MEG ENERGY	**CHRISTINA LAKE REGIONAL PROJECT** **Phase 3A EPC for Central Plant Facilities** **SLI Project No. 511036**	SNC·LAVALIN

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Vendor's drawing review for conformity with specifications and design drawing.

This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract.

☐ A1	Not suitable to initiate fabrication. modify as noted, resubmit for review
☐ B1	Suitable to initiate fabrication as noted. modify as noted, resubmit for review
☐ C1	Suitable to fabricate to completion as noted. submit final documents including as-builts as required
☒ D1	Suitable to fabricate to completion. submit final documents including as-built documents as required
☐ E1	Not suitable as final documents as noted. modify as noted and resubmit.
☐ F1	Suitable as final documents. no further resubmittal required (unless revised by vendor)
☐ VX	Vendor document cancelled.

Vendor: Sewon Cellontech Co. Ltd. - P00007	No.:E0351-3AE102-D-02	Rev:4
Doc. Title:	H00.01 - GENERAL ASSEMBLY (2/2) - Tag:3A-E-102A/B	
Client Code:	Project No: 511036	Date Rec'd: 2014/08/14
Reviewed by: SS Date: 26-Aug-2014	Document No: P-5310-01-0004	Submittal: 05

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE NOTED.
2. ALL FLANGE BOLT HOLES ARE TO STRADDLE THE NORTH/SOUTH AND VERTICAL CENTER LINES.
3. NOZZLE PROJECTIONS ARE FROM CENTER LINE OF H/EX. OR NEAREST TANGENT LINE TO GASKET CONTACT SURFACE OF FLANGE.
4. ALL WELDS TO BE CONTINUOUS EXCEPT NOTED.
5. FLANGE SHALL BE AS PER ASME B16.5(2009) UNLESS OTHERWISE STATED.
6. GASKET SEATING SURFACE SHALL BE AS FOLLOWS:
   1) FOR NOZZLE FLANGE : ASME B16.5
      - SPIRAL WOUND GASKET : Ra 3.2~6.3 μm(125~250 μinch). WITH SPIRAL SERRATION.(▽▽)
   2) FOR GIRTH FLANGE & TUBE SHEET :
      - DOUBLE MAETAL JACKET GASKET : Ra 1.6~3.2 μm(63~125 μinch).(▽▽▽)
7. BASE LINE (B.L) MEANS GASKET CONTACT SURFACE OF TUBE SHEET.

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9. FOLLOWING DOCUMENTS ARE APPLIED TO FABRICATION & INSPECTION
   1) WPS AND PQR REFER TO E0351-COM-P-08
   2) ALL CUSTOMER SPEC. LISTED IN MATERIAL REQUISITION (MR).
10. ALL MATERIALS AND WELDER IDENTIFICATION SHALL BE WITH LOW STRESS STAMPS.
11. ALL NOZZLES SHALL BE GROUND SMOOTH AND FLUSH WITH THE INTERNAL H/EX. SURFACE.
12. NOZZLE REPADS 10" NPS AND SMALLER SHALL HAVE ONE 1 1/4" WEEP HOLE. NOZZLE REPADS, GREATER THAN 10" NPS SHALL HAVE TWO 1/4" WEEP HOLES, 180° APART. ALL WEEP HOLES SHALL BE EQUIPPED WITH 1/4" NIPPLES THAT PROTRUDE 1" BEYOND THE INSULATION.
13. DIMENSIONED TOLERANCES SHALL CONFORM TO ASME CODE REQUIREMENTS.
14. THE REQUIREMENTS OF IMPACT TEST FOR MATERIALS SHALL BE FOLLOWED. TEST SPECIMENS SHALL BE PROVIDED IN COMPLETE HEAT-TREATED CONDITION.
    1) TEST TEMPERATURE : a) -20°F [-29°C] FOR H/EX. BODY
       b) -49°F [-45°C] FOR SADDLE, LIFTING LUG
    2) TEST SPECIMENS : AS PER ASTM A370 MINIMUM 3 SETS PER HEAT.
    3) IMPACT ENERGY :
       A) AS PER UG-84
    4) APPLICABLE MATERIALS :
       A) FOR SHELL & HEADS WITH REINF. PAD, SA516-70N : THE MATERIAL SHALL BE USED WITH NORMALIZED SA516-70 MARKED AS "N" TO EXEMPT FROM IMPACT TEST (NORMALIZED SA516-70 PLATES CLASSIFIED AS CURVE D ARE EXEMPTED AS PER FIG UCS-66)

