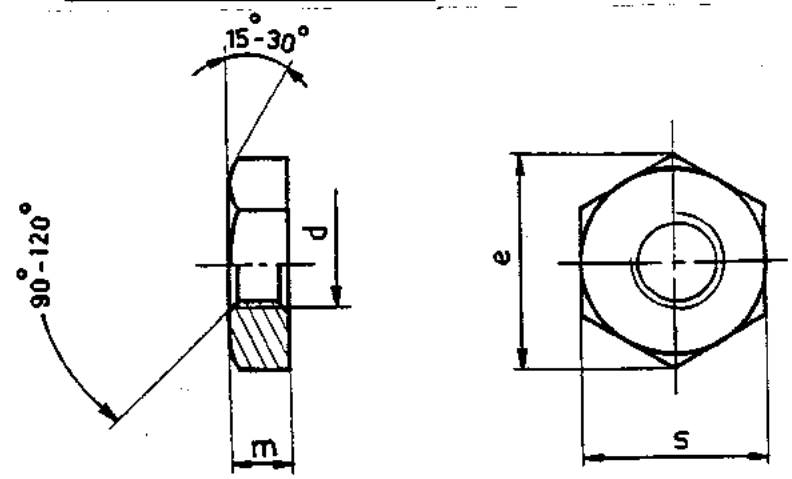
HEXAGON THIN NUT M36x2 to BPS:41318-B-05 - for nuts with d = M36x2
HEXAGON THIN NUT M42x2 to BPS:41318-B-22H - for nuts with d >= M42x2

4.0 ADDITIONAL INFORMATION

4.1 The hardness valus given Table 4 of IS: 1367 Part 6 (for coarse pitch series) shall be applicable for thread sizes up to M39X2

4.2 Copies of this standard shall be enclosed along with purchase order

FIG. 1 DIMENSIONS FOR HEXAGON THIN NUTS
(All dimensions are in millimetres



'm' = Effective gauging height

TABLE 1
(All dimensions are in millimetres)

Thread Size d	e		s		m	Weight
	Max	Min	Max	Min		
M30x2		50.85	46.0	45.0	12	
M36x2		60.79	55.0	53.8	14	120.6
(M39x2)		66.44	60.0	58.8	16	178.9
M42x2	75.0		65.0	63.8	16	284.5
(M45x2)	80.8		70.0	68.8	18	
(M52x2)	92.4		80.0	78.8	20	332.4
(M60x2)	104.0		90.0	88.6	21	691.0

NOTE :

1. Sizes in brackets are non-preferred.
2. Weights are given in Kg per 1000 numbers only.

NUTS FOR TEMPERATURE USE

(For medium of temperature upto 425 ° C)

1.0 SCOPE

Covers the requirements of hexagon nuts for use in medium of temperature upto 425 ° C and in the size range M8 to M45x3.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	Fig 1 &Table 1 of this standard	
Tolerance	Product grade	A for nuts with d <= M16 B for nuts with d > M16
	Indian Standard	IS 1367 (Part 2)
Thread	Pitch	Table 1 of this standards
	Tolerance	6H
	Indian Standard	IS 4218 (Part 3, 5 & 6)
Material	Steel to ASTM A 194 2H Certified	
Testing	The finished nut shall satisfy the requirements of hardness, proof load and cone proof load, tests as specified in ASTM A194	
General requirements	Nuts shall comply with TDC:5:166 in respect of requirements not covered in this standard, except for cadmium plating	

2.1 Referred standards (Only the relevant parts of current versions are applicable)

IS 1367 (Part 2)	Technical supply conditions for threaded steel fasteners
IS 4218 (Part 3,5 & 6)	ISO metric screw threads
TDC:5:166	Carbon steel nuts for OFE & other applications asper A 194 GR 2H/2HM
ASTM A194	Specification for carbon and alloy steel nuts for bolts for high pressure and high temperature service.

