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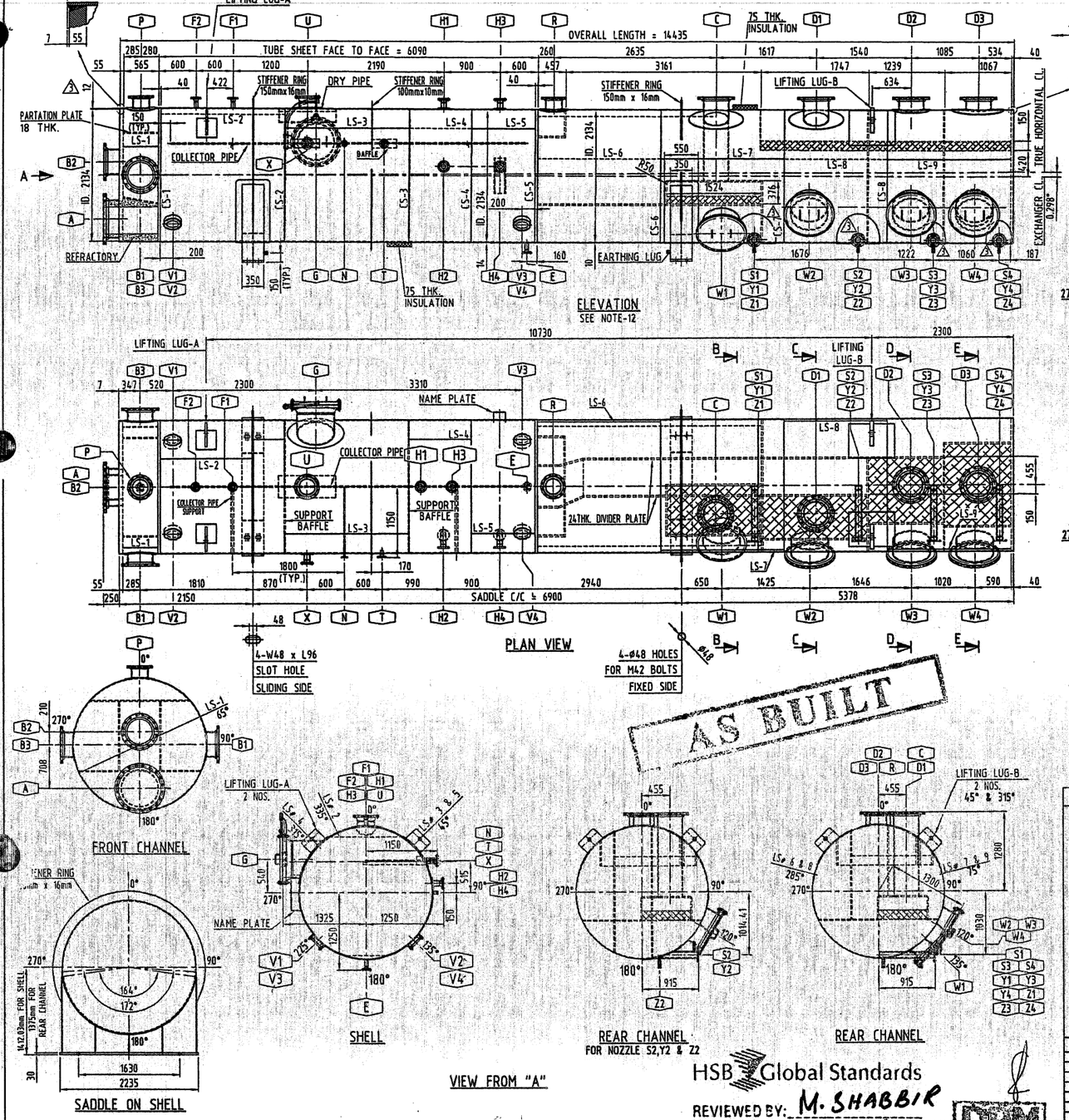

