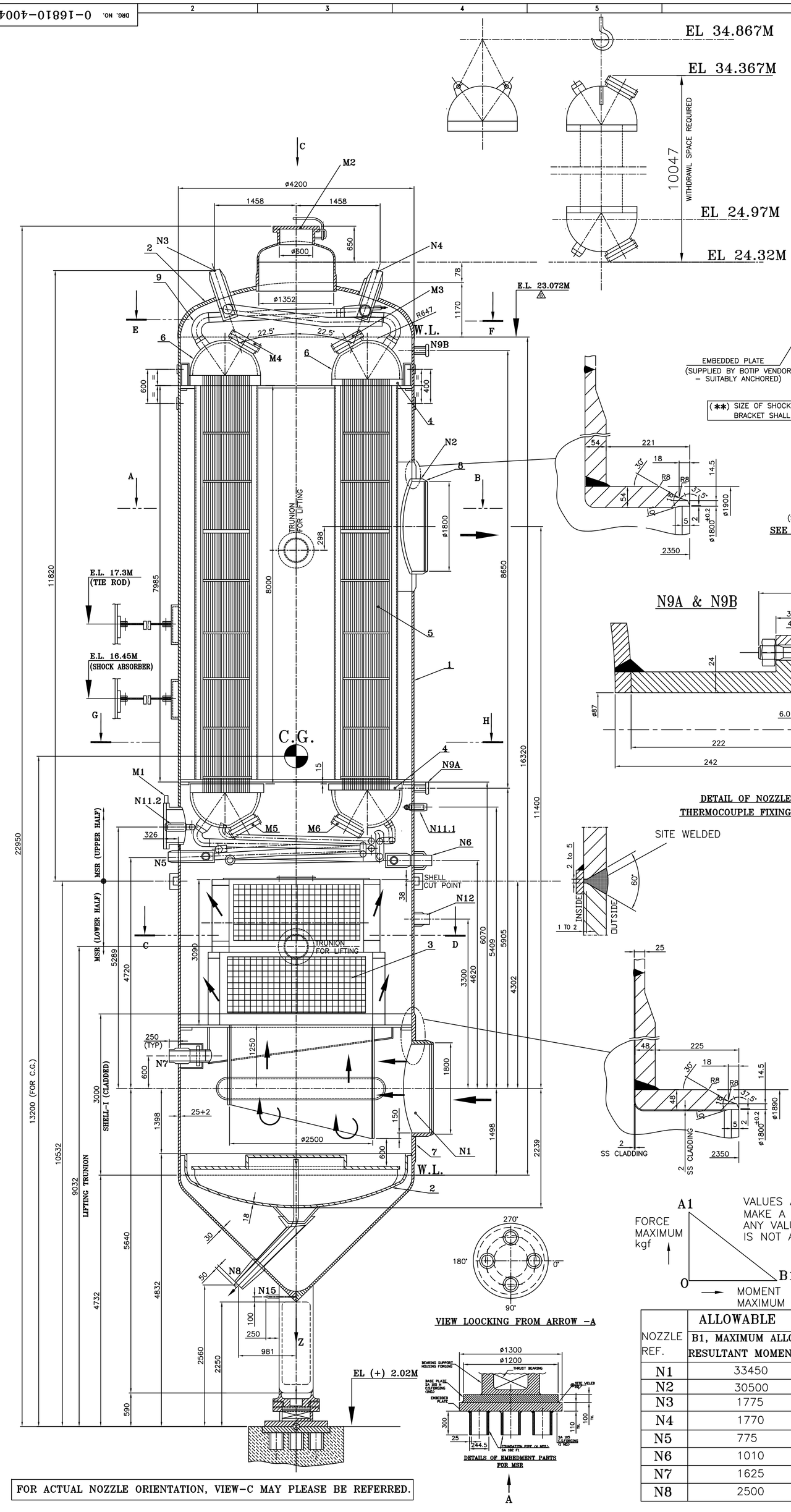
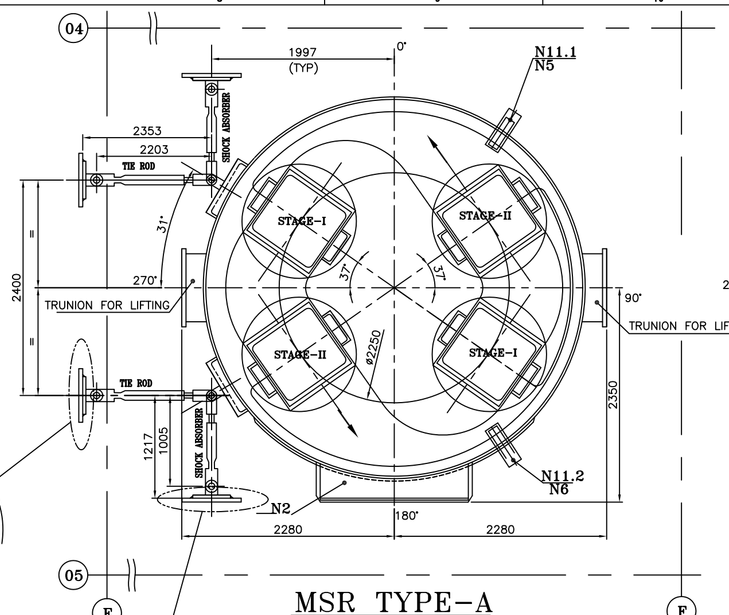
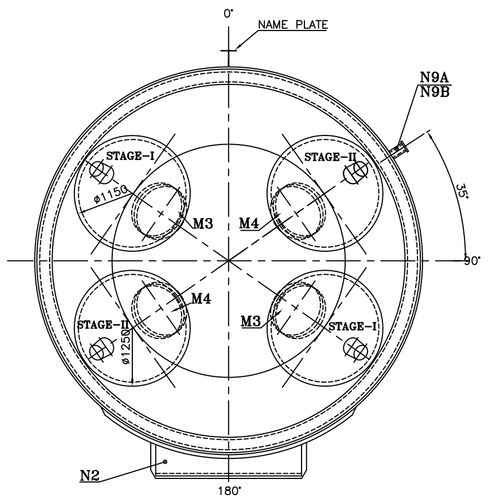
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 0-16810-40048





