R1 05 80 05 Technical Directive

Tata Steel E3D Model Criteria

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If this document is changed in the future, the amendments will not be sent to you.
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1.0 OVERVIEW

This specification has been prepared specifically to meet the PDMS 3D modeling requirements of the Project. This document is generic in nature. Sections that do not apply to this project have been marked though with a line.

2.0 3D MODEL DEFINITION

2.1 FORMAT

The Project Model is to be supplied in AVEVA E3D ver 2.1 and AVEVA Global 3.3

Files to be delivered by Contractor are:

- All AVEVA E3D Project directories and their contents.
- All AVEVA E3D catalogue items and specifications used in the production of the AVEVA E3D Project Model.
- All AVEVA E3D reports, synonyms, and customized PML or other pertinent items along with instructions.
- Following User name and pass words are to be used by contractor for system user
  User Name : SYSTEM
  Password : TSLIJM

2.2 MODEL SEGREGATION

The Project is divided into work packages (i.e. WP XXX-01, WP XXX-02 etc.) as assigned by the TATA Steel AVEVA E3D Administrator. Refer Annexure 1 for Details

3.0 Extent of Modelling

3.1 GENERAL

The Modelling part includes modelling of all civil structures/ buildings, equipment, equipment foundations, enclosures, fencing/railing, Material Handling equipment including cranes and Hoists, piping, electrical & instrumentation items including cable trays ,ducting, supports, platforms, shielding & sealing arrangements, ladders, staircases, reserve volumes along with preparation of data base and checking for all interferences including with reserve volumes. Reserve volumes shall be maintained for maintenance areas, pathways etc. Description regarding jobs related to some of the disciplines is given below for information

3.1.1 Civil & Structural

- All steelwork including columns, beams and bracing (horizontal and vertical) irrespective of size.
- Main access platforms, miscellaneous platforms as identified and defined by the Piping Design Group, hand railing, stairs and ladders including cages.
- Major pipe supports (i.e. pipe racks, t-poles, and concrete sleepers).
- Above ground concrete items (i.e. piers, equipment pads, curbs, bunkers).
- Civil items above ground (i.e. roads, paving, manhole/sump covers, etc.).
- Floor decking (i.e. grating, checker plate) or Elevated Concrete Slab including
- openings required by Piping, Electrical and Process Controls.
- Metal roof deck and siding on equipment structures.
- Building volume will be modelled as defined on the Project's General Arrangement and per design criteria provided by TATA Steel including building size, doorways and location within the Project Model.

3.1.2 Equipment

- All equipment (mechanical, electrical, and C&I) shall be surface modelled to its dimensions contours / shapes etc. Detailing like nut/bolts, etc. may be omitted, except when specifically asked for.
- Also reserve volumes for maintenance of equipment are required. E.g.: Tube bundle removal, rotor removal, drop out area, access path of movement of equipment from its location to outside / maintenance area etc.
- Equipment supports, skirts, support legs, saddles etc. shall be modelled.
- In case of skid mounted equipment, all sub- equipment inside the skid, all external piping in skid mounted equipment, all pipe supports within the skid shall be modelled.
- Steam/ Air manifolds, shall be modelled.
- Volume should be reserved for manhole access, etc. and should be used for clash detection.
- The following attributes shall be added to the equipment i.e. status, description, drawing number, drawing revision number, P&IDs status, dry weight, operating weight, handling weight, centre of gravity, etc. The equipment shall be named in the model using item name and tag number as shown in corresponding drawings / P&IDs. All Nozzles should be tagged in line with P&ID.

3.1.3 Piping

Piping and In-line Instruments are to be designed in the AVEVA E3D Project Model. Piping to be designed per the P&ID's, Line List, and as described in the Project piping Specifications. There will be no deviation permitted between the AVEVA E3D Pipe Spec and the Project Piping Specifications. The AVEVA E3D Pipe Spec Database to be updated in a timely manner as required per each subsequent issue of the Project Piping Specification.

