

DEP SPECIFICATION

TAGGING SPECIFICATION AND SYMBOLS

DEP 01.00.09.10-Gen.

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DESIGN AND ENGINEERING PRACTICE



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for engineering tagging requirements and symbology to be used for new Capital Projects, to satisfy the needs of the operating organisation.

Tags are assigned to uniquely identify a function within a plant. Tags are the key objects required for populating the various systems used to manage business processes during the project and operations phases (for example, maintenance and integrity, commissioning and start up).

Symbols are used to provide a graphical presentation of equipment and piping on drawings.

This DEP is intended for use on all new capital projects. Existing plants executing Brownfield Projects may have an existing tagging philosophy and/or specification that should continue to be used.

This is a revision of the DEP of the same number dated February 2012; see (1.5) regarding the changes. It now consolidates tagging requirements that were previously spread through a number of different discipline DEPs into a single specification, to improve understanding of the total requirements and reduce the effort required by projects to define their tagging specifications.

It may not be possible to reissue all DEPs in one DEP Release and so in the event of any conflicts or duplication of requirements for tagging and symbols, this DEP takes precedence.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorization to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements are acceptable with regards to the safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Term	Definition
Area	An Area represents a part of the geographical surface occupied by a Plant. Areas are created to identify the physical location of Equipment within a Plant.
Asset Register	The asset register is a list of all the facilities and equipment within an asset. The asset register must reflect installed plant for at least all safety and production critical equipment.
Class I Check Valves	Check valves that are inspected to assure reliable operation. Refer to DEP 80.45.10.11-Gen. for more guidance on Class 1 Check valves.
Equipment	Equipment is a physical object designed to perform a Tag function.
Package	Preassembled collection of equipment designed to deliver a process function.
Plant	A plant is an assembly of equipment, assembled to perform a physical or chemical process (this includes the processes of transportation and storage of materials). A Plant represents the high level function to be performed, and during the design, a Plant is decomposed in process units and tags.
Process Unit	Process Units are created to decompose the high level Plant function into more granular sub-functions. This plant breakdown structure is used by the process engineer.
Site	A site represents a geographical surface that can be identified on a map.
Tag	Tags are created to decompose a high level Process Unit function into more granular sub-functions.
Tag Register	List of all tags at a plant.

1.3.3 Abbreviations

Term	Definition
BoM	Bill of Materials
BPCS	Basic Process Control System
CMMS	Computerised Maintenance Management System
CMS	Completions Management System
CUI	Corrosion Under Insulation
DCS	Distributed Control System
DEFINE	Phase 3 of the Opportunity Realisation Process. The objective of the DEFINE Phase is to translate the project concept into a structured and cost plan containing sufficient level of detail to enable the decision on whether to proceed to be made.
DN	Nominal Diameter
EIS	Engineering Information Specification (DEP 82.00.10.30-Gen.)
F&G	Fire and Gas
FF	Foundation™ Fieldbus

GIS	Graphical Information System
HV	High Voltage
IAMS	Instrument Asset Management System
IEC	International Electrotechnical Commission
IPF	Instrument Protective Function
IPS	Instrumented Protective System
LV	Low Voltage
MAC	Main Automation Contractor
MIS	Main Electrical Intake Station
MTO	Material Take Off
NEC	National Electrical Code
NPS	Nominal Pipe Size
P&ID	Piping and Instrument Diagram
PAS	Process Automation System
PEFS	Process Engineering Flow Scheme, also known as a Piping and Instrument Diagram (P&ID). In the context of this DEP, it also includes Utility Engineering Flow Schemes.
PFS	Process Flow Scheme
PSFS	Process Safeguarding Flow Scheme
PSS	Power Station Switchboard
RC	Reinforced Concrete
RRM	Risk and Reliability Management
SAP PM	SAP Plant Maintenance – an example of a computerised maintenance management system.
TOW	Temperature Operating Window
TP	Tie-in points
UCP	Unit Control Panel
UEFS	Utility Engineering Flow Scheme
UFS	Utility Flow Scheme
VSDS	Variable Speed Drive System

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section or clause number is shown in brackets (). Other documents referenced by this DEP are listed in (6).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a full revision of the DEP of the same number dated February 2012. The following are the main, non-editorial changes.

Section/Clause	Change
All	Complete rewrite to convert requirements for a tagging philosophy and specification into a functional tagging specification that can be adopted off the shelf for use on projects. This DEP consolidates tagging requirements from multiple discipline specific DEPs into a single tagging specification and also incorporates symbology. The affected DEPs are: • DEP 01.00.02.11-Gen. Preparation of process flow schemes and process engineering flow schemes • DEP 30.00.60.21-Gen. Human Factors Engineering - Labelling of Facilities, Equipment and Piping • DEP 31.10.03.10-Gen. Symbols and identification system - Mechanical • DEP 32.10.03.10-Gen. Instrumentation symbols and identification on process engineering flow schemes (<i>withdrawn and replaced by this DEP</i>) • DEP 32.37.20.10-Gen. Instrument signal lines • DEP 33.64.10.10-Gen. Electrical engineering design • DEP 33.64.20.10-Gen. Electrical engineering design for North American application

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://www.shell.com/standards. Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (Other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com.