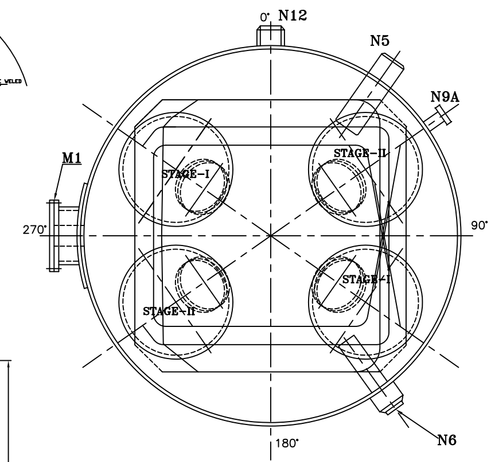


FOR ARRANGEMENT OF NOZZLES ON CIRCUMFERENCE ONLY CROSS-SECTION ARE VALID

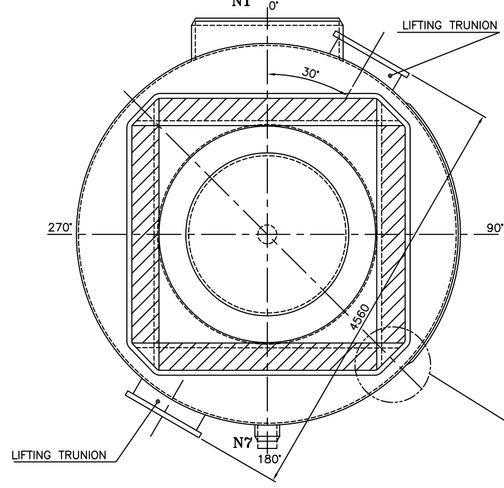
SECTION E-F

MSR TYPE-A

SECTION A-B

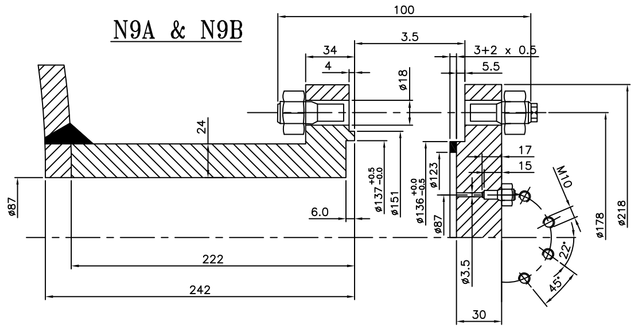


SECTION G-H



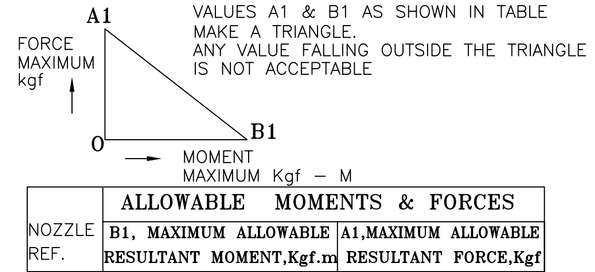
SECTION C-D

N9A & N9B



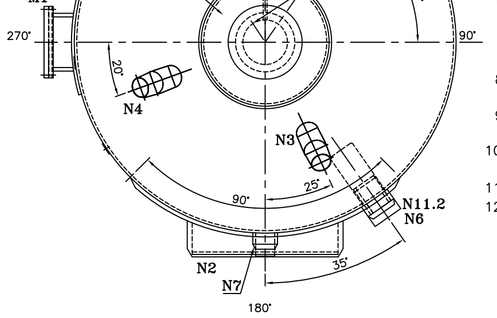
DETAIL OF NOZZLE 9A & 9B THERMOCOUPLE FIXING ARRANGMENT

