

# INTERNATIONAL STANDARD

# ISO 2704

Fourth edition  
1993-12-15

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## Road vehicles — M10 × 1 spark-plugs with flat seating and their cylinder head housing

*Véhicules routiers — Bougies d'allumage M10 × 1 à siège plat et leur  
logement dans la culasse*



Reference number  
ISO 2704:1993(E)

## 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.

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.

International Standard ISO 2704 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Sub-Committee SC 1, *Ignition equipment*.

This fourth edition cancels and replaces the third edition (ISO 2704:1982), which has been extended to include normal reach of spark-plug thread, threaded terminal included in the main body of the Standard, and spark-plug with half thread adopted.

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# Road vehicles — M10 × 1 spark-plugs with flat seating and their cylinder head housing

## 1 Scope

This International Standard specifies the main characteristics of M10 × 1 spark-plugs with flat seating and their cylinder head housing, for use with spark-ignition engines.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 68:1973, *ISO general purpose screw threads — Basic profile.*

ISO 261:1973, *ISO general purpose metric screw threads — General plan.*

ISO 965-1:1980, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data.*

ISO 965-3:1980, *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional threads.*

## 3 Requirements

### 3.1 Terminals

The spark-plug terminal may be either the solid post or the threaded type. A spark-plug with threaded terminal on which a nut is applied shall respect the di-

mensions specified for spark-plugs with solid post terminal. See figure 1.

### 3.2 Dimensions and threads

See figures 1 to 4.

#### 3.2.1 Spark-plug reach

The spark-plug reach shall meet the requirements of table 1.

**Table 1**

Dimensions in millimetres

Type of reach	A ± 0,2	B max.	Y ± 0,3
Normal reach	12,7	19	11,7
Long reach	19	27	18

#### 3.2.2 Gasket

When the spark-plugs have been tightened with a torque of 15 N·m, 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.

#### 3.2.3 Threads

##### 3.2.3.1 Spark-plug and cylinder head

The threads M10 × 1 of spark-plugs and the corresponding tapped holes in the cylinder head shall conform to ISO 68, ISO 261, ISO 965-1 and ISO 965-3. Their dimension limits and their tolerance classes shall be as specified in 3.2.3.1.1 and 3.2.3.1.2 respectively.

### 3.2.3.1.1 Dimension limits of M10 × 1 thread

The dimension limits are given in table 2.

**Table 2**

Dimensions in millimetres

Dimension		Plug thread (on finished plug)	Tapped hole in cylinder head
Major diameter	max.	9,974	not specified
	min.	9,794	10,000
Pitch diameter	max.	9,324	9,500
	min.	9,212	9,350
Minor diameter	max.	8,747	9,153
	min.	8,563 <sup>1)</sup>	8,917

1) With a root radius  $\geq 0,1$  mm (0,1P).

### 3.2.3.1.2 Tolerance classes

The thread tolerance classes for finished M10 × 1 spark-plugs and for the corresponding tapped holes in the cylinder head are as follows:

— 6g for spark-plugs (see note 1);

— 6H for tapped holes in the cylinder head.

#### NOTES

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  $H/6$  for the maximum truncation according to the formula below, instead of the value given by the formula in ISO 965-1:1980, clause 11:

$$\begin{aligned} \text{Minor diameter, maximum} &= d_1 - es - 2(H/4 - H/6) \\ &= 8,917 - 0,026 - 0,144 \\ &= 8,917 - 0,170 = 8,747 \end{aligned}$$

The value for the basic profile remains the same as for the ISO thread ( $8,917 - 0,026 = 8,891$ ).

2 The initial clearance  $g = 0,026$  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.

### 3.2.3.2 Threaded terminal

For spark-plugs with a threaded terminal, the thread tolerance class of the terminal [see figure 1 b)] is 6e.

Depending on manufacturing processes, class 7e is acceptable on the finished product.

Nuts for use with threaded terminals shall have internal threads to 6H tolerance prior to assembly on the threaded post.

### 3.3 Other dimensions of spark-plug and housing in cylinder head

The other dimensions shall be as indicated in figures 1 to 4.

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 3.2.2.