- All Process Piping ½" and above, as defined on the P&ID's.
- All Utility Piping ½" and above, as defined on the P&ID's.
- Fire Protection Riser Mains up to the main shut-off valves.
- Utility Stations, Safety Showers & Eyewash Stations to be modelled and reserve the necessary space for their installation.
- Package Units and Sample Stations to be modelled in the form of a spatial envelope per unit and volumes for maintenance and access.
- Branch connections, instrument connections and/or branch root-valves where indicated on the P&ID's, are to be modelled.
- The attributes like service, P&IDs reference number, P&IDs revision number, operating temperature, pressure, specification etc. must be entered. After the pipe is routed, the data consistency check, All errors and inconsistency shall be removed. Insulation thickness of pipes & insulation specification shall also be entered.
- All pipe supports (consisting of primary and secondary) shall be shown in the model. All support number shall be tagged so that it can have a unique identification number including common supports for piping.
- Actuator, hand wheels etc. on a valve shall be modelled.
- All vents, drains, etc. shall be modelled.
- Connection reference shall be available for both head and tail. insulation of pipes to be shown and the same shall be used for clash detection

3.1.4 Electrical

- Cable Tray Systems (Power, Power and Control, Instrumentation, Emergency Shutdown and Electrical Heat Trace)
- Major Conduit Banks (6" in diameter and larger)
- Local Control Panels (i.e. Heat Tracing, Motor Control, Local Lighting, etc.).
- Motor and Equipment Control Panels
- All Field Terminal Boxes (Power, Control, Ground Reference, Instrumentation, Emergency Shutdown, etc.)
- Cable tray supports shall be shown. All support number shall be tagged so that it can have a unique identification number
- A minimum reserved space as specified shall be provided on top of each cable tray as reserved volume for enabling removal of cable tray top. This volume shall be used for clash detection

3.1.5 HVAC

- All Process and Ventilation Duct of all sizes, Air Handling Units, blowers, ventilators, filters, chiller, dryers, condenser, heater, fans etc., shall be modelled.
- Reserve volume shall be made for insulation on ducts.
- Duct supports shall be modelled. However stiffening angle on duct need not be shown but to be considered for reserve volume §3.1.6.
- All support number shall be tagged so that it can have a unique identification number.

3.1.6 Reserve Volumes

In addition to modelling all the physical components comprising the plant, the following shall be modelled as soft volumes

- Access for maintenance of each equipment, component or device which requires/may require maintenance/removal/ replacement.
- Area required around the above-mentioned equipment, component or device for maintenance.
- Volume required for movement of crane / monorail,
- Operational access/equipment/trolley movement path
- Staff Escape routes
- Movement of maintenance cranes, monorail hoist, chain pulley blocks and any other material handling devices and drop out zones
- Swing areas for building windows and doors

4.0 Model Review

Formal Project Model Reviews will be conducted with the combined Project Management Team, appropriate Engineering Discipline Lead Engineers and subcontractor lead team at scheduled milestone intervals during the course of the Project.

Formal Project Model Review milestone criteria shall include, but not be limited to the following:

- When the Overall Project Model is at varying stages of completion:(30%, 60%, 90%)
- Final Overall Project Model Review, when model is 100% complete prior to handover to TATA Steel

A Model Review held at the end of the Basic Engineering / beginning of detailed design phase used to review the following subjects:

- Plant escape
- Maintenance
- Safety
- Ergonomics
- Constructability
- Operations

5.0 Stages of Model Review

5.1 Model 30% complete

- Location and orientation of all equipment and all space consumers
- Structures (steel and concrete) – Main Beams and Columns
- Major piping that determines equipment positions
- Critical pipe lines
- Concrete slabs, paving and roads
- Packaged unit location and orientation
- Hazardous area classification
- Escape routes and safety zone(s) defined and marked
- Pipe racks and main pipe support structures
- Outline of underground electrical and instrumentation trenches
- Main electrical and instrumentation cable trays
- Underground sewer systems and collecting and separation systems
- Buildings in outline, e.g. control room, analyser houses, switch rooms
- Area reservation for construction, safety, operation and maintenance (dropout/bundle pulling and laydown areas, mobile crane, vacuum truck, etc.)
- Battery limits interfaces marked

5.2 Model 60% complete

- The actions resulting from the 30% model review
- All other piping largely completed
- Orientation of ladders, stairs, platforms on vessels and columns
- Platforms for valves and equipment and operation
- Permanent cranes and hoisting beams
- Final dimensions of table tops, structures and steel constructions
- Certified vendor information (e.g. final dimensions, weights, nozzle orientations)
- Secondary steelworks and bracing
- Eye bath and safety shower locations
- Major and special pipe supports
- Local operation panels
- Firefighting systems (hydrants, monitors)
- Instrument transmitters and outlines of junction boxes, panels and cabinets
- Electrical heat tracing boxes
- Above ground instrumentation and electrical tray routing
- Outlines of steam tracing manifolds.

5.3 *Model 90% complete*

- The actions resulting from the 60% model review.
- Inclusion of Vendor Information in Model.
- The model shall be substantially complete, including instrumentation.
- Final comments shall be made at this stage.