VIEW LOOCKING FROM ARROW -A



VALUES A1 & B1 AS SHOWN IN TABLE MAKE A TRIANGLE. ANY VALUE FALLING OUTSIDE THE TRIANGLE IS NOT ACCEPTABLE

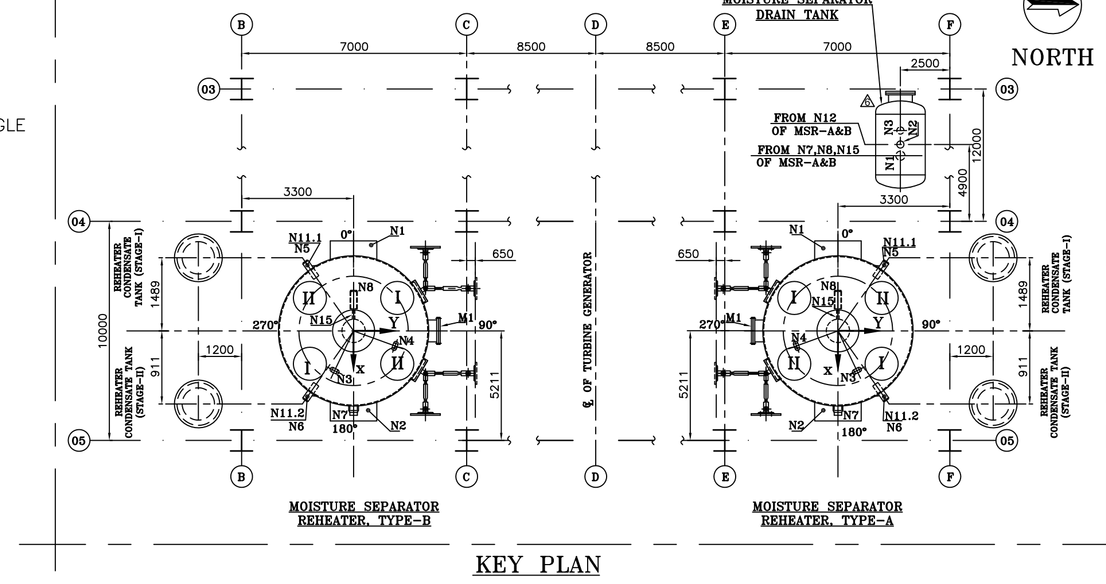
NOZZLE REF.	ALLOWABLE MOMENTS & FORCES	
	B1, MAXIMUM ALLOWABLE RESULTANT MOMENT,Kgf.m	A1,MAXIMUM ALLOWABLE RESULTANT FORCE,Kgf
N1	33450	63750
N2	30500	50600
N3	1775	5420
N4	1770	5410
N5	775	3725
N6	1010	3720
N7	1625	5000
N8	2500	13800



