

**TECHNICAL PROPOSAL
FOR
R2R REACTION / REGENERATION PACKAGE
RESIDUE FLUIDIZED CATALYTIC CRACKING UNIT**

Date : Oct.2023

TABLE OF CONTENTS

1. INTRODUCTION
2. THE R2R PROCESS SCHME & PICTURES OF SOME REFERENCES HAS SHOWN
3. OVERVIEWGENERAL
 - 3.1 General Process Description
 - 3.2 Process Description
 - 3.3. Reaction
 - 3.4. Regeneration
4. SCOPE OF SUPPLY AND SERVICES
 - 4.1. Engineering and Documentation
 - 4.2. Process Equipment
5. DESIGN CONDITION
 - 5 -1 .Disengager / Stripper (V-76101)
 - 5-2 .Riser (R-76101) and Injectors
 - 5-3 .Spent Catalyst Standpipe (V-76102)
 - 5-4 .Spent Catalyst Standpipe (V-76105)
 - 5-5 .Regenerator Section
 - 5-6 .Catalyst Cooler (E-76101)
 - 5-7 .Catalyst Recovery Section
6. DETAIL WORK SCOPE & SPECIFICATION

- Attachments

- | | | |
|---|---|--------|
| - Attach #1. Site Erection Joint Location | 1 | sheets |
| - Attach #2. Shop Refractory Lining plan | 1 | sheets |

1. INTRODUCTION

The following proposal has been prepared based on the received inquiry (No:2001-76-PE-ME-INQ-0005) for the Esfahan Reaction-Regeneration Package (R2R) of the RFCC (Residue Fluid Catalytic Cracking Unit) unit.

This package includes a reactor, two-stage regenerators with their different parts, and at the end third and fourth-stage separators to remove catalyst particles from outlet flue gas. The equipment size and specification have been defined by the process licensor and -- is responsible to design and select vendors based on licensor data sheets/drawings to handle the process.

