Identification, Repair, and Mitigation of Cracking of Steel Equipment in Fuel Ethanol Service

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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

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1 Scope

Usage of fuel ethanol as an oxygenate additive in gasoline blends is increasing both in the United States and internationally. This document discusses stress corrosion cracking (SCC) of carbon steel tanks, piping, and equipment exposed to fuel ethanol as a consequence of being in the distribution system, at ethanol distribution facilities, or end user (EU) facilities where the fuel ethanol is eventually added to gasoline. Such equipment includes but is not limited to:

— storage tanks,

— piping and related handling equipment, and

— pipelines

that are used in distribution, handling, storage, and blending of fuel ethanol. However, data for pipelines in ethanol service is limited and caution should be used when applying guidelines from this document that have been derived mainly from applications involving piping and tanks in ethanol storage and blending facilities. SCC of other metals and alloys is beyond the scope of this document, as is the corrosion of steel in this service.

It is realized that SCC of steel in fuel ethanol is a topic where knowledge of the subject is actively growing through documentation of recent experience and through research in progress. This document deals with handling of cracks in existing equipment and reduction of SCC occurrence in new equipment as a result of exposure to fuel ethanol per ASTM D4806 (or other international specifications), ethanol fuel blends, and pipeline transmixes involving fuel ethanol and conventional hydrocarbon fuels (gasoline, diesel, or jet fuel). It includes guidelines for carbon steel construction materials, including their fabrication, inspection, and repair to help assure safe and reliable operations.

This document is based on current engineering practices and insights from recent industrial experience and research. Older equipment may not conform exactly to the information contained herein, but this does not imply that such equipment is being operated in an unsafe or unreliable manner. It is also recognized that facilities may vary and may need to be modified depending on specific operating conditions, inspection, and maintenance experience. Each user company is ultimately responsible for its own safe and reliable operations.

The steels referred to in this document are defined by the ASTM or API designation systems or equivalent steel grades contained in other recognized codes or standards. Welded construction is considered the primary method of fabrication in equipment exposed to fuel ethanol.

Terminology used herein is given in Section 3.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Specification 5L, *Specification for Line Pipe*

API Publication 327, *Aboveground Storage Tank Standards: A Tutorial*

API 570, *Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-service Piping Systems*

API Recommended Practice 574, *Inspection Practices for Piping System Components*