AEROSPACE STANDARD

AS71051	REV B.

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Reaffirmed 2015-07

Superseding AS71051A

Pipe Threads, Taper, Aeronautical National Form, Symbol ANPT - Design and Inspection Standard

RATIONALE

AS71051B has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

This document establishes the requirements for Aeronautical National Form (ANPT) pipe threads, gages, and gaging methods for determining conformity of aeronautical taper pipe threads to this standard.

1.1 Purpose

Threads and gages covered by this standard are intended for use on pipe, plugs, fittings, and similar devices in aeronautical components and equipment requiring a sealed thread joint, and where straight threads and gaskets or O-rings are inadequate.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AS5200 Port or Fitting End, Internal Taper Pipe Thread, Design Standard

AS5201 Fitting End, External Taper Pipe Thread, Design Standard

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AS71051B

2.1.2 ASME Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASME B46.1 Surface Texture (Surface Roughness, Waviness, and Lay)

2.1.3 U.S. Government Publications

Available from Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, http://assist.daps.dla.mil/quicksearch.

MIL-G-10944 Gages, Dimensional Control

3. REQUIREMENTS

3.1 Form of Thread

The Aeronautical National Taper Pipe Thread Form, Symbol ANPT, as shown on Figure 1, shall be used for taper pipe threads covered by this standard.

3.2 Dimensions

Taper pipe threads shall conform to dimensions as shown on Figure 2 and given in Tables 1 and 2, and shall be full profile within the L_2 and $L_1 + L_3$ lengths. The crest and root of the thread shall be truncated within the limits specified in Table 1, and as shown on Figure 3. This applies to fully machined fittings and bosses and not to fittings made from nominal size pipe stock.

3.2.1 Tolerance

The tolerance for all taper pipe threads shall be plus or minus one turn (length of one pitch --- hereafter “pitch”) on the inspection gage checked over the basic effective length of thread. External threads that are one turn under basic and internal threads that are one turn over basic shall be of correct form for not less than one pitch in excess of the respective L_2 and $L_1 + L_3$ lengths.

3.2.2 Thread Angle

The thread angle, when measured in the axial plane, shall be such that its bisector will be perpendicular to the axis of the thread. Half of the thread angle shall be 30° ± 1° for all pitches with the exception of the 11-1/2 and 8 pitch threads, which shall be within ±45 minutes.

3.2.3 Lead of Thread

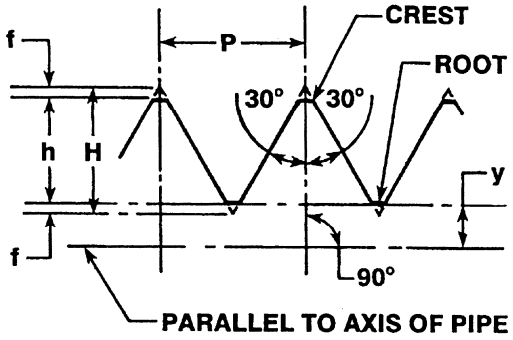
The tolerance on lead (pitch and helix) between any two pitches within the effective thread lengths L_2 and $L_1 + L_3$ shall be the basic pitch within .002 inch.

3.2.4 Taper of Thread

The taper of the thread shall be 3/4 inch per foot, ±1/16 inch, when measured on the diameter and along the axis.

3.2.5 Internal Threads

The entrance end of internal threads shall be countersunk 90° to the diameter given in Table 1.



n = Number of threads per inch.
p = Pitch of thread (measured parallel to axis) = 1/n
H = Height of sharp V thread = 0.866025 p.
h = Basic depth of thread on product = 0.8 p.
f = Depth of truncation.
y = Angle of taper (1°47' approx.) = 3/4 inch per foot on diameter.

FIGURE 1 - AERONAUTICAL NATIONAL TAPER PIPE THREAD FORM AND NOTATION

TABLE 1 - COUNTERSINKING, CHAMFERING, AND LIMITS ON CREST AND ROOT TRUNCATION [1)]

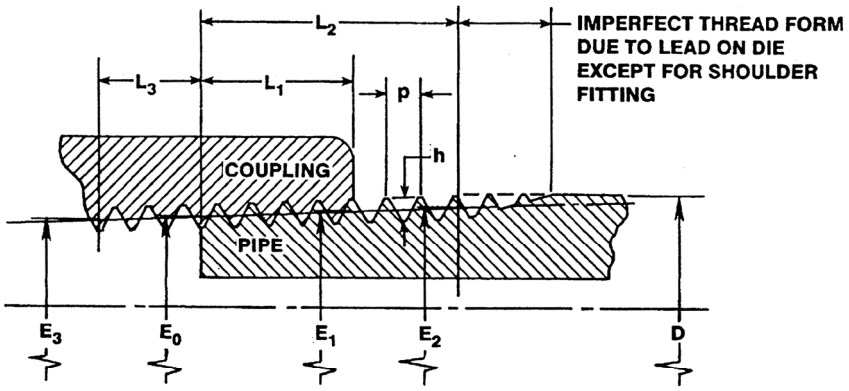
TABLE 1A - DIMENSIONS 1-6

Nominal Pipe Size Inch	Threads per Inch	Truncation			
		Minimum		Maximum	
		Formula	Inch	Formula	Inch
1	2	3	4	5	6
1/16	27	.033P	.0012	.096P	.0036
1/8	27	.033P	.0012	.096P	.0036
1/4	18	.033P	.0018	.088P	.0049
3/8	18	.033P	.0018	.088P	.0049
1/2	14	.033P	.0024	.078P	.0056
3/4	14	.033P	.0024	.078P	.0056
1	11-1/2	.033P	.0029	.073P	.0063
1 1/4	11-1/2	.033P	.0029	.073P	.0063
1 1/2	11-1/2	.033P	.0029	.073P	.0063
2	11-1/2	.033P	.0029	.073P	.0063
2 1/2	8	.033P	.0041	.062P	.0078
3	8	.033P	.0041	.062P	.0078

TABLE 1B - DIMENSIONS 7-12

Nominal Pipe Size Inch	Width of Flat				Chamfer J [2] X 45° Approx Inch	Countersink Diameter K [3] X 90° ±5° Inch
	Minimum		Maximum			
	Formula	Inch	Formula	Inch		
						K +.03 –.00
					J	
1	7	8	9	10	11	12
1/16	.038P	.0014	.111P	.0041	.03-.05	.312
1/8	.038P	.0014	.111P	.0041	.03-.05	.406
1/4	.038P	.0021	.102P	.0057	.04-.07	.562
3/8	.038P	.0021	.102P	.0057	.04-.07	.687
1/2	.038P	.0027	.090P	.0064	.05-.08	.875
3/4	.038P	.0027	.090P	.0064	.05-.08	1.062
1	.038P	.0033	.084P	.0073	.06-.09	1.312
1 1/4	.038P	.0033	.084P	.0073	.06-.09	1.641
1 1/2	.038P	.0033	.084P	.0073	.06-.09	1.906
2	.038P	.0033	.084P	.0073	.06-.09	2.500
2 1/2	.038P	.0048	.072P	.0090	.08-.11	2.906
3	.038P	.0048	.072P	.0090	.08-.11	3.531

[1] See 3.2.7.
[2] J - External Threads.
[3] K - Internal Threads.



