DETAIL	INFORMATION
Contact Person /Address	R.Subramanian **Deputy Manager** **Purchase/ Valves** **3 rd FLOOR, BLDG.24,** **Bharat Heavy Electricals Ltd.,** **HIGH PRESSURE BOILER PLANT,** **TIRUCHIRAPPALLI - 620 014** **TAMILNADU, INDIA**
Approved By	GM/VALVES
Email	suman@bheltry.co.in
Telephone	0431-2577715
Fax	91-434-2520383
Notification (Reference) No.	EN-VAL-BSK-065
Tender Title	Tubes Requirement of various Sizes and Specn
Tender Type	OPEN TENDER - TWO PART BID
BRIEF DESCRIPTION	Tubes & Pipes
Published in Newspaper	
Published On	07.03.2014
Tender Value in Rs	
EMD Value - Rs	
Document Cost- Rs	
Date of Issue of Notification -DD/MM/YY	**07/03/2014**
Date for Closure of Sale of Forms -DD/MM/YY	**NOT APPLICABLE**
Completed Forms to be submitted by -DD/MM/YY	**07/04/2014 14:00 hrs**
Date of Opening of Bids -DD/MM/YY	**07/04/2014 14:30 Hrs**

List of items for Enq: EN:BSK:065 for Tube Procurement 2014-15- Annexure

	Sl.no.	MATL SPECN	size	Material	Qty (Meter)	TDC
	1	AISI 602	108.00 X 12.5	**151591400000**	2000	TDC:0:108/00
	2	AISI 602	108.00 X 4.80	**151611400000**	2000	TDC0101/12
	3	AISI 602	60.3X4.8	**151611240000**	2000	
	4	AISI 602	76.1X4.8	**151611350000**	1000	
	5	SA 213 TP304H	47.63X4	**151510500000**	1000	TDC0102/08
	6	SA 213 TP304H	60.3X4	**151510620000**	15000	TDC:0:102/04
	7	SA 213 TP316TI	16X2	**151160030000**	3000	TDC:0:107/00
	8	SA 213 TP316TI	20X3	**151160070000**	3000	TDC:0:107/00
	9	SA 213 TP316TI	30X4	**151160120000**	3000	TDC:0:107/00
	10	SA 213 TP321H	108X4.88	**151500950000**	2000	TDC0102/14
					34,000	
		Due Date of tender is 07.04.2014				

Bharat Heavy Electricals Ltd

(A.Govt.of India Undertaking)

Valves Purchase,Tiruchirappalli- 620 014. INDIA

Phone : 91- 0431-2577715 e-mail : suman@bheltry.co.in

FAX : 91- 0431-2520383 ashishkhare@bheltry.co.in

SPECIAL CONDITIONS OF ENQUIRY

Ref-EN-VAL-BSK-065-2013-2014 **Date: 07.03.2014**

1 Kindly quote your rates in Indian Rupees on firm price basis with the offer validity of minimum sixty days from the date of tender opening. The same shall be per METER basis for each item and for **FOR,BHEL, Tiruchirappalli-14** destination basis only. No other destination terms are acceptable to BHEL. In case of foreign vendors the rates shall be on **CFR,Chennai** basis only. No other terms are acceptable to BHEL.

2. Kindly quote only for enquired specification and Heat Treatment clauses as per Technical Delivery Condition / Standard Specification and size, single length which are to be in line with the Scope of supply annexed with the enquiry.

3. Item wise quantity required per size / specification and tolerance in Quantities shall be quoted as per our enquiry requirement. Normally+/-10% tolerance In quantities of ordered quantity will be acceptable to BHEL. Outer diameter dimensions shall be in line with the Standards/specifications.

4. ED, CST,other statutory levies and any other charges shall be clearly indicated in the offer alongwith the applicability of VAT and state from where the despatches will take place.

5. Prices shall be firm till entire execution of the Purchase Order. Price variation clause is not acceptable.

6. Lowest prices received against BHEL enquiries need not be the technically acceptable one and in that case BHEL reserves the right not to consider the same.

7. **Our normal payment terms is "100% payment, within 45 to 90 days, after acceptance of materials at BHEL. No other payment term is acceptable to BHEL. If the vendor demands for any other payment term, the offer will be summarily rejected**. **In case of foreign vendors our normal payment term is 100% through Letter of Credit only, no other payment term is acceptable to BHEL.**

8. Heat Number , Specification of material,size , colour coding and supplier's emblem/logo are to be hard stamped on all pipes dia 32 mm and above.

Contd…2..

Ref-EN-VAL-BSK-065-2013-2014 **Date: 07.03.2014**

9.Original Test certificates in triplicate shall accompany all the dispatches . Original Test certificates in triplicate in IBR-Form IV format & Guarantee Certificate should be sent along with dispatches

a)For all sizes Impact test results & Hardness values are to be incorporated as per TDC.

b) Mill Test Certificate for the raw materials should also be submitted. UT to be done 100% and result to be incorporated in T.C.

10.Delivery schedule shall be strictly as per BHEL requirements only which is indicated against each item in the Enquiry / Purchase Order sheet that will be issued. In case of delay in delivery, beyond the end delivery dates given in the Purchase Order sheet, Liquidated Damage clause will be applicable at the rate of 0.5 % per week and subject to a maximum of 15% of undelivered portion of the item value**. This clause has to be confirmed without fail.**

11.The delivery time for the enquired / proposed to order items shall be within three to four months from the date of receipt of Purchase Order. The delivery of the items shall be strictly as per BHEL's enquiry/ Purchase orders.In case of urgency, the delivery period have to be altered to meet BHEL's production plan.

12.Confirmation for compliance is to be given in the offer for all the conditions specified in the respective Technical Delivery Conditions / Standard Specifications.

13.BHEL reserves the right to increase / decrease the enquired quantities or to delete the enquired quantities for any of the items . Also BHEL reserves the right to split the enquired quantity among more than one tenderer and place orders accordingly in any proportion, based on BHEL's requirements and supplier's Capability in terms of delivery and quality.

14. Every dispatch of material shall accompany the packing list, detailing the Numbers of pipes and their actual individual lengths. An advance Copy of dispatch details shall be furnished to purchase/Valves/BHEL/ Tiruchirappalli-620 014.

15.The materials are to be dispatched with proper packing and binding.

Contd…3..

Ref-EN-VAL-BSK-065-2013-2014 **Date: 07.03.2014**

16.BHEL reserves the right to finalise the tender either through price bid open or **through Reverse Auction route**. A typical copy of "Business Rules and Conditions" of Reverse Auction is enclosed herewith for information and reference.

a)In case of Reverse Auction, for arriving the lowest bidder, the total value quoted By the vendors for each group will only be considered.

b) Hence a vendor should quote for all the sub-groups (sizes)in a group. Then only their quote will be considered for evaluation.

17.The offers are invited in two parts.

a)Techno commercial bid covering Technical Conditions, Delivery conditions, acceptance of all our commercial conditions and a copy of unpriced price bid. **(Please submit a separate envelope superscribing the enquiry no for techno commercial bid).Please indicate clearly whether "Quoted" or "Not Quoted"** in the unpriced price bid.

b)Price bid covering only price in Rs/Kg for each case. **(Please submit a separate envelope superscribing the enquiry no for price bid.)**

18.Techno Commercial bid will be opened first. Price bid of technically suitable vendors only will be opened .

19. Price / Purchase Preference Clause (DPE /Guidelines/VI/11) extension of Purchase Preference Policy (PPP) for products and services of Central Public Sector Enterprises (CPSEs) is not applicable for this enquiry as it is not in vogue.

20.The quantity in the enquiry for each sub-group/group is final. No upward /downward revision in the quantity will be made to suit the minimum heat load if any required by the vendor. Hence the vendor is permitted to supply the materials within +/- 10% tolerance allowed for the quantity.

21. If the supply is short (beyond the above allowed tolerance limit) the extra cost to BHEL in replenishing the short fall will be debited to the vendor.

22. In addition to all the above conditions, BHEL standard terms & conditions given as a separate annexure shall also be applicable to the extent they are not superseded by the above conditions.

