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Standard Practice

Prevention, Detection, and Correction of Deaerator Cracking

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Foreword

NACE Task Group (TG) T-7H-7 on Deaerator Cracking (now TG 244, "Deaerators: Prevention, Detection, and Correction of Cracking—Revision of NACE SP0590") was formed in 1984 to conduct an organized study into the cause of the high incidence of serious deaerator cracking problems in steam generating plants. The task group had previously sponsored technical symposia in which several papers were published on deaerator cracking.[1-8]

This standard is intended to be the primary source of information on deaerator cracking and is directed toward operators and designers of deaerator equipment used in steam generation. Information presented in this standard reflects the work of the many individuals involved in documenting the deaerator cracking problem and is based on studies of carbon steel units. Similar cracking has been found in blowdown flash tanks, sedimentation tanks, hot water storage/disengaging vessels, and steam and feedwater piping.

In developing this standard, the TG considered the case of a southeastern U.S. paper mill that had experienced loss of life as a result of a ruptured deaerator storage tank. The catastrophic failure resulted in an increase in deaerator inspections and widespread concern for vessel reliability and personnel safety. A "Deaerator Advisory," published by the Engineering Division of TAPPI,(1) reported that 68 vessels (approximately 50% of the vessels inspected in 1983) showed cracking in welds and adjacent heat-affected zones (HAZ) resulting from corrosion fatigue.[9] Of the three reported storage vessel ruptures, one resulted in fatalities and considerable plant downtime. Other literature on deterioration of deaerators noted that investigations of various systems indicated that cracks in the welds and HAZ of longitudinal and circumferential seams were the cause of some of the problems.[10] Corrosion, another major cause, had occurred at a more rapid rate in the weld HAZ in some instances, and problems had reportedly occurred in both the welds and the base metal caused by shell thinning to levels that could not support the load. Periodic internal inspections combined with nondestructive examinations (NDE) were recommended to detect deaerator deterioration. Other reports of the seriousness of deaerator weld cracking also were published at this time.[11-15] The root causes of deaerator cracking have not been determined; therefore, this standard is based on good practices.

This standard practice was originally prepared in 1990 by Task Group T-7H-7 under the guidance of NACE Unit Committee T-7H on Corrosion and Its Control in Steam Generating Systems and issued by NACE under the auspices of NACE Group Committee T-7 on Corrosion by Waters. It was revised by Task Group T-7H-7 in 1996 and in 2006 by TG 244, "Deaerators: Prevention, Detection, and Correction of Cracking—Review of NACE SP0590". It was reaffirmed in 2015 by TG 244. TG 244 is administered by Specific Technology Group (STG) 11, " Water Treatment," and is sponsored by STG 34, "Petroleum Refining and Gas Processing," STG 36, "Process Industry: Materials Performance in Chemicals," STG 38, "Process Industry: Pulp and Paper," STG 41, "Energy Generation," and STG 60, "Corrosion Mechanisms." This standard is issued by NACE International under the auspices of STG 11.

In NACE standards, the terms *shall, must, should, and may* are used in accordance with the definitions of these terms in the *NACE Publications Style Manual*. *Shall* and *must* are used to state mandatory requirements. *Should* is used to state something considered good and is recommended but is not mandatory. *May* is used to state something considered optional.

(1) TAPPI, formerly the Technical Association of the Pulp and Paper Industry, 15 Technology Parkway South, Suite 115, Peachtree Corners, GA 30092.

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