UCS-66	MDMT -29°	MATERIAL
CURVE B	~ ≤ 9.5MM	SA516-70
CURVE D	9.6MM ≤ 32.5MM	SA516-70N
	32.6MM ≤ ~	SA516-70N+I.T

       B) FOR STANDARD FLANGE, SA105N : THE MATERIAL IS EXEMPTED AS PER UCS-66
       C) FOR PIPE, SA106-B (TH'K ≤ 25mm) : THE MATERIAL IS EXEMPTED AS PER UG-20(F)
       D) FOR SADDLE SUPPORT, SA516-70N : THE MATERIAL SHALL BE USED WITH NORMALIZED SA516-70 MARKED AS "N" TO EXEMPT FROM IMPACT TEST (NORMALIZED SA516-70 PLATES CLASSIFIED AS CURVE D ARE EXEMPTED AS PER FIG UCS-66)

UCS-66	MDMT -45°C	MATERIAL
CURVE D	~ ≤15.1MM	SA516-70N
	15.2MM ≤ ~	SA516-70N+I.T

       E) FOR GIRTH FLANGES : EXEMPT FROM IMPACT TESTING PER UG-20(f) & UCS-66
       F) FOR TUBESHEET, CHANNEL COVER : IMPACT TESTING AT -29°C
15. FOR TUBESIDE ONLY, HARDNESS REQUIREMENTS FOR ALL PRESSURE PARTS AND ATTACHMENTS. PRODUCTION HARDNESS TESTING SHALL BE PERFORMED FOR CARBON STEEL WELDS HAZ. AND BASE METAL AS PER ASTM E-10. MAX. HARDNESS SHALL NOT EXCEED 200 HBW & TESTING SHALL BE AS PER 13.4.6 OF MEG-ENG-MEC-SP-4201.
16. FOR SHELLSIDE ONLY, HARDNESS REQUIREMENTS FOR ALL PRESSURE PARTS AND ATTACHMENTS. HARDNESS TESTING SHALL MEET REQUIREMENT IN 10.2.5 OF API 660.
17. WPS/PQR TO HAVE QUALIFICATION MATERIAL WITH SAME P NO.
18. H/EX. SHALL BE FOLLOWING THE INSPECTION STAMP AND REGISTRATION;

ASME "U" STAMP	NATIONAL BOARD REGISTRATION	◇P.ENG STAMP	ABSA REGISTRATION WITH CRN
1) ALL DRAWINGS 2) ALL CALCULATION 3) WPS & PQR	YES	1) ALL DRAWINGS 2) ALL CALCULATION	1) ALL DRAWINGS 2) ALL CALCULATION

