SU TU TRANG PHASE 2B FIELD DEVELOPMENT PROJECT

“PHÊ DUYỆT”

GIÁM ĐỐC XNXL

PHẠM THANH BÌNH

YÊU CẦU KỸ THUẬT
THUÊ DỊCH VỤ NDT PHỤC VỤ CHẾ TẠO TRÊN BỜ, HẠ THỦY VÀ CHẰNG BUỘC KHỐI CHÂN ĐẾ GIÀN ST-CGF

TÀI LIỆU SỐ. : JK-STT2B-B.I.2-TR

Phiên bản : 0

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MỤC LỤC

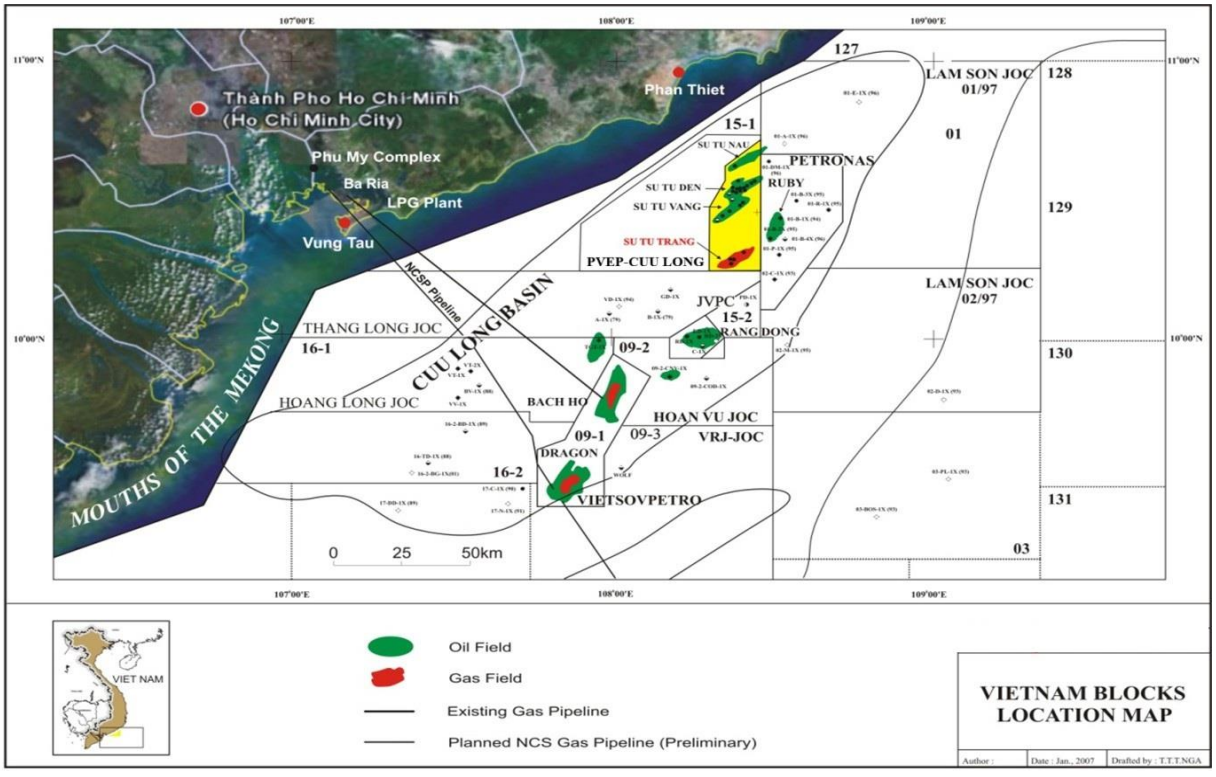
1. GIỚI THIỆU CHUNG VỀ DỰ ÁN 4
1.1. Thông tin chung 4
1.2. Mô tả Dự án phát triển mỏ Sư Tử Trắng giai đoạn 2B 5
2. MỤC ĐÍCH CỦA TÀI LIỆU 6
3. CÁC ĐỊNH NGHĨA VÀ THUẬT NGỮ 6
4. PHẠM VI CÔNG VIỆC 7
4.1. Phạm vi 7
4.2. Tài liệu, tiêu chuẩn và tài liệu liên quan 7
4.3. Mức độ và phương pháp kiểm tra: 8
4.4. Khối lượng công việc : 8
4.5. Khu vực thi công 9
5. YÊU CẦU ĐỐI VỚI DỊCH VỤ 9
5.1. YÊU CẦU KHI THỰC HIỆN HỒ SƠ DỰ THẦU: 9
5.1.1. Yêu cầu chung 10
5.1.2. Yêu cầu về nhân lực 10
5.1.3. Yêu cầu về thiết bị và vật tư 13
5.1.4. Yêu cầu về an toàn bức xạ công nghiệp. 15
5.1.5. Yêu cầu về đánh giá (Audit) nhà thầu: 15
5.2. YÊU CẦU CƠ BẢN KHI THỰC HIỆN HỢP ĐỒNG: 15
5.2.1. Huy động nhân sự, thiết bị và vật tư và công tác chuẩn bị tham gia dự án 15
5.2.2. Vai trò của các nhân sự chính trong dự án. 17
5.2.3. Tổ chức thực hiện công việc 18
6. TÀI LIỆU ĐÍNH KÈM 21

1. GIỚI THIỆU CHUNG VỀ DỰ ÁN

1.1. Thông tin chung

Chi nhánh Điều hành khai thác dầu khí Cửu Long (PVEP-Cửu Long) được thành lập ngày 26 tháng 10 năm 1998 với điều lệ khai thác khu vực cấp phép Lô 15-1. Khu vực hợp đồng nằm ở vị trí bể Cửu Long, ngoài khơi phía Nam Việt Nam, cách thành phố Hồ Chí Minh khoảng 190 km về phía Đông Nam. Hợp đồng chia sẻ sản xuất Dầu khí (PSC) mới cho Lô 15-1 đã được Thủ tướng Chính phủ phê duyệt. PSC mới được ký kết giữa PVN và các Bên tham gia Hợp đồng Lô 15-1 vào ngày 13 tháng 6 năm 2025 và sẽ có hiệu lực từ ngày 17 tháng 9 năm 2025 với thời hạn 25 năm, như quy định trong Giấy chứng nhận Đăng ký Đầu tư số 000042, do Bộ Công Thương cấp ngày 20 tháng 6 năm 2025. Theo PSC mới, Chi nhánh Điều hành khai thác dầu khí Cửu Long (PVEP-Cửu Long) sẽ được chỉ định điều hành của Lô 15-1.

Sơ đồ vị trí của Lô 15-1 được thể hiện bên dưới trong Hình 1.1

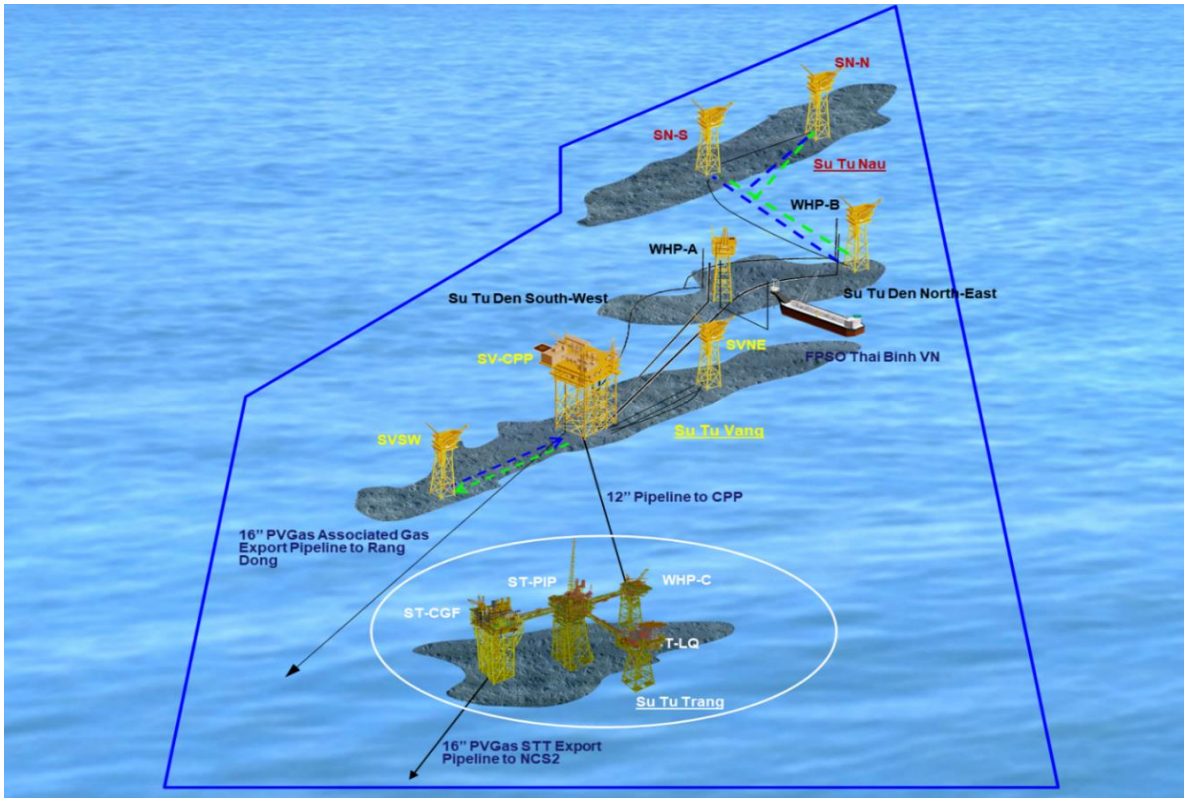


Hình 1.1 : Vị trí trên bản đồ của lô 15-1

Mỏ Sư Tử Trắng nằm ở cực nam của Lô 15-1, cách bờ biển phía đông nam Việt Nam khoảng 60 km, và nằm ở độ sâu khoảng 56 mét. Mỏ được phát hiện bởi

giếng ST-1X vào năm 2003, chiến dịch đánh giá tiếp theo kết thúc vào năm 2006 với các giếng ST-2X, ST-3X và ST-4X.

Tại mỏ Sư Tử Trắng, hiện có một số cơ sở sản xuất bao gồm giàn khoan đầu giếng WHP-C (Chương trình Thử nghiệm Sản xuất Dài hạn ST) từ năm 2012, các giàn Sư Tử Trắng Giai đoạn 1 (ST-PIP và ST-LQ) từ năm 2016. Dự án Sư Tử Trắng Giai đoạn 2A được thực hiện vào năm 2021 với hai (02) giếng mới được khoan trên giàn ST-PIP. Dầu khí sản xuất từ mỏ Sư Tử Trắng được vận chuyển qua tuyến đường ống ngầm 12 inch dài 20 km đến giàn STV-CPP gần đó để xử lý và xuất khẩu.



1.2. Mô tả Dự án phát triển mỏ Sư Tử Trắng giai đoạn 2B

Dự án phát triển mỏ Sư Tử Trắng giai đoạn 2B ("DỰ ÁN") bao gồm chế tạo giàn mới (Greenfield) và cải hoán, nâng cấp giàn cũ (Brownfield), trong đó bao gồm việc kết nối với các giàn hiện có ST-PIP / WHP-C bằng cầu dẫn với giàn khí trung tâm mới (ST-CGF). Ngoài ra, các tiện ích của ST-PIP/WHP-C hiện tại dự kiến sẽ hỗ trợ vận hành của ST-CGF mới để tối đa hóa việc sử dụng hệ thống hiện có và tăng tính linh hoạt trong vận hành của khu phức hợp.

Giàn Khí Trung tâm Sư Tử Trắng (ST-CGF) trong khu phức hợp Sư Tử Trắng sẽ được trang bị công suất sản xuất khí khoảng 300 triệu khối khí/ngày và xuất khẩu 150 triệu khối khí / ngày qua tuyến ống STT 16 inch (của PV Gas) kết nối với tuyến ống Nam Côn Sơn 2. Sản lượng Khí ngưng tụ dự kiến khoảng 25.000-35.000 thùng/ngày, nước tạo ra và một phần khí (khí nhiên liệu cho STV-CPP) sẽ được trộn lẫn và xuất qua tuyến ống 12 inch hiện có từ WHP-C đến STV-CPP. Lượng khí còn lại sẽ được bơm trở lại vào bồn chứa trên giàn ST-PIP.

2. MỤC ĐÍCH CỦA TÀI LIỆU

Tài liệu này mô tả các yêu cầu kỹ thuật và phạm vi công việc tối thiểu để nhà thầu thực hiện dịch vụ NDT phục vụ công tác thi công chế tạo trên bờ, hạ thủy và chằng buộc khối chân đế giàn ST-CGF như mô tả trong phạm vi công việc trong mục 4 của tài liệu này.

3. CÁC ĐỊNH NGHĨA VÀ THUẬT NGỮ

DỰ ÁN	PHÁT TRIỂN MỎ SƯ TỬ TRẮNG GIAI ĐOẠN 2B (SU TU TRANG PHASE 2B FIELD DEVELOPMENT PROJECT)
KHÁCH HÀNG	PVEP-CUU LONG
BÊN A	XNXL Vietsovpetro
BÊN B/NHÀ THẦU	Nhà thầu cung cấp dịch vụ NDT
HAI BÊN	BÊN A và BÊN B
GÓI THẦU	Thuê dịch vụ NDT phục vụ chế tạo trên bờ, hạ thủy và chằng buộc Khối chân đế giàn ST-CGF
HSDT	Hồ sơ dự thầu
OCD/XNXL	Xí nghiệp Xây lắp, Khảo sát và Sửa chữa các công trình khai thác dầu khí
NDT	Kiểm tra không phá hủy
UT	Kiểm tra siêu âm
PAUT	Kiểm tra siêu âm mảng pha.
RT	Kiểm tra chụp ảnh phóng xạ
RI	Kỹ thuật viên đọc phim
MT	Kiểm tra bột từ
PT	Kiểm tra chất lỏng thẩm thấu
ATBX	An toàn bức xạ
SCBX	Sự cố bức xạ

CV	Curriculum Vitae – Lý lịch cá nhân
STT	Sư Tử Trắng
STT2B	Sư Tử Trắng giai đoạn 2B
ST-CGF	Giàn Khí Trung tâm Sư Tử Trắng
JACKET	Khối chân đế
CSWIP	Certification Scheme for Personnel
PCN	Personnel Certification in Non Destructive Testing
N/A	Không áp dụng
KTV	Kỹ thuật viên
ATBX&HN	An toàn bức xạ và Hạt nhân
WP	Writen Practice – Quy trình đào tạo, sát hạch và cấp chứng chỉ cho nhân sự NDT dựa theo yêu cầu của tài liệu ASNT – SNT-TC-1A.

4. PHẠM VI CÔNG VIỆC

4.1. Phạm vi

Bên B chịu trách nhiệm cung cấp dịch vụ kiểm tra NDT cho bên A thi công hạng mục chế tạo trên bờ, hạ thủy và chằng buộc khối Chân đế giàn ST-CGF.

4.2. Tài liệu, tiêu chuẩn và tài liệu liên quan

Stt	Tài liệu	Mô tả
1.	2021-4589-61-0001	ST-CGF Jacket General Notes
2.	2021-4589-0Q-1071	ST-CGF Jacket Weight Control Report.
3.	2021-4589-6H-1001	ST-CGF Jacket Structural Basis of Design
4.	2021-4591-6L-1109	Specification for Structural Fab and Welding
5.	2021-4591-6L-1101	Specification for Structural Materials
6.	2021-4591-6L-1104	Specification for load-out, transportation and installation
7.	2021-4534-2L-0001	Specification for Riser, Tie-in Spool, and SSIV Welding.
8.	2021-4500-1L-5006	Piping Fabrication Specification For ST-CGF
9.	2021-4500-1L-5005	Piping Material Class Specification
10.	2021-4589-6U-1081	ST-CGF Jacket Primary Steel Material Take-Off
11.	2021-4589-6U-1082	ST-CGF Jacket Secondary & Tertiary Steel Material Take-Off
12.	2021-4500-0R-0005	EPCI Project Schedule

13.	P6/QA/58	Quy trình đánh giá năng lực nhân sự NDT (Mock-up Test)
14.	DNVGL-ST-F101	Submarine pipeline systems
15.	API RP 2A WSD	Planning, Designing, and Constructing Fixed Offshore Platforms-Working Stress Design
16.	API RP 2X	Recommended Practice for Ultrasonic and Magnetic Examination of Offshore Structural Fabrication and Guidelines for Qualification of Technicians.
17.	AWS D1.1	Structural Welding Code – Steel
18.	ASTM Volume 03.03	Nondestructive Testing
19.	ASME V	ASME Boiler and Pressure Vessel Code – Nondestructive examination
20.	ASME B31.3	Process Piping
21.	ISO 9712	Non-destructive testing - Qualification and certification of NDT personnel
22.	SNT-TC-1A	Recommended Practice No. SNT-TC-1A: Personnel Qualification and Certification in Nondestructive Testing
23.	CP-189	ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel

4.3. Mức độ và phương pháp kiểm tra:

- Đối với phần kết cấu : tham khảo tài liệu : 2021-4591-6L-1109 - Mục số 4.
- Đối với Riser : tham khảo tài liệu : 2021-4534-2L-0001- Mục số 7.
- Đối với ống Grouting : tham khảo tài liệu : 2021-4500-1L-5006 – Mục số 8.
- Đối với các hạng mục khác không được đề cập trong tài liệu này, mức độ và phạm vi kiểm tra tuân thủ theo các tiêu chuẩn tham chiếu của dự án và bản vẽ thiết kế.

4.4. Khối lượng công việc :

Thông tin cơ bản về khối lượng và thời gian thi công dự kiến khối chân đế giàn ST-CGF như sau:

Bảng 1 - Thông tin cơ bản

Hạng mục	Khối lượng ước tính (Tấn)	Thời gian thi công dự kiến
1. Kết cấu chính: Elevation Row, Framing Plan, Stabbing cone, Upending Padeyes, Bridge landing tower, Launch truss internal ring, launch craddle, Conductor Guard and Framing, Caisson Guard, Launch pulling lug.	3714	Từ 05/2026 đến 31/05/2027
2. Kết cấu phụ: Conductor Guides, Anodes, Flooding System, Leg Closure Plate, Walkway, Lifting Trunnion, Grout Packer, Riser Clamps and support, Caisson and support, J-tube and support, Mudmat Plan.	666	
3. Riser (10”, 12” & 16”)	19	
4. Đường ống (Flooding)	6	
5. Các hạng mục tạm : Rigging Platform, Lifting Riggings, Stiffener Plates, Buoyancy Tank and support	573	
6. Tất cả các công việc liên quan và cần thiết trong quá trình chế tạo, hạ thủy và chằng buộc các hạng mục nêu trên, bao gồm nhưng không giới hạn: - Các kết cấu phụ trợ, tạm thời, giá đỡ, - Chế tạo mẫu hiệu chuẩn NDT (vật liệu chế tạo mẫu - bên A sẽ cung cấp), - Kiểm tra tay nghề thợ hàn, kiểm tra phôi quy trình hàn, kiểm tra vật liệu hàn (CQT), Production Test,… - Cuốn ống cho phao nổi (Buoyancy Tank), v.v… - Kiểm tra vật tư đầu vào (khi có phát sinh), các vật tư, kết cấu cũ tái sử dụng,…	Trọn gói	

4.5. Khu vực thi công

Bãi chế tạo của Liên doanh Việt - Nga Vietsovpetro, số 67 đường 30/4, phường Rạch Dừa, Thành phố Hồ Chí Minh, Việt Nam.

5. YÊU CẦU ĐỐI VỚI DỊCH VỤ

5.1. YÊU CẦU KHI THỰC HIỆN HỒ SƠ DỰ THẦU:

5.1.1. Yêu cầu chung

5.1.1.1. Có giấy phép kinh doanh, trong đó có lĩnh vực kiểm tra NDT.

5.1.1.2. Có giấy phép tiến hành công việc bức xạ, vận chuyển và sử dụng nguồn phóng xạ dự kiến huy động cho dự án.

5.1.1.3. Không chấp nhận nhà thầu phụ của nhà thầu thuê làm dịch vụ NDT cho DỰ ÁN.

5.1.1.4. Nhà thầu phải chứng minh đã hoạt động liên tục trong lĩnh vực cung cấp dịch vụ kiểm tra không phá hủy (NDT) trong thời gian từ 5 năm trở lên, tính đến thời điểm đóng thầu.

5.1.1.5. Nhà thầu phải chứng minh đã từng thực hiện ít nhất một (01) hợp đồng tương tự trong vòng 05 năm trở lại đây với vai trò nhà thầu chính hoặc liên danh đứng đầu trong lĩnh vực chế tạo kết cấu thép ngành dầu khí, hoặc công trình ngoài khơi có tính chất tương tự về môi trường kỹ thuật:

- Cung cấp dịch vụ kiểm tra không phá hủy (NDT) sử dụng các kỹ thuật PAUT, UT, RT, MT và PT.
- Có khối lượng và quy mô tương đương, xét theo số lượng mối hàn, chiều dài đường hàn hoặc kết cấu kiểm tra (có thể xác định tương đối nếu không giống hoàn toàn)

5.1.1.6. Các hồ sơ, tài liệu trong HSDT cho các mục trên phải hợp lệ, còn hạn và được đóng dấu xác nhận của nhà thầu.

5.1.1.7. Nhà thầu trong HSDT phải cung cấp hồ sơ, tài liệu sau:

- Danh sách các dự án / hợp đồng đã thực hiện chứng minh kinh nghiệm của nhà thầu.
- Các hồ sơ, tài liệu trong HSDT cho các mục trên phải hợp lệ/ còn hiệu lực và được đóng dấu xác nhận của nhà thầu.

5.1.2. Yêu cầu về nhân lực

5.1.2.1. Nhà thầu cung cấp sơ đồ tổ chức nhân sự của dự án, chỉ rõ vị trí cụ thể của từng thành viên.

5.1.2.2. Nhân sự đề xuất phải làm việc toàn thời gian cho DỰ ÁN. Đối với các nhân sự nhà thầu đề xuất trong hồ sơ mời thầu mà đang tham gia các dự án khác, nhà thầu phải chứng minh (bằng hồ sơ/ văn bản, ví dụ: thư chấp nhận cho rút nhân sự khỏi dự án hoặc thời gian thực hiện dự án nhân sự đang tham gia sẽ kết thúc khi nhân sự tham gia dự án STT2B ….) và có cam kết nếu trúng

thầu sẽ huy động nhân sự đó làm việc toàn thời gian cho DỰ ÁN này.

5.1.2.3. Nhân sự NDT được nhà thầu đào tạo, sát hạch và cấp chứng chỉ theo quy trình WP của nhà thầu hoặc các chương trình đào tạo, sát hạch và cấp chứng chỉ tương đương được quy định trong tài liệu **2021-4591-6L-1109** và được chấp thuận của Vietsovpetro và Khách hàng.

Nếu nhà thầu đề xuất các nhân sự có chứng chỉ đào tạo nội bộ được cấp theo quy trình WP, thì nhà thầu phải cung cấp quy trình này trong hồ sơ dự thầu. Vietsovpetro sẽ đánh giá quy trình này trong quá trình Audit nhà thầu (Mục 5.1.5 của tài liệu này). Nếu quy trình WP không thỏa mãn ASNT SNT-TC-1A hoặc chứng chỉ / hồ sơ đào tạo không tuân thủ theo quy trình nhân sự được đề xuất sẽ không được chấp thuận.

5.1.2.4. Nhà thầu cung cấp hồ sơ của toàn bộ nhân viên tham gia dự án bao gồm:

- Lý lịch (CV) nhân viên.
- Chứng chỉ chuyên môn phù hợp với chức danh thực hiện trong dự án.
- Giấy chứng nhận sức khỏe.
- Giấy chứng nhận thị lực.
- Giấy chứng nhận về an toàn phù hợp theo yêu cầu của dự án cũng như của chính phủ Việt Nam (chứng nhận học an toàn nhóm 3, chứng nhận đào tạo ATBX, chứng chỉ nhân viên chụp ảnh phóng xạ .v.v.)
- Hồ sơ chứng minh kinh nghiệm tham gia các dự án tương tự (bao gồm: Sơ đồ tổ chức nhân sự các dự án có khách hàng phê duyệt; chứng chỉ NDT (kể cả các chứng chỉ đã hết hạn); các báo cáo kiểm tra NDT liên quan KTV thực hiện kiểm tra NDT có đầy đủ chữ ký của khách hàng và thông tin liên hệ để kiểm chứng).
- Tất cả hồ sơ, tài liệu chứng chỉ phải còn hiệu lực và phù hợp với công việc theo yêu cầu trong specification của dự án. Hồ sơ, tài liệu được đóng dấu xác nhận của nhà thầu.
- Đối với các chứng chỉ đã hết hiệu lực và đang trong quá trình gia hạn, nhà thầu phải cam kết sẽ cung cấp chứng chỉ mới có hiệu lực khi tham gia dự án nếu nhà thầu trúng thầu.

5.1.2.5. Trường hợp nhà thầu huy động nhân sự là người nước ngoài để thực hiện dịch vụ kiểm tra NDT cho DỰ ÁN, ngoài các yêu cầu ở trên, nhà thầu phải đảm bảo:

- Có đầy đủ giấy phép lao động theo quy định pháp luật hiện hành.
- Nhân sự nước ngoài phải được đăng ký thông tin đầy đủ, rõ ràng trong hồ sơ dự thầu và hồ sơ pháp lý kèm theo
- Có hợp đồng/ cam kết làm việc cho dự án với nhà thầu nếu nhà thầu trúng thầu.
- Trường hợp không đáp ứng điều kiện pháp lý về nhân sự nước ngoài, hồ sơ sẽ được đánh giá là **không đạt**.

5.1.2.6. Kinh nghiệm làm việc được tính từ thời điểm có chứng chỉ chuyên môn của phương pháp NDT liên quan.

5.1.2.7. Số lượng nhân sự tối thiểu theo bảng 2.

Bảng 2: Yêu cầu về nhân sự NDT tối thiểu

Stt	Vị trí	Số lượng (người)	Kinh nghiệm (năm)	Kinh nghiệm dự án tương tự	Vị trí có thể kiêm nhiệm	Yêu cầu chuyên môn / chứng chỉ
1	Quản lý dự án (QLDA)	01	03	03	RI	- Có bằng tốt nghiệp đại học, cao đẳng chuyên ngành về kỹ thuật / quản lý. - Có kiến thức về các kỹ thuật NDT áp dụng cho dự án.
2	NDT Cấp 3	01 (1)	03	03	RI	- Cấp 3 ASNT hoặc tương đương các phương pháp NDT áp dụng cho dự án, riêng kỹ thuật UT: Phải có chứng chỉ ASNT cấp 3.
3	KTV UT	05	04	03	PAUT	- UT Cấp 2 cấu hình tối thiểu Plate & Pipe, trong đó ít nhất 3 nhân sự có cấu hình Node (2)
4	KTV PAUT	02	03	03	UT	- PAUT cấp 2.

5	KTV MT/PT	06	02	02	RT	- MT/PT Cấp 2. - PT tối thiểu 2 người
6	KTV RI	01	03	03	QLDA; NDT cấp 3	- RI hoặc RT Cấp 2.
7	KTV RT	03	03	02	MT/PT	- RT Cấp 2. - Chứng nhận đào tạo ATBX. - Chứng chỉ nhân viên chụp ảnh phóng xạ do Cục ATBX và HN cấp.
8	Nhân viên phụ trách ATBX	01	03	02	-	Chứng nhận do Cục ATBX&HN cấp gồm : - Chứng nhận đào tạo ATBX - Chứng nhận người phụ trách an toàn và ứng phó SCBX.
9	Nhân viên hồ sơ	01	02	02	-	- Sử dụng tốt tin học văn phòng.

1. *Nhà thầu được phép bố trí 1 KTV đảm nhiệm 2 phương pháp NDT trong dự án nhưng phải đảm bảo:*

   - Nhân sự được đề xuất đáp ứng yêu cầu của từng chức danh đảm nhiệm.

   - Khi dự án bắt đầu số nhân sự NDT đạt kiểm tra tay nghề (mock-up test) tối thiểu như sau: 05 UT - 2 PAUT - 06 MT/PT - 3 RT.

Ghi chú:

- *(1): Nếu 1 nhân sự không đủ chứng chỉ yêu cầu thì có thể đề xuất nhiều nhân sự phụ trách.*
- *(2): Trên chứng chỉ UT phải thể hiện cấu hình có thể kiểm tra của KTV (v/d Node, PL, Pipe…), nếu không thì nhà thầu cung cấp tài liệu chứng minh chứng chỉ được cấp có đúng cấu hình yêu cầu.*

5.1.3. Yêu cầu về thiết bị và vật tư

5.1.3.1. Nhà thầu phải cung cấp toàn bộ vật tư/ thiết bị NDT phù hợp để thực hiện công việc NDT cho dự án.

5.1.3.2. Thiết bị sử dụng cho DỰ ÁN này không được trùng lặp với dự án khác. Đối với các thiết bị nhà thầu đề xuất trong hồ sơ mời thầu mà đang tham gia các dự án khác, nhà thầu phải chứng

minh (bằng hồ sơ / văn bản, ví dụ: thư chấp nhận cho rút thiết bị khỏi dự án hoặc Schedule dự án thiết bị đang được sử dụng sẽ kết thúc khi thiết bị được đưa vào DỰ ÁN ….) và có cam kết nếu trúng thầu sẽ huy động thiết bị đó làm việc toàn thời gian cho DỰ ÁN này.

5.1.3.3. Nhà thầu cung cấp danh mục vật tư, danh mục thiết bị sử dụng cho dự án, tài liệu kèm theo phải thể hiện rõ:

- Tất cả vật tư/hóa chất sử dụng cho công trình (phim, bột từ, chất lỏng thẩm thấu,…) phải còn trong hạn sử dụng và có chứng chỉ xuất xứ, chứng chỉ chất lượng và MSDS.
- Tất cả thiết bị phát bức xạ phải có giấy phép sử dụng và vận chuyển còn hiệu lực do Cục ATBX hạt nhân cấp cho chính nhà thầu tham gia đấu thầu.
- Tất cả các thiết bị kiểm tra, đo lường như máy siêu âm, gông từ, máy đo cường độ ánh, máy đo liều bức xạ, máy đo liều cá nhân, máy đo độ đen, mẫu chuẩn… phải có chứng chỉ hiệu chuẩn/kiểm định còn hiệu lực và phù hợp với tiêu chuẩn liên quan.

5.1.3.4. Nhà thầu huy động số lượng phù hợp đáp ứng tiến độ dự án. Yêu cầu số lượng thiết bị chính theo bảng 3.

Bảng 3: Yêu cầu về thiết bị

Stt	Loại thiết bị	Đơn vị tính	Số lượng
1	Máy siêu âm	Bộ	05
2	Thiết bị PAUT	Bộ	02
3	Gông từ	Bộ	05
4	Nguồn bức xạ (trong đó tối thiểu phải có 1 thiết bị X- Ray chụp được mối hàn thép có độ dày đến 30 mm)	Bộ	02
5	Đèn đọc film	Bộ	01
6	Máy đo độ đen film	Bộ	01
7	Máy đo cường độ ánh sáng	Bộ	01
8	Máy đo liều bức xạ (Radiation Surveys)	Bộ	02 / 01 RT Team
9	Phim liều cá nhân (Film Badges)	Cái	01 / Mỗi nhân sự tham gia RT.
10	Các mẫu chuẩn cho phương pháp liên quan	Bộ	01

5.1.4. Yêu cầu về an toàn bức xạ công nghiệp.

Nhà thầu cung cấp các hồ sơ, tài liệu sau:

5.1.4.1. Giấy phép nhân viên bức xạ, giấy phép đối với thiết bị phát bức xạ, chứng chỉ hiệu chuẩn / kiểm định định của thiết bị đo bức xạ.

5.1.4.2. Quy trình ATBX hiện hành của nhà thầu.

5.1.4.3. Quy trình ứng cứu sự cố đã được Cục ATBX và Hạt nhân phê duyệt.

5.1.4.4. Kế hoạch ứng cứu sự cố ATBX.

5.1.4.5. Danh sách đội ứng phó sự cố bức xạ (tất cả nhân viên đội phải được đào tạo về ATBX, riêng đội trưởng phải có chứng chỉ về phụ trách ứng phó sự cố bức xạ)

5.1.4.6. Danh mục vật tư, thiết bị đảm bảo an toàn bức xạ và cứu hộ bức xạ.

5.1.4.7. Hồ sơ / Báo cáo các tình huống mất ATBX trong tối thiểu 5 năm gần nhất hoặc từ thời điểm nhà thầu được cấp phép thực hiện công việc chụp ảnh phóng xạ công nghiệp.

5.1.4.8. Biên bản diễn tập ứng cứu sự cố bức xạ trong tối thiểu 3 năm gần nhất hoặc từ thời điểm nhà thầu được cấp phép thực hiện công việc chụp ảnh phóng xạ công nghiệp.

5.1.4.9. Hồ sơ liều tích lũy của nhân viên bức xạ tối thiểu 3 năm gần nhất hoặc từ thời điểm nhà thầu được cấp phép thực hiện công việc chụp ảnh phóng xạ công nghiệp.

5.1.5. Yêu cầu về đánh giá (Audit) nhà thầu:

Trong vòng 5 ngày kể từ thời điểm mở thầu, Bên A sẽ đánh giá năng lực thực tế của bên B tại cơ sở của nhà thầu theo các nội dung trong tài liệu NDT-AUD-CKL-001 (Audit Check list nhà thầu NDT) đính kèm trong hồ sơ mời thầu.

Kết quả đánh giá này là một trong các điều kiện của tiêu chí đánh giá trong kết luận kỹ thuật HSDT của nhà thầu.

5.2. YÊU CẦU CƠ BẢN KHI THỰC HIỆN HỢP ĐỒNG:

Các yêu cầu cơ bản sau đây nhà thầu phải tuân thủ khi thực hiện hợp đồng:

5.2.1. Huy động nhân sự, thiết bị, vật tư và công tác chuẩn bị tham gia dự án

- Trong vòng 03 ngày từ ngày có thư trao thầu (LOA), nhà thầu phải huy động các nhân sự sau vào làm việc toàn thời gian tại công trường: Quản lý dự án, NDT cấp 3, Phụ trách an toàn bức xạ - RSO và nhân viên hồ sơ.
- Chậm nhất 05 ngày kể từ ngày có thư trao thầu (LOA), nhà thầu hoàn thành việc lập danh sách nhân sự tham gia dự án và trình Vietsovpetro và Khách hàng xem xét. Danh sách nhân sự tham gia dự án của nhà thầu không được thay đổi quá 30% so với danh sách nhân sự của nhà thầu đã trình khi tham gia đấu thầu, trong đó nhân sự Quản lý dự án và NDT cấp 3 không được thay đổi so với nhân sự nhà thầu đã trình khi tham gia đấu thầu. Nhân sự thay thế phải đảm bảo thỏa mãn yêu cầu ở mục 5.1.2.
- Chậm nhất 05 ngày kể từ ngày có thư trao thầu (LOA), nhà thầu hoàn thành việc lập danh sách thiết bị, vật tư tham gia dự án và trình Vietsovpetro và Khách hàng xem xét. Hồ sơ thiết bị được quy định trong mục 5.1.3. Chỉ những thiết bị, vật tư được Khách hàng và Vetsovpetro phê duyệt mới được phép tham gia dự án.
- Chậm nhất 15 ngày kể từ ngày có thư trao thầu (LOA), nhà thầu hoàn thành việc soạn thảo và trình phê duyệt quy trình NDT, Quy trình ATBX; Quy trình phối hợp - tổ chức hoạt động NDT với các bên liên quan;
- Tổ chức hướng dẫn quy trình NDT sau khi quy trình được VSP và Khách hàng phê duyệt, tiêu chuẩn NDT và hoàn thành việc mockup-test cho kỹ thuật viên NDT tham gia dự án, đồng thời huy động đầy đủ thiết bị, nhân sự, vật tư và văn phòng vào công trường thực hiện dự án.
- Đảm bảo trong vòng 30 ngày có thư trao thầu (LOA), toàn bộ số lượng nhân sự NDT như yêu cầu trong bảng 2 phải đạt mock-up test và sẵn sàng thực hiện dự án. Chỉ được phép bổ sung, thay thế hoặc rút người khỏi dự án khi được Khách hàng và Vietsovpetro đồng ý.
- Đảm bảo sự liên tục, tính hiệu lực của tất cả các loại chứng chỉ (về nhân sự, thiết bị và vật tư) cũng như các giấy phép liên quan khác.
- Nhân sự của nhà thầu phải được huấn luyện an toàn và kiểm tra kiến thức an toàn tương ứng với từng chức danh. Đảm bảo 100% nhân lực tham gia dự án tại công trường phải có thẻ ATSVLĐ phù hợp theo vị trí đảm nhiệm trong DỰ ÁN theo nghị định 44/2016 trước khi vào làm việc.

- Lập sơ đồ tổ chức nhân sự của dự án, chỉ rõ vị trí cụ thể của từng thành viên.
- Tổ chức chạy thử quy trình NDT, quá trình này có thể được kết hợp với quá trình kiểm tra tay nghề nhân sự. Kết quả chạy thử phải được Vietsovpetro và Khách hàng phê duyệt trước khi kiểm tra các mối hàn trong dự án.

5.2.2. Vai trò của các nhân sự chính trong dự án.

5.2.2.1. Quản lý dự án:

- Quản lý toàn bộ phạm vi công việc NDT trong dự án của nhà thầu.
- Là đầu mối chính giữa nhà thầu, chủ đầu tư và các bên liên quan trong suốt thời gian thực hiện dự án.
- Lập kế hoạch triển khai NDT chi tiết theo tiến độ chế tạo.
- Điều phối nhân sự và thiết bị kiểm tra NDT.
- Cùng với NDT cấp 3 của nhà thầu đảm bảo tuân thủ các tiêu chuẩn kỹ thuật và quy định pháp luật hiện hành.
- Kiểm tra, xác nhận các kết quả kiểm tra NDT trước khi phát hành.
- Giao tiếp kỹ thuật và xử lý sự cố với các bên liên quan.
- Quản lý tài liệu và hồ sơ bàn giao.
- Tham gia các cuộc họp QA/QC định kỳ và cuộc họp Construction (khi có yêu cầu).

5.2.2.2. NDT cấp 3:

- Soạn thảo các quy trình NDT để trình Vietsovpetro và Khách hàng phê duyệt.
- Tổ chức chạy thử quy trình NDT.
- Hướng dẫn và huấn luyện quy trình và tiêu chuẩn cho KTV nhà thầu trước khi kiểm tra tay nghề (mock-up test) và tham gia dự án. Quá trình huấn luyện/ hướng dẫn phải có tài liệu ghi nhận lại và gửi cho Vietsovpetro và khách hàng cùng với đề xuất mock-up test nhân sự NDT của nhà thầu.
- Thực hiện giám sát công việc của các KTV NDT của nhà thầu tại công trường và thực hiện cross check UT các mối hàn đã được kỹ thuật viên UT của nhà thầu kiểm tra trong

tuần. Tổng số mối hàn được giám sát / kiểm tra cross check trong mỗi tháng phải đạt tối thiểu 5% tổng số mối hàn mà mỗi kỹ thuật viên đã thực hiện. Mối hàn cross check sẽ được chỉ định bởi NDT Vietsovpetro. Thời gian thực hiện cross check phải báo trước cho Vietsovpetro và Khách hàng.

- Kiểm tra, xác nhận quá trình hiệu chuẩn và kiểm soát chất lượng thiết bị NDT tham gia dự án.
- Giải trình kỹ thuật với Vietsovpetro và Khách hàng khi có các vấn đề liên quan đến các kỹ thuật NDT.
- Đảm bảo kết quả kiểm tra NDT tuân thủ quy trình và tiêu chuẩn chấp nhận của dự án.

5.2.2.3. Kỹ thuật viên NDT

- Trước khi tham gia kiểm tra NDT cho dự án, KTV phải vượt qua bài đánh giá tay nghề (mock-up test) theo Quy trình P6/QA/58 và kiểm tra thị lực do Vietsovpetro tổ chức, đối với phương pháp NDT mà cá nhân sẽ thực hiện trong dự án.
- Nhân sự PAUT: chỉ các nhân sự vượt qua Mockup test mới được tham gia thu nhận data (quét mối hàn) và giải đoán kết quả kiểm tra.
- Mỗi KTV chỉ được phép Re-mockup test 01 lần cho 1 phương pháp NDT tham gia.
- Tuân thủ đầy đủ quy trình NDT và các yêu cầu khác của dự án.

5.2.2.4. Nhân viên phụ trách ATBX

- Soạn thảo Quy trình an toàn phóng xạ và trình Khách hàng và Vietsovpetro xem xét.
- Tham gia giám sát toàn thời gian các ca chụp phóng xạ của nhà thầu. Đảm bảo mỗi nhóm chụp có 1 nhân viên phụ trách ATBX.

5.2.3. Tổ chức thực hiện công việc

- Nhà thầu tổ chức kiểm tra NDT theo yêu cầu.
- Trong quá trình thi công, nhà thầu phải cung cấp đầy đủ nhân lực, thiết bị, vật tư và mẫu chuẩn liên quan để thực hiện công việc phù hợp với biện pháp tổ chức thi công và tiến độ và tiêu chuẩn yêu cầu của dự án.