2. THE R2R PROCESS SCHME & PICTURES OF SOME REFERENCES HAS SHOWN

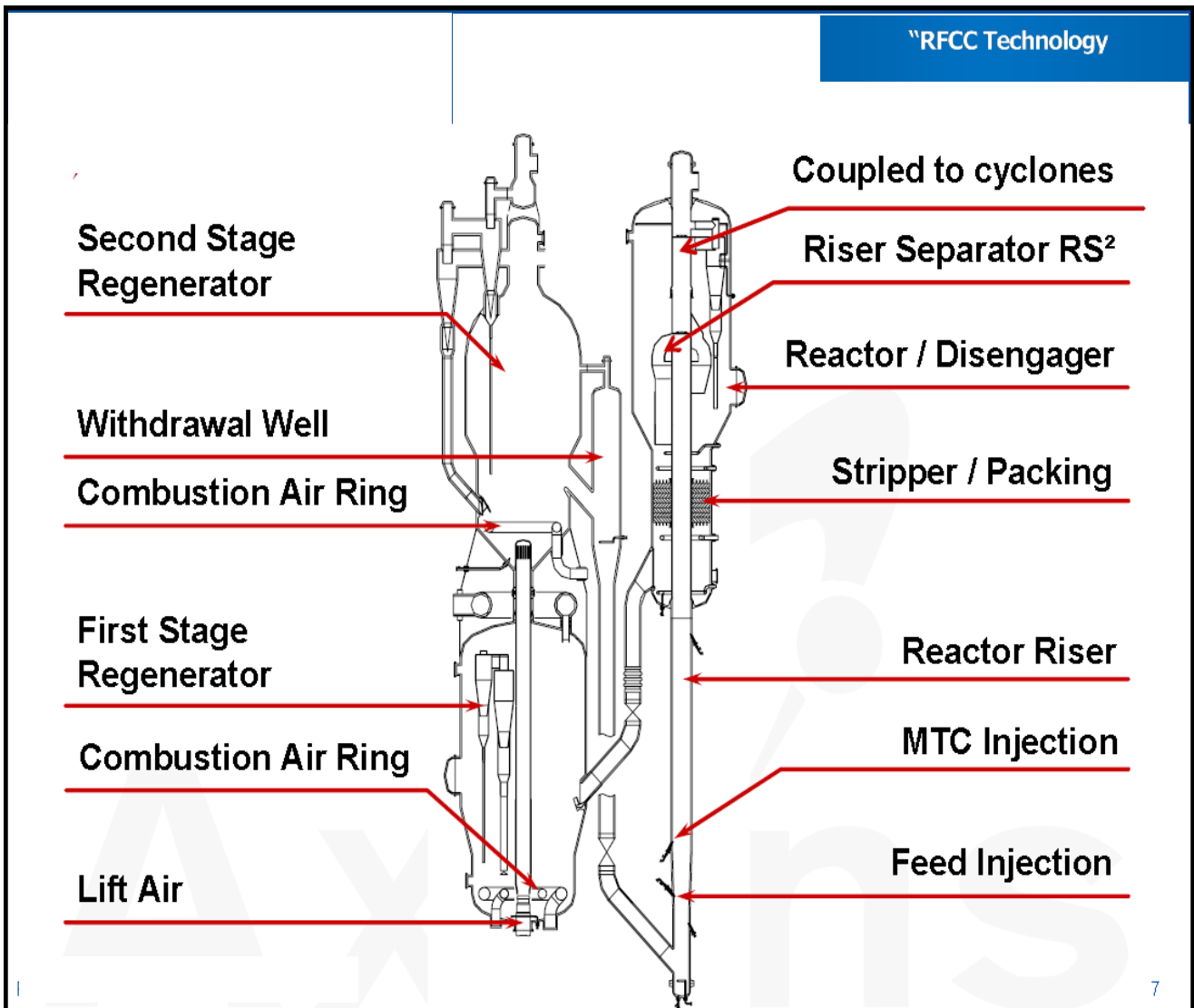


Fig 1: The R2R process scheme

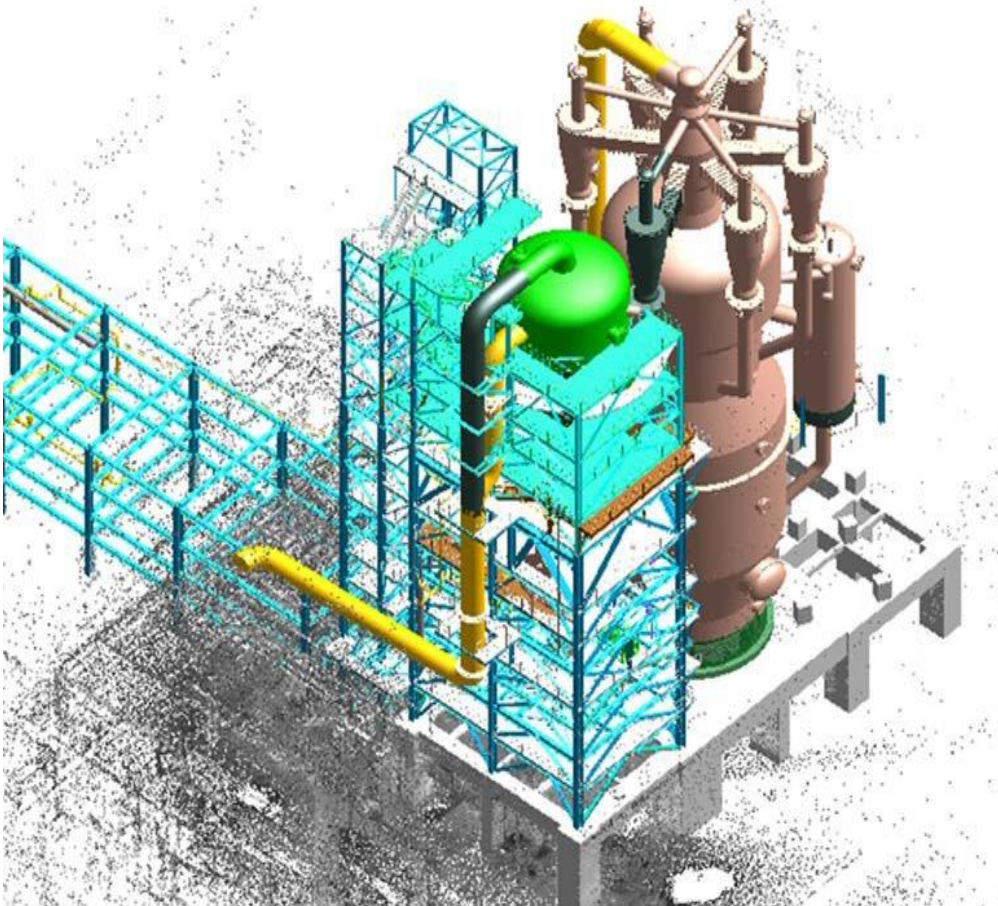
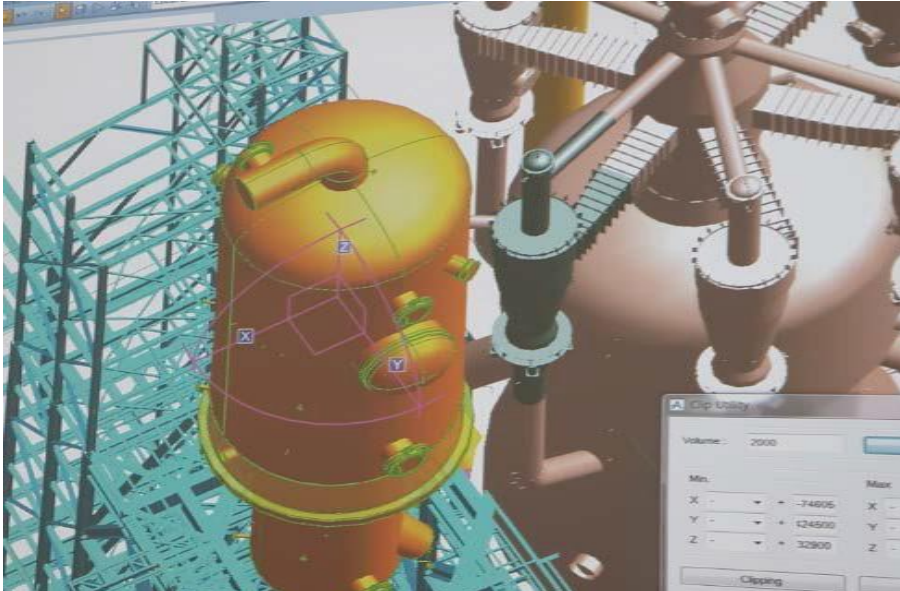


Fig 2: Sample for 3D Model

RFCC/FCC Reference Picture

S-OIL SUPER Project (2016) in Korea (AXENS Technology)



"S-OIL" RFCC Reactor Installation

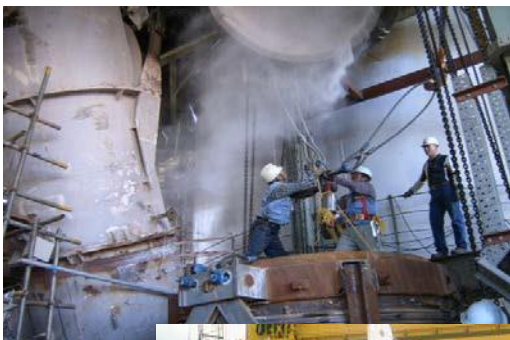


"S-OIL" RFCC Reactor Fabrication



RELIANCE FCC Revamping Project (2005 & 2010) in India (UOP Technology)

