MAThread The World's Best Fastener

Manufacturing Standards

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MAThread® - RADIUSED DOG (PILOT) POINT / USE MAThread DIES ONLY

CRITICAL DESIGN INFORMATION

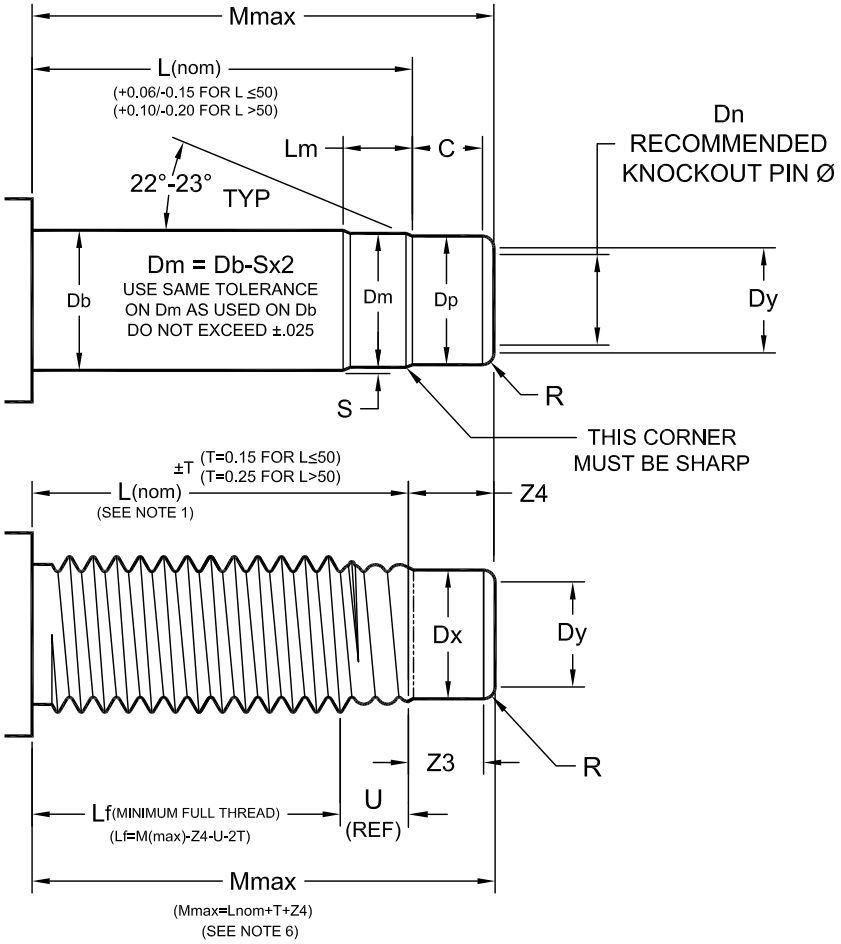
START EVERY DESIGN BY FINDING "Lnom"

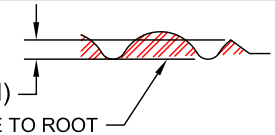
IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z4−T
SECONDARY: Lnom = Lf+U+T

T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD





INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MAThread APPROVED RADIUS CHART. Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.
6. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "R", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF TIP DIAMETER.

		BLANK DIMENSIONS (USE TO DESIGN BLANK)							THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)				
	THREAD SIZE & PITCH	Lm +.06 -.06	C ±.20	Dn REF	R MIN	S REF	Dp +.026 -.026	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	M4x.7	2.10	2.00	2.73	0.2	.086	3.124	2.8	0.14	3.170 3.098	1.50	2.20	2.1
	M5x.8	2.40	2.20	3.18	0.4	.099	3.980	3.2	0.16	4.030 3.954	1.80	2.60	2.4
	M6x1.0	3.00	2.50	3.75	0.5	.127	4.750	3.9	0.20	4.800 4.724	2.00	3.10	3.0
	M8x1.25	3.75	3.25	5.07	0.7	.160	6.473	5.1	0.25	6.540 6.447	2.70	4.20	3.8
	M10x1.5	4.50	3.70	5.17	1.5	.191	8.169	5.3	0.30	8.230 8.143	3.20	5.50	4.5
	M12x1.75	5.25	4.45	5.91	2.0	.221	9.906	6.0	0.35	9.950 9.880	4.20	6.60	5.3
	M14x2.0	6.00	5.20	6.63	2.5	.252	11.630	6.7	0.40	11.720 11.604	5.00	7.90	6.0
	M16x2.0	6.00	6.70	8.50	3.0	.252	13.635	8.7	0.40	13.720 13.609	6.00	9.90	6.0
	DIMENSIONS ARE IN MILLIMETERS (mm)												
FINE THREAD	M8x1.0	3.00	3.25	5.70	0.7	.127	6.750	5.9	0.20	6.810 6.724	2.70	4.20	3.0
	M10x1.25	3.75	3.70	6.00	1.5	.160	8.473	6.2	0.25	8.470 8.447	3.20	5.50	3.8
	M12x1.5	4.50	4.45	6.60	2.0	.191	10.169	6.9	0.30	10.260 10.143	4.20	6.60	4.5
	M14x1.5	4.50	5.20	7.70	2.5	.191	12.169	8.0	0.30	12.260 12.143	5.00	7.90	4.5
	M16x1.5	4.50	6.70	11.50	3.0	.191	14.169	11.9	0.30	14.260 14.143	6.00	9.90	4.5

CRITICAL DESIGN INFORMATION

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IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z4−T
SECONDARY: Lnom = Lf+U+T

T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

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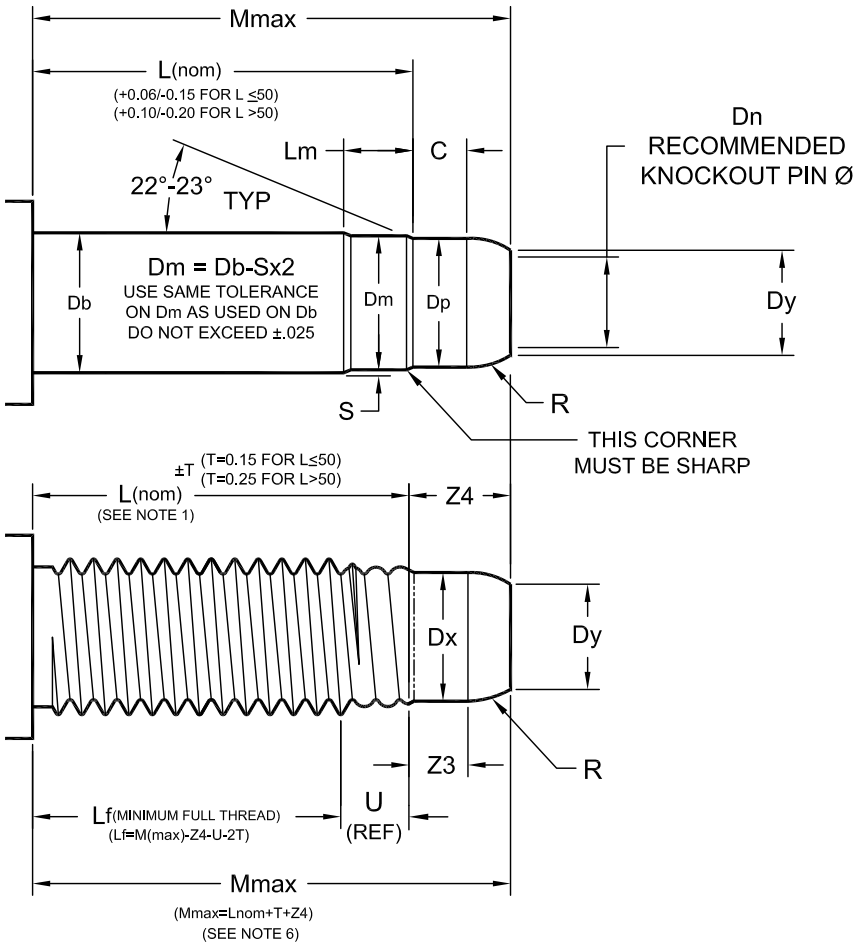
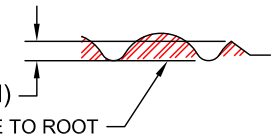
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD





INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MAThread APPROVED RADIUS CHART. Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.
6. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "R" HOWEVER IRREGULARITIES MAY NOT BE PERSENT FOR MORE THAN 100° OF TIP DIAMETER.

		BLANK DIMENSIONS (USE TO DESIGN BLANK)					THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)						
	THREAD SIZE & PITCH	Lm +.06 -.06	C ±.20	Dn REF	R MIN	S REF	Dp +.026 -.026	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	M4x.7	2.10	1.30	2.6	1.5	.086	3.124	2.7	0.14	3.170 3.098	1.0	2.0	2.1
	M5x.8	2.40	1.50	3.3	1.9	.099	3.980	3.4	0.16	4.030 3.954	1.2	2.5	2.4
	M6x1.0	3.00	1.80	4.0	2.3	.127	4.750	4.1	0.20	4.800 4.724	1.7	3.0	3.0
	M8x1.25	3.75	2.60	5.3	3.0	.160	6.473	5.4	0.25	6.540 6.447	2.4	4.3	3.8
	M10x1.5	4.50	3.20	6.7	3.8	.191	8.169	6.8	0.30	8.230 8.143	2.9	5.5	4.5
	M12x1.75	5.25	4.00	8.1	4.6	.221	9.906	8.2	0.35	9.950 9.880	3.7	6.6	5.3
	M14x2.0	6.00	4.30	9.5	5.4	.252	11.630	9.6	0.40	11.720 11.604	4.0	7.9	6.0
	M16x2.0	6.00	4.50	11.4	6.0	.252	13.635	11.5	0.40	13.720 13.609	4.2	7.9	6.0
	DIMENSIONS ARE IN MILLIMETERS (mm)												
FINE THREAD	M8x1.0	3.00	2.60	5.6	1.9	.127	6.750	5.7	0.20	6.810 6.724	2.2	4.1	3.0
	M10x1.25	3.75	3.20	6.9	2.4	.160	8.473	7.0	0.25	8.470 8.447	2.8	5.3	3.8
	M12x1.5	4.50	4.20	8.4	2.9	.191	10.169	8.5	0.30	10.260 10.143	2.8	6.5	4.5
	M14x1.5	4.50	5.00	9.7	3.7	.191	12.169	9.8	0.30	12.260 12.143	4.6	8.5	4.5
	M16x1.5	4.50	6.20	11.1	4.2	.191	14.169	11.2	0.30	14.260 14.143	5.8	10.5	4.5

MATpoint® VERY SHORT / USE MAThread DIES ONLY

IMPORTANT NOTE: THIS DESIGN IS INTENDED TO MINIMIZE CROSS-THREADING UP TO 9 DEGREES AXIAL MISALIGNMENT. IT IS POSSIBLE (THOUGH VERY DIFFICULT) TO CROSS-THREAD THESE PARTS IF YOU NEED 100% EFFECTIVENESS, USE A STANDARD MATHREAD OR MATPOINT.

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

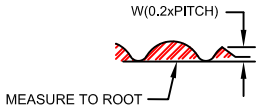
PREFERRED: Lnom = Mmax−Z4−0.25
SECONDARY: Lnom = Lf+U+0.25

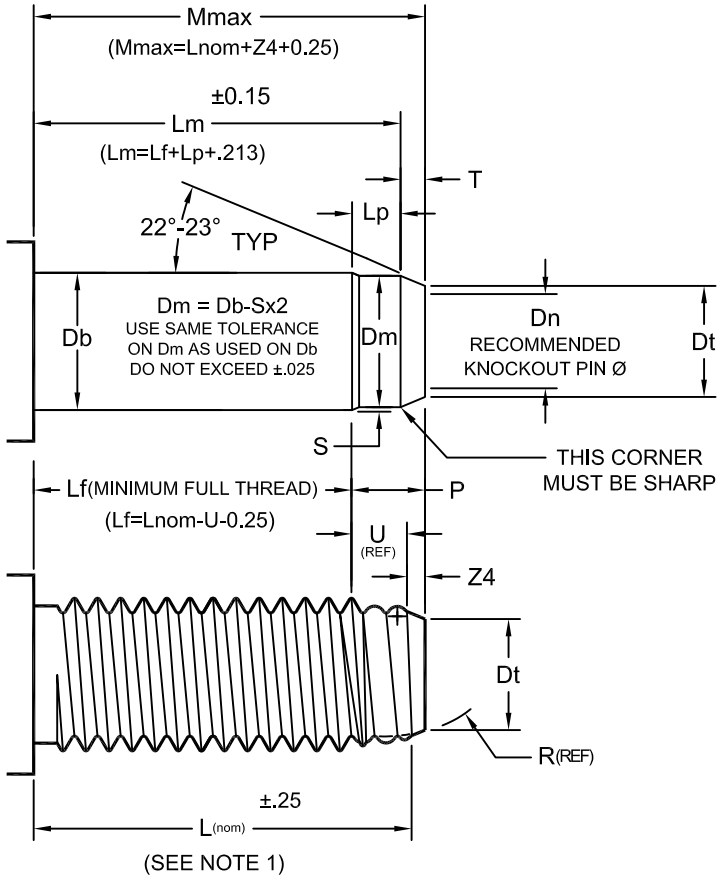
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED, HOWEVER Dt MUST NOT BE EXCEEDED.





	THREAD SIZE & PITCH	Lp ±.05	Dt MAX	Dn REF	S REF	T	W ±.01	U REF	Z_4 REF	P MAX
		BLANK DIMENSIONS (USED TO DESIGN BLANK)					THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)			
COARSE THREAD	M4x.7	1.292	2.83	2.70	.086	0.84 0.58	0.14	1.50	0.50	2.50
	M5x.8	1.500	3.70	3.55	.099	0.93 0.62	0.16	1.80	0.50	2.80
	M6x1.0	1.820	4.30	4.15	.127	1.26 0.87	0.20	2.30	0.65	3.45
	M8x1.25	2.365	5.99	5.80	.160	1.47 0.96	0.25	2.80	0.90	4.20
	M10x1.5	2.900	7.64	7.45	.191	1.63 1.10	0.30	3.40	1.00	4.90
	M12x1.75	3.636	9.30	9.10	.221	1.80 1.23	0.35	4.00	1.30	5.80
	M14x2.0	3.910	10.98	10.75	.252	1.92 1.33	0.40	4.50	1.20	6.20
	M16x2.0	3.910	12.98	12.75	.252	1.92 1.33	0.40	4.50	1.20	6.20
	M18x2.5	5.090	14.30	14.00	.320	2.10 1.70	0.50	5.60	1.50	7.60
	M20x2.5	5.090	16.30	16.00	.320	2.10 1.70	0.50	5.60	1.50	7.60
	M22x2.5	5.090	18.30	18.00	.320	2.10 1.70	0.50	5.60	1.50	7.60
	DIMENSIONS ARE IN MILLIMETERS (mm)									
FINE THREAD	M8x1.0	1.820	6.30	6.15	.127	1.26 0.87	0.20	2.30	0.65	3.45
	M10x1.25	2.365	7.99	7.80	.160	1.47 0.96	0.25	2.80	0.90	4.20
	M12x1.5	2.900	9.64	9.45	.191	1.63 1.10	0.30	3.40	1.00	4.90
	M14x1.5	2.900	11.64	11.45	.191	1.63 1.10	0.30	3.40	1.00	4.90
	M16x1.5	2.900	13.64	13.45	.191	1.63 1.10	0.30	3.40	1.00	4.90

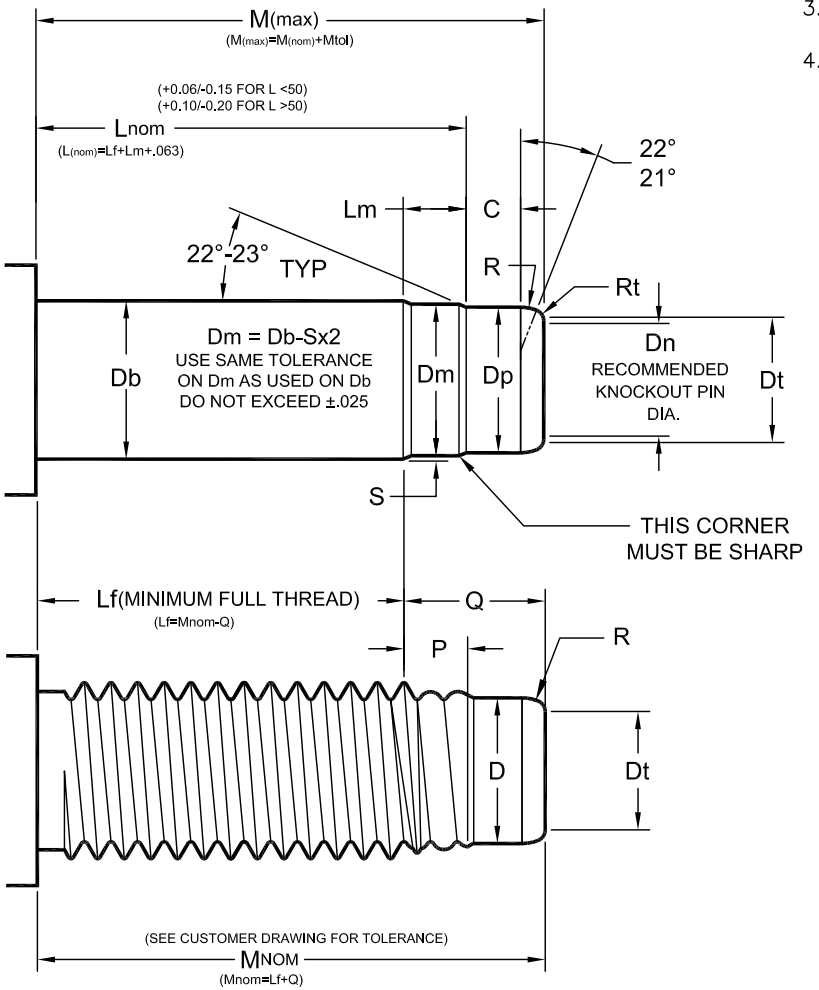
CRITICAL DESIGN INFORMATION

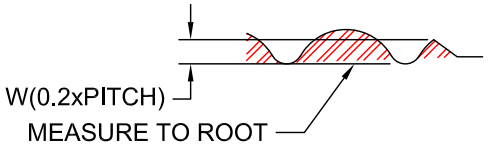
START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING THE FOLLOWING EQUATION

Lnom = Lf+Lm+.063

Lnom MUST BE ON EVERY BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD





INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
2. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M–1984 BEFORE USE.
3. "C" LENGTH MUST BE MEASURED USING MAThread APPROVED RADIUS CHART. Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C"
4. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADUIS "R" HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF TIP DIAMETER.

REFERENCE ONLY - DO NOT USE FOR NEW DESIGN USE ONLY
FOR PRE - 2002 GENERAL MOTORS DRAWINGS WHICH SPECIFY
A "Q" DIMENSION WHICH MATCHES THE "Q" LISTED HERE
CONTACT MATHREAD FOR ALL QUESTIONS RELATED TO THIS PART

		BLANK DIMENSIONS (USE TO DESIGN BLANK)								THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)			
	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Dn REF	R +0.0 -0.3	Rt MIN	Dp ±.026	S REF	Dt MAX	W ±.01	D	Q REF	P MAX
COARSE THREAD	M5x.8	1.737	1.33	3.08	1.50	0.40	3.980	.099	3.4	0.16	4.03 3.87	3.8	2.6
	M6x1.0	2.189	1.42	3.77	1.80	0.40	4.750	.127	4.1	0.20	4.80 4.59	4.5	2.9
	M8x1.25	2.750	2.20	5.23	2.30	0.50	6.473	.160	5.4	0.25	6.48 6.27	6.0	3.6
	M10x1.5	3.312	2.79	6.53	2.80	0.70	8.169	.191	6.8	0.30	8.23 7.94	7.5	4.2
	M12x1.75	3.875	3.45	7.79	3.30	0.90	9.906	.221	8.2	0.35	9.95 9.62	9.0	5.0
	M14x2.0	4.437	3.91	9.40	4.10	1.10	11.630	.252	9.6	0.40	11.72 11.30	10.5	5.6
	M16x2.0	4.437	4.31	10.48	4.70	1.30	13.635	.252	10.9	0.40	13.90 13.30	12.0	5.6

DIMENSIONS ARE IN MILLIMETERS (mm)

CRITICAL DESIGN INFORMATION

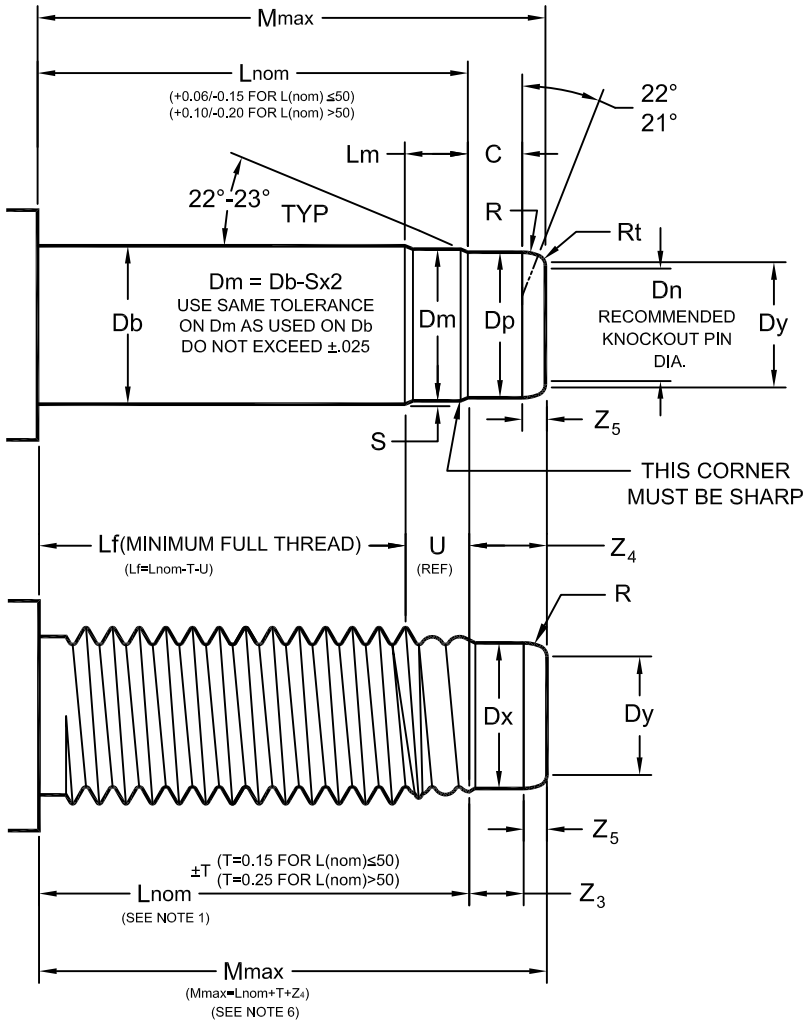
START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z_4−T
SECONDARY: Lnom = Lf+U+T

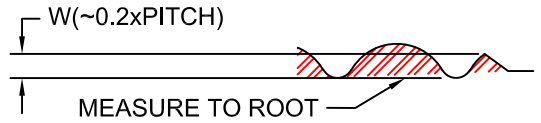
T = 0.15 FOR L(nom) SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR L(nom) LONGER THAN 50mm

Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD



INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:



1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom, ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MAThread APPROVED RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT
6. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADUIS "R", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF TIP DIAMETER.

		BLANK DIMENSIONS (USE TO DESIGN BLANK)									THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)				
	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Dn REF	R +0.0 -0.3	Rt MIN	S REF	Dp +.026 -.026	Dy MAX	Z_5 MIN	Dx	Z_3 MIN	Z_4 MAX	W +.01 -.01	U REF
COARSE THREAD	M4x.7	1.512	1.65	2.25	1.2	0.4	.086	3.124	2.7	0.50	3.170 3.098	1.20	2.40	0.14	1.5
	M5x.8	1.737	1.71	3.08	1.5	0.4	.099	3.980	3.4	0.60	4.030 3.954	1.30	2.50	0.16	1.8
	M6x1.0	2.189	1.81	3.77	1.8	0.4	.127	4.750	4.0	0.75	4.800 4.724	1.50	2.85	0.20	2.3
	M8x1.25	2.750	2.54	5.23	2.3	0.5	.160	6.473	5.5	1.00	6.540 6.447	2.10	3.90	0.25	2.8
	M10x1.5	3.312	3.21	6.53	2.8	0.7	.191	8.169	6.8	1.25	8.230 8.143	2.60	4.65	0.30	3.4
	M12x1.75	3.875	3.90	7.79	3.3	0.8	.221	9.906	8.2	1.50	9.950 9.880	3.15	5.65	0.35	4.0
	M14x2.0	4.437	4.23	9.40	4.1	1.1	.252	11.630	9.6	1.75	11.720 11.604	3.68	6.43	0.40	4.5
	M16x2.0	4.437	4.55	10.48	4.7	1.3	.252	13.635	10.9	2.00	13.720 13.609	4.10	7.10	0.40	4.5
	M18x2.5	5.500	4.95	11.75	5.2	1.5	.320	15.094	12.2	2.75	15.172 15.057	4.40	8.50	0.50	5.6
	M20x2.5	5.500	5.10	12.85	6.0	1.9	.320	17.094	13.3	3.21	17.172 17.057	4.65	8.80	0.50	5.6
	DIMENSIONS ARE IN MILLIMETERS (mm)														
FINE THREAD	M8x1.0	2.189	2.54	5.73	2.5	0.5	.127	6.750	6.0	1.00	6.810 6.724	2.10	3.90	0.20	2.3
	M10x1.25	2.750	3.21	7.23	3.0	0.7	.160	8.473	7.5	1.25	8.540 8.447	2.60	4.85	0.25	2.8
	M12x1.5	3.312	4.05	8.39	3.5	0.9	.191	10.169	8.8	1.50	10.260 10.143	3.15	6.00	0.30	3.4
	M14x1.5	3.312	4.23	10.35	4.3	1.1	.191	12.169	10.8	1.75	12.260 12.143	3.68	6.55	0.30	3.4
	M16x1.5	3.312	4.55	12.35	4.9	1.3	.191	14.169	12.8	2.00	14.260 14.143	4.10	7.20	0.30	3.4
	M18x1.5	3.312	4.95	13.25	5.4	1.5	.191	16.169	13.7	2.75	16.260 16.143	4.40	8.50	0.30	3.4
	M20x1.5	3.312	5.10	15.35	6.2	1.9	.191	18.169	15.8	3.15	18.260 18.143	4.65	8.80	0.30	3.4

Manufacturing Standards MATpoint®/ GM HOLDEN SPECIAL - LONG / USE MATpoint DIES ONLY
(GMW3362 Type D)

CRITICAL DESIGN INFORMATION

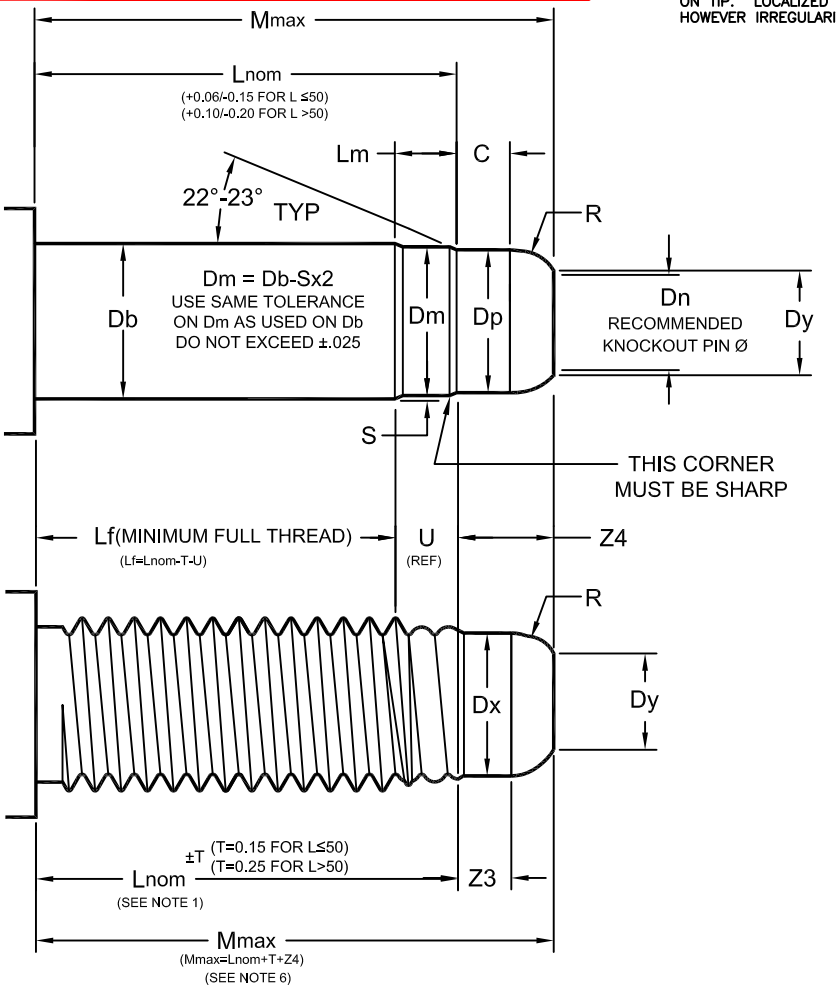
START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z_4−T
SECONDARY: Lnom = Lf+U+T

T = 0.15 FOR L(nom) SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR L(nom) LONGER THAN 50mm

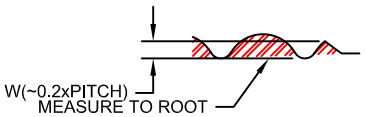
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD



INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom, ON THREAD-ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M-1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MATHREAD APPROVED RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT
6. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "R", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100" OF TIP DIAMETER.



BLANK DIMENSIONS (USE TO DESIGN BLANK) | THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)

	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Dn REF	R +0.0 -0.3	S REF	Dp +.026 -.026	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	M4x.7	1.512	2.20	1.50	2.4	.086	3.124	1.6	0.14	3.170 3.098	1.90	4.10	1.50
	M5x.8	1.737	2.40	1.90	3.1	.099	3.980	2.0	0.16	4.030 3.954	2.10	4.90	1.80
	M6x1.0	2.189	2.70	2.25	3.6	.127	4.750	2.4	0.20	4.800 4.724	2.40	6.30	2.30
	M8x1.25	2.750	3.50	3.05	4.9	.160	6.473	3.3	0.25	6.540 6.447	3.20	7.20	2.80
	M10x1.5	3.312	3.80	4.00	6.1	.191	8.169	4.2	0.30	8.230 8.143	3.50	8.50	3.40
	M12x1.75	3.875	4.20	4.80	7.4	.221	9.906	5.0	0.35	9.950 9.880	3.90	10.40	4.00
	M14x2.0	4.437	4.60	5.55	8.7	.252	11.630	5.8	0.40	11.720 11.604	4.30	11.30	4.50
	M16x2.0	4.437	5.00	6.25	10.3	.252	13.635	6.5	0.40	13.720 13.609	4.70	13.00	4.50
	M18x2.5	5.500	5.70	7.50	11.0	.320	15.083	7.8	0.50	15.172 15.057	5.40	14.50	5.60
	M20x2.5	5.500	6.20	8.30	12.0	.320	17.083	8.6	0.50	17.172 17.057	5.90	16.10	5.60
	M22x2.5	5.500	6.70	9.20	13.3	.320	19.083	9.5	0.50	19.172 19.057	6.40	17.70	5.60
	DIMENSIONS ARE IN MILLIMETERS (mm)												
FINE THREAD	M8x1.0	2.189	3.50	3.40	4.9	.127	6.750	3.58	0.20	6.810 6.724	3.20	7.20	2.30
	M10x1.25	2.750	3.80	4.25	6.1	.160	8.473	4.45	0.25	8.540 8.447	3.50	8.50	2.80
	M12x1.5	3.312	4.20	5.10	7.4	.191	10.169	5.30	0.30	10.260 10.143	3.90	10.40	3.40
	M14x1.5	3.312	4.60	6.13	8.7	.191	12.169	6.38	0.30	12.260 12.143	4.30	11.30	3.40
	M16x1.5	3.312	5.00	6.85	10.3	.191	14.169	7.10	0.30	14.260 14.143	4.70	13.00	3.40
	M18x1.5	3.312	5.70	8.60	11.0	.191	16.169	8.90	0.30	16.260 16.143	5.40	14.50	3.40
	M20x1.5	3.312	6.20	9.40	12.0	.191	18.169	9.70	0.30	18.260 18.143	5.90	16.10	3.40

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

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PREFERRED: Lnom = Bmax−Z4−T
SECONDARY: Lnom = Lf+M+T

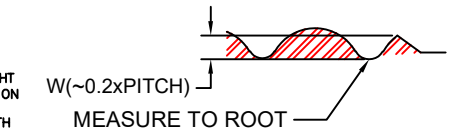
T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

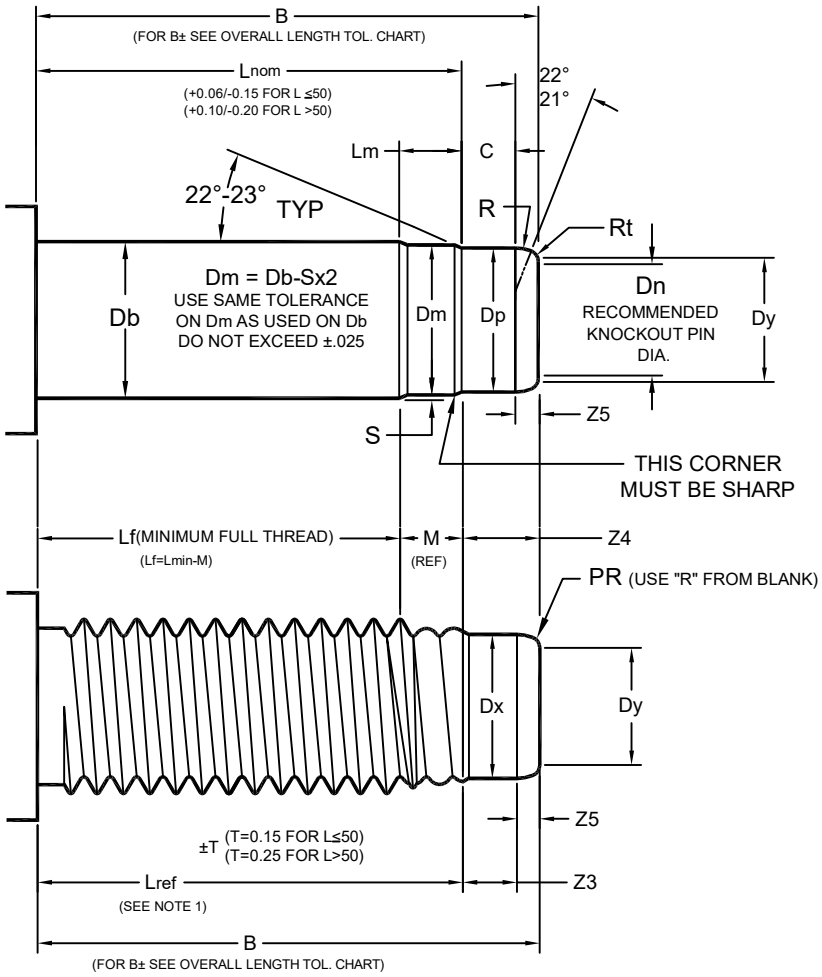
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MAThread APPROVED RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART
6. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "Rt", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF TIP DIAMETER.





THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Dn REF	R +0.0 -0.3	Rt MIN	S REF	Dp +.026 -.026	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 REF	Z_5 MIN	M REF
	BLANK DIMENSIONS (USE TO DESIGN BLANK)								THREAD ROLL DIMENSIONS (DO NOT USE ON BLANKS)					
M3.0x.5	1.095	1.45	1.73	0.8	0.35	.063	2.360	2.00	0.10	2.400 2.334	1.20	2.10	0.40	1.13
M3.5x.6	1.283	1.55	2.20	1.0	0.35	.076	2.725	2.36	0.12	2.771 2.699	1.20	2.20	0.45	1.35
M4x.7	1.512	1.65	2.25	1.2	0.40	.086	3.124	2.70	0.14	3.170 3.098	1.20	2.40	0.50	1.5
M5x.8	1.737	1.67	3.08	1.5	0.40	.099	3.980	3.40	0.16	4.030 3.954	1.65	2.50	0.60	1.8
M6x1.0	2.189	1.77	3.77	1.8	0.40	.127	4.750	4.10	0.20	4.800 4.724	1.75	2.85	0.75	2.3
M8x1.25	2.750	2.50	5.23	2.3	0.50	.160	6.473	5.40	0.25	6.540 6.447	2.49	3.90	1.00	2.8
M10x1.25	2.750	3.21	7.23	3.0	0.70	.160	8.473	7.50	0.25	8.540 8.447	2.60	4.05	1.25	2.8
M10x1.5	3.312	3.17	6.53	2.8	0.70	.191	8.169	6.80	0.30	8.230 8.143	3.15	4.65	1.25	3.4
M12x1.5	3.312	3.90	8.05	3.3	0.90	.191	10.169	8.20	0.30	10.230 10.143	3.94	5.65	1.50	3.4
M12x1.75	3.875	3.90	7.79	3.3	0.80	.221	9.906	8.20	0.35	9.950 9.880	3.15	5.65	1.50	4.0
M14x1.5	3.312	4.19	9.40	4.1	1.10	.191	12.169	9.50	0.30	12.230 12.143	4.18	6.43	1.75	3.4
M14x2.0	4.437	4.23	9.40	4.1	1.10	.252	11.630	9.60	0.40	11.750 11.604	3.68	6.43	1.75	4.5
M16x1.5	3.312	4.55	12.35	4.9	1.30	.191	14.169	12.80	0.30	14.260 14.143	4.10	6.60	2.00	3.4
M16x2.0	4.437	4.55	10.48	4.7	1.30	.252	13.635	10.90	0.40	13.720 13.609	4.10	7.10	2.00	4.5
M18x1.5	3.312	4.95	13.25	5.4	1.50	.191	16.169	13.70	0.30	16.260 16.143	4.40	8.50	2.75	3.4
M18x2.5	5.500	4.95	11.75	5.2	1.50	.320	15.083	12.20	0.50	15.172 15.057	4.40	8.50	2.75	5.6
M20x1.5	3.312	5.10	15.35	6.2	1.90	.191	18.169	15.80	0.30	18.260 18.143	4.65	8.80	3.15	3.4
M20x2.5	5.500	5.10	12.85	6.0	1.90	.320	17.083	13.30	0.50	17.172 17.057	4.65	8.80	3.21	5.6
M22x1.5	3.312	5.35	15.90	6.4	2.20	.191	20.169	16.40	0.30	20.260 20.143	4.90	9.00	3.40	3.4
M22x2.5	5.500	5.35	15.30	6.2	2.20	.320	19.083	15.80	0.50	19.172 19.057	4.90	9.20	3.40	5.6

DIMENSIONS ARE IN MILLIMETERS (mm)

OVERALL LENGTH TOLERANCE CHART - Reference js15 ISO 4759-1

Nom Bolt Length, mm		TOLERANCE	Nom Bolt Length, mm		TOLERANCE
TO 3,	incl	±0.20	>30 TO 50,	incl	±0.50
>3 TO 6,	incl	±0.24	>50 TO 80,	incl	±0.60
>6 TO 10,	incl	±0.29	>80 TO 120	incl	±0.70
>10 TO 18,	incl	±0.35	>120 TO 180	incl	±0.80
>18 TO 30,	incl	±0.42	>180 TO 250	incl	±0.925

CRITICAL DESIGN INFORMATION

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PREFERRED: Lnom = Bmax−Lt(MAX)−T
SECONDARY: Lnom = Lf+M+T

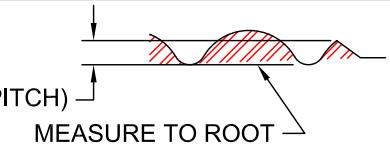
T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

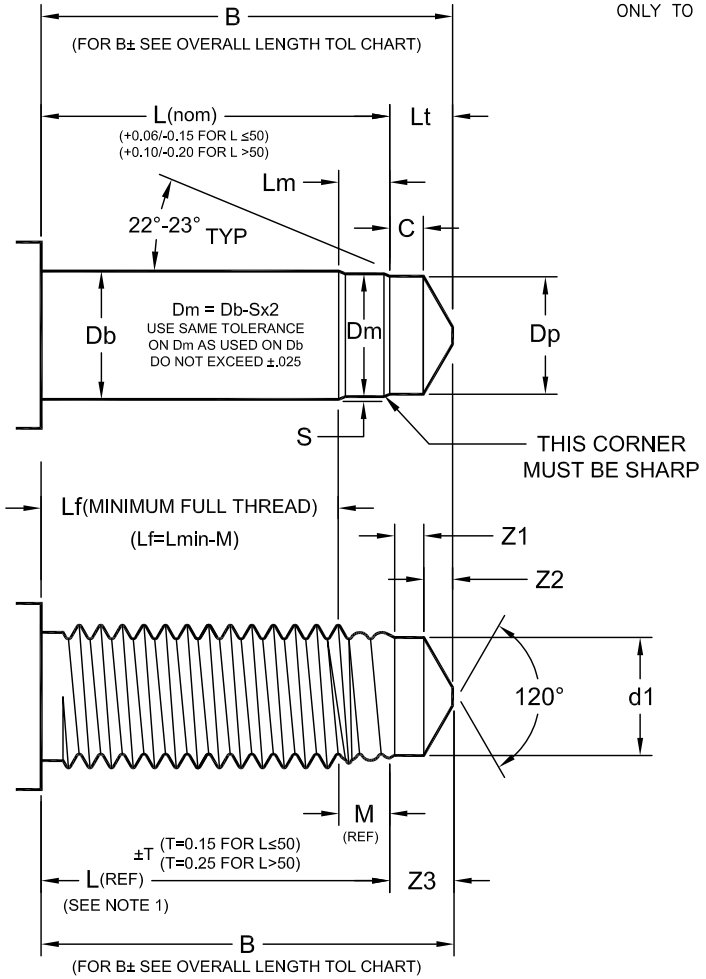
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENISON GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B 1.16−1984 BEFORE USE.
4. Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C"
5. MAXIMUM OVERALL LENGTH (Bmax) AND POINT LENGTH (Lt) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED.





BLANK DIMENSIONS (USE TO DESIGN BLANK) | THREAD ROLL DIMENSIONS (DO NOT USE ON BLANKS)

	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Lt	S REF	Dp +.026 -.026	W ±.01	d1	Z1 MIN	Z3 REF	Z2 MAX	M REF
METRIC	M5x0.8	1.737	1.67	2.50 2.12	.099	3.95	0.16	3.95	1.40	2.25	0.85	1.80
	M6x1.0	2.189	1.77	2.85 2.45	.127	4.70	0.20	4.70	1.75	2.82	1.07	2.25
	M7x1.0	2.189	1.77	3.18 2.78	.127	5.70	0.20	5.70	1.75	2.82	1.07	2.25
	M8x1.25	2.750	2.50	3.90 3.50	.160	6.41	0.25	6.41	2.19	3.75	1.56	2.81
	M10x1.5	3.312	3.17	4.65 4.25	.191	8.09	0.30	8.09	2.63	4.67	2.05	3.38
	M12x1.5	3.312	4.01	6.55 6.15	.191	10.09	0.30	10.09	3.76	6.30	2.54	3.38
	M14x1.5	3.312	4.19	7.15 6.75	.191	12.09	0.30	12.09	3.94	6.90	2.96	3.38

ALL DIMENSIONS ARE IN MILLIMETERS (MM)

	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Lt	S REF	Dp +.026 -.026	W ±.01	d1	Z1 MIN	Z3 REF	Z2 MAX	M REF
INCH	7/16-20	2.858	3.17	4.65 4.25	.162	9.59	0.25	9.57	2.22	4.70	2.47	2.86

OVERALL LENGTH TOLERANCE CHART

Nom Bolt Length, mm		Nom Bolt Size Range M5	M6	M7	M8	M10	M12	M14	7/16-20
UP TO 10,	incl	0.29	0.29	0.29	-	-	-	-	-
10 TO 18,	incl	0.35	0.35	0.35	0.35	-	-	-	-
18 TO 30,	incl	0.42	0.42	0.42	0.42	0.42	0.42	-	-
30 TO 50,	incl	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
50 TO 80,	incl	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
80 TO 120	incl	-	-	-	0.7	0.7	0.7	0.7	0.7
120 TO 200	incl	-	-	-	-	0.8	0.8	0.8	0.8

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE Lnom USING ONE OF THE FOLLOWING EQUATIONS

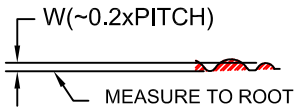
PREFERRED: $Lnom = Mmax - Z_4 - T$
SECONDARY: $Lnom = Lf + U + T$

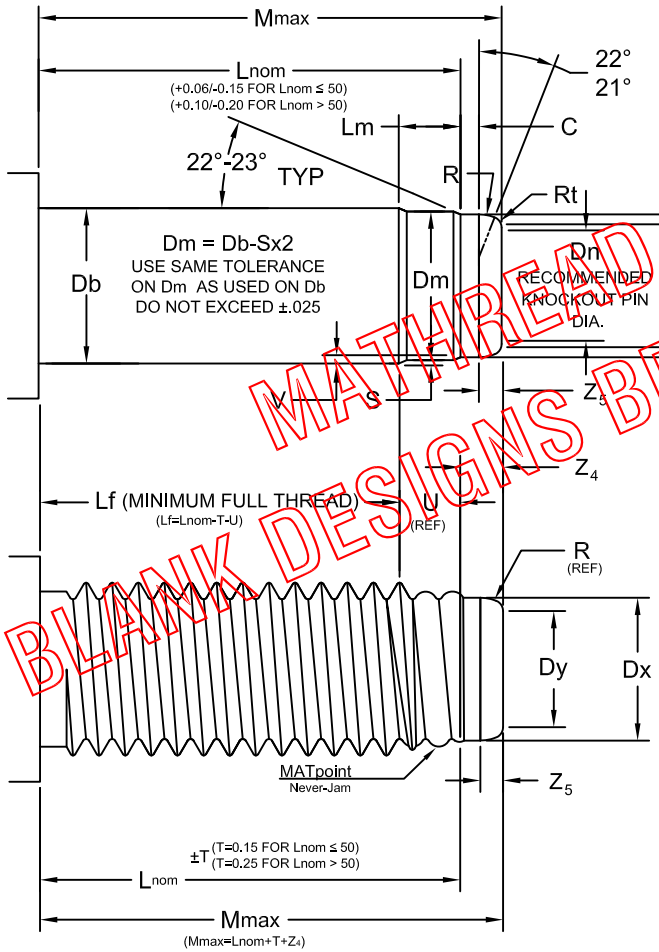
T = 0.15 FOR Lnom SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR Lnom LONGER THAN 50mm

Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:
PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF STANDARD PROFILE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD-ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M-1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING AN INDUSTRY STANDARD RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES PERMITTED ON TIP BUT MISSING METAL MUST NOT EXCEED CYLINDER DEFINED BY "Dy"
6. LAST TURN OF LEAD THREAD MUST HAVE ESSENTIALLY LINEAR REDUCTION IN HEIGHT AND SMOOTH CONTOUR SIMILAR TO FULL HEIGHT RADIUS THREAD





CALCULATE THIS DIMENSION USING EQUATION Dp = Db-(Vx2) USE +/-.015 MAX TOLERANCE

BLANK DIMENSIONS (USE TO DESIGN BLANK) | THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)

	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	Dn REF	R +0.0 -0.3	Rt MIN	S	V	Dy MAX	Z_5 MIN	Dx MAX	Z_4 MAX	W +.01 -.01	U REF
COARSE THREAD	M3x.5	1.095	0.26	1.8	0.8	0.3	.063	.129	2.0	0.40	2.40	0.90	0.10	1.13
	M4x.7	1.512	0.33	2.25	1.2	0.4	.086	.177	2.7	0.50	3.17	1.08	0.14	1.5
	M5x.8	1.737	0.34	3.08	1.5	0.4	.099	.214	3.4	0.60	4.03	1.37	0.16	1.8
	M6x1.0	2.189	0.36	3.77	1.8	0.4	.127	.259	4.0	0.75	4.80	1.45	0.20	2.3
	M8x1.25	2.750	0.54	5.23	2.3	0.5	.160	.314	5.5	1.00	6.54	1.90	0.25	2.8
	M10x1.5	3.312	0.64	6.53	2.8	0.7	.191	.380	6.8	1.25	8.23	2.51	0.30	3.4
	M12x1.75	3.875	0.78	7.79	3.3	0.8	.221	.424	8.2	1.50	9.95	3.12	0.35	4.0
	M14x2.0	4.437	0.85	9.40	4.1	1.1	.252	.477	9.6	1.75	11.72	3.38	0.40	4.5
	M16x2.0	4.437	0.91	10.48	4.7	1.3	.252	.477	10.9	2.00	13.72	3.64	0.40	4.5
	M18x2.0	4.437	1.50	13.05	5.3	1.5	.252	.477	13.10	2.75	15.72	4.70	0.40	4.5
	M18x2.5	5.500	1.50	11.75	5.2	1.5	.320	.583	12.2	2.75	15.17	4.70	0.50	5.6
	M20x2.5	5.500	1.80	12.85	6.0	1.9	.320	.583	13.3	3.21	17.17	5.50	0.50	5.6
	DIMENSIONS ARE IN MILLIMETERS (mm)													
FINE THREAD	M8x1.0	2.189	0.54	5.73	2.5	0.5	.127	.259	6.0	1.00	6.81	1.90	0.20	2.3
	M10x1.25	2.750	0.64	7.23	3.0	0.7	.160	.314	7.5	1.25	8.54	2.28	0.25	2.8
	M12x1.5	3.312	0.81	8.39	3.5	0.9	.191	.380	8.8	1.50	10.26	2.76	0.30	3.4
	M14x1.5	3.312	0.85	10.35	4.3	1.1	.191	.380	10.8	1.75	12.26	3.17	0.30	3.4
	M16x1.5	3.312	0.91	12.35	4.9	1.3	.191	.380	12.8	2.00	14.26	3.56	0.30	3.4
	M18x1.5	3.312	1.50	13.25	5.4	1.5	.191	.380	13.7	2.75	16.23	4.70	0.30	3.4
	M20x1.5	3.312	1.80	15.35	6.2	1.9	.191	.380	15.8	3.15	18.23	5.50	0.30	3.4

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE Lnom USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: $Lnom = Mmax - Z_4 - T$
SECONDARY: $Lnom = Lf + U + T$

T = 0.15 FOR Lnom SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR Lnom LONGER THAN 50mm

Lnom MUST BE ON EVERY PART AND BLANK DRAWING
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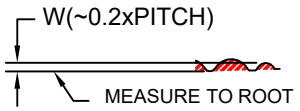
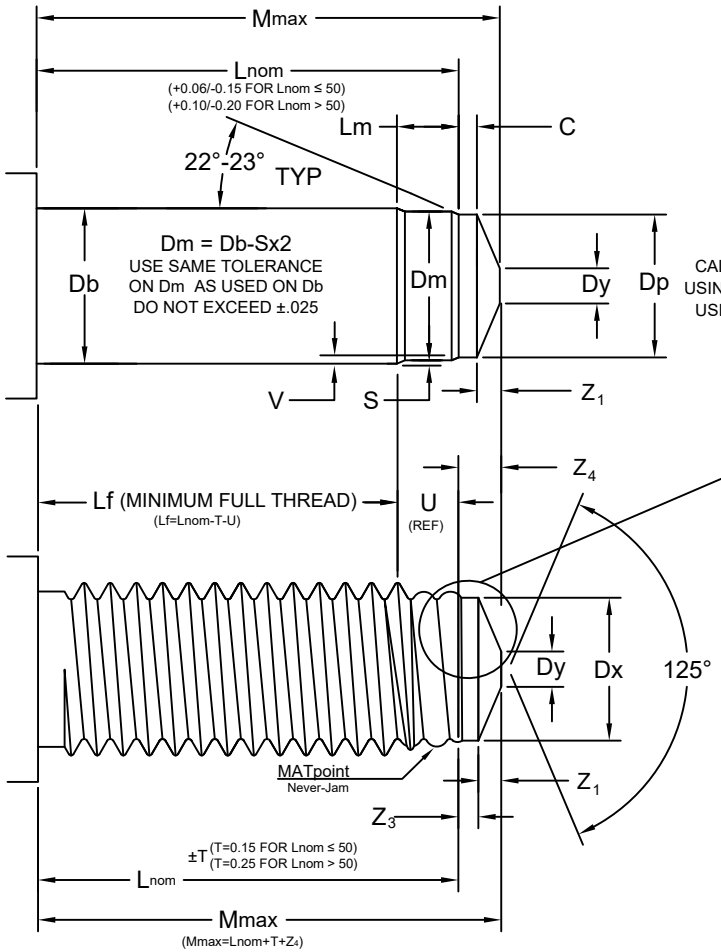
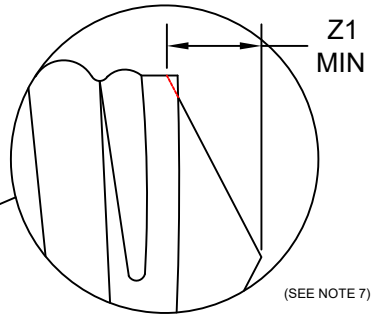
INSPECTION INFORMATION:
PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF STANDARD PROFILE THREAD.
   (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD-ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M-1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING AN INDUSTRY STANDARD RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES PERMITTED ON TIP BUT MISSING METAL MUST NOT EXCEED CYLINDER DEFINED BY "Dy"
6. LAST TURN OF LEAD THREAD MUST HAVE ESSENTIALLY LINEAR REDUCTION IN HEIGHT AND SMOOTH CONTOUR SIMILAR TO FULL HEIGHT RADIUS THREAD
7. MEASUREMENT OF THE Z1 DIMENSION SHALL BE FROM THE END OF THE PART TO THE THEORETICAL INTERSECTION OF Dx





CALCULATE THIS DIMENSION USING EQUATION Dp = Db-(Vx2) USE +/-.015 MAX TOLERANCE



COARSE THREAD

THREAD SIZE & PITCH	Lm +.06 -.06 (BLANK)	C +.06 -.06 (BLANK)	S (BLANK)	V (BLANK)	Dx MAX (ROLLED)	Dy MAX (ROLLED)	Z_1 MIN (ROLLED)	Z_3 MIN (ROLLED)	Z_4 MAX (ROLLED)	W +.01 -.01 (ROLLED)	U REF (ROLLED)
M4x.7	1.512	0.33	.086	.177	3.17	0.47	0.70	0.24	1.15	0.14	1.5
M5x.8	1.737	0.34	.099	.214	4.03	0.51	0.90	0.25	1.36	0.16	1.8
M6x1.0	2.189	0.36	.127	.259	4.80	0.60	1.09	0.27	1.60	0.20	2.3
M8x1.25	2.750	0.54	.160	.314	6.54	1.00	1.30	0.40	2.00	0.25	2.8
M10x1.5	3.312	0.64	.191	.380	8.23	1.23	1.82	0.47	2.70	0.30	3.4
M12x1.75	3.875	0.78	.221	.424	9.95	1.50	2.20	0.57	3.27	0.35	4.0
M14x2.0	4.437	0.85	.252	.477	11.72	1.75	2.60	0.63	3.81	0.40	4.5
M16x2.0	4.437	0.91	.252	.477	13.72	2.05	3.03	0.67	4.37	0.40	4.5

BLANK DIMENSIONS (USE TO DESIGN BLANK)
THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)

DIMENSIONS ARE IN MILLIMETERS (mm)

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PREFERRED: $Lnom = Mmax - Z_4 - T$

SECONDARY: $Lnom = Lf + U + T$

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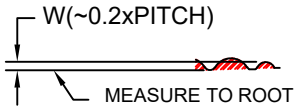
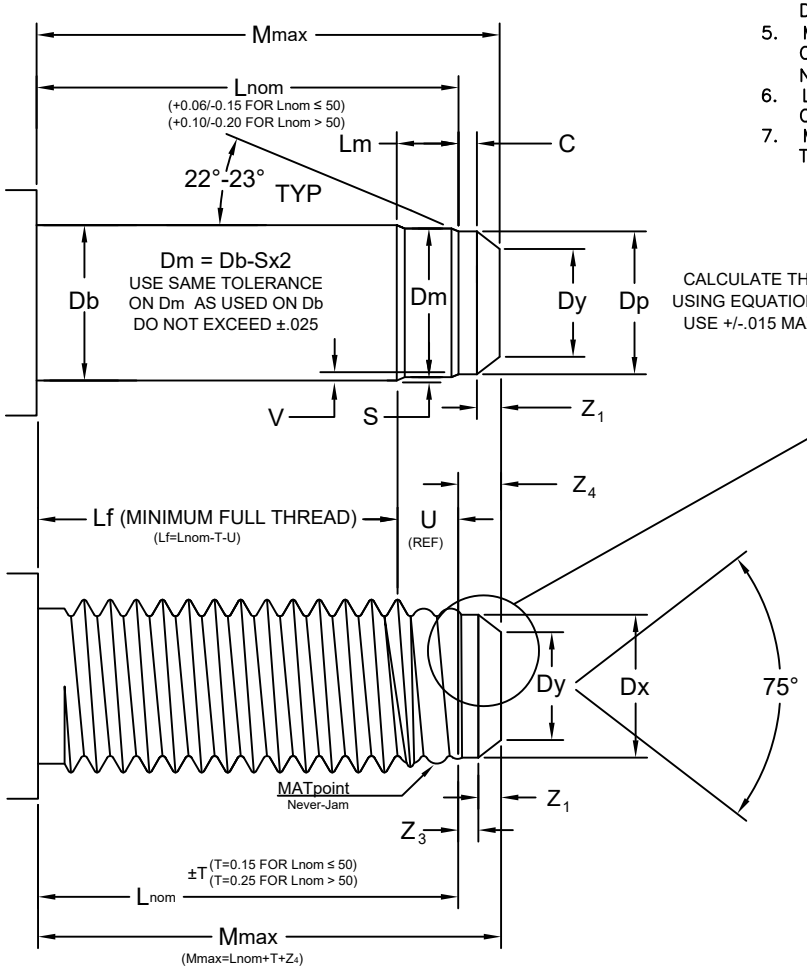
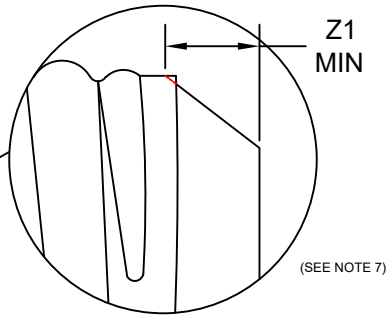
   (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD-ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M-1984 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING AN INDUSTRY STANDARD RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES PERMITTED ON TIP BUT MISSING METAL MUST NOT EXCEED CYLINDER DEFINED BY "Dy"
6. LAST TURN OF LEAD THREAD MUST HAVE ESSENTIALLY LINEAR REDUCTION IN HEIGHT AND SMOOTH CONTOUR SIMILAR TO FULL HEIGHT RADIUS THREAD
7. MEASUREMENT OF THE Z1 DIMENSION SHALL BE FROM THE END OF THE PART TO THE THEORETICAL INTERSECTION OF Dx





CALCULATE THIS DIMENSION USING EQUATION Dp = Db-(Vx2) USE +/-.015 MAX TOLERANCE



	THREAD SIZE & PITCH	Lm +.06 -.06	C +.06 -.06	S	V	Dx MAX	Dy MAX	Z_1 MIN	Z_3 MIN	Z_4 MAX	W +.01 -.01	U REF
		BLANK DIMENSIONS (USE TO DESIGN BLANK)				THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)						
COARSE THREAD	M4x.7	1.512	0.33	.086	.177	3.17	2.10	0.70	0.24	1.15	0.14	1.5
	M5x.8	1.737	0.34	.099	.214	4.03	2.80	0.90	0.25	1.36	0.16	1.8
	M6x1.0	2.189	0.36	.127	.259	4.80	3.13	1.09	0.27	1.60	0.20	2.3
	M8x1.25	2.750	0.54	.160	.314	6.54	4.50	1.30	0.40	2.00	0.25	2.8
	M10x1.5	3.312	0.64	.191	.380	8.23	5.44	1.82	0.47	2.70	0.30	3.4
	M12x1.75	3.875	0.78	.221	.424	9.95	6.58	2.20	0.57	3.27	0.35	4.0
	M14x2.0	4.437	0.85	.252	.477	11.72	7.73	2.60	0.63	3.81	0.40	4.5
	M16x2.0	4.437	0.91	.252	.477	13.72	9.08	3.03	0.67	4.37	0.40	4.5

DIMENSIONS ARE IN MILLIMETERS (mm)

MAThread® - RADIUSED DOG (PILOT) POINT / USE MAThread DIES

CRITICAL DESIGN INFORMATION

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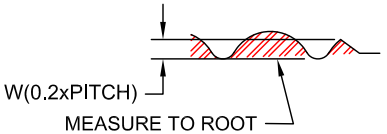
PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+U+.01

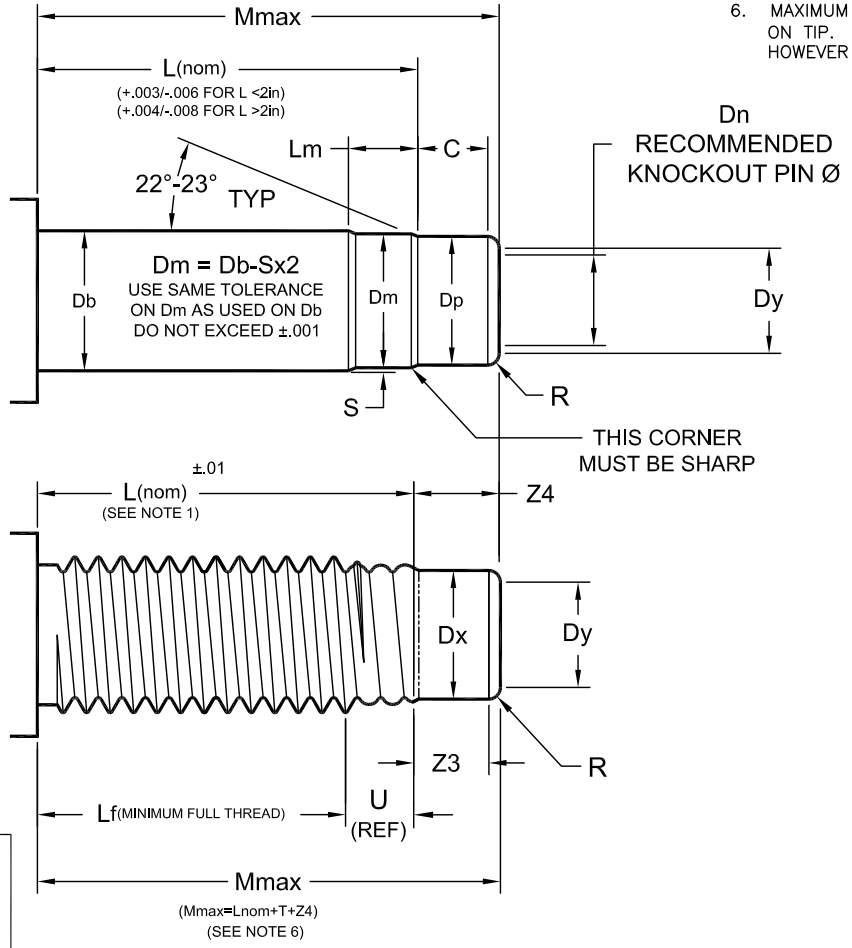
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MAThread APPROVED RADIUS CHART Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.
6. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "R", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF TIP DIAMETER.





	THREAD SIZE & PITCH	Lm ±.0025	C MIN	Dn REF	R MIN.	S REF	Dp ±0.001	Dy MAX	W ±.0004	Dx	Z_3 MIN	Z_4 MAX	U REF
		BLANK DIMENSIONS (USE TO DESIGN BLANK)							THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)				
COARSE THREAD	1/4-20	.150	.085	.149	0.02	.0064	.191	.154	.0100	.189 .193	.065	.100	.150
	5/16-18	.167	.108	.185	0.03	.0073	.247	.190	.0111	.245 .249	.085	.130	.167
	3/8-16	.188	.147	.195	0.05	.0083	.303	.205	.0125	.301 .305	.115	.180	.188
	7/16-14	.214	.171	.210	0.07	.0100	.354	.220	.0143	.352 .356	.135	.220	.214
	1/2-13	.231	.204	.245	0.08	.0104	.411	.260	.0154	.409 .413	.165	.260	.231
	9/16-12	.250	.230	.260	0.10	.0122	.466	.275	.0167	.464 .468	.180	.295	.250
	5/8-11	.273	.262	.275	0.12	.0123	.521	.290	.0182	.519 .523	.215	.350	.273
	DIMENSIONS ARE IN ENGLISH (inch)												
FINE THREAD	1/4-28	.1071	.103	.170	0.02	.0046	.206	.174	.0071	.204 .208	.093	.150	.108
	5/16-24	.1250	.127	.207	0.03	.0051	.261	.217	.0083	.259 .263	.117	.195	.125
	3/8-24	.1250	.190	.262	0.04	.0051	.324	.272	.0083	.322 .326	.180	.276	.125
	7/16-20	.1500	.207	.310	0.06	.0064	.377	.325	.0100	.375 .379	.197	.295	.150
	1/2-20	.1500	.250	.350	0.07	.0064	.440	.365	.0100	.438 .442	.240	.358	.150
	9/16-18	.1667	.285	.400	0.09	.0072	.496	.414	.0111	.494 .498	.275	.404	.167
	5/8-18	.1667	.318	.460	0.10	.0072	.559	.474	.0111	.557 .561	.308	.466	.167

SEE PAGE 1.02 FOR PATENT INFORMATION

MAThread® - TYPE 'P' POINT - LONG / USE MAThread DIES ONLY

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START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

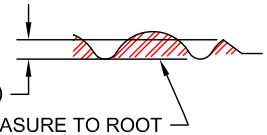
PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+U+.01

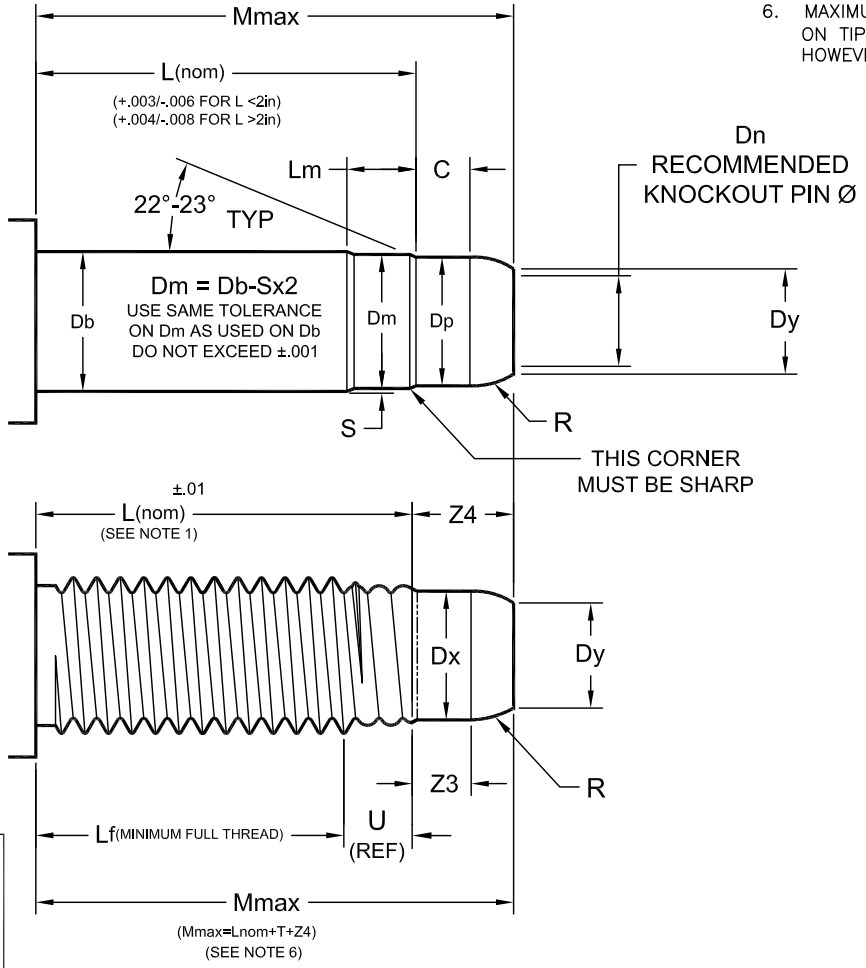
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY GIVEN DIMENSION WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. "C" LENGTH MUST BE MEASURED USING MATHREAD APPROVED RADIUS CHART. Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.
6. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "R", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF TIP DIAMETER.





