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|  MEG ENERGY | | CHRISTINA LAKE REGIONAL PROJECT Phase 3A EPC for Central Plant Facilities SLI Project No. 511036 | |  SNC-LAVALIN | |
|  SNC-LAVALIN | | <input type="checkbox"/> A1 Not suitable to initiate fabrication. modify as noted, resubmit for review <input type="checkbox"/> B1 Suitable to initiate fabrication as noted. modify as noted, resubmit for review <input type="checkbox"/> C1 Suitable to fabricate to completion as noted. submit final documents including as-builts as required <input checked="" type="checkbox"/> D1 Suitable to fabricate to completion. submit final documents including as-built documents as required <input type="checkbox"/> E1 Not suitable as final documents as noted. modify as noted and resubmit. <input type="checkbox"/> F1 Suitable as final documents. no further resubmittal required (unless revised by vendor) <input type="checkbox"/> VX Vendor document cancelled. | | | |
| 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. | | | | | |
| Vendor: Sewon Cellontech Co. Ltd. - P00007 | | No.: E0351-3AE105-D-03 | | Rev: 4 | |
| Doc. Title: | H00.01 - GENERAL ASSEMBLY (3/3) - Tag:3A-E-105A/B | | | | |
| Client Code: | | Project No: 511036 | | Date Rec'd: 2014/08/14 | |
| Reviewed by: SS Date: 26-Aug-2014 | | Document No: P-5310-01-0010 | | Submittal: 05 | |

GENERAL NOTES

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

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9. FOLLOWING DOCUMENTS ARE APPLIED TO FABRICATION & INSPECTION

- WPS AND PQR REFER TO E0351-COM-P-08
- ALL CUSTOMER SPEC. LISTED IN MATERIAL REQUISITION (MR).

- ALL MATERIALS AND WELDER IDENTIFICATION SHALL BE WITH LOW STRESS STAMPS.
- ALL NOZZLES SHALL BE GROUND SMOOTH AND FLUSH WITH THE INTERNAL H/EX. SURFACE.
- 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.
- DIMENSIONED TOLERANCES SHALL CONFORM TO ASME CODE REQUIREMENTS.

- THE REQUIREMENTS OF IMPACT TEST FOR MATERIALS SHALL BE FOLLOWED.
TEST SPECIMENS SHALL BE PROVIDED IN COMPLETE HEAT-TREATED CONDITION.
 - TEST TEMPERATURE : a) -20°F [-29°C] FOR H/EX. BODY
b) -49°F [-45°C] FOR SADDLE, LIFTING LUG

- TEST SPECIMENS : AS PER ASTM A370 MINIMUM 3 SETS PER HEAT.
- IMPACT ENERGY :
 - AS PER UG-84

4) APPLICABLE MATERIALS :

- 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+1T |

- FOR STANDARD FLANGE, SA105N : THE MATERIAL IS EXEMPTED AS PER UCS-66

- FOR PIPE, SA106-B (THK ≤ 25mm) : THE MATERIAL IS EXEMPTED AS PER UG-20(F)

- 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+1T |

- FOR GIRTH FLANGES, FLOATING HEAD FLANGE : EXEMPT FROM IMPACT TESTING PER UG-20(F) & UCS-66

- FOR TUBESHEET, FLOATING TUBESHEET : IMPACT TESTING AT -29°C

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- HARDNESS REQUIREMENTS FOR ALL PRESSURE PARTS AND ATTACHMENTS.
HARDNESS TESTING SHALL MEET REQUIREMENT IN 10.2.5 OF API 660.

- WPS/PQR TO HAVE QUALIFICATION MATERIAL WITH SAME P NO.

- H/EX. SHALL BE FOLLOWING THE INSPECTION STAMP AND REGISTRATION;

| ASME "U" STAMP | NATIONAL BOARD REGISTRATION | (P-ENG) STAMP | ASME 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 |

- 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

- 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
(수압 시험은 깨끗한 물과 염화물 함유량 250ppm보다 작은 물로 사용하고 수압은 최소 60분 유지하고 수압 온도는 최소 5°C임)

- UPON COMPLETION OF HYDROTEST, VESSEL SHALL BE COMPLETELY DRAINED OF ALL WATER, AIR DRIED, AND CLEANED
(수압 테스트 끝난 후 모든 수압물질을 완벽히 제거한 뒤 공기로 건조시킨 뒤 깨끗하게 유지되어야 한다.)

- FOR SHIPMENT/SITE STORAGE, NITROGEN PURGE SYSTEM ON BOTH SHELL AND TUBE SIDE.
(출하/ 사이트 보관을 위해서, SHELL SIDE와 TUBE SIDE에 질소 충전 할 것.)

- ALL WELDED ATTACHMENTS PROVIDED WITH WEEP HOLES, SHALL BE SOAP TESTED AT 175Kpag(1.78kg/cm²) PRIOR TO HYDROSTATIC TEST.
(수압 테스트 전에 보강 파드에 거품 테스트를 1.78kg/cm² 할 것.)

- FOR ELECTRICAL HEAT TRACING(AS PER SPEC. MEG-ENG-ELE-SP-0501)

- APPROVED EHT MANUFACTURER : TYCO THERMAL CONTROLS

- VOLTAGE OF 277 VAC

- HOLD TEMPERATURE OF 10°C. CSA APPROVAL IS REQUIRED FOR ELECTRIC COMPONENTS AND INSTALLATION.
LOCATED IN HAZARDOUS AREA CLASS 1, ZONE 2.

