

GENERAL SPECIFICATION

CONCEPTION AND SAFETY ENGINEERING

GS EP ICS 004

3D CAD Models

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1. Scope

1.1 Purpose

This specification defines the minimum requirements to be applied for the development of 3D CAD Models.

This document presents the Company's strategy toward 3D CAD modelling and specifies Company's requirements for:

- Design of 3D CAD Models,
- Review of 3D CAD Models,
- Deliverables produced from 3D CAD Models,
- Handover of 3D CAD Models.

The requirements for Administration and Catalogues & Specifications of 3D CAD Models are specified in [GS EP ICS 005](#).

1.2 Applicability

This specification is **not** retroactive.

This specification shall apply to all 3D CAD Models produced by the Contractors, its sub-Contractors and Vendors during project execution phases (Basic/FEED and detailed engineering phases) and field operation phases.

This specification shall also apply to all 3D CAD Models produced by the Contractors during pre-project phase with adequate arrangements to be agreed with the Company on the design requirements to accommodate the required level of details.

The Main Contractor is ultimately responsible to incorporate all information produced and issued by its Subcontractors and Vendors in the handed over 3D CAD Model.

This specification shall apply to onshore and offshore Greenfield projects and to Brownfield projects when 3D CAD Model or point clouds are made available.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
Not applicable	

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Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

Reference	Title
GS EP DEV 001	Asset Objects Tagging
GS EP ICS 001	2D CAD Layouts
GS EP ICS 002	2D CAD Process Schematics
GS EP ICS 005	3D CAD Model Administration & Catalogues
GS EP PJC 701	Documents identification & numbering at project execution and field operations phases
GS EP PJC 702	Documents requirement at project execution and field operations phases
GS EP PJC 703	Requirements for Contractor Final Documentation
GS EP STR 001	Weight monitoring and weighing offshore and onshore units

3. Terminology

3.1 Definitions

There are five types of **statements** in this specification, the “shall”, “should”, “may”, “can” and “must” statements. They are to be understood as follows:

Shall	Is to be understood as mandatory. Deviating from a “shall” statement requires derogation approved by Company.
Should	Is to be understood as strongly recommended to comply with the requirements of the specification. Alternatives shall provide the same level of protection or performance and this shall be documented.
May	Is to be understood as permission.
Can	Is to be understood as a physical possibility.
Must	Expresses a regulatory obligation

Note that “will” is not to be understood as a statement.

The following terms as defined below have been used throughout this specification.

3D CAD Model	Databases centric three (3) dimensional digital model of the facility
3D CAD Model Global	Software system used to distribute and update 3D CAD Models between locations like engineering offices and fabrication yards.
3D CAD Model Global Hub	The Hub is the location where the overall 3D CAD Model administration takes place.

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3D CAD Model Global Satellite	A Satellite is an office location outside the Hub where the 3D CAD Model is to be distributed on a scheduled basis.
As-Built	Last revision of an item updated with all the necessary details to reflect the true status of completed work with relation to specified tolerances.
As-Operated	Last revision of an item updated with the finest details to reflect the true physical status at the present time, generally achieved during operation stage using Laser scan data and including latest modifications performed on the facility.
Asset Management Portal (3D Portal)	Secured web-based solution used during project or operation for collating, contextualising, cross-referencing and visualising data and documents (3D CAD models, laser scan data, digital photographs, engineering documentation, SAP data, etc.)
Catalogue	Set of data on a project shared between designers to avoid modelling tasks repetition, generally including piping catalogue (geometry, specifications, bolting, etc.), steelwork catalogue, electrical catalogue, etc.
Company	TOTAL S.A.
Contractor	Entity that enters into a contract with the Company
Detailed Engineering	All studies conducted subsequently to Basic/FEED studies required for the procurement, construction and installation of a facility.
Database	Files created by the 3D CAD System to store and manage the data.
Facility	Onshore Process Plants, Offshore Production platform, Semi-submersibles, Floating units (FPSO, FPU, etc.) operated by the Company
Hub Administrator	Organization responsible for administering the 3D CAD Model Global Hub location.
Point Cloud	Set of data points usually defined by X, Y, and Z coordinates in a three-dimensional coordinate system intended to represent the external surface of an object. Point clouds are generally created by 3D scanners.
Pre-Project	Engineering part of projects conducted before FEED, generally by the Company itself
SITE	E3D MODEL level of hierarchy directly under WORLD
STEP File	Standard for the Exchange of Product model data
Total Master Project	E3D project containing Catalogue & Specification databases provided to the Contractor codified and organised to meet Company requirements for Asset Life Cycle Management.
WORLD	Highest level of the E3D hierarchy

