Ordering Information

ANSI/BMP Bushings

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

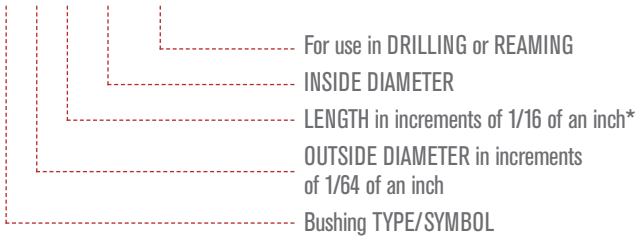
For ANSI/Boneham style bushings please supply the following information:
/ Bushing TYPE
/ OUTSIDE DIAMETER
/ Bushing LENGTH
/ INSIDE DIAMETER
/ Whether for a DRILL or REAMER

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

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. 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.
	HL SF SFM LS	
	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.