D = Outside diameter of pipe = Major diameter of pipe thread at L_2 from end of pipe.
L_1 = Normal engagement by hand between external and internal threads.
L_2 = Effective length of external thread = p(0.8D + 6.8).
L_3 = Normal wrench take-up = 3p.
(L_1+L_3) = Effective length of internal thread.
E_0 = Basic pitch diameter thread at end of pipe = D - (0.05D + 1.1)p.
E_1 = Basic pitch diameter thread at end of coupling = E_0 + 0.0625L_1.
E_2 = Basic pitch diameter thread at end L_2 from end of pipe = E_0 + 0.0625L_2.
E_3 = Basic pitch diameter thread at end L_3 from end of pipe = E_0 - 0.1875p.

FIGURE 2 - AERONAUTICAL NATIONAL TAPER PIPE THREAD DIMENSIONS

TABLE 2 - DIMENSIONS OF AERONAUTICAL NATIONAL TAPER PIPE THREADS

TABLE 2A - DIMENSIONS N - L_3

Nominal Pipe Size Inch	Threads per Inch n	Pitch = 1/n p Inch	Depth of Thread h, Max Inch	D Inch	Basic Lengths		
					L_1 Inch	L_2 Inch	(L_1 + L_3) Inch
1	2	3	4	5	6	7	8
1/16	27	.03704	.02963	.3125	.160	.26111	.27111
1/8	27	.03704	.02963	.405	.1615	.26385	.27261
1/4	18	.05556	.04444	.540	.2278	.40178	.39447
3/8	18	.05556	.04444	.675	.240	.40778	.40667
1/2	14	.07143	.05714	.840	.320	.53371	.53429
3/4	14	.07143	.05714	1.050	.339	.54571	.55329
1	11-1/2	.08696	.06957	1.315	.400	.68278	.66087
1 1/4	11-1/2	.08696	.06957	1.660	.420	.70678	.68087
1 1/2	11-1/2	.08696	.06957	1.900	.420	.72348	.68087
2	11-1/2	.08696	.06957	2.375	.436	.75652	.69687
2 1/2	8	.12500	.10000	2.875	.682	1.13750	1.05700
3	8	.12500	.10000	3.500	.766	1.20000	1.14100

TABLE 2B - DIMENSIONS E_0 - E_3

Nominal Pipe Size Inch	Basic Pitch Diameters			
	E_0 Inch	E_1 Inch	E_2 Inch	E_3 Inch
1	9	10	11	12
1/16	.27118	.28118	.28750	.26424
1/8	.36351	.37360	.38000	.35656
1/4	.47739	.49163	.50250	.46697
3/8	.61201	.62701	.63750	.60160
1/2	.75843	.77843	.79179	.74504
3/4	.96768	.98887	1.00179	.95429
1	1.21363	1.23863	1.25630	1.19733
1 1/4	1.55713	1.58338	1.60130	1.54083
1 1/2	1.79609	1.82234	1.84130	1.77978
2	2.26902	2.29627	2.31630	2.25272
2 1/2	2.71953	2.76216	2.79062	2.69609
3	3.34062	3.38850	3.41562	3.31719

NOTE: For selection of tap drills and taper pipe reamers, subtract the depth “h” from the pitch diameter at E_1.