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ZONE E3D MODEL level of hierarchy directly under SITE

3.2 Abbreviations

CAD	Computer Aided Design
CFD	Computational Fluid Dynamics
E3D	Everything 3D (AVEVA)
EER	Escape, mustering, Evacuation and Rescue
FEED	Front End Engineering Design or Basic Engineering
FPSO	Floating Production Storage and Offloading
FPU	Floating Production Unit
HVAC	Heating, Ventilation and Air Conditioning
ITS	Immersive Training Simulator
MDB	Multiple Database, collection of 3D CAD Model databases
MTO	Material Take Off
PDS	Plant Design System (INTERGRAPH)
PFD	Process Flow Diagram
P&ID	Piping & Instrumentation Diagram
SP3D	Smart Plant 3D (INTERGRAPH, superseding PDS)
UDA	User Defined Attribute in 3D CAD Model

4. General Requirements for 3D CAD Models

4.1 Generalities

The 3D CAD Model is a collection of graphical data and databases which describes the facilities of a plant for design, checking and visualisation purposes. The 3D CAD Model is accessed via a 3D CAD system. The graphical data and the engineering attributes shall be an integral part of an engineering database supporting the design process which will be ultimately owned by the Company.

The 3D CAD engineering databases shall allow integration and consistency of the different design stages and the different disciplines, such as piping, civil, structure, mechanical, safety, instrumentation, electrical, telecom and HVAC equipment into one (1) 3D CAD Model.

4.2 3D CAD Model objectives

The 3D CAD Model shall provide a visual check on safety, operability and maintainability of the facility during the engineering, procurement, construction, commissioning, installation, production and maintenance phases.

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The 3D CAD Model shall enable creation of ITS and Asset Management Portals, and in this respect shall display all the elements that can interact with an operator.

The 3D CAD Models delivered to the Company should allow as a minimum to:

- Perform clash checks to ensure 3D CAD Model is clash free;
- Confirm proper escape ways and access for maintenance, handling and lifting;
- Confirm process requirements for slopes, low points, etc.;
- Extract 1D engineering lists such as equipment lists, line lists and instrument data lists;
- Extract Material Take-off (Bills of Material);
- Produce 2D engineering drawings such as plot plans, layouts with safety distances, plan and elevation views, etc.;
- Produce piping drawings such as general arrangement drawings, pipe support drawings and piping isometrics;
- Produce safety drawings such as Hazardous area classification drawings (plan and elevation views), Fire and Gas Detection Layouts displaying covered area, Fixed Firewater Layouts displaying covered area, Safety equipment layout (fixed and portable facilities), EER drawings, etc.
- Produce other engineering disciplines drawings as structural, HVAC, instrumentation and electrical, etc.
- Extract data for specific studies such as piping stress analysis, 3D explosion modelling, radiation studies, gas dispersion studies, etc.;
- Produce shaded isometric views;
- Issue detailed Weight control report, calculate centre of gravity;
- Perform quality check on CAD Objects attributes, Tag names or piping line numbers;
- Track progress during all project phases;
- Allow Real-Time visualization of the 3D CAD Model using third party software for Model Review, Safety Training, Asset Management Portals, etc.
- Be used as communication tools.

4.3 Data Management

The 3D CAD Model will be used to capitalize project data and shall be usable with the Company's Asset Management Portals, third party immersive training software and real-time software during Operations Phase after Start-Up.

For this purpose, the 3D CAD Model will be used to access information that is stored in its various software systems and databases which requires an accurate and extensive object's tagging implementation. The 3D CAD Model shall contain within its database at a minimum all the information displayed on the piping and instrumentation diagrams including, but not limited to equipment tags, instrument tags, lines numbers, etc.