- Nhà thầu tổ chức diễn tập ứng cứu sự cố bức xạ (SCBX) và được Khách hàng và Vietsovpetro chấp nhận kết quả diễn tập ứng cứu SCBX trước khi tiến hành công việc kiểm tra RT tại dự án. Trong quá trình thực hiện dự án, định kỳ 03 tháng/lần, nhà thầu phải tiến hành thực tập cứu hộ tình huống khẩn cấp tại hiện trường.
- Trong quá trình thực hiện dự án, tất cả thiết bị cứu hộ bức xạ theo danh mục được phê duyệt bởi Khách hàng và Vietsovpetro phải luôn luôn có sẵn tại công trường thi công dự án tính từ thời điểm tổ chức diễn tập trước khi tiến hành công việc RT đến khi hoàn thành tất cả công việc RT tại dự án.
- Phối hợp với Khách hàng và Vietsovpetro định kỳ thực hiện cross-check kỹ thuật viên NDT nhà thầu.
- Đảm bảo kiểm soát được tình trạng tồn đọng (backlog) NDT của dự án luôn ít hơn:
  - UT: 20 mét dài hoặc 10 mối hàn.
  - MT: 30 mét dài hoặc 20 mối hàn.
  - RT/PAUT hạng mục kết cấu : 10 mét hoặc 5 mối hàn.
  - RT cho Piping / Riser: 05 mối hàn.
  - Đối với các mối hàn cần kiểm tra NDT gấp, không được chậm công việc kiểm tra NDT quá 02 giờ tính từ thời điểm nhận được yêu cầu kiểm tra.
  - Trong trường hợp nhà thầu không đáp ứng được yêu cầu về nhân sự, thiết bị và tiến độ của công việc, Vietsovpetro có quyền huy động nhân sự, thiết bị để thực hiện công việc, toàn bộ chi phí cho việc huy động này do nhà thầu chịu trách nhiệm.
- Tùy theo yêu cầu của dự án hoặc không quá 24 giờ từ khi việc kiểm tra mối hàn kết thúc nhà thầu phải phát hành các báo cáo chất lượng (NDT reports) và mời Coordinator của dự án/ cơ quan đăng kiểm/ khách hàng xem xét phim và phê duyệt báo cáo. Báo cáo NDT phải được QLDA của nhà thầu (nếu nhân sự này có chuyên môn và chứng chỉ NDT phù hợp) hoặc NDT cấp 3 của nhà thầu ký nháy trước khi trình ký Vietsovpetro.
- Hàng ngày, nhà thầu phải phát hành các báo cáo thống kê (Daily summary report) trong đó thể hiện được: số mối hàn kiểm tra; số mối hàn hỏng; tỷ lệ khuyết tật; loại khuyết tật...

- Hàng ngày, nhà thầu phải phát hành các báo cáo thống kê nhân sự tham gia dự án của nhà thầu.
- Nhà thầu phải chuẩn bị phần mềm/key giải đoán data PAUT tại văn phòng của nhà thầu trong cảng Vietsovpetro để Khách hàng và Vietsovpetro xem xét dữ liệu kiểm tra tại bất kỳ thời gian nào của dự án.
- Nhà thầu phải chuẩn bị đèn đọc film, mẫu hiệu chuẩn độ đen, máy đo độ đen và các phụ kiện cần thiết tại văn phòng của nhà thầu trong cảng Vietsovpetro để Khách hàng và Vietsovpetro xem xét phim chụp ảnh mối hàn tại bất kỳ thời gian nào của dự án.
- Nhà thầu phải thông báo bằng văn bản cho Vietsovpetro tối thiểu 2 tuần trước khi thay đổi nhân sự tham gia DỰ ÁN. Nhân sự thay thế phải có trình độ, chứng chỉ và kinh nghiệm tương đương với nhân sự được thay. Việc rút nhân sự chỉ được thực hiện sau khi nhân sự thay thế đã tiếp nhận công việc trong DỰ ÁN.
- Nhà thầu hoàn toàn chịu trách nhiệm về an toàn lao động trong suốt quá trình thi công nhằm đảm bảo cho người, thiết bị, vật tư và các công trình lân cận.
- Nhà thầu có trách nhiệm huấn luyện, trang bị đầy đủ dụng cụ và phương tiện an toàn lao động cho người lao động, nhân viên của mình, thường xuyên chỉ đạo và giám sát về an toàn lao động trong quá trình thi công, phải tuân theo đúng tiêu chuẩn kỹ thuật an toàn lao động trong xây dựng.
- Trong suốt quá trình thực hiện dự án, toàn bộ nhân sự, phương tiện và thiết bị của nhà thầu phải tuân thủ theo các quy định về an toàn lao động, sức khỏe và môi trường của Liên Doanh Việt – Nga Vietsovpetro và các quy định an toàn của DỰ ÁN.
- Tất cả các máy móc, thiết bị trước khi đưa vào công trường phải có chứng nhận kiểm định an toàn và đảm bảo chất lượng của các cơ quan có tư cách pháp nhân cấp. Trong thời gian sử dụng nếu giấy phép hết hạn hoặc thiết bị có dấu hiệu mất an toàn Nhà thầu phải mời giám định viên đến xem xét, kiểm tra và cho kết luận.
- Tất cả hồ sơ, tài liệu phải được sắp xếp, đóng thành file, lập danh mục, copy thành các bản theo yêu cầu của dự án.
- Nhà thầu có trách nhiệm bảo quản tất cả báo cáo gốc và phim RT trong thời gian của dự án. Tất cả phim RT sẽ được sắp xếp, đóng thùng,

chống ẩm, lập danh mục cho từng thùng, từng hộp và dán lên mỗi thùng, mỗi hộp phim.

- Tất cả các file dữ liệu PAUT phải được sắp xếp theo từng hạng mục và số báo cáo.
- Bàn giao tất cả hồ sơ, tài liệu, data PAUT và phim RT cho Vietsovpetro/Khách hàng khi dự án kết thúc.

6. TÀI LIỆU ĐÍNH KÈM

Stt	Tài liệu	Phiên bản	Mô tả
1	2021-4589-61-0001	Rev. 0	ST-CGF Jacket General Notes
2	2021-4589-0Q-1071	Rev. 1	ST-CGF Jacket Weight Control Report.
3	2021-4589-6H-1001	Rev. 1	ST-CGF Jacket Structural Basis of Design
4	2021-4591-6L-1109	Rev. 0	Specification for Structural Fab and Welding
5	2021-4591-6L-1101	Rev. 0	Specification for Structural Materials
6	2021-4591-6L-1104	Rev. 0	Specification for load-out, transportation and installation
7	2021-4534-2L-0001	Rev. 0	Specification for Riser, Tie-in Spool, and SSIV Welding.
8	2021-4500-1L-5006	Rev. 1	Piping Fabrication Specification For ST-CGF
9	2021-4500-1L-5005	Rev. 1	Piping Material Class Specification
10	2021-4589-6U-1081	Rev. 2	ST-CGF Jacket Primary Steel Material Take-Off
11	2021-4589-6U-1082	Rev. 1	ST-CGF Jacket Secondary & Tertiary Steel Material Take-Off
12	2021-4500-0R-0005	Rev. 2	EPCI Project Schedule
13	P6/QA/58	Rev. 0	Quy trình đánh giá năng lực nhân sự NDT (Mock-up Test)
14	NDT-AUD-CKL-001	-	Danh mục câu hỏi đánh giá nhà thầu NDT

SU TU TRANG PHASE 2B FIELD DEVELOPMENT PROJECT

PHÊ DUYỆT”

GIÁM ĐỐC XNXL

“VIETSOVPETRO”

PHẠM THANH BÌNH

TIÊU CHÍ ĐÁNH GIÁ
THUÊ DỊCH VỤ NDT PHỤC VỤ CHẾ TẠO TRÊN BỜ, HẠ THỦY VÀ CHẰNG BUỘC KHỐI CHÂN ĐẾ GIÀN ST-CGF

TÀI LIỆU SỐ. **: JK-STT2B-B.I.2-TE**

Phiên bản **: 0**

PHÁT HÀNH CHO ĐẤU THẦU

THỎA THUẬN:

Phó Giám đốc XNXL	Lê Quốc Anh

KIỂM TRA :

Chủ nhiệm dự án	Trần Nguyên Hưng
Phó Chủ nhiệm dự án	Nguyễn Sỹ Han
Trưởng Ban Chánh hàn	Phạm Văn Toàn
Trưởng phòng Đảm bảo chất lượng	Nguyễn Đạt Thịnh
Chủ nhiệm thi công	Đặng Quang Dương
Chủ nhiệm QA/QC dự án	Nghiêm Trung Kiên

CHUẨN BỊ :

Chuyên viên Ban Chánh hàn	Nguyễn Anh Đức
Kỹ sư Ban Chánh hàn	Đinh Đức Quân

STT	Tiêu chí đánh giá	Thang điểm			Ghi chú
		Mức I	Mức II	Mức III	
1	**Yêu cầu chung (Năng lực của nhà thầu):** Các yêu cầu mục 5.1.1 của YCKT.	**15**	100%		
1.1	Đáp ứng YCKT.			100%	
1.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	
1.3	Không đáp ứng YCKT.			0%	
2	**Yêu cầu về nhân lực**	**35**			
2.1	Yêu cầu về sơ đồ tổ chức và thời gian làm việc cho dự án theo mục 5.1.2.1 và 5.1.2.2 của YCKT.		10%		
2.1.1	Đáp ứng YCKT.			100%	
2.1.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	
2.1.3	Không đáp ứng YCKT.			0%	
2.2	Yêu cầu về chứng chỉ nhân sự theo mục 5.1.2.3 và 5.1.2.7 của YCKT.		20%		
2.2.1	Đáp ứng YCKT.			100%	
2.2.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	
2.2.3	Không đáp ứng YCKT.			0%	
2.3	Yêu cầu về hồ sơ, tài liệu theo mục 5.1.2.4; 5.1.2.5 và 5.1.2.7 của YCKT.		20%		
2.3.1	Đáp ứng YCKT.			100%	
2.3.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	
2.3.3	Không đáp ứng YCKT.			0%	

2.4	Yêu cầu số lượng nhân sự theo mục 5.1.2.7 của YCKT.		50%		
2.4.1	Đáp ứng YCKT.			100%	
2.4.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	(*)
2.4.3	Không đáp ứng YCKT.			0%	
3	**Thiết bị, vật tư**	**25**			
3.1	Danh mục thiết bị, vật tư theo mục 5.1.3.1 ; 5.1.3.2 và 5.1.3.3 của YCKT.		25%		
3.1.1	Đáp ứng YCKT.			100%	
3.1.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	
3.1.3	Không đáp ứng YCKT.			0%	
3.2	Yêu cầu số lượng thiết bị chính theo mục 5.1.3.4 của YCKT		75%		(**)
3.3.1	Đáp ứng YCKT.			100%	
3.3.2	Không đáp ứng đủ YCKT nhưng chấp nhận được.			60-90%	
3.3.3	Không đáp ứng YCKT.			0%	
4	**An toàn bức xạ công nghiệp** Các yêu cầu theo mục 5.1.4 của YCKT	**10**	100%		
4.1	Đáp ứng YCKT			100%	
4.2	Không đáp ứng đủ YCKT nhưng chấp nhận được			60-90%	
4.3	Không đáp ứng YCKT			0%	
5	**Kết quả đánh giá nhà thầu theo mục 5.1.5 của YCKT**	**15**	100%		
5.1	Đáp ứng YCKT			100%	

5.2	Không đáp ứng đủ YCKT nhưng chấp nhận được			60-90%	
5.3	Không đáp ứng YCKT			0%	
	Tổng cộng	**100**			

Ghi chú:

(*)

1. Số lượng tối thiểu nhân sự nhóm NDE được chấp nhận

STT	Nhóm Kỹ thuật	Số lượng
1	UT-PAUT	05, trong đó tối thiểu 02 nhân sự PAUT
2	RT-MT/PT	06, trong đó tối thiểu 03 RT và 02 PT

2. Số lượng nhóm KTV UT-PAUT và RT-MT/PT: mỗi nhân sự thấp hơn số lượng yêu cầu trừ 10 điểm mức 3. Chỉ cho phép số nhân sự đề xuất thấp hơn 01 nhân sự so với số lượng nhân sự đươc yêu cầu cho mỗi kỹ thuật.
3. Không chấp nhận các vị trí khác trong sơ đồ tổ chức có số nhân sự thấp hơn yêu cầu.
4. Số năm kinh nghiệm:
   - Thấp hơn yêu cầu: trừ 5 điểm – mức 3/01 năm/1 nhân sự.
   - Chỉ chấp nhận kinh nghiệm thấp hơn tối đa 1 năm so với yêu cầu cho mọi vị trí nhân sự trong sơ đồ tổ chức.
   - Không chấp nhận các nhân sự có kinh nghiệm thấp hơn khi tham gia các dự án tương tự.

(**)

1. Thiết bị UT, RT và MT: Mỗi thiết bị thấp hơn số lượng yêu cầu trừ 10 điểm – mức 3. Chỉ cho phép số thiết bị đề xuất thấp hơn 01 thiết bị so với số lượng thiết bị đươc yêu cầu cho mỗi kỹ thuật.
2. Thiết bị bức xạ cho RT: Tối thiểu phải có 1 nguồn X-Ray.
3. Các thiết bị khác không chấp nhận số lượng thấp hơn yêu cầu.

❖ **Điều kiện đánh giá Đạt YCKT:**

1. Không có tiêu chí nào ở mức II trên bị đánh giá 0 điểm, và
2. Tổng số điểm mức I $\geq$ 80 điểm.

❖ **Điều kiện đánh giá không đạt YCKT:**

1. Bất kỳ tiêu chí ở mức II trên bị đánh giá 0 điểm, hoặc

2. Tổng số điểm mức I < 80 điểm**.**

CODE 1

Cuu Long Joint Operating Company

SU TU TRANG FULL FIELD DEVELOPMENT – PHASE 2
FEED

SPECIFICATION FOR STRUCTURAL MATERIALS

Document Number
2021-4591-6L-1101

0	22.09.2021	Approved for Design (AFD)	C.K.L	L.W.K	B.K.N	H.D.V.
A	16.06.2021	Issued for Review (IFR)	A.L	L.W.K	B.K.N	H.D.V.
Rev.	**Date**	**Purpose of Issue**	**Prepared**	**Checked**	**Approved**	**Approval**
			CONTRACTOR			**CLJOC**

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REVISION RECORD SHEET

No.	Rev. No.	Content of Revision	Date of Revision
1	A	Issued for Review (IFR)	16.06.2021
2	0	Approved for Design (AFD)	22.09.2021

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TABLE OF CONTENTS

1.0	**INTRODUCTION**	**6**
1.1	DESCRIPTION ON FIELD DEVELOPMENT	6
1.2	SCOPE OF FRONT END ENGINEERING DESIGN (FEED)	7
1.3	DOCUMENT PURPOSE	7
1.4	PROJECT REFERENCES	7
1.5	DEFINITIONS AND ABBREVIATIONS	7
2.0	**APPLICABLE STANDARD AND REFERENCE**	**9**
2.1	GENERAL	9
2.2	VIETNAMESE REGULATIONS AND STANDARDS	9
2.3	PROJECT SPECIFICATION AND DOCUMENT REFERENCE	10
2.4	INTERNATIONAL CODE & STANDARDS / TCVN	11
3.0	**GENERAL REQUIREMENTS**	**16**
3.1	UNITS	16
3.2	LANGUAGE	16
3.3	DEVIATION FROM SPECIFICATION	16
3.4	HEALTH, SAFETY AND ENVIRONMENT	16
3.5	QUALITY CONTROL SYSTEM AND MANUAL	16
4.0	**STRUCTURAL STEEL**	**17**
4.1	PRIMARY STEEL	17
4.2	MISCELLANEOUS STEEL	17
5.0	**MOULDED PHENOLIC GRATING AND FRP COMPONENTS**	**19**
5.1	GENERAL	19
5.2	STRENGTH / SERVICEABILITY	19
5.3	ULTIMATE FLEXURAL STRENGTH	19
5.4	IMPACT RESISTANCE	19
5.5	SKID RESISTANCE	19
5.6	ULTRA VIOLET (UV) RESISTANCE	20
5.7	FIRE PERFORMANCE REQUIREMENTS	20
5.8	ADDITIONAL REQUIREMENTS	20

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6.0 TIMBER 22
6.1 Material 22
7.0 MISCELLANEOUS MATERIALS 24
7.1 NEOPRENE FOR RISER CLAMPS 24
7.2 EPDM FOR RISER CLAMPS 25
7.3 SWING ROPE 26
7.4 SAFETY CHAIN 26
7.5 JACKET FENDER 26
8.0 SUBSTITUITION OF MATERIALS 28
9.0 MATERIAL TRACEABILITY 29
9.1 MILL CERTIFICATES 29
9.2 MATERIAL MARKING 30
10.0 STORAGE OF MATERIALS 31
11.0 QUALITY ASSURANCE AND QUALITY CONTROL 32
APPENDIX A : MATERIAL USAGE REQUIREMENT 33
APPENDIX B : STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENT 35

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1.0 INTRODUCTION

1.1 DESCRIPTION ON FIELD DEVELOPMENT

The Block 15-1 contract area is located in the Cuu Long Basin offshore southern Vietnam, 180 kilometres southeast of Ho Chi Minh City.

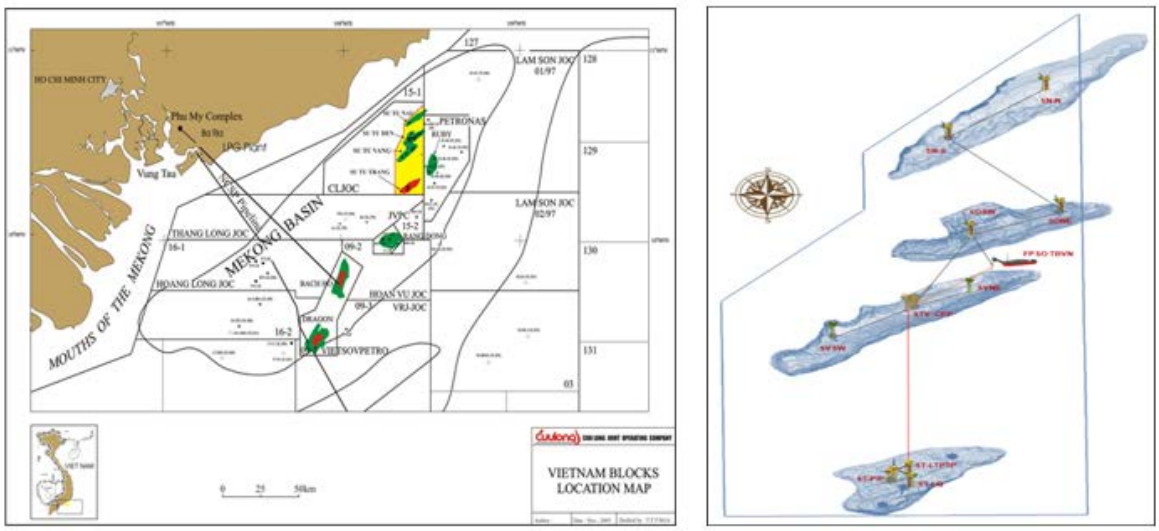

Figure 1.0-1 : Block 15-1 Location Map

There are several producing fields on Block 15-1 (figure 1.0), including Su Tu Den (2003), Su Tu Vang (2008), Su Tu Trang LTPTP (2012), Su Tu Vang North East (2013), Su Tu Nau (2014), Su Tu Vang South West (2014) and Su Tu Trang Phase 1 field (2016).

The gas export pipeline now bottlenecks production of Su Tu Trang Field to shore and the gas sales demand in South Vietnam. Su Tu Trang Full Field Development has been ongoing in two Phases to face these restrictions by allowing the increase of the condensates production while keeping steady the gas export flow rate. Su Tu Trang Full Field Development Phase 1 provided more reservoir information to support STT Full Field Development Phase 2 that will increase gas production/export significantly.

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1.2 SCOPE OF FRONT END ENGINEERING DESIGN (FEED)

Su Tu Trang Phase 2 Development (STT2) project consists of both Greenfield and Brownfield upgrade works which will involve integration between existing ST-PIP / WHP-C (bridge-linked) with the new central gas facility (ST-CGF). Also the existing PIP / WHP-C utilities are expected to support new ST-CGF operation to maximise the utilization of existing set-up and increase flexibility of operation in the complex.

The Su Tu Trang Central Gas Facility (ST-CGF) facility will be equipped for capacities of 185-300 MMSCFD gas production and 150 MMSCFD gas export (MDCQ) to the Third Party pipeline (new pipeline called Nam Con Son 2 Phase 2). The expected condensate of approximately 25,000-35,000 BPD, produced water and export gas to CPP will be commingled and exported via the existing 12" pipeline from WHP-C to SV-CPP. The balance gas after satisfying the fuel gas needs of CPP and STT is re-injected.

1.3 DOCUMENT PURPOSE

This document defines the minimum requirements for the manufacture and supply of steel and miscellaneous materials to be used in the fabrication of the offshore structures. CONTRACTOR shall obtain COMPANY written approval for any deviations from the requirements of this Specification or specifications, standards and drawings referenced herein or elsewhere in the Contract.

This document and the codes, specifications and referenced documents listed in Section 2.0 below are not intended to be all inclusive. The requirements set forth do not relieve CONTRACTOR of his responsibility to perform all services in a safe manner, to meet applicable codes and standards, to comply with government regulations or to supply a product capable of performing its intended service.

1.4 PROJECT REFERENCES

The following are the key Project references:

Contract No./Agreement No. : CLJOC-2021-DEV-2117
TPGM Project Cost Code : 202458C

1.5 DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Certifying Authority : Classification Society or other such body as appointed by COMPANY

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COMPANY [CPY] / OWNER	:	CUU LONG JOINT OPERATING COMPANY (CLJOC) (The party who initiates the project)
CONTRACTOR [CTR]	:	Party who is awarded the contract by COMPANY to perform the project works. (The party provide services to COMPANY)
SUB-CONTRACTOR	:	Party who is providing subcontracting services specified and ordered by CONTRACTOR.
VENDOR/ MANUFACTURER/ SUPPLIER	:	Party who supplies equipment and/or material and perform associated services.