23. **Non-adherence to these special conditions of enquiry and BHEL's standard terms and conditions will lead to disqualification of offer.**

Contd..4..

Ref-EN-VAL-BSK-065-2013-2014 **Date: 07.03.2014**

24. In case of rejection, Vendors shall make their own arrangement for collection of rejected material within 30 days from valve castings stores and shall give authorization letters to their transport carriers for arranging collection of rejected bars from BHEL, Stores Department. Necessary recoveries for the above rejected bars will be made by BHEL's accounts department after returning the same.

25. BHEL has reserved right to split the tender quantity as 60:40. Where enquired qty is more than 1000 mtrs, qty will be split in ration of 60:40 on L1 & L2 Vendors subject to L2 accept L1 price.

26. Tender items are to be supplied within 4 months from the date of LOI/ PO, where the tender qty. is less than or equal to 1000 mtr. For the balance items 50 % of the tender qty to be supplied within 4 month and balance30% qty to be supplied in another two months and balance 20%
To be supplied in another two months time. In case of urgency BHEL & Vendor will fix the delivery qty/period on mutual understanding.

GENERAL TERMS AND CONDITIONS OF RA

Against this enquiry for the subject item/system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING ON INTERNET.

a. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

b. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

c. BHEL will inform the vendor in writing in case of reverse auction, the details of Service Provider to enable them to contact & get trained.

d. Business rules like event date, time, Start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.

e. Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to participate in the event.

Contd..5..

Ref-EN-VAL-BSK-065-2013-2014 **Date: 07.03.2014**

f. BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the vendor to enable them to fill-in the price and keep it ready for keying in during the Auction.

g. Reverse auction will be conducted on scheduled date & time.

h. At the end of Reverse Auction event, the lowest bidder value will be known on the network.

i. The lowest bidder has to Fax the duly signed Filled-in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.

j. Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.

Deputy Manager
(Valves Purchase)

Rev 09: 15/02/03: Cl.3.0 revised
Rev 10: 27/01/04 Cl.8.0 Hydraulic test removed , further clauses renumbered. Annexures introduced for cl.11. In Cl.2.0 limits for carbon in GrC modified.In Cl. 4.0 normalising made mandatory for all pipes of Gr.C& GrB meant for fitting.In Cl.5.0 test coupon for pipes meant for fittings removed.
Rev 11: 29/12/07 Cl 1.0, P92 included.P2,P5,P9,304L,321 Deleted.Cl.4.0,10.0,11.0, modified.
Rev 12: 29/07/10 Cl 1.0, P91,P92 Deleted and included in TDCO123.; Cl:4.0,5.0,7.0,8.0,10.0,11.0 modified..

1.0:MATERIAL:

Specification : ASME. {Latest on the date of Purchase Order (PO)}:
Carbon Steel(CS) : SA 106 Gr.B & C
Alloy Steel(AS) : SA 335 Gr P11, P12, P22.
Stainless Steel(SS) : SA 312 TP 316, TP 316L.
Additional requirement : As listed below.(Supplementary to Specification).
Pipe Size and Qty. : As per PO

2.0:CHEMICAL COMPOSITION AND PROCESS OF MANUFACTURE:

Ladle and Product Analysis: SA 106 Gr B:Carbon:0.25% Max.
SA 106 Gr C:Thickness </=20mm Carbon:0.25 Max.
Thickness > 20mm Carbon:0.30 Max.

3.0:STRAIGHTNESS:

The pipes shall not deviate from straightness by more than 1mm in any one meter, and shall not be more than 6mm over the entire length. A sharp bend at the end or kink and twist are not acceptable. These limitations are applicable for any given plane.

4.0:HEAT TREATMENT:

4.1: HOT FINISHED PIPES:
CS:Shall be in Normaised Condition.
AS: SA 335 P11, P12, P22 –Either in Normalised and Tempered or Isothermal Annealed condition. SA 312 TP 316, TP 316L –Solution Annealed condition.
4.2: COLD FINISHED PIPES:
CS:In sub critical annealed,fully annealed or in Normalised condition.

5.0:MECHANICAL TESTS: As per the Specification.

Number of Tests: (as per IBR) Minimum 2 pipes for first 100 pipes and 1 per 100 or part thereof for pipes over 100 numbers. For alloy steel pipes meant for fitting (As indicated in the Purchase order),test coupon shall be in normalised and tempered condition.

6.0:NON DESTRUCTIVE TEST : On All pipes.

(a)ULTRASONIC TEST : ASTM E213.Calibration: Axial 50 mm long V or Square notch, one in OD and the other in ID. Depth:5% of Max.Thickness.(min of 0.3 mm.max:1.5mm).
For OD<30mm one notch in OD is enough. Scanning:Clockwise and Anti clockwise.

7.0:FINISH AND REPAIR:

The Inside & outside surfaces of the pipes shall be free from any imperfections & defects like laps,seams,folds, cracks, pitting etc;. Localised imperfections, if any,may be removed by skin machining only to a surface finish of </= 6.3 microns ensuring the wall thickness, inside and outside diameter.Local depressions or ground spots are not acceptable.

8.0:MARKING:

Details to be identified.: On Each Pipe.1) PO.Number 2)Maker's emblem/code 3) Specification & grade, 4) Heat number 5) Size. 6) No.of pipes. 7) Inspector's seal.
(a)Upto OD 31.8 (Excl.) – Sl.No: 1 to 7 to be stamped on metal or plastic tag attached to bundle.
(b)OD 31.8 to OD 76.1 (Incl.)– Sl.No:1 to 5,7 to be paint stenciled on each pipe, 1 to 7 to be stamped on metal or plastic tag attached to bundle.
(c)OD > 76.1- Sl.No: 2,3,4& 7 to be hard stamped with round edged stamp at 100mm from an end of each tube and 1 to 5 to be paint stenciled on each pipe
d)Colour Coding: Longitudinally on the entire length of all pipes: As per the procedure SIP:PP:21 (latest)

9.0:PRESERVATION:

All pipes except SS shall be applied with resin type rust preventive coating with visibility to stenciled details on outside and either with rust Preventive coating or rust inhibitor inside. Thick Black coating which camouflages the Surface of the pipes is not permitted. SS pipes to be surface treated as per ASTM A380 both inside and outside. Ends to be closed with end caps for secured storage.

10.0:PACKING:

(1)Thickness</=2.5mm in boxes. 2)OD </= 159 mm in bundles.Others in loose condition. Pipe bundles to be < 4 tons of equal no.of pipes,fastened with galvenised strap(1x25mm.min.) for Carbon Steel & Alloy Steel and by Nylon strap for Stainless Steel at 2 ends & at 1m interval. Wooden pallets to cover pipes are not permitted.

11.0:INSPECTION AND CERTIFICATION:

11.1: Products must be inspected at works and the mill test certificate must be countersigned by the Inspecting authority as indicated below.

Imported Items: Inspecting Authority Approved by IBR for the Country of Origin.
(To be Concurred by BHEL before placing PO.)

Indigenously Supplied Items: Boiler Inspectorate/Directorate of respective state.

1.Mill test certificate (ORIGINAL) in English for each product with following details shall accompany the product. Mill certified Test certificate in IBR Form-IIID.(Annexure-I) sufficient for IBR items from "IBR-Well Known Pipe Maker" and for Others IBR Form-IIIA.(Annexure-II).

2.Purchase Order No.(BHEL), TDC No.& Test certificate No., Size and Quantity-Melt wise.

3.Specification and Grade with year of code, Heat Number, Steel & Pipe making process, Chemistry Including incidental elements-Ladle and Product Analysis.

4.Heat Treatment details with actual temperature and soaking time, Mechanical test Results..