"Reliance" FCCU <Upgrading of Capability: 60,000BPSD to 80,000BPSD>



"Reliance" FCC Reactor Fabrication



CPC REACTOR / REGENERATOR SITE FABRICATUION & INSTALL WORK (2002) -EXON



RX Install



RG Bottom



RG Upper



RG Skirt



3. OVERVIEW

3.1 General Process Description

“Esfahan Oil Refining Company” (EORC), aims to implement a major “Products Upgrading Project” as part of a wider national Iranian effort to expand and improve the country’s refining industry in the coming years. As part of this project, EORC intends to implement a new Residue Fluidized Catalytic Cracking Unit (RFCC) and required process units, that is, Propylene Recovery Unit (PRU), LPG Merox Unit (LPG Merox), RFCC Naphtha Hydrotreater Unit (Prime G) and Hydrogen Production Unit (HPU) in Refinery in line with local and international environmental standards. Furthermore, some petrochemical units are considered at downstream of refinery unit to increase the Refinery complexity.

Sohrevari Petrorefinery Safahan (SPRCO) has been nominated by EORC as Employer of this project. The EPCM work including the Detail Engineering Design, management of procurement and construction activities was awarded to “Oil Design and Construction Company (ODCC)”.

In accordance with received the MR document (2001-76-EP-ME-MR-4702-A0) from ODCC. is pleased to submit technical proposal for the design, engineering, documentation, supply of material, fabrication, painting, shop assembling, Inspection, Testing, spare parts (start-up, pre-commissioning, commissioning and capital two years) supplying, packing, reinforcement for shipping, shipment, supervision on installation, commissioning and guarantee for “R2R REACTION/ REGENERATION PACKAGE” in order to achieve requested performance, and additionally covers the all scope of works/supply, requirements and recommendations for design and construction of this package.

3.2 Process Description

Residue Fluidized Catalytic Cracking (RFCC) process is known as R2R (reactor–2 regenerators). Catalytic and selective cracking occurs in a short-contact time riser where oil feed is effectively dispersed and vaporized through a proprietary feed-injection system. Operation is carried out at a

The riser temperature profile can be optimized with the proprietary mixed temperature control (MTC) system. The reaction system is the heart of the process and is defined from the point of catalyst introduction into the riser to the catalyst discharge from the stripper. The entire system needs to be designed to work in concert to maximize performance for maximum distillate, gasoline or LPG production

Proprietary feed injection nozzles ensure instantaneous and intimate mixing of the feed, atomizing steam and hot regenerated catalyst which combine at the base of the reactor riser. The nozzles are specially designed and installed to ensure long, trouble-free operation while providing optimal performance with low coke and gas

Above the main feed injection point, recycles can be used to fine-tune the reactor performance, promote better feed vaporization and control the catalyst-to-oil ratio (C/O). This recycle is MTC or Mix Temperature Control.

The cracking reactions in the riser progress rapidly and must be stopped abruptly at the riser terminus to avoid over-cracking and product degradation. Removing the catalyst stops the catalyst reactions using a proven advanced riser separation device that separates the product vapor from the catalyst quickly and efficiently. The separated vapor will be further stabilized by injecting a quench material to freeze thermal reactions.

Reaction products exit the riser-reactor through a high-efficiency, close-coupled, proprietary riser termination device RSS (riser separator stripper). Spent catalyst is pre-stripped followed by an advanced high-efficiency packed stripper prior to regeneration. The reaction product vapor will be quenched to give the lowest dry gas and maximum gasoline yield. Final recovery of catalyst particles occurs in cyclones before the product vapor is transferred to the fractionation section. The vapor products are then sent to the main fractionator (M.F.) and gas plant for separation.

The two-stage regeneration system permits safe regeneration of catalyst containing high levels of metals, principally vanadium that would otherwise rapidly deactivate the catalyst. The first regenerator burns 30-70% of the coke. Regeneration conditions are mild and vanadium on the catalyst cannot form V₂O₅ due to the incomplete combustion mode of regeneration. The catalyst is therefore protected from vanadic acid attack. The partial burn, first stage regenerator also provides significant heat rejection in the form of air heater.

In regeneration process, spent catalyst will transfer from the reactor to a regenerator via spent catalyst standpipe. Upon receive the spent catalyst to the first regenerator it will mix with air as oxidation agent. The air flows upward and burns 30-70% of the coke at 640 °C and 2.3 Barg. Regeneration temperature shall be controled to ensure that catalyst will not damage due to overheating. In the second regenerator, the catalytic activity restored by completely removing the remaining coke from the catalyst in a dry atmosphere

Esfahan Reaction-Regeneration Package (R2R) of the RFCC (Residue Fluid Catalytic Cracking Unit) package includes a reactor, two-stage regenerators with their different parts, and at the end third and fourth-stage separators to remove catalyst particles from outlet flue gas. The equipment size and specification have been defined by the process licensor and -- is responsible to design and select vendors based on licensor data sheets/drawings to handle the process.

3.3. Reaction

The first step in the RFCCU process involves feeding the heavy hydrocarbons, along with a catalyst, into the reactor vessel. The reactor vessel is a large, cylindrical vessel that is designed to withstand high temperatures and pressures. The catalyst is composed of zeolite, which is impregnated with metals such as platinum, palladium, or nickel.

Once the heavy hydrocarbons and catalysts are fed into the reactor vessel, they are heated to a high temperature, in the range of 450-550°C. This temperature range is necessary for the cracking process to occur, as it provides the energy required to break the long hydrocarbon chains.

