

DEP SPECIFICATION

UNBONDED FLEXIBLE PIPE FOR OFFSHORE APPLICATIONS (AMENDMENTS/SUPPLEMENTS TO ISO 13628-2 & ISO 13628-11)

DEP 37.81.42.30-Gen.

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DESIGN AND ENGINEERING PRACTICE



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TABLE OF CONTENTS

PART I	INTRODUCTION	5
1.1	SCOPE.....	5
1.2	DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS	5
1.3	DEFINITIONS	5
1.4	CROSS-REFERENCES	6
1.5	SUMMARY OF MAIN CHANGES	6
1.6	COMMENTS ON THIS DEP	6
2.	GENERAL	7
2.1	APPLICATION OF ISO STANDARDS.....	7
2.2	COMPLIANCE TO QUALITY STANDARD	7
PART II	AMENDMENTS, SUPPLEMENTS AND DELETIONS TO ISO 13628-2	8
3	TERMS AND DEFINITIONS	8
3.49	STRESS WHITENING	8
3.50	CRAZING	8
5	FUNCTIONAL REQUIREMENTS	9
5.4	INTERNAL FLUID PARAMETERS	9
5.6	SYSTEM REQUIREMENTS	9
6	DESIGN REQUIREMENTS	10
6.1	LOADS AND LOAD EFFECTS	10
6.3	PIPE STRUCTURE DESIGN.....	10
6.4	SYSTEM DESIGN REQUIREMENTS	13
7	MATERIALS	15
7.1	MATERIAL REQUIREMENTS	15
7.2	QUALIFICATION REQUIREMENTS	16
8	MANUFACTURING REQUIREMENTS	17
8.1	QUALITY ASSURANCE REQUIREMENTS	17
8.2	CARCASS.....	17
8.4	PRESSURE AND TENSILE ARMOUR LAYERS	17
8.9	REPAIRS	17
9	DOCUMENTATION	18
9.4	DESIGN REPORT	18
9.5	MANUFACTURING QUALITY PLAN	18
9.8	OPERATION MANUAL	18
10	FACTORY ACCEPTANCE TESTS	19
10.3	HYDROSTATIC PRESSURE TEST	19
10.5	GAS-VENTING SYSTEM TEST	19
11	MARKING AND PACKAGING	20
11.1	MARKING	20
11.2	PACKAGING.....	20
PART III	AMENDMENTS, SUPPLEMENTS AND DELETIONS TO ISO 13628-11	21
5	PIPE DESIGN CONSIDERATIONS	21
5.4	DESIGN CRITERIA	21
5.5	LOAD CASES	22
6	MATERIALS	23
6.4	ALTERNATIVE MATERIALS	23
6.6	METALLIC-MATERIAL TEST REQUIREMENTS	23
7	SYSTEM DESIGN CONSIDERATIONS	24
7.3	FLOWLINE DESIGN REQUIREMENTS.....	24
7.5	ANCILLARY COMPONENTS	24

8 **ANALYSIS CONSIDERATIONS** 25

8.2 ANALYSIS TECHNIQUES.....25

9 **PROTOTYPE TESTING** 26

9.6 PROCEDURES — STANDARD PROTOTYPE TESTS 26

PART IV **REFERENCES** 27

PART I INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and gives recommendations for design, qualification, analysis, material selection, manufacture, inspection, testing, assembly, marking, packaging, installation and operation of unbonded flexible pipe. It applies to unbonded flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends, including ancillary components.

This DEP does not cover flexible pipes of bonded structure, flexible pipe structures using non-metallic tensile armour wires, flexible pipes for use in choke-and-kill applications, umbilicals and control lines.

This DEP is based on ISO 13628-2 and ISO 13628-11. Part II of this DEP is written as amendments and supplements to ISO 13628-2. Part III is written as amendments and supplements to ISO 13628-11. For ease of reference, the clause numbering of the ISO Standard has been used throughout Parts II and III of this DEP. The clauses of ISO Standards 13628-2 and 13628-11 not mentioned in this DEP apply as written.

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 oil and gas production. Application in other facilities may also apply.

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 where some of the requirements may be more stringent than specified 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 regard 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 that 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 or maintenance 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 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.

1.3.2 Specific definitions

Term	Definition
manufacturer	Term used in ISO 13628-2 and ISO 13628-11 shall be taken to mean Manufacturer/Supplier
purchaser	Term used in ISO 13628-2 and ISO 13628-11 shall be taken to mean Principal

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 (Part IV).

