

Precision  
Machining,  
Grinding,  
Leadscrew  
Products  
& Services.



**OSBORN PRODUCTS, INC.**

*"Committed to Quality"*

## PRECISION GAGES

- *Manufactured*
- *Reconditioned*
- *Certified*



# Table of Contents

Quality Policy & Warranty Statement . . . . .	Page 2
Calibration Service . . . . .	Page 3
Precision Measuring Instruments Offered . . . . .	Page 4, 5
NIST Traceable Calibration . . . . .	Page 6
Machining, Grinding, Leadscrew Products And Services. . . . .	Page 7
Thread Ring Gages and Thread Set Plugs. . . . .	Page 8
Thread Plug Gages . . . . .	Page 9
Screw Thread Insert Gages Helical Coil (STI), Hole Location Gages	Page 10
Metric Thread Plug Gages . . . . .	Page 11
Metric Thread Ring Gages and Set Plugs . . . . .	Page 11
Master Ring Gages . . . . .	Page 12
Reversible & Tri-Lock Plain Plug Gages and Tolerance Chart. . . . .	Page 13
Custom Hex Plug Gages. . . . .	Page 14
Taper Pipe Gages / Plug and Ring Gages . . . . .	Page 15
Taper Pipe Thread Gages Facts . . . . .	Page 16
Gear Measuring Wires. . . . .	Page 17
Method of Gaging, 3 Wire Thread Measuring System . . . . .	Page 18
3 Wire Thread Measuring Holders and Wires. . . . .	Page 19
ThreadTech™ . . . . .	Page 20
Thread Measuring Wires. . . . .	Page 21
Tri-Rolls & Variable Gage Systems. . . . .	Page 22, 23
Class ZZ Pin Gages . . . . .	Page 24, 25
Fixed Limit Gage Facts . . . . .	Page 26
Master Setting Discs . . . . .	Page 27
Calibration Procedures for Thread Ring Gages . . . . .	Page 28
NPTF Class 2 Specifications. . . . .	Page 29
Gagemaker's Tolerance Chart. . . . .	Page 30
ANSI Thread Series Designations. . . . .	Page 31
Thread Pitch Diameter Sizes - Inches. . . . .	Page 32
Thread Pitch Diameter Sizes - Metric . . . . .	Page 33
ROT'EX® . . . . .	Back Cover

## Quality Policy Statement

Osborn Products, Inc. will fabricate, market and service products of such quality that they will reliably perform to their intended function. Through active top management involvement and continual improvement methodologies, Osborn Products, Inc. will make every effort to provide parts and services that will consistently meet the customer's expectations.

**Warranty Statement:** Osborn Products, Inc. warrants all gages for thirty (30) days from date of shipment except in cases of normal wear and/or obvious customer abuse and mishandling. Osborn Products, Inc. offers no further warranties, expressed or implied and its responsibilities due to any defects or inaccuracies in any gage or certificates shall, in no event nor for any cause what-so-ever exceed the purchase price of the pertinent gage.

**Contact Information: Osborn Products, Inc.**  
1127 West Melinda Lane  
Phoenix, Arizona 85027-2812  
USA  
**info@osbornproducts.com**  
**www.osbornproducts.com**

**Phone: (623) 587-0335**  
**Fax: (623) 582-1387**  
Office Hours: Monday - Friday  
7:00 AM - 4:00 PM  
Mountain Standard Time

Prices subject to change without notice. Effective date November 2018.



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · [www.osbornproducts.com](http://www.osbornproducts.com)

# Calibration Services

## Thread Work Plugs

\$28.00 each member up to 3.0000.  
\$35.00 each member over 3.0000 to 8.0100.

## Thread Set Plugs

\$35.00 each member up to 3.0000.  
\$50.00 each HI-LO member up to 3.0000.  
\$45.00 each member over 3.0000 to 8.0100.  
\$60.00 each HI-LO member over 3.0000 to 8.0100.

## Thread Ring Gage

\$35.00 each ring, Standard UNC, UNF & UNEF up to 1.5000.  
\$40.00 each ring, Non-standard 0.060 to 2.0000.  
\$55.00 each ring, Non-standard over 2.0000 to 5.0100.  
\$65.00 each ring, Non-standard over 5.0100 to 8.0100.

Note: Setting plugs for non-standard rings must accompany rings for calibration or rework unless special arrangements are made.

## Plain Cylindrical Gages: (each)

SIZE	PLUGS	SIZE	RING
0.0500 - 4.7600	\$30.00	.0700 - 5.000	\$40.00
4.761 - 6.2500	\$50.00	5.0001 - 10.750	\$55.00

## Pipe Gages:

SIZE	PLUGS	SIZE	RING
0.00625 - 3.0000	\$50.00	0.0625 - 3.0000	\$70.00
3.0010 - 6.0000	\$70.00	3.0010 - 6.0000	\$90.00

## Pin Gages:

	PRICE
Class ZZ	\$3.00
Deltronic	Individual \$10.00 / 25 Piece Set \$160.00
Thread Wires -Standard Sizes: \$35.00 Per Set.	

Note: Unless purchase order specifies "recondition, repair or replace", "return good gages", or words to that effect, gages will be returned as inspected only and thread ring gages will not be sealed if worn out of tolerance. Thread ring gages will be adjusted, if possible, at above prices.

If order specifies "recondition or repair", straight thread gages (plug or ring) will be salvaged, if possible, at approximately 70% of new price. Non-taxable items must be noted and tax number given at time of order.

Special marking \$5.00 per gage member or \$10.00 per gage set.



# Osborn Now Offers the Following Precision Measuring Instruments:

Please call or email for a quotation.



**INSIZE** is a world leader in thread measuring instruments. Their increasing popularity and brand recognition is driven by quality and value. INSIZE offers a large range of products including calipers, micrometers, data transfer systems, height measurement gages, internal and external diameter gages, indicators, squares, protractors, rules, pitch gages, granite surface plates, scales, microscopes, profile projectors, vision systems, levels, roughness testers, hardness testers, torque testers, torque wrenches, and force gages. INSIZE guarantees that all of their products are of the highest quality and made to international standards. INSIZE manufactures high performance products at a great value price point.



System offers actual measurements of dimensional characteristics for quicker machine adjustments during thread production. Reduces gaging time over thread plug and ring gages. One single gage can be used for pre-plate, after-plate class 1, 1A, 2, 2A, 3, 3A eliminating the need for multiple fixed limit thread plug and ring gages. Ideal for use with Statistical Process Control –SPC. Rigid construction and constant measuring pressure provides consistent and accurate readings. Quick setting with the use of a set master. Easy to setup.



Osborn Products, Inc. offers **MITUTOYO** precision hand tools and thread measuring instrument. Mitutoyo offers a full range of micrometers, mitutoyo calipers, bore gages, depth gages, height gages, gage blocks, snap meters, digimatic indicators, thickness gages, laser micrometers, hardness testers, toolmaker's microscope, surf tests, linear scales, profile projectors, digital hand tachometers, digital protractors, rulers, radius gages, vision measuring systems, coordinate measuring machines, roundtest and formtracer instruments. Mitutoyo is the world's largest manufacturer of precision measuring instruments. Call (623) 587-0335 for Osborn Products's great prices, product support and the largest product inventory of Mitutoyo tools.



**MAHR** offers an extensive range of products and solutions for your measurement task. Digimar Height Measuring Instruments, Marameter indicating measuring instrument for high precision internal and external measurements. Air Gages, MarCal Calipers, MarCator Indicators, MarConnect USB Ready Interfaces, Pocket Surf Portable Roughness Gages, MahrSurf roughness and contour measurement, Mahrtest Indicators, MahrTool Inspection Tools, Micromar Micrometers, Millimar probes, Millimess series dial and digital comparators, and Multimar Universal Measuring Instruments.



OSBORN PRODUCTS, INC.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • [www.osbornproducts.com](http://www.osbornproducts.com)

# Osborn Now Offers the Following Precision Measuring Instruments:

Please call or email for a quotation.



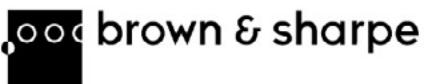
**STARRETT**, founded in 1880, manufactures more than 5,000 variations of Precision Tools, Gages, Micrometers, Measuring Instruments and Saw Blades for industrial, professional and consumer markets worldwide. From the shop floor to the inspection clean room, from jobsite to home workshop, for more than 125 years, Starrett precision measuring tools, saw blades and other quality products have earned the trust of those who rely on their tools.



For nearly 50 years, **SWISS PRECISION INSTRUMENTS, INC.** has continuously introduced exciting new products to the metalworking industry. Since 1956 the SPI family of products has always offered customers Quality, Value and fast Delivery. Today the tradition continues. Our 408 page catalog features all the SPI Branded Products. You will find numerous New, Unique and Hard To Find Measuring Tools, Optical Tools, Machine Tool and Shop Accessories.



The **FRED V. FOWLER COMPANY** is globally recognized as one of today's leading suppliers of quality control and inspection equipment. Founded in 1946, we have dedicated our 54 year history to supplying the most innovative measuring products possible. As industry moves more in the direction of computer-aided manufacturing, Fowler continues to introduce important new tools designed to lead the way in thread gages inspections and measuring. Familiar items-including calipers, micrometers, indicators, height gages and bore gages - have been redesigned and now feature state of the art electronics to ensure compatibility with the latest in computer integrated manufacturing and statistical process control (SPC).



**BROWN & SHARPE** is a brand of Hexagon Metrology, Inc. We offer the most complete line of dimensional metrology products anywhere in the world. On this site you will find products and services from many Hexagon Metrology brands including: Bridge-style Coordinate measuring machines from Brown & Sharpe, Horizontal Arm CMMs and Gantry CMMs by DEA, the Ultra-High Accuracy CMM line from Leitz, Brown & Sharpe and TESA branded precision hand tools and 1D to 3D measuring instruments, the TESASTar CMM probing system, PC-DMIS Measuring software, Vision measuring machines from Brown & Sharpe and TESA, plus information on CMM software upgrades, CMM contract inspection, CMM training, and CMM repair and calibration services.



**DIATEST** manufactures high-precision measuring instruments with a repeatability of up to 0,001 mm / 0,00005". Plug gages, Split Ball Probes, Plunger Probes, Chamfer Gauges, TD-Gauges, Gear Gauges, Dial Indicators, Diatron, Outside Diameter Gauges, Diacators, Dial Indicator Testors, Crank Shaft Gauges, Checking Stands, Floating Holders, Offset Heads, Setting Ring Gauges, Diawireless Gages.



OSBORN PRODUCTS, INC.

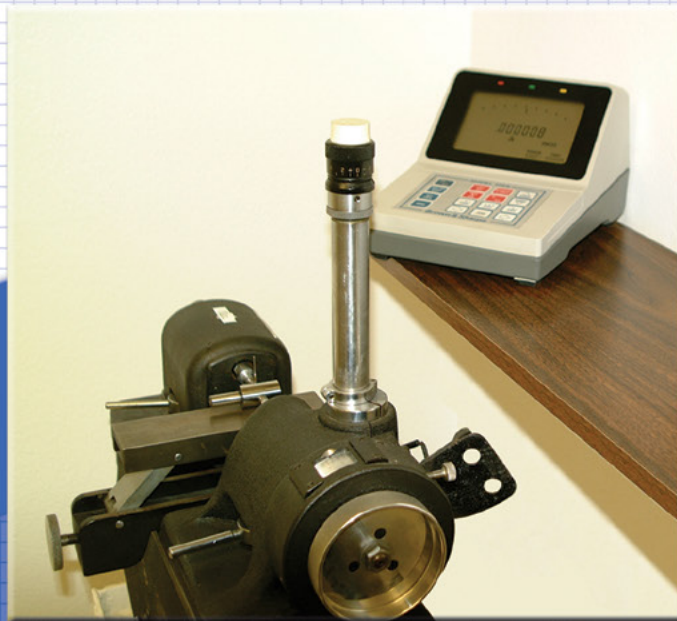
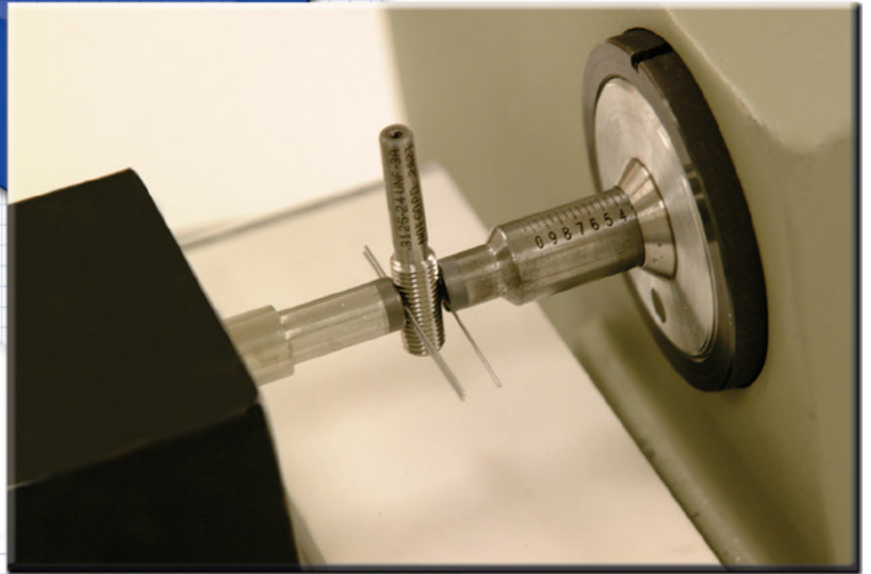
1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • [www.osbornproducts.com](http://www.osbornproducts.com)

# NIST Traceable Calibration



**ISO 9001:2015, AS 9100D Certified**



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

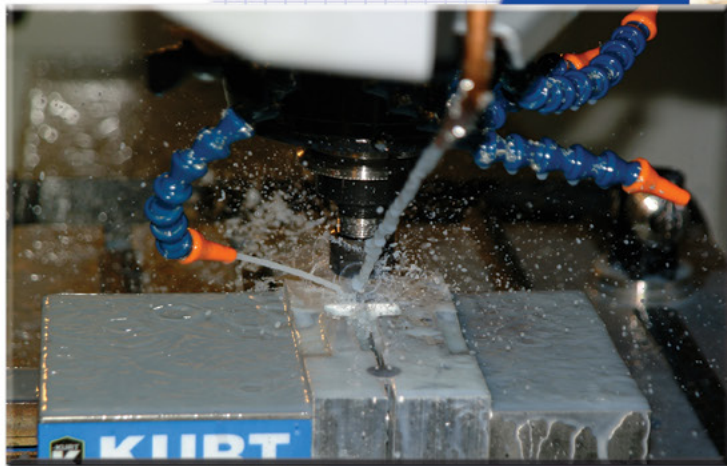
Telephone: (623) 587-0335 · Fax: (623) 582-1387 · [www.osbornproducts.com](http://www.osbornproducts.com)

# Machining, Grinding, Leadscrew Products & Services

**Machining-** Osborn Products, Inc. offers a wide variety of precision machining services ranging from simple hand lathe operations up to 34" CNC turning operations held to aerospace tolerances. We also offer conventional and CNC milling services up to 23" X 39".

**Grinding-** Osborn Products, Inc. offers a variety of precision grinding services including O.D./I.D. plain and thread grinding, angle grinding, centerless grinding and surface grinding. We consistently hold tolerances to 5 microns (.0002). For closer tolerances, our lapping capabilities allow us to hold tolerances to 1 micron (.00004) or better.

**Leadscrews-** Osborn Products, Inc. manufactures precision leadscrew/nut assemblies up to 36" overall length with 21" thread length. The nut can be lapped to the leadscrew to obtain minimal backlash reaching tolerances of 2.5 to 5 microns (.0001 - .0002) in. Using our specially modified thread grinders, helical path deviation can be held to tolerances of 50u in. per inch.



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • [www.osbornproducts.com](http://www.osbornproducts.com)

# Thread Ring Gages & Thread Set Plugs

## THREAD RING GAGES



## THREAD SET PLUGS



AGD THREAD RING GAGES				THREADS PER INCH (TPI)			TRUNCATED SETTING PLUGS			
HOLDER ONLY	GO or NO GO MEMBER 2A or 3A	COMPLETE SET	SIZE DEC.	SIZE FRAC.	UNC	UNF	UNEF	GO or NO GO MEMBER 2A or 3A	COMPLETE GAGE	HANDLE ONLY
\$18.00	\$159.00	\$318.00	.060	#0	—	80	—	\$102.00	\$215.00	\$11.00
18.00	147.00	294.00	.073	#1	64	72	—	93.00	197.00	11.00
18.00	136.00	272.00	.086	#2	56	64	—	82.00	175.00	11.00
18.00	129.00	258.00	.099	#3	48	56	—	82.00	175.00	11.00
18.00	125.00	250.00	.112	#4	40	48	—	80.00	171.00	11.00
18.00	125.00	250.00	.125	#5	40	44	—	80.00	171.00	11.00
18.00	116.00	232.00	.138	#6	32	40	—	74.00	159.00	11.00
18.00	116.00	232.00	.164	#8	32	36	—	78.00	167.00	11.00
18.00	116.00	232.00	.190	#10	24	32	—	74.00	159.00	11.00
18.00	116.00	232.00	.216	#12	24	28	—	82.00	175.00	11.00
18.00	159.00	318.00	.216	#12	—	—	32	110.00	231.00	11.00
18.00	97.00	194.00	.250	1/4	20	28	—	66.00	143.00	11.00
18.00	150.00	300.00	.250	1/4	—	—	32	98.00	207.00	11.00
18.00	97.00	194.00	.3125	5/16	18	24	—	66.00	143.00	11.00
18.00	153.00	306.00	.3125	5/16	—	—	32	103.00	217.00	11.00
22.00	102.00	204.00	.375	3/8	16	24	—	71.00	153.00	11.00
22.00	158.00	316.00	.375	3/8	—	—	32	118.00	247.00	11.00
22.00	102.00	204.00	.4375	7/16	14	20	—	71.00	153.00	11.00
22.00	161.00	322.00	.4375	7/16	—	—	28	119.00	249.00	11.00
22.00	108.00	216.00	.500	1/2	13	20	—	74.00	159.00	11.00
22.00	164.00	328.00	.500	1/2	—	—	28	123.00	257.00	11.00
25.00	128.00	256.00	.5625	9/16	12	18	—	93.00	197.00	11.00
25.00	168.00	336.00	.5625	9/16	—	—	24	125.00	261.00	11.00
25.00	128.00	256.00	.625	5/8	11	18	—	93.00	197.00	11.00
25.00	171.00	342.00	.625	5/8	—	—	24	130.00	271.00	11.00
25.00	199.00	398.00	.6875	11/16	—	—	24	135.00	281.00	11.00
25.00	170.00	340.00	.750	3/4	10	16	—	108.00	227.00	11.00
25.00	206.00	412.00	.750	3/4	—	—	20	136.00	283.00	11.00
25.00	212.00	424.00	.8125	13/16	—	—	20	142.00	295.00	11.00
33.00	194.00	388.00	.875	7/8	9	14	—	125.00	262.00	12.00
33.00	216.00	432.00	.875	7/8	—	—	20	150.00	312.00	12.00
33.00	238.00	476.00	.9375	15/16	—	—	20	155.00	322.00	12.00
33.00	216.00	432.00	1.00	1	8	12	—	136.00	284.00	12.00
33.00	252.00	504.00	1.00	1	—	—	20	164.00	340.00	12.00
33.00	264.00	528.00	1.0625	1-1/16	—	—	18	168.00	348.00	12.00
33.00	251.00	502.00	1.125	1-1/8	7	12	—	167.00	346.00	12.00
33.00	267.00	534.00	1.125	1-1/8	—	—	18	172.00	356.00	12.00
33.00	293.00	586.00	1.1875	1-3/16	—	—	18	177.00	366.00	12.00
40.00	281.00	562.00	1.250	1-1/4	7	12	—	178.00	368.00	12.00
40.00	306.00	612.00	1.250	1-1/4	—	—	18	180.00	372.00	12.00
40.00	316.00	632.00	1.3125	1-5/16	—	—	18	189.00	390.00	12.00
40.00	315.00	630.00	1.375	1-3/8	6	12	—	210.00	432.00	12.00
40.00	336.00	672.00	1.375	1-3/8	—	—	18	210.00	432.00	12.00
40.00	353.00	706.00	1.4375	1-7/16	—	—	18	214.00	440.00	12.00
40.00	350.00	700.00	1.500	1-1/2	6	12	—	224.00	460.00	12.00
40.00	387.00	774.00	1.500	1-1/2	—	—	18	224.00	460.00	12.00

### AGD Unified Thread Series (UNC - UNF - UNEF)

Set Plugs are Class W Tolerance on pitch diameter, lead and flank angle.

