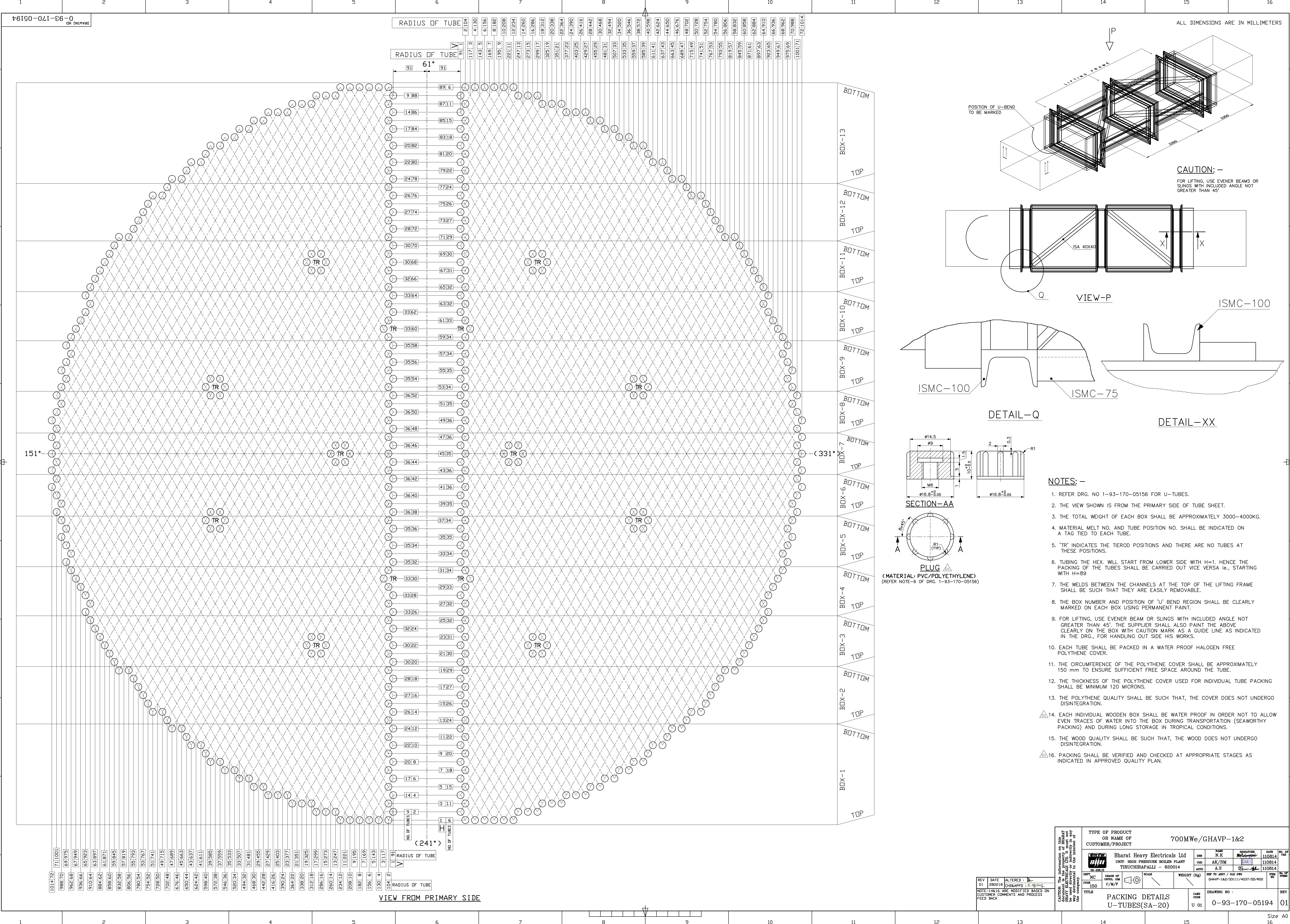




1

2

3

4

5

6

7

8

9

10

11

12

99190-010-05166

DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

1

91.0

10840.5

10941.0

21966.9

42

10.91

2

104.0

10847.0

10960.5

22020.7

45

10.94

3

117.0

10853.5

10980.0

22074.6

44

10.96

4

130.0

10860.0

10999.5

22128.4

45

10.99

5

143.0

10866.5

11019.0

22182.2

44

11.02

6

156.0

10873.0

11038.5

22236.1

45

11.05

7

169.0

10879.5

11058.0

22289.9

44

11.07

8

182.0

10886.0

11077.5

22343.8

45

11.10

9

195.0

10892.5

11097.0

22397.6

44

11.13

10

208.0

10899.0

11116.5

22451.5

45

11.15

11

221.0

10905.5

11136.0

22505.3

44

11.18

12

234.0

10912.0

11155.5

22559.1

44

11.21

13

247.0

10918.5

11175.0

22613.0

44

11.23

14

260.0

10925.0

11194.5

22666.8

43

11.26

15

273.0

10931.5

11214.0

22720.7

44

11.29

16

286.0

10938.0

11233.5

22774.5

43

11.31

17

299.0

10944.5

11253.0

22828.3

42

11.34

18

312.0

10951.0

11272.5

22882.2

43

11.37

19

325.0

10957.5

11292.0

22936.0

42

11.39

20

338.0

10964.0

11311.5

22989.9

43

11.42

21

351.0

10970.5

11331.0

23043.7

42

11.45

22

364.0

10977.0

11350.5

23097.5

43

11.47

23

377.0

10983.5

11370.0

23151.4

42

11.50

24

390.0

10990.0

11389.5

23205.2

41

11.53

25

403.0

10996.5

11409.0

23259.1

42

11.55

26

416.0

11003.0

11428.5

23312.9

41

11.58

27

429.0

11009.5

11448.0

23366.7

42

11.61

28

442.0

11016.0

11467.5

23420.6

41

11.63

29

455.0

11022.5

11487.0

23474.4

40

11.66

30

468.0

11029.0

11506.5

23528.3

41

11.69

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

31

481.0

11035.5

11526.0

23582.1

40

11.71

32

494.0

11042.0

11545.5

23635.9

39

11.74

33

507.0

11048.5

11565.0

23689.8

40

11.77

34

520.0

11055.0

11584.5

23743.6

39

11.79

35

533.0

11061.5

11604.0

23797.5

38

11.82

36

546.0

11068.0

11623.5

23851.3

39

11.85

37

559.0

11074.5

11643.0

23905.2

38

11.87

38

572.0

11081.0

11662.5

23959.0

35

11.90

39

585.0

11087.5

11682.0

24012.8

38

11.93

40

598.0

11094.0

11701.5

24066.7

37

11.95

41

611.0

11100.5

11721.0

24120.5

36

11.98

42

624.0

11107.0

11740.5

24174.4

35

12.01

43

637.0

11113.5

11760.0

24228.2

36

12.03

44

650.0

11120.0

11779.5

24282.0

35

12.06

45

663.0

11126.5

11799.0

24335.9

34

12.09

46

676.0

11133.0

11818.5

24389.7

33

12.11

47

689.0

11139.5

11838.0

24443.6

34

12.14

48

702.0

11146.0

11857.5

24497.4

33

12.17

49

715.0

11152.5

11877.0

24551.2

32

12.20

50

728.0

11159.0

11896.5

24605.1

31

12.22

51

741.0

11165.5

11916.0

24658.9

32

12.25

52

754.0

11172.0

11935.5

24712.8

31

12.28

53

767.0

11178.5

11955.0

24766.6

30

12.30

54

780.0

11185.0

11974.5

24820.4

29

12.33

55

793.0

11191.5

11994.0

24874.3

28

12.36

56

806.0

11198.0

12013.5

24928.1

27

12.38

57

819.0

11204.5

12033.0

24982.0

26

12.41

58

832.0

11211.0

12052.5

25035.8

27

12.44

59

845.0

11217.5

12072.0

25089.6

26

12.46

60

858.0

11224.0

12091.5

25143.5

25

12.49

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

61

871.0

11230.5

12111.0

25197.3

24

12.52

62

884.0

11237.0

12130.5

25251.2

23

12.54

63

897.0

11243.5

12150.0

25305.0

22

12.57

64

910.0

11250.0

12169.5

25358.8

21

12.60

65

923.0

11256.5

12189.0

25412.7

20

12.62

66

936.0

11263.0

12208.5

25466.5

17

12.65

67

949.0

11269.5

12228.0

25520.4

16

12.68

68

962.0

11276.0

12247.5

25574.2

15

12.70

69

975.0

11282.5

12267.0

25628.1

14

12.73

70

988.0

11289.0

12286.5

25681.9

11

12.76

71

1001.0

11295.5

12306.0

25735.7

8

12.78

72

1014.0

11302.0

12325.5

25789.6

5

12.81

TABLE-1

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

1

91.0

10840.5

10941.0

21966.9

42

10.91

2

104.0

10847.0

10960.5

22020.7

45

10.94

3

117.0

10853.5

10980.0

22074.6

44

10.96

4

130.0

10860.0

10999.5

22128.4

45

10.99

5

143.0

10866.5

11019.0

22182.2

44

11.02

6

156.0

10873.0

11038.5

22236.1

45

11.05

7

169.0

10879.5

11058.0

22289.9

44

11.07

8

182.0

10886.0

11077.5

22343.8

45

11.10

9

195.0

10892.5

11097.0

22397.6

44

11.13

10

208.0

10899.0

11116.5

22451.5

45

11.15

11

221.0

10905.5

11136.0

22505.3

44

11.18

12

234.0

10912.0

11155.5

22559.1

44

11.21

13

247.0

10918.5

11175.0

22613.0

44

11.23

14

260.0

10925.0

11194.5

22666.8

43

11.26

15

273.0

10931.5

11214.0

22720.7

44

11.29

16

286.0

10938.0

11233.5

22774.5

43

11.31

17

299.0

10944.5

11253.0

22828.3

42

11.34

18

312.0

10951.0

11272.5

22882.2

43

11.37

19

325.0

10957.5

11292.0

22936.0

42

11.39

20

338.0

10964.0

11311.5

22989.9

43

11.42

21

351.0

10970.5

11331.0

23043.7

42

11.45

22

364.0

10977.0

11350.5

23097.5

43

11.47

23

377.0

10983.5

11370.0

23151.4

42

11.50

24

390.0

10990.0

11389.5

23205.2

41

11.53

25

403.0

10996.5

11409.0

23259.1

42

11.55

26

416.0

11003.0

11428.5

23312.9

41

11.58

27

429.0

11009.5

11448.0

23366.7

42

11.61

28

442.0

11016.0

11467.5

23420.6

41

11.63

29

455.0

11022.5

11487.0

23474.4

40

11.66

30

468.0

11029.0

11506.5

23528.3

41

11.69

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

31

481.0

11035.5

11526.0

23582.1

40

11.71

32

494.0

11042.0

11545.5

23635.9

39

11.74

33

507.0

11048.5

11565.0

23689.8

40

11.77

34

520.0

11055.0

11584.5

23743.6

39

11.79

35

533.0

11061.5

11604.0

23797.5

38

11.82

36

546.0

11068.0

11623.5

23851.3

39

11.85

37

559.0

11074.5

11643.0

23905.2

38

11.87

38

572.0

11081.0

11662.5

23959.0

35

11.90

39

585.0

11087.5

11682.0

24012.8

38

11.93

40

598.0

11094.0

11701.5

24066.7

37

11.95

41

611.0

11100.5

11721.0

24120.5

36

11.98

42

624.0

11107.0

11740.5

24174.4

35

12.01

43

637.0

11113.5

11760.0

24228.2

36

12.03

44

650.0

11120.0

11779.5

24282.0

35

12.06

45

663.0

11126.5

11799.0

24335.9

34

12.09

46

676.0

11133.0

11818.5

24389.7

33

12.11

47

689.0

11139.5

11838.0

24443.6

34

12.14

48

702.0

11146.0

11857.5

24497.4

33

12.17

49

715.0

11152.5

11877.0

24551.2

32

12.20

50

728.0

11159.0

11896.5

24605.1

31

12.22

51

741.0

11165.5

11916.0

24658.9

32

12.25

52

754.0

11172.0

11935.5

24712.8

31

12.28

53

767.0

11178.5

11955.0

24766.6

30

12.30

54

780.0

11185.0

11974.5

24820.4

29

12.33

55

793.0

11191.5

11994.0

24874.3

28

12.36

56

806.0

11198.0

12013.5

24928.1

27

12.38

57

819.0

11204.5

12033.0

24982.0

26

12.41

58

832.0

11211.0

12052.5

25035.8

27

12.44

59

845.0

11217.5

12072.0

25089.6

26

12.46

60

858.0

11224.0

12091.5

25143.5

25

12.49

TABLE-2

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

61

871.0

11230.5

12111.0

25197.3

24

12.52

62

884.0

11237.0

12130.5

25251.2

23

12.54

63

897.0

11243.5

12150.0

25305.0

22

12.57

64

910.0

11250.0

12169.5

25358.8

21

12.60

65

923.0

11256.5

12189.0

25412.7

20

12.62

66

936.0

11263.0

12208.5

25466.5

17

12.65

67

949.0

11269.5

12228.0

25520.4

16

12.68

68

962.0

11276.0

12247.5

25574.2

15

12.70

69

975.0

11282.5

12267.0

25628.1

14

12.73

70

988.0

11289.0

12286.5

25681.9

11

12.76

71

1001.0

11295.5

12306.0

25735.7

8

12.78

72

1014.0

11302.0

12325.5

25789.6

5

12.81

TABLE-3

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

W/UNIT (kg)

61

871.0

11230.5

12111.0

25197.3

24

12.52

62

884.0

11237.0

12130.5

25251.2

23

12.54

63

897.0

11243.5

12150.0

25305.0

22

12.57

64

910.0

11250.0

12169.5

25358.8

21

12.60

65

923.0

11256.5

12189.0

25412.7

20

12.62

66

936.0

11263.0

12208.5

25466.5

17

12.65

67

949.0

11269.5

12228.0

25520.4

16

12.68

68

962.0

11276.0

12247.5

25574.2

15

12.70

69

975.0

11282.5

12267.0

25628.1

14

12.73

70

988.0

11289.0

12286.5

25681.9

11

12.76

71

1001.0

11295.5

12306.0

25735.7

8

12.78

72

1014.0

11302.0

12325.5

25789.6

5

12.81

TABLE-4

VAR NO

R (mm)

L1 (mm)

L2 (mm)

L3 (DEVELOPED LENGTH mm)

NO.OFF / HEX. (SEE NOTE-15)