3.0 DESIGNATION

A Grade 'A' hexagon nut to this standard of thread size M8 shall be designated as :

3.1 On Drawings

i) Material Specification column	ASTM A 194 - 2H
ii) Description Column	NUT HEX GR A T425 M8
iii) Drawing Number Column	BPS 41319
iv) Material Code column:	4131900008

3.2 Ordering Description

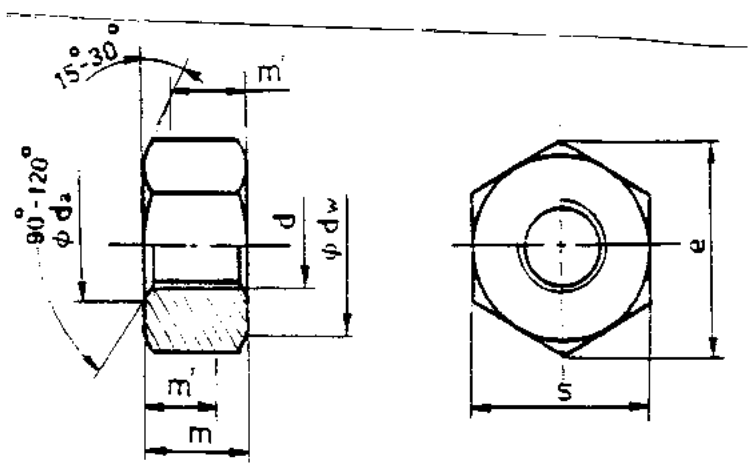
For placing indents, issuing enquiries and on purchase order, Ordering Description given below shall be followed.(Typical exampies)

Hex Nut M8 to BPS : 41319-A-ASTM A194-2H for nuts with d <= M16
Hex Nut M20 to BPS : 41319-B-ASTM A194-2H for nuts with d > M16 and d < M36x3
Hex Nut M36x3 to BPS: 41319-B-ASTM A194-2H for nuts with d >= M36x3

4.0 ADDITIONAL INFORMATION

4.1 Copies of this standard and TDC:5:166 shall be enclosed along with the purchase order.

Figure 1 DIMENSIONS FOR HEXAGON NUTS
(All dimensions are in millimetres)



'm' = Effective gauging height

TABLE 1
(All dimensions are in millimetres)

Thread Size	d_a		d_w	e		m		m'	s		Weight
d	Min	Max	Min	Max	Min	Max	Min	Min	Max	Min	
M8	8	8.75	11.6		14.38	8	7.64	6.1	13	12.73	6.0
M10	10	10.80	14.6		17.77	10	9.64	7.7	16	15.73	10.8
M12	12	13.00	16.6		20.03	12	11.57	9.3	18	17.73	16.5
M16	16	17.30	22.5		26.75	17.1	16.40	13.1	24	23.67	33.0
M20	20	21.60	27.7		32.95	20.7	19.40	15.5	30	29.16	64.5
M24	24	25.90	33.2		39.55	24.2	22.90	18.3	36	35.00	110.0
(M27)					45.20	27.6	26.30	21.0	41	40.00	166.0
M30	30	32.40	42.7		50.85	30.7	29.10	23.3	46	45.00	231.0
(M33)					55.37	33	31.40	25.1	50	49.00	299.0
M36x3	36	38.90	51.1		60.79	36.6	35.00	28.6	55	53.80	364.0
(M39x3)					66.44	39	37.40	29.9	60	58.80	485.0
(M45x3)				80.8		45	43.40	34.7	70	68.80	750.0

NOTE :

1. Sizes in brackets are non-preferred.
2. Weights are given in Kg per 1000 numbers only.

Based on IS: 1364 (part 3)

HEXAGON NUTS, PRODUCT GRADE A
(Property Class 8)

1.0 SCOPE:

Covers the requirement of Hexagon Nuts in the size range M3 to M16.

2.0 SPECIFICATION AND REFERENCE STANDARDS

Dimensions and preferred sizes	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	Steel	
Mechanical properties	Property class	8
	Indian Standard	IS: 1367 (Part 6)
Sampling and Acceptability	Indian Standard	IS: 2614
General requirements	Nuts shall comply with IS: 1364 in respect of requirements not covered in this standard	

2.1 Referred Standards (only the relevant parts of current versions are applicable).

IS: 1364 Specification for Hexagon Head Bolts, Screws & Nuts. (Part 3) of product grade A & B, Part 3 Hexagonal Nuts.

