

DEP SPECIFICATION

DESIGN OF SEAWATER SYSTEMS FOR OFFSHORE AND ONSHORE

DEP 37.05.10.10-Gen.

February 2011
(DEP Circular 69/11 has been incorporated)

DESIGN AND ENGINEERING PRACTICE

DEM1



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for the design of seawater systems for both offshore and onshore application.

Functional requirements are provided for the various components included in such systems, e.g., caissons, pumps, piping and valves, heat exchangers and instrumentation for offshore installations, and intake structures, filters, pumps, heat exchangers and out falls for onshore sea water systems. The detailed technical specifications for the various components are covered by other DEPs.

Fire water systems and water injection facilities are excluded from 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 September 2002; see (1.6) 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 and gasification. This DEP may also be applied in other similar facilities

When DEPs are applied, a Management of Change (MOC) process should 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
Caisson	Open-ended pipe section extending from the platform to below sea level and used for drawing water or for disposing of used water
Cooling medium	Fluid for the removal of heat from process and utility equipment
Sea Water Intake	The intake structure provided to ensure reliable supply of required quantity of clean seawater with minimum ecological impact
Sea Water Outfall	The structure provided to ensure final discharge and dispersion of water to the sea with minimum ecological impact.
Diffuser	System to dilute the used returned water into the sea.
Weir box	Used to keep the system completely water filled and maintain positive pressure (backpressure) all the time.
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).

1.3.3 ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
DN	Diameter Nominal
HVAC	Heating Ventilation and Air Conditioning
NPSH	Net Positive Suction Head
TEG	Tri-Ethylene Glycol
LNG	Liquified Natural Gas

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 (7).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated September 2002. The main revisions to this DEP have been:

- To include specific requirements and guidelines for design of sea water system for onshore installations.
- To move the heat transfer system requirements to the main heat transfer fluids DEP.
- To indicate the process safety requirements.

The following are the main, non-editorial changes.

Old section	New section	Change
1.1	1.1	Scope description modified to reflect deletion of closed circuit heat transfer system and inclusion of onshore installations; DEP title modified; revision date modified.
1.2	1.2	The text describing intended use for closed circuit heat transfer system deleted; onshore installations added.
1.3.1	1.3.1	Added definitions; SHALL [PS]; Intake; Outfall; Outfall Weir box;

Old section	New section	Change
1.3.2	1.3.2	Added definitions; Sea Water Intake; Sea Water Outfall; Diffusers; Weir box
1.4	1.4	Abbreviations list modified; EHRU, HT deleted; LNG added.
1.6	1.6	Summary of revisions from previous edition modified.
2.1	2.1	Sentence describing the scope of the DEP modified to include onshore facilities; last sentence describing heat transfer systems deleted; last para deleted.
2.2	2.2	First para, description of overall goals modified; reference to closed circuit heat transfer systems and heating loads deleted; reference to seawater water added.
2.2	2.2	Second para, description modified; reference to heat transfer medium deleted and goal to meet reliability and availability of the sea water system added.
2.3	2.3	First sentence modified for sea water system; deleted heat transfer system;
2.3	2.3	Third bullet, 'shall' replaced with 'SHALL [PS]'.
2.3	2.3	Sixth bullet, goal to meet required degree of reliability and availability of the sea water system added.
2.3	2.3	Eighth bullet, shall replaced with SHALL [PS]
3.	3.	New heading 'Sea water systems-offshore installation' added.
3.1	3.1	'Introduction' replaced with 'Segregation of users';
3.1	3.1.1	'3.1' renumbered to one level down as 3.1.1; first para; 'and closed circuit heat transfer' deleted; second para, moved to 3.1.2 and 'shall' changed to 'SHALL [PS]'.
3.2	3.1.2	'3.2' renumbered to 3.1.2; last para from 3.1 moved to 3.1.2 and 'shall' changed to 'SHALL [PS]'. Figure 1 & 2 moved to DEP informative.
3.3	3.1.3	'3.3' renumbered to 3.1.3; . Paragraph replaced with bulleted list of requirements and 'shall' changed to 'SHALL [PS]'.5 th para rewritten. Figure 3 and last para moved to informative.
4.	3.2	'4' Sea water lift and distribution system' renumbered to 3.2.
4.1	3.2.1	'4.1' renumbered as 3.2.1. Last two para moved to DEP informative.
4.2		moved to DEP informative
4.3	3.3	'4.3 renumbered as 3.3
4.3.1	3.3.1	'4.3.1 renumbered as 3.3.1
4.3.2	3.3.2	'4.3.2 renumbered as 3.3.2; third bullet para, 'shall' changed to 'SHALL[PS]'
4.3.3	3.3.3	'4.3.2 renumbered as 3.3.3; first para modified and second para moved to DEP informative, first bullet, 'shall' changed to 'SHALL[PS]'; last bullet, 'shall' changed to 'SHALL [PS]'
4.3.4	3.3.4	'4.3.4 renumbered as 3.3.4
4.3.5	3.3.5	'4.3.5 renumbered as 3.3.5

Old section	New section	Change
4.3.6	3.3.6	'4.3.6 renumbered as 3.3.6; third para, 'shall' changed to 'SHALL[PS]'. Last para moved to DEP informative.
4.4	3.4	'4.4 renumbered as 3.4
4.5	3.5	'4.5 renumbered as 3.5; first para, 'shall' changed to 'SHALL[PS]'. The table of alarms and shutdowns moved to DEP informative.
-	4.	New section on SEA WATER SYSTEMS- ONSHORE INSTALLATIONS.
-	4.1	New section on Design considerations
-	4.1.1	New section on Intake Structure
-	4.1.2	New section on Intake pipelines
-	4.1.3	New section on Filtration System
-	4.1.4	New section on Intake Basin
-	4.1.5	New section on Sea water supply pumps and pump house
-	4.1.6	New section on Biocide dosing package
-	4.1.7	New section on Heat Exchangers
-	4.1.8	New section on sea water distribution network
-	4.1.9	New section on sea water outfall
-	4.2	New section on model tests and hydraulic studies
-	4.3	New section on materials
-	4.3.1	New section on GRP
-	4.3.2	New section on Carbon Steel
-	4.3.3	New section on HDPE
-	4.4	New section on control and instrumentation
5.	-	Section 5. on closed circuit heat transfer systems deleted;
6.	5	'6'. renumbered as '5'.
6.1	5.1	'6.1' renumbered as '5.1'
6.2	5.2	'6.2' renumbered as '5.2' and heading modified to indicate applicability for offshore.
7.	7.	Deleted references to DEPs on Heat transfer fluid systems; Gas turbine heat recovery steam generators, fired heaters including waste heat boilers, heat transfer fluid selection for high temperature HTF systems, added references to DEPs on Plate and frame heat exchangers, Piping - General requirements, Piping classes - exploration and production, Glass-fibre reinforced plastic pipeline and piping systems

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://swwww.shell.com/standards> and on the main page of the DEPs DVD-ROM.

1.7 DUAL UNITS

**Amended per
Circular 69/11**

Dual units have been incorporated throughout this DEP.

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.