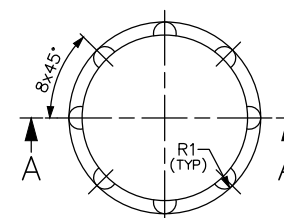
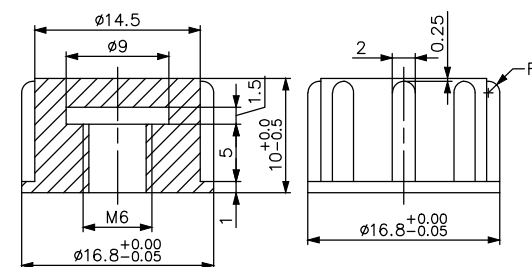
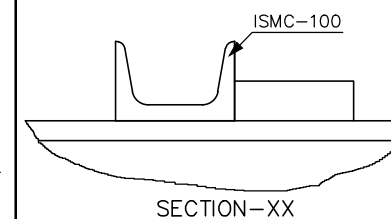
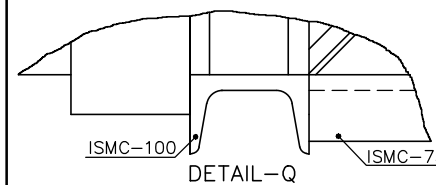
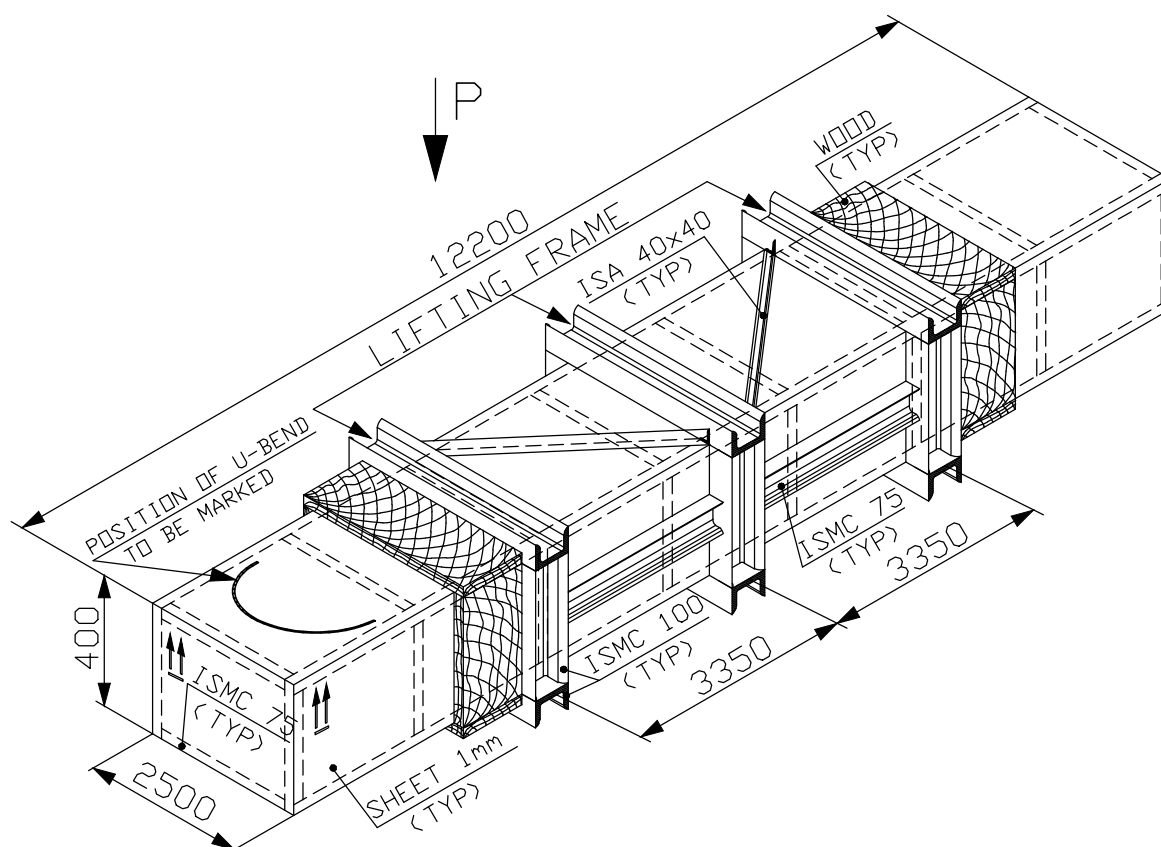
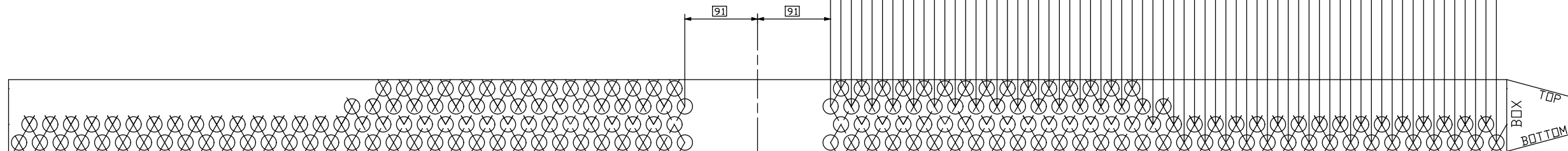
W/UNIT (kg)

61

871.0

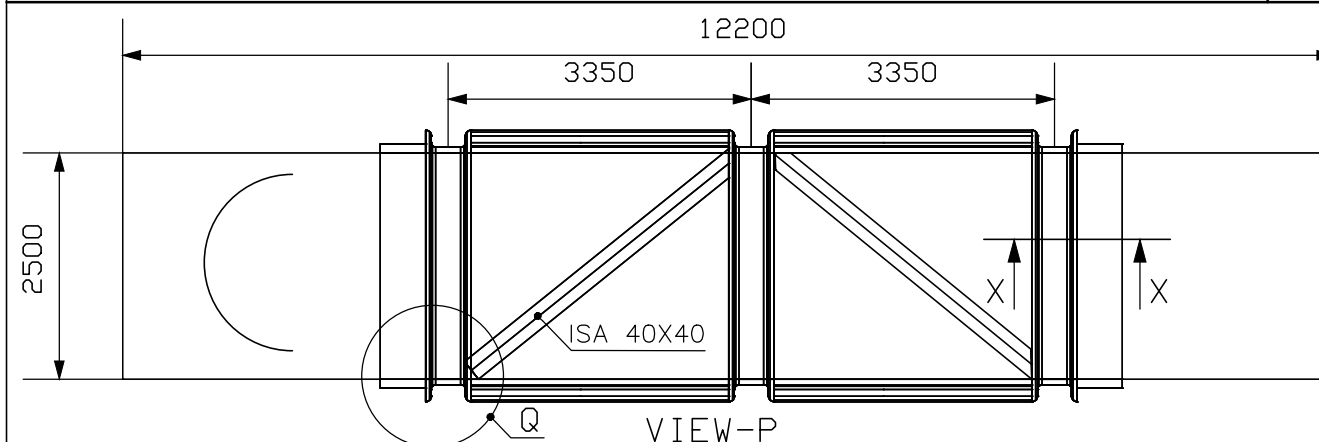
RADIUS OF TUBE	2.104	4.130	6.156	8.182	10.208	12.234	14.260	16.286	18.312	20.338	22.364	24.390	26.416	28.442	30.468	32.494	34.520	36.546	38.572	40.598	42.624	44.650	46.676	48.702	50.728	52.754	54.780	56.806	58.832	60.858	62.884	64.910	
ROW NO.																																	

ROW NO.	91	1																																																																																																																																																																																																																																																																																																																																																																																																																									
RADIUS OF TUBE	117	3	143	5	169	7	195	9	221	11	247	13	273	15	299	17	325	19	351	21	377	23	403	25	429	27	455	29	481	31	507	33	533	35	559	37	585	39	611	41	637	43	663	45	689	47	715	49	741	51	767	53	793	55	819	57	845	59	871	61	897	63	923	65	949	67	975	69	1001	71	1027	73	1053	75	1079	77	1105	79	1131	81	1157	83	1183	85	1209	87	1235	89	1261	91	1287	93	1313	95	1339	97	1365	99	1391	101	1417	103	1443	105	1469	107	1495	109	1521	111	1547	113	1573	115	1599	117	1625	119	1651	121	1677	123	1703	125	1729	127	1755	129	1781	131	1807	133	1833	135	1859	137	1885	139	1911	141	1937	143	1963	145	1989	147	2015	149	2041	151	2067	153	2093	155	2119	157	2145	159	2171	161	2197	163	2223	165	2249	167	2275	169	2301	171	2327	173	2353	175	2379	177	2405	179	2431	181	2457	183	2483	185	2509	187	2535	189	2561	191	2587	193	2613	195	2639	197	2665	199	2691	201	2717	203	2743	205	2769	207	2795	209	2821	211	2847	213	2873	215	2899	217	2925	219	2951	221	2977	223	3003	225	3029	227	3055	229	3081	231	3107	233	3133	235	3159	237	3185	239	3211	241	3237	243	3263	245	3289	247	3315	249	3341	251	3367	253	3393	255	3419	257	3445	259	3471	261	3497	263	3523	265	3549	267	3575	269	3601	271	3627	273	3653	275	3679	277	3705	279	3731	281	3757	283	3783	285	3809	287	3835	289	3861	291	3887	293	3913	295	3939	297	3965	299	3991	301	4017	303	4043	305	4069	307	4095	309	4121	311	4147	313	4173	315	4199	317	4225	319	4251	321	4277	323	4303	325	4329	327	4355	329	4381	331	4407	333	4433	335	4459	337	4485	339	4511	341	4537	343	4563	345	4589	347	4615	349	4641	351	4667	353	4693	355	4719	357	4745	359	4771	361	4797	363	4823	365	4849	367	4875	369	4901	371	4927	373	4953	375	4979	377	5005	379	5031	381	5057	383	5083	385	5109	387	5135	389	5161	391	5187	393	5213	395	5239	397	5265	399	5291	401	5317	403	5343	405	5369	407	5395	409	5421	411	5447



PLUG
(MATERIAL: PVC/POLYETHYLENE)
(REFER NOTE-6 OF DRG. 1-93-170-05156)

1. REFER DRAWING NO. : 1-93-170-05156 FOR U-TUBES.
2. THE REMAINING 2 SPARE TUBES OF RADIUS 91mm SHALL BE KEPT INTACT IN THE SPARE TUBES BOX AT A CONVENIENT LOCATION AND SENT TO BHEL WITHOUT ANY DAMAGE.
3. THE TOTAL WEIGHT OF EACH BOX SHALL BE APPROXIMATELY 3000-4000 KG.
4. MATERIAL MELT NO. AND TUBE POSITION NO. SHALL BE INDICATED ON A TAG TIED TO EACH TUBE.
5. THE WELDS BETWEEN THE CHANNELS AT THE TOP OF THE LIFTING FRAME SHALL BE SUCH THAT THEY ARE EASILY REMOVABLE.
6. FOR LIFTING, USE EVENER BEAM OR SLINGS WITH INCLUDED ANGLE NOT GREATER THAN 45°. THE SUPPLIER SHALL ALSO PAINT THE ABOVE CLEARLY ON THE BOX WITH CAUTION MARK AS A GUIDE LINE AS INDICATED IN THE DRG., FOR HANDLING OUTSIDE HIS WORKS.
7. EACH TUBE SHALL BE PACKED IN A WATER PROOF HALOGEN FREE POLYTHENE COVER.
8. THE CIRCUMFERENCE OF THE POLYTHENE COVER SHALL BE APPROXIMATELY 150 mm TO ENSURE SUFFICIENT FREE SPACE AROUND THE TUBE.
9. THE THICKNESS OF THE POLYTHENE COVER USED FOR INDIVIDUAL TUBE PACKING SHALL BE MINIMUM 120 MICRONS.
10. THE POLYTHENE QUALITY SHALL BE SUCH THAT, THE COVER DOES NOT UNDERGO DISINTEGRATION.
11. EACH INDIVIDUAL WOODEN BOX SHALL BE WATER PROOF IN ORDER NOT TO ALLOW EVEN TRACES OF WATER INTO THE BOX DURING TRANSPORTATION (SEAWORTHY PACKING) AND DURING LONG STORAGE IN TROPICAL CONDITIONS.
12. THE WOOD QUALITY SHALL BE SUCH THAT, THE WOOD DOES NOT UNDERGO DISINTEGRATION.
13. PACKING SHALL BE VERIFIED AND CHECKED AT APPROPRIATE STAGES AS INDICATED IN APPROVED QUALITY PLAN.
14. POSITION OF U-BEND REGION SHALL BE CLEARLY MARKED ON THE BOX USING PAINT.
15. THE OVERALL DIMENSIONS OF THE PACKING BOX SHOWN IS TENTATIVE.



REV	DATE	ALTERED :
		CHD&APPD :

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

बी एच ई एम
BHEM
05-229/D

UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

DEPT NC	GRADE OF UNTOL DIM C/M/F		SCALE 1:50 ; NTS	WEIGHT (Kg) — —	REF TO ASSY / OLD DWG	ITEM NO	No O ITEMS
CODE 150							
TITLE PACKING DETAILS U-TUBES (SPARE)				CARD CODE U 01	DRAWING NO : 3-93-170-05561		REV 00

BHARAT HEAVY ELECTRICALS LIMITED

MM/RM/PURCHASE/TUBES

BHEL / TRICHY-620 014.

ANNEXURE-B

Enq No.

Enquiry Terms & Conditions for Manufacturing, testing and Supply of U & Straight Tubes (OD 19.1 x 1.1 thk).

Note: This Annexure has to be mandatorily filled & signed by the manufacturer (or) mill and submitted along with Technical bid.

Any deviation to the below mentioned terms shall be stated specifically in the comments column for each term and also in case of acceptance to our terms, it will be construed that the whole term is understood and agreed in totality without any deviation. (If otherwise mentioned).

SI No	BHEL Requirements	Supplier Comments
01.	<u>Restrictions for Procurement from a country sharing its land border with India</u> For this procurement, Public procurement order dated 23.07.2020 regarding restrictions under rule 144 (xi) of general financial rules 2017 and clarification dt 08.02.2021 from DoE is applicable. In case of subsequent Orders issued, the same shall be applicable even if issued after issue of this NIT.	
02.	<u>Preference to Make in India:</u> For this procurement, the local content to categorize a supplier as a class I local supplier/class II local supplier /Non-local supplier and purchase preference to class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent Orders issued by the respective Nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of part II bids against this NIT.	
03.	<u>Special Provisions for Micro and Small Enterprises (MSE) bidders registered as per MSME act:</u> (Subject to participating MSE vendors meeting the tender requirements of BHEL) ➤ As per Gazette Notification no. S.O. 2119(E) dated 26.06.2020 issued by Ministry of MSME applicable/existing Micro and small suppliers are requested to get registered with Udyam Registration portal and share us the Udyam registration no along with Udyam registration certificate. MSE suppliers can avail the intended benefits only if they submit Udyam registration certificate or UAM with CA certificate or NSIC certificate or EM-II with CA certificate, along with the offer. ➤ 25% of the tendered quantity is earmarked for MSE suppliers in this tender, subject to participating MSE Vendors should meet the tender requirements of BHEL. In case MSE vendor participating in the tender quotes within the price band of L1 + 15%, they will be allowed to supply the portion of the requirement subject to acceptance of L1 price by MSE vendor. In case of more than one such MSE vendor within the "L1+15% price band", the supply shall be shared proportionately. ➤ In the event of Non MSE supplier becoming L1 and MSE supplier quotes within the price band of L1+15% and it is not possible to split the tendered quantity on account of reasons like customer contract requirement/technical requirements, then 100% of the quantity will be offered to MSE suppliers subject to acceptance of L1 price by MSE supplier. ➤ Counter offering of L1 rate will not be made with any MSE vendor whose quoted rate is more than the price band of L1+15%. ➤ Payment to MSE vendor will be as per the applicable provisions of the MSMED Act 2006. ➤ If L1 offer is from a Micro / Small enterprise, the 25% earmarking provision is not applicable. ➤ Out of the 25% tendered quantity reserved for MSE suppliers, 6.25% shall be earmarked for procurement from MSE owned by SC/ST entrepreneurs. Apart from this 3% shall be earmarked for procurement from MSE owned by Women entrepreneurs. ➤ In case of any change in the MSE status of the bidder, it shall be the responsibility of the bidder to notify the change as a part of the bid document. If at a later date it comes to the knowledge of BHEL, that the change in the status has not been intimated by the bidder and the order is obtained under the premise of an MSE then BHEL would cancel the pending order against this tender and take necessary steps for	

	suspension of the business dealing with the bidder as per the procurement policy of BHEL. ➤ Non submission of the above mentioned 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 are not submitted before price bid opening. However, credentials of all MSE suppliers will be verified before considering the intended benefits for MSE suppliers at the time of tender evaluation.	
04.	<u>Material specification:</u> Supply shall be made strictly as per Material Specifications ASME SB 163 NICKEL-IRON-CHROMIUM ALLOY UNS N08800 (Modified), NPCIL technical specification PC-M-962 Rev.01 and Drawing No. 1-93-170-05156/03, as mentioned in the enquiry.	
05	<u>Pre-qualification requirements:</u> - Item Sl. No 10 to 730 (U tubes variant 01 to 73) to be supplied as per specification ASME SB 163 Nickel-Iron-Chromium Alloy UNS N08800 (Modified), NPCIL technical specification PC-M-962_Rev.01 and Drawing No. 1-93-170-05156/03. - The straight tube shall be supplied as follows, 7m/melt for each set of SG tubes 20 no. of tubes of length 12m per each set of SG tubes - Additional spare tubes of 99 no. for Sl. No. 10 to 650 as specified in Annexure-I are to be packed separately and supplied as per drawing no. 3-93-170-05561/00. - Supplier to give clause by clause confirmation for all clauses mentioned in NPCIL technical specification PC-M-962_Rev.01. Supplier shall agree the Generic Quality Plan (GQP/U TUBE/OI Rev 00). - Supplier to give confirmation for supply and packing of U tubes as per drawings: (i) 1-93-170-05156/03, (ii) 0-93-170-05194/01 & (iii) 3-93-170-05561/00. - Offers from traders & stockiest are not acceptable and will not be considered for evaluation. Vendor to indicate the nature of the firm. Product catalogue shall be submitted. Offer shall be submitted by Tube Manufacturer or through his authorized agents only. - Supplier shall indicate the source of raw material for U tubes. For the indicated raw material sources, the supplier shall confirm that the raw material test certificates will be furnished along with product test certificates. - Supplier shall submit the experienced manpower details specific to Manufacturing, Quality and NDE requirements - For offer acceptance, previous experience is required. Supplier should have experience in supplying similar set of U-Tubes. Supplier should have supplied U tubes which have been used for steam generators of Indian PHWRs as per requirement of ASME Section-III NB and meeting the technical requirements of NPCIL specification PC-M-962_Rev.01. As a documentary proof of supplier's experience, Test Certificates for previous supplies with details of Customer, Third Party Inspection Agency etc. shall be submitted along with offer. - Inspection agency for imports are BHEL & NPCIL or third party inspection (TPI) agency approved by NPCIL. Inspection charges arising out of third party inspection to be quoted separately. - Inspection agency for indigenous supply are BHEL and NPCIL. - Chemical and Mechanical testing shall be at labs certified as per ISO/IEC 17025 or NABL or Government approved labs. - Supplier shall submit manufacturing process flow chart (Raw material to finished product) to meet the applicable TDC (specification PC-M-962_Rev.01) along with the technical bid. - Supplier has to submit Quality documents and related test procedures for approval as referred in PC-M-962_Rev.01 Clause No. 10.1. Supplier shall make the Quality Plan in line with Generic Quality Plan (GQP/U TUBE/OI Rev 00).	

