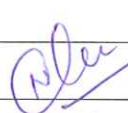
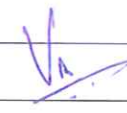
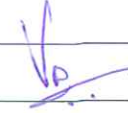





Project Numbering Procedure

BPCL Kochi Refinery- MS Block Project LSTK Package for NHT, PENEX and Balance of Units

OWNER : Bharat Petroleum Corporation Limited (BPCL), India

PMC : Engineers India Limited (EIL), India

0	12-APR-18	ISSUED FOR INFORMATION			
REV.	DATE	DESCRIPTION	PRPD	CHKD	APPD
<div></div>					
CONTRACT NO.	PETROFAC JOB NO.	DOCUMENT NO.	REV		
BM/B034-000-EP-TN-7210/1004	JI-2039	2039-A-PLN-MX-0002-0001	0		

Project Numbering Procedure

Record of Revisions

Rev. No.	Page/Section	Description

List of Holds

Page/Section	Description

Project Numbering Procedure

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Project Numbering Procedure

1.0 PURPOSE

To define Numbering Procedure for the Project and to ensure that a formal and consistent numbering system is implemented across the Project.

2.0 SCOPE

This procedure is applicable to

- All the deliverables / non-deliverable
- Supplier Documents
- Equipment's and Lines

This procedure does not cover the document numbering for Project correspondence.

3.0 DEFINITIONS & ACRONYMS

3.1 Definitions

OWNER	Bharat Petroleum Corporation Ltd.
PMC	Engineers India Ltd.
CONTRACTOR	Petrofac International (UAE) LLC. (PIUL)
SUPPLIER	The equipment manufacturer and / or supplier.
SUB-CONTRACTOR	The party appointed by Contractor to carry out construction of a plant or facility.

3.2 Acronyms

TDR	Technical Document Register (Consisting of DCI & MCI)
DCI	Document Control Index
MCI	Material Control Index
VDR	Vendor Document Register
P&ID	Piping & Instrumentation Diagram
ISO	Isometric Drawing

Project Numbering Procedure

4.0 REFERENCES

2039-A-PLN-MX-0004-0001	Project Communication Procedure
2039-A-PLN-MX-0003-0001	Interface Management Procedure
2039-A-PLN-MX-0001-0001	Engineering Execution Plan
2039-A-PLN-MX-0008-0001	Documentation Control Procedure
2039-A-PLN-MX-0030-0001	Vendor Documentation Procedure
2039-A-PEX-MX-0001-0001	Project Execution Plan
A870-999-79-41-ODB-1001	Basic Engineering Design Basis(Part-B) (ITT Doc.)

5.0 RESPONSIBILITY & AUTHORITY

Project Director along with assigned Project Management, Planning, Procurement, Construction, Subcontracts and Commissioning Team shall ensure that this Numbering Procedure is consistently followed.

Project Engineering Manager along with assigned Design Group Leader shall ensure that the title blocks for various types of documents are agreed at the commencement of the project and informed to all project team.

Individual Discipline Lead Engineers shall be responsible for ensuring that all Equipment's in Project, Lines and documents produced by their discipline, are numbered in accordance with the requirements of the procedure.

The Project Document Controller shall be responsible for maintaining TDR.

Project Document Controller shall check whether the document number and revision of the document comply with this procedure.

6.0 Project Templates

Templates for Documents are covered under Documentation Control Procedure (Doc. No. 2039-A-PLN-MX-0008-0001), Various Templates to be used in the Project are available as an attachment of this Procedure.

7.0 DESCRIPTION OF ACTIVITIES

6.1 Project Documents

All Project documents identified (but not limited to) in the Table E.1 shall be numbered in accordance with the format indicated in Figure A.1.

Piping isometric drawings shall be assigned a document number in accordance with the format indicated in Figure A.3.

6.2 Supplier Documents

All Supplier documents identified (but not limited to) in the Supplier Document Requirement List shall be numbered in accordance with the format indicated in Figure A.2.

6.3 Page/ Sheet Numbering within Document

A multi-page/ sheet, Deliverables or Vendor deliverables shall be numbered using the last four characters of the document numbering structure in accordance with the following instructions.

6.3.1 Multi Page Textual Documents

Multi-page documents (e.g. procedures, reports, specifications, studies, etc.) shall be allocated a unique number per document with '0001' as the 'Document Page Sequential Number'.

The sequential number and total number of pages shall be indicated as X of Y / YY i.e. 1 of 5/15 on every page of the document.

6.3.2 Multi Sheet Schedules

Documents such as cable schedules, instrument schedules, pipe support schedules, junction box schedules, etc., which are generally produced in A3/ A4 format, shall also be numbered as multi-page textual documents.

6.3.3 Data Sheets

i. Piping and Instrumentation

These are generally produced in A3/ A4 format, e.g. Valve data sheet, Special Item data sheet, Instrument data sheet, etc. shall also be numbered as multi-page textual documents.

For data sheet there is a single document number with each data sheet given a data sheet number.

The index of the document shall list out all the data sheet number, their revision history, the sheet no of the overall document.

ii. Process and Mechanical

These are generally produced in A3/ A4 format, shall also be numbered as multi-page textual documents without a Master index sheet and Cover sheet.

6.3.4 **Single Sheet Drawings**

All drawings shall be allocated a unique document number for sheet (e.g. 'Document Sheet Sequential Number' 0001).

6.3.5 **Multi Sheet Drawings**

All multi-sheet A3 and A4 size drawings shall be allocated a unique document number with '0001' as sheet number and 'Document Sheet Sequential Number' 0001, 0002, 0003 etc. for respective sheet 1 for Cover sheet, 2 for Index Sheet, 3, 4 etc. for continuation sheets).

If A1 or A2 size drawings contain multiple sheets then sequential sheets are assigned number 0001, 0002, etc., without index sheet.

Total number of sheets to be indicated as a separate Attribute in the title block.

6.4 **Appendix Numbering**

Appendices shall appear in the order in which they are cited in the text.

Each appendix shall be designated by a heading comprising of word Appendix followed by a capital letter designating its serial order, beginning with 'A' (e.g. 'Appendix A').

Numbers given to the clauses, sub clauses, figures, tables and mathematical formulae of an appendix shall be preceded by the letter designating that appendix followed by a full-stop.

The numbering shall start a fresh with each appendix.

A single appendix shall be designated 'Appendix A'. They shall be 'listed' in the 'Table of Contents' of the document.

6.5 **Attachment Numbering**

Where Attachments (including forms) are identified in the text of a document, they shall have a specific reference and shall be numbered (e.g. Attachment 1, Attachment 2, Attachment 3).

The sequential number and total number of pages of Attachment shall be indicated as X of Y/YY i.e. 1 of 5/15 on every page of the attachment.

They shall be 'listed' in the 'Table of Contents' of the document.

6.6 Figures & Tables Numbering

Figures / Tables shall be numeric, beginning with 1. This numbering shall be independent of the numbering of the clauses & sub clauses.

A single figure/table shall be designated 'Figure1' or 'Table 1'.

The numbering shall be continuous with separate series for figure and separate for table, but not applicable for appendices.

For numbering of Figures/ Tables within an Appendix, refer 6.4.

The numbering shall be continuous with separate series for figure and separate for table and start a fresh with each appendix as stated in 6.4. e.g. a single figure or table in Appendix A shall be designated Figure A.1, A.2, etc. or Table A.1, A.2, etc.

6.7 Soft File Name

All files shall be identified with the same naming convention as the document number structure indicated in APPENDIX A with Revision No.

Example : 2039-A-PLN-MX-0001-0001_A

6.8 Revision Designation for engineering documents

The following explanations shall define the progressive stages a document may follow towards completion.

Due to the different requirements of each type of document and project, it is not necessary that each issue stage be used for all documents.

However, the individual descriptions should be followed whenever a stated issue is implemented.

- Preliminary - Contains information that is advance/ preliminary and will be updated or confirmed later. Revision shall be a 'letter' and revision description shall state 'Issued Preliminary'.
- Issued for Interdisciplinary Check (IDC) – This information shall be issued for internal review, unless required by Customer.
- Issued for Review (IFR) – The information is issued for review by Customer. Revision shall be a 'letter' and revision description shall state 'Issued for Review'.
- Issued for Approval (IFA) - This information is ready for approval by Customer. Revision shall be a 'letter' and revision description shall state 'Issued for Approval'.
- Issued for Design (IFD) - This Information is suitable for proceeding with detail engineering and for drafting team to develop drawings further, and for engineering of other disciplines and/or subcontractors. Revision shall be a 'letter' and revision description shall state 'Issued for Design'.

- Issued for Construction (IFC) –This information is complete and ready for construction. The revision shall be 'number' and revision description shall state 'Issued for Construction'
- 'As-built' - Drawing updated with final construction data and reflects the 'as-built' situation of the facilities.
- Issued for Information (IFI) - Can be used at any stage of development for the document which is not to be issued for design or construction. Revision shall be 'number' and revision description shall state 'Issued for Information'.
- Issued for Inquiry – To be used for material requisitions issued for inquiry
- Issued for Purchase – To be used for material requisitions issued for purchase
- Issued for HAZOP – To be used for P&ID only.
- Issued as VOID/ Document Cancelled – To be used for documents which are issued as cancelled. Revision shall be a letter 'X' and revision description shall state 'Issued as Void'.

6.9 Revision Numbering

A project document shall be assigned a letter revision until it is issued for construction or purchase.

Revision 'A' shall be used for the first external issue.

If changes are incorporated to the document, but it is still not ready to be issued for construction or purchase, then the revision shall be changed to next letter (i.e. B, C,..).

When a document is ready to be 'Issued for Construction' or 'Issued for Purchase', it shall be designated with Revision "0".

All the clouds and the revision letters on the drawing shall be removed for '0' revision, however the history of last revision shall be retained with reference to Client's review and approval only and other history related to internal issues shall be removed, existing above the revision block.

All subsequent revisions to '0' shall be followed by '1', '2', etc.

In case of revision block is full, the revision history of the oldest revisions shall be deleted first and then subsequent revisions, retaining all the latest revisions.

Supplier documents shall be assigned a revision number starting from '01' for first issue and 02, 03.... for subsequent issues.

The As-Built document shall be designated as revision '00' and the revision block shall state 'As built'.

Further revisions shall be issued with the next number as the revision number i.e. '01', '02' etc.

Project Numbering Procedure

All information Category Documents / Non Deliverables shall be designated with Revision "0". All subsequent revisions to '0' shall be followed by '1', '2', etc.

Review / Approval Category Ex. Plot Plan	
Stage	Rev. No.
IFR	A
IFD	B
IFC 1	0
IFC 2	1
As Built 1	00
As Built 2	01

Information Category / Non Deliverable	
IFI 1	0
IFI 2	1
As Built 1	00

6.10 Internal Issue Numbering

All formal internal issues shall be indicated as 'External Revision / Internal Issue Number'.

This shall be marked in a separate soft stamp above the Revision block as denoted below:

<p align="center">INTERNAL ISSUE</p> <p align="center">External Rev. No. / Internal Issue No.</p> <p align="center">ISSUE DATE</p>

An example for internal issue indication is given below:

<p align="center">INTERNAL ISSUE</p> <p align="center">A/1</p> <p align="center">ISSUE DATE</p>
--

Internal issue shall be new series with every new External Revision e.g. A/1, A/2, B/1, B/2, 0/1, 0/2, etc.

6.11 Document Revision Identification

For documents in 'Word' format, the revision indicator shall be a vertical line in the right hand side margin.

The vertical line will commence at the text line in which the change starts, and extend past all lines affected by the change.

The changed text shall be 'Track Changed', so that changes are identified by colour and by underlining the text.

For 'Excel' documents, the revision number shall be indicated in the first or last column for the corresponding revised row.

For drawings, the revision indicator shall be a 'cloud' closely surrounding the area of change with the revision triangle within or immediately adjacent to the 'cloud' with exception to P&IDs.

P&IDs issued for IFR/ IFA will be indicated with Standard Revision clouds and triangle and Equipment List with revision number in the last column for the corresponding revised row, with respect to the FEED document.

When previously revised documents are re-issued as next revision, all previous revision clouds/ triangles shall be removed.

Any 'holds' or restraints on the document shall be clearly indicated either by the use of 'hold (inverted) clouds' and notes on drawings or <hold> on text documents.

Hold clouds shall remain on documents until cleared by a subsequent revision issue.

When a document is updated to incorporate as-built site mark-up comments and data after construction, all previous clouds, revision 'letters' or 'numbers' and related revision block statements and notes shall be removed.

6.12 Cancellation of Documents

Any document that has been formally issued to the Project, which is found to be redundant or invalid, shall be formally issued as 'Issued as VOID/ Document Cancelled'.

This is to ensure that redundant/ invalid information is clearly identified. The document shall be issued formally at revision 'X'.

Where the document to be cancelled is a multi-page document then it is acceptable to issue the Front Sheet only.

And the reason for the cancellation shall be noted on the document in the 'Revision Description' column.

Where a document has been cancelled because it has been superseded by another document, then this another (new/ existing) document shall be referenced in the 'Revision Description' column of the cancelled document.

The watermark with a text 'Cancelled' shall be put on the cancelled document.

6.13 Renumbering of Documents

Where it is necessary to change the document number assigned to an existing valid document (e.g. where the number was incorrectly assigned or where the numbering procedure has changed) then the 'old' document number shall be issued as cancelled as per clause 6.12 above.

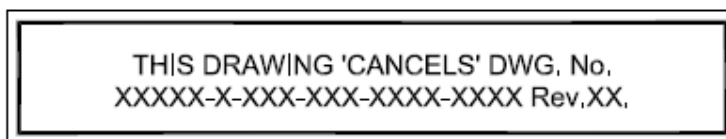
In these instances the 'new' document number shall be referenced clearly on the cancelled issue in the 'Revision Description' column.

When the 'new' document number is issued it shall clearly be referenced in the 'Revision Description' column (and for documents, in the Revision Record) that it has been renumbered.

New document shall clearly indicate the 'Old' document number under which it was previously issued.

Revisions for renumbered documents shall progress from the history generated under the old number (e.g. where the previous issue under its old number was Rev B, then the new document number shall start at Rev C).

Use of 'Text Box' in a new document stating the history of the Void or Cancelled documents as follows;



6.14 Splitting a document into two or more documents

When a document is divided into two, the new document shall be issued from Revision 0.

In case, if both documents are to continue in the same revision, a brief disclaimer shall be made in the new drawing stating that all the required checks have been completed for the new drawing.

6.15 Purchase Order Numbering

The Purchase orders shall be numbered as per Appendix A and C.

The objectives of the number are:

- To Identify the Item group
- Office Code
- To provide a Unique Number

Project Numbering Procedure

8.0 INTERFACE NUMBERING

Interface Numbering is covered in Interface Management Procedure Document No. 2039-A-PLN-MX-0003-0001.

9.0 EQUIPMENT NUMBERING

Equipment Numbering shall be as per Section 14 of ITB Document No. A870-999-79-41- ODB-1001 Rev.0 (Basic Engineering Design Basis (Part-B))

10.0 LINE NUMBERING

Line Numbering shall be as per Section 14 of ITB Document No. A870-999-79-41- ODB-1001 Rev.0 . (Basic Engineering Design Basis (Part-B))

11.0 TRANSMITTAL NUMBERING

Transmittal to be issued to OWNER / PMC shall be numbered as follows
PIUL-BPCL- MSBP-KR-T-XXXX where XXXX is Sequential No.

Transmittal to be issued to Vendor / Supplier shall be numbered as follows
PIUL-PO Number-MSBP-KR-V-XXXX where XXXX is Sequential No.

Transmittal to be issued to Subcontractor shall be numbered as follows
PIUL-Subcontractor Short Code** -MSBP-KR-T-XXXX where XXXX is Sequential No.

** Will be assigned latter

12.0 DOCUMENTED INFORMATION TO BE RETAINED (RECORDS)

All documents produced, as listed in TDR & VDR for the project.

Project Numbering Procedure

13.0 APPENDICES

13.1 APPENDIX A: Document Numbering Structure

The instructions in this section shall apply to:

- Project Document Numbering
- Supplier Document Numbering
- Isometric Numbering
- Purchase Order Numbering
- Technical Query Numbering
- Waiver Request Numbering

Project Document Numbering Format:

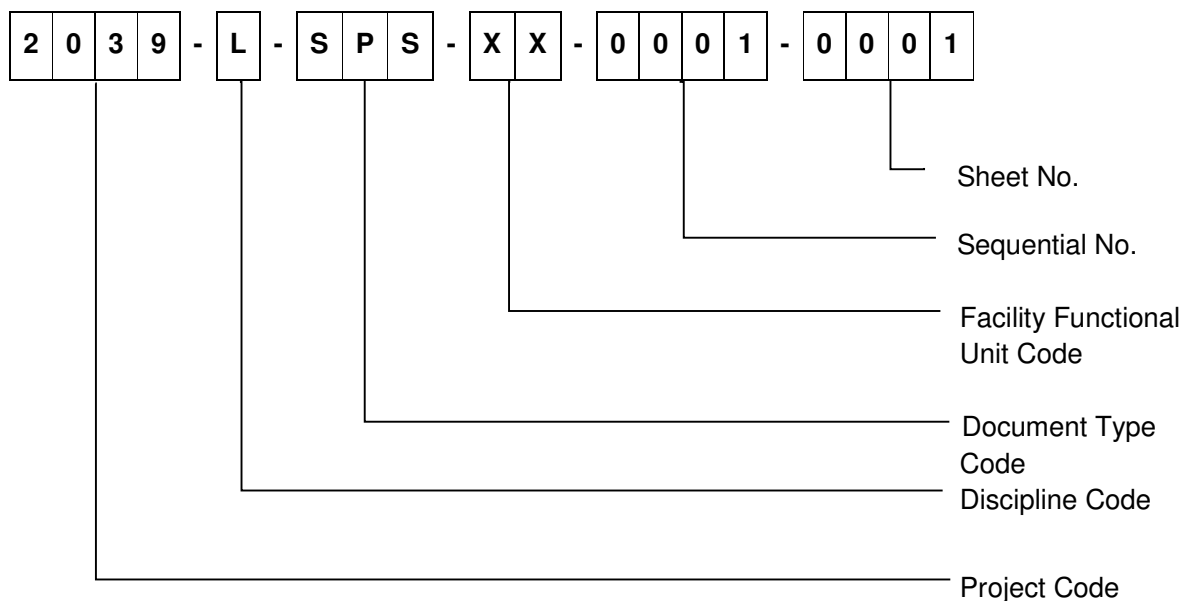


Figure A.1 – Project Document Numbering Format

Project Numbering Procedure

Table A.1 - Project Document Numbering Format Description

(i)	Project Code	2039
(ii)	Discipline Code	Single character alphabetic ; identifies the primary technical discipline or specialist function. Refer Appendix D : Discipline Type Codes
(iii)	Document Type Code	Three character alphabetic ; identifies the specific document types normally produced in the activities of the above disciplines. Refer Appendix E : Document Type Codes
(iv)	Facility Functional Unit	Two character alphabetic ; identifies the specific Project functional unit to which the document refers. Refer Appendix B : Facility Functional Unit Codes
(v)	Sequential Number	Four character numeric ; assigned by the originator shall start a fresh with any change in component (ii), (iii) & (iv) Note : - Not Applicable for P&IDs, Sequential No. of P&IDs shall be aligned with FEED / Licensor P&ID
(vi)	Sheet Number	Four character numeric ; sequential number applicable to the sheets numbering as indicated in (6.3).

Supplier document numbering format:

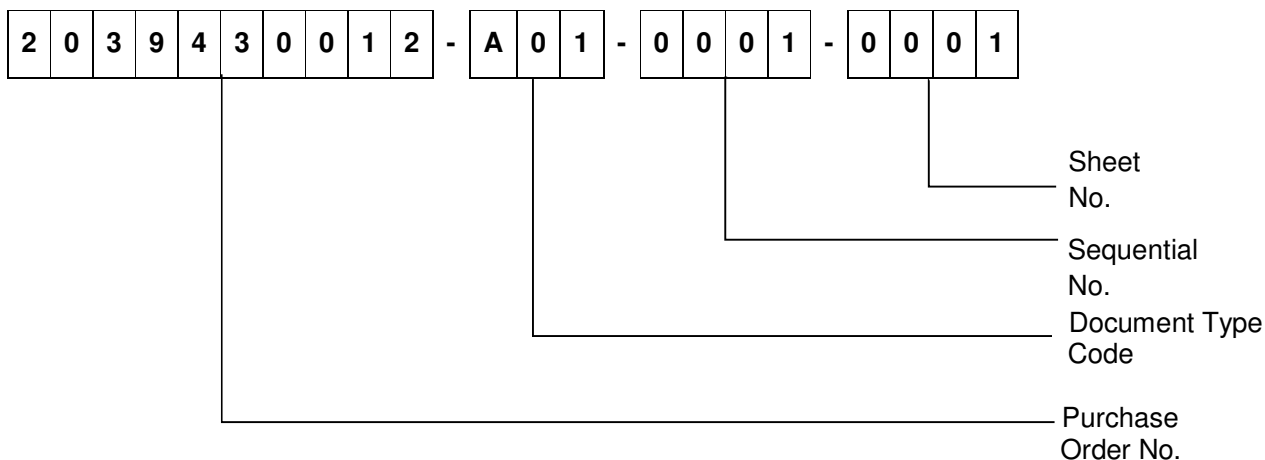


Figure A.2 – Supplier Document Numbering Format

Project Numbering Procedure

Table A.2 - Supplier Document Numbering Format Description

(i)	Purchase Order Number	Ten character numeric ; identifies the specific Project purchase order package with which the document is associated e.g. 2005450012, 2010230015. Refer Appendix C : Purchase Order Type Codes
(ii)	Document Type Code	Three character alpha-numeric ; identifies the specific Supplier document. Refer ATTACHMENT-2 PEC-EN-FRM-X-08623 : Supplier Document Requirement List (SDRL)
(iii)	Sequential Number	Four character numeric ; assigned by the Supplier Document Controller, shall start afresh with any change in component (i) & (ii)
(iv)	Sheet Numbers	Four character numeric ; sequential number applicable to the sheets numbering as indicated in (6.3).

Note : - Not Applicable for Supplier P&ID, Supplier P&ID Numbering shall be as per Section 14.2.2 of ITB Document No. A870-999-79-41-ODB-1001 Rev.0.

Isometric document numbering format:

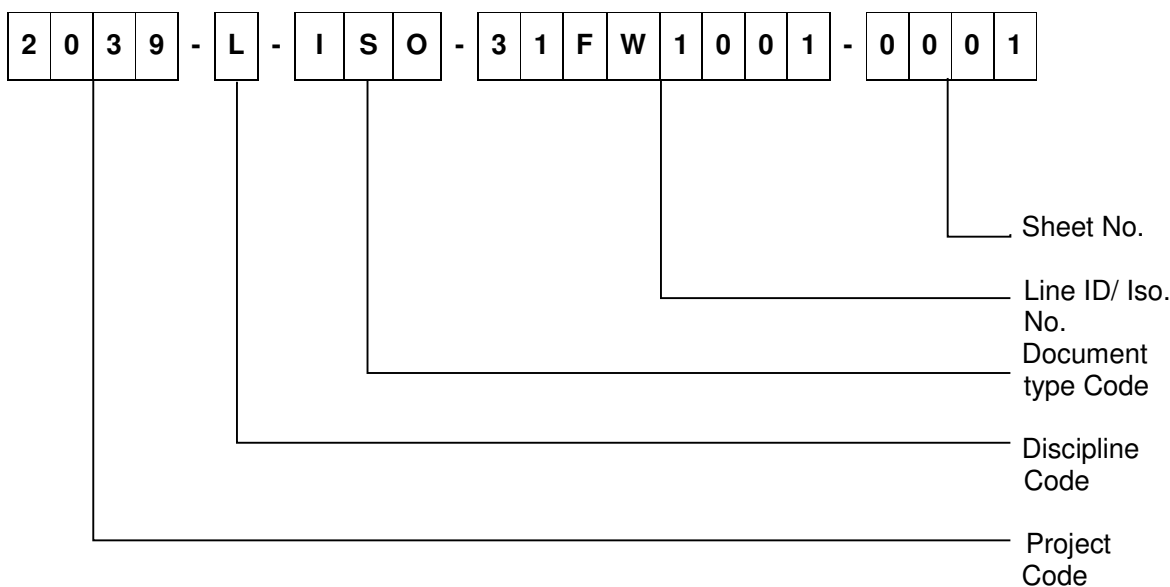


Figure A.3 – Isometric Document Numbering Format

Project Numbering Procedure

Table A.3 - Isometric Document Numbering Format Description

(i)	Project Code	2039
(ii)	Discipline Code	Single character alphabetic ; identifies the primary technical discipline or specialist function. Refer Appendix D : Discipline Type Codes
(iii)	Document Type Code	Three character alphabetic ; identifies the specific document types normally produced in the activities of the above disciplines. Refer Appendix E : Document Type Codes
(iv)	Line ID / Iso. No.	Eight character alpha-numeric ; identifies the specific Process or Utility line with which the isometric is associated. Line ID is a concatenation of Unit No. + Service / Fluid code + Line Serial No. as per P&ID
(v)	Sheet Numbers	Four character numeric ; sequential number applicable to the sheets numbering, shall start a fresh with any change in component (iv)

Purchase Order Numbering format:

The instructions in this section **shall apply** to *Purchase Order Numbers and The Purchase Order component of the Supplier Document Number*

PURCHASE ORDER numbering FORMAT

The Purchase Order numbering is detailed in Figure A.4 & Table A.4.

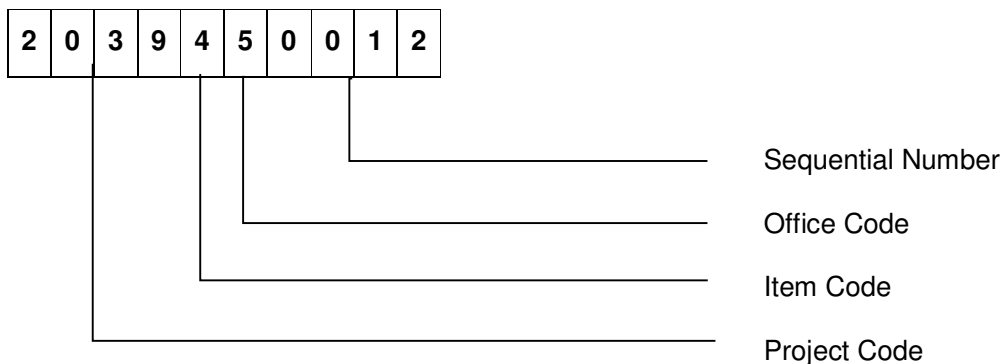


Figure A.4 – Purchase Order Numbering Format

Project Numbering Procedure

Table A.4 – Purchase Order Numbering Format Description

(i)	Project Code	2039
(ii)	Item Group Code	Single character numeric ; identifies the item group. Refer Appendix C : Purchase Order Type Codes
(iii)	Office Code	Single character numeric ; identifies the office code. Refer Appendix C : Purchase Order Type Codes
(iv)	Sequential Number	Four character numeric ; sequential number shall start a fresh with change in component (ii) & (iii)

Technical Query (TQ) Numbering format:

TQ to be issued to OWNER / PMC shall be numbered as follows

TQ-Y-XXXX

Where Y is Discipline Type Code (Single character alphabetic - Refer Appendix D for Discipline Type Codes) & XXXX is Sequential No. (sequential number shall start with 0001 for each and subsequently 0002, 0003 etc.)

Waiver Request (WR) Numbering format:

WR to be issued to OWNER / PMC shall be numbered as follows

WR-Y-XXXX

Where Y is Discipline Type Code (Single character alphabetic - Refer Appendix D for Discipline Type Codes) & XXXX is Sequential No. (sequential number shall start with 0001 for each and subsequently 0002, 0003 etc.)

Project Numbering Procedure

13.2 APPENDIX B : Facility Functional Unit Codes

The instructions in this section **shall apply to** *Project Document Numbering*.

The codes that have been assigned are shown in Table B.1.

Table B.1 – Facility Functional Unit Codes

Unit Code	Description
Process Units	
MX	Plant wide common facilities
MR	CCR
MP	PENEX
MN	NHT & Utility
MH	Hot Oil System

Project Numbering Procedure

13.3 APPENDIX C : Purchase Order Type Codes

Table C.1 indicates the item group codes to be used in PO numbering

Table C.1 – Item Group Codes

Code	Other Disciplines Included
0	Goods, Project Permanent Items
1	Back chargeable variations to Customer
2	Goods, General Items
3	Back chargeable to others
4	Services/ Miscellaneous
5	Goods, Temporary Items
6	(For Future use)
7	(For Future use)
8	(For Future use)
9	(For Future use)

Project Numbering Procedure

Table C.2 indicates the Office group code to be used in PO numbering

Table C.2 – Office Codes

Code	Primary Discipline
1	Houston
2	Woking
3	Sharjah
4	Asia
5	Malaysia
6	Italy
7	(For Future use)
8	(For Future use)

Project Numbering Procedure

13.4 APPENDIX D : Discipline Type Codes

The instructions in this section shall be applied to Project Document Numbering.

Table D.1 indicates the Disciplines type codes to be used in document numbering.

Table D.1 - Discipline Type Codes

Code	Primary Discipline	Other Disciplines Included
A	PROJECT MANAGEMENT	Project Engineering, Contract Management, Multi-Discipline and General
B	METALLURGY & CORROSION	Material Selection, Anti Corrosion & Painting
C	CIVIL	Civil
U	GENERAL CIVIL	UG, Roads, Grading etc.
V	STRUCTURAL	Steel Structure, AG Concrete Structures etc.
E	ELECTRICAL	-
F	PROJECT SUPPORT	Cost Control, Planning, Document Control, Project Reporting and Project Accounting
H	HVAC	Heating, Venting and Air conditioning related engineering
J	INSTRUMENTATION	Instruments & Control
K	CONSTRUCTION	Fabrication, Mechanical Completion and Commissioning
L	PIPING	-
M	MECHANICAL	Static Equipment & Package related engineering
P	PROCESS	-
Q	QUALITY	Quality Assurance and Quality Control

Project Numbering Procedure

R	ROTATING	Rotating equipment & Package related engineering
S	HSE DESIGN	Health, Safety & Environment
T	TELECOMMUNICATIONS	-
X	BUSINESS SUPPORT	Information Technology, Accounts, Finance, Human Recourses, Commercial, Legal, Business Management Systems and Sales.
Y	PIPELINES	-
Z	PROCUREMENT	Procurement, Expediting and Shipping
	COMPLETIONS	-

Project Numbering Procedure

13.5 APPENDIX E : Document Type Codes

The various project document types with their applicable code are listed in following Table E.1.

These document type codes will be applied by Lead discipline engineer for numbering the project document.

Table E.1 – Project Document Type Codes

Document Code	Document Type
A. Common	
CAL	Calculations
CMS	Construction Method Statements
CNR	Concession Request
DBP	Design Basis
DCN	Design Change Notice
DPS	Data Sheets
ETQ	Engineering Technical Query
GEN	General
IDX	Index
INQ	Inquiry Requisitions
ITM	Inspection and Testing Manual
LAY	Layouts
LGD	Logic Diagrams
LST	Lists (eg. Equipment List, Load List, etc)
MIS	Miscellaneous
MTO	Material Take Offs

Project Numbering Procedure

Document Code	Document Type
PHS	Philosophy
PLN	Plans & Procedures
PUR	Purchase Requisitions
RFD	Request for Deviation
RPT	Studies and Reports
SCH	Schedules
SKE	Sketches
SOW	Scope of work
SPC	Specifications
SPR	Spare Part List
STD	Standards
TBE	Technical Bid Evaluation
TIE	Tie-In Schedules
TNS	Technical Notes
VDM	Vendor Data Manual
VLS	Valve List/ Schedule
VTM	Vendor Training Manual
WIN	Work Instruction
WKP	Work Packs
EDS	Equipment Datasheet
IDS	Instrument Datasheet
SUM	Summaries

Project Numbering Procedure

Document Code	Document Type
B. Discipline Specific	
i) Project	
ORG	Organization Charts
PEX	Project Execution Plan
ii) Process / Metallurgy & Corrosion	
BLD	Block Diagram
HAM	Heat & Mass Balance Diagrams
LNL	Line List
MSD	Material Selection Diagrams
OPM	Operating Manuals
PFD	Process Flow Diagram
PID	Piping and Instrument Diagram
PRD	Process Description
SFD	Process Safety Flow Diagram
UFD	Utility Flow Diagram
iii) Piping/ Pipeline	
ISO	Isometrics
KEY	Key Plans
NOZ	Nozzle orientations
PLO	Piping Layouts
PLP	Plot Plans
PSS	Pipe Support Standard

Project Numbering Procedure

Document Code	Document Type
STA	Stress Analysis
TIE	Tie-in Schedule
iv) Civil & Structural	
ARC	Architectural
CGL	Civil General
CON	Concrete Drawings
STR	Structural
SVR	Survey Report
v) Mechanical	
SCL	Strength Calculation
vi) Electrical	
CBD	Cable Block Diagram
CLO	Cable Layout
CSH	Cable Schedule
EBS	Electrical Building Layout
ELO	Earthing Layout
INC	Interconnection Diagram
INS	Installation Drawings
LLO	Lighting layout
SCM	Schematics
SLD	Single Line Diagram
SAR	System Architecture

Project Numbering Procedure

Document Code	Document Type
vii) Instrument & Control	
ANT	Alarm and Trip Settings
CBD	Cable Block Diagram
CNE	Cause & Effect Charts
FNG	Fire and Gas Drawings
GRA	Graphics sheets
HUP	Hook-Up Diagram
IGE	Instrument General
IID	Instrument Interface Drawings
ILC	Instrument Loop Check Sheet
INS	Installation Drawings
LON	Loop Narrations
LOP	Loop Diagrams
LSK	Level Sketches
MET	Method Statements
SAR	System Architecture
TER	Termination Diagrams
CLO	Cable Layout
CSH	Cable Schedule
SCM	Schematics
viii) Telecom	
CLO	Cable Layout

Project Numbering Procedure

Document Code	Document Type
ELL	Electrical Load List
QLO	Field Equipment Layout
BLD	Block Diagram
ix) Commissioning	
COM	Commissioning Manual
CRP	Commissioning Report
x) HSE Design	
FNG	Fire and Gas Drawing
FPE	Fire Protection Equipment Layout
HAC	Hazardous Area Classification
PFP	Passive Fire Protection Drawings
xi) CONSTRUCTION	
MET	Method Statement
SCN	Site Change Notice
SCR	Site Change Request
STQ	Site Technical Query
TPK	Test Pack
WPK	Work Pack
xii) QUALITY	
AUR	Audit Reports
ITP	Inspection & Test Plan
ITR	Inspection & Test Record

Project Numbering Procedure

Document Code	Document Type
PQP	Project Quality Plan
QMS	Quality Management System
WMS	Weld Maps / Weld Summaries

14.0 ATTACHMENTS

14.1 ATTACHMENT – 1 : Basic Engineering Design Basis (Part-B) – Extract

Doc. No. A870-999-79-41-ODB-1001 Rev. 0

14.2 ATTACHMENT – 2 : PEC-EN-FRM-X-08623 : Supplier Document Requirement List (SDRL)

13.0 PROCESS FLOW DIAGRAMS & PIPING & INSTRUMENTATION DIAGRAMS

13.1 LEGEND P&IDS

The following standard legend P&IDs shall be adhered to across all process facilities:

- 1 Standard symbols & nomenclature: Drawing # A870-79-41-00-1191
- 2 General notes & typical details: Drawing #A870-79-41-00-1192(Sheets 1 & 2)

13.2 INSTRUMENT REQUIREMENTS FOR P&IDS

All designers are required to adhere to the following requirements in Piping & Instrumentation Diagrams:

- 1 Control valve / Shut-down valve failure position shall be indicated
- 2 Control valve / Shut-down valve sizes shall be indicated
- 3 Pressure relief valve set points shall be indicated
- 4 Pressure relief valve sizes with orifice designations shall be indicated
- 5 Interlocks shall be shown with sequence numbers matched to description
- 6 Minimum Flow stops, handwheels for control valves, as required shall be shown
- 7 Advanced or complex control loops shall be explained, mathematically if necessary
- 8 Solenoid valves and limit switches shall be shown where stipulated
- 9 Coupons and corrosion probes wherever required shall be shown
- 10 Interface type level instruments shall be clearly identified in the P&ID
- 11 Pressure and temperature elements shall be shown for flow measurement (except mass flow meters) with pressure and temperature compensation, where stipulated
- 12 Block & Bypass valves shall be provided for Mass Flow meters, Integral Orifices, Positive Displacement meters and Rotameters
- 13 Sampling system for online & manual analysis

13.3 PREFERRED DRAWING SIZE AND MEDIA

All P&IDs and PFDs shall preferably be drawn in drawing size ISO A1. The CAD software used shall be AUTOCAD Version 2008 or later.

13.4 MISCELLANEOUS

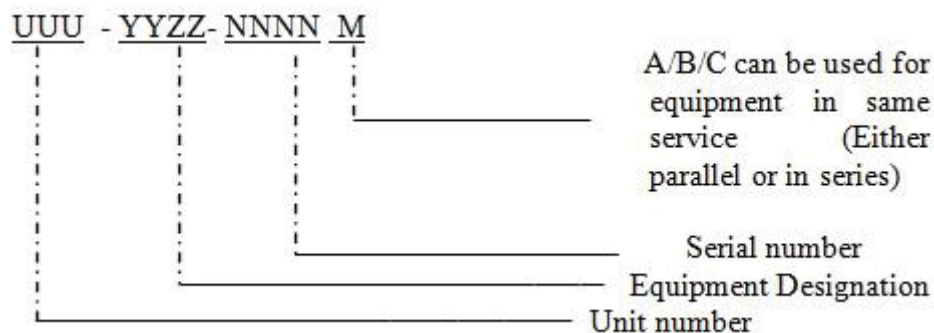
P&ID to indicate rating of control valves, safety valves, vessel flanges if they differ from line rating.

14.0 NUMBERING SYSTEM

14.1 EQUIPMENT NUMBERING PHILOSOPHY

14.1.1 GENERAL EQUIPMENT NUMBERING PHILOSOPHY

Equipment numbering shall be as defined below:



The unit numbers(UUU) have been defined in section 2.4. The equipment designations (YYZZ) are summarised in Section 14.1.1.1 covering the requirement of basic engineering. The serial number to start from 1 (suggested), unless otherwise specified by BPCL, KR.

No. of equipment in one service such as multiple shells of heat exchangers, no. of pumps in the service (operating as well as standby) etc. to be identified as A/B/C etc.