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.8 NON NORMATIVE TEXT (COMMENTARY)

Text shown in italic style in this DEP indicates text that is non-normative and is provided as explanation or background information only.

Non-normative text is normally indented slightly to the right of the relevant DEP clause

2. GENERAL

2.1 INTRODUCTION

1. This DEP specifies engineering tagging requirements for new Capital Projects.

2.2 ENGINEERING REQUIREMENTS

As a project moves through the SELECT – DEFINE – EXECUTE phases, the functional requirements of a plant are progressively decomposed until a sufficient level of granularity is achieved to enable procurement of equipment and materials and subsequent construction. These functions are allocated a unique identifier per plant, known as a tag. The tag enables functions to be identified and information about these functions to be managed.

Traditionally, drawings would be drafted to show the main functions initially without tag numbers. The disciplines would then assign tag numbers to the functions on the drawings and then recorded in tag registers (or schedules) to track which tags had been assigned. Multiple registers and manual allocation of tags could lead to duplication and discrepancies from the tagging specification.

Engineering tools, for example intelligent P&ID tools, are increasingly utilised to create and manage tags. These tools frequently contain an engineering numbering module that can be configured to enforce the formats defined in this tagging specification. The central management of tags facilitates the creation of a consolidated tag register, containing a description and associated data that can be delivered to the Principal in accordance with DEP 82.00.10.30-Gen.

Key issues for engineering include:

1. *Allocation – ensuring unique tagging and a clear demarcation in the range of tag numbers available to a Contractor and/or Manufacturer/Supplier to minimise the impact on each other's work.*
2. *Consistent use by the supply chain – ensuring consistent application of the tagging requirements, especially within packages.*
3. *Replication – ensuring that the tag format is structured in a way to enable systems to be replicated in the engineering tools, e.g. two identical trains.*
4. *Completions Management – ensuring the availability of tags and the correct level of granularity to support the completions management process.*
5. *Regulatory Compliance – in some countries and industry segments compliance with tagging standards is a regulatory expectation, for example API RP 14C in the US offshore industry.*

2.3 OPERATIONS REQUIREMENTS

During the Operations phase, the tag is used as the unique functional identifier for:

- a) *Process control, monitoring, safeguarding and associated reporting.*
- b) *Raising corrective notifications, scheduling maintenance and inspection activities, recording equipment history and costs and unambiguously directing operational activities, e.g. isolation instructions.*

Equipment is installed at tags.

The tag represents the function and not the physical equipment, therefore the removal or change out (like for like) of equipment does not change the tag number. The combination of tag and equipment information is compiled into an asset register, structured to suit the business and local requirements, and loaded into key Operational systems, such as the Computerised Maintenance Management System (CMMS). This becomes the master Asset Register and is

maintained up-to-date with all engineering changes, e.g. plant modifications, decommissioning or replacement of equipment.

1. Tagging structures shall be defined for the Operate Phase at the same time as those for the PAS and Engineering Tools to ensure consistency across all applications.
2. Where consistency cannot be maintained due to tool restrictions, data shall be converted from the PAS/Engineering Tools to the CMMS.

This DEP defines how data conversion shall be achieved.

3. Equipment shall be physically labelled to enable unambiguous identification of the correct equipment, particularly those dependant on human performance.
4. To support operational needs, unique tags shall be provided to identify equipment installed that falls into one or more of the following five categories:
 - a. **Operations:** the need to handle or perform operations activities, such as to identify specific equipment for process control or isolation purposes (electrical, process and utilities) in relation to operational procedures.
 - b. **Maintenance:** the need to handle or perform maintenance activities on an equipment item or line that requires scheduling of maintenance, inspection and/or equipment history recording at that level of detail.
 - c. **Certification:** pressure regulation, hazardous area rating, mechanical handling safe working load, requirements for specific equipment.
 - d. **Safety:** 'Equipment items' that perform a safety function, e.g. pressure relief valves, over-pressure protection devices, safety instrumented systems and fire-fighting devices.
 - e. **Spare Parts:** 'Equipment items' that require tag numbers to allow Bill of Materials (BoMs) to be related to them (See DEP 70.10.90.11-Gen.).
5. The project tagging requirements should be aligned with the Operational requirements, as well as the needs of the engineering phase and be clearly communicated and enforced throughout the supply chain.

Failure to enforce consistent tagging through the supply chain can result in Asset Integrity failures.

3. TAGGING PHILOSOPHY

3.1 INTRODUCTION

1. Different tag formats shall be applied as (5) to different types of tags to allow easy identification and ensure uniqueness.
2. The following rules shall be applied in order of precedence:
 - a. Each full tag shall be unique within a plant.

For example, this is critical for permit to work systems and isolations.
 - b. The tagging philosophy shall be matched to the expected size of the plant and/or other plants within the same operating unit to ensure sufficient tag numbers are available.
 - c. Tagging shall be applied consistently across the Contractor and Manufacturer/Supplier scope.
 - d. Tags shall be functional and not related to the actual equipment installed or its physical characteristics.

For example, no Manufacturer/model information included in the tag.

- e. If a tag has multiple functions, such as for instrumentation, then the primary function shall be reflected in the tag number.