5 Detailed NDE. report with reference norms, Acceptance standards and test results.

29/7/2010	29/07/10	29/7/10	29/07/10	V. Ravikumar 29/7/2010
V.Kalyanaraman	S.Selvarajan	N.Ravi	V.Prabhakaran	V.Ravikumar
Prepared By	Reviewed by			Approved By

COMPANY EMBLEM AND DETAIL

(As published in IBR)

TEST CERTIFICATE – FORM III D

IBR Approval (Well known) Reference : Certificate No.. **XXX Dt. DD/ MM/YY, Valid upto DD/MM/YY**

TC No. , & Date:		TDC No./Rev :	
PO. No., & Date:		Specification & Grade	
Steel Making Process		Year of Code	
Finishing operation	Hot Finished/Cold Finished	Deoxidation process	

Identification

Supply particulars	PO item No	Size D x T x L	Heat No	Weight (Kgs)	Qty	

Chemical Analysis

Elements [N1]	C	S	P	Si	Mn	Ni	Cr	Mo	V	Cu	Sn	Al	Cb
min													
max													
Heat													
Product													

Heat treatment details		Type of HT	Soaking Temp° C	Soaking time/cooling media
	Product			
	Test Coupon [N2]			

Mechanical Properties [N3] Longitudinal / Transverse direction

Specified	YS	UTS	%E	%RA			Hardness
	Kg/mm^2	Kg/mm^2	GL=50mm				BHN
Min							
Max	---	---	---	---			
Test results							

Flattening test/Bend test [N4]	
Surface Treatment details(SS only)	

Non destructive tests

Appearance and dimensions	
Hydrostatic test	

N1 : As applicable to the specification

N2 : If the heat treatment condition differs from the pipes

N3 : The tests specified shall be made on minimum 2 pipes for the first 100 pipes and 1 per 100 or part thereof for pipes over 100 numbers

N4 : as applicable

Surface preparation and preservation

Certified that the particulars entered herein are correct. The part has been manufactured to comply with the Indian Boiler Regulations at our Works above named and satisfactorily withstood a water test of _____ on the _____ day of _____20___ in the presence of our responsible representative whose signature is appended hereunder:

Maker's Representative (Sign. & Name Seal of Quality Control)	Maker (Sign. & Name Seal of Production)

Note : In the case of pipes made from steel, made and certified by well-known Steel Makers in India or other countries, particulars regarding the 'material' as certified by them (in any form) shall be noted in the appropriate columns or paragraphs in this certificate.

COMPANY EMBLEM AND DETAIL

(As published in IBR)

FORM III A
CERTIFICATE OF MANUFACTURE AND TEST

[REGULATION 4(h)]

TC No., & Date:		TDC No./Rev		P.O. No.& Date	
Specification & Year		Finishing Operation		Hot Finished / Cold Finished	

Name of part	
Design pressure	
Design temperature	
Material	
Process of manufacture	
Fully killed/rimmed	
Chemical composition	

Supply particulars	PO item No	Size D x T x L	Heat No	Weight (Kgs)	Qty	

Elements [N1]	C	S	P	Si	Mn	Ni	Cr	Mo	V	Cu	Sn	Al	Cb
min													
max													
Heat													
Product													

Pipes	
Main dimensions	
Tolerances	
Mode of manufacture	
Identification marks	
Drawing numbers	
Bend test on pipe	
Bend test on weld	
Flattening test	

Mechanical Properties [N3]	Longitudinal / Transverse direction					
Specified	YS	UTS	%E	%R.A		Hardness
	Kg/mm^2	Kg/mm^2	GL=50mm			BHN
Min						
Max	---	---	---	---		
Test results						

Mode of attachment of flanges	
Flange particulars	
Size of branches	
Mode of attachment of branches	

Heat treatment details		Type of HT	Soaking Temp° C	Soaking time	Cooling medium
	Product				
	Test Coupon				

Surface Treatment Details(SS Only)	
Other tests	
Ultrasonically tested to UTUTUTUTUTUT	and found satisfactory no UT.NUT.NUT.N.
Appearance and dimensions	
Final hydraulic test	
Surface preparation and preservation	

NOTE.- In addition, the following information in respect of the material shall be furnished in a tabular form in conformity with the requirements of regulation 4(c)(vi) or the note thereto, as the case may be. The information may be given from the established test data or if the material is of standard quality an extract from the standard may be furnished instead.

Metal temperature upto °C	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600
E_t															
S_e															
S_r															

Tensile strength at 20°C.

Where

E_t Yield point at temperature t (0.2% proof stress)

**S_e Average stress to produce an elongation of 1% (creep) in 100,000 hours at various working metal temperatures.

**S_r Average and lowest stress to produce rupture in 100,000 hours at the various working metal temperatures.

Temperature range in the table may extend upto the limit of applicability of the material.

The value of Sc and Sr need be furnished only in respect of Pipes/Tubes intended to be used for working metal temperature above 454°C (850°F).

Certified that the particulars entered herein are correct.

The particulars of fabricated component are show in drawing No._____.

The part has been designed and constructed to comply with the specifications and the Indian Boiler Regulations for a working pressure of _____ and temperature _____ and satisfactorily withstood a water test of _____ on the _____ day of _____ 20___, in the presence of our responsible representative whose signature is appended hereunder.

Maker's Representative (Name and signature)	Maker (Name and signature)

We have satisfied ourselves that the pipes have been constructed in accordance with chapter VIII and the specifications. The tests conducted on the samples taken from the finished pipes have been witnessed by us and the particulars entered herein are correct.

Place _____
Date _____

Name and signature of
Inspecting Authority.

NOTE (1).- This form is intended for the use of both pipe manufacturers and pipe fabricators. Only such of the columns or paragraphs that are applicable, or information that can be obtained and furnished from other certificates, need be filled or entered in this form.

NOTE (2).- In the case of fabrications made from steel pipes obtained from elsewhere, particulars in regard to the "material" and "pipes" shall be taken from similar forms of certificates obtained in respect of pipes and noted in the appropriate columns or paragraphs.

In the case of pipes made from steel, made and tested by well known Steel Makers in India or other countries, particulars regarding the 'material' as certified by them (in any form) shall be noted in the appropriate columns or paragraphs in this certificate

Revision record:
Rev 08: 21.09.04: UT as per BS EN 10246-7, in lieu of ASTM E 213
Rev 09: 31/12/05: Cl 5.0 - mention of shape and size of tensile test specimen on TC introduces
Rev 10: 29/12/07: Cl 1.0, 3.0, 6.0, 7.0, 11.0 and 12.0 modified.
Rev 11: 19/05/09: Cl 8.0 – Modified. Cl 9.0 – Marking details included in line with material specification.
Rev 12: 08/06/11: Cl 1.0- SA 213 T12, T92 and T23 removed from this TDC. Cl 2.0 Process of Manufacture – Clarified.
Cl 9.0- Stenciling and colour coding modified. Cl 12.0- Modified.
Rev 13: 04/07/11: Cl 6.0: Modified, Cl 9.0 – Marking: Correction made in the "Details to be identified"
Rev 14: 26/10/12: Cl 2.0, 6.0 and 12.0 modified

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1. MATERIAL

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

Carbon Steel (CS)	:	SA 192, SA 210 Gr.A1 & Gr.C
Alloy Steel (AS)	:	SA 209 Gr.T1, SA 213 Gr.T11, T22, and T91
Stainless Steel (SS)	:	SA 213 TP 304H, 316, 321, 321H, 347H
Additional Requirement	:	As listed below (supplementary to Specification)
Size and Qty.	:	As per Purchase order

2. CHEMICAL COMPOSITION AND PROCESS OF MANUFACTURE

- **Carbon Steel & Alloy Steel:** Tubes shall be made by seamless process and shall be either cold finished or Hot finished.
  Stainless Steel: Tubes shall be made by seamless process and shall be only Cold Finished.

- All raw materials used in steel making including incoming scrap shall be checked by supplier to ensure freedom from radioactivity. (Applicable for SS material only)

- Ladle & Product analysis is required for all steels.
  Carbon Steel: Max. Carbon: SA 210 Gr.A1: 0.25%, SA 210 Gr.C: 0.30%
  Stainless Steel (SS): Boron: 0.01% max., Vanadium: 0.10% max.