	15. The actual production of material is permitted only after approval of Quality Assurance Plan (QAP), Manufacturing Process Plan (MPP), and test procedures by BHEL and NPCIL. 16. After completion of manufacturing and testing of tubes, supplier shall submit Test Certificate for review. Dispatch clearance for items shall be given after acceptance of Test Certificates by BHEL & NPCIL. 17. Quantity given in the indent is for 3 sets of U tubes + 99 No. of spare tubes as specified in Annexure-I. 18. One Set of U Tubes as per Drawing No. 1-93-170-05156/03(total 2489 U-tubes) along with straight tubes and Spare tube as stated in Annexure -1 shall be supplied within 8 Months from the date of approval of all the documents. Subsequent sets to be supplied at interval of 2months. 19. The offer shall be submitted for the total quantity indicated in the enquiry. However, the final order of each tube variant shall be as per actual requirement, to be finalized before opening the price bid. 20. End Use and End User Certificates will not be provided by BHEL. 21. <u>Offers received will be evaluated by BHEL and NPCIL. Final acceptance of the offers will be based on NPCIL recommendation.</u> 22. All the items given in tender to be procured on package basis from single source. 23. Financial Soundness: - Indigenous supplier shall submit Audited copies of annual reports (Balance Sheet), Profit & Loss statement for the last four years (or from the date of incorporation whichever is less). - Import suppliers shall submit latest report from a reputed third party business rating agency like Dun & Bradstreet, Credit reform etc.	
06	Offer Submission: ➤ This Tender is hosted in EPS portal & offer to be submitted through EPS portal only. You are requested to submit your 2 parts offer before due date & time of the enquiry through NIC (https://eprocurebhel.co.in) only. ➤ Offer is to be submitted in TWO part bids system (Technical bid + Price bid) in the E-Procurement NIC PORTAL (https://eprocurebhel.co.in) ONLY. ➤ Scanned copy of the filled Annexure-B, Tender documents etc., shall be uploaded in the EPS portal. ➤ At its option, BHEL may consider extending the due date/s for the tender openings. Sufficient notice would be given by BHEL for such extensions and it will be published as corrigendum in following websites, https://eprocurebhel.co.in http://www.bhel.com/tender/ ➤ Acceptance of offer will be subject to existing customer approval	
07	Authorization for participation in EPS portal through DSC: E-Tender. Participation requirements: Either Principal or authorized agent shall register their Digital Signature Certificate (DSC) (Class 3- SHA2- 2048 BIT-SIGNING & ENCRYPTION). Suppliers are advised to go through the FAQ available in the web portal (https://eprocurebhel.co.in). DSC shall be registered for the authorized person and all transaction done using that DSC against our tenders shall be taken as valid communication and shall be binding on principal/agent and is valid legally. For foreign Principal In case of Principal (being foreigner), they may apply for DSC through Indian embassy at their country and can register with us for participating in E-tenders. Details of the applicable procedure is available in the webpage http://www.cca.gov.in/cca/. For Indian agent In case of agents participating/registering their DSC (of authorized person), it will be at the sole authorization of principal to their agents to participate on their behalf and all transactions done using that DSC against our tenders shall be known as valid communication and shall binding on principal and is legally valid.	

08.	Reverse Auction BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender. RA shall be conducted among the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.	
09	Validity: Offer/Price validity of 60 days is required after the price bid opening in case you are technically and commercially qualified.	
10	Delivery: The offer shall clearly indicate delivery period in fixed number of weeks/Months from the date of Purchase Order.	
11	IMPORT Vendors - Terms of Delivery: - Import vendors to submit offers on CFR (Cost & Freight), Chennai port (LILO – Liner in Liner Out) basis. - Port of loading should be indicated without fail. - Port of discharge should be Chennai. - The preferred shipment mode “Containerized Cargo or Break Bulk” shall be specified clearly in the offer. FOR CFR INCO TERMS – CONTAINERIZED CARGO a) For CFR terms, moved through CONTAINERS (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the freight charges quoted is on LILO (LINER IN LINER OUT) basis including extra charges, if any, like Container Imbalance Charges, Trade Imbalance charges or any other charges payable to the Liner. No other charges other than the quoted Freight rate will be paid by BHEL excepting applicable Terminal Handling Charges, Container cleaning Charges, DO charges to Shipping Liner at Discharge Port. 14 FREE DAYS FOR Container detention shall be provided. b) In case of shipment through Containers on CFR basis, the BL should bear the endorsement that “14 free days for Container Detention is applicable”. BREAKBULK CARGO: a) For CFR terms, moved through BREAK BULK BASIS (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the freight charges quoted is on LILO (LINER IN LINER OUT) basis. b) The materials will be Custom cleared from Port itself. INFORMATION TO IMPORT SUPPLIERS: A) Indian Customs imposed a penalty on late filing of Bill of Entries (Air/Sea Shipments) by the importer. Bill of Entry is Required to be Filed Latest by the End of Day Preceding the Day (including Holidays) of Arrival of the Vessel for sea shipments and by the end of same day on arrival of air shipment. Penalty for not filing Bill of Entry within the specified time period is Rs.5000/- per day (for Initial 03 days) & Rs.10000/- per day (thereafter). a) The vendor should furnish the Non-Negotiable Documents (Air Way Bill/Bill of Lading, Commercial Invoice, Packing List, and Certificate of Origin) either by email or post/courier to BHEL well before the landing of cargo at final port of discharge. a) Vendor will be held responsible for the penalty arises against the late filing of Bill Of entry due to: a. Non availability of Non-Negotiable Documents (NNDs) before the cargo arrival b. Discrepancy in documents c. Short landing of Consignments (For shipments on CFR/CPT/CIF/CIP – Chennai Port) B) All the shipments for the contracts (POs) finalized on CFR -Chennai Port basis (i) Delivery Orders involving multiple agencies like liners/freight forwarders are not allowed. There must be a single agency office at the final discharge Port (Chennai) for issuing the Delivery Order to BHEL. (ii) The detention/demurrage charges arising due to the nomination of containers under single BL to different/multiple CFS by the liner will be deducted from Vendor’s bills only. (iii) The detention/demurrage charges arise due to the delay in collection of Delivery Orders from multiple agencies of liner/freight forwarder also whose offices are not at available Chennai, the same amount will be deducted from Vendor’s bills only.	

	(iv) Apart from the normal charges like Terminal Handling Charges, Container cleaning Charges, Delivery Order Charges at final port of discharge no other charges will be borne by BHEL. (v) The liner/freight forwarders should be properly communicated by the Vendor for not to claim such charges for issuing Delivery Order. If the liner/freight forwarder claims such charges in their invoices, the same amount will be deducted from the Vendor bills without any prior intimation in order to avoid the delay in Customs clearance. The likely additional/hidden costs or charges are: a. CIC - Container Imbalance Charges/Surcharges b. EIC - Equipment Imbalance Charge/Surcharges c. CAF - Container/Currency Adjustment Factor d. BAF - Bunker adjustment Factor e. RDS - Rupee Depreciation Surcharge f. CDS - Currency Depreciation Surcharge g. PCS - Port Congestion Surcharge h. LSS - Low Sulphur Surcharge i. Devanning Charges	
12	<u>Transport Conditions for Import:</u> The Original Documents (Bill of Lading, Invoice, Packing List, Certificate of Origin & Test Certificate) shall reach BHEL well in advance before the vessel arrival. The soft copies of the above shall be forwarded to BHEL immediately after shipment. a) 14 FREE DAYS for Container detention at final port of destination shall be provided and the same to be endorsed in the Bill of Lading. If there is no free day or less than 14 free days provided by the supplier, the actual cost incurred towards detention charges due to non-availability of above said free days will be recovered from the supplier Invoice. b) In the event of delayed submission of documents/ non-submission of documents by the supplier as per the mutually agreed terms, an amount up to 5% of the invoice value will be retained towards detention/ demurrage & other charges and the difference if any between actual charges and recovery will be settled separately through supplementary invoice. c) In such cases, the Supplier shall authorize the Steamer / Shipping agent / transporter to freely release the consignment to BHEL by providing a "Surrender Bill of Lading". d) Otherwise, No-objection Certificate shall be issued to the Liner, authorizing BHEL to get the Delivery Order without producing the Original Bill of Lading. e) This is required to ensure avoidance of detention/ demurrage at Chennai Sea-port that may arise in case of delayed presentation of documents by the Seller.	
13	<u>Indigenous vendors – Terms of delivery:</u> • Bidders should submit their offer on FOR Destination -BHEL Stores, Trichy basis. The quote should be inclusive of all charges, including testing, packing & forwarding, inspection, Insurance etc. (Ex-Works offers will not be considered). • The soft copies of the Invoice, LR copy & Test certificates shall be forwarded to BHEL immediately after dispatch.	
14	<u>Goods and Service Tax (GST)</u> <u>Indigenous suppliers:</u> • Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GST registration No (GSTIN) which should be clearly mentioned in the offer. If the dealer is exempted from GST registration, a declaration with due supporting documents need to be furnished for considering the offer. Dealers under composition scheme should declare that he is a composition dealer supported by the screen shot taken from GST portal. The dealer has to submit necessary documents if there is any change in status under GST. • Supplier shall mention their GSTIN in all their invoices (incl. credit Notes, Debit Notes) and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No. which is linked/uploaded in GSTN network shall be clearly indicated), Billed to party (with GSTIN) & Shipped to party details, item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature	

	(like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, Place of Supply etc. - All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code). - Invoices will be processed only upon completion of statutory requirement and further subject to following: - Vendor declaring such invoice in Form GST ANX-1 - Receipt of Goods or Services and Tax invoice by BHEL - As the continuous uploading of tax invoices in GSTN portal (in GST ANX-1) is available for all (i.e. both Small & Large) tax payers under proposed new GST Return System, all invoices raised on BHEL may be uploaded immediately in GST portal on despatch of material /rendering of services. The supplier shall ensure availability of Invoice in GST portal before submission of invoice to BHEL. Invoices will be admitted by BHEL only if the invoices are available in GSTN portal (in BHEL's GST ANX-2). - In case of discrepancy in the data uploaded by the supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note or debit note (details also to be uploaded in GSTN portal) for the shortages or rejections in the supplies or additional claims, within the calendar month informed by BHEL. - In cases where invoice details have been uploaded by the vendor but failed to remit the GST amount to GST Department (Form PMT-08 or Form GST RET-01 to be submitted) within stipulated time, then GST paid on the invoices pertaining to the month for which GST return not filed by the vendor will be recovered from the vendor along with the applicable interest (currently 24% p.a) and all subsequent bills of the vendor will not be processed till filing of the GST return by the vendor - In case GST credit is denied to BHEL due to non-receipt or 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 claimed in the invoice shall be disallowed to the vendor. - Where any GST liability arising on BHEL under Reverse Charge (RCM), the vendor has to submit the invoices to BHEL well within the timeline prescribed in GST Law, to enable BHEL to discharge the GST liability. If there is a delay in submission of invoice by the vendor resulting in delayed payment of GST by BHEL along with Interest, then such Interest payable or paid shall be recovered from the vendor. - Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contracts. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Tax Invoice will be issued by BHEL indicating the respective supply invoice number. - GST TDS will be deducted as per Section 51 of CGST Act 2017 and in line with Notification 50/2018 – Central Tax dated 13.09.2018. GST TDS certificate which will be generated in GST portal subsequent to vendor accepting the TDS deduction in the GST portal, will be issued to the vendor. - GST CREDIT: Suppliers are advised to get registered to GSTN portal. Tenderer under "GST credit" shall be preferred. Import Suppliers: Supplier shall mention the HSN code of each item quoted by them in the offer. The HSN shall be mentioned in the Invoice also for each item without fail. Since GST is implemented, the taxes & duties will prevail as per the government notification/ guidelines. Our Provisional GST registration no. is 33AAACB4146P2ZL. However, it will be mandatory to confirm from BHEL for this mentioned GST no. Suppliers may quote their GST no with valid proof in the quotation. Also before quoting of tender it is suggested to consider all the factors in line with GST guidelines for input tax credit to arrive ranking of quoted suppliers.	
15	<u>Acceptance of materials supplied:</u> The supply shall strictly as per the specifications in the tender /purchase order. Delivery of the ordered items as per the delivery terms in the Purchase Order does not automatically constitute acceptance of the delivered items.	

	The acceptance or otherwise of the delivered items will be separately communicated to the supplier by BHEL either through B2B portal or through e mail within 120 days from the delivery of items or delivery of the required test certificates /other documents whichever is later. In case of rejection of the delivered items, either part or full, the vendor shall replace the rejected items as per the specification in the Purchase order/tender at their cost within specified days/months of communication of rejection to the supplier. In case of rejection of the delivered items, either part or full, if the supplier fails to replace the rejected items within the specified days/months of communication of the rejection, the same shall be treated as failure to execute the contract and actions as per the Guidelines for Suspension of Business Dealings with Suppliers /Contractors available in the webpage: http://www.bhel.com/vender_registration/vender.php. would be taken against such supplier.	
16	<u>Payment terms:</u> Indigenous: BHEL Payment term is 100% direct EFT payment after 60 days from the date of receipt and acceptance of materials. Import: BHEL Payment term is 100% payment on CAD basis after 60 days from the date of receipt of documents, specified in PO, at BHEL bank. Respective bank charges to respective account. If supplier insists for LC, only Usance LC with 60 days' credit will be opened one month prior to material readiness, further loading @ 1.5% on the offered value will be considered. Hence supplier shall intimate the material readiness accordingly along with MTC copies for opening of L.C. LC validity period will be 90 days and for any extension, applicable charges will be to supplier's account. New Suppliers: For new suppliers not registered with BHEL, Trichy for the product, Payment shall be made 60 days after acceptance of materials. In case of foreign supplier, first lot of mutually agreed quantity shall be supplied with payment as CAD basis after 60 days from the date of receipt & acceptance of material. If insisted for LC, after acceptance of first lot, only Usance LC with 60 days' credit will be opened one month prior to material readiness. Not Applicable: Offers with payment terms as Advance Payment.	
17	<u>Liquidated Damage (Indigenous & Imports):</u> 1. Time is the essence of the contract. 2. The ordered items shall be delivered as per the delivery period mentioned in the Purchase Order. 3. In case the supplier supplies the ordered items beyond the delivery period specified, Liquidated Damages -LD - as detailed below shall be will be levied from the supplier without prejudice to any other relief /compensation available to BHEL, Tiruchirapalli under any other condition of the contract/applicable legal provisions. 1. LD shall be 0.5% of the undelivered portion per week or part thereof subject to a maximum of 10% of the total order value. 2. Any deviation from the above LD clause, loading will be applied to the extent to which it is not agreed by the bidder (at offered value). 3. Indigenous: For "FOR Delivery terms", Lorry way bill date will be taken for LD calculation. Import: For CFR terms, BL date will be considered for LD calculation.	
18	<u>Warrantee / Guarantee:</u> Supplier to accept guarantee/warrantee of "18 months from dispatch or 12 months from commissioning, whichever is earlier". Supplier shall replace defective material free of cost (inclusive of all Testing, Inspection, TPI, Service charges etc.) up to destination within two months from defect notification date.	