For example, a Well could act as either a producer or an injector but should be tagged as a Well to avoid having to retag if its role changes in future.

- f. Tags shall be compatible with the main Owner Operator systems, e.g. Control Systems, Computerised Maintenance Management System (CMMS).

For example:

- i. String length restrictions – tags not exceeding the maximum allowable sizes.

Tags need only comply with the restrictions of systems they are likely to be loaded in, i.e. low voltage electrical cables are not typically loaded into the CMMS, but are loaded in the Completions Management System (CMS). So, the tag format supports the CMS but need not support the CMMS.

- ii. Tags only use English characters in uppercase, western numbers and hyphens (-).

- iii. The use of hyphens limited to the segregation of elements to assist human performance, to prevent confusion and aid memory.

For example, a pump is identified as P-101 and not P-1-01.

- iv. For piping (5.10) and pipelines (5.11) the characters “(to indicate inches) and, (to indicate a decimal point) may be used for US Customary units.

- v. For cabling (5.20) the character / (forward slash) is used to separate tags.

- g. Tags shall not include Discipline or Organisation details.

This is to avoid tag changes arising from organisation change during the asset lifecycle

For example, module numbers should not be included in the tag, as the boundary of the module can change and would result in a need to retag.

- h. If a tag is terminated for any reason, it shall not be reused unless the original function is reinstated.

- i. Tags should not be used to define hierarchical structures.

For instance, no parent / child relationship identified within the tag for equipment and sub-equipment, as this would be catered for by separate attributes within the data management systems.

The intention of this rule is to prevent the use of suffixes to the primary tag number, e.g. using P4450A-01A to indicate identical pumps in parallel duty within the package A4450A.

- j. Tags shall be structured to enable repeatable designs to be supported in engineering design tools, e.g., use of a train number where applicable.

- k. Tags shall be represented identically on physical labels, in software tools and as referenced in documents.

- i. On documents, a common plant prefix may be dropped for ease of identification/reading, provided each drawing has a customised note stating the prefixes that need to be added to all item numbers.

For example, on PEFS, a note would indicate “All tags on drawing prefixed by...”.)

- l. See DEP 30.00.60.21-Gen. for guidance on physical labelling.

- m. Tags are used in Operations for verbal communication, therefore the length of the tag should be minimised and the format support ease of recollection.
- n. Tags should allow for future scope or capital spares to be allocated a tag number.
- o. Letters 'I' and 'O' or 'Q' should be avoided as the initial letter in any tagging schemes as they can easily be confused with '1' and '0'.

3.2 PLANT BREAKDOWN

1. Tagging formats shall be based on the Process Plant Breakdown Structure defined in DEP 82.00.10.30-Gen. and illustrated in Figure 1.

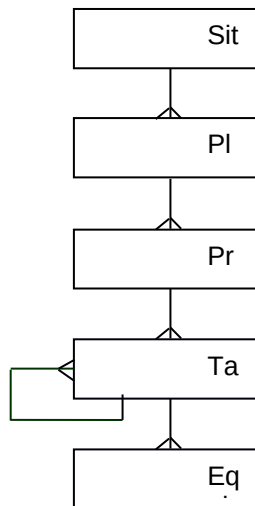


Figure 1 Process Plant Breakdown Structure

2. The terminology presented in Figure 1 is not consistent with the structures defined in all engineering design tools. A clear conversion mapping to the Principal's definition shall be developed.
3. The Principal shall define the Site, Plants and Process Units.
4. For projects delivering multiple plants, all tag formats shall identify the plant to which the tag belongs.

3.3 MANUFACTURERS/SUPPLIERS TAGGING

1. All hardware, including packages, shall be tagged in accordance with this DEP.
2. Principal's tagging requirements shall be adhered to by all parties (Contractors and Manufacturer/Supplier) throughout the asset lifecycle.
3. Manufacturer/Suppliers may apply their own tag numbering, in addition to the tag numbers defined in this DEP, but the project tag number shall be used on all deliverables.
4. Contractors shall be responsible for ensuring:
 - a. Tag uniqueness across the Contractor's scope.
 - b. Compliance with the tag numbering specification by all Manufacturers/Suppliers. Including on documentation supplied.
5. Any deviations from the Manufacturer/Supplier tagging requirements shall be subject to prior written approval by the Principal. Deviations may be considered on a case-by-case basis and require assessment of how Manufacturer/Supplier tags are integrated into systems to be used during the OPERATE phase.

6. Tag numbers should be allocated in one of the following two ways:
 - a. The Contractor allocates a block of serial numbers to each Manufacturer/Supplier for their exclusive use. The Manufacturer/Supplier may be required to advise the quantity of numbers required to enable the block size to be optimized.
 - b. Where the package only forms part of a larger process unit, Contractor may allocate a separate, dedicated identifier for all equipment and instruments within the package.

4. SYMBOLS

Standard Drawings are provided for symbols to be used for different disciplines and deliverables. The Standard Drawings are produced so that the symbols can be easily copied in an electronic form.