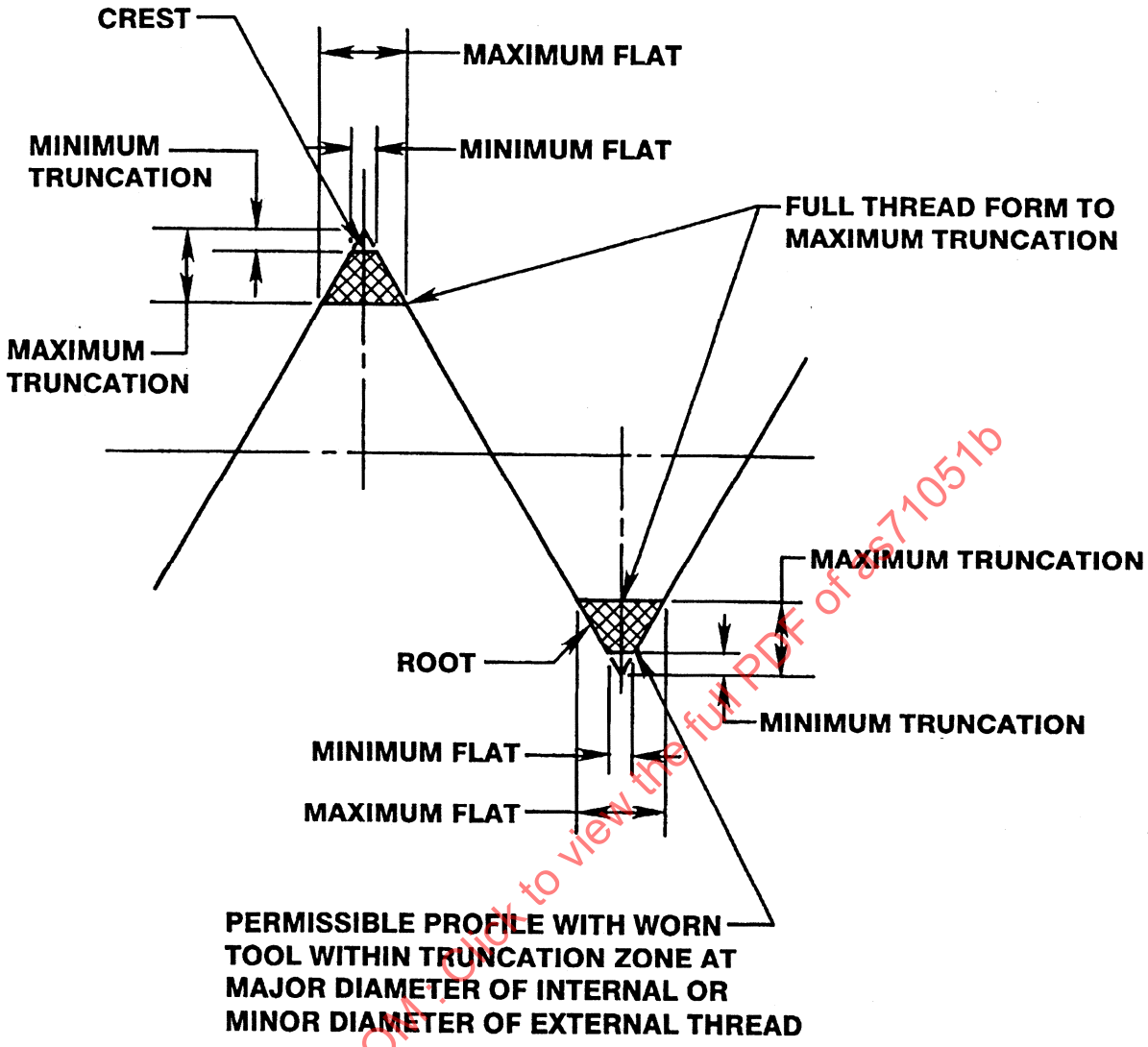


FIGURE 3 - CREST AND ROOT TRUNCATION TOLERANCE ZONES

3.2.6 External Threads

The entering end of external threads shall be chamfered 45° to the distance given in Table 1.

3.2.7 Thread Bosses

Externally pipe threaded bosses shall conform to the dimensions shown on AS5201, and internally pipe threaded bosses shall conform to the dimensions shown on AS5200.

3.2.8 Gages

Gages for checking pipe threads shall be in accordance with the requirements of this standard and MIL-G-10944.

3.2.9 Marking

Gages fabricated in conformance to this standard shall be plainly and permanently marked with “AS71051” to denote compliance with the aeronautical pipe thread requirements of this standard. Additional markings shall be applied as specified on gage drawings, or in the order or invitation for bids.

3.3 Formulae and Constants

The constants for six step plug and ring gages are given in Table 3. The formulae for six step plug and ring gages are as follows:

Taper Plugs Formulae:

D = Minor diameter at E_3 with max truncation = E_3* - Col 4 of Table 3

$B_t = L_1 + L_3$ *

B = B_t - (Length equivalent of max truncation - min truncation) = B_t - Col 5 of Table 3

MN = B - Col 3 of Table 3 (one turn)

$MN_t = B_t$ - Col 3 of Table 3

MX = B + Col 3 of Table 3

$MX_t = B_t$ + Col 3 of Table 3

Taper Rings Formulae:

D = Major diameter at E_2 with max truncation = E_2* + Col 4 of Table 3

$B_t = L_2$*

B = B_t - (Length equivalent of max truncation - min truncation) = B_t - Col 5 of Table 3

MN = B + Col 3 of Table 3

$MN_t = B_t$ + Col 3 of Table 3

MX = B - Col 3 of Table 3

$MX_t = B_t$ - Col 3 of Table 3

*Product figured to 5 significant decimal places

TABLE 3 - CONSTANTS FOR SIX STEP PLUG AND RING GAGES

Threads per Inch	Constant Max Trunc	One Turn Length One Pitch	Twice the Addendum at Maximum Trunc	Length Equivalent of Max Trunc - Min Trunc
1	2	3	4 [1)]	5 [2)]
27	.096	.03704	.02496	.07467
18	.088	.05556	.03833	.09778
14	.078	.07143	.05072	.10286
11-1/2	.073	.08696	.06261	.11130
8	.062	.12500	.09275	.11600

[1)] Sharp "V" thread depth - 2 (max truncation) $\frac{.866025}{n} - 2\frac{(x)}{(n)} = \frac{.866025 - 2x}{n}$

where:

x = maximum truncation constant

[2)] Length equivalent = 32 (max truncation - min truncation) = 32 $\frac{(x - y)}{(n)}$

where:

x = maximum truncation constant

y = minimum truncation constant = .033

3.4 Workmanship

Workmanship shall be consistent with the tolerances herein specified. The threads shall be free from flaws, blow holes, abrupt terminations and other defects which would make them unsuitable for the purpose intended. Unless otherwise specified, the surface texture of the thread flanks and the roots shall be no greater than 100 µin Ra in accordance with ASME B46.1.

4. INSPECTION PROVISIONS

4.1 Gages

Pipe threads shall be checked with gages that conform to Tables 4 and 5 and Figures 4, 5, and 6. The gages shall be subject to certification by a Government agency at the discretion of either the procuring activity or the Government inspector.

TABLE 4 - BASIC DIMENSIONS OF THREADED PLUG AND RING GAGES FOR AERONAUTICAL NATIONAL TAPER PIPE THREADS

TABLE 4A - DIMENSION 1 - 9

			Major Diameter of Plug Gages			Pitch Diameter of Plug and Ring Gages		
Nominal Pipe Size Inch	Threads per Inch n	Pitch P Inch	At small end of L_1 [1] Inch	At gaging notch of L_1 [1] Inch	At small end of master L_2 [2] Inch	Small end of ring gages or L_1 plug gages, E_0 Inch	At gaging notch L_1 plug gages or at large end of thin ring gage, E_1 Inch	At large end, full ring, E_2 Inch
1	2	3	4	5	6	7	8	9
1/16	27	.03704	.29614	.30614	.30081	.27118	.28118	.28750
1/8	27	.03704	.38847	.39856	.39314	.36351	.37360	.38000
1/4	18	.05556	.51572	.52996	.52183	.47739	.49163	.50250
3/8	18	.05556	.65035	.66535	.65645	.61201	.62701	.63750
1/2	14	.07143	.80914	.82914	.81557	.75843	.77843	.79179
3/4	14	.07143	1.01839	1.03958	1.02482	.96768	.98887	1.00179
1	11-1/2	.08696	1.27624	1.30124	1.28320	1.21363	1.23863	1.25630
1 1/4	11-1/2	.08696	1.61974	1.64599	1.62670	1.55713	1.58338	1.60130
1 1/2	11-1/2	.08696	1.85870	1.88495	1.86566	1.79609	1.82234	1.84130
2	11-1/2	.08696	2.33163	2.35888	2.33859	2.26902	2.29627	2.31630
2 1/2	8	.12500	2.81228	2.85491	2.81953	2.71953	2.76216	2.79062
3	8	.12500	3.43338	3.48125	3.44062	3.34062	3.38850	3.41562

[1] These dimensions are based on gage truncation formulas that are the same as column 5 of Table 1.
[2] Major diameter of master thread setting plug gages to be truncated .033p.