- FOR INSULATION(AS PER SPEC. MEG-ENG-MEC-SP-1102)

| THICKNESS | MATERIAL |
|-----------|---------------|
| 64MM | MINERAL FIBER |

- 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 |

- 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 텐서나 사용)

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- POSTWELD HEAT AND STRESS RELIEF TREATMENT CONDITIONS.

| MAX. THK [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] | MIN. 1112 [600] | ALL PART ON THE PRESSURE BOUNDARY WELDS |

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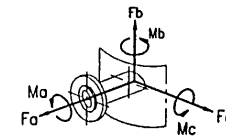
- STRESS RELIEF AFTER FORMING (PER UCS-79) : MIN. 600°C (OR NO.30 ABOVE FOR SHELL SIDE / PER NO.30 ABOVE FOR TUBE SIDE)
(포방 후 열처리 UCS-79와 적용)

- 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

- 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-CLO3A-Q-050-0001 | 1 | SITE-SPECIFIC ENVIRONMENTAL DATA |

- SA325 ANCHOR BOLTS WHICH ARE DESIGNED FOR SUPPORTS ARE SUPPLIED BY OTHERS.



| MAXIMUM ALLOWABLE NOZZLE LOADS (FOR 3A-E-105A) | | | | | | |
|--|--------|--------|--------|---------|---------|---------|
| NOZZLE | Fa (N) | Fb (N) | Fc (N) | Ma (Nm) | Mb (Nm) | Mc (Nm) |
| S1 (24") | 22750 | 27870 | 27870 | 68480 | 48420 | 48420 |
| S2A (16") | 16500 | 20190 | 20190 | 31700 | 22410 | 22410 |
| S2B (16") | 16500 | 20190 | 20190 | 31700 | 22410 | 22410 |
| T1 (10") | 10920 | 13370 | 13370 | 16820 | 11900 | 11900 |
| T2 (10") | 10920 | 13370 | 13370 | 16820 | 11900 | 11900 |

| MAXIMUM ALLOWABLE NOZZLE LOADS (FOR 3A-E-105B) | | | | | | |
|--|--------|--------|--------|---------|---------|---------|
| NOZZLE | Fa (N) | Fb (N) | Fc (N) | Ma (Nm) | Mb (Nm) | Mc (Nm) |
| S1A (16") | 16500 | 20190 | 20190 | 31700 | 22410 | 22410 |
| S1B (16") | 16500 | 20190 | 20190 | 31700 | 22410 | 22410 |
| S2 (24") | 22750 | 27870 | 27870 | 68480 | 48420 | 48420 |
| T1 (10") | 10920 | 13370 | 13370 | 16820 | 11900 | 11900 |
| T2 (10") | 10920 | 13370 | 13370 | 16820 | 11900 | 11900 |

| MAXIMUM FOUNDATION LOADING DATA | | | |
|---------------------------------|---------------|-----------|----------|
| WEIGHT (Kg/Set) | | | |
| | EMPTY | OPERATING | TEST |
| WIND LOAD | 15520 | 22030 | 22900 |
| | SHEAR (N) | 9720 | 9720 |
| | MOMENT (N-mm) | 10691780 | 10691780 |
| SEISMIC LOAD | SHEAR (N) | 29667 | 42111 |
| | MOMENT (N-mm) | 32633810 | 46322353 |

FOR APPROVAL ASME-U

REFERENCE DRAWING

- GENERAL ASSEMBLY (1/3) [FOR 3A-E-105A] E0351-3AE105-D-01
- GENERAL ASSEMBLY (2/3) [FOR 3A-E-105B] E0351-3AE105-D-02

| REV. | DATE | DESCRIPTIONS FOR REVISION | DRWN | CHK'D | REV'D | APP'D |
|------|------------|---------------------------|----------|---------|-------|---------|
| ① | 2014 07.31 | REVISED AS MARKED | B.C.CHIN | J.W.KIM | | H.U.KOO |
| ② | 2013 11.25 | REVISED AS MARKED | B.C.CHIN | J.W.KIM | | H.U.KOO |
| ③ | 2013 10.17 | REVISED AS MARKED | B.C.CHIN | J.W.KIM | | H.U.KOO |
| ④ | 2013 08.21 | REVISED AS MARKED | B.C.CHIN | J.W.KIM | | H.U.KOO |
| ⑤ | 2013 07.08 | FOR APPROVAL | B.C.CHIN | J.W.KIM | | H.U.KOO |

| | | | |
|---|---|-------------------|------------------------|
| CLRP PHASE 3A CENTRAL PLANT FACILITY: EPC | | | |
| CUSTOMER | MEG ENERGY CORP. | | |
| CLIENT | SNC • LAVALIN INC. | | |
| TITLE | EMULSION/GLYCOL EXCHANGER 3A-E-105A/B GENERAL ASSEMBLY (3/3) | | |
| SEWON CELLONTECH CO., LTD. CHANGWON, KOREA | | | |
| OWNER JOB NO. | 511036 | PROJECTION METHOD | THIRD ANGLE PROJECTION |
| P/O NO. | P-5310-01 | OWNER DWG. NO. | |
| SEWON JOB NO. | E-0351 | SEWON DWG. NO. | E0351-3AE105-D-03 |
| WORKS | C | | |