INTERNATIONAL STANDARD

ISO 22977

First edition
2005-07-15

Road vehicles — M12 x 1,25 spark-plugs with flat seating and 14 mm bi-hexagon and their cylinder head housing

Véhicules routiers — Bougies d'allumage M12 x 1,25 à siège plat et bi-hexagonal de 14 mm et leur logement dans la culasse

Reference number
ISO 22977:2005(E)

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Published in Switzerland

Foreword

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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.

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ISO 22977 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 1, *Ignition equipment*.

Road vehicles — M12 x 1,25 spark-plugs with flat seating and 14 mm bi-hexagon and their cylinder head housing

1 Scope

This International Standard specifies characteristics of M12 × 1,25 spark-plugs with flat seating and 14 mm bi-hexagon and of their cylinder head housings, for use with spark-ignition engines.

2 Normative references

The following referenced documents are indispensable for the application 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 68-1, *ISO general purpose screw threads — Basic profile — Part 1: Metric screw threads*

ISO 261, *ISO general purpose metric screw threads — General plan*

ISO 965-1, *ISO general-purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 965-3, *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*

ISO 4095, *Aerospace — Bihexagonal drives — Wrenching configuration — Metric series*

ISO 14508, *Road vehicles — Spark-plugs — Terminals*

3 Terminals

The spark-plug terminal may be either the solid post or the threaded type as described in ISO 14508. A spark-plug with threaded terminal on which a nut is applied shall respect the dimensions specified for spark-plugs with solid post terminals (see Figures 1 and 2).

4 Dimensions and threads

4.1 Spark-plug reach

The spark-plug reach shall be according to Table 1 (see Figures 1 to 4).

Table 1 — Spark plug reach

Dimensions in millimetres

Type of reach	A	E[a]	B max.	Y + 0,3 – 0,8
	Tolerance of $A+E \pm 0,2$			
Normal	12,7	0	21	11,7
Long	19		27	18
Extended long		1,5 … 6	31	
Extra long	26,5	0	34,5	25,5
Extended extra long		1,5 … 6	38,5	

[a] It is intended to specify E more definitively in future revisions of this International Standard.

4.2 Gasket

When the spark-plugs have been tightened with a torque of 25 Nm, on threads that are clean, smooth and dry, the gaskets shall be 1 mm to 1,6 mm thick. If the gasket thicknesses are different, a corresponding adjustment to dimensions *A*, *B* and *Y* shall be made.

Non-captive gaskets may be used in special cases.

4.3 Threads for spark-plugs and cylinder heads

4.3.1 General

The threads of M12 × 1,25 spark-plugs and the corresponding tapped holes in the cylinder head shall conform to ISO 68-1, ISO 261, ISO 965-1 and ISO 965-3. Their limiting dimensions and their tolerance classes are specified in 4.3.2 and 4.3.3, respectively.

4.3.2 Limiting dimensions

The limiting dimensions are given in Table 2.

Table 2 — Limiting dimensions

Dimensions in millimetres

Dimension		Plug thread (on finished plug)	Tapped hole in cylinder head
Major diameter	max.	11,937	Not specified
	min.	11,725	12,000
Pitch diameter	max.	11,125	11,368
	min.	10,993	11,188
Minor diameter	max.	10,404	10,912
	min.	10,181[a]	10,647

[a] With a root radius $\geqslant$ 0,125 mm (0,1 P).

4.3.3 Tolerance classes

The thread tolerance classes of finished M12 × 1,25 spark-plugs and of the corresponding tapped holes in the cylinder head are as follows:

— 6e for spark-plugs (see Note 1);

— 6H for tapped holes in the cylinder head.

NOTE 1 In order that spark-plugs complying with this International Standard can be fitted in existing cylinder heads also in extreme cases, the value for the *maximum truncation* of the minor diameter of the spark-plug base has been slightly reduced with respect to the ISO value.

This maximum value of the minor diameter is calculated from a distance of $H16$ for the *maximum truncation* instead of the value given by the formula in ISO 965-1:1980, Clause 11, according to the formula given below:

Minor diameter, maximum $= d_1 - es - 2(H/4 - H/6)$

$= (10{,}647 - 0{,}063 - 0{,}180)$ mm

$= (10{,}647 - 0{,}243 = 10{,}404)$ mm

The value for the *basic profile* remains the same as for the ISO thread (10,647 – 0,063 = 10,584) mm.

NOTE 2 The initial clearance e = 0,063 mm between the pitch diameters of the thread and of the tapped hole is intended to prevent the possibility of seizure, as a result of combustion deposits on the bare threads, when removing the spark-plugs.

This clearance is also intended to enable spark-plugs with threads in accordance with this International Standard to be fitted in existing tapped holes.

5 Other dimensions of spark-plugs and their cylinder head housings

The other dimensions shall be as indicated in Figures 1 to 5.

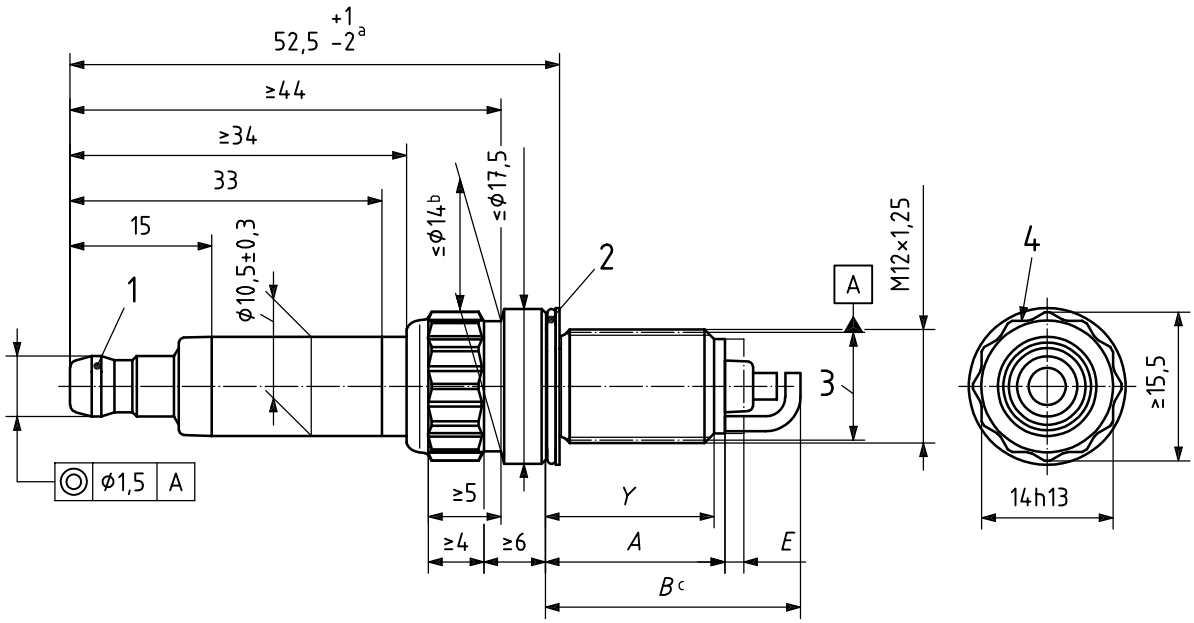
Dimensions 52,5 mm on spark-plugs with solid post terminal and 49,5 mm on spark-plugs with threaded terminal shall be measured when the spark-plugs have been tightened according to 4.2.

The non-ribbed insulator design is preferred because it provides superior protection to flashover between the spark-plug insulator and the cover.

The Z length of the spark-plug housing in the cylinder head shall be sufficient to ensure that the end of the spark-plug thread does not project into the combustion chamber at any point when the gasket is tightened to maximum compression.

Details not specified are left to the manufacturer's choice.

Dimensions in millimetres



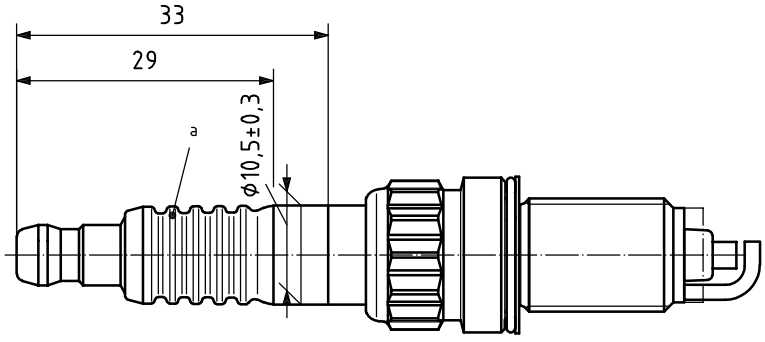
Key

1 solid post terminal ISO 14508
2 captive gasket
3 pitch diameter
4 bi-hexagon according to ISO 4095

a Dimension after spark-plug has been tightened with a torque of 25 Nm.
b Optional.
c Dimension "B" is the maximum protrusion of any part of the spark-plug into the combustion chamber.

Figure 1 — Spark-plug with solid post terminal (preferred design with non-ribbed insulator)

Dimensions in millimetres

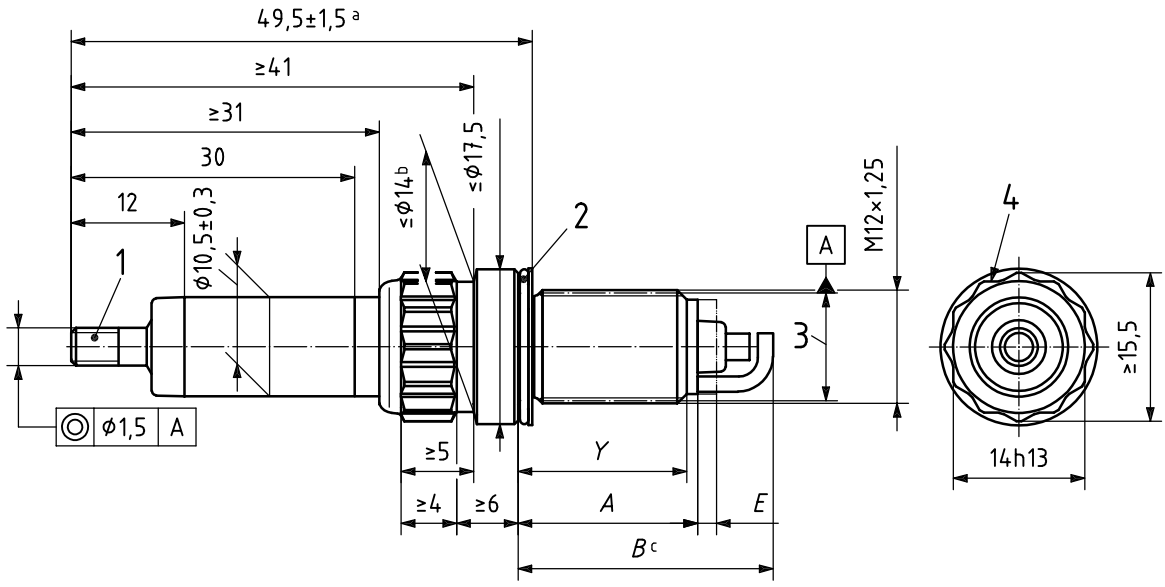


Key

a The number and shape of ribs are optional.

Figure 2 — Spark-plug with solid post terminal (traditional design with ribbed insulator)

Dimensions in millimetres



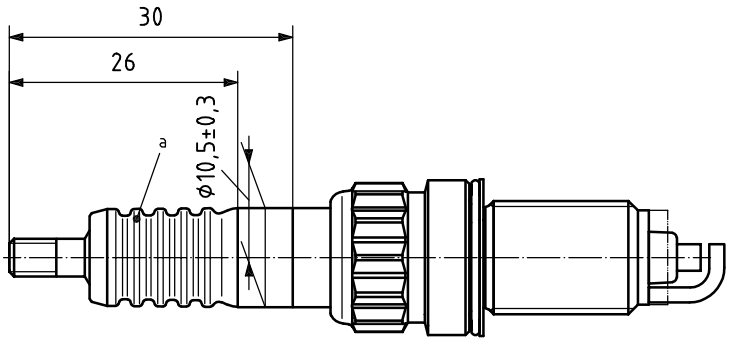
Key

1 threaded terminal ISO 14508
2 captive gasket
3 pitch diameter
4 bi-hexagon according to ISO 4095

a Dimension after spark-plug has been tightened with a torque of 25 Nm.
b Optional.
c Dimension "*B*" is the maximum protrusion of any part of the spark-plug into the combustion chamber.

Figure 3 — Spark-plug with threaded terminal (preferred design with non-ribbed insulator)

Dimensions in millimetres

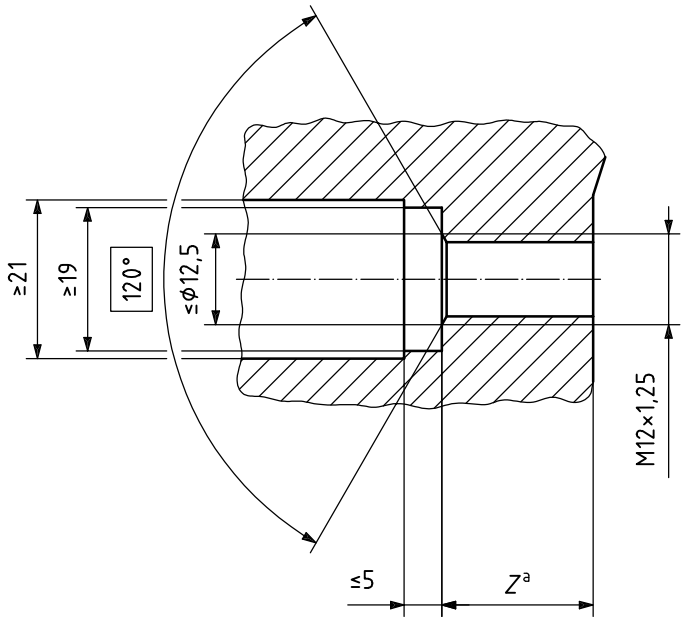


Key

a The number and shape of ribs are optional.

Figure 4 — Spark-plug with threaded terminal (traditional design with ribbed insulator)

Dimensions in millimetres



Key

a The Z length of the spark-plug housing in the cylinder head shall be sufficient to ensure that the end of the spark-plug thread does not project into the combustion chamber at any point when the gasket is tightened to maximum compression.

Figure 5 — Cylinder head housing

6 Installation tightening torque

The installation torque values apply to new spark-plugs without lubricant on the threads. If threads are lubricated, the torque value shall be reduced by approximately one-third to avoid overstressing.

Spark-plugs shall be tightened with a torque of 15 Nm to 25 Nm.

NOTE Engine manufacturers may specify a different torque for the first spark-plug installation.

Bibliography

[1] ISO 11565, *Road vehicles — Spark-plugs — Test methods and requirements*

ICS 43.060.50

Price based on 7 pages