NORTON

DIAMOND AND cBN SUPERABRASIVES

EFFECTIVE 2014

STANDARD PRODUCTS CATALOG

NORTON®
SAINT-GOBAIN

TABLE OF CONTENTS

MAXIMIZING PRODUCTIVITY

Norton Stock Wheels
250+ USA-made, ISO-certified stock diamond and cBN resin products available now.

Norton B99 Express Made-to-Order Resin Line
65,000+ made-to-order diamond and cBN resin products: 25 wheel shapes, with 2 week (and less!) lead-times for 12" and less diameter wheels (14" wheels and larger are available with standard lead-times).

CNC Wheels
Norton Paradign, G-Force, Univel, Resin, CNC Express. Our line of CNC diamond and cBN wheels are pre-engineered to satisfy customer requirements from high production cutting tool manufacturing to precision resharpening.

Norton and Fliesen Stationary Truing and Dressing Products
For all your stationary truing and dressing needs: the market's broadest line of stationary diamond tools, brake controlled truing devices, and dressing sticks.

Norton Electroplated Tools and Wheels
Our extensive stock diamond and cBN electroplated offering (mounted points, drills, routers, contour tools, wheels, files, and saw blades) has been engineered to meet the diverse demands of traditional and emerging tool and die, ceramic, and composite applications.

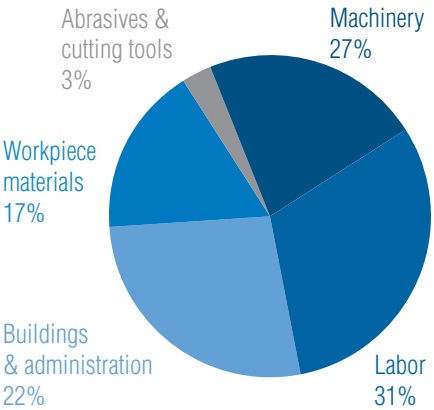
Norton Diamond Lapping Compound
Oil and water soluble compounds for mirrror finishes and close-tolerance performance.

NORTON SAINT-GOBAIN PSP *process solutions program*

REDUCING COSTS

On average, abrasives and cutting tools only account for about 3% of total manufacturing budgets. Norton superabrasive products optimized with Norton's proprietary PSP (process solutions program) helps to optimize your total cost and improve your productivity.

For information on how to achieve the greatest overall cost savings, see the example below or go to www.**nortonindustrial.com/psp.aspx**.



Decreasing the price of abrasives
A 30% price reduction will **only** reduce costs per part by **1%.**

Increasing the life of abrasives
Even a 50% increase in product life will **only** reduce costs per part by **1%.**

Increase overall productivity through PSP
With a 20% decrease in cycle time per part, there will be a **reduced total cost** per part of **more than 15%.**

1% 1% 15%

PLACING AN ORDER

To enable your authorized distributor to fill your order quickly and accurately, please be sure to include your billing and shipping address, purchase order number, and the following product information:

- **UPC Number**
- **The Wheel Shape – see the "Wheel Shape Index"**
- **Product Dimensions – such as Diameter x Thickness x Hole for a wheel, or Thickness x Width x Length for a dressing stick, etc.**
- **Complete Specification – example: ASD120-R100B99-1/8 (abrasive, grit, grade, concentration, bond, abrasive depth) for a wheel, or 38A220-HVBE for a dressing stick, or NS2M6 for a dressing tool, etc.**
- **Blueprint Number – if available**
- **Quantity Ordered**

NORTON PRODUCT TIERING CONCEPT

Norton offers the industry's widest selection of products at three separate value levels to meet your exact grinding needs. Norton abrasives are classified in BEST (gold), BETTER (silver), and GOOD (black) performance/price tiers to help you choose the right product for your specific application every time.

To help you compare and contrast the performance and price levels within each Norton line, the product availability charts highlight the product tier level with a color-coded "tiering bar".

Remember, premium Norton products – BEST and BETTER tiers – will always be the best overall value for your money. While initial unit cost is more, BEST and BETTER products will yield longer life and better performance, resulting in lowest total grinding cost.

BEST — BEST PERFORMANCE

- Represents products that are unmatched in the industry and provide the lowest total grinding cost for the application.
- In many cases, these products are proprietary and only available from Norton.

BETTER — PREMIUM PERFORMANCE

- Represents superior performing products for the user who requires a high level of productivity and low total abrasive cost.

GOOD — EXCELLENT PERFORMANCE, QUALITY AND VALUE

- Represents a value for the user who wants Norton quality products with consistent performance and very competitive prices.

PRODUCT WARRANTY

WARRANTY – Saint-Gobain Abrasives Inc. (SGA) warrants the products in this catalog to be free from defects in material or workmanship for a period of one year from the date of purchase. SGA's sole obligation under this warranty shall be to repair or replace, at SGA's option, any product which is non-conforming provided any such product failure was not caused by a subsequent modification of the product, misuse or a failure to follow any applicable instructions for the product.

EXCEPT FOR THE FOREGOING, SGA EXPRESSLY DISCLAIMS ALL OTHER GUARANTIES AND/OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

LIABILITY LIMITATION

SGA'S LIABILITY FOR ANY LOSS OR DAMAGE ARISING OUT OF OR RESULTING FROM THE USE OF THE PRODUCT SHALL NOT EXCEED THE PURCHASE PRICE THEREOF, REGARDLESS OF WHETHER SUCH LIABILITY ARISES IN CONTRACT, TORT (INCLUDING WITHOUT LIMITATION NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE, AND IN NO EVENT SHALL SGA BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. NO REPRESENTATIVE OF SGA, NOR ANY OF SGA'S DISTRIBUTORS OR DEALERS, IS AUTHORIZED TO MODIFY THIS WARRANTY OR ISSUE ANY WARRANTY REGARDING THE PRODUCTS IN THIS CATALOG.

BREAKAGES/PERSONAL INJURY

In the event of on-machine breakage of Norton abrasive products, call your local Norton Distributor immediately. Whether involving personal injury or not, the abrasive user should leave the equipment and other evidence undisturbed until a Norton Sales Representative has been notified and conducts an investigation. Prompt action on the part of abrasive users, Distributors and Norton sales personnel is important to ensure swift determination of the breakage cause and to guard against recurrence.

For additional information, please review ANSI, OSHA and literature provided by the grinding wheel and machine manufacturer. You may also contact the Saint-Gobain Product Safety Department at **Telephone 508-795-2317** or **Fax 508-795-5120** or your Saint-Gobain Abrasives, Inc. representative with any safety related questions.

NORTON SAINT-GOBAIN

NORTON SAINT-GOBAIN GFORCE™

NORTON SAINT-GOBAIN PARADIGM®

NORTON SAINT-GOBAIN AZTEC®

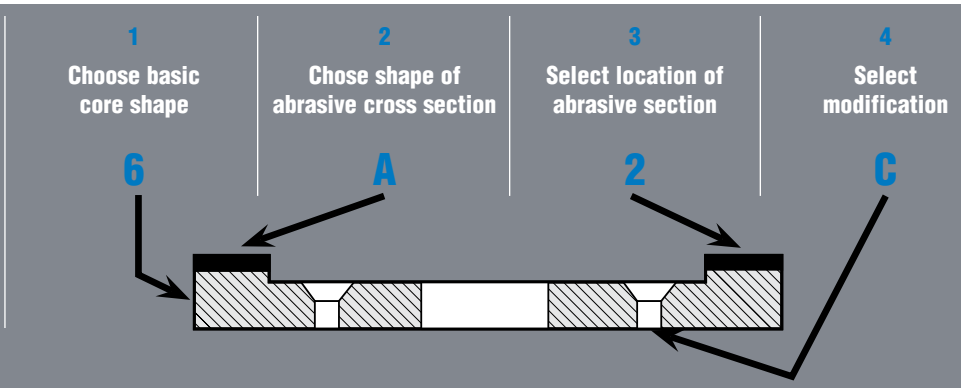
ANSI WHEEL SHAPE IDENTIFICATION SYSTEM

The American Standard Code employs a series of numbers and letters to designate the shape of a diamond wheel. Its use involves four simple steps shown at right.

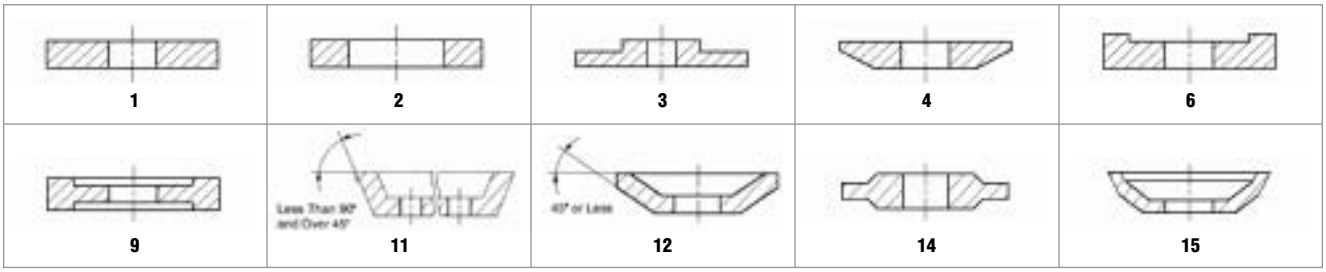
In this example, the complete wheel shape number would read:

6A2C

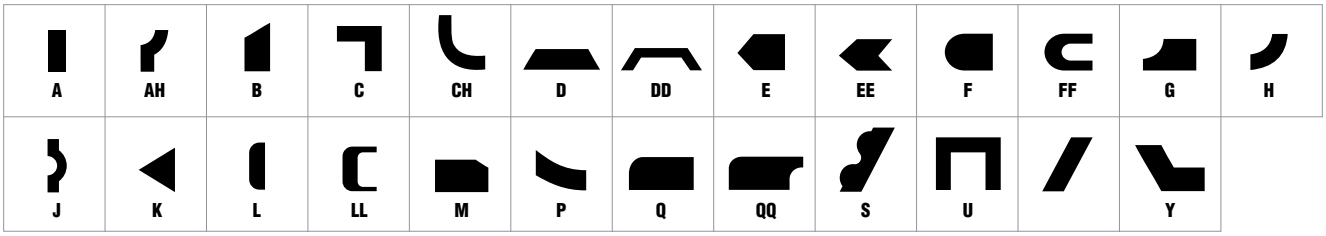
COURTESY OF ANSI



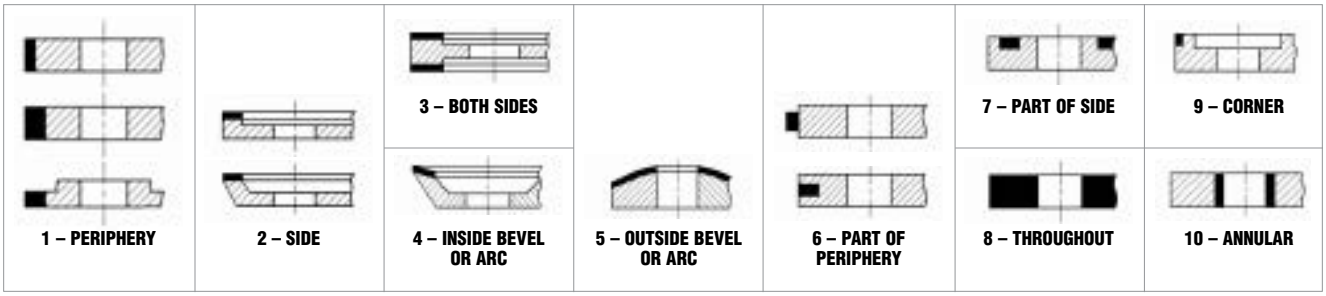
1. BASIC CORE SHAPES AND MARKS



2. ABRASIVE CROSS SECTIONS AND MARKS



3. LOCATION OF ABRASIVE SECTION AND MARKS



4. POPULAR MODIFICATIONS AND MARKS

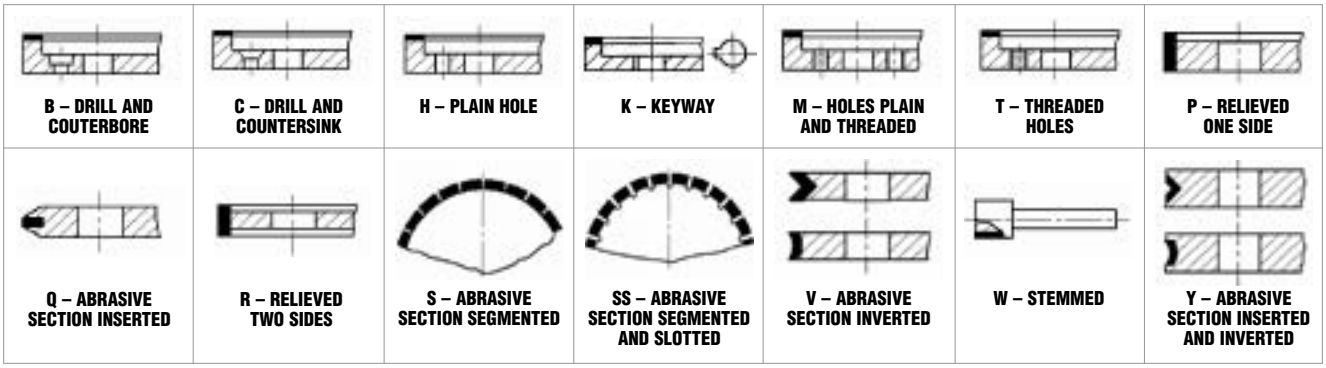


ILLUSTRATION ■ DIAMOND OR cBN MATERIAL	WHEEL SHAPE	AVAILABILITY		
		NORTON STOCK WHEELS	NORTON B99 EXPRESS MADE-TO-ORDER RESIN WHEELS	CNC WHEELS: NORTON UNIVEL, NORTON G-FORCE NORTON/WINTER NORTON
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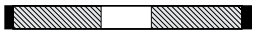
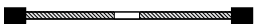
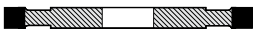
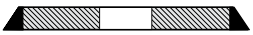
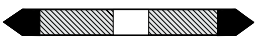
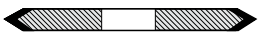
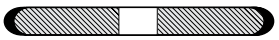
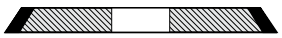
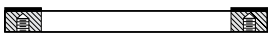
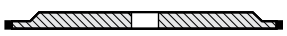
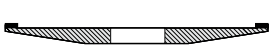
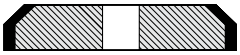
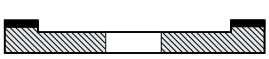
	**HH1**	PAGE 17		
	**HH2**	PAGE 17		
	**1A1**	PAGES 17 – 18	PAGE 28	PAGES 55, 57
	**1A1R**	PAGE 19	PAGE 29	
	**1A1RN**			PAGES 55, 57
	**1A8**		PAGE 29	
	**1B1**		PAGE 30	PAGES 55, 57
	**1E1**		PAGE 30	
	**1EE1**		PAGE 30	
	**1F1**		PAGE 31	
	**1FF1**		PAGE 31	
	**1V1**	PAGE 19	PAGE 32	PAGES 55 – 57
	**2A2T**		PAGE 33	
	**3A1**		PAGE 34	
	**4A2 & 4A2P**	PAGE 20	PAGE 35	
	**4Y1**		PAGE 36	
	**6A2**		PAGE 37	PAGES 56, 57

ILLUSTRATION ■ DIAMOND OR cBN MATERIAL	WHEEL SHAPE	AVAILABILITY		
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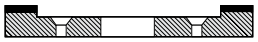
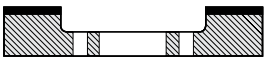
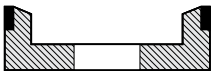
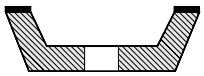
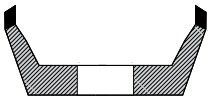
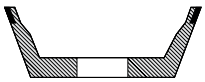
	**6A2C**	PAGE 20	PAGES 38 – 39	
	**6A2H**	PAGE 20		
	**6A9**		PAGE 40	
	**11A2**	PAGE 20	PAGE 41	PAGES 56, 58
	**11V5**			PAGES 56, 58
	**11V9**	PAGES 21 – 22	PAGES 42 – 44	PAGES 56, 58
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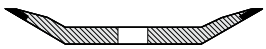	**12V9**	PAGE 23	PAGES 46 – 47	PAGES 56, 58
	**14A1**		PAGE 48	
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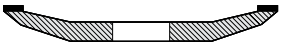
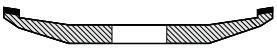
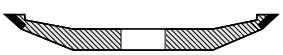
	**15A2**		PAGE 49	
	**15V4**		PAGE 50	
	**15V9**	PAGE 23	PAGES 51 – 52	

NORTON DIAMOND PRODUCT IDENTIFICATION SYSTEM / USAGE INFORMATION

ASD 120 – R 75 B99 1/8

ABRASIVE TYPE

ASD
- Used with B99 and B105 bonds
- Armored
- Durable
- Versatile
- Wet or dry
- Carbide/steel operations

CD
- Used with B99 bond

D
- Used with B99 bond
- Micron-sized diamond; finishing

M3D
- Used with M99 bond

M4D
- Used with M99 bond
- Armored
- Durable; for non-metallics

RMD
- Used with V99 bond

SD
- Used with B99 and V99 bonds
- Norton standard
- Wet or dry
- Free cutting
- Low horsepower (3/4 hp or less)

GRIT SIZE

- 100, 100S – Roughing
- 120 – Roughing/ cutting-off
- 150 – Combined roughing and finishing
- 180 – Improving finish
- 220, 320 & 400 – Finishing only
- 10/20 mic
- 6/12 mic

GRADE

Resin Bond
R – Norton standard
N – Free cutting

Metal Bond
N – Norton standard

Vitrified Bond
P – Norton standard
R – Most durable

CONCENTRATION

50
- Most economical
- For broad area of contact

75
- Norton standard
- Freer cutting than 100
- Dry grinding with ASD

100
- Very durable
- For flood coolants
- Use with 220 grit or finer
- Use for cutting-off

115
- For CNC grinding machines

125
- Form holding
- For high volume, high pressure coolant, precision applications on high-speed tool steels

BOND

B99
- Resin bond
- Wet or dry
- Tool making; resharpening

B105
- Premium resin bond
- Advanced heat-reducing bond
- Dry; reconditioning

B610 and B80
- For CNC grinding machines

M99
- Metal bond
- 1A1R cut-off
- Glass and ceramics

MSL
- Metal single layer
- Type 6A2C only
- Dry
- Offhand reconditioning/ finishing carbide

V99
- Vitrified bond
- Offhand finishing of carbide tools
- Plunge grinding

ABRASIVE DEPTH

1/16"
1/8"
1/4"
9/32"
3/8"
1/2" (New!)
3/4"
Solid

NORTON CBN PRODUCT IDENTIFICATION SYSTEM / USAGE INFORMATION

CB 120 – T B99 1/8

ABRASIVE TYPE

CB – cubic Boron Nitride
- Used with B99 bond
- Armored
- Wet or dry

BAM & BX – cubic Boron Nitride
- For CNC grinding machines

GRIT SIZE

- 100 – Roughing
- 120 –Roughing/cutting-off
- 150 –Combined roughing and finishing
- 180 –Improving finish
- 220, 320, 400 – For finishing only

GRADE

Q
- Approx. 50 concentration
- Type 6A2
- Broad area of contact

T
- Approx. 75 concentration
- Norton standard
- First choice
- Lower horsepower
- Broad area of contact
- Dry grinding
- Resharpening applications

W
- Approx. 100 concentration
- Most durable
- High volume coolant
- Flute polishing
- Surface grinding
- Cylindrical grinding

BOND

B99
- Resin bond
- Wet or dry

BXD3037 and WBB & WBE
- For CNC grinding machines

Aztec III
- Premium resin bond
- Dry
- Tool resharpening

Aztec .007
- Premium resin bond
- Dry
- Increased feed rates
- Heavy stock removal
- Heavier cuts

ABRASIVE DEPTH

1/16"
1/8"
1/4"
1/2" (New!)
Solid

WINTER DIAMOND PRODUCT IDENTIFICATION SYSTEM / USAGE INFORMATION

D 220 – C 100 K+ 925 Y A

ABRASIVE TYPE

D – Diamond

GRIT SIZE

- 100 – Roughing
- 120 – Roughing/ cutting-off
- 150 – Combined roughing and finishing
- 180 – Improving finish
- 220+ – Finishing

GRADE

C
J
N
R

CONCENTRATION

50
75
90
100
125

BOND

K+

- Diamond Resin

Reptilla

- Economical free-cutting, resin

M+

- Diamond metal

BOND MODIFIER #1

Resin Bond Modifiers

730 – Soft, dry grinding bond
777 – Dry grinding bond for high speeds
888 – Dry grinding bond for high speeds
920 – Dry and wet grinding with narrow-rim straight wheels; wear-resistant bond for cup wheels in wet grinding
921 – Modification of the 920 bond
925 – Dry grinding
1066 – Designed for OD grinding and topping of saw blades
1313 – Wet, profile grinding
1414 – Dry toolroom grinding with cup wheels
1421 – Dry grinding
4821 – Premium, sharp cutting action bond; extended wheel life when grinding carbide

Metal Bond Modifiers

789 – Extremely high grinding ratio; the choice when grinding steel and carbide combinations

BOND MODIFIER #2

X – Use when small percentage of steel is present
Y – Use when wet grinding

CORE

A – Aluminum
B – Resin
D – Bakelite
E – Steel
H – Powered Aluminum
None – Resin with metal fillers (for most specs)

WINTER CBN PRODUCT IDENTIFICATION SYSTEM / USAGE INFORMATION

B 220 – V 240 KSS 920 Y A

ABRASIVE TYPE

B – cBN

GRIT SIZE

- 120 – Roughing/ cutting-off
- 150 – Combined roughing and finishing
- 220 – Finishing

GRADE

J
N
R
V

CONCENTRATION

V120 – 50
V180 – 75
V240 –100
V300 – 125

BOND

KSS

- cBN resin

BOND MODIFIER #1

10

- Primarily dry grinding bond; toolroom grinding with cup wheels

63

- Variation of the standard resin bond – used with a more friable abrasive

920

- Dry and wet grinding with narrow-rim straight wheels; wear-resistant bond for cup wheels in wet grinding

BOND MODIFIER #2

Y – Use when wet grinding

CORE

A – Aluminum
D – Bakelite
E – Steel
None – Resin with metal fillers (for most specs)

	NORTON										
	ABRASIVES				BONDS						
	RESIN DIAMOND ASD	RESIN DIAMOND SD	METAL DIAMOND M4D	RESIN/ VITRIFIED cBN CB	RESIN DIAMOND B99/B99E	RESIN DIAMOND B105	METAL DIAMOND M99	VITRIFIED DIAMOND V99	RESIN cBN B99/ B99E	RESIN cBN B99EF	RESIN cBN AZTEC
3M / General Industrial Diamond / Diamond Productions, Inc	CGD, ND	GD, D, MD		CB	PS			V		BC	
Abrasive Technology	SN	S		cBN	B		M		B		
Accurate Diamond Tool	NCD	D, MD		BN	B		M				
Citco	5SD, 6SD	SD	MD	CB	B43, B52		M		B26	C3	
Engis	NMD	D, MD		cBN, CB							
Noritake				CBC		BX4			BD/B38		BX4
Radiac / US Diamond	NCD, WD, 1WD, MDC	D, MD	MD4C	B, CB, BZ	B7Z, BB, B5, B56, BN		M, MF	V	BZ, BN		
Regal Diamond				B, BB	BJ						
Superabrasives, Inc.	MDN	D, MD		B					B82	B5	
Tyrolit / Wickman / Bay State / Cincinnati	SDM, XDL, XDN, D, 7D, CMD	SD, D, 6D, MD	1D	5B, 1BN, BN, BM	BD, BC, BX33, B52, B6	Amigo	MI, MSS, MB		B72, B56, BG, B7	BXU8	Amigo
Wendt / Slip Naxos / Winterthur	SDK			B, BXW					RN	RR	