5.4 Model 100% complete

- 3D Model should represent the As-Built condition.

6.0 2D Drawing Extraction

6.1 Procedure for Drawing Extraction

This section describes method for Exporting Drawings from AVEVA E3D software to AutoCad software with pre-defined template and required attributes for user in .dwg Format.

6.2 Pre-requisites

Autodesk AutoCAD shall be Installed on Machine with Minimum AutoCAD 2013 version.

6.3 Export Drawing

Utility will be shared named 'TATA Apps' ribbon which can be used on Draw Module of AVEVA E3D Software.

- All the TATA Steel templates to kept in <%project iso% und> folder
- Load Exportcad.pmlfrm supplied by TATA Steel
- To access this utility, Go to 'Draw' group Under 'TATA Apps' ribbon.
- Select '2D Drawing' tab under it to execute Program.
- Be at Drawing (DRWG) level in hierarchy before executing this Program.
- Once above option is selected,Following Form will be displayed on screen,

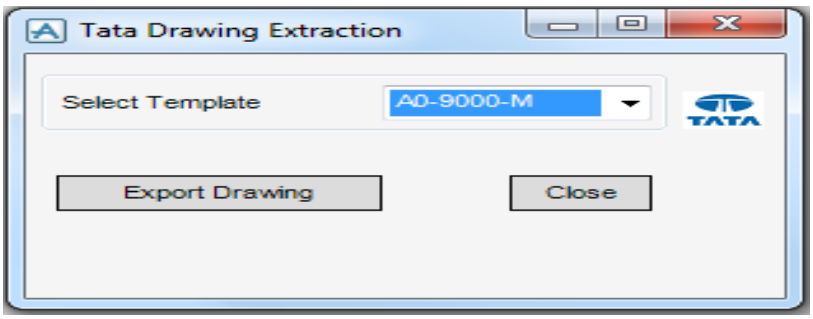
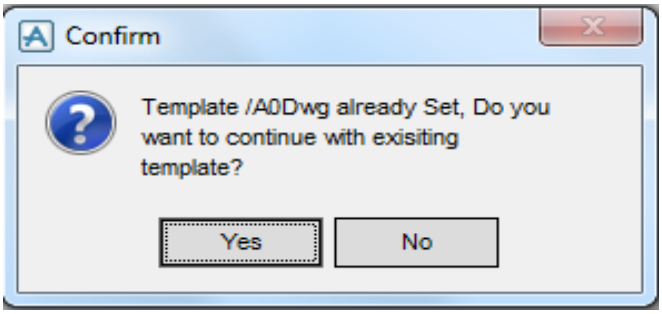


Image 1. Drawing Extraction Form

- Following options are available on Form which are explained as follows
- Select Drawing Template which needs to be attached to Drawing.
- Required template can be selected from drop down given on form.
- Once template is selected, Click on Export Drawing Button.
- In case, Drawing already has template assigned, prompt will be given to you asking whether to continue with Existing template assigned or to assign new template.



- If Selected Yes, Existing Template will be used. If selected No, Newly Selected Template will be assigned.
- Program will Export Drawing along with template and attributes in .DWG format in E3DUSER folder.

6.4 Close

This option will close Form.

6.5 Templates of TATA Steel

For details of templates refer section 10.2 of R1058002 (TATA Steel CAD drawing rules).

6.6 Drawings

- All 2D drawings of the entire project must be located at the highest level in one folder, “General Arrangement Drawings”, Thereafter divided into discipline wise or package or Area wise.
- For details of Drawing File Number, Sheet Numbering and Revision number refer section 11.0 of R1058002 (TATA Steel CAD drawing rules).
- All drawings should comply with TATA Steel Document No R1058001.

6.7 Acceptance test

- The supplier must submit a set of test files before start of Design.
- 2D drawings produced by subcontractors, must be submit for approval.
- Test files in accordance with these regulations.
- The test files will only be used as reference documents after acceptance by the CAD support department.

6.8 Deviations from these regulations

- Deviation from these regulations permitted after a written approval of the CAD support department of Tata Steel.

7.0 Isometric Extraction

7.1 Plant North

- Plant North on the Left hand top corner of the Sheet.

7.2 Drawing Template

- All Isometric drawing must be produced according the TATA Steel supplied templates and option file.
- Deviation from the styles or size only permitted after a written approval of the CAD support department of Tata Steel.
- Refer Annexure-3 for Sample drawing template.