VIEW-C

LIST OF FITTINGS/MSR

S.NO.	DESCRIPTION	QTY.	REMARKS
01	DUPLEX THERMOCOUPLE (TEMPERATURE SENSOR)	8 NOS.	INST. SUPPLIED BY BHEL BHOPAL
02	TIE RODS WITH END BRACKETS	2 SET.	SUPPLIED BY BHEL BHOPAL
03	SHOCK ABSORBER WITH END BRACKETS	2 SET.	SUPPLIED BY BHEL BHOPAL



MOISTURE SEPARATOR REHEATER, TYPE-B

MOISTURE SEPARATOR REHEATER, TYPE-A

KEY PLAN

DESIGN DATA

	SHELL & SEP DRAIN TANK	STAGE-I & TUBE BUNDLE REH. COND. TANK	STAGE-II & TUBE BUNDLE REH. COND. TANK
DESIGN CODE	ASME SECTION-VIII DIVISION-1; 2010		
JOINT FACTOR	1.0		
DESIGN PRESSURE	-1/9KG/CM^2(g)	25.0 KG/CM^2(g)	70.0 KG/CM^2(g)
DESIGN TEMPERATURE	* 285 °C 180 °C	225 °C	286 °C
HYDRAULIC TEST PRESSURE	13.5 KG/CM^2(g)	37.5 KG/CM^2(g)	105 KG/CM^2(g)
NON DISTRUCTIVE TEST	BUTT WELD 100 % RADIOGRAPHY FILLET WELD DYE PENETRANT TEST		
POST WELD HEAT TREATMENT	NO	NO	YES

ESTIMATED WEIGHT (EACH MSR)

DRY	180 TONNES (APPROX)
OPERATING	215 TONNES (APPROX)
FLOODED	425 TONNES (APPROX)

DRY WT. EACH ASSY.

		–	–
SEP. DRAIN TANK	4 TONNES (APPROX)	–	–
TUBE-BUNDLE EACH	–	12 TONNES (APPROX)	16 TONNES (APPROX)
REH. COND. TANK	–	3.2 TONNES (APPROX)	3.3 TONNES (APPROX)
LOWER SHELL WITH SEPRATORS UPPER SHELL WITH REHEATERS	55 TONNES (APPROX) 125 TONNES (APPROX)	–	–

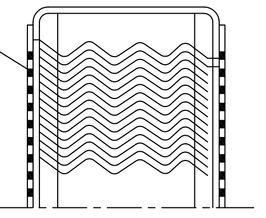
* ONLY FOR UPPER PART OF SHELL.

