

DEP SPECIFICATION

FLEXIBLE COMPOSITE PIPE SYSTEMS

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DESIGN AND ENGINEERING PRACTICE



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for the use of flexible composite pipe systems, for onshore and static offshore use. This DEP addresses thermoplastic pipe reinforced using thermoplastic composites, thermoset composites, steel wires, steel cords and steel strips. Operating pressures are typically up to 300 bar (4350 psi), temperatures between -30 °C (-22 °F) and 90 °C (194 °F), diameters between 25 mm (1 in) and 150 mm (6 in), and continuous length up to 10 km (6.2 miles), depending on reel capacity.

This is a revision of the DEP of the same number dated September 2012; 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 word **should** indicates a recommendation.

1.3.2 Specific definitions

Term	Definition
Design Pressure	Maximum internal pressure intended to be experienced by a component during its service life.
Design Temperature	For each design condition, maximum fluid temperature that can be reached during service.
Mill Hydrostatic Test	Short-term hydrotest at the mill, or factory, used as a quality control check, which is carried out at a pressure above the rated pressure.
Occasional Load	Maximum short-term duration load intended to be experienced during the component's service life.
Operating Pressure	Normal or anticipated standard internal pressure to be experienced by a component which should not exceed the rated pressure, determined in accordance with this DEP.
Pressure Rating Rated Pressure	Maximum allowable continuous pressure, relating to its long-term resistance to failure when subjected to either static or cyclic internal pressure loading, determined in accordance with this DEP.
Product Family	Component type all of whose variants have the same function.
Product Family Representative	Component that is taken to be representative of a particular product family.
Product Sector	Subdivision of a product family that groups variants into specific diameter and pressure ranges.
Product Sector Representative	Component that has the highest nominal diameter and highest pressure rating in a particular sector.
Qualification	Process of demonstrating that a component is in accordance with the requirements of this DEP.
Rated Temperature	Maximum allowable continuous temperature at the rated pressure determined in accordance with this DEP.
Short Term Hydraulic Burst Strength, Short Term Hydrostatic Pressure Strength	Burst pressure measured during a short-term test.
Tensile Load Rating	Maximum allowable continuous tensile load, determined in accordance with this DEP.
1000 Hour Test	Medium survival test to demonstrate long-term strength performance.

1.3.3 Abbreviations

Term	Definition
GRE	Glass-fibre-reinforced epoxy
GRP	Glass reinforced plastic
LCL	Lower Confidence Limit
NPRs	Nominal pressure rating, static pressure service
NPRc	Nominal pressure rating, cyclic pressure service

Term	Definition
PA	Polyamide
PE	Polyethylene
PEX	Cross-linked polyethylene
PP	Polypropylene
PVC	Polyvinylchloride
PVDF	Polyvinylidene fluoride
P_{min}	Minimum pressure during pressure cycle
P_{max}	Maximum pressure during pressure cycle
R	Minimum / maximum pressure ratio during cyclic service
SLT	Standard laboratory temperature
S-FRP	Spoolable fibre-reinforced plastic
S-GRP	Spoolable glass-fibre-reinforced plastic
S-RTP	Spoolable reinforced thermoplastic
STHP	Short-term hydrostatic pressure strength
TLR	Tensile load rating
TP_{1000hrs}	Test pressure to be used in 1000-hour qualification test
TS	Tensile strength pipe
Tg	Glass transition temperature
UV	Ultraviolet

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 (9).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated September 2012. The following are the main, non-editorial changes.

Section/Clause	Change
2.2	Section on Thermoset materials was revised (sub-sections were deleted.)
2.4	New subheading was added on Metallic Reinforcement.
4.8	This section used to be (2.7) and was moved to 4.8 and titled "Hydrocarbon Permeation Test".
4.9	Added new section 4.9, End Fitting Test
4.10	Added new section 4.10, Seawater Resistance
4.11	Added new section 4.11, Collapse Test (External Pressure Resistance)
4.12	Added new section 4.12, Qualification Renewal