IS: 1367 Technical supply conditions for threaded steel fasteners.

IS: 2614 Method of sampling fasteners.

IS: 4218 ISO metric screw threads.

3.0 DESIGNATION

A Grade–A Hexagonal Nut to this standard of thread size M6 shall be designated as:

3.1 On Drawings

1) Material Specification column : IS: 1364
2) Description Column : NUT HEX GR A 8–M6
3) Drawing Number column : 4132006000
4) Material code Column : 4132000006

3.2 Ordering Description

For placing indents, issuing enquiries and on Purchase order, the Ordering Description given below shall be followed:

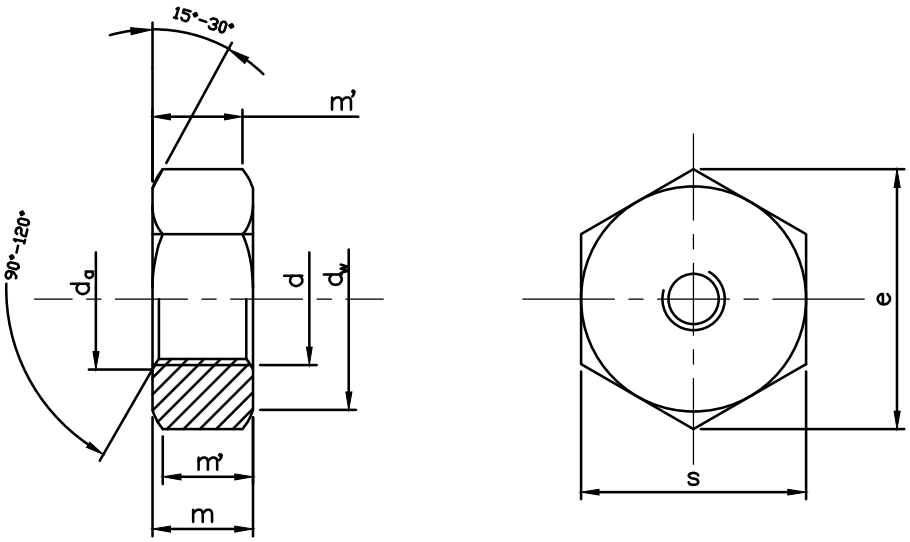
Hex Nut M6 IS: 1364 (part–3) –8

4.0 ADDITIONAL INFORMATION

4.1 For nuts of thread size M20 to M48x3, product grade B, refer BPS: 41301.

4.2 For Cadmium plated nuts, refer BPS: 41360

TABLE 1 DIMENSIONS FOR HEXAGONAL NUTS



m' = Effective guaging height

(All dimension are in millimeters)

Thread Size d	d_a		d_w	e	m		m'	s		Weight
	Min	Max	Min	Min	Max	Min	Min	Max	Min	
M3	3	3.45	4.6	6.01	2.4	2.15	1.72	5.5	5.32	0.4
M4	4	4.6	5.9	7.66	3.2	2.9	2.32	7	6.78	0.9
M5	5	5.75	6.9	8.79	4.7	4.4	3.52	8	7.78	
M6	6	6.75	8.9	11.05	5.2	4.9	3.92	10	9.78	2.5
M8	8	8.75	11.6	14.38	6.8	6.44	5.15	13	12.73	6.0
M10	10	10.8	14.6	17.77	8.4	8.04	6.43	16	15.73	11.6
M12	12	13.0	16.6	20.03	10.8	10.37	8.30	18	17.73	17.9
M16	16	17.3	22.5	26.75	14.8	14.1	11.28	24	23.67	33.5

NOTE;