3. DIMENSIONAL TOLERANCES

(a)For Cold finished tubes: CS: as per SA 450 for AS & SS shall be as per SA 1016.
Tolerance on thickness shall be: For OD </=38.1 mm 0% to +20% and For OD > 38.1 mm 0% to +22%

(b)For hot finished tubes the tolerance shall be as follows:

For Outside Diameter:	± 0.4mm.
For Thickness:	0% to +22% t > 4.5 mm
	0% to +24% t between 3.6 and 4.5 mm (both inclusive)
	0% to +28% t< 3.6mm

4. HEAT TREATMENT

CS Hot finished: No Heat Treatment required
CS Cold finished: Subcritical annealed, fully annealed or normalized
AS: normalized and tempered
SS: Solution Annealed

5. MECHANICAL TESTS

Number of Test: (as per IBR):
Minimum 2 tubes for first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers.
Tension test required for SA 192. Acceptance: explanatory note in Specification.
Hardness for SA 192: 120 HB (max).
For tension tests the shape and size of the specimen shall be mentioned on the Test Certificate.
(viz., Full tube tensile or strip tensile or round tensile)

6. NON DESTRUCTIVE TEST (In house Automated on Line Testing Only)

i) Each tube shall be examined full section over its entire length.
Ultrasonic Testing: For thickness =/ > 3.6 mm to be conducted as per ASTM E213. Calibration: 2 axial 50mm long notches, one in outer surface and the other in inside surface. For OD<30mm one notch in outer surface only. Notch depth: 5% max. (Min. of 0.3 mm.). Scanning: clockwise & anti clockwise.

Eddy current Test: For thickness < 3.6mm, as per ASTM E309 /E426 as applicable.
Calibration: Longitudinal notch depth: 5% max. (Min. of 0.3 mm) or drilled hole as per SA 106.

ii) SS: Finished tubes shall be checked for radioactive contamination and reported. Survey meter shall be used to measure at 5cm near the surface.
Acceptance limits: Shall be less than 0.1 milli Rontgen (MR) per hr or 1 micro Sievert per hr.

7. HYDROSTATIC TEST

Extent of test: On all tubes of thickness < 3.6 mm as per SA 450 Cl 22.3 with S=80% of specified min. yield strength at room temperature. For others if specified in Purchase Order.

8. **FINISH AND REPAIR**
Inside and outside free from loose scales and defects like laps, seams, folds, cracks, pitting etc. Repairs by welding are prohibited. Surface defects can be removed mechanically maintaining specified thickness without affecting the workmanlike finish.

9. **MARKING:** (in English only)
Details to be identified:
Each tube will be marked repeatedly & continuously along its entire length with the following:
(1)PO Number, (2) Maker's emblem/code, (3) Specification & grade, (4) Heat number, (5) Size, (6) No. of tubes, (7) Inspector's seal, (8) Condition: Hot finished or Cold Finished, (9) Tube Minimum Wall Thickness Designation (For SA 213 Spec only)
Below OD 31.8mm. (Excl.)- Sl.No:1 to 9 to be stamped on metal/plastic tag attached to bundle.
OD 31.8-76.1mm. (Incl.) - Sl. No: 1 to 5, 8 and 9 to be paint stenciled on each tube. Also Sl.No:1 to 9 to be stamped on Metal/Plastic tag attached to bundle
OD>76.1 mm. - Sl.No: 2, 3, 4,5 & 7 to be hard stamped with round edge stamp at 100mm from both ends and Sl.No:1 to 5, 8 and 9 to be paint stenciled on each tube.
Colour Coding: Continuous longitudinal colour coding shall be done on the entire length of all tubes. Colour coding scheme as per Procedure SIP: PP: 21 (latest).

10. **PRESERVATION:**
All tubes, except SS to be applied with resin type rust preventive coating with visibility to stenciled details on outside and either with rust preventive coating or rust inhibitor inside. SS tubes to be surface treated as per ASTM A380 both inside and outside. Ends to be closed with plastic end caps / plugs secured for storage.

11. **PACKING:**
Thickness < or = 2.5mm, in boxes and others in bundles. Tubes of thickness >/ = 6.5 mm and OD>/=88.9 can be shipped loose. Bundles to be </ =4 tons of equal no. of tubes, fastened with galvanized strap (1x25mm.min.) or annealed wire for CS & AS and by Nylon strap for SS at both ends & at 1m interval in between. Wooden pallets to cover tubes are not permitted.

12. **INSPECTION AND CERTIFICATION:**
12.1 Products shall be inspected at works and the applicable IBR Form must be Countersigned by the Inspecting Authority as indicated below:
Imported Items: Inspecting Authority approved by IBR for the Country of origin. (To be concurred by BHEL before placing PO.) Indigenously Supplied items: Boiler Inspectorate/Directorate of respective State.
12.2 Certification in IBR Form-IIIE (Annexure-I) for IBR items from "IBR-Well Known Tube Maker" and for Others IBR Form-IIIB(i) (Annexure – II) as per enclosed format to be submitted.
12.3 **Manufacturer's Test certificate(MTC)** (ORIGINAL in ENGLISH with following details)
a) Purchase Order No. (BHEL), TDC No. & Test certificate No., Size and Quantity-Melt wise.
b) Specification and Grade with year of code, Code case number, Heat Number, Steel & Tube making process, chemistry including incidental elements-Ladle and product Analysis.
c) Heat Treatment details with actual temperature and soaking time, Mechanical test Results.
d) Detailed N.D.E. report with reference norms, Acceptance standards and test results.
In the MTC a clause for Certificate of Compliance (as per SA 1016) shall be added stating that: All material components supplied in every Purchase Order shall meet all requirements contained in the PO, this Technical delivery condition and applicable ASME specification.

12.4 For SS: Measured Radioactivity levels at 5cm from the surface of the tube shall be reported in the Mill Test Certificate. (Not to be recorded in IBR Form).

Haritha.C	Kalyanaraman.V	Nadanakumar.M	Dharmalingam.M	Ravikumar.V
PREPARED BY	REVIEWED BY			APPROVED BY

COMPANY EMBLEM AND DETAIL

(As published in IBR)

TEST CERTIFICATE - FORM III E

IBR Approval (Well known) Reference : Certificate No.. **XXX Dt. DD/ MM/YY, Valid upto DD/MM/YY**

TC No. , & Date:		TDC No./Rev :	
PO. No., & Date:		Specification & Grade :	
Steel Making Process		Year of code:	
Finishing operation	Hot Finished/Cold Finished	Deoxidation process	

Identification

Supply particulars	PO item No	Size D x T x L	Heat No	Weight (Kgs)	Qty	

Chemical Analysis

Elements N1	C	S	P	Si	Mn	Ni	Cr	Mo	V	Cu	Sn	Al	Cb
min													
max													
Heat													
Product													

Heat treatment details		Type of HT	Soaking Temp° C	Soaking time
	Product			

Mechanical Properties N2	Longitudinal / Transverse direction						
Specified	YS	UTS	%E	%RA			Hardness
	Kg/mm^2	Kg/mm^2	GL=50mm				BHN
Min							
Max	---	---	---	---			
Test results							

Flattening test/Bend test N3		Flaring test	

Surface Treatment Details(SS Only)	

Non destructive tests

Appearance and dimensions	
Hydrostatic test	

N1 : As applicable to the specification
N2 : The tests specified shall be made on minimum 2 tubes for the first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers
N3 : as applicable

Surface preparation and preservation	

Certified that the particulars entered herein are correct.
The Tubes have been manufactured to comply with specifications and the Indian Boiler Regulations at our works above named and satisfactorily withstood a water test of _____on the _____day of _____ 20___ in the presence of our responsible representative whose signature is appended hereunder:

Maker's Representative (Sign. & Name Seal of Quality Control)	Maker (Sign. & Name Seal of Production)

Note:	In the case of tubes made from steel, made and certified by the Well-known Steel Makers in India or other countries, particulars regarding the 'material' a certified by them (in any form) shall be noted in the appropriate columns or paragraphs in this certificate.

