ASME B1.20.1-2013
[Revision of ASME B1.20.1-1983 (R2006)]

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Pipe Threads, General Purpose (Inch)

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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FOREWORD

In 1973, American National Standards Committee B2, which had formerly been responsible for pipe thread standards, was absorbed by American National Standards Institute (ANSI) Standards Committee B1 and reorganized as Subcommittee 20. A complete rewrite of the B2.1-1968 standard on Pipe Threads (Except Dryseal) was undertaken. It was approved and formally designated as an American National Standard on February 4, 1983 and was reaffirmed in 2001 and 2006. The system of numbering, to include metric conversions, is as follows:

ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch)

ASME B1.20.2M-2006, Pipe Threads, 60°, General Purpose (Metric Translation)

These standards, ANSI/ASME B1.20.1 and B1.20.2M, have product thread dimensions and gaging in the same document. Thread inspection specifies the use of L_1 taper thread gages similar to B2.l-1968. In addition, emphasis was given to the requirement that all basic thread design dimensions were to be met within the specified tolerances.

This revision of ANSI/ASME B1.20.1 has both significant and subtle substantive changes to the 1983 revision. It is more explanatory for the user than the previous revision. Significant changes are as follows:

(a) An acceptability section has been added, providing a referee method in cases of dispute. This acknowledges the potentially wide but acceptable variation in the prescribed gages and gaging methods.

(b) Figures have been updated with additional information and drawn to be more visually explanatory.

(c) The Turns of Engagement method has been moved to an appendix, due to its inherent gage correlation issues. This gaging method may be used when parties agree, but it is no longer an accepted method within the Standard.

(d) Calculated data have been revised following the rounding rules of B1.30M. This provides a standardized high level of precision in calculation. Some tabulated values changed, but no changes were deemed significant enough to affect the conformance status of products or gages. These changes are generally beyond the margin of error of the required measurements. NPTR, NPSM, and NPSL thread dimensions were not recalculated as some historical methodology, necessary for computation, was not available.

(e) Guidance for tap drill sizes has been updated to reflect varying manufacturing conditions and the wider range of available drill sizes. Instead of specifying drill sizes, the Standard now refers to the tabulated basic minor diameter of the internal thread as a reference in which to base drill size choice.

(f) Added are detailed explanations on the effects of coatings on threads, as well as guidance for precoating size compensation.

(g) The gaging point of reference is moved for external threads having chamfer diameters smaller than the minor diameter at the small end. This change was made to help ensure adequate thread engagement over a wider range of product thread chamfers. This change is correspondent to the existing treatment of chamfers for internal threads.

(h) The point of reference for checking wear on working gages is changed to basic. Previously, the point of reference was the size at the time of manufacture. This change facilitates the calibration of gages when the original size at manufacture is not known and standardizes gage sizes at maximum wear.

(i) Gaging guidance for straight pipe threads has been expanded, including allowing the No-Go to enter up to three turns, mimicking ASME B1.2.

(j) The use of indicating gages has been added as a gaging method.

Following the approvals of the Standards Committee and ASME, approval for the new edition was granted by ANSI on October 15, 2013.

All requests for interpretation or suggestions for revisions should be sent to the Secretary, B1 Committee, The American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME B1 COMMITTEE
Standardization and Unification of Screw Threads

(The following is the roster of the Committee at the time of approval of this Standard.)

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CORRESPONDENCE WITH THE B1 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B1 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued for the purpose of providing alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee Web page.

Request for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard, the paragraph, figure or table number(s), and be written as a Question and Reply in the same format as existing Cases. Request for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Attending Committee Meetings. The B1 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B1 Standards Committee.

Pipe Threads, General Purpose (Inch)

1 INTRODUCTION

1.1 Scope

This Standard covers dimensions and gaging of pipe threads of the following series:

NPT
NPSC
NPTR
NPSM
NPSL

1.2 Related Standard

Hose coupling joints are ordinarily made with straight internal and external loose-fitting threads. There are several standards of hose threads having various diameters and pitches, one of which is based on the American National Standard Pipe Thread. By the use of this thread series, NPSH, it is possible to join small hose couplings in sizes $\frac{1}{2}$ to 4, inclusive, to ends of standard pipe having American National Standard external pipe threads, using a gasket to seal the joint. For dimensions, tolerances, and gaging, see ASME B1.20.7.

1.3 Thread Designations

1.3.1 The types of pipe threads included in this Standard are designated by specifying in sequence the nominal pipe size, number of threads per inch, and the thread series symbol as follows:

$\frac{1}{8}$–27 NPT
$\frac{1}{8}$–27 NPSC
$\frac{1}{2}$–14 NPTR
$\frac{1}{8}$–27 NPSM
$\frac{1}{8}$–27 NPSL

Decimal equivalent notation may be substituted for fractional pipe sizes. For example

0.125–27 NPT

For left-hand threads, add "LH" to the designation. For example

$\frac{1}{8}$–27 NPT–LH

Designations without "LH" will signify right-hand threads.

1.3.2 Each of these letters in the symbols has significance as follows:

N = National (American) Standard
P = Pipe
T = Taper
S = Straight
C = Coupling
R = Railing Fittings
M = Mechanical
L = Locknut

1.4 Sealing (NPT and NPSC Only)

1.4.1 Mating Threads. Mating threads should always contact on the thread flanks. The design tolerances are such that mating crests and roots may clear, contact, or interfere (see Fig. 1). This joint may not necessarily seal, unless a sealant is used.

1.4.2 Sealant. Where pressure-tight, leak-free joints are required, it is intended that threads conforming to this Standard be made up wrench-tight with a sealant. To prevent galling during installation, the sealant may have lubricating properties.

1.4.3 Tightening Torque. Due to application-specific variables such as materials, wall thickness, operating pressures, etc., no guidance is given in this Standard regarding joint-tightening torque. However, joints should be tightened beyond the hand-tight engagement position. Advancing the joint past hand-tight creates interference between external and internal thread flanks, produces a seal (with the use of a sealant), and helps prevent loosening of the joint. Overtightening may be detrimental to the sealing function of the joint.

1.4.4 Other Considerations. Out-of-roundness of mating parts can negatively affect their ability to seal when made up wrench tight. The product's elasticity and ductility will also affect sealing.

1.4.5 Pressure-Tight Threads Without Sealant. Pipe threads designed for pressure-tight joints that may be used without sealing compounds (Dryseal Threads) are covered in ASME B1.20.3.

1.5 Appendices

Useful and supplementary information that is not a part of this Standard is presented in a nonmandatory appendix. Specifically, the nonmandatory appendices cover the turns of engagement method of gaging, suggested prethreading hole diameters, and an explanatory gaging matrix.