Owner special requirement:

BPCL, KR desires all the bundles of the air coolers to be identified as A/B/C/D etc.

For offsites tanks/ pump numbering refer note in section 2.4.2

14.1.1.1 EQUIPMENT DESIGNATION

Equipment Designation	Description
C	Air Blower/ Compressor
E	Exchanger/ Reboiler
E	Air Cooler
G	Filter/ Strainer
H	Heater
J	Ejector
PM	Pump Motor
T	Tank
V	Vessel
V	Reactor
V	Column
PT	Pump Turbine
KT	Compressor Turbine
P	Pump
MX	Mixer
FA	Flame Arrestor
SP	Specialty Items (Spray/ Injection nozzles/ Injectors/ Non-slam type NRV)
CT	Cooling Tower
X	Air Dryer
LI	Inert Gas Generator/ Air Separation Plant
CL	Chlorinator
-	DM Water Plant
LF	Condensing Polishing Unit
B	Fired Boiler/ Utility Boiler
LS	Flare Stack & Flare components
LZ	Undefined package Items/ Miscellaneous (Steam trap/ Desuperheater/ Silencer)

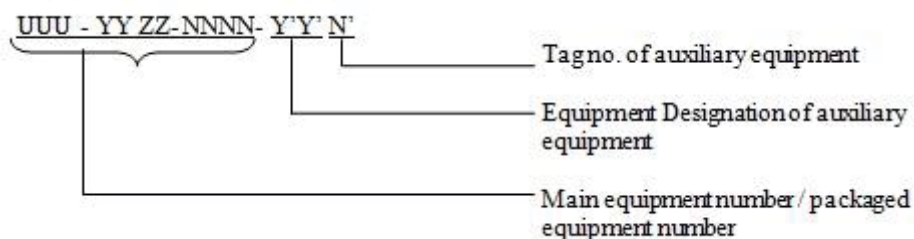
14.1.2 EQUIPMENT NUMBERING PHILOSOPHY FOR VENDOR PACKAGED

ITEMS

- Philosophy for equipment numbering will be in line with the earlier section.
- Additional equipments prepared by vendor will follow the philosophy as given in figure.

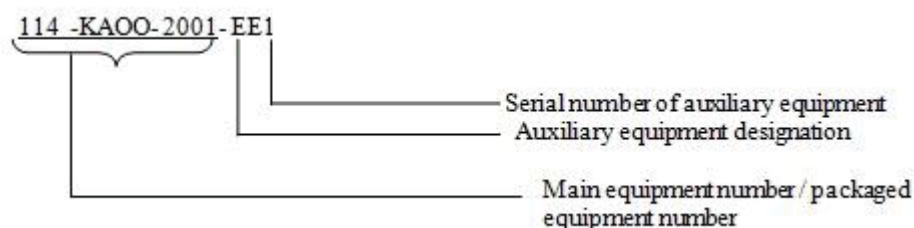
Designation (Y''''Y''') of auxiliary equipment within a package / associated with a main equipment shall be corresponding to a particular project in BEDB -Part B.

If there are multiple items for a particular service considering spare, etc., same can be identified as 1A/B, etc., same way as it is followed for main equipment.



14.1.2.1 EXAMPLE

Example: Consider a compressor having tag number 114-KA00-2001 as packaged equipment and numbering of surface condenser will be as follows:



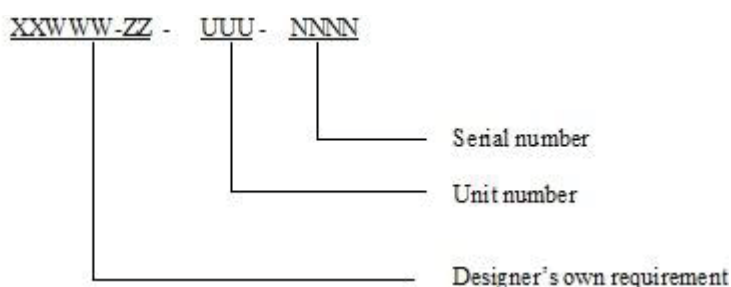
Notes:

- The numbering philosophy of main equipment /packaged equipment shall be as that specified in the BEDB Part-B of the concerned project.

14.2 DRAWING NUMBERING PHILOSOPHY

14.2.1 GENERAL DRAWING NUMBERING PHILOSOPHY

Specific to the numbering of Process Flow Diagrams and Piping & Instrumentation Diagrams, Process control diagram (if applicable), material flow diagram, the following system shall be adhered to by all licensors / designers:



For EIL designed units, XXWWW-ZZ will be indicated as JJJJYY-ZZ. Here JJJJ refers the

Job no. and YY and ZZ are Process department unit code 02 and section code 41 respectively.

This numbering essentially ensures that the first part of the drawing number takes care of a licensor's or designer's own company numbering requirements while the second part of the number ensures a uniform philosophy for all PFD / P&ID serial numbers which will then be utilised for numbering instruments and lines as per 14.3 and 14.4 below.

In the four-digit drawing serial number, the digits shall be used as follows:

First digit: "0" for PFDs and "1" for P&IDs, "2" for PCDs, "3" for MFD, "4" for CFD.

Second digit: "0" for iso size A0, "1" for iso size A1, so forth.

Last 2 digits: Serial number starting from "11" for P&IDs, from "01" for PFDs.

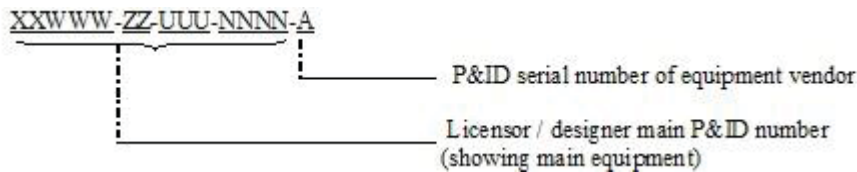
14.2.2 DRAWING (P&ID) NUMBERING PHILOSOPHY FOR VENDOR PACKAGED ITEMS

a) Philosophy for P&ID numbering will be in line with the earlier section.

b) Additional P&ID's prepared by vendor will follow the following philosophy:

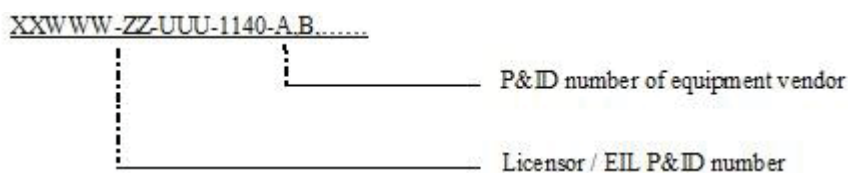
The P&ID number in Licensor's / designer's package will be used.

Suffix A, B,-----Z, as demonstrated below shall be added by vendors of packaged equipment/ main equipment for assigning numbers to the P&IDs to be prepared by them.



14.2.2.1 EXAMPLE

Example: Consider there is a compressor having tag number UUU-YY-ZZ-101 in EIL P&ID with drawing number as XXWW-ZZ-UUU-1140. Packaged equipment vendor for this compressor should number his P&IDs as follows:



Equipment vendor should number the P&ID from alphabet "A" to "Z". If serial numbers "A" to "Z" are not sufficient, vendor can use "A1" to "Z1" for subsequently.

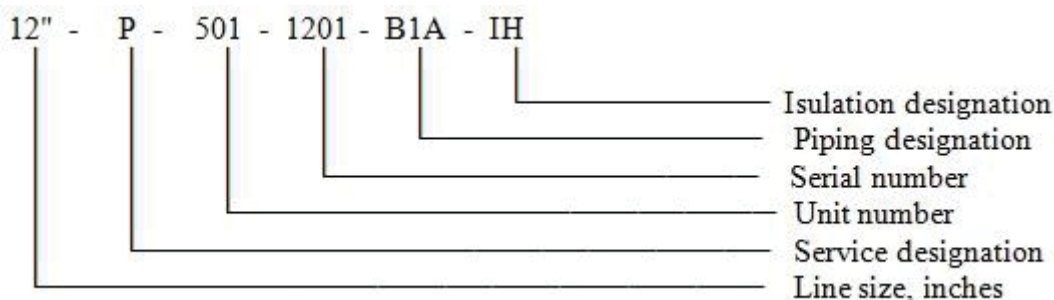
Note

1. Process engineers shall ensure that no other equipment except packaged equipment/ main equipment are shown in EIL generated P&IDs.

14.3 LINE NUMBERING PHILOSOPHY

14.3.1 GENERAL LINE NUMBERING PHILOSOPHY

Line numbering shall be as outlined below:



Service designation and insulation designation are listed in legend drawing # A870-02-41-00-XXXX, A870-02-41-00-XXXX issued for the project..

In the four-digit line serial number, the digits shall be used as follows:

First 2 digits: Same as last 2 digits of P&ID serial number.

Last 2 digits: Serial number starting from "01"

14.3.2 LINE NUMBERING PHILOSOPHY FOR VENDOR PACKAGED ITEMS

- a) Philosophy for line numbering will be in line with the earlier section.
- b) Additional line numbers by vendor will follow the following philosophy:

In the four digit line serial number, the digits shall be followed as follows:

First 2 digits: Same as last 2 digits of Designer / Licensor P&ID serial number (e.g. "40" in the earlier example)

Last 2 digits: Serial number starting from "21" to "99"

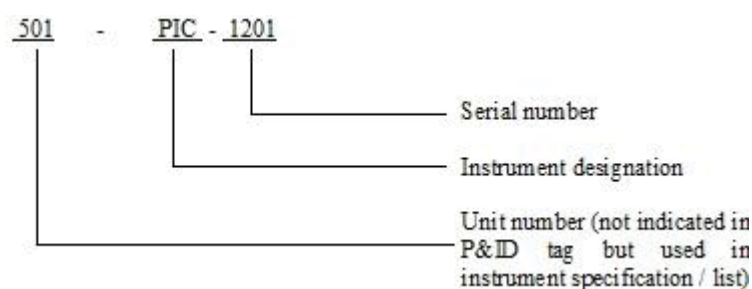
Notes:

1. Designer/vendor shall ensure that no more than 20 lines for each service are covered in designer generated P&IDs related to packaged/ main equipment. In case there is any, the allocated line no. to vendor needs to be changed with last number of designer line number + 1 instead of "21".
2. Package vendor to allocate line nos. designated per P&ID based on their requirement. No repetition of line nos. will be acceptable.
3. In case package vendor needs more no. of lines than allocated, it may be allowed to consider suffix A/B/C in line no. for similar service lines for no. of parallel trains e.g. two parallel pump suction/ discharge lines may have A/B in line with equipment numbering.

14.4 INSTRUMENT NUMBERING

14.4.1 GENERAL INSTRUMENT NUMBERING PHILOSOPHY

Instrument numbering shall be as outlined below:



Instrument depiction shall be as per ISA. The relevant table for the alphabetic depiction of

instrument type is included in drawing # A870-02-41-00-XXXX, issued for the project.

In the four-digit instrument serial number, the digits shall be used as follows:

- First 2 digits: Same as last 2 digits of P&ID serial number.
Last 2 digits: Serial number starting from "01".

14.4.2 INSTRUMENT NUMBERING PHILOSOPHY FOR VENDOR PACKAGED ITEMS

Instrument numbering philosophy for vendor packaged items:

- Philosophy for instrument numbering will be in line with the earlier section.
- Additional instrument numbers by vendor will follow the following philosophy:

In the four digit instrument serial number, the digit shall be used as follows:

- First 2 digits: Same as last 2 digits of EIL P&ID serial number
Last 2 digits: Serial number starting from "21" to "99"

Notes:

- Designer/vendor shall ensure that no more than 20 instruments of each type are covered in designer generated P&IDs related to packaged/ main equipment.
- Package vendor to allocate instrument nos. designated per P&ID based on their requirement. No repetition of instrument nos. will be acceptable.
- In case package vendor needs more no. of instrument than allocated, it may be allowed to consider suffix A/B/C in instrument no. for similar service instruments for no. of parallel trains e.g. two parallel pump suction/ discharge instruments may have A/B in line with equipment numbering.

14.5 OTHER DOCUMENT NUMBERING SYSTEM

With the exception of the above documents, licensor / designer shall follow their respective company procedures for document numbering.

15.0 STANDARDS AND CODES

Standards and Codes shall be as per Detailed Engineering Design Basis.

15.1 EFFLUENT DATA

15.1.1 AQUEOUS EFFLUENT DATA

Description	UOM
Source / Originating Point	
Flow Rate (Average/Peak)	M ³ /hr
Frequency of flow	Continuous / Intermittent
Duration if Intermittent	hours / day
Temperature	C DEG
Color/ Odour	
Pressure	Kg/cm ² a
Sp. Gravity	
Viscosity	cP
Vapor Pressure	Kg/cm ² (g)
pH	

XXX Project

Contract No.: XXXX
Petrofac Job No.: XXXX

SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PEC-EN-FRM-X-08623 Rev 2

For xxxxxxxx


Sheet 1: SDRL (No. of Pages: 8)
Sheet 2: Preamble (No. of Pages: 14)

Document Codes

A Series	CONTROL DOCUMENT
B Series	GENERAL ARRANGEMENTS/ DRAWINGS
C Series	SYSTEM DIAGRAMS & SCHEMATICS
D Series	DATA SHEETS/ SPECIFICATIONS
E Series	SCHEDULES/ LISTING
F Series	CALCULATIONS & ANALYSIS
G Series	PERFORMANCE DATA
H Series	WELDING/MATERIAL ENGINEERING DATA / MANUFACTURING & TEST PROCEDURES
J Series	CERTIFICATION DATA & REPORTS
K Series	MANUFACTURER RECORD BOOK AND OTHER MANUALS
M Series	SPARES AND MAINTENANCE DATA
N Series	HANDLING, SHIPPING & SITE INSTALLATION
S Series	SAFETY DOCUMENTS
Q Series	QUALITY ASSURANCE / QUALITY CONTROL DOCUMENTS

Notes: (To be removed while attaching to IR/PR)

- 1 The Supplier Document Requirement List (SDRL) specifies minimum requirement of documentation to be submitted by Supplier / Sub-suppliers during bidding and different phases of order execution.
- 2 Discipline engineer shall update the SDRL (Columns 1 to 7) to identify documents applicable for the particular requisition to which SDRL is attached. Project requirement shall be taken into consideration.
- 3 Project specific details shall be filled in the following rows.

								Petrofac 	
									TITLE : SUPPLIER DOCUMENT REQUIREMENT LIST
								For xxxxxxxx	
0	ISSUED FOR INQUIRY	DD/MM/YY						Doc Size:A4	REV.
REV.	DESCRIPTION	DATE	PRPD	CHKD	APPD	APPD		Doc no:	Page 1 of 1 0

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PROJECT :
PROJECT No.:
EQUIPMENT DESCRIPTION: xxx xxx
TAG No.:
RFQ / PURCHASE ORDER No.:



No new codes shall be filled in the SDRL without approval from Head of Engineering (Sharjah). Refer to Note 1 for Key Column definition.
Refer to Preamble sheet, the required information on each documents are described against the corresponding Document Code.

DOC. CODE	DOCUMENT TITLE	NOTES	With Bid	Post Order			Final Docs	IOM	MRB
				No. of weeks	Category	Key Doc.	Required		
			1	2	3	4	5	6	7
A - CONTROL DOCUMENT									
A01	SUPPLIER MASTER DOCUMENT SCHEDULE/LIST (SMDS/SMDL)								
A02	EXCEPTIONS TO CODES AND SPECIFICATIONS								
A03	CUSTOMER REFERENCE LIST								
A04	SUB-SUPPLIERS LIST								
A05	SUB-ORDER SCHEDULE / COPIES								
A06	CERTIFICATE OF ORIGIN								
A07	SUPPLIER'S OVERALL SCHEDULE (ENGINEERING, PROCUREMENT & FABRICATION/PRODUCTION)								
A08	MONTHLY PROGRESS REPORT								
A09	SUPPLIER PROFILE/CATALOGUE OF PRODUCT								
A10	SAFETY POLICY RECORDS (HSE)								
A11	PROJECT EXECUTION PLAN								
A12	SUPPLIER CONCESSION REQUEST								
A99	MISCELLANEOUS	NOTE 3							
B - GENERAL ARRANGEMENTS/ DRAWINGS									
B01	GENERAL ARRANGEMENTS								
B02	DETAIL / FABRICATION / EXPLODED VIEW CROSS SECTIONAL DRAWINGS INCLUDING PART LIST								
B03	MOTOR & GENERATOR GA DRAWINGS, TERMINAL BOX DETAILS								
B04	PANEL, CABINET, SWITCH BOARD LAYOUTS (For package)								
B05	ELECTRICAL LAYOUTS								
B06	INSTRUMENT LAYOUTS								
B07	PLOT PLANS FOR PACKAGES (WITH LOCATING DIMENSIONS FOR ALL EQUIPMENT / SKID)								
B08	EQUIPMENT SKID PIPING								
B09	ISOMETRIC DRAWINGS								
B10	NAME PLATE DRAWINGS								
B11	INSULATION/LINING/FIREPROOFING /REFRACTORY DETAILS								
B12	LIFTING BEAM / FRAME / SLING DRAWINGS / LIFTING ARRANGEMENT DRAWINGS (FOR SHIPPING AND ERECTION)								
B13	CIVIL/STRUCTURAL ARRANGEMENT DRAWINGS (INCLUSIVE OF MATCH MARKING DETAILS FOR IDENTIFICATION OF PARTS AND ASSEMBLY)								
B14	3D-MODEL OF PACKAGE / EQUIPMENT (PDS/PDMS/Alternative Package Acceptable to CONTRACTOR)								
B15	HVAC SINGLE LINE LAYOUT								
B16	HVAC REFRIGERANT PIPING AND METERING DEVICES LAYOUT								
B17	HVAC DUCT AND INSTRUMENT DIAGRAM								
B18	CATHODIC PROTECTION SYSTEM INSTALLATION, SCHEMATICS AND LAYOUT DRAWINGS								
B19	PROCESS/ PNEUMATIC/HYDRAULIC SCHEMATIC & HOOKUP DRAWINGS								
B20	CONTROL SYSTEM ARCHITECTURE DRAWING								

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PROJECT :
PROJECT No.:
EQUIPMENT DESCRIPTION: xxx xxx
TAG No.:
RFQ / PURCHASE ORDER No.:



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Refer to Preamble sheet, the required information on each documents are described against the corresponding Document Code.