1. Weights are given in kg per 1000 numbers only.
2. For stocked sizes refer BPS components booklet.

HEXAGONAL NUT

AS PER IS:1364 PART-3 - 1983

1.0 SCOPE: Covers the requirement of HEXAGONAL NUT M20 to M33

2.0 SPECIFICATION AND REFERENCE STANDARDS

MATERIAL	STEEL
DIMENSION AND PREFERRED SIZES	FIGURE 1 & TABLE 1 OF THIS STANDARD
THREAD	PITCH COARSE, TOLERANCE 6H, STANDARD IS:4218 PART-3,5&6
MECHANICAL PROPERTIES	CLASS 10, AS PER IS:1367 PART-6
TOLERANCE	PRODUCT GRADE- B, AS PER IS:1367 PART-2
SAMPLING AND ACCEPTIBILITY	IS:2614
GENERAL REQUIREMENTS	NUTS SHALL COMPLY WITH IS:1364 IN RESPECT OF REQUIREMENTS NOT COVERED IN THIS STANDARD.

2.1 Referred standards (Only current versions are applicable)

IS: 1364(Part 3) Specification for hexagonal head bolts, screws & nuts of product grade A&B part 3 hexagon nuts.
IS: 1367 Technical supply conditions for threaded steel fasteners.
IS: 2614 Methods for sampling of fasteners.
IS: 4218 ISO Metric screw threads.

3.0 Designation

A Grade B Hexagonal nut to this standard of thread size M20 shall be designated as:

3.1 On Drawings

i) Material Specification column	IS:1364 (for nuts with d ≤ M30)
ii) Description column	HEX NUT GR.B 10-M20
iii) Drawing number column	BPS 41322
iv) Material Code Column	413220002000

3.2 Order Description

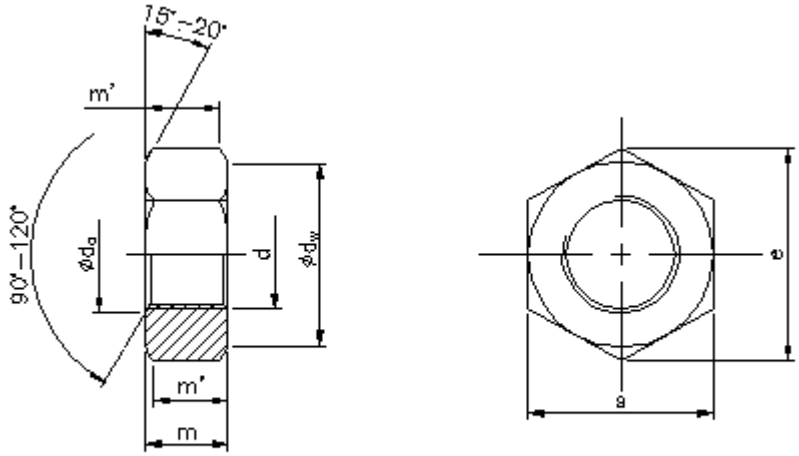
For placing indents, issuing enquiries and on purchase order, ordering description given below shall be followed.

Hexagonal Nut M20, IS: 1364 (Part-3) -10 for nuts with d ≤ M30
Hexagonal Nut M33, BPS: 41322-10 for nuts with d = M33

4.0 ADDITIONAL INFORMATION

4.1 Property class 12 is also acceptable.
4.2 Copies of this standard shall be enclosed along with purchase order for thread size M33.

FIG. 1 DIMENSION FOR HEXAGONAL NUTS
(All dimensions are in millimeters)



m' = Effective guaging height

(Table 1. All dimensions are in millimeters)

Thread Size (d)	d_a		d_w min	e min	m		m' Min	s		Weight
	Min	Max			Max	Min		Max	Min	
M20	20	21.6	27.7	32.95	18.0	16.9	13.52	30	29.16	64.5
M24	24	25.9	33.2	39.55	21.5	20.2	16.16	36	35.0	110
M30	30	32.4	42.7	50.85	25.6	24.3	19.44	46	45.0	
(M33)				55.37	26.0	24.7		50	49.0	299

NOTE:

1. Sizes in brackets are non-preferred.
2. Weights are given in Kg per 1000 numbers only.
3. For stocked sizes refer BPS components book-let.