	THREAD SIZE & PITCH	Lm ±.0025	C MIN	Dn REF	R MIN.	S REF	Dp ±0.001	Dy MAX	W ±.0004	Dx	Z_3 MIN	Z_4 MAX	U REF
		BLANK DIMENSIONS (USE TO DESIGN BLANK)							THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)				
COARSE THREAD	1/4-20	.150	.080	.149	.080	.0064	.191	.154	.0100	.189 .193	.065	.150	.150
	5/16-18	.167	.100	.185	.100	.0073	.247	.190	.0111	.245 .249	.085	.200	.167
	3/8-16	.188	.120	.195	.120	.0083	.303	.205	.0125	.301 .305	.105	.240	.188
	7/16-14	.214	.145	.210	.145	.0100	.354	.220	.0143	.352 .356	.130	.300	.214
	1/2-13	.231	.175	.245	.175	.0104	.411	.260	.0154	.409 .413	.160	.350	.231
	9/16-12	.250	.205	.260	.205	.0122	.466	.275	.0167	.464 .468	.190	.410	.250
	5/8-11	.273	.245	.275	.245	.0123	.521	.290	.0182	.519 .523	.230	.480	.273
	DIMENSIONS ARE IN ENGLISH (inch)												
FINE THREAD	1/4-28	.1071	.100	.170	0.10	.0046	.206	.174	.0071	.204 .208	.090	.150	.108
	5/16-24	.1250	.120	.207	0.12	.0051	.261	.217	.0083	.259 .263	.120	.200	.125
	3/8-24	.1250	.140	.262	0.16	.0051	.324	.272	.0083	.322 .326	.135	.250	.125
	7/16-20	.1500	.165	.310	0.18	.0064	.377	.325	.0100	.375 .379	.160	.275	.150
	1/2-20	.1500	.195	.350	0.21	.0064	.440	.365	.0100	.438 .442	.190	.338	.150
	9/16-18	.1667	.225	.400	0.24	.0072	.496	.414	.0111	.494 .498	.220	.384	.167
	5/8-18	.1667	.265	.460	0.27	.0072	.559	.474	.0111	.557 .561	.260	.446	.167

SEE PAGE 1.02 FOR PATENT INFORMATION

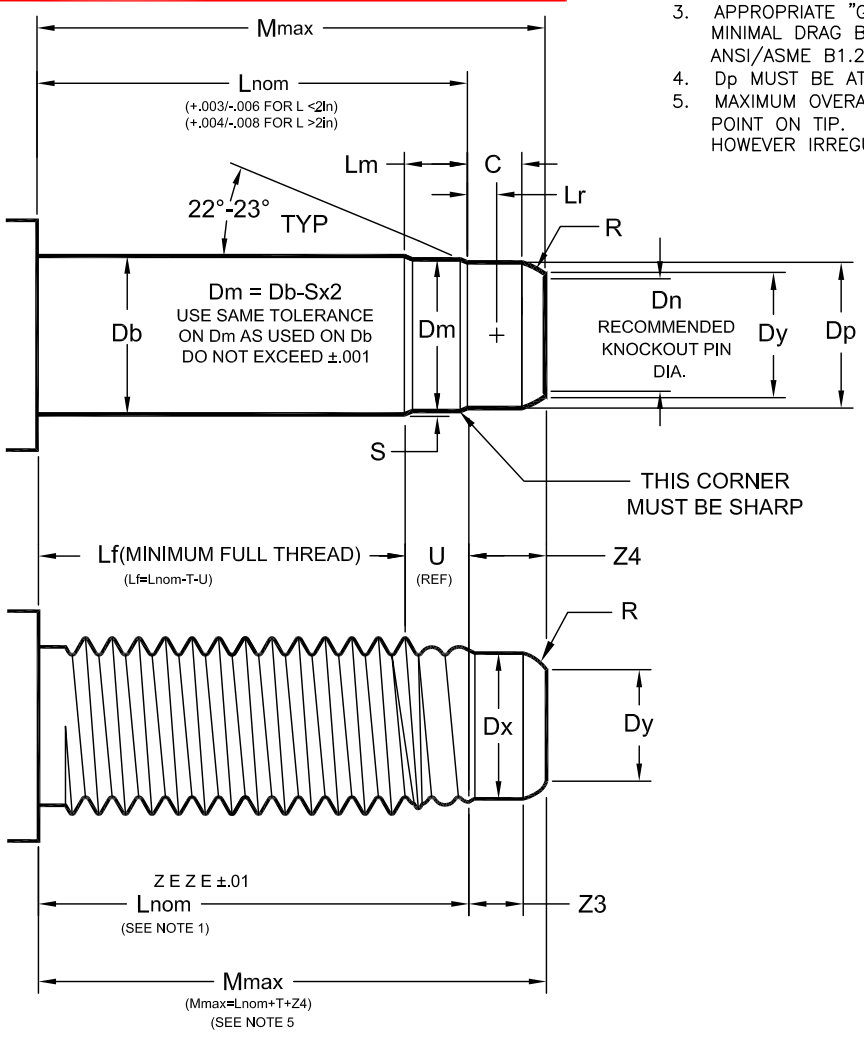
CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+U+.01

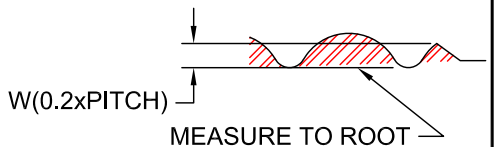
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD



INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. Dp MUST BE AT OR ABOVE MINIMUM FOR ENTIRE LENGTH OF "C".
5. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED WITHIN THE RADIUS "R", HOWEVER IRREGULARITIES MAY NOT BE PRESENT FOR MORE THAN 100° OF THE TIP.



	THREAD SIZE & PITCH	BLANK DIMENSIONS (USE TO DESIGN BLANK) Lm +.0025 -.0025	C +.002 -.002	Dn REF	R +.000 -.005	Lr ±.003	S REF	Dp +.001 -.001	Dy MAX	THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS) W +.0004 -.0004	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	1/4-20	.113	.072	.155	.105	.042	.0064	.191	.160	.0100	.193 .189	.062	.110	.113
	5/16-18	.125	.097	.205	.135	.056	.0073	.247	.210	.0111	.249 .245	.089	.160	.125
	3/8-16	.141	.137	.245	.165	.081	.0083	.303	.255	.0125	.305 .301	.127	.195	.141
	7/16-14	.161	.162	.290	.185	.108	.0100	.354	.300	.0143	.356 .352	.152	.240	.161
	1/2-13	.173	.192	.340	.215	.129	.0104	.411	.350	.0154	.413 .409	.182	.275	.173
	9/16-12	.188	.222	.380	.245	.145	.0122	.466	.395	.0167	.468 .464	.212	.310	.188
	5/8-11	.205	.262	.425	.275	.173	.0123	.521	.440	.0182	.523 .519	.252	.360	.205
	DIMENSIONS ARE IN INCHES (in)													
FINE THREAD	1/4-28	.0838	.072	.169	.115	.011	.0046	.206	.174	.0071	.208 .204	.062	.123	.080
	5/16-24	.0938	.097	.212	.145	.034	.0051	.261	.217	.0083	.263 .259	.087	.162	.094
	3/8-24	.0938	.137	.262	.175	.072	.0051	.324	.272	.0083	.326 .322	.127	.212	.094
	7/16-20	.1125	.162	.315	.195	.108	.0064	.377	.325	.0100	.379 .375	.152	.241	.113
	1/2-20	.1125	.192	.355	.235	.087	.0064	.440	.365	.0100	.442 .438	.182	.295	.113
	9/16-18	.1250	.222	.400	.255	.143	.0072	.496	.414	.0111	.498 .494	.212	.313	.125
	5/8-18	.1250	.262	.460	.295	.154	.0072	.559	.474	.0111	.561 .557	.252	.381	.125

MATpoint® - VERY SHORT / USE MAThread DIES ONLY

IMPORTANT NOTE: THIS DESIGN IS INTENDED TO MINIMIZE CROSS-THREADING UP TO 9 DEGREES AXIAL MISALIGNMENT. IT IS POSSIBLE (THOUGH VERY DIFFICULT) TO CROSS-THREAD THESE PARTS IF YOU NEED 100% EFFECTIVENESS, USE A STANDARD MATHREAD OR MATPOINT.

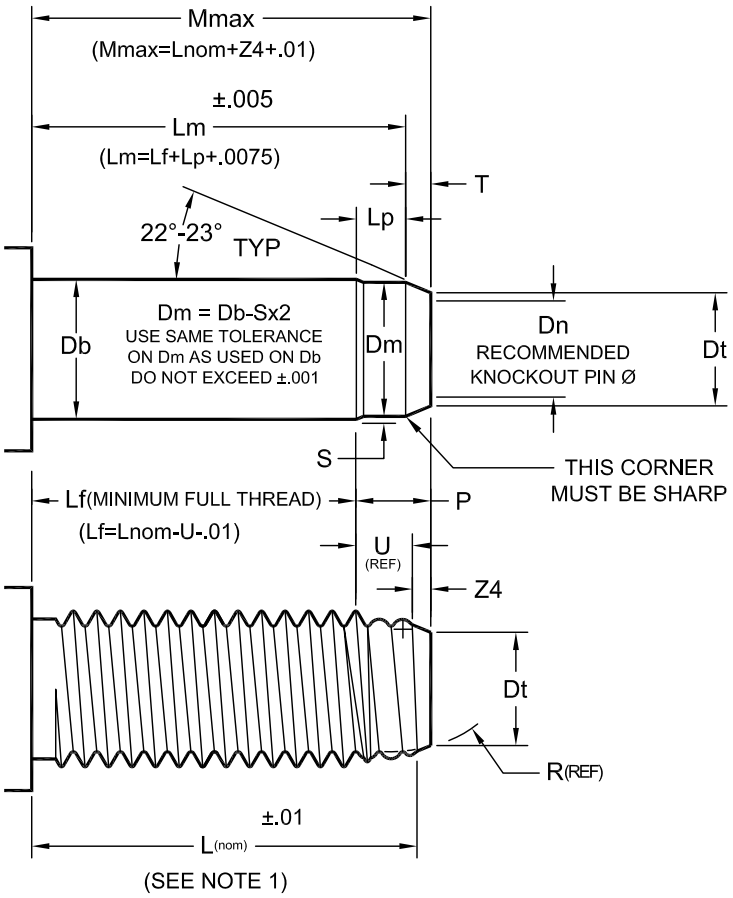
CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

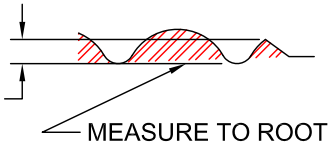
PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+M+.01

Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD



INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:



1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. MAXIMUM OVERALL LENGTH (Mmax) OF BLANK MUST BE MEASURED ONLY TO LONGEST POINT ON TIP. LOCALIZED FORMING IRREGULARITIES ON TIP PERMITTED, HOWEVER Dt MUST NOT BE EXCEEDED.

		BLANK DIMENSIONS (USE TO DESIGN BLANK)					THREAD ROLLED DIMENSIONS (DO NOT USE ON BLANKS)			
	THREAD SIZE & PITCH	LP ±.0025	Dt MAX	Dn REF	S REF	T	W ±.0004	P MAX	Z_4 REF	U REF
COARSE THREAD	1/4-20	.1007	.170	.165	.0064	.055 .037	.0100	.163	.025	.113
	5/16-18	.1124	.220	.215	.0073	.068 .045	.0111	.188	.030	.125
	3/8-16	.1272	.273	.263	.0083	.070 .050	.0125	.205	.035	.141
	7/16-14	.1453	.321	.311	.0100	.075 .055	.0143	.225	.040	.161
	1/2-13	.1560	.376	.361	.0104	.082 .060	.0154	.245	.043	.173
	9/16-12	.1716	.450	.435	.0122	.090 .067	.0167	.275	.050	.188
	5/8-11	.1570	.470	.455	.0123	.135 .110	.0182	.300	.053	.205
	DIMENSIONS ARE IN ENGLISH (inch)									
FINE THREAD	1/4-28	.072	.185	.180	.0046	.055 .035	.0071	.133	.020	.080
	5/16-24	.080	.235	.230	.0051	.065 .045	.0083	.150	.023	.094
	3/8-24	.080	.298	.288	.0051	.065 .045	.0083	.150	.023	.094
	7/16-20	.1007	.358	.348	.0064	.055 .037	.0100	.163	.025	.113
	1/2-20	.1007	.420	.405	.0064	.055 .037	.0100	.163	.025	.113
	9/16-18	.1124	.470	.455	.0073	.068 .045	.0111	.188	.030	.125
	5/8-18	.1124	.533	.518	.0073	.068 .045	.0111	.188	.030	.125

Date Issued: 3/1/09 | Revision Level: AB | Date Revised: 5/1/18 | Page: 3.09

Description:	Thread Type (Die type):
HOW TO ORDER MAThread & MATpoint DIES	**METRIC**

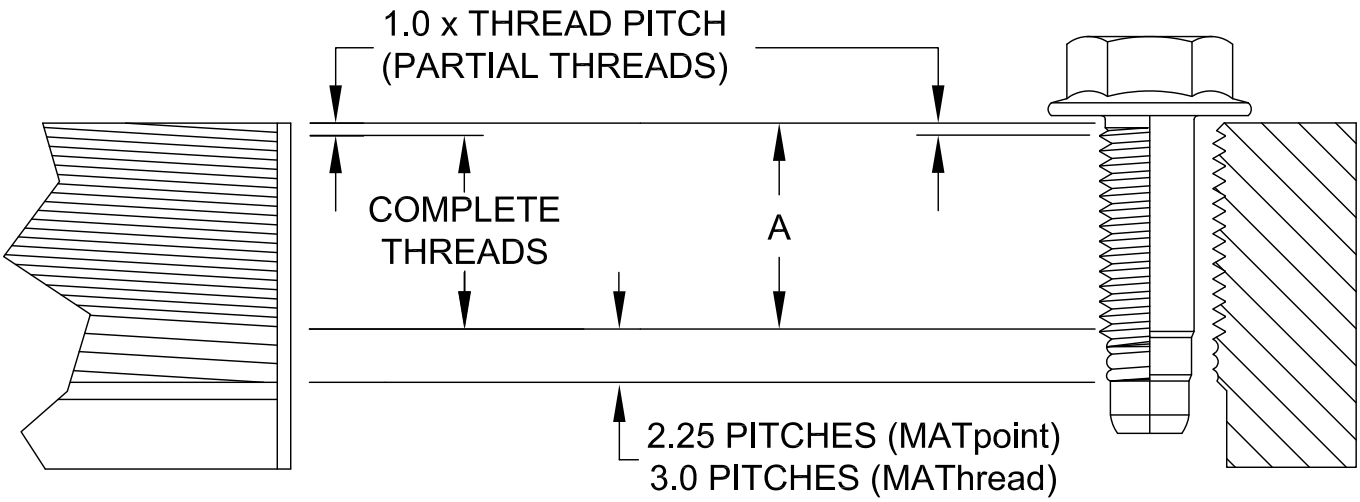
1. Determine the type of product (ie MAThread or MATpoint).

   "T" = MAThread
   "P" = MATpoint

2. Determine the thread size and Machine size. (ex: M8 x 1.25, to be rolled on a #20 machine)

3. Using the above information, look up the Base Tool Number on sheet 6.08.

4. Calculate the "A" length. The "A" length (shown on the die below) is the length of the thread required on the part (in inches), including any incomplete threads near the head of the part, but not including the last 2-3 pitches (MAThreads) Typically, you review the blank and finished drawing to determine the length tolerances and calculate the longest and shortest length of complete thread you might need. Once you have these figures, you add one pitch to the longest length (this covers the incomplete threads rolled by the chamfer at the top of the die) to get the "A" length. Append the "A" length (in thousandths of an inch) to the tool number above.



Your part number now looks like this: MT-08-125-20-1.250

5. Depending on which type of starting surface you want, append one of the following after the "A" length:

   "S" - only if you want starting serrations
   "B" - only if you want a heavy sandblast
   "E" - only if you want a medium grit EDM
   "N" - only if you want no starters

6. Order die # MT-08-125-20-1.250-E from the approved die supplier.

Manufacturing Standards

Description:
MAThread THREAD ROLL DIES

Thread Type (Die type):
METRIC - COARSE

Thread Dia.	Pitch	Machine Size	Thread Style	Base Part Number
M4	0.7	00	MAThread	T-04-070-00-
M4	0.7	00	MATpoint	P-04-070-00-
M4	0.7	10	MAThread	T-04-070-10-
M4	0.7	10	MATpoint	P-04-070-10-
M5	0.8	00	MAThread	T-05-080-00-
M5	0.8	00	MATpoint	P-05-080-00-
M5	0.8	10	MAThread	T-05-080-10-
M5	0.8	10	MATpoint	P-05-080-10-
M6	1.0	00	MAThread	T-06-100-00-
M6	1.0	00	MATpoint	P-06-100-00-
M6	1.0	10	MAThread	T-06-100-10-
M6	1.0	10	MATpoint	P-06-100-10-
M6	1.0	20	MAThread	T-06-100-20-
M6	1.0	20	MATpoint	P-06-100-20-
M8	1.25	10	MAThread	T-08-125-10-
M8	1.25	10	MATpoint	P-08-125-10-
M8	1.25	20	MAThread	T-08-125-20-
M8	1.25	20	MATpoint	P-08-125-20-
M8	1.25	30	MAThread	T-08-125-30-
M8	1.25	30	MATpoint	P-08-125-30-
M10	1.50	20	MAThread	T-10-150-20-
M10	1.50	20	MATpoint	P-10-150-20-
M10	1.50	30	MAThread	T-10-150-30-
M10	1.50	30	MATpoint	P-10-150-30-
M12	1.75	20	MAThread	T-12-175-20-
M12	1.75	20	MATpoint	P-12-175-20-
M12	1.75	30	MAThread	T-12-175-30-
M12	1.75	30	MATpoint	P-12-175-30-
M12	1.75	40	MAThread	T-12-175-40-
M12	1.75	40	MATpoint	P-12-175-40-
M14	2.00	30	MAThread	T-14-200-30-
M14	2.00	30	MATpoint	P-14-200-30-
M14	2.00	40	MAThread	T-14-200-40-
M14	2.00	40	MATpoint	P-14-200-40-
M14	2.00	50	MAThread	T-14-200-50-
M14	2.00	50	MATpoint	P-14-200-50-
M16	2.00	40	MAThread	T-16-200-40-
M16	2.00	40	MATpoint	P-16-200-40-
M16	2.00	50	MAThread	T-16-200-50-
M16	2.00	50	MATpoint	P-16-200-50-

Description:	Thread Type (Die type):
HOW TO ORDER MAThread & MATpoint DIES	**INCH**

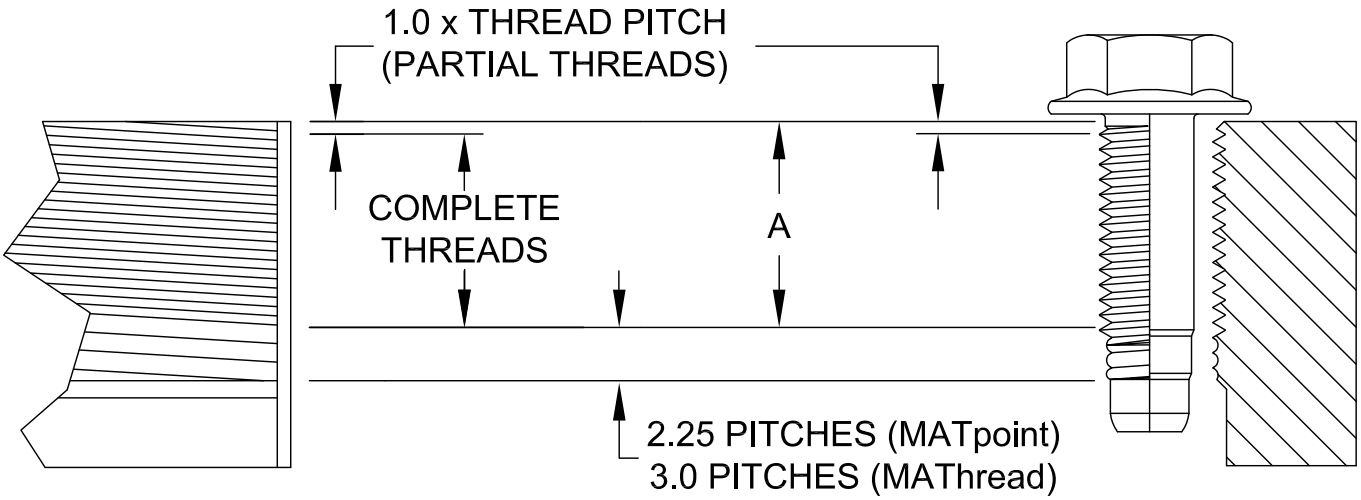
1. Determine the type of product (ie MAThread or MATpoint).

   "T" = MAThread
   "P" = MATpoint

2. Determine the thread size and Machine size. (ex: 1/2-20, to be rolled on a #30 machine)

3. Using the above information, look up the Base Tool Number on sheet 6.10.

4. Calculate the "A" length. The "A" length (shown on the die below) is the length of the thread required on the part (in inches), including any incomplete threads near the head of the part, but not including the last 2-3 pitches (MAThreads) Typically, you review the blank and finished drawing to determine the length tolerances and calculate the longest and shortest length of complete thread you might need. Once you have these figures, you add one pitch to the longest length (this covers the incomplete threads rolled by the chamfer at the top of the die) to get the "A" length. Append the "A" length (in thousandths of an inch) to the tool number above.



Your part number now looks like this: T-1/2-20-30-1.250-

5. Depending on which type of starting surface you want, append one of the following after the "A" length:

   "S" - only if you want starting serrations
   "B" - only if you want a heavy sandblast
   "E" - only if you want a medium grit EDM
   "N" - only if you want no starters

6. Order die # T-1/2-20-30-1.250-E form the approved die supplier.

Description:

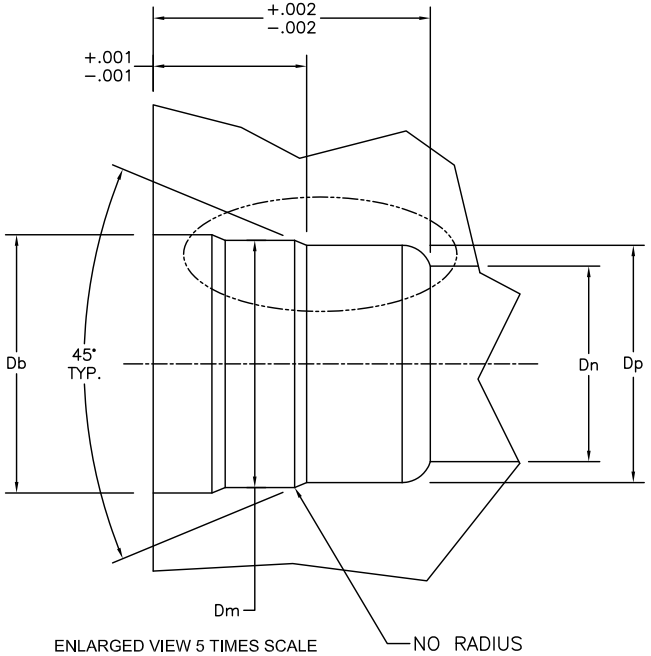
MAThread THREAD ROLL DIES

Thread Type (Die type):

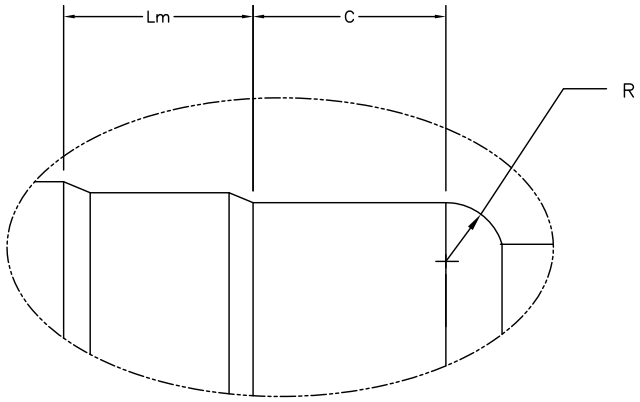
INCH [UNF] FINE PITCH

Thread Dia.	TPI	Machine Size	Thread Style	Base Part Number
1/4	28	00	MAThread	T-1/4-28-00-
1/4	28	00	MATpoint	P-1/4-28-00-
1/4	28	10	MAThread	T-1/4-28-10-
1/4	28	10	MATpoint	P-1/4-28-10-
5/16	24	00	MAThread	T-5/16-24-00-
5/16	24	00	MATpoint	P-5/16-24-00-
5/16	24	10	MAThread	T-5/16-24-10-
5/16	24	10	MATpoint	P-5/16-24-10-
3/8	24	10	MAThread	T-3/8-24-10-
3/8	24	10	MATpoint	P-3/8-24-10-
3/8	24	20	MAThread	T-3/8-24-20-
3/8	24	20	MATpoint	P-3/8-24-20-
7/16	20	10	MAThread	T-7/16-20-10-
7/16	20	10	MATpoint	P-7/16-20-10-
7/16	20	20	MAThread	T-7/16-20-20-
7/16	20	20	MATpoint	P-7/16-20-20-
7/16	20	30	MAThread	T-7/16-20-30-
7/16	20	30	MATpoint	P-7/16-20-30-
1/2	20	20	MAThread	T-1/2-20-20-
1/2	20	20	MATpoint	P-1/2-20-20-
1/2	20	30	MAThread	T-1/2-20-30-
1/2	20	30	MATpoint	P-1/2-20-30-
9/16	18	20	MAThread	T-9/16-18-20-
9/16	18	20	MATpoint	P-9/16-18-20-
9/16	18	30	MAThread	T-9/16-18-30-
9/16	18	30	MATpoint	P-9/16-18-30-
9/16	18	40	MAThread	T-9/16-18-40-
9/16	18	40	MATpoint	P-9/16-18-40-
5/8	18	30	MAThread	T-5/8-18-30-
5/8	18	30	MATpoint	P-5/8-18-30-
5/8	18	40	MAThread	T-5/8-18-40-
5/8	18	40	MATpoint	P-5/8-18-40-
5/8	18	50	MAThread	T-5/8-18-50-
5/8	18	50	MATpoint	P-5/8-18-50-

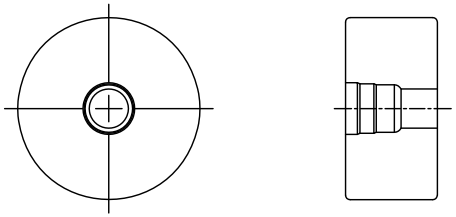
MAThread® - RADIUSED DOG (PILOT) POINT



ENLARGED VIEW 5 TIMES SCALE



ENLARGED VIEW 10 TIMES SCALE

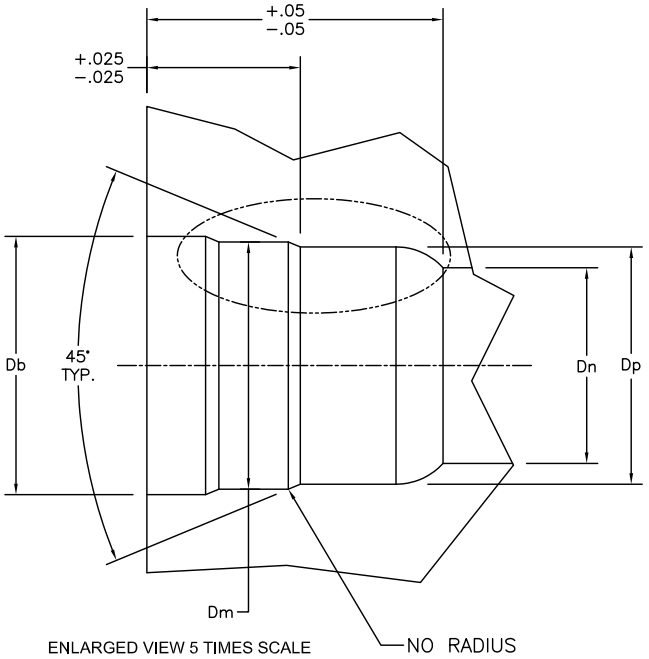


POINT DIMENSIONS

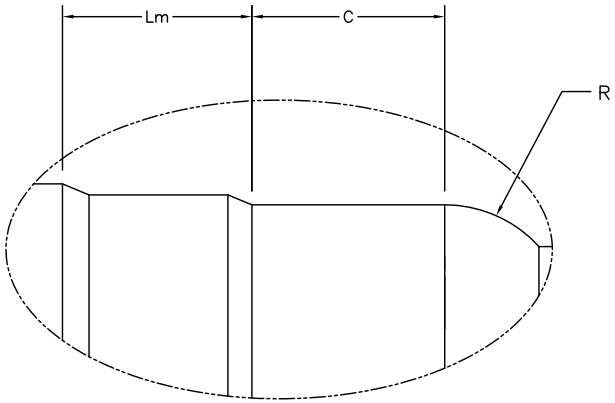
	THREAD SIZE & PITCH	Lm ±.05	C ±.05	R +.15 −.00	Dp +.015 −.015	Dn +0.05 −0.05
COARSE THREAD	M4x.7	2.10	2.00	0.2	3.124	2.8
	M5x.8	2.40	2.20	0.4	3.980	3.2
	M6x1.0	3.00	2.50	0.5	4.750	3.9
	M8x1.25	3.75	3.25	0.7	6.473	5.1
	M10x1.5	4.50	3.70	1.5	8.169	5.3
	M12x1.75	5.25	4.45	2.0	9.906	6.0
	M14x2.0	6.00	5.20	2.5	11.630	6.7
	M16x2.0	6.00	6.70	3.0	13.635	8.7
	DIMENSIONS ARE IN MILLIMETERS (mm)					
FINE THREAD	M8x1.0	3.00	3.25	0.7	6.750	5.9
	M10x1.25	3.75	3.70	1.5	8.473	6.2
	M12x1.5	4.50	4.45	2.0	10.169	6.9
	M14x1.5	4.50	5.20	2.5	12.169	8.0
	M16x1.5	4.50	6.70	3.0	14.169	11.9

SEE PAGE 1.02 FOR PATENT INFORMATION

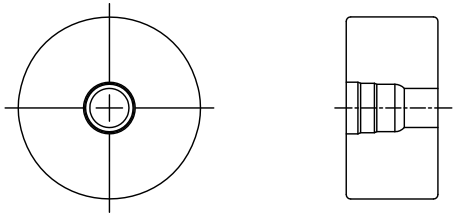
MAThread® TYPE 'P' POINT - LONG



ENLARGED VIEW 5 TIMES SCALE



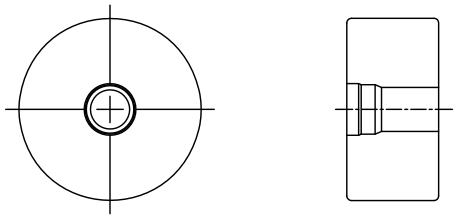
ENLARGED VIEW 10 TIMES SCALE

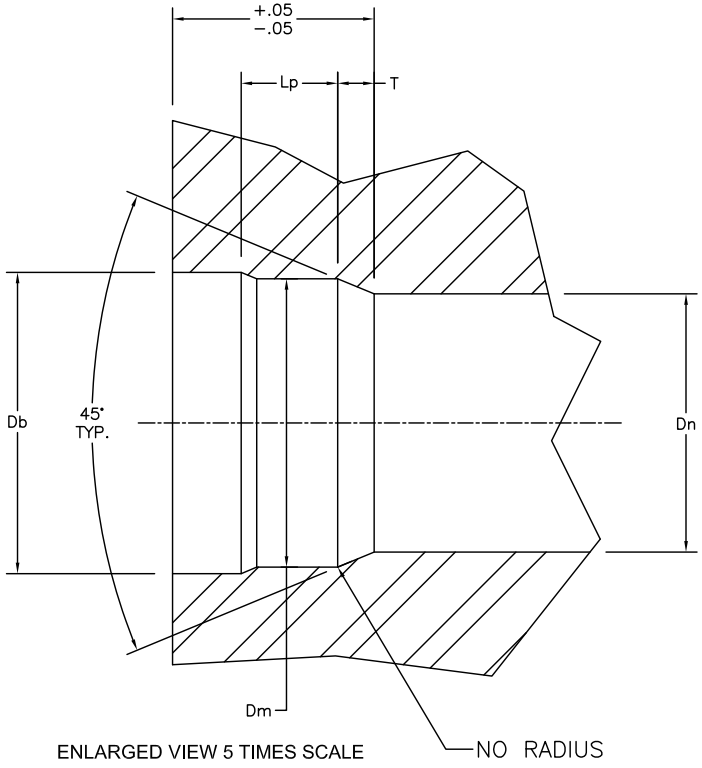


POINT DIMENSIONS

	THREAD SIZE & PITCH	Lm ±.05	C ±.05	R +.15 −.00	Dp ±.015	Dn +0.0 −0.1
COARSE THREAD	M4x.7	2.10	1.30	1.5	3.124	2.6
	M5x.8	2.40	1.50	1.9	3.980	3.3
	M6x1.0	3.00	1.80	2.3	4.750	4.0
	M8x1.25	3.75	2.60	3.0	6.473	5.3
	M10x1.5	4.50	3.20	3.8	8.169	6.7
	M12x1.75	5.25	4.00	4.6	9.906	8.1
	M14x2.0	6.00	4.30	5.4	11.630	9.5
	M16x2.0	6.00	4.50	6.0	13.635	11.4
	DIMENSIONS ARE IN MILLIMETERS (mm)					
FINE THREAD	M8x1.0	3.00	2.60	1.9	6.750	5.6
	M10x1.25	3.75	3.20	2.4	8.473	6.9
	M12x1.5	4.50	4.20	2.9	10.169	8.4
	M14x1.5	4.50	5.00	3.7	12.169	9.7
	M16x1.5	4.50	6.20	4.2	14.169	11.1