1. If a required equipment symbol is not shown in the referenced standard drawings, a simple outline should be drawn, together with a short description of its function. If Principal does not consider a symbol to adequately indicate the type or function of a piece of equipment, additional notes should be located next to the symbol.
2. Mechanical symbols used in PFSSs, UFSSs, PEFSSs and UEFs shall be in accordance with S 02.002. For symbols not shown in S 02.002, the symbols in BS 1553-1 shall be used.
3. See DEP 01.00.02.11-Gen. for details of the information to represent on PEFS.
4. For complicated equipment hook-ups (to be agreed with Principal) a rectangle (dot-and-dash line) should be drawn with a reference to a separate scheme.
5. For electrical symbols, reference is made to one of the following:
 - a. IEC 60617 and S 64.000;
 - b. Symbols as per IEEE 315 for North America.
6. For instrument symbols and identification on PEFS, PFS and PSFS, reference is made to S 37.000. One of the following options shall be used for instrument symbols used on PEFS for process plants:
 - a. Indicating functionality of the loop based on ISO 3511.
 - b. Indicating functionality of components derived from ISA-S5.1.
7. For BPCS and general instrumentation the symbols shall indicate what process condition or property is being measured and controlled and what information is displayed.
8. For safety related function (e.g., IPFs) the symbols shall indicate which process condition or property is being measured and what information is displayed.
9. Instrument tag numbers displayed in balloons shall be split into three lines with the train and the Process Unit code displayed within the balloon as Figure 2.

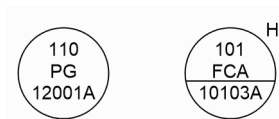


Figure 2 Instrument tag symbol examples

10. For final elements such as valves, the tag number shall be located under the symbol as shown in Figure 3 of split range valves in the 101FCA-42001 loop.

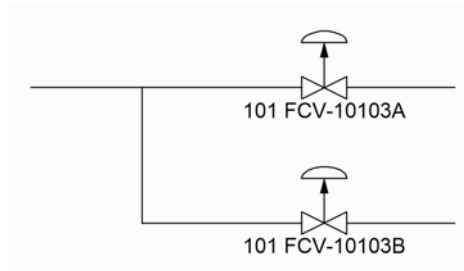


Figure 3 Final element example

11. For most IPF and control functions, it is not possible to cover all functionality in sufficient detail on PEFS. In such cases, further details should be provided on separate documents, such as narratives, block diagrams, functional logic diagrams, flow charts or a combination of these documents.
12. Instrument symbols should follow the convention that a command to increase the output shall produce an increase on the process, such as increase in capacity of control valve, a larger opening of louvres, increased motor speeds, or increased cooling capacity of variable-pitch fans.
 - a. Where this is not the case (e.g., for fail-open control valves) the signal shall be reversed upon exiting the PAS, and the reversal function shown on the PEFS.

5. ENGINEERING TAGGING SPECIFICATION

5.1 GENERAL

This section defines the format and syntax to be used to uniquely identify tags.

1. This DEP should be augmented at the start of the DEFINE Phase by the Principal with allowable reference data to be used for the project. See (Appendix A) for templates for the reference data to be populated.
2. This DEP is intended to covers all disciplines. However, a project-specific specification may need to evolve during a project if new technology or processes are used. All modifications required to expand this DEP into a project-specific specification shall be submitted to Principal for approval before being used.
3. The elements described in (5.1.1) to (5.1.8) shall be used consistently across discipline tagging formats.

In all the numbering formats in this section, the terminology in Table 5.1.1 is used.

Table 5.1.1 Tag numbering terminology

A	Alpha character, e.g., A, B, C
N	Numeric character, e.g., 1, 2, 3
AN	Alphanumeric character, e.g., 1, A, B
()	Optional character

*Some tagging formats utilise a specific character to enable easy identification of the discipline, for example **H** is used in (5.3) to indicate HVAC. These are highlighted in bold.*

5.1.1 Plant code

The plant code ensures that the tag is unique within a plant; this is especially important in the case of projects delivering multiple plants.

1. If the project is for a single plant, the plant code is not required to be displayed.
2. All tag formats in (5) shall be prefixed by a Plant Code and hyphen as shown in Table 5.1.2.

Table 5.1.2 Plant code

	Plant code				
Reference	(5.1.1)				
Character Type	(AN)	(AN)	AN	AN	-
Example	4	4	0	0	-

3. The Principal shall define a list of valid codes to be used.

5.1.2 Train number

1. Identical equipment within parallel trains shall be given identical tag numbers, except for the train identifier. Refer to Table 5.1.3:

Table 5.1.3 Train Number

	Train Number
Reference	(5.1.2)
Character Type	(N)
Example	0

2. Train Number '0' (zero) shall be used for common facilities (e.g. utilities), while each train is represented by a sequential number, e.g. Train 1 – '1', Train 2 – '2'.

In some engineering applications this is referred to as the Area.

5.1.3 Process unit

Process Units are created to decompose the Plant function into more granular sub-functions.

1. The first two or three digits of the process unit shall be used to reflect the process unit identification. Refer to Table 5.1.4 and Table 5.1.5:

Table 5.1.4 Process unit

	Process Unit		
Reference	(5.1.3)		
Character Type	N	N	(N)
Example	0	1	

Table 5.1.5 Two and three digit method for process units

Process unit	Identification	
	Two-digit method	Three-digit method
0100	01	010
1100	11	110
1150	11	115
7400	74	740
7420	74	742

- For instrumentation (5.18), (5.19) and (5.20) and Telecoms (5.21), the two digit method shall be used for all formats.
- The Principal shall define a list of valid process unit codes to be used.

