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# International Standard



# 7416

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Plain washers, chamfered, hardened and tempered for high-strength structural bolting

*Rondelles plates chanfreinées trempées et revenues pour vis à serrage contrôlé pour constructions métalliques*

First edition — 1984-11-15

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**Descriptors** : fasteners, washers, plain washers, specifications, dimensions, designation, marking.

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7416 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

# Plain washers, chamfered, hardened and tempered for high-strength structural bolting

## 0 Introduction

This International Standard is part of the complete ISO product standard series on hexagon drive fasteners. The series comprises:

- a) hexagon head bolts (ISO 4014, ISO 4015 and ISO 4016);
- b) hexagon head screws (ISO 4017 and ISO 4018);
- c) hexagon nuts (ISO 4032, ISO 4033, ISO 4034, ISO 4035 and ISO 4036);
- d) hexagon flanged bolts;<sup>1)</sup>
- e) hexagon flanged screws;<sup>1)</sup>
- f) hexagon flanged nuts (ISO 4161);

- g) structural bolting (ISO 4775 and ISO 7411 to ISO 7417).

## 1 Scope and field of application

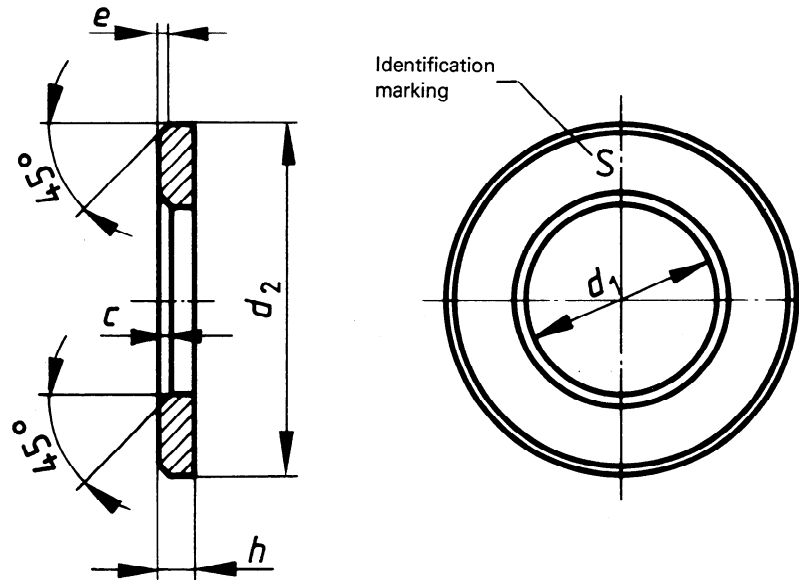
This International Standard specifies those hardened and tempered circular washers intended for assembly with large series hexagon high-strength structural bolts and nuts of diameters from M12 to M36 inclusive.

## 2 Reference

ISO 4759/3, *Tolerances for fasteners — Part 3: Washers for bolts, screws and nuts with thread diameters > 1 and < 150 mm — Product grades A and C.*

<sup>1)</sup> These will be the subject of a future International Standard.

3 Dimensions



Dimensions in millimetres

Thread size, $d$ , of associated bolt		M12	M16	M20	(M22)*	M24	(M27)*	M30	M36
$d_1$	min.	13	17	21	23	25	28	31	37
	max.	13,27	17,27	21,33	23,33	25,33	28,52	31,62	37,62
$d_2$	min.	23,7	31,4	38,4	40,4	45,4	50,4	54,1	64,1
	max.	25	33	40	42	47	52	56	66
$h$	min.	3,4	3,4	3,4	3,4	3,4	4,4	4,4	4,4
	max.	4,6	4,6	4,6	4,6	4,6	5,6	5,6	5,6
$e \approx$		0,5	1	1	1	1	1	1	1
$c$	min.	1,2	1,2	1,6	1,6	1,6	2,0	2,0	2,4
	max.	1,6	1,6	2,0	2,0	2,0	2,4	2,4	2,8

\* Sizes in brackets should be avoided if possible.

#### 4 Specifications and reference standards

<b>Material</b>		Steel		
<b>Mechanical properties</b>	Hardness range (HRC) <sup>1)</sup>	35-45		
<b>Tolerances</b>	Product grade	$d_1$ : A	$d_2$ : C	$h$ : IT 17
	International Standard	ISO 4759/3		
<b>Surface finish</b>	normal	Black oxide <sup>2)</sup>		
	optional	Zinc electroplated <sup>3)</sup> Cadmium electroplated <sup>3)</sup> Hot-dip galvanized <sup>3)</sup>		
<b>Acceptability</b>	This will form the subject of a future International Standard.			
<b>Associated bolts</b>	ISO 7411 and ISO 7412			
<b>Associated nuts</b>	ISO 4775 and ISO 7414			

1) Minimum hardness for hot-dip galvanized washers may be 26 HRC.

2) Black oxide means the normal finish resulting from heat treatment with a light coating of oil.

3) Precautions to avoid hydrogen embrittlement may be necessary and reference should be made to the future International Standard dealing with electroplating of threaded components.

#### 5 Designation

Example for the designation of hardened and tempered chamfered washers for high-strength structural bolts with thread size  $d = M16$ :

**Washer ISO 7416 - 16**

#### 6 Marking

Hardened and tempered chamfered washers shall be identified by the external chamfer as shown in the figure, and an indented letter S.

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