19. NDE INSPECTION REQUIREMENTS
    1) 100% RT FOR ALL BUTT WELD IN ACCORDANCE WITH ASME SEC. V AND ASME SEC. VIII DIV.1 UW-51 BEFORE AND AFTER PWHT.(TUBESIDE ONLY)
    2) 100% UT FOR ALL CUT "D" IN ACCORDANCE WITH ASME SEC. V AND ASME SEC. VIII DIV.1 UW-53 BEFORE AND AFTER PWHT.(TUBESIDE ONLY)
    3) 100% MT FOR ALL ATTACHMENT WELDS (INTERNAL & EXTERNAL) IN ACCORDANCE WITH ASME SEC. V AND ASME SEC. VIII DIV.1 APPENDIX 6. BEFORE AND AFTER PWHT
    4) 100% MT FOR ALL EDGES PREPARED FOR WELDING INCLUDING BACK GOUGES. IN ACCORDANCE ASME SEC. VIII DIV.1 APPENDIX 6. AND ASME SEC. V
    5) EXPANSION JOINT SHALL APPLY AS FOLLOWING :
       a) 100% RT EXAMINATION OF CIRCUMFERENTIAL WELDS IN EXPANSION JOINT
       b) 100% RT EXAMINATION OF WELDS CONNECTING EXPANSION JOINT TO THE SHELL
20. HYDROTEST WATER SHALL BE CLEAN WATER WITH LESS THAN 250ppm CHLORIDE CONTENT. HYDROTEST PRESSURE SHALL BE MAINTAINED FOR A MINIMUM OF 60MINUTES HYDROTEST WATER TEMP. AT A MINIMUM OF 5°C
    (수압물은 계곡천 물과 염화물 함유량 250ppm보다 작은 물로 사용하고 수압은 최소 60분유지하고 수압 온도는 최소 5°C임)
21. UPON COMPLETION OF HYDROTEST, VESSEL SHALL BE COMPLETELY DRAINED OF ALL WATER, AIR DRIED, AND CLEANED
    (수압 테스트 끝난 후 모든 수압물을 완벽히 제거한 뒤 공기로 건조시킨 뒤 폐쇄하게 유지되어야 한다.)
22. FOR SHIPMENT/SITE STORAGE, NITROGEN PURGE SYSTEM ON BOTH SHELL AND TUBE SIDE.
    (출하/ 싸이트 보관을 위해서, SHELL SIDE와 TUBE SIDE에 질소 충전 할것.)
23. ALL WELDED ATTACHMENTS PROVIDED WITH WEEP HOLES, SHALL BE SOAP TESTED AT 175Kpag(1.78kg/cm^2) PRIOR TO HYDROSTATIC TEST.
    (수압 테스트 전에 보강 패드에 가등 테스트를 1.78kg/cm^2 할 것.)
24. FOR ELECTRICAL HEAT TRACING(AS PER SPEC. MEG-ENG-ELE-SP-0501)
    1) APPROVED EHT MANUFACTURER : TYCO THERMAL CONTROLS ◇4
    2) VOLTAGE OF 277 VAC
    3) HOLD TEMPERATURE OF 10°C. CSA APPROVAL IS REQUIRED FOR ELECTRIC COMPONENTS AND INSTALLATION. LOCATED IN HAZARDOUS AREA CLASS 1, ZONE 2.
25. FOR INSULATION(AS PER SPEC. MEG-ENG-MEC-SP-1102)

THICKNESS	MATERIAL
64MM	MINERAL FIBER

26. FOR SURFACE PREPARATION AND PAINTING(AS PER SPEC. MEG-ENG-MEC-SP-1101)

PART	INSUL.	OPERATING TEMP(°C)	COATING NO.	SURFACE PREPARATION	PRIMER COAT PRODUCT NAME DFT (MICRON)	FINISH COAT PRODUCT NAME DFT (MICRON)	TOTAL DFT (MICRON)	FINISH COLOR
SHELL,HEAD T/S, HEAD NOZZLE	YES	98.3 ~ 136.3	P10	SP-05	EPOXY AMINE 50-75 (Avg.)	EPOXY AMINE 100-150 (Avg.)	150-225 (Avg.)	LIGHT GREY
SADDLE	NO	-	P08	SP-05	POLYAMIDE EPOXY 38-62(Avg.)	POLYAMIDE EPOXY 100-150 (Avg.)	138-212 (Avg.)	LIGHT GREY

27. FOR GIRTH FLANGE BOLTING OF 1 1/2" DIAMETER AND LARGER, THE STUB FOR THE GIRTH FLANGE SHALL BE USED A BOLT TENSIONING TOOL(AS PER PARA.7.8.7 OF MEG-ENG-MEC-SP-5201)
    (1 1/2" 볼트부터 볼트 텐셔너를 사용)

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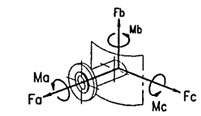
29. SIMULATION TEST FOR HEAT TREATMENT
    1) ALL WPS WITH PWHT SHALL BE QUALIFIED WITH AT LEAST TWO TIMES OF THE TIME USED FOR FABRICATION. (AS PER PARA.6.8 OF MEG-ENG-MEC-SP-1201)
       (WPS는 제작동안 열처리를 위해서 적어도 2배이상 시뮬에이션 테스트 되어야 한다)
    2) FOR TUBESIDE SHELL PLATE ONLY, SUPLEMENTARY REQUIREMENT S3 OF ASTM A20 IN THE PLATE PURCHASE ORDER. THE TEST COUPON SHALL UNDERGO THREE TIMES PWHT CYCLES, HEATING RATE, COOLING RATE, HOLDING TIME SHALL BE THE SAME AS PRODUCTION.
       (열처리가 되는 철판은 철판 주문시 시뮬에이션 테스트를 3배 적용)
    3) CARBON STEEL MATERIAL(P NO.1) OF FORGING, FLANGE, PIPE, FITTING, ETC IS NOT REQUIRED THE SIMULATION TEST FOR HEAT TREATMENT AS PER UCS-85(f)
30. POSTWELD HEAT AND STRESS RELIEF TREATMENT CONDITIONS.

