



Precision Engineered Solutions



Authorized Distributor

Boneham Metal Products Inc.

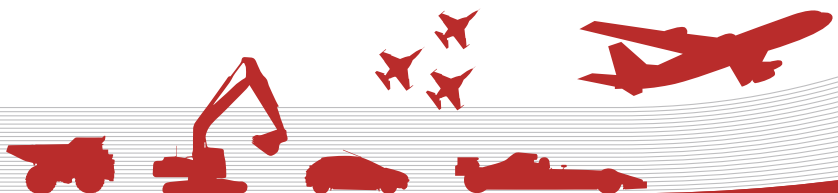
/ Providing Quality Components to You Since 1972

www.bonehamusa.com

/ Tel: 908-272-1200 / Toll Free Tel: 800-631-7852

/ Fax: 908-272-4124 / Toll Free Fax: 800-526-9494

/ sales@bonehamusa.com



A special message for our 100th year in business

It is a proud moment when any company reaches its 100th year, but what makes this special is that The Boneham Group has remained wholly owned and run by the Boneham family. We would like to thank all our customers and associates for their continued support and custom, without you we simply would not be passing through this remarkable milestone.

We believe that clear vision, values and the relentless journey to continuously improve, has not only seen The Boneham Group survive, but flourish. This is why we endeavour to progress with investment and innovation to not only maintain our reputation for quality, but ensure our products remain a competitive proposition for our customers. We continue to focus on our customer needs to ensure your finished goods are delivered on time and competitively.

Thank you again for choosing Boneham.

Cheers,

Charles Boneham Peter Boneham

Charles and Peter Boneham
Fourth generation custodians for the Boneham Group

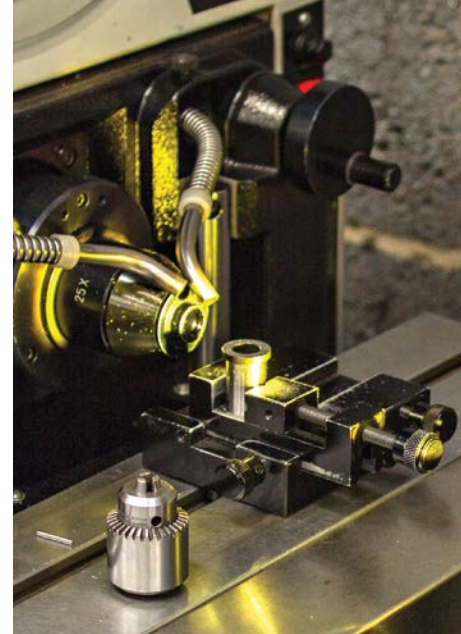


John Boneham, Founder



Celebrating
100 YEARS
1918 – 2018





Statement of Quality

Boneham Metal Products, Inc. is committed to supplying Drill Bushings that meet or exceed the tolerance specifications established by our Customer, the American National Standards Institute (ANSI), and the International Standards Organization (ISO).

We subscribe to the philosophies of maintaining superior levels of product quality through the techniques of Statistical Process Control, frequent quality audits of our operations, strict inspections of all incoming materials, and constant analyses of methods to improve our level of service.

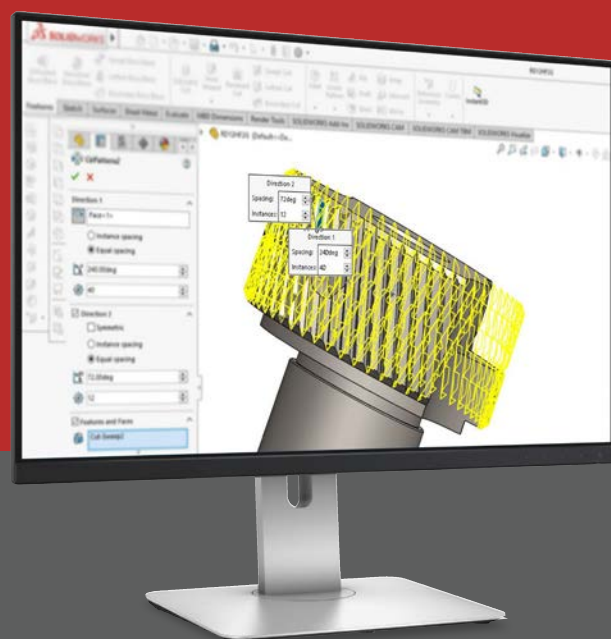
Our Drill Bushings are manufactured to the material, functional, and dimensional parameters dictated by the operational requirements put forth by our customer. We strive to provide Drill Bushings that will maintain a service life consistent with their intended use, and we are always working to deliver our products in the most expeditious time frame possible.

We solicit and welcome any recommendations which will enable us to provide a continuous level of improved service. If we haven't got your requirement in stock this time, please let us know if your item is a repeat order and we will gladly add the product to our inventory.

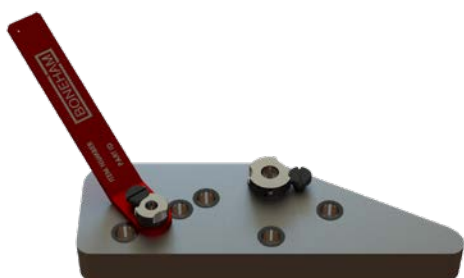




All our products are available in CAD formats



To design Boneham products into a project,
please contact the Technical Sales Team and
request the CAD file you require.



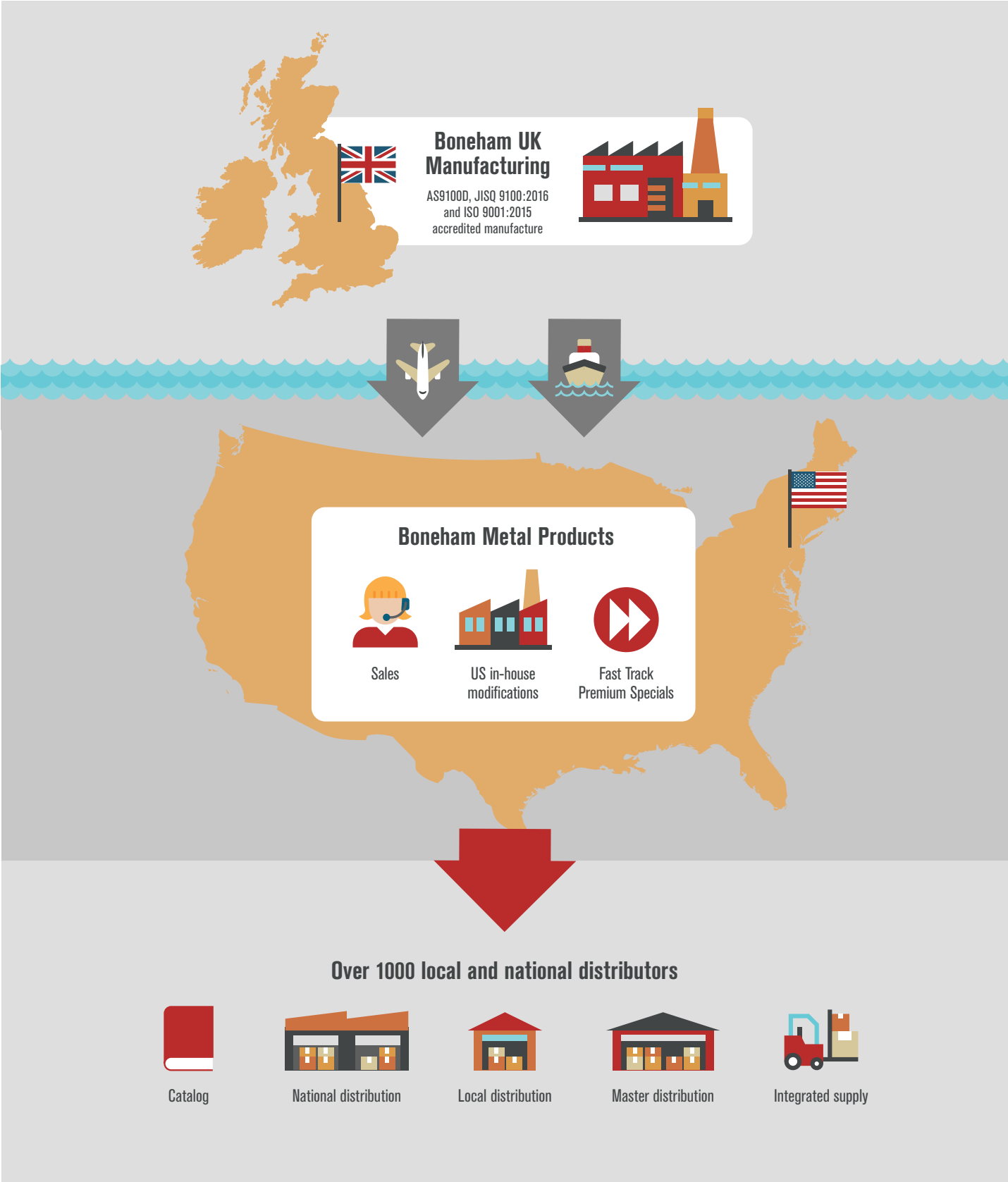


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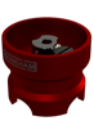
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General Information



Standard Bushings

All of the bushings listed within this catalog are Boneham's range of standard sizes. The first section of this catalog contains our standard range of ANSI/Boneham style bushings whose tolerances conform with the guidelines established by the American National Standards Institute (ANSI). Our range of standard bushing bores are those standard letter, number, and fractional sizes, in both drill and reamer tolerances, as defined by ANSI. For this range of bushings, selected millimeter bores from 2.3mm to 10.5mm, as designated by a box on the back cover, are also available as STANDARD. Any bore size not indicated as standard on the back cover is considered to be special. Our Sales Service Representatives will be glad to supply you with appropriate pricing for all specials.

The second section of this catalog offers our new range of "Total Metric" bushings. These dimensions and tolerances conform with the guidelines established by the International Standards Organization (ISO). Please refer to pages 44 and 45 for ordering and technical information pertaining to these bushings.

Special Bushings

When required dimensions vary from the standard catalog listings of ID., O.D., Length, or Tolerance, the bushings are considered to be "specials". Many specials can be made from standard cataloged items by minor alterations. Others can be manufactured from standard bushing blanks. Some items are so completely different they must be custom made. Boneham is ready to manufacture all specials required - from the minor alteration to the complete "from scratch" special. Please forward your specifications, whether verbal, by sketch, or blueprint, along with your material requirements to our Sales Service Representatives for expeditious review and quotation.

As always, please use our TOLL FREE TELEPHONE or FAX numbers:

800 Telephone: 1-800-631-7852

800 Fax: 1-800-526-9494

Oversized Bushings

All ANSI/Boneham Press Fit and Liner type bushings in the first section of this catalog are available with oversize (unground) O.D.'s. When ordering, use the same ANSI symbol system as for Finish Ground bushings and add a "U" at the end of the bushing length designation. Please note that all bushings will be considered to be Finish Ground unless specifically designated as Oversize or Unground.

For Example:

An Oversize Headless Liner with a 1" ID., a 1-3/8" O.D., and a 2-1/8" length would be described as L-88-34U. No drill size is required since liners have one standard bore size for a specific O.D. Also the "drill or reamer" specifications are not required due to the fact that renewable bushings are inserted into liners.

The following chart details the O.D. tolerances for oversize bushings:

Nom. O.D.	O/S Tol.	Nom. O.D.	O/S Tol.	Nom. O.D.	O/S Tol.
5/32	.166 .161	1/2	.520 .515	1-3/8	1.395 1.390
3/16	.198 .193	9/16	.582 .577	1-1/2	1.520 1.515
13/64	.213 .208	5/8	.645 .640	1-5/8	1.645 1.640
1/4	.260 .255	3/4	.770 .765	1-3/4	1.770 1.765
5/16	.327 .322	7/8	.895 .890	1-7/8	1.895 1.890
3/8	.393 .388	1	1.020 1.015	2-1/4	2.270 2.265
13/32	.421 416	1-1/8	1.145 1.140	2-3/4	2.770 2.765
7/16	.455 .450	1-1/4	1.270 1.265		

Guarantee

Boneham Metal Products, Inc. Drill Bushings are guaranteed against defects in materials or workmanship. The tolerances of our products are guaranteed to conform to either ANSI, ISO, or catalog standards.



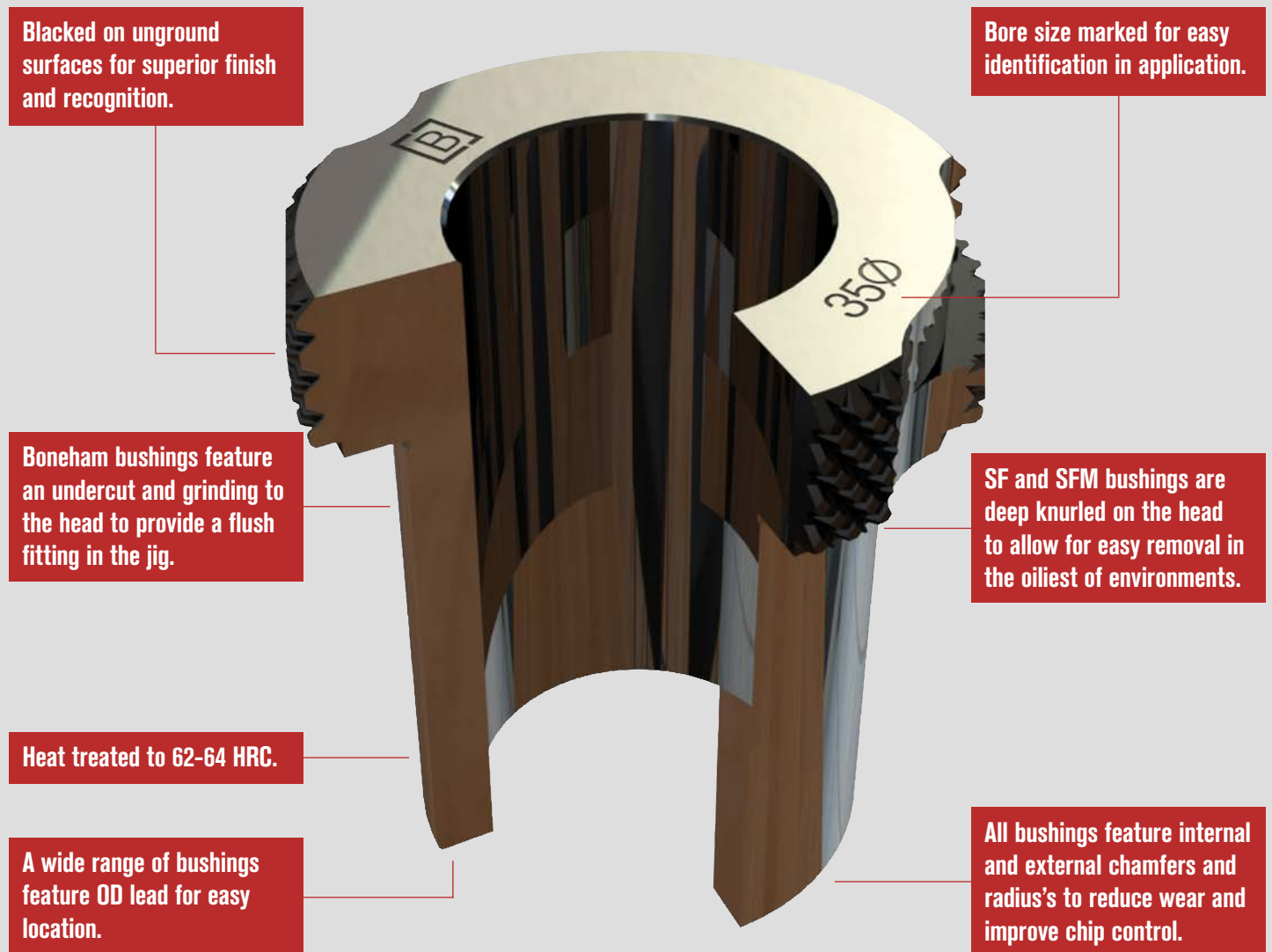
Boneham cannot accept returns or cancellations on special parts.



Part Marking

Boneham Bushings – The Difference

Boneham Drill Bushings are manufactured to the highest quality with dedication to superior concentricity and tolerances. Boneham bushings provide the accuracy required for precise drilling and alignment.



Manufactured from quality EN31 bearing steel which has a high degree of hardness and abrasion resistance. Special material options can be manufactured including Boneham's famous Nitralloy, Carbide, 300 and 400 series stainless and tool steels.

Ordering Information

ANSI/BMP Bushings



For ordering information on ISO style Total Metric Bushings, please see page 36.

For ANSI/Boneham style bushings please supply the following information:

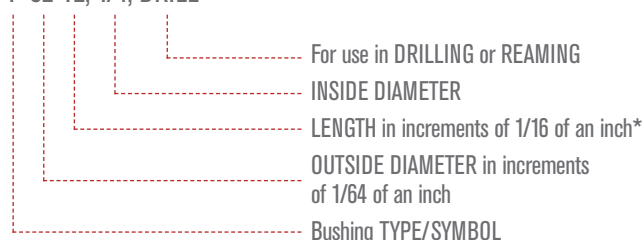
- / Bushing TYPE
- / OUTSIDE DIAMETER
- / Bushing LENGTH
- / INSIDE DIAMETER
- / Whether for a DRILL or REAMER

The bushings in this section of the catalog are defined by the ANSI Symbol System. This system is applied as follows:

Example Number 1:

A Headless Press Fit bushing with a 1/2" OD., a length of 3/4", a 1/4" bore, and to be used for drilling, would be described as:

P-32-12, 1/4, DRILL



*This is overall for headless press fit and all liner bushings and the "under-head" length for all head type press fit and renewable bushings.

Example Number 2:

A Slip-Fixed Renewable bushing with a 7/16" OD., a length of 1/2", a bore of 3mm, and to be used for Reaming, would be described as:

SF-TW-28-8, 3mm, REAMER

Bushing Type Designation

Bushing Type	ANSI/BMP Letter Designation	Thinwall Letter Designation
Headless Press Fit	P	P-TW
Head Press Fit	H	H-TW
Slip Fixed Renewable	SF	SF-TW
Headless Liner	L	L-TW
Head Type Liner	HL	-
Headless Metric	PM	-
Head Metric	HM	-
Serrated Press	SP	-
Serrated Press Metric	SPM	-
Diamond Groove	DG	-
Diamond Groove Metric	DGM	-
Slip Fixed Renewable Metric	SFM	-
U-Lock Liner	UL	-

Payment Terms

1% ten days, net 30. (Please note that invoices not paid within 60 days may be Subject to a 1-1/2% per month service charge).

Shipping

All prices quoted will be FOB. KENILWORTH, New Jersey.

Returns

When requesting authorization for a return please supply your purchase order number and Boneham's invoice number Standard products returned up to 2 weeks from the invoice date will be subject to a 15% re-stocking charge.

Standard products returned over 2 weeks and up to 6 weeks from the invoice date will be subject to a 20% re-stocking charge.

Beyond 6 weeks after the invoice date, the return must be negotiated and will be subject to additional restocking charges. No return will be allowed if inventory conditions do not warrant such a return.

Returns must be shipped prepaid.

Special products are not returnable.

Any products returned because of errors made by Boneham will not be subject to restocking charges and replacements made because of Boneham errors will have all freight charges paid by Boneham.

Any items that are returned without prior approval will be returned at the sender's expense.

Prices

ANSI/Boneham style bushings have the ANSI bushing symbol and Boneham price code in each identification box located in the charts on the following pages.

/ Please see separate price list for Boneham Standard Bushing Steel bushings.

/ Boneham NITRALLOY Nitrided drill bushings will be quoted upon request.

/ Page 44 contains all information on prices for ISO/Boneham drill bushings.

/ Please note that all prices may be subject to change without notice.

Technical Information

ANSI/BMP Bushings

Boneham Bushing Materials

- 1** Standard Boneham Drill Bushings (over .0400" bore) are manufactured from steel which demonstrates excellent wear resistance and dimensional stability characteristics. This material is "hardened" to Rc 62-64.
- 2** All Boneham Drill Bushings (.0625 bore and over), are offered in our Premium alloy NITRALLOY. Boneham NITRALLOY Nitrided Drill Bushings are "case hardened" to a case depth of .013" to Rc 67-69 equivalent. Hardness must be checked by using the 15Kg. Superficial Rockwell Scale. NITRALLOY Nitrided drill bushings demonstrate superior wear resistance and dimensional stability characteristics.
- 3** Our Sales Service Representatives will be glad to provide you with a quotation on those bushings which have material requirements that are different from our standard materials, ie. M-2 HSS, Stainless Steel, O-6 Tool Steel, Carbide.

Bushing Body Characteristics

Entrance End

The entrance end of each Boneham Drill Bushing has a "blended radius". This permits easier tool entry and assistance in guiding the drill in cases of minor drill/drill bushing misalignment.

Counterbores

Any drill bushing with either a "small" bore, or with a "large" drill bushing length-to-bore ratio, is counterbored. This is to provide assistance with lubrication supply to the drill point, as well as expedient removal of chips. Those drill bushings that have standard counterbores are designated with either a • or †.

Please note that all drill bushings with standard counterbores can be supplied without counterbores. Our Sales Service Representatives will be glad to provide you with a quotation as per your requirements.

Chamfers/Leads

All Press Fit Bushings and Liners ground to Press Fit tolerances are supplied with a chamfer and ground concentric lead on the O.D. of the exit end. This chamfer/lead combination provides assistance by "starting" the bushing into the hole, resulting in easier insertion.

Bushing Bore Tolerances

For Ansi/BMP Standard and Thinwall Bushings for DRILLS

Normal Bushing Bore	Bore Tolerance Over Nominal
from .0135" to .2500"	+ .0001" - +.0004"
over. 2500" to 7500"	+ .0001" - +.0005"
over. 7500" to 1.500"	+ .0002" - +.0006"
over. 1.5000" to 1.8750"	+ .0003" - +.0007"

For ANSI/BMP Standard and Thinwall Bushings for REAMERS

Normal Bushing Bore	Bore Tolerance Over Nominal
from .0135" to .2500"	+ .0005" - +.0008"
over. 2500" to 1.0000"	+ .0006" - +.0010"
over. 1.0000"	+ .0008" - +.0012"

Concentricity Tolerances

For ANSI/BMP Standard Drill Bushings

Bores up to .5000"	.0003" T.I.R max
Bores over .5000"	.0005" T.I.R max
Metric Bores	.012mm T.I.R max

For Thinwall Drill Bushings

All Bore sizes	.0005" T.I.R max
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Please note that on Counterbored Drill Bushings, these concentricity specifications apply to the exit end of the bushing.

Bore Tolerances for ANSI Metric Bushings (G6)

Metric Sizes	Tolerance
.35 to 3.00	+ .002 / +.008
3.01 to 6.00	+ .004 / +.012
6.01 to 10.00	+ .005 / +.014
10.01 to 18.00	+ .006 / +.017
18.01 to 30.00	+ .007 / +.020
30.01 to 50.00	+ .009 / +.025
50.01 to 55.00	+ .010 / +.029

Metric Reamer Sizes	Tolerance
1.00 to 3.00	+ .006 / +.012
3.01 to 6.00	+ .010 / +.018
6.01 to 10.00	+ .013 / +.022
10.01 to 18.00	+ .016 / +.027
18.01 to 30.00	+ .020 / +.033

Boneham NITRALLOY

A premium quality bushing steel designed to provide extended wear life.



- NITRALLOY is the name of an alloy. It is not a process.
- We NITRIDE NITRALLOY from 50 to 80 hours at 9000F to produce a .012" case depth, with a surface hardness of Rc 67-69 equivalent.
- The 32-34 Rc core "softness" of NITRALLOY makes it one of the "safest" bushing materials available. Unlike Tungsten Carbide drill bushings, it resists the tendency to shatter due to its tremendous ability to absorb "shock" from heavy "intermittent" cuts, crashes, abuse, or accident.
- NITRALLOY can withstand high operating temperatures which can reduce the hardness, effective service life, and dimensional integrity of ordinary steel bushings.
- The excellent "lubricity" and "anti-galling" characteristics of NITRALLOY make it the ideal bushing material to use with carbide and carbide tipped tooling.
- The wear life of NITRALLOY drill bushings can be up to 80% that of Tungsten Carbide drill bushings. It is not 80% of the cost of carbide. This makes NITRALLOY a cost effective alternative to carbide drill bushings.
- Being that NITRALLOY drill bushings demonstrate tremendous wear life characteristics, the opportunity to drastically reduce tooling costs exists. By simply using fewer drill bushings and incurring less machine downtime due to bushing changes, substantial cost savings can be realized.
- Renewable NITRALLOY drill bushings are stocked. Press Fit, ISO/ Boneham NITRALLOY, and Special Design NITRALLOY drill bushings are made to your special order Standard Reamer tolerances as well as 86 selected metric bore sizes are available as standards.



- Our Sales Service Representatives are available to provide you with assistance in selecting the appropriate NITRALLOY Drill Bushings for your operational requirements.
- To order NITRALLOY drill bushings, add the prefix letter "N" to the ANSI/ Boneham bushing symbol of the drill bushing you require (example: NSF-32-8, 1/4" I.D.). Please call or fax (toll free) our Sales Service Representatives for a quotation on those bushings you require to be made in NITRALLOY.

**Production and Quality Standards
of Boneham Nitralloy Products
are assured by approval to:**

**ISO 9001
EN 29001
B55750 PT 1**

**A PROVEN
ALTERNATIVE
TO CARBIDE**



Popular Boneham Drill Bushings in Application

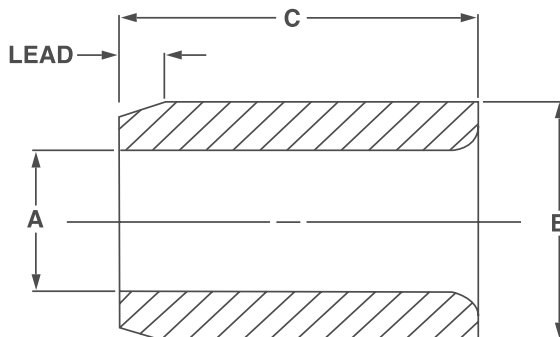
IMAGE	ANSI TYPE	DESCRIPTION
	P PTW PM NP	Headless press fit drill bushings are normally used in jigs where an economically priced drill bushing is required. These drill bushings are also often used where less space is available on the jig plate. Headless press fit drill bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation. Headless drill bushings have less resistance than the headed type when subjected to large axial loads.
	H HTW HM NH	Headed press fit drill bushings are dimensionally identical to the headless range, but for the head. Headed press fit drill bushings contain a shoulder at the top of the bush to allow greater axial force on the jig, and aids where it is desired, to feed down to a dead stop. The head of the bushing can be pressed into the plate easier and can be left either exposed above the plate surface or counter bored to sit flush.
	SP SPM	Serrata Press Fit Drill Bushings are a part serrated drill bushing similar to the 'P Type' bushing but for a half-serrated OD. These bushings are designed to press into soft materials such as wood, plastics and soft metals. The top half of the bushing OD is serrated to prevent rotational movement and increased axial resistance in the jig or fixture. The second half of the Serrata press fit bushing is finish ground for accurate and easy location and positioning.
	DG DGM	Diamond Groove Drill Bushings are fully diamond knurled. They are designed to be cast-in to the fixture or mold. Composite resin runs through the grooves to lock the bushing in place. The combination of the groove(s) and the diamond knurling form a strong resistance to axial and rotational movement. Serrated or diamond knurled bushings do not feature a ground outside diameter, whilst this makes them more economical, the bushing must be accurately located using the bore. Alignment pins can be used where appropriate in a fixture.
	L LTW SF SFM LS	Slip-Fixed Renewable Drill Bushings incorporate two features on one bush. Used in conjunction with liner bushings, Slip-Fixed Renewable Drill Bushings can be held in place by a lock screw, tenon or stop pin. The bushing is a slide fit in its corresponding liner, which allows for accurate alignment and easy replacement.
	HL SF SFM LS	The removable fixed feature of the bushing is normally used in high production work. The bushing can be easily and quickly replaced with a minimum loss of production. The removable slip feature of the bushing is used when more than one operation is carried out. Many drill sizes can be used with one bushing liner. The bushing is instantly removable after each operation. Both methods are designed to speed up operations and improve productivity. The knurled head allows for easy handling of the bushing to enable it to be rotated out of the removable slip feature.
	A2100 A2200 A2300	Air-feed bushings are a threaded locking collar and drill bushing shank. They are designed for use with air-feed drills, rackfeeds, tappers and spotfaces. The collar screws into the air-feed drill's nosepiece, precisely aligns the shank, and locks the drill in place when rotated into the liner. Boneham Air-feed bushings are manufactured to order.



