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Guideline for Materials Selection and Corrosion Control for CO_2 Transport and Injection

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Foreword

The purpose of this document is to provide guidance on materials selection and corrosion control for engineers in the design and identification of operating limits for projects that involve CO_2 transport and injection. It should be used as a guide to help identify specific requirements which can be tailored for each project rather than as definitive requirements used straight from the document. References are also made to other relevant documents and standards. The guidance provided for an initial design should help the engineer focus on the most critical issues related to CO_2 transport and injection. It is a rapidly growing subject area and much exploratory technical work is still being executed, and as such this document should be seen as a starting point with future updates and new insights to be expected.

Scope

The scope of this document is to provide guidance to select materials and ensure long time integrity via effective corrosion control for CO_2 transport and injection, including identification of a safe CO_2 specification.

Rationale

Carbon Capture and Storage (CCS) is a vast growing industry posing challenges to materials and process integrity that are different from more conventional industries. This document aims to provide guidance based on the state of the art to help identify a robust design, to avoid critical items being overlooked, and to avoid/control early degradation and failures.

Referenced Standards and Other Consensus Documents

The latest edition, revision, or amendment of the referenced documents in effect shall govern unless otherwise dated.

AMPP, www.ampp.org:	
ANSI/NACE MR0175/ISO 15156	Petroleum and Natural Gas Industries — Materials for Use in H_2S-containing Environments in Oil and Gas Production
NACE TM0316	Standard Test Method Four-Point Bend Testing of Materials for Oil and Gas Applications
NACE TM0177	Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in H_2S Environments
American Society of Mechanical Engineers (ASME), www.asme.org:	
ASME IX	Welding Qualifications
ASME B31.3	Process Piping, Code for Pressure Piping
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME VIII dev I	Boiler and Pressure Vessel Code ASME VIII dev 1 (Rules for Construction of Pressure Vessels)
ASTM International, www.astm.org:	
ASTM E23	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials
ASTM A20[illegible]	Standard Specification for Pressure Vessel Plates, Alloy Steel, Nickel
ASTM D15[illegible]-16	Standard Test Method for Evaluating Rubber Property - Retraction at Lower Temperatures (TR Test)
ASTM D2137-11	Standard Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics