INTERNATIONAL STANDARD

ISO 16047

First edition
2005-02-01

Fasteners — Torque/clamp force testing

Éléments de fixation — Essais couple/tension

Reference number
ISO 16047:2005(E)

© ISO 2005

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

 © ISO 2005 – All rights reserved

Contents

Page

Foreword ... iv

1 Scope ... 1

2 Normative references ... 1

3 Terms and definitions ... 2

4 Symbols and their designations ... 3

5 Principle of test ... 4
5.1 General ... 4
5.2 Determination of coefficients of friction ... 4
5.3 Determination of torque coefficient K (K-factor) ... 5
5.4 Determination of ratio T/F ... 5

6 Apparatus ... 5
6.1 Testing machine ... 5
6.2 Test fixture ... 5

7 Test parts ... 6
7.1 General ... 6
7.2 Test-bearing plates or test washers ... 7
7.3 Test nuts for testing bolts, screws and studs ... 8
7.4 Test bolts or test screws for testing nuts ... 8

8 Testing under standard conditions ... 9

9 Testing under specific conditions ... 9

10 Evaluation of results ... 9
10.1 Determination of torque coefficient K ... 9
10.2 Determination of coefficient of total friction μ_{tot} ... 10
10.3 Determination of coefficient of friction between threads μ_{th} ... 10
10.4 Determination of coefficient of friction between bearing surfaces μ_b ... 11
10.5 Determination of yield clamp force F_y ... 11
10.6 Determination of yield tightening torque T_y ... 11
10.7 Determination of ultimate clamp force F_u ... 11
10.8 Determination of ultimate tightening torque T_u ... 11

11 Test report ... 11
11.1 General ... 11
11.2 Description of fasteners to be tested ... 12
11.3 Description of test parts ... 13
11.4 Testing machine ... 13
11.5 Test fixture ... 14
11.6 Environmental conditions ... 14
11.7 Specific conditions ... 14
11.8 Test results ... 14

Bibliography ... 15

© ISO 2005 – All rights reserved

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16047 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 1, *Mechanical properties of fasteners*.

© ISO 2005 – All rights reserved

Fasteners — Torque/clamp force testing

1 Scope

This International Standard specifies the conditions for carrying out torque/clamp force tests on threaded fasteners and related parts.

It is applicable, basically, to bolts, screws, studs and nuts made of carbon steel and alloy steel, whose mechanical properties are specified in ISO 898-1, ISO 898-2 or ISO 898-6, having ISO metric threads with thread sizes M3 to M39. It is also applicable to the combination of other externally and internally threaded fasteners with a triangular ISO thread according to ISO 68-1.

It is not applicable to set screws and similar threaded fasteners that are not under tensile stresses, nor to screws which form their own mating thread or threaded fasteners having additional self-locking features.

Unless otherwise agreed, the tests are carried out at room temperature. However, tests carried out under standard conditions are made at a temperature of 10 °C to 35 °C.

This method allows determination of the tightening characteristics of threaded fasteners and related parts.

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 68-1, *ISO general purpose screw threads — Basic profile — Part 1: Metric screw threads*

ISO 273:1979, *Fasteners — Clearance holes for bolts and screws*

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 898-2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*

ISO 898-6, *Mechanical properties of fasteners — Part 6: Nuts with specified proof load values — Fine pitch thread*

ISO 4014, *Hexagon head bolts — Product grades A and B*

ISO 4017, *Hexagon head screws — Product grades A and B*

ISO 4032, *Hexagon nuts, style 1 — Product grades A and B*

ISO 4033, *Hexagon nuts, style 2 — Product grades A and B*

ISO 4042:1999, *Fasteners — Electroplated coatings*

© ISO 2005 – All rights reserved