Weight : Calculate on the basis that steel weight is 7.85Kg/dm^3

NUTS FOR HIGH TEMPERATURE USE

(For medium of temperature from 525°C to 565°C)

1.0 SCOPE

Covers the requirements of hexagon nuts for use in medium oftemperature from 525°C to 565C° and inthesizeM10toM95x4.

2.0 SPECIFICATION AND REFERENCE STANDARDS

/

Dimensions and preferred sizes	Fig 1 & Table 1 of this standard	
Tolerance	Product grade	A for nuts with d <= Ml6 B for nuts with d > Ml6
	Indian Standard	IS: 1367 :Part 2
Thread	Pitch	Table 1 of this standard
	Tolerance	6H
	Indian Standard	IS 4218: Part 3
Material	Steel to ASTM A194 Gr 7 certified in quenched and tempered condition	
General requirements	Nuts shall comply with TDS:5:166 in respect of requirements not covered in this standard except for cadmium plating.	

2.1 Referred standards (Only current versions are applicable)

IS 1367: Part 2 Technical supply conditions for threaded steel fasteners

IS 4218: Part 3ISO metric screw threads

ASTM A194 Specification for carbon and alloy steel nuts for bolts for high pressure and high temperature service

TDC:5:166Carbon & Alloy Steel Nuts to SpecificationSA 194 Gr2H/2HM/Gr4/Gr7 for Valves,Oil Field Equipment & otherapplications.

3.0DESIGNATION

A Grade 'A' hexagon nut to this standard of thread size M10 shall be designated as:

3.1 On Drawings

i) Material Specification column ASTM A 194 Gr 7

ii) Description Column HEX NUT GR A T525 - 565 M10

iii) Drawing Number Column BPS 41324

iv) Material Code column: 4132400010

3.2 Ordering Description

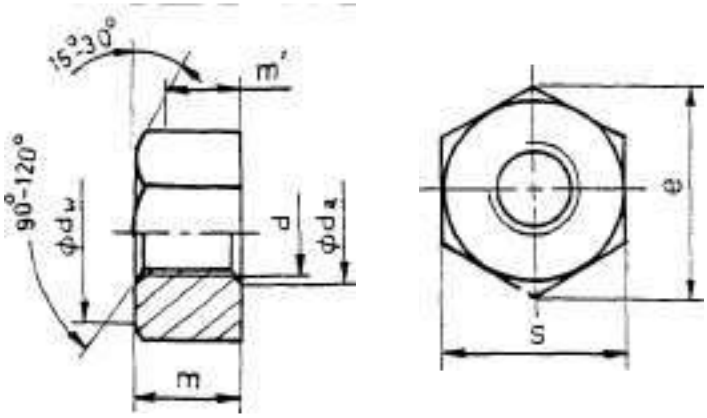
For placing indents, issuing enquiries and on purchase order, Ordering Description given below shall be followed.(Typical examples)

Hex Nut Ml0 to BPS : 41324-A-ASTM A 194 Gr 7 for sizes upto Ml6
Hex Nut M30 to BPS : 41324-B-ASTM A 194 Gr 7 for sizes M20 to M30
Hex Nut M36x3 to BPS : 41324-C- ASTM A 194 Gr 7 for sizes M36x3 and above

4.0 ADDITIONAL INFORMATION

4.1 Copies of this standard and TDC: 5:166 shall be enclosed along with the purchase order.

FIG 1 DIMENSIONS FOR HEXAGON NUTS (All dimensions are in millimeters)



'm' = Effective gauging height

TABLE 1 (All dimensions are in millimeters)

