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Internal combustion engines — Piston pins —

Part 1: General specifications

Moteurs à combustion interne — Axes de pistons —

Partie 1: Spécifications générales

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Contents

Page

Foreword ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**
3.1 General 1
3.2 Geometrical and manufacturing features of piston pins 1
3.2.1 Bore types 1
3.2.2 Outside-edge configurations 2
3.2.3 Other features 3

4 Symbols **3**

5 Nomenclature **4**
5.1 Outside, inside and end features 4
5.2 Outside edge and inside chamfer configurations 6
5.2.1 Chamfered outside-edge configuration 6
5.2.2 Double-chamfered outside-edge configuration 6
5.2.3 Radiused outside-edge configuration 7
5.2.4 Chamfer-locking outside-edge configuration 7
5.3 Outside-edge drop-off configuration 8

6 Codes **9**

7 Designation of piston pins **10**
7.1 Designation elements and order 10
7.1.1 Mandatory elements 10
7.1.2 Additional elements 10
7.2 Designation examples 10

8 Piston pin types, dimensions and tolerances **11**
8.1 Manufacturing types 11
8.2 Dimensions and tolerances 11
8.2.1 Outside diameter and form and location tolerances 11
8.2.2 Inside diameter tolerance 13
8.2.3 Length (l_1) and gauge length (l_5) tolerances 13
8.2.4 Outside-edge form 14
8.2.5 Inside-edge profile 15
8.2.6 Tapered bore dimensions 16
8.2.7 Centre-web dimensions (see Figure 17) 18

9 Material and heat treatment **18**
9.1 Type of material 18
9.2 Core hardness *l* core strength 19
9.3 Carburised and nitrided case depth 20
9.4 Surface hardness 21
9.5 Volume change 21

10 Common features **22**
10.1 Roughness of surfaces 22
10.1.1 Roughness of machined surfaces 22
10.1.2 Roughness of coated surfaces 22
10.1.3 Roughness of extruded and seamless drawn bore surfaces 23
10.2 Marking of piston pins 23
10.3 Miscellaneous 23
10.3.1 Cleanliness 23
10.3.2 Corrosion protection 23
10.3.3 Residual magnetism 23
10.3.4 Packaging 23

11 Quality requirements **24**
11.1 Material characteristics 24
11.1.1 Decarburisation 24
11.1.2 Cementite network 24
11.1.3 Nitride coating 24
11.1.4 Grinder burn 24
11.2 Material defects 24
11.2.1 Cracks 24
11.2.2 Forming streaks 24
11.3 Visual defects 25
Bibliography **26**

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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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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 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain and powertrain fluids*.

This third edition cancels and replaces the second edition (ISO 18669-1:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Clause 2 added,

— Table 4 “Waviness” added,

— Table 18 “Roughness machined surfaces” changed,

— Subclause 10.1.2 “Roughness of coated surfaces” added,

— Table 20 “Material defects” changed,

— Table 21 “Visual defects” changed,

— editorial changes.

A list of all parts in the ISO 18669 series can be found on the ISO website.

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.

Internal combustion engines — Piston pins —

Part 1: General specifications

1 Scope

This document specifies the essential dimensional characteristics of piston pins with a nominal outer diameter from 8 mm up to and including 100 mm, for reciprocating internal combustion engines for road vehicles and other applications. In certain applications, except road vehicles, and provided that mutual agreement is made between the customer and the manufacturer, this document can be used with suitable modifications.

In addition, it establishes a vocabulary, a pin-type classification, material description based on mechanical properties, common features and quality requirements.

The use of this document can require a manufacturer and customer statistical process control agreement.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological 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/

3.1 General

3.1.1
piston pin
precision cylindrical component that connects the piston to the connecting rod and has a smooth hard peripheral surface

3.2 Geometrical and manufacturing features of piston pins

3.2.1 Bore types

3.2.1.1
cylindrical bore
pin having a straight cylindrical bore

3.2.1.2
centre web
pin bore with centre web
pin inside diameter formed symmetrically from each end leaving a web in the pin centre

Note 1 to entry: The web is subsequently removed leaving a step as shown in Figure 3.

