

DETAIL OF TUBE HOLE PITCHING

TOOL LIST		
ITEM	TOOL NO.	DESCRIPTION
001	1421119	PLAIN PLUG GAUGE Ø12.9 Ø12.8
001	1581621	MARKING TEMPLATE FOR OUTER PERIPHERY HOLES
001	1420658	MARKING TEMPLATE FOR TUBE HOLES
001	1582790	MARKING TEMPLATE FOR WATERBOX BOLTING HOLES

NOTES :-

1. TOLERANCE FOR LOCATION OF TUBE HOLES :-
 - i) ON CONSECUTIVE HOLES ± 0.50 MM.
 - ii) CUMULATIVE TOLERANCES W.R. TO CENTER LINE OF TUBE PLATE ± 1 MM MAX.
2. FOR GENERAL MFG. TOLERANCES REFER HE04003.
3. PAINTING AFTER MACHINING AND SHOT BLASTING
 - (i) WATER SIDE - 2 COATS OF CHEMICAL RESISTANCE EPOXY PRIMER TO AA5105 + 2 COATS OF HIGH BUILD BLACK COALTAR PITCH EPOXY PAINT TO AA56135 AS PER AA0674104 INCLUDING FLANGE SEATING SURFACE.
 - TOTAL DFT = 175 MICRONS (MIN.)
 - (ii) AIR SIDE - 2 COATS OF ANTI CORROSION PRIMING PAINT AS PER AA 56101 (COLOUR RED). (TOTAL DFT=50 MICRONS MINIMUM)
4. FLATNESS OF TUBE PLATE WITHIN 0.6 MM/METER.
5. REFER QAP NO. COE-11-2844 REV.05 (FOR DETAIL QUALITY ASSURANCE REQUIREMENT)
6. DRILLED TUBE SHEET SHOULD NOT BE KEPT FOR LONG PERIOD THAN 2-3 DAYS, PROTECTED FROM DUST/OIL, MOISTURE.
7. PAINT TO BE DONE IMMEDIATELY AFTER MACHINING & SHOT BLASTING BEFORE DRILLING.
8. AFTER DRILLING OF COMPLETE HOLES (i.e. BOLTING & TUBE HOLES), SIZE AND PITCH OF BOLT HOLDING TUBE SHEET DIMENSION INCLUDING ITS SQUARENESS & PARALLELITY TO BE CHECKED USING CNC MAKE TEMPLATE 15811621 & 1420638.
9. SIZE AND PITCH OF HOLES TO BE CHECKED WITH TEMPLATE-1421119.
10. DIMENSION GIVEN IN BOM ARE UNMACHINED DIMENSION.
11. DIAGONAL DISTANCE OF TUBE PLATE=950 \pm 1mm. SAME NEED TO BE CHECKED AND REPORTED IN THE FINAL INSPECTION REPORT.

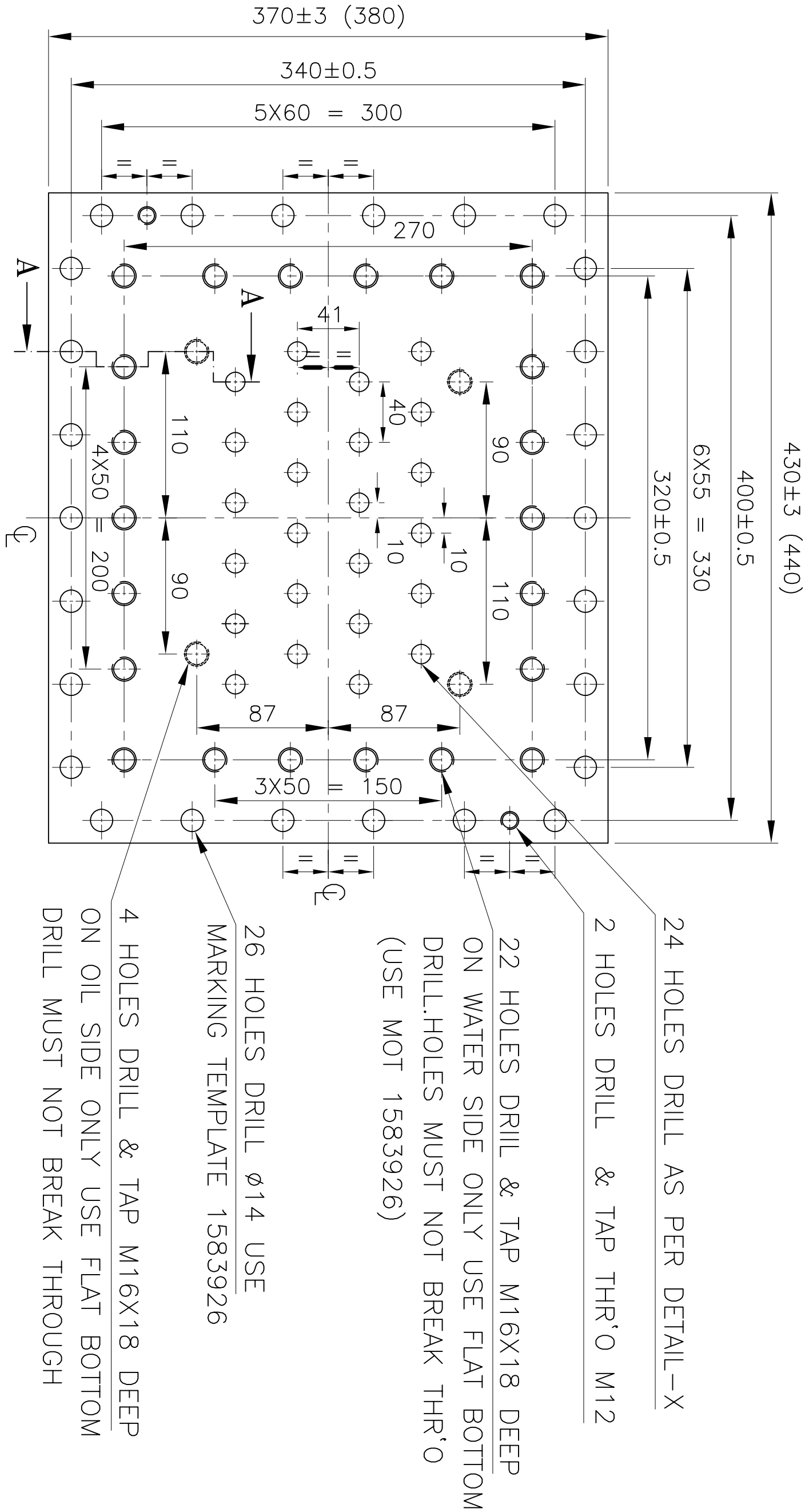
SECTION 'A-A'