Add \$30.00 to Go Rings made to MIL-S-8879 or ASME B.15 (J).

For chrome plating add 50% (Rings .190 and above).

Special gages priced on request. All prices include long form certification.



OSBORN PRODUCTS, INC.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com



# Thread Plug Gages

## TAPERLOCK STYLE



## REVERSIBLE STYLE



TAPERLOCK DESIGN			THREADS PER INCH (TPI)					REVERSIBLE DESIGN		
HANDLE ONLY	GO or NO GO MEMBER 2B or 3B	COMPLETE GAGE	SIZE DEC.	SIZE FRAC.	UNC	UNF	UNEF	GO or NO GO MEMBER 2B or 3B	COMPLETE GAGE	HANDLE ONLY
11.00	\$54.00	\$119.00	.060	#0	—	80	—	\$80.00	\$176.00	\$16.00
11.00	54.00	119.00	.073	#1	64	72	—	80.00	176.00	16.00
11.00	48.00	107.00	.086	#2	56	64	—	80.00	176.00	16.00
11.00	45.00	101.00	.099	#3	48	56	—	73.00	162.00	16.00
11.00	45.00	101.00	.112	#4	40	48	—	73.00	162.00	16.00
11.00	45.00	101.00	.125	#5	40	44	—	62.00	140.00	16.00
11.00	41.00	93.00	.138	#6	32	40	—	62.00	140.00	16.00
11.00	41.00	93.00	.164	#8	32	36	—	62.00	140.00	16.00
11.00	41.00	93.00	.190	#10	24	32	—	62.00	140.00	16.00
11.00	41.00	93.00	.216	#12	24	28	—	62.00	140.00	16.00
11.00	72.00	155.00	.216	#12	—	—	32	99.00	214.00	16.00
11.00	37.00	85.00	.250	1/4	20	28	—	55.00	126.00	16.00
11.00	66.00	143.00	.250	1/4	—	—	32	93.00	202.00	16.00
11.00	37.00	85.00	.3125	5/16	18	24	—	55.00	127.00	17.00
11.00	66.00	143.00	.3125	5/16	—	—	32	93.00	203.00	17.00
11.00	39.00	89.00	.375	3/8	16	24	—	55.00	127.00	17.00
11.00	78.00	167.00	.375	3/8	—	—	32	110.00	237.00	17.00
11.00	39.00	89.00	.4375	7/16	14	20	—	60.00	137.00	17.00
11.00	78.00	167.00	.4375	7/16	—	—	28	110.00	237.00	17.00
11.00	43.00	97.00	.500	1/2	13	20	—	60.00	137.00	17.00
11.00	78.00	167.00	.500	1/2	—	—	28	110.00	237.00	17.00
11.00	47.00	105.00	.5625	9/16	12	18	—	62.00	142.00	18.00
11.00	81.00	173.00	.5625	9/16	—	—	24	113.00	244.00	18.00
11.00	47.00	105.00	.625	5/8	11	18	—	62.00	142.00	18.00
11.00	81.00	173.00	.625	5/8	—	—	24	113.00	244.00	18.00
11.00	85.00	181.00	.6875	11/16	—	—	24	118.00	254.00	18.00
11.00	57.00	125.00	.750	3/4	10	16	—	75.00	168.00	18.00
11.00	85.00	181.00	.750	3/4	—	—	20	118.00	254.00	18.00
11.00	94.00	199.00	.8125	13/16	—	—	20	—	—	—
12.00	58.00	128.00	.875	7/8	9	14	—	—	—	—
12.00	94.00	200.00	.875	7/8	—	—	20	—	—	—
12.00	102.00	216.00	.9375	15/16	—	—	20	—	—	—
12.00	64.00	140.00	1.000	1	8	12	—	—	—	—
12.00	102.00	216.00	1.000	1	—	—	20	—	—	—
12.00	110.00	232.00	1.0625	1-1/16	—	—	18	—	—	—
12.00	84.00	180.00	1.125	1-1/8	7	12	—	—	—	—
12.00	110.00	232.00	1.125	1-1/8	—	—	18	—	—	—
12.00	117.00	246.00	1.1875	1-3/16	—	—	18	—	—	—
12.00	97.00	206.00	1.250	1-1/4	7	12	—	—	—	—
12.00	117.00	246.00	1.250	1-1/4	—	—	18	—	—	—
12.00	125.00	262.00	1.3125	1-5/16	—	—	18	—	—	—
12.00	106.00	224.00	1.375	1-3/8	6	12	—	—	—	—
12.00	132.00	276.00	1.375	1-3/8	—	—	18	—	—	—
12.00	138.00	288.00	1.4375	1-7/16	—	—	18	—	—	—
12.00	113.00	238.00	1.500	1-1/2	6	12	—	—	—	—
12.00	147.00	306.00	1.500	1-1/2	—	—	18	—	—	—

AGD Reversible and Taperlock Styles

Unified Thread Series  
(UNC - UNF - UNEF)

For Chrome Plating add 50%.

Special gages priced on request. All prices include long form certification.



OSBORN PRODUCTS, INC.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Screw Thread Insert Gages Helical Coil (STI)

## SCREW THREAD INSERT GAGE



SIZE	THREADS PER INCH		GO or NO GO MEMBER 2B OR 3B	COMPLETE GAGE	HANDLE	
	UNC	UNF				
#2	.086	56	-	\$74.00	\$159.00	\$11.00
#3	.099	48	56	65.00	141.00	11.00
#4	.112	40	48	54.00	119.00	11.00
#5	.125	40	44	54.00	119.00	11.00
#6	.138	32	40	54.00	119.00	11.00
#8	.164	32	36	54.00	119.00	11.00
#10	.190	24	32	50.00	111.00	11.00
#12	.216	24	28	50.00	111.00	11.00
1/4	.250	20	28	49.00	109.00	11.00
5/16	.3125	18	24	49.00	109.00	11.00
3/8	.375	16	24	54.00	119.00	11.00
7/16	.4375	14	20	54.00	119.00	11.00
1/2	.500	13	20	55.00	121.00	11.00
9/16	.5625	12	18	58.00	127.00	11.00
5/8	.625	11	18	58.00	127.00	11.00
3/4	.750	10	16	62.00	136.00	12.00

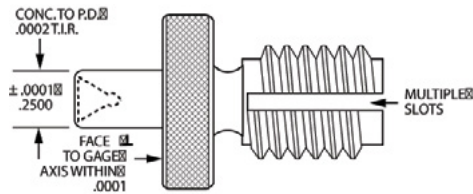
Special gages priced on request. All prices include long form certification.  
Gages made to X tolerance unless otherwise specified.

Inch Flexible Hole Location Gages Threads Per Inch			
Size	UNC	UNF	Price
0	-	80	\$132.00
1	64	72	126.00
2	56	64	123.00
3	48	56	119.00
4	40	48	113.00
5	40	44	113.00
6	32	40	106.00
8	32	36	106.00
10	24	32	106.00
12	24	28	99.00
1/4	20	28	99.00
5/16	18	24	93.00
3/8	16	24	93.00
7/16	14	20	93.00
1/2	13	20	106.00
9/16	12	18	108.00
5/8	11	18	112.00
3/4	10	16	117.00
7/8	9	14	132.00
1	8	12	178.00

Metric Flexible Hole Location Gages	
Size	Price
M1.6 x .35	\$152.00
M2 x 0.4	145.00
M2.5 x 0.45	145.00
M3 x 0.5	133.00
M3.5 x 0.6	133.00
M4 x 0.7	127.00
M5 x 0.8	127.00
M6 x 1.0	104.00
M8 x 1.25	104.00
M8 x 1.0	104.00
M10 x 1.5	111.00
M10 x 1.25	111.00
M10 x .75	133.00
M12 x 1.75	118.00
M12 x 1.5	118.00
M12 x 1.0	118.00
M14 x 1.5	127.00
M15 x 1.0	127.00
M16 x 2.0	127.00
M16 x 1.5	127.00
M17 x 1.0	133.00
M18 x 1.5	133.00
M20 x 2.5	133.00
M20 x 1.5	133.00
M20 x 1.0	145.00
M22 x 2.5	152.00
M22 x 1.5	152.00
M24 x 3.0	171.00
M24 x 2.0	171.00

Sizes #10 (M5 Metric) and smaller are solid tapered thread form from low limit to high limit of class 2B pitch diameters.

## Flexible Hole Location Gages



Flexible Hole Location Gage plugs also referred to as Centerline Hole Location Plugs are used to determine the true centerline to centerline distances of threaded holes. The Flexible Hole Location Gage is slotted at 90° increments to insure positive location on the thread flanks regardless of hole size. This feature provides a firm locating grip without pulling the shoulder of the plug up against the hole face thus avoiding any squareness error being transferred to the centerline measurement.

- Positive grip on flanks regardless of hole size.
- Center is concentric with threaded section within .0002" T.I.R. for probe location of coordinate measuring machines.
- The .2500 +/- .0001 (7.0mm +/- .0025mm) shank is concentric to the threaded section within .0002 T.I.R. prior to slotting and may be used with micrometers or plate inspection setups as "overpin" measurement.
- Used with vee-block, concentricity checks can be made with other diameters.



OSBORN PRODUCTS, INC.

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · www.osbornproducts.com

# Metric Thread Plug Gages

## METRIC THREAD PLUG GAGES 6H Tolerance



HANDLE ONLY	TAPERLOCK DESIGN		NOMINAL SIZE & PITCH			REVERSIBLE DESIGN		HANDLE ONLY
	GO or NOGO MEMBER 6H	COMPLETE SET	SIZE MM	COARSE	FINE	GO or NOGO MEMBER 6H	COMPLETE GAGE	
\$ 11.00	69.00	149.00	M1.6	0.35	—	99.00	209.00	11.00
11.00	69.00	149.00	M1.8	0.35	—	99.00	209.00	11.00
11.00	69.00	149.00	M2	0.4	—	99.00	209.00	11.00
11.00	69.00	149.00	M2.2	0.45	—	99.00	209.00	11.00
11.00	69.00	149.00	M2.5	0.45	—	99.00	209.00	11.00
11.00	64.00	139.00	M3	0.5	—	90.00	191.00	11.00
11.00	64.00	139.00	M3.5	0.6	—	90.00	191.00	11.00
11.00	59.00	129.00	M4	0.7	—	81.00	174.00	12.00
11.00	59.00	129.00	M4.5	0.75	—	81.00	174.00	12.00
11.00	59.00	129.00	M5	0.8	—	81.00	174.00	12.00
11.00	59.00	129.00	M6	1.0	—	81.00	176.00	14.00
11.00	58.00	127.00	M7	1.0	—	80.00	174.00	14.00
11.00	58.00	127.00	M8	1.25	1.0	80.00	174.00	14.00
11.00	58.00	127.00	M10	1.5	1.25	80.00	175.00	15.00
11.00	59.00	129.00	M12	1.75	1.5	81.00	177.00	15.00
11.00	59.00	129.00	M12	—	1.25	81.00	177.00	15.00
11.00	60.00	131.00	M14	2.0	1.5	84.00	183.00	15.00
11.00	60.00	131.00	M16	2.0	1.5	84.00	183.00	15.00
11.00	60.00	131.00	M18	2.5	1.5	84.00	183.00	15.00
11.00	62.00	135.00	M20	2.5	1.5	—	—	—
12.00	62.00	136.00	M22	2.5	1.5	—	—	—
12.00	69.00	150.00	M24	3.0	2.0	—	—	—
12.00	86.00	184.00	M27	3.0	2.0	—	—	—
12.00	111.00	234.00	M30	3.5	2.0	—	—	—

Special gages priced on request. All prices include long form certification.

# Metric Thread Ring Gages & Set Plugs

## METRIC THREAD RING GAGES and METRIC SET PLUG GAGES 6g Tolerance



HOLDER ONLY	RINGS		NOMINAL SIZE & PITCH			SET PLUGS		HANDLE ONLY
	GO or NO GO MEMBER 6g	COMPLETE SET	SIZE MM	COARSE	FINE	GO or NOGO MEMBER 6g	COMPLETE GAGE	
\$18.00	172.00	344.00	M1.6	0.35	—	107.00	225.00	11.00
18.00	172.00	344.00	M1.8	0.35	—	107.00	225.00	11.00
18.00	165.00	330.00	M2	0.4	—	107.00	225.00	11.00
18.00	165.00	330.00	M2.2	0.45	—	107.00	225.00	11.00
18.00	165.00	330.00	M2.5	0.45	—	107.00	225.00	11.00
18.00	153.00	306.00	M3	0.5	—	99.00	209.00	11.00
18.00	153.00	306.00	M3.5	0.6	—	99.00	209.00	11.00
18.00	143.00	286.00	M4	0.7	—	99.00	209.00	11.00
18.00	143.00	286.00	M4.5	0.75	—	99.00	209.00	11.00
18.00	143.00	286.00	M5	0.8	—	99.00	209.00	11.00
22.00	137.00	274.00	M6	1	—	84.00	179.00	11.00
22.00	137.00	274.00	M7	1	—	84.00	179.00	11.00
22.00	137.00	274.00	M8	1.25	1	84.00	179.00	11.00
22.00	137.00	274.00	M10	1.5	1.25	98.00	207.00	11.00
22.00	151.00	302.00	M12	1.75	1.5	98.00	207.00	11.00
22.00	151.00	302.00	M12	—	1.25	98.00	207.00	11.00
22.00	151.00	302.00	M14	2	1.5	103.00	217.00	11.00
25.00	161.00	322.00	M16	2	1.5	103.00	217.00	11.00
25.00	184.00	368.00	M18	2.5	1.5	124.00	260.00	12.00
25.00	219.00	438.00	M20	2.5	1.5	124.00	260.00	12.00
33.00	222.00	444.00	M22	2.5	1.5	152.00	316.00	12.00
33.00	258.00	516.00	M24	3	2.0	168.00	348.00	12.00
33.00	284.00	568.00	M27	3	2.0	179.00	370.00	12.00
33.00	289.00	578.00	M30	3.5	2.0	186.00	384.00	12.00

Set Plugs are Class W Tolerance on pitch diameter, lead and flank angle.  
For chrome plating add 50% (Rings M5 and above).

Special gages priced on request. All prices include long form certification.



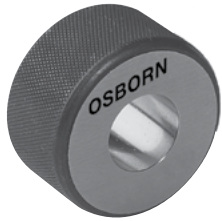
OSBORN PRODUCTS, INC.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Master Ring Gages

## RING GAGES



SIZE	inch (mm)	Class	Tolerance	Steel	Chrome
.040" - .060" (1.02 - 1.52)		XX	0.000020	\$261.00	-
		X	0.000040	224.00	-
		Z	0.000100	220.00	-
.060" - .070" (1.52 - 1.78)		XX	0.000020	224.00	-
		X	0.000040	189.00	-
		Z	0.000100	184.00	-
.070" - .100" (1.78 - 2.54)		XX	0.000020	184.00	-
		X	0.000040	155.00	-
		Z	0.000100	152.00	-
.100" - .123" (2.54 - 3.12)		XX	0.000020	182.00	-
		X	0.000040	155.00	-
		Z	0.000100	141.00	-
.123" - .230" (3.12 - 5.84)		XX	0.000020	155.00	\$206.00
		X	0.000040	141.00	189.00
		Z	0.000100	137.00	179.00
.230" - .365" (5.84 - 9.27)		XX	0.000020	152.00	209.00
		X	0.000040	139.00	191.00
		Z	0.000100	128.00	184.00
.365" - .510" (.927 - 12.95)		XX	0.000020	153.00	210.00
		X	0.000040	140.00	192.00
		Z	0.000100	135.00	185.00
.510" - .825" (12.95 - 20.96)		XX	0.000020	156.00	224.00
		X	0.000040	144.00	206.00
		Z	0.000100	138.00	197.00
.825" - 1.135" (20.96 - 28.83)		XX	0.000030	161.00	230.00
		X	0.000060	147.00	210.00
		Z	0.000120	141.00	201.00
1.135" - 1.510" (28.83 - 38.35)		XX	0.000030	197.00	281.00
		X	0.000060	166.00	238.00
		Z	0.000120	159.00	227.00
1.510" - 2.010" (38.35 - 51.05)		XX	0.000040	222.00	319.00
		X	0.000080	202.00	291.00
		Z	0.000160	193.00	279.00
2.010" - 2.510" (51.05 - 63.75)		XX	0.000040	299.00	430.00
		X	0.000080	252.00	363.00
		Z	0.000160	230.00	330.00

SIZE	inch (mm)	Class	Tolerance	Steel	Chrome
2.510" - 3.010" (63.75 - 76.45)		XX	0.000050	\$351.00	\$507.00
		X	0.000100	297.00	430.00
		Z	0.000200	267.00	385.00
3.010" - 3.510" (76.45 - 89.15)		XX	0.000050	395.00	589.00
		X	0.000100	341.00	493.00
		Z	0.000200	310.00	447.00
3.510" - 4.010" (89.15 - 101.85)		XX	0.000050	459.00	668.00
		X	0.000100	380.00	551.00
		Z	0.000200	349.00	505.00
4.010" - 4.510" (101.85 - 114.55)		XX	0.000050	524.00	762.00
		X	0.000100	439.00	638.00
		Z	0.000200	395.00	574.00
4.510" - 4.760" (114.55 - 120.90)		XX	0.000065	524.00	762.00
		X	0.000130	439.00	638.00
		Z	0.000250	395.00	574.00
4.760" - 5.510" (120.90 - 139.95)		XX	0.000065	650.00	946.00
		X	0.000130	546.00	795.00
		Z	0.000250	492.00	717.00
5.510" - 6.260" (139.95 - 159.00)		XX	0.000065	778.00	1085.00
		X	0.000130	654.00	910.00
		Z	0.000250	594.00	827.00
6.260" - 6.510" (159.00 - 165.35)		XX	0.000065	981.00	1267.00
		X	0.000130	893.00	1152.00
		Z	0.000250	852.00	1099.00
6.510" - 7.010" (165.35 - 178.05)		XX	0.000080	981.00	1279.00
		X	0.000160	893.00	1165.00
		Z	0.000320	852.00	1110.00
7.010" - 7.760" (178.05 - 197.10)		XX	0.000080	1014.00	1309.00
		X	0.000160	931.00	1191.00
		Z	0.000320	881.00	1134.00
7.760" - 8.510" (197.10 - 216.15)		XX	0.000080	1184.00	1475.00
		X	0.000160	1080.00	1339.00
		Z	0.000320	989.00	1276.00
8.510" - 9.100" (216.15 - 231.14)		XX	0.000080	1331.00	1718.00
		X	0.000160	1207.00	1560.00
		Z	0.000320	1152.00	1485.00

Continued on next chart...



OSBORN PRODUCTS, INC.