TABLE 4B - DIMENSIONS 10 - 16

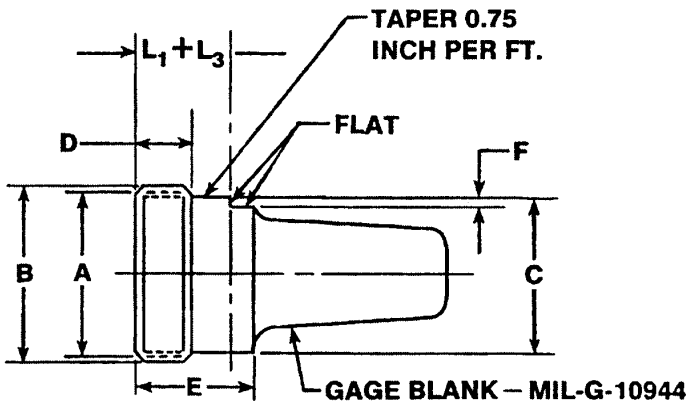
Nominal Pipe Size Inch	Minor Diameter of Ring Gages				Increase in diameter per thread Inch	Thickness of thin ring, L_1 Inch	Thickness of full ring, L_2 Inch
	Thin Ring [1]		Full Ring [2]				
	At small end Inch	At large end Inch	At small end Inch	At large end Inch			
1	10	11	12	13	14	15	16
1/16	.25022	.26022	.24622	.26254	.00231	.160	.26111
1/8	.34255	.35264	.33855	.35504	.00231	.1615	.26385
1/4	.44594	.46018	.43906	.46417	.00347	.2278	.40178
3/8	.58057	.59557	.57368	.59917	.00347	.240	.40778
1/2	.71800	.73800	.70771	.74107	.00446	.320	.53371
3/4	.92725	.94844	.91696	.95107	.00446	.339	.54571
1	1.16441	1.18941	1.15102	1.19370	.00543	.400	.68278
1 1/4	1.50791	1.53416	1.49452	1.53870	.00543	.420	.70678
1 1/2	1.74687	1.77312	1.73348	1.77870	.00543	.420	.72348
2	2.21980	2.24705	2.20641	2.25370	.00543	.436	.75652
2 1/2	2.64878	2.69141	2.62678	2.69787	.00781	.682	1.13750
3	3.26987	3.31775	3.24787	3.32287	.00781	.766	1.20000

[1] L_1 ring gages are to be truncated .15p.
[2] These dimensions are based on gage truncation formulas that are the same as column 5 of Table 1.

TABLE 5 - TOLERANCES OF AERONAUTICAL NATIONAL TAPER PIPE THREAD PLUG AND RING GAGES

Nominal Pipe Size Inch	Threads per Inch n	Tolerance on pitch diameter including taper [1) 2)] Inch	Tolerance on lead [3)] Inch	Tolerance on half angle (plus and minus) [4)] minutes	Tolerance on major diameter of plug gage (minus) Inch	Tolerance on minor diameter of ring gage (plus) Inch	Total cumulative tolerances on pitch diameter Inch	Maximum longitudinal variation from basic for plug or ring gage Inch	Maximum stand-off between plug and ring gages at gaging notch when screwed together tightly by hand [5)] Inch
1	2	3	4	5	6	7	8	9	10
1/16	27	.0002	.0002	20	.0005	.0005	.00088	.0141	.0282
1/8	27	.0002	.0002	20	.0005	.0005	.00088	.0141	.0282
1/4	18	.0003	.0002	15	.0005	.0005	.00102	.0163	.0326
3/8	18	.0003	.0002	15	.0005	.0005	.00102	.0163	.0326
1/2	14	.0003	.0002	13	.0005	.0005	.00107	.0171	.0342
3/4	14	.0003	.0002	13	.0005	.0005	.00107	.0171	.0342
1	11-1/2	.0003	.0003	10	.0005	.0005	.00121	.0194	.0388
1 1/4	11-1/2	.0003	.0003	10	.0005	.0005	.00121	.0194	.0388
1 1/2	11-1/2	.0003	.0003	10	.0005	.0005	.00121	.0194	.0388
2	11-1/2	.0003	.0003	10	.0005	.0005	.00121	.0194	.0388
2 1/2	8	.0004	.0004	5	.0005	.0005	.00137	.0219	.0438
3	8	.0004	.0004	5	.0005	.0005	.00137	.0219	.0438

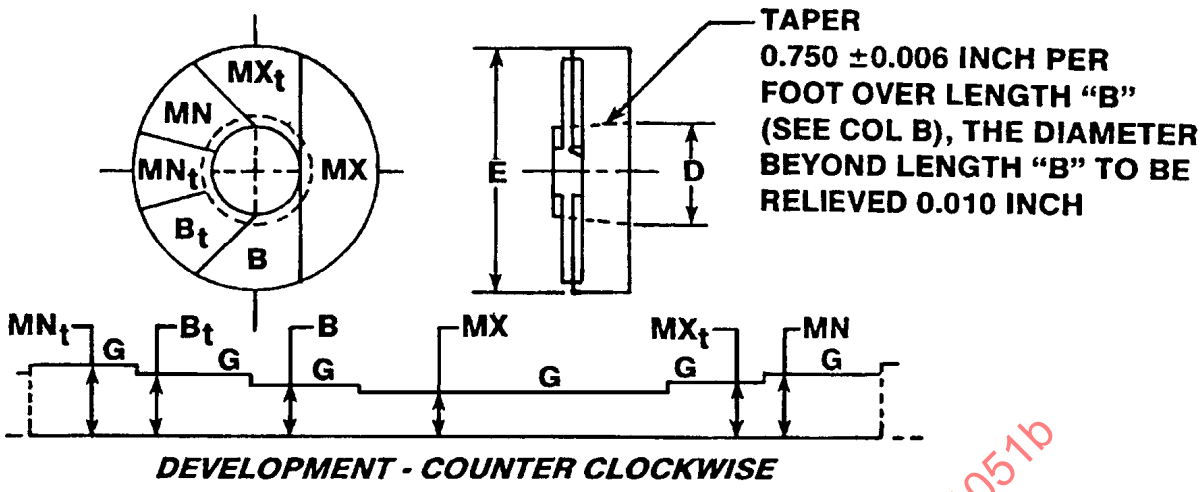
1) The taper of the pitch diameter cone shall be such that the pitch diameter will be within the tolerances given at all points. For example, if a gage is to maximum size at the small end, the taper shall be not greater than .750 inch per foot. If gage is to minimum size at the small end, the taper shall be not less than .750 inch per foot.
2) Pitch diameter tolerance is to be applied plus on plug gages and minus on ring gages.
3) Allowable variation in lead between any two threads.
4) In solving for the correction in diameter for angle errors, the average error in half angle for the two sides of the thread regardless of their signs should be taken.
5) Possible variations if both gages are at opposite extremes of the allowable tolerances.
6) Dimensions in inches at 68 °F.
7) The tolerance for the height from small end to gaging notch of the plug gage shall be +.000 and -.001 for sizes 1/16 to 2 inches, inclusive, and +.000 and -.002 for sizes 2 1/2 inches and 3 inches.
8) The tolerance for the overall thread length of the plug gage shall be +.005 and -.000 for sizes 1/16 to 2 inches, inclusive, and +.010 and -.000 for sizes 2 1/2 inches and 3 inches.
9) The tolerance for the thickness of the ring gage shall be +.001 and -.000 for sizes 1/16 to 2 inches, inclusive, and +.002 and -.000 for sizes 2 1/2 inches and 3 inches.



Nominal Pipe Size Inch	Threads per Inch, n	Small End E_3 Pitch diameter Inch A	Small End E_3 Outside diameter [1] Inch B +.0005 –.0000	Outside diameter at notch .020 to .025 below sharp root Inch C	Length of four pitches Inch D	Standard notch plus length of three pitches Inch (L1 + L3)	Blank length Inch E	Notch depth Inch F
1/16	27	.26424	.28520	.224- .229	.14815	.27111	3/8	.020-.025
1/8	27	.35656	.37753	.318- .323	.14815	.27261	13/32	.030-.035
1/4	18	.46697	.49842	.417- .422	.22222	.39447	1/2	.030-.035
3/8	18	.60160	.63304	.554- .559	.22222	.40667	9/16	.030-.035
1/2	14	.74504	.78546	.692- .697	.28571	.53429	11/16	.040-.045
3/4	14	.95429	.99471	.902- .907	.28571	.55329	23/32	.040-.045
1	11-1/2	1.19733	1.24654	1.138-1.143	.34783	.66087	7/8	.050-.055
1 1/4	11-1/2	1.54083	1.59004	1.483-1.488	.34783	.68087	7/8	.050-.055
1 1/2	11-1/2	1.77978	1.82900	1.722-1.727	.34783	.68087	7/8	.050-.055
2	11-1/2	2.25272	2.30193	2.196-2.201	.34783	.69687	7/8	.050-.055
2 1/2 [2]	8	2.69609	2.76684	2.628-2.633	.50000	1.05700	1 1/2	.050-.055
3 [2]	8	3.31719	3.38794	3.254-3.259	.50000	1.14100	1 1/2	.050-.055

1) Major diameter “B” is based on .15p truncation.
2) Gages for pipe sizes 2 1/2 inches and 3 inches to fit standard trilock handle.
3) Dimensions in inches at 68 °F.
4) The following information shall be marked on relieved portion of blank or shank: “size”, “L_3”.
5) Thread tolerances and distances between gaging notch and small end of gage shall conform to tolerances shown in Table 5.

FIGURE 4 - TAPER THREAD - L_3 PLUG GAGE

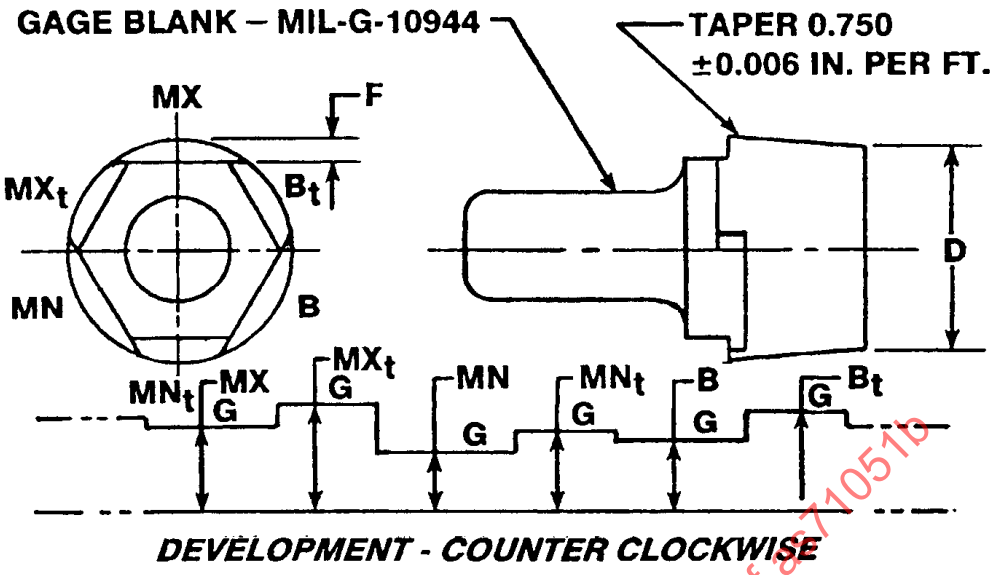


DEVELOPMENT - COUNTER CLOCKWISE

Nominal Pipe Size Inch	Major Dia at L_2, Basic Thread with Max Trunc Inch	Basic Pipe Thread		Minimum Thread (Plus 1 Turn)		Maximum Thread (Minus 1 Turn)		Ring Diameter Inch
		Min Trunc Inch	Max Trunc Inch	Min Trunc Inch	Max Trunc Inch	Min Trunc Inch	Max Trunc Inch	
	D +.00000 –.00015	B ±.001	B_t +.000 –.002	MN ±.001	MN_t +.000 –.002	MX ±.001	MX_t +.000 –.002	E
1/16	.31246	.18644	.26111	.22348	.29815	.14940	.22407	1 1/4
1/8	.40496	.18918	.26385	.22622	.30089	.15214	.22681	1 1/4
1/4	.54083	.30400	.40178	.35956	.45734	.24844	.34622	1 1/2
3/8	.67583	.31000	.40778	.36556	.46334	.25444	.35222	1 3/4
1/2	.84251	.43085	.53371	.50228	.60514	.35942	.46228	2
3/4	1.05251	.44285	.54571	.51428	.61714	.37142	.47428	2 1/4
1	1.31891	.57148	.68278	.65844	.76974	.48452	.59582	2 5/8
1 1/4	1.66391	.59548	.70678	.68244	.79374	.50852	.61982	3 1/8
1 1/2	1.90391	.61218	.72348	.69914	.81044	.52522	.63652	3 3/8
2	2.37891	.64522	.75652	.73218	.84348	.55826	.66956	4
2 1/2	2.88337	1.02150	1.13750	1.14650	1.26250	.89650	1.01250	4 3/4
3	3.50837	1.08400	1.20000	1.20900	1.32500	.95900	1.07500	5 1/2

[1] Dimensions in inches at 68 °F.
[2] See 3.3.