	NORTON POLYIMIDE				NORTON/WINTER			
	ABRASIVES		BONDS		ABRASIVES		BONDS	
	UNIVEL/G-FORCE							
	DIAMOND AD	cBN BX	DIAMOND AND cBN UNIVEL	DIAMOND AND cBN G-FORCE	DIAMOND D	cBN B	RESIN DIAMOND K+888	RESIN cBN K+920
3M / General Industrial Diamond / Diamond Productions, Inc	D	CB	BP	BPP	CGD, ND	CB	PS	
Abrasive Technology					SN	cBN	B	B
Accurate Diamond Tool					NCD	BN	B	
Citco	SD	CB	P	C5	5SD	CB	B43, B52	B26
Engis					NMD	cBN, CB		
Noritake						CBC		BD/B38
Radiac /					NCD, WD, 1WD, MDC	B, CB, BZ	B7Z, BB, B5, B56, BN	BZ, BN
Regal Diamond						B, BB	BJ	
Superabrasives, Inc.					MDN	B		B82
Tyrolit / Wickman / Bay State / Cincinnati					SDM, XDL XDN, D, 7D, CMD	5B, 1BN, BN, BM	BD, BC, BX33, B52, B6	B72, BG56, BG, B7
Wendt / Slip Naxos / Winterthur					SDK	B, BXW		RN

The “99” line of quality stock Diamond and cBN (cubic Boron Nitride) grinding products includes resin, vitrified, metal and MSL (metal single layer) bonds. Premium, high performance resin bond diamond and cBN wheels are also available.

TYPICAL APPLICATIONS

Norton B99 Diamond Wheels

- Sharpening cemented carbide cutting tools
- Cutting off carbide rod
- Grinding or cutting off non-ferrous materials such as ceramics or glass
- Surface grinding dies
- O.D. grinding spray coatings

Norton B99 cBN Wheels

- Sharpening high-speed (M2, D2, T15, etc.) steel cutting tools
- Surface and ID grinding hardened steel die components
- Precision grinding steel parts Rc 50 or harder

DIAMOND WHEELS

FEATURES	BENEFITS
High quality synthetic diamond	High material removal rates; longer wheel life versus conventional green silicon carbide wheels
Pre-engineered resin bond – B99	Free cutting; superior form holding; efficient wet or dry
Premium, heavy-duty resin bond – B105	Ideal for dry toolroom reconditioning applications
Metal bond – M99	Ideal for 1A1R cut-off applications and grinding glass or ceramic materials
MSL (metal single layer) diamond	Fast stock removal, cool cutting; excellent for dry offhand finishing of carbide tools; no wheel dressing required
Vitrified bond – V99	Most durable under high grinding forces; excellent for wet, offhand finishing of carbide tools

cBN WHEELS

FEATURES	BENEFITS
cBN (cubic Boron Nitride) abrasive material is second in hardness to diamond	Easily cuts difficult-to-grind steel parts Rc 50 or harder Highly wear resistant and thermally stable
Pre-engineered resin bond – B99	Free cutting, superior form holding
Premium Aztec III resin bond	Most efficient for dry tool resharpening
Premium Aztec .007 resin bond	Most efficient for dry tool resharpening where heavy stock removal is desired

TECHtip

- Truing makes the wheel concentric with the spindle.
- Dressing opens the wheel’s cutting face.
- Always true and dress diamond and cBN wheels prior to use.
- Diamond and cBN wheels with grit sizes 100 - 180 can be trued with a Brake Controlled Truing Device.
- Refer to the “Mounting, Truing and Dressing Guide” for more information.

It is the user’s responsibility to refer to and comply with ANSI B7.1

HOW TO SELECT NORTON STOCK DIAMOND WHEELS

SELECT

SHAPE		Use the "Wheel Shape Index" to determine shape and availability.
WHEEL DIMENSIONS	**D x T x H** **Select Diameter x Thickness x Hole from the availability tables.** Use blueprint numbers where available.	
ABRASIVE	**RESIN BOND WHEELS:** **ASD** **Armored diamond, durable.** Versatile: can be used wet or dry. Also should be used when carbide and steel are ground in the same operation. **D** **Micron-sized diamond.** Used for finishing and polishing operations. **SD** **Free cutting standard.** Used wet or dry; should be used on low horsepower (3/4 hp or less) machines. **METAL BOND WHEELS:** **M4D** **Armored, durable standard.** A strong, blocky crystal designed for high performance on glass, ceramics, refractories and other non-metallics. **VITRIFIED BOND WHEELS:** **RMD** **Medium strength.** Specifically designed for use with vitrified bonds. **SD** **Free cutting standard.**	Select the abrasive based on horsepower, grinding wet or dry, and contact with steel.
GRIT SIZE	**100** **Roughing.** The most common grit size for roughing operations. **120** **For roughing where 100 is too coarse.** Also for cut-off applications. **150** **Medium stock removal plus good finish.** For combined roughing and finishing applications. **180** **Medium stock removal plus good finish.** To improve finish. **220** **Finishing** **320** **Finishing** **400** **Fine Finishing** **10/12 Mic** **Super Fine Finishing** **6/12 Mic** **Super Fine Finishing**	Select the abrasive grit size based on finish and material removal rate required.
GRADE	**RESIN BOND WHEELS:** **R** **Norton standard** **N** **Free cutting** **METAL BOND WHEELS:** **N** **Norton standard** **VITRIFIED BOND WHEELS:** **P** **Norton standard** **R** **Most durable**	The hardness of the wheel
CONCENTRATION	**50** **Most economical.** For broad area of contact grinding. **75** **Norton standard.** Freer cutting than 100 and the most economical for dry grinding with ASD diamond. **100** **Very durable.** Recommended under flood coolant conditions; for use with 220 grit or finer, when durability is required, and for cut-off applications. **125** **Form holding.** Used in high-volume, high-pressure coolant, precision applications on high speed tool steels.	Select the abrasive concentration based on grinding wet or dry, material removal rates and form holding requirements.
BOND	**RESIN BOND:** **B99** **Norton standard.** Versatile enough to be used wet or dry on most tool making or resharpening applications. **B105** **Premium, heat-reducing bond.** For dry toolroom reconditioning applications. **METAL BOND:** **M99** **Best suited for 1A1R cut-off applications** as well as grinding glass or ceramic materials. **MSL** **Metal Single Layer.** Available in shape 6A2C for dry, offhand reconditioning of carbide tools. **VITRIFIED BOND:** **V99** **Best for wet offhand finishing of carbide tools** as well as plunge grinding of carbide tools.	Select the bond based on the material being ground and grinding application.
ABRASIVE DEPTH	1/16 1/8 1/4 9/32 Solid	Usable abrasive

HOW TO SELECT NORTON STOCK CBN WHEELS

SELECT

SHAPE			Use the "Wheel Shape Index" to determine shape and availability.
WHEEL DIMENSIONS	**D x T x H**	**Select Diameter x Thickness x Hole from the availability tables.** Use blueprint numbers where available.	
ABRASIVE	**CB**	**Norton standard coated cBN (cubic Boron Nitride)**. Optimized for high performance in resin bond systems.	Select Norton cBN abrasive to grind hard tool steels such as A2, D2, T15, etc., and tough alloy steels.
GRIT SIZE	**100** **120** **150**	**Roughing.** The most common grit size for roughing operations. **For roughing where 100 is too coarse**. Also for cut-off applications. **Medium stock removal plus good finish**. For combined roughing and finishing applications.	Select the grit size based on finish and material removal rate required.
GRADE	**Q** **T** **W**	Approximately 50 concentration. Used on wide area of contact applications. **Norton standard**. Approximately 75 concentration. T is the first choice for lower horsepower equipment or large area of contact between the wheel and the work piece. Ideal for resharpening applications with 11V9, 12A2, 4A2P, and 15V9 wheel shapes when dry grinding. **Most durable.** Approximately 100 concentration, W is recommended for high-volume coolant operations: flute grinding from solid, flute polishing, surface, and cylindrical grinding.	The hardness of the wheel
BOND	**B99** **Aztec III** **Aztec .007**	**Norton standard.** Pre-engineered for optimal performance with cBN abrasive. Available in all shapes. **The Norton advanced heat-reducing, lubricating resin bond.** Used for dry grinding tool steels. **The Norton premium resin bond for increased feed rates,** high stock removal and heavier cuts – when dry grinding tool steels.	Select the bond depending on the type of grinding application.
ABRASIVE DEPTH	**1/16** **1/8** **1/4** **9/32** **Solid**		Usable abrasive

NORTON OFFERS A COMPREHENSIVE STOCK PRODUCT SELECTION TO SERVICE MOST OF YOUR NEEDS – WITH THE FASTEST DELIVERY AND LOWEST PRICES. SEE THIS CATALOG SECTION FIRST:

- Norton Stock B99 Products

Can't find the specification in the above section?

Then refer to the Norton B99 Express Made-to-Order Resin Product section on pages 24 - 52 and the Norton CNC Wheel section on pages 53 - 59.

If a product can not be found in the B99 Express offering:

Contact your Norton sales representative or distributor for a custom-made product recommendation.

TECHtip

DIAMOND GRINDS:

In general, diamond is used to grind non-ferrous materials, because it reacts with iron.

- Cemented carbide
- Glass
- Ceramics
- Fiberglass
- Plastics
- Stone
- Abrasives
- Electronic components and materials

cBN GRINDS:

cBN is used to grind ferrous materials.

