



FINAL DRAFT International Standard

ISO/FDIS 24251-1

Prevention of hydrogen assisted brittle fracture of high-strength steel components —

Part 1: Fundamentals and measures

ISO/TC 107/SC 3

Secretariat: **KATS**

Voting begins on:
2025-04-25

Voting terminates on:
2025-06-20

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Published in Switzerland

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This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

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Introduction

High strength steel parts or components are broadly characterized by tensile strengths (R_m) above 1 000 MPa. They are often used in critical applications, such as in bridges, engines and aircraft, where a failure can have catastrophic consequences. Preventing failures and managing the risk of hydrogen embrittlement (HE) is a fundamental consideration that implicates the entire supply chain, including steel mills, part manufacturers, coaters, application engineers, designers and end users.

HE has been studied for decades, yet the complex nature of HE phenomena and the many variables make it hard to predict HE failures. Research is typically conducted under conditions that are either simplified or idealized or both, and the findings cannot be effectively prescribed in industry standards and practices. Circumstances are further complicated by specifications or standards that are sometimes either inadequate or unnecessarily alarmist or both. Inconsistencies and even contradictions in industry standards have led to much confusion and many preventable HE failures. The fact that HE is very often mistakenly determined to be the root cause of failure as opposed to a mechanism of failure reflects the confusion.

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