DOC. CODE	DOCUMENT TITLE	NOTES	With Bid	Post Order			Final Docs Required	IOM	MRB
				No. of weeks	Category	Key Doc.			
			1	2	3	4	5	6	7
B21	I/O POINT ASSIGNMENT DRAWING								
B22	SPECIAL INSTRUMENT INSTALLATION DRAWING								
B23	INSTRUMENT EARTHING/GROUNDING DRAWING								
B24	POWER DISTRIBUTION DRAWINGS								
B25	INTERPOSING RELAY PANEL DRAWING								
B26	ELECTRICAL HEAT TRACING CIRCUIT ISOMETRIC								
B99	MISCELLANEOUS	NOTE 3							
C - SYSTEM DIAGRAMS & SCHEMATICS									
C01	PROCESS DESCRIPTION								
C02	PFD/UFD AND HEAT MASS BALANCE								
C03	PIPING & INSTRUMENTATION DIAGRAM (P&ID)								
C04	CONTROL & SAFETY NARRATIVE (INCLUDING ANTI-SURGE WRITE UP)								
C05	OPERATING AND CONTROL PHILOSOPHY, BLOCK DIAGRAM								
C06	TERMINATION DRAWING								
C07	ELECTRICAL SINGLE LINE DIAGRAM								
C08	INSTRUMENT LOGIC DIAGRAM, CAUSE & EFFECT DIAGRAM								
C09	ELECTRICAL LOGIC, SCHEMATICS AND WIRING DIAGRAM								
C10	CABLE BLOCK / INTERCONNECTION DIAGRAMS								
C11	LOOP DRAWINGS/ DIAGRAMS								
C12	VISUAL DISPLAY UNIT (VDU) GRAPHICS								
C13	INTERNAL WIRING DIAGRAM (CONNECTION DIAGRAMS)								
C14	FUNCTIONAL LOGIC DIAGRAM								
C15	CONTROL SCHEME/ DIAGRAM								
C99	MISCELLANEOUS	NOTE 3							
D - DATA SHEETS/ SPECIFICATIONS									
D01	EQUIPMENT DATA SHEETS (INCLUDING RELIABILITY DATA)								
D02	VALVE DATA SHEETS (INCLUDING FUGITIVE EMISSION LIMIT)								
D03	INSTRUMENT DATA SHEETS								
D04	MOTOR DATA SHEETS (Main and Auxiliary Motors)								
D05	ELECTRICAL EQUIPMENT DATA SHEETS (FOR PACKAGE)								
D06	CATHODIC PROTECTION SYSTEM MATERIALS/EQUIPMENT DATA SHEETS								
D07	SAFETY (COSHH) DATA SHEETS (MSDS)								
D08	MATERIAL DATA SHEETS FOR EXTERNAL/INTERNAL COATING MATERIAL (FBE/3LPE/3LPP/etc.)								
D09	CABLE TECHNICAL DATASHEETS (ELECTRICAL/INSTRUMENT/TELECOM)								
D10	FUNCTIONAL DESIGN SPECIFICATION								
D11	TELECOM DATASHEETS								
D99	MISCELLANEOUS	NOTE 3							
E - SCHEDULES/ LISTING									

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PROJECT :
PROJECT No.:
EQUIPMENT DESCRIPTION: xxx xxx
TAG No.:
RFQ / PURCHASE ORDER No.:



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Refer to Preamble sheet, the required information on each documents are described against the corresponding Document Code.

DOC. CODE	DOCUMENT TITLE	NOTES	With Bid	Post Order			Final Docs	IOM	MRB
				No. of weeks	Category	Key Doc.	Required		
			1	2	3	4	5	6	7
E01	EQUIPMENT LIST (MULTI-DISCIPLINE)								
E02	LOAD / MOTOR LIST								
E03	UTILITIES SCHEDULE (POWER, AIR, WATER, LUBE OIL, Others)								
E04	LUBRICATION/CHEMICAL/CATALYST SCHEDULE (FLUSHING, LUBE OIL, GREASE, OPERATING FLUID)								
E05	INPUT/OUTPUT LIST, ALARM AND TRIP SCHEDULE								
E06	INSTRUMENT SCHEDULE/ INDEX								
E07	PIPING LINE LIST								
E08	BIT MAP / SERIAL LINK PROTOCOL								
E09	BILL OF MATERIALS								
E10	ELECTRIC HEAT TRACING CIRCUIT SCHEDULE								
E11	HVAC AIR DISTRIBUTION DEVICES SELECTION SCHEDULE								
E12	HVAC DAMPERS (FIRE AND CONTROL) SELECTION SCHEDULE								
E13	CATHODIC PROTECTION TEST FACILITIES SCHEDULE								
E14	CABLE SCHEDULE	NOTE 8							
E15	SCHEDULE OF PSVs								
E16	CERTIFIED EQUIPMENT LIST FOR HAZARDOUS AREA	NOTE 8							
E99	MISCELLANEOUS	NOTE 3							
F - CALCULATIONS & ANALYSIS									
F01	PROCESS / UTILITY CALCULATIONS								
F02	MECHANICAL CALCULATION / ANALYSIS / STUDIES								
F03	HEAT / POWER / SYSTEM LOADING CALCULATIONS								
F04	HYDRAULIC CALCULATIONS/ ANALYSIS / THERMOSYPHON LOOP CALCULATION								
F05	EXCHANGER THERMAL RATING CALCULATIONS								
F06	ELECTRICAL CALCULATIONS (LOAD FLOW/SHORT CIRCUIT/MOTOR STARTING TRANSIENT/LIGHTING/EARTHING/ UPS/BATTERY SIZING)								
F07	INSTRUMENT SIZING CALCULATIONS (ORIFICE, CONTROL VALVE,PSV,ACTUATORS ETC.)								
F08	DYNAMIC ANALYSIS								
F09	STABILITY ANALYSIS								
F10	ANTI-SURGE VALVE SIZING								
F11	ACOUSTIC ENCLOSURE VENTILATION SYSTEM CALCULATIONS								
F12	PIPING STRESS ANALYSIS/ CALCULATIONS								
F13	HVAC HEAT LOAD CALCULATIONS								
F14	HVAC DUCT SIZING AND THICKNESS CALCULATIONS								
F15	HVAC EQUIPMENT SELECTION AND CALCULATIONS								
F16	HVAC ACOUSTICS AND SOUND ATTENUATOR CALCULATIONS								
F17	VENTILATION, PRESSURIZATION & EXTRACT SYSTEM CALCULATIONS								
F18	EXTERNAL STATIC PRESSURE & DUCT PRESSURE LOSS CALCULATIONS								

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PROJECT :
PROJECT No.:
EQUIPMENT DESCRIPTION: xxx xxx
TAG No.:
RFQ / PURCHASE ORDER No.:



No new codes shall be filled in the SDRL without approval from Head of Engineering (Sharjah). Refer to Note 1 for Key Column definition.
Refer to Preamble sheet, the required information on each documents are described against the corresponding Document Code.

DOC. CODE	DOCUMENT TITLE	NOTES	With Bid	Post Order			Final Docs	IOM	MRB
				No. of weeks	Category	Key Doc.	Required		
							1		
F19	HVAC CHILLED WATER SYSTEM, PRESSURIZATION AND CHEMICAL INJECTION CALCULATIONS								
F20	HVAC BLAST DAMPERS PRESSURE CALCULATIONS & SELECTION								
F21	RADIO COVERAGE STUDY								
F22	PA / GA COVERAGE STUDY								
F23	CATHODIC PROTECTION SYSTEM DETAILED DESIGN & CALCULATIONS								
F24	CALCULATION AS PER B31.3 FOR FITTINGS ABOVE 48" / BRANCH REINFORCEMENT FITTING CALCULATION								
F25	FLANGE CALCULATIONS (SIZES ABOVE 60") AND SPECIAL FLANGES								
F26	THICKNESS CALCULATION FOR SPACERS & BLINDS (SIZES ABOVE 24")								
F27	STRESS AND WAKE FREQUENCY CALCULATIONS								
F28	CATHODIC PROTECTION SURVEYS (SOIL RESISTIVITY, PRE-DESIGN, CIPS, DCVG, AC MITIGATION) PROCEDURES AND REPORTS								
F29	DYNAMIC SIMULATION STUDY SCOPE OF WORK								
F30	OVERALL PRESSURE DROP CALCULATIONS								
F31	SAMPLING PROBE CALCULATIONS / SAMPLING TRANSPORTATION CALCULATIONS								
F32	OVERALL UNCERTAINTY CALCULATIONS								
F33	SCAN TIME / DATA TRANSFER TIME CALCULATIONS								
F34	FAST LOOP FLOW								
F35	DEWPOINT & BUBBLE POINT CALCULATION								
F36	ACTUATOR TORQUE TABLE								
F37	VOLUME BOTTLE SIZING CALCULATION								
F38	VERIFICATION OF PRESSURE RATING OF TUBE								
F39	STRAINER AREA CALCULATION								
F40	NON SLAM CHECK VALVE FLOW AND PRESSUE DROP CALCULATION								
F99	MISCELLANEOUS	NOTE 3							
G - PERFORMANCE DATA									
G01	DATA REQUIRED FOR MOTOR STARTING STUDY								
G02	PERFORMANCE CURVES								
G03	ELECTRICAL EQUIPMENT/MOTOR/GERNERATOR PERFORMANCE CURVES								
G04	COMPUTER SYSTEM DOCUMENTATION/ MANUAL								
G05	GENERAL PERFORMANCE DATA FOR HVAC ITEMS								
G06	CATALYST PERFORMANCE DATA / GUARANTEE								
G07	SIL RELATED DATA								
G99	MISCELLANEOUS	NOTE 3							
H - WELDING/MATERIAL ENGINEERING DATA / MANUFACTURING & TEST PROCEDURES									
H01	WELD MAP & NDE PLAN								
H02	WELD PROCEDURE SPECIFICATION (WPS) & QUALIFICATIONS (WPQ) RECORDS								

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PROJECT :
PROJECT No.:
EQUIPMENT DESCRIPTION: xxx xxx
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RFQ / PURCHASE ORDER No.:



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DOC. CODE	DOCUMENT TITLE	NOTES	With Bid	Post Order			Final Docs	IOM	MRB
				No. of weeks	Category	Key Doc.			
				1	2	3	4		
H03	NON-DESTRUCTIVE EXAMINATIONS PROCEDURES (NDE) INCLUDING VT, PT, MT, ET, RT, UT MANUAL & MECHANISED								
H04	HARDNESS TEST PROCEDURE								
H05	CHARPY IMPACT TEST PROCEDURE / DWTT TEST PROCEDURE								
H06	SURFACE PREPARATION & PAINTING /COATING/ FBE/ INSULATION PROCEDURE								
H07	HYDROSTATIC AND/OR PNEUMATIC TEST PROCEDURES								
H08	CORROSION TESTING PROCEDURES								
H09	POSITIVE MATERIAL IDENTIFICATION (PMI) PROCEDURE								
H10	FLUSHING AND DRY OUT PROCEDURE								
H11	TRIAL ASSEMBLY PROCEDURE								
H12	FACTORY ACCEPTANCE AND PERFORMANCE TEST PROCEDURE								
H13	WEIGHT CONTROL/ WEIGHING PROCEDURE								
H14	HOLIDAY TESTING PROCEDURE								
H15	PICKLING AND PASSIVATION PROCEDURE								
H16	DYNAMIC BALANCING PROCEDURE								
H17	FERRITE TEST PROCEDURE								
H18	SITE ACCEPTANCE TEST PROCEDURE								
H19	LEAK TEST PROCEDURE								
H20	MATERIAL CONTROL PROCEDURE								
H21	MATERIAL COLOUR CODING, MARKING, TRACEABILITY PROCEDURE								
H22	WELD CONSUMABLE HANDLING PROCEDURE								
H23	LIFTING FRAME TEST PROCEDURE								
H24	VACUUM BOX TESTING PROCEDURE								
H25	MANUFACTURING PROCEDURE SPECIFICATION (INCL. QUALIFICATION & PRODUCTION TESTS)								
H26	CRYOGENIC TEST PROCEDURE								
H99	MISCELLANEOUS	NOTE 3							
J - CERTIFICATION DATA & REPORTS									
J01	TYPE APPROVAL CERTIFICATES								
J02	MANUFACTURE CERTIFICATES, REGISTRATION & ASME CODE STAMP RECORDS								
J03	CERTIFICATE OF COMPLIANCE								
J04	WELD OVERLAY/CLADDING TEST REPORTS								
J05	HAZARDOUS AREA CERTIFICATES FOR E & I EQUIPMENTS								
J06	FACTORY ACCEPTANCE TEST REPORTS AND PERFORMANCE TEST RESULTS (ALL DISCIPLINES)								
J07	WEIGHT REPORTS/ CERTIFICATES								
J08	DIMENSIONAL CONTROL REPORTS								
J09	MATERIAL TEST CERTIFICATES								

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				No. of weeks	Category	Key Doc.	Required		
							1		
J10	WELDER & WELDING OPERATOR PERFORMANCE QUALIFICATION CERTIFICATES	NOTE 2							
J11	NDE OPERATOR QUALIFICATIONS	NOTE 2							
J12	PRE PRODUCTION QUALIFICATION AND PRODUCTION TEST RESULTS								
J13	TUBE TO TUBE SHEET ROLLING/WELDING MOCK-UP TEST RESULTS								
J14	HEAT TREATMENT RECORDS	NOTE 2							
J15	NDE RECORDS (VISUAL/RT/DPI/MPI/EDDY CURRENT)	NOTE 2							
J16	MATERIAL TRACEABILITY RECORDS	NOTE 2							
J17	CALIBRATION CERTIFICATE	NOTE 2							
J18	ROTOR BALANCING REPORT (DYNAMIC/STATIC)								
J19	PRESSURE TEST CERTIFICATE (Hydro / Pneumatic/Leak)	NOTE 2							
J20	CRYOGENIC TEST REPORT								
J21	PROOF LOAD CERTIFICATES (LIFTING EQUIPMENT-BEAMS FRAMES etc.)								
J22	NAMEPLATE RUBBING/ PHOTO	NOTE 2							
J23	INSPECTION/ SURVEY REPORTS (INCLUDING THIRD PARTY/ REGULATORY AUTHORITY)								
J24	FUGITIVE EMISSION TESTS (PROTOTYPE & PRODUCTION)								
J25	WELD REPAIR REPORT	NOTE 2							
J26	ROUTINE TEST CERTIFICATES FOR ELECTRICAL EQUIPMENTS								
J27	HARDNESS TEST REPORT								
J28	FERRITE TEST REPORT, IF APPLICABLE								
J29	CHARPY IMPACT TEST RESULTS/ DWTT TEST RESULT								
J30	OPERATIONAL TORQUE TEST RESULTS								
J31	FUNCTIONAL TESTING OF INSTRUMENTS								
J32	SITE ACCEPTANCE TEST REPORT								
J33	SIL CERTIFICATES WITH SAFETY MANUAL								
J34	NACE CERTIFICATION								
J35	CORROSION TEST REPORTS : HIC , SSC , IGC TEST REPORT								
J36	MECHANICAL RUN TEST REPORT								
J37	POSITIVE MATERIAL IDENTIFICATION (PMI) TEST REPORT								
J38	EC DECLARATION /CE MARKING/ PED CERTIFICATION								
J39	PPRESERVATION RECORDS								
J40	INSPECTION RELEASE NOTE								
J41	NON CONFORMANCE REPORT	NOTE 2							
J42	SURFACE PREPARATION & COATING / PAINTING / FBE /INSULATION INSPECTION REPORT								
J43	MATERIALS TEST CERTIFICATES FOR HVAC SYSTEM UNITS AND SUB COMPONENTS								
J44	HAZARDOUS AREA E&I INSPECTION REPORT FOR PACKAGE SKID								
J99	MISCELLANEOUS	NOTE 3							
K - MANUFACTURER RECORD BOOK AND OTHER MANUALS									

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

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				No. of weeks	Category	Key Doc.	Required		
							1		
K01	MRB INDEX								
K02	MANUFACTURING RECORD BOOK (MRB)	NOTE 4							
K03	TECHNICAL INSTALLATION OPERATING & MAINTENANCE MANUAL- INDEX								
K04	TECHNICAL INSTALLATION, OPERATING AND MAINTENANCE MANUAL	NOTE 11							
K05	CERTIFYING AUTHORITY RELEASE NOTE								
K06	TECHNICAL PASSPORT INDEX (If applicable)								
K07	TECHNICAL PASSPORT (If applicable)								
K99	MISCELLANEOUS	NOTE 3							
M - SPARES AND MAINTENANCE DATA									
M01	SCHEDULE OF MANUFACTURER'S COMMISSIONING SPARES (SPIR FORM)								
M02	SCHEDULE OF MANUFACTURER'S SPARES FOR 2 YEARS OPERATION (SPIR FORM).								
M03	SCHEDULE OF MANUFACTURER'S RECOMMENDED INSURANCE / CAPITAL SPARES (SPIR FORM)								
M04	SPECIAL TOOLS LIST								
M99	MISCELLANEOUS								
N - HANDLING, SHIPPING & SITE INSTALLATION									
N01	PACKING MARKING & SHIPPING PROCEDURES								
N02	PACKING AND SHIPPING SCHEDULE/ LIST	NOTE 6							
N03	HAZARDOUS MATERIAL SHIPPING CERTIFICATE								
N04	ERECTION, INSTALLATION, PRE-COMMISSIONING, COMMISSIONING PROCEDURES								
N05	DETAILED PRESERVATION AND STORAGE PROCEDURE								
N06	DETAILED HANDLING PROCEDURE COMPLETE WITH SPECIAL LIFTING GEAR								
N99	MISCELLANEOUS	NOTE 3							
S - SAFETY DOCUMENTS									
S01	FIRE AND GAS DETECTION SYSTEM LAYOUT								
S02	HAZARDOUS AREA LAYOUT								
S03	SAFETY VALIDATION PLAN / REPORT								
S04	RELIABILITY, AVAILABILITY, MAINTAINABILITY (RAM)								
S05	SAFETY INTEGRITY LEVEL (SIL) CALCULATIONS(VERIFICATION)								
S06	NOISE STUDY								
S07	FIRE FIGHTING EQUIPMENT PERFORMANCE DATA								
S99	MISCELLANEOUS								
Q - QUALITY ASSURANCE / QUALITY CONTROL DOCUMENTS									
Q01	ISO 9001 CERTIFICATE								
Q02	INSPECTION & TEST PLAN								
Q99	MISCELLANEOUS	NOTE 3							

Sheet 1: SUPPLIER DOCUMENT REQUIREMENT LIST (SDRL)

PROJECT : PROJECT No.: EQUIPMENT DESCRIPTION: xxx xxx TAG No.: RFQ / PURCHASE ORDER No.:	
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			1	2	3	4	5	6	7

Notes									
(1) COLUMN 1 DENOTES DOCUMENTATION REQUIRED WITH BID (Y = YES). ALL DOCUMENTS ELECTRONIC SUBMISSION. COLUMN 2 SUBMITTAL DATE POST ORDER IN WEEKS, (D) -DELIVERY, (T)- TEST. ALL DOC. ELECTRONIC SUBMISSION. COLUMN 3 SUBMISSION FOR REVIEW & APPROVAL (A) / FOR INFORMATION (I) / REVIEW AT SITE (AS) OR WORKS (AW) COLUMN 4 KEY/CRITICAL DOCUMENTS LINKED TO PAYMENT AS DETAILED IN COMMERCIAL TERMS & CONDITIONS OF PURCHASE ORDER COLUMN 5 FINAL DOCUMENT TO BE SUBMITTED. IN ADDITION TO SEARCHABLE PDF, ALL DOCUMENTS /CERTIFICATES /DRAWINGS /MANUALS SHALL BE SUBMITTED IN CD-ROM, IN COMPATIBLE NATIVE FORMAT COLUMN 6 DOCUMENTATION TO BE INCLUDED IN INSTALLATION AND OPERATING MANUAL (IOM)/ FINAL DOCUMENT (Y=YES) COLUMN 7 MANDATORY DOCUMENTATION TO BE INCLUDED IN MRB CODE K02. (Y = YES)									
(2) To be verified by Inspector at Supplier's Works. Final review and acceptance will be part of the Manufacturers Record Book (MRB) Review. P.O line items and project tag number must be consistently identified with each serial number as reflected in the inspection/test reports.									
(3) Miscellaneous Documents' is an allocation given to capture all additional necessary documentation required from Supplier to fully define his Scope of Work and will be listed in Supplier Master Document List.									
(4) Refer Manufacturers Record Book (MRB) guidelines attached with the Purchase requisition.									
(5) Compatible Electronic copies of Equipment MRB and Technical Installation, Operating and Maintenance Manual to be submitted after final approval of hard copies.									
(6) Hard copy and Soft copy of Packing and Shipping Schedule shall accompany shipment.									
(7) Documents shall be submitted with Petrofac Document Cover Approval/ Review Sheet. Drawings shall be submitted with Petrofac Drawing Sheet. Document Cover Sheet / Drawing will be given to Supplier during post order engineering.									
(8) Document shall be submitted in PDF searchable format (OCR) and in native format to the extent possible (Excel, Word, ACAD)									
(9) Drawings shall be in AutoCAD / Microstation Format									
(10) Final MRB shall be submitted along with shipment									
(11) Final IOM shall be submitted before 2 weeks from shipment									
(12) Country specific testing/statutory compliance									