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Any process related object shall be uniquely identified by its tag and particular attention shall be paid to the tag spell and format which shall be in accordance with **GS EP DEV 001**.

All non-process related objects (e.g. buildings, door, road, etc.) shall also be uniquely identified, and this requires to group them by category, using accurate description and to follow a proper naming convention.

4.4 Engineering phases

The 3D CAD Model shall be structured in such a way that all disciplines involved can check that the Company's requirements and specifications have been met with respect to safety, operability and maintenance and that it facilitates the engineering, construction, modification and ultimately decommission of the plant. This shall include accessibility for maintenance and fire fighting, location of valves, constructability, process instrumentation, instruments and sensors, routing of the piping adequate for the process, location of emergency shut-down stations, proper and safe location of vents and drains, engine exhausts, accommodation air intakes, location of fire protection and fire-fighting equipment and escape routes, etc.

The 3D CAD Model should allow tracking project progress during the engineering phases as mentioned in **Appendix 4**. This activity is under the Contractor's responsibility, the calculation method being agreed with the Company.

4.5 Model Review

The 3D CAD Model should allow, during engineering and construction phases, the Company to conduct, at any time, internal reviews of the 3D CAD Model and provide feedback and comments to the Contractor whenever deemed necessary by the Company, outside the Milestone Contractual Model Reviews. The objective is to be in position to identify and correct at the earliest any design issues in the 3D CAD Model. The detailed requirements are provided in **section 8**.

4.6 Procurement

The 3D CAD Model should allow interfacing with the procurement third party's software used by the Contractor (if any), required for purchasing, material management and to follow procurement & expediting progress throughout the construction phase. This activity is under the Contractor's responsibility.

4.7 Construction

The 3D CAD Model should be compatible with construction requirements, including construction blocks breakdown, and should be able to provide information during construction for aspects such as construction progress, transport and erection of equipment, routing of piping, positioning of structural steel, reservation for temporary items, platforms, cable trenches, trunking and channels, etc.

4.8 Commissioning

The 3D CAD Model should be structured in such a way that it can be handed over to the Commissioning team to support the start-up of the facility.

4.9 Training

The 3D CAD Model will be used as input to create an interactive real time immersive environment for training and instruction of plant operators, safety staff, construction staff, maintenance staff and emergency response organization. In this respect the 3D CAD Model shall be created in such a way that it can represent the As-Operated state of the Asset, displaying all the objects that can be handled by an operator with sufficient details to have a training environment that corresponds to the reality. It implies that any temporary objects or construction objects or reserved volumes shall be easily removable to allow free navigation in the 3D CAD Model.

4.10 Operation

The 3D CAD Model will be used within 3D Asset Management Portal during the Operations Phase of the Asset. The 3D CAD model shall be linkable to a tag based Asset Management Software Systems such as Document Management Systems, Computerized Maintenance Management Systems, etc.

4.11 As-Operated state: As Built modifications

The 3D CAD Model will be used by the Company's affiliate to perform modifications on the As-Built 3D CAD Model to reflect the As-Operated state of the Asset.

The 3D CAD Model shall thus be an accurate representation of the real Asset during the different stages of the Asset Life Cycle.

5. 3D CAD software

5.1 3D CAD Modelling software

The nominated 3D CAD systems which are authorized by the Company are defined in Table 1:

	3D CAD SYSTEM	PERMISSIBLE VERSION	SUPPLIER	COMMENTS
Greenfield Project	E3D	2.1.0	AVEVA	The use of other software from AVEVA PLANT or MARINE suite shall be agreed by Company.
Brownfield Project without existing 3D CAD Model	E3D	2.1.0	AVEVA	A Laser Scan of the Asset should be conducted to generate a point cloud that will be the background of the 3D modelling. If deemed required the point cloud can be used to rebuild the As-Operated 3D CAD Model of the Asset.
Brownfield Project with available and workable E3D 3D CAD Model	E3D	2.1.0	AVEVA	If required, the existing 3D CAD Model shall be upgraded to permissible version prior Project start.
Brownfield Project with available and	PDS or SP3D	To be agreed with Company	INTERGRAPH	Use of 3D CAD System different than E3D can only be authorized upon confirmation that the existing