- High-speed tool steels
- Die steels
- Hardened carbon steels
- Alloy steels
- Aerospace alloys
- Hardened stainless steel
- Abrasion-resistant ferrous materials

It is the user's responsibility to refer to and comply with ANSI B7.1

SPECcheck

DIAMOND WHEEL STARTING RECOMMENDATION GUIDE

APPLICATION OR COMMON MACHINE TYPE	COMMON WHEEL SIZE, TYPE & BLUEPRINT	APPLICATION VARIABLES	RECOMMENDED SPECIFICATION
CARBIDE GRINDING – TOOLROOM PRODUCTION			
Blanchard Grinding	10", 11", 16" & 18" diameters	Wet – solid carbide	
• Vertical Spindle Surface Grinding	Type 2A2T	• 1" or larger pieces – roughing	SD100-R75B99E*
		• Small pieces	ASD100-R75B99E*
		Carbide & steel (combination)	ASD100-R75B99E*
Hand	6" x 3/32" x 1-1/4"	Dry	ASDC320B-R125B99
• Burr Grinding	Type 1V1P V – 20° ME89562		
Centerless (wet)	12", 14", 16", 18", & 20" diameters	Roughing	ASD100-R75B99E*
• Throughfeed Grinding	Type 1A1		
• Unison Dedtru Grinder	7" x 1" x 1-1/4" Type 1A1		ASD150-R75B99E*
Cutting Off (wet)	6" x .035" x 1-1/4" Type 1A1R ME43572	• Most durable • Free cutting	ASD100S-R100B99 SD100-R75B99
	10" x .050" x 1-1/4" Type 1A1R ME43565		SD120-R100B99
Cylindrical Grinding (wet)	10", 12", 14", 16" & 20" diameters Type 1A1	Wet, rough grinding of cemented carbides, hard (55 Rc+) plasma and ceramic spray coatings	ASD180-R100B99 ASD180-R75B99E* ASD150-R75B99 ASD120-R75B99
		Wet, finish grinding of all carbides, plasma and ceramic spray coatings	SD220-R100B99E*
Tool Sharpener Grinder (wet) • Bench Type	5" x 1" x 1-1/4" Type 6A2H ME27084 Rim Width (W) = 1-1/16	Tool sharpening	SD320-R50B99
Hand Honing (dry)	Various sizes Type HH1 or HH2		ASD100-R100B99 SD320-100V99
Lamination Dies (wet)	Various sizes Type 1A1	Surface grinding of carbide	ASD120-R75B99
Surface Grinding (wet)	Various sizes	Roughing	
• Straight Wheels	Type 1A1	• Durable	ASD100S-R100B99E*
		• Free cutting	SD100S-R100B99
		Finishing only	SD220-R100B99
		General purpose	ASD150-R75B99
Tool & Cutter Grinding	Various sizes Type 11V9, 12V9 or 15V9	Wet or dry	ASD120-R7599
CARBIDE GRINDING – OFFHAND			
Single-Point Carbide Tools	6" x 3/4" x 1-1/4" Type 6A2C ME27853	Wet roughing	
		• Durable	RMD150-P50V99*
		• Free cutting	SD150-P50V99
		Wet finishing	
		• Durable	RMD220-P50V99*
		• Free cutting	SD220-P50V99
		Wet or dry grinding where free-cutting and self-dressing wheels are required	
		• Roughing	ASD120-R75B99
		• Finishing	SD220-R50B99E*

Note: Diamond depths are not indicated in above listings. When ordering, be sure to include Diamond depth (1/16, 1/8, etc.).
*Non-stock: Refer to the B99E Express Made-to-Order Wheel section.

SPECcheck

CBN WHEEL STARTING RECOMMENDATIONS

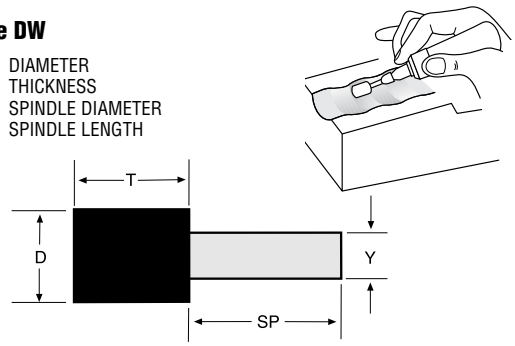
APPLICATION OR COMMON MACHINE TYPE	COMMON WHEEL SIZE, TYPE & BLUEPRINT	APPLICATION VARIABLES	RECOMMENDED SPECIFICATION
TOOLROOM GRINDING			
Cutter Sharpening	3-3/4" x 1-1/2" x 1-1/4"	Dry	Aztec III 120T
• Milling Cutters, Broaches,	Type 11V9 ME92192	Wet	CB120-TB99
Reamers, etc.	6" x 1" x 1-1/4"	Wet or dry	CB120-TB99
	Type 12A2 ME27758		
	6" x 3/4" x 1-1/4"	Wet or dry	CB120-TB99
	Type 12V9 ME48666		
	6" x 3/4" x 1-1/4"	Wet or dry	CB100-WB99E*
	Type 15V9 ME40633		
Surface Grinding	10" x 1/2" x 3"	Wet or dry	CB100-TB99E*
	Type 1A1		
Cylindrical Grinding	12" x 1/2" x 3"	Wet or dry	CB150-WB99E*
	Type 1A1		
Internal Grinding Tools	Thinner than 1/2"	Wet or dry	CB100-WB99
	Type DW		
	1/2" or thicker	Wet or dry	CB120-TB99E*
	Type 1A1		
Slotting	7" x .040" x 1-1/4"	Water-base coolant	CB120-WB99E*
	Type 1A1R		

Note: cBN depths are not indicated in above listings. When ordering, be sure to include cBN depth (1/16, 1/8, etc.)
* B99 Express made-to-order: Refer to the B99E Express Made-To-Order wheel section.

SIZE D x T	SPECIFICATION	UPC #
TYPE DW MOUNTED POINTS – DIAMOND		
1/8 x 1/4 Steel Spindle 1/8 x 1-1/2	SD220-R100B99-SOLID	69014192236
3/16 x 1/4 Steel Spindle 1/8 x 1-1/2	SD100-R100B99-SOLID	69014192238
1/4 x 1/4 Steel Spindle 1/8 x 1-1/2	SD100-R100B99-SOLID	69014192240
3/8 x 1/4 Steel Spindle 1/8 x 1-1/2	SD100S-R100B99-SOLID	69014192243
1/2 x 1/2 Steel Spindle 1/4 x 1-1/2	SD100S-R100B99-SOLID SD220-R100B99-SOLID	69014192248 69014192249
3/4 x 3/8 Steel Spindle 1/4 x 1-1/2	SD150-R100B99-SOLID	69014192251
1 x 1/2 Steel Spindle 1/4 x 1-1/2	SD100-R100B99-SOLID	69014192428
TYPE DW MOUNTED POINTS – cBN		
3/16 x 1/4 Carbide Spindle .125 x 1-3/4	CB150-WB99-SOLID	69014192258
1/4 x 1/4 Carbide Spindle .125 x 1-3/4	CB120-WB99-SOLID	69014192260
1/2 x 1/2 Carbide Spindle .250 x 2-1/4	CB100-WB99-SOLID	69014192272
3/4 x 1/4 Carbide Spindle .250 x 2-1/4	CB100-WB99-SOLID	69014192276
1 x 1/4 Carbide Spindle .250 x 2-1/4	CB100-WB99-SOLID	69014192277
SIZE T x W x L	**SPECIFICATION**	**UPC #**
TYPE HH1 HAND HONES – DIAMOND		
1/4 x 1/4 x 6 One 1/16 deep 1" long insert in one 1/4 surface	ASD220-R100B99-1/16	69014192139
1/4 x 3/8 x 4 One 1/16 deep 1" long insert in one 3/8 surface	ASD100-R100B99-1/16 ASD180-R100B99-1/16 ASD220-R100B99-1/16 ASD320-R100B99-1/16 ASD400-R100B99-1/16 D10/20MIC-R100B99-1/16 SD220-100V99-1/16 SD320-100V99-1/16	69014192141 69014192142 69014191670 69014191672 69014192143 69014192144 69014191671 69014192140
TYPE HH2 HAND HONES – DIAMOND		
1/4 x 3/8 x 4 Two 1/16 deep 1" long inserts in one 3/8 surface	ASD120/220-R100B99-1/16 ASD150/320-R100B99-1/16 ASD220/320-R100B99-1/16 ASD220/400-R100B99-1/16 ASD320/400-R100B99-1/16 SD220/320-100V99-1/16	69014192150 69014192177 69014192178 69014192179 69014192180 69014192149
1/4 x 7/16 x 4 Two 1/16 deep 1" long inserts in one 7/16 surface	SD320/400-100V99-1/16	69014192182

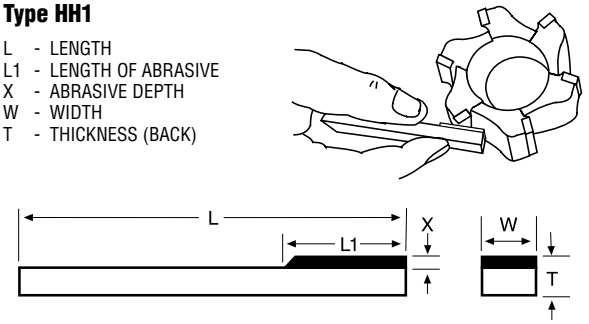
Type DW

D - DIAMETER
T - THICKNESS
Y - SPINDLE DIAMETER
SP - SPINDLE LENGTH



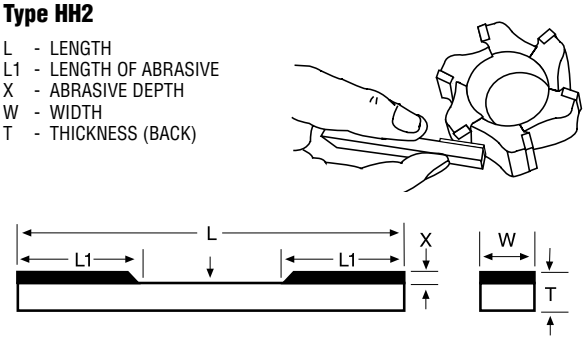
Type HH1

L - LENGTH
L1 - LENGTH OF ABRASIVE
X - ABRASIVE DEPTH
W - WIDTH
T - THICKNESS (BACK)



Type HH2

L - LENGTH
L1 - LENGTH OF ABRASIVE
X - ABRASIVE DEPTH
W - WIDTH
T - THICKNESS (BACK)



CAN'T FIND YOUR SPECIFICATION HERE?

CHECK OUT THE NORTON/WINTER TOOLROOM SECTION. THEN REFER TO OUR B99 EXPRESS MADE-TO-ORDER RESIN WHEEL SECTION.

The Norton B99 Express service is designed to offer you up to 65,000 made-to-order choices of resin bond Diamond and cBN wheels. Almost all popular sizes are offered. Size and shape availability are shown.

12" and less diameter B99 Express wheels will ship in two weeks or less from the date the order is received by Norton. 14" and larger wheels are available at standard lead-times.