FIGURE 5 - PLAIN TAPER RING GAGE



Nominal Pipe Size Inch	Minor Dia at L_3, Basic Thread with Max Trunc Inch	Basic Pipe Thread		Minimum Thread (Minus 1 Turn)		Maximum Thread (Plus 1 Turn)		Depth of Notch Inch
		Min Trunc Inch	Max Trunc Inch	Min Trunc Inch	Max Trunc Inch	Min Trunc Inch	Max Trunc Inch	
	D +.00015 –.00000	B ±.001	B_t +.000 –.002	MN ±.001	MN_t +.000 –.002	MX ±.001	MX_t +.000 –.002	F
1/16	.23928	.19644	.27111	.15940	.23407	.23348	.30815	.032-.037
1/8	.33160	.19794	.27261	.16090	.23557	.23498	.30965	.055-.060
1/4	.42864	.29669	.39447	.24113	.33891	.35225	.45003	.055-.060
3/8	.56327	.30889	.40667	.25333	.35111	.36445	.46223	.085-.090
1/2	.69432	.43143	.53429	.36000	.46286	.50286	.60572	.057-.062
3/4	.90357	.45043	.55329	.37900	.48186	.52186	.62472	.120-.125
1	1.13472	.54957	.66087	.46261	.57391	.63653	.74783	.120-.125
1 1/4	1.47822	.56957	.68087	.48261	.59391	.65653	.76783	.120-.125
1 1/2	1.71717	.56957	.68087	.48261	.59391	.65653	.76783	.120-.125
2	2.19011	.58557	.69687	.49861	.60991	.67253	.78383	.120-.125
2 1/2 [1]	2.60334	.94100	1.05700	.81600	.93200	1.06600	1.18200	.120-.125
3 [1]	3.22444	1.02500	1.14100	.90000	1.01600	1.15000	1.26600	.120-.125

[1] Gages for pipe sizes 2 1/2 inches and 3 inches to fit standard trilock handle.
[2] Dimensions in inches at 68 °F.
[3] See 3.3.

FIGURE 6 - PLAIN TAPER PLUG GAGE

4.2 Gage Usage

Inspection gages shall not be used when worn beyond the basic dimensions by more than 1/2 turn (pitch). Proper allowance shall be made for any variation from basic when using a gage. L_1 and L_3 thread plug gages may be used, having three gaging notches, basic, maximum, and minimum, representing the tolerance of plus or minus one turn (pitch), the maximum notch being one turn (pitch) above basic and the minimum notch one turn (pitch) below basic, and all three notches equally spaced around the gage diameter.

4.3 Gaging

4.3.1 External Thread

In the case of external threads, the fitting or pipe is within the extreme limits when the end of the fitting or pipe is within the minimum or maximum steps of the triroll gage one turn (pitch) either way of basic step (see Figure 7), or within one turn (pitch) either way of the small end of the ring (see Figures 8 and 9).

4.3.1.1 Gaging with the Triroll Gage

When J-S triroll pipe gages are used in gaging external threads, the gage is screwed on until perceptible resistance is encountered; the thread is then ready for gaging. This type of gage should not be forced over the product thread. Fundamentally, the J-S triroll pipe gage is a visual gage and corrections of the thread elements, that is, taper, angle, lead, root, thread form, etc., are determined by “sighting” the contact between the gage rolls and the thread being gaged.

4.3.1.2 Internal Thread

The thread is within the extreme limits in the case of internal threads when the basic gaging notch of the thread plug gage is within one turn (pitch) either way of the fitting or boss face when screwed in tightly by hand (see Figures 10 and 11).

4.3.1.3 Excess Chamfer or Countersink

Should requirements exist for external and internal threads to be chamfered or countersunk in excess of the dimensions shown in Table 1, the thread size shall be determined by using as the reference point the end of the chamfer or bottom of the countersink (first thread scratch) instead of from the end of the pipe or fitting.

4.3.2 Thread Angle

Routine inspection shall be made by visual observation when a triroll gage, or equivalent, is used. More accurate determinations may be made by selective samples measured for thread angle in an approved type of microscope or optical projection equipment. Cross sections or cast proofs may be made of internal threads and measured by the same means to determine accuracy of thread angle.

