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BSI Standards Publication

High-strength structural bolting assemblies for preloading

Part 8: System HV - Hexagon fit bolt and nut assemblies

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National foreword

This British Standard is the UK implementation of EN 14399-8:2018. It supersedes BS EN 14399-8:2007, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee FME/9/-/2, Fasteners for structural bolting.

A list of organizations represented on this committee can be obtained on request to its secretary.

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NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14399-8

July 2018

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Supersedes EN 14399-8:2007

English Version

High-strength structural bolting assemblies for preloading - Part 8: System HV - Hexagon fit bolt and nut assemblies

Boulonnerie de construction métallique à haute résistance apte à la précontrainte - Partie 8 : Système HV - Boulons ajustés à tête hexagonale (vis + écrou)

Hochfeste vorspannbare Garnituren für Schraubverbindungen im Metallbau - Teil 8: System HV - Garnituren aus Sechskant-Passschrauben und Muttern

This European Standard was approved by CEN on 15 October 2017.

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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Full document details: BS EN 14399-8:2018

Contents

Page

European foreword ... 3
Introduction ... 4
1 Scope ... 6
2 Normative references ... 6
3 Fit bolts ... 7
3.1 Dimensions of fit bolts ... 7
3.2 Specifications for fit bolts and reference standards ... 10
3.3 Marking of fit bolts ... 11
4 Nuts ... 11
4.1 Dimensions of nuts ... 11
4.2 Specification for nuts and reference standards ... 13
4.3 Decarburization of the nut thread ... 13
4.4 Marking of nuts ... 13
5 Designation of the bolt/nut assemblies ... 14
6 Associated washers ... 14
7 Functional characteristics of the bolt/nut/washers assembly ... 14
7.1 General ... 14
7.2 Maximum individual value of the bolt force during fitness for purpose test ($F_{bi\,max}$) ... 15
7.3 Values of angle $\Delta\theta_1$ ... 15
7.4 Values of angle $\Delta\theta_2$ ... 15
7.5 Individual values of the k-factor (k_i), mean value of the k-factor (k_m) and coefficient of variation of the k-factor (V_k) ... 15
7.5.1 Individual values of the k-factor (k_i) for k-class K1 ... 15
7.5.2 Mean value of the k-factor (k_m) and coefficient of variation of the k-factor (V_k) for k-class K2 ... 16
Annex A (normative) Clamp lengths and grip lengths ... 17
Bibliography ... 20

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Full document details: BS EN 14399-8:2018

European foreword

This document (EN 14399-8:2018) has been prepared by Technical Committee CEN/TC 185 "Fasteners", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2019 and conflicting national standards shall be withdrawn at the latest by January 2019.

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

This document supersedes EN 14399-8:2007.

In comparison with EN 14399-8:2007, the following modifications have been made:

— Table 1 containing the overview of the composition of bolting assemblies and component marking has been added;

— the coefficient of variation of the *k*-factor, V_k, was changed from 0,10 to 0,06;

— specifications for the designation of the bolting assemblies have been revised;

— Annex A with detailed specifications on clamp lengths and grip lengths has been added.

EN 14399 consists of the following parts, under the general title *High-strength structural bolting assemblies for preloading*:

— *Part 1: General requirements;*

— *Part 2: Suitability for preloading;*

— *Part 3: System HR — Hexagon bolt and nut assemblies;*

— *Part 4: System HV — Hexagon bolt and nut assemblies;*

— *Part 5: Plain washers;*

— *Part 6: Plain chamfered washers;*

— *Part 7: System HR — Countersunk head bolt and nut assemblies;*

— *Part 8: System HV — Hexagon fit bolt and nut assemblies;*

— *Part 9: System HR or HV — Direct tension indicators for bolt and nut assemblies;*

— *Part 10: System HRC — Bolt and nut assemblies with calibrated preload.*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

This document on structural bolting reflects the situation in Europe where two technical solutions exist to achieve the necessary ductility of bolt/nut/washers assemblies. These solutions consist of two different types (HR and HV) of bolt/nut/washer assemblies, see Table 1. Both types are well proven and it is the responsibility of the experts using structural bolting whether they use the one or the other type.

It is, however, important for the performance of the assembly to avoid mixing up the components of both types. Therefore, bolts and nuts for both types are standardized in one single part of this European Standard each and the marking of the components of the bolting assemblies is uniform.

Preloaded bolted assemblies are very sensitive to differences in manufacture and lubrication. Therefore, it is important that the bolting assemblies are supplied by one manufacturer, who is always responsible for the functionality of the bolting assemblies as supplied.

