International Standard

ISO 18954

Steel structures — Structural bolting — Test method to determine parameters of bolt tightening procedures

Structures en acier — Boulonnerie de construction métallique — Méthode d'essai pour déterminer les paramètres des procédures de serrage des boulons

First edition
2026-05

Reference number
ISO 18954:2026(en)

© ISO 2026



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols **2**
5 General **3**
6 Mechanical properties of bolting components **6**
7 Fitness for purpose test **6**
7.1 General 6
7.2 Test apparatus 6
7.3 Test assemblies 7
7.4 Test set-up 7
7.5 Test procedure 8
7.6 Evaluation of the test results 9
7.7 Requirements for suitability 10
7.7.1 General 10
7.7.2 Maximum individual value of the bolt force during the tightening test ($F_{b,max}$) 10
7.7.3 Angle of additional nut rotation 10
7.7.4 Individual values of the k-factor 11
7.8 Test report 11
8 Determination of tightening parameters **12**
8.1 General 12
8.2 Criteria for the determination of the tightening parameters 12
Bibliography **14**

© ISO 2026 – 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 167, *Steel and aluminium structures*.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2026 – All rights reserved

Introduction

This document has been prepared to provide provisions and guidance in the testing of bolting assemblies for pretensioning for which no tightening parameters exist, e.g. when bolts are pretensioned by turning the head, for pretensioning of stainless steel bolting assemblies, when bolts need to be tightened in tapped holes or when a special lubrication is used. This document gives provisions and guidance on how to qualify those bolting assemblies for pretensioning and on how to determine secure tightening parameters.

© ISO 2026 – All rights reserved

Steel structures — Structural bolting — Test method to determine parameters of bolt tightening procedures

1 Scope

This document specifies a test method to determine parameters of bolt tightening procedures for pretensioned bolted connections to be used in structural steelwork.

The methods to establish bolt tightening procedures given in this document are applicable to pretensioned bolted connections for which no approved tightening parameters exist in national or international standards. For example, in cases where bolting assemblies have to be tightened by turning the head instead of the nut, when conditions deviate from a given harmonized standard for pretensioning of bolting assemblies, or when stainless steel bolting assemblies are to be pretensioned. In these cases, tightening parameters as well as tightening procedures can be determined with the use of the Bolt Tightening Qualification Procedure (BTQP) given in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 898-2, *Fasteners — Mechanical properties of fasteners made of carbon steel and alloy steel — Part 2: Nuts with specified property classes*

ISO 898-3, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 3: Flat washers with specified property classes*

ISO 3506-1, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs with specified grades and property classes*

ISO 3506-2, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 2: Nuts with specified grades and property classes*

ISO 3506-7, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 7: Flat washers with specified grades and property classes*

ISO 17607-1, *Steel structures — Execution of structural steelwork — Part 1: General requirements and terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17607-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

© ISO 2026 – All rights reserved