ABBREVIATION

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
ASME	American Society of Mechanical Engineers
ATL	Action Tracking Register
AWS	American Welding Society
BPD	Barrels Per Day
BS	British Standard
CGF	Central Gas Facility
CPP	Central Processing Platform
CE	Carbon Equivalent
CTOD	Crack Tip-Opening Displacement
CVN	Charpy V-notch
EL	Elevation
ERW	Electric Resistance Welded
EPDM	Ethylene Propylene Diene
FEED	Front End Engineering Design
FRP	Fibre Reinforced Plastic
HFI	High Frequency Induction
ISO	International Organization for Standardization
MDCQ	Maximum Daily Contract Quantity
MMSCF	Million Cubic Feet
MMSCFD	Million Cubic Feet Per Day
OD	Outside Diameter
PO	Purchase Order
PQR	Procedure Qualification Record
PTFE	Polytetrafluoroethylene

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RFQ	Request for Quotation
SAW	Submerged Arc Welding
SMLS	Seamless
STT	Su Tu Trang Phase
STT2	Su Tu Trang Phase 2 Development
ST-CGF	Su Tu Trang Central Gas Facility
ST-LQ	Su Tu Trang Living Quarter & Utilities Platform
ST-PIP	Su Tu Trang Production and Injection Platform
TCVN	Vietnam Standard
WHP-C	Su Tu Trang Long Term Production and Test Platform
WPS	Welding Procedure Specification

2.0 APPLICABLE STANDARD AND REFERENCE

2.1 GENERAL

The specifications, codes and standards presented in this section have been interpreted as the minimum requirements applicable to the subject work. Unless otherwise stipulated, the applicable version of codes and standards, including relevant appendices and supplements, shall be the latest as of the date of contract award.

The order of precedence shall be as follows:

- Vietnamese Laws and Regulations;
- Purchase Order;
- Project Datasheets and Drawings;
- Project Specifications;
- Codes & Standards;

Where a conflict exists among the applicable project specifications, codes, standards and regulations, it shall be brought to the attention of the COMPANY immediately for decision and disposition of the discrepancy or conflict. In the absence of COMPANY resolution on such conflict, the most stringent shall apply.

2.2 VIETNAMESE REGULATIONS AND STANDARDS

EPIC CONTRACTOR/VENDOR shall be responsible for ensuring compliance with all applicable Vietnamese codes, standards and regulations.
All equipment/packages are subject to VR (Vietnam Register) Classification Requirements.

Ref	Document Number	Document Title
A01	QCVN 49:2012/BGTVT	National Technical Regulations for Classification and Technical Supervision of Fixed Offshore Platforms

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Ref	Document Number	Document Title
A02	QCVN 97:2016/BGTVT	National technical regulation for lifting appliances onboard offshore units
A03	TCVN 6170-1	Fixed Offshore Platforms - Part 1: General requirements
A04	TCVN 6170-2	Fixed Offshore Platforms - Part 2: Environment Conditions
A05	TCVN 6170-3	Fixed Offshore Platforms - Part 3: Design Loads
A06	TCVN 6170-4	Fixed Offshore Platforms - Part 4: Design of Steel Structures
A07	TCVN 6170-7	Fixed Offshore Platforms - Part 7: Foundation Design
A08	TCVN 6170-8	Fixed Offshore Platforms - Structures - Part 8: Corrosion Protection
A09	TCVN 6170-9	Fixed Offshore Platforms - Part 9: Steel Template (jacket) Platforms
A10	TCVN 6170-11	Fixed Offshore Platforms - Part 11: Fabrication/ Construction
A11	TCVN 6170-12	Fixed Offshore Platforms - Part 12: Transport and Installation Operations
A12	TCVN 6767-2	Fixed offshore platforms - Part 2: Fire protection, detection and extinction
A13	TCVN 7229	Fixed offshore platforms. Rules for classification and construction weldings
A14	TCVN 7230	Fixed offshore platform - Rules for classification and construction materials

2.3 PROJECT SPECIFICATION AND DOCUMENT REFERENCE

The following Project Specifications shall be applied to the subject work. In cases of conflict between Project Specifications and any of the Applicable Codes, CONTRACTOR shall immediately submit the matter in writing to COMPANY who will provide a written clarification.

Ref	Document Number	Document Title
B1	2021-4500-0L-0001	General Quality Requirements Specification
B2	2021-4500-0L-0004	Master Vendor Data Requirements List (VDRL) Specification
B3	2021-4500-0L-0005	Vendor Data Requirements Specification
B4	2021-4500-0L-0003	Project Supplier Surveillance Plan for Bulk

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Ref	Document Number	Document Title
		Material Specification
B5	2021-4500-0L-0010	Storage and Handling of Equipment and Materials Specification
B6	2021-4500-1L-0001	Specification for Package Equipment
B7	2021-4500-1L-5002	Painting and Coating Specification
B8	2021-0000-0L-0001	Project Units Specification
B9	2021-4590-6L-1102	Specification for Fire Rated Blast Walls
B10	2021-4591-6L-1103	Specification for Structural Skids for Packaged Equipment
B11	2021-4591-6L-1106	Specification for Structural Timber
B12	2021-4591-6L-1107	Specification for Timber Testing
B13	2021-4503-6L-1108	Specification for Sacrificial Anodes for Steel Structures
B14	2021-4591-6L-1109	Specification for Structural Fabrication and Welding
B15	2021-4591-6L-1111	Specification For Steel Forging for Floatover Hardware
B16	2021-4591-6L-1112	Specification For Floatover Hardware

2.4 INTERNATIONAL CODE & STANDARDS / TCVN

The structural materials shall be in accordance with the requirements of the latest edition of the following Codes and Standards:

Ref	Document Number	Document Title
	American Petroleum Institute (API)	
C1	RP 2A-WSD	Specification for Carbon Manganese Steel Plate for Structures
C2	API 2MT1	Specification for As-Rolled Carbon Manganese Steel Plate with Improved Toughness for Offshore Structures
C3	API 2MT2	Specification for Rolled Shapes with Improved Toughness
C4	API 2W	Specification for Steel Plates for Offshore Structures, Produced by Thermo-Mechanical Control Processing (TMCP)
C5	API 2Y	Specification for Steel Plates, Quenched and

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Ref	Document Number	Document Title
		Tempered, for Offshore Structures
C6	API 2B	Specification for the Fabrication of Structural Steel Pipe
C7	API 5L	Specification for Line Pipe
C8	API RP 2Z	Recommended Practice for Preproduction Qualification for Steel Plates for Offshore Structures
	American Society of Mechanical Engineers (ASME)	
D1	ANSI/ ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
	American Society for Testing and Materials (ASTM)	
E1	ASTM A6/A6M	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
E2	ASTM A36/A36M	Standard Specification for Carbon Structural Steel
E3	ASTM A53	Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless
E4	ASTM A106	Seamless Carbon Steel Pipe for High Temperature Service
E5	ASTM A123	Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel Products
E6	ASTM A153	Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
E7	ASTM A131	Standard Specification for Structural Steel for Ships
E8	ASTM A269/A269M-14e1	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
E9	ASTM A312/312M-15	Standard Specification for Seamless, Welded, Heavily Cold Worked Austenitic Stainless Steel Pipes
E10	ASTM A193/A193M-12b	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
E11	ASTM A194/A194M	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High

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Ref	Document Number	Document Title
		Temperature Service, or Both
E12	ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60,000PSI Tensile Strength
E13	ASTM A320	Standard Specification for Alloy Steel and Stainless Steel Bolting for Low Temperature Service
E14	ASTM A325-10ae1	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
E15	ASTM A333	Standard Specification for Seamless and Welded Steel Pipe for Low Temperature Service and other Applications with Required Notch Toughness
E16	ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
E17	ASTM A490	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
E18	ASTM A500	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
E19	ASTM A572	Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
E20	ASTM A578	Standard Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications
E21	ASTM A633	Standard Specification for Normalized High Strength Low Alloy Structural Steel Plates
E22	ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
E23	ASTM A709	Standard Specification for Structural Steel for Bridges
E24	ASTM A992	Standard Specification for Structural Steel Shapes
E25	ASTM A770	Standard Specification for Through Thickness Tension Testing of Steel Plates for Special Applications
E26	ASTM A276/A276M	Standard Specification for Stainless Steel Bars

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Ref	Document Number	Document Title
		and Shapes
E27	ASTM D143 - 14	Standard Test Methods for Small Clear Specimens of Timber
E28	ASTM D395	Standard Test Methods for Rubber Property-Compression Set
E29	ASTM D429	Standard Test Methods for Rubber Property-Adhesion to Rigid Substrates
E30	ASTM D945	Standard Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph)
E31	ASTM D1037 – 12	Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
E32	ASTM D2240	Standard Test Methods for Rubber Property-Durometer Hardness
E33	ASTM D695-10	Standard Test Method for Compressive Properties of Rigid Plastics
E34	ASTM D2565-99 (2008)	Standard Practice for Xenon-Arc Exposure of Plastic Intended for Outdoor Applications
E35	ASTM D635-10	Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
E36	ASTM D2863-13	Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastic (Oxygen Index)
E37	ASTM E84-14	Standard Test Method for Surface Burning Characteristics of Building Materials
E38	ASTM E23-93	Standard Methods for Notched Bar Impact Testing of Metallic Materials
E39	ASTM E2248-13	Standard Test Method for Impact Testing of Miniaturized Charpy V-Notch (CVN) Specimens
E40	ASTM E1290-13	Standard Test Method for Crack Tip-Opening Displacement (CTOD) Fracture Toughness Measurement
E41	ASTM F593-13a	Standard Specification for Stainless Steel Bolts, Hex cap Screws and Studs
E42	ASTM F436	Standard Specification for Hardened Steel

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Ref	Document Number	Document Title
		Washers
	American Welding Society (AWS)	
F1	AWS D1.1	Structural Welding Code
	British Standard Institute (BS)	
G1	BS 7448	Fracture Mechanics Toughness Tests Part 1: Methods for Determination of KIC critical CTOD and critical J values of Metallic Materials.
G2	BS EN ISO 15653:2010	Metallic Materials- Method of test for the determination of quasistatic fracture toughness of welds
G3	BS 7191	Specification for Weldable Structural Steels for Fixed Offshore structures
G4	BS: EN10204	Metallic materials-Types of Inspection Documents
	European Standards	
H1	BS EN 10225:2001	Weldable Structural Steels for Fixed Offshore Structures – Technical Delivery Conditions
H2	BS EN 10025-1:2004	Hot Rolled Products of Structural Steels – Part 1: General Technical Delivery Conditions
H3	BS EN 10025-2:2004	Hot Rolled Products of Structural Steels – Part 2: Technical Delivery Conditions for Non-alloy Structural Steels
H4	BS EN 10034	Structural steel I and H section- Tolerances on shape and dimensions
H5	EN 10002	Tensile Testing for Metallic materials (Z test)
H6	EN-10045-1	Metallic Materials – Charpy V-Notch (CVN) Part 1: Test Method
H7	EN-10160	Ultrasonic Testing of Steel Flat Product of Thickness equal to or greater than 6mm

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3.0 GENERAL REQUIREMENTS

3.1 UNITS

The International System of units (SI) shall be used in all documentation.

3.2 LANGUAGE

All documentation and correspondence shall be in English language.

3.3 DEVIATION FROM SPECIFICATION

No deviation from this specification shall be permitted without prior written approval of the COMPANY. Any deviation shall be clearly stated in the MANUFACTURER's tender. The MANUFACTURER shall be deemed to have agreed to comply with all the provisions of this specification upon acceptance of any order that refers to this specification.

3.4 HEALTH, SAFETY AND ENVIRONMENT

COMPANY has HSE targets of no accidents or harm to people or environment. To achieve this goal, all work shall be completed in a safe manner, such that no harm can be caused to personnel and in such a way that the impact on the environment is minimized at all locations where the project related work is performed, including the VENDOR's facilities and the fabrication yard.

3.5 QUALITY CONTROL SYSTEM AND MANUAL

CONTRACTOR shall have a quality control system and quality control manual covering all construction activities. Controlled copies of the quality control manual shall be available for COMPANY approval and for monitoring all construction activities.

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4.0 STRUCTURAL STEEL

4.1 PRIMARY STEEL

1. All structural steel shall be new stock, cut from a single roll unit to be straight, free from laps, seams (except for rolled tubulars), scabs, rust and deformation; and shall conform to Table 1. No substitution will be allowed without written approval from the Company.
2. All steel requiring fine grain practice shall contain acid soluble aluminum of 0.015% or minimum total aluminum content of 0.020%.
3. Spiral welded pipe shall not be used.
4. Electric-resistance welded (ERW) pipe shall neither be used for primary members nor for members with nominal diameter greater than 610mm (24 inches) or wall thickness greater than 25.4mm (1.0 in.). The mill in which ERW pipe is manufactured shall be certified to apply the API monogram and HFI welding shall apply.
5. Boron or nitrogen shall not be intentionally added to steel.
6. Ultrasonic examination shall conform to ASTM A578, Level B S1, Ref.[E20].
7. Certified mill test reports of all the materials used shall be kept on file by the steel fabricator for inspection by the Company and shall be transferred to the Company upon completion of fabrication. Steel shall be marked as per ASTM A6, Ref.[E1].

4.2 MISCELLANEOUS STEEL

4.2.1 Grating

1. Steel grating and stair treads shall be serrated bar grating with bearing bars at 30mm (1-3/16 in.) on centers and crossbars at 100mm on centers with size of 38mm by 5mm for topside deck, well-bay areas, stair landing and treads and 25mm by 5mm (3/16 in.) for service access deck. Prefabricated stair treads may not be substituted without prior written approval by Company.
2. Steel grating shall be heavy-duty galvanized (minimum 600 gr of zinc/sqm (2.0 ounces of zinc per sq. ft or 85 µm thickness) of steel surface) in accordance with ASTM A123, Ref.[E5]. Galvanizing shall be done after completion of all fabrication and welding. All mill coatings scale and paint shall be sandblasted from the surfaces of all items prior to galvanizing. All excess of galvanizing shall be removed. Cold galvanizing repair and touch up on local areas due to modifications or penetrations is permissible with COMPANY approval. The final dry coating shall be at least 95% zinc.
3. Steel grating treads and the edge of landings at the top of stairs shall be fitted with a non-skid, cast abrasive nosing or approved equivalent.

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4. Grating shall be fastened to structural members using grating stainless steel clips or equivalent fasteners, or welded using approved Welding Procedure Specification (WPS).

4.2.2 Threaded Fasteners

1. Bolts, studs, and nuts shall be heavy hexagon pattern, while washer to be flat ring or spring ring type.
2. Threads shall be Coarse Thread Series conforming to ASME B1.1 Ref.[D1].
3. Bolts and studs, of 12.7mm (1/2 in.) diameter and smaller shall conform to ASTM A193 Gr. B7M, Ref.[E10], while nuts shall be to ASTM A194 Gr. 7, Ref.[E11].
4. Stainless steel bolting type 316 shall conform to ASTM A320 Grade B8M, Ref.[E13].
5. Structural bolts, studs, nuts, and washers larger than 12.7mm (1/2 in.) shall conform to ASTM A325, Ref.[E14] and shall be hot spun galvanized in accordance with ASTM A153, Ref.[E6] or specially coated to meet the purpose such as PTFE coated or fluorocarbon coated.
6. Heat treated bolts shall comply with specification ASTM A490, Ref.[E17].
7. Hardened washer ASTM F436, Ref.[E42] shall be used if the connected steel material has minimum yield stress less than 40ksi if using ASTM A490, Ref.[E17] bolts in accordance to AISC steel construction manual 13th Edition, pp 16.2-40.

4.2.3 Floor Plate

All deck plate shall be new and fabricated from ASTM A36 Type 3, Ref.[E2] or ASTM A572 Grade 50, Ref.[E19] smooth plate stock, unless noted otherwise on the construction drawings. Checkered plate shall not be used without prior written approval from Company.

4.2.4 Handrail

Pipe for handrails and sockets shall be in accordance with API 5L Grade B, Ref.[C7] or ASTM A53 Grade B, Ref[E3] Electric Resistance Welded (ERW) pipe. Handrails and sockets shall be hot dipped galvanized, after fabrication, in accordance with ASTM A153, Ref.[E6] / ASTM A123, Ref.[E5]. Stiffener or kick plates shall be welded to the handrail sockets prior to galvanizing.

4.2.5 Manufactured Items

Manufactured items such as cleats, shackles, wire rope, clips, thimbles, turnbuckles, chain, tie wire, stud bolts, nuts, etc., shall be galvanized in accordance with COMPANY approved Manufacturer standard.

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5.0 MOULDED PHENOLIC GRATING AND FRP COMPONENTS

5.1 GENERAL

The phenolic grating shall be square mould with bi-directional strength characteristics.

The grating shall be red in colour.

The grating penetration collars shall be from Polyurethane from Intrepid Industries Inc. or similar penetration collar system approved by COMPANY. These shall be of yellow in colour.

Fiberglass grating shall be 38 x 38 squared meshes, molded type. It shall be secured with HILTI system fasteners or COMPANY approved equivalent.

The Fiberglass stair tread shall be 38mm thick x 38mm rectangular molded with bonded grit epoxy anti-skid surface and nosing.

5.2 STRENGTH / SERVICEABILITY

Grating: Certified load rating and deflection characteristics shall be provided.

As a minimum

- The 38mm grating shall be required to support a uniform load of 10kN/m² for a clear span of 1000mm.
- The 50mm grating shall be required to support a uniform load of 14kN/m² for a clear span of 1200mm.

5.3 ULTIMATE FLEXURAL STRENGTH

For grating the ‘maximum load’ based on the ultimate strength of product shall be 3 times the sum of the specified live load.

The grating shall have flexural stiffness properties sufficient to limit deflection to 5mm assuming simple supports.

5.4 IMPACT RESISTANCE

The grating when simply supported will take impact loadings of 1.0 kJ minimum with 90% retention of flexural stiffness and strength.

Impact Testing shall be in accordance with ASTM A695-10, Ref.[E33].

5.5 SKID RESISTANCE

The grating panels shall have an anti-slip surface.

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5.6 ULTRA VIOLET (UV) RESISTANCE

Mounded grating and fiberglass components shall be manufactured with resins containing integral UV inhibitors.

The manufacture shall provide data demonstrating the UV resistance of the proposed FRP components, in accordance to ASTM D2565, Ref.[E34].

A polyurethane UV coating shall be applied to penetration collars.

5.7 FIRE PERFORMANCE REQUIREMENTS

FRP components proposed shall meet the flammability requirements listed below as a minimum;

5.7.1 Fire Resistance

All FRP grating and FRP components shall be certified fire resistant by testing to ASTM E84, Ref[E37] with a flame spread rating not to exceed 5.

5.7.2 Flame Spread

All FRP grating and FRP components shall have low flame spread characteristics as determined by IMO Resolution A653 (16).

5.7.3 Smoke Test

FRP components shall have low smoke characteristics as determined by ASTM E84, Ref.[E37] with a smoke developed rating not to exceed 5.

5.8 ADDITIONAL REQUIREMENTS

5.8.1 Self-extinguishing

All FRP grating and FRP components shall be certified self-extinguishing by testing to ASTM D635, Ref[E35] with burn rate less than 1 cm/minute linear horizontal rate once the flame source has been removed.

5.8.2 Flame Resistance

All FRP grating and FRP components shall be certified flame resistant by testing to UL 94 as VO class materials.

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5.8.3 Combustion

All FRP grating and FRP components shall be certified to require over 50% oxygen to support candle like combustion by testing to ASTM D2863, Ref[E36].

5.8.4 Heat Exposure

The grating shall be capable of maintaining structural integrity for operating temperatures up to 150˚C minimum.

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6.0 TIMBER

6.1 Material

1. All timber shall be flat, straight and free of any major splits or knots and comply with technical requirement as set forth in Doc. No. 2021-4591-6L-1107, “Specification for Timber Testing”, Ref.[B12].

2. Timber for mudmat and docking system shall be “Keruing” or locally available equivalent, full sized and smooth on 4 sides. At minimum timber for mudmat and docking system shall have the following properties:

Table 6.1: Timber Properties for Mudmat and Docking System

Parameter	Acceptance Criteria
Minimum Elastic Modulus	13000 MPa
Shear Strength (parallel to grain)	2.2 MPa
Minimum Bending Strength	11 MPa
Minimum Dry Density	740 kg/m^3

3. Timber for launch runners, rocker arm bumpers, load-out support frame, side and sway float-over fenders, boat landing fender and crane boom rest shall be stress graded Southern Yellow Pine Dense No. 1 structural, treated “Oak”, “Selangan Batu” or locally available equivalent, full sized and smooth on 4 sides. The timbers above purpose shall have the following properties:

Table 6.2: Timber Properties for Launch Runners, Rocker Arm Bumpers, Load-out Support Frame, Side and Sway Float-over Fenders, Boat Landing Fender and Crane Boom Rest

Parameter	Acceptance Criteria
Minimum Elastic Modulus	15000 MPa
Shear Strength (parallel to grain)	2.6 MPa
Compression Strength (parallel to grain)	23 MPa
Compression Strength (perpendicular to grain)	9.75 MPa
Minimum Bending Strength (parallel to grain)	23 MPa
Minimum Allowable Tension Strength (parallel to grain)	13.8 MPa
Minimum Dry Density	800 kg/m^3

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4. CONTRACTOR shall submit any substitutions for COMPANY approval prior to use.