19	<u>Risk Purchase clause:</u> a) In the event of any successful Tenderer's failure to fulfil any of the tender / Contract obligations including supply of whole or any part of the ordered items as per Contract / Agreement, BHEL has the right to terminate the contract and purchase from elsewhere ,at the risk and cost of the defaulted supplier, either the whole of the goods or any part which the supplier has failed to deliver or dispatch within the time stipulated in the contract or if the same were not available, the best and nearest available substitute thereof. The supplier shall be liable for the additional expenditure/difference in Cost, if any, including consequential losses which BHEL may sustain by reason of risk purchase in addition to the applicable LD as per the Purchase order/contract. b) The decision of BHEL with regard to the additional expenditure / difference in cost and consequential losses incurred by BHEL shall be final and binding on the supplier. c) The amount recoverable under risk purchase shall be recovered from the defaulted supplier in all or any of the following manners: i) from dues available in the form of Bills payable to defaulted supplier, SD, BGs against the same contract. ii) from the dues payable to defaulted supplier against other contracts in the same Region/Unit /any other region/unit iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against defaulted supplier.	
20	<u>Non-Disclosure Agreement(NDA):</u> The bidders shall enter into the Non-disclosure agreement totally voluntarily, with full knowledge of its meaning and without duress. (Format attached).	
21	<u>Patent Right</u> The supplier shall, at all times, indemnify and keep indemnified the purchaser, free of cost, against all claims which may arise in respect of goods & services to be provided by the supplier under the contract for infringement of any intellectual property rights or any other right protected by patent, registration of designs or trademarks. In the event of any such claim in respect of alleged breach of patent, registered designs, trademarks etc. being made against the purchaser, the purchaser shall notify the supplier of the same and the supplier shall, at his own expenses take care of the same for settlement without any liability to the purchaser.	
22	PARTICULARS TO BE FURNISHED BY FOREIGN VENDORS FOR EVALUATION OF BIDS WITH CUSTOMS DUTY BENEFIT A. Whether PTA/ CEPA or any other agreement/treaty between respective Governments/Countries exists and the same is applicable for your supplies w.r.t this Enquired Items/tender. B. If yes, mention the Concessional Customs Duty (Such Duty Benefits) C. Documentary proof for the applicable Concessional Customs Duty (eg. PTA/ CEPA or other agreement) shall be submitted along with the Part-1 bid. D. Relevant documents and details to avail the above concessional duty benefits by BHEL shall be submitted by the supplier along with dispatch documents E. In the event of seller failing to provide appropriate documents along with dispatch documents for purchasers to avail disclosed concessional duty benefits in India, financial loss, so incurred, will be to the seller's account. Note: Evaluation of the Price bids will be based on the above details only and unless mentioned/furnished by the vendor, Customs Duty benefit will not be applied for evaluation purposes.	VENDOR COMMENTS YES / NO % SUBMITTED/NOT SUBMITTED CONFIRMED/NOT CONFIRMED CONFIRMED/NOT CONFIRMED
23	<u>Role of Agents</u> a. BHEL strongly discourages the engagement of Agents by foreign principals, to deal with BHEL, in BHEL's tenders. b. In case of foreign suppliers representing through their Indian/foreign agents, agency agreement should be submitted, else offer is liable for rejection. Agency agreement requirements attached as separate file and full	

	compliance to it shall be ensured while submitting the same. c. BHEL, due to business reasons would ban, would have banned Indian agents from dealing with BHEL. Any foreign principal who engages such a banned agent, or an employee of the banned agency, or any other person connected with the banned agency, at any time during the tender proceedings, would be disqualified from the tender proceedings. The decision of BHEL in this regard shall be final and be binding on the OEM. Hence in their own interests, prospective tenderers may check with BHEL. The list of banned firms is available on BHEL website www.bhel.com. Vendors/ principals proposing to deal with BHEL by engaging and through an Indian Agent does so at their own risk. BHEL shall in no way be responsible for any consequences that may arise to the foreign principal on account of the antecedents / actions of their Indian agent.	
24	<u>Agency Commission:</u> ➤ If overseas principal has any tie-up with any third party/ agents, it should be declared while submitting offers. ➤ In respect of offers from overseas suppliers, agency commission, if any, payable to their agents in India, shall invariably be shown separately in the Performa invoice and this will be paid by BHEL in India, in Indian rupees, on satisfactory completion of the contract. ➤ Copies of current agency agreement / authorization letter in respect of agency commission shall be furnished along with offer. For calculation of rupee equivalent agency commission, exchange rate as prevailing on the date of order will be taken.	
25	<u>Evaluation Criteria:</u> The Evaluation Currency for this tender shall be “INR”. The offers of vendors will be evaluated on total landed cost to BHEL, Trichy. The evaluation process is as detailed below: <u>Indigenous:</u> Total Landed cost = FOR Rate in INR (A) + Applicable Taxes (B) + Loading for payment term & LD (C) – Applicable input tax credit (D) A. Indigenous vendors submit offers on Free on Road (FOR), Trichy in INR. B. GST and any other charges quoted by indigenous vendors will be added to the base price. C. Loading for payment terms & non-acceptance of Liquidated Damages (LD) will be added to the FOR value for arriving the landed rate. D. However, input credit is availed for GST (SGST, CGST/IGST), hence the same is excluded for arriving at the landed cost. <u>Import:</u> Total Landed cost = CFR Rate in INR (A) + Applicable Duties (B) + Incidental Charges (C) + Loading for payment term & LD (D) A. Import vendors to submit offers on CFR (Cost & Freight), Chennai port (LIFO – Liner In Liner Out) basis in foreign currency, which will be converted to INR by multiplying with the Exchange rate (SBI TT Selling rate) as on the technical bid opening date. B. Customs duty, Safe guard duty and antidumping duty as applicable will be added to the INR price. C. Incidental charges of 2.805% will be added to the CFR Value. The incidental charge is inclusive of Insurance, port handling charges, & freight charges for movement from Chennai port to BHEL, Trichy. D. Loading for payment terms & Non-acceptance of Liquidated Damages (LD) will be added to the CFR value for arriving at the landed cost. Note: “In the course of evaluation, if more than one bidder happens to occupy L1 status, effective L1 will be decided by soliciting discounts from the respective L1 bidders. In case more than one bidder happens to occupy the L1 status even after soliciting discounts, the L1 bidder shall be decided by a toss/draw of lots, in the presence of the respective L1 bidders or their representatives. Ranking will be done accordingly. BHEL decision in such situations shall be final and binding”.	

26	General condition: a) Bids including all enclosures and supporting documents like catalogues, pamphlets, etc., shall be submitted / uploaded in ENGLISH language only. If the documents submitted have other than English language, translation of the same shall be provided for evaluation. b) Mill TCs should be provided along with dispatch of Flats. Two sets of original and one copy of all such TCs are to be provided to BHEL, Trichy. c) Acceptance of Test Certificates by BHEL before dispatch is must. d) We require the shipment of the tubes to be as per the dates mentioned against the individual items in the enquiry. e) Multiple PO may also be placed considering the applicable duty structure of the respective requirement/Qty. f) Confirmation for partial ordering to be indicated in the offer itself. g) No revision of prices will be entertained after the tenders are opened. h) For the evaluation purposes, exchange rate (TT selling rate of SBI) as on schedule date of tender opening (Part I, i.e technical bid, in case of two part bid) shall be considered. i) BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed. j) Lowest price received against BHEL tenders need not be the technically acceptable one and in that case, BHEL reserves the right not to consider the same. k) BHEL reserves the right to negotiate L I rate or re-float the tender opened if L1 price is not the lowest acceptable price to them inter-alia other reasons. l) In the event of our customer order covering this tender being cancelled / placed on hold / otherwise modified, BHEL would be constrained to accordingly cancel / hold / modify the tender / your purchase order at any stage of execution. m) Offer will be evaluated based on Landed cost to BHEL- Trichy on individual line item basis only. n) Vendor should physically weigh the materials before stuffing them into container and incorporate the same in BL and packing slip o) Offers for part quantities on item level basis are not acceptable to BHEL. While tenderers can quote for some or all the tendered items, no supplier shall quote for partial quantity of any given enquiry item. Such partial offer would not be considered in the enquiry for that item. p) No payment will be made for the excess quantity. q) Offer should be submitted only as per the Unit of Measurement (UOM) specified in the enquiry. r) The offers of the bidders who are on the banned list as also the offer of bidders who engage the services of the banned firms, shall be rejected. The list of banned firms is available on the BHEL website -www.bhel.com. s) All documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder. t) This Tender is hosted in EPS portal & offer to be submitted through EPS portal only. You are requested to submit your 2 parts offer before due date & time of the enquiry through NIC (https://eprocurebhel.co.in) only. SEALED COVER BIDS / E-MAILS / FAX / MANUAL OFFERS WILL NOT BE ACCEPTED.	
27	Fraud Prevention Policy “The bidder along with its associate/collaborators/sub-contractors /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 fraud or suspected fraud as soon as it comes to their notice.”	

28	<u>Suspension of Business Dealings with Suppliers/Contractors:</u> The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the suspended vendors /principals/agents, shall be rejected. The list of suspended vendors is available on BHEL web site www.bhel.com. Integrity commitment, performance of the contract and punitive action thereof: 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. Commitment by Bidder/ Supplier/ Contractor - 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. - 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. - 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 any act, including but not limited to, 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 tampers the tendering process 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 the Guidelines for suspension of business dealings available in the webpage: http://www.bhel.com/vender_registration/vender.php. and/or under applicable legal provisions.														
29	<u>Cartel Formation:</u> The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.														
30	<u>Integrity Pact (IP):</u> (a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL. <table border="1" data-bbox="240 1192 1369 1318"> <tr> <th>IEM</th><th>Email</th></tr> <tr> <td>Shri Arun Chandra Verma, IPS (Retd.)</td><td>acverma1@gmail.com</td></tr> <tr> <td>Shri Virendra Bahadur Singh, IPS (Retd.)</td><td>vbsinghips@gmail.com</td></tr> </table> (b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification. (c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only. Note: No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below: Details of contact person(s): <table data-bbox="280 1770 1268 1921"> <tr> <td>(1)</td><td>(2)</td></tr> <tr> <td>Name: S. Dhanabal / DM</td><td>Name: Bhaskarnath Biswas / DE</td></tr> <tr> <td>Deptt: MM/Purchase/Tubes</td><td>Deptt: MM/Purchase/Tubes</td></tr> <tr> <td>Address: 4th Floor, 24 Building, HPBP, BHEL, Trichy- 620014</td><td>Address: 4th Floor, 24 Building HPBP, BHEL, Trichy-620014</td></tr> </table>	IEM	Email	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com	(1)	(2)	Name: S. Dhanabal / DM	Name: Bhaskarnath Biswas / DE	Deptt: MM/Purchase/Tubes	Deptt: MM/Purchase/Tubes	Address: 4th Floor, 24 Building, HPBP, BHEL, Trichy- 620014	Address: 4th Floor, 24 Building HPBP, BHEL, Trichy-620014
IEM	Email														
Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com														
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(1)	(2)														
Name: S. Dhanabal / DM	Name: Bhaskarnath Biswas / DE														
Deptt: MM/Purchase/Tubes	Deptt: MM/Purchase/Tubes														
Address: 4th Floor, 24 Building, HPBP, BHEL, Trichy- 620014	Address: 4th Floor, 24 Building HPBP, BHEL, Trichy-620014														

	Email: dhanabals @ bheL.in Phone: 0431-257-5730 Email: bhaskarnath@bhel.in Phone: 0431-257-7958
31	<u>Resolution of Disputes:</u> The Parties agree that if at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the contract/tender which the Parties are unable to settle mutually), arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof. Notes: 1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators. 2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Annexure-1 to this Enquiry Terms and conditions for supply of seamless Tubes. The Annexure-1 together with its appendices will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in these Enquiry Terms and conditions for supply of seamless Tubes. Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract ; or , in any manner touching upon the Contract, then, either Party may , by a notice in writing to other Party refer such dispute or difference to sole arbitration of an arbitrator appointed as per the Arbitration and Conciliation Act, 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force . The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the parties. Subject as aforesaid, the provision of Arbitration & Conciliation Act 1996 (India) or statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause. The seat of arbitration shall be Trichy, Tamil Nadu, India The cost of arbitration shall be borne as per the award of the Arbitrator. Subject to arbitration in terms of clause above, the Courts at Trichy, Tamil Nadu, India shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract. Notwithstanding the existence or any dispute or difference and/or reference for the arbitration, the vendor shall proceed with and continue without hindrance the performance of its obligation under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract. <u>In Case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:</u> In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/Port Trusts <i>inter se</i> and also between CPSEs and Government Departments/Organizations (Excluding disputes concerning Railways, Income Tax, Customs & Excise Departments, such dispute or difference shall be taken up by either party for resolution through AMRCD as mentioned in DPE OM No. 4(1)/2013 – DPE (GM)/FTS-1835 dated 22-05-2018.
32	<u>In the event of Force Majeure:</u> a. Notwithstanding the provisions contained in other clauses, the supplier shall not be liable for imposition of any such sanction so long the delay and/or failure of the supplier in fulfilling its obligations under the contract is the result of an event of Force Majeure. For purposes of this clause, Force Majeure means an event beyond the control of the supplier and not involving the supplier's fault or negligence and which is not foreseeable and not brought about at the instance of the party claiming to be affected by such event and which has caused the non – performance or delay in performance. Such events may include, but are not restricted to, wars or revolutions, hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosions,

	epidemics, quarantine restrictions, strikes excluding by its employees, lockouts excluding by its management, freight embargoes and Acts of GOD. b. If a Force Majeure situation arises, the supplier shall promptly notify the Purchaser/Consignee in writing of such conditions and the cause thereof within twenty-one days of occurrence of such event. Unless otherwise directed by the Purchaser/Consignee in writing, the supplier shall continue to perform its obligations under the contract as far as reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event. c. If the performance in whole or in part or any obligation under this contract is prevented or delayed by any reason of Force Majeure for a period exceeding sixty days, either party may at its option terminate the contract without any financial repercussion on either side. In case due to a Force Majeure event the Purchaser/Consignee is unable to fulfil its contractual commitment and responsibility, the Purchaser/Consignee will notify the supplier accordingly and subsequent actions taken on similar lines described in above sub-paragraphs.
33	<u>Execution of the order:</u> a. BHEL will have the option to pre-inspect the materials at Supplier's works by BHEL's own inspector or by third party agency appointed by BHEL or BHEL's end customer/s. b. If the inspection fails, the vendor shall offer the material again as per ordered terms and specifications for further inspection. c. The mere act of the pre-dispatch inspection (PDI) does not absolve the Supplier from giving the specifications as agreed upon in the Purchase Order. d. In the case of overseas suppliers Inspection call for carrying out the inspection shall be given 30 days before the scheduled contract delivery date. The Inspection date/s given by the Supplier shall be on firm basis. For local Suppliers the Notice period of Inspection shall be 10 working days. e. In the event of any short supply, it shall be the responsibility of the supplier to deliver such short supplied/ missing items on Free-of-Cost basis at BHEL stores, including customs clearances at Indian Ports in the case of foreign suppliers.
34	<u>Caution:</u> - The suppliers are severely cautioned to note that the price bid document accepts the price in figures only. It does not allow the supplier to write the value by words. Therefore, all care shall be exercised by the supplier while filling in the figures. Once the price bid is opened no option is available for the supplier to retract the offer under any grounds. If a supplier, for any reason whatsoever approaches BHEL with a request for change in the price, it would be treated as going back on the offer submitted. In such cases, action would be initiated by BHEL for suspending further business dealings with such suppliers as per policy of BHEL which prevails at that point of time. - The language in the tender documents downloaded by the Bidders shall at no point of time be changed, altered or modified in any manner by the Tenderer. If such changes are made by any tenderer, it shall be considered as tampering with BHEL's terms and the offer shall be summarily rejected, whenever it is noticed by BHEL. Such Bidders would be disqualified from the Bidding Process and their offers would be forfeited / Bank Guarantees invoked. They would also not be allowed to participate in future tenders of BHEL.
35	<u>Enclosures:</u> a) All concerned Drawings and the NPCIL technical specifications as stated above in Pre-qualification requirements clause b) NDA Format c) Pre signed Integrity Pact d) Annexure- 1 to Pre-qualification requirements clause. e) Annexure-1 to Enquiry terms and conditions.
<u>SIGNED BY MANUFACTURER / MILL</u> Name of Mill: Designation / Department: Seal & Signature	