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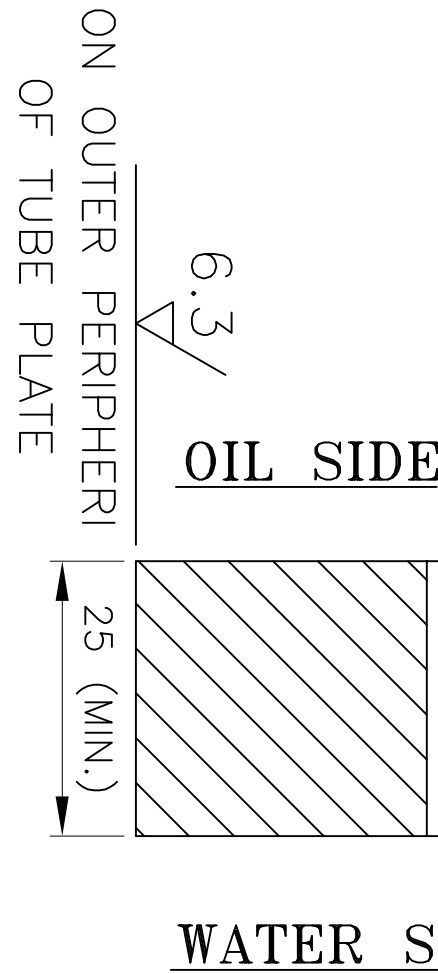
639204-50591-2 ON GRD

TOOL LIST		
IT.NO.	TOOL NO.	DESCRIPTION
01	1583926	MOT FOR 28 HOLES Ø15 OUTER PIRIPHERY HOLES AND TUBE HOLES & 26 NOS. INNER PERIPHERY HOLES
01	1421119	PLAIN PLUG GAUGE Ø12.80/12.90



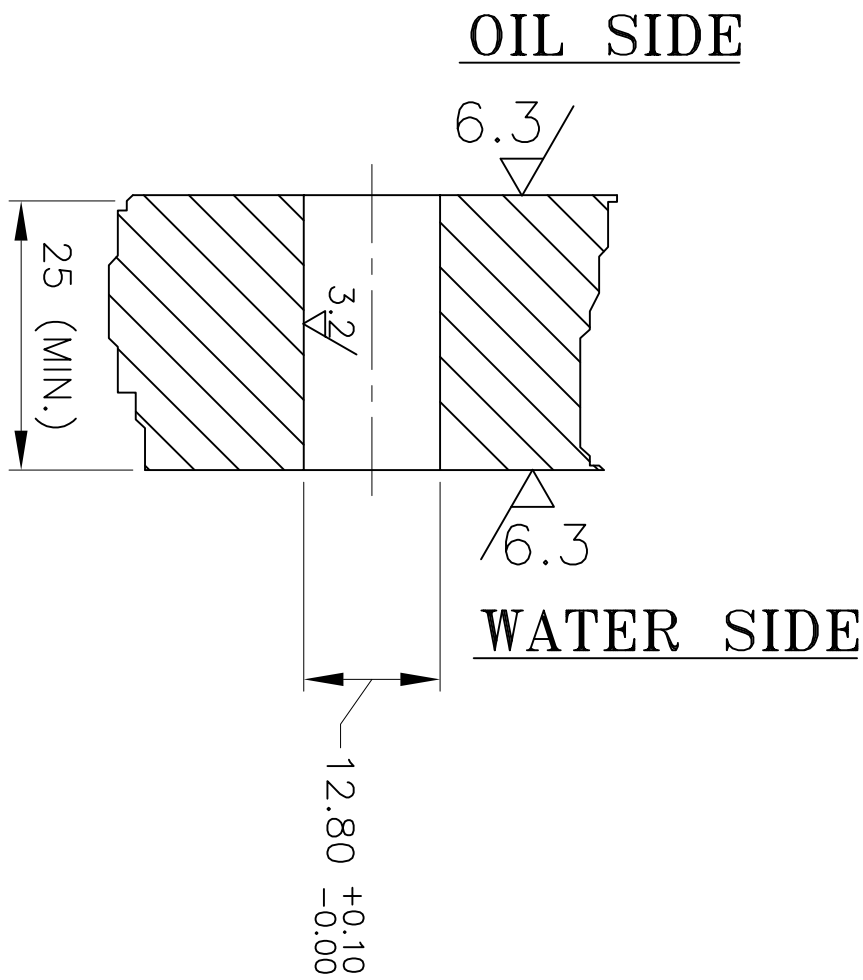
VIEW LOOKING FROM WATER SIDE

DETAIL OF ITEM 001



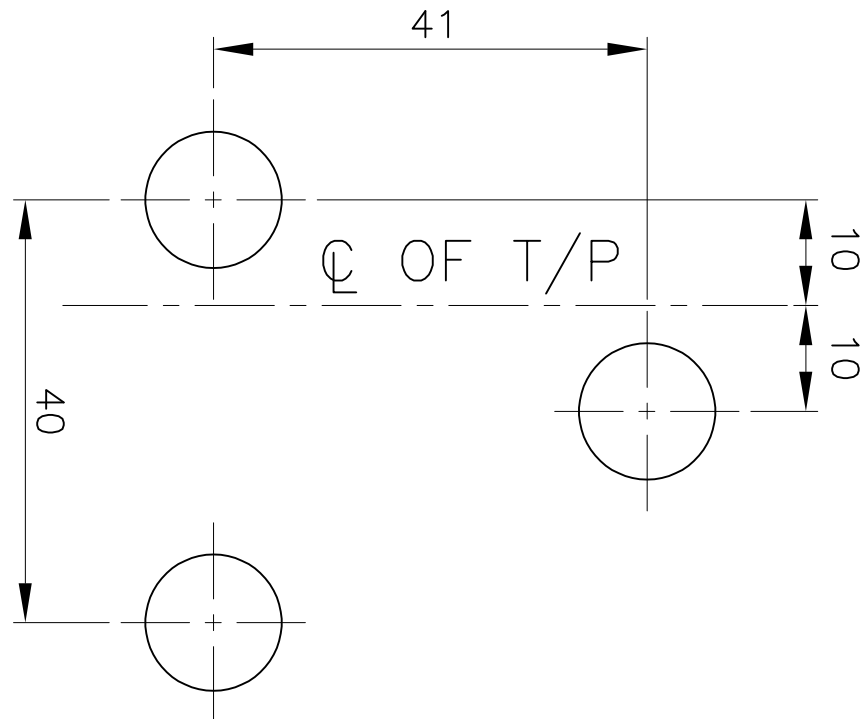
SECTION - 'A-A'