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LTW Type Thin Wall Liner		GDL Type Gun Drill Liners	

Headless Press Fit Drill Bushings

P Type ANSI Drill Bushings



**Premium
Fast-Track**

KEY FEATURES

- / Diameters from 0.0156 to 1.7656
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'P Type' drill bushing is normally used in jigs where an economically priced drill bushing

is required, or where less space is available on the jig plate. Headless press fit bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: 6, P-40-8-5/16

NOTES

- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U
Example: P-40-8U-5/16
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B		C: Bushing Length and Price Code Number											
			Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"
0.0135 to 0.0280	5/32	0.1578	P	-10-4	-10-5	-10-6	-10-8	-10-12						
		0.1575	POA	POA	POA	POA	POA	POA						
0.0292 to 0.0591	5/32	0.1578	P	-10-4	-10-5	-10-6	-10-8†	-10-12†						
		0.1575	POA	POA	POA	POA	POA	POA						
0.0595 to 0.0625	5/32	0.1578	P	-10-4	-10-5	-10-6	-10-8	-10-12•						
		0.1575	206	210	212	213	222							
0.0135 to 0.0280	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8	-13-12						
		0.2043	POA	POA	POA	POA	POA	POA						
0.0292 to 0.0591	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8†	-13-12†						
		0.2043	POA	POA	POA	POA	POA	POA						
0.0595 to 0.0625	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8	-13-12•	-13-16•					
		0.2043	206	210	212	213	222	237						
0.0635 to 0.0995	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8	-13-12•	-13-16•	-13-22•				
		0.2043	138	146	152	153	161	169	195					
0.0980 to 0.1406	1/4	0.2516	P	-16-4	-16-5	-16-6	-16-8	-16-12	-16-16•	-16-22•	-16-28•			
		0.2513		134	137	142	146	155	164	209	219			
0.1250 to 0.1935	5/16	0.3141	P	-20-4	-20-5	-20-6	-20-8	-20-12	-20-16	-20-22•	-20-28•			
		0.3138		123	126	129	130	135	140	169	201			
0.1875 to 0.2570	13/32	0.4078	P	-26-4	-26-5	-26-6	-26-8	-26-12	-26-16	-26-22•	-26-28•			
		0.4075		118	119	122	123	129	137	146	164			

Continued on next page

Bore Size A*	Outside Diameter B	C: Bushing Length and Price Code Number												
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	
0.1875 to 0.3160	1/2	0.5017 0.5014	P	-32-4 118	-32-5 119	-32-6 122	-32-8 123	-32-12 129	-32-16 137	-32-22* 146	-32-28* 164			
0.3125 to 0.4375	5/8	0.6267 0.6264	P	-40-4 123	-40-5 118	-40-6 120	-40-8 120	-40-12 123	-40-16 126	-40-22 146	-40-28 155	-40-34 170	-40-40 290	
0.3125 to 0.5312	3/4	0.7518 0.7515	P	-48-4 126	-48-5 119	-48-6 123	-48-8 123	-48-12 126	-48-16 130	-48-22 145	-48-28 158	-48-34 174	-48-40 235	
0.5000 to 0.6562	7/8	0.8768 0.8765	P		-56-5 138	-56-6 140	-56-8 134	-56-12 135	-56-16 138	-56-22 144	-56-28 159	-56-34 170	-56-40 191	-56-48 292
0.5000 to 0.7656	1	1.0018 1.0015	P				-64-8 135	-64-12 135	-64-16 139	-64-22 144	-64-28 161	-64-34 170	-64-40 191	-64-48 252
0.6250 to 1.0312	1-3/8	1.3772 1.3768	P				-88-8 170	-88-12 155	-88-16 170	-88-22 189	-88-28 201	-88-34 213	-88-40 225	-88-48 305
1.1000 to 1.3906	1-3/4	1.7523 1.7519	P					-112-12 196	-112-16 189	-112-22 196	-112-28 206	-112-34 222	-112-40 235	-112-48 329
1.3750 to 1.7656	2-1/4	2.2525 2.2521	P						-144-16 207	-144-22 218	-144-28 227	-144-34 272	-144-40 299	-144-48 342

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES.

MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.

• COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.

† COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.

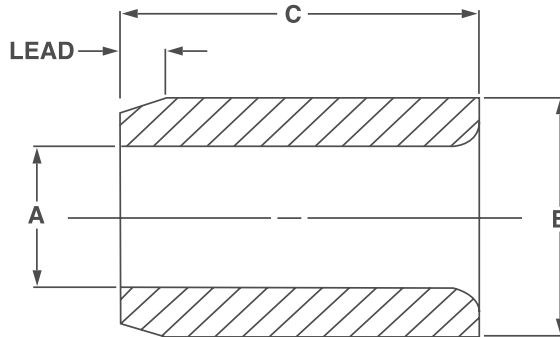
* Price on Application, prices subject to change.

Bushing in application



Headless Press Fit Drill Bushings

PTW Type ANSI Thin Wall Bushings



**Premium
Fast-Track**

KEY FEATURES

- / Diameters from 0.0156 to 1.1250
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / Thin wall space saving feature

APPLICATION

The 'PTW Type' drill bushing has all the features of the 'P Type' but with the added

feature of a thin wall. Where space is absolute paramount, the thin wall bushing allows closer hole spacing. Headless press fit bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: 6, P-TW-24-6-13/64

NOTES

- / For general ordering information and technical data see pages 9-12
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B	C: Bushing Length and Price Code Number													
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	
0.0135 to 0.0280	3/16	0.1891 0.1888	P-TW POA	-12-4 POA	-12-5 POA	-12-6 POA	-12-8 POA	-12-10 POA	-12-12 POA						
0.0292 to 0.0591	3/16	0.1891 0.1888	P-TW POA	-12-4 POA	-12-5 POA	-12-6 POA	-12-8† POA	-12-10† POA	-12-12† POA						
0.0595 to 0.0625	3/16	0.1891 0.1888	P-TW 206	-12-4 210	-12-5 212	-12-6 213	-12-8 226	-12-10 222	-12-12*						
0.0635 to 0.0995	3/16	0.1891 0.1888	P-TW 138	-12-4 146	-12-5 151	-12-6 153	-12-8 158	-12-10 161	-12-12*						
0.0995 to 0.1406	1/4	0.2516 0.2513	P-TW 134	-16-4 137	-16-5 142	-16-6 146	-16-8 152	-16-10 155	-16-12						
0.1406 to 0.1910	5/16	0.3141 0.3138	P-TW 123	-20-4 126	-20-5 129	-20-6 130	-20-8 134	-20-10 135	-20-12 140						
0.1935 to 0.2500	3/8	0.3766 0.3763	P-TW 118	-24-4 119	-24-5 122	-24-6 123	-24-8 126	-24-10 129	-24-12 137						
0.2340 to 0.2900	7/16	0.4392 0.4389	P-TW 118	-28-4 119	-28-5 122	-28-6 123	-28-8 126	-28-10 129	-28-12 137						
0.2950 to 0.3437	9/16	0.5642 0.5639	P-TW 123	-36-4 118	-36-5 120	-36-6 120	-36-8 122	-36-10 123	-36-12 126						
0.3480 to 0.4375	5/8	0.6267 0.6264	P-TW		-40-5 118	-40-6 120	-40-8 120	-40-10 122	-40-12 123	-40-16 126	-40-20 144				

Continued on next page

Bore Size A*	Outside Diameter B	C: Bushing Length and Price Code Number													
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	
0.4531 to 0.5312	3/4	0.7518 0.7515	P-TW		-48-5 119	-48-6 123	-48-8 123	-48-10 126	-48-12 126	-48-16 130	-48-20 146				
0.5469 to 0.6562	7/8	0.8768 0.8765	P-TW			-56-6 140	-56-8 134	-56-10 135	-56-12 135	-56-16 138	-56-20 144	-56-24 152			
0.6719 to 0.7500	1	1.0018 1.0015	P-TW				-64-8 135	-64-10 135	-64-12 135	-64-16 139	-64-20 144	-64-24 153	-64-28 161		
0.7656 to 0.8437	1-1/8	1.1270 1.1267	P-TW				-72-8 169	-72-10 164	-72-12 155	-72-16 169	-72-20 188	-72-24 192	-72-28 199		
0.8594 to 0.9375	1-1/4	1.2520 1.2517	P-TW					-80-10 164	-80-12 155	-80-16 169	-80-20 188	-80-24 192	-80-28 199	-80-32 217	
0.9531 to 1.0000	1-3/8	1.3772 1.3768	P-TW					-88-10 167	-88-12 155	-88-16 170	-88-20 189	-88-24 193	-88-28 201	-88-32 212	
1.0156 to 1.1250	1-1/2	1.5022 1.5018	P-TW						-96-12 196	-96-16 189	-96-20 196	-96-24 203	-96-28 206	-96-32 222	-96-36 228

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES.

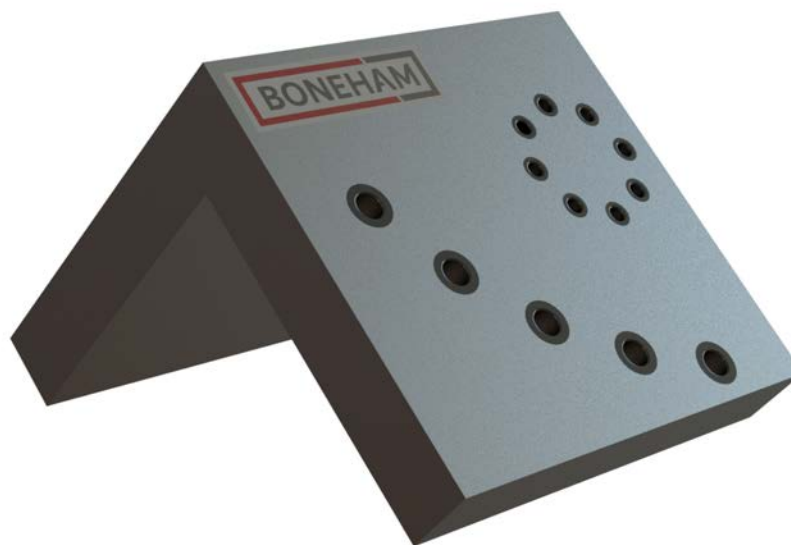
MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.

• COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.

† COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.

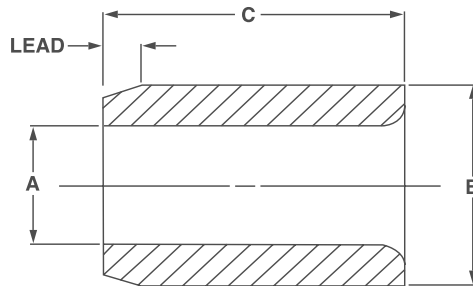
* Price on Application, prices subject to change.

Bushing in application



Headless Press Fit Drill Bushings

PM Type ANSI Metric Bushings



**Premium
Fast-Track**

KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'PM Type' drill bushing is normally used in jigs where an economically priced drill bushing

is required, or where less space is available on the jig plate. Headless press fit bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, PM-10-10-6MM

NOTES

- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U. Example: PM-4-7U-12
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.

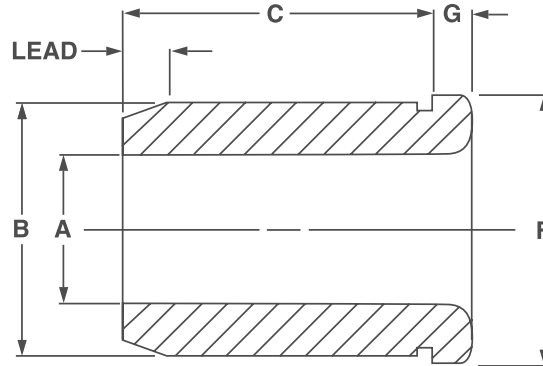


Bore Size Range From - To A (mm)	Outside Diameter B (mm)	C (mm): Headless Press Fit & Liners (PM & LM)											
		Prefix	8mm	10mm	12mm	16mm	20mm	25mm	28mm	36mm	45mm	56mm	67mm
1.500 - 1.800		PM	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA
1.801 - 2.600		PM	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA
2.601 - 3.300	6 6.027-6.019	PM	-6-8 166		-6-12 183	-6-16 191							
3.301 - 4.000	7 7.032-7.023	PM	-7-8 148		-7-12 156	-7-16 166							
4.001 - 5.000	8 8.032-8.023	PM	-8-8 148		-8-12 156	-8-16 166							
5.001 - 6.000	10 10.032-10.023	PM		-10-10 139		-10-16 143	-10-20 152						
6.001 - 8.000	12 12.039-12.028	PM		-12-10 139		-12-16 143	-12-20 152						
8.001 - 10.000	15 15.039-15.028	PM			-15-12 137		-15-20 143	-15-25 148					
10.001 - 12.000	18 18.039-18.028	PM			-18-12 143		-18-20 148	-18-25 156					
12.001 - 15.000	22 22.048-22.035	PM				-22-16 161			-22-28 167	-22-36 189			
15.001 - 18.000	26 26.048-26.035	PM				-26-16 161			-26-28 168	-26-36 191			
18.001 - 22.000	30 30.048-30.035	PM					-30-20 161			-30-36 191	-30-45 199		
22.001 - 26.000	35 35.059-35.043	PM					-35-20 192			-35-36 226	-35-45 235		
26.001 - 30.000	42 42.059-42.043	PM						-42-25 217			-42-45 273	-42-56 318	
30.001 - 35.000	48 48.059-48.043	PM						-48-25 217			-48-45 274	-48-56 318	
35.001 - 42.000	55 55.072-55.053	PM						-55-25 303				-55-56 341	-55-67 358
42.001 - 48.000													
48.001 - 55.000			POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA
55.001 - 63.000													
63.001 - 78.000													

* Price on Application, prices subject to change.

Head Press Fit Drill Bushings

H Type ANSI Drill Bushings



**Premium
Fast-Track**

KEY FEATURES

- / Diameters from 0.0156 to 1.7656
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'H Type' drill bushing features a head which allows for greater axial force, so not to

slip out the plate, or to feed down to a dead stop if required. The head of the bush also allows it to be pressed into the plate easier and can be left either exposed above the plate surface or counterbored to sit flush.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: 6, H-40-8-5/16

NOTES

- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U. Example: H-40-8U-5/16
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number												Head	
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	Dia. F	Thk. G
0.0135 to 0.0280	5/32	0.1578 0.1575	H POA	-10-4 POA	-10-5 POA	-10-6 POA	-10-8 POA	-10-12* POA						1/4	3/32
0.0292 to 0.0591	5/32	0.1578 0.1575	H POA	-10-4 POA	-10-5 POA	-10-6 POA	-10-8† POA	-10-12* POA						1/4	3/32
0.0595 to 0.0625	5/32	0.1578 0.1575	H 211	-10-4 212	-10-5 213	-10-6 214	-10-8† 226	-10-12* 226						1/4	3/32
0.0135 to 0.0280	13/64	0.2046 0.2043	H POA	-13-4 POA	-13-5 POA	-13-6 POA	-13-8 POA	-13-12† POA						19/64	3/32
0.0292 to 0.0591	13/64	0.2046 0.2043	H POA	-13-4 POA	-13-5 POA	-13-6 POA	-13-8† POA	-13-12† POA						19/64	3/32
0.0595 to 0.0625	13/64	0.2046 0.2043	H 211	-13-4 212	-13-5 213	-13-6 214	-13-8* 226	-13-12* 264	-13-16* 264					19/64	3/32
0.0635 to 0.0995	13/64	0.2046 0.2043	H 158	-13-4 159	-13-5 164	-13-6 167	-13-8 187	-13-12* 205	-13-16* 264	-13-22* 264				19/64	3/32
0.0980 to 0.1406	1/4	0.2516 0.2513	H 158	-16-4 152	-16-5 155	-16-6 158	-16-8 183	-16-12 207	-16-16* 252	-16-22* 223				23/64	3/32
0.1250 to 0.1935	5/16	0.3141 0.3138	H 134	-20-4 137	-20-5 140	-20-6 142	-20-8 144	-20-12 159	-20-16* 210	-20-22* 223	-20-28* 223			27/64	1/8
0.1875 to 0.2570	13/32	0.4078 0.4075	H 129	-26-4 130	-26-5 135	-26-6 137	-26-8 140	-26-12 153	-26-16* 164	-26-22* 190	-26-28* 190			1/2	5/32

Continued on next page

Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number													Head	
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	Dia. F	Thk. G	
0.1875 to 0.3160	1/2	0.5017 0.5014	H	-32-4 129	-32-5 130	-32-6 135	-32-8 137	-32-12 140	-32-16 153	-32-22* 165	-32-28* 190				39/64	7/32
0.3125 to 0.4375	5/8	0.6267 0.6264	H	-40-4 135	-40-5 129	-40-6 130	-40-8 130	-40-12 135	-40-16 140	-40-22 164	-40-28 183	-40-34 194			51/64	7/32
0.3125 to 0.5312	3/4	0.7518 0.7515	H	-48-4 140	-48-5 134	-48-6 135	-48-8 135	-48-12 140	-48-16 146	-48-22 167	-48-28 186	-48-34 196			59/64	7/32
0.5000 to 0.6562	7/8	0.8768 0.8765	H				-56-8 149	-56-12 151	-56-16 153	-56-22 161	-56-28 189	-56-34 196	-56-40 212		1-7/64	1/4
0.5000 to 0.7656	1	1.0018 1.0015	H				-64-8 152	-64-12 152	-64-16 158	-64-22 164	-64-28 193	-64-34 206	-64-40 221	-64-48 318	1-15/64	5/16
0.6250 to 1.0312	1-3/8	1.3772 1.3768	H				-88-8 199	-88-12 192	-88-16 200	-88-22 208	-88-28 222	-88-34 237	-88-40 291	-88-48 335	1-39/64	3/8
1.1000 to 1.3906	1-3/4	1.7523 1.7519	H					-112-12 227	-112-16 217	-112-22 227	-112-28 240	-112-34 294	-112-40 307	-112-48 347	1-63/64	3/8
1.3750 to 1.7656	2-1/4	2.2525 2.2521	H					-144-16 276	-144-22 302	-144-28 322	-144-34 332	-144-40 339	-144-48 357		2-31/64	3/8

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES.

MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.

• COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.

† COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.

* Price on Application, prices subject to change.

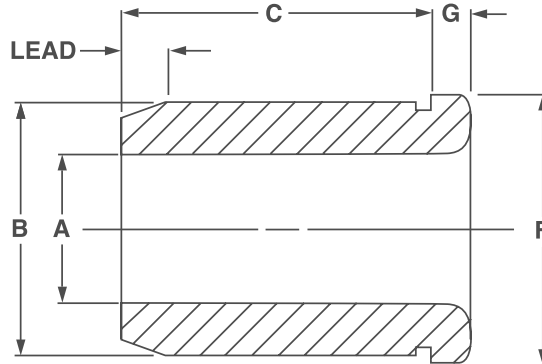
Bushing in application



Head Press Fit Drill Bushings



HTW Type ANSI Thin Wall Bushings



KEY FEATURES

- / Diameters from 0.0156 to 1.1250
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / Thin wall space saving feature

APPLICATION

The 'HTW Type' drill bushing has all the features of the 'H Type' but with the added

feature of a thin wall. Where space is absolute paramount, the thin wall bushing allows closer hole spacing. The head feature allows for greater axial force, so not to slip out the plate, or to feed down to a dead stop if required.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: H-TW-24-6-13/64

NOTES

- / For general ordering information and technical data see pages 9-12
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number														Head	
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	Dia. F	Thk. G	
0.0135 to 0.0280	3/16	0.1891 0.1881	H-TW	-12-4 POA	-12-5 POA	-12-6 POA	-12-8 POA	-12-10 POA	-12-12 POA							5/16	3/32
0.0292 to 0.0591	3/16	0.1891 0.1888	H-TW	-12-4 POA	-12-5 POA	-12-6 POA	-12-8† POA	-12-10† POA	-12-12† POA							5/16	3/32
0.0595 to 0.0625	3/16	0.1891 0.1888	H-TW	-12-4 222	-12-5 224	-12-6 228	-12-8 230	-12-10• 240	-12-12• 248							5/16	3/32
0.0635 to 0.0980	3/16	0.1891 0.1888	H-TW	-12-4 164	-12-5 167	-12-6 170	-12-8 172	-12-10• 181	-12-12• 188							5/16	3/32
0.0995 to 0.1406	1/4	0.2516 0.2513	H-TW	-16-4 146	-16-5 152	-16-6 155	-16-8 158	-16-10 167	-16-12 183							3/8	3/32
0.1406 to 0.1910	5/16	0.3141 0.3138	H-TW	-20-4 134	-20-5 137	-20-6 140	-20-8 142	-20-10 143	-20-12 144	-20-16 159						7/16	3/32
0.1935 to 0.2280	3/8	0.3766 0.3763	H-TW	-24-4 129	-24-5 134	-24-6 135	-24-8 137	-24-10 139	-24-12 140	-24-16 153						1/2	3/32
0.2340 to 0.2900	7/16	0.4392 0.4389	H-TW	-28-4 129	-28-5 134	-28-6 135	-28-8 137	-28-10 139	-28-12 140	-28-16 153						9/16	3/32
0.2950 to 0.3437	9/16	0.5642 0.5639	H-TW	-36-4 135	-36-5 129	-36-6 134	-36-8 134	-36-10 135	-36-12 135	-36-16 140						11/16	3/32
0.3480 to 0.4375	5/8	0.6267 0.6264	H-TW		-40-5 129	-40-6 130	-40-8 130	-40-10 135	-40-12 135	-40-16 140	-40-20 166					3/4	3/32

Continued on next page

Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number														Head	
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	Dia. F	Thk. G	
0.4531 to 0.5312	3/4	0.7518 0.7515	H-TW		-48-5 134	-48-6 135	-48-8 135	-48-10 138	-48-12 140	-48-16 146	-48-20 167					7/8	1/8
0.5469 to 0.6562	7/8	0.8768 0.8765	H-TW			-56-6 151	-56-8 149	-56-10 149	-56-12 151	-56-16 153	-56-20 161	-56-24 170				1-1/16	3/16
0.6719 to 0.7500	1	1.0018 1.0015	H-TW				-64-8 152	-64-10 152	-64-12 152	-64-16 158	-64-20 164	-64-24 187	-64-28 193			1-3/16	3/16
0.7656 to 0.8437	1-1/8	1.1270 1.1267	H-TW				-72-8 201	-72-10 194	-72-12 189	-72-16 201	-72-20 209	-72-24 218	-72-28 224			1-5/16	3/16
0.8594 to 0.9375	1-1/4	1.2520 1.2517	H-TW					-80-10 194	-80-12 191	-80-16 198	-80-20 206	-80-24 213	-80-28 221	-80-32 234		1-1/2	1/4
0.9531 to 1.000	1-3/8	1.3772 1.3768	H-TW					-88-10 193	-88-12 192	-88-16 200	-88-20 209	-88-24 214	-88-28 222	-88-32 237		1-5/8	1/4
1.0156 to 1.1250	1-1/2	1.5022 1.5018	H-TW						-96-12 225	-96-16 213	-96-20 225	-96-24 229	-96-28 234	-96-32 291	-96-36 299	1-3/4	1/4

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES.

MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.

• COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.

† COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.

* Price on Application, prices subject to change.

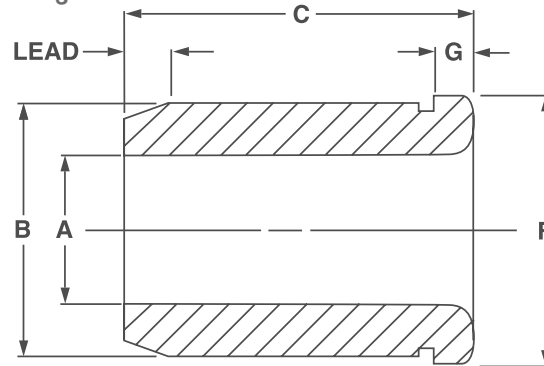
Bushing in application



Head Press Fit Drill Bushings



HM Type ANSI Metric Bushings



**Premium
Fast-Track**

KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'HM Type' drill bushing features a head which allows for greater axial force, so not to

slip out the plate, or to feed down to a dead stop if required. The head of the bush also allows it to be pressed into the plate easier and can be left either exposed above the plate surface or counterbored to sit flush.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, HM-10-10-6MM

NOTES

- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U. Example: HM-10-10U-6MM
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.

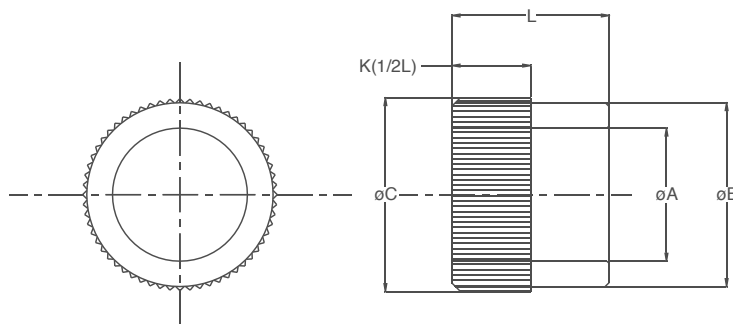


Bore Size Range From - To A (mm)	Outside Diameter B (mm)	C (mm): Headed Press Fit & Liners (HM & HLM) Symbol: Type - OD - Length												F	G
		Prefix	8mm	10mm	12mm	16mm	20mm	25mm	28mm	36mm	45mm	56mm	67mm		
1.500 - 1.800		HM	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA		2
1.801 - 2.600															
2.601 - 3.300	6 6.027-6.019	HM	-6-8 190		-6-12 193	-6-16 211								9	2.5
3.301 - 4.000	7 7.032-7.023	HM	-7-8 161		-7-12 170	-7-16 185								10	2.5
4.001 - 5.000	8 8.032-8.023	HM	-8-8 161		-8-12 170	-8-16 185								11	2.5
5.001 - 6.000	10 10.032-10.023	HM		-10-10 161		-10-16 169	-10-20 208							13	3
6.001 - 8.000	12 12.039-12.028	HM		-12-10 161		-12-16 169	-12-20 191							15	3
8.001 - 10.000	15 15.039-15.028	HM			-15-12 156		-15-20 169	-15-25 170						18	3
10.001 - 12.000	18 18.039-18.028	HM			-18-12 161		-18-20 169	-18-25 185						22	4
12.001 - 15.000	22 22.048-22.035	HM				-22-16 190			-22-28 199	-22-36 206				26	4
15.001 - 18.000	26 26.048-26.035	HM				-26-16 190			-26-28 194	-26-36 213				30	4
18.001 - 22.000	30 30.048-30.035	HM					-30-20 221			-30-36 294	-30-45 304			34	5
22.001 - 26.000	35 35.059-35.043	HM					-35-20 223			-35-36 296	-35-45 305			39	5
26.001 - 30.000	42 42.059-42.043	HM						-42-25 300			-42-45 305	-42-56 349		46	5
30.001 - 35.000	48 48.059-48.043	HM						-48-25 304			-48-45 327	-48-56 348		52	5
35.001 - 42.000	55 55.072-55.053	HM						-55-25 342				-55-56 359	-55-67 360	59	5
42.001 - 48.000															
48.001 - 55.000															
55.001 - 63.000			POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA		
63.001 - 78.000															

* Price on Application, prices subject to change.

Serrata Press Fit Drill Bushings

SP Type Serrated Bushings



$$C = B + (0.014" \text{ to } 0.020")$$



BONEHAM

KEY FEATURES

- / Diameters from 0.0595 to 0.7656
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / Top OD serrated
- / Bottom ID ground

APPLICATION

The 'SP Type' drill bushing is similar to that of the 'P Type' bushing, they are designed

to press into soft materials, such as wood and soft metals. The top of the OD is serrated to prevent rotational movement and increased axial resistance in the jig. The rest of the bushing is finish ground to allow for accurate and easy location.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size. Example: SP-5/16-3/4-1/2

If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 9-12
- / Price list codes detailed below; please see price list.



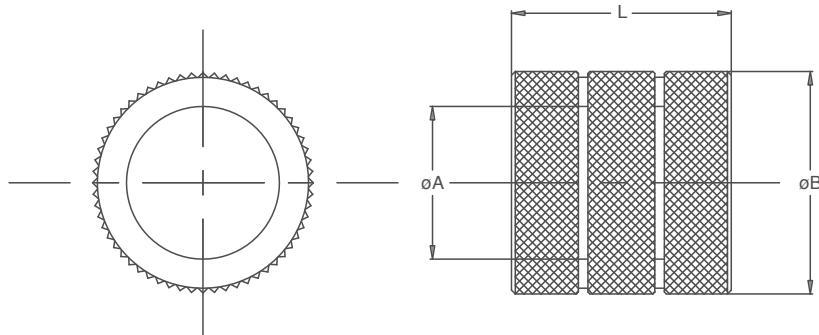
Bore Size Range A	Outside Diameter B		Prefix	Bushing Length L, Code Number & \$						
	Size	Tolerance		L						
0.0595 0.0709	13/64	0.2031 0.2029	SP	13-4 POA	13-5 POA	13-6 POA	13-8 POA			
0.0709 0.0995	13/64	0.2031 0.2029	SP	13-4 167	13-5 187	13-6 190	13-8 191			
0.0980 0.1181	1/4	0.2500 0.2498	SP	16-4 146	16-5 152	16-6 157	16-8 161			
0.1181 0.1406	1/4	0.2500 0.2498	SP	16-4 146	16-5 152	16-6 157	16-8 161			
0.1250 0.1935	5/16	0.3125 0.3123	SP	20-4 137	20-5 137	20-6 139	20-8 143	20-12 150		
0.1562 0.1969	13/32	0.4062 0.4060	SP	26-4 127	26-5 128	26-6 131	26-8 134	26-12 139	26-16 152	
0.1969 0.2362	13/32	0.4062 0.4060	SP	26-4 127	26-5 128	26-6 131	26-8 134	26-12 139	26-16 152	
0.2362 0.2570	13/32	0.4062 0.4060	SP	26-4 127	26-5 128	26-6 131	26-8 134	26-12 139	26-16 152	
0.1562 0.2362	1/2	0.5000 0.4998	SP		32-5 128	32-6 131	32-8 134	32-12 139	32-16 152	
0.2362 0.3160	1/2	0.5000 0.4998	SP		32-5 128	32-6 131	32-8 134	32-12 139	32-16 152	
0.3125 0.4375	5/8	0.6250 0.6248	SP			40-6 129	40-8 129	40-12 134	40-16 137	
0.3125 0.5000	3/4	0.7500 0.7498	SP			48-6 134	48-8 134	48-12 137	48-16 143	
0.5000 0.5312	3/4	0.7500 0.7498	SP			48-6 134	48-8 134	48-12 137	48-16 143	
0.5000 0.6562	7/8	0.8750 0.8748	SP			56-6 154	56-8 146	56-12 150	56-16 152	
0.5000 0.7656	1	1.0000 0.9998	SP				64-8 150	64-12 150	64-16 153	64-22 159

* Price on Application, prices subject to change.

Diamond Groove Drill Bushings



DG Type 'Cast-in' Bushings



KEY FEATURES

- / Diameters from 0.0595 to 0.7656
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / OD diamond knurling

APPLICATION

The 'DG Type' drill bushing is designed to be cast in the fixture or mold. Popular in

the resin and composite industries as the composite runs through the grooves to lock the bushing in place. The groove and the diamond knurling are highly resistant to axial and rotational movement.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size. Example: 6, DG-20-5-1/8

If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 9-12
- / Price list codes detailed below; please see price list.