3.2.1.3
tapered bore
pin with conical-shaped inside diameter near the ends that reduces the weight of the *piston pin* (3.1.1)

3.2.1.4
machined bore
pin with inside diameter produced solely by machining

3.2.1.5
seamless drawn tube
hollow steel product which does not contain any line junctures resulting from the method of manufacture

3.2.1.6
end web
pin bore with end web
pin inner diameter formed from one end leaving a web near the opposite end

Note 1 to entry: The web is punched out. The pin is then drawn over a mandrel and a forming line may result as shown in Figure 4.

3.2.2 Outside-edge configurations

3.2.2.1
chamfer
outside-edge bevelled feature that is sometimes used to mate with a round retainer ring

Note 1 to entry: Referred to as “locking chamfer” when a round wire retainer ring is located on the chamfer angle and used to secure the pin in the piston.

3.2.2.2
outside-edge form angle
δ
region of outside-edge form that provides a smooth transition to the peripheral surface to facilitate ease of assembly

3.2.2.3
outside-edge form angle end face
γ
region of outside-edge form that provides a smooth transition to the end face

3.2.2.4
drop-off
non-functional machining feature that creates a transition between the outside edge and the peripheral surface

Note 1 to entry: See Figure 12.

3.2.2.5
inside-edge chamfer
bevelled edge between the bore surface and the end faces of the *piston pin* (3.1.1)

3.2.2.6
gauge point
locating point on the pin outside-edge *chamfer* (3.2.2.1) from where the gauge diameter (d_5) and gauge length (l_5) are measured

3.2.3 Other features

3.2.3.1
volume change
change detected as a permanent outside-diameter dimensional deviation at reference temperature after being heated to a test temperature for a specified period of time

3.2.3.2
slag line
linear flaw of non-metallic inclusions

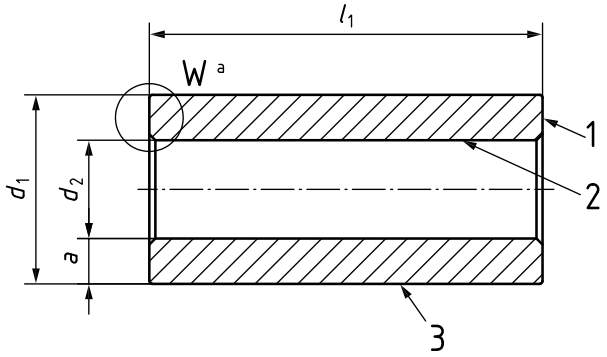
4 Symbols

Symbol	Description
a	Wall thickness
b	Outside-edge drop-off length
c	Outside-edge drop-off height
d_1	Outside diameter
d_2	Inside diameter
d_3	Tapered bore diameter
d_4	Centre-web diameter
d_5	Gauge diameter
d_6	End face diameter
e	Tapered bore runout
f	Outside-edge length
g	Outside-edge chamfer length
H_s	Limit hardness
h_1	End face concavity
h_2	End face step
k	Tapered bore relief
l_1	Length
l_3	Tapered bore length
l_4	Centre-web length
l_5	Gauge length
r	Outside-edge radius
R_m	Core strength
s	End face runout
t_1	Inside-edge chamfer length
t_2	Outside-edge form length
α	Tapered bore angle
β	Outside-edge chamfer angle
γ	Outside-edge form angle end face
δ	Outside-edge form angle

5 Nomenclature

5.1 Outside, inside and end features

Terms commonly used to describe pins with a cylindrical bore are shown in Figure 1.



Key

1 end face
2 bore surface
3 peripheral surface
d_1 outside diameter
d_2 inside diameter
l_1 length
a wall thickness
[a] For detail W see Figure 2.

Figure 1 — Pin with cylindrical bore

Terms commonly used to describe end face concavity are shown in Figure 2a).