COMPANY EMBLEM AND DETAIL

(As published in IBR)

FORM III B (i)

CERTIFICATE OF MANUFACTURE AND TEST

[REGULATION 4(e)]

TC No. , & Date:		TDC No./Rev :		P.O No. & Date	
Specification & Year		Finishing Operation	Hot finished/Cold Finished		
Name of part					
Intended working pressure					
Maximum recommended metal temperature					

Material

Process of manufacture	
Fully killed/rimmed	
Tubes	
Main dimensions	
Tolerances	
Mode of manufacture	
Identification marks	
Drawing numbers	

Supply particulars	PO item No	Size D x T x L	Heat No	Weight (Kgs)	Qty	

Chemical composition

Elements [N1]	C	S	P	Si	Mn	Ni	Cr	Mo	V	Cu	Sn	Al	Cb
min													
max													
Heat													
Product													

Heat treatment details		Type of HT	Soaking Temp° C	Soaking time	Cooling medium
	Product				

Mechanical Properties [N2]	Longitudinal / Transverse direction						
Specified	YS	UTS	%E	%RA			Hardness
	Kg/mm²	Kg/mm²	GL=50mm				BHN
Min							
Max	---	---	---	---			
Test results							

Bend test on tube	
Bend test on weld	
Flattening test	
Crushing test	
Flare test	
Flange test	
Surface Treatment Details(SS Only)	
Appearance and dimensions	
Hydrostatic test	

N1 : As applicable to the specification
N2 : The tests specified shall be made on minimum 2 tubes for the first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers

Surface preparation and preservation	

Other tests

Ultrasonically tested to UTUTUTUTUTUT and found satisfactory to UTAUTAUTA. Eddy current tested to EDEDEDEDE and found satisfactory to EDAEDAEDAEDA Dimensions satisfactory.

Final hydraulic test	

NOTE.- In addition, the following information in respect of the material shall be furnished in a tabular form as indicated. The information may be given from the established test data or if the material is of standard quality, an extract from the standard may be furnished instead.

Metal temperature upto °C	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600
E_t															
S_e															
S_r															

Tensile strength at 20°C.

Where

E_t Yield point at temperature t (0.2% proof stress)

**S_e Average stress to produce an elongation of 1% (creep) in 100,000 hours at various working metal temperatures.

**S_r Average and lowest stress to produce rupture in 100,000 hours at the various working metal temperatures.

Temperature range in the table may extend upto the limit of applicability of the material.

The value of Sc and Sr need be furnished only in respect of Pipes/Tubes intended to be used for working metal temperature above 454°C.

Certified that the particulars entered herein are correct.

The part has been designed and constructed to comply with the variations from the standard conditions laid down in the Indian Boiler Regulations, 1950, for material, design and construction features which have been permitted by the Board or the Inspecting Authority under the Indian Boilers Act, 1923 and satisfactorily withstood a water test of _____ on the _____ day of _____, 20__, in the presence of our responsible representative whose signature is appended hereunder.

Maker's Representative (Name and Signature)	Maker _____

We have satisfied ourselves that the tubes have been constructed in accordance with the variations from the standard conditions laid down in the Indian Boiler Regulations, 1950 and Specifications, for material, design and construction permitted by the Board. The tests conducted on the sample taken from the finished tubes have been witnessed by us and the particulars entered herein are correct.

Place_____ Name and Signature of
Date_____ Inspecting Authority

Note (1) This form is intended for the use of the both tube manufacturers and tube fabricators. Only such of the columns or paragraphs that are applicable, or information that can be obtained and furnished from other certificates, need be filled or entered in this form.

Note (2) In the case of fabrications made from steel tubes obtained from elsewhere, particulars in regard to the "material" and "Tubes" shall be taken from similar forms of certificates obtained in respect of tubes and noted in the appropriate columns or paragraphs.

In the case of tubes made from steel, made and tested by Well Known steel makers in India or other countries particulars regarding the 'material' as certified by them (in any form) shall be noted in the appropriate columns or paragraphs in this "certificate".

Revision record:

Rev 01. 01.01.95 : Title, Cl. 1.1, 2.2, 3.1, 10.2, Table 1 modified.
Rev 02. 18/07/96 : Text revised, Doc.no. included for Colour code.
Rev 03. &effdt& : 304 H included, Cl.6.0,7.0, 9.0, 10.0, 12.0 modified.
Rev 04 21/08/02 ::Cl No. 3.0 deleted, Cl. 2.0,4.0,7.0 modified. Clauses renumbered.
Rev 05 29/05/03 :Cl No 3.0 added, subsequent Clauses renumbered,Cl No:11 modified.
Rev 06 20/12/03 :Hydro removed for thk.> 3.6mm in Cl 8.0.Certificate annexures introduced i n Cl.12.Cl. 2.0,3.0,4.0,6.0 &11.0 modified for clarity.For CS heat treatment removed in Cl.4.0 for hot finished tubes.
Rev 07 16.03.04 Grade T23 added. Tolerance on thickness of cold finished tubes changed as per IBR
Rev 08 21.09.04 : UT as per BS EN 10246-7 , in lieu of ASTM E 213

1.0 **MATERIAL**

Specification: ASME {Latest on date of Purchase Order (PO)}:
CS: SA 179, SA 192, SA 210 Gr.A1 & Gr.C
AS: SA 209 Gr.T1, SA 213 Gr.T2, T5, T9, T11, T12, T22, T23,T91
SS: SA 213 TP 304, 304H, 304L, 316, 316L, 321, 321H, 347H

Additional Requirement: As listed below(supplementary to Specification)
Size and Qty.: Purchase order

2.0 **CHEMICAL COMPOSITION AND PROCESS OF MANUFACTURE**

Fully Killed & Cold finished (Hot finished also permitted for carbon steel(CS) and alloy steel(AS). Ladle & Product analysis is required,
CS: Max.Carbon: SA 210 Gr.A1: 0.25%, SA 210 Gr.C: 0.30%
Stainless Steel(SS): Boron: 0.01% max., Vanadium: 0.10% max.

3.0 **DIMENSIONAL TOLERANCES**

Dimensional tolerance shall be as per SA 450 for cold finished tubes except tolerance on thickness shall be:
0% to +20% for OD 38.1 mm and below and 0% to +22% for OD > 38.1 mm.
For hot finished tubes the tolerance shall be as follows:
Tolerance for OD : $\pm$ 0.4mm.
Tolerance for Thickness: 0% to +22% t > 4.5 mm
0% to +24% t between 3.6 and 4.5 mm (both inclusive)
0% to +28% t< 3.6mm

4.0 **HEAT TREATMENT**

CS Hot finished : No Heat Treatment required
CS Cold finished: Subcritical annealed , fully annealed or normalized
AS: normalized and tempered
Stainless Steel(SS): Solution Annealed

5.0 **MECHANICAL TESTS**

Number of Test: (as per IBR) Minimum 2 tubes for first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers.
Tension test: Also for SA 179 and SA 192. Acceptance: explanatory note in Specification.
Hardness for SA 192: 120 HB (max).

6.0 **NON DESTRUCTIVE TEST** .

Ultrasonic Testing of tubes of thickness = or > 3.6 mm to be conducted as per BS EN 10246-7 (Annex B Table B.1 is applicable) . Calibration: Acceptance Level U2 (5% notch depth) .Longitudinal notch 50mm long in OD and ID, min. 0.3mm depth. For OD<30mm one notch in OD will suffice. Scanning: clockwise & anti clockwise.
For thickness < 3.6mm., Eddy Current Test as per ASTM E309 /E426 as applicable,
Calibration: longitudinal notch depth: 5% max. (min. of 0.3 mm.) or drilled hole as per SA 106.

7.0 **FINISH AND REPAIR**

Inside and outside free from loose scales and defects like laps, seams, folds, cracks, pitting etc. Repairs by welding is prohibited. Surface defects can be removed mechanically maintaining Specified thickness.

8.0 **HYDROSTATIC TEST**

Extent of test:Only on tubes thickness < 3.6 mm as per SA 450 Cl 22.3 with S=80% of specified min. yield strength at room temperature.