5. Timber for launch runners and load-out support frame shall be sanded on all surfaces to a condition that accept varnish. Varnish shall be applied to all surfaces of these timbers with minimum 5 coats and no holiday is accepted.

6. All timber should be adequately preserved at yard prior to installation and after delivery.

7. Miscellaneous timber shall be utility grade hardwood and shall be reasonably flat, straight, and free of splits or loose knots.

8. Testing of timbers used for launch runner and deck support frame shall be performed as per Project specification for timber testing (Doc. No. 2021-4591-6L-1107, Ref.[B12]). For other structural timber, testing shall be performed as per ASTM D1037, Ref[E31] and ASTM D143, Ref[E27].

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7.0 MISCELLANEOUS MATERIALS

7.1 NEOPRENE FOR RISER CLAMPS

7.1.1 Material

1. The VENDOR shall compound black neoprene vulcanized sheeting with optimum ozone resistance and mechanical properties for:
   a) Good abrasive and shear strength
   b) Good weathering resistance
   c) Extreme sea water resistance during platform service life duration, immersion under constant shear stresses
   d) The sheeting shall have been tested to the following specifications:

      - ASTM D395, Ref.[E28]
      - ASTM D429, Ref.[E29]
      - ASTM D945, Ref.[E30]
      - ASTM D2240, Ref.[E32]

   e) The sheeting shall meet or exceed the following requirements:

Table 7.1: Material Properties for Neoprene

Parameter	Acceptance Criteria
Design Temperature	82.2°C (180°F)
Shore Durometer Hardness (ASTM D2240)	60-65A
Tensile Strength (minimum)	13,790 kPa (2,000 psi)
Elongation at Break (minimum)	440 %
Ozone Exposure Rating -100 PPM @ 21°C (70°F) under 15% elongation for 100 hours	no cracks
Outdoor Exposure Rating after 6 months exposure	no cracks
Resilience (ASTM D945-55)	55%
Compression Set 70 hours @ 100 ° C (212 ºF) (ASTM D395-55)	45
Abrasion Rating Using Akron Tester	excellent

2. The VENDOR shall submit details recommended method of bonding of the neoprene to the guides to Company for approval. Sheeting shall be bonded to the guides in accordance with the approved Company method of application.

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3. The VENDOR shall provide a full specification of the neoprene and adhesive intended to be supplied, including details of compounding for approval by Company.
4. The neoprene shall be attached to the steel per the following:
   a) The neoprene will be bonded to the inner surface of the clamps by the neoprene VENDOR or by CONTRACTOR.
   b) The applicator shall apply a neoprene lining to each guide as shown on the approved drawings.
   c) The inside diameter of the guide-plus-neoprene shown on the approved drawings may be achieved by grinding the neoprene surface if necessary.

7.1.2 Bond Specification

Table 7.2: Bonding Properties for Neoprene

Parameter	Acceptance Criteria
Bond Strength	13,790 kPa (2,000 psi)
ASTM D429 Peel Test	793 kPa (115 psi)
Fully Cured Bond Retention Test (six (6) months in sea water)	100%

7.1.3 Inspection and Testing of Neoprene

1. Mechanical tests shall be carried out on a cured sample of the rubber sheeting.
2. Tests shall be carried out by the manufacturer in accordance with ASTM D429, Ref.[E29] Method E to demonstrate the adequacy of adhesion. Test results shall be provided to the Company.

7.1.4 Protection

The applicator shall protect the inner surface of the clamps so that the neoprene surface and edges are protected from physical damage.

7.2 EPDM FOR RISER CLAMPS

The sheeting shall meet or exceed the following requirements:

Table 7.3: Material Properties for Ethylene Propylene Diene (EPDM)

Physical Properties	Test Method	Acceptance Criteria
Design Temperature	-	120°C (248°F)
Shore Durometer Hardness (Shore A)	ASTM D2240	40A - 90A
Tensile Strength (Minimum)	-	7 - 21 MPa

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Physical Properties	Test Method	Acceptance Criteria
Elongation at Break (Minimum)	-	100% -600%
Ozone Exposure	Rating -100 PPM @ 21°C (70°F) under 15% elongation for 100 hours	No cracks
Outdoor Exposure	Rating after 6 months exposure	No cracks
Resilience	ASTM D945-55	Fair to Very Good
Compression Set	ASTM D395-55: 70 hours @ 100° C (212°F)	20% - 60%
Abrasion Resistance	Akron Tester	Good

7.3 SWING ROPE

Swing rope shall be waterflex manila rope. All fittings shall be of Grade SS316 stainless steel.

7.4 SAFETY CHAIN

Safety chain material shall be of mild steel material conforming to ASTM A36, Ref.[E2].

7.5 JACKET FENDER

The jacket fender shall be designed and manufactured from elastomer compound to provide protection to jacket structure against structural damage caused by vessel impact. Material properties for elastomer compound shall meet the following requirements:

Table 7.4: Material Properties for Jacket Fender Elastomer Compound (Before Aging)

Physical Properties	Test Method	Acceptance Criteria
Shore Durometer Hardness (Shore A)	ASTM D2240	50A - 70A
Tensile Strength (minimum)	ASTM D412	18 MPa
Elongation (minimum)	ASTM D412	400 %
Tear Strength (minimum)	ASTM D624	400 N/cm
Compression set (22 hours for 70°C	ASTM D395	30% or less

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Physical Properties	Test Method	Acceptance Criteria
Static ozone aging test	Exposure to 50 pphm (parts of ozone per hundred million of air by volume) at 40°C for 96 hours	No cracks after elongation by 20%

Table 7.4: Material Properties for Jacket Fender Elastomer Compound (After Aging)

Physical Properties	Test Method	Acceptance Criteria
Shore Durometer Hardness (Shore A)	ASTM D2240	Not to exceed the original property by more than 8
Change in Tensile Strength	ASTM D573	Not less than 80% of original property
Change in Elongation	ASTM D573	Not less than 80% of original property

Note: After aging refers to air oven aging at 70°C +/- 1°C for 96 hours.

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8.0 SUBSTITUITION OF MATERIALS

1. Substitution of materials not meeting this specification and not approved in writing by COMPANY shall not be accepted.
2. Non-conforming materials shall be removed and replaced with the specified materials.
3. Material substitution requests shall be submitted in writing to COMPANY for approval, allowing reasonable time for evaluation without disruption of the schedule.
4. Material substitution requests shall include:
   a) Nature and extent of the substitution.
   b) Complete material specifications.
   c) Mechanical and physical properties of proposed substitute.
   d) Other information requested by COMPANY.

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9.0 MATERIAL TRACEABILITY

9.1 MILL CERTIFICATES

1. The Contractor shall furnish Company with one copy of all mill certificates for all pipes, structural shapes and plate before the material is used.
2. Contractor's stock material shall bear mill heat numbers for identification.
3. The maximum carbon equivalent (CE) for all materials in which a carbon equivalent requirement is not specified shall be 0.45 for CE and 0.23 for Pcm as determined by a ladle analysis of the steel. The carbon equivalent value shall be determined by the following:

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

$$Pcm = C + \frac{Si}{30} + \frac{Mn + Cu + Cr}{20} + \frac{Ni}{60} + \frac{Mo}{15} + \frac{V}{10} + 5B$$

4. For steels in which only C, Mn and V are reported, 0.05 shall be added to the value of the CE and 0.03 for Pcm computed with the reported elements.
5. Contractor shall mark each mill certificate with the following information:

   Contractor's job number

   Item to be used, e.g. W36 x 150; HY800x350x16x36

   Quantity to be used, e.g. number of meter

   Area of structure for material, e.g. deck truss, Main Deck Horizontal framing deck

   For plate stock to be used for Contractor rolled steel pipe, pipe diameter and wall thickness of pipe to be fabricated shall be marked on each mill certificate.
6. Contractor shall maintain material traceability maps showing the material heat numbers of all major load bearing structural members.
7. Original mill certificates in accordance with BS EN 10204:2004 level 3.2 shall be provided for all Type 1, Type 2, Type 2A and Type 2B rolled tubular, seamless tubes, sections and plates. For all other material types, level 3.1 inspection certification is adequate.

   In addition, the independent third party inspection certificates (BS EN 10204:2004 Type 3.2) shall state:

   - The identification of the material has been verified by the Certifying Authority.
   - That all tests ware witnessed by the independent third party inspection agency. Only 4 (four) independent third party inspection agencies, namely ABS, BV, DNV-GL, and LRS, are acceptable to the Company.
   - Agency or inspector’s identification symbol.

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9.2 MATERIAL MARKING

1. All Type 1, Type 2, type 2A, Type 2B, Type 3 and Type 4 steels shall be color coded or otherwise marked upon delivery to Contractor's fabrication yard. The steel shall be marked such that the type of steel, heat number and special tests can be immediately recognized. The color code shall be renewed as necessary throughout the fabrication process until the material enters its final location in the structure.
2. All heat numbers or other identification markings for flat plates (for Contractor rolled pipe and plate girders), structural shapes (wide flange beams W24/UB610/HY600 and larger), and manufactured pipe (12-3/4 inches (324 mm) OD and larger) shall be transferred from piece to piece prior to cutting. Cut pieces shall be remarked in the same manner as the original.
3. All heat numbers or other identification markings shall be stamped with 9.5mm (3/8 in.) low stress concentration dies on both ends of each item. CONTRACTOR shall maintain all markings through the life of the project.
4. The Contractor shall stamp (as above) the heat numbers on all component parts of jacket and deck lifting padeyes.
5. In additional to information required by the specific codes and standards, the following information shall be stenciled on each piece using white painted letters on black painted background:
    - Name of COMPANY
    - Name of Project
    - Identification No./ Heat No.
    - Purchase Order Requisition Number/ Item No. (Lot. No.)
    - Material Specification/ Grade
    - Dimensions and Weights
    - Mill Reference Number and trademark

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10.0 STORAGE OF MATERIALS

1. CONTRACTOR and VENDOR shall be responsible for the handling, storage, warehousing and protection of all materials.
2. Structural materials, whether plain or fabricated, shall be stored above ground, protected from the weather, on either flat surfaces or platform type skids or on other COMPANY approved supports.
3. Materials shall be kept free of dirt, grease, paint spray, or other foreign matter and shall be protected from corrosion.
4. Protection of the structural steel during fabrication shall be capable to retain its physical configuration, strength and workability characteristics.

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11.0 QUALITY ASSURANCE AND QUALITY CONTROL

1. VENDOR shall establish and implement the Quality System in accordance with the relevant sections of ISO 9001:2001: 2008 standard / General Quality Requirements or any other equivalent standard recognized by Contractor and Company.
2. Company shall verify that the system is established and effective either by physical audit or by questionnaire or both at his discretion.
3. Reasonable access should be allowed to the CONTRACTOR and COMPANY's Representative(s) as well as to the Representative(s) of Authorized Inspection / Testing Agency.
4. VENDOR shall submit a Quality Plan and Inspection Approach with the proposal, which is to be agreed between Vendor Contractor and COMPANY prior to start of manufacturing.
5. VENDOR shall ensure that the product is meeting the requisite quality requirements as specified in the various sections of this document and applicable standards at the time of manufacturing / supplying.
6. VENDOR shall obtain an unconditional Inspection Release from the CONTRACTOR and COMPANY, prior to any shipment.

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Appendix A : Material Usage Requirement

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TABLE 1

MATERIAL USAGE REQUIREMENTS

Material Type	Required Usage
1	Structural members which are fracture critical and requiring improved through thickness properties; including but not limited to tubular joint chords, lifting eyes and cheek plates, deck leg node cans, and plate girders where other girders or truss braces frame into them.
2	Structural members where failure would pose a threat to the structure, and requiring high strength steel. Such applications include but are not limited to jacket legs, jacket braces, piles, brace end stubs required for fatigue considerations, crane pedestals, deck legs, truss braces, plate girders and main beams.
2A	Usage is similar to Type 2 and is applicable for few sections of piles only
2B	Usage is limited to conductors only.
3	Non-critical or redundant structural members requiring high strength steel, such as deck beams, tubulars and stiffeners for plate girders
4	Non-critical structural shapes, plates and fabricated tubular, pipes not requiring high strength steel, such as deck plate, deck beams, and minor tubular joint chords.

Notes:

1. For steel specifications and supplementary requirements, see Table 2.
2. Non-critical structural members are those in which an isolated fracture would not cause a catastrophic failure of the structure.

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Appendix B : Steel Specifications and Supplemental Requirement

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TABLE 2

STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENTS

Type 1 Material

General Description: High strength plate with guaranteed notch toughness and improved through-thickness properties.

Primary specifications:	API 2H Grade 50
	API 2W Grade 50
	API 2Y Grade 50
Alternate specifications:	ASTM A131 Grade EH36
	ASTM A537 Class 1
	ASTM A633 Grade C
Maximum thickness:	101.6 mm (4 inches)

Supplementary requirements for API 2H/2W/2Y:

- S-1 Ultrasonic Examination
- S-3 Individual Plate Testing / Additional Tension Test
- S-4 Through Thickness (Z-Direction) Testing
- S-5 Low Sulfur Steel for Improved Through-Thickness Properties
- S-8 Strain Aged Charpy V-Notch (CVN) Impact Tests, if plate will be formed into tubular with D/t less than or equal to 30.
- S-11 Pre-production Qualification, (CTOD testing in accordance with API RP 2Z) if thickness is greater than or equal to 2 inches (50 mm). CTOD re-testing can be waived if fabricator has conducted PQR in which CTOD has been performed for materials with similar grades and thickness is greater than or equal to the required thickness and the test results meet supplementary requirement S11 of API Specification 2W.

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- CVN test shall be performed to standard requirements of API 2H/2W/2Y Grade 50. Transverse specimens according to ASTM A370 shall be taken for CVN test, temperature at -20^{o}C, acceptance criteria 40.7J (30ft-lbs) minimum average and 33.9J (25 ft-lbs) minimum single value for full size specimens.
- Maximum Carbon Equivalent (CE) for primary specification per respective specification. Under no circumstances CE or Pcm shall exceed 0.45 or 0.23 respectively as stated in Section 8.1 of this specification.

Supplementary requirements for ASTM A131/A633:

- ASTM A770 “Standard Specification for Through Thickness Tension Testing of Steel Plates for Special Applications” with reduction of area not less 20%, unless as required by COMPANY equivalent to API RP 2W requirement.
- Maximum Carbon Equivalent (CE) for alternate specification as per API 2H Gr. 50, shall be 0.43 and 0.45 for plate thickness no greater than 2” (50mm) and equal to or greater than 2.5” (50mm), respectively.
- CVN test shall be performed to standard requirements of ASTM A131 Grade EH36, ASTM A537 Class 1 and ASTM A633 Grade C respectively. Transverse specimens according to ASTM A370 shall be taken for CVN test, temperature at -20^{o}C, acceptance criteria 40.7J (30ft-lbs) minimum average and 33.9J (25 ft-lbs) minimum single value for full size specimens.
- Sulfur content shall not exceed 0.006% by heat analysis for improved through thickness properties.
- Mechanical tests shall be performed for individual plate in accordance with section 11 and section 12 of ASTM A20/20M for tension test and notch toughness test respectively.
- Strain aged test using CVN impact test as above remains as the Notch Toughness requirement as per Section 7 of API Specification 2H, with the steel plate coupons representing the thickest and thinnest plate of each heat shall be strained 5% or more as specified by COMPANY in axial tension and aged at 480 degree Fahrenheit (250 degree Celsius) for one hour at the temperature prior to cutting the specimens.
- Pre-production Qualification, CTOD testing shall be in accordance with ASTM E1290-13 if thickness is greater than or equal to 2 inches (50 mm). CTOD re-

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testing can be waived if fabricator has conducted PQR in which CTOD has been performed for materials with similar grades and thickness is greater than or equal to the required thickness and the test results meet supplementary requirement S11 of API Specification 2W.

- Ultrasonic test shall be performed on each plate in accordance with ASTM A578/A578M. Acceptance Standard – Level A shall be used. Any area where one or more discontinuities produces a continuous total loss of backwall reflection accompanied by continuous indications on the same plane that cannot be encompassed within a circle with a diameter of 3 inches (75mm) shall cause for rejection. Examination reports shall be furnished for each plate, the areas with more than 50% loss of back reflection shall be indicated on the sketch.

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TABLE 2

STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENTS (continued)

Type 2 Material

General description: High strength plates, shapes and pipe with guaranteed notch toughness.

Primary specifications:	API 2H Grade 50 (plate)
	API 2MT1 Grade 50 (plate)
	API 2W Grade 50 (plate)
	API 2Y Grade 50 (plate)
Alternate specifications:	API 5L Grade X52 PSL2 (pipe)
	ASTM A131 Grade DH36 (plate)
	ASTM A537 Class 1 (plate)
	ASTM A633 Grade C (plate)
	ASTM A709 Grade 50T3 (plate and shapes)
	EN 10025-2 Grade S355K2+M (plate and shapes)
	EN 10225 Grade S355G10+M (plate)
	EN 10225 Grade S355G11+M (shapes)
Maximum thickness:	152.4mm (6 inches)

Supplementary requirements: API 2H/2MT1/2W/2Y

- S-8 Strain Aged Charpy V-Notch (CVN) Impact Tests in accordance with API Spec 2H, if plate will be formed into tubulars with D/t less than or equal to 30. S-8 supplement to be performed in accordance with the provisions of API Spec 2H using a CVN test temperature of 0°F instead of -40°F.

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- CVN testing for plates according to the standard requirements of API 2MT1 (transverse specimens according to API 2H/2W, test temperature -17.8º C (0º F), acceptance criteria 40.7 J (30 ft-lbs) minimum average and 33.9 J (25 ft-lbs) minimum single value for full size specimens). Plate meeting these acceptance criteria at lower temperatures (i.e. plate tested according to the standard requirements of API Spec 2H/2W/2Y) is acceptable without re-testing;
- Maximum Carbon Equivalent (CE) or Pcm shall comply with the reference specification. For reference specifications with no CE or Pcm limit, CE shall be 0.43 for thicknesses up to and including 2” (50 mm) and 0.45 for thicknesses greater than 2” (50 mm). However under no circumstances CE or Pcm shall exceed 0.45 or 0.23 respectively as stated in section 8.1 of this specification.
- Maximum Sulfur content of 0.015% by product analysis or 0.01% by heat analysis.
- API Spec 2B requirements are applicable to mill pipe.

Supplementary requirements for API 5L PSL2:

- SR4 - Nondestructive Inspection of Seamless Line Pipe
- SR5 - Fracture Toughness Testing for Pipes of size 4 ½ inches or larger. Acceptance criteria per SR5B with 40.7 J (30 ft-lbs) average absorbed energy at -17.8º C (0º F)
- SR15 - Test certificates and traceability for Line Pipe
- SR17 -Nondestructive Inspection of Welds in Electrical Welded Pipe and Laser Welded Pipe
- SR18 - Carbon Equivalent shall not exceed 0.43%

Supplementary requirements for ASTM A131/A537/A633/A709:

- S-8 Strain Aged Charpy V-Notch (CVN) Impact Tests in accordance with API Spec 2H, if plate will be formed into tubulars with D/t less than or equal to 30. S-8 supplement to be performed in accordance with the provisions of API Spec 2H using a CVN test temperature of 0°F instead of -40°F.
- S-91 Fine Austenitic Grain Size for shapes only.

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- Ultrasonic (UT) examination (for shapes only) according to the supplementary/optional requirements of respective specification ASTM A578/A578M; Acceptance Standard – Level A shall be used. Any area where one or more discontinuities produces a continuous total loss of backwall reflection accompanied by continuous indications on the same plane that cannot be encompassed within a circle with a diameter of 3 inches (75mm) shall cause for rejection. Examination reports shall be furnished for each plate, the areas with more than 50% loss of back reflection shall be indicated on the sketch.
- CVN testing for plates as per the requirement of API Spec. 2H/2W for Transverse specimens, shall be as follows: -17.8º C (0º F), acceptance criteria 40.7 J (30 ft-lbs) minimum average and 33.9 J (25 ft-lbs) minimum single value for full size specimens.
- For shapes, CVN testing according to the standard requirements of respective specification shall apply
- Maximum Carbon Equivalent (CE) or Pcm shall comply with the reference specification. For reference specifications with no CE or Pcm limit, CE shall be 0.43 for thicknesses up to and including 2” (50 mm) and 0.45 for thicknesses greater than 2” (50 mm). However under no circumstances CE or Pcm shall exceed 0.45 or 0.23 respectively as stated in section 8.1 of this specification
- Maximum Sulphur content of 0.015% by product analysis or 0.01% by heat analysis except rolled shape whose maximum Sulphur content shall be 0.05% by heat analysis.
- API Spec 2B requirements are applicable for mill pipe.

Supplementary requirements for EN 10025/10025-2 steels:

- CVN testing for plates shall be in accordance with EN-10045-1 with requirement not less than the followings: for Transverse specimens meeting the requirement of API 2H/2W, test temperature: -17.8º C (0º F), acceptance criteria 40.7 J (30 ft-lbs) minimum average and 33.9 J (25 ft-lbs) minimum single value for full size specimens.
- For shapes, CVN testing according to the standard requirements of respective specification shall apply;
- Ultrasonic testing for plates and shapes shall be in accordance with EN-10160 and EN 10306, respectively.

