AMERICAN NATIONAL STANDARD

Preferred Metric Limits and Fits

ANSI B4.2 - 1978

REAFFIRMED 1999

FOR CURRENT COMMITTEE PERSONNEL
PLEASE SEE ASME MANUAL AS-11

REAFFIRMED 2020

SECRETARIAT

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

United Engineering Center 345 East 47th Street New York, N. Y. 10017

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FOREWORD

The American National Standards Committee B4 was organized in June 1920, and it developed the American Standard ASA B4a-1925, Tolerances, Allowances and Gages for Metal Fits.

As a result of committee work during World War II by ASA and ABC (American, British, Canadian), American Standard, Limits and Fits for Engineering and Manufacturing (Part I), ASA B4.1-1947, was produced. The preface to that document made significant reference to the contribution of the ABC meetings in developing agreement on five basic principles, four of which apply to the present standard. These related to the desirability of establishing common definitions, a table of preferred basic sizes, a system of preferred tolerances and allowances, and a uniform method of applying tolerances.

In 1973, the General Motors Corporation recognized a need for a metric standard similar to the ISO R286 and published an interim standard which was later adopted as an ANSI Special Metric Publication, SR 11.

The B4 Standards Committee was reorganized in November 1975, and renamed "Standardization of Allowances and Tolerances for Manufactured Parts". The first draft proposal of this standard was based on the principles noted above and utilized computer programs to implement the concept.

The preferred basic sizes have been selected from the American National Standard for Preferred Metric Sizes for Round, Square and Hexagonal Metal Products, B32.4-1974, and the first choice sizes are all consistently rounded off from the Renard 10 (R10) series of preferred numbers. A logical reduction or expansion of the first choice sizes can simply be achieved by utilizing the R5 or R20 series of preferred numbers as explained in this standard.

The selection of standard tolerance zones and preferred metric fits in this standard were based on international and national standards shown in the following list:

WORLD	ISO SYSTEM OF LIMITS AND FITS ISO/R286	PREFERRED TOLERANCE ZONES ISO 1829
USA	ANSI SR 11	ANSI B4.1 (INCH STD)
JAPAN	JIS B 0401	JIS B 0401
GERMANY	DIN 7160/61	DIN 7157/54/55
FRANCE	NF E 02-100-118	NF E 02-131-135
U.K.	BSI 4500	BSI 4500
ITALY	UNI 6388/89	UNI 7218
CANADA	NONE	CSA B97.3 (INCH STD)
AUSTRALIA	AS 1654	AS 1654

The above standards have affected the availability of material stock, tooling and gages to the preferred ISO tolerances throughout the world. Implementation of this standard by industry can greatly reduce cost in manufacturing.

A draft proposal was circulated for letter ballot of the B4 Committee on October 16, 1976. Comments received as a result of this ballot led to changes and subsequent approval of the text by the Committee. Final approval for this standard was granted by the American National Standards Institute (ANSI) on 8 March 1978.

ACKNOWLEDGMENT

Tables 2, 3, 4 and 5 of the text and Tables A1 through A24 of the Appendix were developed by Massey-Ferguson and full rights to usage have been conveyed to ASME.

AMERICAN NATIONAL STANDARDS COMMITTEE B4

Standardization of Allowances and Tolerances for Manufactured Parts

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

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AMERICAN NATIONAL STANDARD

PREFERRED METRIC LIMITS AND FITS

1. SCOPE

This standard describes the ISO system of limits and fits for mating parts as it is approved for general engineering usage in the United States of America. It establishes: (1) the designation symbols used to define specific dimensional limits on drawings, material stock, related tools, gages, etc., (2) the preferred basic sizes (first and second choices), (3) the preferred tolerance zones (first, second and third choices), (4) the preferred limits and fits for sizes (first choice only) up to and including 500 millimeters, and (5) definitions of related terms. Tolerance zones for basic sizes in the range from 500 to 3150 mm are specified in Appendix B.

The general terms "hole" and "shaft" can also be taken as referring to the space containing or contained by two parallel faces of any part, such as the width of a slot, the thickness of a key, etc.

2. DEFINITIONS

The most important terms relating to limits and fits are as shown in Figure 1. The terms are defined in words below:

(1) *Basic Size.* The size to which limits or deviations are assigned. The basic sizes is the same for both members of a fit. It is designated by the number 40 in 40H7.

(2) *Deviation.* The algebraic difference between a size and the corresponding basic size.

(3) *Upper Deviation.* The algebraical difference between the maximum limit of size and the corresponding basic size.

(4) *Lower Deviation.* The algebraic difference between the minimum limit of size and the corresponding basic size.

(5) *Fundamental Deviation.* That one of the two deviations closest to the basic size. It is designated by the letter H in 40H7.

(6) *Tolerance.* The difference between the maximum and minimum size limits on a part.

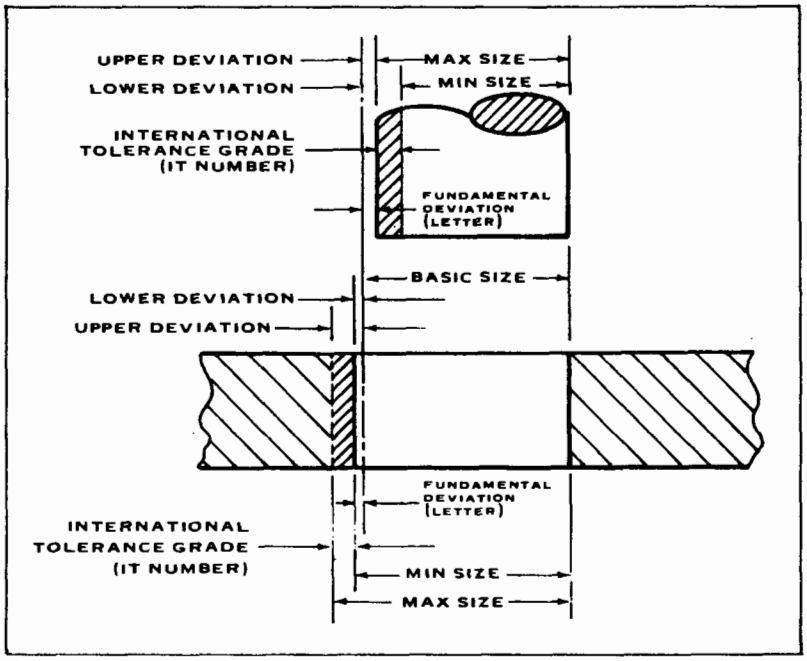

FIG. 1 ILLUSTRATION OF DEFINITIONS