In some engineering applications the equivalent object is referred to as a Unit or a System.

5.1.4 Process group

The Process Group identifies equipment that forms a logical group within sections of a process unit. Process Group is only used for instrumentation tagging (See (5.18), (5.19) and (5.20)).

- The Process Group shall consist of a single digit identifier (0-9) included in the tag to identify equipment that forms a logical group within a process unit.
- The allocation of a Process Group within a process unit shall be according to the process configuration.
- Where process sub-units are not already reflected in the process unit code (e.g., where unit 1100 and 1150 both result in process unit code 11, see (5.1.3)), the process group number should be selected to provide a recognisable numbering relationship.

For example: Blocks of process group numbers may be assigned as follows: Use numbers 1 through 4 for process unit 1100 and 5 through 9 for process unit 1150.

5.1.5 Process string

The Process String is a single digit identifier (1-9) that is included in the tag to assist in logically identifying different parallel process strings within a Process Group, and hence supporting replication.

Process String is only used for instrumentation tagging (See (5.18), (5.19) and (5.20)).

- Equivalent instruments in process strings shall have identical Process Group and sequence numbers, but with the process string identifier changed (1-9) to match the string number as defined on the P&ID.
 - Where a process unit does not have any occurrences of parallel strings, the process string shall be '0' (zero) for all instruments within that Unit.
 - A '0' (zero) shall also be used for instruments on common lines, headers, manifolds in a process section containing parallel strings.

5.1.6 Fire area/sub-area

- The plant shall be organised into a number of fire areas (maximum of 99). Each fire area may be further subdivided into a maximum of 9 sub-areas. Fire Sub-Area 0 shall be used for fire area alarms.

Where ten or more sub-areas are required, the fire area should be split.

2. Instruments associated with fire pumps, fire pump control and fire water header systems common to several fire areas shall use "000" as the fire area/sub-area.

Generally buildings in a fire area are grouped under a single fire sub-area.

5.1.7 GRID/GIS

1. For Onshore facilities, DEP 80.00.10.11-Gen. defines how a plot plan shall be used to define the overall spatial arrangement of the plant.
2. For facilities spread over a wide geographical area, for example multiple well clusters and processing facilities linked by pipelines, a GIS (Graphical Information System) may be used, based on GPS coordinates or a GRID.
3. For Offshore facilities, DEP 80.00.10.12-Gen. shall be followed.

5.1.8 Identical equipment code

1. This code is used to denote identical parallel equipment items used for the same purpose, and shall be one letters of the English alphabet capitalised (e.g. "A", "B", "C", "D").
2. The letter "S" shall be used for installed spare equipment.

5.2 MECHANICAL AND ELECTRICAL EQUIPMENT

5.2.1 General

1. All mechanical and electrical equipment shall be uniquely identified by a tag number of the format shown in Table 5.2.1.

Table 5.2.1 Mechanical and electrical tag format

	Train No.	Equipment Function Code		Process Unit			Sequence Number			Identical Equipment Code
Reference	(5.1.2)	(5.2.2)		(5.1.3)			(5.2.3)			(5.1.8)
Character Type	(N)	A	(A)	N	N	(N)	N	N	N	(A)
Example	1	P	G	0	7		0	0	1	A

5.2.2 Equipment function code

1. The equipment function code is arranged as follows:
 - a. The first letter indicates the equipment type, in accordance with Column 1 of Table 5.2.2.
 - b. The optional second letter indicates the supporting function in accordance with Column 2 of Table 5.2.2.

Table 5.2.2 Equipment Function Codes

Letter	Column 1 (Equipment type)	Column 2 (Supporting function)
A	Packaged units and equipment, e.g., extruders, crushers, cutters, kneaders, crystallisers, pelletisers	Aerial, Air Motor
B	Buildings, rooms, enclosures, containers	
C	Columns: tray columns, packed columns, rotating disc contactors	Chamber
D	Drying equipment	Diesel engine, Damper
E	Unfired heat transfer equipment: heat exchangers, condensers, air-cooled heat exchangers, reboilers	
F	Fired equipment, furnaces, heaters, steam boilers, flare tip	Fan
G	Generator	Gearbox
H	Heaters; electrical	Hydraulic motor
I	Not Used. See (3.1)	
J	Jets (ejectors, injectors and eductors)	
K	Compressors, blowers, fans, turbo expanders	
L	Pig Launchers	
M	Mixers, stirrers, mixing nozzles, blenders, steam desuperheaters, agitators, piping manifolds	Electric motor
N	Not assigned	Natural gas engine
O	Not Used. See (3.1)	
P	Pumps (centrifugal, reciprocating, rotary), PLET (pipeline end termination)	
Q	Not Used. See (3.1)	
R	Pig receivers	
S	Gravity and mechanical separators, e.g., thickeners, cyclones, expellers, centrifuges, filters, dust collectors, sieves, hydro cyclones	Shell, Fan Silencer
T	Atmospheric storage tanks, interceptors, neutralising pits	Turbine (steam or gas), Tube
U	Umbilical, incl. distribution equipment	
V	Vessels, incl. pressure storage vessels, silos and hoppers	
W	Weighing equipment, wellheads	
X	Stationary transport equipment, material handling equipment, cranes, hoists	
Y	Special piping item	
Z	Bulk loading arms, offloading buoys	