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- Maximum Carbon Equivalent (CE) or Pcm shall comply with the reference specification. For reference specifications with no CE or Pcm limit, CE shall be 0.43 for thicknesses up to and including 2" (50 mm) and 0.45 for thicknesses greater than 2" (50 mm). However under no circumstances CE or Pcm shall exceed 0.45 or 0.23 respectively as stated in Section 8.1 of this specification
- Maximum Sulphur content of 0.015% by product analysis or 0.01% by heat analysis except rolled shape whose maximum Sulphur content shall be 0.05% by heat analysis.
- All steels shall be made to fine austenitic grain size practice.
- Strain aged Charpy V-notch (CVN) Impact test according to standard requirements of EN 10225 if the plate will be formed into tubular with D/t ratio less than or equal to 30 except that test temperature shall be at 0^0F.
- API Spec 2B requirements are applicable for mill pipe.

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TABLE 2

STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENTS (continued)

Type 2A Material

General description: High strength plates and pipe with guaranteed notch toughness.

Primary specifications: API 2W Grade 60 (plate)

API 2Y Grade 60 (plate)

Maximum thickness: 101.6 mm (4 inches)

The supplementary requirements for Type 2A is similar to those specified for API 2W/2Y specifications under Type 2 in the previous section and additional supplementary requirements are listed below.

- CVN test for plates shall be in accordance with the requirement as stipulated in API Spec 2H, temperature at -40°F (-40°C), acceptance criteria 40.7J minimum average and 33.9J minimum single value for full size specimens.
- S-11 Pre-production Qualification, (CTOD testing in accordance with API RP 2Z) if thickness is greater than or equal to 2” (50 mm). CTOD re-testing can be waived if fabricator has conducted PQR in which CTOD has been performed for materials with similar grades and thickness is greater than or equal to the required thickness and the test results meet supplementary requirement S11 of API Specification 2W.

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TABLE 2

STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENTS (continued)

Type 2B Material

General description: High strength plates and pipe with guarantee notch toughness

Primary specifications: API 5L Grade X56 PSL2

Supplementary requirements for API 5L Grade X56:

- SR4- Non-destructive inspection of seamless line pipe.
- SR5- Fracture toughness testing for pipes of size 4 ½ inches or larger. Acceptance criteria per SR5B with 40.7J (30ft-lbs) average absorbed energy at -17.8ºC (0ºF).
- SR17- Non-destructive inspection of welds in electrical welded pipe and laser welded pipe.
- SR18- Carbon equivalent shall not exceed 0.43%.

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TABLE 2

STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENTS (continued)

Type 3 Material

General description: High strength plates, shapes and pipe.

Specifications: API 5L Grade X52

ASTM A131 Grade AH36 (plate)

ASTM A572 Grade 50 (plate and shapes)

ASTM A992 Grade 50 (shapes)

EN 10025-2 Grade S355J2 (plates and shapes)

Maximum thickness: 50.8mm (2 inches)

Supplementary requirements:

- Maximum Carbon Equivalent (CE) 0.45%
- Maximum vanadium content 0.10%
- Reporting of Unspecified Elements (for mill steel), as per the requirements of ASTM A6, Section 7.1.2
- API Spec 2B requirements are applicable to mill pipe.

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TABLE 2

STEEL SPECIFICATIONS AND SUPPLEMENTAL REQUIREMENTS (continued)

Type 4 Material

General description: Mild plates, shapes, pipe and tubes.

Specifications:

ASTM A36

API 5L Grade B (pipe)

ASTM A53 Grade B (pipe)

ASTM A106 Grade B (pipe)

ASTM A500 Grade B (square and rectangular hollow tubes)

EN 10025-2 Grade S275JR / S275J0 (plates and shapes)

ASTM 276/276M (for stainless steel), Grade SS316/SS316L

Maximum thickness: 25.4mm (1 inch) for SMLS, SAW or ERW Tubular

Supplemental requirements:

- Maximum Carbon Equivalent (CE) 0.45%.
- S-98 reporting of Unspecified Elements (for mill steel).
- API Spec 2B requirements are applicable to mill pipe.
- Stainless steel for shapes and bars shall be in accordance ASTM 276/276M.

For mill steel, reporting of Unspecified Elements as per the requirements of ASTM A6, Section 7.1.2

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SU TU TRANG FULL FIELD DEVELOPMENT – PHASE 2 FEED

Comment Response Sheet (CRS)

Document Title	Specification for Structural Materials						
Key	**C1 – Approved.** **C2 – Approved with minor comments.** **C3 – Not Approved. Revise and re-submit.**						
COMPANY Doc No.	2021-4591-6L-1101			**CRS Rev. No.**	0	**Date**	22 Sep 2021
CONTRACTOR Doc No.	202458C-045-JSS-3600-1101			**DOC Rev. No.**	A	**Date**	16 Jun 2021
Prepared by (TPGM)	CKL	**Discipline**	Structural	**Response by (TPGM)**	CKL	**Discipline**	Structural

REMINDER : CRS NATIVE FILE & PDF TO BE RETURNED WITH REVISED DOCUMENT

Approval Code : C2

No.	Section / Page	CLJOC Comment	TPGM Response	COMMENT STATUS (OPEN/CLOSED)
1.	Cover page Page 1	General: TEN to keep same order of content structure of the Specifications provided by Company (from STT P1) for convenience in reviewing, except project description, scope of service etc. If there maybe some document structures which are not well established. In this case, TEN can restructure a bit	Noted, the order of content will be rearranged as per Specification provided by Company where applicable.	CLOSED
2.	Sect 1.5 Page 8	CTOD: … CNV: … RFQ: … PO: … HFI: … PTFE: … PQR: … EPDM: … SMLS: … SAW: …	Comment incorporated.	CLOSED
3.	Sect 2.2 Page 10	The numbers not in order, can we separate the symbols A, B, C, D... to solve this issue?	Comment incorporated.	CLOSED

				Approval Code : C2
No.	**Section / Page**	**CLJOC Comment**	**TPGM Response**	**COMMENT STATUS (OPEN/CLOSED)**
4.	Sect 2.2 Page 10	Add Vietnamese standards.	Comment incorporated.	CLOSED
5.	Sect 4.1 Page 15	Ref. [...], general comments for all references document.	Comment incorporated.	CLOSED
6.	Sect 5.8.4 Page 19	Add section for Timber.	Comment incorporated.	CLOSED
7.	Sect 6.0 Page 19	Add specs for Jacket fendering please.	Comment incorporated.	CLOSED
8.	Sect 6.11 Page 20	Repeat as header of table.	Comment incorporated.	CLOSED
9.	Sect 6.3 Page 21	Grade.	Comment incorporated.	CLOSED
10.	Page 21	Any safety chain Deck? If yes, please provide specs.	Comment incorporated.	CLOSED
11.	App A Page 27	Page vertical alignment center.	Comment incorporated.	CLOSED

				Approval Code : C2
No.	**Section / Page**	**CLJOC Comment**	**TPGM Response**	**COMMENT STATUS (OPEN/CLOSED)**
12.	App B Page 29	Page vertical alignment center.	Comment incorporated.	CLOSED

Code 1

Cuu Long Joint Operating Company

SU TU TRANG FULL FIELD DEVELOPMENT – PHASE 2
FEED

SPECIFICATION FOR STRUCTURAL FABRICATION & WELDING

Document Number
2021-4591-6L-1109

0	06.10.2021	Approved for Design (AFD)	C.K.L	L.W.K	B.K.N.	H.D.V.
A	25.06.2021	Issued for Review (IFR)	H.K.L.	L.W.K.	B.K.N.	H.D.V.
Rev.	**Date**	**Purpose of Issue**	**Prepared**	**Checked**	**Approved**	**Approval**
			CONTRACTOR			**CLJOC**

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REVISION RECORD SHEET

No.	Rev. No.	Content of Revision	Date of Revision
1.	A	Issued for Review (IFR)	25.06.2021
2.	0	Approved for Design (AFD)	06.10.2021

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HOLD LIST

HOLD NO.	DESCRIPTION	OWNER DISCIPLINE

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TABLE OF CONTENTS

1.0	**INTRODUCTION**	**6**
1.1	DESCRIPTION ON FIELD DEVELOPMENT	6
1.2	SCOPE OF FRONT END ENGINEERING DESIGN (FEED)	7
1.3	DOCUMENT PURPOSE	7
1.4	PROJECT REFERENCES	7
1.5	DEFINITIONS AND ABBREVIATIONS	8
2.0	**APPLICABLE STANDARD AND REFERENCE**	**10**
2.1	GENERAL	10
2.2	VIETNAMESE REGULATIONS AND STANDARDS	10
2.3	PROJECT SPECIFICATION & DOCUMENT REFERENCE	11
2.4	INTERNATIONAL CODE & STANDARDS	12
3.0	**GENERAL REQUIREMENTS**	**14**
3.1	UNITS	14
3.2	LANGUAGE	14
3.3	DEVIATION FROM SPECIFICATION	14
3.4	HEALTH, SAFETY AND ENVIRONMENT	14
3.5	QUALITY CONTROL SYSTEM AND MANUAL	14
3.6	RECORD AND DOCUMENTATION SYSTEM	14
3.7	PROCEDURES FOR CONTROL OF WELDING QUALITY	15
4.0	**MATERIALS**	**16**
5.0	**WELDING PROCESS AND CONSUMABLES**	**16**
5.1	GENERAL	16
6.0	**WELDING PROCEDURE QUALIFICATION**	**16**
6.1	QUALIFICATION OF WELDING PROCEDURES	16
6.2	REQUIREMENTS OF PROCEDURE QUALIFICATION TEST COUPONS	16
6.3	REQUIREMENTS OF CHARPY TEST	16
6.4	WELD REPAIR WPS QUALIFICATION	16
7.0	**WELDER AND WELDING OPERATOR QUALIFICATION**	**17**

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8.0 WELDING WORKMANSHIP 17
8.1 BASE METAL PREPARATION 17
8.2 CUTTING EDGE PREPARATION AND REPAIR 17
8.3 TACK WELDS 18
8.4 RUN-ON & RUN-OFF TABS 18
8.5 PREHEAT & INTERPASS TEMPERATURE 18
8.6 ARC STRIKES 19
8.7 WELDED JOINTS COVER-UP 19
8.8 COPE & WELD ACCESS HOLES 19
8.9 WELD IDENTIFICATION 20
8.10 INTERRUPTION OF WELDING 20
8.11 CORRECTION OF UNACCEPTABLE FIT-UPS & WELDS 20
8.12 HEAT STRAIGTHENING 21
8.13 WELD DEFECT REPAIR 21
9.0 FABRICATION 22
9.1 GENERAL 22
9.2 JACKETS 22
9.3 DECKS 22
9.4 GENERAL STRUCTURAL DETAILS 23
9.5 SHAPES & PLATES 23
9.6 TUBULAR T, K, & Y JOINTS 24
9.7 TUBULAR BUTT JOINTS 24
9.8 TEMPORARY WELDS 25
10.0 POST-WELD HEAT TREATMENT (PWHT) 26
11.0 INSPECTION & EXAMINATION 27
12.0 REPORTS & RECORDS 29
13.0 VENDOR QUALITY ASSURANCE & CONTROL 30
APPENDIX A: EXAMINATION REQUIREMENTS SUPPLEMENT TO API RP2A 31

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1.0 INTRODUCTION

1.1 DESCRIPTION ON FIELD DEVELOPMENT

The Block 15-1 contract area is located in the Cuu Long Basin offshore southern Vietnam, 180 kilometres southeast of Ho Chi Minh City.

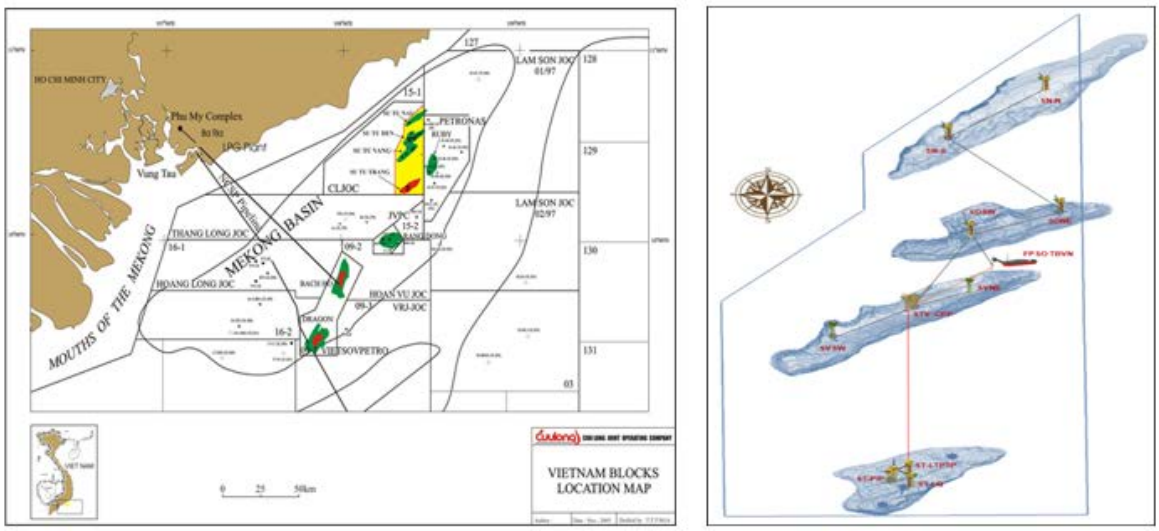

Figure 1.0-1 : Block 15-1 Location Map

There are several producing fields on Block 15-1 (figure 1.0), including Su Tu Den (2003), Su Tu Vang (2008), Su Tu Trang LTPTP (2012), Su Tu Vang North East (2013), Su Tu Nau (2014), Su Tu Vang South West (2014) and Su Tu Trang Phase 1 field (2016).

The gas export pipeline now bottlenecks production of Su Tu Trang Field to shore and the gas sales demand in South Vietnam. Su Tu Trang Full Field Development has been ongoing in two Phases to face these restrictions by allowing the increase of the condensates production while keeping steady the gas export flow rate. Su Tu Trang Full Field Development Phase 1 provided more reservoir information to support STT Full Field Development Phase 2 that will increase gas production/export significantly.

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1.2 SCOPE OF FRONT END ENGINEERING DESIGN (FEED)

Su Tu Trang Phase 2 Development (STT2) project consists of both Greenfield and Brownfield upgrade works which will involve integration between existing ST-PIP / WHP-C (bridge-linked) with the new central gas facility (ST-CGF). Also the existing PIP / WHP-C utilities are expected to support new ST-CGF operation to maximise the utilization of existing set-up and increase flexibility of operation in the complex.

The Su Tu Trang Central Gas Facility (ST-CGF) facility will be equipped for capacities of 185-300 MMSCFD gas production and 150 MMSCFD gas export (MDCQ) to the Third Party pipeline (new pipeline called Nam Con Son 2 Phase 2). The expected condensate of approximately 25,000-35,000 BPD, produced water and export gas fuel gas to CPP will be commingled and exported via the existing 12” pipeline from WHP-C to SV-CPP. The balance gas after satisfying the fuel gas needs of CPP and STT (bridge-linked) is re-injected.

1.3 DOCUMENT PURPOSE

This specification covers the requirements for welding, materials, inspection and fabrication of offshore structures associated with the Su Tu Trang Full Field Development Phase 2 platforms and associated structures.

1.4 PROJECT REFERENCES

The following are the key Project references:

Contract No./Agreement No. : CLJOC-2021-DEV-2117
TPGM Project Cost Code : 202458C

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1.5 DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

COMPANY	:	CUU LONG JOINT OPERATING COMPANY (CLJOC)
	:	(The party who initiates the project)
CONTRACTOR	:	TECHNIP GEOPRODUCTION (M) SDN. BHD. (TPGM) (The party provide services to COMPANY)
SUB-CONTRACTOR	:	Party who is providing subcontracting services specified and ordered by CONTRACTOR.
VENDOR	:	Party who supplies equipment and/or material and perform associated services

ABBREVIATION

^{o}C	Degree Celsius
^{o}F	Degree Fahrenheit
ASNT	American Society for Non-destructive Testing
ATL	Action Tracking Register
BPD	barrels per day
CGF	Central Gas Facility
CPP	Central Processing Platform
EDMS	Electronic Document Management System
EL	Elevation
FEED	Front End Engineering Design
GMAW	Gas Metal Arc Welding
GPS	Global Practice Standard
GTVT	Ministry of Transport
HSE	Healthy, Safety and Environment
MDCQ	Maximum Daily Contract Quantity
mm	Milimeter
MMSCF	Million Cubic Feet
MMSCFD	Million Cubic Feet Per Day
MPFM	Multi-Phase Flow Meter
MPI	Magnetic Particle Inspection
MT	Magnetic Particle Test
NDE	Non-Destructive Examination
NDT	Non-Destructive Test

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PT	Penetrant Test
PWHT	Post-Weld Heat Treatment
QCVN	Vietnamese National Technical Regulations
RT	Radiographic Test
SAW	Submerged Arc Welding
STT	Su Tu Trang Phase
STT2	Su Tu Trang Phase 2 Development
ST-CGF	Su Tu Trang Central Gas Facility
ST-LQ	Su Tu Trang Living Quarter & Utilities Platform
ST-PIP	Su Tu Trang Production and Injection Platform
TCVN	Vietnamese Tiêu chuẩn Việt Nam (Vietnamese National Standard)
TOR	Term of Reference
TSA	Technical Service Agreement
UT	Ultrasonic Test
VT	Visual Test
WHP-C	Su Tu Trang Long Term Production and Test Platform
WPS	Welding Procedure Specification
WSD	Working Stress Design

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2.0 APPLICABLE STANDARD AND REFERENCE

2.1 GENERAL

The design, manufacturing and testing of all the equipment and packages shall be in accordance with all the applicable project specifications, statutory regulations, Vietnamese laws, and International codes and standards. Unless otherwise stipulated, the applicable version of codes and standards, including relevant appendices and supplements, shall be the latest as of the date of contract award.

In case of any conflict in the requirements or intent / interpretation of the various Codes, Standards and the Regulations, the order of hierarchy shall be as follows:

- Vietnamese laws and Regulations;
- Purchase Order
- Project Datasheets and Drawings
- Project Specifications
- Codes & Standards;

Where a conflict exists among the applicable project specifications, codes, standards and regulations, it shall be brought to the attention of the COMPANY immediately for decision and disposition of the discrepancy or conflict. In the absence of COMPANY resolution on such conflict, the most stringent shall apply.

2.2 VIETNAMESE REGULATIONS AND STANDARDS

Ref	Document Number	Document Title
A01	QCVN 49:2012/BGTVT	National Technical Regulations for Classification and Technical Supervision of Fixed Offshore Platforms
A02	QCVN 97:2016/BGTVT	National technical regulation for lifting appliances onboard offshore units
A03	TCVN 6170-1	Fixed Offshore Platforms - Part 1: General requirements
A04	TCVN 6170-2	Fixed Offshore Platforms - Part 2: Environment Conditions
A05	TCVN 6170-3	Fixed Offshore Platforms - Part 3: Design Loads
A06	TCVN 6170-4	Fixed Offshore Platforms - Part 4: Design of Steel Structures
A07	TCVN 6170-7	Fixed Offshore Platforms - Part 7: Foundation Design

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Ref	Document Number	Document Title
A08	TCVN 6170-8	Fixed Offshore Platforms - Structures - Part 8: Corrosion Protection
A09	TCVN 6170-9	Fixed Offshore Platforms - Part 9: Steel Template (jacket) Platforms
A10	TCVN 6170-11	Fixed Offshore Platforms - Part 11: Fabrication/ Construction
A11	TCVN 6170-12	Fixed Offshore Platforms - Part 12: Transport and Installation Operations
A12	TCVN 6767-2	Fixed offshore platforms - Part 2: Fire protection, detection and extinction
A13	TCVN 7229	Fixed offshore platforms. Rules for classification and construction weldings
A14	TCVN 7230	Fixed offshore platform - Rules for classification and construction materials

2.3 PROJECT SPECIFICATION & DOCUMENT REFERENCE

The following Project Specifications shall be applied to the subject work. In cases of conflict between Company Specifications and any of the Applicable Codes, CONTRACTOR shall immediately submit the matter in writing to COMPANY who will provide a written clarification.