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
A - CONTROL DOCUMENT		
A01	Supplier master document schedule/list (SMDs/SMDL)	Listing by category and title of all Suppliers documents to be issued per SDRL Contractor's Format.
A02	Exceptions to codes and specifications	Deviations to P.O during the order execution shall be handled separately through a Deviation Request (DVR) procedure.(Deviation accepted during bidding stage will be part of P.O)
A03	Customer reference list	Reference list containing relevant key technical parameters, End user's name, Contractors name, Year of manufacturing etc. for same / similar equipments and models as that offered against the Requisition.
A04	Sub-supplier list	List to include proposed suppliers of all equipment and components for packaged units.
A05	Sub-order Schedule / Copies	1. Schedule shall show all sub-orders to be placed by Supplier. Against each entry Supplier shall indicate anticipated award date and the latest date by which sub-order must be placed to meet the overall schedule. 2. Supplier shall submit un-priced copies of sub-orders at the time of order placement.
A06	Certificate of origin	Certificate confirming that all goods are sourced, manufactured & tested in the country of origin.
A07	Supplier's overall schedule (engineering, procurement & fabrication/production)	1. Schedule to be in bar chart form, showing design, manufacture, inspection, testing and delivery of all equipment, materials and components to be delivered by Supplier and his sub-Suppliers. 2. Earliest and latest completion dates shall be entered alongside each activity with float indicated. 3. Once agreed with Contractor, the 'planned' dates shall not change without prior approval by Contractor. 4. Progress to date shall be clearly shown against each activity. 5. Procurement and delivery of sub-Supplier items. 6. Summary schedule of issue dates required for all documents in SDRL Code A01 above grouped by prime category, in bar chart format to show relationship with the Fabrication/ Production Schedule.
A08	Monthly progress report (fortnight report will be obtained if required)	<u>Monthly progress reports as per project format;</u> E-mail or fax report to be submitted within three working days after the last Friday in each calendar month containing the following information as a minimum: a) Narrative explaining salient features of work carried out during the month, problems encountered on both on engineering and program nature, steps being taken to overcome them, and confirmation that still the contracted delivery date(s) will be achieved. b) Running log of all commercial changes or requests made (whether or not approved by Contractor) together with status c) Running log of all design concessions / deviation requested by Supplier. d) Updated fabrication/production schedule 'front lined' to show actual progress at cut-off e) Updated sub-order schedule indicating all sub-orders to be placed by Supplier f) Updated Supplier Document Register showing status of all drawings to be produced against the order
A09	Supplier profile / Catalogue of product	Supplier to submit their profile along with the catalogue of product.
A10	Safety policy records (HSE)	Supplier shall provide the following details: • Safety policy • Lost Time Injuries (LTI) 3 to 5 year record • Accident free man-hour in last three years • HSE plan • Number of fatality in last three years • Non-smoking plan • Non-Alcoholic plan
A11	Project Execution Plan	Supplier shall provide the following details: • Organisation Chart • Work locations • Work execution methodology - mobilization in engineering office and site • Participation in meetings and reviews • Information flow/ data exchange
A12	Supplier Concession Request	Concessions to Project Specifications/Codes/Standards during the order execution shall be handled separately through a Concession Request procedure.
A99	Miscellaneous	Control documents, not covered above, that are required by the Contractor or identified by Supplier for submission to Contractor.
B - GENERAL ARRANGEMENTS/ DRAWINGS		
B01	General Arrangements 1) Basic details in GA	1. Overall dimensions relative to unit datum. 2. Access, withdrawal and lay down requirements for maintenance, minimum height for hook (for EOT/HOT crane) to be shown. 3. Location and numbering of all piping and tubing terminations for Contractor connections. 4. A tabulation of connections (interfacing with Contractor's equipment/piping or with another skid of Supplier), preferably located in the top right hand corner of the drawing giving: Connection Identification, Service, Size, Rating and Facing. 5. Design data, Nozzle orientation, Nozzle data and Material Data. 6. Suction line straight run, removable spool requirements for centrifugal compressors and pumps. 7. Overall Dimensions, Heat Treatment Data, Anchor Bolt Ring base Plate Details, BOM, Lifting Lugs, Trunnions, Orientation, Earthling Boss, Location of Platform, Stair ways and ladders. 8. Identification and location of all major skid components with Contractor's tag numbers added. 9. Where a package consists of more than one skid, separate drawings shall be provided for each skid. 10. Direction of rotation for drivers and driven equipment. 11. Magnitude and direction of thermal movement of all cryogenic or hot equipment. 12. Overall weights (erection, operating and test weights), weight of each shipping section and maintenance weights for major components. 13. For equipment, which is welded, skirt weld preparation is to be detailed. 14. All drainage information, including open and closed system drain connection sizes, major lube oil drain pipe slope/angle, drip pan slope, etc. 15. Spreader beam, lifting points and Centre of Gravity (CG) 16. Where appropriate, an equipment list is also to be submitted. 17. Location of local control panels, junction boxes, analyzer shelters etc. 18. Details of all CP equipment layouts.

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
2) Foundation design load	1. Fixing details.	
	Reciprocating Compressors and Engines: Vibrating Solids Processing Equipment:	Magnitude, direction, phase, and point of application of unbalanced forces and couples referenced to a clearly defined axis. Such forces shall be the steady state dynamic forces (not transient or equivalent static forces) which occur during normal operation.
	Turbo generators:	Magnitude of short-circuit torque.
	Condensing Steam Turbines:	Vacuum pull load.
	Free Standing Vessels, Packaged Equipment or Boilers:	1. Moment and shear at point of support as a result of wind. 2. Earthquake forces and moments for both empty and operating conditions. 3. Motion from waves, wind, etc., according to sea state conditions, if applicable. 4. Force due to mass flow of solids. 5. Unsymmetrical loading or unloading.
	Gas Turbine Generator and Emergency Diesel Generator:	Cable trench requirement in the foundation for routing the generator power & control cables.
	Shell and Tube exchangers:	Tube bundle extraction force
	3) Acceptable nozzle loads	Drawings to indicate acceptable loads, forces and moments on flanges to which Contractor connects, together with loads during normal and maximum operating conditions - if not covered by applicable specifications. Calculations to be included. These loads should be within the limit of allowable nozzle loads attached with the requisition.
4) Interface and connection schedule	1. Listing by number of all Supplier termination points, including electrical and instrument cable terminations and all junction boxes cross-referenced to the relevant drawings. 2. Size, rating and specification of all piping and tubing termination points requiring Contractor connection. 3. Identification of corresponding connection point on another skid or system to which each point shall be connected. 4. Identification of fluids at each connection point including pressure and temperature conditions. 5. For each vent and drain, fluids under normal and abnormal operating conditions shall be stated, and system to which each must be connected (i.e. Contractor's vent or drain - safe, open or closed).	
5) Material selection schedule/table	Table listing, for each component of the plant, the Supplier's material selection as a function of service conditions and chemical characteristics of the fluids in contact with it.	
6) Provision for emission monitoring from stack (probe inlet nozzle with access ladder/ platform)	Detail drawing showing specified details.	
7) Terminal point schedule	Terminal point schedule giving details of all Contractors' interfaces (Tie -in point number, Nozzle size, rating, scope of supply of counter flanges	
8) Weight data sheets	Supplier shall complete weight data sheet for each separately installed item of equipment or skid in accordance with weight data sheet and	
B02	Detail drawings / fabrication drawings / Exploded view cross sectional drawings with part list	Detail drawings to indicate method of construction, plus all features, which are omitted in GA drawing but are required for clarity. Shall show detail drawings of individual assemblies, Vessel Support details, Nozzle and welding details, Internal detail drawing, Lifting Lug details, Support ring\ lug details. Cross-sectional drawings shall be produced to allow: 1. Design to be reviewed. 2. Parts to be identified for material identification. 3. Parts to be identified for spares identification. 4. Material of construction (ASME/ASTM grade).
	Mechanical Seal Detail and cross section drawing	Mechanical seal details including, as a minimum, the following information: 1. Dimensions including clearances 2. Equipment tag number and service 3. Part list, defining materials with ASTM Designation. For forced air cooling system, number of cooling fans and rating of the fan motor shall 4. Identification of fluid connection points 5. All wetted parts of the seal in contact with the process fluid highlighted by a note or symbol (e.g. *) 6. API Seal Code and system description 7. Description of operation 8. Piping system indicating all components and materials 9. Cross section with Bill of materials
	Dry gas seal detail & cross section drawing	Dry gas seal details including, as a minimum, the following information: 1. Dimensions including clearances 2. Equipment tag number and service 3. Part list, defining materials with ASTM Designation 4. Identification of fluid connection points 5. All wetted parts of the seal in contact with the process fluid highlighted by a note or symbol (e.g. *) 6. Seal Code system description 7. Piping system indicating all components and materials 8. Cross section with Bill of materials
	B03 Motor and Generator GA drawing, Terminal Box details	1. All dimension as required per IEC 60034 2. Main Terminal Box for the power cables with details of the terminals including the stud size, the clearance from box internal, distance between the terminal and the cable gland plate / cable entry, details of the cable entries, MOC of terminal box enclosure and Ex protection & IP projection 3. Auxiliary Terminal box with all dimensional details, type and size of terminals, clearance of terminals from box internals, details of cable entries, MOC of terminal box enclosure and Ex protection & IP projection. 4. Wiring detail for all auxiliary wiring on the motor & for RTD for bearing and winding the wiring diagram shall include the set point for alarm and trip settings.

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
B04	Panel, cabinet, Switchboard layout (For package)	<p>A) Panel, Cabinet, Switchboard layout drawing shall provide the following as a minimum:</p> <ol style="list-style-type: none"> 1. Front of panel layout clearly showing overall size and layout, with a table of instruments showing duty/label engraving/model no. 2. Back of panel arrangement clearly showing same data as front panel including the minimum rear clearance requirement for maintenance / cooling. 3. Construction drawing showing main dimensions hinging/opening of doors, door restraints, method of locking, plinths, stiffeners, hold down details (fully dimensioned) anti-vibration methods, materials, panel finish procedure and colors. 4. Mimic/enunciator drawing where applicable. 5. Internal layout of panel showing: <ol style="list-style-type: none"> a. Lighting b. Cable entries and terminals / terminal strip locations for power and control including the segregation provided for terminals of different voltages / functions. c. Wiring trays d. Segregation of voltage level, IS and non-IS equipment. e. Hydraulic, pneumatic layouts (where applicable). f. Clean earth/dirty earth bars. 6. Control desk drawing shall provide the following as a minimum: <ol style="list-style-type: none"> a. General arrangement of the control desk along with telecom equipment (if applicable) indicating dimensions etc. b. Detail drawing indicating desk finish, drawers, filing space (if applicable) etc. c. Electrical requirements such as computer/utility sockets etc.
B05	Electrical Layout	<p>Layout drawings showing:</p> <ol style="list-style-type: none"> 1. Location and elevation of all motors, other electrical consumers etc. and Contractor free issued equipment where applicable along with. 2. Separate drawing shall be prepared to indicate the earthing cable layout from the earth bus of the package skid to earthing connection on electrical and instrument devices on the skid.
B06	Instrument Layout	<p>A) Instrument Layout drawings showing:</p> <ol style="list-style-type: none"> 1. Location and elevation of all instrument, control valves, control panels, etc. and Contractor free issued equipment where applicable along with. 2. The routing of all instrument air distribution, pneumatic tubing, signal/power supply cables, earthing cables and the location of all instrument junction boxes. 3. Fire / Gas/ Smoke detection instrumentation including Manual call points. <p>B) Instrument Cable routing drawing shall include the following as a minimum.</p> <ol style="list-style-type: none"> 1. Route details for cabling from the instrument till the junction box and control room. 2. Details such as size, quantity, elevation etc. of cable tray as appropriate for the cabling network. 3. Detail such as cable trench depth, cable segregation, back-filling, cables tiles, route markers etc. for the cable trenches.
B07	Plot plans for packages (with locating dimensions for all equipment / skid)	Drawing indicating all equipment with sizes, locating dimensions, elevation, maintenance/operating space requirements, etc. For HVAC equipment plot plans including outdoor and indoor equipments. The location of the equipments includes the dimensions from the reference points like wall or grids, maintenance space between the equipments for serviceability, grade level of the equipments where they located
B08	Equipment skid piping	<ol style="list-style-type: none"> 1. Drawing that shows piping arrangement and relevant isometrics (for process, drains, vent and auxiliary piping) on equipment skids. 2. Valve drawings shall be submitted for all valves included in the scope of supply.
B09	Isometric drawings	<p>Isometric drawings shall be submitted for :</p> <ol style="list-style-type: none"> 1. Piping within the scope of package supplier (To be erected at site by Contractor). 2. Piping not within the scope of the package supplier but required for interconnecting different units of the package. 3. Valve drawings shall be submitted for all valves included in the scope of supply.
B10	Name plate drawings	Drawing showing details of manufacturer's nameplate.
B11	Insulation/lining/fireproofing /Refractory details	Drawings to indicate thickness, specification and extent of application. To include anchoring and expansion joint details.
B12	Lifting beam / frame / sling drawings / lifting arrangement drawings (for shipping and erection)	<ol style="list-style-type: none"> 1. Certified drawings showing dimensions of lifting equipment and lifting arrangements for transportation and installation. 2. Details of lifting appliances, beams supplied within supplier package.
B13	Civil/structural arrangement drawings (inclusive of match marking details for identification of parts and assembly)	<p>Construction drawings showing all plans, elevations and details necessary for construction of civil and buildings, including the following:</p> <ol style="list-style-type: none"> 1. Structural plans and elevations of buildings 2. Internal and external architectural plans of buildings 3. HVAC layout and air flow diagrams 4. Utility layout details 5. Electrical and Instrument layout details
B14	3D-CAD model of package / equipment.	In Contractor specified format native file.
B15	HVAC single line layout	<p>One line representation of HVAC systems with HVAC equipments and duct/pipe layouts including the interface with the electrical/control panels</p> <ol style="list-style-type: none"> 1. Details/reference to HVAC equipments 2. Tag numbers of all the equipments 3. Duct sizes for the supply, return and fresh air ducts 4. Pipe sizes of all the refrigeration pipes/chilled water pipes 5. Location of HVAC equipments
B16	HVAC refrigerant piping and metering devices layout	<p>Representation of refrigerant pipes and accessories connected to AHU's and Condensing units. The layout represents</p> <ol style="list-style-type: none"> 1. The size of the refrigerant pipes 2. Valves, fittings, strainer, sight glass in the pipe layout). 3. Indication of insulation material and thickness
B17	HVAC duct and instrument diagram	<p>Representation of ducts and instruments showing the duct sizes and instruments including the interfaces with the control panels defining the</p> <ol style="list-style-type: none"> 1. Location of all the duct accessories including dampers, diffusers, grills, louvers etc. 2. Tag numbers for all the dampers and accessories connected to the control panel. 3. Duct layout with sizes

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
B18	Cathodic Protection System Installation, Schematics and Layout Drawings	CP System installation drawings shall cover all the items required to complete the CP system. Complete Installation details including MTO to be provided for each item. A detailed schematic for each CP station shall be provided showing GB location, Power supplies and other associated items.
B19	Process pneumatic /Hydraulic schematic & Hookup Drawings	Process hook-up drawings shall be prepared for each tagged instrument that requires a process impulse line for sensing purposes. A Pneumatic hook-up drawing shall be prepared for each tagged instrument air transmission/control signal. Similarly, a hydraulic hook-up drawing shall be prepared for each tagged instrument that requires hydraulic transmission/control signal. Both types of drawing shall include all the necessary details.
B20	Control system architecture drawing	This document shall include the following as a minimum. 1. Detailed control system hardware, its associated network and interface equipments. 2. Detailed communication networks with package control systems, substation etc. indicating the type of link/protocol and associated equipments.
B21	I/O Point assignment Drawing	This document shall include assignment details of each field tag with control system equipment such as cabinet no., rack no., I/O card no., node no., channel no. slot no. controller no. etc. as a minimum.
B22	Special Instrument installation Drawing	This document shall provide installation details of special instruments such as analyzers which includes, sample probe details, sample conditioning system etc.
B23	Instrument Earthing/Grounding Drawing	This document shall provide details of clean earth, intrinsic earth and dirty earth requirements for instruments, junction boxes, cable trays, control panels, etc., resistance requirements, earthing cable size, bonding requirements etc.
B24	Power Distribution Drawings	Drawing shall include the following as a minimum 1. Incomer details (Source of power) 2. Outgoing consumers 3. Ratings for the above 3. Ratings of all MCBs and fuses 4. Termination wiring details 5. Dimensional details of panel
B25	Interposing Relay panel Drawing	Drawing shall include the wiring between incoming terminals and relay coils, relay contact and outgoing terminals with the details of wire no., terminal no. at both terminal block and relay ends, wire size, color code, signal tag/ identification no. etc.
B26	Electrical Heat Tracing Circuit Isometric	Isometric drawings shall include (as applicable) 1. Piping , vessels , Valves , Instruments , circuit map/limit etc. 2.indicate circuit number/tag
B99	Miscellaneous	Any document (Mechanical/ Electrical/ Instrument/Piping) not covered in the above, which are required by the Contractor to carry out his obligations of EPC / Requested by Company or identified by Supplier for submission to Contractor.
C - SYSTEM DIAGRAMS & SCHEMATICS		
C01	Process description	Process description of the package
C02	Process Flow Diagram (PFD) / Utility Flow Diagram (UFD) and heat mass balance	1. Diagrams shall be provided for all hydrocarbon and utilities systems (e.g. Steam, lube oil, seal gas, cooling water, instrument air, nitrogen, fuel gas etc.). 2. Diagrams shall be drawn using Contractor symbology, and shall indicate major control functions. 3. Each stream shall be clearly labeled with a tag number
C03	Piping & instrumentation diagram (P&ID)	P&ID shall be drawn by Supplier using standard symbols provided on Contractor's legend sheet, for all hydrocarbon and utility systems including: 1. Equipment and spares 2. Equipment names and numbers 3. Major items of equipment stating duties and design conditions. 4. Equipment internals and externals material of construction and corrosion allowance for equipment, consistent with data sheet. 5. Insulation and electrical / steam trace heating requirements 6. Venting, purging and draining requirements 7. Relief requirements - PSV's location, tag numbers and sizes 8. PSV interlock valves and interlocking sequence 9. Positive isolation requirements 10. Block and check valves, with type identified 11. Valves and actuators and solenoids. Failure mode to be stated 12. Nozzles of vessels, sizes, man ways and other inspection provisions 13. Slope of vessels 14. Levels in vessels (Normal, Alarm , trip etc.) 15. Elevations of major equipment 16. Process and utility flow lines with directional arrows 17. Continuous boxes plus references 18. Lines sizes, numbers, pipe specifications, specification breaks and product designation complying with the project specification. 19. Piping special items 20. Piping notes (e.g. Slope, No pocket) 21. Switches and instruments with tag numbers and alarm trip set points. 22. Sample points and corrosion monitoring facilities 23. Emergency shutdown valves 24. Interfaces with other PID, including Contractor's PID 25. All interface equipment, instruments, valves, etc. shall be tagged with Contractor's tag numbering system requirements. All others are to be tagged by Supplier. 26. All Supplier/Contractor scope breaks 27. Symbology Legend as per project

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
C04	Control and safety narrative including Anti-Surge write up	<p>This document shall be a detailed written description giving principles of package function and defining all aspects of the operation of the equipment supplied.</p> <ol style="list-style-type: none"> 1. Simplified block logic diagram shall relate to the system by Project tag number. 2. Start-up, shut down, abnormal operating condition and special maintenance operations shall be covered. 3. Reference shall be made to P&ID and other documents submitted to the Contractor and shall include Contractor's tag numbers. 4. Input, output, permissive signals, including internal logic signals required to accomplish start-up, shut down, etc., shall be described. 5. Display of information, operator interface and access to the package control system shall be described. 6. Listing of pre-alarm and shut down alarm trip requirements (local and CCR) and the failure mode of all valves and equipment must be clearly indicated. 7. Control block diagram shall clearly show switch room equipment, control room equipment/CCR equipment and types of signal to and from, with interface information clearly defined. 8. Details of the Anti surge control system (hardware, software), system description, performance controller and anti-surge controller details with necessary curves, control settings, system calculations to substantiate anti-surge valve sizing and selection, noise data, flow meter calculations, configuration requirements and interfaces with plant ICSS etc.