7.3 Line Properties

- Line Properties shall be shown on the right hand top corner of the sheet as Listed below

    - Pipe Class (Class as per Piping Material Specification)
    - Design Pressure (In bar)
    - Design temperature (In ^{0}C)
    - Medium
    - Test type (hydro/air)
    - Test Pressure (In bar(g))
    - Tracing (Applicable/ Not Applicable)
    - Insulation type (PP/ Hot Insulation / Cold Insulation etc.)
    - Design Code
    - NDT (Yes / No)
    - Paint System (Reference document number)

- Deviations only permitted after a written approval of the CAD support department of Tata Steel
- Refer Annexure-2 for Mapping of E3D/ PDMS attributes

7.4 Material List

- Material List shall be on the right hand side of the sheet and shall describe part number, component description, material and quantity. including bolts, nuts, washers and primary supports.
- Component Description shall give information about Type, Dimensional Standard, type of end connection.
- Nominal size shall be in metric.
- Item Code shall give information of STS number.

PT NO	COMPONENT DESCRIPTION	MATERIAL	N.S. (MM)	ITEM CODE	QTY

7.5 References

- Reference drawings to be indicated in the bottom left corner of the drawing Following references are required but not limited to:
  - Piping & instrumentation drawing
  - Support book
  - Line List
  - Stress Calculation
  - Piping layout (if any)
- Refer Annexure-2 for Mapping of E3D/ PDMS attributes

7.6 Notes

- See “NOTES” at the bottom of the drawing. Extra notes can be added per project requirement .
- Existing notes may only be removed after a written approval of the CAD support department of Tata Steel

7.7 Standards Directives and PED

- For standards directives and PED see bottom of drawing
- Refer Annexure-2 for Mapping of E3D/ PDMS attributes

7.8 Revision number

- Revision details shall be mentioned on bottom of the drawing where space is reserved for purpose of revision, Drawn, Checked and Approved.

7.9 Drawing, Line and Sheet number

- Drawing Number and Sheet Number are Indicated in right down corner of the sheet.
- Line Number shall indicated in the bottom of the sheet and to be identical as shown in P&ID.

7.10 Pipe Isometric

Refer Annexure -4 for the Sample Isometric for reference

- Isometric shall be drawn in the space provided on the drawing template.
- From and to reference, North- East coordinates and elevation at start and end of the line with reference to Plant coordinates.
- All dimensions of branch connections given from COP (centreline of main pipe).
- At line or branch connections , line- or Equipment Number (incl. reference sheet), North-, East- Coordinates and Elevation with reference to Plant coordinates.
- All the required dimensions for erection.
- Dimensions of Standard components such as Elbow, Tee, reducer etc. are not required.
- Slope lines coordinates at every change of direction and end of line.
- Hold points to be marked on the drawing below the Bill of Material table.
- Position of Pipe Supports shall be shown.

7.11 Drawings

- All Isometric drawings of the entire project must be located at the highest level in one folder, “Isometrics”, Thereafter divided into package or Area (…\<project folder>\ <Isometrics>\Area).
- Drawings must be supplied in PDF and DWG format.
- Drawing file names must be compiled as follows:
  <TATA-DWGNO>-<REVNO>-BL<SHEETNO>-<SUB-SHEETNO>.<EXTENSION>
  In which: <TATA-DWGNO> : 6 positions
  <REVNO> : 3 positions (numerical)
  <SHEETNO> : 4 positions
  <SUB-SHEETNO> : 2 positions
  Example: A54321-002-BL0000-00.DWG
  A54321-002-BL0001-00.DWG
  A54321-002-BL0010-00.DWG

- All drawings should comply with TATA Steel Document No R1058001

7.12 Letters and Numbers

Description	Letters and Numbers	Character Height in mm
Drawing Number	Large	5
Sheet Number	Large	3.5
Line number	Large	3.5
Revision	Large	3.5
Standard directive and PED	Small	2.5
Reference drawings	Small	2.5
Line Properties	Small	2.5

7.13 Acceptance test

- The supplier must submit a set of test files before start of Design.
- Option file (PDMS) for Isometric extraction to be prepared on the basis of this document.
- Isometrics produced by subcontractors, must be submit for approval.
- Test files in accordance with these regulations.
- The test files will only be used as reference documents after acceptance by the CAD support department.

7.14 Deviations from these regulations

- deviation from these regulations permitted after a written approval of the CAD support department of Tata Steel.

ANNEXURE – 1

1 Introduction

This document has been made as an instruction for AVEVA E3D project use. The agreements made herein are to be followed to ensure an unambiguous and efficient way of working to guarantee the quality.

This instruction is based on E3D2.1.

Agreements and instructions which are not mentioned in this instruction, which have influence on the (CAD) project documents, always need to be discussed with the lead engineer of the project and if applicable with the application owner. These project related agreements have to be recorded in a project note or memo.

Additional findings during projects are supposed to be incorporated into this instruction to keep the document up to date as much as possible.

The information in this document is subject to change. Contractor will receive updated versions.

General notes:

- 3D model is leading. All 2D drawings to be extracted/ based on 3D model.
- All piping items in the 3D models are to be drawn according to pipe specs. The additions of items to the database will be made in a structured manner.
- If an item in a pipe class is needed which is unavailable, send a request to the piping lead engineer.
- After approval it will be forwarded to the E3D administrator.
- Contractor will be informed when it's available in the spec.
- If Custom parts are placed, use a dummy PCOM component if available.
- If something is incomplete or missing it will be added during the project. It is not allowed to make changes at one's own initiative. Note it or ask, so it can be adjusted.

2 Project setup

2.1 General

Contractor shall use a AVEVA E3D2.1 and AVEVA Global 3.3

2.2 Units

Distance: Metric
Bore Pipe Size: Metric

2.3 Project ID

Project ID will be provided by TATA Project Manager

2.4 Security and administration

Project can be setup Local or Global as per project requirements

2.5 Local/Global project setup

When using a Local project setup, contractor will receive the relevant project data. Project can be setup Global to be able to work with multiple contractors. Access rights for a SAT will be set per Site (PBS / WP/ Area Number).
It is not allowed to create databases or extracts. To avoid trouble shooting while merging the extract databases into Global Environment.

2.6 HUB

Hub is located at contractor and administrator under the supervision of Tata Steel

2.7 SAT

Sat is located at TATA and other subcontractors using AVEVA E3D

2.8 User security

Each user will have unique login account with dedicated access rights to relevant site/area/work.
The SAT administrator has to create the user accounts/users.

3 3D Model Setup

3.1 General

3D MODEL will be made using the software AVEVA Everything3D version 2.1

3.2 X-Y-Z- coordinates

Tata Steel IJmuiden uses its own local coordinate system, managed by a Tata Steel cadaster team. The X-Y-Z- coordinates to be used are based upon nearest “hoogtebout”. This has to be verified by means of a GPS- measurement if required.

The ground levels are indicated on existing (SAP) drawings / documents the for Re-vamp projects. If existing (SAP) drawings / documents have a different ground level this needs to be verified to the benchmark (+8000)

4 Hierarchy and Naming Convention

All tags and names have to be in accordance with all other project documents like P&ID, data sheets, line list etc.

Hierarchy used to be submitted by the contactor for approval of TATA project manager.

Project hierarchy is setup as follows:

SITE *(PBS/ Area/ Work package Number)*

SITE PLANT

ZONE (*GRID/GRADE/ROADS/RAIL-ROADS /PAVING/ WALKWAYS /FNCING/WATER /DIKES)*

5 Roles and Responsibilities

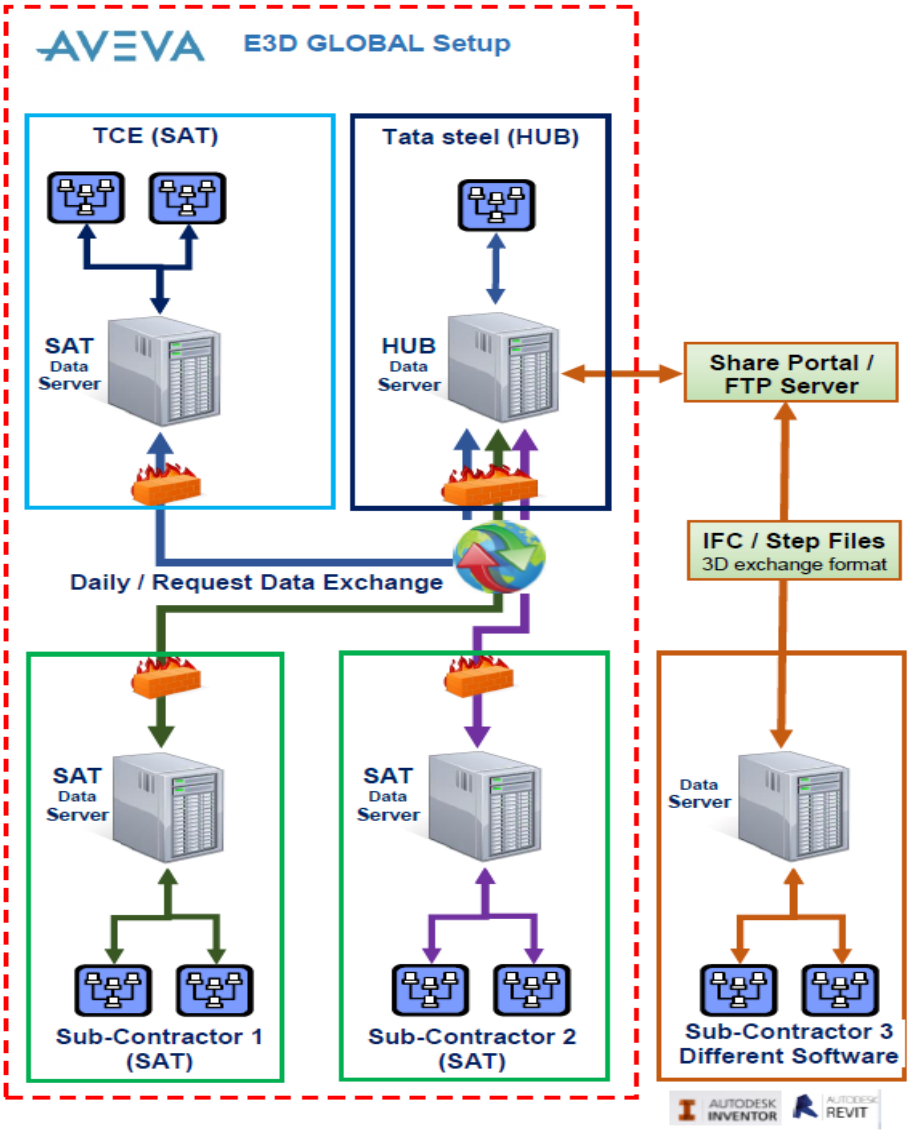
5.1 General

Contractor is responsible for managing the design for completing the Work as required.
Contractor shall use an AVEVA Global Satellite Location, with a daily on-line connection to the Company AVEVA Global Hub. TS Ijmuiden is the Hub Administrator and is responsible for creating and allocating Teams, Databases, Locations and distribution of Databases.
Design databases are implemented per PBS-Number (SITE) and primary at the HUB or SAT.
Global satellite access rights are set per Source. <To be implemented later using DAC>

When using a Local project setup instead of Global project setup, contractor will send on a daily basis the relevant updated database.

5.2 Global

Contractor shall ensure that their AVEVA E3D Global daemon runs continuously in a working state at Contractors location, including at Contractors sub-satellite locations and other satellite locations involved in the scope of work.
Contractor shall set up and execute daily Scheduled Global Updates between Contractors location and any locations below Contractors location in the AVEVA E3D Global hierarchy.



5.3 *User and MDB*

Contractor is responsible for establishing and administering the Users and MDBs for Contractor satellite locations including sub-satellite locations. Contractor is responsible for the MDB content required for completing the Work. This includes databases containing Work from other Contractors. Contractor shall on request by Hub Administrator, detach databases from MDBs and remove any claims from databases required for service by Company or other Contractors.

5.4 *Expunging Users*

Once per day, Contractor shall Expunge all Users at his Locations and sub-contractor Locations in all Company AVEVA E3D Global 3D CAD models using the “Expunge”-command (Expunge All Users) to clear any AVEVA E3D “dead user”-claim lists.

5.5 Expunging Claim list

On request Contractor shall expunge the claim list on one or more databases.

6 3D Model Colors

Colors are set according the E3D default file des-col.pmldat

7 Status Control

Status control should be implemented in 3D Model. Status of the 3D model should be send to TATA project manager every fort night or as agreed in the Kick of Meeting. Progress measurement shall be discussed and approved by TATA project manager before Implementation based on scope of work.

7.1 Setting Status Information for Equipment

Status Definition for equipment modelling in AVEVA E3D shall be as follows:

STATUS	PROGRESS	DESCRIPTION
S1	20%	Inquiry Specification
S2	30%	Order Specification
S3	40%	Vendor Drawing
S4	60%	Nozzles Pos. & Orientation Fixed
S5	75%	Foundation / Supporting Steel Structure released for construction / Civil Design
S7	80%	Final Vendor info Checked
S8	100%	As-Built Updation

7.2 Setting Status Information for Piping

STATUS	PROGRESS	DESCRIPTION
S1	10%	Modelling of Line Includes Instruments +Supporting +Clash & consistency check
S2	20%	P & ID Check
S3	30%	Checking of adequacy of Supports, Accessibility and all Engineering requirements
S4	40%	Interdepartmental Review
S5	45%	Incorporation of Comments
S6	50%	Stress Analysis
S7	55%	Incorporation of Stress Analysis Comments