9.0 **MARKING:** (in English only)

Details to be identified.: 1) PO Number, 2) Maker's emblem/code 3) Specification & grade, 4) Heat number 5) Size, 6) No.of tubes, 7) Inspector's seal

Up to OD 31.8mm.(Excl.)- 1 to 7 to be stamped on metal/plastic tag attached to bundle.
OD 31.8-76.1mm.(Incl.) - 1 to 5 to be paint stenciled on each tube, 1 to 7 to be stamped on Metal/Plastic tag attached to bundle.
OD>76.1 mm. - 2,3,4 &7 to be hard stamped with round edge stamp at 100mm from both endsand 1 to 5 to be paint stenciled on each tube.
Colour Coding on all tubes: As per procedure SIP:PP:21 (latest)

10.0 **PRESERVATION:**

All tubes, except SS to be applied with resin type rust preventive coating with visibility to stenciled details on outside and either with rust preventive coating or rust inhibitor inside.
SS pipes to be surface treated as per ASTM A380 both inside and outside.
Ends to be closed with plastic end caps / plugs secured for storage.

11.0 **PACKING:**

t < or = 2.5mm: in boxes and others in bundles.Tubes of thickness > = 6.5 mm and OD>=88.9 can be shipped loose. Bundles to be < =4 tons of equal no. of tubes, fastened with galvanized strap(1x25mm.min.) or annealed wire at both ends & at 1m interval in between.
Wooden pallets to cover tubes are not permitted.

12.0 **INSPECTION AND CERTIFICATION**

Products must be inspected at works and the mill test certificates must be countersigned by the Inspecting Authority as indicated below:
Imported IBR items: Inspecting Authority approved by IBR for the country of origin. (to be concurred by BHEL before placing PO.)
Indigenously supplied IBR items:-Boiler Inspectorate/Directorate of respective State
Indigenously supplied non IBR items:-M/s EIL/PDIL/TUV/Lloyds Register of Shipping (as indicated in Purchase Order).
Mill certified TC in IBR Form IIIE (Annexure:I) sufficient for IBR items from 'IBR - well known tube maker' and for others IBR Form IIIB(i) (Annexure:II) As per the enclosed format.

Prepared by	Reviewed by		Approved by
Amit Roy	C.R.Raju	K.Rengachari	C.Mani

COMPANY EMBLEM AND DETAIL

(As published in IBR)

TEST CERTIFICATE - FORM III E

IBR Approval (Well known) Reference : Certificate No.. **XXX Dt. DD/ MM/YY, Valid upto DD/MM/YY**

TC No. , & Date:		TDC No./Rev :	
PO. No., & Date:		Specification & Grade :	
Steel Making Process		Year of code:	
Finishing operation	Hot Finished/Cold Finished	Deoxidation process	

Identification

Supply particulars	PO item No	Size D x T x L	Heat No	Weight (Kgs)	Qty	

Chemical Analysis

Elements N1	C	S	P	Si	Mn	Ni	Cr	Mo	V	Cu	Sn	Al	Cb
min													
max													
Heat													
Product													

Heat treatment details		Type of HT	Soaking Temp° C	Soaking time
	Product			

Mechanical Properties N2 — Longitudinal / Transverse direction

Specified	YS	UTS	%E	%RA			Hardness
	Kg/mm^2	Kg/mm^2	GL=50mm				BHN
Min							
Max	---	---	---	---			
Test results							

Flattening test/Bend test N3		Flaring test	

Surface Treatment Details(SS Onl	

Non destructive tests

Appearance and dimensions	
Hydrostatic test	

N1 : As applicable to the specification
N2 : The tests specified shall be made on minimum 2 tubes for the first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers
N3 : as applicable

Surface preparation and preservation	

Certified that the particulars entered herein are correct.
The Tubes have been manufactured to comply with specifications and the Indian Boiler Regulations at our works above named and satisfactorily withstood a water test of _____on the _____day of _____ 20___ in the presence of our responsible representative whose signature is appended hereunder:

Maker's Representative (Sign. & Name Seal of Quality Control)	Maker (Sign. & Name Seal of Production)

Note:	In the case of tubes made from steel, made and certified by the Well-known Steel Makers in India or other countries, particulars regarding the 'material' a certified by them (in any form) shall be noted in the appropriate columns or paragraphs in this certificate.

COMPANY EMBLEM AND DETAIL

(As published in IBR)

FORM III B (i)
CERTIFICATE OF MANUFACTURE AND TEST

[REGULATION 4(e)]

TC No. , & Date:		TDC No./Rev :		P.O No. & Date	
Specification & Year		Finishing Operation	Hot finished/Cold Finished		
Name of part					
Intended working pressure					
Maximum recommended metal temperature					

Material

Process of manufacture	
Fully killed/rimmed	
Tubes	
Main dimensions	
Tolerances	
Mode of manufacture	
Identification marks	
Drawing numbers	

Supply particulars	PO item No	Size D x T x L	Heat No	Weight (Kgs)	Qty	

Chemical composition

Elements [N1]	C	S	P	Si	Mn	Ni	Cr	Mo	V	Cu	Sn	Al	Cb
min													
max													
Heat													
Product													

Heat treatment details		Type of HT	Soaking Temp° C	Soaking time	Cooling medium
	Product				

Mechanical Properties [N2]	Longitudinal / Transverse direction						
Specified	YS	UTS	%E	%RA			Hardness
	Kg/mm^2	Kg/mm^2	GL=50mm				BHN
Min							
Max	---	---	---	---			
Test results							

Bend test on tube	
Bend test on weld	
Flattening test	
Crushing test	
Flare test	
Flange test	
Surface Treatment Details(SS Onl	
Appearance and dimensions	
Hydrostatic test	

N1 : As applicable to the specification
N2 : The tests specified shall be made on minimum 2 tubes for the first 100 tubes and 1 per 100 or part thereof for tubes over 100 numbers

Surface preparation and preservation	

Other tests	
Ultrasonically tested to UTUTUTUTUTUT and found satisfactory to UTAUTAUTA. Eddy current tested to EDEDEDEDE and found satisfactory to EDAEDAEDAEDA Dimensions satisfactory.	
Final hydraulic test	

NOTE.- In addition, the following information in respect of the material shall be furnished in a tabular form as indicated. The information may be given from the established test data or if the material is of standard quality, an extract from the standard may be furnished instead.

Metal temperature upto °C	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600
E_t															
S_e															
S_r															

Tensile strength at 20°C.

Where

E_t Yield point at temperature t (0.2% proof stress)

**S_e Average stress to produce an elongation of 1% (creep) in 100,000 hours at various working metal temperatures.

**S_r Average and lowest stress to produce rupture in 100,000 hours at the various working metal temperatures.

Temperature range in the table may extend upto the limit of applicability of the material.

The value of Sc and Sr need be furnished only in respect of Pipes/Tubes intended to be used for working metal temperature above 454°C.

Certified that the particulars entered herein are correct.

The part has been designed and constructed to comply with the variations from the standard conditions laid down in the Indian Boiler Regulations, 1950, for material, design and construction features which have been permitted by the Board or the Inspecting Authority under the Indian Boilers Act, 1923 and satisfactorily withstood a water test of _____ on the _____ day of _____, 20__, in the presence of our responsible representative whose signature is appended hereunder.

Maker's Representative (Name and Signature)	Maker _____

We have satisfied ourselves that the tubes have been constructed in accordance with the variations from the standard conditions laid down in the Indian Boiler Regulations, 1950 and Specifications, for material, design and construction permitted by the Board. The tests conducted on the sample taken from the finished tubes have been witnessed by us and the particulars entered herein are correct.

Place_____ Name and Signature of
Date _____ Inspecting Authority

Note (1) This form is intended for the use of the both tube manufacturers and tube fabricators. Only such of the columns or paragraphs that are applicable, or information that can be obtained and furnished from other certificates, need be filled or entered in this form.

Note (2) In the case of fabrications made from steel tubes obtained from elsewhere, particulars in regard to the "material" and "Tubes" shall be taken from similar forms of certificates obtained in respect of tubes and noted in the appropriate columns or paragraphs.
In the case of tubes made from steel, made and tested by Well Known steel makers in India or other countries particulars regarding the 'material' as certified by them (in any form) shall be noted in the appropriate columns or paragraphs in this "certificate".

1.0 SCOPE

This Technical Delivery Condition specifies the additional requirements for the delivery of cold drawn seamless austenitic stainless steel tubes conforming to Grade 316 Ti (Latest),upto wall thickness 4 mm.
This TDC is supplementary to the mandatory requirements covered in the specification.
The size and quantity shall be as specified in the purchase order.

