

DEP SPECIFICATION

EQUIPMENT CRITICALITY IN PRESSURE VESSEL DESIGN

DEP 31.22.00.30-Gen.

February 2014

ECCN EAR99

DESIGN AND ENGINEERING PRACTICE

DEM1



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and give recommendations for defining equipment criticality categories that are to be applied during equipment design and fabrication. The categorization is based on the criticality of the equipment as assessed against the following:

- a. Operational risk – loss of containment and loss of production risks
- b. Design complexity – high operating temperatures and pressures, potentially high corrosion rates, hydrogen service
- c. Fabrication complexity – complex materials of fabrication, heavy wall, complex internals, postweld heat treatment (PWHT) requirements, clad vessels

DEP 31.22.00.31-Gen. specifies design, fabrication and inspection/testing requirements for pressure vessels based on the vessel criticality category resulting from this DEP.

This DEP is applicable to heat exchangers that are not supplied as part of original equipment manufacturer (OEM) equipment packages (e.g., lube oil heat exchangers on rotating equipment skid packages).

This DEP is not applicable to atmospheric pressure storage tanks.

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 2013; see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

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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
cyclic service	Pressure equipment subject to frequent fluctuations in pressure and/or temperature, mechanical vibration or external loading that may lead to damage from fatigue. Severe cyclic service refers to equipment that requires a fatigue analysis.
hydrogen service (H₂ service)	Service in which the hydrogen partial pressure is greater than 700 kPa absolute (100 psia) at any temperature. See also API RP 941, Figure 1.
pressure vessel	Vessel used for containing, storing, distributing, processing or otherwise handling an expansible fluid under pressure. This excludes rotating or reciprocating equipment, fired heaters, and piping.
PWHT	Post weld heat treatment; aimed at reducing hardness and residual stresses in welds
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 references databases of "toxic" substances)

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 (4).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a minor revision of the DEP of the same number dated February 2013. The following are the main, non-editorial changes.

Section/Clause	Change
1.1	changed wording in second paragraph.

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