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	3D CAD SYSTEM	PERMISSIBLE VERSION	SUPPLIER	COMMENTS
workable PDS or SP3D 3D CAD Model				3D CAD system databases completeness allows respecting the general requirements of this specification.
Brownfield Project with available and workable 3D CAD Model different than E3D, PDS or SP3D	The first approach should be to generate a 3D CAD Model from the existing data that can be integrated into E3D. However, such operations on 3D CAD Model systems generally generate data losses; therefore it is recommended to assess the way forward on a case by case basis with the Company.			

Table 1 – Authorized 3D CAD System

Although SP3D, PDS or other 3D CAD systems could be authorized for 3D CAD modelling, under conditions specified above, the terminology used in this General Specification is E3D terminology.

In order to avoid loss of quality at handover, conversion between 3D CAD formats is not authorized. However, if conversion or remodelling is required and permitted by the Company, which will be in such case under the Contractor's responsibility, the final hand over model shall adhere to all requirements of current specification regarding 3D CAD modelling.

The Contractor shall use licensed software only, the Company reserves right to require information regarding the licenses for the 3D CAD Modelling software.

5.2 3D CAD Review software

The nominated 3D CAD Review software which is authorized by the Company for the review of the 3D CAD models is defined in Table 2:

REVIEW SOFTWARE	PERMISSIBLE VERSION	SUPPLIER	COMMENTS
NAVISWORK FREEDOM	2015	AUTODESK	Most widely used by the Company as compatible with both AVEVA & INTERGRAPH 3D CAD System and free software
NAVISWORK MANAGE	2015	AUTODESK	Used for official reviews and/or when FREEDOM version is deemed too limited.
REVIEW	12.2	AVEVA	Accepted during Milestone Contractual Model Reviews

Table 2 – Authorized 3D CAD Review software

5.3 3D CAD integrated software suite

The Contractor may, if required, use software integrated in the design suite of the 3D CAD Modelling software (e.g. Hull Design, Multi-Discipline Supports, etc. from AVEVA). In this case, the Company shall be notified prior to project start, the use of this software being conditional on the agreement of the Company as for any other software not listed in Table 1.

5.4 3D CAD Model and external software

The Contractor is responsible for the integration of developed 3D CAD Models with any external software including, but not limited to, engineering calculation software (piping stress calculation,

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structure calculation, Safety calculations, etc.) and material management software (procurement, expediting, etc.). The Company shall be notified regarding particular type of software which is chosen by the Contractor when not imposed by Company General Specifications.

The contractor should use, if they exist, in-built tools of the 3D CAD Model software or develop interface macros in order to simplify working process with external software. In this case, the macros developed in the frame of the project shall be handed over, non-encrypted, to the Company and shall be included in the 3D CAD Model handover. Any other macros, property of Contractor but necessary for proper use of the 3D CAD Model shall also be handed over, possibly encrypted to protect source code.

5.5 3D CAD Model and Point Clouds

For brownfield projects, when a Laser scan has been conducted, the point clouds generated shall be converted by the Contractor in the format compatible with the 3D CAD software authorized for the project (*.zfc or *.lfd respectively for AVEVA Laser Modeller and E3D software). The point clouds source files (*.asc, *.xyz, *.zfs, *.ptx, *.fls or *.3dd) generated by the Laser scan shall then be included in the 3D CAD Model handover in a dedicated folder.

5.6 3D CAD Model from Subcontractors & Vendors

The integration of 3D CAD Models of equipment or packages developed by Subcontractor or Vendor into the 3D CAD Model is under the Contractor responsibility.

In the case SubContractor or Vendor uses a 3D CAD Model system different from the Contractor's one, the Contractor is responsible for the remodelling of the equipment or the package into the main 3D CAD Model in order to comply with the requirements of this General Specification. The Contractor shall ensure that remodelling is relevant with the level of detail of the main 3D CAD Model which generally implies shape simplification and detail being removed from the original 3D CAD Model provided by the Subcontractor or Vendor.

