

DEP SPECIFICATION

**DESIGN OF SEAWATER SYSTEMS FOR OFFSHORE
AND ONSHORE**

DEP 37.05.10.10-Gen.

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DESIGN AND ENGINEERING PRACTICE

DEM1



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All administrative queries should be directed to the DEP Administrator in Shell GSI.

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1. INTRODUCTION

1.1 SCOPE

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

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 seawater 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 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 offshore and onshore oil and gas production. 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
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.
seawater intake	The intake structure provided to ensure reliable supply of required quantity of clean seawater with minimum ecological impact.
seawater 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	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

Term	Definition
DN	diameter nominal
LNG	liquefied natural gas
NPSH	net positive suction head

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 2011. The following are the main, non-editorial changes.

Section/clause	Change
2.1	'Introduction'; first para. deleted.
2.3	Bullet c) 'SHALL [PS] changed to 'shall'.
2.3	Bullet h) clause modified and 'SHALL [PS] changed to 'shall',
3.1	Reference to new closed circuit cooling system DEP added.
3.1	'Figure-1' added to show the intrinsically safe segregation.
3.1.1	'Introduction' removed.
3.1.2	'New Installations' replaced with modified clauses on segregation requirement.
3.1.3	'Existing Installations' clauses moved to informative.
3.1.4	New clause on segregation requirement.
3.1.5	Reference to the segregation scheme added
3.1.6	Modified clause for 3.1.2 first bullet.

Section/clause	Change
3.3.1	Added new requirement under bullet point '10'.
3.3.2	'SHALL [PS]' under bullet point 'c' changed to 'shall' under new bullet point '6', sub-bullet 'j'.
3.3.3	Specific personal safety requirements added under bullet point 'a'; New criteria for design capacity added under bullet 'b'.
3.3.5	Fourth para., new clause added, check valves clause 'should' changed to 'shall' under new numbered bullet '4'.
3.3.5	Fifth para, 'should' changed to 'shall' under new numbered bullet '5'
3.3.6	Para. 3, new clause for vent line added under bullet '3', '4' and '5'.
3.3.6	The relief requirement modified under new bullet '6'; new clause under bullet '9' added.
3.5	First para., 'SHALL [PS]' changed to 'shall'. Table-1 added.
4.1	Para 8, requirement modified under 4.1.1, new bullet point '10'.
4.1	New clause added under 4.1.1, bullet 3.
4.1.2	Para. 2, 'shall' changed to 'should', clause moved under 4.1.1 new bullet '6'.
4.1.2	Para. 4, 'shall' changed to 'should' under 4.1.3, bullet '4.'
4.1.2	Para. 11, 'shall' changed to 'should' under 4.1.3, bullet '12'.
4.1.5	First para., temperature rise criteria deleted.
4.1.6	First para., reference made to (3.3.3).
4.1.7	Text on temperature rise requirement deleted.
4.1.8	Second para., 'SHALL [PS]' changed to 'shall' under 4.1.9, bullet point '2.'
4.1.8	Para. 6, 'SHALL [PS]' requirement changed to 'shall' in a modified clause under 4.1.9, bullet point '11'.
4.1.9	Para. 3, 'shall' changed to 'should' under 4.1.10 bullet '4'.
6.	Reference list updated.

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://swwww.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. OVERALL GOALS AND SPECIFIC OBJECTIVES

2.1 INTRODUCTION

1. It is essential to segregate hazardous users from non-hazardous users. At the initial design stage it shall be determined whether a user is hazardous or non-hazardous.

A hazardous user is one where, if the equipment fails, the seawater can be contaminated with a hydrocarbon, flammable or very toxic substance. Hazardous users typically include process heat exchangers, such as crude oil coolers, gas coolers, etc.

2.2 OVERALL GOALS

1. The goal of a seawater system is to provide a safe, stable, and reliable supply of seawater, at the required pressure and flow, to all users.
2. The system shall ensure that the seawater quality is adequate so as not to cause blocking, fouling, contamination or undue corrosion of user equipment and the system itself.
3. The system shall be designed to provide ease of operation and maintenance and have a design life, reliability and availability that meet the needs of the facility, taking the lifecycle economics into account.

2.3 SPECIFIC OBJECTIVES

1. The following is a list of specific objectives for the design of seawater systems:
 - a. Designs should take into account the demands of present and planned future users;
 - b. All necessary considerations and good engineering practice should be applied to ensure that the system can be operated safely without hazard to any personnel, plant and equipment on the installation;
 - c. Hazardous users shall be segregated from non-hazardous users;
 - d. Designs should comply with the environmental constraints of the locality;
 - e. Suitable materials and corrosion protection should be used in all aspects of the design in order to attain the expected design life of the system;
 - f. Systems should be designed to allow for ease of operation and maintenance and to provide the required degree of reliability and availability;
 - g. Required provision shall be made in the design of system vessels and pipework to allow for fluid expansion during heating;
 - h. Overpressure protection of seawater systems including vessels and heat exchangers shall be provided as per the applicable DEPs and Standards;
 - i. Means should be provided to detect hydrocarbon leaks in heat exchangers.