

DEP SPECIFICATION

DEFINITION OF TEMPERATURE, PRESSURE AND TOXICITY LEVELS

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DESIGN AND ENGINEERING PRACTICE

DEM1



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1. INTRODUCTION

1.1 SCOPE

This DEP gives requirements and recommendations for determining and specifying temperatures and pressures in design and operation. It also defines substances with regard to their toxicity, for which other DEPs may specify additional design and engineering requirements.

Note: Where a substance has been deemed "very toxic acute" on the basis of the definitions in section 4 of this document, there may be over conservativeness in specifying equipment if the classification has been reached as a result of R34, R35 (causes burns). Risk should be evaluated before determining the degree of equipment needed (i.e. double pump seals or double block and bleed). In some instances, derogation to DEM1 requirements may be appropriate.

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

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Term	Definition
Intended operation	Operation in which process conditions, i.e. temperature, pressure, flow, fluid compositions, etc., are stable and in accordance with the process design.
MSDS	Materials Safety Data Sheet
Pressure relief valve	Generic term for relief valves, safety valves or safety/relief valves.
Pressure relief device	Generic term for pressure relief valves, bursting disks, or other mechanical emergency relief appliances.
ppm-volume	Molar concentration of a substance in parts per million. For gas, the ppm-volume in SI-units is calculated as: $ppmv = (mg/m^3) \times (22.42) / (MW \text{ of substance})$ where: - mg/m^3 is the substance concentration in milligrams per cubic metre; - 22.42 is the molar gas volume at normal temperature and pressure conditions (0 °C and 101.325 kPa) (32 °F and 14.7 psi) - MW is the relative molecular mass of the substance For gas, the ppm-volume in US Customary units is calculated as: $ppmv = (lb/ft^3) \times (359) / (MW \text{ of substance})$ where: - lb/ft^3 is the substance concentration in pounds per cubic foot; - 359 is the molar gas volume at normal temperature and pressure conditions (32 °F and 14.7 psi) - MW is the relative molecular mass of the substance
Very toxic (substances)	Substances that are very hazardous for the environment or human health. NOTES: 1. "Toxic" substances are classified as such in databases such as the European Chemical Substances Information System (ESIS) and the Globally Harmonised System of Classification and Labelling (GHS). This DEP (see 5.2) further classifies some of these substances as "very toxic". 2. This DEP further classifies very toxic substances as "very toxic - acute", "very toxic - chronic" and "very toxic - environment". 3. Where a substance has been deemed "very toxic acute" on the basis of the definitions in section 4 of this document, there may be over conservativeness in specifying equipment if the classification has been reached as a result of R34, R35 (causes burns). Risk should be evaluated before determining the degree of equipment needed (i.e. double pump seals or double block and bleed). This DEP contains mandatory requirements to mitigate process safety risks in accordance with Design Engineering Manual DEM 1 – Application of Technical Standards. In some instances, derogation may be appropriate.

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 (5).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated February 2011. The following are the main, non-editorial changes.

Old section	New section	Change
1.1	1.1	Added clarification note for very toxic acute definition as related to equipment selection
1.3.2	1.3.2	Added clarification note for very toxic acute definition as related to equipment selection
Appendix 1A	Appendix 1A	Added clarification note for very toxic acute definition as related to equipment selection
Appendix 2	Appendix 2	Added clarification note for very toxic acute definition as related to equipment selection

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://swww.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. **PRESSURE SYSTEM**

A pressure system is an individual equipment item or a group of equipment including associated piping that within its boundaries remains open under all conditions, and it can be demonstrated that blockage due to freezing, solidification, fouling, sublimation, damage of internals, scale, debris, foreign objects, etc. cannot occur. If block valves are included in the system the requirements of ASME VIII Division 1 Appendix M shall be met.

The system design pressure SHALL [PS] not be higher than the pressure rating of any system component. The effects of static head shall be taken into account.

When a system approach is taken, the hydraulics shall be evaluated to ensure that no equipment exceeds its design pressure before a pressure relief device activates and during relieving conditions no equipment exceeds its code allowable accumulation.