Terms commonly used to describe end face step are shown in Figure 2b).

a) End face concavity **b) End face step**

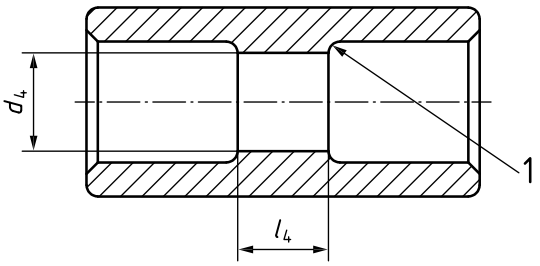
Key

h_1 end face concavity
h_2 end face step
d_6 end face diameter

End face concavity and end face step are not recommended for end face locking.

Figure 2 — Detail W of Figure 1

Terms commonly used to describe pins with a centre web are shown in Figure 3.

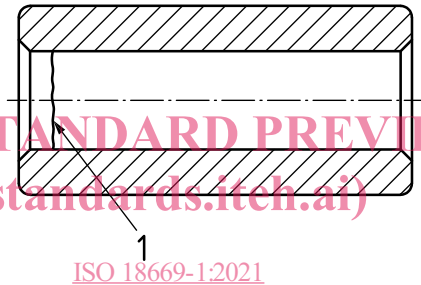


Key

1 centre-web radius
l_4 centre-web length
d_4 centre-web diameter

Figure 3 — Pin with cold-formed centre web

Terms commonly used to describe pins with a cold-formed end web are shown in Figure 4.

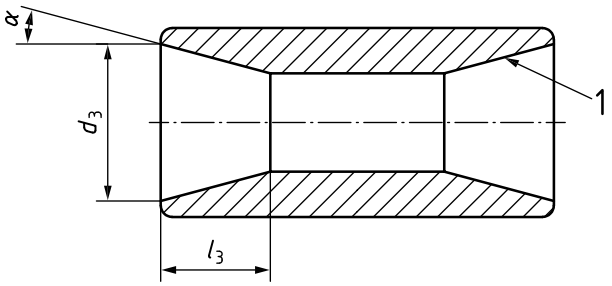


Key

1 end-web forming line

Figure 4 — Pin with cold-formed end web

Terms commonly used to describe pins with a tapered bore are shown in Figure 5.



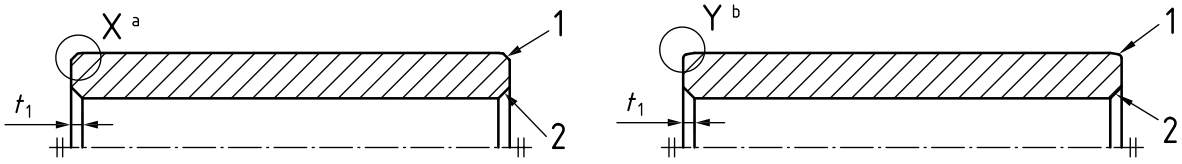
Key

1 tapered bore surface
α tapered bore angle
d_3 tapered bore diameter
l_3 tapered bore length

Figure 5 — Pin with tapered bore

5.2 Outside edge and inside chamfer configurations

Terms commonly used to describe the outside edge and inside chamfer configurations are shown in Figure 6.



Key

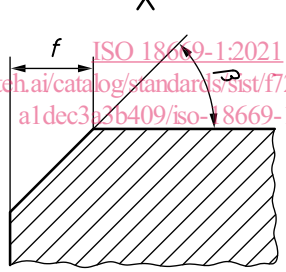
1 outside-edge chamfer or radius
2 inside-edge chamfer
t_1 inside-edge chamfer length
a For detail X see Figures 7 and 8.
b For detail Y see Figure 9.

NOTE This can be used with either a round or rectangular retainer ring.

Figure 6 — Outside-edge configuration (detail X: chamfered; detail Y: radiused)

5.2.1 Chamfered outside-edge configuration

Terms commonly used to describe the chamfered outside-edge configuration are shown in Figure 7.



Key

f outside-edge length
β outside-edge chamfer angle

Figure 7 — Chamfered configuration (detail X of Figure 6)

5.2.2 Double-chamfered outside-edge configuration

Terms commonly used to describe double-chamfered outside-edge configurations are shown in Figure 8. The double chamfer is for assembly improvements of the piston pin.