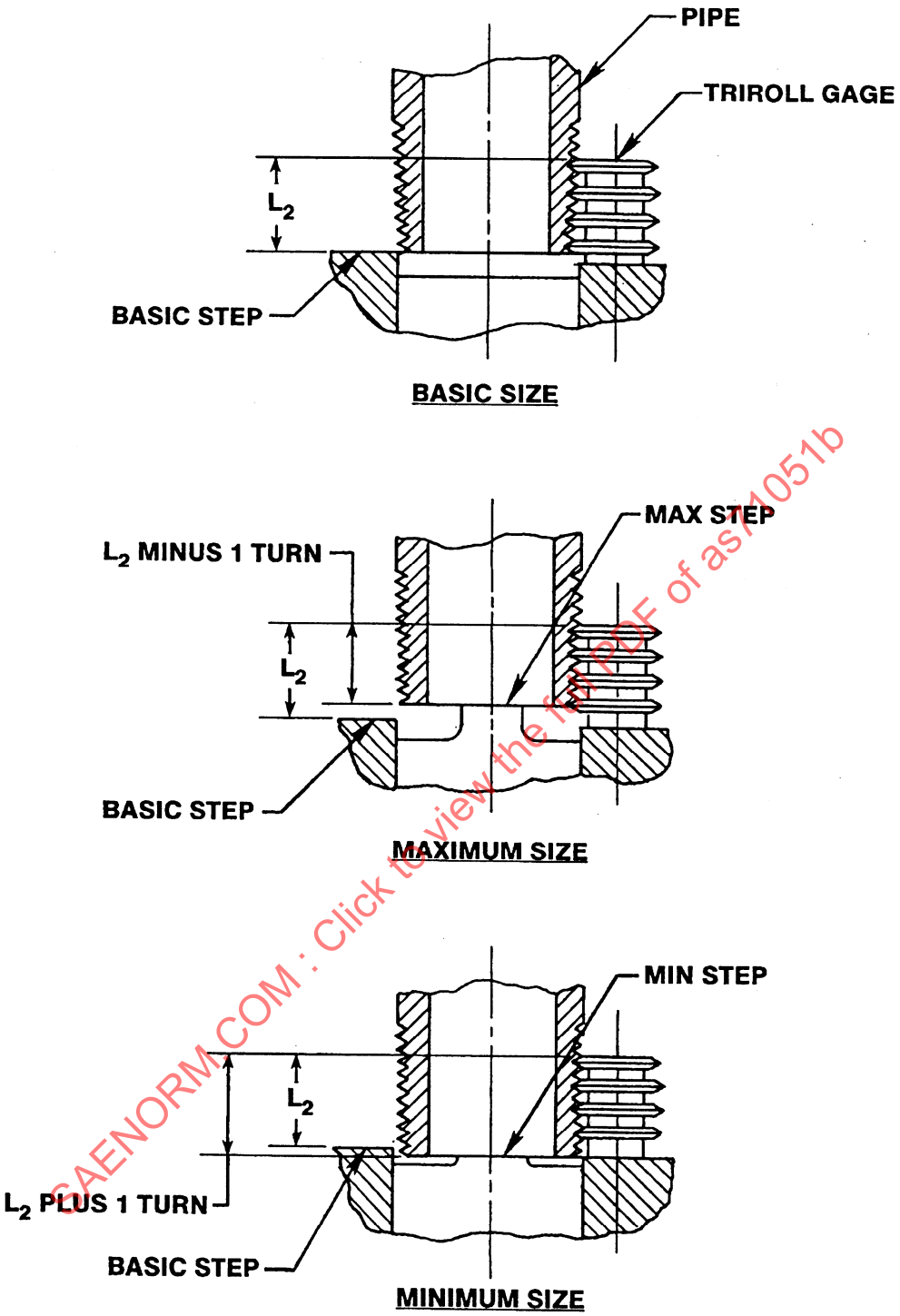


FIGURE 7 - APPLICATION OF TRIROLL GAGE

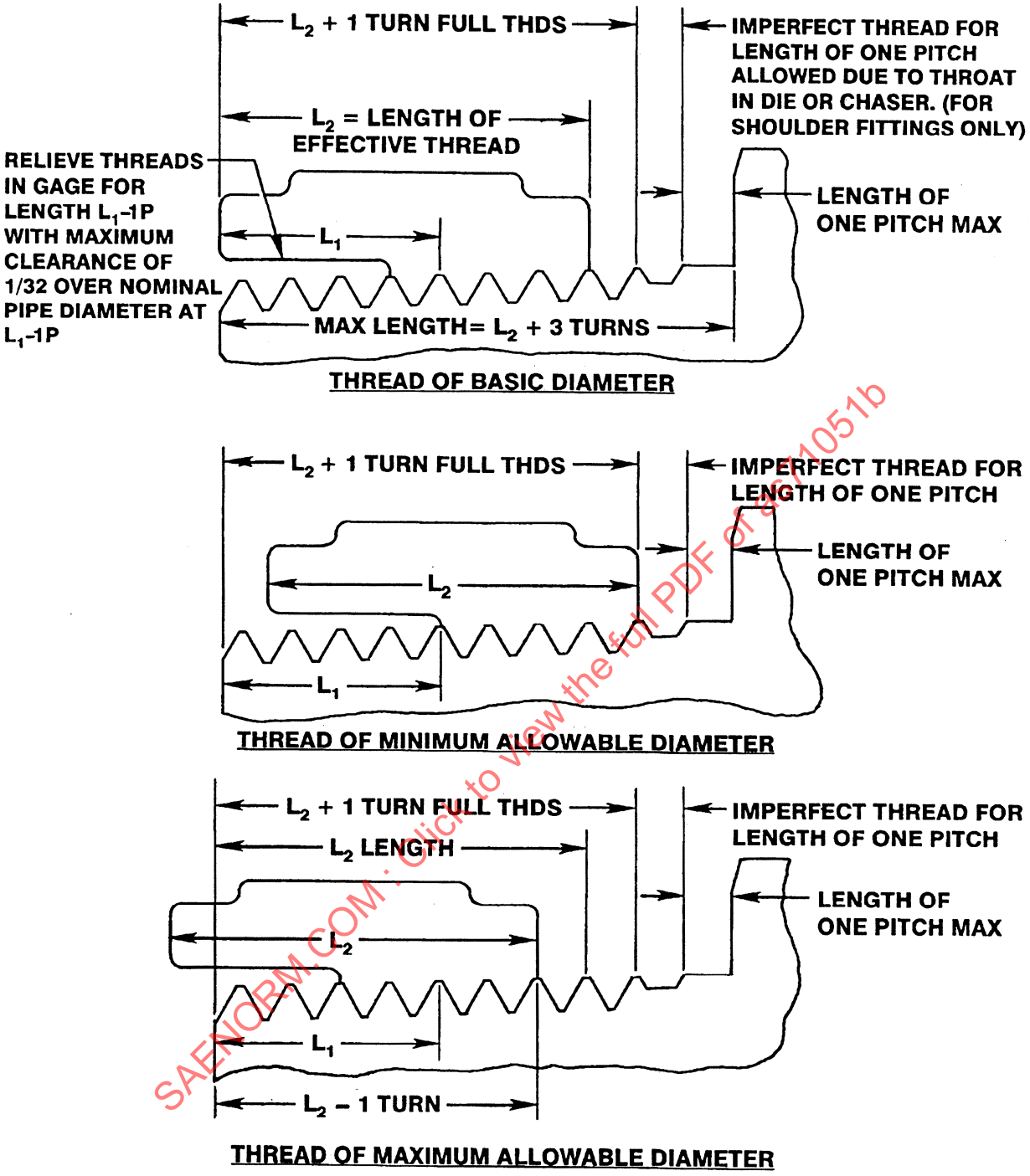


FIGURE 8 - APPLICATION OF FULL RING TAPER THREAD GAGE

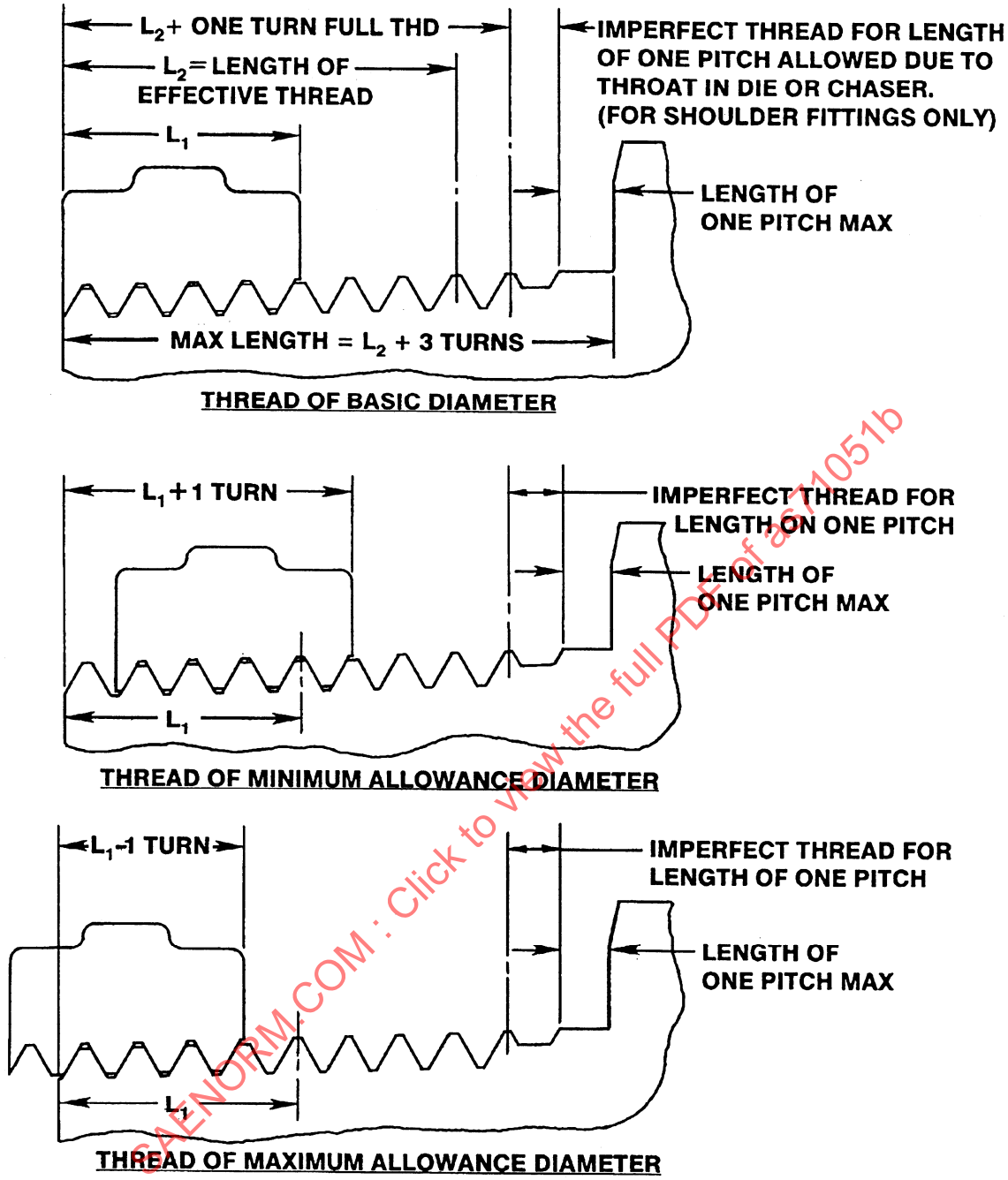