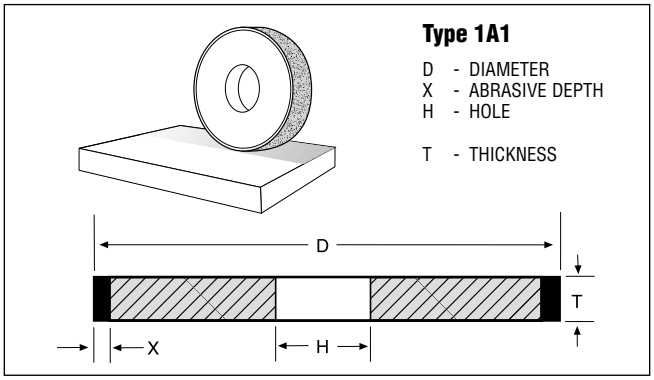
SIZE D x T x H	SPECIFICATION	UPC #
TYPE 1A1 STRAIGHT – DIAMOND		
3/4 x 1/4 x 1/4	ASD150-R100B99-1/8	69014192174
1 x 1/4 x 1/4	SD100-R100B99-1/8	69014192175
1-1/2 x 1/2 x 1/2	D6/12MIC-N100B99-1/8	69014192176
2 x 1/8 x 1/4	SD100-R100B99-1/8	69014192184
3 x 1/4 x 3/4	SD180-N100B99-1/8	69014192187
4 x 1/32 x 1-1/4	SD100S-R100B99-1/4	69014192192
4 x 1/16 x 1-1/4	SD100S-R100B99-1/4	66260273583
	SD150-R100B99-1/4	66260273584
	SD220-R100B99-1/4	66260273586
4 x 1/8 x 3/4	SD150-R100B99-1/4	69014192024
4 x 1/8 x 1-1/4	SD150-R100B99-1/4	69014191677
4 x 1/4 x 1/2	SD150-R100B99-1/4	66260273590
4 x 1/4 x 3/4	SD150-R100B99-1/4	66260273592
4 x 1/4 x 1-1/4	SD100S-R100B99-1/4	66260273587
	SD120-R100B99-1/4	66260273588
	SD150-R100B99-1/4	66260273589
4 x 1/2 x 1-1/4	SD150-R100B99-1/4	66260273594
6 x 1/32 x 1-1/4	SD220-R100B99-1/4	69014192197
6 x 1/16 x 1-1/4	SD100-R100B99-1/4	66260273596
	SD150-R100B99-1/4	66260273597
	SD180-R100B99-1/4	66260273598
	SD220-R100B99-1/4	66260273599
6 x 1/8 x 1-1/4	ASD150-R75B99-1/4	66260273617
	SD100-R100B99-1/4	66260273611
	SD120-R100B99-1/4	66260273612
	SD150-R100B99-1/4	66260273613
	SD180-R100B99-1/4	66260273614
	SD220-R100B99-1/4	66260273615
6 x 1/4 x 1-1/4	ASD100S-R75B99-1/4	69014192205
	ASD120-R75B99-1/4	69014192769
	ASD150-R75B99-1/4	66260273609
	ASD180-R75B99-1/4	69014192770
	ASD220-R75B99-1/4	69014192771
	ASD320-R75B99-1/4	69014192772
	RMD180-P100V99-1/8	69014192203
	SD120-R100B99-1/4	69014191691
	SD150-R100B99-1/4	69014191692
	SD180-R100B99-1/4	69014191693
	SD220-R100B99-1/4	69014192764
6 x 3/8 x 1-1/4	ASD120-R75B99-1/4	69014192773
	ASD150-R75B99-1/4	69014191695
	SD150-R100B99-1/4	69014191696
6 x 1/2 x 1-1/4	ASD120-R75B99-1/4	69014192777
	ASD150-R75B99-1/4	69014191698
	ASD220-R75B99-1/4	69014192779
	ASD320-R75B99-1/4	69014192780
	SD120-R100B99-1/4	66260273557
	SD150-R100B99-1/4	66260273561
	SD180-R100B99-1/4	69014191700
7 x 1/4 x 1-1/4	ASD150-R75B99-1/8	69014191701
	SD100S-R100B99-1/4	69014192210
	SD120-R100B99-1/4	66260273566
	SD150-R100B99-1/4	69014191703
	SD180-R100B99-1/4	69014191704
	SD220-R100B99-1/4	69014191705
7 x 3/8 x 1-1/4	ASD150-R75B99-1/4	69014191848
	SD120-R100B99-1/4	69014191849
	SD220-R100B99-1/4	69014191852
7 x 1/2 x 1-1/4	ASD100-R75B99-1/4	69014192211
	ASD150-R75B99-1/4	69014191853
	ASD180-R75B99-1/4	69014192212
	SD120-R100B99-1/4	69014191854
	SD150-R100B99-1/4	69014191855
	SD180-R100B99-1/4	69014191856
	SD220-R100B99-1/4	69014191857
8 x 1/2 x 1-1/4	SD150-R100B99-1/4	66260273574

STANDARD PACKAGE = 1 MOUNTED POINT, HAND HONE, OR WHEEL

CONTINUED

SIZE D x T x H	SPECIFICATION	UPC #
TYPE 1A1 STRAIGHT – DIAMOND (CONT'D)		
10 x 1/2 x 3	ASD120-R75B99-1/4	69014192305
	ASD180-R100B99-1/4	69014192306
12 x 1/2 x 3	ASD150-R75B99-1/4	69014192310
12 x 1/2 x 5	ASD150-R75B99-1/4	69014192311
12 x 1 x 3	ASD120-R75B99-1/4	69014192312
12 x 1 x 5	ASD120-R75B99-1/4	69014192313
14 x 1/2 x 5	ASD150-R75B99-1/4	69014192314
14 x 1 x 5	ASD120-R75B99-1/4	69014192316
20 x 1 x 12	ASD120-R75B99-1/4	69014192325
TYPE 1A1 STRAIGHT – cBN		
6 x 1/8 x 1-1/4	CB120-TB99-1/4	66260273601
6 x 1/4 x 1-1/4	CB120-TB99-1/4	66260273605
6 x 1/2 x 1-1/4	CB120-TB99-1/4	66260273607
7 x 1/4 x 1-1/4	CB120-TB99-1/4	69014192021
7 x 1/2 x 1-1/4	CB120-TB99-1/4	66260273567
12 x 1/2 x 5	CB150-TB99-1/4	66260273560
12 x 1 x 5	CB150-TB99-1/4	66260273562

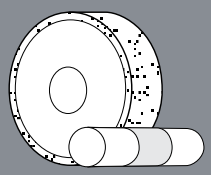
STANDARD PACKAGE = 1 WHEEL



NOTE: 1A1 NORTON STOCK WHEELS WITH 1/8" DIAMOND DEPTH HAVE BEEN CONVERTED TO 1/4" DEPTH – AND PRICED TO DELIVER EXCEPTIONAL VALUE!

TECHtip

CYLINDRICAL GRINDING APPLICATIONS – 1A1 WHEELS:



- Includes all outside grinding of round parts, even though the finished product is not always a true cylinder.
- Infeed at both ends of the traverse to keep wheel face flat.
- Use work supports to prevent deflection.
- Rough grinding traverse speed should be 1/2 to 2/3 of the thickness of the wheel per work revolution.
- Finishing grinding traverse speed should be 1/2" or less per work revolution.

It is the user's responsibility to refer to and comply with ANSI B7.1

DIAMOND GRINDS:

- Cemented carbide
- Glass
- Ceramics
- Fiberglass
- Plastics
- Stone
- Abrasives
- Electronic components and materials

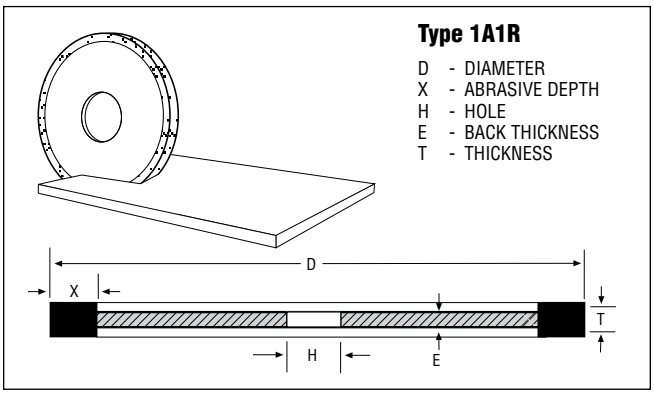
CBN GRINDS:

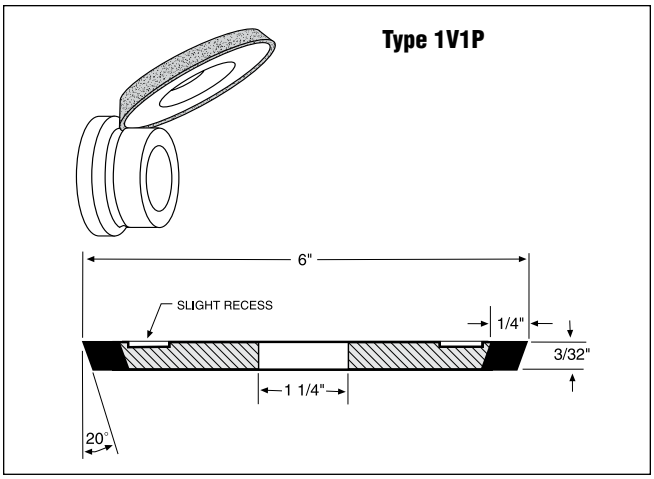
- High-speed tool steels
- Die steels
- Hardened carbon steels
- Alloy steels
- Aerospace alloys
- Hard stainless steel
- Abrasion-resistant ferrous materials

SIZE D x T x H	SPECIFICATION	UPC #
TYPE 1A1R CUT-OFF – DIAMOND		
3 x .020 x 1/2 (ME104177)	M4D150-N50M99-1/8	69014192060
4 x .012 x 1/2 (ME104180)	M4D180-N75M99-1/8 M4D220-N75M99-1/8	69014192063 69014192064
4 x .020 x 1/2 (ME104180)	M4D220-N100M99-1/8	69014192067
4 x .030 x 1/2 (ME104180)	M4D150-N75M99-1/8	69014192068
4 x 1/32 x 3/4 (ME43570)	SD100S-R100B99-1/4 SD120-R100B99-1/4	69014192151 69014191706
4 x 1/32 x 1-1/4 (ME43570)	SD100S-R100B99-1/4	69014192152
5 x .015 x 1/2 (ME104180)	M4D150-N100M99-1/8 M4D220-N100M99-1/8	69014192069 69014192070
6 x .017 x 1-1/4 (ME104180)	M4D150-N100M99-1/8 M4D220-N100M99-1/8	69014192082 69014192083
6 x .025 x 1-1/4 (ME104180)	M4D150-N100M99-1/8	69014192086
6 x .035 x 5/8 (ME104177)	M4D100-N75M99-1/8	69014192088
6 x .035 x 1-1/4 (ME43572)	ASD120-R75B99-1/4 SD100-R75B99-1/4 ASD100S-R100B99-1/4 ASD120-R100B99-1/4 SD100-R100B99-1/4 SD100S-R100B99-1/4 SD220-R100B99-1/4	69014191707 69014192155 69014192158 69014192159 69014191858 69014192156 69014192157
6 x .035 x 1-1/4 (ME73316)	ASD100S-R100B99-9/32 ASD120-R100B99-9/32 SD100-R100B99-9/32 SD120-R100B99-9/32 SD150-R100B99-9/32	69014192164 69014192165 69014192161 69014192162 69014192163
6 x .045 x 1-1/4 (ME83991)	SD100-R50B99-1/8	69014192166
6 x .055 x 1-1/4 (ME104177)	M4D100-N75M99-1/8	69014192099
7 x .035 x 1-1/4 (ME82347)	ASD100-R100B99-1/4	66260238686
7 x .040 x 1-1/4 (ME104177)	M4D120-N75M99-1/8	69014192105
7 x .055 x 1-1/4 (ME104177)	M4D120-N100M99-1/8	69014192108
8 x .030 x 1-1/4 (ME104180)	M4D180-N75M99-1/8	69014192110
8 x .045 x 5/8 (ME43569)	SD120-R100B99-1/4	69014192167
8 x .045 x 1 (ME43569)	SD120-R100B99-1/4	69014192168
8 x .045 x 1-1/4 (ME43569)	SD120-R100B99-1/4	69014192169
8 x .050 x 1-1/4 (ME104180)	M4D180-N75M99-1/8	69014192114
10 x .050 x 1-1/4 (ME 43565)	ASD120-R100B99-1/4 CD100-R100B99-1/4 SD120-R100B99-1/4	66260230236 69014192815 69014192170
10 x .050 x 3 (ME 43565)	ASD100S-R75B99-1/4	69014192172
12 x .070 x 3/4 (ME 43567)	SD150-R100B99-1/4	69014192173
14 x .070 x 3/4 (ME 106589)	SD120-R100B99-1/4	66260259011
TYPE 1A1R CUT-OFF – cBN		
6 x .035 x 1-1/4 (ME43572)	CB100-WB99-1/4	69014192160

SIZE D x T x H	SPECIFICATION	UPC #
TYPE 1V1P FLUTING – DIAMOND		
6 x 3/32 x 1-1/4 Face Bevel 1 Side 20 Deg Copper Core (ME89562)	ASD320B-R125B99-1/4 ASDC320C-R100B99-1/4	69014192302 69014192761

STANDARD PACKAGE = 1 WHEEL

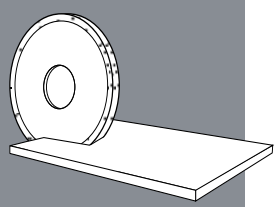




TECHtip

CUT-OFF APPLICATIONS – 1A1R WHEELS:

- Use the largest diameter flanges possible
- Use flanges of equal diameter
- Use the thickest wheel possible for increased stiffness and straightness of cut



cBN wheels are used on hardened steels. Diamond wheel are used to cut or slot carbide, glass or ceramic parts.