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
C05	Operating and Control Philosophy, Block diagram	<p>Shall be supplied for all packaged equipment and shall include the following:</p> <ol style="list-style-type: none"> 1. Modes of operation 2. Basis for selection of the mode of operation 3. Operator dependent actions 4. Health and safety responsibilities 5. To show pump sizing criteria, stop/start pump quenching, pressures & capabilities- unit starting & stopping pump changeovers, etc. 6. Simplified Control block diagram related to systems etc. indicating field instrument, local room / control room equipment, substation equipment, type of signals (hardwired/soft link) to and from the Contractor's system etc. shall be clearly defined. 7. All communication equipment with type of serial links with the Contractor's control system to be clearly defined.
C06	Termination drawing	<p>A) Instrument cable termination details shall show the following as a minimum.</p> <ol style="list-style-type: none"> 1. Tag nos. of panel and junction box, where the cable needs to be terminated. 2. Terminal nos. at both the ends; source and destination (junction box and control panel end). 3. Cable number, core number with necessary core colors as appropriate. 4. Junction box gland plate drilling sizes to suit external cabling to/from the package, and all gland information. <p>All cables indicated on these drawings must be terminated at both ends.</p> <p>B) Terminal block diagrams shall indicate the following as a minimum.</p> <ol style="list-style-type: none"> 1. Each terminal block with terminals numbered and the cores of the connecting cable identified. 2. The core identifiers given shall be those ferruled onto the conductor and shall follow Contractor's numbering system. 3. Segregation between AC and DC signals, IS and non-IS signals must be indicated.
C07	Electrical Single Line Diagram	<p>One line representation of electrical power distribution diagram with metering and protection details including the interface within the distribution equipment / DCS / Electrical Network System defining the relationships & to include (as appropriate):</p> <ol style="list-style-type: none"> 1. Details / reference to SLD of the power source 2. Tag no's, rating details of all the distribution equipment viz. generators, switchboards transformers with interconnecting cables / bus duct details. 3. Metering, protection and control for each type of feeders connected to switchboards. 4. Details of the consumers connected to the each switchboard with type of feeder and cable details (this can be represented tabular form with type feeder shown in SLD). 5. Location of equipment shall be indicated in the SLD. 6. SLD shall be developed based on the legend sheet provided)
C08	Instrument Logic diagram, Cause & effect diagram	<ol style="list-style-type: none"> 1. To be prepared for all sequence and interlock systems to show shutdown & control systems functions. 2. Symbols to be in accordance with ISA 5.2. 3. Diagrams are to be arranged so that the overall logic is clearly apparent. 4. Sub-system logic will be grouped together to clearly identify their association with each other and with the overall logic system. 5. Fire & Gas logic diagram shall be separately prepared in line with the details mentioned above. 6. Cause & Effect diagram shall be in accordance with ISO 10418 to indicate clearly and precisely the shut down requirements on the standard format sheet with defined convention. Individual C&E charts to be produced for each process unit. All auto start-change-over, etc. of pumps, etc. to be clearly defined with location of field devices.
C09	Electrical Logic, Schematics, Wiring diagram	<p>This diagram shall include the details of all external connections/ devices, cross reference of the contacts / devices for easy identification / reading of the schematic drawings, detail bill of material with manufacture / type reference details for all devices used in the scheme. The scheme shall include the termination block diagram details and cross referring to the internal wiring detail.</p>
C10	Cable block / Interconnection diagrams	<p>Diagrams shall display, in block form, the items of electrical and instrument - equipment and the cables connecting them. The terminal block reference for each item shall be stated, along with the number and size of the conductors in the cables. Cable NOT in the Supplier's Scope of Supply shall be clearly identified. For instrument diagrams shall display, in block form, the instruments and the cable connecting to the junction box and marshaling \ system cabinet.</p>
C11	Loop drawings/ diagrams	<p>The loop drawings shall be prepared for all open and closed loops configured in the plant. It shall indicate as a minimum the details of field instrument/valve, field junction box, marshaling terminals, barriers, relays, I/O cards, etc. All wiring details, termination details and interconnections from field device to system, including junction box numbers, cable numbers, cable core numbers, terminal colour coding of wires and ferruling details etc. must be clearly indicated.</p>
C12	Visual display unit (VDU) graphics	<p>This document indicates the details of the operator interface graphics to be configured in the system and shall include the following details as a minimum:</p> <ol style="list-style-type: none"> 1. All equipment with associated instrument tag nos. & valves with interconnecting piping as appropriate based on P&IDs. 2. Colour coding of pipelines as per Contractor's agreed philosophy. 3. Static and dynamic data requirements.
C13	Internal Wiring Diagram (Connection Diagrams)	<p>This shall indicate the following as a minimum:</p> <ol style="list-style-type: none"> 1. Interconnection wiring details between marshaling cabinet terminals, relays, lamps, cards, relays, barriers, surge protectors (where applicable), etc. 2. Power distribution details for all consumers within the panel and for those instruments/equipment (located outside the panel). 3. All wiring to be colour coded/ marked with identification numbers for easy reference.
C14	Functional LOGIC Diagram	<p>Diagrams shall include logic diagrams for all functions in the ESD and F&G systems like safeguarding, blowdown, start-up etc. including typical function blocks like voting blocks, input and output blocks etc. Logic diagrams for F&G system shall be provided separately. System generated logic diagrams may be provided.</p>
C15	Control Scheme/ Diagram	<p>Diagrams shall include control and logic schematics for all control functions in the DCS like simple & cascade PID control, on-off control, bias, PT-compensation blocks, start-up and stop sequences, duty/ standby logic etc. including typical function blocks like motor start/ stop, fan speed control, alarm handling etc. System generated control diagrams may be provided.</p>
C99	Miscellaneous	<p>System Diagrams, not covered above, that are required by the Contractor or identified by Supplier for submission to Contractor.</p>
D - DATA SHEETS/ SPECIFICATIONS		
D01	Equipment data sheets (Including Reliability Data)	<p>Where Equipment Data Sheets are issued by Contractor as part of the Requisition, they shall be completed by the Supplier for each item identified. Where data sheets are not issued by Contractor the Supplier is to use an approved format. In addition to the above following shall also be provided for the applications indicated.</p>
	Lube oil system data sheet (API 614)	<p>API-614 datasheet duly filled in by Supplier.</p>
	Lube oil cooler data sheet	<p>Lube oil cooler data sheet, duly filled in by Supplier.</p>
	Lube oil cooler fan data sheet	<p>Lube oil cooler fan data sheet giving details of performance, material of construction etc. duly filled in by Supplier.</p>
	Lube oil pump data sheet	<p>Lube oil pump duly filled in by Supplier.</p>

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
	Gear box data sheet	Gear box data sheet API format, duly filled in by Supplier. Gear box structural natural frequencies with mode shapes and complete gear meshing frequency of all mating gears.
	Dry gas seal data sheet	Dry Gas Seal data sheet API format, duly filled in by Supplier. Quality of Dynamic balance shall also be indicated as a note in the datasheet.
	LS/HS coupling data sheet	Coupling datasheet duly filled in by Supplier
	Vacuum pump datasheet	Vacuum pump datasheet duly filled in by Supplier
	Drum unloading pumps datasheet	Drum unloading pumps datasheet duly filled in by Supplier
	Pipeline data sheets	Pipeline datasheet as provided in the specification
	Noise level data sheets	Contractor will define sound power and sound pressure level limitation. Supplier will complete and return these sheets with anticipated and, if requested, guaranteed data, for the octave mid-band frequencies corresponding to these limitations.
	Reliability Data	Vendor shall provide reliability data(figures) as per their experience which is published for equipment suitable for particular services.
	Fire & Safety datasheet	Fire and safety equipment data sheet shall cover weight ,name plate, material specification,, utility requirement, valve details, etc.
D02	Valve datasheets (Including Fugitive Emission Limit)	<p>Datasheet in Contractor's format duly filled in by Supplier in compliance with the project specification.</p> <p>Supplier to provide the following:</p> <ol style="list-style-type: none"> 1. Control Valve/Actuated Valve/Relief Valve data sheet in Contractor's format OR supplier datasheet which includes the performance data (all operating cases), materials, end connections, response time, sizing calculations, noise calculations, utility requirements etc. 2. Anti surge valve data sheet in Contractor's format OR supplier datasheet which includes the performance data (all operating cases), materials, end connections, response time, sizing calculations, noise calculations, vibration limits, utility requirements etc. 3. Hot Gas Bypass valve data sheet in Contractor's format OR supplier datasheet which includes the performance data (all operating cases), materials, end connections, response time, sizing calculations, noise calculations, utility requirements etc. 4. Fugitive emission rate for frequently operated/automated valves
D03	Instrument data sheets	Instrument datasheets shall be prepared based on Contractor's agreed format. Where Instrument Data Sheets are issued by the Contractor as part of the Requisition, they shall be completed by the Supplier. All instruments shall be covered and separate data sheets shall be provided for each instrument tag. Data sheets shall be given drawing numbers.
D04	Motor data sheets (Main & Auxiliary Motors)	Where typical Motor Data Sheets are issued by the Contractor as part of the Requisition, they shall be completed by the Supplier for each tag
D05	ELECTRICAL EQUIPMENT DATA SHEETS (FOR PACKAGE)	Data sheets shall be submitted by supplier by filling in all the information as per Contractor's format
D06	Cathodic Protection System Material/Equipment Data Sheets	Technical data of each item as per design and specification requirements.
D07	Safety (COSHH) data sheets (Material Safety Data Sheet)	Detailed data for all hazardous chemicals to be supplied / required for operation of Supplier's Equipment.
D08	Material datasheet for external / internal coating material(FBE/3LPE/3LPP/etc.)	-
D09	Cable Technical Datasheets (Electrical/Instrument/ Telecom)	Technical data sheets/ technical specifications for all cables including system, FO, serial link & power cables between cabinets as per cable specification requirements. These datasheets/ specifications shall include details of conductor, inner & outer sheathing, armor, screen, size, color, physical, chemical and electrical properties, fire resistant/ flame retardant, applicable codes etc. as a minimum.
D10	Functional Design Specification	Functional design specification for Supplier packaged equipment (e.g. DCS, ESD, LIMS, PAS, PLC, F&G, OTS, AMS etc.) to demonstrate Supplier's understanding and compliance to Contractor's specifications and project requirements. Complete description of the system and its various sub-systems/components in terms of specifications, functionality, features, hardware and software specific to the project requirements shall be indicated in details. Irrespective of whether specified or not, document shall also include redundancy, loading, failure modes and recovery, references to codes and standards, equations, calculations, details of report generations, maintenance features etc.. Separate FDS documents shall be prepared for the following as a minimum:
		1. FDS for DCS (FDS for LIMS, PAS & MMS) to be included where applicable)
		2. FDS for ESD
		3. FDS for FGS
		4. FDS for OTS
		5. FDS for AMS
		6. FDS for Alarm Management System
		7. FDS for Graphics
		9. FDS for Software configuration
		9. FDS for Third party interfaces
		10. FDS for Plant information system and networking and security
		11. FDS for SCADA System design specification
D11	Telecom Datasheets	Telecom Equipment datasheet shall be prepared based on Contractor's agreed format. Where Item Data Sheets are issued by the Contractor as part of the Requisition, they shall be completed by the Supplier. All Items shall be covered and separate data sheets shall be provided for each Item tag. Data sheets reflect applicable reference drawing numbers.
D99	Miscellaneous	Data sheets, not covered in the above that are required by the Contractor or identified by Supplier for submission to Contractor.
E - SCHEDULES/LISTING		
E01	Equipment list (multi-discipline)	Equipment list for all equipments covered in package to be supplied by Supplier with brief specifications.
E02	Load / motor list	Each load (static, motor & electrical utility) shall be listed with description, nameplate rating and absorbed rating stated.
E03	Utilities schedule (power, air, water, lube oil and others)	1. Instrument air consumption.
		2. Electrical instrument control and power requirements for both normal operation and upset conditions.
		3. Cooling water, steam, or electric tracing requirements.
E04	Lubrication/chemical/catalyst schedule (flushing, lube oil, grease, operating fluid)	Schedule to indicate type and grade of lubricants and other consumables required for all equipment supplied in format issued by Contractor. For each entry, first fill capacities, rate of consumption plus frequency of change shall be indicated. Also indicate particle count for change of oils.
E05	Input / Output List, Alarm and trip schedule	Alarm / Trip values for all instruments in Supplier's scope of supply shall be included in this document.
		Input / Output (I/O) list to be prepared for all Control and Safeguard Systems included in the Material Requisition (DCS, IPS, PLC, F&G etc.). This list, dedicated to hardware and software signals, will contain as a minimum the following information:
		1. Unit code
		2. Loop Name

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
		3. Tag number (in alpha-numerical sequence) 4. Instrument Type 5. Service Description 6. P&ID No 7. Location (DCS / IPS / FGS) 8. Control System I/O type 9. Signal type 10. Serial Link (S/L) 11. Serial Link System I/O Type 12. Serial Interface type 13. Certification (IS/NIS) 14. State 0 15. State 1 16. Volt / current 17. Loop Power (Int / Ext) 18. Line Monitored (Yes / No) 19. Control Action 20. Minimum DCS Range 21. Maximum DCS Range 22. Engineering Unit 23. Alarm 24. Barrier 25. Trend 26. Production Report 27. Station report Separate I/O list shall be prepared for the DCS , IPS & FGS Field tag number. Contractor's agreed format shall be used in preparation of this
E06	Instrument schedule/ index	Instrument details (tag no. instrument description, service description, location, P&ID no., datasheet no., hook-up drawing reference, instrument range with associated alarm and trip values, manufacturer, model number, specifications etc. for all instruments in Supplier's scope of supply shall be included in this document as a minimum. Contractor's agreed format shall be used in preparation of this document.
E07	Piping line list	All lines in Supplier's scope of supply. It shall include as a minimum, service, design & operating pressure / temperature, test medium and pressure, NDE requirements etc.
E08	Bit map / serial link protocol	This document shall include as a minimum, 1. Serial link interface details such as such as type of link, baud rate, etc. as per Contractor's agreed format. 2. I/O details such as tag nos., address, service, bit no., range for analog values, logic states for digital values etc. as per Contractor's agreed format.
E09	Bill of materials	Bill of materials (including insulation, painting and fireproofing) for bulk items (piping / instrument / electrical and mechanical) supplied loose by supplier / CP BOQ.
E10	Electric heat tracing circuit schedule & isometric	Supplier shall identify extent of trace heating requirement on Contractor supplied / Supplier P & ID, piping isometrics and prepare the design sheet for the heat tracing, circuit schedules and BOM of heat tracing materials.
E11	HVAC air distribution devices selection schedule	The air distribution devices selection schedule shall include all the selection procedures for devices such as inlet, exhaust & fresh air louvers, supply and return diffusers and grills. The schedule shall show velocity, pressure drop & sound levels through the devices.
E12	HVAC dampers (fire and control)selection schedule	Selection shall indicate the selection schedule for all fire dampers, gas dampers and modulating dampers. The fire and gas dampers selection shall adhere to international standards. The selection schedule shall indicate the velocity and pressure drop through the dampers in fully open and close conditions. The modulating damper schedule shall indicate the voltage ratings of the actuators, type of drive, method of actuation etc. in the schedule.
E13	Cathodic Protection Test Facilities Schedule	CP Test facilities schedule shall provide details of all facilities required for CP system monitoring and testing. These include crossings (road, pipeline, overhead lines, rivers) schedule and parallelism (pipelines and overhead lines) details. Schedule shall also indicates preliminary BOM (connection details, TCP, boxes, etc.)
E14	Cable schedule for Instrumentation & Electrical cables within the package	All electrical, instrument and telecom cables shall be listed (in separate contractor supplied template document), both internal to Supplier's package, interconnecting cables (loose supply if any by Supplier) between package and external equipment and identification of Contractor installed cables between components of Supplier's package, listing: 1. Cable size and type 2. Cable number as per project cable tagging philosophy (where supplier wants to retain the tags as per their internal standards, it can be indicated in cable schedule along with project tag no.) 3. Gland size and type 4. To/from location 5. Interconnection diagram cross-reference 6. Cable length in meters (interconnecting cables only) 7. Voltage grade 8. Specification 9. Source and destination termination description 10. Where applicable terminal lug sizes also to be indicated (e.g. HV/MV application)
E15	Schedule of PSVs	List of all PSV's within the package.
E16	Certified Equipment List for Hazardous area	List of certified (ATEX/IECx/NEC) showing project tag number , model number , serial number , type of protection , IP rating , Ex marking details (ATEX/ IEC and where applicable NEC), Certifying Authority / Notifying body , Ex-certificate number .
E99	Miscellaneous	Schedule/lists, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor
F - CALCULATIONS & ANALYSIS		
F01	Process / utility calculations	Calculations demonstrating the sizing basis and criteria of equipment and systems; e.g. de-aerator sizing, thermosyphon cooler sizing, fired heating sizing, etc. and the associated utilities; e.g. fuel, coolant, instrument air, etc.
F02	Mechanical calculation / Analysis / Studies	Stress calculations shall be in accordance with relevant code requirements and demonstrate that design (inc. nozzles) is adequate for operation within the parameters specified for the item, in terms of pressure, temperature, nozzle loadings, etc.
	Structural steel design calculations for base plates, lifting beams	Calculations shall determine that structure and any lifting aids are suitable for all phases of lifting, transportation, installation and operation without overstressing any member. Blast study report shall be included as applicable. Where building/structure design by the Supplier is specified (Code B07), structural design calculations shall be submitted for review and approval. Shall also contain Local load analysis for external attachments like Platform and pipe support cleats.