S8	60%	Model Review By Client or by Internal team
S9	65%	Incorporation of Comments received
S10	80%	Issue to site for construction
S11	100%	As- Built Updation

7.3 Setting Status Information for Cable Trays

STATUS	PROGRESS	DESCRIPTION
S1	10%	Modelling of cable trays +Supporting +Clash check
S2	30%	Checking of adequacy of Supports, Accessibility and all Engineering requirements
S3	40%	Interdepartmental Review
S4	45%	Incorporation of Comments
S5	60%	Model Review By Client or by Internal team
S6	65%	Incorporation of Comments received
S7	80%	Issue to site for construction
S8	100%	As- Built Updation

7.4 Setting Status Information for HVAC

STATUS	PROGRESS	DESCRIPTION
S1	10%	Modelling of HVAC, Supporting and Clash check
S2	30%	Checking of adequacy of Supports, Accessibility and all Engineering requirements
S3	40%	Interdepartmental Review
S4	45%	Incorporation of Comments
S5	60%	Model Review By Client or by Internal team
S6	65%	Incorporation of Comments received
S7	80%	Issue to site for construction
S8	100%	As- Built Updation

7.5 *Status Definition for Structural RCC & STEEL*

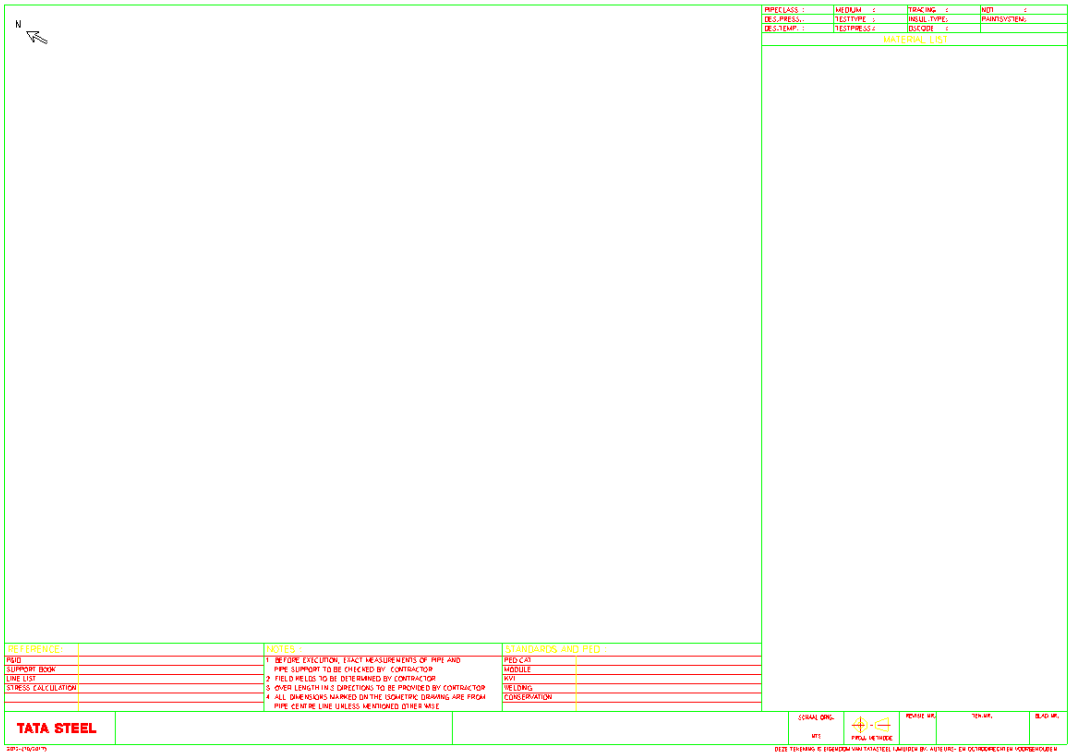
STATUS	PROGRESS	DESCRIPTION
S1	30%	Initial modelling
S2	50%	Update as per preliminary structural Analysis & released for Interdepartmental comments
S3	60%	Comments incorporated, secondary beams, finalized, sent for Interdepartmental comments.
S4	80%	Released For Construction
S5	100%	As-Built updation