LIST OF CONNECTIONS / MSR

CONN. REF.	NOM SIZE	END. CONN. DIM. (OD X TK)	END TYPE	DESCRIPTION	NO. OFF	MATERIAL (NOZZLE) ASME	REMARKS
N1	1800	1840 X 20	BW	STEAM INLET	1	SA516 GR.70 + SS TP321 CLADDING	BLANKED
N2	1800	1840 X 20	BW	SUPERHEATED STEAM OUTLET	1	SA516 GR.70	BLANKED
N3	250	273 X 9.27	BW	REHEATER STEAM INLET STAGE-1	1	SA182 GR.F1/F11	BLANKED
N4	250	273 X 12.7	BW	REHEATER STEAM INLET STAGE-2	1	SA182 GR.F1	BLANKED
N5	150	168.3 X 7.11	BW	REH. CONDENSATE OUTLET STAGE-1	1	SA182 GR.F1	BLANKED
N6	200	219.1 X 12.7	BW	REH. CONDENSATE OUTLET STAGE-2	1	SA182 GR.F1	BLANKED
N7	250	273 X 6.35	BW	SEPARATOR DRAIN OUTLET	1	SA182 GR.F1	BLANKED
N8	200	219.1 X 6.35	BW	SHELL DRAIN (COARSE SEPARATOR)	1	SA182 GR.F1	BLANKED
N9A+B	80	--	FLANGED	THERMOCOUPLE WELL	2	SA105 N	WITH BLIND FLANGE
N11.1	100	114.3 X 6.02	BW	PRESSURE BALANCE REH. DRAIN RECEIVER	1	SA182 GR.F1	BLANKED
N11.2	100	114.3 X 8.56	BW	PRESSURE BALANCE REH. DRAIN RECEIVER	1	SA182 GR.F1	BLANKED
N12	250	273 X 6.35	BW	PRESSURE BALANCE MSR DRAIN TANK	1	SA182 GR.F1	BLANKED
N15	25	33.4 X 3.38	BW	RESIDUAL DRAIN-COARSE SEPARATOR	1	SA182 GR.F1	BLANKED
M1+M2	600	--	FLANGED	MANHOLE (SHELL)	2	SA105 N	WITH MANHOLE COVER
M3+M4	400	--	FLANGED	MANHOLE (REHEATER TOP)	4	SA105 N	WITH MANHOLE COVER
M5+M6	400	--	FLANGED	MANHOLE (REHEATER BOTTOM)	4	SA105 N	WITH MANHOLE COVER

NOTES:-

1. FABRICATION TO BE DONE AS PER ASME SEC-VIII DIVN-1; 2010
2. ALL WELDING TO BE DONE BY ASME QUALIFIED WELDERS & APPROVED PROCEDURE ONLY.
3. ALL BUTT WELDS TO BE FULLY RADIAGRAHED AS PER UW-51 OF ASME SEC-VIII DIVISION -1;2010 WHERE FULL RADIOGRAPHY IS NOT POSSIBLE, 100% UT TO DONE AS PER UW-53 OF ASME SEC-VIII DIVISION-1;2010
4. AFTER BACK CHIPPING (BUTT SEAM & NOZZLE JOINTS) AND FINAL WELDING, DYE TESTING TO BE DONE AS PER APPERDIX-8 OF ASME SEC. VIII DIVN-1; 2010
5. REMOVE BURRS & SHARP EDGES.
6. TANKS TO BE SHOT BLASTED AND PAINTING SHOULD BE DONE AS FOLLOWS.
   INTERNAL : NIL (N2 PURGED ONLY).
   EXTERNAL SURFACE :- TWO COATS OF RED OXIDE PRIMER TO AA-56101 ONLY.
7. VESSEL TO BE THOROUGHLY DRAINED AND DRIED AFTER HYDRAULIC TESTING.
8. ALL NOZZLE CONNECTIONS TO BE SUITABLY BLANKED FOR TRANSPORTATION PURPOSE.
9. ALL FITTINGS ARE TO BE SENT LOOSE TO SITE ALONG-WITH THE MAIN EQUIPMENT.
10. MSR-LOWER HALF AND MSR-UPPER HALF SHALL BE DISPATCHED SEPARATELY FROM BHEL WORKS AND SHALL BE WELDED AT SITE.
11. MOISTURE SEPARATOR TYPE-A AND TYPE-B ARE MIRROR IMAGE TO EACH OTHER.
12. FOR DETAIL OF METALLIC STRUCTURE (ON WHICH SHOCK ABSORBER SHALL BE ATTACHED) REFER ALSTOM DRAWING KAPP-3&4/41112/6260/GA. THE SUBJECT STRUCTURE SHALL BE SUPPLIED BY BHEL BHOPAL WHICH SHALL BE BASED ON ALSTOM'S SUBJECT DRAWING.