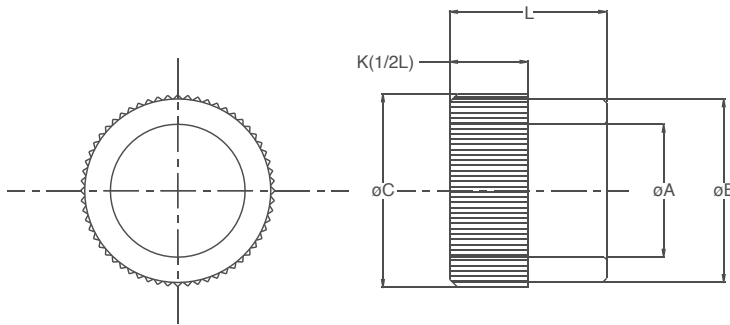


Bore Size Range A	Outside Diameter B		Prefix	Bushing Length L And Price Code Numbers L							
	Size	Tolerance		1/4	5/16	3/8	1/2	3/4	1	1-3/8	1-1/2
0.0595 0.0709	13/64	0.2230 0.2130	DG	13-4 POA	13-5 POA	13-6 POA	13-8 POA				
0.0709 0.0995	13/64	0.2230 0.2130	DG	13-4 152	13-5 153	13-6 156	13-8 159				
0.0980 0.1181	1/4	0.2750 0.2600	DG	16-4 129	16-5 130	16-6 134	16-8 135	16-12 145			
0.1181 0.1406	1/4	0.2750 0.2600	DG	16-4 129	16-5 130	16-6 134	16-8 135	16-12 145			
0.1250 0.1935	5/16	0.3370 0.3220	DG	20-4 115	20-5 116	20-6 117	20-8 118	20-12 120	20-16 129		
0.1562 0.1969	13/32	0.4310 0.4160	DG	26-4 115	26-5 115	26-6 116	26-8 117	26-12 118	26-16 120		
0.1969 0.2362	13/32	0.4310 0.4160	DG	26-4 115	26-5 115	26-6 116	26-8 117	26-12 118	26-16 120		
0.2362 0.2570	13/32	0.4310 0.4160	DG	26-4 115	26-5 115	26-6 116	26-8 117	26-12 118	26-16 120		
0.1562 0.2362	1/2	0.5250 0.5100	DG		32-5 115	32-6 116	32-8 117	32-12 118	32-16 120		
0.2362 0.3160	1/2	0.5250 0.5100	DG		32-5 115	32-6 116	32-8 117	32-12 118	32-16 120		
0.3125 0.4375	5/8	0.6500 0.6350	DG			40-6 115	40-8 116	40-12 117	40-16 118	40-22 120	
0.3125 0.5000	3/4	0.7750 0.7600	DG			48-6 115	48-8 116	48-12 117	48-16 118	48-22 139	
0.5000 0.5312	3/4	0.7750 0.7600	DG			48-6 115	48-8 116	48-12 117	48-16 118	48-22 139	
0.5000 0.6562	7/8	0.9000 0.8850	DG			56-6 138	56-8 131	56-12 132	56-16 134	56-22 139	
0.5000 0.7656	1	1.0350 1.0100	DG				64-8 132	64-12 132	64-16 135	64-22 137	64-24 151

* Price on Application, prices subject to change.

Serrata Press Fit Drill Bushings

SPM Type Serrated Metric Bushings



$$C = B + (0.35 \text{ to } 0.5 \text{ mm})$$



BONEHAM

KEY FEATURES

- / Diameters from 1.20mm to 18mm
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / Top OD serrated
- / Bottom ID ground

APPLICATION

The 'SPM Type' drill bushing is similar to that of

the 'P Type' bushing, they are designed to press into soft materials, such as wood and soft metals. The top of the OD is serrated to prevent rotational movement and increased axial resistance in the jig. The rest of the bushing is finish ground to allow for accurate and easy location.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore

Size. Example: 6, SPM-7-16-4MM

If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 9-12
- / Price list codes detailed below; please see price list.



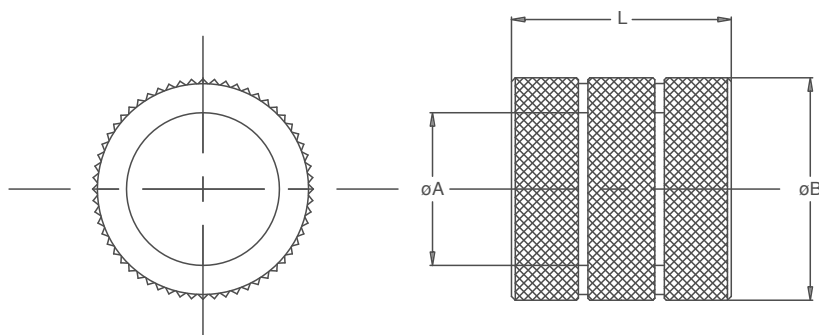
Bore Size A (mm) F7		OD B (mm)	OD B Tolerance (mm)	Length L (mm)	Part Code	Price Code
From	To					
1.20	1.8	5	5.000/4.995	6	SPM-5-6	POA
				9	SPM-5-9	POA
1.80	2.6	5	5.000/4.995	6	SPM-5-6	187
				9	SPM-5-9	198
				8	SPM-6-8	160
2.61	3.3	6	6.000/5.995	12	SPM-6-12	187
				16	SPM-6-16	190
3.31	4	7	7.000/6.995	8	SPM-7-8	143
				12	SPM-7-12	152
				16	SPM-7-16	159
4.01	5	8	8.000/7.994	8	SPM-8-8	143
				12	SPM-8-12	152
				16	SPM-8-16	159
5.01	6	10	10.000/9.994	10	SPM-10-10	139
				16	SPM-10-16	148
				20	SPM-10-20	159
6.01	8	12	12.000/11.992	10	SPM-12-10	139
				16	SPM-12-16	148
				20	SPM-12-20	159
8.01	10	15	15.000/14.992	12	SPM-15-12	134
				20	SPM-15-20	143
				25	SPM-15-25	148
10.01	12	18	18.000/17.992	12	SPM-18-12	139
				20	SPM-18-20	152
				25	SPM-18-25	160
12.01	15	22	22.000/21.991	16	SPM-22-16	159
				28	SPM-22-28	161
				36	SPM-22-36	170
15.01	18	26	26.000/25.991	16	SPM-26-16	159
				28	SPM-26-28	161
				36	SPM-26-36	170

*Price on Application, prices subject to change.

Diamond Groove Drill Bushings

BONEHAM

DGM Type METRIC 'Cast-in Bushings'



BONEHAM

KEY FEATURES

- / Diameters from 1.20mm to 18mm
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / OD diamond knurling

APPLICATION

The 'DGM Type' drill bushing is designed to be cast in the fixture or mold. Popular in the resin and composite industries as the composite runs

through the grooves to lock the bushing in place. The groove and the diamond knurling are highly resistant to axial and rotational movement.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size. Example: DGM-6-12-3MM
If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 9-12
- / Price list codes detailed below; please see price list.

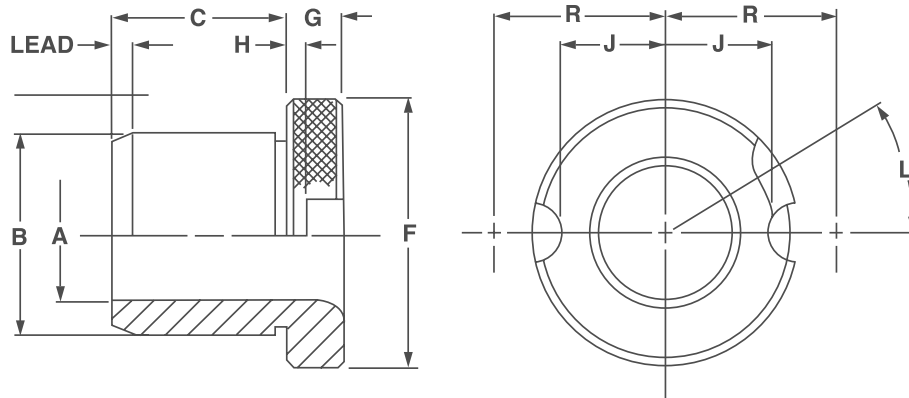


Bore Size A (mm) F7		OD B (mm)	OD B Tolerance (mm)	Length L (mm)	Part Code	No. of Grooves	Price Code
From	To						
1.20	1.8	5	5.50/5.25	6	DGM-5-6	1	POA
				9	DGM-5-9	1	POA
1.80	2.6	5	5.50/5.25	6	DGM-5-6	1	187
				9	DGM-5-9	1	198
				8	DGM-6-8	1	160
2.61	3.3	6	6.65/6.25	12	DGM-6-12	1	187
				16	DGM-6-16	2	190
				8	DGM-7-8	1	143
3.31	4	7	7.65/7.25	12	DGM-7-12	1	152
				16	DGM-7-16	2	159
				8	DGM-8-8	1	143
4.01	5	8	8.65/8.25	12	DGM-8-12	1	152
				16	DGM-8-16	2	159
				10	DGM-10-10	1	139
5.01	6	10	10.65/10.25	16	DGM-10-16	2	148
				20	DGM-10-20	2	159
				10	DGM-12-10	1	139
6.01	8	12	12.65/12.25	16	DGM-12-16	2	148
				20	DGM-12-20	2	159
				12	DGM-15-12	1	134
8.01	10	15	15.65/15.25	20	DGM-15-20	2	143
				25	DGM-15-25	2	148
				12	DGM-18-12	1	139
10.01	12	18	18.65/18.25	20	DGM-18-20	2	152
				25	DGM-18-25	2	160
				16	DGM-22-16	2	159
12.01	15	22	22.65/22.25	28	DGM-22-28	2	161
				36	DGM-22-36	3	170
				16	DGM-26-16	2	159
15.01	18	26	26.90/26.25	28	DGM-26-28	2	161
				36	DGM-26-36	3	170

* Price on Application, prices subject to change.

Slip-Fixed Renewable Combination Drill Bushings

SF Type ANSI Combination Bushings



BONEHAM

KEY FEATURES

- / Diameters from 0.0156 to 1.8750
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / Fixed lock screw mount
- / Slip locking recess

APPLICATION

The 'SF Type' drill bushing is designed to be used with a liner and lockscrew. The

removable fixed feature of the bush is normally used in high production work, where the bush can be easily and quickly replaced with a minimum loss of productivity. The removable slip feature of the bush is used when more than one operation is carried out; the bush is instantly removable after each operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: SF-20-8-3/16

NOTES

- / For general ordering information and technical data see pages 9-12
- / For dimensional data please see page 43
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B	C: Bushing Length under head and Price Code Number												Lock Screw No.
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	
0.0135 to 0.0280	3/16	0.1875 0.1873	SF POA	-12-4 POA	-12-5 POA	-12-6 POA	-12-8 POA	-12-12 POA						N/A
0.0292 to 0.0591	3/16	0.1875 0.1873	SF POA	-12-4 POA	-12-5 POA	-12-6 POA	-12-8† POA	-12-12† POA						N/A
0.0595 to 0.0625	3/16	0.1875 0.1873	SF 222	-12-4 224	-12-5 224	-12-6 226	-12-8* 227	-12-12* 244						N/A
0.0135 to 0.0280	5/16	0.3125 0.3123	SF POA	-20-4 POA	-20-5 POA	-20-6 POA	-20-8 POA	-20-12 POA						1
0.0292 to 0.0591	5/16	0.3125 0.3123	SF POA		-20-5 POA	-20-6 POA	-20-8† POA	-20-12† POA						1
0.0595 to 0.0625	5/16	0.3125 0.3123	SF 224		-20-5 224	-20-6 226	-20-8* 227	-20-12* 244						1
0.0635 to 0.0890	5/16	0.3125 0.3123	SF		-20-5 174	-20-6 180	-20-8 187	-20-12* 194	-20-16* 212					1
.0935 to 0.1935	5/16	0.3125 0.3123	SF		-20-5 164	-20-6 167	-20-8 170	-20-12 190	-20-16* 203	-20-22* 225				1
0.1405 to 0.1875	1/2	0.5000 0.4998	SF		-32-5 149	-32-6 152	-32-8 153	-32-12 161	-32-16* 177	-32-22* 192	-32-28* 204			1
0.1890 to 0.3437	1/2	0.5000 0.4998	SF		-32-5 139	-32-6 142	-32-8 144	-32-12 152	-32-16 161	-32-22* 187	-32-28* 195	-32-34* 304		1

Continued on next page

Bore Size A*	Outside Diameter B	C: Bushing Length under head and Price Code Number												Lock Screw No.	
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"		
0.2812 to 0.5625	3/4	0.7500 0.7498	SF				-48-8 143	-48-12 149	-48-16 153	-48-22 187	-48-28 196	-48-34 206	-48-40* 310	-48-48* 346	1
0.4687 to 0.7812	1	1.0000 0.9998	SF				-64-8 161	-64-12 164	-64-16 170	-64-22 188	-64-28 201	-64-34 217	-64-40 323	-64-48 348	2
0.7187 to 1.0625	1-3/8	1.3750 1.3757	SF					-88-12 204	-88-16 214	-88-22 224	-88-28 248	-88-34 294	-88-40 333	-88-48 355	2
0.9687 to 1.4062	1-3/4	1.7500 1.7497	SF					-112-12 264	-112-16 233	-112-22 264	-112-28 303	-112-34 322	-112-40 341	-112-48 356	3
1.3437 to 1.8750	2-1/4	2.2500 2.2496	SF					-144-12 328	-144-16 314	-144-22 328	-144-28 334	-144-34 345	-144-40 352	-144-48 360	3

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES.

MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.

• COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.

† COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.

* Price on Application, prices subject to change.

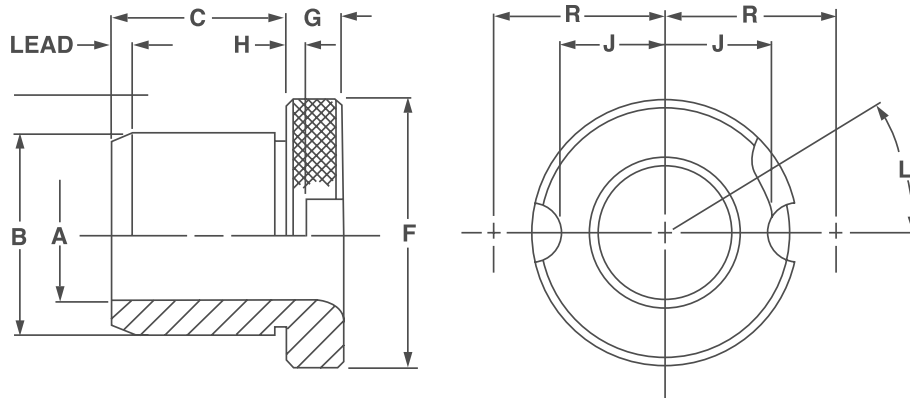
Our Sales Service Representatives are available to assist you in defining the appropriate sizes of the bushings that you require.

Bushing in application



Slip-Fixed Renewable Combination Drill Bushings

SFTW Type ANSI Thin Wall Bushings



KEY FEATURES

- / Diameters from 0.0156 to 1.8750
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / Fixed lock screw mount
- / Slip locking recess
- / Thin wall space saving feature

APPLICATION

The 'SF-TW Type' drill bushing is designed to be used with a liner and lockscrew. The removable fixed feature of the bush is

normally used in high production work, where the bush can be easily and quickly replaced with a minimum loss of productivity. The removable slip feature of the bush is used when more than one operation is carried out; the bush is instantly removable after each operation. The Thin Wall feature of this bushing allows for space saving on the jig as bushings can be spaced closer together.

NOTES

- / For general ordering information and technical data see pages 9-12
- / For dimensional data please see page 43
- / Price list codes detailed below; please see price list.



ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, SF-TW-20-8-9/64

Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number													Head Screw No.
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	
0.0135 to 0.0280	3/16	0.1875 0.1873	SF-TW POA	-12-4 POA	-12-5 POA	-12-6 POA	-12-8 POA	-12-10 POA	-12-12 POA						N/A
0.0292 to 0.0591	3/16	0.1875 0.1873	SF-TW POA	-12-4 POA	-12-5 POA	-12-6 POA	-12-8† POA	-12-10† POA	-12-12† POA						N/A
0.0595 to 0.0625	3/16	0.1875 0.1873	SF-TW 222	-12-4 222	-12-5 224	-12-6 226	-12-8• 227	-12-10• 233	-12-12• 244						N/A
0.0635 to 0.0980	3/16	0.1875 0.1873	SF-TW 170	-12-4 170	-12-5 177	-12-6 180	-12-8 187	-12-10• 191	-12-12• 194						N/A
0.0995 to 0.1406	1/4	0.2500 0.2498	SF-TW 164	-16-4 164	-16-5 164	-16-6 167	-16-8 170	-16-10 186	-16-12 190						TW-2
0.1406 to 0.1910	5/16	0.3125 0.3123	SF-TW 161	-20-4 161	-20-5 161	-20-6 164	-20-8 168	-20-10 177	-20-12 188	-20-16• 201					TW-2
0.1935 to 0.2280	3/8	0.3750 0.3748	SF-TW 135	-24-4 135	-24-5 139	-24-6 142	-24-8 146	-24-10 149	-24-12 152	-24-16 161					TW-2
0.2340 to 0.2900	7/16	0.4375 0.4373	SF-TW 135	-28-4 135	-28-5 139	-28-6 142	-28-8 146	-28-10 149	-28-12 152	-28-16 161					TW-2
0.2950 to 0.3437	9/16	0.5625 0.5623	SF-TW 135	-36-4 135	-36-5 139	-36-6 142	-36-8 146	-36-10 149	-36-12 152	-36-16 161					TW-2
0.3480 to 0.4375	5/8	0.6250 0.6248	SF-TW		-40-5 143	-40-6 143	-40-8 143	-40-10 146	-40-12 149	-40-16 153	-40-20 187				TW-2

Continued on next page

Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number													Head Screw No.
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	
0.4531 to 0.5312	3/4	0.7500 0.7498	SF-TW	-48-5 142	-48-6 142	-48-8 143	-48-10 149	-48-12 149	-48-16 153	-48-20 187					TW-2
0.5469 to 0.6562	7/8	0.8750 0.8748	SF-TW		-56-6 161	-56-8 161	-56-10 164	-56-12 166	-56-16 170	-56-20 188	-56-24 193				TW-7
0.6719 to 0.7500	1	1.0000 0.9998	SF-TW			-64-8 161	-64-10 164	-64-12 164	-64-16 170	-64-20 188	-64-24 192	-64-28 201			TW-7
0.7656 to 0.8437	1-1/8	1.1250 1.1248	SF-TW			-72-8 203	-72-10 204	-72-12 205	-72-16 214	-72-20 224	-72-24 230	-72-28 240			TW-7
0.8594 to 0.9375	1-1/4	1.2500 1.2498	SF-TW				-80-10 204	-80-12 205	-80-16 214	-80-20 224	-80-24 231	-80-28 240	-80-32 293		TW-7
0.9531 to 1.000	1-3/8	1.3750 1.3747	SF-TW				-88-10 204	-88-12 204	-88-16 214	-88-20 224	-88-24 231	-88-28 248	-88-32 294		TW-7
1.0156 to 1.1250	1-1/2	1.5000 1.4997	SF-TW					-96-12 272	-96-16 273	-96-20 276	-96-24 295	-96-28 302	-96-32 321	-96-36 332	TW-7

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES.

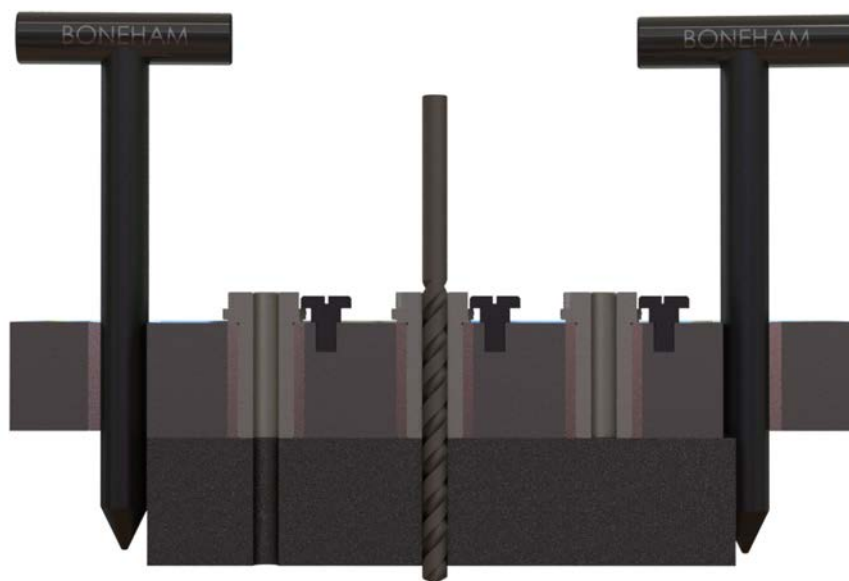
MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.

• COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.

† COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.

* Price on Application, prices subject to change.

Bushing in application

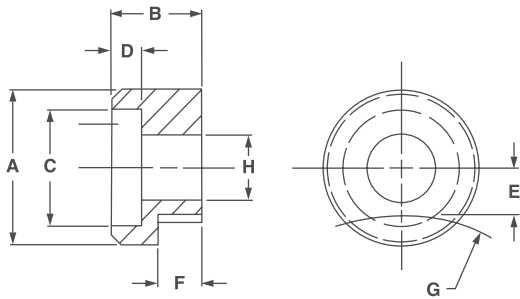


Renewable Drill Bushing Dimensional Data

Body O.D.	F Standard	F Thinwall	G	H Standard	H-Fixed Thinwall	H-Slip Thinwall	J Standard	J-Fixed Thinwall	J-Slip Thinwall	L	R Standard	R-Fixed Thinwall	R-Slip Thinwall
3/16	5/16	5/16	3/16	3/32	3/32	3/32	5/64	5/64	5/64	55°	17/64	19/64	17/64
1/4		7/16	1/4		3/32	3/32		9/64	9/64	30°		23/64	21/64
5/16	35/64	9/16	1/4	1/8	1/8	1/8	11/64	13/64	13/64	65°	1/2	27/64	27/64
3/8		5/8	1/4		1/8	1/8		15/64	15/64	30°		29/64	29/64
7/16		5/8	1/4		1/8	1/8		15/64	15/64	30°		29/64	29/64
1/2	51/64		1/4	1/8			19/64			65°	5/8		
9/16		7/8	1/4		1/8	1/8		23/64	21/64	30°		37/64	37/64
5/8		7/8	1/4		1/8	1/8		23/64	21/64	30°		37/64	37/64
3/4	1-3/64	1	1/4	1/8	1/8	1/8	27/64	27/64	25/64	50°	3/4	41/64	41/64
7/8		1-1/4	3/8		3/16	3/16		31/64	33/64	30°		53/64	53/64
1	1-27/64	1-3/8	3/8	3/16	3/16	3/16	19/32	35/64	37/64	35°	59/64	57/64	57/64
1-1/8		1-1/2	3/8		3/16	3/16		39/64	41/64	35°		61/64	61/64
1-1/4		1-5/8	3/8		3/16	3/16		43/64	45/64	35°		1-1/64	1-1/64
1-3/8	1-51/64	1-3/4	3/8	3/16	3/16	3/16	25/32	47/64	49/64	30°	1-7/64	1-5/64	1-5/64
1-1/2		1-7/8	3/8		3/16	3/16		51/64	51/64	30°		1-9/64	1-9/64
1-3/4	2-19/64		3/8	3/16			1			30°	1-25/64		
2-1/4	2-51/64		3/8	3/16			1-1/4			25°	1-41/64		

Round Clamps

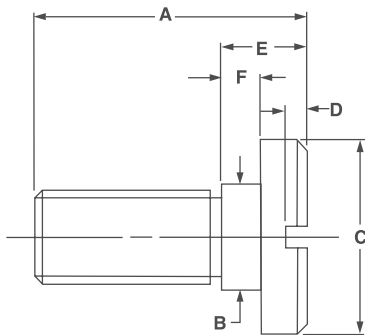
For Fixed Renewable Bushings



Round Clamp No.	A	B	C	D	E	F	G	H	Socket Head Screw	USA Bush Symb.
RC-1	5/8	5/16	31/64	5/32	0.203	1/8	17/32	21/64	5/16-18	SF-20 SF-32 SF-48
RC-2	5/8	7/16	31/64	7/32	0.194	3/16	29/32	21/64	5/16-18	SF-64 SF-88
RC-3	3/4	1/2	37/64	9/32	0.219	3/16	1-13/32	25/64	3/8-16	SF-112 SF-144

Lock Screws

For ANSI/BMP Standard and Thinwall Bushings

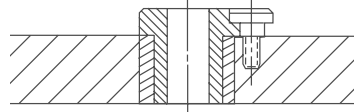
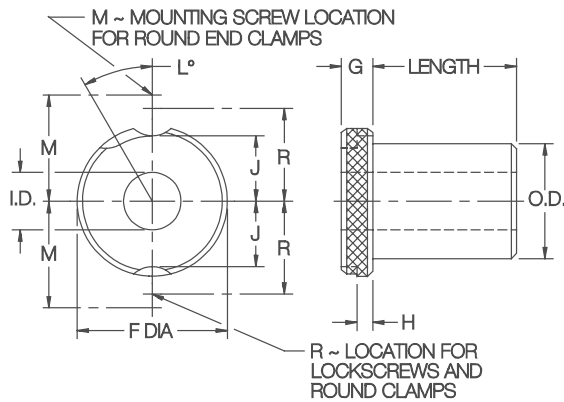


Lock Screw No.	A	B	C	D	E	F	Thread	Price
0	7/16	3/16	5/16	3/64	3/16	0.105 0.100	8-32	UNC-2A
1	5/8	3/8	5/8	1/16	1/4	0.138 0.132	5/16-18	UNC-2A
2	7/8	3/8	5/8	1/8	3/8	0.200 0.194	5/16-18	UNC-2A
3	1	7/16	3/4	1/8	3/8	0.200 0.194	3/8-16	UNC-2A
TW-1	7/16	3/16	5/16	3/64	3/16	3/32	8-32	UNC-2A
TW-2	1/2	1/4	3/8	1/16	1/4	1/8	10-32	UNF
TW-3	11/16	1/4	7/16	1/16	3/8	3/16	10-32	UNF
TW-4	7/8	3/8	9/16	1/8	1/2	1/4	5/16-18	UNC-2A
TW-5	1	3/8	5/8	1/8	5/8	5/16	5/16-18	UNC-2A
TW-7	3/4	3/8	5/8	1/16	3/8	3/16	5/16-18	UNC-2A

Slip-Fixed Renewable Combination Drill Bushings



SFM Type ANSI Metric Combination Bushings



KEY FEATURES

- / Diameters from 1.50mm to 85mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / Fixed lock screw mount
- / Slip locking recess

APPLICATION

The 'SFM Type' drill bushing is designed to be used with a liner and lockscrew. The removable fixed feature of the bush is normally used in high production work, where the bush can be easily and quickly replaced with a minimum loss of productivity. The removable slip feature of the bush is used when more than one operation is carried out; the bush is instantly removable after each operation.

ORDERING INSTRUCTIONS

Ordering Examples:

- / SF-20-16-.1250 Standard USA bushing, inch ID
- / SF-20-16-.1772 Standard USA bushing, mm ID (.1772 = 4.50mm)
- / SF-20-16-.1250 REAMER Reamer tolerance on ID
- / SF-20-16-.1250 NCB No counterbore on long bushings marked with * (no counterbore is standard on all other bushings)
- / SFC-20-16-.1250 Carbide bushing
- / SFM-8-16-4.50 Standard metric bushing

NOTES

- / Standard prices apply only to bushings with a standard-drillsize ID with the stated ID range. See catalogue page 52 for standard drill sizes and their decimal equivalents. For

prices on non-standard ID sizes, including reamer-tolerance bushings, please contact BMP sales.

