TABLE 1 GAGES AND TOLERANCES

Thread to be Gaged	Gaged With	Product Thread Tolerance Applied to Basic Size [Note (1)]		Limit Method of Gaging [Note (1)] Tolerance
NPTF, external	L_1 or L_1 short and [Note (2)] L_2 or L_2 short ring gages	Plus (small) 1 turn	Minus (large) 1 turn	Threads are within the allowable tolerance when the product reference point is on or between the maximum and minimum step of the L_1 gage
PTF-SAE SHORT, external		Plus (small) 0 turn	Minus (large) 1.5 turn	
NPTF, internal	L_1 or L_1 short and [Note (3)] L_3 or L_3 short plug gages	Plus (large) 1 turn	Minus (small) 1 turn	
PTF-SAE SHORT, internal		Plus (large) 0 turn	Minus (small) 1.5 turn	
NPSF, internal	L_1 or L_1 short plug gage	Plus (large) 0 turn	Minus (small) 1.5 turn	
NPSI, internal		Plus (large) 1 turn	Minus (small) 0.5 turn	

NOTES:
(1) Step limit gages with 4 (or 3) steps should be used.
(2) The difference in engagement of the L_1 versus L_2 ring gages shall not exceed 0.5 turn. See para. 1.8.4.
(3) The difference in engagement of the L_1 versus L_3 plug gages shall not exceed 0.5 turn. See para. 1.8.4.

1.5 Inspection of Product Threads

1.5.1 Inspection of NPTF Class 1 Threads and PTF-SAE Short Threads. Acceptability is determined by coordinated use of L_1 and L_2 gages for external product threads and L_1 and L_3 gages for internal product threads. Crest and root truncation is generally considered to be controlled by tooling or other means.

1.5.2 Inspection of NPTF Class 2 Threads. Acceptability is determined, in part, by coordinated use of L_1 and L_2 gages for external product threads and L_1 and L_3 gages for internal product threads. Direct measurement of crest and root truncation is a method that ensures a high degree of accuracy in determining compliance with this Standard for both external and internal threads, but may not be necessary or practicable. It does not preclude the use of other gaging methods or inspection techniques such as L_1 and L_2 snap or indicating gages, 6-step crest or root check gages and in-process control of tooling. This Standard covers the 6-step crest check gages and 6-step root check gage for NPTF threads. (See para. 1.8.6.)

1.5.3 Inspection of NPSF and NPSI Internal Threads. Functional size is determined by use of the applicable L_1 taper thread gage (see Table 1) since these product threads are intended to assemble with taper dryseal external threads. Crest and root truncation is generally considered to be controlled by tooling or other means and can be verified by direct measurement.

1.6 Methods of Gaging Product Threads

1.6.1 The method of gaging dryseal pipe threads described in this Standard is commonly called the limit method. The limit method is intended for L_1 and L_2 ring gages and L_1 and L_3 plug gages of the corresponding 4(or 3)-step design. Basic step plug and ring gages may also be used. The 4-step design facilitates the use of the 6-step crest and root check gages.

1.6.2 When the limit method is used NPTF external and internal threads should be gaged with NPTF length gages with steps to indicate the size range to which the product thread qualifies (minimum range, basic range, or maximum range). PTF-SAE short product threads should be gaged with NPTF gages modified with steps to indicate the short length of hand tight engagement for

that application. Both L_1 and L_2 gages for the external threads and L_1 and L_3 gages for internal threads are used to inspect these types of dryseal pipe threads.

When the turns engagement method of gaging is used, the NPTF length and short length gages can be used interchangeably, since the pitch diameter size at the small end of the gage is the same in both cases, and the step location is not used for the turns location method of gaging.

NPSF and NPSI straight internal threads should be gaged with NPTF gages modified with steps to indicate the minimum and maximum pitch diameters assigned to the respective type of thread. Only the L_1 type gages are used on NPSF and NPSI straight internal threads (GO and NOT GO straight gages are not recommended for size acceptance).

1.7 Coordination of Gages

As described in paragraphs under 2.1 the L_1 and L_2 ring gages and the L_1 and L_3 plug gages provide a check of the functional diameter (excluding crest and root truncation) of the product threads. Additionally, the coordinated use of these gages provides a check on the taper of the product thread. Proper use of the 6-step crest and root check gages also requires coordination with the L_1 ring or L_1 plug gage.

1.7.1 Order of Gaging. The L_1 gage is always used first. The L_2 or L_3 gage is used second and if root and/or crest check gages are used, they are applied last.

1.7.2 Gage and Product Thread Reference Points. Since dryseal pipe threads (except NPSF and NPSI) and the gages covered by this Standard are tapered, the gages will only engage the product thread a finite amount. Consequently, gaging is based on the relative position of the gage to the product thread.

1.7.2.1 For the limit method of gaging, the reference points of the gages are the steps. In order to provide a common reference point and eliminate variations due to chamfer or uneven surface, the reference point of external and internal product threads is the end of the pipe or fitting, provided the chamfer does not exceed the major diameter of the internal thread or be less than the minor diameter of the external thread. Allowance must be made for excessive chamfer at the small end of the external thread and the large end of the internal thread. When this condition exists customer and vender should agree upon a common reference point to be used in inspection.

1.7.3 Classification of Product Thread Size (NPTF). When 6-step crest and/or root check gages are used, it is necessary that the product thread be classified either as a "maximum thread," "basic thread," or "minimum thread." Classification is based on the position of the L_1 ring or L_1 plug gages.

1.7.3.1 For the limit method of gaging, the product thread reference point may not directly coincide with the L_1 ring or L_1 plug reference points (maximum, basic, or minimum step). Therefore, the distance between the maximum step and minimum step is divided into three equal ranges as shown in Fig. 1. The ranges may be determined by use of 4-step L_1 taper thread gages or may be approximated by eye or by turns of the gage on the product thread. If the reference point of the product thread lies in the minimum range, basic range or maximum range, it is termed a "minimum thread," "basic thread," or "maximum thread" respectively.

1.8 Use of Gages

1.8.1 Prior to gaging threads, it is important that the gage and product threads are clean and free from burrs.

1.8.2 In all cases when a gage is used, it is inserted or screwed handtight onto or into the product thread. The next steps of the gaging procedure are detailed in the following paragraphs, and unless noted otherwise, L_1, L_2, and L_3 are synonymous with L_1 Short, L_2 Short, and L_3 Short. An outline of the gages and gaging tolerances are given in Table 1.

1.8.3 L_1 Gages. For the limit method of gaging using 4(or 3)-step gages, the product thread reference point must lie between the appropriate steps. If the 6-step crest and/or root gages are to be used, the product thread must be classified to be either a "maximum thread," "basic thread," or "minimum thread" (see para. 1.7.3).

1.8.4 L_2 Gage or L_3 Gage. The L_1 gage is the sizing gage and L_2 and L_3 gages are relationship gages. When assembled with the L_2 or L_3 gage the position of the product thread reference point may not vary more