

When Two Approved Thread Gages Do Not Agree, Is the Thread Acceptable or Not?

According to the **American Society of Mechanical Engineer's (ASME)** standard *B1.3M*, if any gage that is approved for the inspection of a given thread characteristic accepts a thread, that thread is to be considered acceptable even if another approved gage rejects that same thread.

The *ASME B1.3M* standard titled, "*Screw Thread Gaging Systems for Dimensional Acceptability - Inch and Metric Screw Threads (UN, UNR, UNJ, M and MJ)*", provides industry guidance for the acceptance of threads. This standard covers three specific critical areas in addition to other general information. These areas are:

- Tables 3 and 4 delineate three systems for thread inspection. These systems are designated as Systems 21, 22 & 23. System 21 is the most basic system and the one required for the inspection of threads on most commercial fasteners. System 22 is required for the inspection of threads on many automotive fasteners and most aerospace fasteners. System 23 is for use in research and development projects and in failure analysis. Tables 3 and 4 identify the thread characteristics that must be inspected when using each system. Beside each thread characteristic is a list of both the fixed limit and indicating types of gages that are approved for use when inspecting the associated thread characteristic. The approved gages are listed by identifying numbers that are fully described in *ASME B1.2*.
- Tables 1 and 2 in *ASME B1.3M* provide a brief description of the gage numbers listed in tables 3 and 4. The descriptions are in charts that indicate which thread characteristics each gage is appropriate to inspect.
- Section 6 of *ASME B1.3M* provides rules for determining thread acceptability.

Table 3 in *ASME B1.3M* indicates the three thread characteristics requiring inspection when using System 21 to inspect external threads. In the table beside each characteristic is a list of approved gage numbers. An excerpt from Table 3 follows to illustrate the relationship between the system number, thread characteristic requiring inspection and the approved gages for inspecting that characteristic:

System	Characteristic	Fixed limit gages	Indicating gages
System 21	Go maximum material	1.1, 2.1, 2.3, 4.1, 4.3	4.1, 4.3
	NOT GO functional diameter	1.2, 2.2, 2.4, 4.1, 4.3, 6	4.1, 4.3, 6
	Major diameter	3.1 (a), 3.1 (b), 3.2, 3.4, 5.1, 14	5.1, 14, 17, 18

Table 1 identifies gage 1.1 as a GO split or solid ring gage and gage 1.2 as a NOT GO split or solid ring gage. It identifies gage 4.1 as a segment gage and gage 4.3 as a Tri roll gage (see diagram).

This means that any gage that is listed to the right of that thread characteristic, either fixed limit or indicating type, is equally acceptable to inspect that particular characteristic. There is no hierarchy within the gages that gives any gage type more credibility or validity over any other type.

Section 6 (b) of *ASME B1.3M* states:

"Within each gaging system, a choice of gages is specified for each characteristic. Acceptance by any one gage specified for a characteristic shall be the criterion for acceptance of the characteristic."

IFI Technical Bulletin ®	When Two Approved Thread Gages Do Not Agree, Is the Thread Acceptable or Not?	IFI Page 1 of 3
Published and issued by the Industrial Fasteners Institute of Independence, OH		Issued: Dec., 1998

INDUSTRIAL FASTENERS INSTITUTE

6363 Oak Tree Boulevard • Independence, Ohio 44131 USA, www.indfast.org

This means that if a ring gage rejects a thread, but a Tri Roll gage or a segment gage accepts that thread, the thread is to be accepted. Likewise if a Tri roll or segment gage rejects a thread, but a ring gage accepts the thread, the thread is to be acceptable. This rule is based on the assumption that all gages are properly calibrated when used to inspect the thread.

This rule recognizes that all types and styles of gages will not always judge a given thread the same. These infrequent disagreements between thread gages occur when the product thread is very close to either its maximum or minimum limit of size for the characteristic being inspected.

There are two reasons for these infrequent contradictory judgements from two different approved gages:

- Each gage design has different geometry and contacts the thread in a slightly different manner that may cause a different determination.
- Slightly different settings or calibrations on two gages of the same type sometimes provide different outcomes.