SEE PAGE 1.02 FOR PATENT INFORMATION

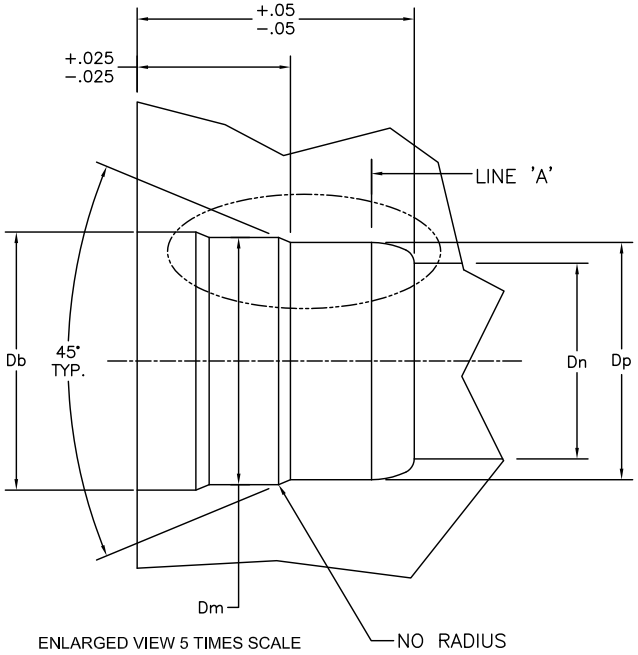




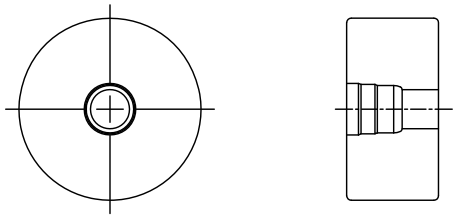
ENLARGED VIEW 5 TIMES SCALE

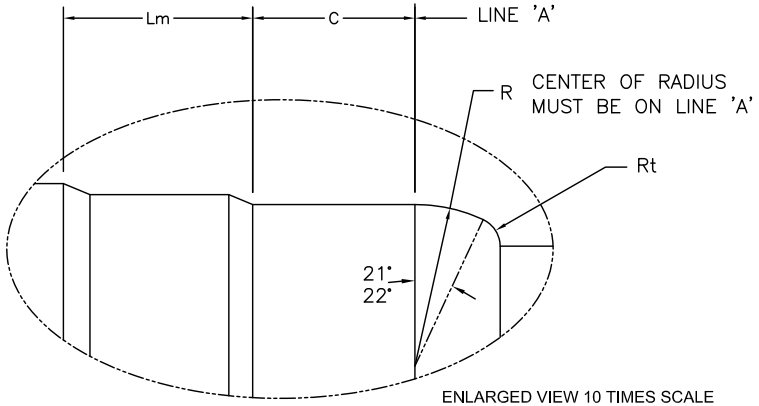
POINT DIMENSIONS

	THREAD SIZE & PITCH	Lp ±.03	Dn +0.0 −0.1	T REF
COARSE THREAD	M4x.7	1.292	2.70	0.84 0.58
	M5x.8	1.500	3.55	0.93 0.62
	M6x1.0	1.820	4.15	1.26 0.87
	M8x1.25	2.365	5.80	1.47 0.96
	M10x1.5	2.900	7.45	1.63 1.10
	M12x1.75	3.636	9.10	1.80 1.23
	M14x2.0	3.910	10.75	1.92 1.33
	M16x2.0	3.910	12.75	1.92 1.33
	DIMENSIONS ARE IN MILLIMETERS (mm)			
FINE THREAD	M8x1.0	1.820	6.15	1.26 0.87
	M10x1.25	2.365	7.80	1.47 0.96
	M12x1.5	2.900	9.45	1.63 1.10
	M14x1.5	2.900	11.45	1.63 1.10
	M16x1.5	2.900	13.45	1.63 1.10



ENLARGED VIEW 5 TIMES SCALE





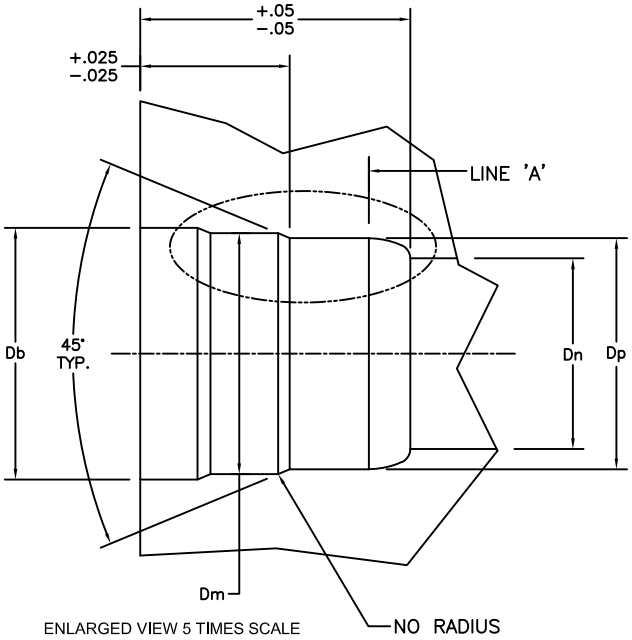
ENLARGED VIEW 10 TIMES SCALE

POINT DIMENSIONS

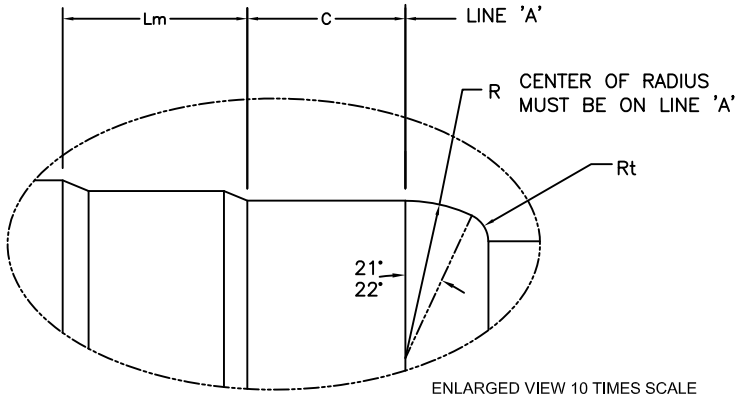
COARSE THREAD

THREAD SIZE & PITCH	Lm +.05 −.05	C +.05 −.05	R +0.0 −0.15	Rt +.15 −.00	Dp ±.015	Dn +.00 −.10
M5x.8	1.737	1.33	1.50	0.40	3.950	3.08
M6x1.0	2.189	1.42	1.80	0.40	4.750	3.77
M8x1.25	2.750	2.20	2.30	0.50	6.473	5.23
M10x1.5	3.312	2.79	2.80	0.70	8.169	6.53
M12x1.75	3.875	3.45	3.30	0.90	9.906	7.79
M14x2.0	4.437	3.91	4.10	1.10	11.630	9.40
M16x2.0	4.437	4.31	4.70	1.30	13.635	10.48

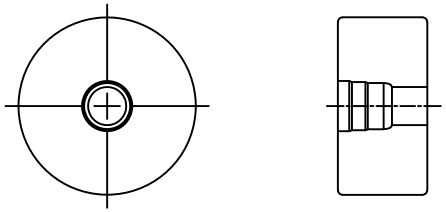
DIMENSIONS ARE IN MILLIMETERS (mm)



ENLARGED VIEW 5 TIMES SCALE



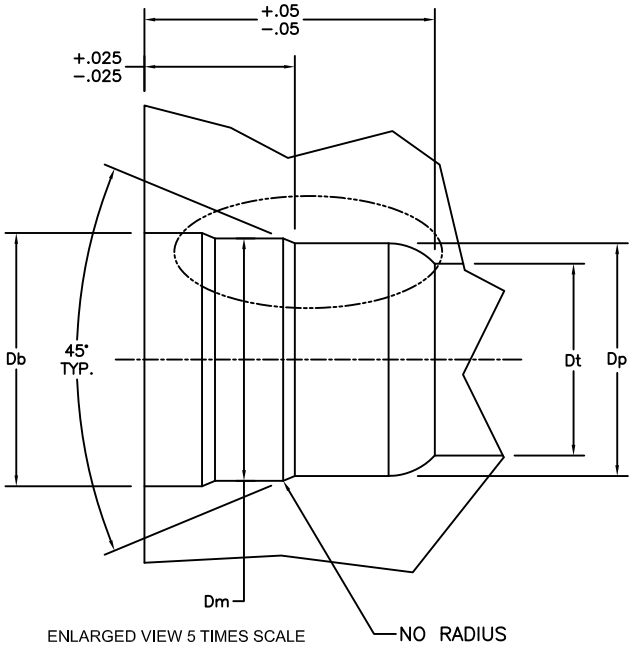
ENLARGED VIEW 10 TIMES SCALE



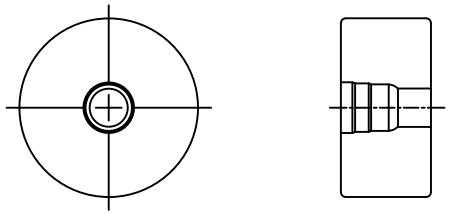
POINT DIMENSIONS

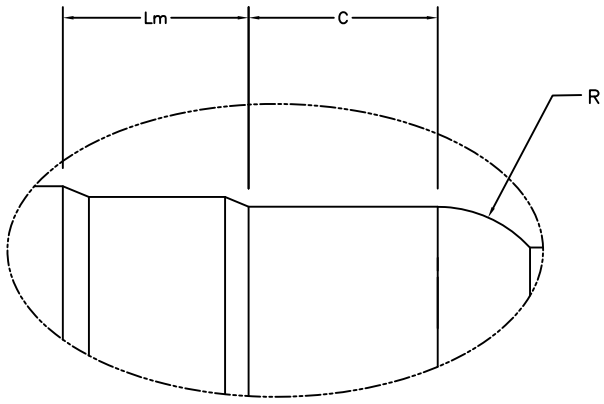
	THREAD SIZE & PITCH	Lm +.05 −.05	C +.05 −.05	R +.00 −.15	Rt +.15 −.00	Dp +.015 −.015	Dn +.00 −.10
COARSE THREAD	M4x.7	1.512	1.65	1.2	0.4	3.124	2.25
	M5x.8	1.737	1.71	1.5	0.4	3.980	3.08
	M6x1.0	2.189	1.81	1.8	0.4	4.750	3.77
	M8x1.25	2.750	2.54	2.3	0.5	6.473	5.23
	M10x1.5	3.312	3.21	2.8	0.7	8.169	6.53
	M12x1.75	3.875	3.90	3.3	0.8	9.906	7.79
	M14x2.0	4.437	4.23	4.1	1.1	11.630	9.40
	M16x2.0	4.437	4.55	4.7	1.3	13.635	10.48
	M18x2.5	5.500	4.95	5.2	1.5	15.094	11.75
	M20x2.5	5.500	5.10	6.0	1.9	17.094	12.85
	DIMENSIONS ARE IN MILLIMETERS (mm)						
FINE THREAD	M8x1.0	2.189	2.54	2.5	0.5	6.750	5.73
	M10x1.25	2.750	3.21	3.0	0.7	8.473	7.23
	M12x1.5	3.312	4.05	3.5	0.9	10.169	8.39
	M14x1.5	3.312	4.23	4.3	1.1	12.169	10.35
	M16x1.5	3.312	4.55	4.9	1.3	14.169	12.35
	M18x1.5	3.312	4.95	5.4	1.5	16.169	13.25
	M20x1.5	3.312	5.10	6.2	1.9	18.169	15.35

MATpoint®/ GM HOLDEN SPECIAL - LONG (GMW3362 Type D)



ENLARGED VIEW 5 TIMES SCALE

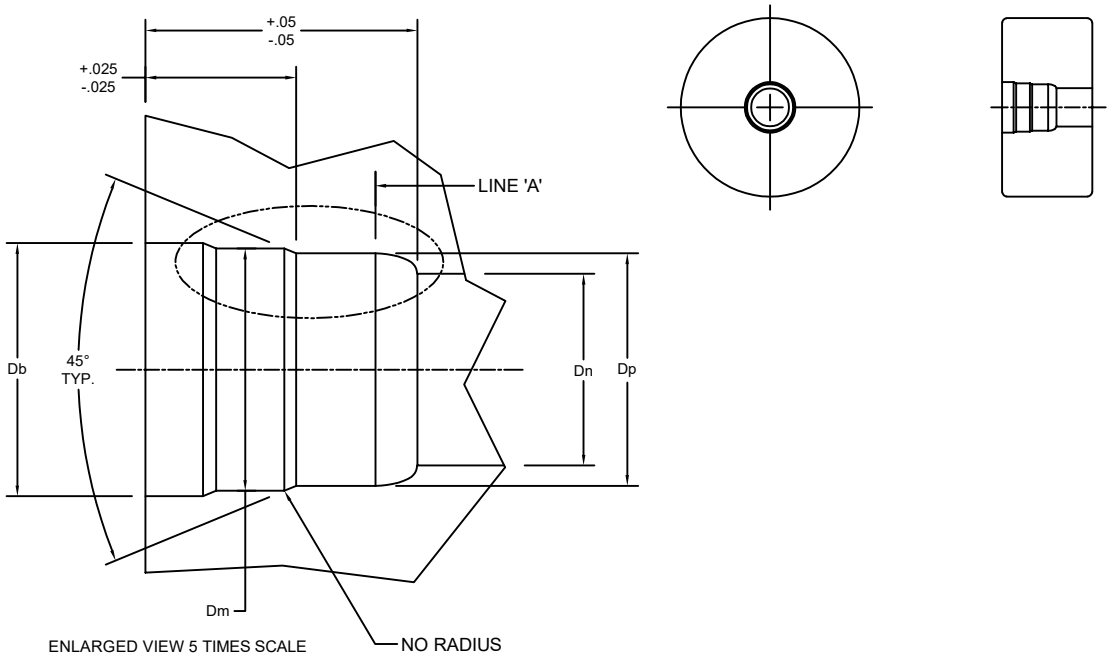




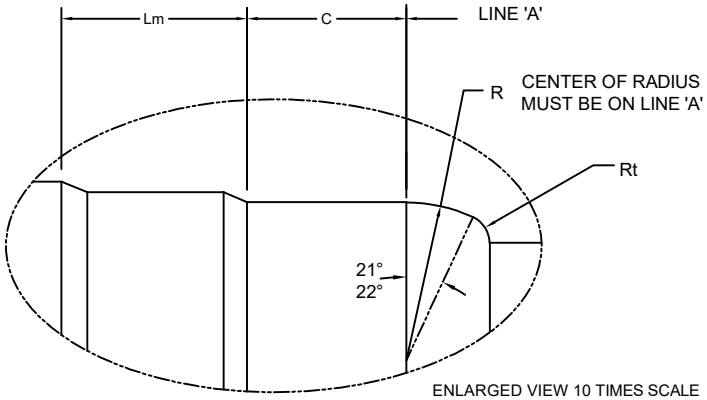
ENLARGED VIEW 10 TIMES SCALE

POINT DIMENSIONS

	THREAD SIZE & PITCH	Lm +.05 −.05	C ±.05	R +0.0 −0.1	Dp ±.015	Dn +.00 −.10
COARSE THREAD	M4x.7	1.512	2.20	2.4	3.124	1.50
	M5x.8	1.737	2.40	3.1	3.980	1.90
	M6x1.0	2.189	2.70	3.6	4.750	2.25
	M8x1.25	2.750	3.50	4.9	6.473	3.05
	M10x1.5	3.312	3.80	6.1	8.169	4.00
	M12x1.75	3.875	4.20	7.4	9.906	4.80
	M14x2.0	4.437	4.60	8.7	11.630	5.55
	M16x2.0	4.437	5.00	10.3	13.635	6.25
	M18x2.5	5.500	5.70	11.0	15.083	7.50
	M20x2.5	5.500	6.20	12.0	17.083	8.30
	M22x2.5	5.500	6.70	13.3	19.083	9.20
	DIMENSIONS ARE IN MILLIMETERS (mm)					
FINE THREAD	M8x1.0	2.189	3.50	4.9	6.750	3.40
	M10x1.25	2.750	3.80	6.1	8.473	4.25
	M12x1.5	3.312	4.20	7.4	10.169	5.10
	M14x1.5	3.312	4.60	8.7	12.169	6.13
	M16x1.5	3.312	5.00	10.3	14.169	6.85
	M18x1.5	3.312	5.70	11.0	16.169	8.60
	M20x1.5	3.312	6.20	12.0	18.169	9.40



ENLARGED VIEW 5 TIMES SCALE

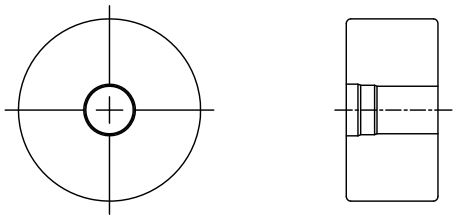


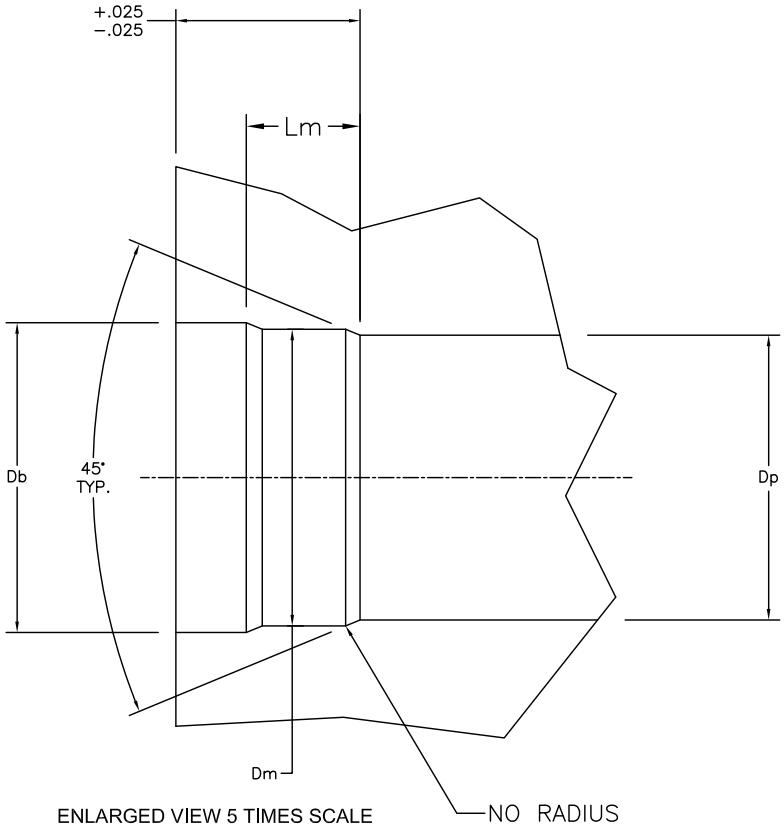
ENLARGED VIEW 10 TIMES SCALE

POINT DIMENSIONS

THREAD SIZE & PITCH	Lm ±.05	C ±.05	R +0.00 -0.15	Rt +0.10 -0.00	Dp +.015 -.015	Dn +.00 -.10
M3.0x.5	1.095	1.45	0.8	0.35	2.360	1.73
M3.5x.6	1.283	1.55	1.0	0.35	2.725	2.20
M4x.7	1.512	1.65	1.2	0.40	3.124	2.25
M5x.8	1.737	1.67	1.5	0.40	3.980	3.08
M6x1.0	2.189	1.77	1.8	0.40	4.750	3.77
M8x1.25	2.750	2.50	2.3	0.50	6.473	5.23
M10x1.25	2.750	3.21	3.0	0.70	8.473	7.23
M10x1.5	3.312	3.17	2.8	0.70	8.169	6.53
M12x1.5	3.312	3.90	3.3	0.90	10.169	8.05
M12x1.75	3.875	3.90	3.3	0.80	9.906	7.79
M14x1.5	3.312	4.19	4.1	1.10	12.169	9.40
M14x2.0	4.437	4.23	4.1	1.10	11.630	9.40
M16x1.5	3.312	4.55	4.9	1.30	14.169	12.35
M16x2.0	4.437	4.55	4.7	1.30	13.635	10.48
M18x1.5	3.312	4.95	5.4	1.50	16.169	13.25
M18x2.5	5.500	4.95	5.2	1.50	15.083	11.75
M20x1.5	3.312	5.10	6.2	1.90	18.169	15.35
M20x2.5	5.500	5.10	6.0	1.90	17.083	12.85
M22x1.5	3.312	5.35	6.4	2.20	20.169	15.90
M22x2.5	5.500	5.35	6.2	2.20	19.083	15.30

DIMENSIONS ARE IN MILLIMETERS (mm)





ENLARGED VIEW 5 TIMES SCALE

BLANK DIMENSIONS

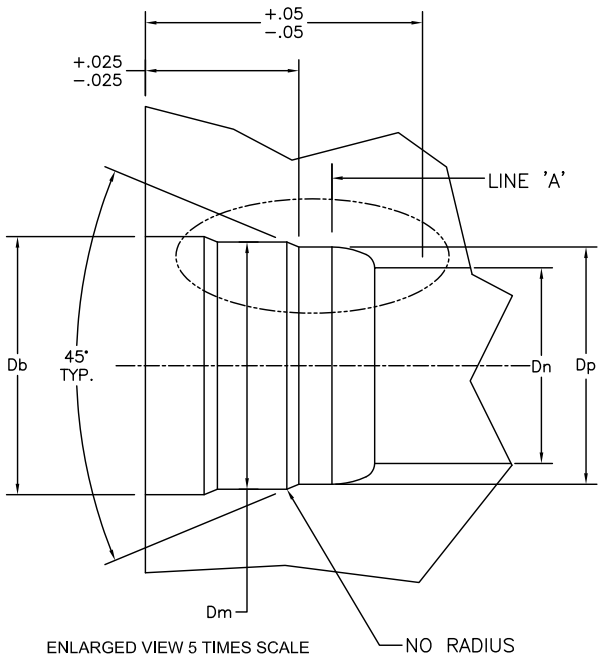
METRIC

THREAD SIZE & PITCH	Lm ±.05	Dp +.015 −.015
M5x0.8	1.737	3.95
M6x1.0	2.189	4.70
M7x1.0	2.189	5.70
M8x1.25	2.750	6.41
M10x1.5	3.312	8.09
M12x1.5	3.312	10.09
M14x1.5	3.312	12.09

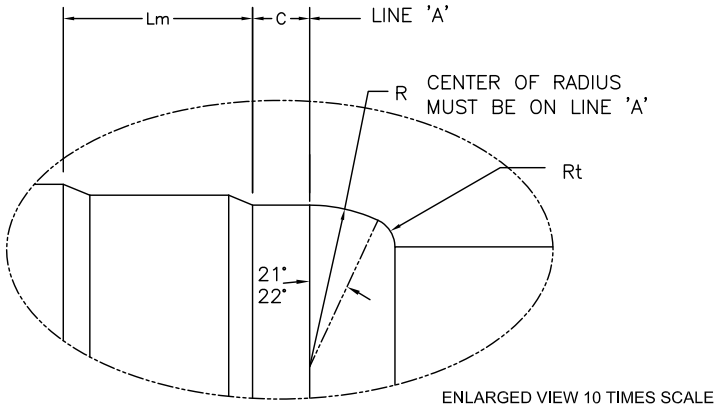
ALL DIMENSIONS ARE IN MILLIMETERS (MM)

INCH

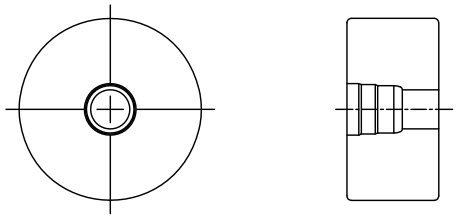
THREAD SIZE & PITCH	Lm ±.05	Dp +.015 −.015
7/16−20	2.858	9.59



ENLARGED VIEW 5 TIMES SCALE



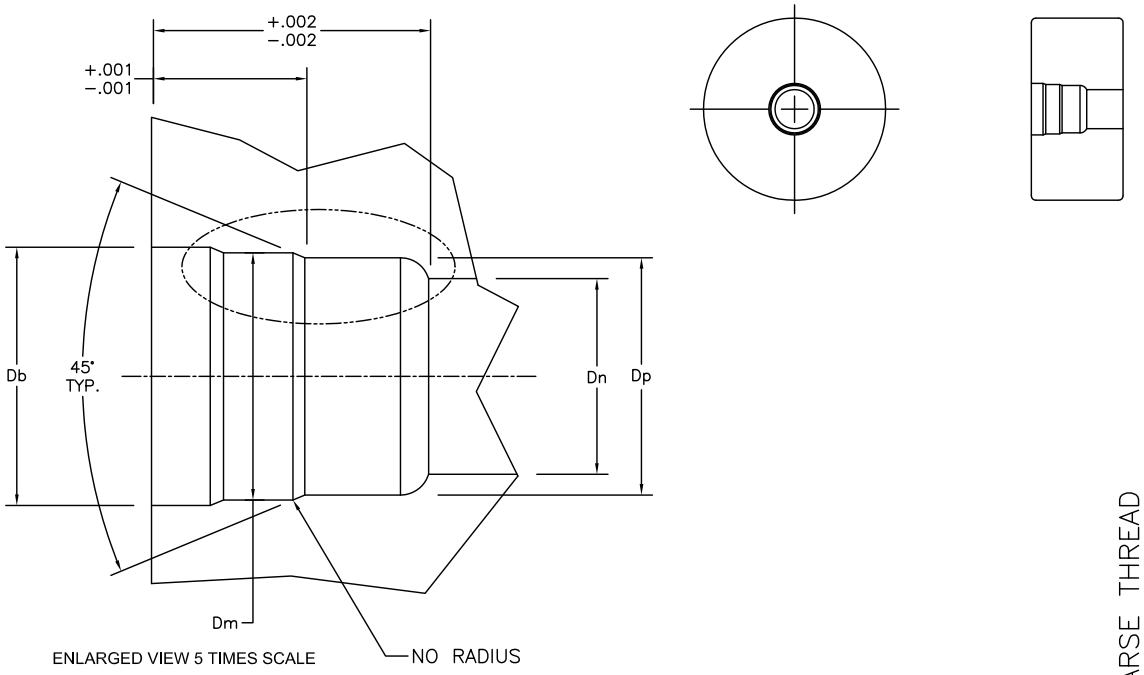
ENLARGED VIEW 10 TIMES SCALE



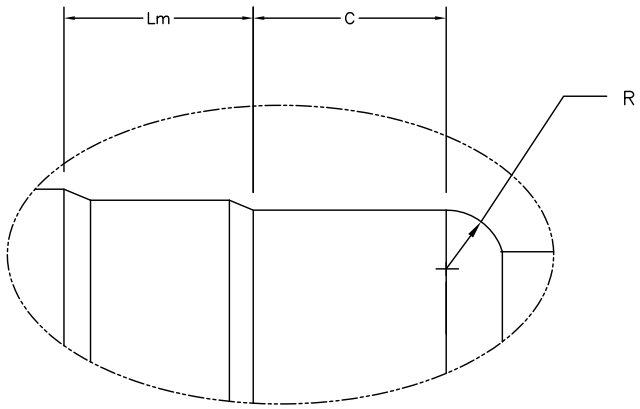
POINT DIMENSIONS

	THREAD SIZE & PITCH	Lm +.05 −.05	C +.05 −.05	R +.00 −.15	Rt +.15 −.00	Dp +.015 −.015	Dn +.00 −.10
COARSE THREAD	M4x.7	1.512	0.33	1.20	0.40	3.124	2.25
	M5x.8	1.737	0.34	1.50	0.40	3.980	3.08
	M6x1.0	2.189	0.36	1.80	0.40	4.750	3.77
	M8x1.25	2.750	0.54	2.30	0.50	6.473	5.23
	M10x1.5	3.312	0.64	2.80	0.70	8.169	6.53
	M12x1.75	3.875	0.78	3.30	0.80	9.906	7.79
	M14x2.0	4.437	0.85	4.10	1.10	11.630	9.40
	M16x2.0	4.437	0.91	4.70	1.30	13.635	10.48
	DIMENSIONS ARE IN MILLIMETERS (mm)						
FINE THREAD	M8x1.0	2.189	0.54	2.50	0.50	6.750	5.73
	M10x1.25	2.750	0.64	3.00	0.70	8.473	7.23
	M12x1.5	3.312	0.81	3.50	0.90	10.169	8.39
	M14x1.5	3.312	0.85	4.30	1.10	12.169	10.35
	M16x1.5	3.312	0.91	4.90	1.30	14.169	12.35

MAThread® - RADIUSED DOG (PILOT) POINT



ENLARGED VIEW 5 TIMES SCALE

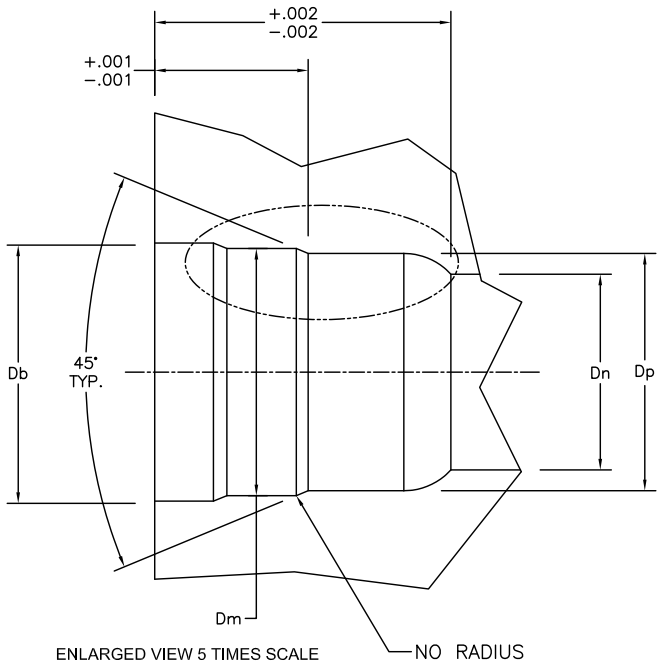


ENLARGED VIEW 10 TIMES SCALE

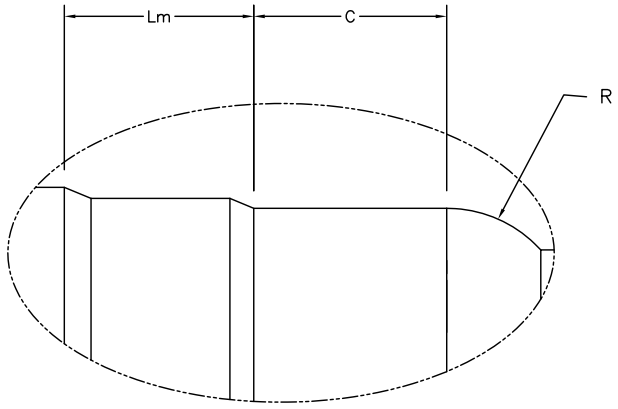
POINT DIMENSIONS

	THREAD SIZE & PITCH	Lm ±.002	C +.004 −.000	R +.005 −.000	Dp ±.0005	Dn +.000 −.005
COARSE THREAD	1/4−20	.150	.085	0.02	.191	.149
	5/16−18	.167	.108	0.03	.247	.185
	3/8−16	.188	.147	0.05	.303	.195
	7/16−14	.214	.171	0.07	.354	.210
	1/2−13	.231	.204	0.08	.411	.245
	9/16−12	.250	.230	0.10	.466	.260
	5/8−11	.273	.262	0.12	.521	.275
	DIMENSIONS ARE IN ENGLISH (inch)					
FINE THREAD	1/4−28	.1071	.103	0.02	.206	.170
	5/16−24	.1250	.127	0.03	.261	.207
	3/8−24	.1250	.190	0.04	.324	.262
	7/16−20	.1500	.207	0.06	.377	.310
	1/2−20	.1500	.250	0.07	.440	.350
	9/16−18	.1667	.285	0.09	.496	.400
	5/8−18	.1667	.318	0.10	.559	.460

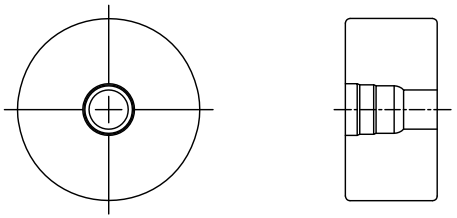
MAThread® - TYPE 'P' POINT - LONG



ENLARGED VIEW 5 TIMES SCALE

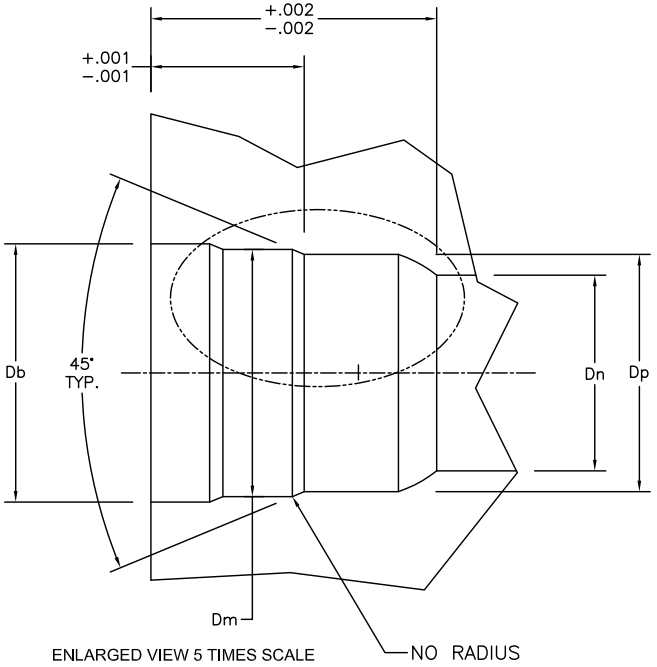


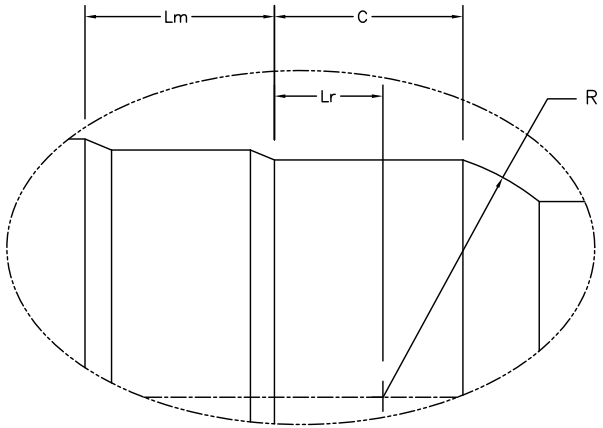
ENLARGED VIEW 10 TIMES SCALE

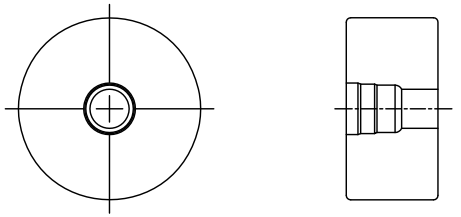


POINT DIMENSIONS

	THREAD SIZE & PITCH	Lm ±.002	C +.004 −.000	R +.005 −.000	Dp ±.0005	Dn +.00 −.05
COARSE THREAD	1/4−20	.150	.080	.080	.191	.149
	5/16−18	.167	.100	.100	.247	.185
	3/8−16	.188	.120	.120	.303	.195
	7/16−14	.214	.145	.145	.354	.210
	1/2−13	.231	.175	.175	.411	.245
	9/16−12	.250	.205	.205	.466	.260
	5/8−11	.273	.245	.245	.521	.275
	DIMENSIONS ARE IN ENGLISH (inch)					
FINE THREAD	1/4−28	.1071	.100	0.10	.206	.170
	5/16−24	.1250	.120	0.12	.261	.207
	3/8−24	.1250	.140	0.16	.324	.262
	7/16−20	.1500	.165	0.18	.377	.310
	1/2−20	.1500	.195	0.21	.440	.350
	9/16−18	.1667	.225	0.24	.496	.400
	5/8−18	.1667	.265	0.27	.559	.460

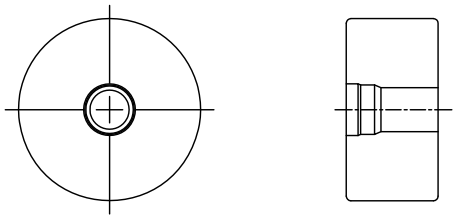


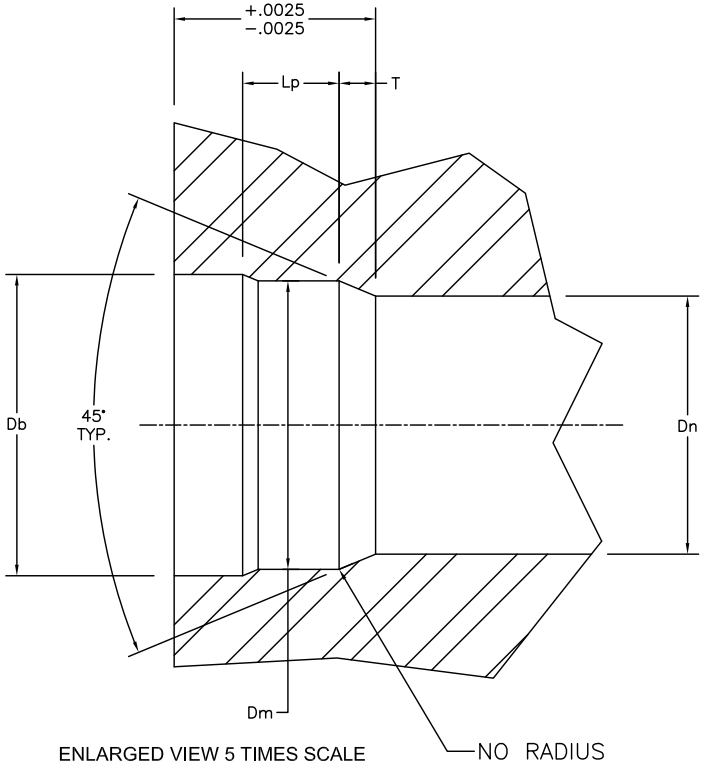




POINT DIMENSIONS

	THREAD SIZE & PITCH	Lm ±.002	C +.004 −.000	R +.000 −.005	Lr ±.0015	Dp ±.0005	Dn +.000 −.005
COARSE THREAD	1/4−20	.113	.072	.105	.042	.191	.155
	5/16−18	.125	.097	.135	.056	.247	.205
	3/8−16	.141	.137	.165	.081	.303	.245
	7/16−14	.161	.162	.185	.108	.354	.290
	1/2−13	.173	.192	.215	.129	.411	.340
	9/16−12	.188	.222	.245	.145	.466	.380
	5/8−11	.205	.262	.275	.173	.521	.425
	DIMENSIONS ARE IN INCHES (in)						
FINE THREAD	1/4−28	.0838	.072	.115	.011	.206	.169
	5/16−24	.0938	.097	.145	.034	.261	.212
	3/8−24	.0938	.137	.175	.072	.324	.262
	7/16−20	.1125	.162	.195	.108	.377	.315
	1/2−20	.1125	.192	.235	.087	.440	.355
	9/16−18	.1250	.222	.255	.143	.496	.400
	5/8−18	.1250	.262	.295	.154	.559	.460





ENLARGED VIEW 5 TIMES SCALE

BLANK DIMENSIONS

	THREAD SIZE & PITCH	LP ±.002	Dn +.000 −.005	T REF
COARSE THREAD	1/4−20	.1007	.165	.055 .037
	5/16−18	.1124	.215	.068 .045
	3/8−16	.1272	.263	.070 .050
	7/16−14	.1453	.311	.075 .055
	1/2−13	.1560	.361	.082 .060
	9/16−12	.1716	.435	.090 .067
	5/8−11	.1570	.455	.135 .110
	DIMENSIONS ARE IN ENGLISH (inch)			
FINE THREAD	1/4−28	.072	.180	.055 .035
	5/16−24	.080	.230	.065 .045
	3/8−24	.080	.288	.065 .045
	7/16−20	.1007	.348	.055 .037
	1/2−20	.1007	.405	.055 .037
	9/16−18	.1124	.455	.068 .045
	5/8−18	.1124	.518	.068 .045

Description:	Thread Type (Die type):
INSPECTION INSTRUCTIONS	**ALL MAThread AND MATpoint**

The following steps should be followed when inspecting MAThread and/or MATpoint product after initial set-up and at normal inspection intervals during the manufacturing run:

1. Inspect standard profile threads using suitable functional gages. Standard threads should meet all criteria normally associated with inspection of machine threads.

2. Insure that a go-gage appropriate for the standard thread size spins freely over the three lead threads and onto the standard threads. Excess drag of the go-gage indicates poor set-up or dimensional problem with blank. Note: Acceptable minor diameters for the "go" gage are listed in ISO STANDARD 1502:1996(E).

3. Utilize appropriate Optical Comparator to view profile of the lead threads. Comparitor should be at least 15X. The following steps should be taken:

    a. Place part on the comparator and focus.
    b. Rotate part until the profile matches that shown in Rotation A on Page 7.02a of the MAThread Standards. (Rotation 'A' may be found by rotating part until the "bump" on the transition thread gradually shrinks until it disappears into the top of a Radiused thread.) Rotation 'A' is the only profile in which only one (1) transition thread peak is visible.
    c. Inspect profile per the criteria specified on Page 7.02a
    d. Remove part from comparator and visually inspect lead thread per page 7.02b

4. If parts meet inspection criteria above, both standard and MAThread functionality is insured.

CRITICAL

Operators should immediately stop production and segregate any suspect parts when one of the following events takes place:

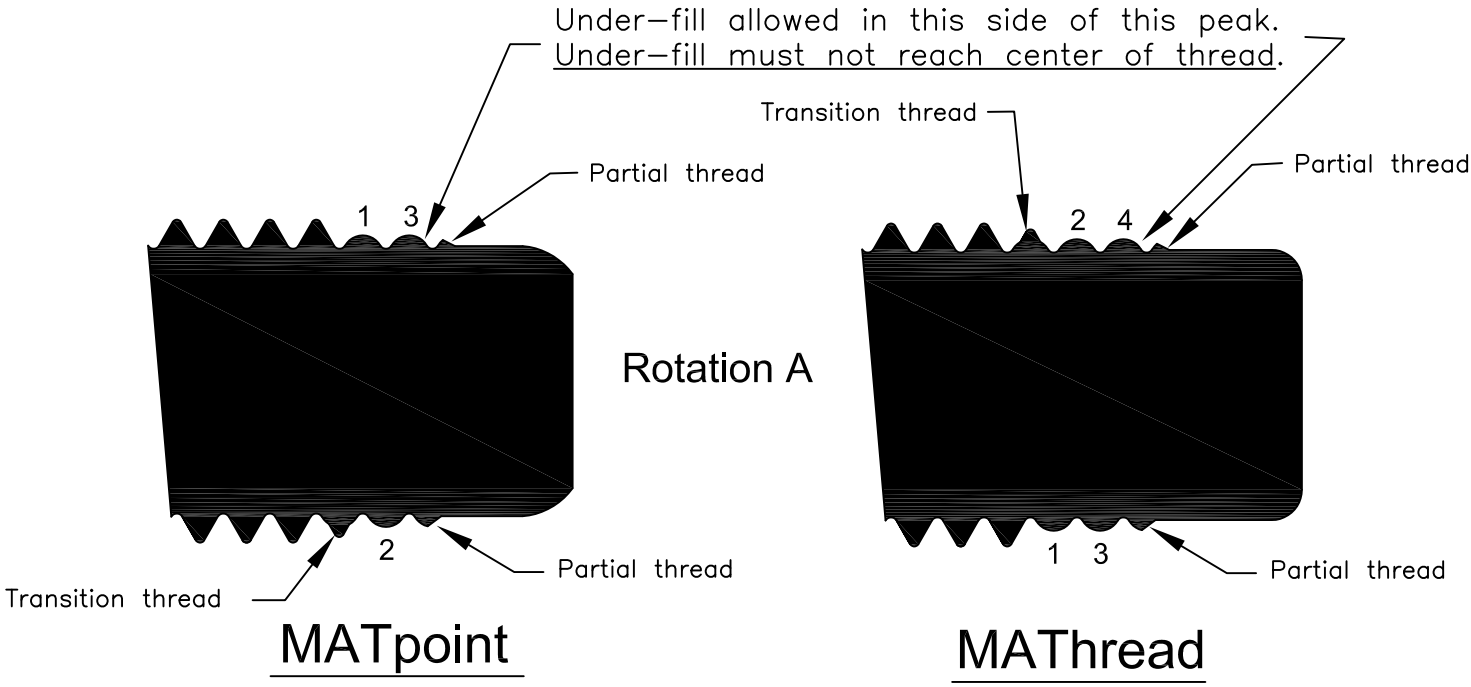
1. Radiused thread fails to fill completely. This is evidenced by a small gap at the top of the radius. Such parts, no matter how small to gap, are non-functional and must be scrapped.

2. Standard threads do not gage using functional gages.

3. Go-gage does not spin on parts.

Manufacturing Standards

Description:	Thread Type (Die type):
COMPARATOR INSPECTION	**3.0 P MAThread & 2.25 P MATpoint**



Optical Comparitor Inspection Criteria

1a. MAThread Rotation 'A' (above) must have 4 complete radiused peaks. (labeled 1,2,3,4 above-two on each side) All Other Rotations of part should show at least 3 complete radiused thread peaks. No under-fill is permitted on any radiused thread. (unless noted above)

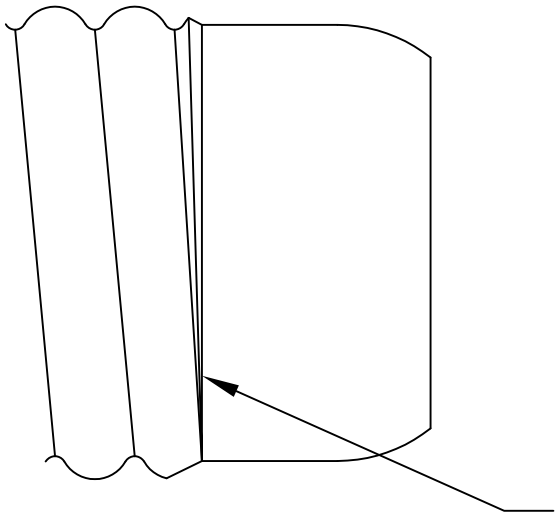
1b. MATpoint Rotation 'A' (above) must have 3 complete radiused peaks. (labeled 1,2,3, above-one on one side and two on the other) All Other Rotations of part should show at least 2 complete radiused thread peaks. No under-fill is permitted on any radiused thread. (unless noted above)

2. Transition thread (between full and radiused thread) should be a radiused thread with a 'bump' on top. The 'bump' will vary in height over one complete rotation of the part and should be shaped like the peak of a normal thread. The 'bump' will be visible on both sides of part in all rotations except 'A' (above). Slight rotation from the 'A' position should result in 2 'bumps' becoming visible, note, the bump farthest from the dog point will be higher. Parts should be set-up to fill the 'bump' completely. Note that a slight under-fill of the 'bump' is permitted during a run, as long as the radiused threads are still full.

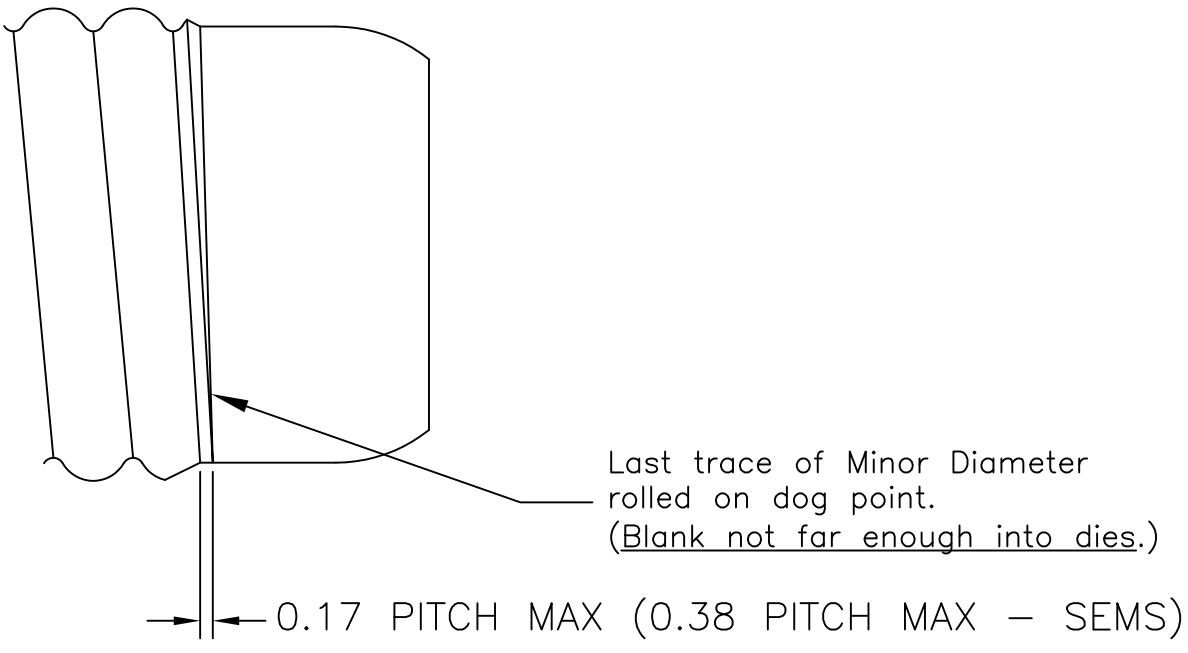
3. The Lead thread will always have a radius on the side of the thread opposite the dog point, with a chamfer on the dog side. The lead thread must not have a 'scalloped' top caused by under-fill and must not be higher than the radiused threads. Lead thread must not have a vertical 'wall' on the dog point side.

Manufacturing Standards

Description:	Thread Type (Die type):
INSPECTION INSTRUCTIONS	**3.0 P MAThread & 2.25 P MATpoint**



Correct Thread Run-out

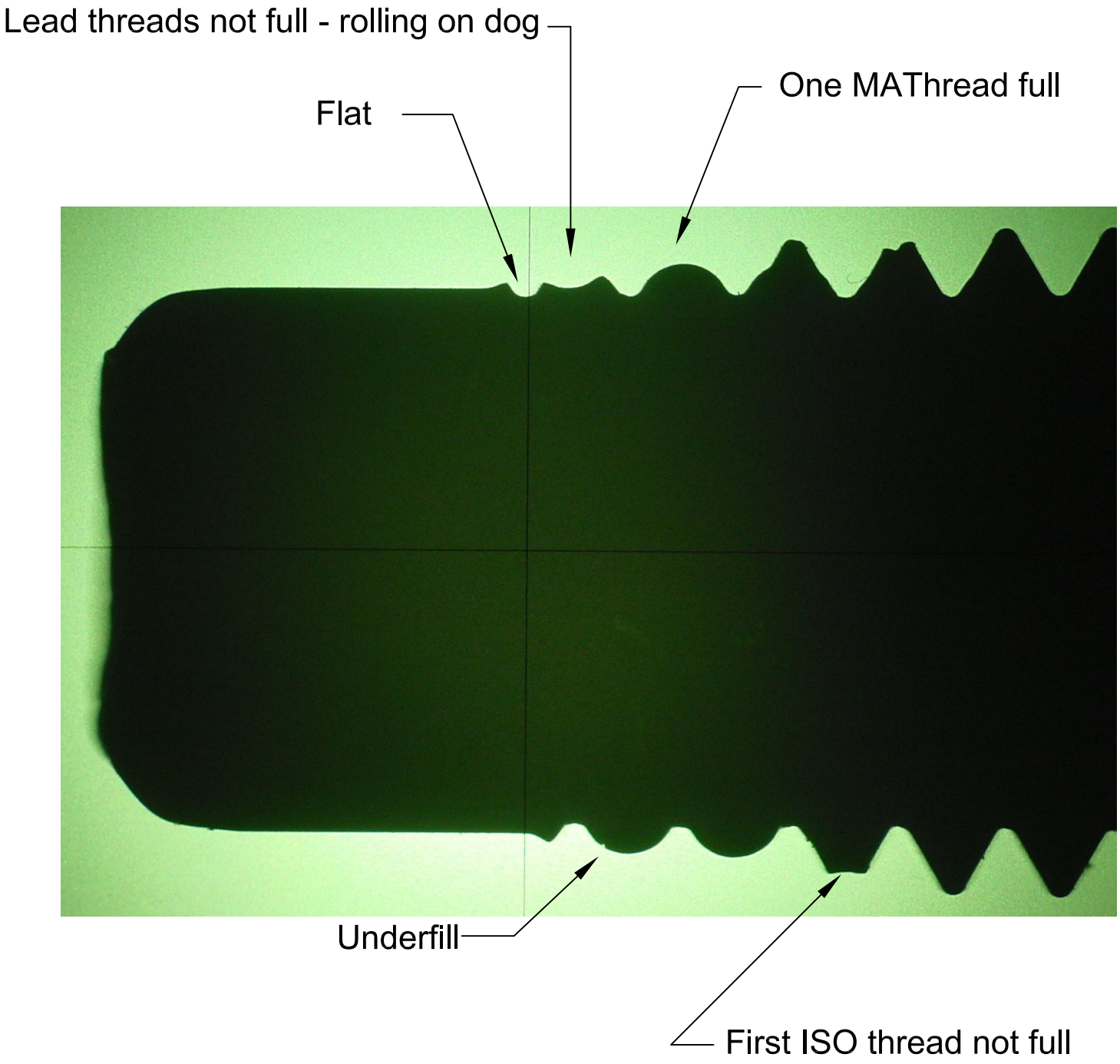


Incorrect Thread Run-out

Description:	Thread Type (Die type):
SET-UP PROBLEMS	**3.0 P MAThread AND 2.25 P MATpoint**

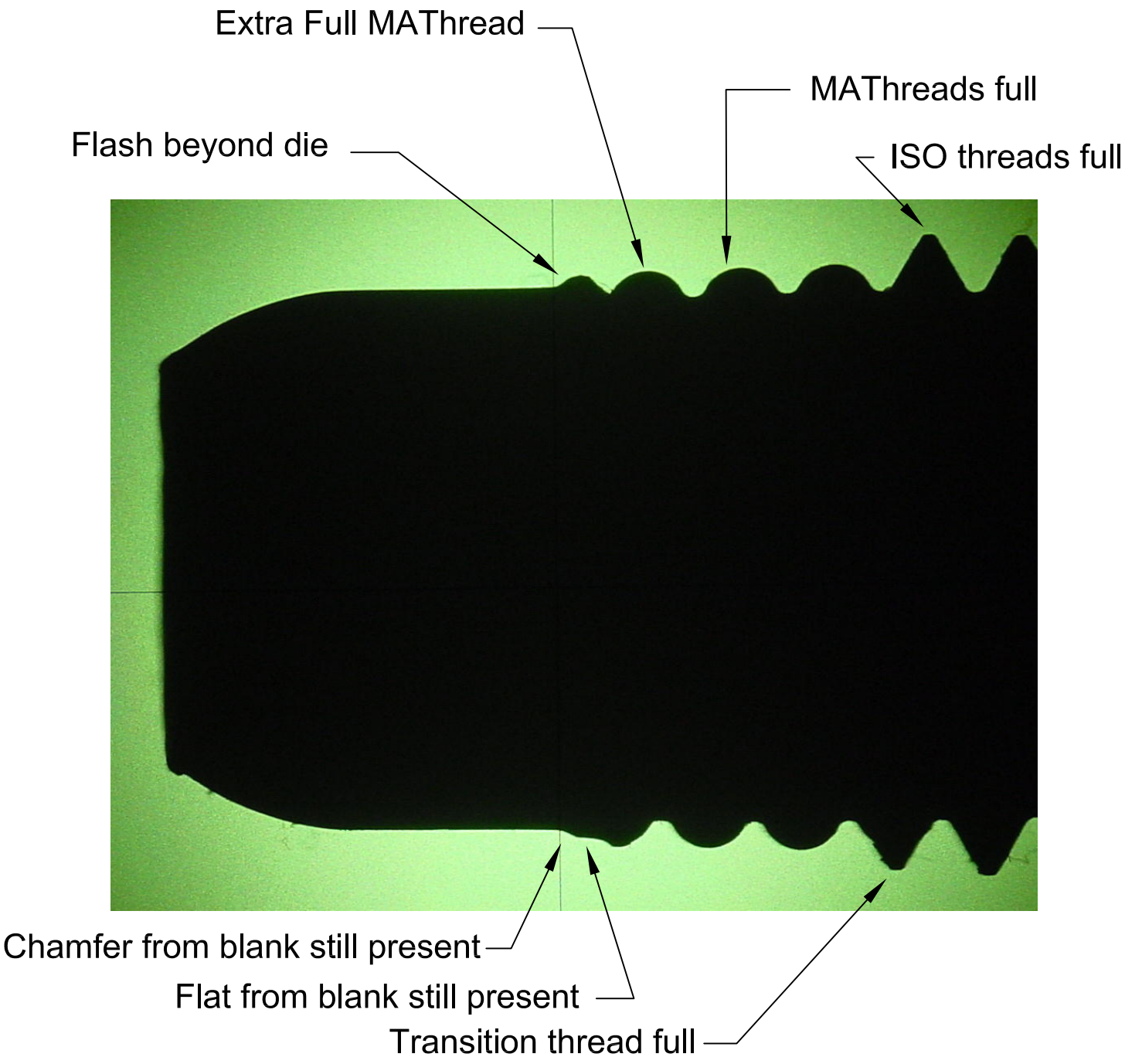
Part not far enough into thread roll dies

Transition thread not full - Rolling on MAThread section of blank



Description:	Thread Type (Die type):
SET-UP PROBLEMS	**3.0 P MAThread AND 2.25 P MATpoint**

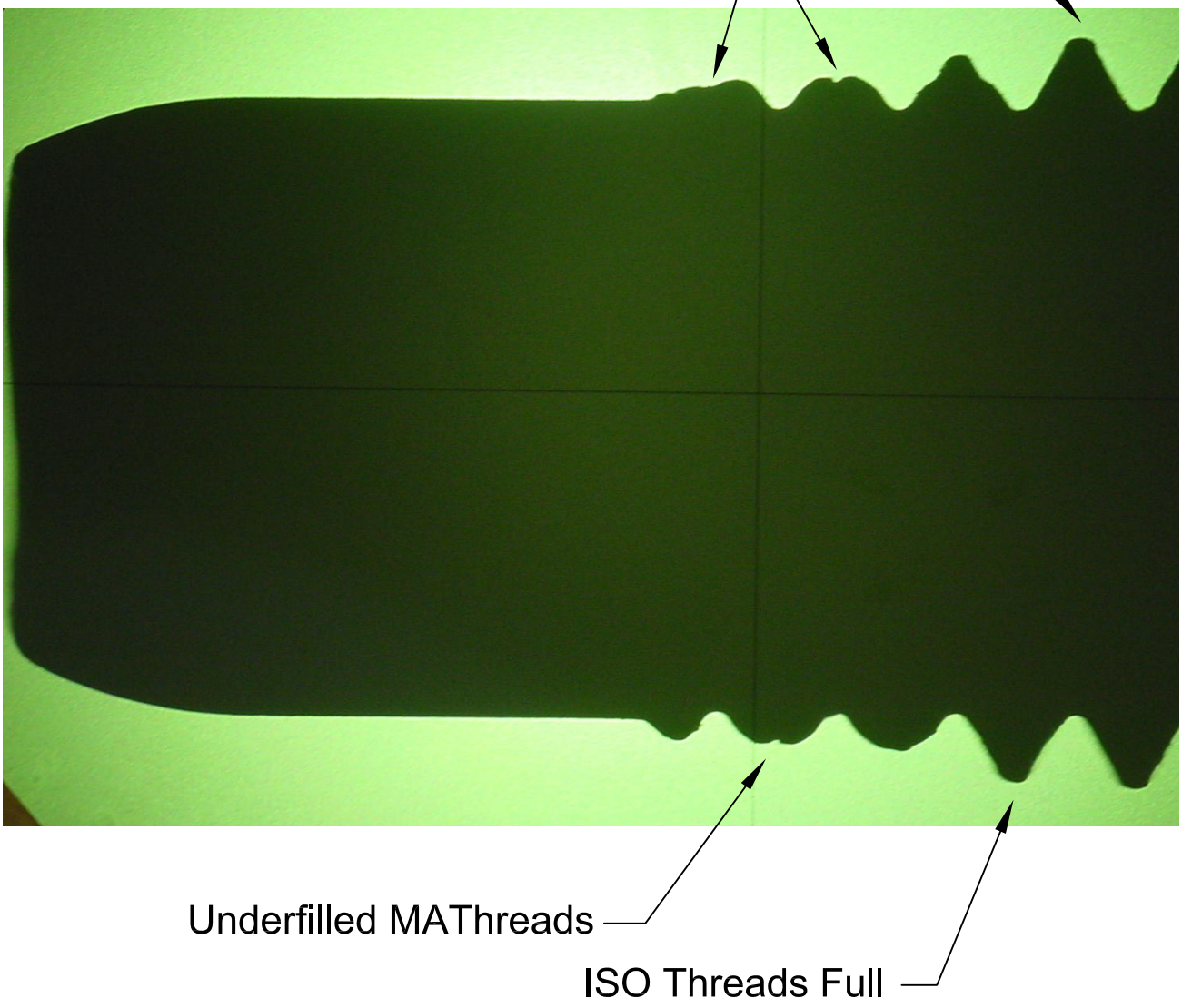
Blank too far into thread roll dies



Description:	Thread Type (Die type):
SET-UP PROBLEMS	**3.0 P MAThread AND 2.25 P MATpoint**

Possible Causes

1. Not enough pressure on point
2. Undersize blank MAT diameter



MATpoint TOO FAR INTO THREAD DIES

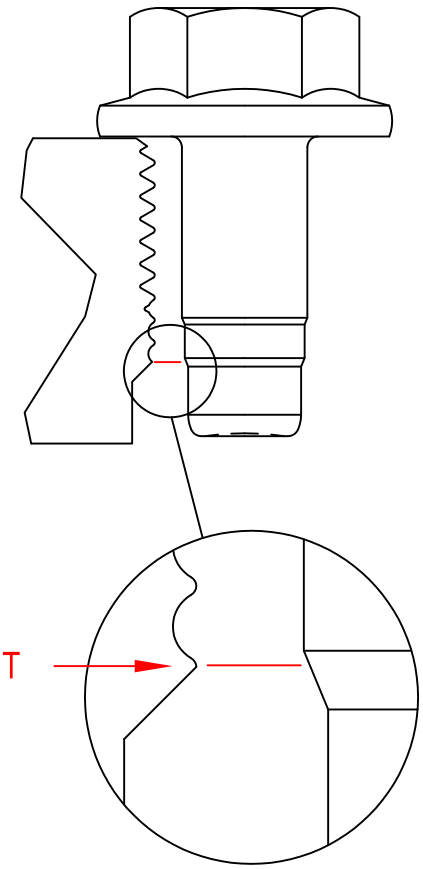
THIS PART WILL NOT ACCEPT A RING GAGE

FIRST FULL THREAD MAY BE OVERSIZED AS COMPARED TO OTHER THREADS

"EXTRA" RADIUSED THREAD IS AN INDICATION THAT THE PART IS TOO FAR DOWN IN THE DIES.

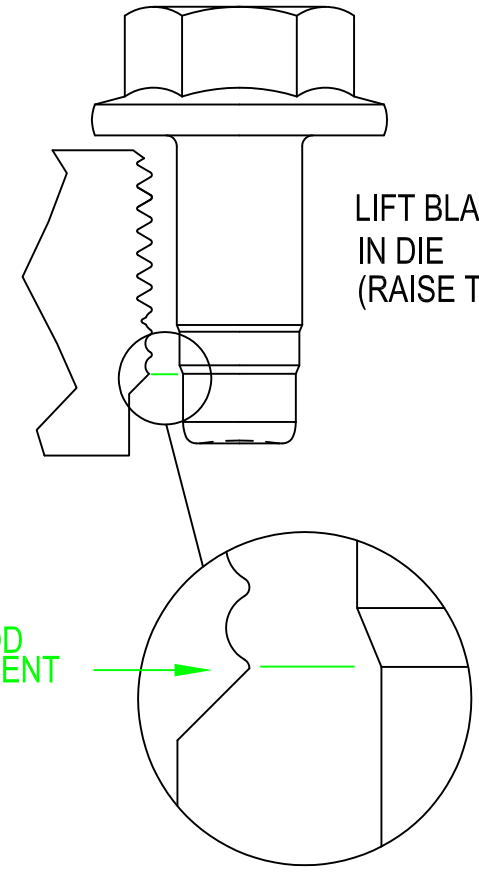
SHAPE OF LEAD THREAD WILL INTERFERE WITH GO GAGE.