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · www.osbornproducts.com

# Reversible and Tri-Lock Plain Plug Gages

SIZE Inch (mm)	CLASS	TOLERANCE	STEEL (Member Only)	CHROME (Member Only)
.060" - .135" (1.52 - 3.43)	XX	0.000020	\$98.00*	\$146.00*
	X	0.000040	80.00*	108.00*
	Z	0.000100	68.00*	97.00*
.135" - .385" (3.43 - 9.78)	XX	0.000020	91.00*	127.00*
	X	0.000040	68.00*	94.00*
	Z	0.000100	55.00*	75.00*
.385" - .635" (9.78 - 16.13)	XX	0.000020	91.00*	127.00*
	X	0.000040	72.00*	94.00*
	Z	0.000100	62.00*	85.00*
.635" - .825" (16.13 - 20.96)	XX	0.000020	98.00*	146.00*
	X	0.000040	91.00*	127.00*
	Z	0.000100	85.00*	114.00*

\* Reversible pin style plug gage members are furnished in sizes below .825" (20.95mm).

Tri-Lock style gages are furnished in sizes above .825" (20.95mm).



**REVERSIBLE  
GAGES**



**PLAIN  
PLUG  
GAGES**

SIZE Inch (mm)	CLASS	TOLERANCE	STEEL (Member Only)	CHROME (Member Only)
.825" - 1.135" (20.96 - 28.83)	XX	0.000030	\$135.00	\$176.00
	X	0.000060	108.00	142.00
1.135" - 1.510" (28.83 - 38.35)	XX	0.000030	142.00	192.00
	X	0.000060	114.00	152.00
1.510" - 2.010" (38.35 - 51.05)	XX	0.000040	180.00	237.00
	X	0.000080	145.00	189.00
2.010" - 2.510" (51.05 - 63.75)	XX	0.000040	196.00	264.00
	X	0.000080	158.00	211.00
2.510" - 3.010" (63.75 - 76.45)	XX	0.000050	216.00	292.00
	X	0.000100	160.00	214.00
3.010" - 3.510" (76.45 - 89.15)	XX	0.000050	310.00	414.00
	X	0.000100	245.00	326.00
3.510" - 4.010" (89.15 - 101.85)	XX	0.000050	322.00	430.00
	X	0.000100	254.00	337.00
4.010" - 4.510" (101.85 - 114.55)	XX	0.000050	333.00	492.00
	X	0.000100	262.00	346.00
4.510" - 5.010" (114.55 - 127.25)	XX	0.000065	351.00	480.00
	X	0.000130	262.00	355.00
5.010" - 5.510" (127.25 - 139.95)	XX	0.000065	384.00	551.00
	X	0.000130	259.00	369.00
5.510" - 6.010" (139.95 - 152.65)	XX	0.000065	458.00	627.00
	X	0.000130	329.00	448.00
6.010" - 6.510" (152.65 - 165.35)	XX	0.000130	494.00	678.00
	X	0.000190	355.00	483.00
6.510" - 7.010" (165.35 - 178.05)	XX	0.000160	511.00	702.00
	X	0.000240	381.00	519.00
7.010" - 7.510" (178.05 - 190.75)	XX	0.000160	551.00	755.00
	X	0.000240	418.00	571.00
7.510" - 8.010" (190.75 - 203.45)	XX	0.000160	596.00	818.00
	X	0.000240	457.00	624.00
8.010" - UP" (203.45 - UP)	• • • • PRICE ON APPLICATION • • • •			

Special gages priced on request. All prices include long form certification.

## Tolerance Chart

SIZE RANGE		TOLERANCE CLASSES			
ABOVE	TO & INCL.	XX	X	Y	Z
.056	.825	.00002	.00004	.00007	.00010
.825	1.510	.00003	.00006	.00009	.00012
1.510	2.510	.00004	.00008	.00012	.00016
2.510	4.510	.00005	.00010	.00015	.00020
4.510	6.510	.000065	.00013	.00019	.00025
6.510	9.010	.00008	.00016	.00024	.00032
9.010	12.010	.00010	.00020	.00030	.00040

## Plug Gage Handles Single or Double End

PLUG SIZE (Above-incl.) Inch/(mm)	PRICE
.060 - .260 (1.52 - 6.60)	\$16.00
.260 - .510 (6.60 - 12.95)	\$17.00
.510 - .635 (12.95 - 16.13)	\$18.00
.635 - .825 (16.13 - 20.96)	\$18.00
.825 - 2.510 (20.96 - 63.75)	\$20.00
2.510 - 8.010 (63.75 - 203.45)	\$20.00



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Custom Hex Plug Gages

Osborn Products, Inc offers a complete line of GO/NOGO Hex plug gages manufactured to both specs ANSI/ASME B107.17M and ANSI B18.3. Special diameter Hex gages are also available. Hex gages are perfect for inspecting machine head fasteners.

- ANSI/ASME B107.17M
- ANSI B18.3
- Go, NoGo Class Z tolerances
- NIST traceable
- Tool Steel: 60/62 Rc (Cold Stabilized)
- Certificate of Accuracy included
- Long Form Calibration available at an additional charge

Prices are for complete Double end Go & NoGo assemblies.

**DOUBLE  
END**



D.E. HEX GAGES TO ANSI B18.3 FRACTIONAL SIZES	
Size	Price
0.028	\$350.00
0.035	330.00
0.05	290.00
1/16	290.00
5/64	290.00
3/32	290.00
7/64	290.00
1/8	255.00
9/64	255.00
5/32	255.00
3/16	255.00
7/32	255.00
1/4	255.00
5/16	265.00
3/8	280.00
7/16	280.00
1/2	280.00
9/16	300.00
5/8	300.00
3/4	315.00
7/8	340.00
1	370.00
METRIC	
0.70mm	\$350.00
0.90mm	330.00
1.30mm	290.00
1.50mm	290.00
2.00mm	290.00
2.50mm	290.00
3.00mm	255.00
4.00mm	255.00
5.00mm	255.00
6.00mm	255.00
8.00mm	255.00
10.00mm	265.00
12.00mm	280.00
14.00mm	280.00
17.00mm	300.00
19.00mm	315.00
22.00mm	340.00
24.00mm	370.00

Go Member - Hex Shape

NoGo Member - Rectangular Shape

D.E. HEX GAGES TO ANSI/ASME B107.17M FRACTIONAL SIZES	
Size	Price
1/8	\$255.00
5/32	255.00
3/16	255.00
13/64	255.00
7/32	255.00
15/64	255.00
1/4	255.00
9/32	265.00
5/16	265.00
11/32	265.00
3/8	265.00
1/2	265.00
9/16	265.00
19/32	265.00
5/8	280.00
21/32	280.00
11/16	280.00
3/4	280.00
25/32	300.00
13/16	300.00
7/8	300.00
15/16	300.00
1	300.00
1-1/16	335.00
1-1/8	335.00
1-3/16	335.00
1-1/4	335.00
1-5/16	365.00
1-3/8	400.00
1-7/16	409.00
1-1/2	440.00
1-9/16	440.00
1-5/8	440.00
1-11/16	440.00
1-3/4	440.00
1-13/16	510.00
1-7/8	510.00
1-15/16	510.00
2	510.00
2-1/16	510.00
2-1/8	510.00
2-3/16	540.00
2-1/4	540.00
2-5/16	540.00
2-3/8	540.00
2-7/16	565.00
2-1/2	565.00
2-9/16	565.00
2-5/8	565.00
2-11/16	565.00
2-3/4	655.00
2-13/16	655.00
2-7/8	655.00
2-15/16	655.00
3	655.00

D.E. HEX GAGES TO ANSI/ASME B107.17M METRIC SIZES	
Size	Price
2mm	\$260.00
3mm	260.00
3.2mm	255.00
4mm	255.00
5mm	255.00
5.5mm	255.00
6mm	224.00
6.3mm	255.00
7mm	265.00
8mm	265.00
9mm	265.00
10mm	265.00
11mm	265.00
12mm	265.00
13mm	265.00
14mm	265.00
15mm	265.00
16mm	280.00
17mm	280.00
18mm	280.00
19mm	300.00
20mm	300.00
21mm	300.00
22mm	300.00
23mm	300.00
24mm	300.00
25mm	300.00
26mm	335.00
27mm	335.00
28mm	335.00
29mm	335.00
30mm	335.00
31mm	335.00
32mm	365.00
33mm	365.00
34mm	400.00
35mm	400.00
36mm	435.00
37mm	440.00
38mm	440.00
39mm	440.00
40mm	440.00
41mm	440.00
42mm	440.00
43mm	440.00
44mm	510.00
45mm	510.00
46mm	510.00
47mm	510.00
48mm	510.00
49mm	510.00
50mm	510.00
55mm	540.00
60mm	540.00
65mm	565.00
70mm	655.00
75mm	655.00




OSBORN PRODUCTS, INC.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Pipe Gages / Plug and Ring

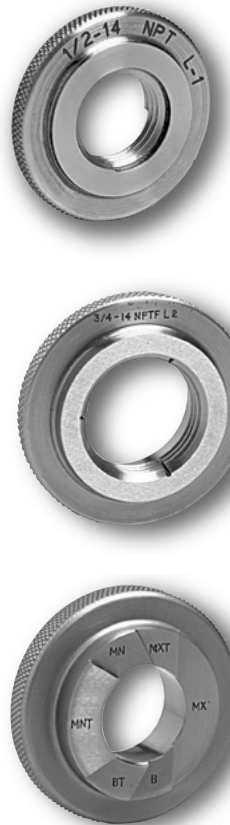
NPT - National Pipe Thread



NOM. SIZE	THREADS PER INCH	PLUGS		RINGS
		MEMBER	HANDLE	
1/16	27	\$126.00	\$10.00	\$206.00
1/8	27	92.00	10.00	163.00
1/4	18	103.00	10.00	175.00
3/8	18	109.00	10.00	194.00
1/2	14	\$117.00	\$10.00	\$207.00
3/4	14	134.00	10.00	228.00
1	11-1/2	141.00	10.00	254.00
1-1/4	11-1/2	154.00	10.00	275.00
1-1/2	11-1/2	\$170.00	\$10.00	\$317.00
2	11-1/2	197.00	10.00	372.00
2-1/2	8	232.00	19.00	424.00
3	8	269.00	19.00	517.00
3-1/2	8	\$375.00	\$19.00	\$693.00
4	8	421.00	19.00	789.00
5	8	591.00	19.00	937.00
6	8	697.00	19.00	1098.00

Special gages priced on request. All prices include long form certification.

## A.N.P.T. (Aeronautical National Pipe Taper) N.P.T.F. (National Pipe Taper Dryseal) Pressure-Tight Joints



NOM. SIZE	THREADS PER INCH	PLUGS			RINGS		
		L1 or L3	6 Step Plain	Handle	L1	L2	6 Step Plain
1/16	27	\$150.00	\$205.00	\$10.00	\$219.00	\$283.00	\$333.00
1/8	27	110.00	205.00	10.00	165.00	275.00	333.00
1/4	18	124.00	205.00	10.00	188.00	283.00	333.00
3/8	18	143.00	205.00	10.00	201.00	293.00	333.00
1/2	14	\$157.00	\$205.00	\$11.00	\$220.00	\$307.00	\$333.00
3/4	14	171.00	217.00	11.00	243.00	333.00	372.00
1	11-1/2	187.00	238.00	11.00	262.00	356.00	372.00
1-1/4	11-1/2	206.00	249.00	11.00	275.00	382.00	372.00
1-1/2	11-1/2	\$224.00	\$269.00	\$11.00	\$317.00	\$413.00	\$437.00
2	11-1/2	267.00	359.00	11.00	428.00	467.00	494.00
2-1/2	8	399.00	518.00	19.00	462.00	558.00	581.00
3	8	452.00	565.00	19.00	520.00	649.00	693.00

Special gages priced on request. All prices include long form certification.



OSBORN PRODUCTS, INC.

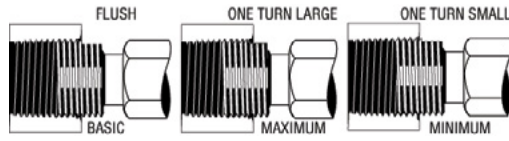
1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Taper Pipe Thread Gages

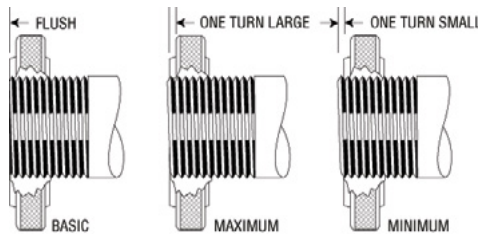
## METHOD OF GAGING PRODUCT – NPT

**Internal Taper Pipe Threads:** The plug gage is screwed up tight by hand into the internal thread of the product. The thread is within the permissible tolerance when the gaging notch of the working plug is not more than plus or minus one turn from being flush with the end of the thread. Fig. 1.



*Fig. 1 Gaging internal American National Taper pipe threads with working gage. When the internal thread is chamfered, the gaging point shall be the intersection of the chamfer and the pitch cone of the thread.*

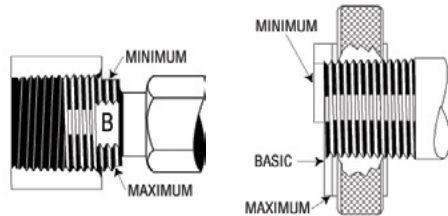
**External Taper Pipe Threads:** In gaging external taper threads, the ring gage is screwed up tight by hand on the external thread of the product. The thread is within the permissible tolerance when the the gaging face of the working ring is plus or minus one turn from being flush with the end of the thread. Figure 2.



*Fig. 2 Gaging External NPT Threads.*

## Limit Type Plug and Ring Gages

The limit type gage is used to eliminate counting turns by which the gage over or under travels to the basic surface.



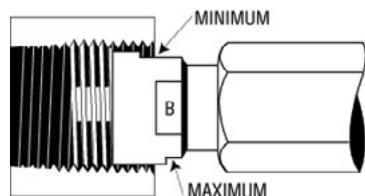
*Fig. 3 L<sup>1</sup> limit type Plug Gage*

*Fig. 4 L<sup>2</sup> limit type Ring Gage*

The gages include the basic notch on the plug and the basic surface on the ring and in addition include two notches, or steps, on both plug and ring. One notch is considered the maximum and the other the minimum. The retention of the basic step, or notch, facilitates king against master and reference gages and provides a means of checking the maximum and minimum steps.

## METHOD OF GAGING PRODUCT - ANPT AND NPTF

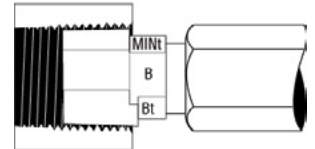
**Internal Threads:** The internal thread is first gaged with a limit-type L1 taper thread plug gage, and the gaging notch which most nearly represents the size of the thread is noted.



*Fig. 5 Checking fitting with L<sup>3</sup> thread Plug Gages.*

The three product threads beyond the L1 are called the L3 length and are the additional threads which will be engaged when the pipe is tightened with a wrench, or “wrench tight”. These threads are next gaged with an L<sup>3</sup> taper thread plug gage. This is also a limit type gage with the length equal to L<sup>1</sup> plus L3, but which has four threads at the small end only. For a thread to be acceptable on an L3 gage, the position of the gaging notch must coincide within 1/2 turn of the position previously noted on the L1 gage. The L1 and the L3 together check the lead, taper, pitch diameter, and the major diameter.

The minor diameter of internal threads is determined by the amount of truncation of the thread crests. As the truncation and pitch diameter varies within limits, so will the minor diameter vary and for this reason it is customary to refer to minor diameter as at “maximum truncation” or “minimum truncation”. There are also 3 pitch diameter gaging positions: basic, minimum, and maximum which necessitates 3 pairs of maximum and minimum truncation steps, or a total of 6 positions.



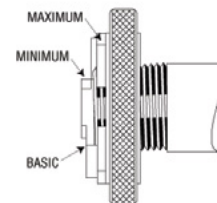
*Fig. 6 Checking minor diameter truncation with 6 step plain Plug Gages.*

To gage the minor diameter, a 6 step plain plug gage is always used in connection with the L1 gage. The L1 gage is used as a guide to determine the gaging position. If the basic gage notch is flush with end of the product, the threads are considered to be basic. The plain plug gage used on the same fitting should show the end of the product at or between the basic maximum and minimum notches.

**External Threads:** ANPT and NPTF external threads are first gaged with a thin L1 taper thread ring gage. Observe the small end of the gaging face of the ring to the small end of the pipe.

The L2 ring is used to gage the effective external threads beyond the L1 location length. It is relieved by counterboring at the small end to a depth equal to L1 minus 1P. The L2 is used like the thin L1 gage is used with a count of the number of turns by which the product over travels or fails to reach basic. The two gages together inspect the lead, pitch diameter, taper, and minor diameter. When both the L1 and L2 rings are used, the relative position of the small end of the pipe and the basic gaging face of the rings may not vary more than 1/2 turn.

The 6 step plain taper ring gage checks the truncation of the crest at the major diameter. Three of the steps represent the minimum truncation for the basic, maximum and minimum thread sizes – B, MN, MX. The other three represent the corresponding maximum truncation.



*Fig. 8 Checking major diameter truncation with 6 step plain ring gage.*

The 6 step plain ring is used similar to the 6 step plain plug. The ring is always used with a limit type thin L1 ring gage.



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com



# Gear Measuring Wires

**Gear Measuring Wires** are a quick and economical method to measure the tooth thickness of gears at the pitch diameter. Gear measuring wires are the same as thread measuring wires except that gear measuring wires are supplied in 2 wire sets. Special 3 wire sets and sizes may be quoted upon request.

- Tolerance +/- .000010
- Round within .00001
- Wire sets up to .825 are matched to within .00001
- Oil hardened tool steel or high speed steel
- 2" long
- 2 rms or better
- 2 meets former Federal Specification GGG-W-233b

PITCH	Wire Diameter for Enlarged Pinions	Wire Diameter for External Gears	Alternate	Wire Diameter for Internal Gears	PRICE
	1.92" Series	1.728" Series	1.68" Series	1.44" Series	
2	0.96	0.864	0.84	0.72	\$100.00
2-1/2	0.768	0.6912	0.672	0.576	100.00
3	0.64	0.576	0.56	0.48	89.00
4	0.48	0.432	0.42	0.36	89.00
5	0.384	0.3456	0.336	0.288	89.00
6	0.32	0.288	0.28	0.24	72.00
7	0.27428	0.24686	0.24	0.20571	72.00
8	0.24	0.216	0.21	0.18	72.00
9	0.21333	0.192	0.18666	0.16	72.00
10	0.192	0.1728	0.168	0.144	72.00
11	0.17454	0.15709	0.15273	0.13091	72.00
12	0.16	0.144	0.14	0.12	72.00
14	0.13714	0.12343	0.12	0.10286	58.00
16	0.12	0.108	0.105	0.09	58.00
18	0.10667	0.096	0.09333	0.08	58.00
20	0.096	0.0864	0.084	0.072	58.00
22	0.08727	0.07855	0.07636	0.06545	58.00
24	0.08	0.072	0.07	0.06	58.00
28	0.06857	0.06171	0.06	0.05143	58.00
32	0.06	0.054	0.0525	0.045	58.00
36	0.05333	0.048	0.04667	0.04	58.00
40	0.048	0.0432	0.042	0.036	58.00
48	0.04	0.036	0.035	0.03	58.00
64	0.03	0.027	0.02625	0.0225	58.00
72	0.02667	0.024	0.02333	0.02	58.00
80	0.024	0.0216	0.021	0.018	58.00
96	0.02	0.018	0.0175	0.015	68.00
100	0.0192	0.01728	0.0168	0.0144	68.00
120	0.016	0.0144	0.014	0.012	76.00
128	0.015	0.0135	0.01312	0.01125	76.00
200	0.0096	0.00864	0.0072	0.0072	79.00

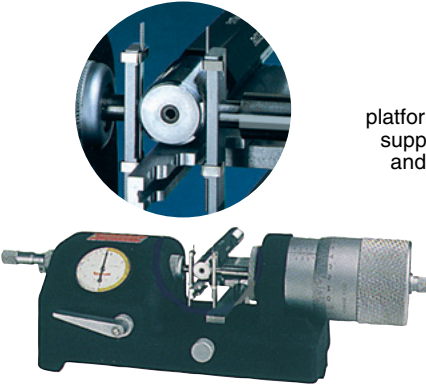


# 3-Wire Thread Measuring System

Thread measuring holders and wires available for a wide selection of measuring instruments.