It may be tolerated to integrate 3D CAD Model of equipment or packages developed with a third party software directly within the main 3D CAD Model provided that all the following conditions are fulfilled:

- The equipment or package has no process functionality and is not represented on a P&ID (e.g. crane, davit, life boats, etc.);
- The equipment or package does not contain tagged elements within,
- The exchange format is STEP-File,
- The STEP file is cleaned of any unnecessary details that would slow down the 3D CAD Model, such as, but not limited to: internals elements, bolting, fillets, chamfers, engraving, holes, etc. prior to its integration within the 3D CAD Model. The cleaning/simplification activities shall fall under the Contractor responsibility.

The original native files and corresponding STEP files, as provided by SubContractor or Vendor, used either for remodelling or integration into the 3D CAD Model shall be handed over to the Company as separate files at final 3D Model Handover.

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6. General Design requirements

6.1 3D CAD Model Development stages

In the basis of development of 3D CAD Models, the following stages are taken into consideration in the current specification:

- Newly developed 3D CAD models. Such models are created from scratch during pre-project, BASIC Engineering (or FEED in some cases) or Detailed Engineering stages of the project. During this stage of the model's development, basic rules of modelling have to be established which will exist throughout the model's life.
- As-Built stage. Stage where 3D CAD model requires updating as per current construction status in order to allow conducting further modification projects.
- As-Operated stage. Stage where 3D CAD model requires updating as per modifications performed on the Asset by the Company's affiliate (maintenance works, modification works, Laser scan data integration, etc.).

6.2 General requirements

The complete scope of work shall be represented by a Single Uniform 3D CAD Model on transfer to the Company. This shall include a common set of catalogues and specifications synchronized during the project execution and on project completion.

When modelling is carried out by more than one (1) Contractor, each Contractor or sub-Contractor shall comply with a common set of modelling standards to facilitate the merging of models at all stages of the Project and prior to 3D CAD Model handover. The detailed standards shall be as per current General Specification and any additional documents issued and coordinated by the main Contractor shall be approved by the Company.

The 3D CAD Model shall not be dependent on any internally developed or third party software.

All 3D CAD elements created or modified in the model shall be named in accordance with Company specifications, in order to be identified during all project phases and after the handover. This task is under the Contractor's responsibility.

The 3D CAD Model software version shall be defined at project's start for the whole duration of the project and shall correspond to the requirements defined in **section 5**.

Contractors shall update and complete the 3D CAD Models with information from sub-Contractors, suppliers and manufacturers as specified.

The 3D CAD Model shall be maintained throughout the complete project lifecycle. Contractors shall develop and implement procedures for controlling the updating of models. The complete model including additional required catalogues and specifications shall continuously be made available for information to the Company and other Contractors or sub-Contractors involved in the project unless not permitted by the Company for confidentiality reasons.

At Project completion, the 3D CAD Model shall reflect the latest As-Built or As-Operated status of the installation on transfer to the Company. The As-Built or As-Operated status shall be reflected on object level. As-Built elements shall be designed according to the dimensional tolerances shown in **Appendix 1**.

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Engineering documentation (general arrangement, plot plan, piping layout drawings, structural drawings, isometrics, etc.) produced from the 3D CAD Model shall be maintained in the model throughout the Asset life cycle. Manual annotations on these drawings by other 2D CAD tools are prohibited; the 3D CAD Model remaining always the source of information.

All objects in models shall be identified with unique tag numbers in accordance with Company specifications. The same applies to syntax of tag and document numbers shown on engineering documentation generated from 3D CAD Model.

Any temporary facilities (e.g. hook-up areas and temporary objects) or virtual volumes (reservations and obstructions) shall be properly identified in an exclusive way with the aim to be automatically hidden, at any time, from the 3D CAD Model.

The 3D CAD model shall be completed with key fabrication information for piping such that isometric reports can be generated from the 3D CAD model.

The Contractor shall fill in the required Attributes and Company's UDAs as specified in **Appendix 2** and **Appendix 3**.