The contour of the insulator is optional; however, between the reference planes defined for spark-plugs with solid post terminals by the dimensions 29 mm and 33 mm, and for spark-plugs with threaded terminals by the dimensions 26 mm and 30 mm, its largest diameter shall be  $10,5 \text{ mm} \pm 0,3 \text{ mm}$ .

The Z length (see figures 2 and 4) 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 its maximum specified torque.

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

### 3.4 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 10 N·m to 15 N·m in aluminium and cast iron cylinder heads.

NOTE 3 Engine manufacturers may specify a different torque for the first spark-plug installation.

Dimensions in millimetres

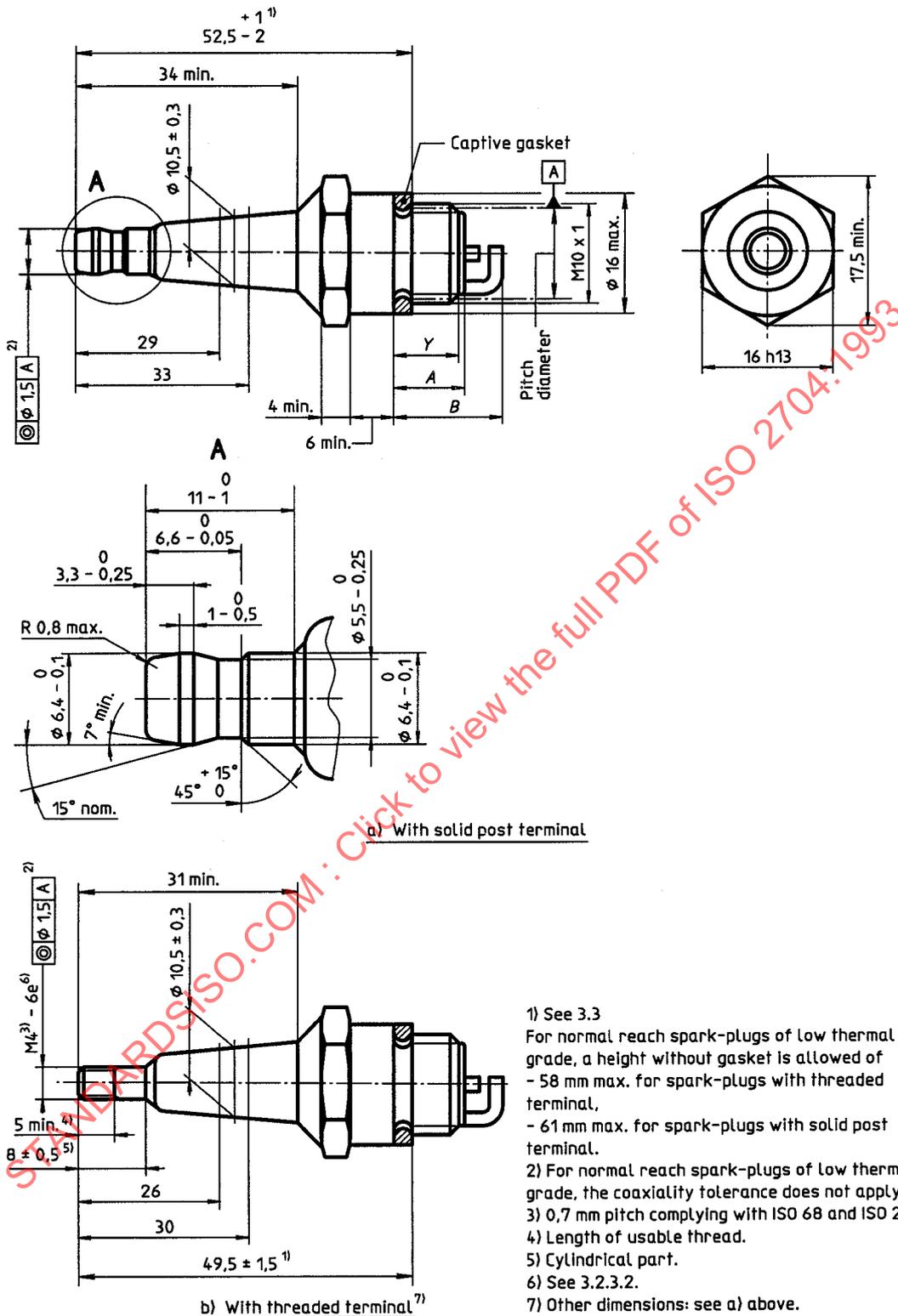
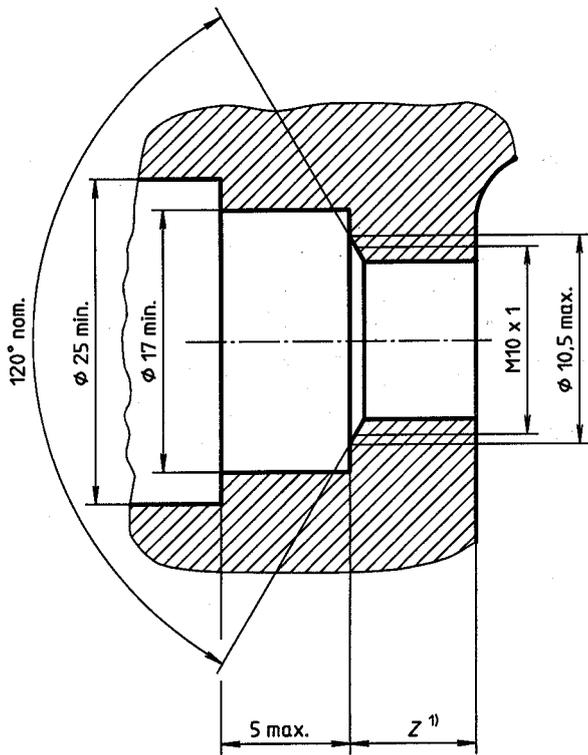


