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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 19350-2012

**Metallic and other inorganic coatings -- Post-coating treatments
of iron or steel to reduce the risk of hydrogen embrittlement**

金属和其他无机覆盖层

(English Translation)

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1 Scope

This Standard specifies procedures for reducing susceptibility, or degree of susceptibility, to hydrogen embrittlement that can arise in surface finishing processes.

The heat-treatment procedures for iron or steel specified in this Standard have been shown to be effective in reducing the susceptibility to hydrogen embrittlement. These heat-treatment procedures are used after surface finishing, but prior to any secondary conversion-coating operation.

Stress-relief heat-treatment procedures applied after fabrication, but prior to surface finishing, are specified in ISO 9587.

This Standard does not apply to fasteners.

NOTE The heat treatment does not guarantee complete freedom from the adverse effects of hydrogen embrittlement.

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.

ISO 2080, Metallic and other inorganic coatings - Surface treatment, metallic and other inorganic coatings - Vocabulary

ISO 9587, Metallic and other inorganic coatings - Pretreatment of iron or steel to reduce the risk of hydrogen embrittlement

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2080 and the following apply.

5.1 With the exception of surface-hardened parts, the heat-treatment

conditions shall be selected on the basis of the actual tensile strength. When only the minimum tensile strength is specified or if the tensile strength is not known, the heat-treatment condition shall be selected by relating known or measured hardness values to equivalent tensile strengths. The tensile strength, or equivalent derived from known or measured hardness values, shall be supplied by the purchaser.

Steels that have been wholly or partly surface-hardened shall be considered as being in the category appropriate to the hardness of the surface-hardened layer.

5.2 If the purchaser requires any tests to be performed to verify an

adequate embrittlement-relief treatment, then the test method and the sampling plan to be used shall be specified.

6 Heat treatment after processing

6.1

The heat treatment shall commence as soon as possible, preferably within 1 h but not later than 3 h after surface finishing, and before commencement of any grinding or other mechanical operation. For cadmium, tin, zinc, their alloys or any other coating receiving a chromate treatment, heat treatment shall be carried out before chromate treatment, with the exception of electrodeposited zinc-cobalt alloys that should be passivated prior to hydrogen-embrittlement-relief heat treatment.

NOTE 1: Chromate coatings undergo change at temperatures above 66°C. The coating changes from an amorphous structure to a crystalline structure and no longer exhibits

"self-healing" properties. Although the crystallized chromate coating will provide satisfactory corrosion protection under most natural environments, the chromate coating will no longer pass accelerated corrosion tests.

NOTE 2: The time period referred to in this Clause is the time between the end of the plating operation and the loading of the article concerned into the heat-treatment processor.

6.2 For high-strength steels, the conditions given in Tables 1 and 2 and

Figure 1 shall apply. For steels of actual tensile strength less than 1000 MPa, heat treatment after plating is not essential.

6.3 If threads or sharp notches exist or the articles have a thickness greater than 25 mm, then, for articles electroplated with cadmium or zinc, heat treatment shall be carried out immediately after electroplating for a minimum period of 24 h.