Thread size d	d_a		d_w Min	e		m		M' Min	s		Weight
	Min	Max		Max	Min	Max	Min		Max	Min	
M10	10	10.8	14.6		17.77	10	9.64	7.7	16	15.73	10.8
M12	12	13.0	16.6		20.03	12	11.57	9.3	18	17.73	16.5
M16	16	17.3	22.5		26.75	17.1	16.40	13.1	24	23.67	33.0
M20	20	21.6	27.7		32.95	20.7	19.40	15.5	30	29.16	64.5
M24	24	25.9	33.2		39.55	24.2	22.90	18.3	36	35.0	110.0
(M27)					45.20	27.6	26.30	21.0	41	40.0	166.0
M30	30	32.4	42.7		50.85	30.7	29.10	23.3	46	45.0	231.0
M36x3	36	38.9	51.1		60.79	36.6	35.00	28.6	55	53.8	364.0
(M48x3)				86.5		48	46.40	37.1	75	73.8	935.0
M60x4	60	64.8		104		48	47		90	88.6	1625
M72x4	72	77.8		121		72	71		105	103.6	3020
M95x4	95	102.6		190		95	94		164.5	163	12200
M36x4	36	38.9	51.3	60.8	61.02	36	34.40	27.5	55	54	430
M42x4.5	42	45.4	60.8	75.1	72.32	42	40.40	32.3	65	64	810
M48x5	48	51.8	70.3	86.5	83.62	48	46.40	37.1	75	74	1240
M56x4	56	60.5	79.6	98	94.69	56	54.10	43.3	85	83.8	1760
M64x4	64	69.1	88.5	110	105.2	54	52.10	41.7	95	93.1	2460
(M64x6)	64	69.1	88.5	110	105.2	54	52.10	41.7	95	93.3	2460

NOTE:

1. Sizes in brackets are non-preferred
2. Weights are given in Kg per 1000 numbers only

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	Fig 1 and Table 1 of this standard	
	Product Grade	A
	Indian Standard	IS 1367 Part-2
	Pitch	Coarse
	Tolerance	6H
	Indian Standard	IS 4218(Part 3,5 & 6)
Material	Steel	
	Property class	6
	Indian Standard	IS 1367 (Part 6)
Spring	Suitable spring steel	
Finish	Cadmium plating (Thickness 10-15 microns)	
Hydrogen embrittlement relief	According to IS 1367 (Part 17)	
Design	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

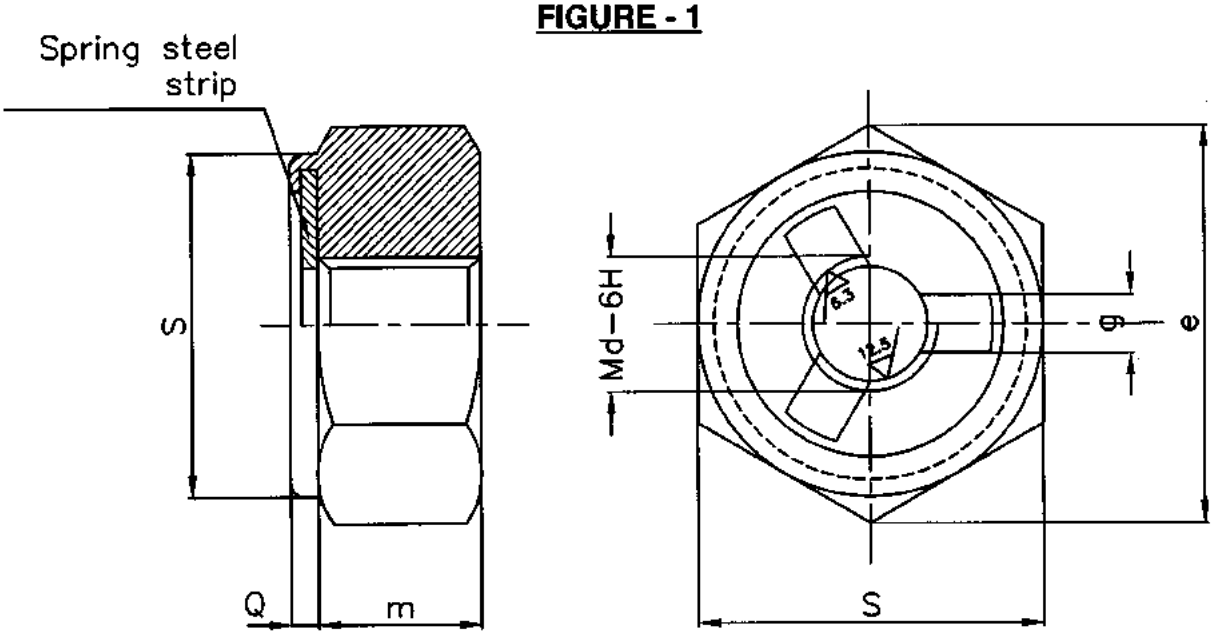


TABLE - 1

(All dimensions are in millimetres)