Wire holders and 3 thread measuring wires for each thread pitch

## Thread Check™ 0-1" 3-Wire Thread Measuring System



Vertically adjustable platform for positioning and supporting threaded parts and plug gages between anvils of micrometer

Exclusive "U" Track for maintaining wire holders in the ideal position for engaging the lead angle of a thread

SPC Compatible

Micrometer with a graduation of .00005

Locking clamp holds micrometer accurately in place

1001B-Base Assembly . . . . . \$225.00  
1001M-Micrometer .0-1" Micrometer . . . Call for Price

PATENT NO. 5,317,809  
PATENT NO. 5,383,286  
FOREIGN PATENT NO. 94901380.0

## The Thread Check™ 3-Wire Thread Measuring System provides fast and accurate thread measurement on a variety of measuring instruments.

The traditional three-wire method is the most accurate method of measuring the effective or pitch diameter of an external screw thread. Unfortunately in the past, holding and correctly positioning three wires against a thread while simultaneously taking an accurate measurement had been an extremely difficult task. Now, The Thread Check 3-Wire Thread Measuring System provides a simple and precise way for determining the pitch diameter for threaded parts and thread plug gages. The system enhances Repeatability and Reproducibility (R&R) and reduces measurement time to a fraction of the time normally taken using the traditional three-wire method.

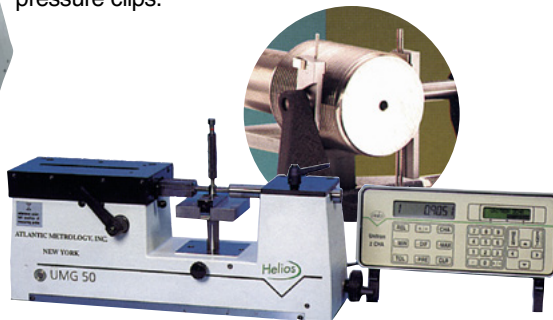
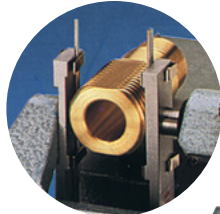
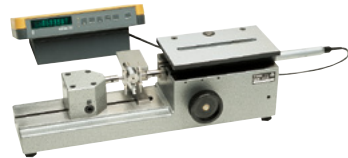
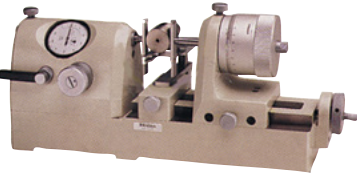
The Thread Check System offers specially designed wire holders and wires, base assemblies and vertically adjustable off-set platforms that make thread measurement fast and accurate. Thread Check's holders are fitted with certified full length thread measuring wires that meet or exceed the requirements of the ASME/ANSI B1.2, and B1.16M, thread standards as well as Federal Spec. GGG-W-366b and ISO standards. All wire holder sets include the actual wire size, NIST traceable number, and the constant required for determining the pitch diameter.

Thread measuring holders are precision made to predetermined thread pitches. Thread measuring wires are held in a predetermined position by light pressure clips.

The holders rotate freely on the spindle/anvil of the measuring instrument so as to engage the lead angle of a thread. Holders for fine pitches have wires positioned off center to allow for measurement at the back of the thread and closer to the shoulder of certain part. Holders can be purchased without wires for companies that have existing wires. Wires can be easily installed. Thread measuring holders are available in a full range of Standard, Metric and Acme sizes. Our engineering department can design wire holders for multiple start threads, helical gears, worms and other special thread measurement applications.

### Applications:

- Certify set plug gages and working thread gages
- Monitor the wear on working thread plug gages
- Monitor and control pitch diameter variation during thread fabrication
- Use in conjunction with "Go" and No Go" ring gages to control thread sizes to the most demanding specifications
- Determine out of roundness and taper that may exist in threaded parts
- Eliminate the cost and time involved in using outside calibration services
- Reduce measurement time to a fraction of the time normally taken using the traditional three-wire method



OSBORN PRODUCTS, INC.

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · www.osbornproducts.com

# 3 Wire Thread Measuring Holders & Wires



PATENT NO. 5,317,809  
 PATENT NO. 5,383,286  
 FOREIGN PATENT NO. 94901380.0

**1001-16TPI-W**

## Tolerance and Specifications:

Thread measuring wire sets are:

- within .000020" of best wire diameter for specified tpi
- within .000005" of the calibrated size provided on label
- roundness within .000010"
- Taper does not exceed .000010"
- standard 2" lengths
- minimum hardness of Rc 62.5
- surface finish lapped, 1 MU AA
- traceable to NIST
- wires meet or exceed Federal specifications ASME/ANSI B1.2 and B1.6M for Grade A Master Thread Wires



MEASURING INSTRUMENTS	ANVIL DIA.		Part NO.
	INCH	MM	
Mitutoyo Micrometers 0-1", 1"-2"	.250	6.35	1001-
Starrett Micrometers 0-1", 1"-2"	.250	6.35	1001-
Mitutoyo Bench Comparator Series 162.315	8.0		3004-
Starrett Bench Comparator 673Z	.300	7.62	5002-
Pratt & Whitney Supermicrometer	.375	9.525	3104-
Browne & Sharpe Ultra Mic.	.312	7.924	3204-
Fowler Trimos	.256	6.5	1201-
Zeis ULM	.237	6.5	1301-
American SIP	.315	8.0	1401-
Helios UMG 50	.256	6.5	1501-
Mahr 828 Universal	.295	7.5	1601-

Call for compatibility of other measuring instruments.  
 All trademarks are the property of their respective companies.

### HOLDERS AND WIRES

When ordering Deduct  
 5 to 9 sets.....\$5 per set  
 10 or more sets.....\$10 per set

### HOLDERS LESS WIRES

When ordering any pitch/TPI.  
 1 to 4 sets.....\$115 per set  
 5 to 9 sets.....\$110 per set  
 10 or more sets.....\$105 per set

### HOW TO ORDER

**1001 - 16TPI - W**

Part No. TPI W=wires  
 or Pitch LW=less wires

**1001 - 1.0M - W**

METRIC HOLDERS & WIRES			
Pitch	MM Diameter	Inch Diameter	Price
.2MM	.1155	.00455	\$237.00
.225MM	.1299	.00511	237.00
.25MM	.1443	.00568	237.00
.30MM	.1732	.00682	237.00
.35MM	.2021	.00796	237.00
.40MM	.2309	.00909	237.00
.45MM	.2598	.01023	225.00
.50MM	.2887	.01137	225.00
.55MM	.3175	.01250	279.00
.60MM	.3464	.01364	225.00
.70MM	.4041	.01591	192.00
.75MM	.4330	.01705	192.00
.80MM	.4619	.01818	192.00
.90MM	.5196	.02046	279.00
1.00MM	.5774	.02273	192.00
1.25MM	.7217	.02841	192.00
1.50MM	.8660	.03410	192.00
1.75MM	1.0104	.03978	192.00
2.00MM	1.1547	.04546	192.00
2.50MM	1.4434	.05683	192.00
3.00MM	1.7321	.06819	192.00
3.50MM	2.0207	.07956	192.00
4.00MM	2.3094	.09092	192.00
4.50MM	2.5981	.10229	237.00
5.00MM	2.8868	.11365	237.00
5.50MM	3.1754	.12502	237.00
6.00MM	3.4641	.13638	237.00
LIBRARIES IN WOODEN CASES			
Partial Library: .3-3.5MM			\$3890.00
Full Library: .2-4.0MM			\$4323.00

Special gages priced on request.

STANDARD HOLDERS & WIRES		
Threads Per Inch	Wire Diameter	Price
120	.00481	\$230.00
100	.00577	230.00
96	.00601	230.00
90	.00642	230.00
80	.00722	230.00
72	.00802	230.00
64	.00902	220.00
56	.01031	220.00
50	.01155	220.00
48	.01203	180.00
44	.01312	180.00
40	.01443	180.00
36	.01604	180.00
32	.01804	180.00
30	.01925	180.00
28	.02062	180.00
27	.02138	180.00
26	.02221	180.00
24	.02406	180.00
22	.02624	180.00
20	.02887	180.00
18	.03208	180.00
16	.04124	180.00
14	.04124	180.00
13	.04441	180.00
12	.04811	180.00
11.5	.05020	180.00
11	.05249	180.00
10	.05774	180.00
9	.06415	180.00
8	.07217	180.00
7.5	.07698	180.00
7	.08248	180.00
6	.09623	180.00
5.5	.10497	220.00
5	.11547	220.00
LIBRARIES IN WOODEN CASE		
Partial Library* 6-36		\$3502.00
Full Library* 5-80		\$5292.00
*7.5 and 22 TPI not included		

ACME HOLDERS & WIRES		
Threads Per Inch	Wire Diameter	Price
5	.10329	\$230.00
5.5	.09390	208.00
6	.08608	208.00
7	.07378	208.00
8	.06456	208.00
9	.05738	208.00
10	.05164	208.00
12	.04304	208.00
14	.03689	208.00
16	.03228	208.00
18	.02869	208.00
20	.02582	208.00
LIBRARIES IN WOODEN CASE		
Full Library 5A-20A		\$2517.00
Specify A after TPI when ordering ACME sizes.		



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

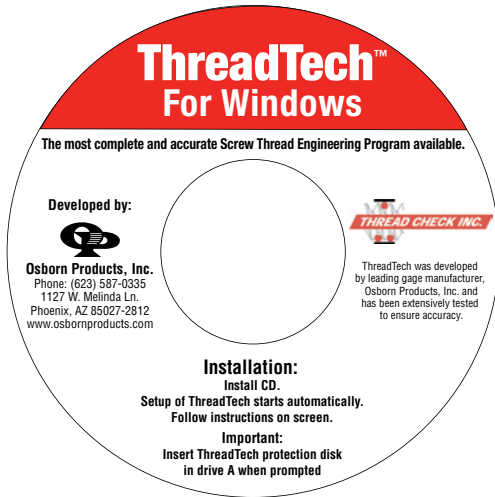
# ThreadTech™

## A Complete and Accurate Screw Thread Program

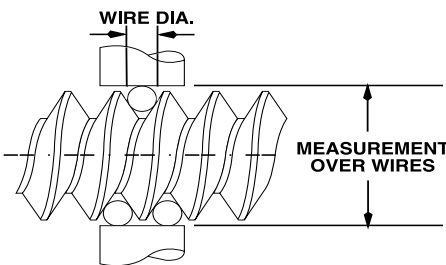
**ThreadTech™** is a powerful thread engineering program designed for engineers, quality assurance and machinists to save time and to help eliminate human error. This comprehensive computer program takes the confusion out of thread manufacturing and inspection. ThreadTech™ eliminates time consuming computations and searches for specifications.

**ThreadTech™** provides thread data on pitch diameters, major diameters, gage data, part data, tap data, helix angles, product and gage tolerances, crest and root flats, wire sizes, constants and just about anything on threads one needs to know.

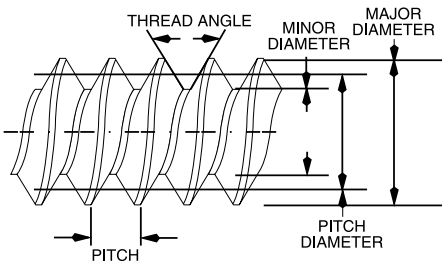
- Uses latest government and industry specifications
- 60 degree English and Metric threads
- Acme, pipe, STI, British buttress threads, and ISO metric trapezoidal threads
- Threads for Thread Plug Gages, Thread Ring Gages and Thread Setting Plugs
- Default sizes to agree with specifications
- All diameters, angles, roots, flats, plated or not
- Pitch Diameter
- Minor Diameter
- Helix Angles
- Asymmetrical Threads
- Worm gearing calculations utilize Buckingham and Vogel formulas (various included angles)
- Gage Data
- Part Data
- Tap Data
- Tolerances
- Crest and Root Flats
- Wire Sizes and Constants
- Measurement Over the Wires
- Standard Plating
- Anodize Plating
- HAE Plating
- Metric and Inch Equivalents
- Table and computer values
- Length of engagement



### SCREW THREAD NOTATION



### THREE-WIRE METHOD



## ThreadTech™ Screw Thread Software

Uses formulas and rounding off techniques consistent with the latest ANSI and governmental specifications available.

ThreadTech™ offers both table values and computed values. The program will alert the user if a dimension is input for plating thicknesses or size combination that is geometrically impossible or impractical. Metric 60 degree thread information is provided in both inches and millimeters to make double dimensioning for manufacturing and inspection easier. A powerful worm gearing program utilizes both Vogel and Buckingham formulas. ThreadTech™ even provides default data in cases where the applicable thread specifications do not agree with the calculated tables.

Easy to use: No computer skills are necessary to operate the ThreadTech™. The program provides step by step on screen explanations. All data can be easily saved and printed. The program is compatible with any Windows based system with 10 megabytes of available space on the hard drive.

- ThreadTech™ installs easily in Windows 2000, XP VISTA and 7 operating systems.
- Network capabilities
- Multi-User License Agreements available
- Free unlimited technical support, Toll-Free, 800-767-7633

**DISTRIBUTOR: Thread Check, Inc.**

To place an order for ThreadTech™ call 800-767-7633

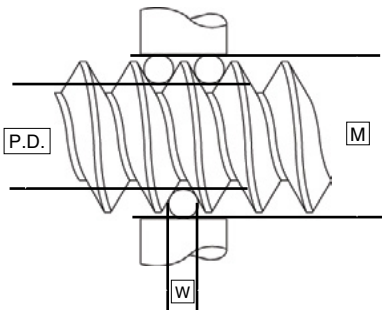


OSBORN PRODUCTS, INC.

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · www.osbornproducts.com

# Thread Measuring Wires



P.D. = Pitch Diameter  
 M = Measurement over wires  
 W = Wire diameter  
 C = Constant

$C = .86603 \times \text{Pitch (inches)} - 3W$   
 $P.D. = M - C$   
 $W = .57735 \times P$

## Thread Measuring Wires

### Tolerance and specifications:

- Within .000020" of best wire diameter for specified TPI.
- Within .000005" of the calibrated size provided on label.
- Have the same diameter within .000005".
- Roundness within .000010".
- Taper does not exceed .000010".
- standard 2" lengths.
- Minimum hardness of RC 62.5.
- Surface finish lapped, 1 MU AA.
- Traceable to NIST.
- Wires meet or exceed Federal specifications ASME/ANSI B1.2 and B1.6M for Grade A Master Thread Wires

## Use of Best Size Wires

In measuring screw threads it is desirable to use wires which touch the thread at or near the pitch diameter for the reason that with such "Best Size" wires the measurement of pitch diameter is least effected by an error in the included angle of thread.

	Max.	Best	Min.
60°	1.010362p	.57735p	.505182p
55°	.82573p	.563692p	.50568p
53°-8°	.97828p	.55902p	.54076p
47 1/2°	.72889p	.54625p	.49852p
29° Acme	.650013p	.51645p	.487263p

p=Pitch n=TPI P= 1/n

**Notes:** Maximum and minimum wires should be used which are safely within the limiting dimensions given by the above formulas.

Call for information and pricing of special wire diameters including Whitworth, British Association, Buttress and worm threads.

### Root Diameter Wires:

60° and 55° threads from 4 1/2-64 TPI.  
 Price per set of 3 wires. Call for prices.

60° METRIC		
Pitch MM	Nominal Best Wire Diameter MM	Price Set of 3
.2	.1155	\$107.00
.225	.1299	107.00
.25	.1443	107.00
.3	.1732	107.00
.35	.2021	107.00
.4	.2309	107.00
.45	.2598	107.00
.5	.2887	107.00
.6	.3464	100.00
.7	.4041	100.00
.75	.4330	100.00
.8	.4619	100.00
.9	.5196	100.00
1.0	.5774	72.00
1.25	.7217	72.00
1.5	.8660	72.00
1.75	1.0104	72.00
2.0	1.1547	72.00
2.5	1.4434	72.00
3.0	1.7321	72.00
3.5	2.0207	72.00
4.0	2.3094	72.00
4.5	2.5981	88.00
5.0	2.8868	100.00
5.5	3.1754	100.00
6.0	3.4641	100.00
7.0	4.0415	102.00
8.0	4.6188	102.00
9.0	5.1962	102.00
10.0	5.7735	107.00
LIBRARY SETS		
.3MM to 6MM Pitch (23 sizes in set)		\$1985.00
.2MM to 10MM Pitch (30 sizes in set)		\$2585.00

### Grand Master Calibration Sets

Supplied in durable corrosion-resistant containers in fitted cases, identified by serial numbers with certification of calibration.

- #20 HSC, 20 sizes (6-36 TPI)
- #30 HSC, 30 sizes (5-80 TPI)
- #34 HSC, 34 sizes (4-80 TPI)
- #30 HSC, 30 sizes (.2-10mm)
- #23 HSC, 22 sizes (.3-6mm)
- #22 HSC, 22 sizes (1-20 TPI)

### Call for Pricing

One master for each pitch. Grand Master Calibration Sets are not returnable for credit or cancellation. Certificate of Calibration traceable to NIST included with all sets.

Long form certificates available on request

60° INCH		
Threads per Inch (n)	Nominal Best Wire Diameter G	Price Set of 3
120	.00481	\$106.00
100	.00577	106.00
96	.00601	106.00
90	.00642	106.00
80	.00722	106.00
72	.00802	106.00
64	.00902	106.00
56	.01031	106.00
50	.01155	106.00
48	.01203	72.00
44	.01312	72.00
40	.01443	72.00
36	.01604	72.00
32	.01804	72.00
30	.01925	72.00
28	.02062	72.00
27	.02138	72.00
26	.02221	72.00
24	.02406	72.00
22	.02624	72.00
20	.02887	72.00
18	.03208	72.00
16	.03608	72.00
14	.04124	72.00
13	.04441	72.00
12	.04811	72.00
11 1/2	.05020	72.00
11	.05249	72.00
10	.05774	72.00
9	.06415	72.00
8	.07217	72.00
7 1/2	.07698	72.00
7	.08248	72.00
6	.09623	72.00
5 1/2	.10497	98.00
5	.11547	100.00
4 1/2	.12830	100.00
4	.14434	102.00
3 1/2	.16496	102.00
3 1/4	.17765	102.00
3	.19245	102.00
2 3/4	.20995	102.00
2 1/2	.23094	107.00
2	.28868	107.00
LIBRARY SETS		
4 to 80 TPI (34 Sizes in Set)		\$2530.00
5 to 80 TPI (30 Sizes in Set)		2205.00
6 to 36 TPI (20 Sizes in Set)		2585.00

29° ACME		
Threads per Inch (n)	Nominal Best Wire Diameter G	Price Set of 3
1	.51645	\$126.00
1 1/3	.38734	113.00
1 1/2	.34430	113.00
1 3/4	.29511	113.00
2	.25823	113.00
2 1/2	.20658	113.00
3	.17215	113.00
3 1/2	.14756	104.00
4	.12911	104.00
4 1/2	.11477	104.00
5	.10329	91.00
5 1/2	.09390	91.00
6	.08608	91.00
7	.07378	91.00
8	.06456	91.00
9	.05738	91.00
10	.05164	91.00
12	.04304	91.00
14	.03689	91.00
16	.03228	91.00
18	.02869	91.00
20	.02582	91.00
LIBRARY SETS		
29° Acme Set No. 22AB, 22 sizes (1 to 20 TPI), with case		\$1902.00

Special thread measuring wires priced on application.