Examples of the letter codes of Table 5.2.2:

EG Gearbox of heat transfer equipment (e.g., fin-fans)

GT Turbine of generator

KT Turbine of compressor
PD Diesel engine of pump
PG Gearbox of pump
PM Electric motor of pump
EM Electric motor of air-cooled heat exchanger

5.2.3 Sequence number

1. The sequence number shall consist of a three digit number, running consecutively from 001 for each equipment function code group in accordance with Table 5.2.2, unless flexibility for the addition of future equipment within the same sequence is required.

5.2.4 Equipment numbering of package units

1. Package units shall be uniquely identified with an Equipment Function Code 'A'. Each element with the package shall also be numbered using an equipment identifier.
2. The first digit of the sequence number shall be allocated so that this digit is identical for all equipment in the package unit.

5.2.5 Examples of mechanical and electrical equipment

Example 1:

4	0	0	0	-	P	-	1	2	0	0	6	A
---	---	---	---	---	---	---	---	---	---	---	---	---

4000	Plant code for Plant 4000
P	equipment function code of a pump
12	process unit 1200
006	equipment sequence number of pump 6
A	letter indicating first of (at least) two identical pumps (either working in parallel or in series or equipment with single spare)

Example 2:

6	0	0	0	-	P	M	-	7	0	0	0	8	S
---	---	---	---	---	---	---	---	---	---	---	---	---	---

6000	Plant code for Plant 6000
PM	equipment function code of a pump motor
70	process unit 7000
008	equipment sequence number of pump 8
S	Indicates a single spare

Example 3:

4	0	0	0	-	1	K	-	1	5	2	0	1	0	B
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

4000	Plant code for Plant 4000
1	Train 1
K	equipment function code of a compressor
152	process unit 15200
010	equipment sequence number of compressor 10
B	Indicates a common spare

Example 4:

6	0	0	0	-	A	-	1	5	1	0	1
6	0	0	0	-	E	-	1	5	1	0	1
6	0	0	0	-	P	-	1	5	1	0	1

6000	Plant code for Plant 6000
A	Equipment function code for a Package Tag
15	Process Unit 1500
101	Sequence Number 101
E	Equipment function code for a Heat Exchanger in the Package
P	Equipment function code for a Pump in the Package

5.2.6 Application rules

1. All fixed mechanical handling systems (e.g., runway beams, pad-eyes) shall have a unique tag number.
2. Moveable mechanical handling equipment that is permanently located on a specific facility (e.g., fork lift trucks, trolleys, load slings) shall have a unique tag number.

5.3 HEATING, VENTILATION AND AIR CONDITIONING (HVAC) EQUIPMENT

5.3.1 General

1. All HVAC equipment shall be uniquely identified by a tag number of the format defined in Table 5.3.1.

Table 5.3.1 HVAC tag format

	Train No.	HVAC Equipment Function Code					Process Unit			Sequence Number			Identical Equipment Code
Reference	(5.1.2)	(5.3.2)					(5.1.3)			(5.3.3)			(5.1.8)
Character Type	(N)	H	A	A	-		N	N	(N)	N	N	N	(A)
Example	1	H	D	F	-		0	7	4	0	0	1	A

5.3.2 HVAC equipment function code

- The HVAC equipment function code shall be in accordance with Table 5.3.2.

Table 5.3.2 HVAC Equipment Function Codes

Letter	HVAC Equipment Function Code
HAH	Air Handling Unit
HCC	Cooling Coils
HCF	Filters/Coalescers
HCU	Chiller Unit
HCV	Constant Volume Unit
HDC	Control Damper
HDF	Diffuser
HDF	Fire Damper
HDN	Non Return Damper
HDR	Pressure Relief Damper
HDS	Shut-off Damper
HDV	Manual Volume Control Damper
HEG	Extract Grille
HHU	Humidifiers
HLV	Louvre
HSA	Sound Attenuator
HSG	Supply Grille
HTU	Terminal Unit

5.3.3 Sequence number

- The sequence number shall be a three digit number, running consecutively from 1 for each equipment function code in accordance with Table 5.3.2, unless flexibility for the addition of future equipment within the same sequence is required.

5.3.4 Examples of HVAC equipment numbers

Example 1:

4	0	0	0	-	H	D	F	-	7	4	0	0	1	A
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

4000	Plant code for Plant 4000
HDF	HVAC equipment function code of a fire damper
74	process unit 7400
001	equipment sequence number of fire damper 1
A	letter indicating first or at least two identical fire dampers (either working in parallel or in series or equipment with single spare)

5.4 SAFETY EQUIPMENT

5.4.1 General

1. All safety equipment (e.g., fire extinguisher stations and lifeboats) shall be uniquely identified by a tag number of the format in Table 5.4.1.