	M8	M10	M12	M16	M20
	13.00	17.00	19.00	24.00	30.00
Min	14.38	18.90	21.10	26.75	33.53
Max	--	--	--	--	--
	6.50	8.00	10.00	13.00	16.00
	2.00	2.00	2.00	3.00	3.00
	3.00	3.00	4.00	5.00	6.00
	5.71	13.09	20.00	40.00	75.76

NOTE :

1. Weights given in Kg per 1000 numbers.

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.

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 SA193 Gr B7, B7M & B16.
Nuts - Carbon Steel	:	ASME SA194 Gr 2H & 2HM
Alloy Steel	:	ASME SA194 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 & 16C) 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. 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 to ensure freedom from surface/sub-surface defects.

iii. 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 to ensure freedom from surface/sub-surface defects.

iv. 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.

v. 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.

ii. **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 193 and shall meet the material specification requirements for corresponding grades.

iii. **Hardness Testing for Studs/Bolts:**

a) **For SA 193 Gr B7 & B16:** Hardness check shall be carried out on finished stud/ bolt as per SA193, at least on 10% of the finished studs/bolts.

Hardness shall be between 25 HRC and 35 HRC or between 253 HBW and 321 HBW.

b) **For SA193 Gr B7M:**
Hardness check on 100% of studs/bolts as per SA193.
Hardness must be between 94 HRB and 99 HRB or between 201 HBW and 235 HBW.

iv. **Mechanical Testing for Nuts:**

a) **For SA194 Gr 2H, Gr 4, & Gr 7:**
Hardness check on finished nuts shall be as per SA194 (including quantum of testing). Hardness in the finished nut shall be between 24 HRC and 35 HRC or between 248 HBW and 327 HBW.

b) **For SA194 Gr 2HM:**
Hardness check on 100% of finished nuts shall be carried out as per SA194.
Hardness must be between 159 HBW and 235 HBW.

c) **Proof load test shall be done as per SA194 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 (^{0}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 SA194 in case of visible surface discontinuities. On such cases Proof load shall be as per SA194.

v. **NDE:**
Magnetic particle inspection shall be carried out as per ASTM E709 in at least 10% of the finished studs/bolts of all grades. Cracks, linear indications (length $\geq$ 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 SA193 for studs/bolts and SA194 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 in 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 SA193 for studs/bolts & SA194 for nuts.

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.

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.

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. 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 D-3359 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. 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. 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
vi. Heat treatment details (temperature, time, cooling medium, etc.)
vii. 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.

R. Venkanna 15/06/2017	15/06/17	15/6/17	R Dharmar 15/06/17	15/6/17	Revisankaran 15/06/17
Venkanna Rupani	G. Panneer Selvam	R. Elayaraja	R. Dharmar	K. Fayas Malik	U. Revisankaran
Sr. Engineer / QA	DGM/QA	Manager/ Engg/Valves	AGM / QC	Sr.Engineer/ Valves/ Purchase	AGM / QA & BE
Prepared By	**Reviewed By**				**Approved By**

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

TC No: Date:

Customer : PO No./ Amd :
TDC No./Rev.: DC No. :
Product : Drg. No./Rev :
Description : (Spec, dia, pitch, length) Thread Spec. :
Quantity :

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:
2.0 & 3.0	**a) Heat Treatment Details:** Hardening Temperature: ^{0}C; Soaking time: Cooling Medium: Tempering Temperature: ^{0}C; Soaking time: Cooling Medium: **b) Additional Tempering for Nuts (after final tempering):** Temperature: ^{0}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 and ASME SA193 for studs/bolts & SA194 for 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: ^{0}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.