
Diesel engines — Clamp mounted CR fuel injectors — Mounting dimensions

*Moteurs diesels — Injecteurs de combustible pour rampe commune
fixée par patte — Dimensions de montage*

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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 (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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 22 *Road Vehicles*, Subcommittee SC 34 *Propulsion, powertrain, and powertrain fluids*.

This second edition cancels and replaces (ISO 12251:2011) which has been technically revised.

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

- surface specification has been referenced to ISO 1302;
- ISO 2974 has been added for the high pressure connector;
- large D and small d have been interchanged, corresponding to ISO 286-1 (large D for bores, small d for shafts);
- numbering D_1 to D_5 and d_1 to d_5 has been rearranged: same numbers now indicate same position within the assembly of injector and cylinder head;
- **Figure 5** has been completed in order to show the complete assembly and a new dimension D_3 and bore for capnut space have been added;
- D_4 has been corrected to 24,1 in **Table 2** at type A.5 (error in the first edition);
- **Table 3** has been changed: tolerances for d_3 changed to max. values and max. value for type B.2 changed from 19,1 to 19,2;
- dimension D_3 and bore for capnut space 19,3 mm have been introduced in **Table 4**;
- type B.6 has been added in **Table 3** and **Table 4**;
- Bibliography has been added.

Diesel engines — Clamp mounted CR fuel injectors — Mounting dimensions

1 Scope

This document specifies dimensional requirements for clamp mounted CR fuel injectors and their corresponding cylinder head features in diesel engines.

According to the injector nozzle capnut, the clamp mounted CR fuel injectors can be divided into two types:

- a) Type A, where the nozzle capnut is straight (see [Figure 4](#));
- b) Type B, where the nozzle capnut is stepped (see [Figure 5](#)).

Each clamp mounted CR fuel injector type is subdivided by a series of different sizes.

NOTE This differentiation corresponds to the relationship between the two guide diameters of the clamp mounted CR fuel injectors.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 2974, *Diesel engines — 60 female cones for high pressure fuel injection components*

3 Terms, definitions and symbols

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

For the purposes of this document, the following symbols apply:

d_1 injector upper guide diameter

d_2 injector shaft diameter

d_3 capnut diameter

d_4 injector lower guide diameter

d_5 injector nozzle shaft diameter

D_1 bore for upper guide diameter

- D_3 bore for capnut space
- D_4 bore for lower guide diameter
- D_5 bore for nozzle shaft
- l_1 overall injector length
- l_2 distance between sealing face and upper guide diameter of injector
- l_3 overlapping (upper guide diameter/cylinder head)
- l_4 injector clamping width
- l_5 clamp width;
- l_6 injector clamping height
- l_7 distance between sealing face and datum B on injector
- l_8 distance between sealing face and datum C on injector

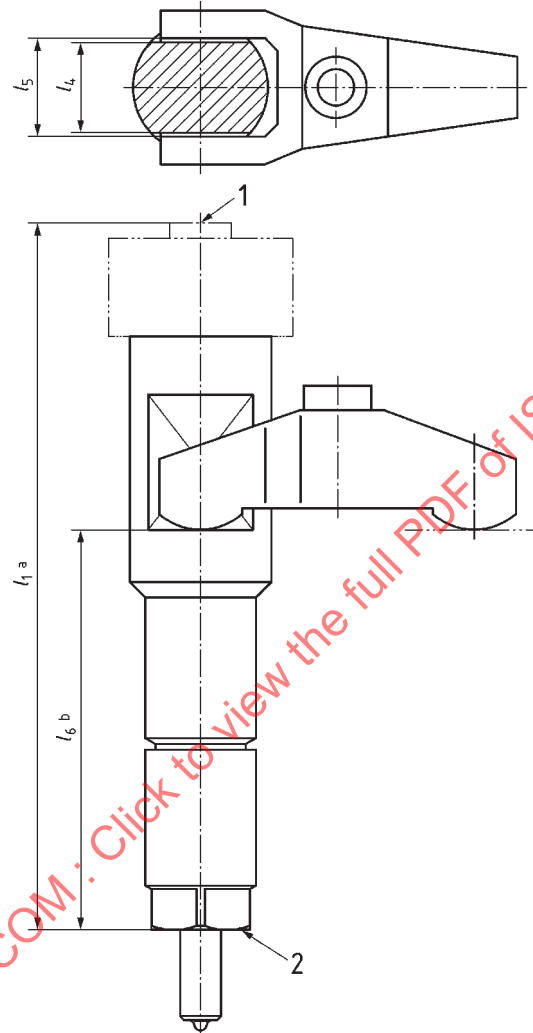
NOTE l_7 and l_8 are dependent on the cylinder head design as agreed between injector manufacturer and customer.

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4 General requirements

4.1 Clamp mounting arrangement

A typical clamp mounting arrangement is shown in [Figure 1](#) (schematically).



Key

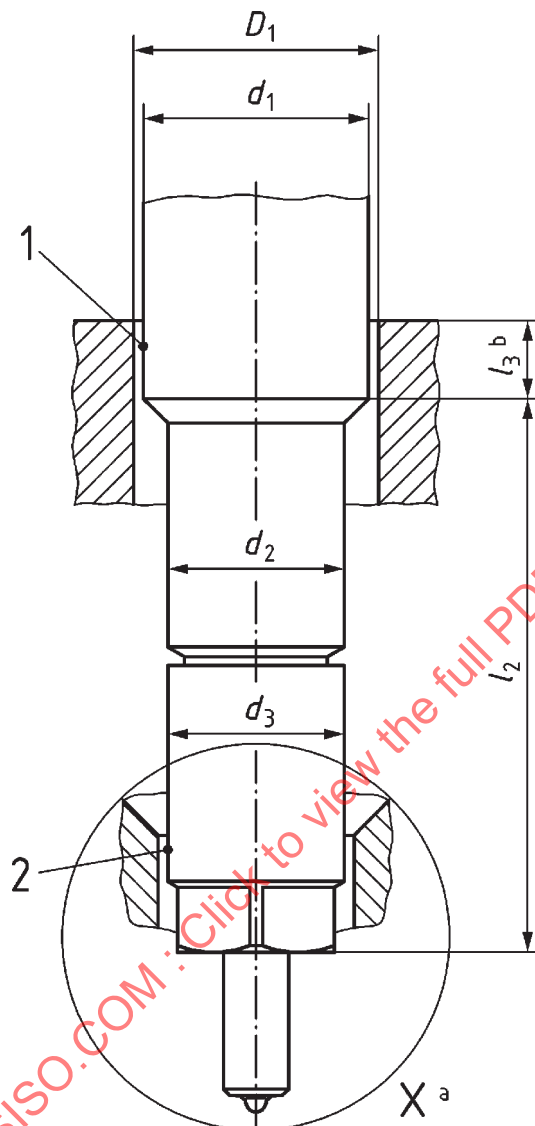
- 1 top of injector (e.g. hydraulic connection)
- 2 injector sealing face
- a Overall injector length.
- b Injector clamping height.

NOTE The injector clamping height varies depending on engine application and is agreed between manufacturer and customer.

Figure 1 — Typical injector clamp mounting arrangement

4.2 Injector guiding dimensions

The important injector guiding dimensions are shown in [Figure 2](#) (schematically).



Key

- 1 upper
- 2 lower guide
- a See [Figures 4](#) and [5](#) for details.
- b Overlapping at upper guide (upper guide diameter/cylinder head)

Figure 2 — Typical injector guiding arrangement

4.3 Concentricity of the nozzle shaft

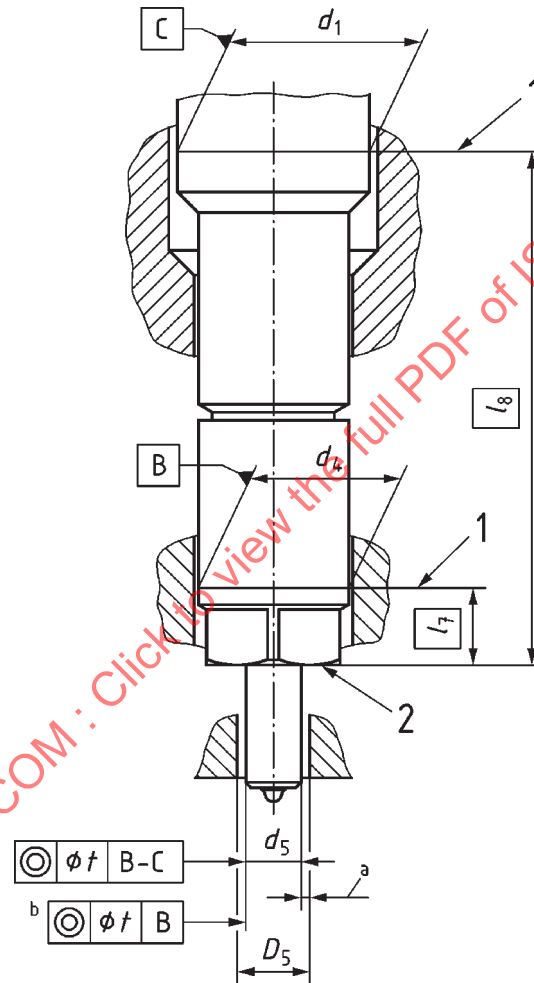
The determination of the concentricity, ϕt , of the nozzle shaft relative to the axis of the two guide diameters, ϕd_1 and ϕd_4 , is shown in [Figure 3](#) (schematically).

The concentricity, ϕt , is the result of the form and position tolerances of the two guide diameters, based on the production conditions, and is specified by the injector manufacturer by simultaneously taking into consideration the compatibility with the dimensional structure of the cylinder head.

The purpose of this concentricity is to determine the position of the nozzle shaft (centre axis of ϕd_5) related to the cylinder head bore, ϕD_5 ; this is important in order to ensure that the nozzle shaft does not interfere with the bore in the cylinder head (see [Tables 2](#) and [4](#), table footnote c, and [Figure 3](#), key item a).

Requirements for measurement of the concentricity, ϕt :

- the datum B position (l_7) shall be agreed between injector manufacturer and customer,
- the datum C position (l_8) depends on the distance between the two guides and the overlapping (see [Figure 2](#): l_2 and l_3) and shall be agreed between injector manufacturer and customer.



Key

- 1 datum positions (at the two guide diameters)
- 2 injector sealing face
- a Required gap between the nozzle shaft and the bore in the cylinder head (no interference).
- b For single guide diameter injector types/

Figure 3 — Concentricity ϕd_5 of the nozzle shaft to the guide diameters

4.4 High pressure connector

The high pressure connector shall comply with the requirements of ISO 2974.

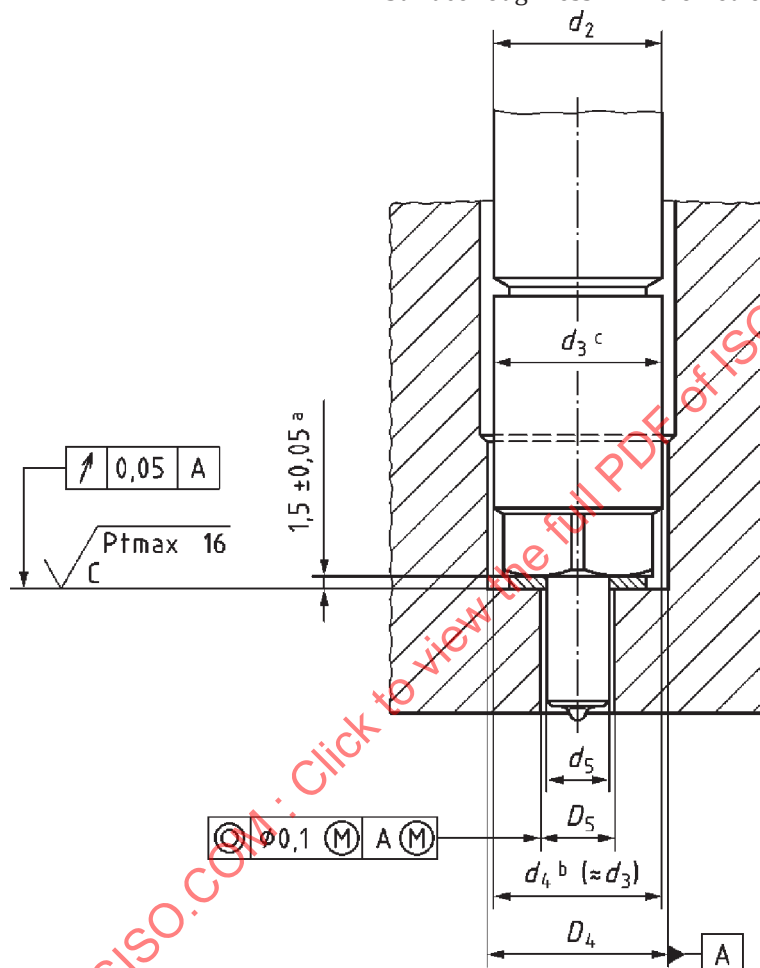
5 Dimensions and tolerances

5.1 Type A, clamp mounted CR fuel injectors with straight capnut

[Figure 4](#) shows the injector and nozzle dimensions and the corresponding cylinder head dimensions.

Dimensions in millimetres

Surface roughness in micrometres, as defined in ISO 1302



- a Sealing washer thickness may vary depending on engine manufacturer's requirements.
- b d_4 is valid for the overlapping section.
- c d_3 is valid above the overlapping section.

Figure 4 — Injector and cylinder head dimensions, Type A (detail X of Figure 2)

The specified clamp mounted CR fuel injector and nozzle dimensions and the corresponding cylinder head bore dimensions are given in [Tables 1](#) and [2](#).

Table 1 — Clamp mounted CR fuel injector dimensions, Type A

Dimensions in millimetres

Size	d_2		d_1^a		d_3		d_4		d_5		l_1^b nom.	l_2^a min.	l_4^b	
A.1	16,9	+0 −0,13	16,9	+0 −0,13	17	+0,10 −0,15	17	+0 −0,11	7	+0,20 −0,15	137 to 200	40	10,8	+0 −0,10
A.2	17	+0 −0,15	17,5			+0,20 −0,15					137 to 200	50	13	
A.3	19	+0 −0,20	19,5			+0,10 −0,15					121 to 210	40	15 or 17	
A.4	19	+0 −0,15	19,5			+0,20 −0,15					150 to 200	50	12,8, 13, 14, 15 or 17	
A.5	21	+0 −0,10	24,25	+0 −0,13	24,1	+0 −0,13	24,1	+0 −0,13	9,2	+0 −0,10	164 to 207	55	13, 17, 20 or 27	

a See [Figure 2](#).

b See [Figure 1](#).

Table 2 — Cylinder head bore dimensions, Type A

Dimensions in millimetres

Size	D_1^a		D_4		D_5^c nom.	l_3^{ad} nom.	l_5^{be}	
A.1	17	+0,07 +0,02	17	+0,07 +0,02	7,6 to 8,1	5 to 10	10,85	+0,10 +0
A.2	17,5				7,6 to 7,8		13,05	
A.3	19,5				7,6 to 8,1		15,05 or 17,05	
A.4	19,5				7,6 to 7,8		12,85, 13,05, 14,05, 15,05 or 17,05	
A.5	24,3	+0,10 +0	24,1	+0,20 +0	9,5 to 9,7		13,1, 17,1, 20,1 or 27,1	+0,30 +0

a See [Figure 2](#).

b See [Figure 1](#).

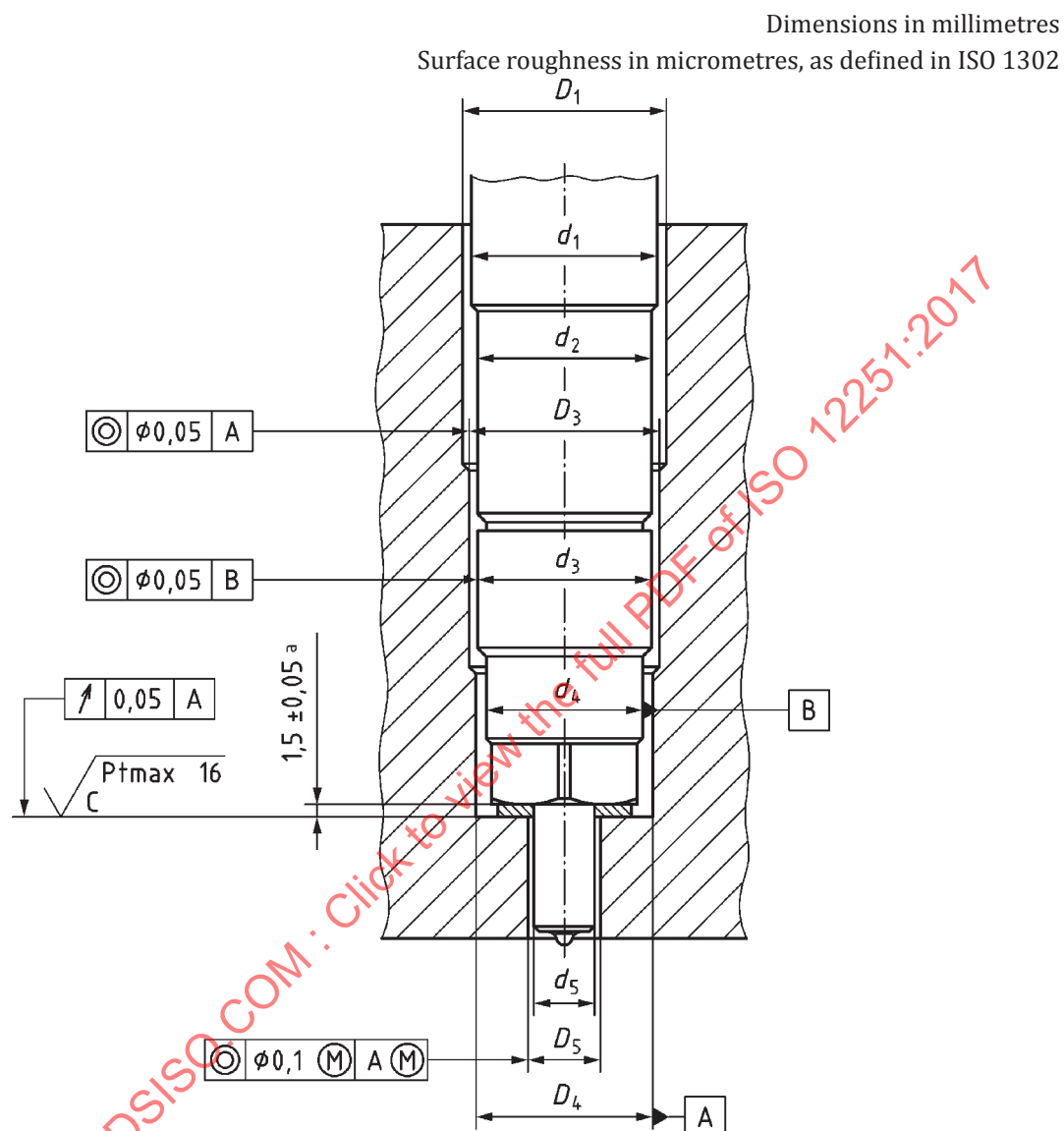
c To ensure that the nozzle shaft does not interfere with the bore in the cylinder head, the maximum value of the nozzle shaft diameter, the maximum axis tilt and the bias of the injector shall be taken into account.

d Typical dimensions; other dimensions are allowable as agreed between manufacturer and customer.

e l_5 is an important dimension and needs to be closely controlled in order to guarantee the orientation of the injector.

5.2 Type B, clamp mounted CR fuel injectors with stepped capnut

Figure 5 shows the injector and nozzle dimensions and their corresponding cylinder head dimensions.



^a Sealing washer thickness may vary depending on engine manufacturer's requirements.

Figure 5 — Injector and cylinder head dimensions, Type B

The specified clamp mounted CR fuel injector and nozzle dimensions and the corresponding cylinder head bore dimensions are given in [Tables 3](#) and [4](#).