Table 5.4.1 Safety equipment tag format

	Train No.	Safety Equipment Function Code				Process Unit			Sequence Number			Identical Equipment Code
Reference	(5.1.2)	(5.4.2)				(5.1.3)			(5.4.3)			(5.1.8)
Character Type	(N)	Y	A	A	-	N	N	(N)	N	N	N	(A)
Example		Y	B	S	-	0	7	4	0	0	1	A

5.4.2 Safety equipment function code

1. The safety equipment function code shall be in accordance with Table 5.4.2.

Table 5.4.2 Safety Equipment Function Codes

Letter	Safety Equipment Function Code
YBA	Breathing Apparatus Sets
YBS	Eyebath/Safety Shower
YDC	Deluge Valve Release Cabinet
YDF	Defibrillator
YDT	Life boat davit
YDV	Deluge Valve (manual operated)
YEE	Escape Equipment
YFA	First Aid Equipment (litter, reanimation unit)
YFV	Firefighting Vehicle
YGS	Galley Hood Suppression System
YHC	Hydrant Cabinet
YHR	Hose reel
YHT	Hydrant
YIM	Permanently Installed Monitor
YLB	Lifebuoy / Lifeboat / Life raft
YPC	Portable Monitor Cabinet
YPM	Portable Monitor
YSE	General Safety Equipment
YXC	Extinguisher Cabinet
YXP	Packaged Bottled Extinguisher System (i.e. for turbine acoustic enclosure)
YXT	Extinguisher

5.4.3 Sequence number

1. The sequence number shall consist of a three digit number, running consecutively from 1 for each equipment function code in accordance with Table 5.4.2, unless flexibility for the addition of future equipment within the same sequence is required.

5.4.4 Examples of safety equipment numbers

Example 1:

4	0	0	0	-	Y	H	T	-	6	0	0	0	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---

4000	Plant code for Plant 4000
YHT	Safety equipment function code of a hydrant
60	process unit 6000
001	equipment sequence number of fire damper 1

5.4.5 Application rules

1. Firefighting equipment cabinets/stations shall be given a unique tag number. Individual extinguishers should not be tagged.

5.5 ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

5.5.1 General

1. For facilities in the United States, all electrical distribution and control equipment (including valve actuator motors and motor operated valves) shall be uniquely identified in accordance with NEC 430.104(A) -2011.
2. All electrical equipment, unless already covered in (5.2), shall be assigned a unique tag number of the format in Table 5.5.1.

Table 5.5.1 Electrical distribution and control equipment tag format

	Electrical Equipment Function Code			Substation Number				Voltage Identification		Sequence Number		Identical Equipment Code
Reference	(5.5.2)			(5.5.3)				(5.5.4)		(5.5.5)		(5.1.8)
Character Type	A	A	-	AN	AN	AN	(N)	A	(A)	N	(N)	(A)
Example	T	R	-	3	0	0		B	D	0	2	A

5.5.2 Electrical equipment function code

1. The references in Table 5.5.2 shall be used to identify the function of electrical equipment.

Table 5.5.2 Electrical Equipment Function Code

Electrical Equipment Function Code	Electrical Equipment type
AP	Alarm panel
BA	Battery
BD	Bus Duct
CA	Capacitor bank
CB	Cable Bus
CN	Cathodic Protection Anode
CP	Control panel
DP	Distribution Panel (For use in North America only)
EE	Earth Electrode (Known as Ground Electrode in North America).
IR	Interposing relay
JB	Junction box
MC	Motor Control Centre (For use in North America only)
RR	Resistor (earthing)
RX	Reactor
SB	Switchboard (also known as Switchgear in IEC)
SG	Switchgear (For use in North America only)
TR	Transformer
UP	UPS unit
VS	VSDS

5.5.3 Substation number

1. A unique reference for each substation within the plant shall be:
 - a. The sources of power, i.e., Main Electrical Intake Station (MIS) and/or Power Station Switchboard (PSS), shall be uniquely identified by a tag number of the format in Table 5.5.3.
 - b. HV and LV substations fed from the main power sources or from other substations shall be uniquely identified by a tag number of the format in Table 5.5.4.
2. For HV substations fed directly from these substations, the first digit shall be a sequence number, e.g. SS-100, SS-200;
3. For HV substations fed from another HV substation, of the second digit shall be a sequence number, e.g. SS-110, SS-210;
4. For LV substations fed from an HV substation, the third digit shall be a sequence number, e.g. SS-111, SS-201.

Table 5.5.3 Substation number

	Substation Number			
Reference	(5.5.3)			
Character Type	A	A	A	(N)
Example	P	S	S	2

Table 5.5.4 HV and LV substation number

	Substation Code			Substation Number		
Reference	-			-		
Character Type	A	A	-	N	N	N
Example	S	S	-	1	1	0

5.5.4 Voltage identification

1. A one or two letter code shall be used to identify the handled voltage. Two letters are used for transformers (one for each winding voltage).
2. The references in Table 5.5.5 shall be used to identify the nominal voltage level(s) of the equipment:

Table 5.5.5 Voltage Identification

Letter	Equipment type
A	60 kV and above;
B	20 kV – 33 kV;
C	10 kV and 11 kV;
D	3 kV - 6.6 kV;
E	LV (interruptible, maintained);
F	LV (DC) N = LV (essential and non-essential);
V	LV (uninterruptible, maintained);
X	LV (controls, alarms and indications, AC or DC).