- TECHNICAL REQUIREMENT:-**
- TOLERANCE FOR LOCATION OF TUBE HOLES:-
 - ON CONSECUTIVE HOLES ± 0.50 MM.
 - CUMULATIVE TOLERANCES W.R.T. CENTER LINE OF TUBE PLATE ± 1 MM MAX.
 - SURFACE PREPARATION AND PAINTING:-
 - FOR MACHINED SURFACE (WATER SIDE), TWO COAT OF CHEMICAL RESISTANT EPOXY PRIMER TO AA56105 TO BE PROVIDED WITHIN 4HOURS OF MACHINING WITH SURFACE PREPARATION ST2.
 - FOR NON-MACHINED SURFACE, SHOT BLASTING TO BE DONE TO SURFACE PREPARATION SA 2 OR SA 2 1/2 AND TWO COATS OF ANTI-CORROSIVE PRIMER TO AA 56101 (COLOUR RED) , DFT- 50 MICRON MIN. TO BE PROVIDED WITHIN 4 HOURS OF SHOT BLASTING.
 - AFTER DRILLING OF TUBE PLATE, MACHINED SURFACE IS TO BE PAINTED WITH PRECAUTIONS TO AVOID PAINT ENTRY TO HOLES. FOR WATER SIDE, 2 COATS OF HIGH BUILD BLACK COALTAR PITCH EPOXIDE PAINT TO AA56135 AS PER AA 0674104 TO BE PROVIDED ON SURFACE OTHER THAN GASKET SEATING AREA (DFT - 175 MICRON MIN.) .
 - FLATNESS ON MACHINED SIDE OF TUBE PLATE TO BE KEPT WITHIN 0.6 MM/METER.
 - REFER QAP NO. CDE-11-2844 (FOR DETAIL QUALITY ASSURANCE REQUIREMENT)
 - TUBEPLATE TO BE DRILLED ONLY 2-3 DAYS PRIOR TO EXPANSION OF TUBE TO AVOID ANY RUSTING AT TUBE HOLES. OTHERWISE DTE OIL TO BE PROVIDED ON DRILLED SURFACE.
 - AFTER DRILLING OF COMPLETE HOLES (i.e. BOLTING & TUBE HOLES), SIZE AND PITCH OF BOLTING HOLES TUBE SHEET DIMENSION INCLUDING ITS SQUARENESS & PARALLELITY TO BE CHECKED USING CNC MAKE TEMPLATE 1583926.
 - DIMENSION GIVEN IN BOM ARE FOR RAW MATERIAL.
 - DIMENSIONS IN BRACKET () ARE BEFORE MACHINING.



DETAIL - 'X'

