

DEP SPECIFICATION

PIPING CLASS - BASIS OF DESIGN

DEP 31.38.01.10-Gen.

February 2012

DESIGN AND ENGINEERING PRACTICE

DEM1



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1. INTRODUCTION

1.1 SCOPE

This DEP explains the design basis of the piping classes contained in DEP 31.38.01.12-Gen. and DEP 31.38.01.15-Gen. Guidance on the application of piping classes for projects is given in DEP 31.38.01.21-Gen.

Line pipe and fittings for oil and gas transmission pipeline systems are outside the scope of this DEP.

This DEP contains mandatory requirements to mitigate process safety risks in accordance with Design Engineering Manual DEM 1 – Application of Technical Standards.

This is a revision of the DEP of the same number dated February 2011; see (1.5) regarding the changes.

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 will be 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 its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The lower-case word **shall** indicates a requirement.

The capitalised term **SHALL [PS]** indicates a process safety requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Term	Definition
Piping class	Collection of piping components, suitable for a defined service and design limits, in a piping system. The piping classes are contained in the following DEPs: DEP 31.38.01.12-Gen.- "Piping classes - Refining and chemicals". These are piping classes developed for oil refineries, chemical plants and gas plants; also suitable for onshore exploration and production facilities. DEP 31.38.01.15-Gen.- "Piping classes - Exploration and production". These are piping classes developed for offshore facilities (platform piping). NOTE: For standardization and interchangeability reasons, the Principal may decide to use these piping classes also for onshore facilities.
Assembly	Pre-designed standard configuration for vents, drains, orifice meter runs, thermowells and pressure points within a piping class
Very toxic (substances)	substances that are very hazardous for the environment or human health, as specified in DEP 01.00.01.30-Gen. (which also identifies "toxic" substances by reference to chemical substances databases).

1.4 CROSS-REFERENCES

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

1.5 CHANGES FROM THE PREVIOUS EDITION

The previous edition of this DEP was dated February 2011. Other than editorial changes, the following are the major changes to the previous edition.

Section	Change
3.9	Alignment of design temperatures and piping classes with ASME B31.3
3.11	added section 3.11 titled Socket-Welded Piping Components

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be sent to the Administrator at standards@shell.com, using the DEP Feedback Form. The DEP Feedback Form can be found on the main page of "DEPs on the Web", available through the Global Technical Standards web portal <http://www.shell.com/standards> and on the main page of the DEPs DVD-ROM.

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.

2. GENERAL

For services not covered in DEP 31.38.01.12-Gen., DEP 31.38.01.15-Gen. and DEP 31.38.01.84-Gen. (e.g. fluid service, ASME pressure rating, temperatures, sizes, materials, valves, etc.), piping classes SHALL [PS] be developed based on the design basis outlined in this DEP.

2.1 DEFINITION OF A PIPING CLASS

A piping class consists of a collection of standardised piping components that are compatible and are suitable for a defined service at stated pressure and temperature limits. All components applied in piping classes are covered by a 'Material and Equipment Standards and Codes' (MESC) buying description.

The MESC catalogue is available to Shell users and licensees on the Customer Wide Web of Shell Global Solutions: <http://www.shell.com/cww>

2.2 PURPOSE AND BENEFITS OF PIPING CLASSES

The purpose and benefits of piping classes are summarised as follows:

- a) Large reduction in piping system engineering and procurement effort
- b) Group-wide standardisation of piping material and piping systems design
- c) Variety control, leading to reduced costs of stocking material
- d) Integrity control in relation to applied standards
- e) Increased leverage for centralised purchasing
- f) Reduced risk of wrong material selection.

2.3 APPLICATION OF PIPING CLASSES

Piping classes SHALL [PS] be applied in accordance with DEP 31.38.01.11-Gen.

An explanation of the piping class numbering system is given in (2.4) and a description of the contents of each piping class is given in (2.5).

Section (2.6) explains how to select a piping class for a particular service.

2.4 IDENTIFICATION OF PIPING CLASSES

The piping class number is comprised of three parts.

Part 1.		Part 2.				Part 3.

Part 1 indicates the ASME rating class as follows:

1 for ASME rating class 150

9 for ASME rating class 900

3 for ASME rating class 300

15 for ASME rating class 1500

6 for ASME rating class 600

25 for ASME rating class 2500

Part 2 is related to the materials selection, as follows:

The *first digit* indicates the general group of selected materials, i.e.

- | | |
|--|--|
| 1 - Carbon steels | 5 - Copper and copper alloys |
| 2 - Low and intermediate alloy steels | 6 - Nickel and nickel base alloys |
| 3 - Stainless steels | 7 - Non-metallic materials |
| 4 - Aluminium and aluminium alloys | 8 - Carbon steel, lined or galvanised |

The *next three digits* are for identification and have no specific meaning.

For example, piping class **15 3 050** is ASME rating class 1500, stainless steel.

Part 3 indicates a process service related selection of impact tested and non-impact tested material in carbon steel piping classes.

- KS** Impact tested material selection for application down to -29°C (-20°F). These piping classes have been developed for liquid butane, LPG and compressed light and flammable gases such as hydrogen, methane, ethane, propane and ethylene.
- 29** Piping class material selection in line with ASME B31.3 Figure 323.2.2A curve B for application down to -29°C (-20°F) for services not mentioned above.

2.5 CONTENT OF PIPING CLASSES

Page 1:

- Summary block giving class details and revision status.
- Mechanical design limits, indicating the pressure ratings at coincident temperatures.
- Notes, giving additional design background and application guidelines/restrictions.
- Branch table, giving construction details for 90° branch connections, suitable within the design limits.
- Table of schedules, giving the selected pipe (schedule number or actual thickness) for each nominal pipe diameter in the piping class concerned.

Page 2 (and 3)

- Short materials descriptions for piping components used in the piping class, referring to external standards.

Pages 3, 4 (and 5):

- Components and their MESC numbers.

Page 5 (or 6):

- Ranges of bolt sets for various types of flanged joints.
- Assemblies for vents, drains and instrument connections. Assemblies for instrument connections are in accordance with DEP 32.31.00.32-Gen. and DEP 32.37.10.11-Gen. Figure numbers shown in the assemblies refer to those given in (Appendix 1) of this DEP.

2.6 SELECTION OF PIPING CLASSES

The "services and materials selection index" (Standard Form DEP 31.38.01.84-Gen.) identifies the main characteristics (e.g. materials, valves, gaskets and bolting) of all piping classes.