



MECHANICAL DESIGN DATA			
CODE	ASME VIII DIV.1 - 2007 Ed. + GOOD ENGINEERING PRACTICE		
U/ STAMP	YES (SEE NOTE-7)		
TEMA TYPE	NEN (SPECIAL)		
SERVICE	UNFIRED STEAM BOILER (SHELL SIDE ONLY)		
WIND / EARTHQUAKE	UBC 1997 / UBC 1997		
SHELL SIDE		TUBE SIDE	
FLUID	WATER/STEAM	PROCESS GAS	
DESIGN PRESS. (int./ext.)	(100/FV) / (689.476/FV)	PSIG / KPAG	(14.1) / (96.528) / (SEE NOTE-9) PSIG / KPAG
DESIGN TEMP.	350 / 176.667	°F / °C	(SEE NOTE-10)
TUBE SHEET PRESS.	216.798 / 1494.77	PSIG / KPAG	(SEE NOTE-11&14)
TUBE SHEET TEMP.	100 / 689.476	°F / °C	
TUBE SHEET TOT CORR.	750 / 389.89	°F / °C	
MAMP @ TEMP.	104.91 @ 350 / (102.85 @ 176.667) PSIG	°F / (°C)	(16 @ 650) / (9.526 @ 350) PSIG / (°C)
MDMT @ MAMP	10 @ 164.99 / (1-17.78 @ 102.85) PSIG	°C / (°F)	10 @ 141 / (17.78 @ 36.526) °F / (°C)
IMPACT TEST	NO		
CORROSION	3.175	MM	3.175 / 1.6 (FOR TUBE ONLY) MM
JOINT EFFICIENCY	1		0.85
RADIOGRAPHY	FULL [AS PER UW-11(a)(3)]	(SEE NOTE-5)	SPOT (SEE NOTE-6)
STRESS RELIEVING	YES [AS PER UW-2(c)]		YES (SEE NOTE-13)
NO. OF PASSES	1		5
INSULATION	YES 75 THK. (SEE NOTE-8)		YES 75 THK. (SEE NOTE-8)

EXPANSION JOINT	
FLANGED & FLUED	NO
BELLOW TYPE	NO
TUBE BUNDLE DATA	
725 NO'S TUBES OF OD 38.1mm AT 57.15mm PITCH	LENGTH 6096 MM
53 NO'S TUBES OF OD 50.8mm AT 69.85mm PITCH	LAYOUT 60°
THK. BWG 12 (MIN.)	JOINT STRENGTH WELD
SURFACE (EFFECTIVE)	M <sup>2</sup>

MATERIALS		
SHELL	CHANNEL	
BARREL	SA 516 GR. 70	BARREL SA 516 GR. 70
GIRTH FLANGES	-	COVER SA 516 GR. 70
NOZZLE FROM PIPE	SA 106 GR. B	NOZZLE FROM PIPE SA 106 GR. B
NOZZLE FROM PLATE	SA 516 GR. 70	NOZZLE FROM PLATE SA 516 GR. 70
NOZZLE FLANGES	SA 105	NOZZLE FLANGES SA 105
COUPLINGS & PLUGS	-	COUPLINGS & PLUGS SA 105
NOZZLE REIN. PAD	SA 516 GR. 70	NOZZLE REIN. PAD SA 516 GR. 70
SADDLE (WEAR / RING PLATE)	SA 36 (SA 516 GR. 70)	SADDLE (WEAR / RING PLATE) SA 36 (SA 516 GR. 70)
LIFTING LUG PAD / LIFTING LUG	SA 516 GR. 70 / SA 36	LIFTING LUG PAD / LIFTING LUG SA 516 GR. 70 / SA 36
INTERNAL	SA 516 GR. 70	PARTITION PLATES SA 516 GR. 70
LINING	-	LINING -

SHELL COVER		FLOATING HEAD	
BARREL	-	COVER	-
FLANGES	-	FLANGES	-
COVER	-	SPLIT RING	-
BOLTS & NUTS		GASKETS	
SHELL/COVER	-	MANWAY	FLEXITALLIC STYLE CG. WITH FLEXITE FILLER
SHELL/CHANNEL	-	CHANNEL/TUBESHEET	-
CHANNEL/COVER	-	CHANNEL/COVER	-
FLOATING HEAD	-	FLOATING HEAD	-

TUBE BUNDLE		WEIGHTS & LOADING DATA	
TUBES & SPACERS	SA 210 GR. A-1 (SMLS)	CONSOLIDATED WEIGHT OF EACH SECTION	TUBE BUNDLE 14,388 KG [APPROX.]
TUBESHEETS	SA 516 GR. 70	FULL OF WATER	37,500 KG [APPROX.]
BAFFLES	SA 36	EARTH QUAKE	MOMENT NM 117,840
TIE RODS	SA 36	LOADING AT BASE (OPERATING CONDITION)	SHEAR N 83,450
		WIND	MOMENT NM 47,180
			SHEAR N 33,410

