INTERNATIONAL STANDARD

ISO 18669-1

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Internal combustion engines — Piston pins —

Part 1: General specifications

Moteurs à combustion interne — Axes de pistons —
Partie 1: Spécifications générales

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 18669-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

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 of outer diameter from 8 mm up to 100 mm, for reciprocating internal combustion engines. In addition, it establishes a vocabulary, a pin-type classification, material description based on mechanical properties, common features and quality requirements. It may also be used for piston pins of compressors working under analogous conditions.

In certain applications, except road vehicles, and provided that mutual agreement is made between the purchaser and the manufacturer, this part of ISO 18669 may be used with suitable modifications.

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 The web is subsequently removed leaving a step as shown in Figure 2.

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 The web is punched out. The pin is then drawn over a mandrel and a forming line may result as shown in Figure 3.

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

See Figures 6, 7 and 9.

2.2.2.4
inside-edge chamfer
bevelled edge between the bore surface and the end faces of the piston pin

2.2.2.5
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.

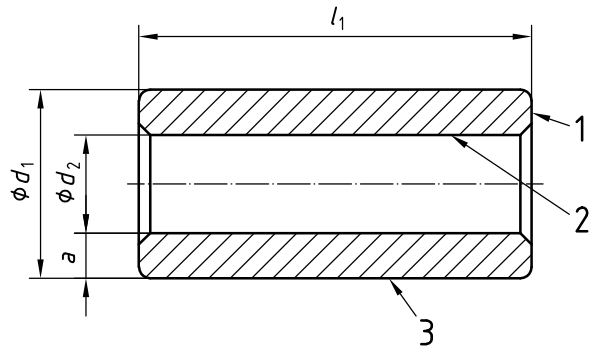
Table 1 — Symbols

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
f	Outside-edge length
g	Outside-edge chamfer length
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	Inside-edge chamfer length
α	Tapered bore angle
β	Outside-edge chamfer angle
δ	Outside-edge form angle
H_s	Limit hardness

4 Nomenclature

4.1 Outside, inside and end features

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



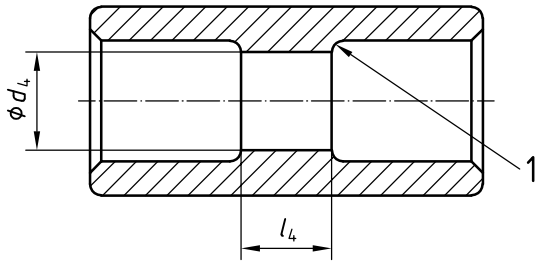
Key

1	end face	d_1	outside diameter
2	bore surface	d_2	inside diameter
3	peripheral surface	l_1	length

a Wall thickness.

Figure 1 — Pin with cylindrical bore

Terms commonly used to describe pins with a centre web are shown in Figure 2.



Key

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

Figure 2 — Pin with cold-formed centre web

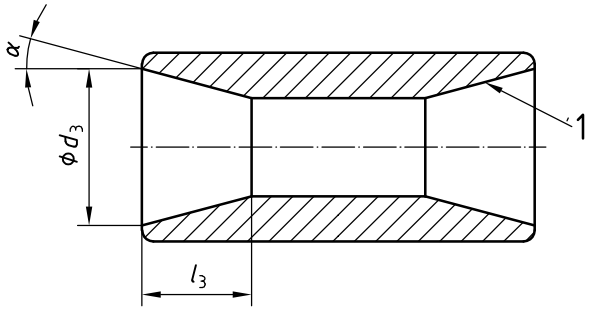
Terms commonly used to describe pins with a cold-formed end-web are shown in Figure 3.

Key

1 end-web forming line

Figure 3 — Pin with cold-formed end web

Terms commonly used to describe pins with a tapered bore are shown in Figure 4.



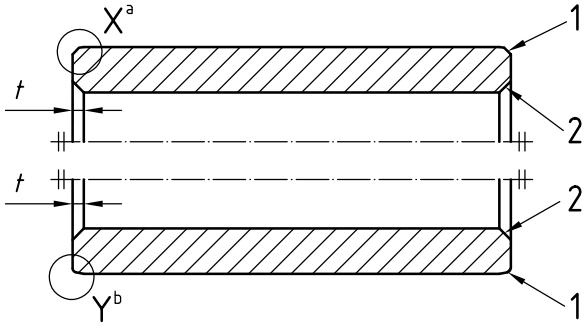
Key

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

Figure 4 — 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 5.



Key

1 outside-edge radius or chamfer (see Figures 6 and 7)

2 inside-edge chamfer

t inside-edge chamfer length

a See Figure 6

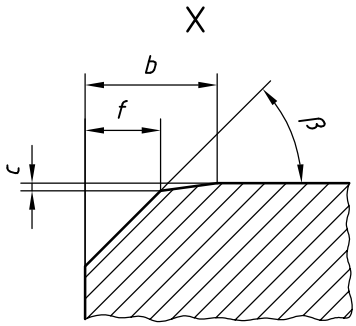
b See Figure 7

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

Figure 5 — Outside-edge configuration

Terms commonly used to describe the chamfered outside-edge configuration and outside-edge drop-off are shown in Figure 6a).