Ref	Document Number	Document Title
B01	2021-4591-6L-1101	Specification for Structural Materials
B02	2021-4590-6L-1102	Specification for Fire Rated Blast Walls
B03	2021-4591-6L-1103	Specification for Structural Skids for Packaged Equipment
B04	2021-4591-6L-1104	Specification for Load-out, Transportation & Installation
B05	2021-4500-6L-1105	Specification for Weight Control
B06	2021-4591-6L-1106	Specification for Structural Timber
B07	2021-4591-6L-1107	Specification for Timber Testing
B08	2021-4503-6L-1108	Specification for Sacrificial Anodes for Steel Structures

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Ref	Document Number	Document Title
B09	2021-4502-6L-1110	Specification for Thermally Sprayed Aluminium Coatings
B10	2021-4591-6L-1111	Specification for Steel Forgings for Float-over Hardware
B11	2021-4591-6L-1112	Specification for Floatover Hardware
B12	2021-4500-0L-0008	Welding Procedures Performance Qualification Specification
B13	2021-4500-1L-5002	Painting and Coating Specification

2.4 INTERNATIONAL CODE & STANDARDS

The structural fabrication and welding shall be in accordance with the requirements of the latest edition of the following Codes and Standards:

Ref	Document Number	Document Title
	American Petroleum Institute (API)	
C01	API 2H	Specification for Carbon Manganese Steel Plate for Offshore Structures, Ninth Edition, Jul 2006
C02	API 2MT1	Specification for As-Rolled Carbon Manganese Steel Plate with Improved Toughness for Offshore Structures, Second Edition, Sep 2001
C03	API 2MT2	Specification for Rolled Shapes with Improved Toughness, First Edition, Jun 2002
C04	API 2W	Specification for Steel Plates Produced by Thermo-Mechanical Control Processing (TMCP) for Offshore Structures, Sixth Edition, Jan 2019
C05	API 2Y	Specification for Steel Plates, Quenched and Tempered, for Offshore Structures, Fifth Edition, Dec 2006
C06	API 2B	Specification for the Fabrication of Structural Steel Pipe, Sixth Edition, Jul 2001
C07	API 5L	Specification for Line Pipe, Forty-sixth Edition, Apr 2018
C08	API RP 2Z	Recommended Practice for Preproduction Qualification for Steel Plates for Offshore Structures, Fourth Edition, Sep 2005

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Ref	Document Number	Document Title
C09	API RP 2A-WSD	API RP 2A-WSD, "Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms - Working Stress Design". 22nd Edition, November 2014
C10	API RP 2X	Recommended Practice for Ultrasonic and Magnetic Examination of Offshore Structural Fabrication and Guidelines for Qualification of Technicians, Fourth Edition, April 2004, Reaffirmed September 2020
C11	API RP 2Z	Recommended Practice for Preproduction Qualification for Steel Plates for Offshore Structures, Fourth Edition, April 2004, Reaffirmed, September 2020
	American Society for Testing and Materials (ASTM)	
C12	A578/A578M-17	Standard Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications
	American Society for Non-destructive Testing (ASNT)	
C13	SNT-TC-1A:2020	Personnel Qualification and Certification in Nondestructive Testing (2020)
	American Welding Society (AWS)	
C14	AWS D1.1/D1.1M:2020	Structural Welding Code – Steel
	Engineering Material and Equipment Users Association (EEMUA)	
C15	EEMUA 158:14	Construction Specification for Fixed Offshore Structures, Edition 3
C16	EEMUA 197:99	Specification for the Fabrication of Non-Primary Structural Steelwork for Offshore Installations

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3.0 GENERAL REQUIREMENTS

3.1 UNITS

The International System of units (SI) shall be used in all documentation.

3.2 LANGUAGE

All documentation and correspondence shall be in English language.

3.3 DEVIATION FROM SPECIFICATION

No deviation from this specification shall be permitted without prior written approval of the COMPANY. Any deviation shall be clearly stated in the MANUFACTURER's tender. The MANUFACTURER shall be deemed to have agreed to comply with all the provisions of this specification upon acceptance of any order that refers to this specification.

3.4 HEALTH, SAFETY AND ENVIRONMENT

COMPANY has HSE targets of no accidents or harm to people or environment. To achieve this goal, all work shall be completed in a safe manner, such that no harm can be caused to personnel and in such a way that the impact on the environment is minimized at all locations where the project related work is performed, including the VENDOR's facilities and the fabrication yard.

3.5 QUALITY CONTROL SYSTEM AND MANUAL

CONTRACTOR shall have a quality control system and quality control manual covering all construction activities. Controlled copies of the quality control manual shall be available for COMPANY approval and for monitoring all construction activities.

3.6 RECORD AND DOCUMENTATION SYSTEM

CONTRACTOR shall establish a record and documentation system suitable for identifying and tracing all primary structural members. The system shall follow the practice recommended in API RP 2A-WSD, Ref[C09], Section 13.4 and 14.5.

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3.7 PROCEDURES FOR CONTROL OF WELDING QUALITY

CONTRACTOR shall establish detailed procedures for control of welding quality. The following procedures shall be submitted for review and approved by COMPANY prior to starting fabrication:

1. Welding and weld repair.
2. Storage, control, and identification of welding consumables.
3. Welder qualification records.
4. Inspection / Non Destructive Examinations (NDE).
5. Pre- and/or Post-weld heat treatment, if required.
6. Monitoring the progress and quality of welding.
7. Material and NDE traceability.

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4.0 MATERIALS

Contract documents shall designate the material type for each Contract Object. COMPANY Specification "Specification for Structural Materials", Ref[B01] shall be followed for material usage requirements and specifications.

5.0 WELDING PROCESS AND CONSUMABLES

5.1 GENERAL

Welding processes, storage, and handling of consumables shall comply with COMPANY Specification "Welding Procedure Performance Qualification", Ref[B12] or AWS D1.1, Ref[C14]. In case of conflict, Company approval shall be sought for resolution.

6.0 WELDING PROCEDURE QUALIFICATION

6.1 QUALIFICATION OF WELDING PROCEDURES

Welding procedures and limitations shall be qualified in accordance with the essential variables of AWS D1.1, Ref[C14] and the supplemental requirements of COMPANY Specification, "Welding Procedure Performance Qualification Specification", Ref[B12].

6.2 REQUIREMENTS OF PROCEDURE QUALIFICATION TEST COUPONS

Requirements of procedure qualification test coupons shall be in accordance with AWS D1.1, Ref[C14] Table 4.2 and other relevant sections of AWS D1.1, Ref[C14].

6.3 REQUIREMENTS OF CHARPY TEST

Charpy tests shall be conducted on the weld metal, fusion line, and heat affected zone at the locations given in COMPANY Specification, Welding Procedure Performance Qualification, Ref[B12]. The test temperature and energy values shall comply with API RP 2A-WSD, Ref[C09] Section 10.2.2 and Commentary on welding, Section 10.2.2.

6.4 WELD REPAIR WPS QUALIFICATION

Weld repairs techniques shall be qualified in accordance with the essential variables of AWS D1.1 Ref[C14], Section 7.25 and API RP 2A-WSD, Ref[C09] Section B.8.5.3.

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7.0 WELDER AND WELDING OPERATOR QUALIFICATION

Welders and welding operators shall be qualified in accordance with the essential variables of AWS D1.1, Ref[C14] and the supplemental requirements of COMPANY Specification, “Welding Procedures Performance Qualification”, Ref[B12].

8.0 WELDING WORKMANSHIP

8.1 BASE METAL PREPARATION

Surfaces to be welded shall be visually examined and must be cleaned to bright metal, free of fins, tears, cracks, loose scale, slag, rust, oil, paint and other defects for a distance of not less than 12.7 mm (1/2 in.) from the edge of the weld grooves. All surface finish paints, including weldable primers, shall be removed from the weld groove when welding pre-painted materials. Welding through "weldable primer" is acceptable provided the weld procedure used is qualified using the specific thickness and type of primer and provided the contract documents allow the use of weldable primers. Acceptable mill-induced discontinuities and the repair of visually observed cut surface discontinuities shall conform to AWS D1.1, Ref[C14].

8.2 CUTTING EDGE PREPARATION AND REPAIR

1. Shearing shall be limited to plate material with thickness not exceeding 15.9mm (5/8 in.). A minimum of 0.8 mm (1/32 in.) shall be ground or machined from the cold sheared edge prior to use.

2. All cut edges shall be visually examined for laminations, cracks, and other defects. Sharp edges shall be removed by grinding. Edge defects on surfaces to be painted shall be repaired. Prior to making repairs, the method to be used shall be submitted to COMPANY for approval.

3. For fabricated beams, all web and flange plates shall be cut such that the principal rolling direction of the plate aligns with the longitudinal axis of the finished plate girder.

4. Thermally cut surfaces by electric arc cutting and gouging processes and oxyfuel gas cutting processes shall be ground to bright metal prior to subsequent welding. Surfaces inaccessible to grinding shall be abrasive blasted to white metal with subsequent removal of all abrasive and residue near the weld groove. Other thermal cutting processes are not acceptable without COMPANY approval.

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5. Trimming tubular braces in-situ for closed root openings is not acceptable without specific approval by COMPANY.

6. Oxygen gouging shall not be used for joint preparation of quenched and tempered or normalized steels in accordance to AWS D1.1, Ref[C14].

7. Chamfering is not required if the two to be welded plated thickness difference is less than and equal to 5mm

8.3 TACK WELDS

All tack welds, originally performed to hold members in alignment and later incorporated into the completed weld, shall be made by COMPANY approved welders using the qualified welding procedure for the root pass. These welds shall be subject to all applicable structural welding requirements in this document.

Tack welds shall have the same preheat requirements as the root pass of the appropriate structural welding procedure. Prior to continuation of welding, the "tack" weld shall be ground to a feather edge to permit acceptable weld metal tie-in. Minimum length of tack welds shall be 100 mm (4 in.) where practical, for tack welds ≤ 100 mm (4 in.) CONTRACTOR shall propose and demonstrate an acceptable alternate to COMPANY.

Tack weld or construction aid weld not be incorporated into final weld or in tension zones of cyclically loaded structure shall be removed, except as permitted by AWS D1.1, Ref[C14] Section 4.16.2 for cyclically loaded structures.

8.4 RUN-ON & RUN-OFF TABS

Run-on and run-off tabs shall be used for all welds at the plates, tubular end locations, and at beam splices and terminations. These tabs shall be produced from material of the same type as being welded. CONTRACTOR may be required by COMPANY to demonstrate control, distribution, receipt and use of run-on/run-off tabs.

8.5 PREHEAT & INTERPASS TEMPERATURE

1. CONTRACTOR shall develop a general preheat control procedure for joints with an effective thickness of 25.4 mm (1 in.) and greater. This procedure shall be submitted to COMPANY and approved prior to its use. The procedure shall specify the method of heat application, maximum temperature of the steel surface, time required for each application, and the use of a pyrometer thermocouple and/or temperature-indicating crayons for accurately monitoring the steel temperature throughout all weld passes

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during procedure qualifications and the method of measuring steel temperature during production welding.

2. Minimum preheat for all steel shall be the greater of 38°C (100°F), AWS D1.1, Ref[C14] Table 5.8, or the COMPANY approved welding procedure specification (WPS) whichever is higher. Minimum interpass temperature shall be maintained during welding.

3. Maximum interpass temperature or preheat for structural welding carbon steel shall not exceed 232°C (450°F) for thickness greater than 1-1/2 in (40mm), unless otherwise qualified as in AWS D1.1, Ref[C14].

8.6 ARC STRIKES

Arc strikes outside the weld groove area are not allowed. Arc strikes outside the weld groove area shall be removed by grinding or removal and replacement of the section affected by the arc strike. All arc strike areas outside the weld area shall be subject to magnetic particle inspection. All indication(s) of cracking shall be subject to grinding and re-inspection to insure complete removal.

8.7 WELDED JOINTS COVER-UP

All welded joints to be subsequently covered by an abutting member weld shall be accepted by NDE in accordance with Section 11 of this specification prior to fit-up or welding of the covering member. All plate butt welds that will be subsequently covered by an abutting weld shall be ground smooth and subject to magnetic particle inspection on the attachment surface for a minimum distance of 50 mm (2 in.) either side of the intended attachment. A gradual transition shall exist between the ground and ungrounded areas of welded joint.

8.8 COPE & WELD ACCESS HOLES

1. CONTRACTOR shall develop fabrication sequences and weld details to minimize the requirement for cope holes. Cope holes shall only be permitted at the locations specified on the Contract Drawings, or as subsequently shown on approved CONTRACTOR Shop Drawings. Minimum cope holes should be provided with radius 20mm on the web between two abutting flanges, flange with insert flange or star plates; star plate with deck column.

2. Cope holes shall have an edge finish that complies with the requirements of AWS D1.1, Ref[C14] Section 7.16 and a size sufficient for welding and coating application. CONTRACTOR shall develop and demonstrate details for all configurations

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including the ability to control, check and measure size and surface finish of all cope holes in production trials.

3. Full fillet welds shall be returned through the cope holes.

8.9 WELD IDENTIFICATION

All welders shall permanently mark with paint stick or low stress metal stamp, each weld with his identifying mark. Note: Paint stick markings shall be subject to approval from CONTRACTOR's Painting Inspector.

8.10 INTERRUPTION OF WELDING

Whenever possible, welding of joints shall be completed in one continuous operation. Where interruption is unavoidable, at least one-third of the weld joint thickness over the full weld length shall be completed before welding is discontinued. All cases of interruption shall be approved by COMPANY.

8.11 CORRECTION OF UNACCEPTABLE FIT-UPS & WELDS

1. Welding (buttering through member) in-situ to reduce excessive root openings is not acceptable without specific approval by COMPANY. Through member buttering will only be approved by COMPANY when proper consideration is given to materials, loading, NDE, and welding requirements. Out-of-position brace buttering shall require COMPANY approval.

2. Buttered layers on removed branch members shall be grounded to the desired profile and shall be subject to 100 percent visual, magnetic particle examination, and ultrasonic examination prior to refitting into the structure.

3. Correction of excessive root gaps by in-situ buttering is acceptable provided the gap is less than or equal to 1/2 in. (12.7 mm). A COMPANY approved buttering procedure is required. For root gaps greater than 1/2 in. (12.7 mm) buttering proposals require specific COMPANY approval. The maximum gap to be corrected by buttering shall be limited to the lesser of 3/4 in. (19 mm) or twice the thickness of the thinner part to be joined.

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8.12 HEAT STRAIGTHENING

Heat straightening may be used on a case by case basis with prior COMPANY approval. A heat straightening procedure shall be submitted to COMPANY for approval prior to use in fabrication.

For API 2Y, API 2W, or any quenched and tempered or thermo-mechanical control processed steel, the maximum temperature shall not exceed 593°C (1100°F) or the tempering temperature, whichever is less. Accelerated cooling of steel above 315 °C shall be prohibited.

8.13 WELD DEFECT REPAIR

For all welding processes written repair procedures approved by COMPANY shall be utilized. These may be developed from COMPANY approved full penetration groove welding procedures or procedures specifically qualified for repairs.

Work piece temperature shall be a minimum of 38°C (100°F) higher than the minimum preheat temperature required for the original approved welding procedure. The number of repair attempts shall be limited to not more than two.

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9.0 FABRICATION

9.1 GENERAL

Final fabrication tolerances shall be as per API RP 2A – WSD, Ref[C09] except as modified or supplemented in this specification or design drawings. When appropriate, dimensions shall be measured and corrected to a standard temperature of 20°C (68°F) if the ambient temperature is more than ±11.1°C (52°F) from 20°C (68°F). In some cases, measurements should be carried out at night so as to avoid local distortion due to daytime temperature changes.

Fabrication and welding, including all attachments/appurtenances shall be completed prior to the application of top and mid coats of their respective paint systems. Sub-assemblies shall be blasted, primed and assembled in tie coat in order to minimize the re-work and damage associated with fabrication to a complete paint system top coat.

COMPANY shall consider on a case by case basis instances where it may be practical or advantageous to apply top coat prior to completion of fabrication works. Where CONTRACTOR feels this is necessary, it shall be discussed and agreed with COMPANY.

9.2 JACKETS

1. Jacket lifting eye angles shall be within one degree of the design angle. All lifting eye holes shall be drilled and reamed to the design diameter ±0.8 mm (1/32 in.).

2. All jacket legs, skirt pile guides, conductor guides, and all other items identified shall be drafted with a template at least 305 mm (1 ft.) long and with at least 25.4 mm (1 in.) greater diameter than the member that will pass through the leg or guide.

9.3 DECKS

1. Permissible variation in straightness of welded beams and other shapes is 3.2 mm (1/8 in.) multiplied by total length (mm) divided by 10. Maximum deviation allowed is 9.5 mm (3/8 in.)

2. The horizontally diagonal spread of the rectangular plan layout between the two diagonally opposite deck legs measured from center lines of deck legs shall be within ±19 mm (3/4 in.), while between two adjacent deck legs shall be within a tolerance of ±12.7 mm (1/2 in.). The deck fabricator shall check and verify with the jacket fabricator (if applicable) to ensure that the cumulative out-of-tolerance between deck and jacket is less than 19mm (3/4 in.) at each leg intersection.

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3. Handrail sockets and panels shall be erected such that all panels are straight, level to the eye, and within ±9.5 mm (3/8 in.) of the theoretical height, as detailed on the approved drawings. The removable handrail panels shall fit snugly in the sockets such that there is less than 9.5 mm (3/8 in.) total movement or "play" measured at the top of the handrail panel.

4. Deck plate shall be installed smooth and seal welded such that the plate is level within ±9.5 mm (3/8 in.). A ponding test shall be carried out to demonstrate that there are no excessive water ponds. Water ponds, with a water depth > 6.4 mm (1/4 in.), are unacceptable. If ponds exceed 6.4 mm (¼ in.), necessary drains and lines shall be installed and connected to the drain system by CONTRACTOR. An acceptable alternative to a ponding test is to use a long, accurate level and measure the deck plate deviation in local areas. Weld reinforcement shall be grounded smooth where equipment is placed in a particular area.

5. Landing elevations shall be within ±12.7 mm (1/2 in.) of the drawing dimension while landing and stairways shall be within ±50 mm (2 in.) of their horizontal drawing dimension.

9.4 GENERAL STRUCTURAL DETAILS

Splices may be introduced into the fabrication of members according to API RP 2A-WSD, Ref[C09]. This requirement applies equally to open and closed sections. The location of all splices shall be clearly indicated on the Shop Drawings and splice locations on the primary steel members shall be subject to approval by COMPANY.

9.5 SHAPES & PLATES

1. For cantilever beams, no splices may be located closer to the point of support than one-half of the cantilevered length. For span beams, there should be no splice within one-eighth of the span from beam center or within the eighth of the span nearest a support, nor directly over a support.

2. Web-to-web and flange butt weld locations shall be offset a minimum of 150 mm (6 in.). If single side splice welds are necessary, approval shall be obtained from COMPANY before welding.

3. All edges of plate and/or structural shapes to be broken with a power disk to a 2 mm chamfer and dressed to remove burrs.

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9.6 TUBULAR T, K, & Y JOINTS

1. Adjacent structural braces which are not specifically shown as overlapping shall be provided with a separation between adjacent weld toes. Gap shall be:

   - 100 mm (4 in.) when measured prior to welding - measured as an extension of brace surface, and
   - 75 mm (3 in.) when measured after completion of welding - measured between adjacent weld toe.

   Shall any circumstance appear, Gap cannot be less than 75mm (3 in) and weld toe to toe distance shall not be less than 50mm (2 in). All appurtenances, temporary, or other welds shall be at least 64 mm (2 ½ in.) measured toe-to-toe from any structural joint weld.

2. Overlapped member joints shall not be permitted unless specifically detailed on the drawings. When overlapped joints are detailed, the assembly order shall be strictly in accordance with the detail as stipulated in API RP 2A-WSD, Ref[C09].

3. Tubular members shall not intersect a larger through member within 50 mm (2 in.) of an existing weld on the through member. This is applicable to both girth and longitudinal welds on the through member.

4. The root face of T-, Y-, and K-joints is zero unless dimensioned otherwise. The actual root face size and tolerances shall be in accordance with the WPS for the particular weld.

9.7 TUBULAR BUTT JOINTS

1. When joining tubular members (butt welds) that differ in wall thickness by more than 3.2 mm (1/8 in.), there shall be a smooth transition accomplished by chamfering the thicker member with a minimum transition of 1 to 2.5.

2. Jacket legs, piling, conductor pipe, and large diameter brace pipe welded by the submerged arc welding (SAW) process may employ gas metal arc welding (GMAW) for root and/or hot pass only. If GMAW-S (short arc) is used in conjunction with SAW, the maximum deposit GMAW thickness shall not exceed 6.4 mm (1/4 in.). If the GMAW-S weld deposit is not completely removed, and radiography is the method for NDE, 100 percent UT examination shall be required on 5% of the welds selected by COMPANY. If extensive lack of fusion defects is found, additional inspections or the discontinuance of GMAW may be required at COMPANY's discretion.

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9.8 TEMPORARY WELDS

1. Temporary welds for fabrication aids shall not be made in high-stress areas where tubular members intersect. If unavoidable, these welds shall be subject to the same welding and material requirements as other structural welds. These welds shall not be made within 100 mm (4 in.) or 2 times the chord thickness of a tubular joint, whichever is greater.

2. Preheat for temporary welds shall be a minimum of 38°C (100°F) higher than specified on the applicable welding procedure.

3. All fabrication aids shall be removed unless approved by COMPANY. Removal shall be accomplished by cutting no closer than 3.2 mm (1/8 in.) from the main member and the remainder ground flush. It is permissible to grind up to 1.6 mm (1/16 in.) into the base metal surface to remove any undercut associated with the attachment weld. If COMPANY observes damage to the primary structure as a result of flame cutting or gouging, the damage shall be rectified by grinding followed by repair welding and the cutting position shall be changed to 6.4 mm (1/4 in.) from the base metal surface.