Standard ID Tolerances:

- / From .35 to 3mm $+.002/+0.008$ mm
- / Over 3 to 6mm $+.004/+0.012$ mm
- / Over 6 to 10mm $+.005/+0.014$ mm
- / Over 10 to 18mm $+.006/+0.017$ mm
- / Over 18 to 30mm $+.007/+0.020$ mm
- / Over 30 to 50mm $+.009/+0.025$ mm
- / Over 50 to 80mm $+.010/+0.029$ mm
- / Over 80 to 120mm $+.012/+0.034$ mm (G6 tolerance)



Slip / Fixed Head Dimensions (Part table on the following page)

Body OD	F DIA	G	H	J	L	M	R	Lock Screw
8mm	15mm	6mm	3mm	4.5mm	65°		11.5mm	LSM-1
10mm	18mm			6mm	65°		13mm	LSM-2
12mm	22mm			7.5mm	60°		16mm	LSM-3 LSM-4
15mm	26mm			9.5mm	50°		18mm	
18mm	30mm	8mm	4mm	11.5mm	50°		20mm	
22mm	34mm			13mm	35°		23.5mm	LSM-5 LSM-6
26mm	39mm			15.5mm	35°		26mm	
30mm	46mm			19mm	30°		29.5mm	
35mm	52mm	10mm	5.5mm	22mm	30°		32.5mm	LSM-7 LSM-8
42mm	59mm			25.5mm	30°		36mm	
48mm	66mm			28.5mm	30°		41mm	
55mm	74mm			32.5mm	25°		45mm	
62mm	82mm	12mm	7mm	36.5mm	25°		49mm	
70mm	90mm			40.5mm	25°		53mm	
78mm	100mm			45.5mm	25°		58mm	
85mm	110mm			50.5mm	20°		63mm	
95mm	120mm			55.5mm	20°		68mm	
105mm	130mm			60.5mm	20°		73mm	

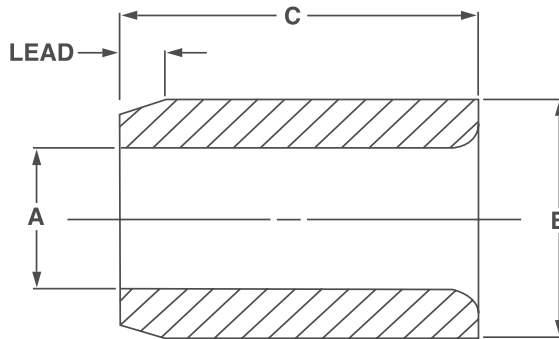
Slip / Fixed Head Part Table

ID Range (G6)	OD (h5)	Length	Ansi Part No.	Price 1-5
1.5-1.80mm	8mm 8.000-7.994mm	10mm	SFM-8-10	POA
		16mm	SFM-8-16	POA
3.01-4.00mm		10mm	SFM-8-10	198
		16mm	SFM-8-16	230
4.01-6.00mm	10mm 10.000-9.994mm	12mm	SFM-10-12	187
		20mm	SFM-10-20	191
		25mm	SFM-10-25	199
6.01-8.00mm	12mm 12.000-11.992mm	12mm	SFM-12-12	176
		20mm	SFM-12-20	191
		25mm	SFM-12-25	199
8.01-10.00mm	15mm 15.000-14.992mm	16mm	SFM-15-16	191
		28mm	SFM-15-28	199
		36mm	SFM-15-36	220
10.01-12.00mm	18mm 18.000-17.992mm	16mm	SFM-18-16	189
		28mm	SFM-18-28	193
		36mm	SFM-18-36	222
12.01-15.00mm	22mm 22.000-21.991mm	20mm	SFM-22-20	207
		36mm	SFM-22-36	227
		45mm	SFM-22-45	247
15.01-18.00mm	26mm 26.000-25.991mm	20mm	SFM-26-20	207
		36mm	SFM-26-36	226
		45mm	SFM-26-45	297
18.01-22.00mm	30mm 30.000-29.991mm	25mm	SFM-30-25	298
		45mm	SFM-30-45	332
		56mm	SFM-30-56	360
22.01-26.00mm	35mm 35.000-34.989mm	25mm	SFM-35-25	298
		45mm	SFM-35-45	332
		56mm	SFM-35-56	360
26.01-30.00mm	42mm 42.000-41.989mm	30mm	SFM-42-30	333
		56mm	SFM-42-56	-
		67mm	SFM-42-67	-
30.01-35.00mm	48mm 48.000-47.989mm	30mm	SFM-48-30	360
		56mm	SFM-48-56	POA
		67mm	SFM-48-67	POA
35.01-42.00mm	55mm 55.000-54.987mm	30mm	SFM-55-30	358
		56mm	SFM-55-56	POA
		67mm	SFM-55-67	POA
42.01-48.00mm	62mm 62.000-61.987mm	35mm	SFM-62-35	POA
		67mm	SFM-62-67	POA
		78mm	SFM-62-78	POA
48.01-55.00mm	70mm 70.000-69.987mm	35mm	SFM-70-35	POA
		67mm	SFM-70-67	POA
		78mm	SFM-70-78	POA
55.01-62.00mm	78mm 78.000-77.987mm	40mm	SFM-78-40	POA
		78mm	SFM-78-78	POA
		105mm	SFM-78-105	POA
62.01-70.00mm	85mm 85.000-84.985mm	40mm	SFM-85-40	POA
		78mm	SFM-85-78	POA
		105mm	SFM-85-105	POA
70.01-78.00mm	95mm 95.000-94.985mm	45mm	SFM-95-45	POA
		89mm	SFM-95-89	POA
		112mm	SFM-95-112	POA
78.01-85.00mm	105mm 105.000-104.985mm	45mm	SFM-105-45	POA
		89mm	SFM-105-89	POA
		112mm	SFM-105-112	POA

Headless Liner Drill Bushings



L Type ANSI Headless Liner



KEY FEATURES

- / Diameters from 5/16 to 2 1/4
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves SF location
- / OD ground to press fit size

APPLICATION

The 'L Type' liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear caused by drill bush replacement on the jig plate.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, L-32-22

NOTES

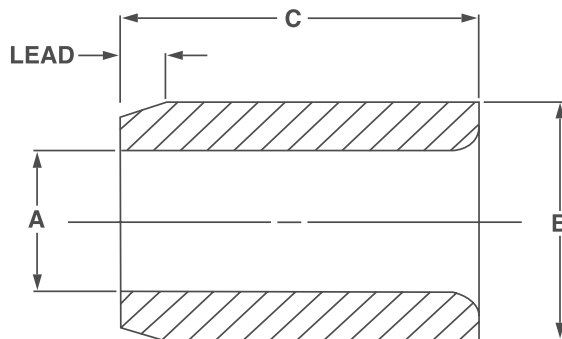
- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U. Example: L-32-22U
- / Price list codes detailed below; please see price list.



Bore Size A		Outside Diameter B		C: Liner Length and Price Code Number											
				Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"
3/16	0.1879	5/16	0.3141	L	-20-4	-20-5	-20-6	-20-8	-20-12						
	0.1876		0.3138		123	126	129	130	135						
5/16	0.3129	1/2	0.5017	L	-32-4	-32-5	-32-6	-32-8	-32-12	-32-16	-32-22				
	0.3126		0.5014		118	119	122	123	129	137	146				
1/2	0.5005	3/4	0.7518	L		-48-5	-48-6	-48-8	-48-12	-48-16	-48-22	-48-28	-48-34		
	0.5002		0.7515			119	123	123	126	130	145	158	174		
3/4	0.7506	1	1.0018	L				-64-8	-64-12	-64-16	-64-22	-64-28	-64-34	-64-40	-64-48
	0.7503		1.0015				135	135	139	144	161	170	191	252	
1	1.0007	1-3/8	1.3772	L				-88-8	-88-12	-88-16	-88-22	-88-28	-88-34	-88-40	-88-48
	1.0004		1.3768				170	155	170	189	201	213	225	305	
1-3/8	1.3760	1-3/4	1.7523	L					-112-12	-112-16	-112-22	-112-28	-112-34	-112-40	-112-48
	1.3756		1.7519					196	189	196	206	222	235	329	
1-3/4	1.7512	2-1/4	2.2525	L					-144-12	-144-16	-144-22	-144-28	-144-34	-144-40	-144-48
	1.7508		2.2521					218	207	218	227	272	299	342	
2-1/4	2.2515	2-3/4	2.7526	L					-176-12	-176-16	-176-22	-176-28	-176-34	-176-40	-176-48
	2.2510		2.7522					228	218	229	260	294	308	344	

Headless Liner Drill Bushings

LTW Type Thin Wall Liner



KEY FEATURES

- / Diameters from 5/16 to 2 1/4
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves SF location
- / OD ground to press fit size
- / Thin wall space saving feature

APPLICATION

The 'LTW Type' liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear caused by drill bush replacement on the jig plate. The thin wall allows for greater space on the jig.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, L-TW-40-4

NOTES

- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U. Example: L-TW-28-6U
- / Price list codes detailed below; please see price list.



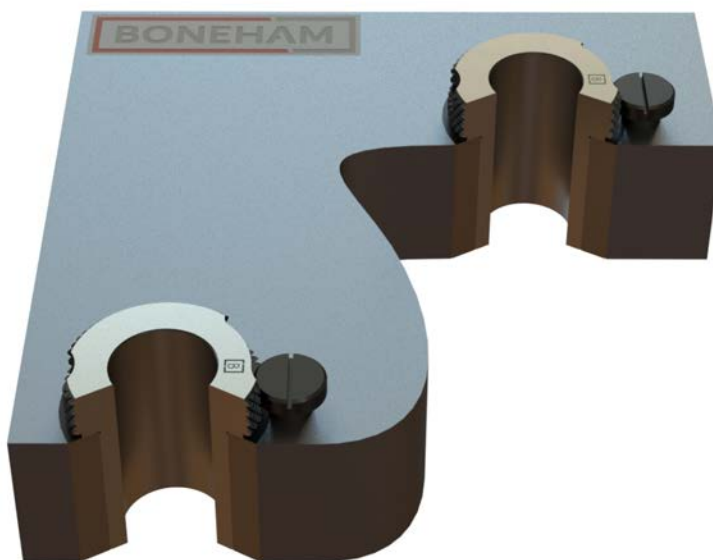
Bore Size A		Outside Diameter B		C: Liner Length and Price Code Number												
				Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"
3/16	0.1879	5/16	0.3141	L-TW	-20-4	-20-5	-20-6	-20-8	-20-10	-20-12						
	0.1876		0.3138	123	126	129	130	134	135							
1/4	0.2504	7/16	0.4392	L-TW	-28-4	-28-5	-28-6	-28-8	-28-10	-28-12						
	0.2501		0.4389	118	119	122	123	126	129							
5/16	0.3129	9/16	0.5642	L-TW	-36-4	-36-5	-36-6	-36-8	-36-10	-36-12	-36-16					
	0.3126		0.5639	123	118	120	120	122	123	126						
3/8	0.3754	5/8	0.6267	L-TW	-40-4	-40-5	-40-6	-40-8	-40-10	-40-12	-40-16					
	0.3751		0.6264	123	118	120	120	122	123	126						
7/16	0.4380	5/8	0.6267	L-TW	-40-4X	-40-5X	-40-6X	-40-8X	-40-10X	-40-12X	-40-16X					
	0.4377		0.6264	123	118	120	120	122	123	126						
9/16	0.5630	7/8	0.8768	L-TW	-56-4	-56-5	-56-6	-56-8	-56-10	-56-12	-56-16					
	0.5627		0.8765	140	138	140	134	135	135	138						
5/8	0.6255	7/8	0.8768	L-TW		-56-5X	-56-6X	-56-8X	-56-10X	-56-12X	-56-16X	-56-20X				
	0.6252		0.8765		138	140	134	135	135	138	144					

Continued on next page

Bore Size A		Outside Diameter B		C: Liner Length and Price Code Number												
				Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"
3/4	0.7506	1	1.0018	L-TW		-64-5	-64-6	-64-8	-64-10	-64-12	-64-16	-64-20				
	0.7503		1.0015			138	140	135	135	135	139	144				
7/8	0.8757	1-1/4	1.2520	L-TW			-80-6	-80-8	-80-10	-80-12	-80-16	-80-20	-80-24			
	0.8754		1.2517			169	169	164	155	169	188	192				
1	1.0007	1-3/8	1.3772	L-TW				-88-8	-88-10	-88-12	-88-16	-88-20	-88-24	-88-28		
	1.0004		1.3768				170	167	155	170	189	193	201			
1-1/8	1.1259	1-1/2	1.5022	L-TW				-96-8	-96-10	-96-12	-96-16	-96-20	-96-24	-96-28		
	1.1255		1.5018				190	190	196	189	196	203	206			
1-1/4	1.2509	1-5/8	1.6272	L-TW					-104-10	-104-12	-104-16	-104-20	-104-24	-104-28	-104-32	
	1.2505		1.6268					190	195	195	195	200	206	217		
1-3/8	1.3760	1-3/4	1.7523	L-TW					-112-10	-112-12	-112-16	-112-20	-112-24	-112-28	-112-32	
	1.3756		1.7519					196	196	189	196	200	206	222		
1-1/2	1.5010	1-7/8	1.8773	L-TW						-120-12	-120-16	-120-20	-120-24	-120-28	-120-32	-120-36
	1.5006		1.8769							195	195	195	200	198	218	225

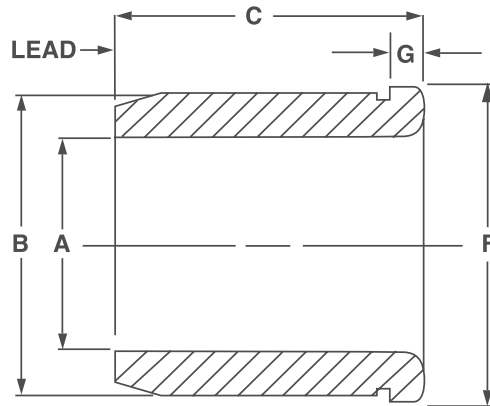
**Boneham Metal Products, Inc. drill bushings are guaranteed against defects in materials or workmanship.
The tolerances of our products are guaranteed to confirm to either ANSI, ISO or catalog standards.**

Bushing in application



Head Liner Drill Bushings

HL Type ANSI Liner Bushings



KEY FEATURES

- / Diameters from 5/16 to 2 1/4
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves SF location
- / OD ground to press fit size

APPLICATION

The 'HL Type' liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear caused by drill bush replacement on the jig plate. The head prevents the liner from slipping out the jig when excess axial force is placed on the workpiece.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, HL-32-22

NOTES

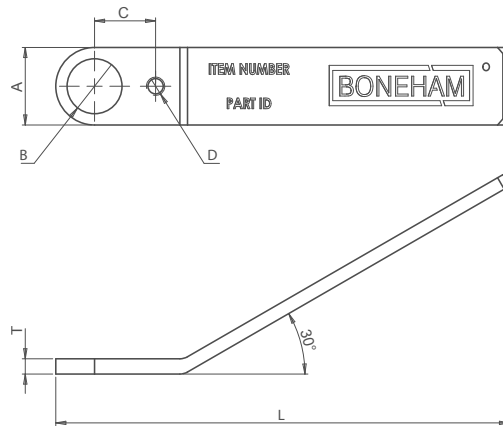
- / For general ordering information and technical data see pages 9-12
- / To order Oversize Bushings; suffix symbol with the letter U. Example: HL-32-22U
- / Price list codes detailed below; please see price list.



Bore Size A		Outside Diameter B		C: Overall and Price Code Number											Head	
				Prefix	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	Dia. F	Thk. G
5/16	0.3129	1/2	0.5017	HL	-32-5	-32-6	-32-8	-32-12	-32-16	-32-22					5/8	3/32
	0.3126		0.5014													
1/2	0.5005	3/4	0.7518	HL	-48-5	-48-6	-48-8	-48-12	-48-16	-48-22	-48-28	-48-34			7/8	3/32
	0.5002		0.7515													
3/4	0.7506	1	1.0018	HL			-64-8	-64-12	-64-16	-64-22	-64-28	-64-34	-64-40	-64-48	1-1/8	1/8
	0.7503		1.0015				149	153	159	164	191	201	217	314		
1	1.0007	1-3/8	1.3772	HL			-88-8	-88-12	-88-16	-88-22	-88-28	-88-34	-88-40	-88-48	1-1/2	1/8
	1.0004		1.3768				180	164	180	190	201	211	225	335		
1-3/8	1.3760	1-3/4	1.7523	HL				-112-12	-112-16	-112-22	-112-28	-112-34	-112-40	-112-48	1-7/8	3/16
	1.3756		1.7519					198	203	210	222	237	291	350		
1-3/4	1.7512	2-1/4	2.2525	HL				-144-12	-144-16	-144-22	-144-28	-144-34	-144-40	-144-48	2-3/8	3/16
	1.7508		2.2521					233	224	234	276	301	320	353		
2-1/4	2.2515	2-3/4	2.7526	HL				-176-12	-176-16	-176-22	-176-28	-176-34	-176-40	-176-48	2-7/8	3/16
	2.2510		2.7522					299	268	301	316	330	338	359		

Handle Bushing

Spoon Handle Drill Bushing



KEY FEATURES

- / Red Anodised Aluminium
- / Etched Part Code
- / Etched ID Range
- / Special Lock Screw Included

APPLICATION

Boneham Handle Bushings are designed to provide an accurate drilling tool without the need for a rigid fixture. Handle bushings are lightweight, ergonomic and able to provide precise drilling in hard to reach applications.

For applications in fixtures where multi drilling or reaming operations are required, liner bushings can be placed in a complex

fixture and each handle can be equipped with a pilot and multi sizes of RD, RPS, SF and SFM bushings using standard renewable bushings and lock-screw assembly. Handle bushings are a must have solution for controlled environments. Kits of bushings can be associated with one handle to reduce error and prevent loss.

Boneham Handle Bushings use renewable SF and SFM bushings to reduce tooling costs across a wide range of tooling, including conventional jigs, handles and egg cup style fixtures.

ORDERING INSTRUCTIONS

When ordering identify the OD size required based on the standard drill range.

Ordering example:

- / Handle Only: To Suit 10mm OD bushing would be HBM-10
- / With Drill Bushing: To Suit 10mm OD bushing with 6mm bore would be HBM-10 - RD10H 6mm



INCH

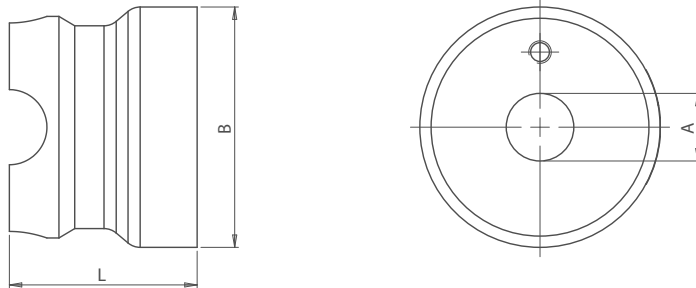
Part No.	B	A	L	T	ANSI Bushing	Lock screw
HB-12-SL	3/16	5/8"	4.75"	0.1968"	SF-12	HBLS0
HB-12	3/16	1"	4.75"	0.1968"	SF-12	HBLS0
HB-20-SL	5/16	5/8"	4.75"	0.1968"	SF-20	HBLS1
HB-20	5/16	1"	4.75"	0.1968"	SF-20	HBLS1
HB-32	1/2	1"	4.75"	0.1968"	SF-32	HBLS1
HB-48	3/4	1"	4.75"	0.1968"	SF-48	HBLS1

METRIC

Part No.	B	A	L	T	ANSI Bushing	Lock screw
HBM-8-SL	8mm	16mm	4.75"	5mm	SFM-8	HBMS5
HBM-8	8mm	25mm	4.75"	5mm	SFM-8	HBMS5
HBM-10-SL	10mm	16mm	4.75"	5mm	SFM-10	HBMS5
HBM-10	10mm	25mm	4.75"	5mm	SFM-10	HBMS5
HBM-12	12mm	25mm	4.75"	5mm	SFM-12	HBMS6
HBM-15	15mm	25mm	4.75"	5mm	SFM-15	HBMS6
HBM-18	18mm	25mm	4.75"	5mm	SFM-18	HBMS6

Egg Cup Bushing

Right Angle Drill Bushing Fixture



KEY FEATURES

- / Ideal for drilling sheet metal
- / Red Anodised Aluminium
- / For Standard Renewable Bushings
- / Etched Part Code
- / Etched Size Range

APPLICATION

Boneham "Egg Cup" style drill bushing fixtures are designed to provide an accurate and portable drilling fixture. This drilling solution is ideal for sheet metal applications including piloting, drilling and reaming for rivets. Interchangeable with traditional Boneham

drill bushings and lock screws. No need for a separate range of drill bushings or liners.

ORDERING INSTRUCTIONS

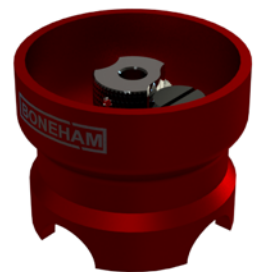
When ordering identify the OD size required based on the standard drill range.

For example:

- / 1/4" drilled hole: SF-32-16 .2500 bushing required and an Egg Cup part of ECB-500

NOTES

- / Nylon version available
- / Specials Manufactured by BONEHAM



INCH

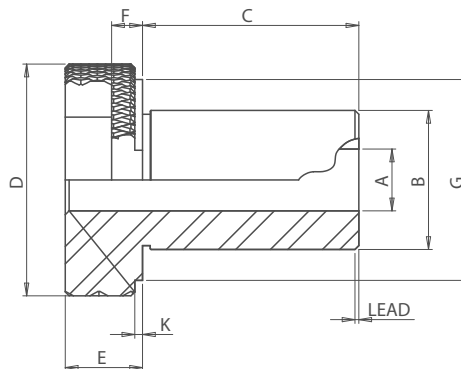
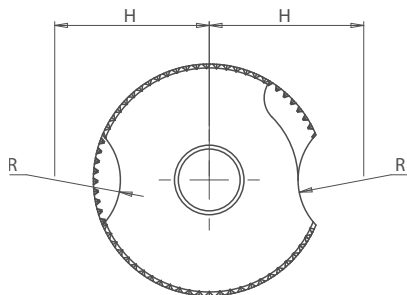
Part Code	Fixture ID (A)	To Suit Bushing ID Range	Diameter (B)	Height (L)
ECB-500	0.500"	5/32" - 11/32"	64mm	50mm

METRIC

Part Code	Fixture ID (A)	To Suit Bushing ID Range	Diameter (B)	Height (L)
ECB-8	8mm	1mm - 4mm	64mm	50mm
ECB-10	10mm	3.7mm - 6mm	64mm	50mm
ECB-12	12mm	5.7mm - 8mm	64mm	50mm
ECB-15	15mm	7.7mm - 10mm	64mm	50mm
ECB-18	18mm	9.6mm - 12mm	64mm	50mm

Pilot Bushing

Drill Bushings for Pilot Holes



KEY FEATURES

- / Standard OD Sizes
- / Special Pilot Hole Bores
- / Can be used with Handles, Egg Cups and with Liners

APPLICATION

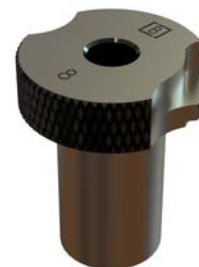
Boneham Pilot Bushings are designed for guiding drills for pilot holes in drilling and reaming operations. They are traditionally used with liner bushings in a fixture, but they can also be used with handle bushings and egg cup stands. Standard OD's.

ORDERING INSTRUCTIONS

When ordering: Identify the OD of the bushing required. The OD will either suit the liner or the hand held fixture used in the application. For example: 12mm ID Liner Choose SFM122035

NOTES

Specials Manufactured by BONEHAM



INCH

Part Code	ID (A) F7	OD (B) h5	Length	D	E	H	F
SF321218	1/8"	1/2"	3/4"	51/64"	1/4"	5/8"	1/8"
SF4828516	5/16"	3/4"	1+3/4"	1-3/64"	1/4"	3/4"	1/8"

METRIC

Part Code	ID (A) F7	OD (B) h5	Length	D	E	H	F
SFM122035	3.5mm	12mm	20	22	8	16	4
SFM122045	4.5mm	12mm	20	22	8	16	4
SFM152865	6.5mm	15mm	28	26	8	18	4
SFM182880	8mm	18mm	28	30	8	20	4

Ordering Information

ISO/BMP Metric Bushings

Please supply the following information:

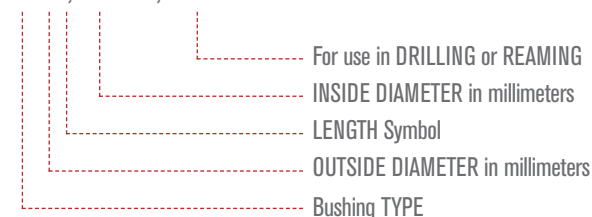
- / Bushing TYPE
- / OUTSIDE DIAMETER
- / Bushing LENGTH
- / INSIDE DIAMETER
- / Whether for a DRILL or REAMER

The bushings in this section of the catalog are defined by the ISO Symbol System. This system is applied as follows:

Example Number 1:

A Headless Press Fit bushing with a 10mm OD., a length of 16mm, a bore of 6mm, and to be used for drilling, would be described as:

PP10F, 6.00mm, DRILL



Bushing Type Designation

Bushing Type	ISO Letter Designation
Headless Press Fit	PP
Head Press Fit	PH
Slip-Fixed Renewable	RD
Headless Liner	LP
Head Type Liner	LH

Length Symbols

The ISO Length Designation System incorporates the use of "Letters" for specific standard bushing lengths. Each Boneham Metric drill bushing has three standard lengths as indicated in the identification charts. Standard ISO length symbols/lengths are as follows:

Length	Symbol	Length	Symbol	Length	Symbol
6mm	A	25mm	J	56mm	S
8mm	B	28mm	K	67mm	T
9mm	C	30mm	L	78mm	W
10mm	D	35mm	M	89mm	X
12mm	E	36mm	N	105mm	Y
16mm	F	40mm	P	112mm	Z
20mm	H	45mm	R		

The LENGTH of a Metric Drill Bushing is considered to be overall for headless press fit, all liner bushings, and head press fit, and the "under head" length for all renewable bushings.

Standard Increment Bore Sizes

Metric Drill Bushings are manufactured with standard incremental bore sizes. The following chart outlines these standard increments:

Bore Size Range	Bore Size Increments
From 1.0mm to 3mm	0.05mm
Over 3mm to 14mm	0.1mm, and all 0.25mm and 0.75mm bore sizes
Over 14mm to 33mm	0.25mm
Over 33mm to 51mm	0.5mm
Over 51mm to 100mm	1.0mm

Any bore size that does not fall within the above standard range listings will be considered to be special. Our Sales Service Representatives will be glad to supply you with the appropriate pricing for all specials.

Metric Drill Bushings with bore sizes above 48mm are not stock items, and will be manufactured against customer's order.

Prices

Each ISO/Boneham style bushing has a "Bushing Reference" number. These reference numbers are located in the identification charts on the following pages.

Please note that all prices may be subject to change without prior notice.

Special Bushings

When required dimensions vary from the standard catalog listings of ID., O.D., Length, or Tolerance, the bushings are considered to be "specials". Many specials can be made from standard cataloged items by minor alterations. Others can be manufactured from standard bushing blanks. Some items are so completely different they must be custom made. Boneham is ready to manufacture all Metric specials required - from the minor alteration to the complete from "scratch" special. Please forward your specifications, whether verbal, by sketch, or blueprint, along with your material requirements, to our Sales Service Representatives for expeditious review and quotation.

As always, please use our TOLL FREE TELEPHONE or FAX numbers:

800 Telephone: 1-800-631-7852

800 Fax: 1-800-526-9494

Technical Information

ISO/BMP Metric Bushings



Metric Bushing Materials

- 1 Boneham Metric Drill Bushings are manufactured from steel which demonstrates excellent wear resistance and dimensional stability characteristics. This material is hardened to Rc 62-64.
- 2 All Boneham Metric Drill Bushings (1.6mm bore and over), are offered in our Premium alloy NITRALLOY. Boneham NITRALLOY Nitrided Drill Bushings are case “hardened” to a case depth of .013” to Rc 67-69 equivalent. Hardness must be checked by using the 15Kg. Superficial Rockwell Scale. NITRALLOY Nitrided drill bushings demonstrate superior wear resistance and dimensional stability characteristics. Our Sales Service Representatives will be glad to provide you with a quotation on those Metric Drill Bushings required in NITRALLOY. More information on page 8.

Bushing Body Characteristics

Entrance End

The entrance end of each ISO/Boneham Metric Drill Bushing has an internal chamfer. This “angle”, which is closely matched to the angle of a drill point, permits easier tool entry and assistance in guiding the drill in cases of minor drill/drill bushing misalignment.

Chamfers/Leads

All Metric Press Fit Bushings and Liners ground to Press Fit tolerances are supplied with a chamfer and ground concentric lead on the O.D. of the exit end. This chamfer/lead combination provides assistance by “starting” the bushing into the hole, resulting in easier insertion.

Bushing Bore Tolerances

Bore limits for ISO/Boneham Standard Drill Bushings for DRILLS and REAMERS.

ISO Bore Tolerances (mm)					
Normal Bore Sizes (mm)		Limits for Bores of Drill Bushings (F7 Hole)		Limits for Bores of Reamer Bushings	
Over	Up to	High+	Low+	High+	Low+
-	3	.016	.006	.018	.011
3	6	.022	.010	.023	.015
6	10	.028	.013	.027	.018
10	18	.034	.016	.031	.021
18	30	.041	.020	.038	.025
30	50	.050	.025	.046	.030
50	80	.060	.030	-	-
80	120	.071	.036	-	-

Bushing O.D. Tolerances

O.D. limits for ISO/Boneham Standard Drill Bushings for Press Fit Bushings and Liners, and Renewable Bushings.

ISO Bore Tolerances (mm)					
Normal Bore Sizes (mm)		Limits for Bores of Drill Bushings (F7 Hole)		Limits for Bores of Reamer Bushings	
Over	Up to	High+	Low+	High+	Low+
-	3	.010	.004	.008	.002
3	6	.016	0.08	.012	.004
6	10	.019	0.10	.015	.006
10	18	.023	.012	.018	.007
18	30	.028	.015	.021	.008
30	50	.033	.017	.025	.009
50	80	.039	.020	.030	.011
80	120	.045	.023	.035	.013

Concentricity Tolerances

For ISO/Boneham Standard Drill Bushings	
Bores up to 16mm	0.008mm T.I.R max
Over 16mm to 48mm	0.012mm T.I.R max
Over 48mm	0.04mm T.I.R max

Counterbores

All of the standard Boneham metric drill bushings listed in this catalog are manufactured without counterbores. Our Sales Service Representatives will be glad to provide you with a quotation should you require metric drill bushings that are counterbored. Please note that if counterbored bushings are required, the concentricity tolerances outlined above apply to the exit end of the bushing.

Locking Screw Thread Tolerances

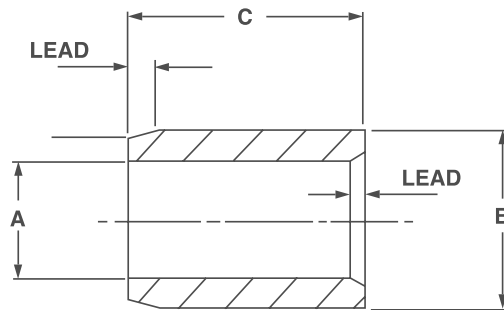
The screw threads on all Metric locking screws are manufactured to class 6g tolerances.