3.4. Regeneration

After the catalyst in the RFCCU has been used to crack the heavy hydrocarbons, it becomes deactivated and needs to be regenerated in order to restore its activity. The regeneration process involves burning off the carbon deposits that have accumulated on the surface of the catalyst during the cracking process.

The regeneration process begins by transferring the spent catalyst from the reactor vessel to a regenerator vessel. The regenerator vessel is a large, cylindrical vessel similar to the reactor vessel, but with different internal components and a different operating temperature range.

Once the spent catalyst has been transferred to the regenerator vessel, it is mixed with air, which is used as the oxidizing agent for the regeneration process. The air is introduced into the bottom of the vessel, and it flows upward through the catalyst bed. As the air flows through the bed, it reacts with the carbon deposits on the surface of the catalyst, causing them to burn off and form carbon dioxide gas.

The regeneration process is carried out at a temperature of around 650-700°C, which is high enough to burn off the carbon deposits, but not so high that it damages the catalyst. The process is also carried out under carefully controlled conditions to ensure that the catalyst is not overheated or damaged during the process.

Once the regeneration process is complete, the regenerated catalyst is transferred back to the reactor vessel to continue the cracking process.

4. SCOPE OF SUPPLY AND SERVICES

This section defines the scope of all supplies and services that will be provided by co. The scope of work has been remarked on the client PIDs and attached to this technical proposal.

4.1. Engineering and Documentation

co will provide the following engineering services and related documentation:

- . Design and detail engineering for the equipment
- . Procurement, inspection, and expediting.
- . Supervision on erection, commissioning, and start-up

4.2. Process Equipment

Reactor Section

Tag No.	Description	Q'ty
V-76101	Disengager / Stripper	1
CY-76101 A~H	Disengager Cyclones	8
R-76101	Riser	1
ME-76101 A~H	Feed Injectors	8
ME-76102 A~D	Stabilization Steam Injectors	4
ME-76103 A~F	MTC Injectors	6
ME-76104	Backflush Oil Injector	1

Regenerator Section

Tag No.	Description	Q'ty
V-76103	First Regenerator	1
CY-76102 A~H	First Reg. Internal Cyclones (First Stage)	8
CY-76103 A~H	First Reg. Internal Cyclones (Second Stage)	8
ME-76110 A~F	First Reg. Torch Oil Injectors	5
ME-76112	Expansion Joint Between 1st and 2nd Stage Regenerators	1
V-76104	Second Regenerator	1
CY-76104 A~F	Second Reg. External Cyclones (First Stage)	6
CY-76105 A~F	Second Reg. External Cyclones (Second Stage)	6
ME-76111 A~E	Second Reg. Torch Oil Injectors	5

Reactor and Regenerator Interconnection

Tag No.	Description	Q'ty
V-76102	Spent Catalyst Standpipe	1
ME-76109	Spent Catalyst Expansion Joint	1
SG-76101	Spent Catalyst Slide Valve	1
V-76105	Withdrawal Well / Regenerated Catalyst Standpipe	1
SG-76102	Regenerated Catalyst Slide Valve	1

Catalyst Cooler

Tag No.	Description	Q'ty
E-76101	Catalyst Cooler	1
ME-76108	Catalyst Cooler Expansion Joint	1
SG-76106	Catalyst Cooler Slide Valve	1

Catalyst Recovery Section

Tag No.	Description	Q'ty
CY-76106	Third Stage Cyclone	1
CY-76107	Fourth Stage Cyclone	1

5. DESIGN CONDITION

5 -1 .Disengager / Stripper (V-76101)

One 5,950 / 9,900 mm I.D. X 30,195 mm T/T, a vertical refractory lined vessel built in accordance with ASME Code, Section VIII, Division 1

Design Temperature (Shell/Internal):	350 / 650°C
Design Pressure:	4.7 barg
Dimension:	5,950 / 9,900 mm x 30,195 mm
Corrosion Allowance (Shell/Internal):	3 / 1.5 mm
Material (Shell / Internal / Packing):	A-516 Gr.70 / SS 410S

The Disangager has eight internal cyclones (CY-76101 A~H) at the riser separation system to separate the catalyst from hydrocarbon.

The bottom part of the Disangager, the stripper section is located. The main aim of the stripper section is to remove hydrocarbon from the catalyst:

- . To control the regeneration section operating temperature
- . To increase product recovery

The stripper section will be equipped with eight layers of annular KFBE packing

5-2 .Riser (R-76101) and Injectors

One 1,630 / 2,420 mm I.D. X 29,355 mm T/T, a vertical refractory lined vessel built in accordance with ASME Code, Section VIII, Division 1

The riser is equipped with high-efficiency injectors for steam, fresh feed, MTC, and backflush oil

Design Temperature (Shell/Internal):	350 / 650 (Upper) & 900 (Lower)°C
Design Pressure:	4.5 barg
Dimension:	1,630 / 2,420 mm x 29,155 mm
Corrosion Allowance (Shell/Internal):	3 / 0.75 mm
Material (Shell / Internal):	A-516 Gr.70 / SS 304H

5-3 .Spent Catalyst Standpipe (V-76102)

One 1,500 mm I.D. x 10,740 mm Length, vertical refractory lined standpipe built in accordance with ASME Code, Section VIII, Division 1.

This standpipe will be equipped with an expansion joint to protect equipment and a sliding valve to control the level of liquid in the reactor.

Design Temperature (Shell/Internal):	350 / 650 °C
Design Pressure:	5.2 barg
Dimension:	1,500 mm x 20,740 mm
Corrosion Allowance (Shell/Internal):	3 mm
Material (Shell / Internal):	A-516 Gr.70

5-4 .Spent Catalyst Standpipe (V-76105)

One 1,500 / 3,200 mm I.D. x 39,050 mm Length, vertical refractory lined standpipe built in accordance with ASME Code, Section VIII, Division 1.