MAX. TH'K [mm]	HOLDING TIME (HOURS)	MAX. HEAT RATE °F[°C]/HR	MAX. COOL RATE °F[°C]/HR	HOLDING TEMP. °F [°C]**	APPLICATION PART
SEE DWG	MIN. 1	431.6 [222]	532.4 [278]	1150~1200 [622~649]	ALL PART ON THE PRESSURE BOUNDRY WELDS

    ** AS PER PARA.21.6 OF MEG-ENG-MEC-SP-1201
31. STRESS RELIEF AFTER FORMING (PER UCS-79) : MIN. 600°C (OR NO.30 ABOVE FOR SHELL SIDE / PER NO.30 ABOVE FOR TUBE SIDE)
    (포밍 후 열처리는 UCS-79따라 적용)
32. IN SOUR SERVICE(AS PER PARA.13 OF MEG-ENG-MEC-SP-4201)
    1) THE MATERIAL AND FABRICATION OF H/EX. SHALL COMPLY WITH THE REQUIREMENTS OF NACE MR0175-2002
    2) ALL PRESSURE PARTS AND ATTACHMENTS SHALL COMPLY WITH THE FOLLOWING RESTRICTIONS
       (1) PROPERTIES: THE CARBON EQUIVALENT SHALL NOT BE GREATER THAN 0.44 AND SHALL BE CALCULATED BASED ON THE FOLLOWING FORMULA. CE=C+MN/6+(Cr+Mo+V)/5+(Ni+Cu)/15
       (2) MATERIAL HARDNESS NOT TO EXCEED 200 HBW.
    3) ALL INTERNAL ATTACHMENTS SHALL BE WELDED WITH FULL PENETRATION ON THE BASE METAL OF THE PRESSURE ENVELOPE.
    4) CARBON STEEL SHALL BE PWHT AS PER NOTE 30 ABOVE.
    5) NDE SHALL BE APPLIED AS PER PARA.13.4 OF MEG-ENG-MEC-SP-4201
    6) PLATES OVER 12mm THICK FOR VESSELS IN SOUR SERVICE SHALL BE ULTRASONICALLY EXAMINED FOR LAMINATIONS AND DEFECTS. THE INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH ASME SECTION II PART A, SA-578 SPECIFYING A 75 mm GRID. ACCEPTANCE CRITERIA SHALL BE IN ACCORDANCE WITH LEVEL C.
33. EXCHANGER SHELL BODY SHALL BE 1% SLOPED TO THE TUBE SIDE OUTLET TO FACILITATE TUBE SIDE CONDENSING. ALL FLANGE FACES SHALL BE HORIZONTAL. EXCEPT, BLIND FLANGE NOZZLE V1~V3, D1~D3, T3, T4
    [열교환기를 TUBE SIDE OUTLET NOZZLE 방향으로 1% 경사지게 제작, 단 BLIND FLANGE가 있는 V1~V3, D1~D3, T3, T4 NOZZLE은 제외-(중심 C.L으로 제작)]
34. NDE REPORTS WILL BE APPROVED BY SNT-TC-1A, LEVEL III PERSONNEL. IN ADDITION, NDE PERSONNEL ARE QUALIFIED TO SNT-TC-1A AS PER PARA 6.21 OF MEG-ENG-MEC-SP-1201
35. FLANGE JOINTS(SHELL COVER/SHELL, SHELL/CHANNEL & CHANNEL/CHANNEL COVER) SHALL BE PROVIDED WITH SOFT REMOVABLE COVERS AS SPECIFIED IN MEG-ENG-MEC-SP-1102
36. APPLICABLE PURCHASER SPECIFICATIONS