This rule acknowledges that due to measurement uncertainty it is frequently impossible to determine which gage may be slightly more precise than the other. Practical experience, coupled with the recent IFI study on the relationship between thread size and part performance, clearly indicate that when a thread is so close to a given size limit that one gage accepts and another rejects it there is virtually no chance of the part having a strength or fit problem when used in its application.

Following are the suggested steps to take when a supplier and customer have thread gages that do not agree on the acceptance of the thread on a fastener:

- Determine that both gages are inspecting the thread for the same thread diameter pitch size and class of fit. Remember, unless otherwise specified, external inch threads are gaged 2A before plating and 3A GO/2A NOT GO after plating and metric threads are gaged 6g before plating and 6h GO/6g NOT GO after plating.
- Determine that both gages being used for the inspection of the thread characteristic being challenged are on the approved list of gages in table 3 or 4 of ASME B 1.3M.
- Determine that both gages are properly calibrated within a recent time of the inspection.
- If all of the above are determined to be correct, accept the threads based on the rule in ASME B 1.3M, section 6(b).

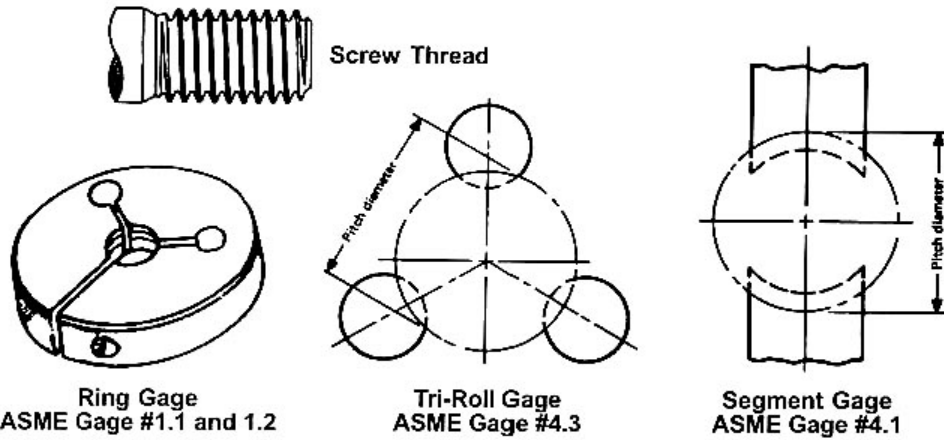
Every fastener supplier should have the current issue of this standard, which is *ASME B1.3M 1992*, in their resource library to help in the effective resolution of the type of gaging disputes described in this article.

This standard is available from ASME at +1 800 843 2763 or on the Internet at www.asme.org/catalog.

IFI Technical Bulletin ®	<h2>When Two Approved Thread Gages Do Not Agree, Is the Thread Acceptable or Not?</h2>	IFI Page 2 of 3
Published and issued by the Industrial Fasteners Institute of Independence, OH		Issued: Dec., 1998

INDUSTRIAL FASTENERS INSTITUTE

6363 Oak Tree Boulevard • Independence, Ohio 44131 USA, www.indfast.org



Disclaimer: All information provided in this document and/or presentation is based on data the Industrial Fasteners Institute believes to be reliable and accurate. Such information is intended for use by persons at their own discretion and risk. The information here in is based on industry standards and recognized practices. The Industrial Fasteners Institute and the representatives providing this material assume no responsibility for the content.

<p>IFI Technical Bulletin ®</p>	<p>When Two Approved Thread Gages Do Not Agree, Is the Thread Acceptable or Not?</p>	<p>IFI Page 3 of 3</p>
<p>Published and issued by the Industrial Fasteners Institute of Independence, OH</p>		<p>Issued: Dec., 1998</p>

All standards and specifications are advisory only. Their use by anyone is entirely voluntary. Reliance thereon for any purpose by anyone is at the sole risk of that person or the user of the product, and the IFI is not responsible for any loss, claim, or damage arising therefrom. In formulating and approving standards and specifications, the IFI has not investigated and will not investigate patents which may apply to the subject matter. Prospective users of the standards and specifications are responsible for advising themselves of and protecting themselves against any patent infringement liability which may arise out of such use. © INDUSTRIAL FASTENERS INSTITUTE 2008