BAD SET-UP



BAD ALIGNMENT

HOW TO FIX IT



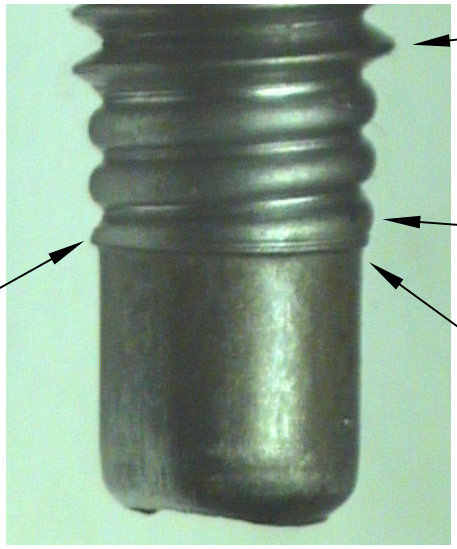
LIFT BLANK IN DIE (RAISE THE RAIL)

GOOD ALIGNMENT

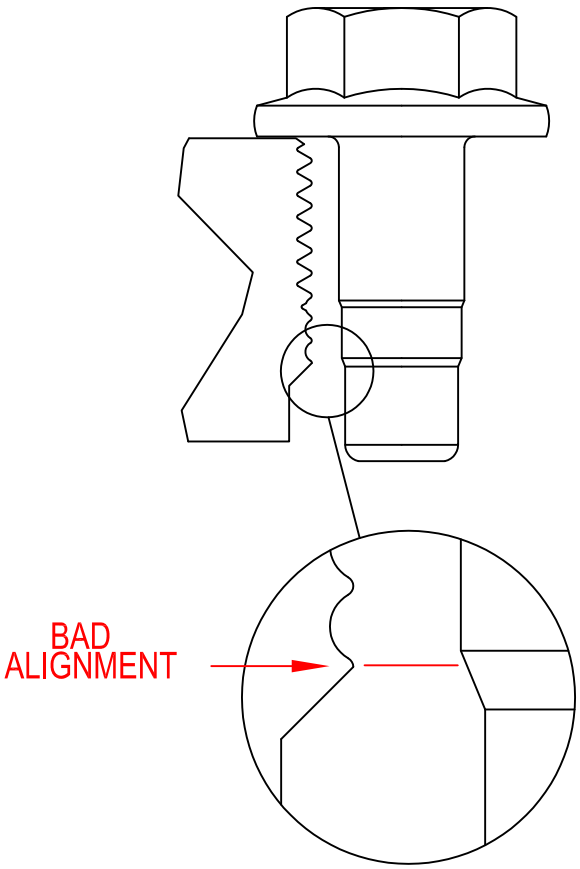
DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

MAThread TOO FAR INTO THREAD DIES

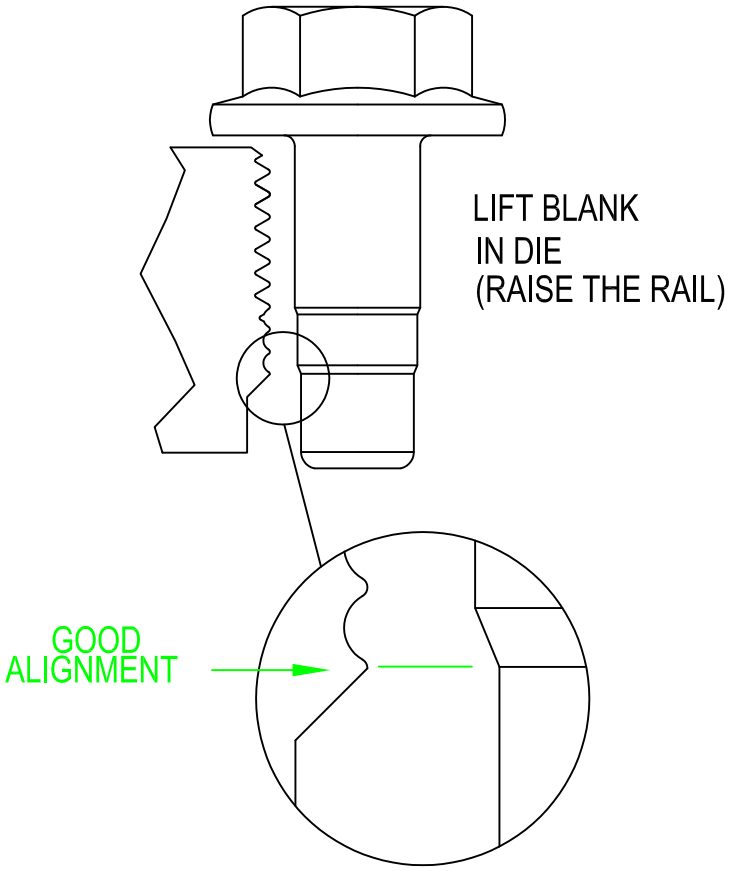
THIS PART WILL NOT ACCEPT A RING GAGE



BAD SET-UP



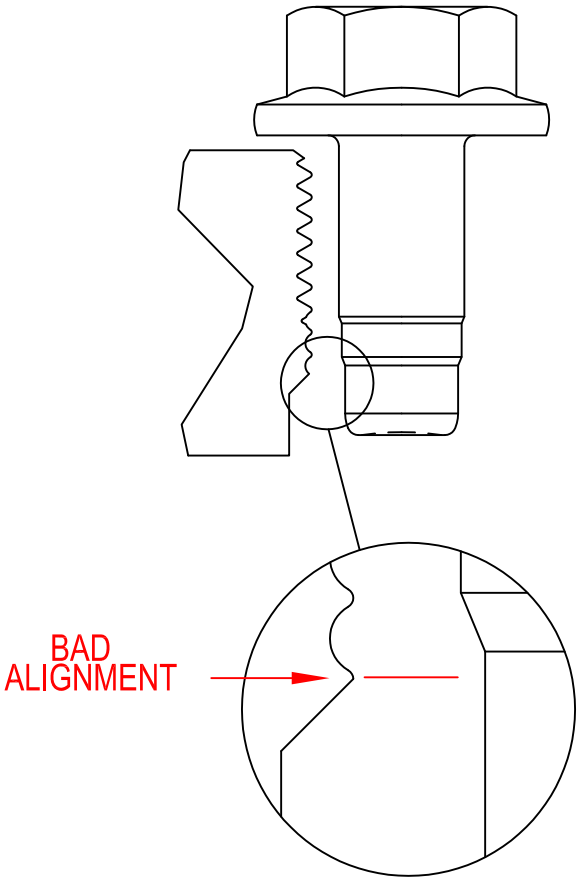
HOW TO FIX IT



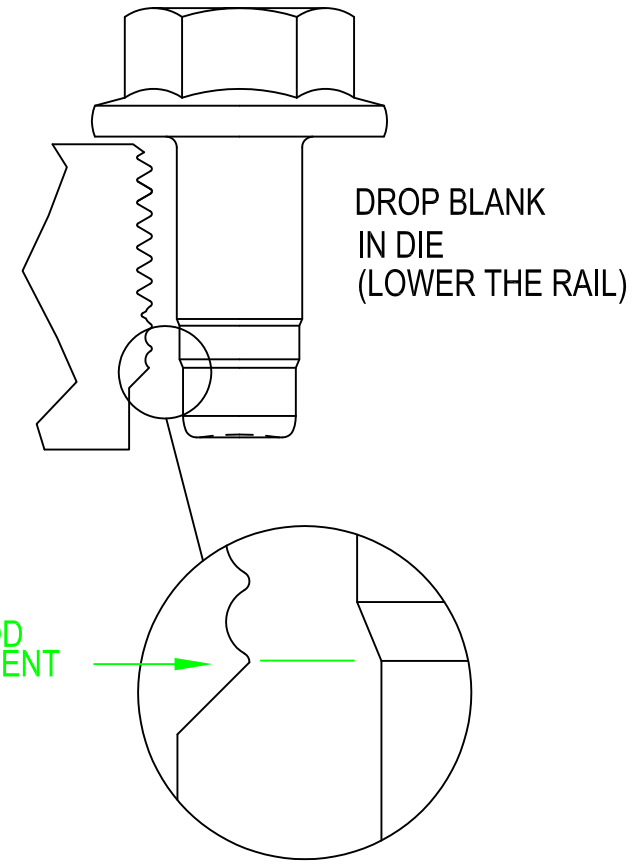
DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

MATpoint NOT FAR ENOUGH INTO THREAD DIES

BAD SET-UP

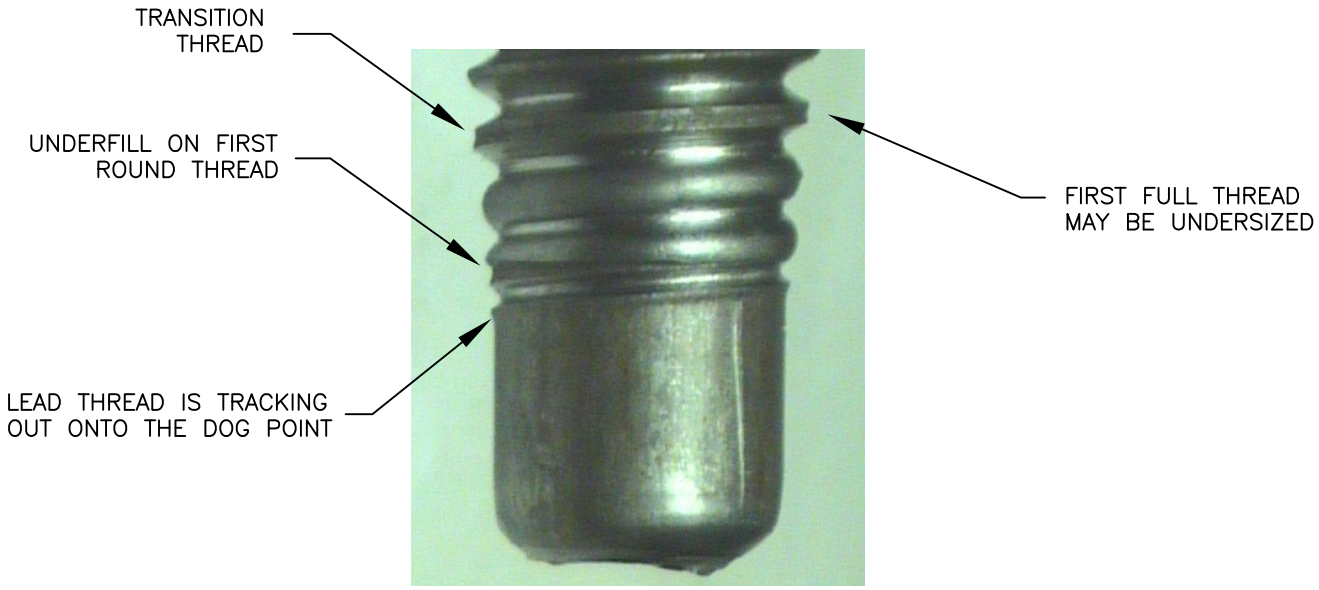


HOW TO FIX IT

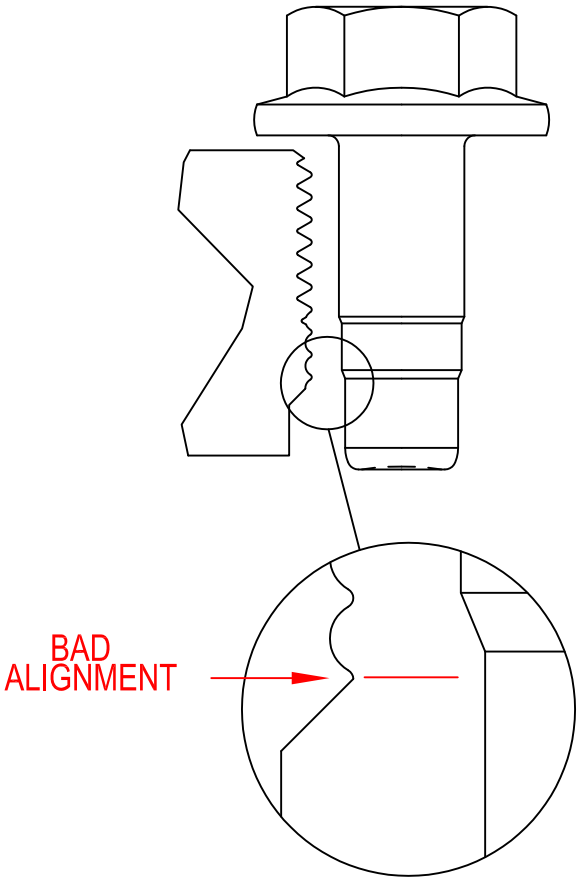


DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

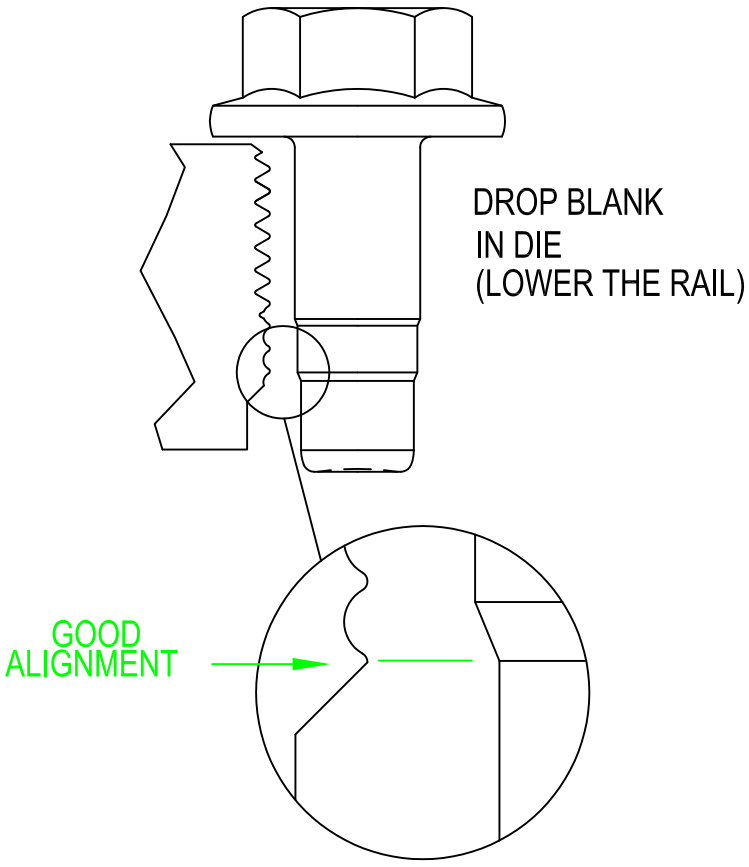
MAThread NOT FAR ENOUGH INTO THREAD DIES



BAD SET-UP

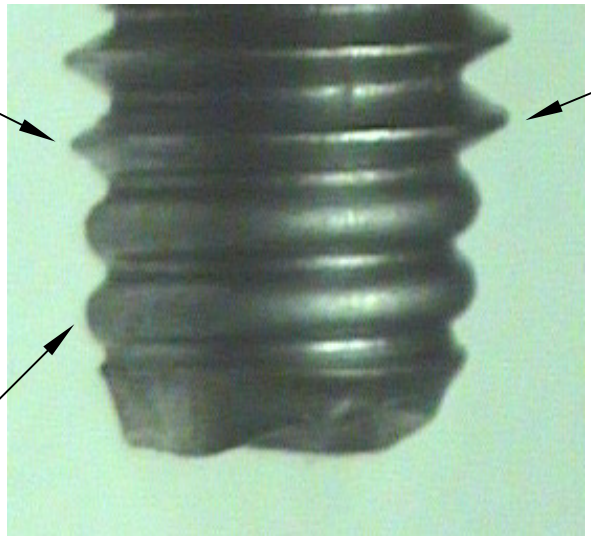


HOW TO FIX IT

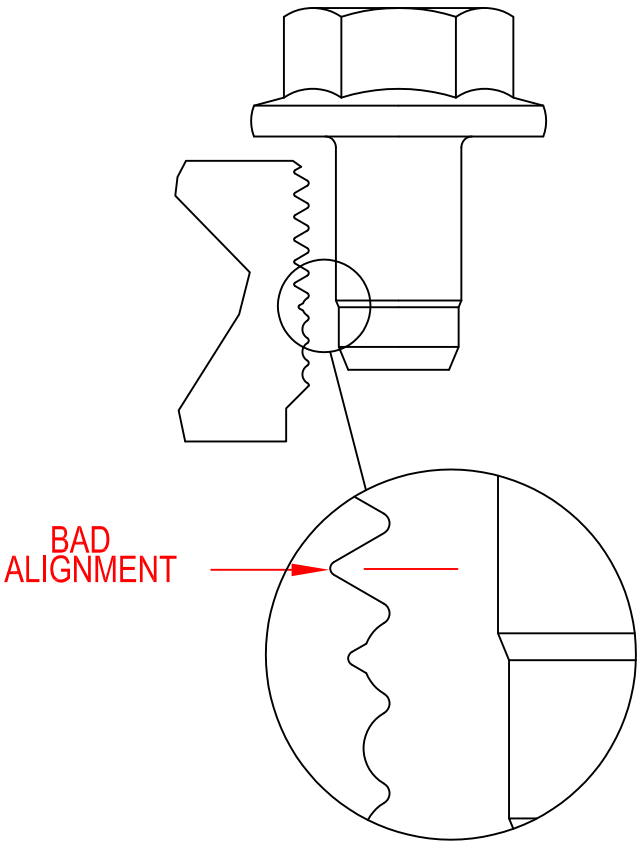


DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

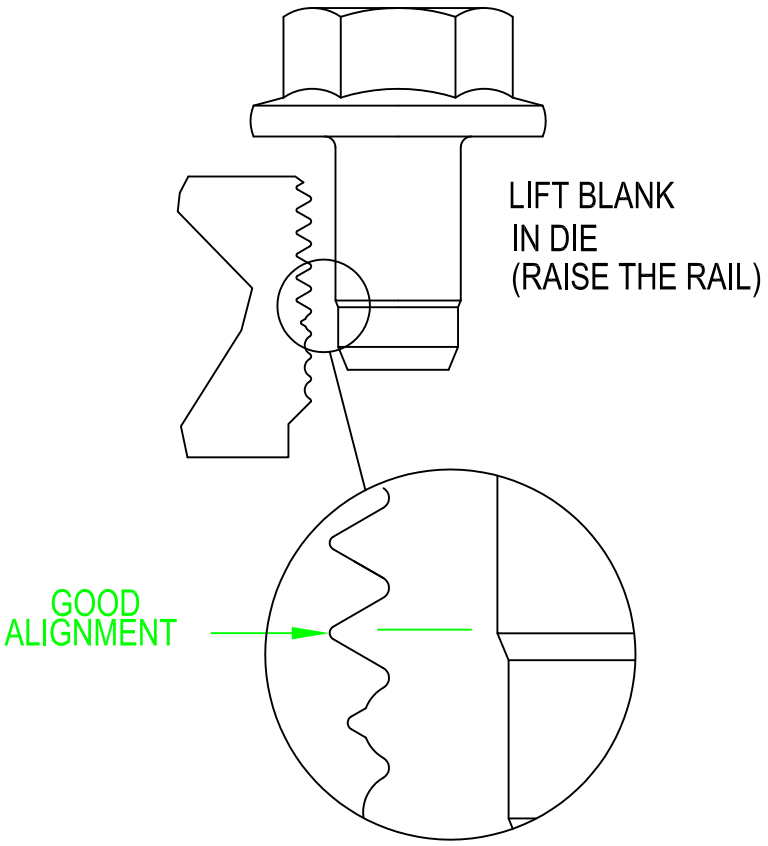
MAThread VERY SHORT SPECIAL TOO FAR INTO THREAD DIES



BAD SET-UP

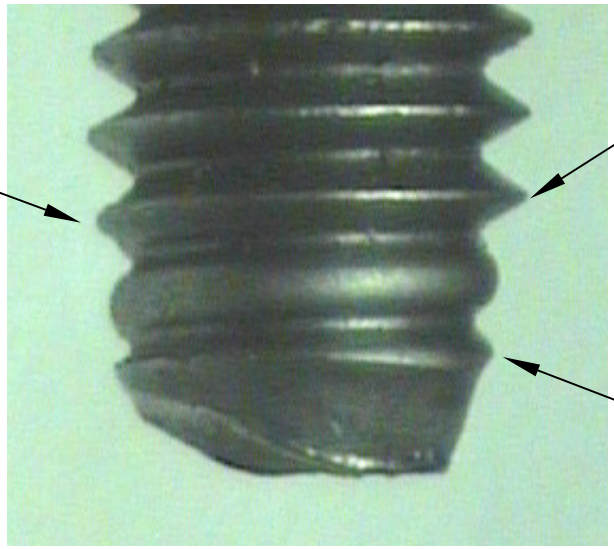


HOW TO FIX IT

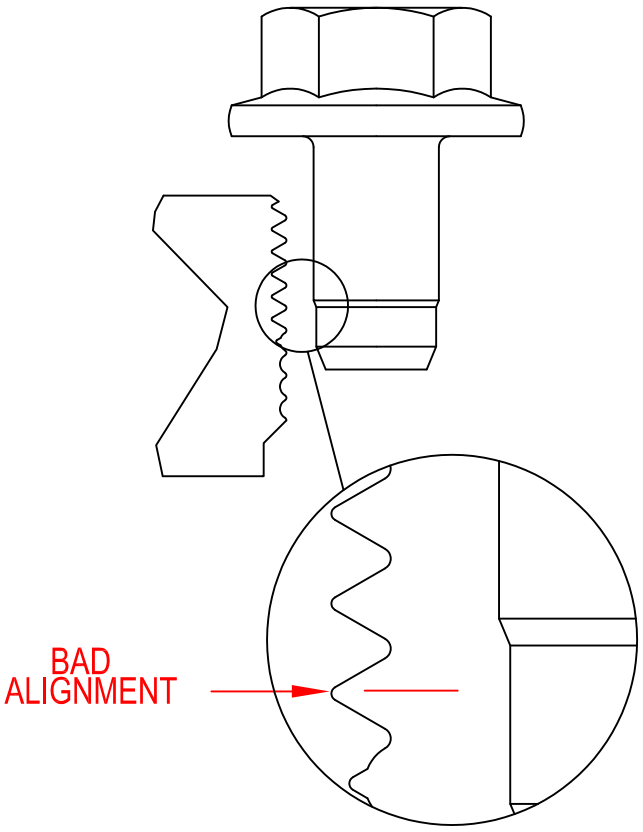


DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

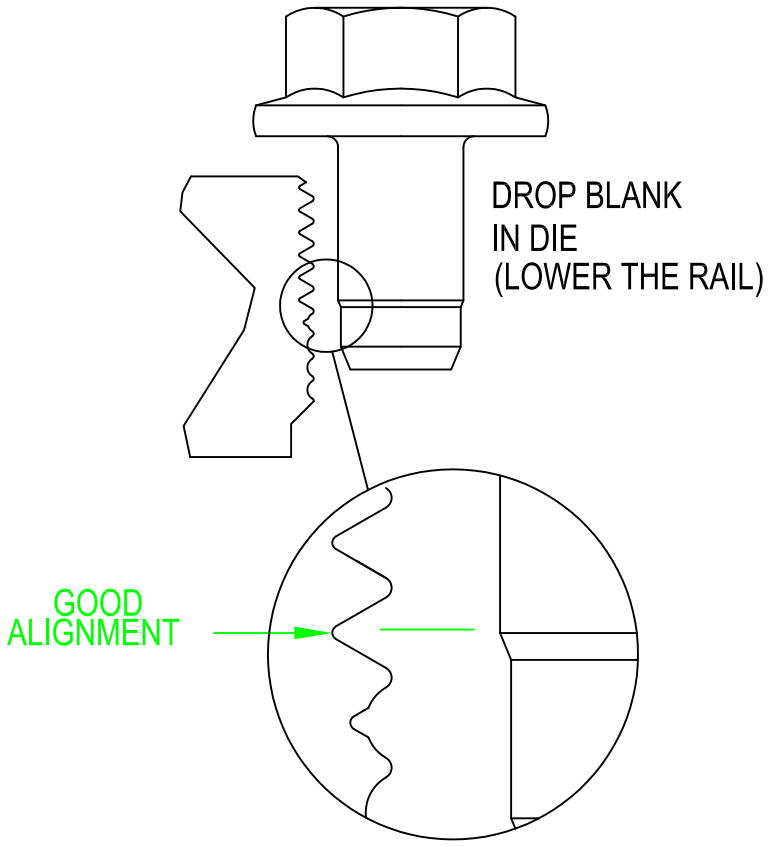
MAThread VERY SHORT SPECIAL NOT FAR ENOUGH INTO THREAD DIES



BAD SET-UP



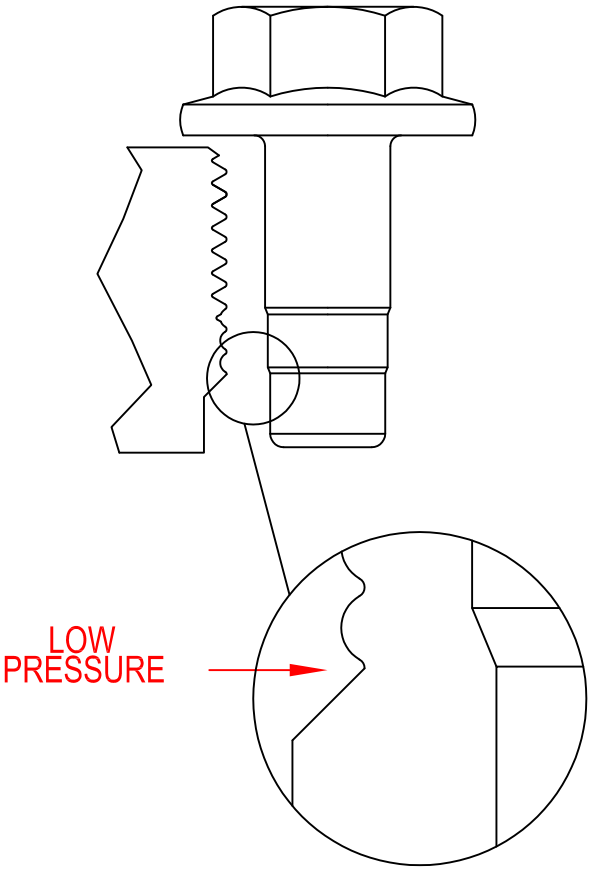
HOW TO FIX IT



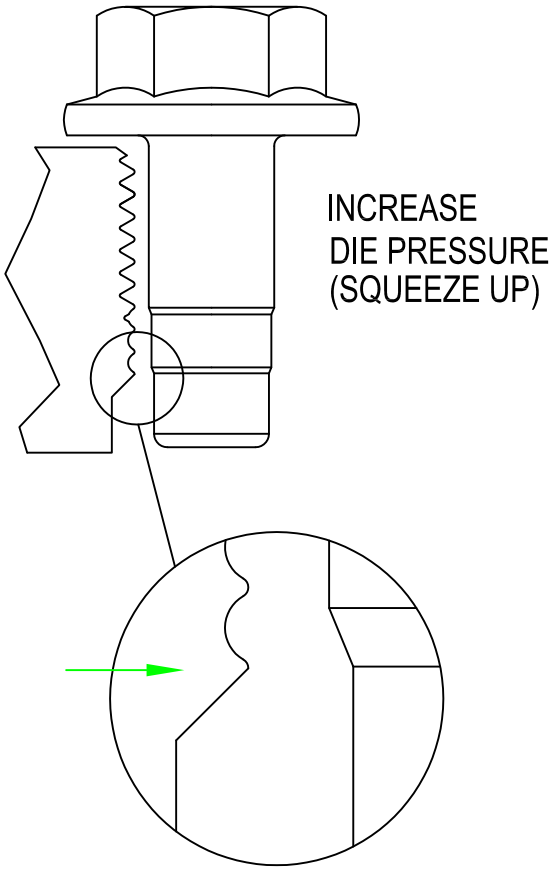
DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

MAThread NOT ENOUGH PRESSURE ON THREAD DIES

BAD SET-UP

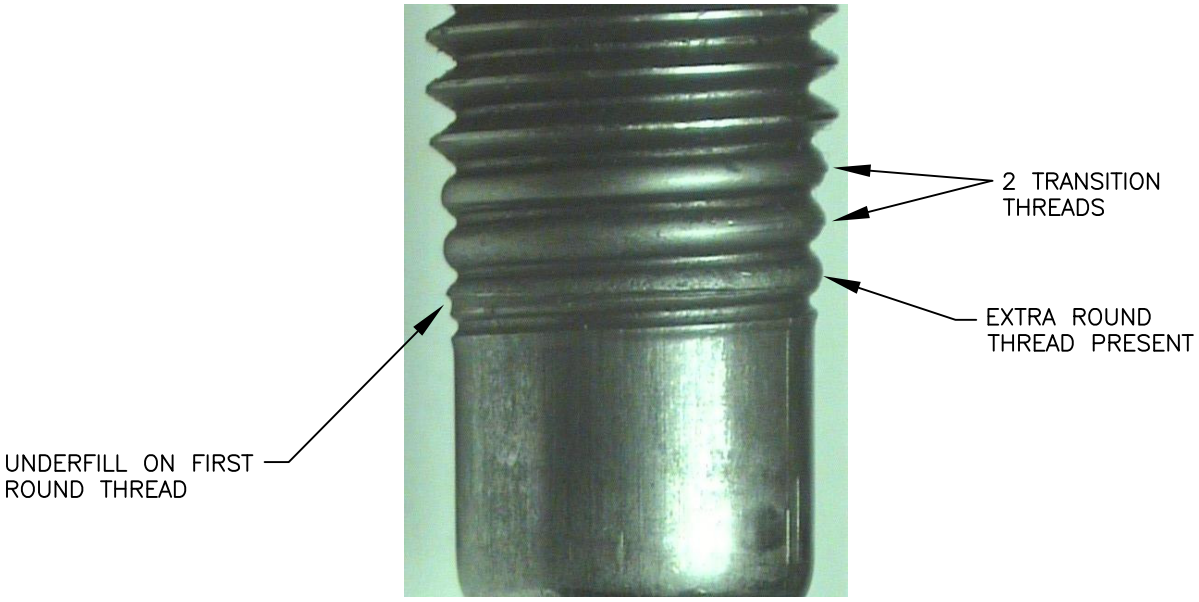


HOW TO FIX IT

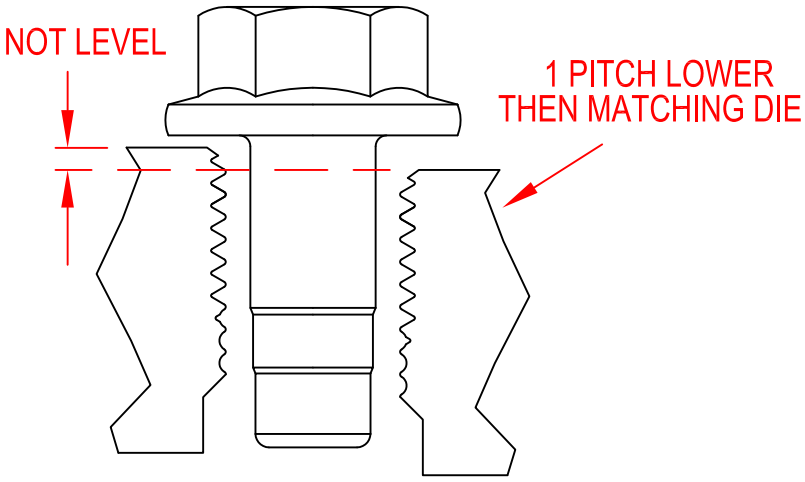


DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

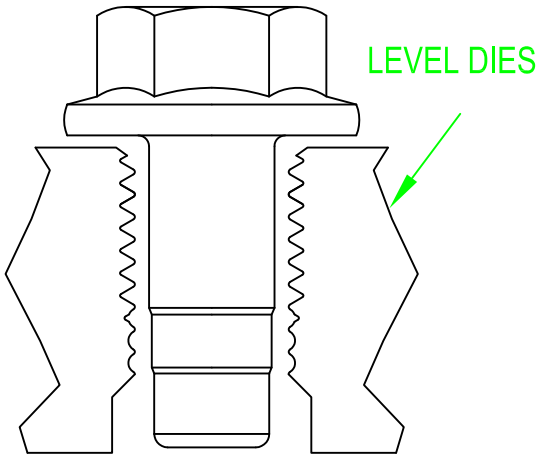
MAThread DIES ARE NOT LEVEL IN THREAD ROLLER