Metric Conversion Factors

Multiply	By	To Obtain
inch	25.4	millimeter
millimeter	0.03937008	inch

Headless Press Fit Drill Bushings

ISO 4247 / DIN 179A Headless Metric Drill Bushing



BONEHAM

KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / F7 drill limits

APPLICATION

The 'PP Type' of drill bushing is to European and UK standards. They are normally used

in jigs where an economically priced drill bushing is required, or where less space is available on the jig plate. Headless press fit bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation. Headless drill bushings have less resistance than the headed type when subjected to large axial loads.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, PP15E 10MM

NOTES

- / For general ordering information and technical data see pages 44-45
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



F7 Limits (Drills)		B Dia. n6 Limits	Length C and Bushing Reference					
A Dia * Limits (Reamers)			Short		Long		Extra Long	
From	Up to		C	Ref.	C	Ref.	C	Ref.
—	1	3	6	PP3A	9	PP3C	—	—
1.05	1.8	4	6	PP4A	9	PP4C	—	—
1.85	2.6	5	6	PP5A	9	PP5C	—	—
2.65	3.3	6	8	PP6B	12	PP6E	16	PP6F
3.4	4	7	8	PP7B	12	PP7E	16	PP7F
4.1	5	8	8	PP8B	12	PP8E	16	PP8F
5.1	6	10	10	PP10D	16	PP10F	20	PP10H
6.1	8	12	10	PP12D	16	PP12F	20	PP12H
8.1	10	15	12	PP15E	20	PP15H	25	PP15J
10.1	12	18	12	PP18E	20	PP18H	25	PP18J
12.1	15	22	16	PP22F	28	PP22K	36	PP22N
15.25	18	26	16	PP26F	28	PP26K	36	PP26N
18.25	22	30	20	PP30H	36	PP30N	45	PP30R
22.25	26	35	20	PP35H	36	PP35N	45	PP35R
26.25	30	42	25	PP42J	45	PP42R	56	PP42S
30.25	35	48	25	PP48J	45	PP48R	56	PP48S
35.50	42	55	30	PP55L	56	PP55S	67	PP55T
42.50	48	62	30	PP62L	56	PP62S	67	PP62T
48.50	55	70	30	PP70L	56	PP70S	67	PP70T
56	63	78	35	PP78M	67	PP78T	78	PP78W
64	70	85	35	PP85M	67	PP85T	78	PP85W
71	78	95	40	PP95P	78	PP95W	105	PP95Y
79	85	105	40	PP105P	78	PP105W	105	PP105Y
86	95	115	45	PP115R	89	PP115X	112	PP115Z
96	105	125	45	PP125R	89	PP125X	112	PP125Z

ALL DIMENSIONS IN MILLIMETERS

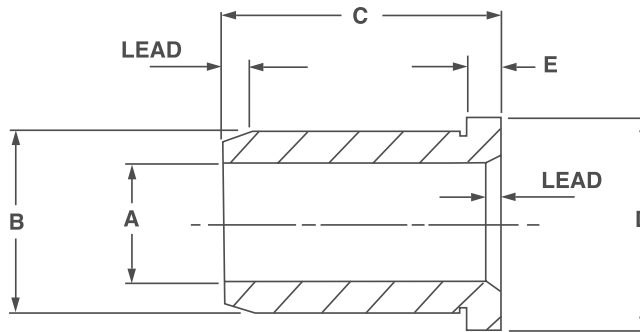
*See page 18 for table showing ISO Bore Tolerances of reamer bushings

Boneham Metal Products, Inc. strives to provide drill bushings that will maintain a service life consistent with their intended use, and we are always working to deliver our products in the most expeditious time frame possible.

Head Press Fit Drill Bushings



ISO 4247 / DIN 172A Head Metric Drill Bushing



KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / F7 drill limits

is similar to the PP Type but features a head to allow greater axial force, so not to slip out the plate, and aids where it is desired, to feed down to a dead stop. The head of the bushing also allows it to be pressed into the plate easier and can be left either exposed above the plate surface or counterbored to sit flush.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: 6, PH15E 10MM

NOTES

- / For general ordering information and technical data see pages 44-45
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



APPLICATION

The 'PH Type' of drill bushing is to European and UK standards. This headed drill bushing

F7 Limits (Drills) A Dia * Limits (Reamers)		B Dia. n6 Limits	Length C and Bushing Reference						D Dia.	E Length
From	Up to		Short		Long		Extra Long			
			C=OAL	Ref.	C=OAL	Ref.	C=OAL	Ref.		
-	1	3	6	PH3A	9	PH3C	-	-	6	2
1.05	1.8	4	6	PH4A	9	PH4C	-	-	7	
1.85	2.6	5	6	PH5A	9	PH5C	-	-	8	
2.65	3.3	6	8	PH6B	12	PH6E	16	PH6F	9	2.5
3.4	4	7	8	PH7B	12	PH7E	16	PH7F	10	
4.1	5	8	8	PH8B	12	PH8E	16	PH8F	11	
5.1	6	10	10	PH10D	16	PH10F	20	PH10H	13	3
6.1	8	12	10	PH12D	16	PH12F	20	PH12H	15	
8.1	10	15	12	PH15E	20	PH15H	25	PH15J	18	
10.1	12	18	12	PH18E	20	PH18H	25	PH18J	22	4
12.1	15	22	16	PH22F	28	PH22K	36	PH22N	26	
15.25	18	26	16	PH26F	28	PH26K	36	PH26N	30	
18.25	22	30	20	PH30H	36	PH30N	45	PH30R	34	5
22.25	26	35	20	PH35H	36	PH35N	45	PH35R	39	
26.25	30	42	25	PH42J	45	PH42R	56	PH42S	46	
30.25	35	48	25	PH48J	45	PH48R	56	PH48S	52	6
35.50	42	55	30	PH55L	56	PH55S	67	PH55T	59	
42.50	48	62	30	PH62L	56	PH62S	67	PH62T	66	
48.50	55	70	30	PH70L	56	PH70S	67	PH70T	74	6
56	63	78	35	PH78M	67	PH78T	78	PH78W	82	
64	70	85	35	PH85M	67	PH85T	78	PH85W	90	
71	78	95	40	PH95P	78	PH95W	105	PH95Y	100	
79	85	105	40	PH105P	78	PH105W	105	PH105Y	110	
86	95	115	45	PH115R	89	PH115X	112	PH115Z	120	
96	105	125	45	PH125R	89	PH125X	112	PH125Z	130	

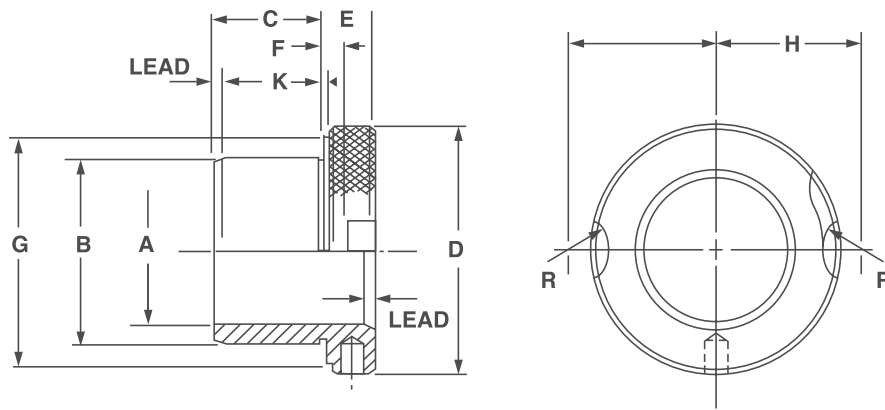
ALL DIMENSIONS IN MILLIMETERS

*See page 18 for table showing ISO Bore Tolerances of reamer bushings

Boneham Metal Products, Inc. is committed to supplying drill bushings that meet or exceed the tolerance specifications established by our Customer, the American National Standards Institute (ANSI), and the International Standards Organisation (ISO).

Slip-Fixed Renewable Combination Drill Bushings

ISO 4247 Renewable Bushings



BONEHAM

KEY FEATURES

- / Diameters from 1.50mm to 85mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size
- / F7 drill limits
- / Fixed lock screw mount
- / Slip locking recess

APPLICATION

The 'RD Type' drill bushing is to UK standards and features a 'combination' feature. These

two features are incorporated on one bushing, which is used in conjunction with a liner bushing, and is held in place by a lock screw, tenon or stop pin. The bushing is a slide fit in its corresponding liner. The removable fixed feature of the bushing is normally used in high production work where the bushing can be easily and quickly replaced with a minimum loss in production. The removable slip feature of the bushing is used when more than one operation is carried out; the bushing is instantly removable after each operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, RD15F 10MM

NOTES

- / For general ordering information and technical data see pages 44-45
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



F7 Limits (Drills)		B Dia. n6 Limits	Length C and Bushing Reference						D Dia.	D Dia. +0 -0.25	E Length	F Thickness	K Length	H	R Rad.								
A Dia * Limits (Reamers)			Short		Long		Extra Long																
From	Up to		C	Ref.	C	Ref.	C	Ref.															
1.0	4	8	10	RD8D	16	RD8F	-	-	15	12	8	3	1	11.5	7								
3.7	6	10	12	RD10E	20	RD10H	25	RD10J	18	15				13									
5.7	8	12	12	RD12E	20	RD12H	25	RD12J	22	18				16									
7.7	10	15	16	RD15F	28	RD15K	36	RD15N	26	22	10	4		18	8.5								
9.6	12	18	16	RD18F	28	RD18K	36	RD18N	30	26				20									
11.5	15	22	20	RD22H	36	RD22N	45	RD22R	34	30			23.5	10.5									
14.5	18	26	20	RD26H	36	RD26N	45	RD26R	39	35	26												
17.5	22	30	25	RD30J	45	RD30R	56	RD30S	46	42	12	5.5	29.5										
21.5	26	35	25	RD35J	45	RD35R	56	RD35S	52	46			1.5		32.5								
25.5	30	42	30	RD42L	56	RD42S	67	RD42T	59	53					36								
29	35	48	30	RD48L	56	RD48S	67	RD48T	66	60	16	7		2	41	12.5							
34	42	55	30	RD55L	56	RD55S	67	RD55T	74	68			45										
41	48	62	35	RD62M	67	RD62T	78	RD62W	82	76			49										
47	55	70	35	RD70M	67	RD70T	78	RD70W	90	84			53										
53	63	78	40	RD78P	78	RD78W	105	RD78Y	100	94			58										
61	70	85	40	RD85P	78	RD85W	105	RD85Y	110	104	63	76	85	105	45	RD105R	89	RD105X	112	RD105Z	130	124	73
68	78	95	45	RD95R	89	RD95X	112	RD95Z	120	114	68												
76	85	105	45	RD105R	89	RD105X	112	RD105Z	130	124	73												

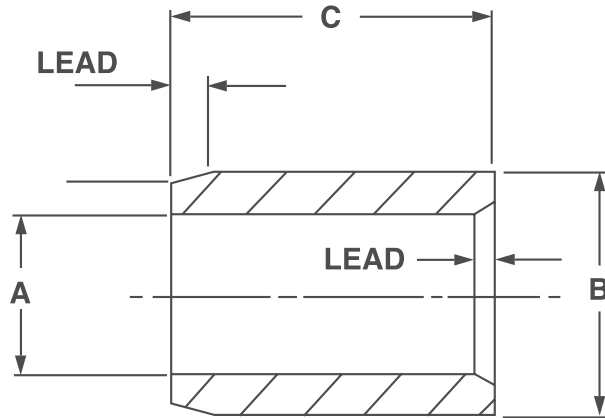
ALL DIMENSIONS IN MILLIMETERS

*See page 20 for table showing ISO Bore Tolerances of reamer bushings

Boneham Metal Products, Inc. solicits and welcomes any recommendations which will enable us to provide a continuous level of improved service. Our Sales Service Representatives are available to provide you with assistance. It is our pleasure to serve you.

Headless Liner Drill Bushings

ISO 4247 Headless Metric Liner



KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'LP Type' of drill bushing is to European and UK standards. This liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing

whilst eradicating wear caused by drill bush replacement on the jig plate.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, LP22F

NOTES

- / For general ordering information and technical data see pages 44-45
- / Price list codes detailed below; please see price list.

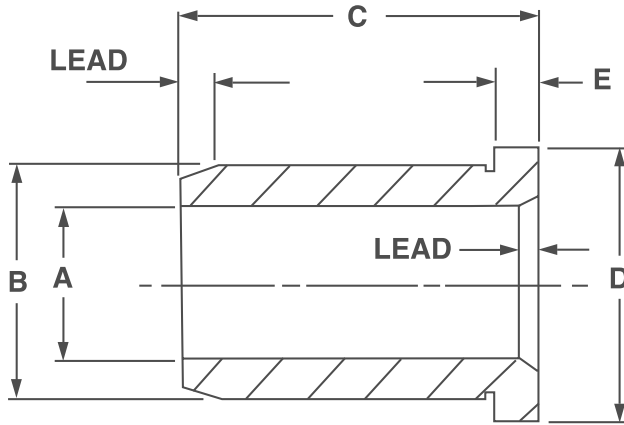


A Dia. F7 Limits	B Dia. n6 Limits	Length C and Bushing Reference					
		Short		Long		Extra Long	
		C	Ref.	C	Ref.	C	Ref.
8	12	10	LP12D	16	LP12F	-	-
10	15	12	LP15E	20	LP15H	25	LP15J
12	18	12	LP18E	20	LP18H	25	LP18J
15	22	16	LP22F	28	LP22K	36	LP22N
18	26	16	LP26F	28	LP26K	36	LP26N
22	30	20	LP30H	36	LP30N	45	LP30R
26	35	20	LP35H	36	LP35N	45	LP35R
30	42	25	LP42J	45	LP42R	56	LP42S
35	48	25	LP48J	45	LP48R	56	LP48S
42	55	30	LP55L	56	LP55S	67	LP55T
48	62	30	LP62L	56	LP62S	67	LP62T
55	70	30	LP70L	56	LP70S	67	LP70T
62	78	35	LP78M	67	LP78T	78	LP78W
70	85	35	LP85M	67	LP85T	78	LP85W
78	95	40	LP95P	78	LP95W	105	LP95Y
85	105	40	LP105P	78	LP105W	105	LP105Y
95	115	45	LP115R	89	LP115X	112	LP115Z
105	125	45	LP125R	89	LP125X	112	LP125Z

ALL DIMENSIONS IN MILLIMETERS

Head Liner Drill Bushings

ISO 4247 Head Metric Liner



KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'LH Type' of drill bushing is to European and UK standards. This liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear

caused by drill bush replacement on the jig plate. The head prevents the liner from slipping out the jig when excess axial force is placed on the workpiece.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, LH22F

NOTES

- / For general ordering information and technical data see pages 44-45
- / Price list codes detailed below; please see price list.



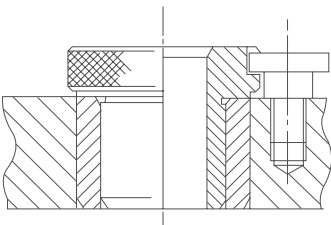
A Dia. F7 Limits	B Dia. n6 Limits	Length C and Bushing Reference						D Dia.	E Length
		Short		Long		Extra Long			
		C	Ref.	C	Ref.	C	Ref.		
8	12	10	LH12D	16	LH12F	-	-	15	3
10	15	12	LH15E	20	LH15H	25	LH15J	18	
12	18	12	LH18E	20	LH18H	25	LH18J	22	
15	22	16	LH22F	28	LH22K	36	LH22N	26	4
18	26	16	LH26F	28	LH26K	36	LH26N	30	
22	30	20	LH30H	36	LH30N	45	LH30R	34	
26	35	20	LH35H	36	LH35N	45	LH35R	39	5
30	42	25	LH42J	45	LH42R	56	LH42S	46	
35	48	25	LH48J	45	LH48R	56	LH48S	52	
42	55	30	LH55L	56	LH55S	67	LH55T	59	6
48	62	30	LH62L	56	LH62S	67	LH62T	66	
55	70	30	LH70L	56	LH70S	67	LH70T	74	
62	78	35	LH78M	67	LH78T	78	LH78W	82	
70	85	35	LH85M	67	LH85T	78	LH85W	90	
78	95	40	LH95P	78	LH95W	105	LH95Y	100	
85	105	40	LH105P	78	LH105W	105	LH105Y	110	
95	115	45	LH115R	89	LH115X	112	LH115Z	120	
105	125	45	LH125R	89	LH125X	112	LH125Z	130	

ALL DIMENSIONS IN MILLIMETERS

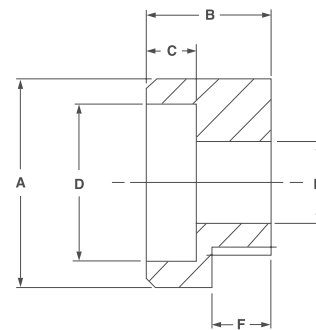
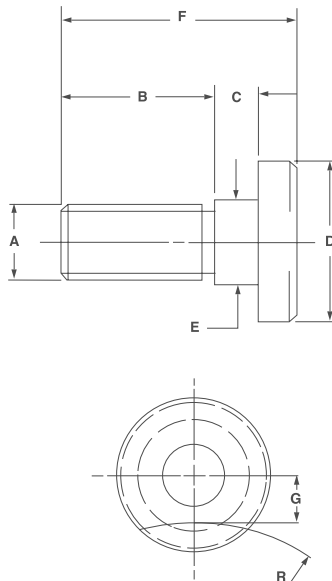
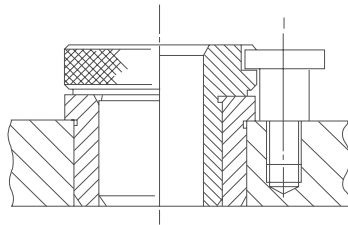
Lock Screws and Round Clamps

ISO and BMP Standard

BUSHING MOUNTED IN HEADLESS LINER



BUSHING MOUNTED IN HEAD TYPE LINER



Lock Screws

When Bushing is mounted in Headless Liner.

For use with Bushings	F	C	B	D	E	A	Screw Ref.
RD8 - RD10	15	3	9	13	7.5	M5	MS5
RD12 - RD18	18	4	10	16	9.5	M6	MS6
RD22 - RD42	22	5.5	11.5	20	12.0	M8	MS8
RD48 - RD105	32	7	18.5	24	15.0	M10	MS10

When Bushing is mounted in Head Type Liner.

For use with Bushings	F	C	B	D	E	A	Screw Ref.
RD8 - RD10	18	6	9	13	7.5	M5	LMS5
RD12 - RD18	22	8	10	16	9.5	M6	LMS6
RD22 - RD42	27	10.5	11.5	20	12.0	M8	LMS8
RD48 - RD105	38	13	18.5	24	15.0	M10	LMS10

Round Clamps

When Bushing is mounted in Headless Liner.

For use with Bushings	B	F	C	A	D	E	R	G	Size of Fixing Screw	Clamp Ref.
RD8 - RD10	8	3	4	13	10	5.1	9.5	3.7	M5	DMS5
RD12 - RD18	10	4	5	16	12	6.1	15	4.7	M6	DMS6
RD22 - RD42	12	5.5	5	20	15	8.1	30	6.2	M8	DMS8
RD48 - RD105	16	7	7	24	18	10.1	80	7.5	M10	DMS10

When bushing is mounted in Head Type Liner.

For use with Bushings	B	F	C	A	D	E	R	G	Size of Fixing Screw	Clamp Ref.
RD8 - RD10	11	6	4	13	10	5.1	9.5	3.7	M5	DLMS5
RD12 - RD18	14	8	5	16	12	6.1	15	4.7	M6	DLMS6
RD22 - RD42	17	10.5	5	20	15	8.1	30	6.2	M8	DLMS8
RD48 - RD105	22	13	7	24	18	10.1	80	7.5	M10	DLMS10

ALL DIMENSIONS IN MILLIMETERS

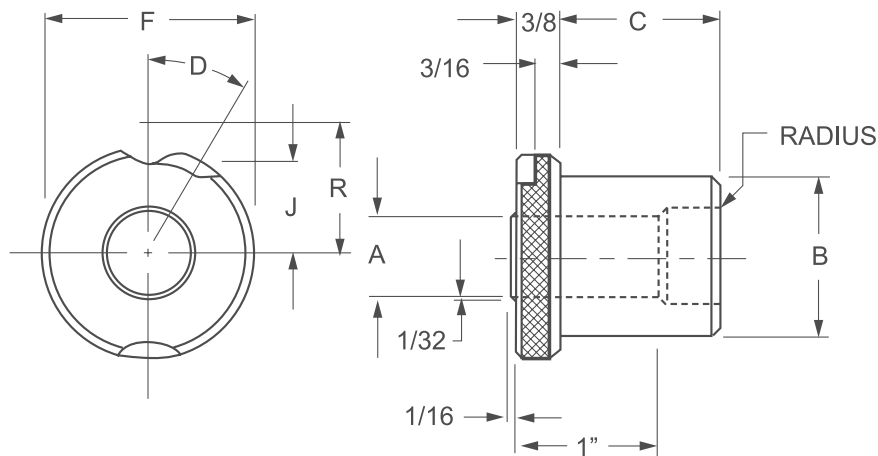
Standard Drill Sizes and Decimal Equivalents

Millimeter sizes designated by ■ available as standard

Decimal	English	mm	Decimal	English	mm	Decimal	English	mm	Decimal	English	mm	Decimal	English	mm	Decimal	English	mm	Decimal	English	mm	Decimal	English	mm
0.0135	80		0.0846		2.15	0.1595	■	4.05	0.2598	■	6.60	0.3860	W		0.6299		16.00	1.0156	1-1/64		1.4075		35.75
0.0145	79		0.0860	44		0.1610	20		0.2610	G		0.3898		9.90	0.6398		16.25	1.0236		26.00	1.4173		36.00
0.0156	1/64		0.0866		2.20	0.1614	■	4.10	0.2638	■	6.70	0.3906	25/64		0.6406	41/64		1.0312	1-1/32		1.4219	1-27/64	
0.0160	78		0.0886		2.25	0.1654		4.20	0.2656	17/64		0.3937	■	10.00	0.6496		16.50	1.0335		26.25	1.4272		36.25
0.0180	77		0.0890	43		0.1660	19		0.2657	■	6.75	0.3970	X		0.6562	21/32		1.0433		26.50	1.4370		36.50
0.0200	76		0.0906	■	2.30	0.1673	■	4.25	0.2660	H		0.3976	■	10.10	0.6594		16.75	1.0469	1-3/64		1.4375	1-7/16	
0.0210	75		0.0925	■	2.35	0.1693	■	4.30	0.2677	■	6.80	0.4016		10.20	0.6693		17.00	1.0531		26.75	1.4469		36.75
0.0225	74		0.0935	42		0.1695	18		0.2717		6.90	0.4035		10.25	0.6719	43/64		1.0625	1-1/16		1.4531	1-29/64	
0.0240	73		0.0937	3/32		0.1719	11/64		0.2720	I		0.4040	Y		0.6791		17.25	1.0630		27.00	1.4567		37.00
0.0250	72		0.0945	■	2.40	0.1730	17		0.2756		7.00	0.4055	■	10.30	0.6875	11/16		1.0728		27.25	1.4665		37.25
0.0260	71		0.0960	41		0.1732	■	4.40	0.2770	J		0.4062	13/32		0.6890		17.50	1.0781	1-5/64		1.4687	1-15/32	
0.0280	70		0.0965	■	2.45	0.1752	■	4.45	0.2795	■	7.10	0.4094	■	10.40	0.6988		17.75	1.0827		27.50	1.4764		37.50
0.0292	69		0.0980	40		0.1770	16		0.2810	K		0.4130	Z		0.7031	45/64		1.0925		27.75	1.4844	1-31/64	
0.0310	68		0.0984	■	2.50	0.1772	■	4.50	0.2812	9/32		0.4134	■	10.50	0.7087		18.00	1.0937	1-3/32		1.4862		37.75
0.0312	1/32		0.0995	39		0.1791	■	4.55	0.2835	■	7.20	0.4219	27/64		0.7185		18.25	1.1024		28.00	1.4961		38.00
0.0320	67		0.1004	■	2.55	0.1800	15		0.2854		7.25	0.4232		10.75	0.7187	23/32		1.1094	1-7/64		1.5000	1-1/2	
0.0330	66		0.1015	38		0.1811	■	4.60	0.2874		7.30	0.4252		10.80	0.7284		18.50	1.1122		28.25	1.5059		38.25
0.0350	65		0.1024	■	2.60	0.1820	14		0.2900	L		0.4291		10.90	0.7344	47/64		1.1220		28.50	1.5156	1-33/64	
0.0360	64		0.1040	37		0.1831	■	4.65	0.2913	■	7.40	0.4331		11.00	0.7382		18.75	1.1250	1-1/8		1.5158		38.50
0.0370	63		0.1043	■	2.65	0.1850	13	4.70	0.2950	M		0.4370		11.10	0.7480		19.00	1.1319		28.75	1.5256		38.75
0.0380	62		0.1063	■	2.70	0.1870	■	4.75	0.2953	■	7.50	0.4375	7/16		0.7500	3/4		1.1406	1-9/64		1.5312	1-17/32	
0.0390	61		0.1065	36		0.1875	3/16		0.2969	19/64		0.4409		11.20	0.7579		19.25	1.1417		29.00	1.5454		39.00
0.0394		1.00	0.1083	■	2.75	0.1890	12	4.80	0.2992	■	7.60	0.4429		11.25	0.7656	49/64		1.1516		29.25	1.5453		39.25
0.0400	60		0.1094	7/64		0.1910	11		0.3020	■		0.4488		11.40	0.7677		19.50	1.1562	1-5/32		1.5469	1-35/64	
0.0410	59		0.1100	35		0.1929	■	4.90	0.3032	■	7.70	0.4528		11.50	0.7776		19.75	1.1614		29.50	1.5551		39.50
0.0413		1.05	0.1102	■	2.80	0.1935	10		0.3051	■	7.75	0.4531	29/64		0.7812	25/32		1.1713		29.75	1.5625	1-9/16	
0.0420	58		0.1110	34		0.1949	■	4.95	0.3071		7.80	0.4567		11.60	0.7874		20.00	1.1719	1-11/64		1.5650		39.75
0.0430	57		0.1122	■	2.85	0.1960	9		0.3110		7.90	0.4606		11.70	0.7969	51/64		1.1811		30.00	1.5748		40.00
0.0433		1.10	0.1130	33		0.1968	■	5.00	0.3125	5/16		0.4626		11.75	0.7972		20.25	1.1875	1-3/16		1.5781	1-37/64	
0.0453		1.15	0.1142	■	2.90	0.1990	8		0.3150	■	8.00	0.4646		11.80	0.8071		20.50	1.1910		30.25	1.5846		40.25
0.0465	56		0.1160	32		0.2008	■	5.10	0.3160	O		0.4687	15/32		0.8125	13/16		1.2008		30.50	1.5937	1-19/32	
0.0469	3/64		0.1161	■	2.95	0.2010	7		0.3189	■	8.10	0.4724		12.00	0.8169		20.75	1.2031	1-13/64		1.5945		40.50
0.0472		1.20	0.1181	■	3.00	0.2031	13/64		0.3228		8.20	0.4764		12.10	0.8268		21.00	1.2107		30.75	1.6043		40.75
0.0492		1.25	0.1200	31		0.2040	6		0.3230	P		0.4803		12.20	0.8281	53/64		1.2187	1-7/32		1.6094	1-39/64	
0.0512		1.30	0.1220	■	3.10	0.2047	■	5.20	0.3248	■	8.25	0.4823		12.25	0.8366		21.25	1.2205		31.00	1.6142		44.00
0.0520	55		0.1250	1/8		0.2055	5		0.3268		8.30	0.4842		12.30	0.8437	27/32		1.2304		31.25	1.6240		42.25
0.0532		1.35	0.1260	■	3.20	0.2067	■	5.25	0.3281	21/64		0.4844	31/64		0.8465		21.50	1.2344	1-15/64		1.6250	1-5/8	
0.0550	54		0.1280	■	3.25	0.2087	■	5.30	0.3307	■	8.40	0.4882		12.40	0.8563		21.75	1.2402		31.50	1.6339		41.50
0.0551		1.40	0.1285	30		0.2090	4		0.3320	Q		0.4921		12.50	0.8594	55/64		1.2500	1-1/4	31.75	1.6406	1-41/64	
0.0571		1.45	0.1299	■	3.30	0.2126		5.40	0.3346	■	8.50	0.4961		12.60	0.8661		22.00	1.2598		32.00	1.6437		41.75
0.0591		1.50	0.1339		3.40	0.2130	3		0.3386		8.60	0.5000	1/2		0.8750	7/8		1.2656	1-17/64		1.6535		42.00
0.0595	53		0.1358		3.45	0.2165	■	5.50	0.3390	R		0.5020		12.75	0.8760		22.25	1.2697		32.25	1.6562	1-21/32	
0.0610		1.55	0.1360	29		0.2187	7/32		0.3425	■	8.70	0.5039		12.80	0.8858		22.50	1.2795		32.50	1.6634		42.25
0.0625	1/16		0.1378	■	3.50	0.2205	■	5.60	0.3437	11/32		0.5079		12.90	0.8906	57/64		1.2812	1-9/32		1.6719	1-43/64	
0.0630		1.60	0.1398		3.55	0.2210	2		0.3445	■	8.75	0.5118		13.00	0.8957		22.75	1.2894		32.75	1.6732		42.50
0.0635	52		0.1405	28		0.2244	■	5.70	0.3465	■	8.80	0.5156	33/64		0.9055		23.00	1.2969	1-9/64		1.6831		42.75
0.0650		1.65	0.1406	9/64		0.2264		5.75	0.3480	S		0.5217		13.25	0.9062	29/32		1.2992		33.00	1.6875	1-11/16	
0.0669		1.70	0.1417	■	3.60	0.2280	1		0.3504	■	8.90	0.5312	17/32		0.9154		23.25	1.3090		33.25	1.6929		43.00
0.0670	51		0.1437	■	3.65	0.2283	■	5.80	0.3543	9.00		0.5315		13.50	0.9219	59/64		1.3125	1-5/16		1.7028		43.25
0.0689		1.75	0.1440	27		0.2323		5.90	0.3580	T		0.5413		13.75	0.9252		23.50	1.3189		33.50	1.7031	1-45/64	
0.0700	50		0.1457	■	3.70	0.2340	A		0.3583	■	9.10	0.5469	35/64		0.9350		23.75	1.3281	1-21/64		1.7126		43.50
0.0709		1.80	0.1470	26		0.2344	15/64		0.3594	23/64		0.5512		14.00	0.9375	15/16		1.3287		33.75	1.7187	1-23/32	
0.0728		1.85	0.1476	■	3.75	0.2362	■	6.00	0.3622	■	9.20	0.5610		14.25	0.9449		24.00	1.3386		34.00	1.7224		43.75
0.0730	49		0.1495	25		0.2380	B		0.3642	9.25		0.5625	9/16		0.9531	61/64		1.3437	1-11/32		1.7323		44.00
0.0748		1.90	0.1496	■	3.80	0.2402	■	6.10	0.3661	9.30		0.5709		14.50	0.9547		24.25	1.3484		34.25	1.7344	1-47/64	
0.0760	48		0.1516	■	3.85	0.2420	C		0.3680	U		0.5781	37/64		0.9646		24.50	1.3583		34.50	1.7421		44.25
0.0768		1.95	0.1520	24		0.2441	■	6.20	0.3701	■	9.40	0.5807		14.75	0.9687	31/32		1.3594	1-23/64		1.7500	1-3/4	
0.0781	5/64		0.1535	■	3.90	0.2460	D		0.3740	9.50		0.5906		15.00	0.9744		24.75	1.3681		34.75	1.7520		44.50
0.0785	47		0.1540	23		0.2461	■	6.25	0.3750	3/8		0.5937	19/32		0.9842		25.00	1.3750	1-3/8		1.7618		44.75
0.0787		2.00	0.1555	■	3.95	0.2480	■	6.30	0.3770	V		0.6004		15.25	0.9844	63/64		1.3780		35.00	1.7656	1-49/64	
0.0807		2.05	0.1562	5/32		0.2500	1/4		0.3780	■	9.60	0.6094	39/64		0.9941								

Gun Drill Bushings

One Piece GDE Type



KEY FEATURES

- / Diameters 1/8 to 1-1/16
- / Heat treated to HRC 62-65
- / ID / OD concentric within .0002 TIR
- / ID tolerance - .0000 / + .0002

APPLICATION

Boneham's 'GDE Type' bushings are designed for the El Dorado type gun drilling machines as well as DeHoff, and Lahr. Unlike the expansive GDL insert version, the GDE type are a one piece bushing giving high accuracy and faster replacement / setup, requiring a bushing for each Gun-Drill size. The GDE bushing has a 1/16" drill bearing on the head of the bushing as standard.