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
	Foundation support calculations	Calculations of foundation support loads and base plate deflections under normal, fault, transportation and installation conditions taking into account static and dynamic loads, and as defined in Contractor's specifications.
	Lateral critical speed calculations	<p>Calculations shall determine the natural frequency of the shaft assembly and identify forcing frequencies and harmonic components thereof, relative to operating speed range. Results shall be presented in graphical and narrative form, and shall include:</p> <ol style="list-style-type: none"> 1. Rotor drawings showing each shaft segment clearly numbered 2. Table of masses and stiffness values for each segment. 3. Plot of critical speed against support stiffness with stiffness both in the vertical plane and horizontal plane to be shown for each support 4. Plot of speed against vibration amplitudes (Campbell diagrams) to demonstrate the specifications of operating modes form harmonic regions.
	Torsional critical speed calculations	Calculations shall determine the torsional critical speeds for driver / transmission / driven equipment trains. Calculations shall clearly indicate number and details of finite elements that the system has been divided into for the calculation and a table of stiffness's and inertias for each element shall be included. Results shall be presented in graphical and narrative form.
	Bearing life calculations	Calculations for Rolling Element bearings shall determine anticipated B10 life with bearing identification in accordance with ANSI B3.15 or B3.16 for radial, axial or combined loading, considering methods of lubrication, dimensions and load variation determined from performance envelope.
	Thrust bearing size	<p>Calculations and curves taking into account static and dynamic forces over the full range of operating conditions including:</p> <ol style="list-style-type: none"> 1. Aerodynamic or hydrodynamic thrust load and balance piston compensating load to be shown. 2. Variation in balance piston compensating load with increased leakage rate to be shown.
	Pulsation studies	Calculations shall be provided to demonstrate compliance with the nominated design approach in compliance with API 618. Results of acoustical simulation studies shall be provided where specified. Calculations shall also demonstrate the sizing of pulsation dampeners.
	Rotor / shaft system imbalance response analysis	<p>Demonstration of the sensitivity of the rotor/shaft design to imbalance at various locations by plotting amplitude against shaft speed for both vertical and horizontal vibration.</p> <p>Plot of shaft vibration mode shape, showing displacement against axial length and bearing the locations with the rotor excited at its critical speeds.</p>
	Coupling selection calculations	To show speed range, torque, power, lock-up axial stiffness, torsional stiffness, service factors, etc. to substantiate coupling selection.
	Finite element analysis/ calculation	Input data along with Results of FEA analysis with conclusion.
	Nozzle loads and movements	Allowable nozzle loads & movements (X, Y, Z directions) at Contractor's end connections. Loads to be limited as specified in allowable nozzle loads specification attached with the requisition.
	Externally applied loadings calculations (incl. Seismic)	Calculations to substantiate impact of external loads like wind; seismic etc. is taken in to account.
	Tank sizing calculations for DWST	Supplier shall size the inner tank in cold condition, i.e. at the MDMT the tank dimensions shall be such that the tank can hold the specified volume. Necessary free board shall also be provided. Outer tank shall be sized to hold insulation required for maintaining cryogenic storage temperature of inner tank.
	Anchor bolt sizing calculations	Supplier shall size the anchor bolts of inner and outer tank to withstand seismic load and wind load on inner and outer tanks as required. For concrete outer tank it is not applicable.
	Anchor strap sizing calculations	Supplier shall size the anchor strap of inner and outer tank to withstand seismic load and wind load on inner and outer tanks as required. For concrete outer tank it is not applicable.
	Boil off rate calculation for DWST	Supplier shall carry out calculations to justify that, the maximum boil off rate is within the specified limit.
	Perlite Concrete calculation for DWST	Supplier shall carry out calculations to reflect that selected size of perlite concrete ring below the inner tank shell is adequate to withstand the specified anticipated loading.
	Pre-stressed concrete outer shell tank calculation	Supplier shall carry out calculations to substantiate adequacy of pre-stressed concrete outer tank as per BS EN 14620 Part 3 or other code as specified.
	Reinforced concrete outer tank roof calculation	Supplier shall carry out calculations to substantiate adequacy of reinforced concrete roof of outer tank.
	Suspended deck calculation	Supplier shall carry out calculation for adequacy of suspended deck thickness for its self weight and weight of insulation over it. It shall also include calculation for adequacy of hangers and supports welded to outer tank roof frame.
F03	Heat/Power/System loading calculations	<p>Calculations shall determine heat emitted to atmosphere including radiation and convection for various loadings, versus the extremes of environmental temperature specified by Contractor. Discharge temperatures of exhaust gases from both equipment and exhaust stack/pipe to be substantiated.</p> <p>Full details of all assumptions shall be stated.</p> <p>This document shall provide details of the heat dissipation and power consumed by various consumers within the package. It shall also provide details of each system controller loading to ensure that the same is within the project specifications.</p>
F04	Hydraulic calculations/ analysis / thermosyphon loop calculation	<p>Calculations demonstrating pipe friction losses, nozzle sizes, and discharge rates for 'extinguish ant', CO₂, sprinkler & deluge system.</p> <p>Detailed calculations indicating the priority volume, head available for loop circulation, frictional loss shall be provided for Contractor's review.</p>
F05	Exchanger thermal rating calculations	Calculations to demonstrate thermal ratings of heat exchangers.
F06	Electrical calculations (load flow/short circuit/ transient/lighting/earthing)	<ol style="list-style-type: none"> 1. Load Flow Study shall calculate the steady state active and reactive power flows, current flows, system power factor and the magnitudes and phase angles of all the load and generation bus voltages. 2. Short Circuit Study shall calculate fault level assessments at peak make and break instants at each bus of the switchboard & at various location of distribution network 3. Transient Stability Study is an assessment of system response due to different disturbances via loss of generation / fault / sudden load application / rejection. 4. Lighting calculation shall determine the illumination level & uniformity ratio for an area based on the lighting fixtures provided. 5. Earthing calculation shall include the earthing grid design to meet the required earthing resistance and sizing of earthing conductors
	UPS battery sizing calculation	Determination of the load profile and sizing of the battery bank for the load profile.
F07	Instrument sizing calculations (Orifice, Control Valve, PSV, Actuators etc.)	<p>Orifice size calculation to API 520 for all relief valves, including maximum relieving temperature.</p> <p>Burst disc calculations to manufacturer's formula.</p>
	ESD valve calculations for ESD valve & volume bottles	Flow capacity calculations; break out, running and reseating torque figures for valve versus actuator torque figures at minimum supply pressure, safety factors used etc.
F08	Dynamic Simulation	Report detailing results of Dynamic simulation for predefined / agreed cases (Start-up, shutdown, settle out conditions etc.)
F09	Stability analysis	Analysis performed on high speed rotary equipments which include Lateral critical speed analysis / Tensional critical speed analysis as specified in relevant specification.

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
F10	Anti-surge valve sizing	System calculations to substantiate valve sizing selection and noise data. Information to be provided per SDRL Code F11 below.
F11	Acoustic enclosure ventilation system calculations	<p>Calculation of air flow requirements and power requirements to substantiate system design and sizing criteria. Taking into account:</p> <ol style="list-style-type: none"> 1. Air mass flows 2. Inlet and exhaust 3. Temperature rise heat loads and temperature gradients 4. Filtration requirements 5. Back pressure at worst wind conditions 6. Sketch of system to be provided. Full details of all assumptions shall be stated.
F12	Piping stress analysis/ calculations	<ol style="list-style-type: none"> 1. Piping stress isometric drawing showing the extent of calculations. 2. Calculations of piping stress of lines defined as critical by Contractor. 3. Wall thickness calculations. 4. Branch reinforcement calculations. 5. Piping stress calculations.
F13	HVAC heat load calculations	<p>HVAC Heat load calculations shall indicate the necessary cooling or heating load requirement in the buildings/rooms. The heat load calculations includes:</p> <ol style="list-style-type: none"> 1. Heat gain through solar gain 2. Heat gain from the solar gain through transmission 3. Heat gain through transmission gain due to the difference in temperature inside/outside 4. Heat gain from the occupants and equipments inside the rooms 5. Heat gain from the fresh air intake 6. Room pressure
F14	HVAC duct sizing and thickness calculations	The calculation includes the duct sizing and thickness for the ducts as per the specified air quantity and velocity. The calculations shall indicate the method used for duct sizing.
F15	HVAC equipment selection and calculations	<p>HVAC equipment selection includes the selection procedures for various HVAC equipments as</p> <ol style="list-style-type: none"> 1. AHU's and FCU's 2. Split units/Ducted Split units 3. Condensing units/Chillers 4. Ventilation/ Exhaust Fans 5. HVAC Unit Control Panel 6. HVAC MCC
F16	HVAC acoustics and sound attenuator calculations	HVAC acoustic calculations shall include study of sound pressure level of each equipments and comparison with NC requirements. Selection of acoustic/ attenuator with complete data sheet and material properties.
F17	Ventilation, pressurization and extract system calculations	Flow and Static pressure calculations for ventilation, pressurization and extract systems to comply with the requirement of positive/ negative pressures, air changes, fresh air requirement etc. Battery rooms and other rooms where negative pressure is specified separate calculations shall be made with the above criteria's.
F18	External static pressure and duct pressure loss calculations	<p>ESP calculations shall be done for</p> <ol style="list-style-type: none"> 1. AHUs 2. Fan coil units 3. Exhaust fans <p>Complete with the drops in ducts, dampers/filters/ grilles etc.</p>
F19	HVAC chilled water system, pressurization and chemical injection calculations	<p>Chilled water pressurization unit selection with calculation of Flow and static head of the pumps. Selection of pressure vessel.</p> <p>Chemical injection calculation with selection of dosing pump, chemical quantity etc. for corrosion inhibition, bioorganic controlling, pH balancing etc.</p>
F20	HVAC blast dampers pressure calculations and selection	The blast damper pressure calculations shall be with maximum pressure that the damper can with stand, type of damper. i.e. either blast proof damper or blast proof valves.
F21	Radio coverage Study	Radio link path profiling and link budgeting; Radio signal level prediction calculations.
F22	PA / GA coverage study	System calculations to substantiate loudspeaker power settings, amplifier loading and spare capacity.
F23	Cathodic Protection System Detailed Design and Calculation	Document shall cover details of structures to be protected, considered parameters, protection criteria, detailed calculation, design philosophy, material specification and detailed MTO of considered CP system in line with project requirements and according to international standards and practices.
F24	Calculation as per B31.3 for fittings above 48" / Branch reinforcement fitting calculation	<ol style="list-style-type: none"> 1. Thickness calculation as per ASME B31.3. 2. Branch reinforcement calculations.
F25	Flange calculations (Sizes above 60") and special flanges	<ol style="list-style-type: none"> 1. Design calculation for flanges for non-standard flanges which are not covered by standards as indicated in PR/PO. 2. Design calculation for flanges for sizes 60" and above .
F26	Thickness calculation for spacers & blinds (Sizes above 24")	Thickness calculation for spacers & Blinds as per ASME B 31.3
F27	Stress and wake frequency calculations	Stress and Natural frequency calculation for corrosion probes/coupons, injection quills etc.,
F28	Cathodic Protection Surveys (Soil Resistivity, Pre-Design, CIPS, DCVG, AC Mitigation) Procedures and Reports	Survey procedures shall cover detailed methods of conducting surveys, measurement techniques and report formatting. Survey reports shall indicate the results of surveys, recorded values, analysis of survey results, conclusions and recommendations.
F29	Dynamic Simulation Study Scope of Work	Document detailing Model scope, list of equipments to be modeled, model boundaries
F30	Overall pressure drop calculations	<p>The document details out the overall pressure drop across the metering system and defines the calculations performed while arriving at the overall pressure drop value. The calculations shall be based on worst case conditions i.e.. maximum flow, maximum density, maximum viscosity, maximum pipe roughness etc. Also, the individual items (such as pipe fittings, basket filters, control valves, manual valves, On/Off valves, flow meters, straightening vanes etc.) pressure drop contribution to be accounted for either by referring to manufacturer published values or by ascertaining these from standards (in case not available from manufacturer).</p> <p>In case prover is part of the metering system, then overall pressure drop to be presented separately i.e.. 'Overall pressure drop for the metering system' and 'Overall pressure drop for the metering system + prover'.</p>

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
F31	Sampling probe calculation/ sampling transportation	Sample probe calculations shall include two aspects namely Wake frequency calculations, proper fluid dispersion analysis (the linear velocity of the fluid through the opening of the sample probe is equal to the linear velocity of the fluid in the pipeline at the sampling location or the cross section of the pipe where the sampling probe is). Maximum design flow velocities to be considered for arriving at the values. Sample transportation calculations to ensure that the sample transportation takes place within stipulated time as specified in project specification. This document to also mention about velocity, Reynolds number, required sample flow, total pressure drop, required sample flow etc.
F32	Overall uncertainty calculations	Overall Uncertainty calculations ascertain the uncertainties associated with the metering system items, operation and maintenance regimes & influences on the system. The document has to discuss and detail the calculations with a final conclusion stating the final uncertainty values calculated for 'Gross observed volume flow uncertainty', 'Mass flow uncertainty', 'Standard volume flow uncertainty'. The actual values of the various calculated uncertainty components (Ex. Temperature uncertainty, Pressure uncertainty, Density uncertainty, Volume correction factor, Thermal expansion uncertainty etc.) are to be clearly detailed out in this document. Manufacturer published uncertainties to be considered (Example : Transmitter uncertainties).
F33	Scan time / Data transfer time calculations	Scan Time calculations shall be provided separately for each system. Data transfer time calculations shall be provided for each inter-system & subsystem communication. This may be included in the respective FDS.
F34	Fast loop flow	Sampling system calculations document objective is to indicate whether dispersion is likely to be adequate for the sampling in the fast loop system with the given piping elements. This document to also mention about velocity, Reynolds number, required sample flow, total pressure drop, required sample flow etc.
F35	Dew point and bubble point calculation	This document objective is for 2 parameters namely Dew point & Bubble point calculations. Dew point calculations has to demonstrate that the process sample remains in same phase before the pressure regulator / vaporizer of sampling system and after the pressure regulator / vaporizer the sample need to be maintained above the calculated dew point to ensure sample is in gas phase. Bubble point calculations has to demonstrate that the liquid sample is maintained at a temperature & pressure where the bubble of vapour formation is avoided. Given that vapor will probably have a different composition than the liquid, the bubble point along with the dew point at different compositions are useful data.
F36	Actuator torque table	Actuator torque table shall have following details a) Valve size , rating & type b) Shutoff DP used for actuator sizing c) Torque required by valve (BTO,ETO, RT, BTC,ETC) d) Actuator type e) Instrument air pressure used for actuator sizing f) Torque delivered by actuator (BTO,ETO, RT, BTC,ETC) g) Safety factor for all the position (Opening, running & closing) h) Valve MAST (Maximum allowable stem torque) i) Maximum torque developed by actuator j) Opening /closing time
F37	Volume bottle sizing calculation	Supplier shall carry out air volume tank capacity sizing calculation based on following design inputs 1) Number of required air stroke 2) Initial charging pressure for volume tank 3) Required safety factor on backup air capacity (if required) 4) Minimum Instrument air pressure required for full stroke 5) Actuator displacement volume
F38	Verification of pressure rating of tube.	Verification of tube design pressure with the tube dimensions and mechanical strengths as per the 'American Standard Pressure Equation'.
F39	Strainer area calculation	Strainer filter element open area ratio calculation to be provided by the supplier.
F40	Non slam check valve flow and pressure drop calculation	Non Slam Check valve flow verses pressure drop calculation/report for minimum, operating and maximum flow to be provided by the supplier.
F99	Miscellaneous	Calculations, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.
G - PERFORMANCE DATA		
G01	Data required for motor starting study	Speed torque characteristics of the motor at rated voltage, speed torque characteristic of load (a statement as to the process condition prevailing at the driven equipment for the curve shown), inertia of the motor and load, for gear box application, the gear ratio and the inertia of the gear box. Stator resistance (Ra), Stator reactance(Ax), Magnetizing resistance (Mr.), Magnetizing reactance (M), Rotor resistance(R1), Rotor reactance (X1) for dynamic modeling.
G02	Performance curves	Centrifugal compressor: Curves to indicate the discharge pressure, coupling shaft power, polytropic head and efficiency versus inlet capacity for specified inlet pressure temperature and molecular weight for each section (casing) and overall unit. Curves shall indicate performance from surge through to 115% rated capacity. Units driven by variable speed drivers shall be provided with curves for the full range of speed operation. Curves of Mu versus Q/N and quadrant curves will also be provided. Guarantee points shall be clearly identified. Reciprocating compressor: Supplier performance data and calculations including the following: 1. Performance curves or tables displaying power, capacity and pressure 2. Gas load, rod load and crosshead load reversal and duration charts for all stages and specified conditions of operation and all available load steps. 3. Primary and secondary unbalance forces and moments with information on component weights and counter-balance weights, as appropriate. 4. Flywheel sizing calculations with information on moments of inertia of all components and the expected torque curves for all conditions of unloading and operation. 5. Expected resulting speed and current variations. Centrifugal pumps: Curves to indicate differential head developed efficiency and absorption power, versus flow with any velocity corrections for rated impeller. Rotary pumps: Curves shall indicate discharge pressure, NPSHR and absorbed power, versus inlet flow including velocity corrections. Reciprocating pumps:

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
		Differential, pressure, shaft input power efficiency & NPSHR over the range for variable stroke pumps of operation with stroke length. Curves shall indicate pressure rise, efficiency, and power absorbed, versus inlet flow for specified inlet pressure, temperature and molecular weight. Curves shall also indicate performance from surge to 115% rated capacity. Fans with variable pitch screws shall indicate performance for five settings between maximum and minimum. Guarantee points shall be clearly identified.
G03	Electrical Equipment Motor/Generator performance curves	1. Curves to indicate torque and current against speed for 80% and 100% voltage rated conditions. Driven equipment torque shall also be plotted to confirm that there is adequate net torque for acceleration. 2. Curves to indicate the efficiency and power factor against % of rated output with value of starting power factor.
G04	Computer system documentation/ manual	This shall include the following as a minimum. 1. System supplier manuals for hardware and software. 2. Detailed configuration database. 3. Graphic display software. 4. Application software for the project. 5. Operating system software details.
G05	General performance data for HVAC items	For HVAC chillers, condensing units and condensing fans : 1. Chiller data sheets with capacity, power consumption etc. 2. Performance curves for compressors, fans etc. 3. GA Drawings with point load details 4. Motor details 5. Control panel details 6. Electrical wiring diagram For AHU coils, fan coil units : 1. Data sheets with details of filters, coil, fan etc. 2. Performance curves. 3. Dimensional drawings showing sections and components 4. Control panel details 5. Electrical wiring diagram For standalone and AHU mounted humidifiers : Define selection procedure, temperature/humidity range details, water supply and drain connection and electrode details. Dimensional drawings For heaters duct and AHU mounted types: Electric heaters selection procedure, type and capacity of electrodes, material construction.
G06	Catalyst performance data / guarantee	Performance data/guarantee of catalyst for the design condition.
G07	SIL related data	SIL related data like PFD, Safe failure fraction etc. which are required for SIF loop evaluation are to be provided.
G99	Miscellaneous	Documents, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.
H - WELDING/MATERIAL ENGINEERING DATA / MANUFACTURING & TEST PROCEDURES		
H01	Weld Map & NDE plan	For all vessels, tanks and other fabricated items, the following information shall be shown: All dimensions with tolerances , Plate layouts Weld joint design ,Weld procedure specification reference for each and every weld, NDT requirements for each joint ,Number of nozzles, Internal details & nozzle locations and orientations When applicable, weld location plans shall be verified by the Contractor and/or third party inspection authority.
H02	Weld procedure specification (WPS) & qualifications (WPQ) records	Define all shop, field and repair welding procedures (WPS) in accordance with Contractor's requirements. WPS shall be cross-referenced to the applicable weld location plan (SDRL Code H01) and weld procedure qualification (WPQ). All WPS documents shall be issued in a single submission, together with the WPQ and a listing register to show status of approval. Qualification records describe parameters used in qualification of weld procedure specifications (WPS) together with mechanical testing and results in accordance with Contractor's requirements. WPQ test records are to be cross-referenced to the WPSs and when applicable stamped by the third party inspection authority. Fabrication shall not commence before the appropriate weld procedure has been approved by Contractor. For site construction pre fab WPS/PQRs, an Engineering weld data sheet involving each line class ,fluid service, type of materials, thickness and diameter ranges, design temperatures, applicable WPS/PQRs, applicable welding construction code etc. shall be made and this shall be a master index of the all WPS/PQRs. Cladding , weld overlay procedure where applicable including repair procedure. Weld repair procedure .
H03	Non-destructive examinations procedures (NDE)	Define method, extent and acceptance levels of all NDE used to verify that materials and/or formed or welded fabrications comply with Contractor's requirements. To include, as applicable, visual, radiographic, ultrasonic, magnetic particle, dye penetrant, hardness tests and other techniques. Procedures shall give acceptance criteria. When applicable, procedures shall comply with the requirements of the third party inspection authority. Procedures shall also be cross-referenced to the weld location plan (SDRL Code J01).
H04	Hardness test procedure	This procedure shall describe the method of carrying out the Hardness testing of welds and HAZ on the production welds during the fabrication. It shall describe the equipment used, list applicable codes and specifications, location of hardness measurement, number of tests, procedures, acceptance criteria.
H05	Charpy impact test procedure / DWTt test procedure)	The procedure shall describe the relevant standard, type of impact test machines used, test temp, test specimen location (Base metal, HAZ, Weld metal), direction (transverse, longitudinal), orientation details, acceptance criteria for minimum impact values, minimum average values required, additional test requirements in case of failures etc.
H06	Surface preparation & painting / coating / FBE / insulation procedure	This shall include: surface preparation, paint application, coating application, FBE application, insulation application, inspection checks, shop or field painting, linings (where applicable), galvanizing (where applicable) Painting and /or Coating procedure including acceptance criteria , repair method , paint system and final colour.
H07	Hydrostatic and / or pneumatic test procedures	Detailed procedures for compliance with Contractor's specifications, including duration of test, quality of test medium, confirmation of no leakage.
H08	Corrosion testing procedures	Detailed procedures for compliance with Contractor's specification, including control and calibration of electrochemical parameters, temperature preparation, method of data analysis, metallographic evaluation, acceptance criteria.
H09	Positive material identification (PMI) procedure	Procedure for Positive Material Identification of fabricated equipment and piping. The procedure shall specify the scope, extent of testing, calibration of the instrument, operator skill requirements, elements that can be analyzed, acceptance criteria etc.

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H10	Flushing and Dry out Procedure	To detail method of flushing pipe work systems at work and site (e.g. lube, seal and hydraulic oil systems) including acceptance criteria.
H11	Trial assembly procedure	-
H12	Factory acceptance test & Performance test procedure	Procedures for final acceptance testing prior to testing. The procedure should define the order of sequential tests and where appropriate should include all elements defined in H13 below. Procedures for Performance test at works and site testing shall include the following: 1. Purpose of the test 2. P & ID or diagram with written description of test set-up. 3. Definition of all equipment to be used for testing, including tag numbers for Contractor's equipment. 4. Acceptance criteria for the test 5. Sample log for the reading to be taken 6. Full description of the method of calculating the results of their accuracy
H13	Weight control/ weighing procedure	This Procedure shall describe the method of carrying out the weight control/ weighing. It shall describe the equipments used, list of applicable codes and specifications, method of inspections, procedures and acceptance criteria.
H14	Holiday testing procedure	This Procedure shall describe the method of carrying out the holiday testing based on applicable code/standards/specifications. It shall describe the equipments used, list of applicable codes and specifications, method of inspections, procedures and acceptance criteria. The holiday test procedure shall also exclusively mention the actual voltage to be applied, calibration of the detector instrument, extent of repairs, repair paints on holidays etc.
H15	Pickling and passivation procedure	Procedure prepared based on codes / project specifications indicating the test procedure, measurements & acceptance criteria.
H16	Dynamic balancing procedure	Procedure prepared based on code / project specifications indicating the test procedure, measurements & acceptance criteria.
H17	Ferrite test procedure	This procedure shall describe the method, location and acceptance criteria for checking ferrite content in the weld overlay.
H18	Site acceptance test procedure	Procedure prepared based on code / project specifications indicating the test procedure, measurements & acceptance criteria.
H19	Leak test procedure	Procedure prepared based on code / project specifications indicating the test procedure, measurements & acceptance criteria.
H20	Material control procedure	-
H21	Material colour coding , marking and traceability procedure	-
H22	Weld consumable handling procedure	This Procedure shall describe the method of dedicated personnel/storage/baking/Issue- type, quantity/ re-use, detail of logs/records/register and handling welding consumables based on applicable code/standards/specifications. It shall describe the equipments used, list of applicable codes and specifications, calibration method and frequency of calibration and acceptance criteria. The procedure shall also describe the atmospheric temp of stored materials, color coding details if any on the consumables.
H23	Lifting frame test procedure	Procedure prepared based on 3 rd party certification / code / project specifications indicating the test procedure, measurements & acceptance criteria.
H24	Vacuum Box Testing Procedure	Procedure shall include the procedures for Annular plate to bottom shell course joint and bottom joints as well, as per code / manufacturer's practice.
H25	Manufacturing procedure specification	Including qualification & production tests, Tube to tube sheet rolling/welding and repair procedure (if any), Forming and heat treatment procedures (if any) , Perlite expansion and filling Procedure (if any).
H26	Cryogenic test procedure	-
H99	Miscellaneous	Material Engineering Data / Manufacturing & Test Procedures, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.
J - CERTIFICATION DATA & REPORTS		
J01	Type approval certificates	Certificate comply with the requirements stated in the type approval test procedure.
J02	Manufacture certificates, registration & ASME code stamp records	Certificate issued by the Certifying authority confirming that the manufacturer is authorized to use ASME code stamp and registered with Certifying authority.
J03	Certificate of compliance	Certificate issued by the Supplier confirming that the product complies with the purchase order requirements.
J04	Weld overlay/cladding test reports	Weld overlay / cladding test report based on approved test procedure.
J05	Hazardous area certificates for E & I equipments	Compliance Certificate issued based on ATEX Directive or IECEx system requirements as applicable-Product complies with the hazardous area requirements of the project.
J06	Factory acceptance test reports & Performance test results (all disciplines)	Report on performance/functional tests carried out in the factory to demonstrate the equipment suitability to fulfill the duty specified. This report to include certificates as appropriate, tests for over speed, balancing, shaft mechanical and electrical run out, and vibration. FAT reports on electrical and instrument control equipment shall include high voltage pressure tests and insulation resistance certificates. Report shall include the following: Description of how test was conducted , Method of calculating results, Acceptance criteria Calculations of results taking into account the accuracy of the results , Log of test readings signed by Contractor's representative and third party inspection authority (when applicable) e.g. where applicable Vibration reports, noise report Complete unit/string test / package acceptance test report etc. specific to the equipment/product.
J07	Weight reports/ certificates	Certificate indicating actual weights after fabrication / manufacturing and confirm that the values are within tolerance.
J08	Dimensional control reports	Report issued by supplier confirming the actual overall dimensions, anchor bolt locations and tie-in connection based on final built skid / equipment.
J09	Material test certificates	Certificates in compliance BS EN 10204 latest edition where applicable. This category to include all MTCs
J10	Welder & welding operator performance qualification certificates	Welder's name, identification and positions to be recorded to code requirements with approval by third party inspection authority when applicable, using approved weld procedure.
J11	NDE operator qualifications	Copies of Qualification Certificates for the technicians/operators' signing certificates.
J12	Pre production qualification and	Results of tensile, ductility hardness and impact tests carried out on production tests.

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
	production test results (included welding)	Certificates to state Contractor's purchase order number, tag number (or other unique identification) to permit traceability of testing equipment, item or piping system. Supplementary marked-up piping isometrics shall be included when necessary to define extent of testing, those being verified by the Contractor, when required.
J13	Trial fit-up/ mock-up reports	Report covering trial assembly or mock up test for example Tube to tube sheet rolling/welding etc.
J14	Heat treatment records	Pyrometric charts or certificates confirming the heat treatment cycles have been conducted to Contractor's requirements. Certificates to state Contractor's purchase order number, item number and identification to permit traceability to the heat-treated component or materials.
J15	NDE records (VISUAL/RT/DPI/MPI/EDDY CURRENTS)	NDE Records to confirm that acceptable results were obtained, stating equipment used, standards followed, operators name in accordance with code requirements.
J16	Material traceability records	Location plans/records with an identification system cross referring to the individual material certificates. When applicable, material placement drawings shall be verified by the Contractor and/or third party inspection authority.
J17	Calibration certificate	Calibration certificate for inspection, measuring and test equipment. Each certificate to state equipment serial number and calibration validity. Calibration certificate for procured process control instruments. Each certificate to state Project tag number, serial number, applicable parameters in accordance with data sheet.
J18	Rotor balancing report (dynamic/static)	Report indicating results / acceptance based on the approved rotor balancing procedure.
J19	Pressure test certificate (Hydro / Pneumatic/Leak)	Certificate of hydrostatic and/or pneumatic, Leak tests carried out.
J20	Cryogenic test report	Report indicating results / acceptance based on the approved test procedure.
J21	Proof load certificates	Test certificates for all lifting equipment; e.g. hoists, cranes, wire ropes, shackles, hooks, pulleys and lifting beams. Certification to be to Contractor's requirements and approved by the third party inspection authority, when applicable.
J22	Nameplate rubbing/ photo	1. Rubbing or copy of nameplate and/or stamping. 2. Required for pressure vessels, heat exchangers and atmospheric tanks. 3. Submission must be legible and exhibit equipment tag number.
J23	Inspection/ survey reports (including third party/ regulatory authority)	Report shall indicate in detail inspection activities carried out by vendor and acceptance / rejection based on the inspection findings.
J24	Fugitive emission tests (prototype & production)	-
J25	Weld repair report	Report mentioning the location and results after an agreed weld procedure.
J26	Routine test certificates for electrical equipments	Certificate of routine tests carried out; e.g. no load losses. High voltage, insulation resistance, etc. when type tests have been carried out.
J27	Hardness test report	Report to verify that allowable values as per Contractors specifications have been met, and test is conducted as per procedure.
J28	Ferrite test report	Issued by Supplier when applicable
J29	Charpy impact test results / DWTT test result	Issued by Supplier; in many cases the charpy impact results are included in the Material test certificates.
J30	Operational torque test report	-
J31	Functional test reports	(This may be applied at Factory Acceptance or at site and may include part or whole of the item supplied depending on the application).
J32	Site acceptance test report	-
J33	SIL certificates With safety manual	Certificate issued by the certifying authorities confirming that the product complies with the safety integrity requirements as per IEC 61508. and provide safety manual
J34	NACE certification	Where NACE MR/01/75 is applicable, the statement of compliance and hardness results to be incorporated within the material certificate.
J35	Corrosion test reports :HIC test report, SSC test report, IGC test report	Certificate / report issued by the certifying authorities confirming that the product complies with the testing practice as specified in requisition/specification: HIC , SSC , IGC (as applicable).
J36	Mechanical run test report	
J37	Positive material Identification (PMI) Test Report	
J38	EC Declaration/CE Marking / PED Certification	EC Declaration of Conformity as required. Provide details of NoBo (if any Notified Body) involved in production process. if PED is applicable then NoBo shall certify for it.
J39	Preservation Records	Preservation log , records with details.
J40	Inspection Release Note	
J41	Non Conformance Report	
J42	Surface preparation and coating/ painting / FBE /Insulation inspection reports	Issued by Supplier. The report shall include the evidence of surface profile check, i.e. tested profile paper pasted with report along with certificate of compliance to the relevant codes and standards. Certificate shall confirm compliance with painting/insulation specification requirements and include pertinent data with respect to surface preparation paint system applied number of coats, thickness, etc.
J43	Material Test Certificates for HVAC System Units and Sub-components	Material Test Certificates for the listed items.
J44	Hazardous Area E&I Inspection Report for Package Skid	Inspection report produced by third party agency. This may be on design review, on product manufactured, on performance / calibration/testing etc.
J99	Miscellaneous	Certification data / reports, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.
K - MANUFACTURER RECORD BOOK AND OTHER MANUALS		
K01	MRB index	An index of all documents to be included in this document. The Index shall be submitted in advance of the main document (as indicated in the SDR/L) to allow Contractor to evaluate the format and content of the main document.
K02	Manufacturing record book (MRB)	Shall contain as a minimum, ITP, Material certificates, hydrotest certificates, Hardness certificates, WPS\ PQR, Painting certificate, driver Certificate, GA drawing, O&M index, Approved Concession requests ,Balancing Certificates, etc.

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
K03	Technical installation operating and maintenance manual - index	An index of all documents to be included in this document. The Index shall be submitted in advance of the main document (as indicated in the SDRL) to allow Contractor to evaluate the format and content of the main document.
K04	Technical installation, operating and maintenance manual	Manual shall include description of equipment, Installation Procedure, operating procedures for start-up including Set points, steady state, shut down, emergency and fault conditions, operating parameters, function of protective devices and controls, copies of all relevant cause and effect charts and block diagrams, and fault finding guidelines. Minimum data to be included as indicated in SDRL.
K05	Certifying authority release note	
K06	Technical Passport Index (if applicable)	Specific to CIS requirement
K07	Technical Passport (If applicable)	Specific to CIS requirement

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(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
K99	Miscellaneous	Manufacturer Record Book (MRB) and other manuals, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor. Other requirements like Preliminary , Final dossier, Technical data file(compilation of datasheets, specifications and other technical data for approval from regulatory authority / government (e.g.. ARH - Hydrocarbon Regulatory Authority of Algeria)) for Algerian projects.
M - SPARES AND MAINTENANCE DATA		
M01	Schedule of manufacturer's commissioning spares (SPIR form)	List shall indicate parts recommended by Supplier and be defined by reference to cross sectional drawings and relevant parts list. Against each entry, price and delivery shall be given. The Supplier shall complete Contractor's Spare Parts List & Interchangeability Record (SPIR).
M02	Schedule of manufacturer's spares for 2 years operation (SPIR form)	List shall indicate parts recommended by Supplier and be defined by reference to cross sectional drawings and relevant parts list. Each item shall be referenced by its original manufacturer's name & part number. Against each entry, number of parts in operation, price and delivery shall be indicated. Supplier shall complete Contractor's Spare Parts List & Interchangeability Record (SPIR).
M03	Schedule of manufacturer's recommended insurance / capital spares (SPIR form)	List shall indicate parts recommended for insurance by Contractor and be defined by reference to cross sectional drawings and relevant parts list. Each item shall be referenced by its original manufacturer's name and part number. Against each entry, number of parts in operation, price and delivery shall be indicated. The Supplier shall complete Contractor's Spare Parts List & Interchangeability Record (SPIR).
M04	Special tools list	List shall indicate those tools necessary for removing equipment from transport at site, plus those necessary for installation and maintenance equipment. Against each entry, a brief description shall be given and where necessary for clarify, a drawing shall be provided.
M99	Miscellaneous	Spares and maintenance data, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.
N - HANDLING, SHIPPING & SITE INSTALLATION.		
N01	Packing Marking & Shipping PROCEDURES	Shipping, Packing and marking procedures must be adhered to determine the materials are going to ship as per local regulations and customs requirements , Also must follow the project specification and manufactures recommendations.
N02	Packing and shipping schedule/ list	For equipment shipping in more than one piece, a schedule is to be submitted which identifies all the major components of the package for use as a Check List at the receiving point to ensure all items have been received. Copy of document to accompany shipment.
N03	Hazardous material shipping certificate	In accordance with applicable regulations and requirements included in the Commercial Instructions to Suppliers. Typical Material Safety Data Sheets and TREM cards shall be provided in the main language of each country through which the goods will be shipped.
N04	Erection, Installation, Pre-commissioning and Commissioning procedures	Detailed description and procedures for installation of equipment to be supplied to be used at the fabrication site. Procedure shall include list of spare parts, special tools and utilities required, sequence of pre-commissioning/commissioning tests/checks to be performed on site and should include elements defined in sequenced procedure for start-up and fault guidelines. Copies of all relevant drawings shall also be included. This document shall also include detailed procedure of installing each Cathodic Protection material and complete procedure for testing and commissioning of Cathodic Protection system. The following information shall be included: 1. Lifting points 2. Lifting weights 3. Shipping break points for panels and switchboard assemblies 4. Erection match markings 5. Fixing points 6. Leveling procedures 7. Alignment procedures 8. Erection fasteners summary list 9. Details of any special unpacking/handling requirements shall be stated
N05	Detailed preservation and storage procedure	-
N06	Detailed handling procedure complete with special lifting gear	-
N99	Miscellaneous	Handling, Shipping & Site Installation data, not covered in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.
S - SAFETY DOCUMENTS		
S01	Fire and gas detection system layout	If in the scope of supplier, the layout drawing indicating location and type of detector with coverage circles.
S02	Hazardous area layout	If in the scope of supplier, the layout drawing indicating hazardous area classification balloon around applicable equipments as per project specification.
S03	Safety validation plan/report	The SVP should cover 1. Compliance to IEC-61508 & IEC-61511 standards. 2. How Functional Safety Management will be implemented. 3. Safety Requirement Specification provided by PUL. 4. How each phase in the Safety life Cycle will be implemented. 5. How Modification/Change will be handled and documented. 6. Typical Configuration of SIF's based on the SRS provided by Petrofac. (E.g. Typical voting, relay configurations) 7. Reliability calculations for these typicals. 8. List of all the assumptions made to calculate Proof test interval for the system.
S04	Reliability Availability, Maintainability(RAM)	Document represent reliability & availability calculation and block diagram of the proposed facility.It shall include assumptions, recommendations to improve availability.
S05	Safety Integrity Level(SIL) calculation(verification)	Study report representing outcome of SIL determination workshop or calculation performed as per recognized international standard or project specification
S06	Noise study	Document represents noise mapping/calculation for the facility and represent calculated noise contour in geographically on layout.
S07	Fire fighting Equipment Performance Data	Data sheets representing operating limitations like flow ,through, pressure. Movements etc.
S99	Miscellaneous	Safety documents, not covered above, that are required by the Contractor or identified by Supplier for submission to Contractor.
Q - QUALITY ASSURANCE / QUALITY CONTROL DOCUMENTS		
Q01	ISO 9001:2008 certificate	For information only.

Sheet 2: PREAMBLE		
(The minimum contents envisaged in the required documents from Supplier is specified in the below)		
Q02	Inspection & test plan	Quality control plan shall be purchase specific, it shall contain as a minimum sequential activities including all test and inspections as well as associated 'hold', 'witness', 'surveillance', inspection/test' and 'review' points for all parties, the activity to be inspected, the attributes/characteristics to be confirmed, the applicable acceptance criteria, the procedure to be followed, the responsible party and the verification record.
Q99	Miscellaneous	Quality Documents, not in the above, that are required by the Contractor or identified by Supplier for submission to Contractor.