This standpipe will be equipped with a sliding valve to the temperature of the reaction in the reactor.

Design Temperature (Shell/Internal):	350 / 900 °C
Design Pressure:	5.4 barg
Dimension:	1,500 / 3,200mm x 10,740 mm
Corrosion Allowance (Shell/Internal):	3 mm
Material (Shell / Internal):	A-516 Gr.70

5-5 .Regenerator Section

This section aims to remove coke from the catalyst and regenerate the catalyst to recirculate to the reaction section through an interconnection standpipe.

There are two stage regeneration system, in the first one which has a lower operating temperature most of the coke and carried out hydrocarbon will be burned and in the second stage, the remaining unburned coke will be burned at about 100°C higher temperature than the first regenerator, and final step of regeneration will be done.

5-5-1 .First Regenerator (V - 76103)

One 10,750 / 12,750 mm I.D. X 19,000 mm T/T, a vertical refractory lined vessel built in accordance with ASME Code, Section VIII, Division 1

The first regenerator has eight two-stage external cyclones (CY-76102/76103 A~H) at the top of the first regenerator to separate the catalyst from flue gases.

Design Temperature (Shell/Internal):	350 / 840°C
Design Pressure:	5.1 barg
Dimension:	15,750 / 12,750 mm x 39,000 mm
Corrosion Allowance (Shell/Internal):	3 / 0.75 mm
Material (Shell / Internal / Packing):	A-516 Gr.70 / SS 304H

5-5-2 .Second Regenerator (V - 76104)

One 8,800 / 11,150 mm I.D. X 26,900 mm T/T, a vertical refractory lined vessel built in accordance with ASME Code, Section VIII, Division 1

The second regenerator has six two-stage internal cyclones (CY-76104/76105 A~F) at the top of the second regenerator to separate the catalyst from flue gases.

Design Temperature (Shell/Internal):	350 / 900°C
Design Pressure:	4.31 barg
Dimension:	8,800 / 11,150 mm x 26,900 mm
Corrosion Allowance (Shell/Internal):	3 / 0.75 mm
Material (Shell / Internal / Packing):	A-516 Gr.70 / SS 304H

5-6 .Catalyst Cooler (E-76101)

The catalyst cooler aims to control the temperature in the regeneration section. It cools the catalyst from the second regenerator back to the first regenerator.

One 3,615 mm I.D. X 20,715 mm T/T, vertical refractory lined cooler built in accordance with ASME Code, Section VIII, Division 1.

Design Temperature (Shell/Internal):	350 / 900°C
Design Pressure:	15 barg
Dimension:	3,615 mm x 20,715 mm
Corrosion Allowance (Shell/Internal):	3 / 0.75 mm
Material (Shell / Internal / Packing):	A-516 Gr.70 / SS 304H

5-7 .Catalyst Recovery Section

The main purpose of this section is to remove catalyst dust from the flue gas before entering the incinerator section. It contains two-stage integrated cyclones to remove particles larger than 7 microns.

These refractory-lined cyclones should be built with A-516 Gr.70 and their design pressure and temperature are 5.7 barg and 350 °C respectively.

6. DETAIL WORK SCOPE & SPECIFICATION

1) Scope of application

This specification covers the particular requirements of Reactor & Regenerators ,
(hereinafter referred to as "Equipment") for above title project.

Article marked thus shall apply to the equipment to supplied by the co and/or shall be included in the KHPT's scope of supply. Article marked are not applicable and excluded from the vendor's scope of supply.

2) Equipment to be supplied

This specification shall be applied to equipment items in "Cost break down ".

3) Code, Standards and Regulation

3.1. Applied code and standards

- ASME Code Section VIII Div. 1 2021 Edition
- ASME Code Section I Latest Edition
- ASME Code Section V Latest Edition
- ASME Code Section IX Latest Edition
- TEMA "R" 1999 8th Edition
- PD 5500
- KS JIS
- API Std. 660 Sixth Edition, 2001

3.2. Code stamp

- Not Required
- Required
 - "S" "U" "U2" "PP"

3.3. Material Codes

3.3.1. Pressure Parts

- ASTM ASME JIS DIN KS

3.3.2. Non Pressure parts

- ASTM ASME JIS BS KS

3.3.2. Large size flange

- ANSI B16.5 for 24 inch and small
- ANSI B16.47 series B for 26 inch through 60 inch
- MSS SP44
- API 605
- KS & JIS

3.4. Measuring Unit

- SI unit

3.4. Local regulation

- High Pressure Gas Safety Control Law in Korea
- Energy Utilization Rationalization in Korea
- Korea Industrial Safety & Health Law
- Not Applied
- Others

4) Scope of work and Supply

4.1 Design

- Thermal and Hydraulic Performance Calculation and Guarantee
- Stress / flexibility analysis by FEM
For the full set of reaction / regeneration section including Riser, Disengager / Stripper, First/Second Regenerators, Catalyst Stand Pipes, Withdrawal Well & stand pipe, catalyst cooler & stand pipe, expansion joints, slide valves, plug valve and all internals within the battery limit
- Fabrication detail Drawing
- Strength Calculation in accordance with application code & Job specification
- Fatigue Analyzer Calculation. if required
- Platform and Ladder
 - Drawing only

4.2 Material Procurement

- All scope materials to be provided by the vendor
- Excepted material procurement

4.3 Manufacturing

- Fabrication
 - at shop at Job site Pre-fabrication at shop
- Stress relieving and/or PWHT per code and specification requirement.
- Internal lining or coating
 - Refractory Lining at shop Phenolic Lining
- Internal Assembly for RS2 (Supply by others)