ANNEXURE – 2

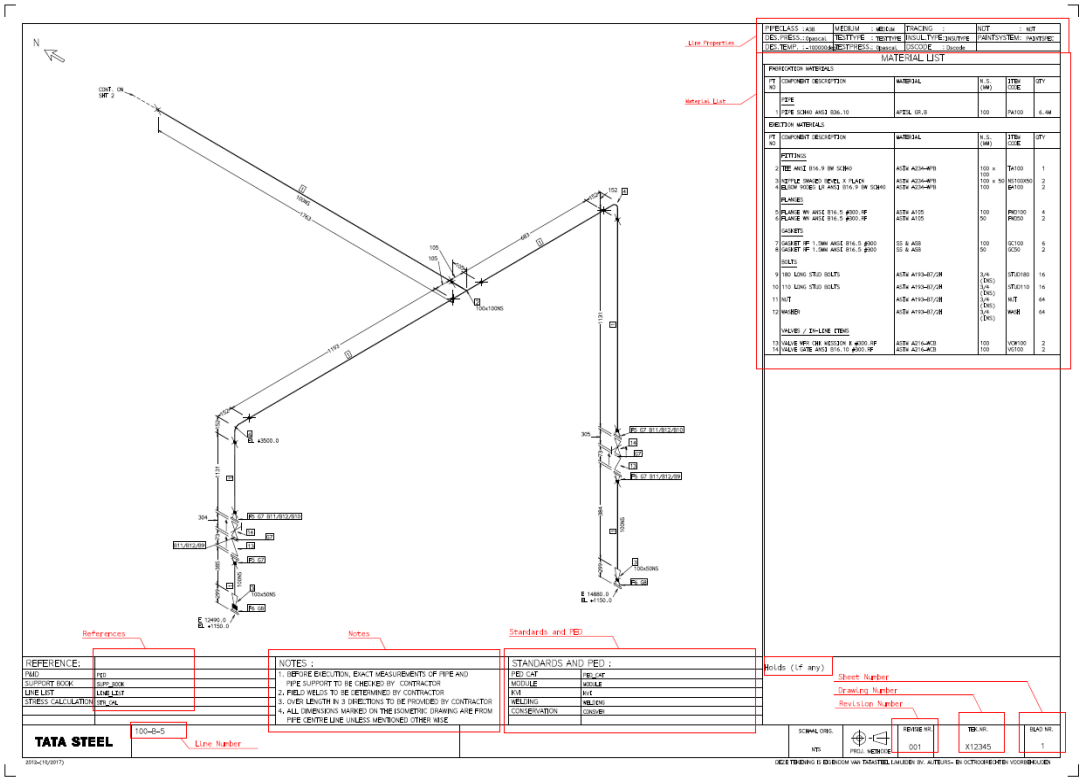
- **Mapping of Attributes for E3D/PDMS**

Sl. No	Name	E3D/PDMS Attribute	Remarks
Line Properties (Refer Section 2.3)			
1	Pipe Class	PSPE	Default Attribute
2	Design Pressure	PRES	Default Attribute
3	Design temperature	TEMP	Default Attribute
4	Medium	:Medium	User Defined Attribute
5	Test type	:Test_Type	User Defined Attribute
6	Test Pressure	TPRESS	Default Attribute
7	Tracing	:Tracing	User Defined Attribute
8	Insulation type	:Insul_Type	User Defined Attribute
9	Design Code	Dscode	Default Attribute
10	NDT	:NDT	User Defined Attribute
11	Paint System	PTSP	Default Attribute
Reference (Refer Section 2.4)			
1	P&ID	:PID	User Defined Attribute
2	Support book	:Supp_Book	User Defined Attribute
3	Line List	:Line_List	User Defined Attribute
4	Stress Calculation	:Stress_Calc	User Defined Attribute
Standards and PED (Refer Section 2.6)			
1	PED CAT	:PED_CAT	User Defined Attribute
2	Module	:Module	User Defined Attribute
3	KVI	:KVI	User Defined Attribute
4	Welding	:Welding	User Defined Attribute
5	Conservation	:Conservation	User Defined Attribute
General			
1	Drawing Number	FDRA	Default Attribute
2	Revision Number	FREV	Default Attribute

ANNEXURE – 3



ANNEXURE – 4



ABBREVIATIONS

DAC – Data Access Control
E3D – Everything 3D
ESC – Engineering Service Contractor
HVAC – Heating Ventilation and Air conditioning
LOC – Location
MDB – Multiple Database
PBS – Product Breakdown Structure
PCOM – Piping Component
PDMS – Plant Design Management System
PML – Programming Macro Language
SAT – Satellite
TS – TATA Steel
TSIJ – TATA Steel Ijmuiden

REFERENCES

The following references are made in this Technical Directive:

R1058001 Tata Steel Drawing rules.
R1058002 Tata Steel CAD Drawing rules