The level of details required in the As-Built or As-Operated 3D CAD Model should approach reality to the maximum extent possible in order to be used for operator training. This implies that any element that can be handled by an operator should be modelled and the 3D CAD Model should be continuously update with Vendor data received, for all disciplines, throughout the project duration.

6.3 MODEL hierarchy requirements

6.3.1 General Requirements

The clarity of the 3D CAD Modelling MODEL hierarchy is essential for a proper understanding of the project. The Design databases shall be structured to allow efficient management and control of the 3D CAD Model contents as a whole and on an individual discipline basis and shall be structured in a simple and logical form.

The first and highest level of the MODEL hierarchy is the WORLD which contains all required databases of the Project. The second level of the hierarchy is the SITE and the third level of the hierarchy is the ZONE.

As a general rule, the SITE and ZONE breakdown should follow a geographical distribution for SITES and functional distribution for ZONES.

To store similar types of items for easy reference in a database, SITE and ZONE are defined by category and the following naming and codification convention shall be implemented in all of the Company's projects.

6.3.2 SITE Naming Convention

The Contractor is responsible for establishing an even distribution of SITE in each database of the 3D CAD Model. The quantity and battery limits of the SITE shall be defined with the Company in accordance with best engineering practices and Contractor know-how.

The Contractor shall strictly respect the following naming convention for all SITES defined in the WORLD of the 3D CAD Model:

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/ | T | R | I | D | E | L | E | V | - | M | E | C | - | A | B |

Area Code

**Discipline
Code**

**Project
Phase Code**

The Contractor shall avoid any SITE name duplication and shall guarantee their uniqueness across all the databases.

SITE names shall not contain any blank characters, tabulator characters or empty spaces.

The Contractor is authorized, only during engineering and construction phases, to create SITE which would not respect the Company's naming convention, typically to deal with AVEVA GLOBAL requirements when 3D modelling is carried out between different engineering operating centres. In this case, it will be under the Contractor's full responsibility to perform, prior to any handover, all necessary remediation actions to ensure that delivered 3D CAD Model will strictly be in compliance with the codification defined in this section. SITE not in accordance with the Company's naming convention shall never, in any circumstance, be handed over to the Company.

The Contractor shall never, in any circumstance, hand over a 3D CAD Model to the Company with an empty SITE.

6.3.2.1 Group World

Group World is used to group elements together within a secondary hierarchy. In order to ensure a better legibility of the 3D CAD Model hierarchy, the Contractor shall create GPWL per area in accordance with the hereafter naming convention.

The GPWL shall respect the following naming convention:

/ | T | R | I | D | E | L | E | V |

Area Code

The GPSET shall respect the following naming convention:

/ | T | R | I | D | E | L | E | V | - | M | E | C |

Area Code

**Discipline
Code**

6.3.2.2 Area Code

The Area Codes shall be requested from the Company at project start and are defined in accordance with field operation phase requirements.

The Area Codes shall consist as a minimum the Area Trigram. The Area Codes shall not exceed 8 digits in length.

The Areas definition and division depend on the type of facility and may correspond to a deeper breakdown of the Sector Code or Geographical Breakdown Structure which may be defined as the following examples:

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I	T	R	I	D	E	L	E	V
Area Trigram				Elevation Direction From Reference	Level from Reference			

- Area Code may be developed as the following example:

Onshore			
Area Trigram	Description	Elevation Direction from Reference	Geographic Level from Reference (m)
S11	Inlet Facilities (Slug catcher)	R	0000
S20	Produced Liquid Processing (Separation)	R	0000
S30	Produced Gas Processing (Dehydration)	R	0000
S31	Produced Gas Processing (Gas compression)	R	0000
S33	Produced Gas Processing (Sulphur Recovery)	R	0000
S35	Produced Gas Processing (Gas export)	R	0000
S53	Water Processing (Water treatment)	R	0000
S70	Common Facilities (Fuel gas)	R	0000
S73	Common Facilities (Hot oil generation)	R	0000
S82	Housing & Others (Administration)	R	0000

Table 3 Example for Onshore Area Code where Area Trigram is defined according to Sector Codes

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Offshore			
Area Trigram	Description	Elevation Direction from Reference	Geographic Level from Reference (m)
WEA	Weather Deck	U	0036
UPP	Upper Deck	U	0030
MEZ	Mezzanine Deck	U	0022
LOW	Lower Deck	U	0015
MSF	Main Structure Frame	U	0012
DRA	Drain Deck	U	0010
ESD	ESDV Deck	U	0005
CDM	Chart Datum (For Reference)	R	0000
JAC	Jacket	R	0000
MUD	Mudline	D	0150

Table 4 Example for Offshore Area Code where Area Trigram is defined according to topside decks and elevations.