4.4 Scope of supply

- Equipment Proper and the under-mentioned accessories
- Nozzle, Manhole and Handhole with Blind flange, Gasket, Bolt and Nut.
- Name plate and its saddle
- Stiffener ring, if required
- Welding rods for field welds, if necessary
- Internals indicated on Engineering Drawing, Formal Sketch or Data Sheet
- Template
- Foundation bolts and nuts or setting bolts and nuts
- Top davits, if necessary
- Davit for manhole cover
- Earth lugs (Min. two (2) lugs per item)
- Insulation support ring, if any
- Lifting lugs and tailing lugs
- Lugs for platform, ladder, piping support and fire protection, if any
- Fittings for transportation including;
 - Nozzle cover, bolts, nuts and gaskets for shipping for flange nozzles
 - Wooden or Steel Skid for transportation
 - Lugs for transportation
 - Lifting beam and/or spread bar, if required.
 - Wooden belts for sling the vessel or truck
 - Blind solid steel protection cover for nozzles of bevel end nozzles (Gas inlet and

- outlet nozzles).(Easy removable at site)
- Special fittings for site assembling, if any
- Bolting and blind covers for shop hydro-static test
- Blind flanges together with bolts, nuts and gaskets (For manholes and blinded flanges)
- Spare parts for construction - Separate price
- Spare parts for commissioning and two (2) years operation - Separate price
- Supply of required utilities, warehouse, space for refractory lining application at shop

4.5 Scope of Works

- Manufacturing of equipment and materials
- Installation of refractory anchors
- Welding procedure qualification tests (Note), if any
- Welding performance qualification tests (Note), if any
 - Note :Not required in case the tests are already qualified (WPS/PQR to be supplied)
- Inspection and tests at shop
- Cleaning and rust removal
- Pneumatic test
- Trial assembly of Internals at shop, if applicable
- Code stamp
- Application & approval of local regulation and law
- Third party inspection - Inspector provide by Buyer
- Painting at shop
 - Primer (Only for Carbon/ Low Alloy Steel parts)
- Rust prevention of equipment internals;
 - Filling desiccant (Silicagel)
- Seaworthy export packing
- Transportation (Shop to Yoolchon Port, Korea)
- To obtain any export license or other official authorization for exportation
- Filed fabrication work of Equipment Bodies, if any
- Supervising at site for installation, if any
- Maintenance and operation training of the Customer at manufacturer shop, if any
- **Installation of RS2 & Reactor Cyclone at manufacturer shop,**

But, RS2 (Separator) & Stripper Packing by others / Stripper Packing install on site & Demolition of temporary support for RS2 (Separator) & Cyclones, refractory lining work on removed area of temporary support by others scope.

4.6 Out of Scope of Supply

The required specification and data sheets for Slide Valve & Plug Valve as well as RS2 are not received yet. In addition, even through inquiry of the items below have been issued to potential sub-vendors, unfortunately, however, their quotation did not receive yet due to US sanction issues. Accordingly the below items shall not be included in our scope of supply work at this moment and it might be included upon receipt of sub-vendors' quotation in due course.

- Expansion bellows
- Slide valve & Plug valve
- Catalyst Cooler

- Cyclones (DS-761-CY-76101/76102/76104/76105/76106)
- Injector (Backflush, Feed, Syabi. & MTC)
- Refractory lining materials at Site
- RS2 (Separator)
- Stripper Packing
- Sprayers

4.7 Out of Scope of Work

- Field installation of equipment -See, Attached Site Joint Location Drawing
- Field installation of 1st & 2nd Cyclone / Flue Gas Duct / Cyclone Connection
- Field installation of 1st Air Lift with support
- Refractory lining application at site
- Drying of refractory lining at site

5 Spare Parts

- Not to be supply
- **Option** For commissioning or start up for Manhole flange and Blind connections
 - Gasket 200 %
 - Bolt and Nuts 10 % Min. 2 Sets
- **Option** for 2 Years Operation for Manhole flange and Blind connections
 - Gasket 200 %
 - Bolt and Nuts 10 % Min. 2 Sets

5) Rust Prevention and Painting

5 Inner surface preparation

- Not applicable
- Acid Cleaning (SS Part)
- Buffing
- Electric Polishing
- Chemical Cleaning with shot/sanding

5 Rust Prevention

- N2 Gas padding
- VCI (Volatile Corrosion Inhibits)
- Slicagel

5 Painting

5.3.1. Surface preparation of outer surface for carbon steel

- SSPC-SP-3 Power Tool Cleaning
- SSPC-SP-6 Commercial Blast cleaning
- SSPC-SP-10 Near White Blast Cleaning
- To be done as per the job specification

5.3.2. Surface preparation of outer surface for Stainless steel

- Acid Cleaning
- Passivation

5.3.3. Painting

- Primer 1 coat only
- Primer and intermediate coating
- Final coating
- To be done as per the job specification

6) Packing and shipping

6.1. Internal protection

- Blanked and protected with steel cover
- Blanked and protected with wooden cover

6.2. Seaworthy Packing Method

6.2.1. Body

- Standard Export Packing with Steel & wooden skid
- Standard Export Packing with 50% open crate
- Standard Export Packing with crate

6.2.2. Spare Parts with accessory

- Standard Export Packing with crate

6.3. Transportation & Shipping

- Inland Transportation
- FOT(Free on Truck) at Job site
- FOB(Free on board)
- CIF