For the same reason it is important that coating of the bolting assemblies is under the control of one manufacturer.

Beside the mechanical properties of the components, the functionality of the bolting assemblies requires that the specified preload can be achieved if the bolting assemblies are tightened with a suitable procedure. For this purpose a test method for the suitability of the bolting assemblies for preloading was created, which will demonstrate whether the functionality of the bolting assemblies is fulfilled.

It should be pointed out that compared to ISO 272 the width across flats (large series) for M12 and M20 have been changed to 22 mm and 32 mm respectively. These changes are justified by the following reasons.

Under the specific conditions of structural bolting, the compressive stresses under the bolt head or nut for the sizes M12 may become too large with the width across flats of 21 mm, especially if the washer is fitted eccentrically to the bolt axis.

For the size M20, the width across flats of 34 mm is very difficult to be produced. The change to 32 mm is primarily motivated by economics but it should also be pointed out that the width across flats of 32 mm was already common practice in Europe.

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Table 1 — Composition of high-strength structural bolting assemblies and component marking

Type of bolting assembly		**System HR**				**System HV**		**System HRC**	
General requirements		EN 14399-1							
Suitability for preloading		EN 14399-2 and, if any, additional testing specified in the product standard							
Bolt and nut		EN 14399-3		EN 14399-7		EN 14399-4	EN 14399-8	EN 14399-10	
Marking	Bolt	HR8.8	HR10.9	HR8.8	HR10.9	HV10.9	HVP10.9	HRC10.9	
	Nut	HR8 or HR10	HR10	HR8 or HR10	HR10	HV10	HV10	HR10	HRD10
Washer(s)		EN 14399-5[a] or EN 14399-6				EN 14399-6			EN 14399-5[a] or EN 14399-6
Marking		H or HR[b]				H or HV[b]		H or HR[b]	H or HR[b] or HD[c]
Direct tension indicator and nut face washer or bolt face washer, if any		EN 14399-9						Not applicable	
Marking	Direct tension indicator	H8	H10	H8	H10	H10			
	Nut face washer	HN				HN			
	Bolt face washer	HB		Not applicable		HB			

[a] EN 14399-5 can only be used under the nut.
[b] At the choice of the manufacturer.
[c] Mandatory mark for washers with enlarged outer diameter according to EN 14399-5 only.

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1 Scope

This European Standard specifies together with EN 14399-1 and EN 14399-2, the requirements for assemblies of high-strength structural bolts and nuts of system HV suitable for preloaded joints with large width across flats, thread sizes M12 to M36 and property classes 10.9/10.

Bolting assemblies (including fit bolts with nominal shank diameter d + 1 mm) in accordance with this document have been designed to allow preloading of at least 0,7 $f_{ub} \times A_s$[1)] according to EN 1993-1-8 (Eurocode 3) and to obtain ductility predominantly by plastic deformation of the engaged threads. For this purpose, the components have the following characteristics:

— nut height approximately 0,8 D;

— bolt with short thread length.

Bolting assemblies in accordance with this document include washers according to EN 14399-6.

NOTE Attention is drawn to the importance of ensuring that the bolting assemblies are correctly used if satisfactory results are to be obtained. For recommendations concerning proper application, reference to EN 1090-2 is made.

General requirements and requirements for suitability for preloading are specified in EN 14399-2.

Clamp lengths and grip lengths for the bolting assemblies are specified in the normative Annex A.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14399-1, *High-strength structural bolting assemblies for preloading - Part 1: General requirements*

EN 14399-2, *High-strength structural bolting assemblies for preloading - Part 2: Suitability for preloading*

EN 14399-6, *High-strength structural bolting assemblies for preloading - Part 6: Plain chamfered washers*

EN 14399-9, *High-strength structural bolting assemblies for preloading - Part 9: System HR or HV - Direct tension indicators for bolt and nut assemblies*

EN 26157-1, *Fasteners - Surface discontinuities - Part 1: Bolts, screws and studs for general requirements (ISO 26157-1)*

EN 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 898-1)*

EN ISO 898-2, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 2: Nuts with specified property classes - Coarse thread and fine pitch thread (ISO 898-2)*

EN ISO 3269, *Fasteners - Acceptance inspection (ISO 3269)*

EN ISO 4759-1, *Tolerances for fasteners - Part 1: Bolts, screws, studs and nuts - Product grades A, B and C (ISO 4759-1)*

1) f_{ub} is the nominal tensile strength (R_m) and A_s is the nominal stress area of the bolt.

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