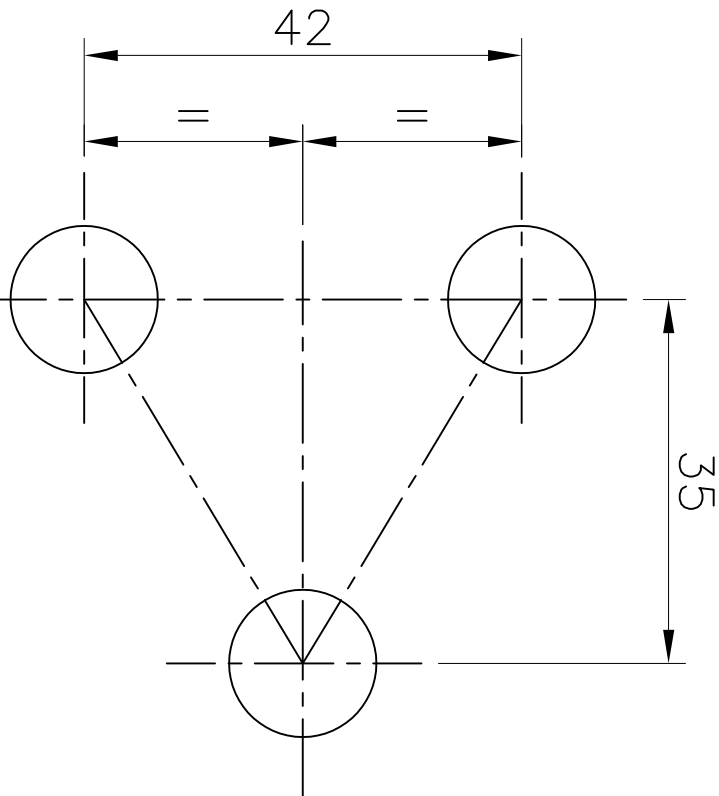
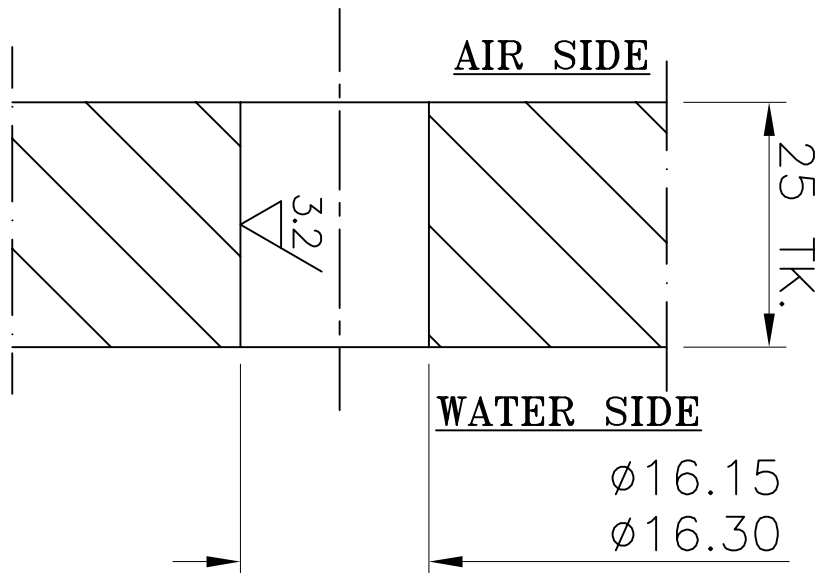
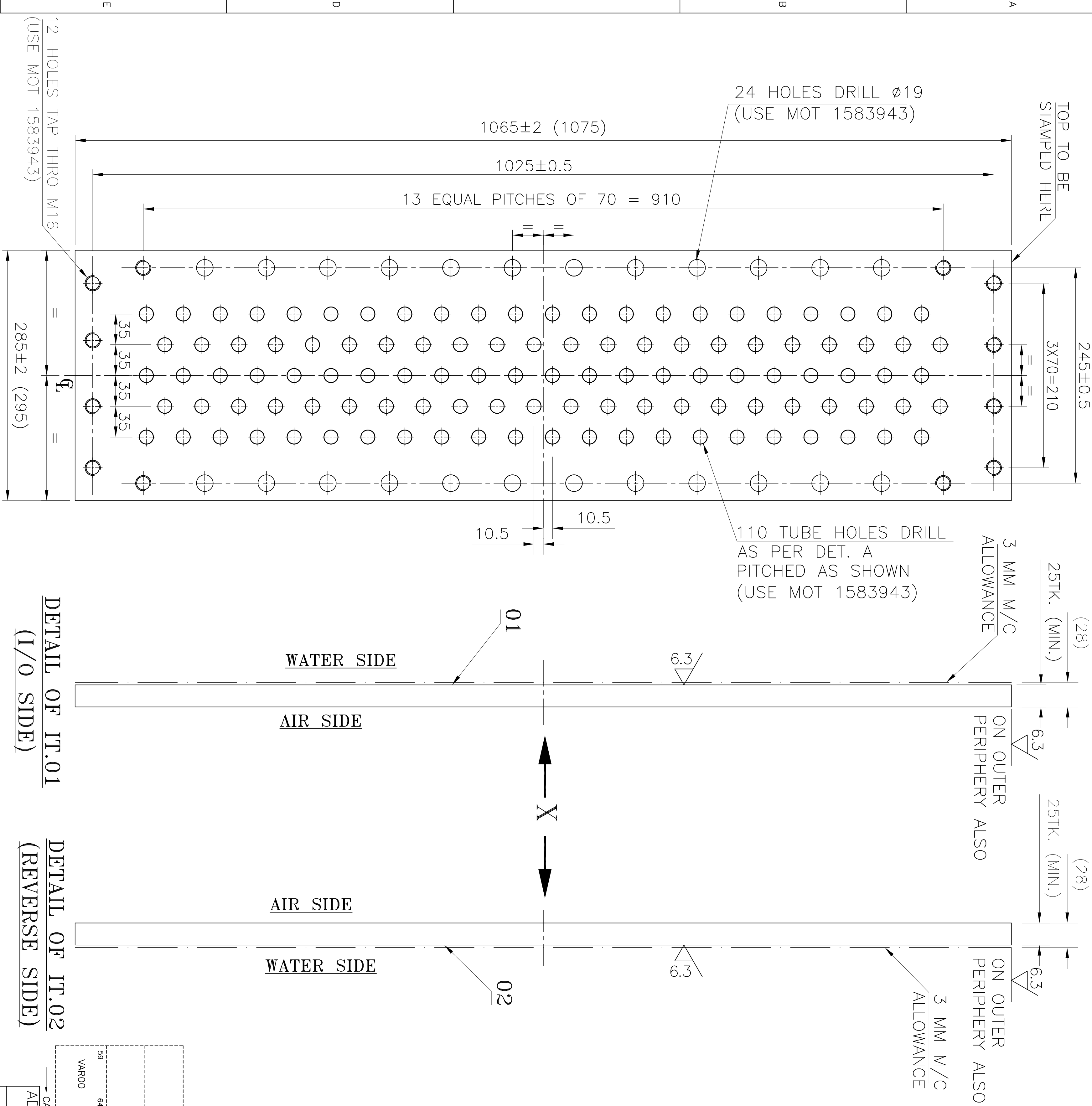
EDGES OF HOLES ARE TO BE DEBURRED



DETAIL OF TUBE HOLE PITCHING

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				32 TK.								IS:2062							
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VAR00		REMARKS		VAR. ITEM ND.		DESCRIPTION		STD		DRAWING ND.		IT ND.		MATL. CODE		A		57	
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DETAIL OF TUBE HOLE - 'A'
EDGES OF HOLES ARE TO BE DEBURRED.
(WITHOUT CHAMFERING THE HOLE)

DETAIL OF TUBE
HOLE PITCHING

TOOL LIST		
ITEM	TOOL NO.	DESCRIPTION
01	1420762	PLUG GAUGE Ø16.15/16.30
02	1583943	MOT FOR 110 NOS OF TUBE HOLES, 24 HOLES Ø19 AND 12 HOLES TAP THROUGH M16

TECHNICAL REQUIREMENT:-

- TOLERANCE FOR LOCATION OF TUBE HOLES:-
 - ON CONSECUTIVE HOLES ±0.50 MM.
 - CUMULATIVE TOLERANCES W.R.T. CENTER LINE OF TUBE PLATE ± 1 MM MAX.
- SURFACE PREPARATION AND PAINTING:-
 - FOR MACHINED SURFACE (WATER SIDE), TWO COAT OF CHEMICAL RESISTANT EPOXY PRIMER TO AA56105 TO BE PROVIDED WITHIN 4HOURS OF MACHINING WITH SURFACE PREPARATION ST2.
 - FOR NON-MACHINED SURFACE, SHOT BLASTING TO BE DONE TO SURFACE PREPARATION SA 2 OR SA 2 1/2 AND TWO COATS OF ANTI-CORROSIVE PRIMER TO AA 56101 (COLOUR RED), DFT=50 MICRONS MIN. TO BE PROVIDED WITHIN 4 HOURS OF SHOT BLASTING.
 - AFTER DRILLING OF TUBE PLATE, MACHINED SURFACE IS TO BE PAINTED WITH PRECAUTIONS TO AVOID PAINT ENTRY TO HOLES. FOR WATER SIDE, 2 COATS OF HIGH BUILD BLACK COALTAR PITCH EPOXIDE PAINT TO AA56135 AS PER AA 0674104 TO BE PROVIDED ON SURFACE OTHER THAN GASKET SEATING AREA (DFT = 175 MICRONS MIN.) .
- FLATNESS ON MACHINED SIDE OF TUBE PLATE TO BE KEPT WITHIN 0.6 MM/METER.
- REFER QAP NO. CDE-11-2844 (FOR DETAIL QUALITY ASSURANCE REQUIREMENT)
- TUBEPLATE TO BE DRILLED ONLY 2-3 DAYS PRIOR TO EXPANSION OF TUBE TO AVOID ANY RUSTING AT TUBE HOLES. OTHERWISE DTE OIL TO BE PROVIDED ON DRILLED SURFACE.
- AFTER DRILLING OF COMPLETE HOLES (i.e. BOLTING & TUBE HOLES), SIZE AND PITCH OF BOLTING HOLES TUBE SHEET DIMENSION INCLUDING ITS SQUARENESS & PARALLELITY TO BE CHECKED USING CNC MAKE TEMPLATE 1583943.
- DIMENSION GIVEN IN BOM ARE FOR RAW MATERIAL.
- DIMENSIONS IN BRACKET () ARE BEFORE MACHINING.