Deep Water			
Area Trigram	Description	Elevation Direction from Reference	Geographic Level from Reference (m)
LIV	Living Quarters	R	0000
S01	Starboard Topside 01	U	0110
P01	Portside Topside 01	U	0110
F01	Flare 01	U	0100
H01	Hull Top Deck	R	0000
H02	Hull Internals	D	0090
L11	Subsea Loop 11	D	1020

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L21	Subsea Loop 21	D	0960
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Table 5 Example for Deep Water Area Code where Area Trigram is defined according to topside modules, hull and subsea loop.

The design engineer shall be responsible to define the Area Code to best fit with the engineering study. The examples in table 3, 4 and 5 may be used as guidelines for the Area Code definition.

6.3.2.3 Discipline Code

The codification to be used for discipline definition in the 3D CAD Model system shall be in accordance with **GS EP PJC 701** and is presented in Table 6.

DISCIPLINE CODE	DESCRIPTION
ARC	Architectural
CIV	Civil
ELE	Electrical, ladders, cable trays and supports
HSE	Safety
HVA	HVAC and HVAC supports
INS	Instrumentation, ladders, cable trays and supports
MEC	Mechanical equipments (static & rotating)
MIE	Handling and Maintenance
MIS	Miscellaneous
NAV	Naval
PLR	Pipeline, Risers & Umbilicals
PVV	Piping, Valves & Fittings
SPS	Subsea Production System
SUP	Pipe Supports
STR	Structure
TEL	Telecom

Table 6 – Discipline Code

The use of the MIS discipline shall be avoided as often as possible and shall in any case be under the responsibility of a nominated Contractor's discipline.

Only disciplines relevant for the project, depending on type of facility, shall be used in the 3D CAD Model hierarchy. The 3D CAD Model handed over to the Company shall not contain unused disciplines.

6.3.2.4 Project Phase Code

The Project Phase Code specifies the current phase of the element.

It shall be added in the suffix of the SITE names and in the database names.

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The possible values which shall be in accordance with **GS EP PJC 701** or as defined in Table 7.

PROJECT PHASE CODE	DESCRIPTION
PS	Elements of the Pre-Study (Conception) 3D CAD Model
PP	Elements of the Pre-Project 3D CAD Model
BE	Elements of the Basic Engineering 3D CAD Model
FE	Elements of the FEED Engineering 3D CAD Model
DE	Elements of the Detailed Engineering 3D CAD Model
AB	Elements of the As-Built 3D CAD Model
AO	Elements of the As-Operated 3D CAD Model

Table 7 – Project Phase Code

6.3.2.5 SITE Attributes requirements

The Description Attribute of the SITE shall be:

UPPU0030	-	Upper deck	-	Electrical
Area Code		Area Description		Discipline Description

The Position and Orientation Attributes shall be properly defined for each SITE defined in the 3D CAD Model:

Example for SITE A oriented along Plant North and located with bottom left corner at [0;0;0] in the Plant coordinate system:

- Position: E 0 N 0 U 0
- Orientation: Y is N and Z is U

Example for SITE B oriented 45° from Plant North and located at [Xb;Yb;0] from SITE A:

- Position: E Xb N Yb U 0
- Orientation: Y is W 45 N and Z is U

6.3.3 ZONE Naming Convention

The Contractor is responsible for defining and establishing a proper segregation of ZONES within each SITE of the 3D CAD Model in accordance with project's specificities, best engineering practices and Contractor know-how.