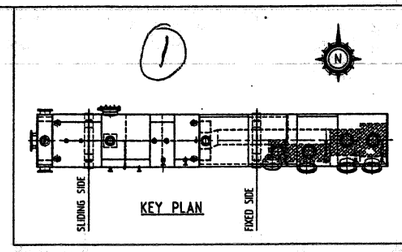

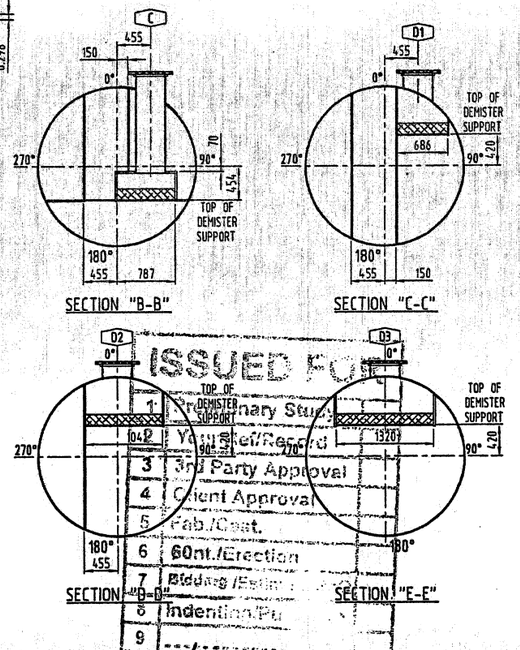

ISSUED FOR
1 Preliminary Stud
2 Yard Rel/Record
3 3rd Party Approval
4 Client Approval
5 Fab./Const.
6 Const./Erection
7 Bidding/Estim
8 Indenting/Pu
9
10
Issue 62-180049
Date 8.8.OCT 2008

AS BUILT

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/-) / (96.526/-) (SEE NOTE-9) PSIG / KPAG
DESIGN TEMP.	350 / 176.667 °F / °C	(SEE NOTE-10) °F
TEST PRESSURE	216.798 / 1494.77 PSIG / KPAG	(SEE NOTE-11&14) PSIG
TUBESHEET PRESS.	100 / 689.476 PSIG / KPAG	
TUBESHEET TEMP.	750 / 389.89 °F / °C	
TUBESHEET TOT.CORR.	6.35 MM	
MAWP @ TEMP	(164.191 @ 350)/(1132.05 @ 176.667)PSIG @ °F/(KPAG @ °C)	(14 @ 650)/(96.526 @ SEE NOTE-10) (PSIG @ °F)/(KPAG @ °C)
MDMT @ MAWP	(0 @ 164.191) / (-17.778 @ 1132.05)°F @ PSIG)/(°C @ KPAG)	(0 @ 14)/(-17.778 @ 96.526) °F @ PSIG)/(°C @ KPAG)
IMPACT TEST	NO	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.) MM	JOINT	STRENGTH WELD
SURFACE (EFFECTIVE)	528.9 M²		

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 REINF. PAD	SA 516 GR. 70	NOZZLE REINF. 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
INTERNALS	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/COVER	-	CHANNEL/TUBESHEET	-
FLOATING HEAD	-	CHANNEL/COVER	-
		FLOATING HEAD	-
TUBE BUNDLE		WEIGHTS & LOADING DATA	
TUBES & SPACERS	SA 210 GR. A-1 (SMLS)		
TUBESHEETS	SA 516 GR. 70		
BAFFLES	SA 36		
TIE RODS	SA 36		

WEIGHTS & LOADING DATA		
CONSOLIDATED WEIGHT OF EACH SECTION	TUBE BUNDLE	14,388 KG (APPROX.)
	TOTAL DRY	37,500 KG (APPROX.)
	FULL OF WATER	87,500 KG (APPROX.)
LOADING AT BASE (OPERATING) CONDITION	EARTH QUAKE	MOMENT N.M 117,840
		SHEAR N 83,450
	WIND	MOMENT N.M 47,180
		SHEAR N 33,410