295 X 1075		002	TUBE PLATE (REVERSE END) 28 TK.				E 250	G.BR		53.30		
295 X 1075	001	TUBE PLATE (I/O END) 28 TK.					E 250	G.BR		53.30		
VAR00	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	DRAWING NO.	I.T.NO.	31 34	MATL. CODE	45 55 56 58	UNIT	WT.	65 72
						32 33 46			A 67 68	QTY.	71 72	73
									C 5			74

CARD TYPE-3

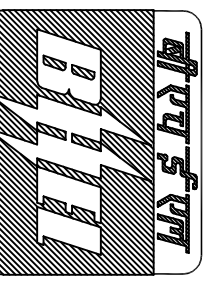
CARD TYPE-1

CARD TYPE-2

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS



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BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

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01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
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चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
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चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22

01

आप/NAME	हस्ताक्षर/DATE	आप/NAME	हस्ताक्षर/DATE
डिज़ाइनर	11.07.22	डिज़ाइनर	11.07.22
ड्राफ्ट्समैन	11.07.22	ड्राफ्ट्समैन	11.07.22
चेक	11.07.22	चेक	11.07.22



A-FORM

BHARAT HEAVY ELECTRICALS LIMITED - BHOPAL

MM DEPARTMENT

ESTIMATE SHEET FOR ISSUE OF MATERIAL/COMPONENTS FROM BHEL

FORM NO BP-0021

CHECKLIST

A-FORM NO : A211B46
REV NO : 0
A-FORM DATE 04-AUG-22
DATE : 04-AUG-22
PAGE : 1 / 3

DEPARTMENT : 211

PROJECT

: RAHUGHAT
HEP (

PO NO : A211B46

END PRODUCT : M/CING OF TUBE PLATE

INDENT NO : 221120061

WORK ORDER NO : 39227X14365

PO DATE :

DELV REQD : 20102022

INDENT DATE : 02082022

MATERIAL ISSUE DIV : 211

SUPP CODE :

SUPP NAME :

DETAILS OF FINISHED GOODS

A.SL.NO	PO IT NO	PIT NO	QUANTITY REQUIRED	UNIT	SHOP NO	DEST CD	COST CD	H.CELL
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DESCRIPTION OF SUB-ASSEMBLY/ITEM & WEIGHT/VOLUME/AREA

FREE ISSUE MATERIAL PER UNIT OF FINISHED GOODS

MATL CODE	QTY PSL UNIT	PSL UNIT	RATE PSL UNIT	TOTAL MATL TO BE ISSUED	ISSUE PSL/ UNIT WIP	SMIV/ PPMIV NO	MATERIAL VALUE	TARIFF HEAD	MATL ISSUE QTY
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DESCRIPTION OF FREE ISSUE MATERIAL AND WEIGHT /VOLUME/AREA

M/CING & DRILLING OF TUBE PLATE	1	0	1	20.000	NO	211	211		211
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E250 GR BR	1.0000	NO	5040.000	20.00	NO	WIP	100800.000		1.0000
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MACHINING & DRILLING OF TUBE PLATE INLET/OUTLET SIDE TO DRG NO-21660640264 REV-00 ITEM-01 MATERIAL DIMENSION 28X295X1075 LG R.WT-70 KG F.WT-53.3 KG APPROX.									
---	--	--	--	--	--	--	--	--	--

M/CING & DRILLING OF TUBE PLATE	2	0	1	20.000	NO	211	211		211
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E250 GR BR	1.0000	NO	5040.000	20.00	NO	WIP	100800.000		1.0000
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MACHINING & DRILLING OF TUBE PLATE REVERSE END SIDE TO DRG NO-21660640264 REV-00 ITEM-02 MATERIAL DIMENSION 28X295X1075 LG R.WT-70 KG F.WT-53.3 KG APPROX.									
--	--	--	--	--	--	--	--	--	--

M/CING & DRILLING OF TUBE PLATE	3	0	2	14.000	NO	211	211		211
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E250 GR BR	1.0000	NO	4752.000	14.00	NO	WIP	66528.000		1.0000
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MACHINING & DRILLING OF TUBE PLATE TO DRG NO-21650540265 REV-00 ITEM-01 MATERIAL DIMENSION 28X500X600 LG R.WT-66 KG F.WT-47.5 KG APPROX.									
--	--	--	--	--	--	--	--	--	--

M/CING & DRILLING OF TUBE PLATE	4	0	3	14.000	NO	211	211		211
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E250 GR BR	1.0000	NO	5184.000	14.00	NO	WIP	72576.000		1.0000
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MACHINING & DRILLING OF TUBE PLATE INLET/OUTLET SIDE TO DRG NO-21660640262 REV-00 ITEM-01 MATERIAL DIMENSION 28X330X990 LG R.WT- 72 KG F.WT-55.2 KG APPROX.									
---	--	--	--	--	--	--	--	--	--

1 MATERIAL TO BE ISSUED ON :-

FREE ISSUE BASIS

2.TRANSFERT TO BE PROVIDED BY :-

SUPPLIER

3.EXCISE DUTY ON ISSUE MATL TO BE BORNE BY :-

SUPPLIER

4.SCRAP TO BE RETURNED :-

NO

5 INVARIABLY ISSUE WT. TO BE RECORDED ON SMIV/PMIV

SIGNATURE OF INDENTOR

NAME

DESIGNATION

TEL: BPHON 3333333333 / VINOD PATNAIK

SIGNATURE OF ASC EXECUTIVE

NAME

DESIGNATION

TELEPHONE



A-FORM

BHARAT HEAVY ELECTRICALS LIMITED - BHOPAL

MM DEPARTMENT

ESTIMATE SHEET FOR ISSUE OF MATERIAL/COMPONENTS FROM BHEL

FORM NO BP-0021

CHECKLIST

A-FORM NO : A211B46
REV NO : 0
A-FORM DATE 04-AUG-22
DATE : 04-AUG-22
PAGE : 2 / 3

DESCRIPTION OF SUB-ASSEMBLY/ITEM & WEIGHT/VOLUME/AREA	A-SLNO	PO IT NO	PI IT NO	QUANTITY REQUIRED	UNIT	SHOP NO	DEST CD	COST CD	H.CELL
---	--------	----------	----------	-------------------	------	---------	---------	---------	--------

