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Guidance on Practice for Pipeline Crossings

GP 43-28

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) GP 43-28. This Guidance on Practice (GP) is based on parts of heritage documents from the merged BP companies as follows:

BP

GS 118-3	General Specification for Welded Fabrication and Construction.
GS 118-9	Welding of Transmission Pipelines: Supplementary to API 1104.
GS 118-10	Welding of Transmission Pipelines: Supplementary to BS 4515:1996.
GS 136-1	Materials for Sour Service.
GS 142-1	Line Pipe and Fittings Part 1: Submerged Arc Welded Pipe to API 5L.
GS 142-4	Pipeline Flanges.
GS 142-5	Pipeline Fittings.
RP 42-1	Piping Systems.
RP 43-1	Onshore Transmission Pipelines to BS 8010.

Amoco

A PN-PLT-31.3-C	Piping—Plant—ASME B31.3—Construction Specification.
A PN-PLT-31.3-E	Piping—Plant—ASME B31.3—Engineering Specification.
A PN-PLT-31.3-G	Piping—Plant—ASME B31.3—Guide.
A PN-PLT-31.3-CG	Piping—Plant—ASME 31.3—Construction Guide.
A PN-PLT-SS-G	Piping—Plant—Special Services—Guide.
A PN-PLD-00-G	Piping—Pipeline Design—Guide.
A MM-GEN-00-E	Metallic Materials—General—Selection Specification.
A MM-GEN-00-G	Metallic Materials—General—Selection Guide.
A PN-OFS-WLD-C	Piping—Offshore—Welding Pipelines—Construction Specifications.
A MM-OFS-WLD-G	Metallic Materials—Offshore—Welding—Guide.
A MM-WLD-00-C	Metallic Materials—Welding—Construction Specification.
A MM-WLD-00-E	Metallic Materials—Welding—Engineering Specification.
A PN-5L-00-G	Piping—Steel Line Pipe—Guide.
A PN-PL-5L-E	Piping—Pipeline—API 5L Steel Line Pipe—Selection Specification.
A PN-PL-5L-G	Piping—Pipeline—API 5L Steel Line Pipe—Guide.
A PN-OFS-LC-C	Piping—Offshore—Line Crossings—Construction Specification.

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Introduction

This document provides BP Projects with guidance on pipeline crossings and access to a repository of experience including lessons learnt, examples, success stories and failure reports. Any mandatory pipeline crossing guidance is also contained in this document.

The repository of BP experience on pipeline crossings is contained in the Engineering Technical Practices (ETP) library archives and may be accessed by electronic link from this document. This document should be used in conjunction with document PR 43: Status of ETP Pipeline Documents.



1. Scope

This GP provides guidance for BP Projects on design and installation methods required to ensure safe crossings of facilities (see clause 3 for a definition of the term facility as used in this document), with the primary emphasis to provisions for public safety. The scope of the document applies to both onshore and offshore pipeline projects.

The provisions of this document are formulated to protect the facility crossed by the pipeline, as well as to provide adequate design for safe installation and operation of the pipeline. This document does not include provisions for aerial pipeline crossings.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this guidance document are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred shall apply.

American Petroleum Institute (API)

API RP 1102 Steel Pipelines Crossing Railroads and Highways.

American Railway Engineering and Maintenance of Way Association (AREMA)

Manual for Railway Engineering.

American Society of Mechanical Engineers (ASME)

ASME B31.4 Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids.

ASME B31.8 Gas Transmission and Distribution Piping Systems.

International Organisation for Standardization (ISO)

ISO 15589 Petroleum and natural gas industries Cathodic protection of pipeline transportation systems Part 2: Offshore pipelines.

American Society for Testing and Materials (ASTM)

ASTM D1452 Standard Practice for Soil Investigation and Sampling by Auger Borings.

ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

3. Terms and definitions

For the purposes of this GP, the following terms and definitions apply:

Facility

Any structure that is constructed or placed on the right-of-way of a pipeline; and any highway, secondary road, railway, or other systems of general transportation, water course, municipal or private irrigation/drainage system, municipal sewer, or other systems for the transportation of water, systems for the transmission and distribution of electricity, telephone, fibre optic or other means of communications, pipelines, and other systems for the transportation of liquids other than water



including oil, natural gas, and any refined product produced from oil, and lines for the transmission of any other substance that is to be carried across, along or under any pipeline installation.

Facility owner

A person, public agency, corporation, or any combination thereof, that owns a facility or that undertakes or has control over one or more of the activities related to construction, installation, operation, maintenance, or removal of a facility.

Excavator

The agency, corporation, or person who performs the excavation.

Permission

The consent given by a facility owner to BP to construct or install a facility or to excavate near the existing facility.

4. General guidance

This GP presents guidelines on the design and installation of pipeline crossings and is intended for use by BP Project Management Teams. It shall be applied to BP pipeline projects, and projects that include pipelines as part of their scope. For joint venture projects in which BP is not the operator, the Project team should endeavour to use BP GPs wherever possible.

This GP shall be applied during the preparation of key project documents and specifications including the preparation of invitations to tender for Define and Execute contracts and the evaluation of Contractors' bids, proposals, and method statements. The GP is intended for internal BP guidance and shall not form part of any contract.

5. Route crossing selection criteria

The applicable regulations of national/federal, state/provincial, municipal, and regulatory authorities having jurisdiction over the facility to be crossed shall be followed. The owner's (or responsible authority's) permission/permits shall be obtained prior to commencement of any crossing installation activities.

- a. A pipeline crossing existing facilities should be both economically and efficiently installed and remain free of in-service disruption for at least its projected lifespan.
- b. The design and execution of a successful crossing shall be addressed in formalizing the route selection.
- c. Pipeline route selection should attempt to minimise the number of crossings, as part of the route selection criteria.
- d. The following general points shall be considered:
 1. The carrier pipe shall be as straight as practicable and shall have uniform support for the entire crossing length.
 2. The angle and intersection of crossing shall be as near to 90 degrees as practicable.
 3. Vertical and horizontal clearances, at the crossing, shall be sufficient to permit maintenance of the pipeline and comply with the third party utility owner's requirements.
 4. A minimum depth of cover, as specified by applicable regulations, shall be observed. If the minimum coverage cannot be provided, mechanical protection shall be installed to supplement the available coverage.