FIGURE 9 - APPLICATION OF THIN RING TAPER THREAD GAGE (.15P)

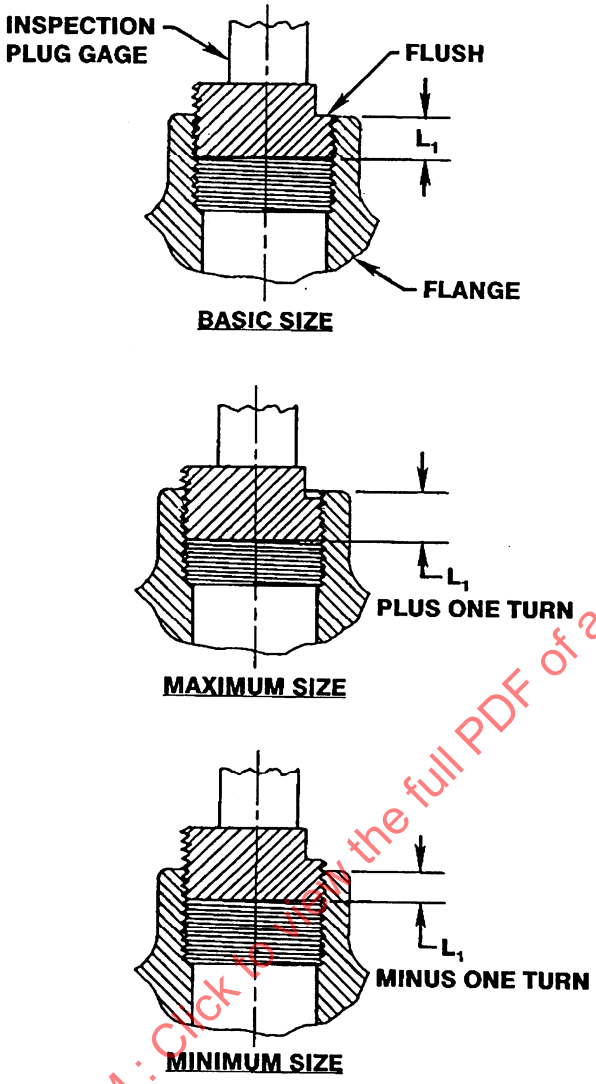


FIGURE 10 - APPLICATION OF L_1 TAPER THREAD PLUG GAGE

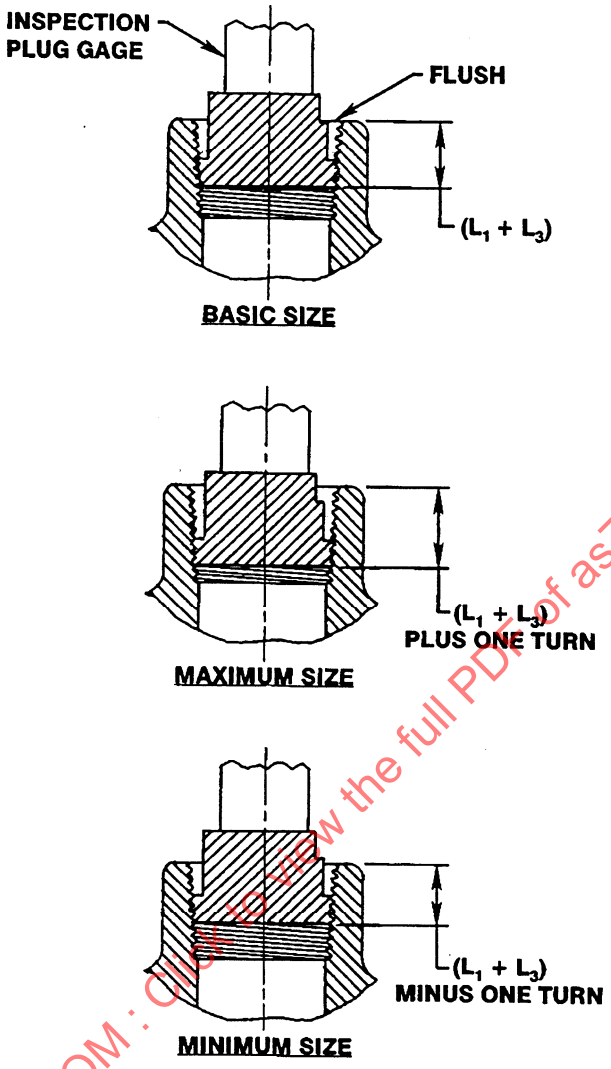


FIGURE 11 - APPLICATION OF L_3 TAPER THREAD PLUG GAGE