FREE ISSUE MATERIAL PER UNIT OF FINISHED GOODS

MATL CODE	QTY PSL UNIT	PSL UNIT	RATE PSL UNIT	TOTAL MATL TO BE ISSUED	ISSUE PSL/ SMIV/ PPMIV NO	MATERIAL VALUE	TARRIF HEAD	MATL ISSUE QTY
-----------	--------------	----------	---------------	-------------------------	---------------------------	----------------	-------------	----------------

DESCRIPTION OF FREE ISSUE MATERIAL AND WEIGHT /VOLUME/AREA

M/CING & DRILLING OF TUBE PLATE	5	0	3		14.000 NO	211	211	211
E250 GR BR	1.0000	NO	5184.000	14.00	NO	WIP	72576.000	1.0000
MACHINING & DRILLING OF TUBE PLATE REVERSE END SIDE TO DRG NO-21660640262 REV-00 ITEM-02 MATERIAL DIMENSION 28X330X990 LG R.WT-72 KG F.WT-55.2 KG APPROX.								

M/CING & DRILLING OF TUBE PLATE	6	0	4		9.000 NO	211	211	211
E250 GR BR	1.0000	NO	2664.000	9.00	NO	WIP	23976.000	1.0000
MACHINING & DRILLING OF TUBE PLATE TO DRG NO-21650540263 REV-00 ITEM 01 MATERIAL DIMENSION 28X380X440 LG R.WT- 37 KG F.WT-29 KG APPROX.								

M/CING & DRILLING OF TUBE PLATE	7	0	5		42.000 NO	211	211	211
E250 GR BR	1.0000	NO	12456.000	42.00	NO	WIP	523152.000	1.0000
MACHINING & DRILLING OF TUBE PLATE INLET/OUTLET SIDE TO DRG NO-11650540512 REV-02 ITEM 01 MATERIAL DIMENSION 36X400X1532 LG R.WT-173 KG F.WT-132 KG APPROX.								

M/CING & DRILLING OF TUBE PLATE	8	0	5		42.000 NO	211	211	211
E250 GR BR	1.0000	NO	12456.000	42.00	NO	WIP	523152.000	1.0000
MACHINING & DRILLING OF TUBE PLATE REVERSE END SIDE TO DRG NO-11650540512 REV-02 ITEM-02 MATERIAL DIMENSION 36X400X1532 LG R.WT- 173 KG F.WT-132 KG APPROX.								

M/CING & DRILLING OF TUBE PLATE	9	0	6		48.000 NO	211	211	211
E250 GR BR	1.0000	NO	6840.000	48.00	NO	WIP	328320.000	1.0000
MACHINING & DRILLING OF TUBE PLATE INLET/OUTLET SIDE TO DRG NO-11660640498 REV-01 ITEM 01 MATERIAL DIMENSION 32X295X1275 LG R.WT-95 KG F.WT-63.10 KG APPROX.								

1 MATERIAL TO BE ISSUED ON :-	FREE ISSUE BASIS	SIGNATURE OF INDENTOR	SIGNATURE OF ASC EXECUTIVE
2.TRANSPORT TO BE PROVIDED BY :-	SUPPLIER	NAME	NAME
3.EXCISE DUTY ON ISSUE MATL TO BE BORNE BY :-	SUPPLIER	DESIGNATION	DESIGNATION
4.SCRAP TO BE RETURNED :-	NO	TELEPHONE	TELEPHONE
5 INVARIABLY ISSUE WT. TO BE RECORDED ON SMIV/PMIV			

For Dy. Manager
Vinod Pattnaik



A-FORM

BHARAT HEAVY ELECTRICALS LIMITED - BHOPAL
MM DEPARTMENT

FORM NO BP-0021

ESTIMATE SHEET FOR ISSUE OF MATERIAL/COMPONENTS FROM BHEL
CHECKLISTA-FORM NO : A211B46
REV NO : 0
A-FORM DATE : 04-AUG-22
DATE : 04-AUG-22
PAGE : 3 / 3

DESCRIPTION OF SUB-ASSEMBLY/ITEM & WEIGHT/VOLUME/AREA		A-SLNO	PO IT NO	PI IT NO	QUANTITY REQUIRED	UNIT	SHOP NO	DEST CD	COST CD	H.CELL
FREE ISSUE MATERIAL PER UNIT OF FINISHED GOODS										
MATL CODE	QTY PSL UNIT	PSL UNIT	RATE PSL UNIT	TOTAL MATL TO BE ISSUED	ISSUE PSL/ UNIT WIP	SMIV/ PPMIV NO	MATERIAL VALUE	TARIFF HEAD	MATL ISSUE QTY	
DESCRIPTION OF FREE ISSUE MATERIAL AND WEIGHT /VOLUME/AREA										
APPROX.										
M/CING & DRILLING OF TUBE PLATE										
E250 GR BR	1.0000	NO	6840.000	48.00	NO	WIP	328320.000		1.0000	
MACHINING & DRILLING OF TUBE PLATE REVERSE END SIDE TO DRG NO-11660640498 REV-01 ITEM 02 MATERIAL DIMENSION 32X295X1275 LG R.WT-95 KG F.WT-63.10 KG APPROX.										
	11		0	7			48.000	NO	211	211
M/CING & DRILLING OF TUBE PLATE										
E250 GR BR	1.0000	NO	8064.000	48.00	NO	WIP	387072.000		1.0000	
MACHINING & DRILLING OF TUBE PLATE TO DRG NO-11650540277 REV-02 ITEM 01 MATERIAL DIMENSION 32X580X770 LG R.WT-112 KG F.WT-79 KG APPROX.										
REMARKS -----NA-----										
TOTAL NO OF CANCEL ITEM 0										
AFORM TOTAL 2527272.000										

1 MATERIAL TO BE ISSUED ON :- FREE ISSUE BASIS
2. TRANSPORT TO BE PROVIDED BY :- SUPPLIER
3. EXCISE DUTY ON ISSUE MATL TO BE BORNE BY :- SUPPLIER
4. SCRAP TO BE RETURNED :- NO
5. INVARIABLY ISSUE WT. TO BE RECORDED ON SMIV/PMIVSIGNATURE OF INDENTOR
NAME
DESIGNATION
TELEPHONE
31/08/2022
31/08/2022 / VINOD PATNAYSIGNATURE OF ASC EXECUTIVE
NAME
DESIGNATION
TELEPHONE

08	HOLDER	IS: 5986-1992 Gr.FE 330 (HDG)
09	TIE ROD	STRUCTURAL BAR IS
10	STUDS BOLTS & NUTS	CLASS 6.6 OF IS 1367

EQUIVALENT MATERIAL TO THOSE SPECIFIED IN LIST OF PARTS FOR DIFFERENT ITEMS MAY ALSO BE USED.

