Second edition
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Metallic and other inorganic coatings — Pretreatment of iron or steel to reduce the risk of hydrogen embrittlement

Revêtements métalliques et autres revêtements inorganiques — Prétraitements du fer ou de l'acier visant à réduire le risque de fragilisation par l'hydrogène

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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ISO 9587 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

This second edition cancels and replaces the first edition (ISO 9587:1999), of which it constitutes a minor revision. Table 1 has been replaced with Tables 1 and 2.

Introduction

When atomic hydrogen enters steels and certain other metals, for example aluminium and titanium alloys, it can cause loss of ductility or load-carrying ability or cracking (usually as sub-microscopic cracks), or catastrophic brittle failures at applied stresses well below the yield strength, or even the normal design strength, for the alloys. This phenomenon often occurs in alloys that show no significant loss in ductility, when measured by conventional tensile tests, and is frequently referred to as hydrogen-induced delayed brittle failure, hydrogen stress cracking or hydrogen embrittlement. The hydrogen can be introduced during cleaning, pickling, phosphating, electroplating and autocatalytic processes, as well as in service as a result of cathodic protection or corrosion reactions. Hydrogen can also be introduced during fabrication prior to cleaning, pickling and application of coatings, for example, during roll forming, machining and drilling, due to the breakdown of unsuitable lubricants, as well as during welding or brazing operations. Parts that have been machined, ground, cold-formed or cold-straightened subsequent to a hardening heat treatment are especially susceptible to hydrogen embrittlement damage.

The susceptibility to hydrogen embrittlement resulting from the absorption of atomic hydrogen and/or the tensile stresses induced during fabrication can be reduced by heat treatment. The time-temperature relationship of the heat treatment is dependent on the composition and structure of steels, as well as on the specific coatings being applied and the nature of the coating procedures. For most high strength steels, the effectiveness of the heat treatment falls off rapidly with reduction of time and temperature.

This International Standard is intended for use by purchasers in specifying requirements to the electroplater, supplier or processor, and is to be indicated on the part drawing or purchase order.