2.0 CHEMICAL COMPOSITION AND PROCESS

The tubes shall be made from silicon killed steel made by any one of the electric furnace processes.
The tubes shall be made by cold drawing only.
The chemical composition of the steel shall conform to the requirements given below:

Element	%_Composition
C	0.08 max.
Mn	2.00 max.
Si	0.75 max.
P	0.045 max.
S	0.035 max.
N	0.10 max.
Cr	16 - 18
Mo	2 - 3
Ni	10 - 14
Ti	(C+N) x 5 min. & 0.70 max.

3.0 DIMENSIONAL TOLERANCES

All tubes shall conform to dimensional tolerances of cold finished tubes as specified in ASME SA 450.

4.0 HEAT TREATMENT

All tubes shall be supplied in the solution heat treated conditions. The solution annealing temperature shall be 2000 deg.F minimum.

5.0 MECHANICAL TESTS

The tubes shall be subjected to mechanical tests as specified in SA 213/SA 450.
The acceptance standards shall be as given below:
Tensile strength : 75000 Psi min.
Yield strength : 30000 Psi min.
% Elongation : 35 min.
Other tests : As per SA 213.

6.0 NON DESTRUCTIVE TESTS

Each length of tube shall be subjected to eddy current testing as per ASTM E309 with a longitudinal calibration notch of depth 5% of the tube wall thickness.
In addition, each length of tube shall be hydraulically tested to the pressure indicated in the purchase order.

7.0 **REPAIR**

Repairs involving fusion welding is prohibited.
Wherever defects are rectified by mechanical means, the wall thickness requirements shall be satisfactori
met with and the surfaces shall be smoothly dressed up without any sharp edges.

8.0 **WORKMANSHIP**

The tubes shall be free from mill scales both on the inside and outside and shall present a workman like finish.

9.0 **MARKING AND PACKING**

The tubes shall be marked and despatched as given below:
The marking shall be legibly done in ENGLISH language only.

9.1 **PRESERVATION**

The ends of the tube shall be closed with end caps, which should be securely held so that it will not fall off during transit.

9.2 **PACKING**

All the tubes shall be supplied in bundles, properly packed in wooden crates to avoid any dent formation and other transit damages to the tubes. The weight of each consignment shall not exceed 2 tons.
A metal tag with Purchase Order number, tube specification and grade, outside diameter, nominal wall thickness, length of tubes in the bundle,no.of tubes in the bundle,serial no. and light stamped shall be securely fastened in each bundle.

A packing list should be sent along with each consignment, with the following details:
1. Purchase order number
2. Number of bundles (indicating serial no. also)
3. No. of tubes in each bundle
4. Material specification and grade
5. Size of tube.

10.0 **INSPECTION AND CERTIFICATION**

All the tests mentioned here shall be conducted at the works and the tubes must be supplied along with the Test certificates legibly written in English and furnishing the following details:

The test certificate shall furnish:
1. Purchase Order reference (BHEL).
2. Test Certificate number.
3. Specification and Grade.
4. Quantity & Size.
5. Melt Number.
6. Steel making process.
7. Ladle analysis meltwise.
8. Heat treatment details.
9. Mechanical test results.
10.NDT results with reference standard.

11.Hydraulic test results.

All the tubes must be inspected at the works and the test certificates shall be countersigned by an Inspecting Authority as specified in the purchase order.

11.0 **END USE**

These tubes are intended for use in valves.

U.Revisankaran	K.S.Modak	K.Rengachari	D.Krishanmoorthy	SM/QA
Prepared		Reviewed		Approved

1.0 SCOPE

This Technical Delivery Condition specifies the additional requirements for the delivery of cold drawn seamless alloy steel tubes conforming to AISI 602.
This TDC is supplementary to the mandatory requirements covered in the specification.
The size and quantity shall be as specified in the purchase order.

2.0 CHEMICAL COMPOSITION AND PROCESS

The tubes shall be made from fully killed steel made by any one of the electric furnace processes.
The tubes shall be made by cold drawing only.
The chemical composition of the steel shall conform to the requirements given below, in both ladle and product analysis:

Element	% Composition
C	0.20 - 0.33
Mn	0.45 - 0.65
Si	0.55 - 0.75
P	0.04 max.
Cr	1.00 - 1.50
Mo	0.40 - 0.60
V	0.20 - 0.30

3.0 DIMENSIONAL TOLERANCES

All tubes shall conform to the dimensional tolerances as given below:
Tolerance on outside diameter : plus 0.5 mm, - 0 mm.
Tolerance on thickness : plus or minus 10%.

4.0 HEAT TREATMENT

All tubes shall be supplied in the normalised and tempered condition as given below:
Normalise at 940 - 980 deg. C/ 0.5 hour per inch thick soaking/ air cool.
Temper at 650 - 680 deg. C/ 1 hour per inch thick soaking/ air cool.

5.0 MECHANICAL TESTS

The tubes shall be subjected to mechanical tests as per specification. The acceptance criteria for tensile testing shall be as follows:
Tensile strength : 130 - 260 Ksi.
Yield strength : 110 - 200 Ksi.
% Elongation : 10 min.
% Reduction in area : 40 - 60.

6.0 NON DESTRUCTIVE TESTS

6.1 ULTRASONIC TEST

Each length of tube shall be subjected to ultrasonic test in accordance with ASTM E213 with calibration notch of depth 5% of the wall thickness of the tube or 0.3 mm whichever is greater. However, the maximum notch depth shall be limited to 1.5 mm.
The calibration tube shall contain two longitudinal notches not exceeding 50 mm, which have been accurately machined along with longitudinal axis of the tube. For tubes of outer diameter exceeding 30 mm, one notch shall be on the outside and the other notch shall be on the inside

separated by atleast 75 mm.
Each tube shall be scanned so that the sound beam is propagated in both the clockwise and counter clockwise directions as observed from one end of the tube.

6.2 **HYDRAULIC TEST**

Each length of the tube shall be hydraulically tested, if specified in the PO, to the pressure indicated.

7.0 **REPAIR**

Repairs involving fusion welding is prohibited.
Wherever defects are rectified by mechanical means, the wall thickness requirements shall be satisfactorily met with, and the surfaces shall be smoothly dressed up without any sharp edges.

8.0 **WORKMANSHIP**

The tubes shall be free from mill scales both on the inside and outside and shall present a workman like finish.

9.0 **MARKING AND PACKING**

The tubes shall be marked and despatched as given below: The marking shall be legibly done in ENGLISH language only.

9.1 **PRESERVATION**

All painted details shall be protected with one coat of transparent rust preventive.
All tubes shall be applied with resin type translucent rust preventive coating on the outside and either with rust preventive coating or rust inhibitor on the inside.
The ends of the tube shall be closed with end caps, which should be securely held so that it will not fall off during transit.

9.2 **PACKING**

All the tubes shall be supplied in bundles, properly packed in wooden crates to avoid any dent formation and other transit damages to the tubes. The weight of each consignment shall not exceed 2 tons.
A metal tag with Purchase Order number,tube specification and grade,outside diameter,nominal wall thickness,length of tubes in the bundle,no.of tubes in the bundle,serialno.and weight stamped shall be securely fastened in each bundle.
A packing list should be sent along with each consignment, with the following details:

1. Purchase order number.
2. Number of bundles (indicating serial no. also).
3. No. of tubes in each bundle.
4. Material specification and grade.
5. Size of tube.

10.0 INSPECTION AND CERTIFICATION

All the tubes must be inspected at the works and the test certificates ountersigned by an Inspection Authority, recognised by Indian Boiler Regulations, 1950. If the tube manufacturer is recognised as a “Well known tube maker” under IBR, then the tube maker’s certificate is enough, with the prior approval of BHEL.
The certificates shall furnish the following details in ENGLISH language only.

1. Purchase Order reference (BHEL).
2. Test certificate number.
3. Specification.
4. Quantity & Size.
5. Heat number.
6. Steel making process.
7. Ladle analysis heat-wise.
8. Product analysis heat-wise.
9. Heat treatment details.
10. Mechanical test results.
11. NDT results with reference standard.
12. Hydraulic test results.

Wherever specified in Purchase Order, the tubes shall be subjected to inspection by Authorities nominated by BHEL and the test certificates shall be countersigned by them.

11.0 END USE

These tubes are intended for use in the lance tubes of soot blowers.

U.Revisankaran	K.S.Modak	K.Rengachari	D.Krishanmoorthy	SM/QA
Prepared		Reviewed		Approved

BHARAT HEAVY ELECTRICALS LTD

VALVES PURCHASE
Trichy - 620 014. India
TERMS AND CONDITIONS-E-procurement

Phone: 0431 257-7715, 7919 Email: suman@bheltry.co.in
ashishkhare@bheltry.co.in

1. QUOTATIONS:

a. **Submission of Tender:** Each offer should be sent in double cover separately and the same should be sealed and super scribed with correct Tender No., item of supply and due date of opening. Two or more quotations should not be sent in one cover. Price Bid should contain only Price in Rs per unit for each type. Tender should not be addressed to any individual's name but only by designation as below:

Sr. Manager/Purchase/Valves
High Pressure Boiler Plant
Bharat Heavy Electricals Limited
Tiruchirappalli - 620 014, Tamilnadu, India

b. **Late tenders:** Late tenders shall not be considered under any circumstance.

c. **Regulations:** Tender should be accompanied by detailed technical literature, Catalogue and detailed dimensional drawings in ENGLISH. Tenders should be free from CORRECTION AND ERASURES. Corrections if any must be attested. All amounts shall be indicated both in words as well as figures. Where there is difference between amount quoted in words and figures, amount quoted in words shall prevail.

d. **Two Bid Systems:** If tender calls for two part bid system (Techno commercial & price Bid). First the Techno Commercial bid will be opened. Techno-commercially suitable vendors alone will be intimated for price bid opening or Reverse Auction.

e. **PVC**:. Price Variation clause not acceptable. Prices should be firm.

f. **Catalogue:** Manufacturer's name, Trade Mark or Patent No. if any should be specified. Illustrative leaflets giving technical particulars are required along with quotation wherever necessary.

g. **Acceptance:** The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.

h. **Samples:** Samples should be submitted separately if specially requested in tender before due date of the enquiry. They should be clearly marked with the enquiry No and date on the outside cover to facilitate identification.

i. **Spares:** The tenderer should quote separately for spares that are required for two years trouble free operation. The spares offer should accompany the offer of main equipment; otherwise the quotation will be overlooked.

2. COMMERCIAL TERMS & CONDITIONS:

a. **Terms of Payment**: 100% after 45 days on satisfactory receipts and acceptance of material at BHEL stores/ Site acknowledgement.

Any deviation in the above payment terms will attract loading as mentioned below.

"Base rate of SBI (as applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders.

LC will not be operated for indigenous vendors. Offers with payment terms as LC from Indigenous vendors will be rejected.

b. **Liquidated Damage:** Liquidated damages shall be 0.5% of the total order value or part thereof subject to a maximum of 10% of the total order value.

For staggered delivery schedule, LD shall be 0.5% of the undelivered portion per week of the delay or part thereof subject to a maximum of 10% of the total order value.

Any deviation from the above LD clause, loading will be applied to the extent to which it is not agreed by the bidder (at offer value).

c. **Delivery Terms:** Price should be quoted FOR BHEL Trichy/FOR site as mentioned in enquiry inclusive of freight and insurance in transit.

d. **Validity of Offer:** Prices should be valid for 120 days from the date of opening of this tender.

e. **Taxes & Duties:** If any Sales Tax is payable as extra to the quoted price, it should be specifically stated in quotation along with CST & T.N.G.S.T No. failing which the purchaser will not be liable for payment of Sales Tax. Our T.N.G.S.T No. 3550005 Dated 01-04-1995 C.S.T. No. 259383 Dt. 11.06.1991.

f. **Guarantee Clause:** The vendor shall give a guarantee for the performance of his supplies for a period of eighteen months from the date of dispatch or twelve months from the date of commissioning whichever is earlier.

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ashishkhare@bheltry.co.in

g. **Risk Purchase:** Alternatively the purchaser at his option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of seller either the whole of goods or any part which the supplier has failed to deliver or dispatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefore. Supplier shall be liable for any loss which the purchaser may sustain by reason for such risk purchases in addition to penalty at the rate mentioned in clause 2 b above.

h. **Preferential Delivery:** If a contract is placed on a higher tender as a result of this invitation to tender in preference to the lowest acceptable offer in consideration of the earliest delivery, the seller will be liable to pay to the purchaser the difference between the contract rate and that of the lowest acceptable tender on the basis of final price FOR destination, including all elements of freight, sales tax, duties and other incidents, incidental in case of failure to complete supplies in terms of such contract within the date of delivery specified in the tender and incorporated in the contract.

i. **MODVAT/CREDIT:** If any Excise Duty is payable, the chapter head/sub-head reference and the rate of the duty should be quoted. If the tender is availing MODVAT credit for his input materials, the effect of proforma invoice should be passed on to the purchaser.

j. **Miscellaneous:** Any Other conditions which might have been quoted by the seller and are in contravention to the terms prescribed I the order and which have not been specifically accepted in by Purchaser will not be applicable to the contract.

k. **Delivery:** Delivery schedule shall be strictly as per BHEL tender requirement which are as indicated against each item in our tender. If supplier offers more than this delivery period BHEL will operate 0.5% loading factor for evaluation of their offer for every week delay.

l. **Performance Bank Guarantee:** If tender Calls for Performance Bank Guarantee, Vendor should provide a performance bank guarantee (PBG) for 10% of the total Purchase order value valid for warranty/guarantee period with an additional claim period of 2 months.

3. GENERAL CONDITIONS

a. BHEL reserves the right to finalize the tender as per item sl no wise or as a total package or project wise. Separate orders will be released for each project and documents should be supplied for each order separately.

b. BHEL reserves the right to increase or reduce or split the Tender Quantity and to NOT to order for some or all material based on the changes in project.

c. BHEL shall have the right to visit vendor works during the execution of contract along with end customer for verifying status, inspection and testing of the material.

d. BHEL reserves the right to negotiate or re-float the tender in case the quoted prices are not acceptable.

e. Supplier shall arrange packing to avoid lose or damages during Road Transport, Site handling & Storage.

f. Purchase Order, PO Item Sl No, Material code, Quantity should marked the Packing clearly.

g. Confirmation for compliance is to be given in the offer for all the conditions specified above and to the respective Purchase Specification.

4. DOCUMENTATION:

a. **With Consignment:** Duplicate for transporter copy of Invoice, Packing List, Delivery Challan, O&M manual Material Test Certificate, Test Certificates, Calibration Report, Compliance Certificate & Guarantee/Warrantee Certificate etc…

b. **Online Submission:**Supplier should upload the soft copy of all Test Certificates in BHEL website http://vis.bheltry.co.in/vis/index.jsp at Vendor information system tab.

c. **To Finance:** Original and Duplicate Invoice for payment with GR reference ,should be sent directly to

Senior Manager/Finance/Valves-Bills section

BHEL Tiruchirappalli-620014, Tamilnadu.

To Purchase:

i. **FOR BHEL TRICHY case-**Copy of Invoice, Packing list, LWB and Delivery challan for reference, original IBR documents/Inspection despatch clearance certificates

Phone: 0431 257-7715, 7919 Email: suman@bheltry.co.in

ashishkhare@bheltry.co.in

ii. **FOR Site case-** Original Excise Invoice, Original LWB, Original Packing List, Original IBR documents, Original despatch clearance Certificate, Original Inspection report, Test certificates as per PO, Original Site Acknowledgment etc...

d. **Identification:**, Purchase Order, PO item Sl No, Material code, quantity, Unique Sl No if any should be provided in all despatch documents, materials and packing clearly.

5. DISCLAIMER CLAUSE:

Neither the Organization (Bharat Heavy Electricals Ltd.) nor the service provider (m junction Services Ltd.) is responsible for any failure of submission of bids due to failure of internet or other connectivity problems or reasons thereof.