NOTES:-

ITEM-06 (CASING ASSY.)

1. PRIME PAINT : 2 COATS OF CHEMICAL & THERMAL RESISTANCE EPOXY PRIMER TO TRE-166.
(DFT.=50 MICRONS).

FINISHING PAINT : 2 COATS OF POLYURETHANE FINISHING PAINT TO TRE-165.(DFT = 50 MICRONS)
TOTAL DFT = 100-150 MICRONS. SHADE : BLUE TO RAL-5012.

ITEM 04 & 05 (OIL CHAMBER INLET & OUTLET), ITEM 02 & 03 (TUBE PLATE),
INSIDE OF OIL CHAMBER & OIL SIDE OF TUBE PLATE


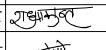
2 COATS OF CHEMICAL & THERMAL RESISTANCE EPOXY WHITE TO TRE-168.
(DFT = 50 MICRONS MIN).

OUTSIDE OF OIL CHAMBER & AIR SIDE OF TUBE PLATE

2 COATS OF CHEMICAL & THERMAL RESISTANCE EPOXY PRIMER TO TRE-166
(DFT. 50 MICRONS) + 2 COATS OF POLYURETHANE FINISHING PAINT TO TRE-165(DFT=50 MICRONS)
TOTAL DFT = 100-150 MICRONS. SHADE : BLUE TO RAL-5012.

2. TUBE TO BE EXPANDED IN LINE WITH TUBE EXPANSION PROCEDURE NO. HE 74017.
3. COOLER TO BE AIR UNDER WATER, PRESSURE TESTED IN LINE WITH PROCEDURE NO. HE 74115 AT
2 Kg/sq.cm(g) FOR MINIMUM 15 MINUTES.
4. FOR GENERAL MANUFACTURING TOLERANCES FOR COOLER REFER DRG. NO. HE 04003.
5. AFTER AIR PRESSURE TESTING COOLER SHOULD BE CLEANED AND COMPLETELY DRIED.
6. ITEM 13 IS TO BE PAINTED IN LINE WITH NOTE-1.
7. ITEMS 11, 12, 19, 20, 22, TO 24, 26, 27, 35 & 36 ARE TO BE HOT DIP GALVANISED.
8. POWER CONSUMPTION BY FANS TO BE MEASURED BEFORE DISPATCH TO TRM FOR EACH COOLER.
9. SOUND LEVEL FOR EACH COOLER TO BE MEASURED.
10. AIR DELIVERY OF EACH FAN TO BE CHECKED BEFORE DISPATCH TO TRM FOR EACH COOLER.

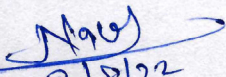
FOR BOM REFER DOC. NO. 11650540548

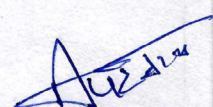
ADDITIONAL INFORMATION W.O. NO. 69139-A-14301 STATUS OF DRAWING				उत्पाद का प्रकार या ग्राहक/परियोजना का नाम TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 5x21.5 O.F.A.F. COOLER 275 MVA NTPC KHURJA							
DISTRIBUTION OF PRINTS OC - 1 HCM - 4				 भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल BHARAT HEAVY ELECTRICALS LTD. BHOPAL		बनाया DRN.	नाम/ NAME राधाकान्त मेहर	हस्ता./SIGN 	दिनांक/DATE 29.07.21	वे रि. की संख्या NO. OF VAR.	
DATE	ALTERED	REV.	DATE	ALTERED	विभाग DEPT. CDE	अनुपात SCALE	भार (कि.ग्रा) WEIGHT (KG.)	उत्से. ड्राईंग का संदर्भ REF. TO ASSY. DRG.	मद क. ITEM NO.	मद संख्या NO. OF ITEM	
	CHECKED			CHECKED	अन.टोल. नाप की श्रेणी UNTOL. DIMS. GR.						
	APPROVED			APPROVED	कोड CODE 411						
ZONE				AA0230208							
				शीर्षक/ TITLE							
				ARRANGEMENT & ASSY. OF COOLER				ड्राईंग क./DRAWING NO.		पुन./REV.	
								1-16505-40548		00	
								पृष्ठ क./SHT. NO.		पृष्ठों की संख्या/NO. OF SHT.	


Pre-Qualification Requirement: 221120061

S.No.	DESCRIPTION	Requirement	Vendor to specify
1	Details of past experience in Drilling/Machining of jobs of Minimum 300 X 450 mm including job executed and under progress, in last five year.	PO Copy/Job Completion Certificate	
2	Facility of CNC machine for Drilling of Tube Plate for drilling as per respective items of the Drawing.	As mentioned below	Vendor to confirm
2.1	Make	Vendor to Specify	
2.2	Qty	Vendor to Specify and confirm	
2.3	Capacity X Axis	Vendor to Specify and confirm.	
2.4	Capacity Y Axis	Vendor to Specify and confirm	
3	Facility of Machine for Machining of Tube Plate as per respective items of the Drawing.	Vendor to Specify machine details and confirm.	

All machineries, measuring instrument and inspection tool shall be in good working condition and valid calibration reports shall be available.