It is the user's responsibility to refer to and comply with ANSI B7.1

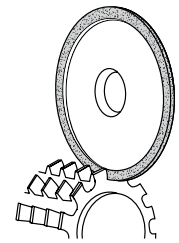
SIZE D x T x H	SPECIFICATION	UPC #
TYPE 4A2P DISH – DIAMOND		
6 x 3/8 x 1-1/4 Rim Width 1/4" (ME88369)	ASD120-R75B99-1/16	69014192280
TYPE 6A2C STRAIGHT CUP – DIAMOND		
6 x 7/16 x 1-1/4 Rim Width 1" (0640185M)	D120/140-H-MSL	66260269172
6 x 3/4 x 1-1/4 Rim Width 3/4" (ME27853)	SD220-R50B99-1/16 ASD120-R75B99-1/16 ASD120-R75B99-1/8 SD150-P50V99-1/16 SD220-P50V99-1/8	69014191665 69014191860 69014192786 69014192217 69014191623
6 x 3/4 x 1-1/4 Rim Width 1/2" (ME30621)	ASD120-R75B99-1/8	66260273565

STANDARD PACKAGE = 1 WHEEL

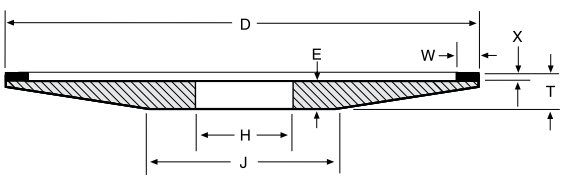
SIZE D x T x H	SPECIFICATION	UPC #
TYPE 6A2H STRAIGHT CUP – DIAMOND		
5 x 1 x 1-1/4 Rim Width 1-1/16" (ME27084)	SD320-R50B99-1/16	69014192221
TYPE 11A2 FLARING CUP – DIAMOND		
6 x 1-1/2 x 1-1/4 Rim Width 1/4" (ME128467)	ASD150-R100B99-1/4	69014192799

STANDARD PACKAGE = 1 WHEEL

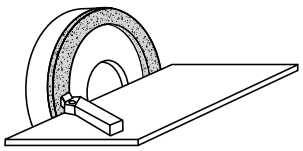
Type 4A2P

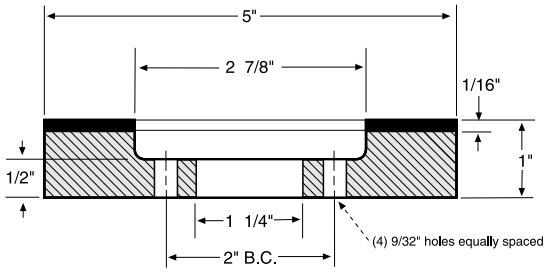


D - DIAMETER
E - BACK THICKNESS
H - HOLE
J - HUB DIAMETER
T - THICKNESS
W - RIM WIDTH
X - ABRASIVE DEPTH

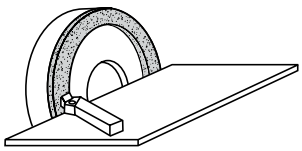


Type 6A2H

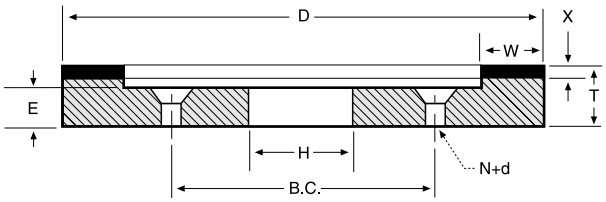




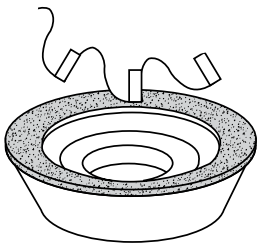
Type 6A2C



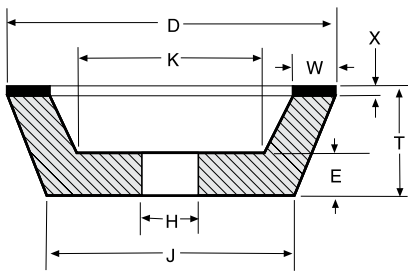
D - DIAMETER
E - BACK THICKNESS
H - HOLE
BC - BOLT CIRCLE DIAMETER
T - T HICKNESS
N - NUMBER OF MOUNTING HOLES
W - RIM WIDTH
X - ABRASIVE DEPTH
d - DIAMETER OF MOUNTING HOLES



Type 11A2



D - DIAMETER
K - INSIDE DIAMETER OF FLAT
H - HOLE
E - BACK THICKNESS
J - HUB DIAMETER
T - THICKNESS
W - RIM WIDTH
X - ABRASIVE DEPTH



REFER TO "BRAKE CONTROLLED TRUING DEVICES" AND "DRESSING STICKS" SECTIONS FOR TRUING AND DRESSING PRODUCTS.

BEST — ASD DIAMOND / B105 RESIN BOND WHEELS – IDEAL FOR DRY GRINDING CARBIDE TOOLS

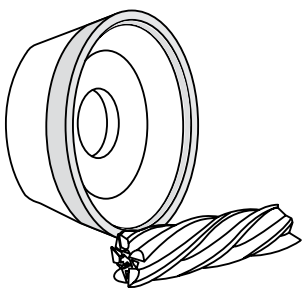
FEATURES	BENEFITS
▮ Premium quality diamond	▮ Produces keen cutting tools that hold their shape, are easier to sharpen, and require fewer reconditionings
▮ Advanced, heat-reducing bond	▮ Minimizes heat generation and thermal damage to tool ▮ Increases tool life and productivity ▮ Lasts more than 2X as long as standard diamond wheels ▮ Lowest total wheel costs; highest productivity
▮ Self-lubricating bond	▮ No steel or braze loading ▮ Uses less power
▮ Unique self-dressing core	▮ Eliminates wheel core damage ▮ Eliminates downtime to dress core

SIZE D x T x H	SPECIFICATION	UPC #
TYPE 11V9 FLARING CUP – DIAMOND		
3-3/4 x 1-1/2 x 1-1/4 Insert Length 3/8" (ME92192)	ASD100S-R75B105-1/16	69014191904
	ASD120-R75B105-1/16	69014191905
	ASD150-R75B105-1/16	69014191906
	ASD100S-R75B105-1/8	69014191908
	ASD120-R75B105-1/8	69014191909
	ASD150-R75B105-1/8	69014191910
5 x 1-3/4 x 1-1/4 Insert Length 7/16" (ME98298)	ASD120-R75B105-1/16	69014191913
	ASD150-R75B105-1/16	69014191914
	ASD100S-R75B105-1/8	69014191916
	ASD120-R75B105-1/8	69014191917
	ASD150-R75B105-1/8	69014191918

STANDARD PACKAGE = 1 WHEEL

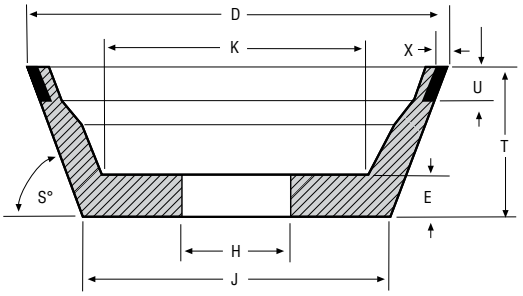
SIZE D x T x H	SPECIFICATION	UPC #
TYPE 11V9 FLARING CUP – DIAMOND		
3 x 1-1/4 x 3/4 Insert Length 3/8" (ME93912)	ASD120-R75B99-1/16	69014192291
	ASD150-R75B99-1/16	69014192292
	SD150-R100B99-1/16	69014192293
3-3/4 x 1-1/2 x 3/4 Insert Length 3/8" (M92192)	ASD120-R75B99-1/16	69014192022
3-3/4 x 1-1/2 x 1-1/4 Insert Length 3/8" (ME92192)	ASD150C-R50B99-1/8	69014190751
	ASD120-R75B99-1/16	69014191660
	ASD150-R75B99-1/16	69014191725
	ASD180-R75B99-1/16	69014191658
	ASD220-R75B99-1/16	69014192363
	ASD100S-R75B99-1/8	69014191653
	ASD120-R75B99-1/8	69014191652
	ASD150-R75B99-1/8	69014191651
	ASD180-R75B99-1/8	69014191650
	SD120-R100B99-1/16	69014191657
	SD150-R100B99-1/16	69014191656
	SD220-R100B99-1/16	69014191654
	SD320-R100B99-1/16	69014192814
	SD100S-R100B99-1/8	69014192427
	SD120-R100B99-1/8	69014191649
	SD150-R100B99-1/8	69014191648
	SD180-R100B99-1/8	69014191647
	SD220-R100B99-1/8	69014191646
5 x 1-3/4 x 1-1/4 Insert Length 7/16" (ME98298)	ASD100S-R75B99-1/16	69014191645
	ASD120-R75B99-1/16	69014191644
	ASD150-R75B99-1/16	69014191643
	ASD100S-R75B99-1/8	69014191637
	ASD120-R75B99-1/8	69014191636
	ASD150-R75B99-1/8	69014191635
	ASD180-R75B99-1/8	69014191634
	ASD320-R75B99-1/8	69014192810
	SD120-R100B99-1/16	69014191641
	SD150-R100B99-1/16	69014191640
	SD180-R100B99-1/16	69014191639
	SD220-R100B99-1/16	69014191638
	SD150-R100B99-1/8	69014191632
	SD180-R100B99-1/8	69014191631

STANDARD PACKAGE = 1 WHEEL



Type 11V9

D - DIAMETER
K - INSIDE DIAMETER OF FLAT
H - HOLE
E - BACK THICKNESS
T - THICKNESS
J - HUB DIAMETER
U - INSERT LENGTH
X - ABRASIVE DEPTH
S - FACE ANGLE



BEST — NORTON AZTEC cBN WHEELS – IDEAL FOR DRY RESHARPENING OF STEEL TOOLS

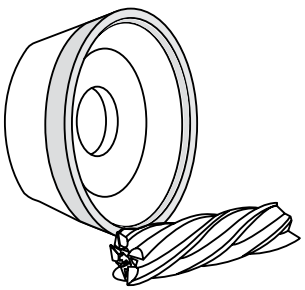
FEATURES	BENEFITS
▮ Consistent, high quality cBN (cubic Boron Nitride) abrasive	▮ 85% longer life than standard cBN wheels
▮ Advanced heat-reducing bond conducts heat away from the workpiece	▮ Eliminates heat build-up and damage ▮ Extends wheel life ▮ Freer cutting action ▮ Maintains cutting tool steel integrity ▮ Extends cutting tool life
Aztec III	
▮ Lubricating bond	▮ Eliminates steel and braze loading ▮ Reduces drag ▮ Allows greater infeeds
Aztec .007	
▮ Allows increased infeed (start at .007)	▮ High stock removal rate ▮ Heaviest cuts with less wheel wear ▮ Lower grinding forces ▮ Elimination of chatter

SIZE D x T x H	SPECIFICATION	UPC #
TYPE 11V9 FLARING CUP – cBN		
3-3/4 x 1-1/2 x 1-1/4 Insert Length 3/8" (ME92192)	AZTEC .007-100-1/16	69014195683
	AZTEC .007-150-1/16	69014195679
	AZTEC III 100T-1/16	69014191832
	AZTEC III 120T-1/16	69014191833
	AZTEC III 150T-1/16	69014191834
	AZTEC .007-150-1/8	69014195680
	AZTEC III 100T-1/8	69014191838
	AZTEC III 120T-1/8	69014191839
	AZTEC III 150T-1/8	69014191840
	AZTEC III 100W-1/16	69014191835
	AZTEC III 150W-1/16	69014191837
5 x 1-3/4 x 1-1/4 Insert Length 7/16" (ME98298)	AZTEC .007-100-1/16	69014195685
	AZTEC III 100T-1/16	69014191841
	AZTEC III 120T-1/16	69014191842
	AZTEC III 150T-1/16	69014191843
	AZTEC .007-100-1/8	69014195686
	AZTEC .007-150-1/8	69014195682
	AZTEC III 100T-1/8	69014191844