7) Inspection & test

- The inspection and test shall be executed in accordance with the requisition and inspection specification and minimum inspection as follows;
 - Pre- inspection meeting before work starting
 - Inspection and test plan
 - Raw material inspection
 - Material ID translation inspection (MI)
 - Welder's and Welding operator's performance qualification Test if required
 - Welding Procedure Qualification Test (WPQT)
 - Edge preparation, Fit up and Back chipping inspection
 - Liquid penetrate examination test (PT)
 - Magnetic particle examination test (MT)
 - Ultrasonic examination test (UT)
 - PAUT or Radiographic Test (RT)
 - Pneumatic Test - Horizontal position
 - Refractory lining at some parts aren Necessary to be performed before pressure test.
 - Therefore, pressure test for Reactor / Regenerator is performed by pneumatic.
 - Hardness Test
 - Visual and dimensional inspection (VI/DI)

- Hydro Test (HT) at horizontal position for Riser, Spent catalyst Line, Flue Gs Line of 2nd Regenerator & Wethdrawal Well
- Leak test on reinforcement pad by Pneumatic
- Mechanical running test
- Surface preparation inspection
- Packing inspection
- Rust prevention inspection
- Painting inspection
- Name Plate inception
- Inspection arid tests witnessed by Purchaser /Third party inspector is required. Vendor shall provide suitable office spare for such inspection.

8) Documentation

- The documentation shall be executed in accordance with the requisition and minimum submit after contract and/or delivery as follows;
 - Sub-supply vendor List
 - Fabrication Detail Drawing
 - Strength Calculation
 - Loading data
 - Spare Parts List
 - WPS (Welding Procedure Specification) & PQR(Pre Qualification test Record)
 - ITP (Inspection and Test Plan)
 - Master Schedule
 - Fabrication Schedule
 - Progress report by monthly
 - Packing List
 - Final Inspection Report

9) Delivery & Delivery Condition

- Delivery
 - 23 Months** after Purchase Order
- Delivery Condition
 - FOT (Free on Truck-unloading) Job site
 - Loading at Jobsite
 - FOB(Free on board-free along side condition)
 - C&F port
 - CIF port

10) Warranties

The vendor shall undertake to remedy or replace any defects resulting from faulty design, faulty materials or faulty workmanship.

Warranties period is 24 months from the date of commercial operation or 36 months from the date of shipment, whichever comes first and other detailed conditions shall be in accordance with the General terms and Conditions in the Purchase Order.

11) Deviation or clarification

No deviation

Deviation / clarification

We need Clarification for Work Scope.

- Attachments

- | | | |
|---|---|--------|
| - Attach #1. Site Erection Joint Location | 1 | sheets |
| - Attach #2. Shop Refractory Lining plan | 1 | sheets |