2/8/22
Prepared by


Checked by VINOD PATNAIK
उप प्रबंधक / Dy. Manager
एच.सी.एम. विभाग / HCM Division
बी.एच.ई.एल. भोपाल / BHEL, BHOPAL


पंकज निमजे / PANKAJ NIMJE
Approved by DGM
एच. सी. एम. विभाग / HCM Division
बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL



Heat Exchanger Group
BHEL Bhopal

STANDARD QUALITY ASSURANCE
PLAN (SQAP)

ITEM
MACHINED AND DRILLED TUBE PLATES
FOR COOLERS

QAP No. QAX/TH/1597
Revision No. 01
Date of Issue 13.06.2022
Page 1 of 2

S. No.	Components & Operations	Characteristics	Category	Type / Method of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Records			Agency			Remarks
								1	2	3	1	2	3	
1	2	3	4	5	6	7	8	9	10			11		
1.0	TUBE PLATE (MACHINED & DRILLED)													
1.1	MATERIAL INSPECTION													
a.	Verification of Co-related Mill Test Certificates - MTCs.	• Chemical composition (Heat & Product Analysis) • Mechanical Properties	Major	Visual	100%	BHEL Drawing / BHEL Specification	BHEL Drawing / BHEL Specification	MTC	R	R	-	Not Applicable in Case of BHEL supplied plate.		
b.	Correlation of MTC & Attestation marks before use.	Marking & transfer of Heat Nos.	---do---	--do--	--do--	---do---	---do---	IR	P	R	-	Identification mark on each part before cutting of plates.		
1.2	IN PROCESS INSPECTION													
a.	Machining of Tube plate	Machining of Outer Periphery (OD/Length & width) & surface as mentioned in the drawing.	Major	I + Visual	100%	BHEL Drawing	BHEL Drawing	IR	P	-	-			
b.	Surface Preparation and primer painting	--	Major	Visual	--do--	BHEL Drawing	BHEL Drawing	--do--	P	W	-	For CS T/P only		
c.	Drilling of Tube Plate	Drilling of tube holes, Bolt/stud hole, Lifting holes (if any) etc. and holes surface finish as mentioned in the drawing.	Major	I + Visual	100%	BHEL Drawing	BHEL Drawing	IR	P	-	-	Surface Finish to be ensured using comparator.		
1.3	FINAL INSPECTION													
		• Measurement of overall dimensions (e.g. Thickness (Tk.), Outside diameter (OD)/Length & Width, Groove depth etc.). • Location & Size of tube holes, Grooves in tube holes, Bolt/Stud hole, Lifting holes (if any), drain-vent holes etc.	Critical	I + Visual	100%	BHEL Drawing	BHEL Drawing	IR	P	W	-	• Refer Note-c & d also. • BHEL-IA to ensure the same. • All dimensions to be within tolerance limit.		
a.	Dimensional check													
b.	Surface finish check for tube holes	Surface finish.	Major	I + Visual	100%	BHEL Drawing	BHEL Drawing	IR	P	W	-	• Comparator to be used. • Tube holes of tube plate should be free from any tool mark, scratches & roughness.		

APPROVED BY: [Signature]
DATE: 13/6/2022



Heat Exchanger Group
BHEL Bhopal

STANDARD QUALITY ASSURANCE PLAN (SQAP)

ITEM
MACHINED AND DRILLED TUBE PLATES
FOR COOLERS

QAP No. QAX/TH/1597
Revision No. 01
Date of Issue 13.06.2022
Page 2 of 2

S. No.	Components & Operations	Characteristics	Category	Type / Method of Check	Quantum of check	Reference Document	Acceptance Norms	Format of Records	Agency			Remarks
									1	2	3	
1	2	3	4	5	6	7	8	9	10			11
c.	Machined side/surfaces of Tube plate	Flatness	Critical	I + Visual	100%	BHEL Drawing	≤ 0.6 mm/meter)	IR	P	W	-	<ul style="list-style-type: none">• Bed Plate with suitable method to be used to ensure flatness.• Machined surfaces of tube plate should be free from any tool mark, scratches & roughness.• 20% by BHEL TPIA (First one to be offered then random)
d.	Final Painting & Paint thickness (For CS tube plates only, if applicable).	Visual & Measurement for ensuring thickness	Minor	I + Visual	100%	BHEL Drawing	BHEL Drawing	IR	P	W	-	<ul style="list-style-type: none">• Color shade and DFT to be checked.• Adhesion Test.• Ensure holes shall be free from paint ingress.
e.	Documentation	Verification of Quality Documents.	Minor	Visual	100%	BHEL Drawing	BHEL Drawing	Two (02) sets of all the above documents (i.e. MTC & Inspection Reports-IR) duly signed and stamped by the BHEL-IA.	P	R	-	<ul style="list-style-type: none">• Out of two sets, minimum one set shall be in original format.

Approval does not relieve supplier from meeting our requirements as per the drawing/specification.

Notes: - (a) All the inspection report & test certificates shall be part of the final QA Document.

BHEL-IA to ensure that all reports shall be arranged in sequential manner as per this QAP with proper index sheet at top.

(b) Size of tube plate, tube holes & its location to be ensured using suitable CNC make templates.

(c) Size of tube holes to be checked with calibrated GO & No-Go gauges.

(d) Sharp edge if any to be removed.

LEGEND:

1: Supplier, 2: BHEL IA, 3: Customer, P-Perform, W-Witness, R-Record review, MTC: Mill Test Certificates, IR: Inspection report, IA: Inspection Agency, I: Instrument to be used for check.

QC Manager / Dy. Manager
BHEL BHOPAL

Shm


ब्रजेंद्र यादव / Brajendra Yadav
उप प्रबंधक (निर्माण) / Dy. Manager (Design)
श्री.सी.ई. सेल, भोपाल / CODE BHEL, BHOPAL


15/06/2022


Technical Annexure-01 OF PI-221120061

Scope of Work for Machining & Drilling of MS Tube Plates: -

1. Collection of raw Materials from Stores, BHEL. (Transportation TO & FRO in your scope)
2. Painting in your scope as per drawing. (PAINT MATERIAL IN YOUR SCOPE)
3. Painting to be done immediately after machining and shot blasting before drilling.
4. Preparation of Operation process sheet and submission by the vendor.
5. Machining, & drilling to be done as per drawing.
6. All the dimensions shall be maintained as per drawing and surface finish requirement also shall met as per drawing.
7. Inspection by BHEL appointed Third Party TPI/BHEL QC.
8. Scrap deduction as per scrap weight.(Note-scrap rate-37 Rs/kg)
9. Packing of Tube Plates individually with proper identification tags.
10. Drilling & Machining tools, Jigs and Fixture shall be in vendor scope.
11. Plug gauge tools preferably shall be in vendor scope. BHEL may provide subject to Plug Gauge availability for issuing on loan basis.
12. Facilities Required.
 - 12.1. CNC Drilling /VMC/HMC
 - 12.2. Boring/Milling(Vertical/Horizontal)
13. Dimension shall be as per Drawing. Qty may decrease as per requirement. Before taking action for drilling tools and fixture, BHEL confirmation will be required lot wise.


02/08/22


02/08/22
विनोद पटनायक / VINOD PANT
उप प्रबंधक / Dy. Manager
एच.सी.एम. विभाग / HCM Division
बी.एच.ई.एल., भोपाल / BHEL, BHOPAL


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