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

NOZZLES SCHEDULE

MARK	D.N. (INCH)	FLANGES RATING	FLANGES TYPE	FLANGES 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 COUPLING (THRD.)		-	-	-	JACKET STEAM INLET	SPECIAL FITTING
Z1-Z4	20 (3/4")	6000	HALF COUPLING (THRD.)		-	-	-	JACKET STEAM OUTLET	SPECIAL FITTING

GENERAL NOTES

1- ALL DIMENSIONS ARE IN mm, UNLESS OTHERWISE SPECIFIED.
2- ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.
3- REINFORCING PAD ON NOZZLES 11" & 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 HOLE LOCATED 180° APART.
4- 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.
5- ALL BUTT WELDS OF SHELL SIDE BARREL SHALL BE FULLY RADIOGRAPHED.
6- THE FRONT AND REAR CHANNEL COVER PLATES SHALL PREFERABLY MADE FORM ONE PLATE. IF MADE BY WELDING OF PLATES, THE SEAM SHALL BE FULLY RADIOGRAPHED.
7- ONLY SHELL SIDE OF THE EXCHANGER SHALL BE "U STAMPED" AS AN UNFIRED STEAM BOILER.
8- ALL OF THE PIPING INCLUDING NOZZLES & FLANGES SHALL BE INSULATED AT FIELD.
9- THE CHANNEL PLATES ARE DESIGNED FOR 3.0 PSIG DIFFERENTIAL PRESSURE AND 350/0 °F TEMPERATURE.
10- THE DESIGN TEMPERATURE FOR INLET & OUTLET CHANNELS IS 350/0 °F AND DESIGN TEMPERATURE FOR TUBES IS 650/0 °F.
11- THE TUBE SIDES ARE NOT TO BE PRESSURE TESTED. ALL TUBE WELDS ARE TO HAVE CLOSE VISUAL INSPECTION.
12- THE EXCHANGER SLOPES 150.75mm PER 30480mm 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.
13- ALL WELDS TO BE STRESS RELIEVED AS PER MACE #H0175/ISO 15156 2003(E).
14- THE NOZZLES ASSEMBLIES S1-S4 ARE TO BE FABRICATED COMPLETELY, HYDROTESTED AT 150 Psig & THEN INSTALLED IN OUTLET CHANNELS.
15- MACE HR-0175/ISO-15156 IS APPLICABLE TO TUBESIDE ONLY & NOT REQUIRED FOR SHELL SIDE.

CLIENT REFERENCE DOCUMENTS

NO	TITLE / DESCRIPTION	DRAWING / DOC. NO
01	DATA SHEET FOR SULFUR CONDENSER	1029-09-04-DS-007 (REV. 1)
02	DATA SHEET FOR REFRACTORY FOR SULFUR CONDENSER	1029-09-04-DS-004 (REV. 0)
03	SPECIFICATION FOR SHELL & TUBE HEATEXCHANGE	4900-EA-5503 (REV-1)
04	SPECIFICATION FOR PRESSURE VESSELS	4900-VA-3002 (REV-1)
05	SPECIFICATION FOR PAINTING	4900-GS-9502 (REV-0)
06	SPECIFICATION FOR INSULATION - HOT SERVICES	4900-PA-2012 (REV-0)

SR.NO.	DESCRIPTION	DRAWING NO.
08	STANDARD TOLERANCE DRAWING	X15-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 PLATEDS 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

REFERENCE DRAWINGS

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		
				DESCON		PDIL	

HSB Global Standards

REVIEWED BY: M. SHABBIR

SIGNATURE: M. Shabbir

DATE: 19/10/2009

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CLIENT REFERENCE	PRO-FC/CB/DKN/EXP-1882/2007
DESCON PROJECT NO.	6218
PDIL PROJECT NO.	1029

PROJECT: SULFUR RECOVERY UNIT FOR DAKHNI EXPANSION PROJECT

TITLE: G.A OF SULFUR CONDENSER (E-1902)

DRAWING NUMBER:	REV.
1029-09-04-GA-015	3

DRAWN	CHECKED	APPROVED	SCALE	DATE	SHEET
MAT	SN	ARS	(40 Sheet, A1)	17/09/2008	1 OF 1

0800-EN-04-FRM-004