OSBORN PRODUCTS, INC.

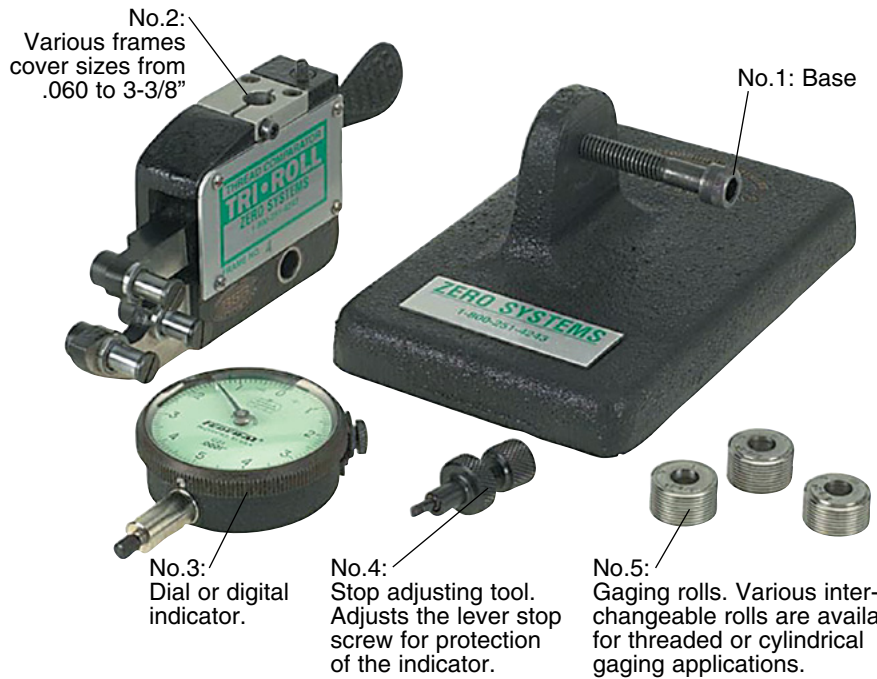
1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Tri-Roll Comparator

## COMPARATORS:

- System offers actual measurements of dimensional characteristics for quicker machine adjustments during thread production.
- Reduces gaging time over thread plug and ring gages.
- One single gage can be used for pre-plate, after-plate class 1, 1A, 2, 2A, 3, 3A eliminating the need for multiple fixed limit thread plug and ring gages.
- Ideal for use with Statistical Process Control – SPC.
- Rigid construction and constant measuring pressure provides consistent and accurate readings.
- Quick setting with the use of a set master.
- Easy to setup.



BASIC SPECIFICATIONS						
Frame No.	Range Normal Size		Metric (MM)		For Threads	Roll Length
	Above	to & Incl.	Above	to & Incl.		
0	.059	.073	1.5	1.8	80 to 64	.223
1	.073	.099	1.8	2.5	64 to 48	.223
2	.099	.164	2.5	4.2	48 to 32	.223
3	.164	.313	4.2	7.9	32 to 18	.424
4	.313	.500	7.9	12.7	32 to 12	.424
5	.500	.750	12.7	19.0	28 to 10	.626
6	.750	1.125	19.0	28.5	28 to 6	.931
7	1.125	1.500	28.5	38.1	28 to 6	.931
8	1.500	1.875	38.1	47.6	28 to 4	.931
9	1.875	2.250	47.6	57.1	28 to 4	.931
10	2.250	2.625	57.1	66.7	28 to 4	.931
11	2.625	3.000	66.7	76.2	28 to 4	.931
12	3.000	3.375	76.2	85.7	28 to 4	.931

**Note:**  
Setting Master Also Required.

There are 5 components that comprise a complete Tri-Roll Comparator assembly. To assist you in ordering, we have separated each of the five components into pricing tables with the size and/or range, price, and order number.

FRAMES:			
Frame No.	Range-Nominal Size		Price
	Above Inch (Metric)	To & Including Inch (Metric)	
0	.059 (1.5MM)	.073 (1.8MM)	\$412.00
1	.073 (1.8MM)	.099 (2.5MM)	412.00
2	.099 (2.5MM)	.164 (4.2MM)	419.00
3	.164 (4.2MM)	.313 (7.9MM)	419.00
4	.313 (7.9MM)	.500 (12.7MM)	426.00
5	.500 (12.7MM)	.750 (19.0MM)	426.00
6	.750 (19.0MM)	1.125 (28.5MM)	446.00
7	1.125 (28.5MM)	1.500 (38.1MM)	446.00
8	1.500 (38.1MM)	1.875 (47.6MM)	659.00
9	1.875 (47.6MM)	2.250 (57.1MM)	698.00
10	2.250 (57.1MM)	2.625 (66.7MM)	732.00
11	2.625 (66.7MM)	3.000 (76.2MM)	863.00
12	3.000 (76.2MM)	3.375 (85.7MM)	922.00
BASE			\$47.00
MULTIPLE MOUNTING BAR			48.00
DUAL FRAME ASSEMBLY			88.00
ALUMINUM HANDLE BAR for HAND HELD UNIT			56.00
DIAL INDICATOR for TRI-ROLL THREAD COMPARATOR			QUOTE
DIGITAL INDICATOR for TRI-ROLL THREAD COMPARATOR			QUOTE
STOP ADJUSTING TOOL			29.00



Portable Hand Held Model



Tri-Roll Comparator



Dual Frame Base Assembly



Multiple Mounting Bar with Spacers and Screws

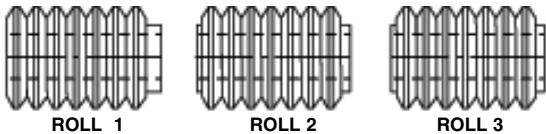


OSBORN PRODUCTS, INC.

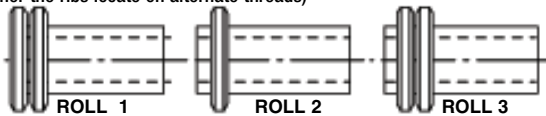
1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

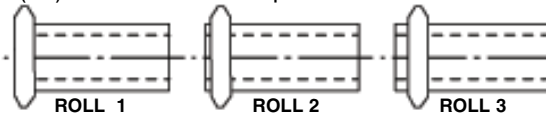
# Selecting Gaging Rolls



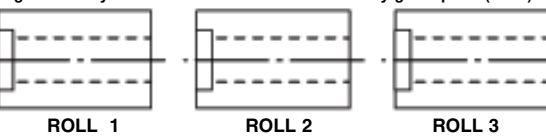
**TYPE 3:** Full Profile-Functional Diameter size. Full ribbed rolls for functional diameter size for pitches coarser than 48 T.P.I. (for 48 T.P.I. and finer the ribs locate on alternate threads)



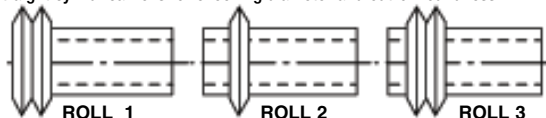
**TYPE 4:** Cone and Vee-Single Element Pitch Diameter. Two ribs ("vee"-type) on lower rolls (No.1 and 3). One rib ("cone" type) on upper roll (No.2) Flank contact limited to .1 pitch.



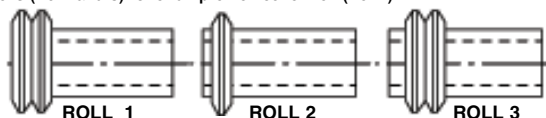
**TYPE 5:** "Best Wire" Size Radius-Single Element Pitch Diameter. Single ribs only with "best wire" size radius for any given pitch (T.P.I.).



**TYPE 6:** Plain Rolls-Thread Major Diameter and Plain Cylindrical Parts. Straight cylindrical rolls for checking diameter and out-of-roundness.



**TYPE 7:** Minor Diameter (55° Included Angle). Two full profile "vee" rolls (No 1 and 3). One full profile "cone" roll (No. 2).



**TYPE 8:** Lead/Flank Angle. Two full profile "vee" rolls (No 1 and 3) with outside flanks relieved. One full profile "cone" roll (No. 2).

**Gaging rolls are also available for: Taper Pipe, ACME, Buttress, specials.**

Call for prices: (623) 587-0335



Measure I.D. Threads with **Internal Thread Comparators.** Call for prices.



**STC External Segment Thread Comparator.** Functional size. Use full form gaging sequential where 180° contact is specified.



**OSBORN PRODUCTS, INC.**

5. GAGING ROLLS - INCH								
Type 3 Full Profile - Functional Size Diameter			Type 4 Cone and Vee - Single Element Pitch Diameter			Type 5 "Best Wire" Size Radius Single Element Pitch Diameter		
Size	Frame	Price	Size	Frame	Price	Size	Frame	Price
0-80	0	\$353.00				0-80	0	\$204.00
1-64	0	353.00				1-64	0	204.00
1-72	0	353.00				1-72	0	204.00
2-56	1	353.00	Call for price			2-56	1	204.00
2-64	1	353.00				2-64	1	204.00
3-48	1	353.00				3-48	1	204.00
3-56	1	353.00				3-56	1	204.00
4-40	2	353.00	4-40	2	\$305.00	4-40	2	204.00
4-48	2	353.00	4-48	2	305.00	4-48	2	204.00
5-40	2	353.00	5-40	2	305.00	5-40	2	204.00
5-44	2	353.00	5-44	2	305.00	5-44	2	204.00
6-32	2	353.00	6-32	2	305.00	6-32	2	204.00
6-40	2	353.00	6-40	2	305.00	6-40	2	204.00
8-32	2	353.00	8-32	2	305.00	8-32	2	204.00
8-36	2	353.00	8-36	2	305.00	8-36	2	204.00
10-24	3	353.00	10-24	3	305.00	10-24	3	204.00
10-32	3	353.00	10-32	3	305.00	10-32	3	204.00
12-24	3	353.00	12-24	3	305.00	12-24	3	204.00
12-28	3	353.00	12-28	3	305.00	12-28	3	204.00
1/4-20	3	353.00	1/4-20	3	305.00	1/4-20	3	204.00
1/4-28	3	353.00	1/4-28	3	305.00	1/4-28	3	204.00
5/16-18	3	353.00	5/16-18	3	305.00	5/16-18	3	204.00
5/16-24	3	353.00	5/16-24	3	305.00	5/16-24	3	204.00
3/8-16	4	353.00	3/8-16	4	305.00	3/8-16	4	204.00
3/8-24	4	353.00	3/8-24	4	305.00	3/8-24	4	204.00
7/16-14	4	353.00	7/16-14	4	305.00	7/16-14	4	204.00
7/16-20	4	353.00	7/16-20	4	305.00	7/16-20	4	204.00
1/2-13	4	353.00	1/2-13	4	305.00	1/2-13	4	204.00
1/2-20	4	353.00	1/2-20	4	305.00	1/2-20	4	204.00
9/16-12	5	353.00	9/16-12	5	305.00	9/16-12	5	204.00
9/16-18	5	353.00	9/16-18	5	305.00	9/16-18	5	204.00
5/8-11	5	353.00	5/8-11	5	305.00	5/8-11	5	204.00
5/8-18	5	353.00	5/8-18	5	305.00	5/8-18	5	204.00
3/4-10	5	353.00	3/4-10	5	305.00	3/4-10	5	204.00
3/4-16	5	353.00	3/4-16	5	305.00	3/4-16	5	204.00
7/8-9	6	362.00	7/8-9	6	341.00	7/8-9	6	235.00
7/8-14	6	362.00	7/8-14	6	341.00	7/8-14	6	235.00
1"- 8	6	362.00	1"- 8	6	341.00	1"- 8	6	235.00
1"-12	6	362.00	1"-12	6	341.00	1"-12	6	235.00
1"- 14	6	362.00	1"- 14	6	341.00	1"- 14	6	235.00
1 1/8-7	6	362.00	1 1/8-7	6	341.00	1 1/8-7	6	235.00
1 1/8-12	6	362.00	1 1/8-12	6	341.00	1 1/8-12	6	235.00
1 1/4-7	7	362.00	1 1/4-7	7	341.00	1 1/4-7	7	235.00
1 1/4-12	7	362.00	1 1/4-12	7	341.00	1 1/4-12	7	235.00
1 3/8-6	7	362.00	1 3/8-6	7	341.00	1 3/8-6	7	235.00
1 3/8-12	7	362.00	1 3/8-12	7	341.00	1 3/8-12	7	235.00
1 1/2-6	7	362.00	1 1/2-6	7	341.00	1 1/2-6	7	235.00
1 1/2-12	7	362.00	1 1/2-12	7	341.00	1 1/2-12	7	235.00

5. GAGING ROLLS - METRIC								
TYPE 3 Full Profile - Functional Size Dia.			TYPE 4 Cone and Vee - Single Element Pitch Dia.			TYPE 5 Best Wire Size Radius - Single Element Pitch Dia.		
Size	Frame	Price	Size	Frame	Price	Size	Frame	Price
CALL FOR PRICE						M1.6 x .35	0	\$204.00
M2 x .4	1	\$350.00				M2 x .4	1	204.00
M2.5 x .45	1	350.00	CALL FOR PRICE			M2.5 x .5	1	204.00
M3 x .5	2	350.00				M3 x .45	1	204.00
M3.5 x .6	2	350.00	M3.5 x .6	2	\$303.00	M3.5 x .6	2	204.00
M4 x .7	2	350.00	M4 x .7	2	303.00	M4 x .7	2	204.00
M5 x .8	3	350.00	M5 x .8	3	303.00	M5 x .8	3	204.00
M6 x 1	3	350.00	M6 x 1	3	303.00	M6 x 1	3	204.00
M8 x 1.25	4	350.00	M8 x 1.25	4	303.00	M8 x 1.25	4	204.00
M10 x1.5	4	350.00	M10 x 1.5	4	303.00	M10 x 1.5	4	204.00
M10 x1.25	4	350.00	M10 x1.25	4	303.00	M10 x 1.25	4	204.00
M12 x1.75	4	350.00	M12 x1.75	4	303.00	M12 x 1.75	4	204.00
M12 x1.25	4	350.00	M12 x1.25	4	303.00	M12 x 1.25	4	204.00
M14 x 2	5	350.00	M14 x 2	5	303.00	M14 x 2	5	204.00
M14 x 1.5	5	350.00	M14 x 1.5	5	303.00	M14 x 1.5	5	204.00
M16 x 2	5	350.00	M16 x 2	5	303.00	M16 x 2	5	204.00
M20 x 1.5	6	357.00	M20 x 1.5	6	346.00	M20 x 1.5	6	235.00
M22 x 1.5	6	357.00	M22 x 1.5	6	346.00	M22 x 1.5	6	235.00
M24 x 3	6	357.00	M24 x 3	6	346.00	M24 x 3	6	235.00

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Class ZZ Plain Pin Gage Sets & Libraries

Osborn Products, Inc. offers an extensive inventory of Vermont Gage precision products certified to ISO 9002 and traceable to NIST.

## Economical and General Purpose Pin Gages

Make quick and accurate measurements with Vermont Gage pin gages. Measure hole sizes. Calculate distances between holes. Gage slot widths. Check locations. Use for Go/NoGo gaging. Size in micrometers and snap gages. These gages are essential for anyone making frequent and varied measurements.

- Class ZZ (.0002" or .005MM tolerance)
- Go (Plus) or NoGo (Minus) tolerance
- NIST traceable
- .0005" or .02MM sizes
- .001" or .02MM set increments
- 52100 tool steel; 60/62 Rc
- 2" long
- 10 microinch finish or better
- Within .0001" round
- Marked with size & direction of tolerance on gages over .060"
- Certificate of Accuracy Included

## Black Guard™

- Prevents rust and corrosion
- Visible wear indicator
- Bright clear marking
- Longer gage life



Pin Gage Set



Pin Gage Library



Pin Gage Set

METRIC SETS (.02MM INCREMENTS)			
Range	No of Gages	Wt. Lbs.	Steel or Black Guard Price
0.20MM to 1.28MM	55	2	\$100.00
0.21MM to 1.29MM	55	2	100.00
1.30MM to 4.98MM	185	6	205.00
1.31MM to 4.99MM	185	6	205.00
5.00MM to 9.98MM	250	14	315.00
5.01MM to 9.99MM	250	14	315.00
10.00MM to 13.98MM	200	24	275.00
10.01MM to 13.99MM	200	24	275.00
14.00MM to 16.48MM	125	24	345.00
14.01MM to 16.49MM	125	24	345.00
16.50MM to 18.98MM	125	30	440.00
16.51MM to 18.99MM	125	30	440.00
19.00MM to 20.98MM	100	32	755.00
19.01MM to 20.99MM	100	32	755.00
21.00MM to 22.48MM	75	29	645.00
21.01MM to 22.49MM	75	29	645.00
22.50MM to 23.98MM	75	33	670.00
22.51MM to 23.99MM	75	33	670.00
24.00MM to 25.48MM	75	36	700.00
24.01MM to 25.49MM	75	36	700.00
METRIC LIBRARIES (.02MM INCREMENTS)			
Range	No of Gages	Wt. Lbs.	Price
.20MM to 13.98MM	690	86	\$1075.00
.21MM to 13.99MM	690	86	1075.00
.20MM to 18.98MM	940	100	1850.00
.21MM to 18.99MM	940	100	1850.00
.20MM to 22.48MM	1115	161	3400.00
.21MM to 22.49MM	1115	161	3400.00
.20MM to 25.48MM	1265	230	4955.00
.21MM to 25.49MM	1265	230	4955.00
1.30MM to 16.48MM	760	68	1450.00
1.31MM to 16.49MM	760	68	1450.00
1.30MM to 20.98MM	985	130	2425.00
1.31MM to 20.99MM	985	130	2425.00
1.30MM to 23.98MM	1135	192	4210.00
1.31MM to 23.99MM	1135	192	4210.00
1.30MM to 25.48MM	1210	228	4610.00
1.31MM to 25.49MM	1210	228	4610.00

INCH SETS (.001" INCREMENTS)			
Range	No of Gages	Wt. Lbs.	Steel or Black Guard Price
.0060" to .0600"	55	2	\$110.00
.0065" to .0605"	55	2	110.00
.0110" to .0600"	50	2	85.00
.0115" to .0605"	50	2	85.00
.0110" to .2500"	240	6	240.00
.0115" to .2505"	240	6	240.00
.0610" to .2500"	190	6	175.00
.0615" to .2505"	190	6	175.00
.2510" to .5000"	250	20	255.00
.2515" to .5005"	250	20	255.00
.5010" to .6250"	125	21	300.00
.5015" to .6255"	125	21	300.00
.6260" to .7500"	125	31	325.00
.6265" to .7505"	125	31	325.00
.7510" to .8320"	82	27	555.00
.7515" to .8325"	82	27	555.00
.8330" to .9160"	84	33	645.00
.8335" to .9165"	84	33	645.00
.9170" to 1.0000"	84	38	670.00
.9175" to 1.0005"	84	38	670.00
INCH LIBRARIES (.001 INCREMENTS)			
Range	No of Gages	Wt. Lbs.	Price
.0060" to .6250"	620	89	\$1045.00
.0065" to .6255"	620	89	1045.00
.0060" to .8320"	827	187	1965.00
.0065" to .8325"	827	187	1965.00
.0060" to 1.000"	995	256	3315.00
.0065" to 1.0005"	995	256	3315.00
.0110" to .6255"	1230	202	1905.00
.0110" to .6250"	615	120	1015.00
.0115" to .6255"	615	120	1015.00
.0110" to .7500"	740	118	1335.00
.0115" to .7505"	740	118	1335.00
.0110" to .9160"	906	192	2540.00
.0115" to .9165"	906	192	2540.00
.0110" to 1.000"	990	256	3285.00
.0115" to 1.0005"	990	256	3285.00
.0610" to .5005"	880	120	1045.00
.0610" to .7500"	690	118	1245.00
.0615" to .7505"	690	118	1245.00
.0610" to .9160"	856	218	2485.00
.0615" to .9165"	856	218	2485.00
.0610" to 1.000"	940	256	3200.00
.0615" to 1.0005"	940	256	3200.00

Please specify plus or minus tolerance when ordering.