BAD SET-UP

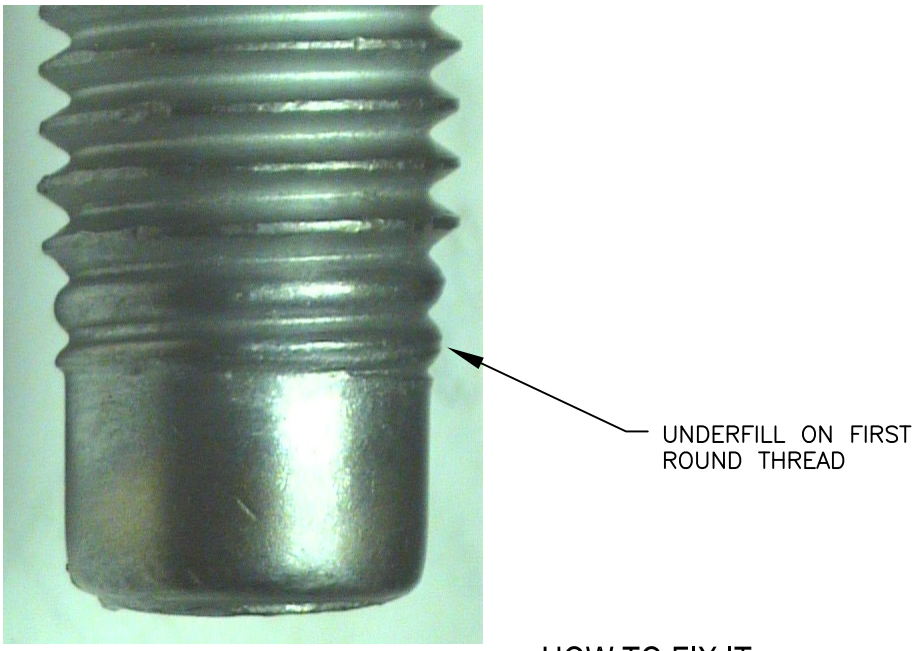


HOW TO FIX IT

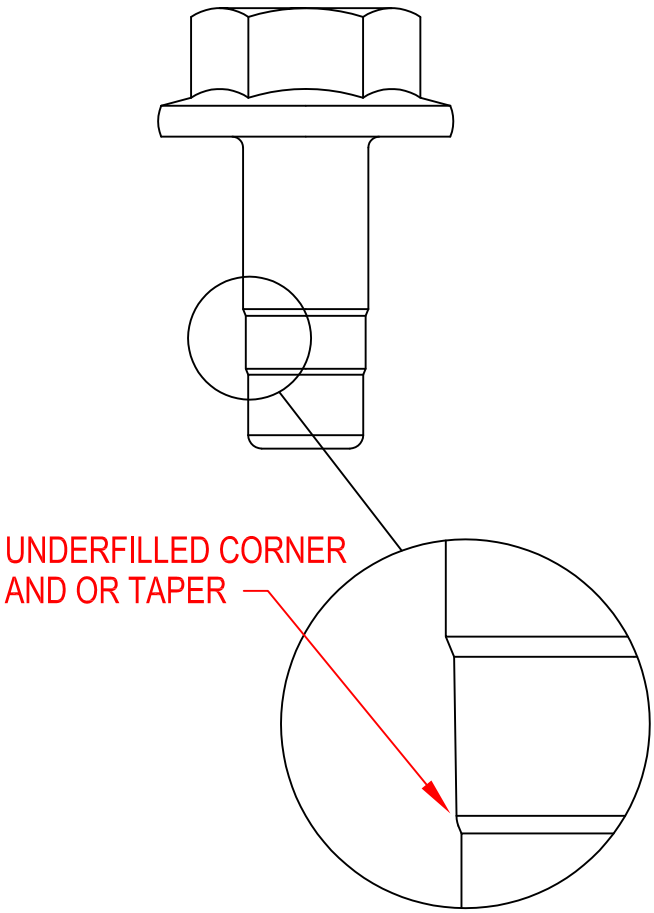


DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

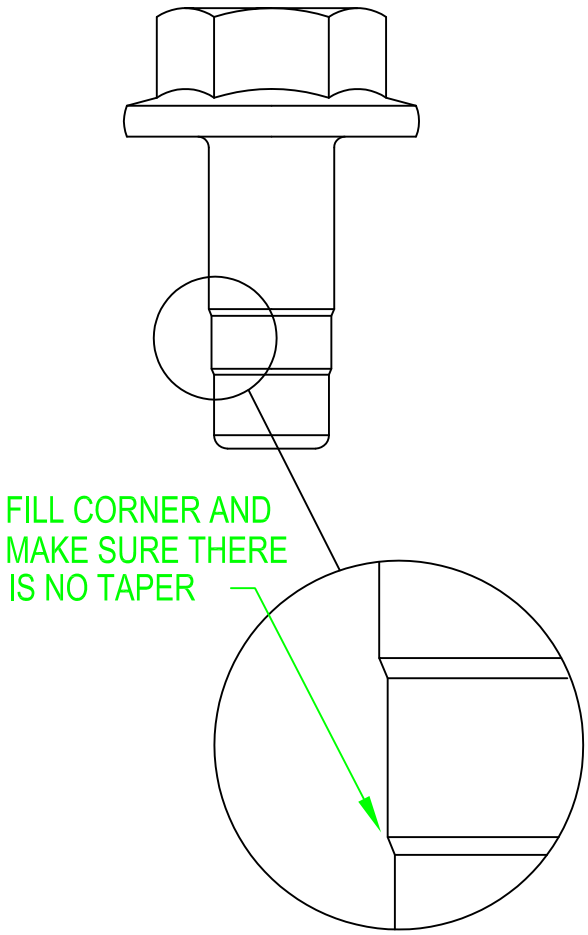
MATpoint FIRST ROUND THREAD IS NOT FULL



BAD BLANK



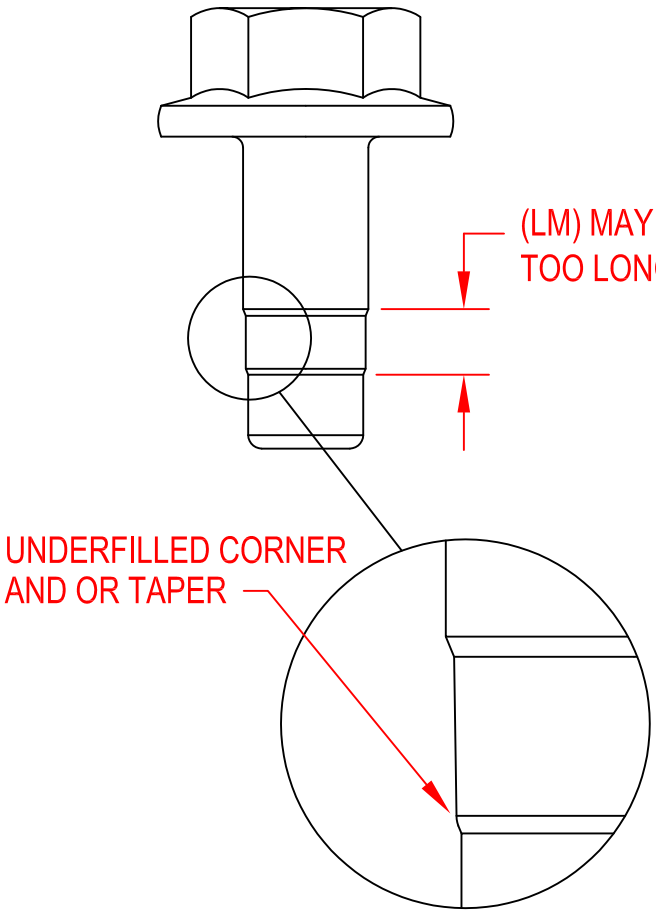
HOW TO FIX IT



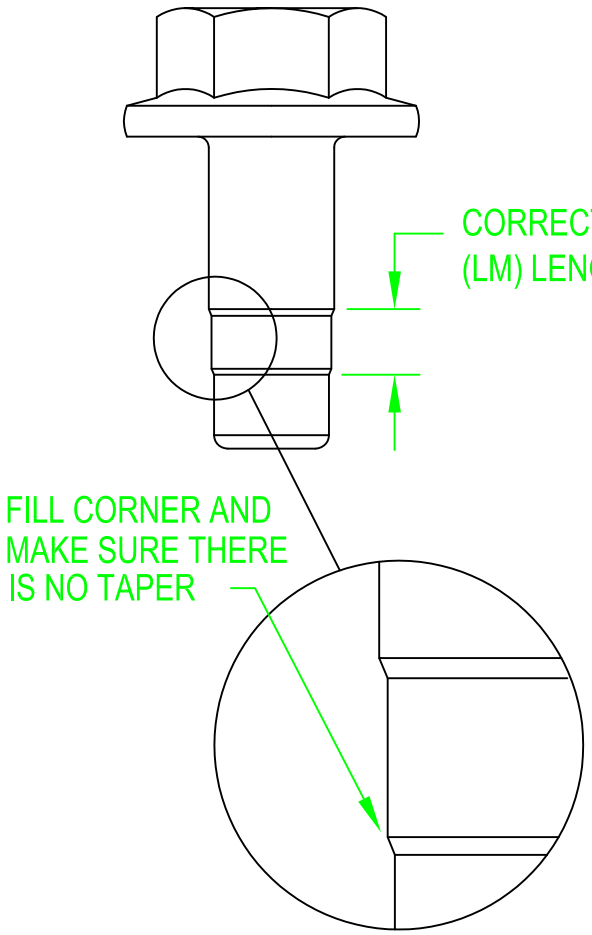
DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

MAThread FIRST ROUND THREAD IS NOT FULL

BAD BLANK



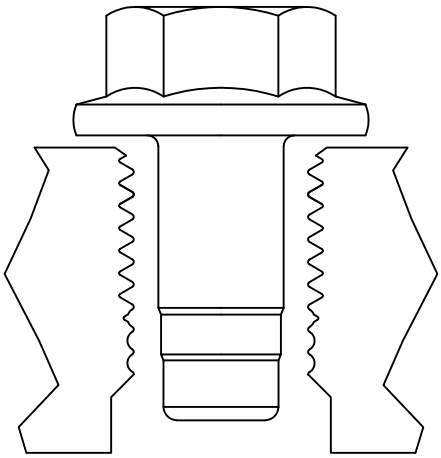
HOW TO FIX IT



DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

MATpoint part ROLLED with MATHREAD DIES

BAD SET-UP



HOW TO FIX IT

USE MATpoint THREAD ROLL DIES

DRAWINGS ABOVE ARE INTENDED ONLY AS VISUAL AIDS AND ARE NOT TO SCALE

MAThread® - RADIUSED DOG (PILOT) POINT

CRITICAL DESIGN INFORMATION

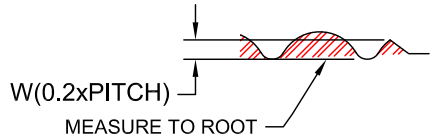
START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z4−T
SECONDARY: Lnom = Lf+U+T

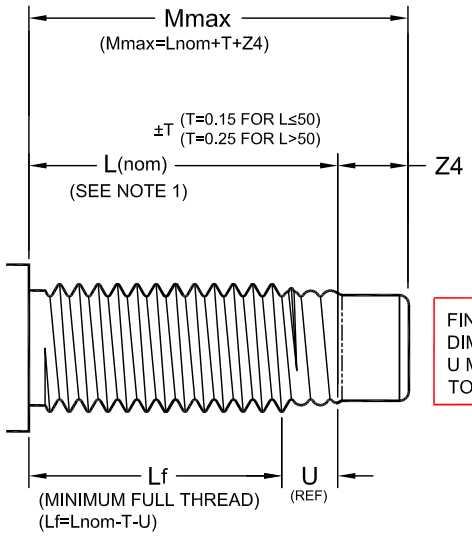
T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT COLSULTING MATHREAD

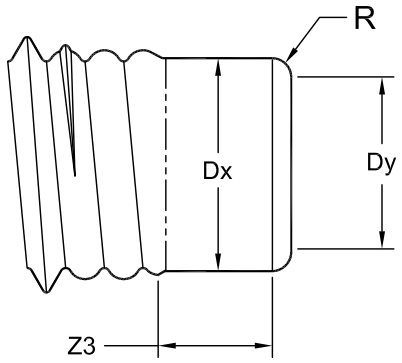


INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16−1984 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.



FINISHED PART DIMENSIONS Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



(SEE NOTE 4)

	THREAD SIZE & PITCH	R MIN	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	M4x.7	0.2	2.8	0.14	3.170 3.098	1.50	2.20	2.1
	M5x.8	0.4	3.2	0.16	4.030 3.954	1.80	2.60	2.4
	M6x1.0	0.5	3.9	0.20	4.800 4.724	2.00	3.10	3.0
	M8x1.25	0.7	5.1	0.25	6.540 6.447	2.70	4.20	3.8
	M10x1.5	1.5	5.3	0.30	8.230 8.143	3.20	5.50	4.5
	M12x1.75	2.0	6.0	0.35	9.950 9.880	4.20	6.60	5.3
	M14x2.0	2.5	6.7	0.40	11.720 11.604	5.00	7.90	6.0
	M16x2.0	3.0	8.7	0.40	13.720 13.609	6.00	9.90	6.0
	DIMENSIONS ARE IN MILLIMETERS (mm)							
FINE THREAD	M8x1.0	0.7	5.9	0.20	6.810 6.724	2.70	4.20	3.0
	M10x1.25	1.5	6.2	0.25	8.470 8.447	3.20	5.50	3.8
	M12x1.5	2.0	6.9	0.30	10.260 10.143	4.20	6.60	4.5
	M14x1.5	2.5	8.0	0.30	12.260 12.143	5.00	7.90	4.5
	M16x1.5	3.0	11.9	0.30	14.260 14.143	6.00	9.90	4.5

SEE PAGE 1.02 FOR PATENT INFORMATION

CRITICAL DESIGN INFORMATION

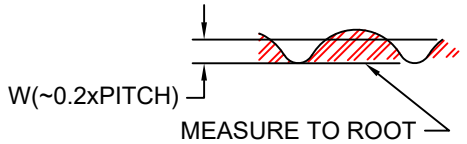
START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z4−T
SECONDARY: Lnom = Lf+U+T

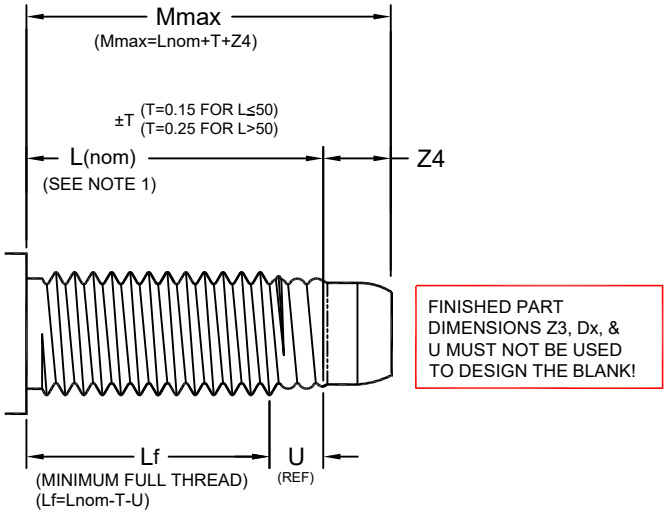
T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

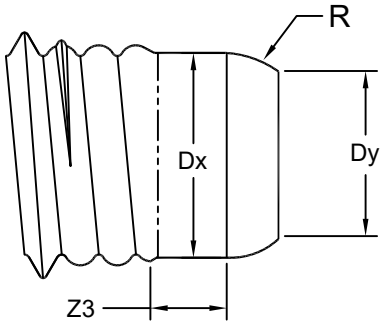


INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16−1984 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.



FINISHED PART DIMENSIONS Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



(SEE NOTE 4)

	THREAD SIZE & PITCH	R MIN	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	M4x.7	1.5	2.7	0.14	3.170 3.098	1.0	2.0	2.1
	M5x.8	1.9	3.4	0.16	4.030 3.954	1.2	2.5	2.4
	M6x1.0	2.3	4.1	0.20	4.800 4.724	1.7	3.0	3.0
	M8x1.25	3.0	5.4	0.25	6.540 6.447	2.4	4.3	3.8
	M10x1.5	3.8	6.8	0.30	8.230 8.143	2.9	5.5	4.5
	M12x1.75	4.6	8.2	0.35	9.950 9.880	3.7	6.6	5.3
	M14x2.0	5.4	9.6	0.40	11.720 11.604	4.0	7.9	6.0
	M16x2.0	6.0	11.5	0.40	13.720 13.609	4.2	7.9	6.0
	DIMENSIONS ARE IN MILLIMETERS (mm)							
FINE THREAD	M8x1.0	1.9	5.7	0.20	6.810 6.724	2.2	4.1	3.0
	M10x1.25	2.4	7.0	0.25	8.470 8.447	2.8	5.3	3.8
	M12x1.5	2.9	8.5	0.30	10.260 10.143	2.8	6.5	4.5
	M14x1.5	3.7	9.8	0.30	12.260 12.143	4.6	8.5	4.5
	M16x1.5	4.2	11.2	0.30	14.260 14.143	5.8	10.5	4.5

IMPORTANT NOTE: THIS DESIGN IS INTENDED TO MINIMIZE CROSS-THREADING UP TO 9 DEGREES AXIAL MISALIGNMENT. IT IS POSSIBLE (THOUGH VERY DIFFICULT) TO CROSS-THREAD THESE PARTS IF YOU NEED 100% EFFECTIVENESS, USE A STANDARD MATHREAD OR MATPOINT.

CRITICAL DESIGN INFORMATION

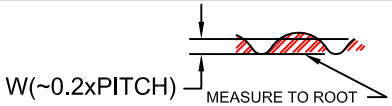
START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

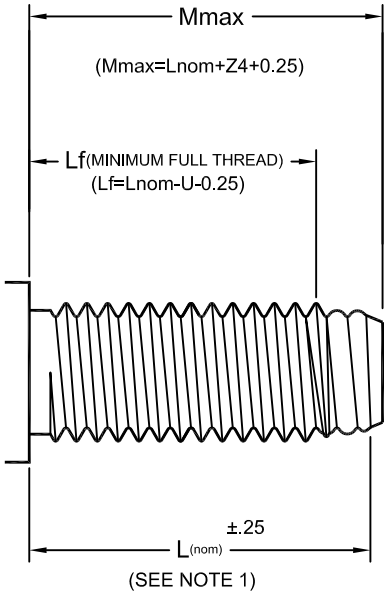
PREFERRED: Lnom = Mmax−Z4−0.25
SECONDARY: Lnom = Lf+U+0.25

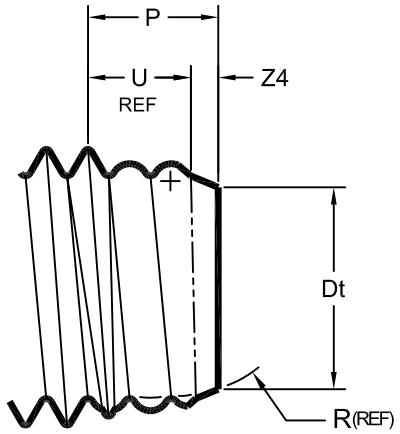
Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

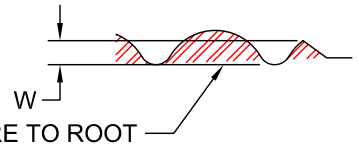


1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16−1984 BEFORE USE.





	THREAD SIZE & PITCH	Dt MAX	W ±.01	U REF	Z_4 REF	P MAX
COARSE THREAD	M4x.7	2.83	0.14	1.5	0.50	2.50
	M5x.8	3.70	0.16	1.8	0.50	2.80
	M6x1.0	4.30	0.20	2.3	0.65	3.45
	M8x1.25	5.99	0.25	2.8	0.90	4.20
	M10x1.5	7.64	0.30	3.4	1.00	4.90
	M12x1.75	9.30	0.35	4.0	1.30	5.80
	M14x2.0	10.98	0.40	4.5	1.20	6.20
	M16x2.0	12.98	0.40	4.5	1.20	6.20
	M18x2.5	14.30	0.50	5.6	1.50	7.60
	M20x2.5	16.30	0.50	5.6	1.50	7.60
	M22x2.5	18.30	0.50	5.6	1.50	7.60
	M24x2.0	20.98	0.40	4.5	1.20	6.20
	M28x2.0	24.98	0.40	4.5	1.20	6.20
	DIMENSIONS ARE IN MILLIMETERS (mm)					
FINE THREAD	M8x1.0	6.30	0.20	2.3	0.65	3.45
	M10x1.25	7.99	0.25	2.8	0.90	4.20
	M12x1.5	9.64	0.30	3.4	1.00	4.90
	M14x1.5	11.64	0.30	3.4	1.00	4.90
	M16x1.5	13.64	0.30	3.4	1.00	4.90
	M18x1.5	15.64	0.30	3.4	1.00	4.90
	M20x1.5	17.64	0.30	3.4	1.00	4.90
	M22x1.5	19.64	0.30	3.4	1.00	4.90
	M24x1.5	21.64	0.30	3.4	1.00	4.90
	M28x1.5	25.64	0.30	3.4	1.00	4.90

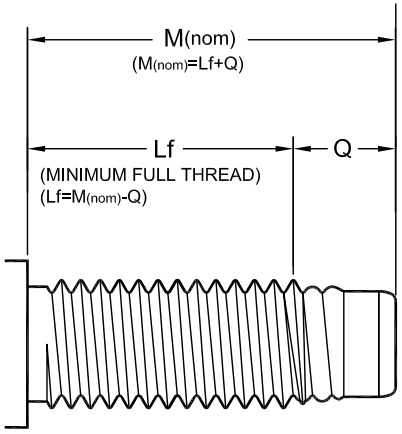


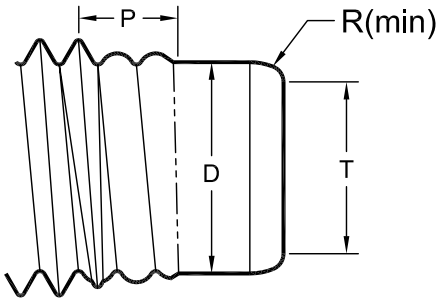
GAGING INFORMATION:

PARTS SHALL BE GAGED PER MAThread STANDARD PAGE 7.10:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M–1984 BEFORE USE.

REFERENCE ONLY - DO NOT USE FOR NEW DESIGN
USE ONLY FOR PRE - 2002 GENERAL MOTORS DRAWINGS
WHICH SPECIFY A "Q" DIMENSION WHICH MATCHES THE "Q" LISTED HERE





COARSE THREAD

THREAD SIZE & PITCH	R MIN	Dt MAX	W ±.01	T MAX	D	Q REF	P MAX
M5x.8	1.50	3.4	0.18	3.4	4.03 3.87	3.8	2.6
M6x1.0	1.80	4.1	0.20	4.1	4.80 4.59	4.5	2.9
M8x1.25	2.30	5.4	0.25	5.4	6.48 6.27	6.0	3.6
M10x1.5	2.80	6.8	0.30	5.8	8.23 7.94	7.5	4.2
M12x1.75	3.30	8.2	0.35	8.2	9.95 9.62	9.0	5.0
M14x2.0	4.10	9.6	0.40	9.6	11.72 11.30	10.5	5.6
M16x2.0	4.70	10.9	0.40	10.9	13.90 13.30	12.0	5.6

DIMENSIONS ARE IN MILLIMETERS (mm)

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

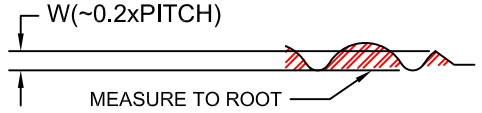
IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

PREFERRED: Lnom = Mmax−Z4−T
SECONDARY: Lnom = Lf+U+T

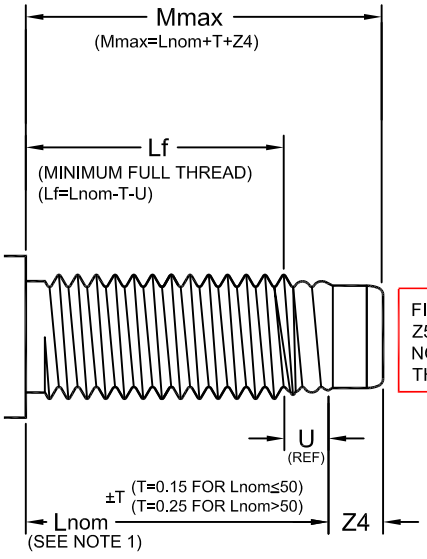
T = 0.15 FOR Lnom SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR Lnom GREATER THAN 50mm

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

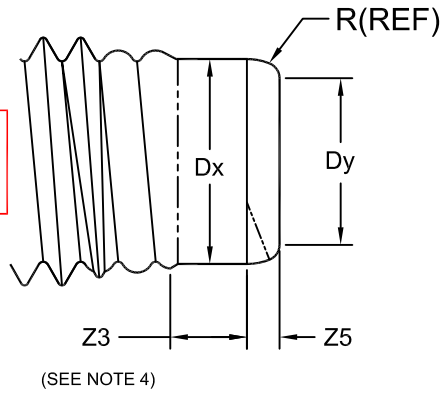
INSPECTION INFORMATION:



1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16−1984 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT



FINISHED PART DIMENSIONS Z5, Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



	THREAD SIZE & PITCH	R REF	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	Z5 MIN	U REF
COARSE THREAD	M4x.7	1.2	2.7	0.14	3.170 3.098	1.20	2.40	0.50	1.5
	M5x.8	1.5	3.4	0.16	4.030 3.954	1.30	2.50	0.60	1.8
	M6x1.0	1.8	4.0	0.20	4.800 4.724	1.50	2.85	0.75	2.3
	M8x1.25	2.3	5.5	0.25	6.540 6.447	2.10	3.90	1.00	2.8
	M10x1.5	2.8	6.8	0.30	8.230 8.143	2.60	4.65	1.25	3.4
	M12x1.75	3.3	8.2	0.35	9.950 9.880	3.15	5.65	1.50	4.0
	M14x2.0	4.1	9.6	0.40	11.720 11.604	3.68	6.43	1.75	4.5
	M16x2.0	4.7	10.9	0.40	13.720 13.609	4.10	7.10	2.00	4.5
	M18x2.5	5.2	12.2	0.50	15.172 15.057	4.40	8.50	2.75	5.6
	M20x2.5	6.0	13.3	0.50	17.172 17.057	4.65	8.80	3.12	5.6
	DIMENSIONS ARE IN MILLIMETERS (mm)								
FINE THREAD	M8x1.0	2.5	6.0	0.20	6.810 6.724	2.10	3.90	1.00	2.3
	M10x1.25	3.0	7.5	0.25	8.540 8.447	2.60	4.85	1.25	2.8
	M12x1.5	3.5	8.8	0.30	10.260 10.143	3.15	6.00	1.50	3.4
	M14x1.5	4.3	10.8	0.30	12.260 12.143	3.68	6.55	1.75	3.4
	M16x1.5	4.9	12.8	0.30	14.260 14.143	4.10	7.20	2.00	3.4
	M18x1.5	5.4	13.7	0.30	16.260 16.143	4.40	8.50	2.75	3.4
	M20x1.5	6.2	15.8	0.30	18.260 18.143	4.65	8.80	3.15	3.4

Customer Design Standards

MATpoint®/ GM HOLDEN SPECIAL - LONG
(GMW3362 Type D)

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

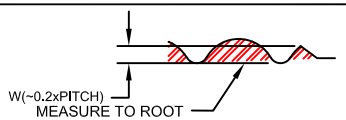
PREFERRED: Lnom = Mmax−Z_4−T
SECONDARY: Lnom = Lf+U+T

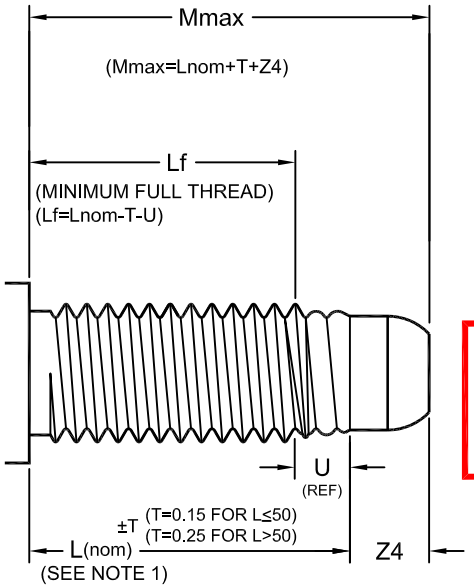
T = 0.15 FOR L(nom) SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR L(nom) LONGER THAN 50mm

Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

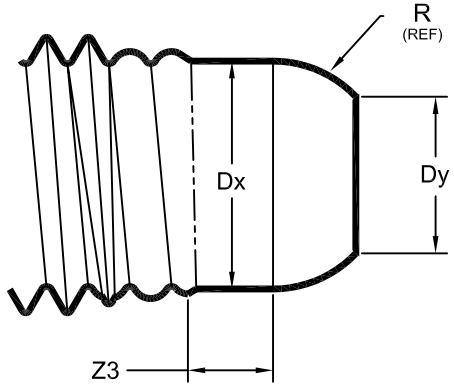
INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16−1984 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.





FINISHED PART DIMENSIONS Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



(SEE NOTE 4)

	THREAD SIZE & PITCH	R (REF)	Dy MAX	W +.01 -.01	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	M4x.7	2.4	1.6	0.14	3.170 3.098	1.90	4.10	1.50
	M5x.8	3.1	2.0	0.16	4.030 3.954	2.10	4.90	1.80
	M6x1.0	3.6	2.4	0.20	4.800 4.724	2.40	6.30	2.30
	M8x1.25	4.9	3.3	0.25	6.540 6.447	3.20	7.20	2.80
	M10x1.5	6.1	4.2	0.30	8.230 8.143	3.50	8.50	3.40
	M12x1.75	7.4	5.0	0.35	9.950 9.880	3.90	10.40	4.00
	M14x2.0	8.7	5.8	0.40	11.720 11.604	4.30	11.30	4.50
	M16x2.0	10.3	6.5	0.40	13.720 13.609	4.70	13.00	4.50
	M18x2.5	11.0	7.8	0.50	15.172 15.057	5.40	14.50	5.60
	M20x2.5	12.0	8.6	0.50	17.172 17.057	5.90	16.10	5.60
	M22x2.5	13.3	9.5	0.50	19.172 19.057	6.40	17.70	5.60
	DIMENSIONS ARE IN MILLIMETERS (mm)							
FINE THREAD	M8x1.0	4.9	3.58	0.20	6.810 6.724	3.20	7.20	2.30
	M10x1.25	6.1	4.45	0.25	8.540 8.447	3.50	8.50	2.80
	M12x1.5	7.4	5.30	0.30	10.260 10.143	3.90	10.40	3.40
	M14x1.5	8.7	6.38	0.30	12.260 12.143	4.30	11.30	3.40
	M16x1.5	10.3	7.10	0.30	14.260 14.143	4.70	13.00	3.40
	M18x1.5	11.0	8.90	0.30	16.260 16.143	5.40	14.50	3.40
	M20x1.5	12.0	9.70	0.30	18.260 18.143	5.90	16.10	3.40

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Bmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

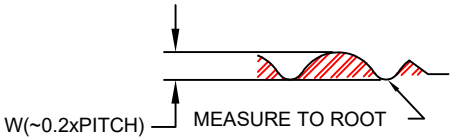
PREFERRED: Lnom = Bmax−Z4−T
SECONDARY: Lnom = Lf+M+T

T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATELY REACHES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART

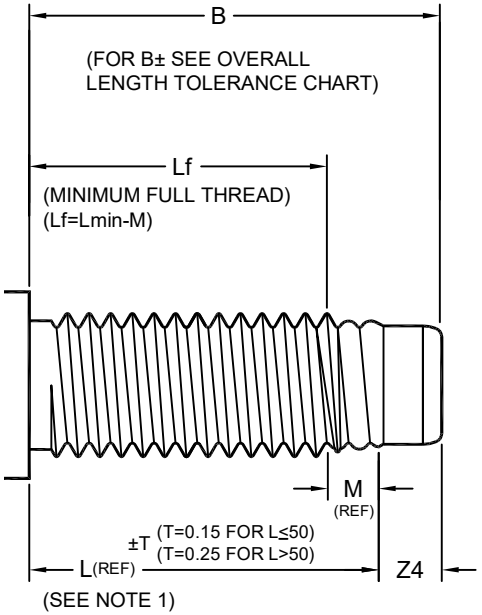


THREAD SIZE & PITCH	PR REF	D_y MAX	W +.01 -.01	D_x	Z_3 MIN	Z_4 REF	Z_5 MIN	M REF
M3.0x.5	0.8	2.00	0.10	2.400 2.334	1.20	2.10	0.40	1.13
M3.5x.6	1.0	2.36	0.12	2.771 2.699	1.20	2.20	0.45	1.35
M4x.7	1.2	2.7	0.14	3.170 3.098	1.20	2.40	0.50	1.50
M5x.8	1.5	3.4	0.16	4.030 3.954	1.65	2.50	0.60	1.80
M6x1.0	1.8	4.1	0.20	4.800 4.724	1.75	2.85	0.75	2.30
M8x1.25	2.3	5.4	0.25	6.540 6.447	2.49	3.90	1.00	2.80
M10x1.25	3.0	7.5	0.25	8.540 8.447	2.60	4.05	1.25	2.80
M10x1.5	2.8	6.8	0.30	8.230 8.143	3.15	4.65	1.25	3.40
M12x1.5	3.3	8.2	0.30	10.230 10.143	3.94	5.65	1.50	3.40
M12x1.75	3.3	8.2	0.35	9.950 9.880	3.15	5.65	1.50	4.00
M14x1.5	4.1	9.5	0.30	12.230 12.143	4.18	6.43	1.75	3.40
M14x2.0	4.1	9.6	0.40	11.720 11.604	3.68	6.43	1.75	4.50
M16x1.5	4.9	12.8	0.30	14.260 14.143	4.10	6.60	2.00	3.40
M16x2.0	4.7	10.9	0.40	13.720 13.609	4.10	7.10	2.00	4.50
M18x1.5	5.4	13.7	0.30	16.260 16.143	4.40	8.50	2.75	3.40
M18x2.5	5.2	12.2	0.50	15.172 15.057	4.40	8.50	2.75	5.60
M20x1.5	6.2	15.8	0.30	18.260 18.143	4.65	8.80	3.15	3.40
M20x2.5	6.0	13.3	0.50	17.172 17.057	4.65	8.80	3.21	5.60
M22x1.5	6.4	16.4	0.30	20.260 20.143	4.90	9.00	3.40	3.40
M22x2.5	6.2	15.8	0.50	19.172 19.057	4.90	9.20	3.40	5.60

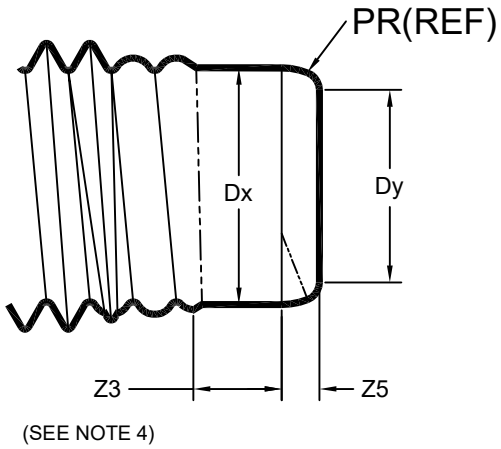
DIMENSIONS ARE IN MILLIMETERS (mm)

OVERALL LENGTH TOLERANCE CHART - Reference js15 ISO 4759-1

Nom Bolt Length, mm		TOLERANCE	Nom Bolt Length, mm		TOLERANCE
TO 3,	incl	±0.20	>30 TO 50,	incl	±0.50
>3 TO 6,	incl	±0.24	>50 TO 80,	incl	±0.60
>6 TO 10,	incl	±0.29	>80 TO 120	incl	±0.70
>10 TO 18,	incl	±0.35	>120 TO 180	incl	±0.80
>18 TO 30,	incl	±0.42	>180 TO 250	incl	±0.925



FINISHED PART DIMENSIONS Z5, Z3, Dx, & M MUST NOT BE USED TO DESIGN THE BLANK!