DETAIL SEPARETOR

LIST OF PARTS

PART	DESCRIPTION	DISCRIPTION ASTM
1	SHELL	SA516 GR.70
2	TORISPHERICAL HEAD	SA516 GR.70
3	SEPARATOR	SA240 TP321
4	REHEATER TUBE SHEET	SA266 Gr.2 WITH SS OVERLAY
5	REHEATER FINNED TUBE	SA268 TP439
6	REHEATER HEADER	SA516 GR.70
7	NOZZLE N1/SHELL SECTION-1	SA516 GR.70+CLADDING SS TP321
8	NOZZLE	SA106 GR.B/SA182 GR.F1/SA516 GR.70
9	INTERNALS	SA240 TP 321
10	GASKET	S.S. SPIRAL WOUND GRAPHITE FILLED
11	BOLTS / NUTS	P-6.6/6, P-8.8/8

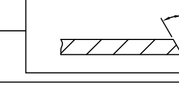
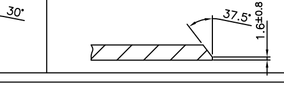
PRESSURE TEST

TUBE BUNDLE : AT BHEL WORKS
SHELL : AT SITE (AFTER ASSEMBLY)

CORROSION ALLOWANCE

CLADDED SHELL :	1.0 MM
NON-CLADDED SHELL :	3.2 MM
INTERNALS AND REHEATER PARTS :	1.0 MM
REHEATER TUBES :	NIL

WELDING PREPARATION FOR NOZZLE CONNECTIONS

WALL THICKNESS ≤ 7MM	WALL THICKNESS > 7MM
	

PURCHASER

NUCLEAR POWER CORPORATION OF INDIA LTD. (NPCIL)

(A GOVERNMENT OF INDIA ENTERPRISE)

PROJECT

2 x 700MW KAKRAPAR ATOMIC POWER PROJECT (UNIT-3)
DIST. SURAT, GUJARAT, INDIA

CONTRACTOR

ALSTOM POWER

BHEL

Revision History

Rev.	Revision Date	Created by	Checked by	Approved by	Description
D	13.02.2012	R.K.MEHER	MLC/SKB	RAJEEV	FOURTH SUBMISSION
E	14.07.2012	R.K.MEHER	MLC/SKB	RAJEEV	FIFTH SUBMISSION
F	05.01.2013	R.K.MEHER	MLC/SKB	RAJEEV	SIXTH SUBMISSION
G	12.01.2013	R.K.MEHER	MLC/SKB	RAJEEV	SEVENTH SUBMISSION

Description Latest Revision : DRAWING REVISED TO MODIFY THE LOCATION OF MSR DRAIN TANK IN KEY PLAN AS INFORMED BY NPCIL VIDE THEIR MAIL DATED 11.01.2013. REVISION MARKED △ THUS.

BHEL Identification Number: 01681040048

Cross Checked (BHEL)

Department	Name	Date	Signature
THERMAL	RAKESH SHRIVASTAVA	12.01.2013	

Replaces	Scale		NPCIL Document Code
-	NTS		KAPP- 3/41100/6001/GA R-6
Responsible dept. CDE-BHEL BHOPAL	Created by R.K. MEHER	Checked by MLC / SKB	Approved by RAJEEV / Format A0

Originator: BHEL

Document Type: GENERAL ARRANGEMENT

Document Status: -

Title, Subtitle: MOISTURE SEPARATOR REHEATER, TYPE-A

ALSTOM Document Code: KKP/03/R/-------A60/EA/001

Rev.	Date	Lang.	Sheet
G	12.01.13	En	1/1

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