Terms commonly used to describe double-chamfered outside-edge configurations are shown in Figure 6b).



Key

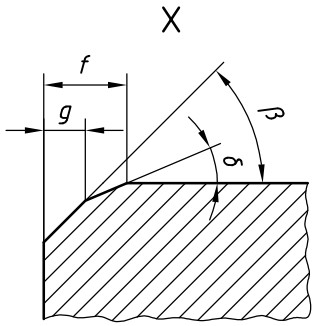
b outside-edge drop-off length

f outside-edge length

c outside-edge drop-off height

β outside-edge chamfer angle

a) Chamfer and drop-off



Key

f outside-edge length

g outside-edge chamfer length

δ outside-edge form angle

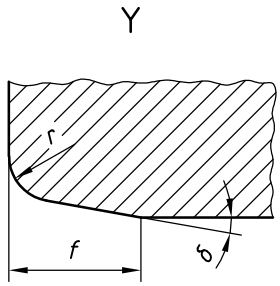
β outside-edge chamfer angle

b) Double-chamfered edge

NOTE Outside-edge drop-off may be used with chamfered, double-chamfered, or radiused outside-edge configurations.

Figure 6 — Detail X of Figure 5

Terms commonly used to describe radiused outside-edge configurations are shown in Figure 7.

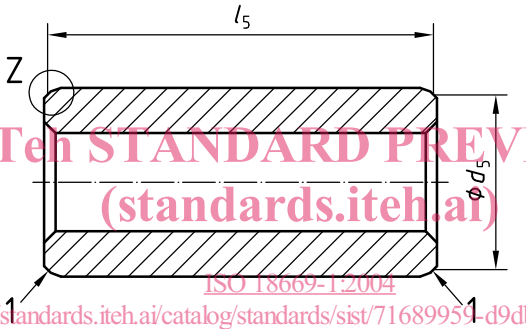


Key

r outside-edge radius
f outside-edge length
δ outside-edge form angle

Figure 7 — Detail Y of Figure 5

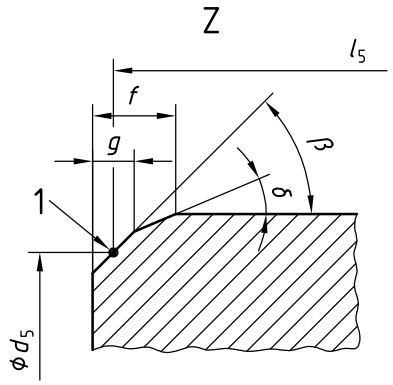
Terms commonly used to describe chamfer-locking outside-edge configurations are shown in Figures 8 and 9.



Key

1 gauge points
l_5 gauge length
d_5 gauge diameter

Figure 8 — Chamfer-locking outside edge for round retainer ring



Key

1 gauge point
d_5 gauge diameter
f outside-edge length
g outside-edge chamfer length
l_5 gauge length

Figure 9 — Detail Z of Figure 8

5 Codes

Codes used for piston pins shall be as given in Table 2 with their explanatory descriptions.

Table 2 — Codes and descriptions

Code	Description	Relevant ISO 18669-1 clause
P1…P6	Pin-type classification according to manufacturing method of the pin bore	7.1
X	Piston pins in combination with needle bearing	8.3
F1, F2	Outside-edge configuration tolerance class	7.2.4
K	Carburising steel class K	8.1 / 8.2
S	Carburising steel class S	8.1 / 8.2
L	Carburising steel class L	8.1 / 8.2
M	Carburising steel class M	8.1 / 8.2
N	Nitriding steel class N	8.1 / 8.2
V	Piston pins with limited volume change	8.3 / 8.4 / 8.5
R1, R2	Peripheral surface roughness class	9.1.1
G	Chamfer-locking outside-edge configuration (gauge point)	6.2 / 7.2.4
R	Outside-edge radiused	7.2.4 / 6.1.2
C1	Outside-edge chamfered	7.2.4
C2	Outside-edge double chamfered	7.2.4
LA, LB	Length tolerance class	7.2.3
MM	Manufacturer's mark	9.2
TC	Piston pins with bore surface cold formed	7.2.6

6 Designation of piston pins

6.1 Designation elements and order

To designate piston pins, the following details shall be given, in the order shown below. The codes given in Table 2 shall be used.

6.1.1 Mandatory elements

The following mandatory elements shall constitute the designation of a piston pin:

— designation, i.e., piston pin;

— number of International Standard: ISO 18669;

— type of piston pin, e.g. P1;

— hyphen;

— size of piston pin, $d_1 \times d_2 \times l_1$ or $d_1 / d_3 - \alpha \times d_2 \times l_1$ for a pin with tapered bore;

— hyphen;

— material code, e.g. L.