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Internal combustion engines — Piston pins —

Part 1:
General specifications

Moteurs à combustion interne — Axes de pistons —

Partie 1: Spécifications générales

ICS: 43.060.10

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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 22, *Road vehicles*.

This second edition cancels and replaces the first edition (ISO 18669-1:2004), which has been technically revised.

ISO 18669 consists of the following parts, under the general title *Internal combustion engines — Piston pins*:

— *Part 1: General specifications*

— *Part 2: Inspection measuring principles*

Internal combustion engines — Piston pins —

Part 1: General specifications

1 Scope

This part of ISO 18669 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 part of ISO 18669 may 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 part of ISO 18669 may require a manufacturer and customer statistical process control agreement.

2 Terms and definitions

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

2.1 General

2.1.1
piston pin
precision cylindrical component that connects the piston to the connecting rod and has a smooth hard peripheral surface

2.2 Geometrical and manufacturing features of piston pins

2.2.1 Bore types

2.2.1.1
cylindrical
pin having a straight cylindrical bore

2.2.1.2
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.

2.2.1.3
tapered
pin with conical-shaped inside diameter near the ends that reduces the weight of the piston pin

2.2.1.4
machined
pin with inside diameter produced solely by machining

2.2.1.5
seamless drawn tube
hollow steel product which does not contain any line junctures resulting from the method of manufacture

2.2.1.6
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.

2.2.2 Outside-edge configurations

2.2.2.1
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.

2.2.2.2
form angle δ
region of outside-edge form that provides a smooth transition to the peripheral surface to facilitate ease of assembly

2.2.2.3
form angle γ
region of outside-edge form that provides a smooth transition to the end face

2.2.2.4
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.

2.2.2.5
inside-edge chamfer
bevelled edge between the bore surface and the end faces of the piston pin

2.2.2.6
gauge point
locating point on the pin outside-edge chamfer from where the gauge diameter (d_5) and gauge length (l_5) are measured

2.2.3 Other features

2.2.3.1
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

2.2.3.2
slag lines
linear flaws of non-metallic inclusions

3 Symbols

For the purposes of this part of ISO 18669, the symbols in Table 1 apply.

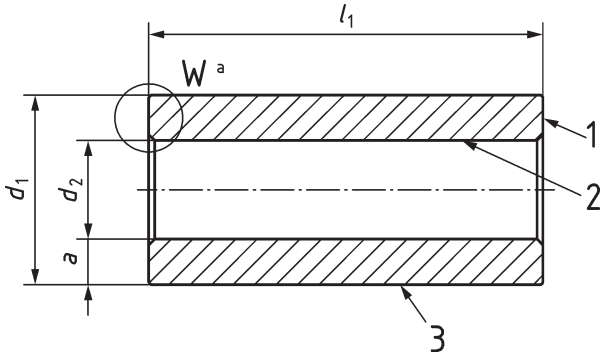
Table 1 — Symbols

Symbol abbreviation	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

4 Nomenclature

4.1 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] 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**

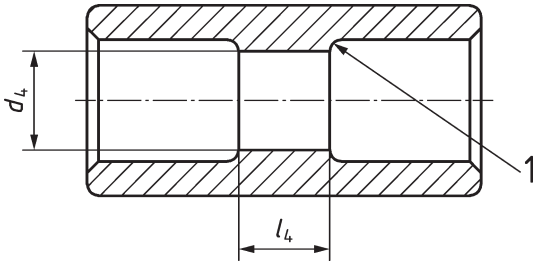
Key

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

NOTE End face concavity and end face step 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

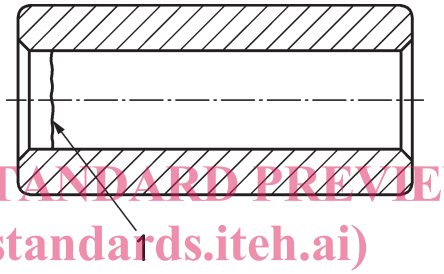
1 centre-web radius

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.

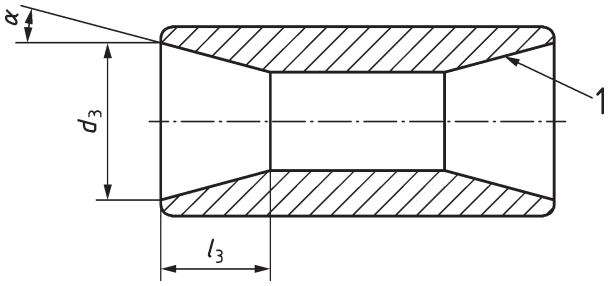


Key

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

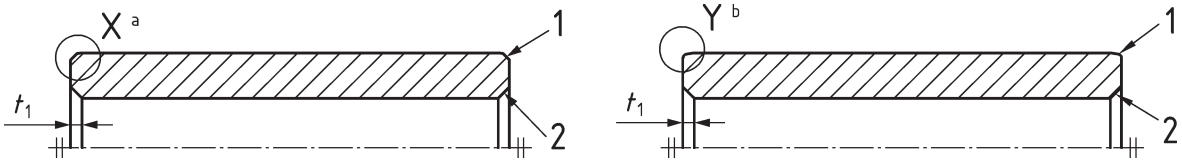
d_3 tapered bore diameter

l_3 tapered bore length

Figure 5 — Pin with tapered bore

4.2 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 See Figures 7 and 8.

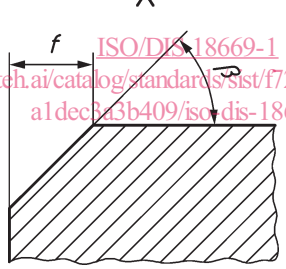
b See Figure 9.

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

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

4.2.1 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)

4.2.2 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.