

DESIGN OF HOSE BULK TRANSFER FACILITIES FOR FIXED OFFSHORE INSTALLATIONS

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DESIGN AND ENGINEERING PRACTICE



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1. INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and give recommendations for the design of the hose bulk transfer facilities for new fixed offshore installations. It may also be used as a basis for the review of facilities on existing installations although generally they will only be modified where this is justified by safety or operational considerations. This DEP covers all components of the bulk transfer facilities but excludes the design of the storage tanks themselves.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI and SIEP, the distribution of this DEP is confined to companies forming part of the Royal Dutch/Shell Group or managed by a Group company, and to Contractors and Manufacturers/Suppliers nominated by them (i.e. the distribution code is "F", as described in DEP 00.00.05.05-Gen.).

This DEP is intended for use on offshore installations.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are more stringent and which combination of requirements will be acceptable as regards 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 with the object of obtaining agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party which carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project, or operation or maintenance of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party which manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party which 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 word **shall** indicates a requirement.

The word **should** indicates a recommendation.

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 in this DEP are listed in (4) and (5).

2. OPERATIONAL REQUIREMENTS

2.1 GENERAL

Offshore installations often require regular supplies of bulk materials, both liquids and powders. These are delivered by supply boats equipped with pumps and compressors which provide the motive force to transfer the bulk materials to storage tanks on the installation via hoses and filling lines. Flexible hoses shall be provided which are permanently connected at one end to the storage tank filling lines on the installation and temporarily connected to the supply boat to enable the transfer of bulk materials. Facilities are required to stow the flexible hoses alongside the installation when they are not in use. The main installation crane is used to lower the hoses from their stowage positions to the supply boat and to retrieve the hoses on completion of discharge.

NOTE: The aspects of stowing and shipping bulk cargoes onboard supply boats are outside the scope of this DEP. However, attention is drawn to a Code of Safe Practice for Solid Bulk Cargoes published by the International Maritime Organization (IMO). The primary aim of the code is to promote safe stowage and shipment of bulk cargoes.

2.2 BULK MATERIALS

The following bulk materials which are transferred by hose are commonly required on offshore installations which have an ongoing drilling programme:

- baryte and bentonite;
- cement powder;
- brine and drill water;
- oil-based mud;
- potable water;
- diesel oil;
- base oil;
- well kill fluid.

Offshore installations without an ongoing drilling programme normally only require potable water, diesel oil and well kill fluid to be transferred by hose.

2.3 TRANSFER AND HANDLING

2.3.1 Transfer conditions

Typical hose bulk transfer operations start when the hoses are passed to the supply boat by means of the installation crane and are connected to the appropriate supply boat outlet. For powders the hoses are purged/blown out with air to free them from any residual material etc. before they are offered to the supply boat. When the appropriate approval is given, the commodity is pumped to the installation.

After the required quantity has been transferred or a high-level alarm has sounded, the flow is stopped and the liquid in the hose is drained back to the supply boat. The installation filling lines are drained to their respective commodity tanks. For powders, after loading, the supply boat blows the residual powder to the platform and into the tanks.

The bulk material capacity and transfer capability varies between supply boats. In general the aim is to effect a rapid continuous transfer without the risk of spillage.

Powders are transferred by a pneumatic conveying system on the supply boat with operating pressures up to a nominal 5.5 barg. Liquids should be pumped at the following typical pressures:

Liquid	Typical operating pressure bar (ga)	Max. (shut-in) pressure bar (ga)
Diesel oil/base oil Drill water/potable Water/brine	less than 10	5-10
Invert mud (max. SG 2)	less than 10	12-14
Well kill fluid (in well kill mode)	To suit reservoir	To suit reservoir

NOTE: In certain cases where drilling mud of high specific gravity is transferred, a check may be required to ensure pumping pressure and equipment are sufficient to overcome the head requirements.

2.3.2 Hose stowage

Facilities are required to enable the orderly and protected stowage of the hoses when they are not in use without disconnecting them at the hose station. The free ends of the hoses are carried to and retrieved from the supply boat by the platform crane. Attention should be paid to the protection of the hoses from damage, this being a common cause of failure. Hose rupture can result from abrasion at the installation or supply boat, from kinking at the hose station or stowage point or during transfer if the hose fouls the propeller.

2.3.3 Communications and control

The communication systems should be such that effective contact can be maintained between the offloading/backloading supervisor on the installation and the supply boat Master during transfer operations. Control of the loading operations should be possible without posting operators at the storage tanks.

2.3.4 Cranage

A crane is required on the installation which is capable of lifting the flexible hoses from their stowage positions and passing them safely to an awaiting supply boat. The crane shall be used for recovering and stowing the hoses when loading of each commodity is complete, even when other hoses remain connected for loading. The crane shall be capable of lifting the hose in order to drain the contents either to the installation storage tank or to a drainage facility at the hose station on completion of a loading operation.

2.3.5 Compressed air

Compressed air is required for purging the hoses and filling lines for dry bulk powder and oil-based mud to prevent or remove a blockage.

2.4 POLLUTION AND SAFETY

The powder commodities transferred by compressed air from a supply boat are not a pollution risk but they may present a health and safety hazard if allowed to spill. It is therefore important to design the powder tank/silo vent systems to minimise powder emission during transfer and to locate the vents so as to avoid any hazard to personnel on both the platform and the attendant supply boats. To avoid spillage on completion of delivery, the flexible hose and filling line should be purged for a few minutes before disconnection. The filling line valve should then be closed at the hose station and the flexible hose capped at the supply boat end.

Diesel oil and oil-based mud represent a pollution and safety hazard and spillage shall be avoided. Tight shut-off valves are required at the supply boat end of the hoses and at the hose station. Drain connections are required to enable hose drainage.