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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 1415-2008

Replacing GB/T 1415-1992

Metric threads where pressure-tight joints are made on the threads

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Foreword

This standard replaces GB/T 1415-1992 Metric taper threads.

The main technical changes with respect to GB/T 1415-1992 are the following: the new standard sets out the principles for selecting between the two gauge lengths and makes explicit the correspondence between the two mating forms and the two gauge lengths (see Clause 5); ten sizes of the old standard have been deleted, namely 6x1, 18x1.5, 22x1.5, 24x1.5, 30x2, 36x2, 39x2, 45x2, 52x2 and 56x2; ten new sizes have been added, namely 16x1, 72x3, 76x2, 90x2, 90x3, 115x2, 115x3, 140x2, 140x3 and 170x3; the 12x1.5 of the old standard has been changed to 12x1; the basic dimension of the minimum effective thread length of the short type has been increased; the limit deviations of the gauge plane of the external thread for pitches of 1 mm and 1.5 mm have been adjusted; the major diameter and minor diameter tolerance parameters of the old standard have been changed to crest height and root height tolerance parameters, and the tolerance values have been suitably tightened; the limit deviation of the pitch diameter taper angle has been increased; the pitch diameter tolerance band of the parallel internal thread has been changed from 6H to 5H; the restriction of the old standard on the major diameter tolerance of the parallel internal thread has been removed; a specified flank tolerance for the parallel internal thread

has been added; in the designation, the new thread characteristic codes Mc and Mp replace the ZM and M of the old standard; and on inspection, whereas the old standard specified no inspection method for the parallel internal thread and did not make clear that the standard type and the short type of taper external thread require different thread gauges, the new standard specifies the relevant inspection methods explicitly.

This standard was proposed by and is under the jurisdiction of the National Technical Committee on Screw Threads of Standardization Administration of China (SAC/TC 108).

The organisation responsible for drafting this standard is the China Machinery Productivity Promotion Centre; the participating drafting organisations are the Jiangsu Zhuzan Machinery Factory, the Jiangsu Provincial Institute of Product Quality Supervision and Inspection and the Jiangsu Fangyuan Group Co., Ltd.

The previous editions of the standard replaced by this standard are GB 1415-78 and GB/T 1415-1992.

1 Scope

China's national standard for the metric sealing thread - the thread that makes the joint tight by itself, without a gasket or an O-ring. A parallel thread cannot do that: it leaves a helical gap along the flanks. A taper thread can, because as it is screwed home the flanks are forced into interference and the metal deforms enough to close the leak path. That is why pipe fittings, valves, unions and plugs have used taper threads for a century, and why every industrial country has a standard for them. This one is the metric version, with a 60 degree profile and a taper of 1 to 16, as against the inch-based Whitworth families used elsewhere. The standard specifies the profile, the basic dimensions, the tolerances and the designation of metric sealing threads with a 60 degree thread angle. The internal thread may be taper or parallel and the external thread is always taper, so two mating forms are possible, taper on taper and parallel on taper. It applies to the general sealing thread joints of pipes, valves, pipe fittings, plugs and similar products, and on assembly a suitable sealing medium such as sealing tape or thread sealant is recommended in the thread pair. The 2008 edition dropped ten old sizes, added ten new ones, lengthened the minimum effective thread length of the short type and set out the inspection methods that the 1992 edition left unstated.

This standard specifies the thread profile, the basic dimensions, the tolerances and the designation of metric sealing threads with a thread angle of 60 degrees.

There are two kinds of internal thread, taper internal thread and parallel internal thread, and only one kind of external thread, the taper external thread. The internal and external threads can form two sealing mating forms: a taper internal thread with a taper external thread forms the "taper/taper" fit, and a parallel internal thread with a taper external thread forms the "parallel/taper" fit.

This standard applies to the general sealing thread joints on pipes, valves, pipe fittings, plugs and similar products. On assembly it is recommended that a suitable sealing medium, for example sealing tape or thread sealant, be added in the thread pair.

2 Normative references

The clauses of the following documents become clauses of this standard through reference in this standard. For dated references, all subsequent amendments (excluding corrigenda) or revisions do not apply to this standard; however, parties to agreements based on this standard are encouraged to investigate whether the latest editions of these documents may be used. For undated references, the latest edition applies to this standard.

GB/T 192 General purpose screw threads - Basic profile (GB/T 192-2003, ISO 68-1:1998, ISO general purpose screw threads - Basic profile - Part 1: Metric screw threads, MOD).

GB/T 197 General purpose screw threads - Tolerances (GB/T 197-2003, ISO 965-1:1998, ISO general purpose metric screw threads - Tolerances - Part 1: Principles and basic data, MOD).

GB/T 14791 Screw threads - Terminology (GB/T 14791-1993, neq ISO 5408:1983).

3.1 Terms

The thread terms used in this standard all conform to the provisions of GB/T 14791.

3.2 Codes

D is the major diameter of the internal thread in the gauge plane; D2 the pitch diameter of the internal thread in the gauge plane; D1 the minor diameter of the internal thread in the gauge plane.

d is the major diameter of the external thread in the gauge plane; d2 the pitch diameter of the external thread in the gauge plane; d1 the minor diameter of the external thread in the gauge plane.

P is the pitch; H the height of the fundamental triangle; L1 the gauge length; L2 the effective thread length.

The Greek letter phi is one half of the taper angle of the taper thread; T1 is the tolerance on the gauge length (the position of the gauge plane) of the taper external thread and T2 the corresponding tolerance for the taper internal thread.

4 Thread profile

The basic profile of the metric sealing taper thread shall comply with Figure 1; the basic profile of the metric sealing parallel internal thread shall comply with GB/T 192. The taper of

the taper thread is 1 to 16.

Figure 1 shows the basic profile of the taper thread, with its 30 degree half angles, the gauge plane, the fundamental triangle height H and the fractions of it that fix the crest and root truncations, and the half taper angle phi of 1 degree 47 minutes 24 seconds. The thread profile dimensions are calculated from formulae given in terms of the pitch P.

5 Basic dimensions

The basic dimensions of the pitch diameter and the minor diameter of the thread are calculated by the formulae D2 = d2 = d - 0.6495P and D1 = d1 = d - 1.0825P.

The theoretical position of the gauge plane of the taper external thread is the plane perpendicular to the thread axis at a gauge length from the small end face; the theoretical position of the gauge plane of the internal thread is the end face perpendicular to the thread axis.

The distribution of the main dimensions on the metric sealing thread is shown in Figure 2, and their basic dimensions shall comply with Table 1. Figure 2 shows the internal and external threads in engagement, with the gauge plane, the gauge length L1, the effective thread length L2 and the thread run-out at each end.

6.1 Tolerances of the taper thread

6.1.1 The limit deviations of the position of the gauge plane of the taper thread are given in Table 2, separately for the taper external thread and the taper internal thread and for each pitch.

6.1.2 The limit deviations of the crest height and the root height of the thread are given in Table 3, separately for the external and the internal thread and for each pitch.

6.1.3 The limit deviations of the flank angle, the pitch and the pitch diameter taper angle of the taper thread are given in Table 4; a footnote states that the measuring span for the pitch diameter taper angle is the gauge length L1.

6.2 Tolerances of the parallel internal thread

6.2.1 Pitch diameter tolerance: the pitch diameter tolerance band of the parallel internal thread is 5H and its tolerance values shall comply with GB/T 197.

6.2.2 The limit deviations of the crest height and the root height of the parallel internal thread are given in Table 3.

7.1 Basic designation

The designation of a metric sealing thread consists of the thread characteristic code, the size code and the code for the class of gauge length.