

DEP SPECIFICATION

ENABLING INFRASTRUCTURE WORKS

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DESIGN AND ENGINEERING PRACTICE



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PREFACE

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These views are based on the experience acquired during involvement with the design, construction, operation and maintenance of processing units and facilities. Where deemed appropriate DEPs are based on, or reference international, regional, national and industry standards.

The objective is to set the standard for good design and engineering practice to be applied by Shell companies in oil and gas production, oil refining, gas handling, gasification, chemical processing, or any other such facility, and thereby to help achieve maximum technical and economic benefit from standardization.

The information set forth in these publications is provided to Shell companies for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual Operating Units to adapt the information set forth in DEPs to their own environment and requirements.

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- 3) Contractors/subcontractors and Manufacturers/Suppliers under a contract with users referred to under 1) or 2) which requires that tenders for projects, materials supplied or - generally - work performed on behalf of the said users comply with the relevant standards.

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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 and construction of "Enabling Infrastructure Works" which is scope that is required for and enables the development of the hydrocarbon facility. This scope requires meeting specific performance requirements related to infrastructure development, which are not related to dealing with hydrocarbons.

Hydrocarbon performance requirements for infrastructure primarily enable the following functions. These functions are not required for EIW.

- to prevent the loss of containment of hazardous materials.
- to prevent the escalation of a hazardous events following loss of containment of hazardous materials.
- to mitigate the effects of fire or blast following loss of containment and ignition of hazardous materials.
- to minimise potential for creating source of ignition in locations with the potential for release of inflammable or explosive materials.

Facilities specifically excluded from this DEP are:

- Building facilities, including occupied buildings, within the LSR 10^{-5} Building risk contour, due to proximity to hydrocarbon inventories or process facilities;
- Jetties, docks or piers for hydrocarbon service;
- Sewer systems (AC, CC, CD, and ODD) that will be part of the hydrocarbon services;
- Engineered fill, required to provide stability to hydrocarbon facilities.

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 refineries, chemical plants, LNG plants, LNG receiving terminals, onshore exploration and production facilities and supply and distribution installations or depots. 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.

The word **may** indicates a permitted option.

1.3.2 Specific definitions

Term	Definition
Bridge	Any structure having a cross sectional opening not less than 6 m (20 ft) that is located over or under a highway, watercourse or other infrastructure.
Building Risk	Explosion risk to an individual in the building, based on an occupancy rate of 40 hours/week.
Culvert	A pipe or other structure for conveying a watercourse or services from one side of a road or embankment to the other.
Earthworks	The preparation of the ground surface across the site, so as to achieve the final gradients / falls for construction and, the correct functioning of surface drainage systems.
Foundation	That part of the substructure in direct contact with the ground.
Ground Improvement	Geotechnical activities related to remediation, surface compaction, deep compaction or densification, filling of voids by grouting, formation of sand or gravel columns, strengthening soils by mechanical inclusions – reinforced earth or mechanically stabilised earth, strengthening soils by mechanical inclusions by soil nailing, increasing the rate of consolidation or drainage using vertical drains, soil pre-loading or surcharge loading during construction.

1.3.3 Abbreviations

Term	Definition
BC-IR	Building Contribution to the Individual Risk, Annual frequency that an individual might be killed from an explosion whilst occupying a specific building. It is calculated by multiplying the building risk with the fraction of 40 hrs/week the individual is occupying the specific building.
EIW	Enabling infrastructure works, scope that is required for and enables the development of the hydrocarbon facility but does not require to be designed to operating hydrocarbon facility performance requirements.
HVAC	Heating, Ventilation and Air Conditioning
LSR	Location Specific Risk, Annual risk of fatality to a hypothetical individual at a location for 24 hours per day, 365 days per year, unprotected and unable to escape.

Term	Definition
MOF	Material Offloading Facility
WHO	World Health Organization

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 (11).

1.5 SUMMARY OF MAIN CHANGES

This is a new DEP.

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.

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. CLASSIFICATION, STANDARDS AND CODES

2.1 STANDARDS HIERARCHY

The specific intent of this DEP is to ensure fit for purpose definition of requirements for non-hydrocarbon infrastructure and to avoid overly onerous and costly requirement which are not appropriate for EIW works. The EIW framework is based on the premise that, for EIW scope, local standards are both sufficient and appropriate to the local environment and physical conditions. Furthermore, they can be expected to be well understood, proven in practice and accepted by local designers, material Suppliers and construction Contractors.

1. The design and construction of enabling infrastructure works (EIW) scope shall be in accordance with the law, mandatory local codes and standards, corporate mandatory requirements and project specifications.
2. Recognized international and industry standards and guidelines should be used to supplement local standards where appropriate and where local standards do not provide any guidance or indication of minimum standard.
3. A consistent standards set, e.g. standards relating to a single jurisdiction or issuing body, shall be used.
4. In case of conflicting requirements, the following order of precedence shall be applicable in the design and construction of the EIW scope:
 - a. Legal requirements;
 - b. Mandatory local codes and standards;
 - c. Corporate mandatory requirements, such as the HSSE Control Framework;
 - d. This DEP.
5. Throughout this DEP, internationally recognised standards have been identified and should be used, in the absence of locally applicable standards.

2.2 EIW PERFORMANCE CLASSIFICATION

Functional performance requirements for EIW scope are based on the following classifications:

- *Design life*
 - o *One time or limited time use (e.g., for import of a large piece of equipment)*
 - o *Temporary structure (utilised for plant construction purposes only),*
 - o *Permanent structure (utilised for the logistical support of the operation and maintenance/ future expansion of the hydrocarbon facilities)*
- *Reliability/ consequence class*
 - o *Low occupancy (life safety) or business criticality*
 - o *Medium occupancy or business criticality*
 - o *High occupancy or business criticality*

Aspects influencing the classifications and the functional requirements are the following:

- *Operational regime, e.g., whether regular maintenance is allowed.*
- *Functional adaptability, e.g., whether the EIW scope needs to:*
 - o *Be extendable*
 - o *Be constructed in phases*