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:1 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
Sl. No	Component & Operations	Characteristics	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Agency			Remarks
									M	B	N	
1.	2.	3.	4.	5.	6.	7.	8.	D*	9. **			10.
1.0	Raw Material :											
1.1	Steel Melting; : Melting in electric furnace	Temperature	Record Verification	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	--		---
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Melt	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R		---
1.3	Electro slag Remelting (ESR)	Temperature	Record Verification	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	--		---
1.4	Forge to Round Billet	Forging Ratio	Dimensions	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	--		Forging Ratio: For information only
1.5	Ultrasonic Examination for Billet	Internal soundness	By Ultrasonic Test	100%	PC-M-962 Rev 01 UT Procedure for Billet: To be submitted	TC	√	P	R	R		Ensure freedom from cavities and slag Inclusions.
1.6	Mechanical/ Metallurgical tests on Billets	Mechanical & Metallurgical properties, Chemistry	Tensile at RT Tensile at 350° Hardness Grain Size, Macro Product analysis	1 per melt	PC-M-962 Rev 01	TC	√	P	R	R		---

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

BHEL
 - Prepared -
 [Signature]
 [Signature]
 [Signature]
 [Signature]
 - Approved -
 S. Lakshmi
 [Signature]
 [Signature]
 [Signature]

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:2 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.0	In process Controls :											
2.1	Heating of Billet	Temp , Soaking Time	HT Chart/ Server Recording	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	R	R	---	
2.2	Hot Extrusion to Intermediate Size	OD , Wall thickness	Visual & Dimension	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	R	R	Size to be filled by Supplier	
2.3	Cold Pilgering to intermediate Size	OD , WT , Dimensions , Size	Visual & Dimension	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	R	R	Reduction in WT=To be filled. Reduction in OD= To be filled.	
2.4	Cleaning	Surface Condition	Visual & Cleaning	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	--	P	W	R	--	
2.5	Final Annealing	Temp , Time , ROH ,ROC	HT Chart/ Server Recording	100%	PC-M-962 Rev 01 HT Plan: To be submitted MPP: To be submitted	RD	--	P	H	W	HT Chart to be signed by Purchaser.	
2.6	Straightening	Straightness	Visual & Measurement	100%	PC-M-962 Rev 01 MPP: To be submitted	RD	---	P	R	R	Ensure sufficient straightness to get the final straightness of 0.5mm/metre.	
2.7	Blasting	OD& ID Surface condition	Visual & cleanliness check	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	---	
2.8	Polishing	OD& ID Surface condition	Visual & cleanliness check	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	---	

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Handwritten signature/initials

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No: 3 of 14		Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier						
2.9	Pickling	OD& ID Surface condition	Visual & cleanliness check	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	---	
2.10	Cold Drawing to Final Size (OD19 x1.1 mm)	OD , WT , Dimensions , Size	Visual & Dimension	100%	PC-M-962 Rev 01 Drg No: To be filled MPP: To be submitted	TC	√	P	W	W	--	
2.11	Cleaning & Degreasing	Surface Condition	Visual & Boroscopic for ID & Visual for OD	100%	PC-M-962 Rev 01 Procedure for Cleaning process: To be submitted MPP: To be submitted	TC	√	P	W	W	--	
2.12	Straightening	Straightness	Visual & Measurement	100%	PC-M-962 Rev 01 MPP: To be submitted	TC	√	P	R	R	straightness: 0.5mm/metre.	
2.13	Eddy Current Examination	Defect Inspection	By ECT	100%	PC-M-962 Rev 01 Procedure for Eddy Current Test: To be submitted	TC	√	P	H	H	---	
2.14	Ultrasonic Inspection	Defect Inspection & Dimensional Check (OD & WT)	By Ultrasonic Test	100%	PC-M-962 Rev 01 Procedure for Ultrasonic Examination: To be submitted	TC	√	P	H	H	Two opposite axial & Two opposite circumferential directions	
2.15	Eccentricity of Tube at straight condition* (For both U tube and straight Tube supply)	Eccentricity	By Ultrasonic	100%	PC-M-962 Rev 01 Procedure for Ultrasonic Examination(showing OD, Wall thickness measurement) : To be submitted	TC	√	P	H	W	* shall be reported from the data obtained during OPN: 2.14	
2.16	Straight Tube's Visual Examination	Visual	Visual	100%	PC-M-962 Rev 01	TC	√	P	R	R	---	

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TP1 P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	


 17/10/2021

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes						Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:4 of 14				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.17	Repair of Tubes at straight condition (if necessary)	Superficial external surface defects removal	Visual/NDE	100%	PC-M-962 Rev 01 Procedure for Repair : To be submitted.	TC	√	P	W	R	---		
		OD Polishing on the repaired area	Visual & Cleanliness check	100%	PC-M-962 Rev 01 Procedure for OD polishing : To be submitted	TC	√	P	H	H	---		
		UT for repaired Area(Note-1)	Ultrasonic Test	100%	PC-M-962 Rev 01 Procedure for UT: To be submitted.	TC	√	P	H	H	---		
		ECT for repaired Area(Note-1)	Eddy Current Test	100%	PC-M-962 Rev 01 Procedure for ECT: To be submitted	TC	√	P	H	H	---		
		Wall thickness , Visual , Ovality , out of roundness at repaired area	Visual , Dimensions	100%	PC-M-962 Rev 01	TC	√	P	H	H	---		
2.18	Boroscopic Examination (For straight Tube supply)	Visual	By Boroscope	3% per lot #	PC-M-962 Rev 01 Procedure for Boroscopic Examination: To be filed	TC	√	P	R	R	100% shall be ensured by Supplier.		
2.19	End Trimming and Cutting to Final Length(For straight Tube supply)#	End Cut & Deburring	Visual	3% per lot #	PC-M-962 Rev 01 Drg No: To be filled	TC	√	P	R	R	#Identify the samples from both ends of each tube for Flare Test(For Straight Tube supply). 100% shall be ensured by Supplier.		

				LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

17/07/2014

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:5 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
2.20	Hydrostatic Test (For straight Tube supply)	Integrity	Defect Inspection by Hydro test	100%	PC-M-962 Rev 01 Procedure for Hydrostatic Test: To be submitted	TC	√	P	W	R	---	
2.21	Material Sampling and Testing Plan	Test samples	Traceability	Sample/ Lot	PC-M-962 Rev 01 Procedure for Extraction of Samples: To be submitted	TC	√	P	H	H	Identification of samples with traceability to the tube/bend , before they are parted off.	
2.22	Tube Bending Qualification	Wall Thickness-WT (Before bending)	Dimensions	2 Samples/ 100 No. for smallest Bend Radius/ Machine	PC-M-962 Rev 01 Procedure for Bending Qualification , Liquid Penetrant Examination ,Hydro Test , Ball Test , Surface Roughness : To be submitted	TC	√	P	H	H	Wall thickness: For Bend Region- Measure by ultrasonically (90° apart circumferentially) and at End portions of tube shall be measured by physical means for calculation purpose.	
		Bending Radius Control	Dimensions/Lay out check			TC	√	P	H	H		
		Hydrostatic Test (Integrity)	Hydro pressure test			TC	√	P	H	H		
		ID obstructions	Ball passage Test			TC	√	P	H	H		
		Surface NDE	LPE Test			TC	√	P	H	H		
		External Visual control , Surface Finish	Visual , Roughness Gauge			TC	√	P	H	H		
		Visual Defects	Visual			TC	√	P	H	H		
		Non circularity , Ovality	Vernier calipers and micrometer			TC	√	P	H	H		
		-One of the above identified two bends shall be cut transversely into eleven equally spaced sections starting at the start of the bend and finishing at the end of the bend. : ie 10 Transverse ring(11 transverse section cuts) -The other bend shall be sectioned in longitudinal plane (Plane of Flexure) into two halves: ie 2 Longitudinal sections.										
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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved									
SUPPLIER'S NAME: To be filled			BHEL		NPCIL							


 17/09/2024

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:6 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
		Visual(Internal defects)	Visual	10 Transverse rings & 2 longitudinal sections	PC-M-962 Rev 01 Procedure for Bending Qualification , Surface Roughness , Hardness Test : To be submitted	TC	√	P	H	H	Bright Finish at ID & OD.	
		Surface finish(Internal & External)	Surface Roughness			TC	√	P	H	H		
		HV hardness at 3 places (At neutral, tension& compression cross sectional zone)	Hardness Tester			TC	√	P	H	H		
		Optical illustration of the cross section	Optical illustration			TC	√	P	H	H		
		Wall thickness at Internal & External apex as well as at neutral bending axis	Dimensions	10 Transverse rings		TC	√	P	H	H		
		Non circularity , ovality , thinning	Dimensions			TC	√	P	H	H		
		2.23	Tube Bending (Production Bending)	Ovality , out of roundness		Dimensions	100% for smallest radius	PC-M-962 Rev 01 Procedure for Tube Bending(Production) ,	TC	√		P

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

NAEP
17/07/2024

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:7 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
		Ovality , Noncircularity , Bend radius at 5 locations , wall thickness , Visual & Bright Finish	Dimensions Visual	a) First two productio n bend for each radius b) Every 10 th productio n bend for each radius	Roughness control : To be submitted	TC	√	P	H	H		
		Visual control (Surface Defects)	Visual	100%		TC	√	P	H	H		
		Surface Finish (Internal & External)	Surface Roughness	1% per shift		TC	√	P	H	H		
2.24	Repair for U Bends (If necessary)	Superficial External surface Defects removal	Visual /NDE	100%	PC-M-962 Rev 01 Procedure for Repair: To be submitted.	TC	√	P	H	H	The local repair shall be carried out with the approval from purchaser only. Repaired Tubes shall be clearly identified and easily distinguishable from other tubes.	
		LPE for repaired area	LPE Test	100%	PC-M-962 Rev 01 Procedure for Liquid Penetrant Examination: To be submitted	TC	√	P	H	H		
		Wall thickness , Visual , Ovality , Out of roundness for repaired area	Visual , Dimensions	100%	PC-M-962 Rev 01	TC	√	P	H	H		

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Handwritten signature and date: 17/07/2017

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes						Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:8 of 14				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.25	Cut to the final length (For U Tube supply)	Leg length deviation , leg difference , end squareness deviation , straight portion of the bend	Visual & Dimension	3 % per lot	PC-M-962 Rev 01 Drg: No to be filled	TC	√	P	H	H	Identify the samples from both ends of each tube for Flare Test (For U tube supply)		
2.26	Hydrostatic test for U Tube supply)	Integrity	Hydro Test	100%	PC-M-962 Rev 01 Procedure for Hydro Test: To be submitted	TC	√	P	H	H	---		
2.27	Trial assembly of U Tubes	Trial assembly	Dimensions	100%	Drg No: 2-HE-171-01076/Latest	TC	√	P	H	H	Note-4		
2.28	Liquid Penetrant Examination for Both straight and U Tube supply	Surface NDE	LPE	100%. As per Clause No:8.9 of PC-M-962 Rev 01	PC-M-962 Rev 01 Procedure for Liquid Penetrant Examination: To be submitted	TC	√	P	W	W	---		
2.29	Vickers Hardness Measurement for both Straight Tube and U Tube supply.	Hardness (For bend portion: at neutral, tension& compression cross sectional zone & For straight portion: 3 locations 120° apart)	Vickers Hardness Test	3 % per lot	PC-M-962 Rev 01 Procedure for Hardness Test: To be submitted	TC	√	P	H	W	HV:170 Hv:270 Max(On smallest Bend)		

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	


17/11/2024

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:9 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier							
2.30	Residual stress Test/ Stress Measurement (Before Peening)	Residual stress (at the apex portion on the outside surface of smallest bent radius)	XRD	1 Sample/ Lot	PC-M-962 Rev 01 Procedure for Stress measurement: To be submitted	TC	√	P	H	W	Stress shall be measured at 6 locations(ie at a depth of 30μm , 60μm , 90μm ,120μm , 150μm & 180μm from OD in axial and longitudinal direction – [At neutral , tension and compression zone of Bend].	
2.31	Stress Corrosion cracking Test (Before Glass Bead peening)	Stress corrosion cracking test , Test 100hrs , 500Hrs	LPE Test at 400	1 Sample /Lot	PC-M-962 Rev 01 Procedure for Stress Corrosion Cracking Test : To be submitted	TC	√	P	H	W	---	
2.32	Glass Bead peening Qualification	a)Max acceptance Level b) Normal acceptance level c) Minimum acceptance Level	Almen Gauge	3 Sample tubes for Bend and 3 Sample tubes for straight	PC-M-962 Rev 01 Procedure for Glass bead Peening Qualification , Procedure for stress measurement : To be submitted for approval	TC	√	P	H	H	Stress shall be measured at 6 locations(ie at a depth of 30μm , 60μm , 90μm ,120μm , 150μm & 180μm from OD in axial and longitudinal direction for bend and straight. For bend: at neutral	
		Compressive Stress Depth upto 0.15 mm(Min) from OD.	Stress Measurement by XRD			TC	√	P	H	H		
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Prepared		Reviewed & Approved		Reviewed & Approved		Reviewed & Approved						
SUPPLIER'S NAME: To be filled		BHEL		NPCIL								


27/07/2021

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes				Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No: 10 of 14	Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier						
		OD Dimension	Dimension			TC	√	P	H	H	, tension and compression zone of Bend
2.33	Glass Bead Peening (Production-For both straight and U Tubes supply)	Arc Height & Coverage	Almen Test	1 Sample/Lot	PC-M-962 Rev 01 Procedure for Stress measurement, Procedure for Glass bead peening(production) : To be submitted for approval	TC	√	P	R	R	OD Dimensions shall be reported at both the ends and at regular interval along the length. Stress shall be measured at 6 locations(ie at a depth of 30μm , 60μm , 90μm , 120μm , 150μm & 180μm from OD in axial and longitudinal direction for bend and straight. For bend: at neutral , tension and compression zone of Bend.
		OD Dimension	Micrometer			TC	√	P	R	R	
		Compressive stress at 0.12 mm(Min) depth from OD	Stress measurement by XRD			TC	√	P	R	R	
		OD Check at both the ends and at random intervals along the length	Limit Gauge	100%		TC	√	P	R	R	
		Visual for adequacy of uniformity of glass bead peening and comparison with already established reference specimen.	Visual	100%		TC	√	P	W	R	
2.34	Stress Corrosion cracking Test (After Glass Bead Peening)	Stress Corrosion cracking Test , Test 100 Hrs , 500Hrs	LPE Test . 400x magnification	1 sample/Lot	PC-M-962 Rev 01 Procedure for Stress Corrosion Cracking Test : To be submitted	TC	√	P	H	W	---
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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved								
SUPPLIER'S NAME: To be filled		BHEL	NPCIL								