OSBORN PRODUCTS, INC.

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · www.osbornproducts.com



# Class ZZ Replacement Pin Gages & Assemblies

## CLASS ZZ REPLACEMENT PINS

### Keep old sets in compliance!

Replace missing, damaged, or worn out Class ZZ gages from your existing sets & Libraries. These replacement pins are perfect in updating your old sets, and bringing them back into compliance. Each pin is individually marked with size and direction of tolerance. Packaged with a rust preventative, these pins maintain an indefinite shelf life; so keep several of your most used sizes on hand! Each pin is NIST traceable and includes a Certificate of Accuracy printed on back page.



Replacement Pins

INCH Range	Member Only Steel or Black Guard™
.0040" to .0105"	\$7.25
.0110" to .0605"	4.00
.0610" to .5005"	3.75
.5010" to .6255"	4.50
.6260" to .7505"	6.25
.7510" to .8325"	8.50
.8330" to .9165"	10.00
.9170" to 1.0005"	10.25
METRIC Range	Member Only Steel or Black Guard™
.20mm to 1.29mm	\$4.75
1.30mm to 9.99mm	4.25
10.00mm to 13.99mm	5.00
14.00mm to 16.49mm	6.50
16.50mm to 18.99mm	7.25
19.00mm to 20.99mm	9.00
21.00mm to 22.49mm	10.00
22.50mm to 23.99mm	11.25
24.00mm to 25.49mm	12.50



### Replacement Pins:

Rust-preventative packaging and individually labeled with size, tolerance direction and NIST traceable numbers.



### Black Guard™

- Prevents rust & corrosion
- Visible wear indicator
- Bright clear marking
- Longer gage life

## CLASS ZZ ASSEMBLIES

### A great Go/NoGo inspection Tool.

Purchase your Class ZZ gages factory assembled in a handle for production gaging. Class ZZ assemblies are economical and very versatile for Go/NoGo gaging. If the Go (Green End) fits and the NoGo (Red End) doesn't, your part passes inspection. It doesn't get any easier! Each assembly includes 1 line (up to 15 characters) of custom marking.

INCH Range	Single-End Assembly Steel or Black Guard™	Double-End Assembly Steel or Black Guard™
.0040" to .0105"	\$ 14.75	\$24.00
.0110" to .0755"	11.50	17.50
.0760" to .1805"	11.75	17.50
.1810" to .2815"	12.25	18.00
.2820" to .4065"	12.75	18.50
.4070" to .5005"	15.25	21.00
.5100" to .6255"	19.75	27.50
.6260" to .7505"	22.50	32.00
.7510" to .8325"	31.75	43.50
.8330" to .9165"	33.25	46.50
.9170" to 1.0005"	33.50	47.00
METRIC Range	Single-End Assembly Steel or Black Guard™	Double-End Assembly Steel or Black Guard™
.20mm to 1.29mm	\$11.00	\$19.00
1.30mm to 4.56mm	11.00	18.00
4.57mm to 7.14mm	12.00	18.50
7.15mm to 9.99mm	12.00	19.00
10.00mm to 12.94mm	14.00	21.00
12.95mm to 16.12mm	19.00	27.00
16.13mm to 18.99mm	21.00	32.50
19.00mm to 19.30mm	22.00	37.50
19.31mm to 22.49mm	30.00	44.50
22.50mm to 23.99mm	31.00	48.00
24.00mm to 25.49mm	32.00	50.50

Green end GO

Red end NOGO



Double End Assembly



Single End Assembly



OSBORN PRODUCTS, INC.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Fixed Limit Gage Fact Sheet

GAGEMAKER'S TOLERANCE CHART							
RANGE	XXXX	XXX	XX	X	Y	Z	ZZ
.0009" to .8250"	.000005"	.00001"	.00002"	.00004"	.00007"	.0001"	.00020"
.8251" to 1.5100"	.000008"	.000015"	.00003"	.00006"	.00009"	.00012"	.00024"
1.5101" to 2.5101"	.00001"	.00002"	.00004"	.00008"	.00012"	.00016"	.00032"
2.5101" to 4.5100"	.000013"	.000025"	.00005"	.00010"	.00015"	.00020"	.00040"
4.5101" to 6.5100"	.000017"	.000033"	.000065"	.00013"	.00019"	.000250"	.00050"
6.5101" to 9.0100"	.00002"	.00004"	.00008"	.00016"	.00024"	.000320"	.00064"
9.0101" to 12.260"	.000025"	.00005"	.0001"	.0002"	.0003"	.000400"	.00080"

METRIC EQUIVALENTS						
RANGE	XX	X	Y	Z	ZZ	
.74MM to 20.96MM	.00051	.00102	.00178	.00254	.005	
20.96MM to 38.35MM	.00076	.00152	.00229	.00305	.006	
38.35MM to 63.75MM	.00102	.00203	.00305	.00406	.008	
63.75MM to 114.55MM	.00127	.00254	.00381	.00508	.010	
114.55MM to 163.35MM	.00165	.00330	.00483	.00635	.013	
163.35MM to 228.85MM	.00203	.00406	.00610	.00813	.016	
228.85MM to 311.40MM	.00254	.00508	.00762	.01016	.020	

Fixed limit gages are primarily used to check dimensions and geometries. Plug gages check internal dimensions and ring gages check external dimensions. Inspection is performed by use of GO/NOT GO gages that represent the Minimum and Maximum limit of the product part characteristic to ensure assembleability and fit. This method is used for both thread gages and cylindrical plain gages.

GO gages passing through a part assure that the maximum material condition of a part has not been exceeded. NOT GO gages not passing through the part assure the dimension has not dropped below the minimum material condition.

Fixed limit gages are highly accurate, easy to use and economical.

## HOW TO DETERMINE AND SELECT THE PROPER TOLERANCE FOR YOUR GAGING APPLICATION:

The normal rule of practice requires 10% of product tolerance to be divided between the "GO" and "NOT GO" gages. For plug gages, a plus tolerance is applied to the GO member and a minus tolerance to the NOT GO member. Ring gages receive reverse tolerance direction so that the "GO" member is minus and the "NOT GO" is plus tolerance. Applying this practice results in gage tolerance always being included in the part tolerance by up to 10%. This results in the possibility that 10% of good product could fail inspection but that no bad product would ever pass.

Type of Gage	TOLERANCE DIRECTION	
	GO Member	NO GO Member
Thread Plug	Plus	Minus
Plain Plug	Plus	Minus
Thread Ring Gage	Minus	Plus
Plain Ring Gage	Minus	Plus
Thread Setting Plug	Minus	Plus

## WHEN ORDERING GAGES, THE TWO BASIC PRINCIPLES ARE:

1. Do not allow the tolerance of the GO and NOT GO gages to consume more than 10% of your product tolerance. The 10% is usually divided equally between the GO and NOT GO gages.
2. Higher precision gages will accept slightly more product but with less wear life and greater expense.

## PROPER CARE AND USAGE OF GAGES:

- Part dimensions to be gaged should be cleaned and burr free to prevent gaging interference.
- Gages should be turned or pushed slowly and gently into or onto the dimension being checked. Forcing gages will result in faulty gaging and the possibility of damaging both the part and gage.
- The effects of thermal expansion should be taken into consideration on both the part and the gage. The temperature of the part and the gage should be the same. 68° F is the ideal temperature at which both part and gage should be at when inspected because gages are calibrated at 68° F. This effectively eliminates any error due to thermal expansion.
- Protecting gages from excessive heat, moisture and corrosive chemicals will extend the life of your gages. After use, gages should be cleaned and recoated with a thin-film rust preventative and stored properly.
- Gages should be periodically inspected and calibrated to assure accuracy. Go member gages tend to wear quicker with normal use. NOT GO gages will wear on the ends that receive the greatest usage. Frequency of inspection and calibration should be dependent on such factors as the amount of usage, part and gage material, tolerance and quality procedures.

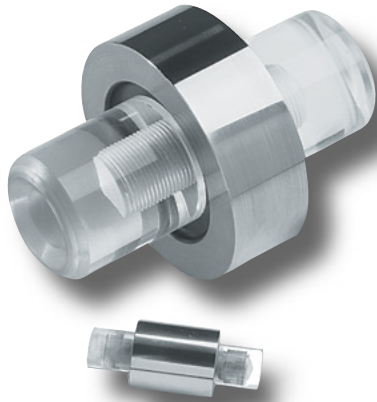


OSBORN PRODUCTS, INC.

1127 West Melinda Lane · Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 · Fax: (623) 582-1387 · www.osbornproducts.com

# Master Setting Discs



Use MASTER SETTING DISCS to calibrate and set comparators, snap gages, and other precision measuring instruments. All master setting discs are furnished with insulating grips to prevent heat distortion. Master Setting Discs are designed to satisfy quality control traceability requirements.

Master setting discs are available in 3 styles. Unless otherwise specified, the gagemakers tolerances will be applied bilaterally – +/- 1/2 tolerance on styles -#1 and #3. Style #2 is a unilateral tolerance with minus on the GO and plus on the NOGO.

- All MASTER SETTING DISCS conform to ANSI B47.1
- All MASTER SETTING DISCS are ring lapped to size and polished.
- Roundness and taper of all gages will not exceed 50% of the application gagemaker's size tolerance and are non-accumulative.
- All Master Setting discs furnished with insulator grips to prevent heat distortion.

### 3 STYLES:

#### Styles 1 and 3 -

Bilateral tolerance +/- 1/2 tolerance.

#### Style 2-

Unilateral tolerance  
GO – minus tolerance  
NOGO + Plus tolerance

XXX and Carbide Master Setting Discs are priced on request.

Larger sizes priced on request.

Call for quantity discounts.

Note: sizes above 1.510" to and including 8.510 –AGD standards call for style #3 in place of style #2. Style #3 master setting are separated by an A.G.D. separator plate and linked together with a tie rod and insulators.

Sizes available up to 23 inches in style #3.

Call Osborn Products, Inc. at:

**(623) 587-0335**

for pricing and delivery.

SIZE RANGE	CLASS	S T E E L			C H R O M E		
		PRICE STYLE 1	PRICE STYLE 2	PRICE STYLE 3	PRICE STYLE 1	PRICE STYLE 2	PRICE STYLE 3
.1500" - .2300" 3.81MM - 5.84MM	XX	\$115.00	\$195.00	\$105.00	\$161.00	\$273.00	\$147.00
	X	105.00	165.00	90.00	147.00	231.00	126.00
	Y	100.00	160.00	85.00	140.00	224.00	119.00
.2301" - .3650" 5.85MM - 9.27MM	XX	115.00	195.00	105.00	161.00	273.00	147.00
	X	105.00	165.00	90.00	147.00	231.00	126.00
	Y	100.00	160.00	85.00	140.00	224.00	119.00
.3651" - .5100" 9.28MM - 12.95MM	XX	120.00	200.00	105.00	168.00	280.00	147.00
	X	105.00	170.00	95.00	147.00	238.00	133.00
	Y	100.00	165.00	90.00	140.00	231.00	126.00
.5101" - .8250" 12.65MM - 20.95MM	XX	120.00	205.00	110.00	168.00	287.00	154.00
	X	110.00	180.00	100.00	154.00	252.00	140.00
	Y	105.00	170.00	90.00	147.00	238.00	126.00
.8251" - 1.1350" 20.96MM - 28.83MM	XX	130.00	210.00	115.00	182.00	294.00	161.00
	X	115.00	190.00	105.00	161.00	266.00	147.00
	Y	110.00	175.00	100.00	154.00	245.00	140.00
1.1351" - 1.5100" 38.36MM - 51.05MM	XX	135.00	225.00	120.00	189.00	315.00	168.00
	X	120.00	200.00	110.00	168.00	280.00	154.00
	Y	115.00	190.00	105.00	161.00	266.00	147.00
1.5101" - 2.0100" 38.36MM - 51.05MM	XX	150.00	235.00	140.00	210.00	329.00	196.00
	X	130.00	215.00	120.00	182.00	301.00	168.00
	Y	120.00	200.00	110.00	168.00	280.00	154.00
2.0101" - 2.5100" 51.06MM - 63.75MM	XX	170.00	275.00	160.00	238.00	385.00	224.00
	X	145.00	230.00	135.00	203.00	322.00	189.00
	Y	125.00	220.00	125.00	175.00	308.00	175.00
2.5101" - 3.0100" 63.76MM - 76.45MM	XX	185.00	305.00	175.00	259.00	427.00	245.00
	X	160.00	270.00	145.00	224.00	378.00	203.00
	Y	145.00	245.00	135.00	203.00	343.00	189.00
3.0101" - 3.5100" 76.46MM - 89.15MM	XX	240.00	380.00	230.00	336.00	532.00	322.00
	X	215.00	345.00	200.00	301.00	483.00	280.00
	Y	200.00	330.00	190.00	280.00	462.00	266.00
3.5101" - 4.0100" 89.16MM - 101.85MM	XX	290.00	415.00	245.00	406.00	581.00	343.00
	X	260.00	385.00	215.00	364.00	539.00	301.00
	Y	235.00	350.00	200.00	329.00	490.00	280.00
4.0101" - 4.5100" 101.86MM - 114.55MM	XX	320.00	470.00	270.00	448.00	658.00	378.00
	X	290.00	430.00	235.00	406.00	602.00	329.00
	Y	280.00	400.00	225.00	392.00	560.00	315.00
4.5101" - 5.0100" 114.56MM - 127.75MM	XX	405.00	490.00	280.00	567.00	686.00	392.00
	X	375.00	440.00	240.00	525.00	616.00	336.00
	Y	360.00	410.00	230.00	504.00	574.00	322.00
5.010" - 5.510" 127.25MM - 139.95MM	XX	410.00	510.00	290.00	574.00	714.00	406.00
	X	380.00	470.00	260.00	532.00	658.00	364.00
	Y	370.00	440.00	240.00	518.00	616.00	336.00
5.510" - 6.010" 139.90MM - 152.65MM	XX	415.00	550.00	295.00	581.00	770.00	413.00
	X	385.00	500.00	265.00	539.00	700.00	371.00
	Y	375.00	470.00	250.00	525.00	658.00	350.00

Special gages priced on request. All prices include long form certification.



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Procedures for Setting Thread Ring Gages to Truncated Master Setting Plugs

The size of a thread ring gage is established primarily by the setting plug to which it is set. Setting plugs are also known as master plugs or check plugs. The truncated type has both a full form and a truncated section on them. They should be made to class W tolerance on all three elements (pitch diameter, lead and angle). Many competitors furnish the wider class X tolerance particularly on the element of pitch diameter. The class W permits setting of ring gages closer to the extreme maximum and minimum product limits thereby accepting a greater percentage of borderline parts. It also promotes better correlation of gaging results between different inspection stations and different companies.

Product threads accepted by a gage of one type may be verified by other types. It is possible, however, that parts which are near a limit may be accepted by one type and rejected by another. Also, it is possible for two individual limit gages of the same type to be at opposite extremes of the gage tolerances permitted and borderline product threads accepted by one gage could be rejected by another.

Before using the setting plug it is necessary to know that it is within the proper tolerance and free from nicks, burrs or surface defects. If any damage is present on either the setting plug or the ring gage they should not be used because in attempting to acquire a snug matched fit the nicks on one will cause scratches or surface defects on the other.

Setting plugs must be reasonably straight on pitch diameter to be effective. They tend to wear more rapidly at the front in normal usage. However, using the following recommended procedure helps to prolong the straightness of the setting plug.

## The following procedure is recommended:

- 1) Lubricate the setting plug with a thin film of light viscosity oil before inserting in the ring gage.
- 2) Turn the locking screw counter clockwise until it is loosened.
- 3) Turn the adjusting screw clockwise, which opens the ring to a larger pitch diameter than the setting plug.
- 4) Turn the ring gage onto the setting plug all the way to the back (full form section) so that approximately one thread extends beyond the last thread of the setting plug. (This promotes more uniform wear over the entire thread length of the plug.)
- 5) Turn the adjusting screw counter clockwise until there is a slight drag between the ring and setting plug.
- 6) Turn the locking screw clockwise until tight. This locks the adjusting screw so that the size of the ring gage remains fixed. There should now be a noticeable drag between ring and setting plug. Operations 2.5 and 2.6 may have to be repeated more than once to obtain the proper drag fit.
- 7) Turn the ring gage from the full form section onto the truncated section at the front. The drag should be approximately the same to both sections, which insures good flank angle contact.
- 8) Remove the setting plug from the ring.
- 9) Now turn the ring onto the setting plug 1 to 2 threads at the front. There should be some resistance or drag (pick-up) even at this short engagement. To test for taper or bell-mouth, place the ring on its face on the workbench and test for shake or looseness with the setting plug, being very careful not to damage these end threads.
- 10) Remembering the feel at the 1 to 2 thread engagement, turn the ring further onto the truncated section. The drag should remain approximately the same although it may be slightly greater at full engagement due to more flank contact.
- 11) Remove the ring from the setting plug and repeat operations 2.9 and 2.10 on the other side of the ring gage.
- 12) The fit should be approximately the same on both sides of the ring to insure proper straightness.
- 13) Actual measurements are derived from the pitch diameter of the setting plug.

## Tightness of Fit

There are no established torque values for the degree of drag. Some judgment and common sense must be used. The resistance or drag for a small size gage should be less than for a large size gage. A spin fit is obviously much too loose. Too tight a fit could damage, or cause, excessive wear on the ring or the setting plug. On properly made gages with accurate lapped threads it takes very little change in size to effect a noticeable difference in drag. Two different setting plugs both within class W tolerance may feel entirely different in the same ring gage. (One could be too tight and the other too loose.)

In addition to pitch diameter variations, there may be a slight difference in the flank angle or lead of the ring versus the setting plug. This can also cause a small increase in the degree of drag at full engagement versus partial engagements. One should not expect absolute perfection. Within reason these differences are not serious as both the ring and the setting plug may well be within their tolerances.

## Resetting of New Gages

It should be realized that a ring gage set to one setting plug does not necessarily fit another setting plug due to allowable tolerances. When ring gages and setting plugs are ordered together they should be matched properly at the factory before shipping. Sometimes the customer's setting plug is loaned to the manufacturer who matches them properly.

In other cases it may be necessary for the user to remove the sealing wax and reset the ring gage to their own setting plug, following the recommended procedure outlined above.

