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**Fasteners—Preloading test
for the detection of hydrogen
embrittlement—Parallel bearing
surface method**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from The Japan Research Institute for Screw Threads and Fasteners (JFRI)/the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on **ISO 15330 : 1999 Fasteners—Preloading test for the detection of hydrogen embrittlement—Parallel bearing surface method** for the purposes of making easy to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of International Standard which is based on Japanese Industrial Standard.

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
4 Principle	3
5 Test apparatus	3
5.1 Metric bolts, screws and studs	3
5.2 Thread rolling screws, self-tapping screws and self-drilling screws	5
5.3 Screw and washer assemblies	6
5.4 Nuts	6
5.5 Spring washers	6
6 Sampling	7
7 Test procedure	7
7.1 Lubrication	7
7.2 Application of preload	7
7.2.1 Metric bolts, screws, studs and nuts	7
7.2.2 Thread rolling screws, self-tapping screws and self-drilling screws	8
7.2.3 Spring washers	8
7.3 Reference test	8
7.4 Time for starting the test	9
7.5 Retightening during test	9
8 Test evaluation	9
9 Test report	9
Bibliography	9

Fasteners—Preloading test for the detection of hydrogen embrittlement— Parallel bearing surface method

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 15330** *Fasteners—Preloading test for the detection of hydrogen embrittlement—Parallel bearing surface method* published in 1999 without modifying the technical contents.

When atomic hydrogen enters steels, it can cause loss of ductility or load-carrying ability, cracking (usually as submicroscopic 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 heat treatment, gas carburizing, cleaning, pickling, phosphating, electroplating and in the service environment as a result of cathodic protection or corrosion reactions. Hydrogen can also be introduced during fabrication, for example during roll forming, machining, and drilling due to coolant or lubricant break-down as well as during welding or brazing operations.

1 Scope This Standard specifies a preloading test which is able to detect the occurrence of hydrogen embrittlement of fasteners at room temperature.

This test is applicable to

- metric bolts, screws and studs;
- thread rolling screws;
- self-tapping screws;
- self-drilling screws;
- nuts;
- washers

which are made of steel and are under tensile stress.

The test shall be carried out within a temperature range of 10 °C to 35 °C.

The test is suitable only for in-process control and may be carried out after any step of the manufacturing process. It is not intended as an acceptance test. It is capable of assessing differences or changes in processing conditions or techniques and to determine the effectiveness of the various processing steps including pre- and post-coating treatments (baking) to reduce the mobile hydrogen in the fasteners.

This test does not relieve the manufacturer or processor from the responsibility of imposing and monitoring suitable process control.

Note 1 The chance of detecting hydrogen embrittlement decreases significantly if the test is started more than 24 h after the last step of manufacturing process. Therefore, in normal cases this test is not suitable for acceptance testing.