Handwritten signature and date:
 17/07/2021

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00			
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:11 of 14			Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier			
2.35	Identification	Electro etching/ Permanent Method	Visual	100%	PC-M-962 Rev 01 Procedure for Permanent Marking Method : To be submitted	TC	√	P	H	W	---
2.36	Ball go through Test (After Glass bead peening)	ID obstruction	Ball passage Test	100%	PC-M-962 Rev 01 Procedure for Ball passage Test : To be submitted	TC	√	P	H	W	---
2.37	Cleanliness/Quantitative Measurement of Contaminants	Surface Contamination	Swipe Test/Swab Test	1 Sample/ 500 Tubes	PC-M-962 Rev 01 Procedure for Quantitative measurements of contaminants : To be submitted	TC	√	P	W	R	Chloride, Silica , Halogen , Sulphur , Lead , Fluorides & Sulphate
2.38	Product Analysis	Chemical analysis	XRF	1 Sample/ Lot	PC-M-962 Rev 01 Procedure for Product Analysis : To be submitted	TC	√	P	H	H	---
2.39	Intergranular Corrosion Test	IGC	Corrosion rate (Weight)	1 Sample/m elt/Heat Treatment Batch	PC-M-962 Rev 01 Procedure for IGCT : To be submitted	TC	√	P	H	H	≤ 0.6 mm/year
2.40	Roughness Control	Surface Finish	Surface roughness	1% per shift	PC-M-962 Rev 01 Procedure for Surface Roughness check: To be submitted	TC	√	P	H	H	Ra<1.6µm on ID Ra<3.3 µm on OD

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Handwritten signature/initials

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes						Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:12 of 14				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
2.41	Tensile Test Room Temperature	Mechanical property	Destructive Test	1 Sample/ Lot	PC-M-962 Rev 01 Procedure for Tensile Test : To be submitted	TC	√	P	H	H	Tensile strength: 569-697 MPa 0.2%Yield strength: 334-471 MPa Elongation on 5d ≥30% on Full Size specimen		
2.42	Tensile Test at 350°C	Mechanical property	Destructive Test	1 Sample/ Lot	PC-M-962 Rev 01 Procedure for Hot Tensile : To be submitted	TC	√	P	H	H	Tensile strength ≥495 MPa 0.2%Yield strength: ≥295 MPa Elongation to be reported on full size specimen.		
2.43	Flare Test	No Crack(Flare sample)	Flare Up	100%(At both sides of each Tube)	PC-M-962 Rev 01 Procedure for Flare Test: To be submitted	TC	√	P	H	H	OD Increase ≥30%		
2.44	Micro , Macro and Grain Size	Grain Size	Metallographic	1 sample/ Lot	ASTM E 112 PC-M-962 Rev 01 Procedure for Micro, Macro etch and Grain size: To be submitted	TC	√	P	H	H	Grain size Number shall be STM Micro Grain Size Number 8 or finer. Attempts shall be made to achieve a grain size of 10 or finer.		

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SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

N. P. K. 17/07/2024

Supplier's LOGO	Supplier's Name and Address		Quality Plan for U Tubes & Straight Tubes					Generic QP: GQP/U Tube/01 Rev 00				
			Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:13 of 14				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier				
3.0	Final Inspection											
3.1	Final cleaning Control	ID& OD Surface cleanliness	Visual & Boroscopic for ID & Visual for OD	100%	PC-M-962 Rev 01 Cleaning procedure: To be submitted. Boroscopic Inspection Procedure:To be submitted.	TC	√	P	H	H	Bright Finish at ID&OD for both straight and U Tube supply.	
3.2	Material Mix up Test	Material Inspection	PMI	100%	PC-M-962 Rev 01	TC	√	P	W	R	---	
3.3	Final Compilation of all test reports/ Dimensional reports	All Test & Inspection Review	Visual & Review	100%	---	--	---	P	H	H	---	
3.4	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL)											
3.5	Packing and Shipment	Cleaning & Packing	Visual & Packing	100%	Packing procedure :To be submitted	--	---	P	H	H	--	
3.6	Final Documentation	Six copies	Set of Test reports	100%	---	--	√	H	H	H	---	

Note:

1. The repaired area shall be inspected by both UT & ECT (after completion of repair work) , irrespective of the method by which the defects got revealed.
2. A "lot" shall consist of 100 Tubes Max/Each Melt/Each Heat Treatment Batch.
3. All the test/dimensional reports and certificates shall indicate the relevant QAP stage Number also.
4. Trial assembly of U Tubes shall be carried out as per drawing No: 2-HE-171-01076/Latest
5. Defect catalogue to be submitted as per clause 6.4 of PC-M-962.

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

Handwritten signature and date:
 17/07/2024

Supplier's LOGO	Supplier's Name and Address	Quality Plan for U Tubes & Straight Tubes		Generic QP: GQP/U Tube/01 Rev 00 Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No : To be filled by Supplier
		Item : U Tubes & Straight Tubes Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No:14 of 14	

6. Following Procedures/Documents shall be submitted for approval:

Sl No		Sl No	
1	UT Procedure for Billet	17	Stress Measurement
2	Cleaning procedure adopted during various stages	18	Stress Corrosion Crack Test
3	Eddy Current Test	19	Glass Bead Peening Qualification
4	Ultrasonic Examination (OD, Wall thickness measurement) –Final Cold drawn Tubes	20	Glass Bead Peening- Production
5	Repair Procedure	21	Permanent Marking
6	ID Blasting	22	Quantitative Measurement of contaminants
7	OD Polishing	23	Product Analysis-Chemistry
8	Boroscopic Examination	24	IGC Test
9	Hydrostatic Test	25	Tensile Test- Room Temperature
10	Extraction of Samples(Material Sampling and Testing Plan)	26	Tensile Test at 350°C
11	Bending Qualification	27	Flare Test
12	Liquid Penetrant Examination	28	Micro structure, Macro etch & Grain Size determination
13	Ball Passage Test	29	Packing procedure
14	Surface Roughness Checking	30	Heat Treatment plan
15	Hardness Test	31	MPP(Manufacturing Process Plan)
16	Tube Bending- Production		

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Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved	
SUPPLIER'S NAME: To be filled		BHEL	NPCIL	

INTEGRITY PACT**Between**

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for ENQUIRY NO 1502100022 - Manufacturing, testing and Supply of U-Tube & Straight Tube INCOLOY 1

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions:

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) 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.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity; they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

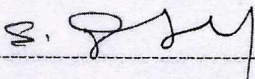
Section 9 - Pact Duration

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

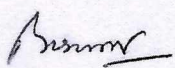


For & On behalf of the Principal
S. DHANABAL
Dy. Manager
MM / RM / Purchase / Tubes
BHEL, TRICHY - 620 014
(Office Seal)

For & On behalf of the Bidder/
Contractor

(Office Seal)

Place Trichy
Date 16/07/2021


Witness: _____
(Name & Address) _____
BHASKARNATH BISWAS
Asst. Engineer - Gr-II
MM / Purchase / Tubes
BHEL, TRICHY - 620 014.

Witness: _____
(Name & Address) _____



BHEL
Tenders

Government eProcurement System

Tender Details

Date : 17-Jul-2021 12:12 PM

Print

Basic Details

Organisation Chain	Bharat Heavy Electricals Limited BHEL Trichy MM/RM		
Tender Reference Number	1502100022		
Tender ID	2021_BHEL_4564_1		
Tender Type	Open Tender	Form of contract	Supply
Tender Category	Goods	No. of Covers	2
General Technical Evaluation Allowed	No	ItemWise Technical Evaluation Allowed	No
Payment Mode	Not Applicable	Is Multi Currency Allowed For BOQ	Yes
Is Multi Currency Allowed For Fee	No	Allow Two Stage Bidding	No

Cover Details, No. Of Covers - 2

Cover No	Cover	Document Type	Description
1	Fee/PreQual/Technical	.pdf	Annexure-1-to-Enquiry-terms-and-conditions-AnnexureB
		.pdf	Annexure-1-to-PQR-clause-of-AnnexureB
		.pdf	Drawing-No-0-93-170-05194-Rev01
		.pdf	Drawing-No-1-93-170-05156-Rev03
		.pdf	Drawing-No-3-93-170-05561-Rev00
		.pdf	Enquiry-terms-and-condition-AnnexureB
		.pdf	GQP-as-referred-in-PQR-clause-of-AnnexureB
		.pdf	Integrity-pact-pre-signed
		.pdf	Non-Disclosure-Agreement
		.pdf	PC-M-962-Rev01
2	Finance	.xls	Price Bid

Tender Fee Details, [Total Fee in ₹ * - 0.00]

Tender Fee in ₹	0.00		
Fee Payable To	Nil	Fee Payable At	Nil
Tender Fee Exemption Allowed	No		

EMD Fee Details

EMD Amount in ₹	0.00	EMD through BG/ST or EMD Exemption Allowed	No
EMD Fee Type	fixed	EMD Percentage	NA
EMD Payable To	Nil	EMD Payable At	Nil

[Click to view modification history](#)

Foreign Currency BOQ Details

S.No	Currency	Conversion rate in ₹
1	US Dollar	NA
2	European Euro	NA
3	Japanese Yen	NA

Work /Item(s)

Title	Manufacture Testing and Supply of Incoloy U-Tubes and Straight tubes				
Work Description	Manufacture Testing and Supply of Incoloy U-Tubes and Straight tubes				
Pre Qualification Details	Please refer Tender documents.				
Independent External Monitor/Remarks	Applicable				
Show Tender Value in Public Domain	No				
Tender Value in ₹		Product Category	Metals - Ferrous	Sub category	INCOLOY TUBES
Contract Type	Tender	Bid Validity(Days)	90	Period Of Work(Days)	365
Location	BHEL Trichy Stores Ward 29	Pincode	620014	Pre Bid Meeting Place	NA
Pre Bid Meeting Address	NA	Pre Bid Meeting Date	NA	Bid Opening Place	NIC portal
Should Allow NDA Tender	No	Allow Preferential Bidder	No		

Critical Dates

Publish Date	17-Jul-2021 12:30 PM	Bid Opening Date	31-Jul-2021 04:00 PM
Document Download / Sale Start Date	17-Jul-2021 12:30 PM	Document Download / Sale End Date	31-Jul-2021 11:00 AM
Clarification Start Date	NA	Clarification End Date	NA
Bid Submission Start Date	17-Jul-2021 12:30 PM	Bid Submission End Date	31-Jul-2021 11:00 AM

Tender Documents

NIT Document	S.No	Document Name	Description	Document Size (in KB)	
	1	Tendernotice_1.pdf	Annexure-1-to-Enquiry-terms-and-conditions-AnnexureB	321.14	
	2	Tendernotice_2.pdf	Annexure-1-to-PQR-clause-of-AnnexureB	3042.01	
	3	Tendernotice_3.pdf	Drawing-No-0-93-170-05194-Rev01	489.14	
	4	Tendernotice_4.pdf	Drawing-No-1-93-170-05156-Rev03	1184.66	
	5	Tendernotice_5.pdf	Drawing-No-3-93-170-05561-Rev00	241.14	
	6	Tendernotice_6.pdf	Enquiry-terms-and-condition-AnnexureB	986.01	
	7	Tendernotice_7.pdf	GQP-as-referred-in-PQR-clause-of-AnnexureB	3224.08	
	8	Tendernotice_8.pdf	Integrity-pact-pre-signed	4001.44	
	9	Tendernotice_9.pdf	Non-Disclosure-Agreement	53.25	
	10	Tendernotice_10.pdf	PC-M-962-Rev01	746.04	
Work Item Documents	S.No	Document Type	Document Name	Description	Document Size (in KB)
	1	BOQ	BOQ_4728.xls	Price bid	398.00

Bid Openers List

--	--	--	--

S.No	Bid Opener Login Id	Bid Opener Name	Certificate Name
1.	bhaskarnath@bhel.in	Bhaskarnath Biswas	BHASKARNATH BISWAS
2.	dhanabals@bhel.in	S Dhanabal	S DHANABAL
3.	visvanathan@bhel.in	Visvanathan S	S VISVANATHAN
4.	amk@bhel.in	Ramanathan K	RAMANATHAN K

GeMARPTS Details

GeMARPTS ID	Y8ECXG7T8NYV
Description	U Tubes for SG
Report Initiated On	07-Jul-2021
Valid Until	06-Aug-2021

Tender Properties

Auto Tendering Process allowed	No	Show Technical bid status	Yes
Show Finance bid status	Yes	Show Bids Details	Yes
BoQ Comparative Chart model	Normal	BoQ Compative chart decimal places	2
BoQ Comparative Chart Rank Type	L	Form Based BoQ	No

Tender Inviting Authority

Name	Dy Manager Purchase Tubes
Address	BHEL Trichy

Tender Creator Details

Created By	Bhaskarnath Biswas
Designation	DY. ENGINEER
Created Date	17-Jul-2021 11:56 AM

 BHEL - TRICHY	THIRD PARTY NON-DISCLOSURE AGREEMENT		Doc.No. : ISMS-04/TP/011
			Ver. No: 3.0 Rev. No: 00
	Date : 27 - 10 - 14		

THIRD PARTY NON-DISCLOSURE AGREEMENT

I, _____, on behalf of the _____ (Name of Company), acknowledge that the information received or generated, directly or indirectly, while working with BHEL, Trichy on contract is confidential and that the nature of the business of the BHEL, Trichy is such that the following conditions are reasonable, and therefore:

I warrant and agree as follows:

I, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL, Trichy Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer programs/data/configuration and research projects.
- Business information: Customer lists, project schedules, pricing data, estimates, financial or marketing data,

On conclusion of contract, I, or any other personnel employed or engaged by our company shall return to BHEL, Trichy all documents and property of BHEL, Trichy, including: drawings, blueprints, reports, manuals, computer programs/data/configuration, and all other materials and all copies thereof relating in any way to BHEL, Trichy 's business, or in any way obtained by me during the course of contract. I further agree that I, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

This obligation of confidence shall continue after the conclusion of the contract also.

I acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, Trichy and are reasonable given the nature of the business carried on by the BHEL, Trichy I agree that this agreement shall be governed by and construed in accordance with the laws of country.

I enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

Dated at _____, this ____ day of _____, 20__.

Name

Company

Signature

**NUCLEAR POWER CORPORATION OF INDIA LTD.
(A Government of India Enterprise)**

SPECIFICATION NO. : PC – M – 962

REVISION NO.	:	0	1						
DATE OF ISSUE (MONTH/YEAR)	:	Sept, 2013	Feb 2014						
TOTAL NO. OF PAGES (Including Cover Sheet)	:	27	27						

**TECHNICAL SPECIFICATION
FOR
SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION
ASME SB 163 NICKEL-IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)
REF. USI NO. : 33111**

	NAME	Designation	SIGNATURE	DATE
PREPARED BY	R.K.Gupta	ACE	Sd/-	02/09/2013
	Braham Prakash	ACE	Sd/-	02/09/2013
CHECKED BY	P.B.Rshikesan	ACE	Sd/-	04/09/2013
	D.Ganesh	ACE	Sd/-	04/09/2013
	M.R.S.Saxena	ACE	Sd/-	04/09/2013
REVIEWED BY	S.N.Kamath	CE	Sd/-	04/09/2013
	M.K.Sharma	CE	Sd/-	04/09/2013
APPROVED BY	U.C.Muktibodh	ED (Engg.)	Sd/-	07/09/2013

(For Revisions see Revision Control Sheet)

File Name : PC- M- 962

CD No.:

REVISION CONTROL SHEET

DOCUMENT TYPE: TECHNICAL SPECIFICATION

NO. : PC - M - 962

TITLE: SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES
TO SPECIFICATION ASME SB 163 NICKEL-IRON-CHROMIUM ALLOY UNS
N08800 (MODIFIED)

REV. NO. & DATE	DESCRIPTION OF REVISION	PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
0 Sept, 2013	Original (Pages : 27)	R.K.Gupta Braham Prakash	P.B.Rshikesan D.Ganesh M.R.S.Saxena	S.N.Kamath M.K.Sharma	U.C. Muktibodh
1 Feb, 2014	General Revision. Clause No 6.5 at Page no 9 revised.	<i>R.K. Gupta</i> 3/2/14 R.K.Gupta <i>Braham Prakash</i> 08/02/14 Braham Prakash	<i>P.B. Rshikesan</i> 5/2/14 P.B.Rshikesan <i>D. Ganesh</i> 7/2/14 D.Ganesh <i>M.R.S. Saxena</i> 7/2/14 M.R.S.Saxena	<i>S.N. Kamath</i> 18.2.14 S.N.Kamath <i>M.K. Sharma</i> 14/02/14 M.K.Sharma	<i>U.C. Muktibodh</i> 12-02-2014 U.C. Muktibodh

(ii)

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 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 1 of 23
	<u>TECHNICAL SPECIFICATION</u>	
	SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION ASME SB 163 NICKEL- IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)	Rev. No. : 1

1.0 SCOPE

This Specification covers the technical requirements for the supply of Seamless cold worked Heat Exchanger Tubes to Specification ASME SB 163 Nickel-Iron-Chromium Alloy UNS N08800 modified as per this specification. All requirements of this specification represent minimum requirements

This specification is applicable for Steam Generators of 700 MWe projects beyond RAPP 7&8.

2.0 CONTENTS

The requirements of this specification are presented under following sections:

<u>Description</u>	<u>Section</u>
Scope	1.0
Contents	2.0
Applicable Specifications	3.0
Material, Process of Manufacture, Workmanship and Requirements.	4.0
Mechanical Tests	5.0
Non-Destructive Examination	6.0
Bending Procedure Qualification	7.0
Production Control	8.0
Hydro-Test	9.0
Documentation	10.0
Quality Surveillance	11.0

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 2 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

Cleaning, Identification, Material Mix-up Test, Packing and Shipment.

12.0

3.0 APPLICABLE SPECIFICATIONS

The following codes and standards of the issue in effect on the date of issuing tender document shall form part of this specification. In case of conflict between the Codes/ Standards listed below, with the requirements of this specification, the requirements which are more stringent shall govern.

3.1 Relevant ASTM Standards.

3.2 ASME – Section II Part B

3.3 ASME Section III NB

3.3 ASME – Section V, Non Destructive Examination.

4.0 MATERIAL, PROCESS OF MANUFACTURE, WORKMANSHIP AND REQUIREMENTS :

4.1 Material

The tubing shall comply with ASME-SB-163 Seamless Nickel and Nickel Alloy Condenser and Heat Exchanger Tubes, with particular requirements specified below. The alloy shall be that designated in ASME-SB-163 Nickel-Iron-Chromium alloy UNS N08800 with the following restricted chemical composition:

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 3 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

CHEMICAL COMPOSITION (Product & Ladle Analysis)

<u>Element</u>	<u>Composition Present</u>
C	0.03 max.
Si	0.3 to 0.7
Mn	0.40 – 1.0
P	0.015 max.
S	0.015 max.
Co	0.015 max. (To be aimed 0.01)
Al	0.15 to 0.45
Ti	0.6 max.
N	0.03 max.
Cu	0.075 max.
Cr	20 - 23
Ni	32 - 35
Fe	Remainder

Stabilisation

Ti

----- = 12 minimum

C

Ti

----- = 8 minimum

C + N

(N + P) = 0.045 maximum

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 4 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

4.2 **Process of Manufacture and Workmanship**

The tubes shall be manufactured by cold working, heat treatment, final cold drawing to enhance yield strength, followed by straightening process. The tubes shall be supplied in U-bent form, in sizes and quantities indicated in the relevant Purchaser's drawing. The tubes shall be cold bent with subsequent glass bead peening to introduce uniform controlled residual compressive stresses at the outside tube surface. The shot peening procedure and the equipment used shall be qualified by demonstrating its effectiveness in producing consistent quality of tubes having compressive stresses extending to a depth of about 0.15 mm. The procedure shall be submitted to the Purchaser for his approval.

Materials, process and workmanship shall be of high quality and in accordance with good practice pertinent to the manufacture of Nickel-Iron-Chromium alloy heat exchanger tubes. Each rolled bar which will be used for tube manufacture shall be ultrasonically checked for internal soundness. Sufficient discard shall be made from the bar corresponding to the top of the ingot to ensure freedom from cavities and slag inclusions. The bars shall be further examined by taking macro specimens from each end and also subjected to chemical analysis, which shall be within the specified limits stated under clause 4.1.

Material shall be manufactured from ingots melted in electric furnace.

Mother hollows used for the manufacture of these tubes shall be produced from hot extrusion process.

4.3 **Grain Size**

The grain size shall be determined according to ASTM-E-112 and shall be ASTM micro-grain size number 8 or finer. Attempt shall be made to achieve a grain size of 10 or finer.

4.4 **Halogen and Sulphur Content**

Chemicals, oils, lubricants, paint, etc. used during the manufacture, inspection/examination etc. of tubes shall not contain halogen and sulfur in excess of 25 ppm each. These shall also be free from lead. However, if for technical reasons the lubricants used for tube drawing contain halogens in excess of the above stipulated limit, these may be

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD		
	ATOMIC POWER PROJECT		Page No. : 5 of 23
	TECHNICAL SPECIFICATION		Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

used provided the manufacturing procedure is such that excess of these element does not produce an harmful effect on quality of tubes on a long term trouble free service (40 years) basis. Subsequent cleaning shall, however, ensure cleanliness requirements stipulated in Section 12 of the specification.

4.5 Surface Condition

The tubes shall be in bright finish condition. The inside and outside surfaces of the tubes shall be very smooth and the finish after shot peening shall be better than 1.6 microns (CLA) on internal surfaces and 3.3 microns on external surface.

4.6 Heat Treatment

Tubes shall be supplied in cold worked condition, with glass bead, shot peening on the tube outer surface. The details of annealing temperature, soaking time, etc. must be indicated in the test certificate. Detailed procedure of heat treatment shall be submitted for approval before start of manufacture. The details of heat treatment including furnace type, furnace atmosphere, rate of heating, soaking time, rate of cooling, thermocouple location, etc. shall be submitted for approval before start of manufacture.

5.0 Mechanical Tests

The following requirements shall be met with after final annealing and cold drawing. Unless otherwise stated testing shall be done in accordance with ASTM B 163.

5.1 Tensile Test

Properties	At Room Temp	At 350 ⁰ C	Unit
Tensile strength	569-697	495 min	N/ mm ²
	58-71	50.5 min	Kp/mm ²
0.2% Yield strength	334-471	295 min	N/ mm ²
	34-48	30.0 min	Kp/mm ²
% Elongation on 5d or 50mm whichever is higher (See Note Below)	30	To be reported	%

Note: Where 'd' is the Equivalent Diameter

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 6 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

5.2 Hardness

The hardness shall be measured on sample tubes and shall be about 170 vickers. The maximum hardness however can be upto 270 vickers in the cold worked part of the smallest bend. Hardness shall be checked on sample bent tubes before shot peening.

All measurements shall be done on the Vickers Scale.

5.3 Flare Test

Flare test shall be made on both ends of each tube with expanding tool having an included angle of 60° until the specified outside diameter has been increased by 20%. The pieces cut from the tube ends for flare test shall be checked for freedom from temper discoloration on inside before subjecting them to flare test.

5.4 Intergranular Corrosion resistance Test

Intergranular corrosion resistance test shall be done accordance with ASTM-G-28 on one sample from each melt heat treatment batch. The specimen shall be sensitized by heating it up to 650°C , soaking for 15 minutes and then water quenching. The heating shall be rapid and shall not take more than 1.5 min. The corrosion rate as calculated per G 28 shall not exceed 0.6 mm/year. The guaranteed maximum value of the corrosion rate shall be indicated in the bid.

5.5 Stress Corrosion Cracking Test

Stress corrosion cracking test shall be done in accordance with ASTM-G-36 on samples from each melt and heat treatment batch. The tube specimens (with and without shot peening) shall be bent 180° to the shortest radius on order. The bends shall be immersed in boiling MgCl_2 solution for 100 hours. The effect of 100 hours boiling shall show no crack by examining at 400 magnification and also by liquid penetrant examination.

In addition to above SCC test, one sample per heat shall be boiled to determine the time required for initiation of crack or maximum of 500 hours.

The residual stress developed on the tube shall be measured and reported.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 7 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

5.6 Test Coupon Numbers and Location

A 'Lot' shall consist of 100 tubes max. from the same melt and heat treatment batch. Test coupons shall be taken from the finished tubes.

- 5.6.1 A ladle analysis for each heat shall be performed. One product analysis chemical shall be made on each 'lot of tubes'.
- 5.6.2 One tension test each at Room Temperature and at 350⁰ C shall be made on each lot of tubes. The mechanical properties like Tensile Strength, Yield Strength and % Elongation, etc. shall be recorded.
- 5.6.3 Hardness shall be measured on 3% of tubes in each lot.
- 5.6.4 One flare test shall be made on each end of every tube prior to cutting to length.
- 5.6.5 Intergranular corrosion test shall be done on one sample from each melt and heat treatment batch.
- 5.6.6 Microstructure and grain size shall be determined on one sample from each 'Lot'. Micrographs are to be attached to test reports.
- 5.6.7 One stress corrosion cracking test is to be done on one sample from each lot.
- 5.6.8 Surface roughness on OD and ID shall be measured on 1% tubes completed in each shift.
- 5.6.9 Compressive stress measurement on 3 sample tubes per heat treatment batch.

6.0 NON DESTRUCTIVE EXAMINATION

6.1 Liquid Penetrant Examination (LPE)

The bent tubes shall be subjected to Liquid Penetrant Examination (LPE) on the entire bent portion and 150 mm straight length beyond the bent portion. Apart from this LPE shall also be conducted for a length of 450 mm at each end of the bent tube.. LPE shall be conducted in accordance with NB-2556 of ASME Section III NB, ASTM E165 and

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 8 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

relevant Article of ASME Section V. The extent of tubes subjected to Liquid Penetrant examination is set out in para 8.9. Liquid Penetrant Examination shall be done prior to shot peening but after the hydrostatic test. No indications are permitted.

6.2 **Ultrasonic Examination**

Each tube shall be subjected to Ultrasonic Examination after heat treatment. The ultrasonic examination shall be carried out generally in accordance with NB 2552 of ASME Section III NB, ASTM E 213 and relevant Article of ASME Section V.

The standards for testing and acceptance criteria over and above ASME requirements shall be as follows:-

The reference specimen shall be of the nominal diameter, thickness, nominal composition and heat treated condition as the product being examined. The standard defect shall be internal and external notches both in transverse and longitudinal direction. The notches shall be saw tooth wedge shaped groove having 60° angle opening, with sides at right angle and max. depth of 0.1 mm. The external notches shall be 1.5 mm long and internal notches 2.0 mm long.

The ultrasonic examination shall be done in two opposite circumferential and two opposite axial directions. Defect indications equal to or greater than those from the reference standard shall be unacceptable.

6.3 **Eddy Current Examination**

Each tube shall be subjected to eddy current examination as per NB 2554 of ASME Section III NB, ASTM E571 and relevant Article of ASME Section V except that in the reference standard a through wall hole not exceeding 0.8mm in diameter shall be used in lieu of 1.5 mm diameter hole stated therein .

Defect indication equal to or greater than those from the reference standard shall be unacceptable.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 9 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

In the event of an order, bidder shall supply at least 10 straight tube pieces of at least 0.5 m length each containing various types of eddy current subsurface indications in mid half length, from the rejected (color marked) tube stock during production job eddy current examination. This would enable Purchaser to conduct any investigation using eddy current ID probes at a later date.

- 6.4 Non-destructive examination indications found to be within the acceptable standards shall be investigated to establish that they are harmless (eg. not cracks or pores) for the intended use of the tubes. Adequate number of such acceptable defects, categorized into various types, shall be metallographically investigated. The results of investigation shall be documented to form a detailed illustrated catalogue of defects.

The categorized defect indications chosen for metallographic investigation shall be examined prior to sectioning by suitable eddy current ID probes to obtain eddy current signals of the individual defect location and recorded along with corresponding production UT / ET examination signal results to form part of defect catalogue. This is required in connection with signal interpretation during inservice inspection of tubes.

6.5 O.D and Thickness Measurement

Purchaser requires very high degree of reliability on uniformity, within the required limits, of the thickness and OD all along the length of the tube. OD and wall thickness over the entire length of each tube shall be measured ultrasonically and reported.

7.0 BENDING PROCEDURE QUALIFICATION

Before bending, the procedure of bending shall be qualified as under.

- 7.1 For each 100 number or less of tubes of smallest bend radius, 2 numbers (minimum) of bends of smallest radius shall be bent in each process of bending for qualification. These 2 sample bends shall be made in the presence of Purchaser or his Authorised Inspection Agency and subjected to following examinations:
- 7.1.1 Entire surface shall be visually examined for ripples, scratches and other surface defects. The cross sections at 2 positions minimum (to be agreed upon) for each bend shall be plotted by a suitable device to ascertain non-circularity and ovality.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 10 of 23
	<u>TECHNICAL SPECIFICATION</u> SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION ASME SB 163 NICKEL- IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)	Rev. No. : 1

- 7.1.2 Bending procedure qualification tubes shall be hydrostatic tested and after hydrostatic test, entire bend surface and 150mm straight length beyond bend portion shall be subjected to liquid penetrant examination . Radius of bend shall be checked by layout.
- 7.1.3 One of the two bends shall be cut transversely into eleven equally spaced sections starting at the start of the bend and finishing at the end of the bend (resulting in 10 rings) for further examination. The other bend is sectioned in longitudinal plane (Plane of flexure) into two halves for further examination.
- 7.1.4 Each of the above sections shall be examined for following:
- Visually examine internal surface for ripples, scratches and other surface defects.
 - Check the surface finish on internals as well as external surface on each bend sections.
 - Measure the wall thickness at internal and external apex as well as at neutral bending axis for each section and compare with the wall thickness before bending, at minimum of 3 places.
 - Measure the ovality and non-circularity at each section.
 - Measure hardness on each cut piece, at minimum of 3 places.
 - Optical illustration of the outline of the cross sections obtained by the two above said sectional planes (viz., Transverse and Longitudinal) for each of the test bends. Choice of the transverse sections for such illustrations shall be exercised by the Purchaser or his authorized inspection agency.
 - Non-circularity and ovality, thinning and other dimensions shall meet the requirements as specified in purchase drawing.

8.0 **PRODUCTION CONTROL**

- 8.1 The production of U bends shall be taken up after qualification of the bending procedure as stated above. Ovality and out of roundness shall be measured on each tube for the smallest bend radius. Beyond that, for each radius, the first two production bends shall

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 11 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

be measured for ovality, non-circularity (outline of cross section), bend radius at 5 locations and surface defects and then every 10th bend shall be measured for these dimensions. Wall thickness at the bends shall be measured by UT on each tube in first and second row. For balance tubes, this shall be measured on first 2 tubes and then every 10th tube for each row. If wall thickness does not conform to the requirements for any bend, all the previous bends shall be checked.

- 8.2 The ovality in the U-bend portion as measured by micrometer screw gauge shall not exceed 5%. Ovality for this purpose is defined as

$$\text{Ovality} = \frac{\text{O.D. max.} - \text{O.D. min.}}{\text{O.D. nominal}}$$

Where O.D = outside diameter.

- 8.3 Out of roundness of tube other than ovality shall be determined using the formula:

$$\frac{\text{maximum radius} - \text{minimum radius}}{\text{maximum radius}} \times 100\%$$

Where maxi radius = outside radius of smallest possible surrounding circle.

Minimum radius = smallest distance of contour from centre of smallest possible surrounding circle.

The out of roundness shall not exceed 6%.

- 8.4 Each bent tube shall be checked after shot peening by a ball go-through test with a specified ball diameter of 15.77 mm.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 12 of 23
	<u>TECHNICAL SPECIFICATION</u> SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION ASME SB 163 NICKEL- IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)	Rev. No. : 1

8.5 The internal and external surface finish shall be measured on 1% of the tubes completed in each shift. The tubes shall be very smooth and surface condition shall meet requirements stated in section 4.5.

8.6 The tubes shall be free from kinks/local distortions. The straight portion of bent tubes shall be straight within 0.5 mm in one meter. The tolerance on leg spacing shall be as per relevant Purchaser's drawing.