# NPTF Class 2 Specifications

Nominal Size & T.P.I	Basic Dimensions for L1 Plug Gages, NPTF											Basic Dimensions for L3 Plug Gages									
	Basic Length L1	Small End		Basic Dim. at L1 Plane		Min. Range		Basic Range		Max. Range		Basic Length L1+L3	Small End		Four Thread L3+p	Min. Range		Basic Range		Max. Range	
		Pitch Dia.	Major Dia.	Pitch Dia.	Major Dia.	Min. Step 1 L1-p	Max. Step 2 L1-1/3p	Min. Step 2 L1-1/3p	Max. Step 3 L1+1/3p	Min. Step 3 L1+1/3p	Max. Step 4 L1+p		Pitch Dia.	Major Dia.		Min. Step 1 L3+L3-p	Max. Step 2 L3+L3-1/3p	Min. Step 2 L3+L3-1/3p	Max. Step 3 L3+L3-1/3p	Min. Step 3 L3+L3-1/3p	Max. Step 4 L3+L3+p
1/16-27	.1600	.27118	.29289	.28118	.30289	.12296	.14766	.14766	.17234	.17234	.19704	.2711	.2642	.2815	.1482	.23406	.25876	.25876	.28344	.28344	.30814
1/8-27	.1615	.36351	.38522	.37360	.39531	.12446	.14916	.14916	.17384	.17384	.19854	.2726	.3566	.3738	.1482	.23556	.26026	.26026	.28494	.28494	.30964
1/4-18	.2278	.47739	.51339	.49163	.52763	.17224	.20928	.20928	.24632	.24632	.29336	.3945	.4670	.4928	.2222	.33894	.37598	.37598	.41302	.41302	.45006
3/8-18	.2400	.61201	.64801	.62701	.66301	.18444	.22148	.22148	.25852	.25852	.29556	.4067	.6016	.6275	.2222	.35114	.38818	.38818	.42522	.42522	.46226
1/2-14	.3200	.75843	.80815	.77843	.82815	.24857	.29619	.29619	.34381	.34381	.39143	.5343	.7451	.7783	.2857	.46287	.51049	.51049	.55811	.55811	.60573
3/4-14	.3390	.96768	1.01740	.98887	1.03859	.26757	.31519	.31519	.36281	.36281	.41043	.5533	.9543	.9876	.2857	.48187	.52949	.52949	.57711	.57711	.62473
1-11/2	.4000	1.23363	1.27329	1.23863	1.29829	.31304	.37102	.37102	.42898	.42898	.48696	.6609	1.1973	1.2379	.3478	.57394	.63192	.63192	.68988	.68988	.74786
1 1/4-11/2	.4200	1.55713	1.61679	1.58338	1.64304	.33304	.39102	.39102	.44898	.44898	.50696	.6809	1.5408	1.5814	.3478	.59394	.65192	.65192	.70988	.70988	.76786
1 1/2-11/2	.4200	1.79609	1.85575	1.82234	1.88200	.33304	.39102	.39102	.44898	.44898	.50696	.6809	1.7798	1.8203	.3478	.59394	.65192	.65192	.70988	.70988	.76786
2-11/2	.4360	2.26902	2.32868	2.29627	2.35593	.34904	.40702	.40702	.46498	.46498	.52296	.6969	2.2527	2.2932	.3478	.60994	.66792	.66792	.72588	.72588	.78386

Nominal Size & T.P.I	Basic Dimensions for Crest Check Plug Gages								Max. Dia. at L1+L3 length from end of fitting Basic Thread with Min. Truncation	Max. width of crest at Major Dia.	Basic Dimensions for Root Check Plug Gages						
	Max. Dia. at L3 Basic Thread with Max. Truncation	Basic Pipe Thread		Min. Thread		Max. Thread		Basic Length L2			Basic Pipe Thread		Min. Thread		Max. Thread		
		Min. Truncation	Max. Truncation	Min. Truncation	Max. Truncation	Min. Truncation	Max. Truncation				Min. Truncation	Max. Truncation	Min. Truncation	Max. Truncation	Min. Truncation	Max. Truncation	
	+ .00015		+ .000		+ .000		+ .000	+ .0002			+ .002		+ .002		+ .002		+ .002
	- .00000	+/- .001	- .002	+/- .001	- .002	+/- .001	- .002	- .0000			+/- .001	- .000	+/- .001	- .000	+/- .001	- .000	
1/16-27	.2391	.2154	.2711	.1907	.2464	.2401	.2958	.2893	.003	.2711	.2166	.2464	.1919	.2958	.2413		
1/8-27	.3315	.2169	.2726	.1922	.2479	.2416	.2973	.3817	.003	.2726	.2181	.2479	.1934	.2973	.2428		
1/4-18	.4276	.3394	.3945	.3024	.3575	.3764	.4315	.5064	.004	.3945	.3394	.3575	.3024	.4315	.3764		
3/8-18	.5622	.3516	.4067	.3146	.3697	.3886	.4437	.6410	.004	.4067	.3516	.3697	.3146	.4437	.3886		
1/2-14	.6918	.4794	.5343	.4318	.4867	.5270	.5819	.7984	.004	.5343	.4772	.4867	.4296	.5819	.5248		
3/4-14	.9010	.4984	.5533	.4508	.5057	.5460	.6009	1.0076	.004	.5533	.4962	.5057	.4486	.6009	.5438		
1-11/2	1.1324	.6052	.6609	.5472	.6029	.6632	.7189	1.2622	.005	.6609	.5774	.6029	.5194	.7189	.6354		
1 1/4-11/2	1.4759	.6252	.6809	.5672	.6229	.6832	.7389	1.6057	.005	.6809	.5974	.6229	.5394	.7389	.6554		
1 1/2-11/2	1.7149	.6252	.6809	.5672	.6229	.6832	.7389	1.8447	.005	.6809	.5974	.6229	.5394	.7389	.6554		
2-11/2	2.1878	.6412	.6969	.5832	.6389	.6992	.7549	2.3176	.005	.6969	.6134	.6389	.5554	.7549	.6714		

Nominal Size & T.P.I	Basic Dimensions for L1 Ring Gages										Basic Dimensions L2 Ring Gages							
	Basic Length L1	Large End		Maximum Range		Basic Range		Minimum Range		Basic Length L2	Large End		Maximum Range		Basic Range		Minimum Range	
		Pitch Dia.	Minor Dia.	Max. Step 1 (L1-p)	Min. Step 2 (L1-1/3p)	Max. Step 2 (L1-1/3p)	Min. Step 3 (L1+1/3p)	Max. Step 3 (L1+1/3p)	Min. Step 4 (L1+p)		Pitch Dia.	Minor Dia.	Max. Step 1 L2-P	Min. Step 2 L2-1/3p	Max. Step 2 L2-1/3p	Min. Step 3 L2+1/3p	Max. Step 3 L2+1/3p	Min. Step 4 L2+p
1/16-27		.1600	.28118	.25947	.12296	.14766	.14766	.17234	.17234		.19704	.26113	.28750	.27024	.22409	.24879	.24879	.27347
1/8-27	.1615	.37360	.35189	.12446	.14916	.14916	.17384	.17384	.19854	.26385	.38000	.36274	.22681	.25151	.25151	.27619	.27619	.30089
1/4-18	.2278	.49163	.45563	.17224	.20928	.20928	.24632	.24632	.28336	.40178	.50250	.47661	.34622	.38326	.38326	.42030	.42030	.45734
3/8-18	.2400	.62701	.59101	.18444	.22148	.22148	.25852	.25852	.29556	.40778	.63750	.61161	.35222	.38926	.38926	.42630	.42630	.46334
1/2-14	.3200	.77843	.72871	.24857	.29619	.29619	.34381	.34381	.39143	.53371	.79179	.75850	.46228	.50990	.50990	.55752	.55752	.60514
3/4-14	.3390	.98887	.93915	.26757	.31519	.31519	.36281	.36281	.41043	.54571	1.00179	.96850	.47428	.52190	.52190	.56952	.56952	.61714
1-11/2	.4000	1.23853	1.17897	.31304	.37102	.37102	.42898	.42898	.48696	.68278	1.25630	1.21577	.59582	.65379	.65379	.71176	.71176	.76974
1 1/4-11/2	.4200	1.58338	1.52372	.33304	.39102	.39102	.44898	.44898	.50696	.70678	1.60130	1.56077	.61982	.67780	.67780	.73576	.73576	.79374
1 1/2-11/2	.4200	1.82234	1.76268	.33304	.39102	.39102	.44898	.44898	.50696	.72348	1.84130	1.80077	.63652	.69450	.69450	.75246	.75246	.81044
2-11/2	.4360	2.29627	2.23661	.34904	.40702	.40702	.46498	.46498	.52296	.75652	2.31630	2.27577	.66956	.72754	.72754	.78550	.78550	.84348

Nominal Size & T.P.I	Basic Dimensions for Crest Check Ring Gages							Minor Dia. at L2 length from end of pipe Basic thread with Min. Trunc. D	Max. width of Crest at Minor Dia. F	Basic Dimensions for Root Check Ring Gages						
	Major Dia. at L2 Basic Thread with Max. Trunc. D	Basic Pipe Thread		Min. Thread		Max. Thread				Basic Pipe Thread	Min. Thread		Max. Thread			
		Min. Trunc. B	Max. Trunc. Bt	Min. Trunc. MN	Max. Trunc. MNt	Min. Trunc. MX	Max. Trunc. MXt				Min. Trunc. B	Max. Trunc. Bt	Min. Trunc. MN	Max. Trunc. MNt	Min. Trunc. MX	Max. Trunc. MXt
	- .00015		+ .000		+ .000		+ .000	+ .0002			+ .002		+ .002		+ .002	
	+ .0000	+/- .001	- .002	+/- .001	- .002	+/- .001	- .002	+/- .003	- .0000		+/- .001	- .000	+/- .001	- .000	+/- .001	- .000
1/16-27	.3126	.2054	.2611	.2301	.2858	.1807	.2364	1-1/4	.2624	.003	.2611	.2066	.2858	.2313	.2364	.1819
1/8-27	.4051	.2082	.2639	.2329	.2886	.1835	.2392	1-1/4	.3549	.003	.2639	.2094	.2886	.2341	.2392	.1847
1/4-18	.5419	.3467	.4018	.3837	.4388	.3097	.3648	1-1/2	.4631	.004	.4018	.3467	.4388	.3837	.3648	.3097
3/8-18	.6769	.3527	.4078	.3897	.4448	.3157	.3708	1-3/4	.5981	.004	.4078	.3527	.4448	.3897	.3708	.3157
1/2-14	.8451	.4788	.5337	.5264	.5813	.4312	.4861	2	.7385	.004	.5337	.4766	.5813	.5242	.4861	.4290
3/4-14	1.0551	.4908	.5457	.5384	.5933	.4432	.4981	2-1/4	.9485	.004	.5457	.4886	.5933	.5362	.4981	.4410
1-11/2	1.3212	.6272	.6828	.6852	.7408	.5692	.6248	2-5/8	1.1914	.005	.6828	.5993	.7408	.6573	.6248	.5413
1 1/4-11/2	1.6662	.6512	.7068	.7092	.7648	.5932	.6488	3-1/8	1.5364	.005	.7068	.6233	.7648	.6813	.6488	.5653
1 1/2-11/2	1.9062	.6678	.7235	.7258	.7815	.6098	.6655	3-3/8	1.7764	.005	.7235	.6400	.7815	.6980	.6655	.5820
2-11/2	2.3812	.7008	.7565	.7588	.8145	.6428	.6985	4.00	2.2514	.005	.7565	.6730	.8145	.7310	.6985	.6150

# Gage Tolerances

W Tolerance											X Tolerance									
PITCH DIAMETER						MAJOR & MINOR			LEAD		PITCH DIAMETER					MAJOR & MINOR		LEAD		
Threads per inch	To and incl. 1/2" dia.	Above 1/2" to 1 1/2" diameter	Above 1 1/2" to 4" diameter	Above 4" to 8" diameter	Above 8" to 12" diameter	To and incl. 1/2" diameter	Above 1/2" to 4" diameter	Above 4" Dia.	1/2 Angle Tol. 0 Deg. +/- Min.	To and incl. 1/2"	Above 1/2"	Threads per inch	To and incl. 1-1/2"	Above 1-1/2" to 4"	Above 4" to 8"	Above 8" to 12"	To and including 4" diameter	Above 4"	1/2 Angle Tol. 0 Deg. +/- Min.	Lead Tolerance
80	.0001	.00015				.0003	.0003		20'	.0001	.00015	80	.0002				.0003		30'	.0002
72	.0001	.00015				.0003	.0003		20'	.0001	.00015	72	.0002				.0003		30'	.0002
64	.0001	.00015				.0003	.0004		20'	.0001	.00015	64	.0002				.0004		30'	.0002
56	.0001	.00015	.0002			.0003	.0004		20'	.0001	.00015	56	.0002	.0003			.0004		30'	.0002
48	.0001	.00015	.0002			.0003	.0004		18'	.0001	.00015	48	.0002	.0003			.0004		30'	.0002
44	.0001	.00015	.0002			.0003	.0004		15'	.0001	.00015	44	.0002	.0003			.0004		20'	.0002
40	.0001	.00015	.0002			.0003	.0004		15'	.0001	.00015	40	.0002	.0003			.0004		20'	.0002
36	.0001	.00015	.0002			.0003	.0004		12'	.0001	.00015	36	.0002	.0003			.0004		20'	.0002
32	.0001	.00015	.0002	.00025	.0003	.0003	.0005	.0007	12'	.0001	.00015	32	.0003	.0004	.0005	.0006	.0005	.0007	15'	.0003
28	.0001	.00015	.0002	.00025	.0003	.0005	.0005	.0007	8'	.00015	.00015	28	.0003	.0004	.0005	.0006	.0005	.0007	15'	.0003
27	.0001	.00015	.0002	.00025	.0003	.0005	.0005	.0007	8'	.00015	.00015	27	.0003	.0004	.0005	.0006	.0005	.0007	15'	.0003
24	.0001	.00015	.0002	.00025	.0003	.0005	.0005	.0007	8'	.00015	.00015	24	.0003	.0004	.0005	.0006	.0005	.0007	15'	.0003
20	.0001	.00015	.0002	.00025	.0003	.0005	.0005	.0007	8'	.00015	.00015	20	.0003	.0004	.0005	.0006	.0005	.0007	15'	.0003
18	.0001	.00015	.0002	.00025	.0003	.0005	.0005	.0007	8'	.00015	.00015	18	.0003	.0004	.0005	.0006	.0005	.0007	10'	.0003
16	.0001	.0002	.00025	.0003	.0004	.0006	.0006	.0009	8'	.00015	.00015	16	.0003	.0004	.0006	.0008	.0006	.0009	10'	.0003
14	.00015	.0002	.00025	.0003	.0004	.0006	.0006	.0009	6'	.0002	.0002	14	.0003	.0004	.0006	.0008	.0006	.0009	10'	.0003
13	.00015	.0002	.00025	.0003	.0004	.0006	.0006	.0009	6'	.0002	.0002	13	.0003	.0004	.0006	.0008	.0006	.0009	10'	.0003
12	.00015	.0002	.00025	.0003	.0004	.0006	.0006	.0009	6'	.0002	.0002	12	.0003	.0004	.0006	.0008	.0006	.0009	10'	.0003
11½	.00015	.0002	.00025	.0003	.0004	.0006	.0006	.0009	6'	.0002	.0002	11	.0003	.0004	.0006	.0008	.0006	.0009	10'	.0003
11	.00015	.0002	.00025	.0003	.0004	.0006	.0006	.0009	6'	.0002	.0002	10	.0003	.0004	.0006	.0008	.0006	.0009	10'	.0003
10		.0002	.00025	.0003	.0004		.0006	.0009	6'		.00025	9	.0003	.0004	.0006	.0008	.0007	.0011	10'	.0003
9		.0002	.00025	.0003	.0004		.0007	.0011	6'		.00025	8	.0004	.0005	.0006	.0008	.0007	.0011	5'	.0004
8		.0002	.00025	.0003	.0004		.0007	.0011	5'		.00025	7	.0004	.0005	.0006	.0008	.0007	.0011	5'	.0004
7		.0002	.00025	.0003	.0004		.0008	.0013	5'		.0003	6	.0004	.0005	.0006	.0008	.0008	.0013	5'	.0004
6		.0002	.00025	.0003	.0004		.0008	.0013	4'		.0003	5		.0005	.0006	.0008	.0008	.0013	5'	.0004
5			.00025	.0003	.0004		.0008	.0013	4'		.0003	4½		.0005	.0006	.0008	.0008	.0013	5'	.0004
4½			.00025	.0003	.0004		.0008	.0013	4'		.0003	4		.0005	.0006	.0008	.0009	.0015	5'	.0004
4			.00025	.0003	.0004		.0009	.0015	4'		.0003									

## Gagemaker's Tolerance Chart

RANGE	XXXX	XXX	XX	X	Y	Z	ZZ
.0009" to .8250"	.000005"	.00001"	.00002"	.00004"	.00007"	.0001"	.00020"
.8251" to 1.5100"	.000008"	.000015"	.00003"	.00006"	.00009"	.00012"	.00024"
1.5101" to 2.5101"	.00001"	.00002"	.00004"	.00008"	.00012"	.00016"	.00032"
2.5101" to 4.5100"	.000013"	.000025"	.00005"	.00010"	.00015"	.00020"	.00040"
4.5101" to 6.5100"	.000017"	.000033"	.000065"	.00013"	.00019"	.000250"	.00050"
6.5101" to 9.0100"	.00002"	.00004"	.00008"	.00016"	.00024"	.000320"	.00064"
9.0101" to 12.600"	.000025"	.00005"	.0001"	.0002"	.0003"	.000400"	.00080"

## Metric Equivalents

RANGE	XX	X	Y	Z	ZZ
.74MM to 20.96MM	.00051	.00102	.00178	.00254	.005
20.96MM to 38.35MM	.00076	.00152	.00229	.00305	.006
38.35MM to 63.75MM	.00102	.00203	.00305	.00406	.008
63.75MM to 114.55MM	.00127	.00254	.00381	.00508	.010
114.55MM to 163.35MM	.00165	.00330	.00483	.00635	.013
163.35MM to 228.85MM	.00203	.00406	.00610	.00813	.016
228.85MM to 311.40MM	.00254	.00508	.00762	.01016	.020



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# ANSI and International Thread Series Designations

Osborn Products, Inc. Manufactures Gages to the Following ANSI Thread Series Designations:

Designations	Thread Series	Reference
UN	Unified Inch Screw Thread, Constant-Pitch Series	B1.1
UNC	Unified Inch Screw Thread, Coarse-Pitch Series	B1.1
UNF	Unified Inch Screw Thread, Fine-Pitch Series	B1.1
UNEF	Unified Inch Screw Thread, Extra-Fine Series	B1.1
UNS	Unified Inch Screw Thread, Special Diameter Pitch, or Length of Engagement	B1.1
UNJ	Unified Inch Screw Thread, Constant-Pitch Series with Rounded Root of Radius 0.15011P to 0.18042P (3)	B1.15
UNJC	Unified Inch Screw Thread, Coarse-Pitch Series, with Rounded Root of Radius 0.15011P to 0.18042P (3)	B1.15
UNJF	Unified Inch Screw Thread, Fine-Pitch Series, with Rounded Root of Radius 0.15011P to 0.18042P (3)	B1.15
UNJEF	Unified Inch Screw Thread, Extra-Fine Pitch Series, with Rounded Root of Radius 0.15011P to 0.18042P (3)	B1.15
UNR	Unified Inch Screw Thread, Constant-Pitch Series, with Rounded Root of Radius Not Less Than 0.108P	B1.1
UNRC	Unified Inch Screw Thread, Coarse-Pitch Series, with Rounded Root of Radius Not Less Than 0.108P	B1.1
UNRF	Unified Inch Screw Thread, Fine-Pitch Series, with Rounded Root of Radius Not Less Than 0.108P	B1.1
UNREF	Unified Inch Screw Thread, Extra-Fine Pitch Series, with Rounded Root of Radius Not Less Than 0.108P	B1.1
NC5	Class 5 Interference Fit External Threads	B1.12
NC5HF	For Driving in Hard Ferrous Material of Hardness over 160 Bhn	B1.12
NC5CSF	For Driving Copper Alloy and Soft Ferrous Material of 160 Bhn or Less	B1.12
NC5ONF	For Driving in Other NonFerrous Material (Nonferrous Materials Other Than Copper Alloys, Any Hardness)	B1.12
NC5	Class 5 Interference Fit Internal Threads	B1.12
NC5 IF	Entire Ferrous Material Range	B1.12
NC5 INF	Entire Nonferrous Material Range	B1.12
M	Metric Screw Threads-M Profile with Basic ISO 68 Profile	B1.13M B1.18M
MJ	Metric Screw Threads-MJ Profile with Rounded Root of Radius 0.15011P to 0.18042P	B1.21M
MJS	Metric Screw Threads-MJ Profile Special Series	B1.21M
UNM	Unified Miniature Thread Series	B1.10
NPT	American Standard Taper Pipe Threads for General Use	B1.20.3
NPTF	Dryseal American Standard Taper Pipe Threads	B1.20.3B
F-PTF	Dryseal Fine Taper Threads Series	B1.20.3 Appendix.C
PTF-SAE Short	Dryseal SAE Short Taper Pipe Threads	B1.20.3
PTF-SPL Short	Dryseal Special Short Taper Pipe Threads	B1.20.3 Appendix.C
PTF-SPL Extra Short	Dryseal Special Short Taper Pipe Threads	B1.20.3 Appendix.C
SPL-PTF	Dryseal Special Taper Pipe Threads	B1.20.3 Appendix.C
ANPT	Aeronautical National Form Taper Pipe Threads (2)	MIL P-7105B
NPSL	American Standard Straight Pipe Threads for Loose-Fitting Mechanical Joints with Locknuts	B1.20.1
NPSM	American Standard Straight Pipe Threads for Free-Fitting Mechanical Joints for Fixtures	B1.20.1
NPSC	American Standard Straight Pipe Threads in Pipe Couplings	B1.20.1
NPSF	Dryseal American Standard Fuel Internal Straight Pipe Threads	B1.20.3
NPSI	Dryseal American Standard Intermediate Internal Straight Pipe Threads	B1.20.3
NH	American Standard Hose Coupling Threads of Full Form	B1.20.7
NPSH	Dryseal American Standard for Hose Coupling Joints with Straight Internal & External Loose Fitting Threads	B1.20.7
NFPA 1963	Fire Hose Connections	—
NHR	American Standard Hose Coupling Threads for Garden Hose Applications	B1.20.7
NGT	National Gas Taper Threads (See Also SGT)	CGA V-1
NGO	National Gas Outlet Threads (1)	CGA V-1
NGS	National Gas Straight Threads	CGA V-1
SGT	Special Gage Taper Threads	BS.21
R	British Taper Pipe Threads	BS.21
Rc, Rp	British Taper Pipe Threads	BS.21
G	Straight Pipe Threads	BS.2779
BSW	British Parallel Screw Threads	BS.84
BSF	British Parallel Screw Threads	BS.84
BA	British Screw Threads	BS.57
ACME-C	Acme Threads, Centralizing	B1.5
ACME-G	Acme Threads, General Purpose	B1.5
STUB ACME	Stub Acme Threads	B1.8
BUTT	Buttress Threads, Pull Type	B1.9
PUSH-BUTT	Buttress Threads, Push Type	B1.9
AMO	American Standard Microscope Objective Threads	B1.11
AWWA	Underground Service Line Valves and Fittings	C800-84
DIN	German Specifications	—
JIS	Japanese Industrial Standard	—
ISO	International Standard Organization	—

NOTES: (1) All threads, except NGO, are right hand, unless otherwise designated. For NGO threads, designations RH or LH are required.  
 (2) As published in Military Specification MIL-P7105  
 (3) As published in Military Specification MIL-S8879, and ISO 3161



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# Standard Inch Pitch Diameters

## Basic, 2B, 3B, 2A and 3A

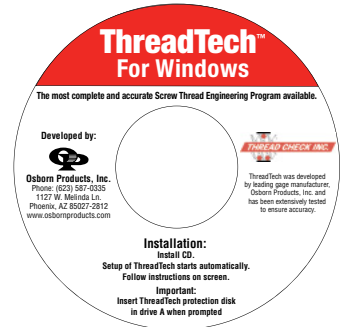
Standard Inch Pitch Diameters																					
No. or Decimals Fracs. Size	TPI	Thread	Work	Plugs			Thread Rings & Setting Plugs				No. or Decimals Fracs. Size	TPI	Thread	Work	Plugs			Thread Rings & Setting Plugs			
				GO Basic	NG 2B	NG 3B	3A GO	3A NG	2A GO	2A NG					GO Basic	NG 2B	NG 3B	3A GO	3A NG	2A GO	2A NG
#0	.060	80	UNF	.0519	.0542	.0536	.0519	.0506	.0514	.0496	9/16	.5625	24	UNEF	.5354	.5405	.5392	.5354	.5325	.5342	.5303
#1	.073	64	UNC	.0629	.0655	.0648	.0629	.0614	.0623	.0603	5/8	.625	11	UNC	.5660	.5732	.5714	.5660	.5619	.5644	.5589
#1	.073	72	UNF	.0640	.0665	.0659	.0640	.0626	.0634	.0615	5/8	.625	18	UNF	.5889	.5949	.5934	.5889	.5854	.5875	.5828
#2	.086	56	UNC	.0744	.0772	.0765	.0744	.0728	.0738	.0717	5/8	.625	24	UNEF	.5979	.6031	.6018	.5979	.5949	.5967	.5927
#2	.086	64	UNF	.0759	.0786	.0779	.0759	.0744	.0753	.0733	11/16	.6875	24	UNEF	.6604	.6656	.6643	.6604	.6574	.6592	.6552
#3	.099	48	UNC	.0855	.0885	.0877	.0855	.0838	.0848	.0825	3/4	.75	10	UNC	.6850	.6927	.6907	.6850	.6806	.6832	.6773
#3	.099	56	UNF	.0874	.0902	.0895	.0874	.0858	.0867	.0845	3/4	.75	16	UNF	.7094	.7159	.7143	.7094	.7056	.7079	.7029
#4	.112	40	UNC	.0958	.0991	.0982	.0958	.0939	.0950	.0925	3/4	.75	20	UNEF	.7175	.7232	.7218	.7175	.7142	.7162	.7118
#4	.112	48	UNF	.0985	.1016	.1008	.0985	.0967	.0978	.0954	13/16	.8125	20	UNEF	.7800	.7857	.7843	.7800	.7767	.7787	.7743
#5	.125	40	UNC	.1088	.1121	.1113	.1088	.1069	.1080	.1054	7/8	.875	9	UNC	.8028	.8110	.8089	.8028	.7981	.8009	.7946
#5	.125	44	UNF	.1102	.1134	.1126	.1102	.1083	.1095	.1070	7/8	.875	14	UNF	.8286	.8356	.8339	.8286	.8245	.8270	.8216
#6	.138	32	UNC	.1177	.1214	.1204	.1177	.1156	.1169	.1141	7/8	.875	20	UNEF	.8425	.8482	.8468	.8425	.8392	.8412	.8368
#6	.138	40	UNF	.1218	.1252	.1243	.1218	.1198	.1210	.1184	15/16	.9375	20	UNEF	.9050	.9109	.9094	.9050	.9016	.9036	.8991
#8	.164	32	UNC	.1437	.1475	.1465	.1437	.1415	.1428	.1399	1	1	8	UNC	.9188	.9276	.9254	.9188	.9137	.9168	.9100
#8	.164	36	UNF	.1460	.1496	.1487	.1460	.1439	.1452	.1424	1	1	12	UNF	.9459	.9535	.9516	.9459	.9415	.9441	.9382
#10	.190	24	UNC	.1629	.1672	.1661	.1629	.1604	.1619	.1586	1	1	14	UNS	.9536	.9609	.9590	.9536	.9494	.9519	.9463
#10	.190	32	UNF	.1697	.1736	.1726	.1697	.1674	.1688	.1658	1	1	20	UNEF	.9675	.9734	.9719	.9675	.9641	.9661	.9616
#12	.216	24	UNC	.1889	.1933	.1922	.1889	.1863	.1879	.1845	1-1/16	1.0625	12	UN	1.0084	1.0158	1.0139	1.0084	1.0042	1.0067	1.0010
#12	.216	28	UNF	.1928	.1970	.1959	.1928	.1904	.1918	.1886	1-1/16	1.0625	18	UNEF	1.0264	1.0326	1.0310	1.0264	1.0228	1.0250	1.0203
#12	.216	32	UNEF	.1957	.1998	.1988	.1957	.1933	.1948	.1917	1-1/8	1.125	7	UNC	1.0322	1.0416	1.0393	1.0322	1.0268	1.0300	1.0228
1/4	.250	20	UNC	.2175	.2224	.2211	.2175	.2147	.2164	.2127	1-1/8	1.125	12	UNF	1.0709	1.0787	1.0768	1.0709	1.0664	1.0691	1.0631
1/4	.250	28	UNF	.2268	.2311	.2300	.2268	.2243	.2258	.2225	1-1/8	1.125	18	UNEF	1.0889	1.0951	1.0935	1.0889	1.0853	1.0875	1.0828
1/4	.250	32	UNEF	.2297	.2339	.2328	.2297	.2273	.2287	.2255	1-3/16	1.1875	12	UN	1.1334	1.1409	1.1390	1.1334	1.1291	1.1317	1.1259
5/16	.3125	18	UNC	.2764	.2817	.2803	.2764	.2734	.2752	.2712	1-3/16	1.1875	18	UNEF	1.1514	1.1577	1.1561	1.1514	1.1478	1.1499	1.1450
5/16	.3125	24	UNF	.2854	.2902	.2890	.2854	.2827	.2843	.2806	1-1/4	1.25	7	UNC	1.1572	1.1668	1.1644	1.1572	1.1517	1.1550	1.1476
5/16	.3125	32	UNEF	.2922	.2964	.2953	.2922	.2898	.2912	.2880	1-1/4	1.25	12	UNF	1.1959	1.2039	1.2019	1.1959	1.1913	1.1941	1.1879
3/8	.375	16	UNC	.3344	.3401	.3387	.3344	.3311	.3331	.3287	1-1/4	1.25	18	UNEF	1.2139	1.2202	1.2186	1.2139	1.2103	1.2124	1.2075
3/8	.375	24	UNF	.3479	.3528	.3516	.3479	.3450	.3468	.3430	1-5/16	1.3125	12	UN	1.2584	1.2659	1.2640	1.2584	1.2541	1.2567	1.2509
3/8	.375	32	UNEF	.3547	.3591	.3580	.3547	.3522	.3537	.3503	1-5/16	1.3125	18	UNEF	1.2764	1.2827	1.2811	1.2764	1.2728	1.2749	1.2700
7/16	.4375	14	UNC	.3911	.3972	.3957	.3911	.3876	.3897	.3850	1-3/8	1.375	6	UNC	1.2667	1.2771	1.2745	1.2667	1.2607	1.2643	1.2563
7/16	.4375	20	UNF	.4050	.4104	.4091	.4050	.4019	.4037	.3995	1-3/8	1.375	12	UNF	1.3209	1.3291	1.3270	1.3209	1.3162	1.3190	1.3127
7/16	.4375	28	UNEF	.4143	.4189	.4178	.4143	.4116	.4132	.4096	1-3/8	1.375	18	UNEF	1.3389	1.3452	1.3436	1.3389	1.3353	1.3374	1.3325
1/2	.50	12	UN	.4459	.4529	.4511	.4459	.4419	.4443	.4389	1-7/16	1.4375	12	UN	1.3834	1.3910	1.3891	1.3834	1.3790	1.3816	1.3757
1/2	.50	13	UNC	.4500	.4565	.4548	.4500	.4463	.4485	.4435	1-7/16	1.4375	18	UNEF	1.4014	1.4079	1.4062	1.4014	1.3977	1.3999	1.3949
1/2	.50	20	UNF	.4675	.4731	.4717	.4675	.4643	.4662	.4619	1-1/2	1.500	6	UNC	1.3917	1.4022	1.3996	1.3917	1.3856	1.3893	1.3812
1/2	.50	28	UNEF	.4768	.4816	.4804	.4768	.4740	.4757	.4720	1-1/2	1.500	12	UNF	1.4459	1.4542	1.4522	1.4459	1.4411	1.4440	1.4376
9/16	.5625	12	UNC	.5084	.5152	.5135	.5084	.5045	.5068	.5016	1-1/2	1.500	18	UNEF	1.4639	1.4704	1.4687	1.4639	1.4602	1.4624	1.4574
9/16	.5625	18	UNF	.5264	.5323	.5308	.5264	.5230	.5250	.5205											



# Metric Pitch Diameters

## 6H Thread Work Plugs and 6g Thread Ring and Set Plugs

6H Thread Work Plugs					6g Thread Rings & Setting Plugs			
Basic	MM Min. GO	Inch Min. GO	MM Max NOT GO	Inch Max NOT GO	MM Max GO	Inch Max GO	MM Min. NOT GO	Inch Min. NOT GO
M1.6 x .35	1.3730	.05406	1.4580	.05740	1.3540	.05331	1.2910	.05083
M1.8 x .35	1.5730	.06193	1.6580	.06528	1.5540	.06118	1.4910	.05870
M2 x .40	1.7400	.06850	1.8300	.07205	1.7210	.06776	1.6540	.06512
M2.2 x .45	1.9080	.07512	2.0030	.07886	1.8880	.07433	1.8170	.07154
M2.5 x .45	2.2080	.08693	2.3030	.09067	2.1880	.08614	2.1170	.08335
M3 x .5	2.6750	.10531	2.7750	.10925	2.6550	.10453	2.5800	.10157
M3.5 x .6	3.1100	.12244	3.2220	.12685	3.0890	.12161	3.0040	.11827
M4 x .7	3.5450	.13957	3.6630	.14421	3.5230	.13870	3.4330	.13516
M4.5 x .75	4.0130	.15799	4.1310	.16264	3.9910	.15713	3.9010	.15358
M5 x .8	4.4800	.17638	4.6050	.18130	4.4560	.17543	4.3610	.17169
M6 x 1	5.3500	.21063	5.5000	.21654	5.3240	.20961	5.2120	.20520
M7 x 1	6.3500	.25000	6.5000	.25591	6.3240	.24898	6.2120	.24457
M8 x 1.25	7.1880	.28299	7.3480	.28929	7.1600	.28189	7.0420	.27724
M8 x 1	7.3500	.28937	7.5000	.29528	7.3240	.28835	7.2120	.28394
M10 x 1.5	9.0260	.35535	9.2060	.36244	8.9940	.35409	8.8620	.34890
M10 x 1.25	9.1880	.36173	9.3480	.36803	9.1600	.36063	9.0420	.35598
M12 x 1.75	10.8630	.42768	11.0630	.43555	10.8290	.42634	10.6790	.42043
M12 x 1.25	11.1880	.44047	11.3680	.44756	11.1600	.43937	11.0280	.43417
M14 x 2	12.7010	.50004	12.9130	.50839	12.6630	.49854	12.5030	.49224
M14 x 1.5	13.0260	.51283	13.2160	.52031	12.9940	.51157	12.8540	.50606
M16 x 2	14.7010	.57878	14.9130	.58713	14.6630	.57728	14.5030	.57098
M16 x 1.5	15.0260	.59157	15.2160	.59906	14.9940	.59031	14.8540	.58480
M18 x 2.5	16.3760	.64472	16.6000	.65354	16.3340	.64307	16.1640	.63638
M18 x 1.5	17.0260	.67031	17.2160	.67780	16.9940	.66906	16.8540	.66354
M20 x 2.5	18.3760	.72346	18.6000	.73228	18.3340	.72181	18.1640	.71512
M20 x 1.5	19.0260	.74906	19.2160	.75654	18.9940	.74780	18.8540	.74228
M22 x 2.5	20.3760	.80220	20.6000	.81102	20.3340	.80055	20.1640	.79386
M22 x 1.5	21.0260	.82780	21.2160	.83528	20.9940	.82654	20.8540	.82102
M24 x 3	22.0510	.86815	22.3160	.87858	22.0030	.86626	21.8030	.85839
M24 x 2	22.7010	.89374	22.9250	.90256	22.6630	.89224	22.4930	.88555
M27 x 3	25.0510	.98626	25.3160	.99669	25.0030	.98437	24.8030	.97650
M27 x 2	25.7010	1.01185	25.9250	1.02067	25.6630	1.01035	25.4930	1.00366
M30 x 3.5	27.7270	1.09161	28.0070	1.10264	27.6740	1.08953	27.4620	1.08118
M30 x 2	28.7010	1.12996	28.9250	1.13878	28.6630	1.12846	28.4930	1.12177
M33 x 3.5	30.7270	1.20972	31.0070	1.22075	30.6740	1.20764	30.4620	1.19929
M33 x 2	31.7010	1.24807	31.9250	1.25689	31.6630	1.24657	31.4930	1.23988
M36 x 4	33.4020	1.31504	33.7020	1.32685	33.3420	1.31268	33.1180	1.30386
M36 x 3	34.0510	1.34059	34.3160	1.35102	34.0030	1.33870	33.8030	1.33083
M39 x 4	36.4020	1.43315	36.7020	1.44496	36.3420	1.43079	36.1180	1.42197
M39 x 3	37.0510	1.45870	37.3160	1.46913	37.0030	1.45681	36.8030	1.44894



**ThreadTech™ for Windows**  
 The most complete and accurate screw thread program.  
 See page 18



**OSBORN PRODUCTS, INC.**

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • www.osbornproducts.com

# ROT'EX<sup>®</sup>

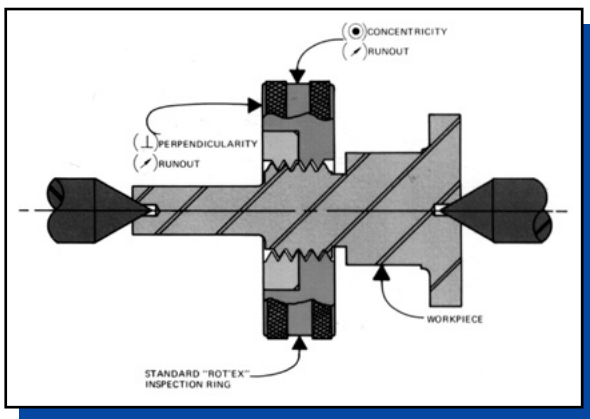
## THREAD ARBORS & CHUCKS

Guaranteed to establish true pitch diameter centerlines within .0001 T.I.R.

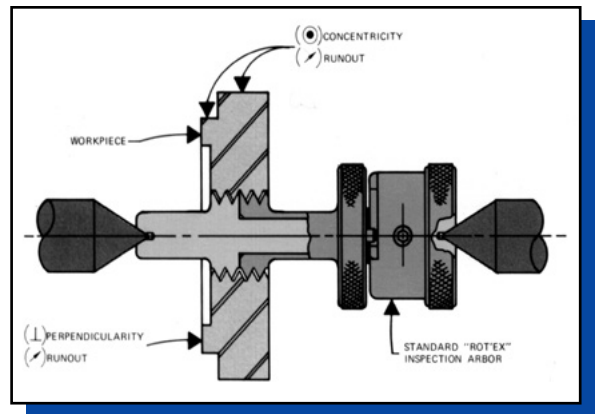
**YES!**  
**Guaranteed**



- **ROT'EX<sup>®</sup>** arbors have made taper threaded arbors obsolete.
- How do “you” control or check perpendicularity ( $\perp$ ) concentricity ( $\odot$ ) or runout ( $\rightarrow$ ) to thread pitch diameter centerlines within **.001** or less on your parts?
- These arbors have proven their accuracy and reliability on difficult inspection and machining applications.
- Call for pricing.



**EXTERNAL**



**INTERNAL**



**OSBORN PRODUCTS, INC.**

Copyright Osborn Products ©2000-2019. All Rights Reserved.

1127 West Melinda Lane • Phoenix, Arizona 85027-2812

Telephone: (623) 587-0335 • Fax: (623) 582-1387 • [www.osbornproducts.com](http://www.osbornproducts.com)