

DEP SPECIFICATION

RUBBER-LINING OF PROCESS EQUIPMENT AND TANKS

DEP 30.48.60.10-Gen.

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DESIGN AND ENGINEERING PRACTICE



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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 recommendations for the application, design, qualification testing, fabrication, production testing, inspection, transportation and installation of internal rubber-lining for process equipment and tanks.

This DEP is applicable to vulcanised and non-vulcanised rubber-lining of process equipment; both shop fabricated and field fabricated. It is intended that this DEP be referenced as part of any contractual document where such internal rubber lining work is involved.

This DEP is a revision of the DEP of the same number dated September 2012 see (1.5) regarding 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 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 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

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.

1.4 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 (10).

1.5 SUMMARY OF MAIN CHANGES

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

Section/Clause	Change
Title page	Included the word 'Tank' in the title of DEP.
2.2	Included the typical service temperatures and hardness values for various types of rubber materials has been included.
	The temperature resistance of various types of rubber materials described in this DEP has been revised in line with DEP 30.10.02.13-Gen., Feb 2012.
	Test Methods standards: Replaced the ASTM references with ISO references as applicable in the document.
10	Included ISO standards in the references section

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://www.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.

2. APPLICATION**2.1 GENERAL**

Rubber linings shall be mainly used for protection against corrosion, chemicals and/or erosion damage.

2.2 MATERIAL SELECTION

1. Material selection shall be determined by:
 - a) service conditions (pressure, temperature, medium, etc.)
 - b) design
 - c) manufacturing method
2. The following rubber types shall be used for lining purposes (classification according to ISO 1629) based on exposure fluid and maximum operating temperature:

Type	Symbol	Typical Service Temperature	Shore Hardness
Natural rubber	NR	-30 °C to +60 °C (-22 °F to +140 °F)	A70
Hard ebonite rubber	ER	-30 °C to +80 °C (-22 °F to +176 °F)	D75
Isoprene rubber, synthetic	IR	-30 °C to +60 °C (-22 °F to +140 °F)	A70
Styrene-butadiene rubber	SBR	-50 °C to +80 °C (-58 °F to +176 °F)	A70
Chloroprene rubber (Neoprene)	CR	-30 °C to +90 °C (-22 °F to +194 °F)	A70
Butyl rubber	IIR	-40 °C to +120 °C (-40 °F to +248 °F)	A60
Bromobutyl rubber	BIIR	-40 °C to +120 °C (-40 °F to +248 °F)	A60
Chlorobutyl rubber	CIIR	-40 °C to +120 °C (-40 °F to +248 °F)	A60
Nitrile Butadiene rubber	NBR	-25 °C to +100 °C (-13 °F to +212 °F)	A70
Ethylene propylene-M rubber / Ethylene propylene Diene-M rubber	EPM, EPDM	-40 °C to +150 °C (-40 °F to +302 °F)	A70
Urethane rubber	AU, EU	-30 °C to +70 °C (-22 °F to +158 °F)	A80
Chlorosulfonyl polyethylene	CSM ¹⁾	-30 °C to +120 °C (-22 °F to +248 °F)	A70
Fluoro rubber	FKM ²⁾	-25 °C to +170 °C (-13 °F to +338 °F)	A75

NOTE: 1) Also known as "Hypalon®" (DuPont product).

2) Also known as "Viton®" (DuPont product).