SURFACE PREPARATION (EXTERNAL)		NOZZLES SCHEDULE	
PRIMER	-	INORGANIC ZINC (75 JJ)	-
INTERMEDIATE COAT	-	-	-
FINISH COAT	-	-	-
SAND BLAST	SA 2 1/2	-	-

- ### GENERAL NOTES
- ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED.
  - ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.
  - REINFORCING PAD ON NOZZLES 10" & SMALLER IN SIZE SHALL HAVE ONE 1/4" NPT TELL TALE HOLE & REINFORCING PAD ON LARGER NOZZLES SHALL HAVE TWO 1/4" NPT TELL TALE HOLES LOCATED 180° APART.
  - EACH SEALED AREA OF REINFORCING PAD SHALL HAVE 1/4" NPT OUTLET. THE INTEGRITY OF THE WELDS ON PAD SHALL BE CHECKED BY DOING AN AIR PRESSURE TEST 50 PSIG & CHECKING FOR LEAKS WITH SOAPY WATER. ON COMPLETION OF THE AIR PRESSURE TEST, TAPPED HOLE SHALL BE FILLED WITH A HEAVY GREASE.
  - ALL BUTT WELDS OF SHELL SIDE BARREL SHALL BE FULLY RADIOGRAPHED.
  - THE FRONT AND REAR CHANNEL COVER PLATES SHALL PREFERABLY BE MADE FROM ONE PLATE. IF MADE BY WELDING OF PLATES, THE SEAM SHALL BE FULLY RADIOGRAPHED.
  - ONLY SHELL SIDE OF THE EXCHANGER SHALL BE "U" STAMPED AS AN UNFIRED STEAM BOILER.
  - ALL OF THE PIPING INCLUDING NOZZLES & FLANGES SHALL BE INSULATED AT FIELD.
  - THE CHANNEL PLATES ARE DESIGNED FOR 3.0 PSIG DIFFERENTIAL PRESSURE AND 750/0 °F TEMPERATURE.
  - THE DESIGN TEMPERATURE FOR INLET & OUTLET CHANNELS IS 750/0 °F AND DESIGN TEMPERATURE FOR TUBES IS 650/0 °F.
  - THE TUBE SIZES ARE NOT TO BE PRESSURE TESTED. ALL TUBE WELDS ARE TO HAVE CLOSE VISUAL INSPECTION.
  - THE EXCHANGER SLOPES 150/15mm PER 3048mm FROM THE INLET END TO THE OUTLET END. THE SADDLES AND ALL VERTICAL NOZZLES ARE TO BE SET PERPENDICULAR TO THE TRUE HORIZONTAL CL. (NOT THE EXCHANGER CL). ALL HORIZONTAL NOZZLES ARE TO BE SET PARALLEL TO THE TRUE HORIZONTAL CL.
  - ALL WELLS TO BE STRESS RELIEVED AS PER NACE MR0175/ISO 15156-2003E1.
  - THE NOZZLES ASSEMBLIES S1-S4 ARE TO BE FABRICATED COMPLETELY, HYDROTESTED AT 150 PSIG & THEN INSTALLED IN OUTLET CHANNELS.
  - NACE MR-0175/ISO-15156 IS APPLICABLE TO TUBESIDE ONLY & NOT REQUIRED FOR SHELL SIDE.

CLIENT REFERENCE DOCUMENTS	
NO	TITLE / DESCRIPTION
01	DATA SHEET FOR SULFUR CONDENSER
02	DATA SHEET FOR REFRACTORY FOR SULFUR CONDENSER
03	SPECIFICATION FOR SHELL & TUBE HEAT EXCHANGER
04	SPECIFICATION FOR PRESSURE VESSELS
05	SPECIFICATION FOR PAINTING
06	SPECIFICATION FOR INSULATION - HOT SERVICES