8.7 The tolerance on other parameters are as follows :-

Outside diameter : 19.0 + 0.12 mm
- 0.03

Thickness : 1.1 ± 10%

Eccentricity ($\frac{t_{\max} - t_{\min}}{2 \times t_{\text{avg}}}$) : ≤ 5%

Minimum wall thickness in the bend region : 0.91 mm

Leg length deviation : + 3
-0.0

Leg length difference : 2 mm (maximum)

End squareness deviation : 0.2 mm (maximum)

Bend radius < 300 mm : ± 0.75 mm
tolerance > 300 mm : ± 1.50 mm

8.8 Each tube shall be hydrostatically tested as per requirements of para 9 of this specification. Hydrostatic test shall be done after bending. For such tubes hydrostatic test on straight length tubes prior to bending is not required.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 13 of 23
	TECHNICAL SPECIFICATION	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

- 8.9 After hydrostatic test, U-Bends shall be subjected to liquid penetrant examination (LPE) over the complete U bend portion and 150 mm of the straight length beyond the bend. Apart from this 450 mm length of the tube at each end shall also be subjected to LPE. The scope of LPE shall be as follows:
- 8.9.1 All the tube bends of the smallest bend radius shall be L.P. examined. In case of any unacceptable indication found in this examination, all the bends in next higher radius shall also be subjected to LP examination. This process will continue till all the bends in a particular radius are defect free. The charges for this examination are considered to be included in the cost of the product.
- 8.9.2 For remaining tube bends not covered under 8.9.1 shall be subjected to random LP examination upto a maximum of 2% of the remaining tube bends at purchaser's option. If any unacceptable defect is found in the examination all the tube bends in that radius and all the bends in lower radii shall be subjected to LP examination free of cost. The charges for this examination shall be on "unit rate" (LP charge / bend) indicated by the bidder for this random 2% LP check.
- 8.9.3 With above limited LP examination scope, the manufacturer shall be obliged to replace (free of cost) all the tubes having unacceptable defect revealed during LP examination conducted by the purchaser.
- 8.9.4 Alternatively, manufacturer may indicate LPE charges for all bent tubes on unit rate basis.
- 8.10 Glass bead peening procedure shall be qualified on sample tubes before taking up the production tubes. For sample tubes, 3 tubes must be taken out and kept for acceptance purposes with respect to uniformity and adequacy of peening operation as follows:
- with maximum acceptance level.
 - with normal acceptance level.
 - with minimum acceptance level.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 14 of 23
	<u>TECHNICAL SPECIFICATION</u> SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION ASME SB 163 NICKEL- IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)	Rev. No. : 1

These samples shall be used as comparators for checking the peening operation. Separate sets of samples shall be made for comparison with straight and bent portion of U-tubes. The compressive stress values verses depth from the O.D. and I.D. tube surfaces shall be determined for the above three acceptance levels by an accurate method (such as x-ray diffraction). The procedure and stress values/profile shall be subjected to Purchaser's approval. The bidder shall indicate the method and the guaranteed stress values/profile in his bid. The compressive stresses shall exist upto a minimum of 0.12 mm depth from the tube outside surface both in the straight and bent portions of the tube.

- 8.11 During production, internal and external surfaces of all tubes shall be visually inspected using optical aids such as boroscope for ascertaining freedom from surface defects and temper colors. If necessary, test pieces from tubes shall be taken and investigated. The complete external surface of the tubes shall be inspected for adequate and uniform peening effect and compared with reference standards for acceptance. U-tubes shall be in a free condition while their dimensions, straightness, etc. are being checked with respect to the specified values.

O.D. of each tube shall be checked either automatically by UT or manually by limit gauges at both ends and also over the entire length at random intervals. However, actual dimensions are to be recorded at those locations for a minimum of 1% of tubes, distributed over the whole production quantity.

8.12 **REPAIRS**

Repairs are generally not allowed. However, superficial external surface defects may be removed by mechanical means prior to the shot peening operation provided the minimum wall thickness requirement after repair are still complied with and the surface area is blended smoothly. The repaired area shall be re-examined by appropriate non-destructive examination to ascertain freedom from defects and subjected to wall thickness measurement. The repair procedure shall be prepared by the supplier and subject to purchaser's approval prior to its application on production tubes. Tubes repaired shall be clearly identified and reported to purchaser.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 15 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

9.0 HYDROSTATIC TESTING

Each tube shall be hydrostatic tested at an internal pressure of 25 plus one minus zero MPa. The water used shall be demineralised water and shall have conductivity 10 μ s / cm (max.) at inlet. An increase of 3 μ s / cm (max.) at the outlet is permissible. The test pressure shall be maintained for a duration of 10 seconds minimum. The water used shall not have halogen and sulfur in excess of 25 ppm each.

10. DOCUMENTATION

10.1 Procedure and Plans

The following procedures and plans shall be submitted to the Purchaser for review and approval in six copies each before start of manufacture. No manufacturing activity shall start unless written approval of related documents is obtained.

- a) Manufacturing procedure giving sequence of operations right from melting, ingot pouring, and tube manufacturing and testing.
- b) Heat treatment plan.
- c) Mechanical testing procedures.
- d) Non-destructive Examination procedures.
- e) Wall thickness measurement procedure.
- f) Glass bead peening procedure.
- g) Quality Assurance Manual / plan.
- h) Cleaning procedure adopted during various stages of manufacture.
- i) Repair procedure.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 16 of 23
	<u>TECHNICAL SPECIFICATION</u> SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION ASME SB 163 NICKEL- IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)	Rev. No. : 1

- j) Tube bending qualification and production bending/control procedures (to include measurement / plotting of ovality, non-circularity / cross section).
- k) Material samples and testing plan.
- l) Metallurgical examination procedures (macro etch, microstructure and grain size).
- m) Dimensional control procedures (for ID, OD and bend radius, etc.)
- n) Surface finish measurement and inspection procedures.
- o) Hydro test procedure.
- p) Ball-pass through test procedure.
- q) Compressive stress measurement procedure.
- r) Quantitative measurement of contaminants such as chloride, SiO₂, halogens, sulfur and lead.
- s) Corrosion resistance test procedure.
- t) Any other procedure having bearing on tube quality.

10.2 **REPORTS**

The following reports shall be submitted to the Purchaser in Nine copies each:

- a) Chemical analysis – ladle and product.
- b) Mechanical test report.
- c) Non-destructive examination report (along with properly identified recording strips for ultrasonic and Eddy current examinations showing defects accepted).
- d) Heat treatment charts.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 17 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

- e) Visual and dimensional inspection report.
- f) Hardness survey report.
- g) Metallurgical examination reports, with photographs (such as Macro-etch, Micro-structure / grain size).
- h) Illustrated catalogue of defects.
- i) Corrosion resistance test reports, with photographs.
- j) Compressive stress measurement report.
- k) Tube bending qualification and production bend / reports.
- l) Surface finish reports.
- m) Hydro test reports.
- n) Liquid penetrant examination reports.
- o) Ball-pass through test reports.
- p) Cleanliness/quantitative measurement of contaminants reports.
- q) Material mix up test reports.
- r) Any other reports on examinations/inspections/tests conducted on tubes for ensuring tube quality.

One set of test reports / certificates including packing list shall be sent along with the material in a suitable fashion to facilitate inventory control identification and release of material to fabricators of heat exchangers from Purchaser's stores. Final documentation containing all the above shall also be submitted in soft form (pdf format) with proper indexing.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 18 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

11.0 QUALITY SURVEILLANCE

The material covered in this specification shall be subjected to quality surveillance by the Purchaser or his Authorised inspection agency. The Purchaser and/or his Authorised Inspection Agency shall have access to the msupplier's works at all reasonable times to carry out quality surveillance on the item ordered. The Supplier shall render all necessary help and extend inspection and testing facilities to the Purchaser/Authorised Inspection Agency to satisfy him that the material is being furnished in accordance with this specification.

The Purchaser or his 'Authorised Inspection Agency' will witness the tests at various stages as indicated below. The stages shall be clearly identified in the manufacturing plan to be submitted by the supplier in the required format. The supplier shall notify the inspection agency and the Purchaser at least a fortnight before the commencement of each stage of testing.

- a) Heat treatment.
- b) Ultrasonic Tests.
- c) Eddy Current Tests.
- d) Mechanical Tests.
- e) Corrosion Resistance Test.
- f) Bending Procedure Qualification.
- g) Hydrostatic Test.
- h) Liquid Penetrant Examination.
- i) Preparation of reference samples for tube bends and for glass bead peering.
- j) Glass bead peering qualification.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 19 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

k) Ball-test on first three small radii U-bends.

l) Final Visual Examination and Marketing.

m) Cleanliness before packing.

n) Packaging for shipment.

12.0 CLEANING, IDENTIFICATION MATERIAL MIX-UP TEST, PACKING & SHIPMENT

12.1 Cleaning

Each tube shall be thoroughly cleaned inside and outside prior to packing. Outside may be cleaned by wiping with cloth soaked in acetone. Inside cleaning shall be done by passing a clean felt sponge ball with the help of oil free dry air or Nitrogen until the ball at exit shows no discoloration during its passage through the tube. The cleanliness shall be checked by wiping test as follows:

- a) Qualitative evaluation of unacceptable dust, oil, etc.
- b) Quantitative evaluation of chlorides, silica, lead, halogens and sulfur. These contaminants shall be as low as possible. The bidder shall give in their bid the guaranteed maximum values which shall be less than the following:

Chlorides	20 μ g /dm ²
Silica	30 μ g /dm ²
Halogens & Sulfur (total)	25 p.p.m.
Lead, Fluorides and sulphate	to be indicated

Cleanliness check shall be carried out on one tube per 500 tubes.

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 20 of 23
	<u>TECHNICAL SPECIFICATION</u>	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

- c) Chemicals, lubricants, cleaning agents and any other materials used in the manufacture, inspection testing and packaging shall be free from contaminants such as halogens and sulfur. In any case sulfur and halogens shall not exceed 25 ppm each.

12.2 **Identification**

The tube number shall be marked on each tube by electro etching or by any other suitable permanent marking method, at approximately 200 mm from each end. Complete history of each tube shall be placed in box containing the tube. As a minimum, following information shall be provided in the Check List: Material Specification, Melt Heat No. & Lot No., Supply Condition, Tube Identification number and Radius of Bend.

In addition each box containing tubes shall bear the Purchase Order number, destination, size and number of tubes, manufacturer's symbol and authorized inspection agency's seal.

12.3 **Testing For Material Mix-up**

Spectroscopic, semi qualitative, non-destructive (sigma test) check shall be carried out to ascertain the tube of the same type of alloy from different quality manufacture are not mixed up during production and testing.

12.4 **Packing and Shipment**

After cleaning, both ends of each tube shall be plugged with special plug. At each end two plugs and one plastic cap (halogen free) shall be put.

Each tube shall be packed in halogen free polythene sleeve and heat sealed on both ends. The polythene sleeve shall be of soft grade (transparent) and at least 0.1 mm thick. The U bends shall be packed in a proper sequence and other packing requirements as per Purchaser's drawing for packing details-U-tubes indicated in the tender document.

The tubes shall be packed full length in suitable padded water proof containers suitable not only for transportation but also for long storage in tropical conditions. Special precautions shall be taken to ensure that no hard or sharp object such as nails, etc. project

 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 21 of 23
	<u>TECHNICAL SPECIFICATION</u>	
	SEAMLESS, COLD WORKED HEAT EXCHANGER TUBES TO SPECIFICATION ASME SB 163 NICKEL- IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)	Rev. No. : 1

into the container to possibly damage the tubing. Each package shall also contain corresponding packing list. The container is likely to be subjected to multiple handling at docks in an event of trans-shipment. The containers should be designed sturdily to withstand such multiple handling and would require the approval of Purchaser. The packing boxes shall be reinforced by welded cross steel beams. The packing cases may be inspected on arrival as a precautionary measure by the Purchaser.

- 12.5 The supplier shall be responsible for the shipment and safe delivery of tubes to the destination, specified in the pertinent tender document or purchase order. The tubes shall be shipped 'UNDER DECK' only in the ship to avoid sea water entry into the boxes during the shipment. The tubes shall be protected and covered to prevent damages, corrosion and ingress of foreign material.

12.6 **Identification during Shipment**

Each package shall be clearly and legibly marked in suitable permanent manner with following information:

- a) Purchase Order Number.
- b) Destination.
- c) Size and Number of Tubes.
- d) Manufacturer's Emblem.
- e) Seal of the Authorised Inspection Agency.



NUCLEAR POWER CORPORATION OF INDIA LTD

ATOMIC POWER PROJECT

TECHNICAL SPECIFICATION

Page No. : 22 of 23

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

Rev. No. : 1

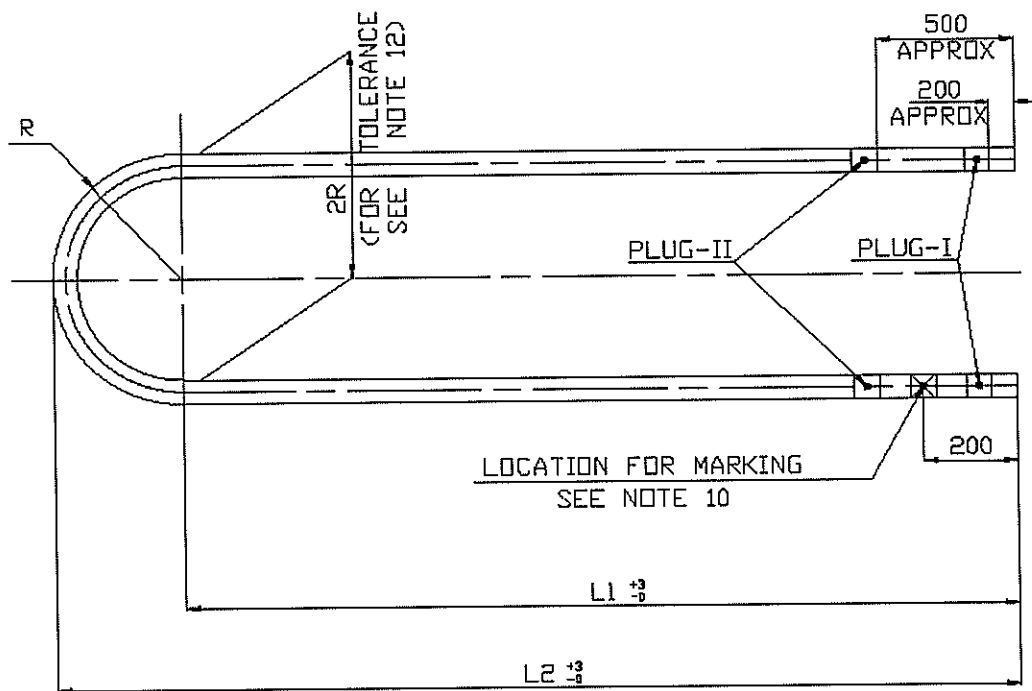


Figure:1

Notes :

- 1) For ordering dimensions refer purchase order.
- 2) Outside Diameter, mm (tolerance) : 19.0 (+0.12, -0.03)

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Feb., 2013

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 एनपीसीआईएल NPCIL	NUCLEAR POWER CORPORATION OF INDIA LTD	
	ATOMIC POWER PROJECT	Page No. : 23 of 23
	TECHNICAL SPECIFICATION	Rev. No. : 1

**SEAMLESS, COLD WORKED HEAT EXCHANGER
TUBES TO SPECIFICATION ASME SB 163 NICKEL-
IRON-CHROMIUM ALLOY UNS N08800 (MODIFIED)**

- 3) Wall Thickness, mm ($t_{max} - t_{min.}$) / ($2 \times t_{avg.}$) : $1.1 \pm 10\%$
- 4) Eccentricity : $\leq 5\%$
- 5) Minimum wall thickness in the bend region : 0.91 mm
- 6) Leg length difference : 2 mm (maximum)
- 7) End squareness deviation : 0.2 mm (maximum)
- 8) Bend radius tolerance, R < 300 mm : ± 0.75 mm
> 300 mm : ± 1.50 mm
- 9) Two felt plugs on either end of the tube shall be provided at location as shown in the figure.
- 10) Marking on tube shall be done at location shown; electric etching method shall be adopted for the above.
- 11) All quantities shall be covered in as few numbers of melts as practicable.
- 12) Tolerances on leg spacing shall be as given below :

Sl. No.	Bend Radius (R), mm	Tolerance on Dimension 2R, mm
1.	Less than 220	± 1
2.	$220 < R < 450$	± 1.8
3.	$450 < R < 760$	± 2.0
4.	More than 760	± 2.5