STANDARD PACKAGE = 1 WHEEL

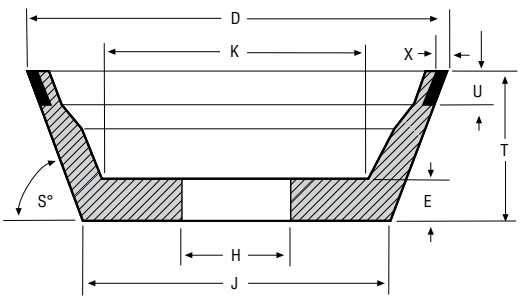
SIZE D x T x H	SPECIFICATION	UPC #
TYPE 11V9 FLARING CUP – cBN		
3-3/4 x 1-1/2 x 1-1/4 Insert Length 3/8" (ME92192)	CB100-TB99-1/16	69014191719
	CB100-TB99-1/8	69014191722
	CB120-TB99-1/8	69014191723
	CB150-TB99-1/8	69014191724
	CB120-WB99-1/16	69014191720
	CB150-WB99-1/16	69014191721
5 x 1-3/4 x 1-1/4 Insert Length 7/16" (ME98298)	CB120-TB99-1/8	69014191715
	CB150-TB99-1/8	69014191716

STANDARD PACKAGE – 1 WHEEL



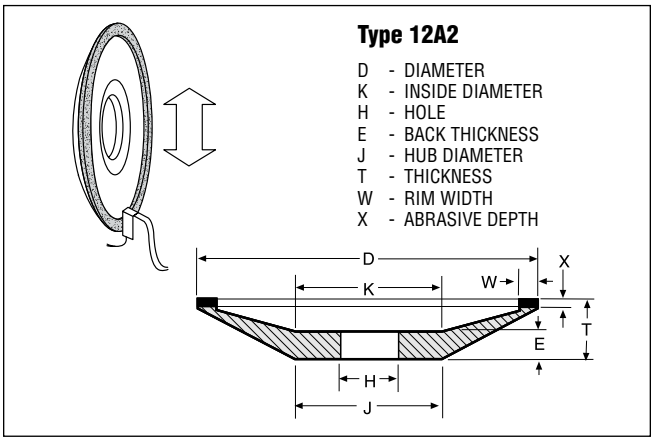
Type 11V9

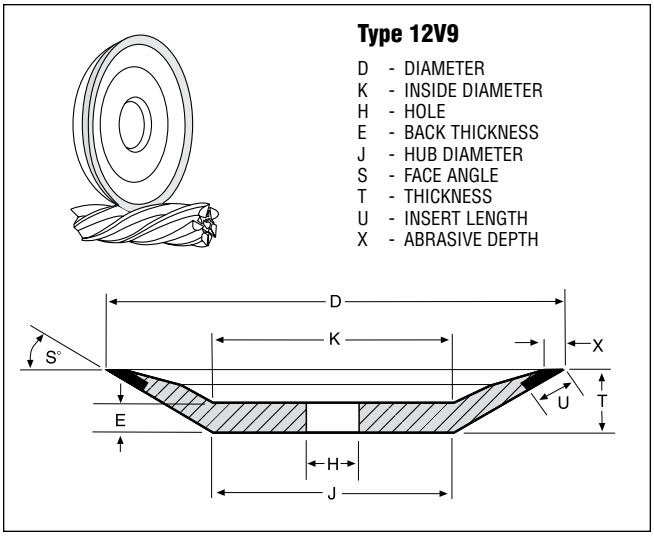
D - DIAMETER
K - INSIDE DIAMETER OF FLAT
H - HOLE
E - BACK THICKNESS
T - THICKNESS
J - HUB DIAMETER
U - INSERT LENGTH
X - ABRASIVE DEPTH
S - FACE ANGLE

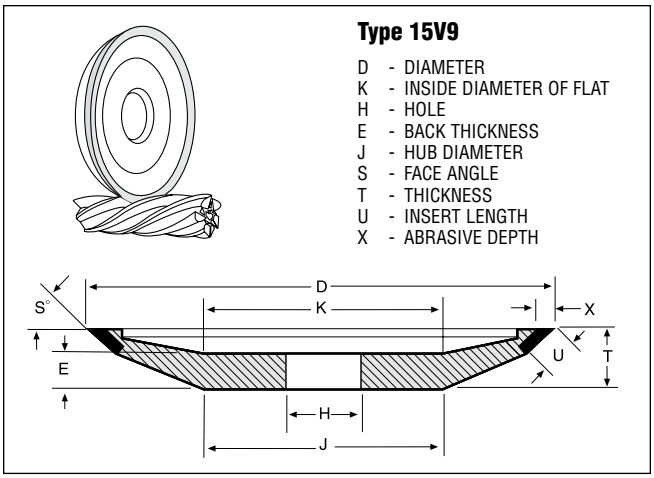


SIZE D x T x H	SPECIFICATION	UPC #
TYPE 12A2 DISH – DIAMOND		
4 x 1/2 x 1-1/4 Rim Width 1/4" (ME40745)	SD180-R75B99-1/8	69014192223
6 x 1 x 1-1/4 Rim Width 3/16" (ME27758)	ASD120-R75B99-1/8 ASD180-R75B99-1/8	69014191630 69014192226
TYPE 12A2 DISH – cBN		
6 x 1 x 1-1/4 Rim Width 3/16" (ME27758)	CB120-TB99-1/16	69014192227
TYPE 12V9 DISH – DIAMOND		
3 x 7/16 x 3/4 Insert Length 7/16" (ME41755)	SD150-R100B99-1/16	69014192228
4 x 1/2 x 1-1/4 Insert Length 1/4" (ME58734)	SD180-R100B99-1/8	69014191629
6 x 3/4 x 1-1/4 Insert Length 3/8" (ME48666)	ASD150-R75B99-1/16	69014191628
TYPE 12V9 DISH – cBN		
4 x 1/2 x 1-1/4 Insert Length 1/4" (ME58734)	CB120-TB99-1/8	69014192229
6 x 3/4 x 1-1/4 Insert Length 3/8" (ME48666)	CB120-TB99-1/8 CB150-TB99-1/8	69014192020 69014192784
TYPE 15V9 DISH – DIAMOND		
6 x 3/4 x 1-1/4 Insert Length 3/8" (ME40633)	SD150-R100B99-1/16	69014192230

STANDARD PACKAGE = 1 WHEEL







NORTON OFFERS A COMPREHENSIVE STOCK PRODUCT SELECTION TO SERVICE MOST OF YOUR NEEDS – WITH THE FASTEST DELIVERY AND LOWEST PRICES. SEE THESE CATALOG SECTIONS FIRST:

- Norton Stock B99 Products
- Norton/Winter Stock Toolroom Products

Can't find the specification in the above sections?

Then refer to the Norton B99 Express Made-to-Order Resin Product section.

If a product can not be found in the B99 Express offering:

Contact your Norton sales representative or distributor for a custom-made product recommendation.

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

65,000+ made-to-order resin products; 25 wheel shapes, with 2 week lead-times for 12" and less diameter wheels. 14" and larger wheels and 80 grit and coarser wheels are available with standard made-to-order lead-times. If you do not find the resin specification and/or shape you need in our stock offering, you will most likely find it in our B99 Express made-to-order offering.

TYPICAL APPLICATIONS

Norton B99E Diamond Wheels

- Sharpening cemented carbide cutting tools
- Cutting off carbide rod
- Grinding or cutting off non-metallic materials such as ceramics or glass
- Surface grinding dies
- O.D. grinding spray coatings

Norton B99E cBN Wheels

- Sharpening high-speed (M2, D2, T15, etc.) steel cutting tools
- Surface and ID grinding hardened steel die components
- Precision grinding steel parts Rc 50 or harder

BETTER — B99 EXPRESS DIAMOND AND cBN WHEELS

FEATURES	BENEFITS
Superior diamond and cBN abrasives in durable resin bond systems	These quality wheels will get your job done
Thousands of abrasive, grit, grade, concentration, and bond combinations	There is a B99 Express wheel for almost every resin bond application
Made in our state-of the art, USA, ISO-certified facilities	Exceptional quality and performance
Priced as stock products	Excellent performance/price ratio
Two week (and less) lead-times	Minimal time from order to production floor

HOW TO SELECT B99 EXPRESS MADE-TO-ORDER DIAMOND WHEELS

SELECT

SHAPE			Use the "Wheel Shape Index" to determine shape and availability.
WHEEL DIMENSIONS	**D x T x H**	**Select Diameter x Thickness x Hole from the availability tables.** Use blueprint numbers where available.	
ABRASIVE	**ASD**	**Armored diamond; most durable.** Versatile: can be used wet or dry. ASD should be used when carbide and steel are ground in the same operation.	Select the abrasive based on horsepower, grinding wet or dry, and contact with steel.
	SD	**Free cutting standard.** Can be used wet or dry; should be used on low horsepower (3/4 hp or less) machines.	
GRIT SIZE	**80**	**Roughing**	Select the grit size based on finish and material removal rate required. **Note:** Standrad made-to-order lead-times apply to 80 grit and coarser wheels.
	100	**Roughing.** The most common grit size for roughing operations.	
	120	**For roughing where 100 is too coarse**. Also for cut-off applications.	
	150	**Medium stock removal plus good finish**. For combined roughing and finishing applications.	
	180	**Medium stock removal plus good finish.** To improve finish.	
	220	**Finishing**	
	320	**Finishing**	
	400	**Fine finishing**	
GRADE	**R**	**Resin bond standard**	The hardness of the wheel
CONCENTRATION	**50**	**Shape 2A2T only.** For broad area of contact grinding.	Select the abrasive concentration based on grinding wet or dry, material removal rates and form holding requirements.
	75	**Norton standard.** Freer cutting than 100 and the most economical for dry grinding with ASD diamond.	
	100	**Very durable**. Recommended under flood coolant conditions. For use with 220 grit or finer, when durability is required. Also for cut-off applications.	
	125	**Improved form holding.** Used with B99EF bond only for form holding in high-volume, high-pressure coolant applications. Used with ASD abrasive.	
BOND	**B99E**	**Norton standard pre-engineered resin bond.** Versatile enough to be used wet or dry on most tool making or resharpening applications as well as for grinding non-metallic materials such as ceramics or glass. Available in all shapes.	Select the bond based on the material being ground and grinding application.
	B99EF	**Improved form holding.** More durable than B99E. Improved heat dissipation in wet or dry applications. Available in wheel shapes 1V1, 1B1, 1E1, 1EE1, 1F1 and 1FF1.	
ABRASIVE DEPTH	**1/16** **1/8** **1/4** **1/2**		Usable abrasive

NORTON OFFERS A COMPREHENSIVE STOCK PRODUCT SELECTION TO SERVICE MOST OF YOUR NEEDS – WITH THE FASTEST DELIVERY AND LOWEST PRICES. SEE THESE CATALOG SECTIONS FIRST:

- Norton Stock B99 Products
- Norton/Winter Stock Toolroom Products
- Norton CNC Products

Can't find the specification in the above sections?

Then refer to the Norton B99 Express Made-to-Order Resin Product section.

If a product can not be found in the B99 Express offering:

Contact your Norton sales representative or distributor for a custom-made product recommendation.

TECHtip

DIAMOND GRINDS:

In general, diamond is used to grind non-ferrous materials, because it reacts with iron.

- Cemented carbide
- Glass
- Ceramics
- Fiberglass
- Plastics
- Stone
- Abrasives
- Electronic components and materials

cBN GRINDS:

cBN is used to grind ferrous materials.