MARK	D.N. (INCH)	RATING	TYPE	FAC.	SCH/THK. (MM)	R. PAD DIA X THK. (MM)	PROJ. SHELL OUT SIDE (MM)	SERVICE	REMARKS
A	600 (24")	150	SO	RF	-/12	-	SEE DWG	1st COND. PASS INLET	-
B1	400 (16")	150	SO	RF	-/14	506 x 10	203	2nd COND. PASS INLET	-
B2	400 (16")	150	SO	RF	-/12	-	SEE DWG	3rd COND. PASS INLET	-
B3	400 (16")	150	SO	RF	-/14	506 x 10	203	4th COND. PASS INLET	-
C	400 (16")	150	SO	RF	-/14	881 x 10	SEE DWG	1st COND. PASS OUTLET	-
D1	400 (16")	150	SO	RF	-/14	881 x 10	SEE DWG	2nd COND. PASS OUTLET	-
D2	400 (16")	150	SO	RF	-/14	606 x 10	203	3rd COND. PASS OUTLET	-
D3	400 (16")	150	SO	RF	-/14	836 x 10	203	4th COND. PASS OUTLET	-
E	50 (2")	150	WN	RF	160/-	-	169	INTERMITTENT BLOWDOWN	-
F1-F2	50 (2")	300	WN	RF	160/-	-	169	RELIEF	-
G	600 (24")	150	WN	RF	-/14	1020 x 14	SEE DWG	MANWAY	WITH DAVIT ARM
H1-H3	80 (3")	150	WN	RF	160/-	190 x 14	169	LEVEL BRIDLE	-
H2-H4	80 (3")	150	WN	RF	160/-	190 x 14	SEE DWG	LEVEL BRIDLE	-
N	20 (3/4")	150	WN	RF	XXS/-	-	SEE DWG	SURFACE BLOWDOWN	-
P	250 (10")	150	SO	RF	60/-	473 x 10	198	PREHEAT PASS INLET	-
R	250 (10")	150	SO	RF	60/-	383 x 10	198	PREHEAT PASS OUTLET	-
S1-S4	80 (3") X 100 (4")	150	3" BLIND RF	40/-X 80/-	690 x 10	SEE DWG	SULFUR OUTLET	-	
T	50 (2")	150	WN	RF	160/-	-	SEE DWG	BFW INLET	-
U	250 (10")	150	WN	RF	80/-	433 x 14	169	STEAM OUTLET	-
V1-V4	150 (6")	150	STUD	-/63.5	-	-	-	INSPECTION OPENING	WITH BLIND FLANGE
W1-W4	600 (24")	150	SO	RF	-/14	-	SEE DWG	MANWAY	WITH PLATE FLANGE
X	80 (3")	150	WN	RF	160/-	201 x 14	173	CONDENSATE RETURN	-
Y1-Y4	20 (3/4")	6000	HALF (PLNG (DRD))	-	-	-	-	JACKET STEAM INLET	SPECIAL FITTING
Z1-Z4	20 (3/4")	6000	HALF (PLNG (DRD))	-	-	-	-	JACKET STEAM OUTLET	SPECIAL FITTING

SR.NO.	DESCRIPTION	DRAWING NO.
08	STANDARD TOLERANCE DRAWING	XIS-STD-001
07	DEMISTER SUPPORTS DETAIL FOR (E-1902)	1029-09-04-DR-015 SHEET 7 OF 7
06	NAME PLATE WITH BRACKET DETAIL FOR (E-1902)	1029-09-04-DR-015 SHEET 6 OF 7
05	SADDLE AND INSULATION SUPPORT DETAILS FOR (E-1902)	1029-09-04-DR-015 SHEET 5 OF 7
04	HORIZONTAL DAVIT ARM DETAIL NPS 24" FOR MANHOLE 150# (E-1902)	1029-09-04-DR-015 SHEET 4 OF 7
03	REAR CHANNEL DIVIDER PLATES DETAIL FOR (E-1902)	1029-09-04-DR-015 SHEET 3 OF 7
02	BODY AND NOZZLE DETAILS FOR (E-1902)	1029-09-04-DR-015 SHEET 2 OF 7
01	TUBES LAYOUT AND BUNDLE DETAILS FOR (E-1902)	1029-09-04-DR-015 SHEET 1 OF 7

REV. NO.	DESCRIPTION	DATE	DRAWN	CHKD	APPD	CHKD	APPD
3	AS BUILT AS MARKED	06-10-09	SHB NAQVI	SN	SN		
2	REVISED AS MARKED	01-09-09	SHB NAQVI	SN	SN		
1	REVISED AS MARKED	14-07-09	SHB NAQVI	SN	SN		
0	ISSUED FOR FABRICATION	15-04-09	SHB NAQVI	SN	ARS		

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PROJECT:	SULFUR RECOVERY UNIT FOR DAKHNI EXPANSION PROJECT		
TITLE:	G.A OF SULFUR CONDENSER (E-1902)		
DRAWING NUMBER:	1029-09-04-GA-015		
DRAWN	CHECKED	APPROVED	DATE
MAT	SN	ARS	17/09/2008
SCALE	40 Sheet, A1		SHEET
			1 OF 1