The Contractor shall follow the following naming convention for all ZONES defined in any SITE of the 3D CAD Model:

/	T	R	I	D	E	L	E	V	-	C	I	V	-	A	B	/	R	O	A	D	-	F
SITE Name																ZONE Code				State Code		

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The SITE Name is the name of the SITE containing the ZONE as defined in **section 6.3.2**.

Typical ZONE Codes to use are defined for each discipline from **section 7.2** to **section 7.16** and correspond to the minimum segregation the Company expects for the 3D CAD Model. However it is the Contractor's responsibility to define the Zone Codes and have them approved by the Company.

The Contractor should limit its own Zone Codes to 8 characters to ensure the readability of the 3D CAD Model hierarchy.

6.3.3.1 State Code

The State Code is placed in the ZONE name to easily identify the element functions for design purposes and to allow proper ZONE selection prior to handover of the 3D CAD Model to the Company.

The possible values of this code are given in Table 8.

STATE CODE	DESCRIPTION	CONTENT
∅	New Element	Elements created during the project
_D	Dismantled Element	Elements added in the 3D CAD Model but dismantled in reality (Brownfield Project).
_E	Existing Element	Existing elements (Brownfield Project)
_F	Future Element	Future elements
_H	Hook Up Element	Elements constructed on site which permit to connect two (2) Areas.
_C	Construction Element	Temporary structure for the construction
_T	Temporary Element	Other temporary elements
_DC	Decommissioned Element	Existing elements but decommissioned in reality (Brownfield Project)

∅ symbolizes the empty set (no suffix).

Table 8 – State Code

6.3.3.2 ZONE Attributes requirements

The description attribute of the ZONEs shall be:

UPPU0030	-	Upper deck	-	Telecom	-	Junction Box
Area Code		Area Description		Discipline Description		Zone Code Description

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6.4 Elements tagging requirements

The codification of a tagged element in E3D shall be in accordance with **GS EP DEV 001** and strictly identical to the tag available in the project documentation, especially P&IDs. The tag used in E3D shall not be truncated with respect to its value in the project documentation.

All tagged elements in the project shall be represented with individual E3D elements directly below the ZONE level, like PIPE, EQUI and STRU elements or similar.

All tagged elements need to be selectable as individual 3D CAD objects. When selecting an element in the model, this object should only refer to one (1) Tag Number. If a physical component includes more than one (1) tag number (e.g. pump and motor) they shall always be modelled as separate items while taking into account, when relevant, relationship notion (e.g. motor should be a sub-equipment of the related pump).

All tagged objects need to be identifiable uniquely and it is the Contractor's responsibility to verify that tags are correctly entered in the 3D CAD Model.

All tags in a Skid or Package shall be represented by E3D elements directly under ZONE, and placed in the correct discipline.

In some project documents, tag names are required to contain one (1) or more special characters, like the blank character (space). In such cases, each special character in the E3D element name shall be replaced by an underscore character. In the case of other special characters, the Contractor shall seek clarification from the Company. The letters used in E3D Names and Descriptions shall be from the 26 letters of the English alphabet and in capitals.

If the Contractor needs to fill in the tags or the descriptions in another language, it shall be done using Contractor's UDAs. In any case, the tags and the descriptions shall be in English in the Name and Description of E3D attributes.

The codifications of elements specified for each discipline in **section 7** shall be strictly respected. If an element has no tag codification specified in this specification or has no Tag Reference in any project document, the Contractor shall submit a naming and tagging convention for approval of the Company. In these cases, the following codification rules shall be followed:

- It shall be homogeneous throughout the project,
- It shall be explained in the 3D CAD Model Execution Plan (refer to **section 9.2**),
- It shall guarantee the uniqueness of the names,
- It should be as clear and as explicit as possible,
- The incremental numbering of the elements should be avoided.

6.5 General Attributes and UDAs requirements

The Contractor is responsible to fill, without exception, all the Company's UDAs specified in **Appendix 3**.

The Contractor is authorized to define as many UDAs as deemed necessary to carry out its scope of work. In this case the Contractor's UDAs shall be prefixed with DO Trigram and shall follow the upper and lower case format similarly to the Company's UDAs format, each word comprising the UDA's name starting with a capital letter.