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CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

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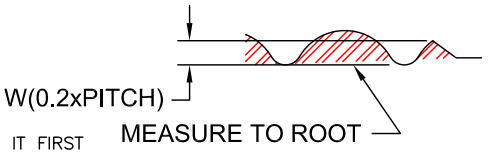
PREFERRED: Lnom = Bmax−Z4−T
SECONDARY: Lnom = Lf+M+T

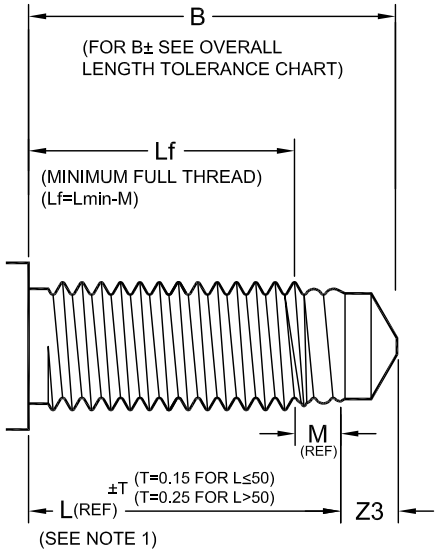
T = 0.15 FOR PARTS SHORTER OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

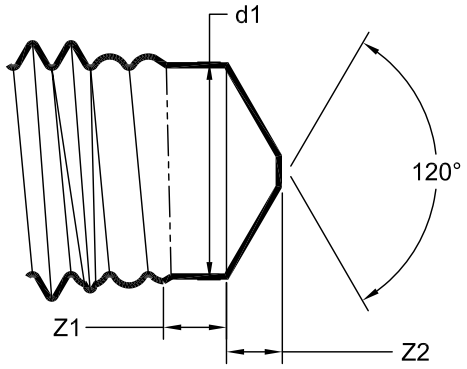
INSPECTION INFORMATION:

1. Lref ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B 1.16−1984 BEFORE USE.





FINISHED PART DIMENSIONS Z1, Z2, Z3, D1 & M MUST NOT BE USED TO DESIGN THE BLANK!



METRIC

THREAD SIZE & PITCH	W ±.01	d_1	Z_1 MIN	Z_3 REF	Z_2 MAX	M REF
M5x0.8	0.16	3.95	1.40	2.25	0.85	1.80
M6x1.0	0.20	4.70	1.75	2.82	1.07	2.25
M7x1.0	0.20	5.70	1.75	2.82	1.07	2.25
M8x1.25	0.25	6.41	2.19	3.75	1.56	2.81
M10x1.5	0.30	8.09	2.63	4.67	2.05	3.38
M12x1.5	0.30	10.09	3.76	6.30	2.54	3.38
M14x1.5	0.30	12.09	3.94	6.90	2.96	3.38

ALL DIMENSIONS ARE IN MILLIMETERS (MM)

INCH

THREAD SIZE & PITCH	W	D_1	Z_1 MIN	Z_3 REF	Z_2 MAX	M REF
7/16-20	0.25	9.57	2.22	4.70	2.47	2.86

OVERALL LENGTH TOLERANCE CHART

Nom Bolt Length, mm		Nom Bolt Size Range M5	M6	M7	M8	M10	M12	M14	7/16-20
UP TO 10,	incl	0.29	0.29	0.29	-	-	-	-	-
10 TO 18,	incl	0.35	0.35	0.35	0.35	-	-	-	-
18 TO 30,	incl	0.42	0.42	0.42	0.42	0.42	0.42	-	-
30 TO 50,	incl	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
50 TO 80,	incl	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
80 TO 120	incl	-	-	-	0.7	0.7	0.7	0.7	0.7
120 TO 200	incl	-	-	-	-	0.8	0.8	0.8	0.8

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SECONDARY: Lnom = Lf+U+T

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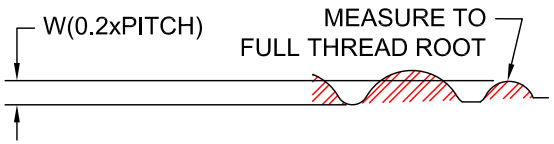
T = 0.25 FOR PARTS LONGER THAN 50mm

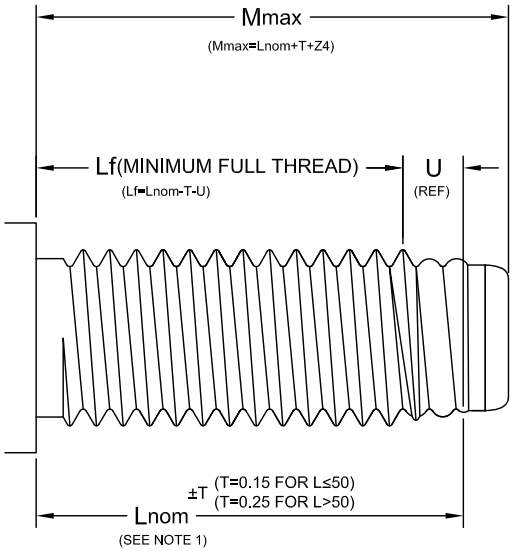
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD



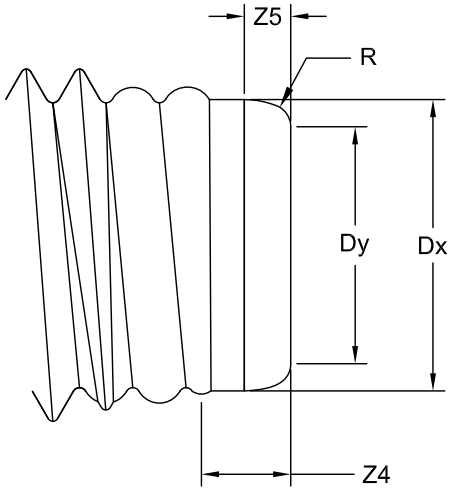
INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF STANDARD PROFILE THREAD. (see sketch above) NOTE THAT TOLERANCE ON Lnom ON THREAD−ROLLED PARTS, IS DIFFERENT THAN TOLERANCE ON HEADED PARTS.
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. LAST TURN OF LEAD THREAD MUST HAVE ESSENTIALLY LINEAR REDUCTION IN HEIGHT AND SMOOTH CONTOUR SIMILAR TO FULL HEIGHT RADIUS THREAD



FINISHED PART DIMENSIONS Z5, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



	THREAD SIZE & PITCH	R REF	Dy MAX	Z5 MIN	Dx MAX	Z_4 MAX	W +.01 -.01	U REF
COARSE THREAD	M4x.7	1.2	2.7	0.50	3.17	1.08	0.14	1.50
	M5x.8	1.5	3.4	0.60	4.03	1.37	0.16	1.80
	M6x1.0	1.8	4.0	0.75	4.80	1.45	0.20	2.30
	M8x1.25	2.3	5.5	1.00	6.54	1.90	0.25	2.80
	M10x1.5	2.8	6.8	1.25	8.23	2.51	0.30	3.40
	M12x1.75	3.3	8.2	1.50	9.95	3.12	0.35	4.00
	M14x2.0	4.1	9.6	1.75	11.72	3.38	0.40	4.50
	M16x2.0	4.7	10.9	2.00	13.72	3.64	0.40	4.50
	DIMENSIONS ARE IN MILLIMETERS (mm)							
FINE THREAD	M8x1.0	2.5	6.0	1.00	6.81	1.90	0.20	2.30
	M10x1.25	3.0	7.5	1.25	8.54	2.28	0.25	2.80
	M12x1.5	3.5	8.8	1.50	10.26	2.76	0.30	3.40
	M14x1.5	4.3	10.8	1.75	12.26	3.17	0.30	3.40
	M16x1.5	4.9	12.8	2.00	14.26	3.56	0.30	3.40

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

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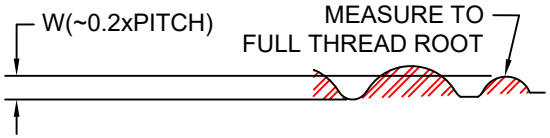
PREFERRED: Lnom = Mmax−Z4−T
SECONDARY: Lnom = Lf+U+T

T = 0.15 FOR PARTS SHORTER THAN OR EQUAL TO 50mm
T = 0.25 FOR PARTS LONGER THAN 50mm

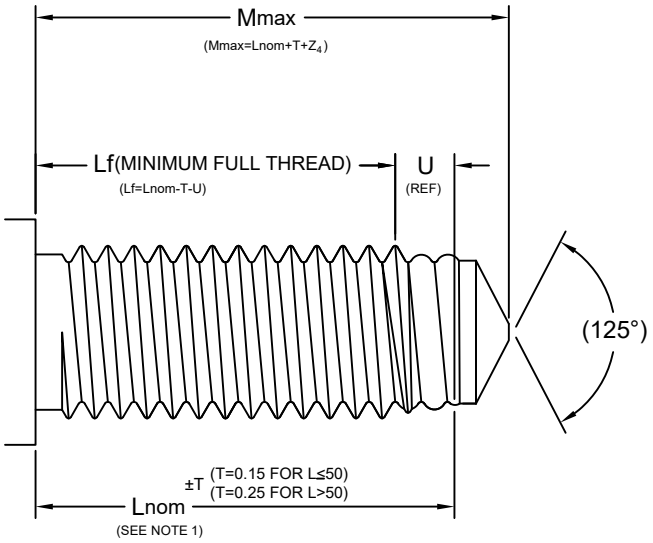
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

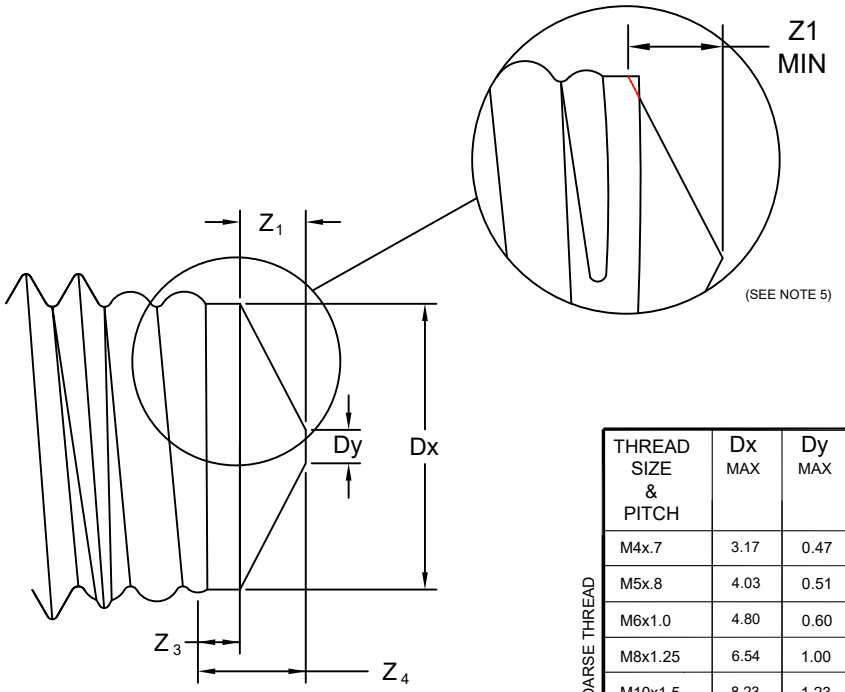


INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF STANDARD PROFILE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. LAST TURN OF LEAD THREAD MUST HAVE ESSENTIALLY LINEAR REDUCTION IN HEIGHT AND SMOOTH CONTOUR SIMILAR TO FULL HEIGHT RADIUS THREAD
5. MEASUREMENT OF THE Z1 DIMENSION SHALL BE FROM THE END OF THE PART TO THE THEORETICAL INTERSECTION OF Dx





COARSE THREAD

THREAD SIZE & PITCH	Dx MAX	Dy MAX	Z_1 MIN	Z_3 MIN	Z_4 MAX	W +.01 -.01	U REF
M4x.7	3.17	0.47	0.70	0.24	1.15	0.14	1.5
M5x.8	4.03	0.51	0.90	0.25	1.36	0.16	1.8
M6x1.0	4.80	0.60	1.09	0.27	1.60	0.20	2.3
M8x1.25	6.54	1.00	1.30	0.40	2.00	0.25	2.8
M10x1.5	8.23	1.23	1.82	0.47	2.70	0.30	3.4
M12x1.75	9.95	1.50	2.20	0.57	3.27	0.35	4.0
M14x2.0	11.72	1.75	2.60	0.63	3.81	0.40	4.5
M16x2.0	13.72	2.05	3.03	0.67	4.37	0.40	4.5

DIMENSIONS ARE IN MILLIMETERS (mm)

CRITICAL DESIGN INFORMATION

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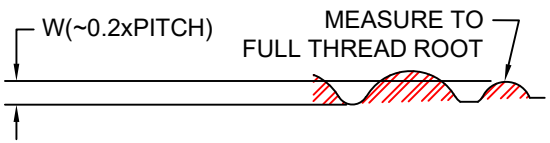
T = 0.25 FOR PARTS LONGER THAN 50mm

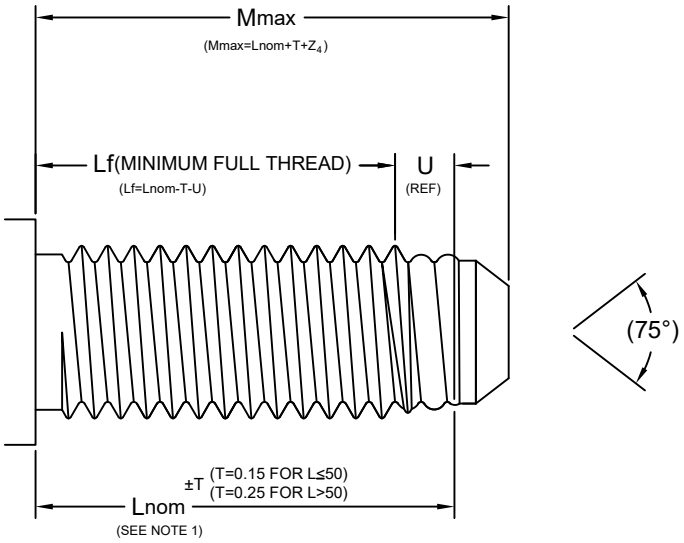
Lnom MUST BE ON EVERY PART AND BLANK DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

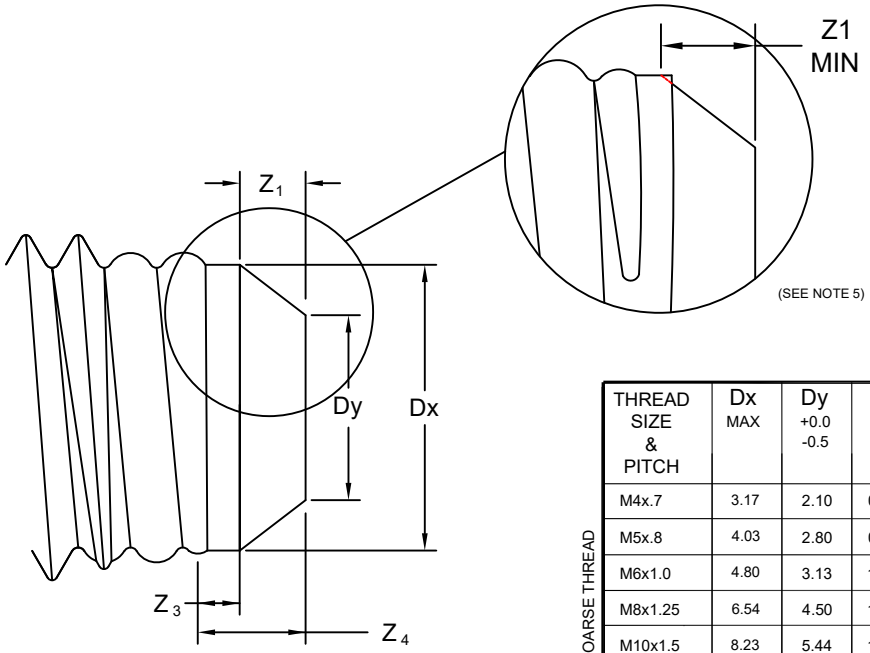


INSPECTION INFORMATION:

PARTS SHALL BE INSPECTED PER SECTION 7:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT APPROXIMATES A HEIGHT OF 'W' (~0.2xPITCH) WHEN MEASURED FROM THE ROOT OF STANDARD PROFILE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO" GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.16M−1984 BEFORE USE.
4. LAST TURN OF LEAD THREAD MUST HAVE ESSENTIALLY LINEAR REDUCTION IN HEIGHT AND SMOOTH CONTOUR SIMILAR TO FULL HEIGHT RADIUS THREAD
5. MEASUREMENT OF THE Z1 DIMENSION SHALL BE FROM THE END OF THE PART TO THE THEORETICAL INTERSECTION OF Dx





COARSE THREAD

THREAD SIZE & PITCH	Dx MAX	Dy +0.0 -0.5	Z_1 MIN	Z_3 MIN	Z_4 MAX	W +.01 -.01	U REF
M4x.7	3.17	2.10	0.70	0.24	1.15	0.14	1.5
M5x.8	4.03	2.80	0.90	0.25	1.36	0.16	1.8
M6x1.0	4.80	3.13	1.09	0.27	1.60	0.20	2.3
M8x1.25	6.54	4.50	1.30	0.40	2.00	0.25	2.8
M10x1.5	8.23	5.44	1.82	0.47	2.70	0.30	3.4
M12x1.75	9.95	6.58	2.20	0.57	3.27	0.35	4.0
M14x2.0	11.72	7.73	2.60	0.63	3.81	0.40	4.5
M16x2.0	13.72	9.08	3.03	0.67	4.37	0.40	4.5

DIMENSIONS ARE IN MILLIMETERS (mm)

MAThread® - RADIUSED DOG (PILOT) POINT

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

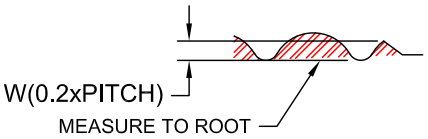
IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

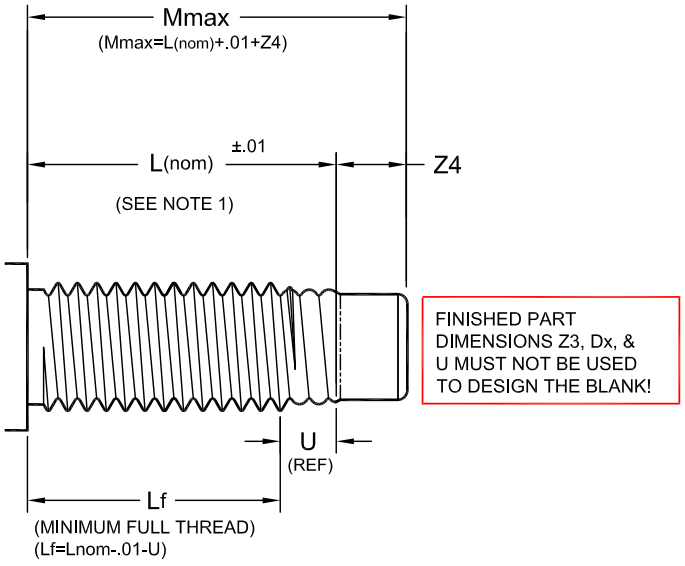
PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+U+.01

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

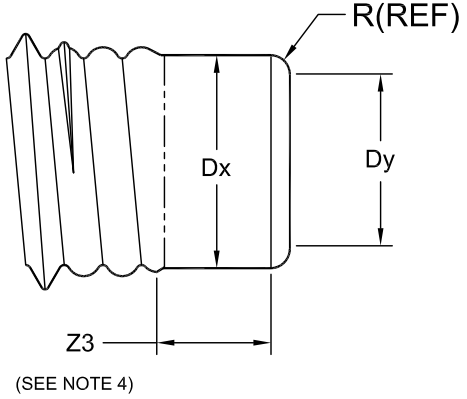
INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.





FINISHED PART DIMENSIONS Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



	THREAD SIZE & PITCH	R MIN.	Dy MAX	W ±.0004	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	1/4-20	0.02	.154	.0100	.189 .193	.065	.100	.150
	5/16-18	0.03	.190	.0111	.245 .249	.085	.130	.167
	3/8-16	0.05	.205	.0125	.301 .305	.115	.180	.188
	7/16-14	0.07	.220	.0143	.352 .356	.135	.220	.214
	1/2-13	0.08	.260	.0154	.409 .413	.165	.260	.231
	9/16-12	0.10	.275	.0167	.464 .468	.180	.295	.250
	5/8-11	0.12	.290	.0182	.519 .523	.215	.350	.273
	DIMENSIONS ARE IN ENGLISH (inch)							
FINE THREAD	1/4-28	0.02	.174	.0071	.204 .208	.093	.150	.108
	5/16-24	0.03	.217	.0083	.259 .263	.117	.195	.125
	3/8-24	0.04	.272	.0083	.322 .326	.180	.276	.125
	7/16-20	0.06	.325	.0100	.375 .379	.197	.295	.150
	1/2-20	0.07	.365	.0100	.438 .442	.240	.358	.150
	9/16-18	0.09	.414	.0111	.494 .498	.275	.404	.167
	5/8-18	0.10	.474	.0111	.557 .561	.308	.466	.167

SEE PAGE 1.02 FOR PATENT INFORMATION

MAThread® - TYPE 'P' POINT - LONG

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

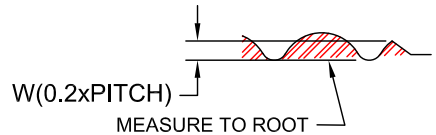
IF "Lnom" IS NOT GIVEN ON THE CUSTOMER DRAWING, USE EITHER THE MAXIMUM LENGTH (Mmax) OR MINIMUM FULL THREAD LENGTH (Lf) FROM THE CUSTOMER DRAWING TO CALCULATE IT USING ONE OF THE FOLLOWING EQUATIONS

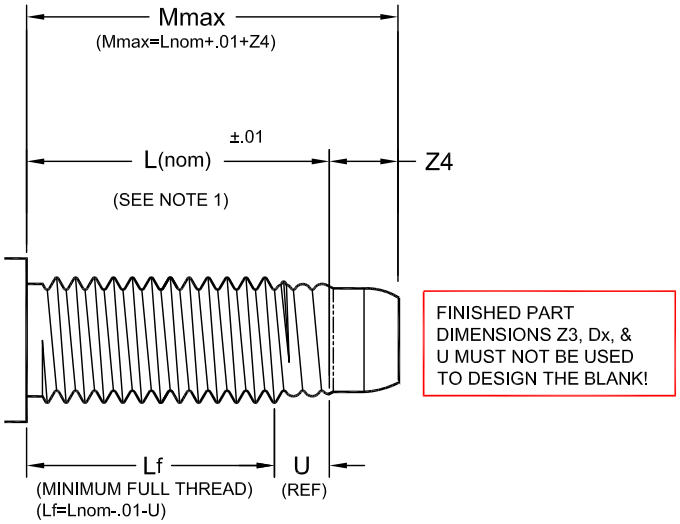
PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+U+.01

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

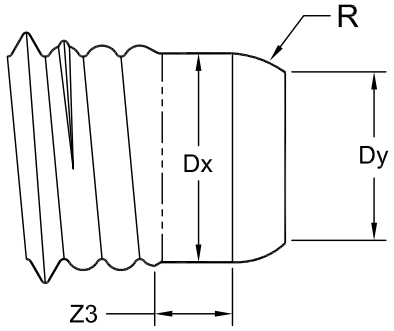
INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT.





FINISHED PART DIMENSIONS Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



(SEE NOTE 4)

	THREAD SIZE & PITCH	R MIN.	Dy MAX	W ±.0004	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	1/4-20	.080	.154	.0100	.189 .193	.065	.150	.150
	5/16-18	.100	.190	.0111	.245 .249	.085	.200	.167
	3/8-16	.120	.205	.0125	.301 .305	.105	.240	.188
	7/16-14	.145	.220	.0143	.352 .356	.130	.300	.214
	1/2-13	.175	.260	.0154	.409 .413	.160	.350	.231
	9/16-12	.205	.275	.0167	.464 .468	.190	.410	.250
	5/8-11	.245	.290	.0182	.519 .523	.230	.480	.273
	DIMENSIONS ARE IN ENGLISH (inch)							
FINE THREAD	1/4-28	0.10	.174	.0071	.204 .208	.090	.150	.108
	5/16-24	0.12	.217	.0083	.259 .263	.120	.200	.125
	3/8-24	0.16	.272	.0083	.322 .326	.135	.250	.125
	7/16-20	0.18	.325	.0100	.375 .379	.160	.275	.150
	1/2-20	0.21	.365	.0100	.438 .442	.190	.338	.150
	9/16-18	0.24	.414	.0111	.494 .498	.220	.384	.167
	5/8-18	0.27	.474	.0111	.557 .561	.260	.446	.167

SEE PAGE 1.02 FOR PATENT INFORMATION

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

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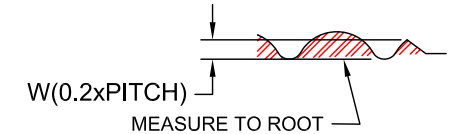
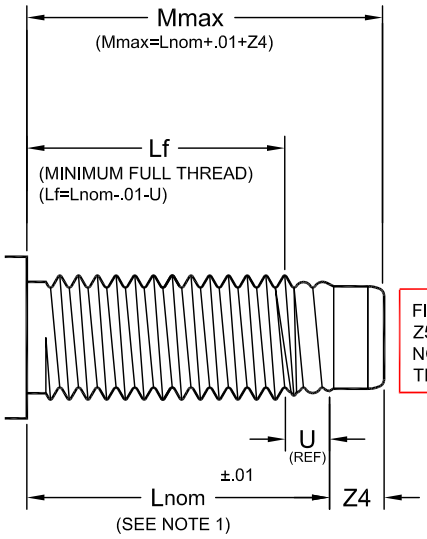
PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+U+.01

Lnom MUST BE ON EVERY PART DRAWING
DO NOT CHANGE ANY DIMENSION GIVEN WITHOUT CONSULTING MATHREAD

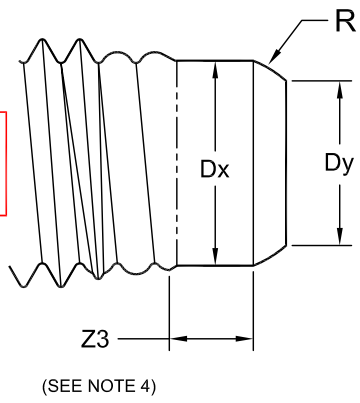


INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MATpoint SHALL HAVE A MINIMUM OF 1.0 COMPLETE TURN OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, THREE COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO GAGE MUST COMPLETELY PASS OVER MATpoint SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.
4. "Z3" MUST BE MEASURED TO TANGENT POINT OF 'R', USING MAThread APPROVED RADIUS CHART FROM POINT "W" TO TANGENT



FINISHED PART DIMENSIONS Z5, Z3, Dx, & U MUST NOT BE USED TO DESIGN THE BLANK!



(SEE NOTE 4)

	THREAD SIZE & PITCH	R +.000 -.005	Dy MAX	W +.0004 -.0004	Dx	Z_3 MIN	Z_4 MAX	U REF
COARSE THREAD	1/4-20	.105	.160	.0100	.193 .189	.062	.110	.113
	5/16-18	.135	.210	.0111	.249 .245	.089	.160	.125
	3/8-16	.165	.255	.0125	.305 .301	.127	.195	.141
	7/16-14	.185	.300	.0143	.356 .352	.152	.240	.161
	1/2-13	.215	.350	.0154	.413 .409	.182	.275	.173
	9/16-12	.245	.395	.0167	.468 .464	.212	.310	.188
	5/8-11	.275	.440	.0182	.523 .519	.252	.360	.205
	DIMENSIONS ARE IN INCHES (in)							
FINE THREAD	1/4-28	.115	.174	.0071	.208 .204	.062	.123	.080
	5/16-24	.145	.217	.0083	.263 .259	.087	.162	.094
	3/8-24	.175	.272	.0083	.326 .322	.127	.212	.094
	7/16-20	.195	.325	.0100	.379 .375	.152	.241	.113
	1/2-20	.235	.365	.0100	.442 .438	.182	.295	.113
	9/16-18	.255	.414	.0111	.498 .494	.212	.313	.125
	5/8-18	.295	.474	.0111	.561 .557	.252	.381	.125

IMPORTANT NOTE: THIS DESIGN IS INTENDED TO MINIMIZE CROSS-THREADING UP TO 9 DEGREES AXIAL MISALIGNMENT. IT IS POSSIBLE (THOUGH VERY DIFFICULT) TO CROSS-THREAD THESE PARTS IF YOU NEED 100% EFFECTIVENESS, USE A STANDARD MATHREAD OR MATPOINT.

CRITICAL DESIGN INFORMATION

START EVERY DESIGN BY FINDING "Lnom"

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PREFERRED: Lnom = Mmax−Z4−.01
SECONDARY: Lnom = Lf+M+.01

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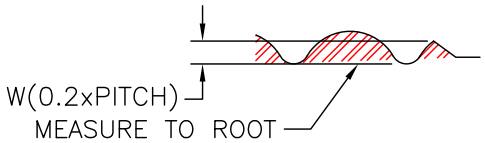
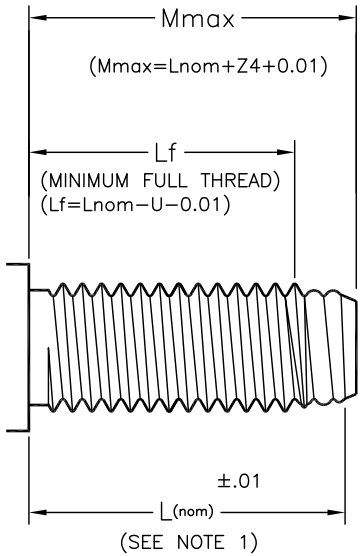
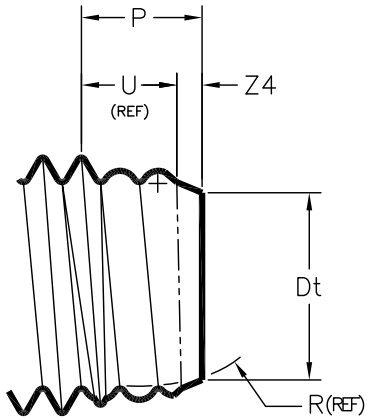
INSPECTION INFORMATION:

1. Lnom ON ROLLED PART IS MEASURED TO THE POINT ON THE LEAD THREAD WHERE IT FIRST REACHES A HEIGHT OF 'W' (0.2xPITCH) WHEN MEASURED FROM THE ROOT OF THE THREAD. (see sketch above)
2. MAThread SHALL HAVE A MINIMUM OF 1.5 COMPLETE TURNS OF RADIUSED THREAD. THREAD MUST BE FULLY FORMED, WITH NO UNDER FILL (FLATS, FISSURES) AT PEAK OF THREAD. WHEN VIEWED IN THE DESIGNATED INSPECTION POSITION, FOUR COMPLETE RADIUSED THREAD PROFILES MUST BE VISIBLE.
3. APPROPRIATE "GO GAGE MUST COMPLETELY PASS OVER MAThread SECTION OF THREAD WITH MINIMAL DRAG BEFORE PLATING. GAGE MUST HAVE MINOR DIAMETER VERIFIED TO ANSI/ASME B1.2−1983 BEFORE USE.







	THREAD SIZE & PITCH	Dt MAX	W ±.0004	P MAX	Z_4 REF	U REF
COARSE THREAD	1/4−20	.170	.0100	.163	.025	.113
	5/16−18	.220	.0111	.188	.030	.125
	3/8−16	.273	.0125	.205	.035	.141
	7/16−14	.321	.0143	.225	.040	.161
	1/2−13	.376	.0154	.245	.043	.173
	9/16−12	.450	.0167	.275	.050	.188
	5/8−11	.470	.0182	.300	.053	.205
	DIMENSIONS ARE IN ENGLISH (inch)					
FINE THREAD	1/4−28	.185	.0071	.133	.020	.080
	5/16−24	.235	.0083	.150	.023	.094
	3/8−24	.298	.0083	.150	.023	.094
	7/16−20	.358	.0100	.163	.025	.113
	1/2−20	.420	.0100	.163	.025	.113
	9/16−18	.470	.0111	.188	.030	.125
	5/8−18	.533	.0111	.188	.030	.125

REVISION UPDATE LIST

SUBJECT	REV	PAGE
INDEX ADD NEW PAGES TO INDEX	WAS AS NOW AT	1.01 5/1/18
MATHREAD VERY SHORT RE-INSERTED R REF.	WAS AJ NOW AH	2.04 5/1/18
MATHREAD VERY SHORT RE-INSERTED R REF.	WAS AA NOW AB	3.09 5/1/18
MATHREAD VERY SHORT RE-INSERTED R REF.	WAS AH NOW AG	10.04 5/1/18
MATHREAD VERY SHORT RE-INSERTED R REF.	WAS AA NOW AB	11.09 5/1/18
PAGE 2.14 WAS ADDED	AA	2.14 3/9/18
PAGE 6.214 WAS ADDED	AA	6.214 3/9/18
PAGE 10.14 WAS ADDED	AA	10.14 3/9/18
ADDED PATENT INFORMATION PAGE	AA	2.02 3/9/18
ADDED 2.17, 2.18, 10.17, 10.18		NEW 2/26/26