1.5 SUMMARY OF MAIN CHANGES

This new DEP-Gen. is a revision of former local standard DEP 37.81.42.30-EPP, dated January 2006, which was based on API Specification 17J and API Recommended Practice 17B. In 2006 and 2007, ISO formally adopted API Specification 17J and API Recommended Practice 17B as ISO 13628-2 and ISO 13628-11, respectively.

Due to the fundamental change in the overall scope and clause numbering in ISO 13628-2 and ISO 13628-11, it is impractical to summarise the changes here.

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

2. GENERAL

2.1 APPLICATION OF ISO STANDARDS

Part II of this DEP is written as amendments and supplements to ISO 13628-2 and Part III is written as amendments and supplements to ISO 13628-11.

Wherever reference is made to ISO 13628-2 or to ISO 13628-11, it shall be understood to mean the ISO Standard as amended/supplemented by this DEP.

For ease of reference, the clause numbering of the ISO Standard has been used throughout Parts II and III of this DEP.

The clauses of ISO Standards 13628-2 and 13628-11 not mentioned in this DEP shall apply as written.

2.2 COMPLIANCE TO QUALITY STANDARD

The Manufacturer/Supplier and all sub-suppliers to the Manufacturer/Supplier shall maintain and operate quality assurance systems that shall be in accordance with ISO 9001. The Principal, for agreement, may consider a quality assurance system based on an alternative standard. The quality system shall be available for review by the Principal, at the Principal's site.

Any conflicts between requirements of this DEP, related specifications, standards, purchase order, or drawing(s) shall be referred to the Principal for clarification before proceeding with the work.

PART II AMENDMENTS, SUPPLEMENTS AND DELETIONS TO ISO 13628-2
3 TERMS AND DEFINITIONS

Add new clause:

3.49 STRESS WHITENING

Stress whitening is a generic term describing many different microscopic phenomena that produce a cloudy, foggy, whitened appearance in transparent or translucent polymers in stress. The cloudy appearance is the result of a localized change in polymer refractive index. Transmitted light is therefore scattered. Stress can introduce clusters microvoids within the polymer. The whitening effect is caused by the fact that the clusters of microvoids having a dimension equal or greater than the wavelength of light. For visible light this is in the range from about 0.38 μm to about 0.78 μm . Although stress whitening results in visually apparent changes, the load bearing capabilities of a specimen may not be substantially reduced during stress whitening.

Add new clause:

3.50 CRAZING

A craze is a microcrack that is spanned by fibrils, typically oriented in the direction of applied stress and are formed in homogeneous materials under continuous, slow tensile stress and are not formed as a result of impact stress. Craze can be formed on exposed surfaces as well as inside and have semi-circular or circular boundaries. In a transparent or translucent polymer it is possible to see the extent of the boundary with the naked eye (stress whitening), but when viewed through the scanning electron microscope, opened-up crazes show the following characteristics: curved boundaries which are clear in contrast to the residual force fracture, and signs of ductile force fracture, i.e. peaks and fibrils. The width of a craze is of the order of 1 to 2 μm , and it may grow to several millimeters in length, depending on its interaction with other heterogeneities. Crazes grow normal to the applied tensile component of the stress field. Craze fibrils are load-bearing elements whose strength and density depend to some extent on the molecular weight of the polymer. Because the fibrils are load bearing, the microcrack usually does not open substantially before additional parallel crazes form.

5 FUNCTIONAL REQUIREMENTS

5.4 INTERNAL FLUID PARAMETERS

5.4.2 Internal pressure

5.4.2.2 The following internal pressures should be specified:

Replace item a) with:

Minimum and maximum operating pressures or pressure profile through service life during normal operating conditions;

5.6 SYSTEM REQUIREMENTS

5.6.1 Minimum system requirements

5.6.1.4 Thermal insulation

Delete 1st paragraph and replace with:

The purchaser should specify any performance requirements of the flexible pipe for heat loss or retention. Overall heat transfer coefficients shall be based on the pipe structure's inner most layer internal diameter and shall differentiate between the pipe and any external effects, such as soil cover for buried pipe.

5.6.1.5 Gas venting

Add new list item:

f) Smooth bore collapse as a result of external permeation, such as Nitrogen charged J-tube applications.