ORDERING INSTRUCTIONS

Please state part number followed by required ID size. Example: GDE-64-16 .5000

NOTES

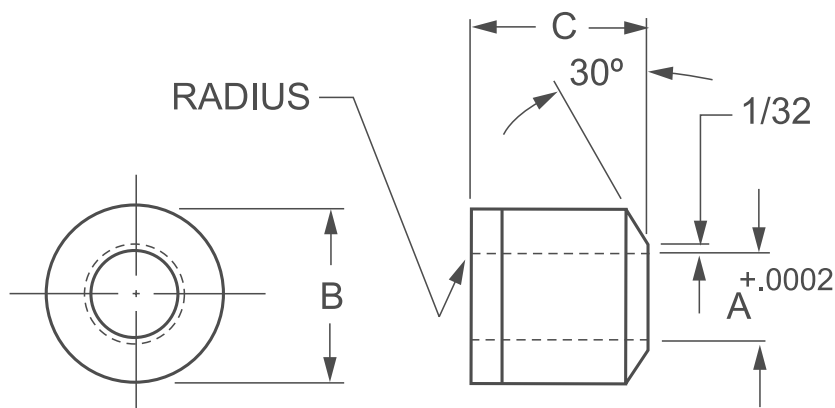
- / Gun-Drill Bushings are classed as special bushings and require finish machining. GDE bushings are non-returnable.
- / If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



Part No.	A	B	C	D	F	J	R	Lock Screw
GDE-64-12			3/4	35°				LS-2
GDE-64-16	1/8 - 25/32 .1250 - .7812 3.20 - 19.50mm	1" 1.0000 - .9998	1	35°	1-27/64	19/32	59/64	
GDE-64-22			1-3/8	35°				
GDE-88-16	1/8 - 1-1/16 .1250 - 1.0625 3.20 - 27.00mm	1-3/8 1.3750 - 1.3747	1	30°	1-51/64	25/32	1-7/64	
GDE-88-22			1-3/8	30°			1-7/64	

Gun Drill Bushings

GDI Type Gun Drill Inserts



BONEHAM

KEY FEATURES

- / Diameters 5/64 to 3/4
- / Heat treated to HRC 62-65
- / ID / OD concentric within .0002 TIR
- / ID tolerance - .0000 / + .0002

APPLICATION

Boneham's 'GDI Type' Gun Drill Bushing Inserts are intended for use with Gun Drill Liner bushings, designed to interchange depending on the drill and workpiece requirements, or after wear.

ORDERING INSTRUCTIONS

When ordering please state part number followed by required bore / ID size.
Example: GDI-13-8 .0890

NOTES

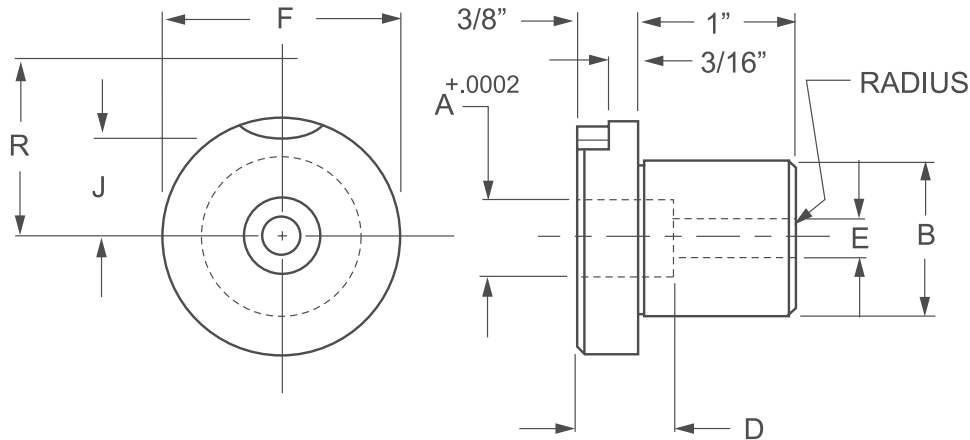
- / Gun-Drill Bushings are classed as special bushings and require finish machining. GDI bushings are non-returnable.
- / If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.
- / Boneham can manufacture the 3/4 and 1" length bushings as well as nitrided or carbide for longer life.



Part No.	A	B	C
GDI-13-8	.0635-.0995 #52 - #39 1.65 - 2.50mm	13/64 0.2046 - 0.2043	1/2
GDI-16-8	.0980 - .1406 #40 - 9/64 2.50 - 3.50mm	1/4 0.2516 - 0.2513	1/2
GDI-20-8	.1250 - .1935 1/8 - #10 3.20 - 4.90mm	5/16 0.3141 - 0.3138	1/2
GDI-32-8	.1875 - .3160 3/16 - 0 4.8 - 8.00mm	1/2 0.5017 - 0.5014	1/2
GDI-48-8	.3125 - .5312 5/16 - 17/32 8.00 - 13.50mm	3/4 0.7518 - 0.7515	1/2
GDI-64-12	.5000 - .7656 1/2 - 49/64 13.00 - 19.00mm	1" 1.0018 - 1.0015	3/4

Gun Drill Bushings

GDL Type Gun Drill Liners



KEY FEATURES

- / Diameters 0.2045 to 1.0017
- / Heat treated to HRC 62-65
- / ID / OD concentric within .0002 TIR
- / ID tolerance + .0002

APPLICATION

Boneham's 'GDL Type' Gun Drill Liners are high precision bushings for gun-drilling machines, and used in conjunction with removable Gun-Drill Inserts GDI, form a two piece system allowing more flexibility than the one piece bushing, with each liner able to hold a range of inserts.

ORDERING INSTRUCTIONS

When ordering please state part number followed by required bore / ID size.
Example: GDL-64-16 .05016

NOTES

- / Gun-Drill Bushings are classed as special bushings and require finish machining. GDL bushings are non-returnable.
- / If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



Part No.	A	B	D	E	F	J	R	Lock Screw	GDI Used
GDL-64-16	0.2045	1" 1.0000 - 0.9998	7/16	1/8	1-37/64	19/32	15/64	LS-2	GDI138
	0.2515			5/32					GDI168
	0.314			7/32					GDI208
	0.5016			11/32					GDI328
	0.7517			9/16					GDI488
GDL-88-16	0.2045	1-3/8 1.3750 - 1.3748	7/16	1/8	1-51/64	25/32	1-7/16	LS-2	GDI138
	0.2515			5/32					GDI168
	0.314			7/32					GDI208
	0.5016			11/32					GDI328
	0.7515			9/16					GDI488
	1.0017		11/16	51/64					GDI6412

Dowel Pins



Dowel Pins

57

INCH Dowel Pins to ASME 18.8.2-2000

Dowel Pins

58

Metric Dowel Pins to ASME 18.8, 100m-2000

Pull Dowel Pins

59

INCH Pull Dowel Pins

Pull Dowel Pins

60

Metric Pull Dowel Pins

Pull Dowel Pins

61

Pull Dowel Pin Extractor Tool

Dowel Extractor Kit

62

DPE and DP Heads

Nylon Dowel Pins

63

Nylon 66 Dowel Pins

Clevis Pins

Clevis Pins

64

Metric Pin to ISO 2341B or DIN 1444B

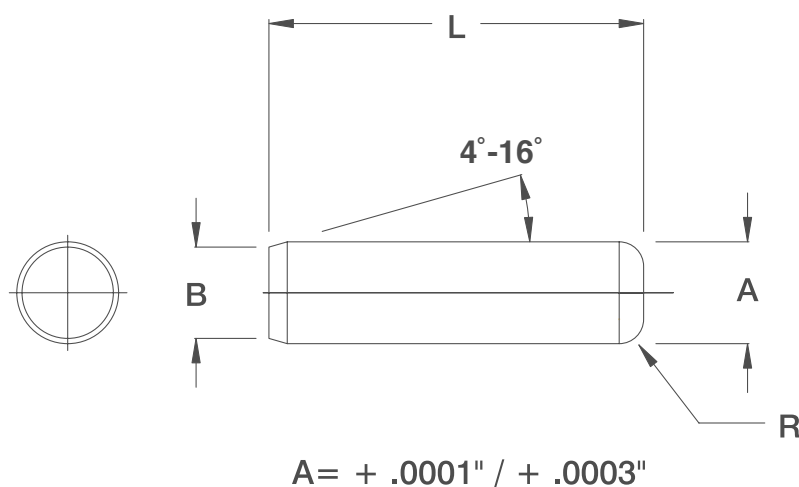
Clevis Pins

65

INCH Pin to ANSI Sizes

Dowel Pins

INCH Dowel Pins to ASME 18.8.2-2000



KEY FEATURES

- / Precision ground alloy steel
- / Diameters from 1/16 to 1"
- / Surface hardness 60 HRC minimum
- / Core hardness 50-58 HRC
- / Chamfer and Radius
- / Oversize to fit reamed hole

APPLICATION

ANSI standard parallel dowel pins are chamfered at the insertion end for easy location. Dowel pins are ground with accurate tolerances for exact alignment.

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 66.

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 1/16 x 5/8



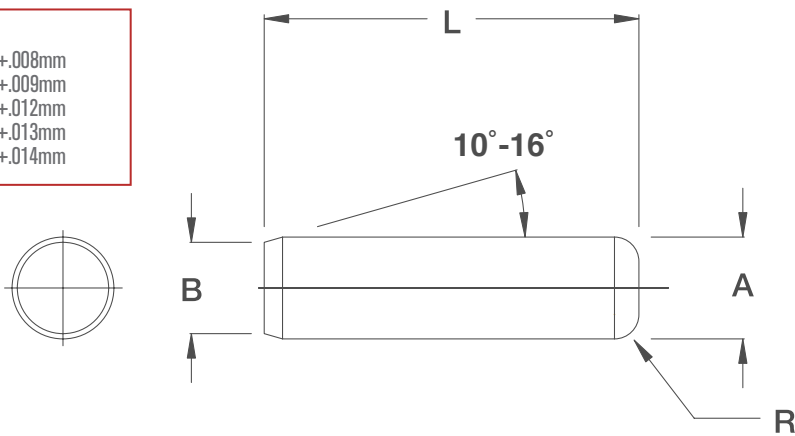
	B	Nominal Dia A													
		1/16"	3/32"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	
		.058	.089	.120	.180	.240	.302	.365	.424	.486	.611	.735	.860	.980	
		.048	.079	.110	.170	.230	.290	.350	.409	.471	.595	.715	.840	.960	
R min	.008	.012	.016	.023	.031	.039	.047	.055	.063	.078	.094	.109	.125		
Length L	3/16"														
	1/4"														
	5/16"														
	3/8"														
	7/16"														
	1/2"														
	5/8"														
	3/4"														
	7/8"														
	1"														
	1 1/4"														
	1 1/2"														
	1 3/4"														
	2"														
	2 1/4"														
	2 1/2"														
	3"														
	3 1/2"														
	4"														
	4 1/2"														
	5"														
	5 1/2"														
	6"														

Additional lengths can be supplied to order.

Dowel Pins

Metric Dowel Pins to ASME 18.8. 100m-2000

Limits on Diam A
1.5 to 3mm + .003 / +.008mm
4mm to 6mm + .004 / +.009mm
8mm to 10mm + .006 / +.012mm
12mm to 16mm + .007 / +.013mm
20mm to 25mm + .008 / +.014mm



- KEY FEATURES**
/ Precision ground alloy steel
/ Diameters from 1.5mm to 25mm
/ Surface hardness 60 HRC minimum
/ Core hardness 50-58 HRC
/ Chamfer and Radius

APPLICATION
ANSI standard parallel dowel pins are

chamfered at the insertion end for easy location. Dowel pins are ground with accurate tolerances for exact alignment.

ORDERING INSTRUCTIONS
When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 4mm x 16mm

NOTES
If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 66.



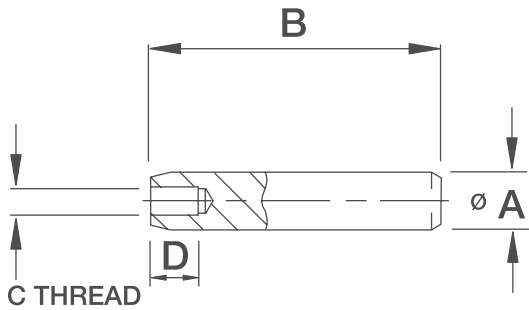
Length L	B	Nominal Dia A												
		1.5	2	2.5	3	4	5	6	8	10	12	16	20	25
		1.4	1.9	2.4	2.9	3.9	4.9	5.8	7.8	9.8	11.8	15.8	19.8	24.8
		1.2	1.7	2.2	2.6	3.6	4.6	5.4	7.4	9.4	11.4	15.3	19.3	24.3
R min	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6	0.8	0.8	1mm	
6														
8														
10														
12														
16														
20														
25														
30														
35														
40														
45														
50														
60														
70														
80														
90														
100														
110														
120														
130														
140														
150														

Additional lengths can be supplied to order.

Pull Dowel Pins

INCH Pull Dowel Pins

Diam A= + .0001" / + .0003"
hardened 60-63 Rc



Supplied with or without air release flat.



KEY FEATURES

- / Precision ground alloy steel
- / Diameters from 3/16 to 1"
- / Surface hardness 60-63 HRC
- / Core hardness 50-58 HRC
- / Chamfer and Radius

APPLICATION

Pull dowel pins are chamfered at both ends for easy location into the hole. Pull dowel pins are ground with accurate tolerances for exact alignment. The internal thread allows for extraction by a tool (see page*). They can be supplied with or without air release flats. Air release flats are ground on the dowel pin to allow for air displacement in blind holes.

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 1/4" x 1"

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 66.

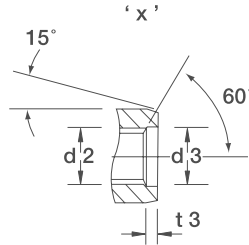
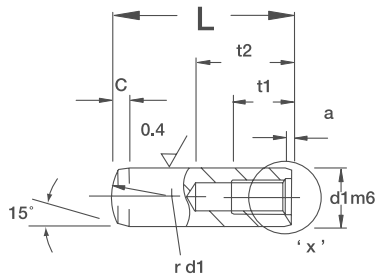


Diam A	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
1/2"								
5/8"								
3/4"								
1"								
1 1/4"								
1 1/2"								
1 3/4"								
2"								
2 1/4"								
2 1/2"								
3"								
C Thread	4-40	8-32	10-32	10-32	1/4-20	5/16-18	5/16-18	5/16-18
D	1/4"	1/4"	1/4"	3/8"	1/2"	1/2"	1/2"	1/2"

Pull Dowel Pins

Metric Pull Dowel Pins

Diam d1 = m6 Limit
hardened



Supplied with or without air release flat.



BONEHAM

KEY FEATURES

- / Precision ground alloy steel
- / Diameters from 5mm to 25mm
- / Hardness 60-63 HRC
- / Chamfer and Radius

for exact alignment. The internal thread allows for extraction by a tool (see page 53). They can be supplied with or without air release flats. Air release flats are ground on the dowel pin to allow for air displacement in blind holes.

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 66.



APPLICATION

Metric pull dowels are chamfered and chamfer dome for easy location and installation. Pull dowel pins are ground with accurate tolerances

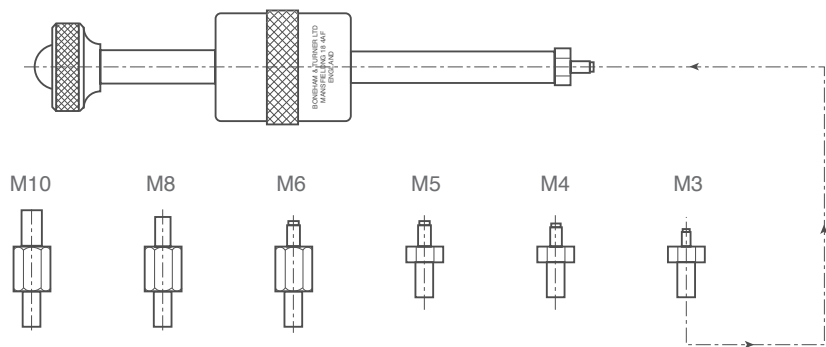
ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 8mm x 32mm

d1	m6	5	6	8	10	12	16	20	25
a	≈	.6	0.8	1	1.2	1.6	2	2.5	3
c		2.0	2.1	2.6	3	3.8	4.6	6	6
d2		M2.5 / M3	M4	M5	M6	M6	M8	M10	M16
d3		3.3	4.3	5.3	6.4	6.4	8.4	10.5	17
t1		5	6	8	10	12	16	18	24
t2	min.	9	10	12	16	20	25	28	35
t3		.75	1	1.2	1.2	1.2	1.5	1.5	2
L									
nom.	min.	max.							
10	9.5	10.5							
16	15.5	16.5							
18	17.5	18.5							
20	19.5	20.5							
22	21.5	22.5							
24	23.5	24.5							
25	24.5	25.5							
28	27.5	28.5							
30	29.5	30.5							
32	31.5	32.5							
35	34.5	35.5							
40	39.5	40.5							
45	44.5	45.5							
50	49.5	50.5							
55	54.25	55.75							
60	59.25	60.75							
65	64.25	65.75							
70	69.25	70.75							
75	74.25	75.75							
80	79.25	80.75							
85	84.25	85.75							
90	89.25	90.75							
95	94.25	95.75							
100	99.25	100.75							
120	119.25	120.75							

Pull Dowel Pins

Pull Dowel Pin Extractor Tool



KEY FEATURES

- / Metric M3 to M10
- / INCH UNC, UNF, BSW and BSF
- / Slide hammer style
- / Knurled for extra grip
- / Special head sizes manufactured

APPLICATION

The Boneham Extractor Tool is designed for use with pull dowel pins in metric and inch. The tool uses a slide hammer method making it extremely easy to use. Knurled parts allow for easy grip.

ORDERING INSTRUCTIONS

- / When ordering the tool state: DPE
- / When ordering metric heads state: DPE and then metric size. Example: DPE3MM
- / When ordering INCH heads state: DPE, size and standard. Example: DPE3/8BSF

NOTES

- / A BONEHAM original product. For Pull Dowel pins see pages 59-60.
- / BA, UNC and BSF heads available.



CODE SUFFIX	UNF / UNC	METRIC
DPE	4-40	M2.5
DPE	8-32	M3
DPE	10-32	M4
DPE	1/4-20	M5
DPE	5/16-18	M6
DPE		M8
DPE		M10
DPE		M12
DPE		M16

Dowel Extractor Kit

DPE and DP Heads



KEY FEATURES

- / Dowel Pin Extractor Tool
- / Choice of Metric or Inch extractor heads

APPLICATION

The Boneham Pull Dowel Pin Extractor tool is used to extract pull dowel pins from their location hole. This kit is supplied in a hard, durable and ergonomic case. It's ideal for production environments and tool control. The case uses pick and pluck foam so operators can customise to suit. The case is supplied as pictured.

ORDERING INSTRUCTIONS

The Dowel Pin Extractor Kit has a part number of DPE001 for Metric and DPE002 for Inch. Please see table below for the kit contents.

NOTES

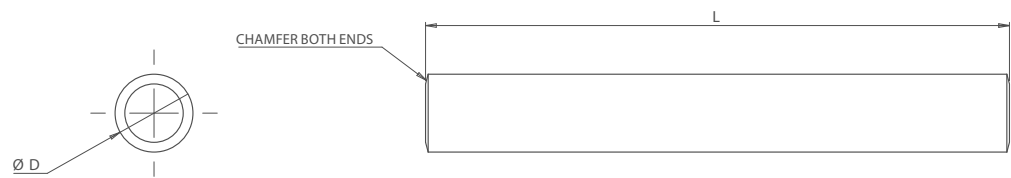
Specials Manufactured by BONEHAM



Part Code	Tool	Unit	Heads included						
DPE001	DPE	Metric	M3	M4	M5	M6	M8	M10	M16
DPE002	DPE	Inch	4-40	8-32	10-32	1/4-20	5/16-18		

Nylon Dowel Pins

Nylon 66 Dowel Pins



KEY FEATURES

- / White Nylon 6.6
- / Tough and Rigid
- / Excellent Abrasion and Chemical Resistance
- / Low Friction Coefficient

APPLICATION

Nylon dowels are ideal for the composite mould process. They have a wide temperature range (-40°C - +70°C) with good chemical and

abrasive qualities. Boneham Nylon dowels work in vacuum environments and unlike traditional metal dowels, can easily be destroyed to prevent damage to the mould or workpiece.

ORDERING INSTRUCTIONS

When ordering identify the diameter and length required and choose the appropriate part number.

NOTES

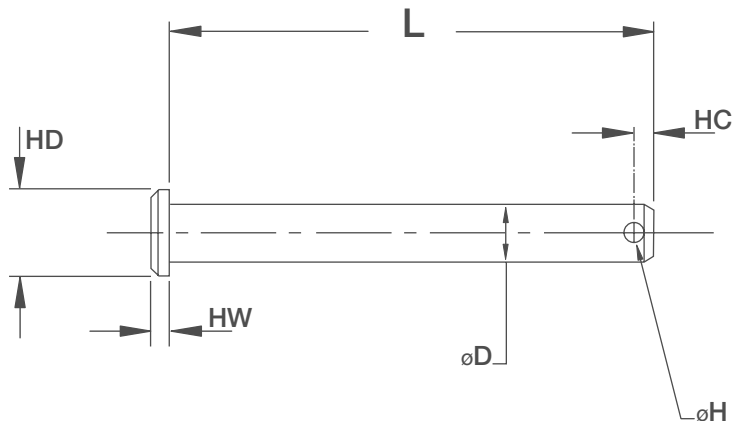
- / Can be used with Boneham GS bushings or -BP mould bushings
 - / Specials, including tighter tolerances
- Manufactured by BONEHAM.



D	3	4	6	8	10
L	+ /- 0.01	+ /- 0.01	0.00	0.00	0.00
+ 0.1			+ 0.02	+ 0.02	+ 0.02
20					
30					
35					
40					
45					
50					
55					
60					

Clevis Pins

Metric Pin to ISO 2341B or DIN 1444B



KEY FEATURES

- / Diameters from 3mm to 24mm
- / Hardened
- / OD lead for easy installation
- / ISO 2341B and DIN 1444 B
- / Zinc plated or Stainless steel

APPLICATION

Clevis Pins are a type of fastener that will allow the rotation or swivel of the connected

parts about the axis of the pin linkage. A clevis pin, sometimes referred to as a link pin or hinge pin, consists of a head, shank and cross drilled hole. When using a fastening, such as a clevis pin, the hole which is at the opposite end of the pin to the head is inserted through the items to be linked, and then a cotter pin, R clip or similar retaining fastener is inserted through the hole to fix the clevis pin in place.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, CPSS for Stainless Steel or CPZP for Zinc Plate, followed by diameter required and length. Example: 6, CPZP 3mm x 30mm

NOTES

Stainless clevis pins are manufactured from A2 but other grades can be manufactured upon request.

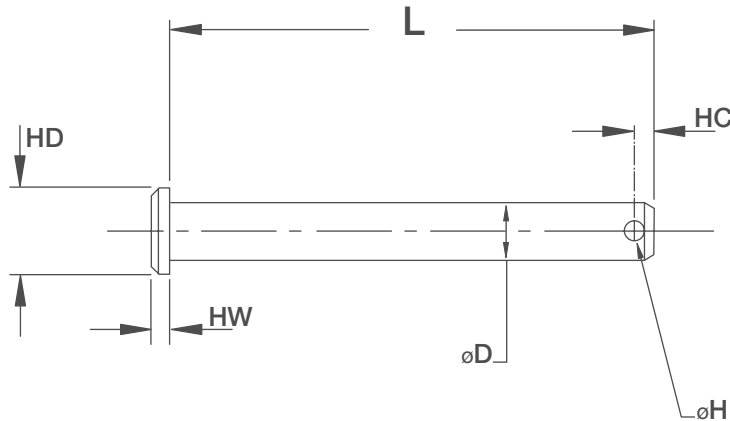


Dia	D	3	4	5	6	8	10	12	16	20	24
Head Dia	HD	5.5	6	8	10	14	18	20	25	30	36
Head Width	HW	1	1	1.6	2	3	4	4	4.5	5	6
Hole Dia	H	0.8	1	1.2	1.6	2	3.2	3.2	4	5	6.3
Hole Centre	HC	2.1	2.5	2.9	3.2	3.5	4.5	5.5	6	8	9

L \ D	3	4	5	6	8	10	12	16	20	24
10										
12										
16										
20										
25										
30										
35										
40										
50										
60										
70										
80										
90										
100										

Clevis Pins

INCH Pin to ANSI Sizes



BONEHAM

KEY FEATURES

- / Diameters from 3/16 to 1"
- / Hardened
- / OD lead for easy installation
- / ISO 2341B and DIN 1444 B
- / Zinc plated or Stainless steel

APPLICATION

Clevis Pins are a type of fastener that will allow the rotation or swivel of the connected

parts about the axis of the pin linkage. A clevis pin, sometimes referred to as a link pin or hinge pin, consists of a head, shank and cross drilled hole. When using a fastening, such as a clevis pin, the hole which is at the opposite end of the pin to the head is inserted through the items to be linked, and then a cotter pin, R clip or similar retaining fastener is inserted through the hole to fix the clevis pin in place.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, CPSS for Stainless Steel or CPZP for Zinc Plate, followed by diameter required and length. Example: 6, CPSS 1/2" x 2"

NOTES

Stainless clevis pins are manufactured from A2 but other grades can be manufactured upon request.



Dia	D	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Head Dia	HD	5/16"	3/8"	7/16"	1/2"	5/8"	11/16"	15/16"	1.3/16"
Head Width	HW	1/16"	3/32"	3/32"	1/8"	5/32"	13/64"	1/4"	11/32"
Hole Dia	H	0.078"	0.078"	0.104"	0.104"	0.135"	0.156"	0.156"	0.156"
Hole Centre	HC	0.100"	0.100"	0.140"	0.160"	0.160"	0.160"	0.160"	0.210"

L \ D	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
1/2								
5/8"								
3/4"								
1"								
1 1/4"								
1 1/2"								
1 3/4"								
2"								
2 1/4"								
2 1/2"								
2 3/4"								
3"								
3 1/4"								
3 1/2"								
3 3/4"								
4"								

DOWEL PINS AVAILABLE FROM THE UK



STEEL / 303 STAINLESS / 304 STAINLESS / 316 STAINLESS / INCH + METRIC



ISO 8734



ISO 8735



ISO 1804



ISO 2338A



DIN 6325



DIN 7979



BONEHAM[®]

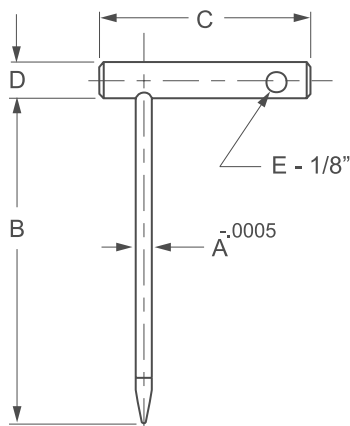
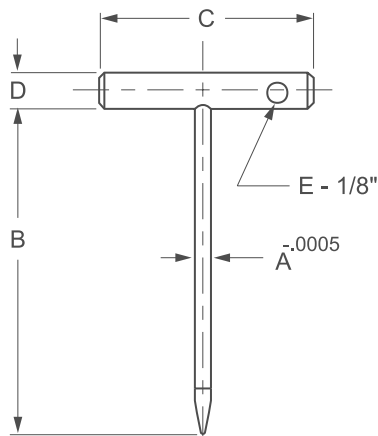
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L-Pins and T-Pins

Case Hardened Steel – Black Oxide Finish



BONEHAM

KEY FEATURES

- / Precision ground pin
- / Case hardened steel
- / Black oxide finish
- / Drilled handle for cable assembly

APPLICATION

L Shaped Alignment Pins LP:
L-Pins are used to align location devices in Jig and Fixtures. They are precise and quick to remove. The 'L' shape is ideal when working space is restrictive. A cross drilled 1/8 hole is

supplied in the handle to connect the pin to the fixture using an optional cable of lanyard.

T Shaped Alignment Pins TP:

T-Pins are used to align location devices in Jig and Fixtures. They are precise and quick to remove. The T shaped pins allow for greater grip control and easy removal. A cross drilled 1/8 hole is supplied in the handle to connect the pin to the fixture using an optional cable of lanyard."

