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Guidance on Practice for Design Decisions that Affect Corrosion

GP 06-67

**BP GROUP
ENGINEERING TECHNICAL PRACTICES**

Forward

This is the first issue of Engineering Technical Practice (ETP) BP GP 06-67. This Guidance on Practice (GP) is newly created and is not based on heritage documents from the merged BP companies. However, the following heritage document is relevant:

British Petroleum (BP OUS)

RP 15-1-2 Fired Heater Refractory.

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Introduction

Decisions made during the project Design phase affect corrosion and how it impacts the operation and integrity management of the equipment in the Operate phase. Major design issues that effect corrosion and integrity management such as materials selection, manufacturing and fabrication techniques, equipment layouts, quality control, environmental constraints, and operating limits, are generally dealt with adequately in other equipment specific and material selection GP documents.

Notwithstanding the comprehensive nature of these GP documents and their heritage predecessors, field experience has identified a number of reoccurring corrosion and integrity management problems that are correctable through modifications in design or fabrication practices. This document compiles these problems and the recommended modifications to design practices to eliminate them.



1. Scope

- a. This GP augments specific GP and GIS documents for the design of equipment, facilities, and installations.
- b. This GP provides guidance applicable to the design of piping and equipment to mitigate or eliminate corrosion and integrity management difficulties resulting from design decisions. These difficulties generally do not impact the intended function of the equipment, but they do impact operability and serviceability. It is applicable to oil refineries, petrochemical and chemical plants, onshore and offshore/subsea oil and gas production facilities, liquefied natural gas plants, pipelines, and distribution facilities.
- c. The scope does not include well tubulars or well completion designs.
- d. The scope of corrosion and integrity management difficulties relevant to this document include:
 1. Inappropriate materials and equipment selection.
 2. Accelerated corrosion events resulting directly or indirectly from design deficiencies.
 3. Premature replacement of piping and equipment.
 4. Equipment interference.
 5. Difficulty adopting a full non-intrusive inspection program.
 6. Excessive requirements for the use of temporary access techniques to support operations, maintenance, and inspection activities.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For the purpose of this document, only information related to materials selection and application is intended for reference. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. Parties to agreements based on this technical practice 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 to applies.

American Petroleum Institute (API)

API RP 651	Cathodic Protection of Aboveground Petroleum Storage Tanks.
API Std 650	Welded Steel Tanks for Oil Storage.

British Standards Institute (BSI)

BS EN 14015	Specification for the design and manufacture of site built, vertical, cylindrical, flat-bottomed, above ground, welded, steel tanks for the storage of liquids at ambient temperature and above.
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GP 06-10	Guidance on Practice for Corrosion Management.
GP 06-14	Guidance on Practice for Erosion Control.
GP 06-25	Guidance on Practice for Design for the Prevention of Corrosion under Insulation and Fireproofing (CUI and CUF).
GP 06-60	Guidance on Practice for Painting Metal Surfaces.
GP 06-70	Guidance on Practice for Corrosion Monitoring.



GP 35-10	Guidance on Practice for Maintainability.
GP 42-10	Guidance on Practice for Design of Piping System (ASME B31.3).
GIS 42-101	Guidance on Industry Standard for Fabrication, Assembly, Erection, and Inspection of Carbon, Carbon Manganese, and Low Alloy Steel Pipework (ASME B31.3).
GP 44-10	Guidance on Practice for Plant Layout.
GIS 46-010	Guidance on Industry Standards for New Pressure Vessels.
GIS 46-020	Guidance on Industry Standards for the Purchase of Pressure Vessels.
GP 48-01	Guidance on Practice for HSSE Review of Projects.
GP 52-10	Guidance on Practice for Insulation.
GIS 58-101	Guidance on Industry Standard for Welded Steel Atmospheric Tanks for Oil Storage.

Engineering Equipment and Materials User Association (EEMUA)

EEMUA Pub 183	Guide for the Prevention of Bottom Leakage from Vertical Cylindrical Storage Tanks.
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3. Terms and definitions

corrosive service

service in which the estimated carbon steel uninhibited corrosion rate causes the corrosion allowance to be consumed before the design service life of the equipment is reached.

solid particles

particulate inorganic matter that can cause erosion damage, e.g. sand (silica), certain hard scales (e.g. magnetite, mill scale), proppants, and catalysts.

4. Symbols and abbreviations

CML	Corrosion monitoring location
CRA	Corrosion resistant alloy
CUI	Corrosion under insulation
NDE	Nondestructive examination

5. Plant layout

- a. If possible, plants and facilities shall be designed so that equipment, piping, and components requiring frequent inspection or maintenance as part of a corrosion or integrity management program are accessible without the need for scaffolding or rope lifting. Permanent platforms shall be provided for items relevant to this guidance that are 2 m (6,6 ft) or more above grade or deck level. If these activities are performed on five year intervals or more frequently then permanent access is required. Refer to GP 35-10, clause 4 and GP 44-10, for additional guidance.

Among the corrosion and integrity management activities that require access to equipment or components on an ongoing, regular basis are: NDT inspections; insertion and retrieval of intrusive corrosion monitoring devices; drawing samples from sampling ports; inspection, function testing, and maintenance of protective devices; and inspection and testing of corrosion and safety instrumentation. Items,