NO.	DOCUMENT NO.	REV.	TITLE
1	MEG-ENG-MEC-SP-5201	0	SPECIFICATION FOR SHELL AND TUBE HEAT EXCHANGERS
2	MEG-ENG-MEC-SP-1201	0	PIPING AND EQUIPMENT WELDING SPECIFICATION
3	MEG-ENG-MEC-SP-4201	0	SPECIFICATION FOR PRESSURE VESSELS
4	MEG-ENG-MEC-SP-1101	0	SPECIFICATION FOR PAINTING AND PROTECTIVE COATING
5	MEG-ENG-MEC-SP-1102	0	GENERAL SPECIFICATION FOR INSULATION
6	MEG-ENG-MEC-SP-1205	0	ALLOWABLE NOZZLE LOADS FOR MECHANICAL EQUIPMENT
7	MEG-ENG-ELE-SP-0501	0	ELECTRICAL HEAT TRACING SPECIFICATION
8	MEG-ENG-MEC-SP-1104	0	PROTECTION OF GOODS DURING SHIPMENT
9	SP-CL03A-Q-050-0001	1	SITE-SPECIFIC ENVIRONMENTAL DATA

37. FOR INTEGRAL TUBE SHEET, TENSION TEST SHALL BE PERFORMED AS PER UW-13(f)(1).
38. SA325 ANCHOR BOLTS WHICH ARE DESIGNED FOR SUPPORTS ARE SUPPLIED BY OTHERS.



MAXIMUM ALLOWABLE NOZZLE LOADS						
NOZZLE	Fa (N)	Fb (N)	Fc (N)	Ma (Nm)	Mb (Nm)	Mc (Nm)
S1 (12")	10680	13080	13080	18830	13310	13310
S2 (12")	10680	13080	13080	18830	13310	13310
T1 (16")	16500	20190	20190	31700	22410	22410
T2 (12")	10680	13080	13080	18830	13310	13310

MAXIMUM FOUNDATION LOADING DATA ◇4				
WEIGHT (Kg/Set)		EMPTY	OPERATING	TEST
		35790	44190	47110
WIND LOAD	SHEAR (N)	18682	18682	6165
	MOMENT (N-mm)	17187072	17187072	5671734
SEISMIC LOAD	SHEAR (N)	68879	85045	
	MOMENT (N-mm)	63368680	78241455	

FOR APPROVAL ASME-U

REFERENCE DRAWING

1. GENERAL ASSEMBLY (1/2) E0351-3AE102-D-01

REV.	DATE	DESCRIPTIONS FOR REVISION	DRW'N	CHK'D	REV'D	APP'D
◇4	2014 07.31	REVISED AS MARKED	B.C.CHIN	J.W.KIM 08.01.2014		H.U.KOO 08.01.2014
◇3	2013 11.25	REVISED AS MARKED	B.C.CHIN	J.W.KIM 11.26.2013		H.U.KOO 11.26.2013
◇2	2013 10.17	REVISED AS MARKED	B.C.CHIN	J.W.KIM 10.18.2013		H.U.KOO 10.18.2013
◇1	2013 08.21	REVISED AS MARKED	B.C.CHIN	J.W.KIM 08.22.2013		H.U.KOO 08.22.2013
◇0	2013 07.08	FOR APPROVAL	B.C.CHIN	J.W.KIM 07.09.2013		H.U.KOO 07.09.2013

PROJECT: CLRP PHASE 3A CENTRAL PLANT FACILITY: EPC

CUSTOMER: MEG ENERGY CORP.

CLIENT: SNC-LAVALIN — SNC ◆ LAVALIN INC.

TITLE: PRODUCED GAS/GLYCOL EXCHANGER
3A-E-102A/B — GENERAL ASSEMBLY (2/2)

ISSUE DATE: 2014. 08. 14

SEWON CELLONTECH CO.,LTD.
CHANGWON, KOREA

OWNER JOB NO.	PROJECTION METHOD	SCALE
511036	THIRD ANGLE PROJECTION	SEE DWG.
P/O NO. P-5310-01	OWNER DWG. NO. -	
SEWON JOB NO. E-0351	SEWON DWG. NO. E0351-3AE102-D-02	WORKS C ◇4