4. When approved by COMPANY, some erection aids weld may remain on the structure. These welds shall be trimmed to within 10 mm (3/8 in.) of the main member. All rough edges shall be ground smooth. There shall be no crevices. Additional seal welding may be required to eliminate crevices, temporary attachments/welds. In this case they shall be visually acceptable in accordance with AWS D1.1, Ref[C14] and subject to magnetic particle inspection.

5. All areas of primary structural members from which temporary attachments are completely removed shall be examined by magnetic particle inspection. Gouges deeper than allowed by the material specification thickness tolerance shall be reported to COMPANY and repaired.

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10.0 POST-WELD HEAT TREATMENT (PWHT)

Post-weld heat treatment (PWHT) is required only when specified by contract documents, identified on drawings, or required by welding procedure. PWHT shall be in accordance with AWS D1.1, Ref[C14] except as follows:

1. When PWHT is required, CONTRACTOR shall submit a PWHT procedure and obtain approval from COMPANY prior to application of any PWHT. The maximum temperature for API 2Y, API 2W, or any quenched and tempered or thermo-mechanical control processed steel, shall not exceed 593°C (1100°F) or the tempering temperature, whichever is less.

2. Thermocouples shall be attached directly to the weldment (near the weld) to be PWHT and the full temperature cycle automatically recorded, witnessed and approved by COMPANY. The thermographs produced shall be included in the final documentation package.

3. All final visual inspection and NDE shall be completed or repeated after PWHT.

4. Welding shall not be conducted on PWHT components without the approval by COMPANY except for welds to connect items to the structure (i.e., stub to brace welds, core or barrel to leg welds, etc).

5. The PWHT of nodes, when required, shall be performed on the node as a complete component if practical.

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11.0 INSPECTION & EXAMINATION

1. Inspection and non-destructive examination shall comply with the requirements of API RP 2A – WSD, Ref[C09], AWS D1.1, Ref[C14] and the additional requirements of this specification. Each inspection or examination shall be carried out using a written procedure approved by COMPANY.

2. All inspector shall be AWS QC1 certified (or acceptable equivalent) except specialty technicians (PT, MT, UT, and RT) who shall be qualified and certified according to the guidelines ASNT SNT-TC-1A, Ref[C13] or equivalent. COMPANY reserves the right to proficiency test, at no additional cost to COMPANY, any NDT operative working at any of the CONTRACTOR or SUBCONTRACTORS facilities, irrespective of their current qualifications. The test shall comprise a practical demonstration of the NDT operative's abilities on a sample test piece together with the ability to record and report the work relative to the duties for which they are qualified.

3. The required NDE methods and the minimum extent of inspection shall comply with API RP 2A – WSD, Ref[C09] Table 16.1 and the additional requirements in Table 1, Appendix A of this specification.

4. Welds that are subject to radiographic or magnetic particle testing shall comply with the quality level requirements of AWS D1.1, Ref[C14] acceptance standards for dynamically loaded structures. Acceptance standards for cyclic loading shall be used on weld as specified by the contract documents or welds ground for improved fatigue performance. Magnetic particle inspection (MPI) shall be by the Wet Method using a white background and black ink. MPI using Dry Method may be used for the specific situation (e.g. MPI for hot metal after back gouging) and shall be approved by COMPANY prior to application.

5. Ultrasonic Examination.

   - Ultrasonic examination procedures shall be established by an ASNT Level III ultrasonic specialist. The procedure shall define equipment, techniques, and methods consistent with the design requirements. As a minimum the essential variables listed in API RP 2X, Ref[C10] shall be detailed in the written procedure and submitted for COMPANY approval prior to use during trial and subsequent examinations. Variations from the proven procedure will cause for re-qualification.
   - Ultrasonic examination of groove welds in structural shapes and plates shall comply with AWS D1.1, Ref[C14] Section 8 and Annex O12. Acceptance - rejection criteria shall be as per Table O.1 - Annex O with the following notes:

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a) Discontinuity level 1 and 2 shall be separated by at least 2L, L being the length of the longer discontinuity, except that when two or more such discontinuities are not separated by at least 2L, but the combined length of discontinuities and their separation distance is equal to or less than the maximum allowable length under the provisions of Level 1 or 2, the discontinuity shall be considered as single acceptable discontinuity.

b) Discontinuity Level 1 and 2 shall not begin at a distance less than 2L from weld ends carrying primary tensile stress, L being the discontinuity length.

- Ultrasonic examination of tubular structural welds shall comply with API RP 2X Ref[C10]. T, Y, or K connections shall comply with Level "C" acceptance weld quality. Unless otherwise approved by COMPANY representative, Level "A" acceptance weld quality shall apply where UT is substituted for radiography.

- Plate or pipe to be used as lifting aids, node cans in chord members, flanges or critical girders requiring substantial stiffening, and all applications where the member is subject to substantial Z-direction loading shall be ultrasonically examined. Examination and reporting requirements of ASTM A578, Ref[C12] shall apply.

- The intersect location (footprint), including a 150 mm (six (6) inch) wide band shall be examined in accordance with ASTM A578, Ref[C12] with supplement S1 acceptance standard-level “C”.

- Members with flaws that would interfere with weld inspection may be positioned so that acceptable material is located under all brace footprint areas.

- Weld repairs of members with unacceptable flaws up to 6500 mm² (10 in.²) may be made using a COMPANY approved weld repair procedure.

- Weld inaccessible for Ultrasonic examination shall be substituted by Magnetic Particle or radiographic testing upon approval of COMPANY QC.

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12.0 REPORTS & RECORDS

The following reports and data sheets shall be supplied to COMPANY representative:

1. Mill test reports and certificates.
2. COMPANY approved welding procedure package.
3. Welder and/or welding operator qualification test results.
4. Temperature charts or records for all stress relieving and/or post-weld heat treating (When required by COMPANY specifications and/or regulatory authorities).
5. NDE reports and results, including repairs.
6. As-built construction drawings.

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13.0 VENDOR QUALITY ASSURANCE & CONTROL

1. VENDOR shall establish and implement the Quality System in accordance with the relevant sections of ISO 9001:2008 standard / General Quality Requirements or any other equivalent standard recognized by CONTRACTOR and COMPANY.

2. COMPANY shall verify that the system is established and effective either by physical audit or by questionnaire or both at its discretion.

3. Safe access should be allowed to the CONTRACTOR and COMPANY's Representative(s) as well as to the Representative(s) of Authorized Inspection/ Testing Agency.

4. VENDOR shall submit a Quality Plan and Inspection Approach with the proposal, which is to be agreed among VENDOR, CONTRACTOR, and COMPANY prior to start of manufacturing.

5. VENDOR shall ensure that the product is meeting the requisite quality requirements as specified in the various sections of this document and applicable standards at the time of manufacturing / supplying.

6. VENDOR shall obtain an unconditional Inspection Release from the CONTRACTOR and COMPANY, prior to any shipment.

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Appendix A: Examination Requirements Supplement to API RP2A

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TABLE 1

EXAMINATION REQUIREMENTS SUPPLEMENTAL TO API RP 2A – WSD

LOCATION / TYPE OF WELD	EXTENT Note 1	METHOD Note 2
Lamination Surveys (Location of Structural Plate)		
Joint Cans Note 3	100%	UT
Padeyes	100%	UT
Plate to which padeyes or crane pedestals are attached Note 4	100%	UT
Fabricated Tubulars for Piling, Braces, Jacket Legs, Deck Legs, Stabbing Guides	100%	RT or UT
Tubular Connections		
Primary T, K, Y joints with brace diameter ≥ 323.9mm (12¾ in) and wall thickness ≥ 12.7mm (½ in.) Note 5	100%	UT + MT
All other T, K, Y joints	10%	MT
Plate Girder, Beam and Shape Connections		
Secondary full penetration welds	10%	RT or UT
Primary fillet welds	100%	MT
Secondary fillets welds	10%	MT
Padeyes Note 9		
Full penetration	100%	UT + MT
Fillet	100%	MT
Miscellaneous Fabrication		
Structural fillet	10%	MT
Arc strikes	100%	MT
Weld repairs Note 6	100%	RT, UT or MT

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LOCATION / TYPE OF WELD	EXTENT Note 1	METHOD Note 2
Sea fastening	100%	UT + MT
Full penetration welds on launch legs, ring stiffeners, launch lugs and skirt pile sleeves	100%	MT + (RT or UT)
Fillet welds on launch legs, launch lugs	100%	MT
Grout, flood, and inflation lines	10%	RT
Connections Made During Offshore Installation		
Pile/conductor field girth welds	100%	UT
Pile to deck girth welds	100%	UT
Jacket leg to deck girth welds Note 7	100%	UT
Pile to shim welds Note 8	100%	MT

Notes:

1. Based on percent of total weld length. COMPANY to designate welds inspected to less than 100%.
2. All welds (structural and non-structural) and structural steel are subject to 100% Visual Test (VT) at all times. VT may include Penetrant Test (PT).
3. Projection of the brace onto the joint can plus an additional 150 mm (6 in.) radius around the circumference of the projection.
4. Projection of the padeye or pedestal plus an additional segment equal to 5 times the padeye thickness.
5. Although conventional techniques are generally limited to these dimensions, smaller members may require examination if they are designated primary welds.
6. NDE should be the same as the original inspection and performed by the same party.
7. For jackets with skirt piles.
8. Visual examination of each pass and Magnetic Testing (MT) upon completion of welding.
9. Primary structural padeyes utilized by CONTRACTOR during the construction phase shall be subject to the applicable 100% NDE both before and after use.
10. NDE shall begin once all the completed welds have been cooled down to ambient temperature where the interval time can range from immediately upon cooling to 72 hours depending on the grade of steel in accordance to AWS D1.1, Ref[C14] Table 8.11 and API RP 2X, Ref[C10] Section 6.

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SU TU TRANG FULL FIELD DEVELOPMENT – PHASE 2 FEED

Comment Response Sheet (CRS)

Document Title	Specification for Structural Fabrication & Welding						
Key	**C1 – Approved.** **C2 – Approved with minor comments.** **C3 – Not Approved. Revise and re-submit.**						
COMPANY Doc No.	2021-4591-6L-1109			**CRS Rev. No.**	0	**Date**	06 Oct 2021
CONTRACTOR Doc No.	202458C-045-JSS-3600-1109			**DOC Rev. No.**	A	**Date**	25 Sep 2021
Prepared by (TPGM)	CKL	**Discipline**	Structural	**Response by (TPGM)**	CKL	**Discipline**	Structural

REMINDER : CRS NATIVE FILE & PDF TO BE RETURNED WITH REVISED DOCUMENT

Approval Code : C2

No.	Section / Page	CLJOC Comment	TPGM Response	COMMENT STATUS (OPEN/CLOSED)
1.	Page 1	General: TEN to keep same order of content structure of the Specifications provided by Company (from STT P1) for convenience in reviewing, except project description, scope of service etc. If there maybe some document structures which are not well established. In this case, TEN can restructure a bit	Noted. The order of the content will be rearranged as per Specification provided by Company where applicable.	CLOSED
2.	Page 4	~~N~~SCOPE OF FRONT END ENGINEERING DESIGN (FEED)	Comment incorporated.	CLOSED
3.	Sect 1.2 Page 7	~~N~~SCOPE OF FRONT END ENGINEERING DESIGN (FEED)	Comment incorporated.	CLOSED
4.	Sect 1.2 Page 7	SU Tu Trang FFD	Full form is written. Comment incorporated.	CLOSED
5.	Sect 1.5 Page 8	Not same font	Comment incorporated.	CLOSED

				Approval Code : C2
No.	**Section / Page**	**CLJOC Comment**	**TPGM Response**	**COMMENT STATUS (OPEN/CLOSED)**
6.	Sect 1.5 Page 8	1. Su Tu Trang Central Gas Facility 2. GTVT: Ministry of Transport QCVN: Vietnamese National Technical Regulations ASNT:	Full form is written. Comment incorporated.	CLOSED
7.	Sect 2.0 Page 10	Please check the line break.	Comment incorporated.	CLOSED
8.	Sect 2.2 Page 10	Add table title (typical comments)	Comment incorporated.	CLOSED
9.	Sect 2.4 Page 10	Fabrication and Welding	Comment incorporated.	CLOSED
10.	Sect 2.4 Page 10	CLJOC understands that all listed below code and standard are the latest edition based on the date of contract award, but some of them should not be issued in 2021, so its ok if TEN minimum mentions the latest version of the year issued of those codes and standard, for easy to find in future	Comment incorporated.	CLOSED
11.	Sect 2.4 Page 10	API RP 2A-WSD (2014 or2021?)	API RP 2A-WSD, November 2014 is used.	CLOSED
12.	Sect 2.4 Page 10	To the heading down.	Comment incorporated.	CLOSED
13.	Sect 2.4 Page 11	Sequence not in order.	Comment incorporated.	CLOSED

				Approval Code : C2
No.	**Section / Page**	**CLJOC Comment**	**TPGM Response**	**COMMENT STATUS (OPEN/CLOSED)**
14.	Sect 3.5.1 Page 14	Section 3.5.1 to be renamed as 3.6	Comment incorporated.	CLOSED
15.	Sect 3.5.1 Page 14	Indicated numbering of the section instead of paragraph for easy to find.	Comment incorporated.	CLOSED
16.	Sect 3.5.2 Page 15	Section 3.5.1 to bed renamed as 3.7	Comment incorporated.	CLOSED
17.	Sect 6.2 Page 16	Ref. [C22]	Comment incorporated.	CLOSED
18.	Sect 6.3 Page 16	2017-4500-0L-0008	Comment incorporated.	CLOSED
19.	Sect 6.3 Page 16	6.4 Weld Repair WPS Qualification	Comment incorporated.	CLOSED
20.	Sect 8.1 Page 17	Ref. [C22]	Comment incorporated.	CLOSED
21.	Sect 8.7 Page 19	50mm or 75mm?	The weld of the cover plate is usually small. Therefore, 50mm of NDE from the weld is considered to be sufficient.	CLOSED

				Approval Code : C2
No.	**Section / Page**	**CLJOC Comment**	**TPGM Response**	**COMMENT STATUS (OPEN/CLOSED)**
22.	Sect 9.8 Page 25	Temporary Welds	Comment incorporated.	CLOSED
23.	Sect 11.0 Page 28	0	Comment incorporated.	CLOSED
24.	Appendix A Page 33	PT	Comment incorporated.	CLOSED
25.	Appendix A Page 33	Please mention somewhere time require from completed welding to start NDE?	Comment incorporated.	CLOSED

DANH MỤC CÂU HỎI ĐÁNH GIÁ NHÀ THẦU NDT

Số tài liệu: NDT-AUD-CKL-001 Rev.0

Ngày:

No.	Mục lục	Kiểm tra	Kết luận/ kiến nghị	Tình Trạng
1.	**QUẢN LÝ CHUNG**			
1.1	Chứng chỉ quản lý hệ thống chất lượng của nhà thầu (nếu có). Nếu không có thì công ty có các quy trình quản lý hệ thống không?			
1.2	Giấy phép hoạt động của nhà thầu NDT			
1.3	Giấy phép hoạt động của cơ sở bức xạ			
1.4	Các công trình/công việc khác nhà thầu đã có cam kết thực hiện hoặc sẽ thực hiện trong thời gian thực hiện dự án			
2.	**QUY TRÌNH**			
2.1	Quy trình RT			
2.2	Quy trình UT			
2.3	Quy trình MT			
2.4	Quy trình PT			
2.5	Quy trình PAUT (nếu có) (Cần chuẩn bị STQ sử dụng PAUT thay cho RT và quy trình PAUT + Nhân sự + TB liên quan + DEMO/Qualification cho PAUT)			
2.6	Quy trình/ Hướng dẫn kiểm soát hồ sơ.			

2.7	Quy trình DEMO/ Qualification Quy trình NDT.			
2.7	Quy trình Mockup test nhân sự NDT			
2.8	Quy trình/ Hướng dẫn kiểm soát hiệu chuẩn thiết bị (Ngày hiệu chuẩn? Ngày hiệu chuẩn kế tiếp? Hiêu chuẩn theo code?) Tem hiệu chuẩn?			
2.9	Quy trình hiệu chuẩn thiết bị nội bộ nếu có			
2.10	Quy trình an toàn bức xạ			
2.11	Quy trình cứu hộ bức xạ or Kế hoạch UCSCBX/ Danh sách đội cứu hộ bức xạ/ thực tập ứng cứu sự cố bức xạ/ mẫu xin phép chụp/ mẫu đo đạc hiện trường của các ca chụp/ Vận chuyển nguồn từ nơi lưu trữ tới nơi chụp.			
2.12	Quy trình đào tạo cấp chứng chỉ NDT nội bộ			
3.	**THIẾT BỊ NDT**			
3.1	**Danh mục thiết bị RT**			
3.1.1	Nguồn phóng xạ (số lượng, loại nguồi, cường độ nguồn)/ Giấy phép/ nơi cất giữ nguồn/ log book theo dõi nguồn.			
3.1.2	Thiết bị cứu hộ bức xạ (loại, số lượng)			
3.1.3	Máy đo liều phóng xạ/chứng chỉ hiệu chuẩn, nơi hiệu chuẩn (loại, số lượng) Phim liều kế cá nhân?			

3.1.4	Máy đo độ đen phim/ chứng chỉ hiệu chuẩn (loại, số lượng)			
3.1.5	Vật tư film (loại film, thuốc rủa phim hạn sử dụng)			
3.1.6	Lưu trữ film chưa chụp/film đã chụp, đánh số lưu trữ/ nhiệt độ bảo quản firm			
3.1.7	Xử lý chất thải xử lý phim (tại văn phòng nhà thầu và tại bãi thi công. Có Hợp đồng với đơn vị xử lý chất thải không? HĐ còn thời hạn không?)			
3.2	**Thiết bị siêu âm**			
3.2.1	Máy siêu âm/chứng chỉ hiệu chuẩn (số lượng, hiệu chuẩn bên ngoài/nội bộ?)			
3.2.2	Máy đo chiều dày/ chứng chỉ hiệu chuẩn (số lượng, hiệu chuẩn bên ngoài/nội bộ?)			
3.2.3	Mẫu chuẩn/ chứng chỉ (số lượng, hiệu chuẩn bên ngoài/nội bộ?)			
3.2.4	List Đầu dò (số lượng, chủng loại)			
3.3	**Gông từ**			
3.3.1	Gông từ/ chứng chỉ hiệu chuẩn (số lượng, hiệu chuẩn bên ngoài/nội bộ?)			
3.3.2	Mẫu hiệu chuẩn 4.5 kg/chứng chỉ			
3.3.3	Đo cường độ từ trường			
3.3.4	Đo nồng độ bột từ (Nếu sử dụng loại pha sẵn thì không cần)			
3.3.5	Thiết bị đo từ dư/chứng chỉ hiệu chuẩn			

3.3.6	Vật tư MT (số lượng/hạn sử dụng/ cách bảo quản lưu giữ)			
3.3.7	Vật tư PT (số lượng/hạn sử dụng/ cách bảo quản lưu giữ)			
3.3.8	Đèn chiếu sáng trong trường hợp làm khu vực không đủ sáng. (có hiệu chuẩn ?)			
4.	**Nhân sự**			
4.1	Danh sách nhân sự/ Sơ đồ chart/ trách nhiệm/kinh nghiệm làm việc			
4.2	Chứng chỉ nhân sự/ CV (loại chứng chỉ, tổ chức cấp chứng chỉ, hạn)			
4.3	Phụ trách an toàn bức xạ/Giấy phép nhân viên bức xạ/ đào tạo an toàn bức xạ/ theo dõi liều xạ cho NVBX/ Kết qủa đọc liều chiếu cá nhân 01 quý gần nhất.			
4.4	Danh sách đội cứu hộ bức xạ/ đào tạo/ ứng cứu/ Khi có sự cố cách thức thông báo…..			
4.5	Các giấy chứng nhận đặc biệt khác (Chứng chỉ NVBX, Giấy chứng nhận Nhân viên VATBX ….)			
5.	**An Toàn**			
5.1	Chứng nhận đã Huấn luyện ATVSLD nhóm 3			
5.2	Giấy khám sức khỏe			
5.3	Hợp đồng LĐ			
5.4	Bố trí vật tư thiết bị NDT khi tham gia thi công tại cảng VSP, điều kiện bảo quản vật tư theo quy định dự án.			

	Quy trình cấp pháp và kiểm soát vật tư (Hạn sử dụng vật tư)			
5.5	Trang bị BHLĐ cho nhân viên			

Bên đánh giá:

Bên được đánh gía:

TABLE 1

EXAMINATION REQUIREMENTS SUPPLEMENTAL TO API RP 2A – WSD

LOCATION / TYPE OF WELD	EXTENT Note 1	METHOD Note 2
Lamination Surveys (Location of Structural Plate)		
Joint Cans Note 3	100%	UT
Padeyes	100%	UT
Plate to which padeyes or crane pedestals are attached Note 4	100%	UT
Fabricated Tubulars for Piling, Braces, Jacket Legs, Deck Legs, Stabbing Guides	100%	RT or UT
Tubular Connections		
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Padeyes Note 9		
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Weld repairs Note 6	100%	RT, UT or MT

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Pile to shim welds Note 8	100%	MT

Notes:

1. Based on percent of total weld length. COMPANY to designate welds inspected to less than 100%.
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7. For jackets with skirt piles.
8. Visual examination of each pass and Magnetic Testing (MT) upon completion of welding.
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