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 0.1910 x 6

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH Alignment Pins

T-PIN Part No.	L-PIN Part No.	A (+.0000 -.0005)	B (+-.06)	Dimensions C	D	E (+-.06)
TP125025	LP125025	0.1250	2-1/2	1-1/2	1/4	1/4
TP156235	LP156235	0.1562	3-1/2	2-1/2	5/16	1/4
TP18753	LP18753	0.1875	3	2-1/2	5/16	1/4
TP18754	LP18754	0.1875	4	2-1/2	5/16	1/4
TP18756	LP18756	0.1875	6	2-1/2	5/16	1/4
TP19103	LP19103	0.1910	3	2-1/2	5/16	1/4
TP19104	LP19104	0.1910	4	2-1/2	5/16	1/4
TP19106	LP19106	0.1910	6	2-1/2	5/16	1/4
TP19603	LP19603	0.1960	3	2-1/2	5/16	1/4
TP25002	LP25002	0.2500	2	2-1/2	3/8	3/8
TP25003	LP25003	0.2500	3	2-1/2	3/8	3/8
TP25004	LP25004	0.2500	4	2-1/2	3/8	3/8
TP25006	LP25006	0.2500	6	2-1/2	3/8	3/8
TP25703	LP25703	0.2570	3	2-1/2	3/8	3/8
TP25704	LP25704	0.2570	4	2-1/2	3/8	3/8
TP31252	LP31252	0.3125	2	2-1/2	7/16	1/2
TP312535	LP312535	0.3125	3-1/2	3	7/16	1/2
TP31254	LP31254	0.3125	4	3	7/16	1/2

ALL DIMENSIONS IN INCHES

Continued on next page

L-Pins and T-Pins (continued)

T-PIN Part No.	L-PIN Part No.	A (+.0000 -.0005)	B (+-.06)	Dimensions C	D	E (+-.06)
TP31256	LP31256	0.3125	6	3	7/16	1/2
TP37503	LP37503	0.3750	3	2-1/2	1/2	1/2
TP37504	LP37504	0.3750	4	3-1/2	1/2	1/2
TP37505	LP37505	0.3750	5	3-1/2	1/2	1/2
TP37506	LP37506	0.3750	6	3-1/2	1/2	1/2
TP37507	LP37507	0.3750	7	3-1/2	1/2	1/2
TP43754	LP43754	0.4375	4	3-1/2	9/16	5/8
TP43755	LP43755	0.4375	5	3-1/2	9/16	5/8
TP43756	LP43756	0.4375	6	3-1/2	9/16	5/8
TP50004	LP50004	0.5000	4	3-1/2	9/16	5/8
TP50005	LP50005	0.5000	5	3-1/2	9/16	5/8
TP50006	LP50006	0.5000	6	3-1/2	9/16	5/8
TP50007	LP50007	0.5000	7	3-1/2	5/8	5/8
TP50009	LP50009	0.5000	9	3-1/2	5/8	5/8
TP56254	LP56254	0.5625	4	3-1/2	5/8	5/8
TP56256	LP56256	0.5625	6	3-1/2	5/8	5/8
TP62506	LP62506	0.6250	6	3-1/2	7/8	3/4
TP62508	LP62508	0.6250	8	3-1/2	7/8	3/4
TP75006	LP75006	0.7500	6	3-1/2	7/8	3/4

ALL DIMENSIONS IN INCHES

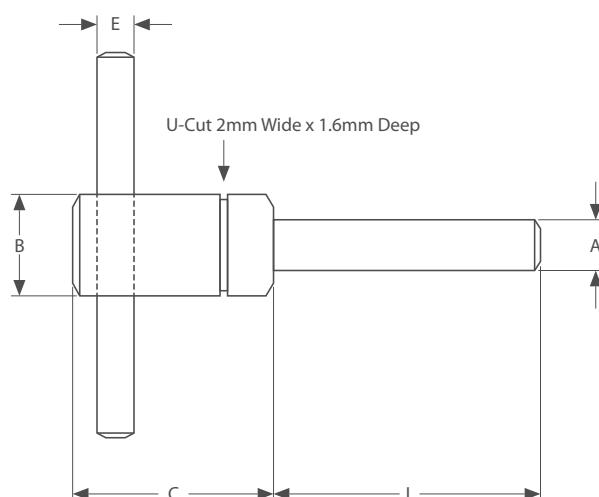
METRIC Alignment Pins

T-PIN Part No.	L-PIN Part No.	A (+.0000 -.0005)	B	Dimensions C	D	E (+-.06)
TP488	LP488	4	88	64	8	8
TP576	LP576	5	76	64	8	8
TP5152	LP5152	5	152	64	8	8
TP676	LP676	6	76	64	10	10
TP6152	LP6152	6	152	64	10	10
TP888	LP888	8	88	76	11	11
TP8152	LP8152	8	152	76	11	11
TP1076	LP1076	10	76	64	13	13
TP10152	LP10152	10	152	88	13	13
TP12102	LP12102	12	102	88	16	16
TP12152	LP12152	12	152	88	16	16
TP16152	LP16152	16	152	88	22	22
TP16204	LP16204	16	204	88	22	22
TP20152	LP20152	20	152	88	22	22
TP20204	LP20204	20	204	88	22	22

ALL DIMENSIONS IN MILLIMETERS

Quick removing “T-Bar” Location Pins

Metric and Imperial Jig Pins



APPLICATION

T-Bar Location Pins, or Jig Pins, are a removable precision ground location pin which is designed to accurately align holes in sectional jigs. The ground finish pin can be used in conjunction with Boneham's standard liner bushings pressed into the jig. Quick removal is assisted thanks to the featured shoulder of the pin which allows a raised handle and a slide pin which can be

tapped into an 'L-shaped' pin if necessary. In both metric and imperial and with various lengths, the T-Bar pins can be used in various applications of alignment and location.

MATERIAL

Body: Mild Steel

Pin: Case Hardened and Ground
Available in Stainless Steel

TIP

Use with BONEHAM bushings for accurate alignment in jigs.



INCH

Part Reference	Pin Diameter A		Pin	Body		T-Bar	
	Nominal	Tolerance	Length	Diameter	Length	Length	Diameter
			L	B	C	D	E
RLP-1AS	3/16	-0.00015" -0.00045"	2"	3/8	1+1/4	1+3/4	3/16
RLP-2AS	1/4	-0.0002" -0.0006"	2"	1/2	1+1/2	2+1/2	3/16
RLP-2BS	5/16	-0.0002" -0.0006"	2"	1/2	1+1/2	2+1/2	3/16
RLP-3AS RLP-3AM	3/8	-0.0002" -0.0006"	2" 3"	5/8	1+1/2	2+3/4	1/4
RLP-4AS RLP-4AL	1/2	-0.0002" -0.0006"	2" 4"	3/4	1+3/4	2+3/4	1/4

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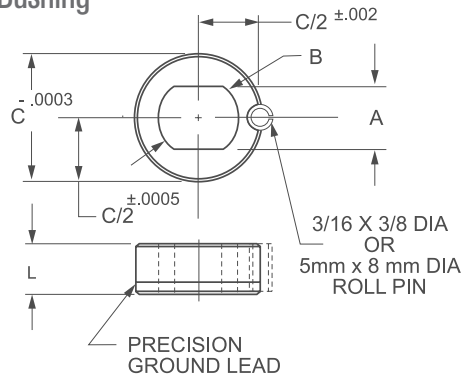
Quick removing “T-Bar” Location Pins

METRIC

Part Reference	Pin Diameter A		Pin	Body		T-Bar	
	Nominal	Tolerance	Length	Diameter	Length	Length	Diameter
			L	B	C	D	E
MRLP-1AS MRLP-1AM	5	-0.004mm -0.012mm	25 50	3/8	1+1/4	1+3/4	3/16
MRLP-2AS MRLP-2AM	6	-0.004mm -0.012mm	25 50	1/2	1+1/2	2+1/2	3/16
MRLP-2BS MRLP-2BM	7	-0.005mm -0.014mm	25 50	1/2	1+1/2	2+1/2	3/16
MRLP-2CS MRLP-2CM	8	-0.005mm -0.014mm	25 50	1/2	1+1/2	2+1/2	3/16
MRLP-3AM MRLP-3AL	9	-0.005mm -0.014mm	50 75	5/8	1+1/2	2+3/4	1/4
MRLP-3BM MRLP-3BL	10	-0.005mm -0.014mm	50 75	5/8	1+1/2	2+3/4	1/4
MRLP-4AM MRLP-4AL	12	-0.005mm -0.014mm	50 75	3/4	1+3/4	2+3/4	1/4

Slotted Locator Bushings

SL Type Press-Fit Locator Bushing



KEY FEATURES

- / INCH (SL) and Metric (SLM)
- / Heat treated to HRC 58-62
- / Precision ground
- / Black oxide finish

APPLICATION

Boneham's 'SL Type' Slotted Locator Bushings are designed for use with 'L' or 'T' Pins. Using a configuration with a high tolerance bushing, Slotted Location Bushings allow for relief in one direction during

alignment, whilst maintaining tight tolerances in the other direction.

ORDERING INSTRUCTIONS

When ordering identify the slot width required and select the appropriate part number.
Example: SL-488-A

NOTES

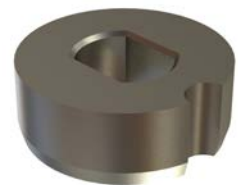
To Install:

- / Drill and ream a 3/16 for the Inch roll pin or 5mm for the metric assembly

- / Then bore a press fit hole with an interference fit of 0.0003 to 0.0005
- / Press the roll pin and locator bushing in together until flush. The relationship between the roll pin and bushing provides accurate orientation.

Roll Pin Included: Inch: 3/16 x 3/8
Metric: 5mm x 8mm

- / Stainless can be manufactured upon request. Please talk to the technical sales team.



INCH

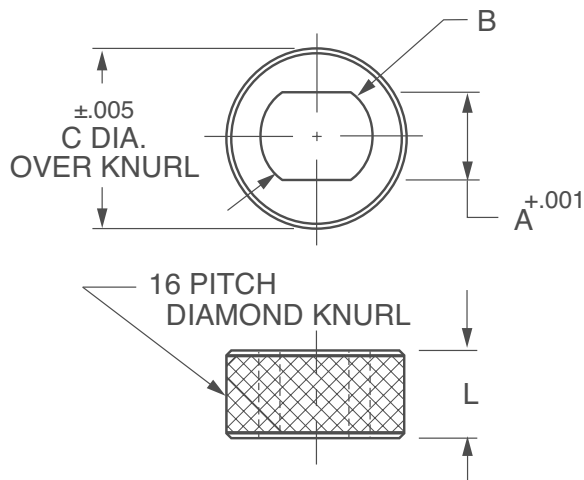
Part No.	A	B	C	L	Pin Dia.
SL-488-A	.1876 / .1882	0.312	0.7504	0.40	3/16
SL-488-B	.2501 / .2507	0.375	0.7504	0.40	1/4
SL-648-A	.2501 / .2507	0.375	1.0004	0.40	1/4
SL-648-B	.3126 / .3132	0.437	1.0004	0.40	5/16
SL-648-C	.3751 / .3757	0.500	1.0004	0.40	3/8
SL-648-D	.5001 / .5007	0.625	1.0004	0.40	1/2
SL-6416	.5001 / .5007	0.625	1.0004	0.90	1/2
SL-8016	.6251 / .6257	0.750	1.2504	0.90	5/8
SL-9616-A	.7501 / .7510	0.812	1.5004	1.00	3/4
SL-9616-B	.8751 / .8760	1.000	1.5004	1.00	7/8
SL-9616-C	1.0001 / 1.0010	1.062	1.5004	1.00	1

METRIC

Part No.	A	B	C	L	Pin Dia.
SLM6	6.00 / 6.03mm .2363 / .2373	9mm 0.354	20mm 0.787	9mm 0.354	6mm
SLM8	8.00 / 8.03mm .3151 / .3161	11mm 0.423	24mm 0.945	9mm 0.354	8mm
SLM10	10.00 / 10.03mm .3938 / .3948	13mm 0.512	24mm 0.945	9mm 0.354	10mm
SLM12	12.00 / 12.03mm .4725 / .4735	15mm 0.591	24mm 0.945	14mm 0.551	12mm
SLM16	16.00 / 16.03mm .6300 / .6310	18mm 0.709	30mm 1.181	12mm 0.472	16mm
SLM20	20.00 / 20.03mm .7875 / .7885	22mm 0.866	36mm 1.417	19mm 0.748	20mm
SLM25	25.00 / 25.03mm .9844 / .9854	27mm 1.063	40mm 1.575	19mm 0.748	25mm

Slotted Locator Bushings

KSL Type Knurled Locator Bushings



KEY FEATURES

- / Inch sizes
- / Heat treated to HRC 58-62
- / Knurled OD
- / Ground

APPLICATION

Boneham Metal Products KSL type bushings are designed with a knurled OD for setting or casting into composites or soft materials. Like the 'SL type' these locator bushings are used with locator pins such as the 'L' or 'T' pins. The slotted bushing allows for relief in one direction during alignment, whilst maintaining tight tolerances in the other direction.

ORDERING INSTRUCTIONS

When ordering identify the slot width required and select corresponding part number.
Example: KSL-408

NOTES

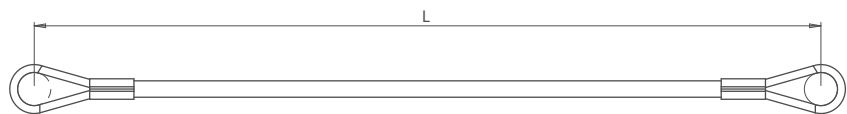
The KSL bushings OD diamond knurl allows for the locator bushing to be embedded into materials such as composites.



Part No.	A	B	C	L
KSL-368	0.1876	0.312	0.565	0.500
KSL-408	0.2501	0.375	0.640	0.500
KSL-488	0.3126	0.437	0.765	0.500
KSL-568	0.3751	0.500	0.890	0.500
KSL-648	0.5001	0.625	1.015	0.500
KSL-9616	0.5001	0.625	1.015	1.000

Cable

Cables for Fixtures



KEY FEATURES

- / Red nylon jacket
- / 4" to 24" long
- / Loop to loop configuration
- / 304 stainless steel cable
- / Aluminium crimps

APPLICATION

Boneham cables are ideal for linking removable location or alignment components to a fixture. Cables prevent damage or loss of the component by fixing one end of the cable to the fixture and the other to the component.

ORDERING INSTRUCTIONS

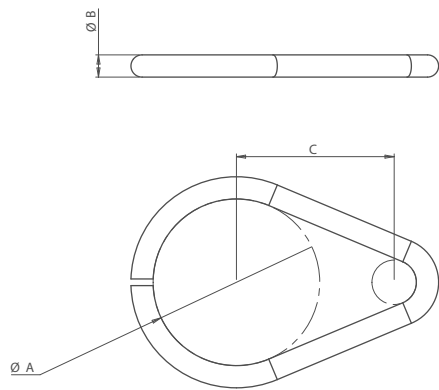
When ordering: Choose length of wire required and order corresponding part number. Clips are ordered separately.



Part No.	L	Loop Fixing Size
LC4R	4"	1/4"
LC6R	6"	1/4"
LC8R	8"	1/4"
LC10R	10"	1/4"
LC12R	12"	1/4"
LC16R	16"	1/4"
LC20R	20"	1/4"
LC24R	24"	1/4"

Cable Clips

Clips for Cables



KEY FEATURES

- / Use with Boneham Cables
- / To suit T-Bar and Alignment Pins
- / 304 Stainless Steel
- / Simple economic cable solution

APPLICATION

Retaining Clips for Boneham cables are a simple and economic method of securing components to cables (lanyards) which then prevent loss or damage to important location and alignment pins on fixtures.

ORDERING INSTRUCTIONS

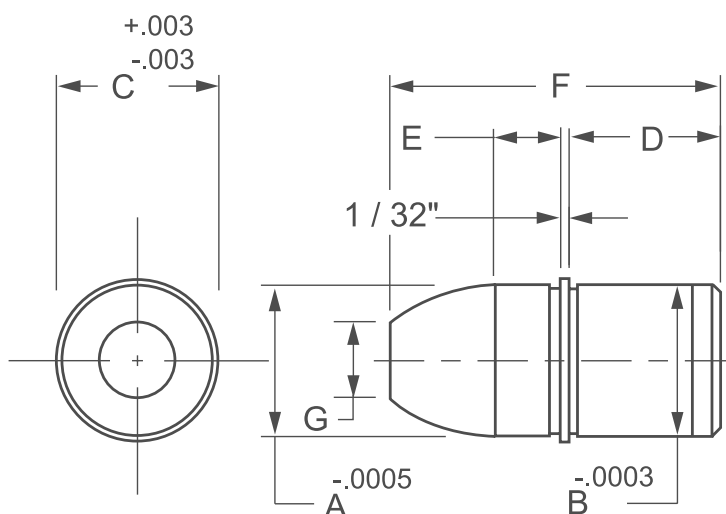
When ordering: Identify the clip size required and choose corresponding part number. Lanyards ordered seperately.



Part No.	A (ID)	B	C
LCC8.5SS	0.335	0.039	0.279
LCC11.5SS	0.453	0.047	0.343
LCC14.5SS	0.571	0.063	0.405
LCC17.5SS	0.689	0.063	0.468
LCC20.5SS	0.807	0.078	0.532

Location Pins

Bullet Nose Dowels



BONEHAM

KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / Concentric to 0.0005" TIR
- / INCH and Metric sizes

APPLICATION

Bullet Nose Dowels BND are used in conjunction with a Bullet Nose Liner BNL to create a precision location system, aligning two work pieces with complete accuracy. The pin's head and body diameters are concentric to within .0005" TIR.

ORDERING INSTRUCTIONS

When ordering identify the diameter required and identify the part number from the chart below. Example: BND2499

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

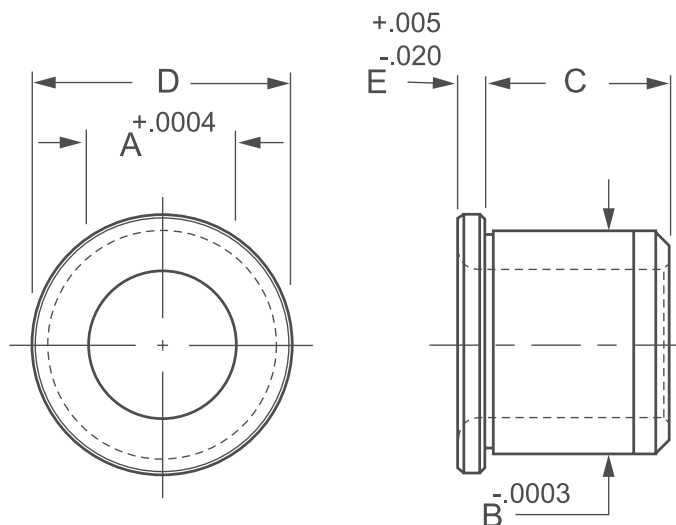
Part No.	Dimensions							Mating Liner Part No.
	A +.0000 -0.0005	B +.0000 -0.0003	C +/- .003	D	E	F	G	
BND2499	.2499	.2516	.280	.500	.125	.907	1/8	BNL2501
BND3124	.3124	.3141	.344	.500	.157	.939	5/32	BNL3126
BND3749	.3749	.3766	.407	.500	.187	1.032	3/16	BNL3751
BND4999	.4999	.5017	.532	.500	.187	1.094	1/4	BNL5001

METRIC

Part No.	Dimensions							Mating Liner Part No.
	A +.0000 -0.0005	B +.0000 -0.0003	C +/- .003	D	E	F	G	
BNDM600	6mm	6mm	7mm	12mm	3mm	22mm	1/8	BNLM600
BNDM800	8mm	8mm	9mm	12mm	4mm	23mm	5/32	BNLM800
BNDM1000	10mm	10mm	11mm	12mm	5mm	25mm	3/16	BNLM1000
BNDM1200	12mm	12mm	15mm	12mm	5mm	27mm	1/4	BNLM1200

Location Pins

Liner for Bullet Nose Dowels



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / ID / OD Concentric to 0.0003" TIR
- / INCH and Metric sizes

APPLICATION

Liners for Bullet Nose Dowels are the receiving bushing element of the location system. The bushings ID and OD are concentric to within .0003 TIR.

ORDERING INSTRUCTIONS

When ordering identify the ID required and identify the part number from the chart below.
Example: BNL3751

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

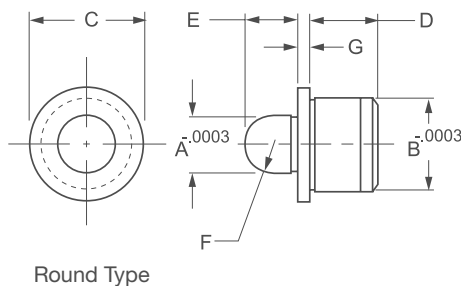
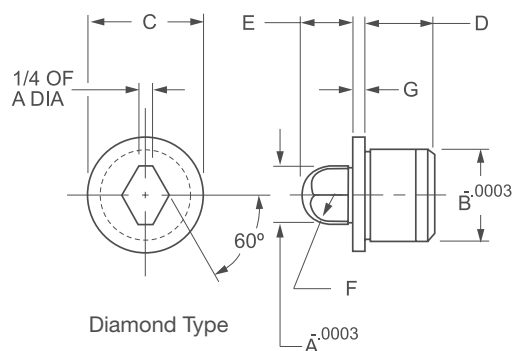
Part No.	A .0000 / +.0004	B - .0003	Dimensions C	D	E +.005 / -.020
BNL2501	0.2501	0.5017	3/8	0.625	.100
BNL3126	0.3126	0.5017	3/8	0.625	.100
BNL3751	0.3751	0.6267	1/2	0.750	.100
BNL5001	0.5001	0.7518	5/8	0.875	.100

METRIC

Part No.	A .0000 / +.0004	B - .0003	Dimensions C	D	E +.005 / -.020
BNLM600	6mm	10mm	7mm	13mm	3mm
BNLM800	8mm	12mm	7mm	15mm	3mm
BNLM1000	10mm	15mm	9mm	18mm	3mm
BNLM1200	12mm	18mm	12mm	22mm	3mm

Location Pins

Bullet Nose Pins



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / Concentric to .0005" TIR
- / INCH and Metric sizes

APPLICATION

Bullet Nose Pins come in two different forms, round BNR or diamond (relieved) BNP. Bullet Nose Pins are

used with a mating bushing BNPL to create an accurate alignment and locating system. Using a relieved diamond pin maintains accuracy in alignment but prevents binding of the work pieces. For simple installation the OD of the pin and the bushing are exactly the same to allow for one pass boring of the holes in both plates. The pins head and body are concentric to .0005 TIR.

ORDERING INSTRUCTIONS

When ordering identify the diameter of the pin required and select the part number from the chart below. Example: BNR4998

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

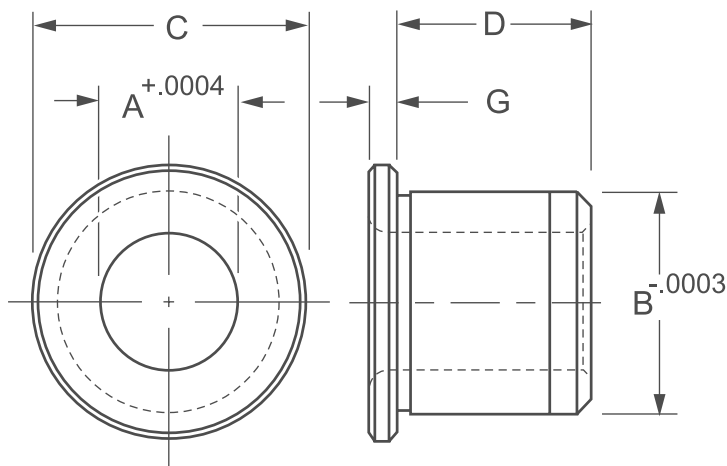
Part No.		Dimensions							Mating Liner Part No.
Round Pin	Diamond Pin	A -0.0003	B -0.0003	C	D	E	F	G	
BNR2499	BNP2499	0.2499	0.4078	9/16	3/8	7/32	1/8	1/16	BNPL2501
BNR3124	BNP3124	0.3124	0.5017	5/8	3/8	9/32	5/32	1/16	BNPL3126
BNR3748	BNP3748	0.3748	0.6267	3/4	1/2	11/32	3/16	1/16	BNPL3751
BNR4998	BNP4998	0.4998	0.7518	7/8	1/2	13/32	1/4	1/16	BNPL5001
BNR7498	BNP7498	0.7498	1.0018	1-1/8	3/4	9/16	3/8	1/8	BNPL7502
BNR9998	BNP9998	0.9998	1.3771	1-1/2	3/4	3/4	1/2	1/8	BNPL1000

METRIC

Part No.		Dimensions							Mating Liner Part No.
Round Pin	Diamond Pin	A -0.0003	B -0.0003	C	D	E	F	G	
BNRM600	BNDPM600	6mm	10mm	13mm	9mm	6mm	3mm	2mm	BNPLM600
BNRM800	BNDPM800	8mm	12mm	15mm	9mm	7mm	4mm	2mm	BNPLM800
BNRM1000	BNDPM1000	10mm	15mm	18mm	11mm	9mm	5mm	2mm	BNPLM1000
BNRM1200	BNDPM1200	12mm	18mm	22mm	11mm	10mm	6mm	2mm	BNPLM1200

Location Pins

Liner for Bullet Nose Pins



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / ID / OD Concentric to .0003" TIR
- / INCH and Metric sizes"

APPLICATION

Liners for bullet nose pins are the receiving bushing element of the location system. The bushing OD is the same size as the pins diameter and is concentric to the ID within .0003 TIR.

ORDERING INSTRUCTIONS

When ordering identify the ID required and identify the part number from the chart below.
Example: BNPL5001

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

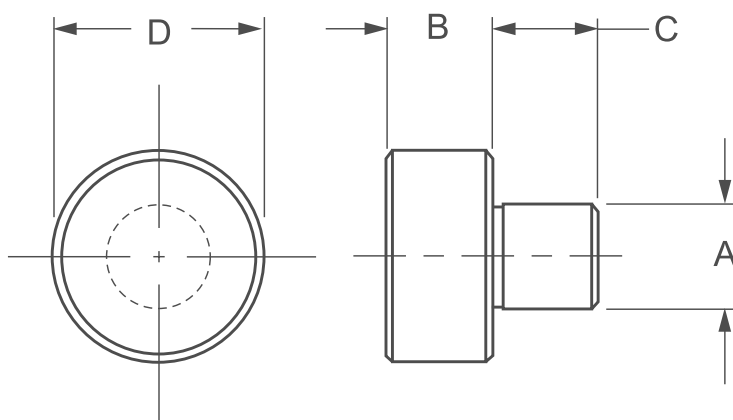
Part No.	A +.0004	B -.0003	Dimensions C	D	G
BNPL2501	0.2501	0.4078	9/16	7/16	1/16
BNPL3126	0.3126	0.5017	5/8	7/16	1/16
BNPL3751	0.3751	0.6267	3/4	7/16	1/16
BNPL5001	0.5001	0.7518	7/8	1/2	1/16
BNPL7502	0.7502	1.0018	1-1/8	1/2	1/8
BNPL10000	1.0002	1.3771	1-1/2	11/16	1/8

METRIC

Part No.	A +.0004	B -.0003	Dimensions C	D	G
BNPLM600	6mm	10mm	13mm	8mm	2mm
BNPLM800	8mm	12mm	15mm	8mm	2mm
BNPLM1000	10mm	15mm	18mm	10mm	2mm
BNPLM1200	12mm	18mm	22mm	10mm	2mm

Rest Buttons

Round Rest Buttons



KEY FEATURES

- / Pin diameters from 0.1885 to 0.7515
- / Finish ground head thickness ± 0.001
- / Pin tolerance ± 0.0005
- / Case hardened
- / Black oxide finish

APPLICATION

Round Rest Buttons RB are a precise and accurate method of supporting, height setting or resting a work piece in a fixture. They are designed to press fit, with the head thickness also precision ground.

ORDERING INSTRUCTIONS

When ordering identify the pin diameter and head depth required and select the appropriate part number. Example: RB28

NOTES

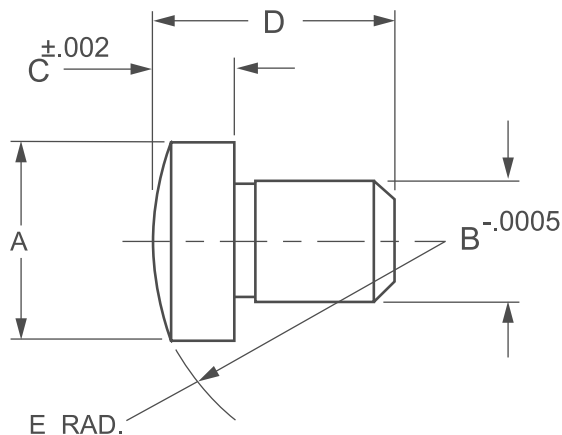
- / Stainless and specials can be manufactured upon request. Please talk to the technical sales team.
- / Metric sizes upon request.



Part No.	Dimensions			
	A ± 0.0005	B ± 0.001	C	D
RB02	0.1885	0.250	3/8	3/8
RB04	0.1885	0.375	3/8	3/8
RB06	0.1885	0.500	3/8	3/8
RB08	0.2510	0.250	1/2	1/2
RB10	0.2510	0.375	1/2	1/2
RB12	0.2510	0.500	1/2	1/2
RB14	0.3135	0.250	1/2	9/16
RB16	0.3135	0.375	1/2	9/16
RB18	0.3135	0.500	1/2	9/16
RB20	0.3760	0.250	5/8	5/8
RB22	0.3760	0.375	5/8	5/8
RB24	0.3760	0.500	5/8	5/8
RB26	0.3760	0.625	5/8	5/8
RB28	0.3760	0.750	5/8	5/8
RB30	0.5010	0.375	5/8	7/8
RB32	0.5010	0.500	5/8	7/8
RB34	0.5010	0.625	5/8	7/8
RB36	0.5010	0.750	5/8	7/8
RB38	0.6260	0.375	3/4	1
RB40	0.6260	0.500	3/4	1
RB42	0.6260	0.625	3/4	1
RB44	0.6260	0.750	3/4	1
RB46	0.7515	0.500	7/8	1-1/4
RB48	0.7515	0.625	7/8	1-1/4

Locator Buttons

SLB Type Spherical Locator



KEY FEATURES

- / Case hardened
- / Black oxide finish
- / Pin tolerance -.0005
- / Head thickness +/- .002

APPLICATION

Boneham's Spherical Locator Buttons are designed for irregular work surface applications, the spherical radius creates a single point of contact on contoured workpieces. The features of the SLB allow for other uses such as jig feet and rest pads. The pin element of the button is ground to allow for press fit.