5.5.5 Sequence number

1. The sequence number shall consist of a one or two digit number, running consecutively from 1 for each group of equipment in accordance with Table 5.5.2.

5.5.6 Examples of electrical distribution and control equipment

The first 6.6 kV switchboard in substation 110 is SB110D1:

4	0	0	0	-	S	B	-	1	1	0	D	1
---	---	---	---	---	---	---	---	---	---	---	---	---

The third 400 V (AC) switchboard in substation 112 is:

4	0	0	0	-	S	B	-	1	1	2	E	3
---	---	---	---	---	---	---	---	---	---	---	---	---

The second 33/6.9 kV transformer located at distribution substation 300 is:

4	0	0	0	-	T	R	-	3	0	0	B	D	2
---	---	---	---	---	---	---	---	---	---	---	---	---	---

The tap change control panel associated with this transformer would be identified as:

4	0	0	0	-	C	P	-	3	0	0	X	2
---	---	---	---	---	---	---	---	---	---	---	---	---

5.6 MAIN ELECTRICAL CABLES

5.6.1 General

- If a project is using a traditional AutoCAD methodology, electrical cables having different voltages or differing functions shall be distinguished.
 - The sequence identification numbers should be sub-divided into blocks, e.g., 1000-1999 for HV cables, 2000-2999 for LV cables, 3000-3999 for control cables.
- A block of electrical cable numbers should be allocated for site use, e.g., 1900-1999 for HV cables across the site.
- If a project is utilising an electrical engineering tool, then main electrical cables shall be uniquely identified by a tag number of the format in Table 5.6.1.

Table 5.6.1 Main electrical cable tag format

	Train No	Process Unit			Sequence Number				Electrical Cable		System	Phase		Parallel
Reference	(5.1.2)	(5.1.3)			(5.6.2)						(5.6.3)	(5.6.4)		(5.6.5)
Character Type	(N)	N	N	(N)	N	N	N	-	C	E	A	(AN)	-	(A)
Example	1	1	0	0	0	6	1	-	C	E	P	Y	-	1

5.6.2 Sequence number

- The sequence number shall be a three digit number, running consecutively from 001 to 999 for process unit.

5.6.3 System

- The system code shall be a single character using the values shown in Table 5.6.2.

Table 5.6.2 Electrical system codes

System		
C	Control	
H	High Voltage	IEC – Over 1000V North America – Over 38kV
L	Low Voltage	IEC – Under 1000V North America – Under 1000V
M	Medium Voltage	IEC – Not Used North America – 1000V to 38kV

5.6.4 Phase

1. The phase shall be a single character using the values shown in Table 5.6.3.

Table 5.6.3 Electrical phase

Phase	
(blank)	Multicore
R	Phase L1
Y	Phase L2
B	Phase L3
D	Direct Current (DC)

5.6.5 Parallel

1. An optional numeric character shall be used to indicate if a parallel cable exists.

5.6.6 Examples of main electrical cable tagging

Example 1:

4	0	0	0	-	4	0	1	5	3	-	C	E	H	R	-	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

4000	Plant 4000 No Train
40	Process Unit 40
153	Cable number - 153
CE	Electrical Cable
H	High Voltage
R	Phase L1
1	First Power Cable

Example 2:

4	0	0	0	-	4	0	0	1	4	-	C	E	L
---	---	---	---	---	---	---	---	---	---	---	---	---	---

4000	Plant 4000 No Train
40	Process Unit 40 Main Electric Power Distribution < 1000V
014	Cable number - 014
CE	Electrical Cable
L	Low Voltage
(blank)	Multicore

5.6.6 Application rules

1. Outside of North America, DEP 33.64.10.10-Gen. Section 5.3.7 shall be used to number branches off a main route.
2. For North American applications, numbering shall be approved by the Principal's Electrical Technical Authority.

5.7 LIGHTING AND SMALL POWER DEVICES, JUNCTION BOXES, SINGLE PHASE CABLES, SECONDARY EQUIPMENT

5.7.1 General

1. If a project is using a traditional AutoCAD methodology, (e.g., electrical fittings, lights, sockets, and switches), the electrical circuit tag shall be used to group these devices. Formal tag numbers are not issued.
2. If a project is utilising an Electrical Engineering tool then all maintainable electrical fittings (e.g., lights, sockets, and switches), shall be uniquely identified by a tag number of the format in Table 5.7.1.

Table 5.7.1 Lighting and small power tag format

	Train No	Process Unit			Lighting and Small Power Equipment Function Code				Sequence Number				Identical Equipment Code		Feeder				Phase	Device Type	Progressive Number	
Reference	(5.1.2)	(5.1.3)			(5.7.2)				(5.7.3)				(5.1.8)		(5.7.4)				(5.7.5)	(5.7.7)	(5.7.6)	
Character Type	(N)	N	N	(N)	E	A	A	-	N	N	N	AN	(A)	-	(AN)	(AN)	(AN)	(AN)	(A)	(A)	(N)	(N)
Example	1	1	0	0	E	H	F	-	0	0	1	4		-	2	A			Y	L	0	1