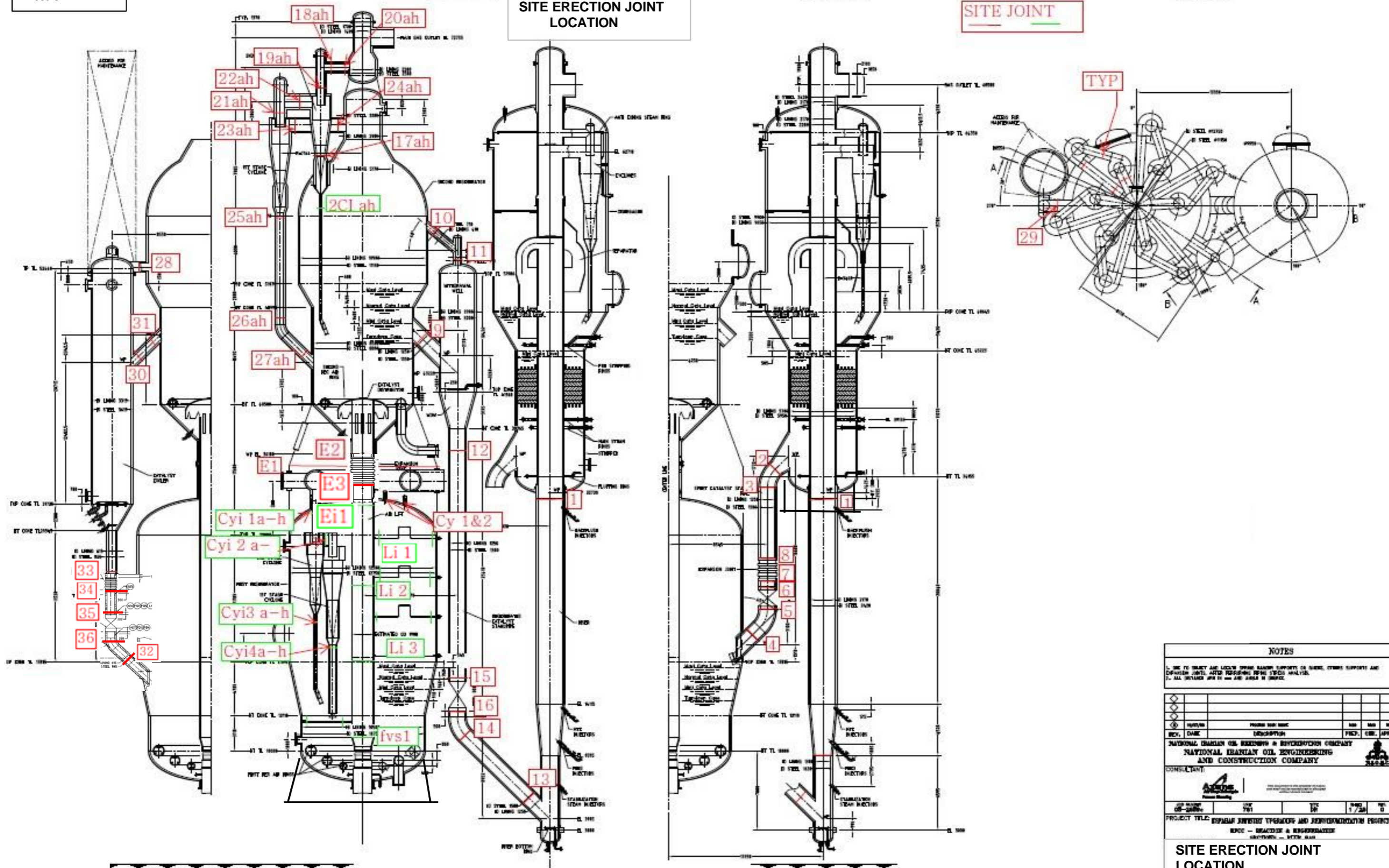
SECTION A-A

SITE ERECTION JOINT LOCATION

SECTION B-B

SITE JOINT

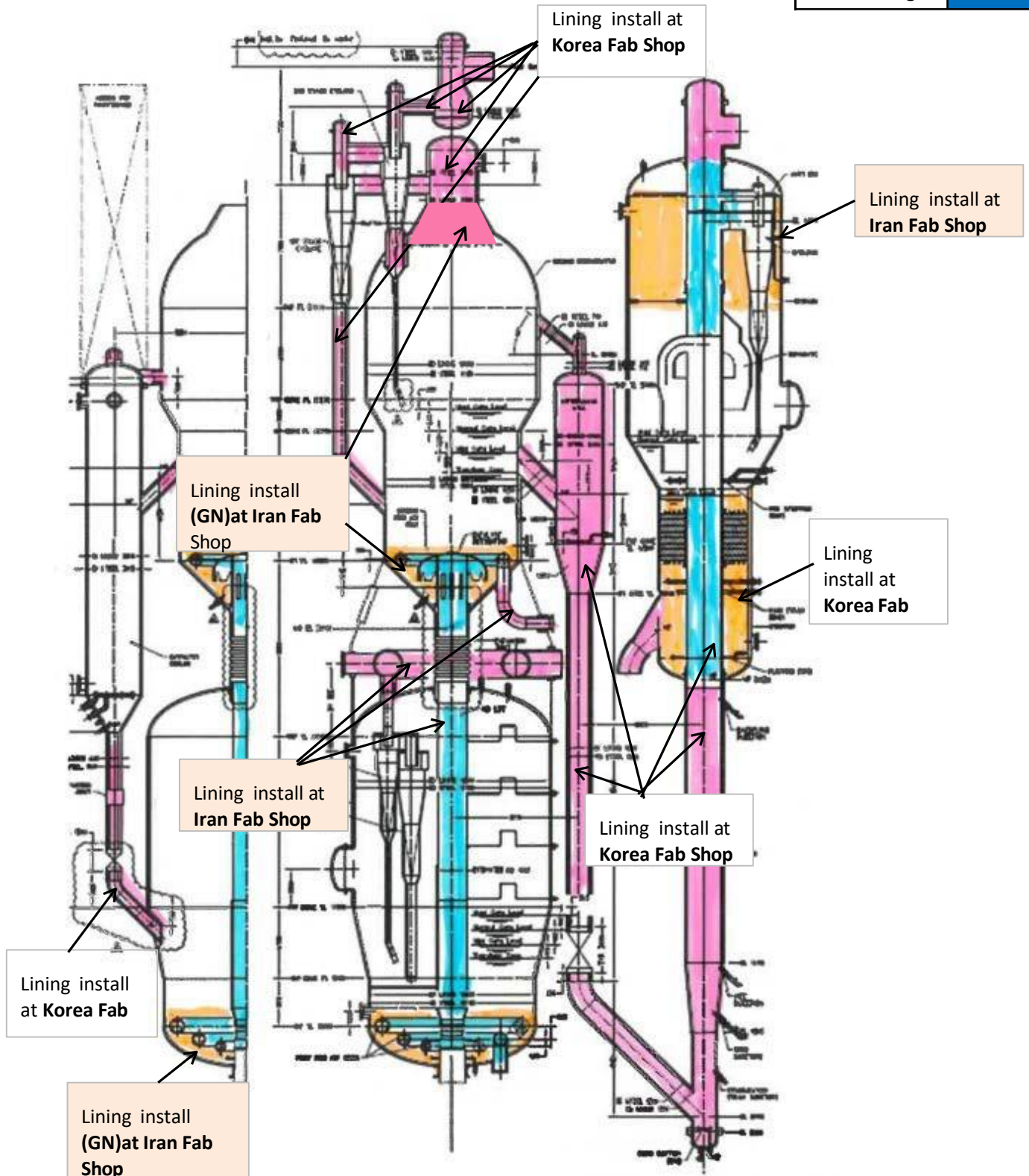
TOP VIEW



NOTES				
1. SEE TO SELECT AND LOCATE SPREADER SUPPORTS OR SLING, CHUCK SUPPORTS AND DRAFTER JOINTS AFTER PERFORMING FEASIBILITY STUDY.				
2. ALL DIMENSIONS ARE IN MM AND ANGLES IN DEGREE.				
SYMBOL	DESCRIPTION	REV.	DATE	BY
NATIONAL IRANIAN OIL REFINING & HYDROCRACKING COMPANY NATIONAL IRANIAN OIL ENGINEERING AND CONSTRUCTION COMPANY				
CONSULTANT				
PROJECT TITLE	DATE	SCALE	SHEET NO.	TOTAL SHEETS
EXPANSION UNIT AND REFORMER UNIT	17/2/88	1/1	17	20
ERDC - REACTOR & REGENERATOR (REACTOR - VTR-800)				
SITE ERECTION JOINT LOCATION				
CONT. JOB NO.:	CONT. DWG. NO.:	SCALE:		DATE:

Shop Refractory Lining Plan

Gunning	Orange
Vibra Casting	Pink
Hand Packing	Blue



The Cyclone, RSS, Expansion Joint & Valve Refractory lining install is Vendor Shop