ORDERING INSTRUCTIONS

When ordering identify the pin diameter and head depth required and select the appropriate part number. Example: SLB5000

NOTES

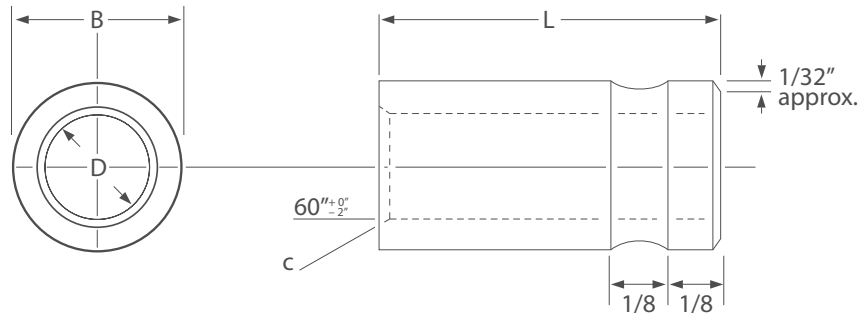
- / Stainless and specials can be manufactured upon request. Please talk to the technical sales team.
- / Metric sizes upon request.



Part No.	Dimensions				
	A	B + .0000 -.0005	C + / - .002	D	E
SLB3750	5/16	0.1890	1/8	3/8	1/2
SLB5000	3/8	0.2515	3/16	1/2	5/8
SLB5625	1/2	0.3765	3/16	9/16	3/4
SLB6250	1/2	0.3765	1/4	5/8	3/4
SLB7500	1/2	0.3765	3/8	3/4	3/4
SLB8750	1/2	0.3765	1/2	7/8	3/4

Polygrip Recessed Serrated Bushing

Bushings for Composites – Drilling and Locating



KEY FEATURES

- / Ground bores
- / Resin groove
- / Chamfered entry

APPLICATION

Serrated bushings are common place in glass fibre, composite or synthetic jigs. The serrations and grooved recess lock the bushing in place and prevent axial movement. Unlike regular drill bushings, serrated bushings are not to tight tolerance unless requested.

The grooved recess feature of our GS bushings allows for resin based materials to run into the channel and set the bush in place.

ORDERING INSTRUCTIONS

Identify the Bushing ID required and length. Part codes are the Bushing reference plus the diameter.
For example: GS14-5/16"

NOTES

Boneham Bushing codes ranging from GS1 to GS15. Drill bushing drill diameters from 1.6mm to 9.5mm. Maximum eccentricity 0.003.

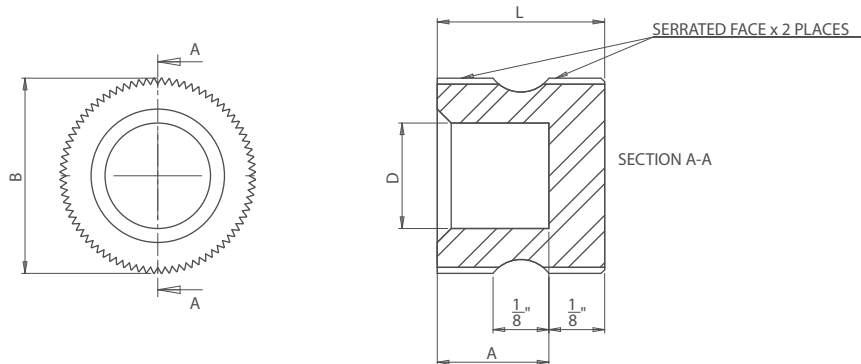


Bushing Reference	"Bore Diameter D"			Outside Diameter of Body B	Depth of Chamfer C	Length L
	From	To	Limits of Tolerance			
GS1	1/16	1/8	+0.0005	1/4	1/64	3/8
GS2	1.6mm	3.45mm	+0.0015	1/4	1/64	1/2
GS3				1/4	1/64	3/4
GS4	3/32	3/16	+0.0005	3/8	1/32	3/8
GS5	3.45mm	4.9mm	+0.0015	3/8	1/32	1/2
GS6				3/8	1/32	3/4
GS7	3/16	1/4	+0.001	7/16	1/32	3/8
GS8	4.95mm	6.5mm	+0.002	7/16	1/32	1/2
GS9				7/16	1/32	3/4
GS10	1/4	5/16	+0.001	1/2	3/64	3/8
GS11	6.4mm	7.9mm	+0.002	1/2	3/64	1/2
GS12				1/2	3/64	3/4
GS13	5/16	13/32	+0.001	5/8	3/64	3/8
GS14	8.0mm	10.5mm	+0.002	5/8	3/64	1/2
GS15				5/8	3/64	3/4

Unless otherwise stated, dimensions and tolerances shown in Inches.
Maximum eccentricity 0.003.

Blind Polygrip Bushing

Polygrip Serrated GS Bushing Blind Hole



KEY FEATURES

- / Carbon Tool Steel
- / Hardened
- / Blind Bore

APPLICATION

Boneham Blind Serrated Bushings are hardened like the standard GS bushings, but with a blind bore. The hardened nature of the bushing provides protection for the mold when flash is being drilled out carefully, maintaining vacuum integrity. These bushings retain the same features as the standard Polygrip Bushings. The serrations prevent rotational movement and the recess allows resin to lock the bushing in place.

ORDERING INSTRUCTIONS

When ordering: Choose the ID required based on the pin size in use and select the part number from the corresponding length. Part numbers are formed using the 'Bushing Reference' code followed by the bore size. For example: BLGS14-8.00MM

NOTES

Specials Manufactured by BONEHAM



INCH

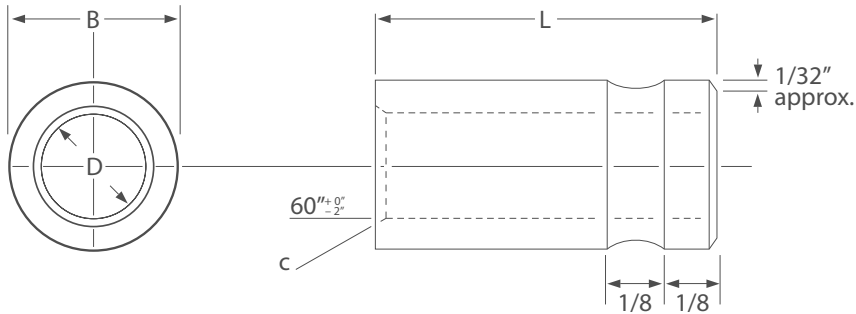
Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
BLGS7-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/8"
BLGS8-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	1/2"
BLGS9-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/4"
BLGS13-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/8"
BLGS14-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	1/2"
BLGS15-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/4"

METRIC

Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
BLGS7-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/8"
BLGS8-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	1/2"
BLGS9-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/4"
BLGS13-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/8"
BLGS14-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	1/2"
BLGS15-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/4"

Soft GS Bushing

Polygrip Serrated GS Bushing Soft Condition



KEY FEATURES

- / Soft Natural Condition
- / Reworkable in the Mold

APPLICATION

Boneham Soft Serrated Bushings are designed to be reworked in a mold or fixture should alignment be slightly off-centre. They are for alignment purposes and not drilling applications. Tolerances and concentricity may differ to the standard hardened bushing.

ORDERING INSTRUCTIONS

When ordering: Choose the ID required based on the pin size in use and select the part number from the corresponding length. Part numbers are formed using the 'Bushing Reference' code followed by the bore size. For example: SFGS14-8.00MM

NOTES

Specials Manufactured by BONEHAM



INCH

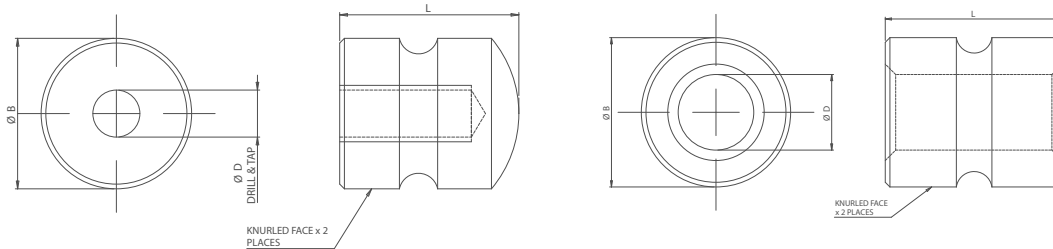
Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
SFGS7-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/8"
SFGS8-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	1/2"
SFGS9-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/4"
SFGS13-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/8"
SFGS14-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	1/2"
SFGS15-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/4"

METRIC

Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
SFGS7-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/8"
SFGS8-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	1/2"
SFGS9-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/4"
SFGS13-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/8"
SFGS14-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	1/2"
SFGS15-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/4"

Knurled Mold Clamps

A Boneham registered design for Split Molds



BONEHAM

KEY FEATURES

- / Mild Steel
- / Chemically Blacked
- / Deep Knurl
- / Resin Recess
- / Compact Design

APPLICATION

Knurled Mold Clamps are designed by Boneham to be used in the composite mold process. The split composite mold process can require accurate alignment and good torque resistance. The GSCL mold clamp range is relatively compact and reduces

mold scrappage whilst providing dedicated components which reduce subcontract and multicomponent requirements. The bushing and nut are purchased separately so a more precise bushing, such as a GS or PP type bushing can be used if required.

ORDERING INSTRUCTIONS

When ordering check the size of bolt and thread required and choose corresponding part number. Example:
/ M8 Bolt: Bushing: GSCL-8MM-B and Nut: GSCL-8MM-N

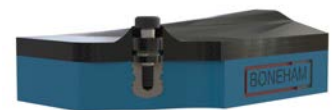
If a shoulder bolt is being used. Example:
/ 8MM Shoulder Bolt with 6mm thread: Bushing GS14-8.00MM and Nut: GSCL-6MM-N

Bushing Types

-B: Suitable for standard bolts

NOTES

/ Can be used as a nut and bushing assembly or with Boneham pins and drill bushings



Knurled Bushing – For use with standard bolt

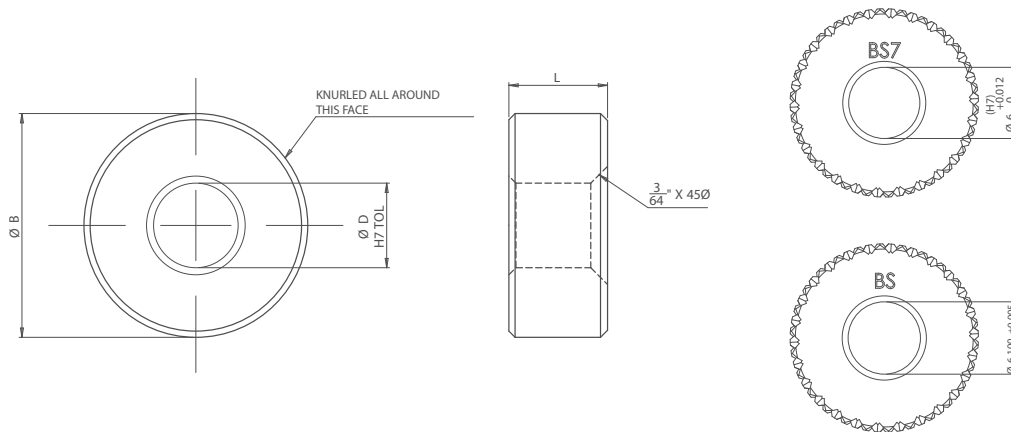
Part Code	Bore D	Outside Diameter B	Length L	Grooves
GSCL-6MM-B	6.1mm	5/8"	3/4"	1
GSCL-8MM-B	8.1mm	5/8"	3/4"	1
GSCL-10MM-B	10.1mm	5/8"	3/4"	1
GSCL-12MM-B	12.1mm	5/8"	3/4"	1

Knurled Nut – For use with standard bolt

Part Code	D	Outside Diameter B	Length L	Grooves
GSCL-6MM-N	M6	5/8"	3/4"	1
GSCL-8MM-N	M8	5/8"	3/4"	1
GSCL-10MM-N	M10	5/8"	3/4"	1
GSCL-12MM-N	M12	5/8"	3/4"	1

Short Knurled Mold Bushing

A Boneham registered design for Split Molds



KEY FEATURES

- / Mild Steel
- / Chemically Blacked
- / Deep Knurl
- / Compact Design
- / 7mm Long

APPLICATION

The Short Knurled Mold Bushing is a shortened version of the Knurled Mold Clamp Bushing. The short version does not feature a resin groove, but allows for alignment when depth of locating material is at a minimum and a standard length bushing is not suitable. The short mold clamp is available in two versions. BS: Short version of -B for a fastening bolt. BS7: Machined for a locating dowel pin.

ORDERING INSTRUCTIONS

When ordering check the size of bolt and thread required and choose corresponding part number. Example:

- / M8 Bolt: Bushing: GSCL-8MM-BS and Nut: GSCL-8MM-N

If a dowel pin is being used. Example:

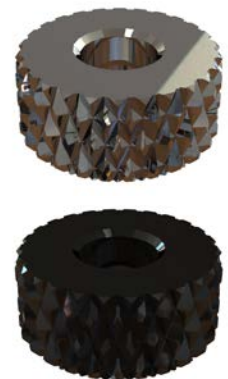
- / DP35B 8MM Pin order: Bushing GSCL-8MM-B7 and Nut: GSCL-6MM-N

Bushing Types:

- / BS: Suitable for standard bolts
- / BS7: Suitable for Boneham Dowel Pins

NOTES

- / Can be used as a nut and bushing assembly or with Boneham pins and drill bushings
- / Inch versions available



Knurled Bushing – For use with standard bolt

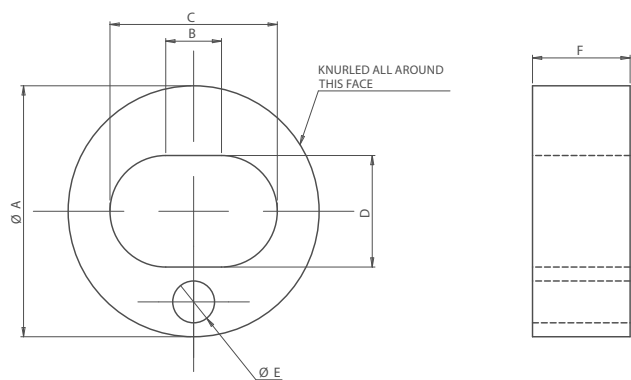
Part Code	Bore Ø	Outside Diameter B	Length L	Grooves
GSCL-6MM-BS	8.1mm	5/8"	7mm	0
GSCL-8MM-BS	6.1mm	5/8"	7mm	0

Knurled Bushing – For use with standard Dowels

Part Code	Bore Ø H7	Outside Diameter B	Length L	Grooves
GSCL-6MM-BS7	6mm	5/8"	7mm	0
GSCL-8MM-BS7	8mm	5/8"	7mm	0

Knurled Slotted Mold Bushing

For Composite Molds



KEY FEATURES

- / Mild Steel
- / Chemically Blacked
- / Deep Knurl
- / Compact Design
- / 7mm Long

APPLICATION

Knurled Slotted Mold Bushings are designed for the mold tool-up process. They can be used for alignment and for locating edge bars in the composite mold tool. The elongated bushing features a drilled hole to assist in clocking up the bushing during setting.

ORDERING INSTRUCTIONS

When ordering check the size of pin in use and choose corresponding part number. Example:
/ 8mm pin order: CLS8MM

NOTES

- / Can be used with Boneham pins and drill bushings

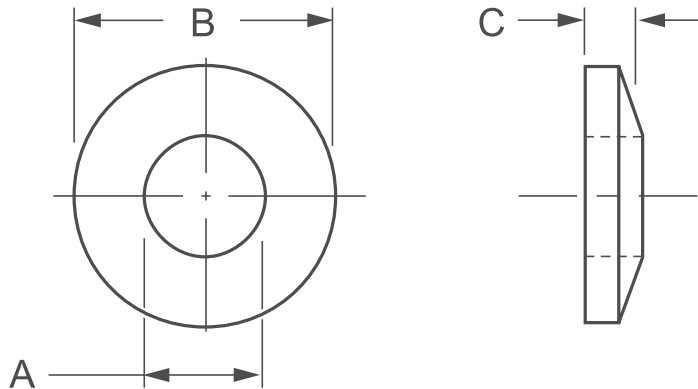


Slotted Bushing – For use with Standard Dowels

Part Code	Slot W x L	Outside Diameter A	Length F	Clock Pin
CLS6MM	6mm x 10mm	18mm	7mm	3mm
CLS8MM	8mm x 12mm	18mm	7mm	3mm
CLS10MM	10mm x 14mm	24mm	10mm	3mm

Spherical Washers

Top Washer



BONEHAM

KEY FEATURES

- / Case hardened (Steel)
- / Black oxide finish
- / Stainless are 300 series and natural finish
- / Hole to fit bolts and studs

APPLICATION

Boneham's 'SWT Type' spherical washers are designed to aid even fastening between parts with irregular alignment. The 'Top' washer features a convex spherical radius for aligning in the concaved bottom.

ORDERING INSTRUCTIONS

When ordering identify the bolt size required and use the corresponding part number. Example: SWT08

NOTES

Boneham sells spherical washers separately, please turn to page 89 for the bottom washer.



Steel Spherical Washer Top

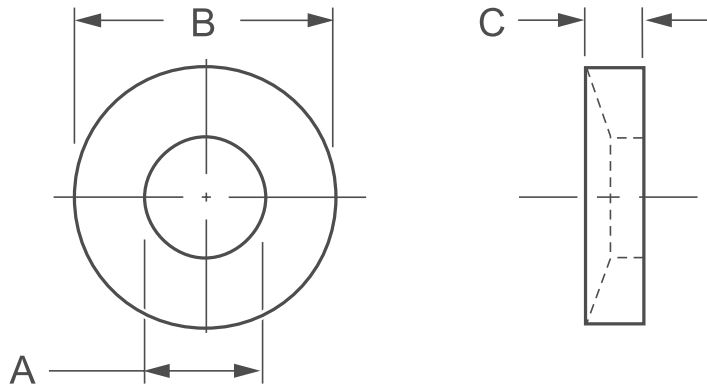
Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWT01	9/32	5/8	1/8	3/16 & 1/4
SWT02	11/32	3/4	5/32	5/16
SWT03	13/32	7/8	9/64	3/8
SWT04	17/32	1-1/8	3/16	7/16 & 1/2
SWT05	21/32	1-3/8	3/16	5/8
SWT06	25/32	1-5/8	7/32	3/4
SWT07	15/16	1-3/4	1/4	7/8
SWT08	1-1/16	2	11/32	1
SWT09	1-3/16	2-1/4	19/64	1-1/8
SWT10	1-5/16	2-5/8	11/32	1-1/4
SWT11	1-9/16	2-7/8	23/64	1-1/2

Stainless Steel Spherical Washer Top

Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWT01SS	9/32	5/8	1/8	3/16 & 1/4
SWT02SS	11/32	3/4	5/32	5/16
SWT03SS	13/32	7/8	9/64	3/8
SWT04SS	17/32	1-1/8	3/16	7/16 & 1/2
SWT05SS	21/32	1-3/8	3/16	5/8
SWT06SS	25/32	1-5/8	7/32	3/4
SWT07SS	15/16	1-3/4	1/4	7/8
SWT08SS	1-1/16	2	11/32	1

Spherical Washers – Bottom

Bottom Washer



KEY FEATURES

- / Case hardened (Steel)
- / Black oxide finish
- / Stainless are 300 series and natural finish
- / Hole to fit bolts and studs

APPLICATION

Boneham's 'SWB Type' spherical washers are designed to aid even fastening between parts with irregular alignment. The 'bottom' washer features a concave spherical radius for aligning with the convex top.

ORDERING INSTRUCTIONS

When ordering identify the bolt size required and use the corresponding part number. Example: SWB09

NOTES

Boneham sells spherical washers separately, please turn to page 88 for the top washer.



Steel Spherical Washer Bottom

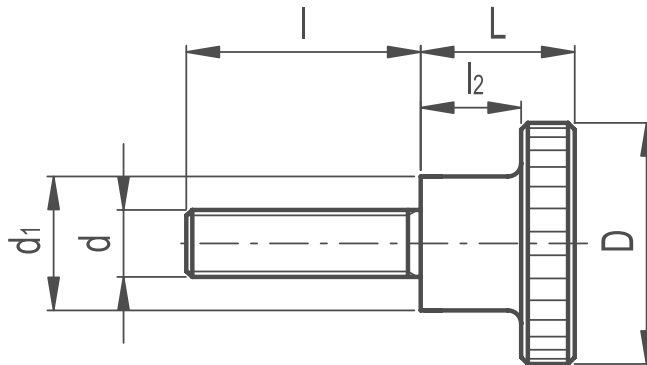
Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWB01	5/16	5/8	1/8	3/16 & 1/4
SWB02	3/8	3/4	5/32	5/16
SWB03	7/16	7/8	5/32	3/8
SWB04	9/16	1-1/8	7/32	7/16 & 1/2
SWB05	11/16	1-3/8	7/32	5/8
SWB06	13/16	1-5/8	9/32	3/4
SWB07	1	1-3/4	1/4	7/8
SWB08	1-1/8	2	5/16	1
SWB09	1-1/4	2-1/4	11/32	1-1/8
SWB10	1-3/8	2-5/8	23/64	1-1/4
SWB11	1-5/8	2-7/8	27/64	1-1/2

Stainless Steel Spherical Washer Bottom

Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWB01SS	5/16	5/8	1/8	3/16 & 1/4
SWB02SS	3/8	3/4	5/32	5/16
SWB03SS	7/16	7/8	5/32	3/8
SWB04SS	9/16	1-1/8	7/32	7/16 & 1/2
SWB05SS	11/16	1-3/8	7/32	5/8
SWB06SS	13/16	1-5/8	9/32	3/4
SWB07SS	1	1-3/4	1/4	7/8
SWB08SS	1-1/8	2	5/16	1

Knurled Thumb Screw

DIN 464



BONEHAM

/ MATERIAL

Turned black-oxide steel.

/ ASSEMBLY

Threaded pin.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
Different lengths and threadings.

/ MATERIAL

AISI 303 stainless steel, sandblasted matte finish.

/ ASSEMBLY

Threaded pin.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
Different lengths and threadings.

FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Knurled Thumb Screw DIN 464

Part No.	d	l	D	L	d1	l2
KTS1-3714	M3	6	12	7.5	6	5
KTS2-3714	M3	10	12	7.5	6	5
KTS3-3714	M3	12	12	7.5	6	5
KTS4-3714	M3	16	12	7.5	6	5
KTS5-3714	M4	8	16	9.5	8	6
KTS6-3714	M4	10	16	9.5	8	6
KTS7-3714	M4	12	16	9.5	8	6
KTS8-3714	M4	16	16	9.5	8	6
KTS9-3714	M4	20	16	9.5	8	6
KTS10-3714	M4	25	16	9.5	8	6
KTS11-3714	M5	6	20	11.5	10	7.5
KTS12-3714	M5	8	20	11.5	10	7.5
KTS13-3714	M5	10	20	11.5	10	7.5
KTS14-3714	M5	12	20	11.5	10	7.5
KTS15-3714	M5	16	20	11.5	10	7.5
KTS16-3714	M5	20	20	11.5	10	7.5
KTS17-3714	M5	25	20	11.5	10	7.5
KTS18-3714	M5	30	20	11.5	10	7.5
KTS19-3714	M6	8	24	15	12	10
KTS20-3714	M6	10	24	15	12	10
KTS21-3714	M6	12	24	15	12	10
KTS22-3714	M6	16	24	15	12	10
KTS23-3714	M6	20	24	15	12	10
KTS24-3714	M6	25	24	15	12	10

Continued on next page

Knurled Thumb Screw

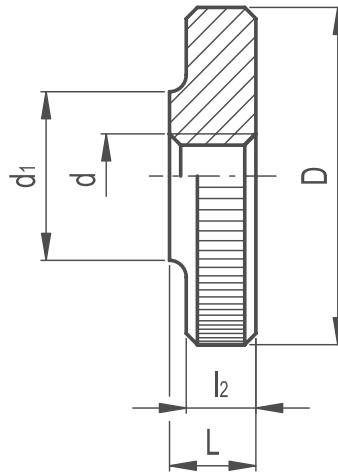
Part No.	d	l	D	L	d1	l2
KTS25-3714	M6	30	24	15	12	10
KTS26-3714	M8	12	30	18	16	12
KTS27-3714	M8	16	30	18	16	12
KTS28-3714	M8	20	30	18	16	12
KTS29-3714	M8	25	30	18	16	12
KTS30-3714	M8	30	30	18	16	12
KTS31-3714	M8	35	30	18	16	12
KTS32-3714	M8	40	30	18	16	12
KTS33-3714	M10	20	36	23	20	15
KTS34-3714	M10	25	36	23	20	15
KTS35-3714	M10	30	36	23	20	15
KTS36-3714	M10	35	36	23	20	15
KTS37-3714	M10	40	36	23	20	15

Knurled Thumb Screw DIN 464-303 Stainless Steel

Part No.	d	l	D	L	d1	l2
KTS1SS	M5	10	20	11.5	10	7.5
KTS2SS	M5	16	20	11.5	10	7.5
KTS3SS	M6	16	24	15	12	10
KTS4SS	M6	20	24	15	12	10
KTS5SS	M8	16	30	18	16	12
KTS6SS	M8	20	30	18	16	12
KTS7SS	M8	30	30	18	16	12

Flat Knurled Nut

DIN 467



BONEHAM

/ MATERIAL

Turned black-oxide steel.

/ ASSEMBLY

Tapped through hole.

/ MATERIAL

AISI 303 stainless steel, sandblasted matte finish.

/ ASSEMBLY

Tapped through hole.

FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Flat Knurled Nut DIN 467

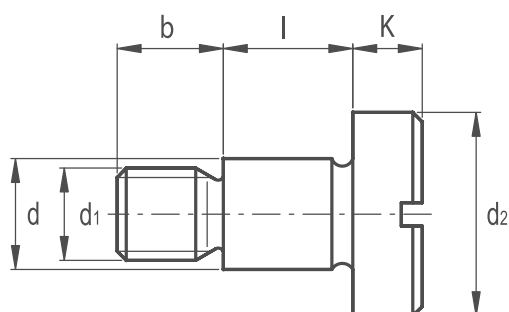
Part No.	Hole d	D	L	d1	l2
FKN1	M3	12	3	6	2.5
FKN2	M4	16	4	8	3.5
FKN3	M5	20	5	10	4
FKN4	M6	24	6	12	5
FKN5	M8	30	8	16	6
FKN6	M10	36	10	20	8
FKN7	M12	40	12	22	10

Flat Knurled Nut DIN 467-303 Stainless Steel

Part No.	Hole d	D	L	d1	l2
FKN1SS	M3	12	3	6	2.5
FKN2SS	M4	16	4	8	3.5
FKN3SS	M5	20	5	10	4
FKN4SS	M6	24	6	12	5
FKN5SS	M8	30	8	16	6

Stripper Bolts and Shoulder Screws

Slotted Shoulder Screw



BONEHAM

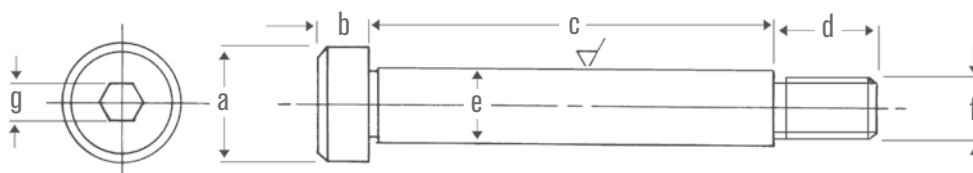
/ MATERIAL

Steel
DIN 923



Part No.	d1	d2	d3 hg	l	b	k
SS1-3670	M6	13	8	10	9.0	3.1
SS2-3670	M8	16	10	12	11.0	3.8
SS3-3670	M8	16	10	16	11.0	3.8

Stripper Bolts



BONEHAM

KEY FEATURES

- / To ISO 7379
- / h8 tolerance shaft
- / Grade 12.9

APPLICATION

Boneham's stripper bolts or shoulder bolts are designed with a ground shaft and a hex and knurled head for a variety of different applications.

ORDERING INSTRUCTIONS

When ordering identify the shaft diameter and length required and prefix with 'Stripper Bolt'. Example: Stripper Bolt 12mm x 50mm



e	Length c Sizes Available										a dia	b	d	f Thread	g
8	25	30	40	50							13	5.5	11	6x1	4
10		30	40	50	60	70	80				16	7	13	8x1.25	5
12		30	40	50	60	70	80	90	100		18	8	16	10x1.5	6
16		30	40	50	60	70	80	90	100	120	24	11	18	12x1.75	8
20				50	60	70	80	90	100	120	30	14	22	16x2	10
24						70	80	90			36	16	27	20x2.5	12

Advise e dia. and length

www.bonehamusa.com / Tel: 908-272-1200 / Toll Free Tel: 800-631-7852 / Fax: 908-272-4124 / Toll Free Fax: 800-526-9494 / sales@bonehamusa.com



Since 1918 when the Company was founded by Mr. John Boneham, Boneham & Turner has built up an extensive knowledge and experience in precision manufacture of a wide variety of engineering products.

Boneham's reputation for quality and excellence is well established over the many years of the Company's existence, enabling it to provide engineering solutions to a wide variety of customers both large and small.

The commitment to provide a service to Boneham's customers which is second to none, has been a philosophy which has contributed to the Company's success and

continues to be the policy of the current generation of the Boneham family who still own and manage the Company.

Boneham's US base, Boneham Metal Products, established in 1972, is pleased to offer their customers a continued service for the future, built on the foundation of its past, BMP are strong, reliable, solid and innovative, providing tomorrow's solutions from a wealth of experience gained by the Boneham Group for a century.



Celebrating
100 YEARS
1918 – 2018

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