Figure 1 — M10 × 1 spark-plug with flat seating and full thread

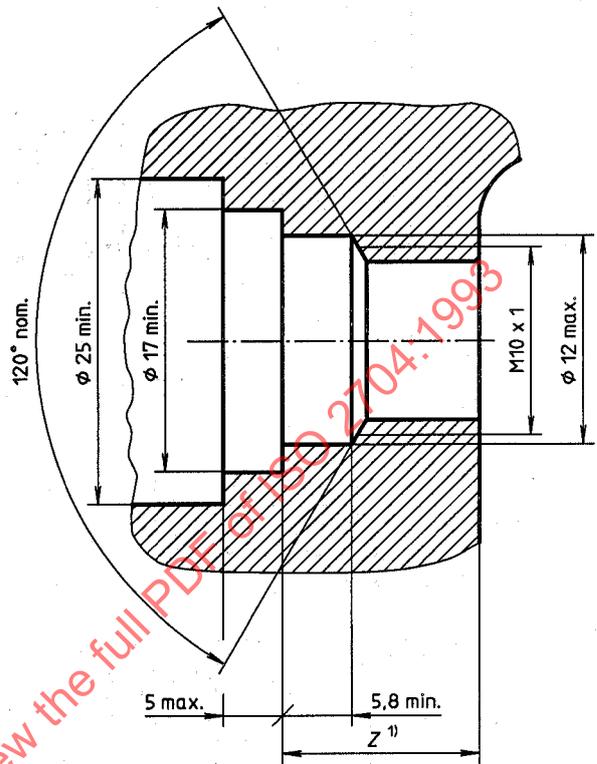
Dimensions in millimetres



1) See 3.3.

**Figure 2 — Housing of spark-plug with full thread in cylinder head**

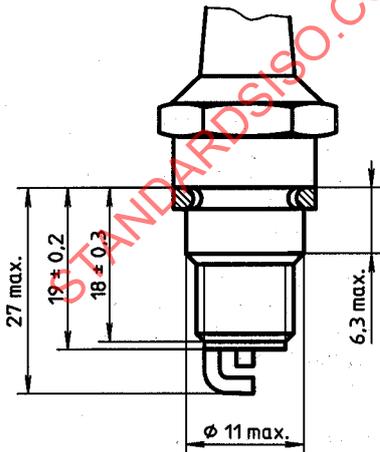
Dimensions in millimetres



1) See 3.3.

**Figure 4 — Housing of spark-plug with half thread in cylinder head**

Dimensions in millimetres



NOTE — All other dimensions: see figure 1.

**Figure 3 — M10 x 1 spark-plug with flat seating and half thread**