- High-speed tool steels
- Die steels
- Hardened carbon steels
- Alloy steels
- Aerospace alloys
- Hardened stainless steel
- Abrasion-resistant ferrous materials

HOW TO SELECT B99 EXPRESS MADE-TO-ORDER CBN WHEELS

SELECT

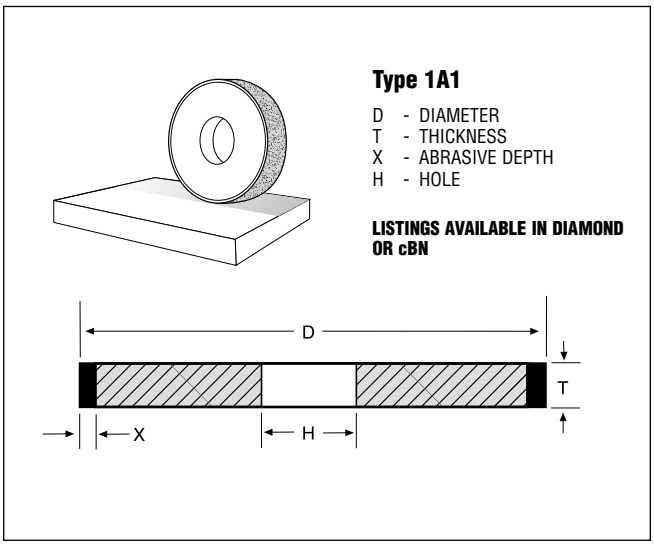
SHAPE			Use the "Wheel Shape Index" to determine shape and availability.
WHEEL DIMENSIONS	**D x T x H**	**Select Diameter x Thickness x Hole from the availability tables.** Use blueprint numbers where available.	**Note:** Standard made-to-order lead-times apply to 14" and larger wheels.
ABRASIVE	**CB**	**Norton standard coated cBN (cubic Boron Nitride)**. Optimized for high performance in resin bond systems.	Select Norton cBN abrasive to grind hard tool steels such as A2, D2, T15, etc., and tough alloy steels.
GRIT SIZE	**100** **120** **150** **180** **220** **320** **400**	**Roughing.** The most common grit size for roughing operations. **For roughing where 100 is too coarse**. Also for cut-off applications. **Medium stock removal plus good finish**. For combined roughing and finishing applications. **Medium stock removal plus good finish.** To improve finish. **Finishing** **Finishing** **Fine finishing**	Select the grit size based on finish and material removal rate required. **Note:** Standrad made-to-order lead-times apply to 80 grit and coarser wheels.
GRADE	**T** **W** **Z**	**Norton standard.** Approximately 75 concentration, T is the first choice for lower horsepower equipment or wide area of contact between the wheel and the workpiece. Ideal for resharpening applications with 11V9, 12A2, 4A2P, and 15V9 wheel shapes when dry grinding. **Very Durable.** Approximately 100 concentration, W is recommended for high volume coolant operations: flute grinding from solid, flute polishing, surface, and cylindrical grinding. **Form holding.** Approximately 125 concentration, Z grade is extremely durable and is recommended where long life or form holding is required in high-volume, high-pressure coolant applications. Used with B99EF bond only.	The hardness of the wheel
BOND	**B99E** **B99EF**	**Norton standard resin bond.** Pre-engineered for optimal performance with cBN abrasive. Available in all shapes. **Improved form holding.** More durable than B99E. Improved heat dissipation in wet or dry applications. Available in wheel shapes 1V1, 1B1, 1E1, 1EE1, 1F1 and 1FF1.	Select the bond depending on the type of grinding application.
ABRASIVE DEPTH	**1/16** **1/8** **1/4** **1/2**		Usable abrasive

D	T	X
TYPE 1A1 – STRAIGHT WHEELS		
1	1/16	1/8
1	3/32	1/8
1	1/8	1/8
1	1/4	1/8
1	3/8	1/8
1	1/2	1/8
1	5/8	1/8
1	3/4	1/8
1	1	1/8
1-1/8	1/4	1/8
1-1/8	1/2	1/8
1-1/8	5/8	1/8
1-1/4	1/16	1/8
1-1/4	1/8	1/8
1-1/4	1/4	1/8
1-1/4	3/8	1/8
1-1/4	1/2	1/8
1-1/4	3/4	1/8
1-3/8	1/4	1/8
1-3/8	1/2	1/8
1-1/2	1/16	1/8
1-1/2	1/8	1/8
1-1/2	1/4	1/8
1-1/2	3/8	1/8
1-1/2	1/2	1/8
1-1/2	3/4	1/8
1-1/2	1	1/8
1-3/4	3/16	1/8
1-3/4	1/8	1/8
1-3/4	1/4	1/8
1-3/4	1/2	1/8
1-3/4	1	1/8
2	1/16	1/8
2	3/32	1/8
		1/4
2	1/8	1/8
		1/4
2	3/16	1/8
		1/4
2	1/4	1/8
2	3/8	1/8
		1/4

CONTINUED

D	T	X
TYPE 1A1 – STRAIGHT WHEELS (CONT'D)		
2	1/2	1/8
		1/4
2	3/4	1/8
2	1	1/8
2-1/4	1/2	1/8
		1/4
2-1/2	1/4	1/8
		1/4
2-1/2	1/2	1/8
2-3/4	1/4	1/8
2-3/4	1/2	1/8
3	1/32	1/8
		1/4
3	1/16	1/8
		1/4
3	3/32	1/8
		1/4
3	1/8	1/8
		1/4
3	3/16	1/8
		1/4
3	1/4	1/8
		1/4
3	3/8	1/8
		1/4
3	1/2	1/8
		1/4
3	3/4	1/8
4	1/32	1/8
		1/4
4	1/16	1/8
		1/4
4	3/32	1/8
		1/4
4	1/8	1/8
		1/4
4	3/16	1/8
		1/4
4	1/4	1/8
		1/4
4	5/16	1/8
		1/4

CONTINUED



D	T	X
TYPE 1A1 – STRAIGHT WHEELS (CONT'D)		
4	3/8	1/8
		1/4
4	1/2	1/8
		1/4
4	3/4	1/8
		1/4
4	1	1/8
		1/4
5	1/32	1/8
		1/4
5	1/16	1/8
		1/4
5	3/32	1/8
		1/4
5	1/8	1/4
5	3/16	1/4
5	1/4	1/4
		1/2
5	3/8	1/4
		1/2
5	1/2	1/4
		1/2
6	1/32	1/4
6	1/16	1/4
6	3/32	1/4
6	1/8	1/4
6	3/16	1/4
6	1/4	1/4
		1/2
6	5/16	1/4
		1/2
6	3/8	1/4
		1/2
6	1/2	1/4
		1/2
6	5/8	1/4
		1/2
6	3/4	1/4
		1/2
6	1	1/4
		1/2
7	1/16	1/4
7	3/32	1/4
7	1/8	1/4
7	3/16	1/4
7	1/4	1/4
		1/2
7	5/16	1/4
		1/2
7	3/8	1/4
		1/2
7	1/2	1/4
		1/2
7	1	1/4
		1/2
8	1/16	1/4
8	3/32	1/4
8	1/8	1/4
8	3/16	1/4
8	1/4	1/4
		1/2
8	3/8	1/4
		1/2

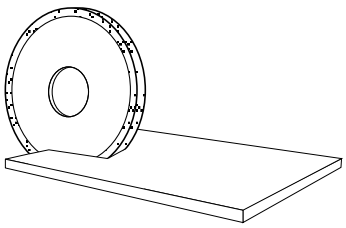
CONTINUED

D	T	X
TYPE 1A1 – STRAIGHT WHEELS (CONT'D)		
8	1/2	1/4
		1/2
8	5/8	1/4
		1/2
8	3/4	1/4
		1/2
8	1	1/4
		1/2
9	1/2	1/4
		1/2
10	1/4	1/4
		1/2
10	3/8	1/4
		1/2
10	1/2	1/4
		1/2
10	3/4	1/4
		1/2
10	1	1/4
		1/2
11	1/2	1/4
		1/2
12	1/4	1/4
		1/2
12	3/8	1/4
		1/2
12	1/2	1/4
		1/2
12	5/8	1/4
		1/2
12	3/4	1/4
		1/2
12	1	1/4
		1/2
14	1/2	1/4
		1/2
14	3/4	1/4
		1/2
14	1	1/4
		1/2
16	1/2	1/4
		1/2
16	3/4	1/4
		1/2
16	1	1/4
		1/2
18	1/2	1/4
		1/2
18	1	1/4
		1/2
20	1/2	1/4
		1/2
20	3/4	1/4
		1/2
20	1	1/4
		1/2
24	3/4	1/4
		1/2
24	1	1/4
		1/2
30	1	1/4
		1/2

STANDARD PACKAGE = 1 WHEEL

BLUEPRINT NUMBER	D	T	MINIMUM H	E	X	X1
TYPE 1A1R – CUT-OFF WHEELS						
ME43571	3	1/32	1/2	.022	1/4	3/16
ME93308	3	.035	1/2	.027	1/4	3/16
ME87950	4	.025	1/2	.017	1/8	3/32
ME77202	4	.031	1/2	.022	1/8	3/32
ME43570	4	1/32	1/2	.022	1/4	3/16
ME81257	4	.035	1/2	.027	1/8	3/32
ME86670	4	.035	1/2	.027	1/4	3/16
ME65456	4	1/16	1/2	.052	1/4	3/16
ME81104	5	.018	1/2	.015	1/8	3/32
ME80798	5	.025	1/2	.020	1/8	3/32
ME79842	5	.035	1/2	.030	1/8	3/32
ME76331	5	.040	1/2	.035	1/8	3/32
ME89529	5	1/16	1/2	.057	1/8	3/32
ME100815	5	1/8	1/2	.117	1/8	3/32
ME97801	6	.0305	1/2	.022	1/8	3/32
ME89709	6	1/32	1/2	.022	1/8	3/32
ME81121	6	1/32	1/2	.022	1/4	3/16
ME83187	6	.035	5/8	.027	1/8	1/16
ME80676	6	.035	1/2	.027	1/8	3/32
ME43572	6	.035	1/2	.027	1/4	3/16
ME73316	6	.035	1/2	.027	9/32	1/4
ME72577	6	.040	1/2	.032	1/4	3/16
ME83991	6	.045	1/2	.037	1/8	3/32
ME72002	6	.045	1/2	.037	1/4	3/16
ME74626	6	.050	1/2	.042	1/4	3/16
ME82694	6	.062	1/2	.054	1/8	3/32
ME69777	6	.062	1/2	.054	1/4	3/16
ME93344	6	.125	1/2	.117	1/8	3/32
ME82347	7	.035	1/2	.030	1/4	3/16
ME70075	7	.040	1/2	.030	1/4	3/16
ME75148	8	.035	5/8	.027	9/32	1/4
ME73768	8	.040	5/8	.027	1/4	3/16
ME106550	8	.045	5/8	.032	3/16	1/8
ME102293	8	.045	5/8	.027	1/4	3/16
ME43569	8	.045	5/8	.032	1/4	3/16
ME118534	8	.045	5/8	.032	5/16	1/4
ME43565	10	.050	5/8	.036	1/4	3/16
ME85766	10	1/16	5/8	.041	1/4	3/16
ME43567	12	.070	5/8	.056	1/4	3/16
ME106589	14	.070	3/4	.056	1/4	3/16

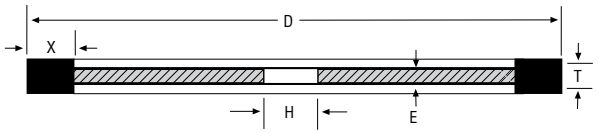
X1 = USABLE ABRASIVE DEPTH
STANDARD PACKAGE = 1 WHEEL



Type 1A1R

D - DIAMETER
T - THICKNESS
X - ABRASIVE DEPTH
H - HOLE
E - STEEL CENTER THICKNESS

LISTINGS AVAILABLE IN DIAMOND OR cBN

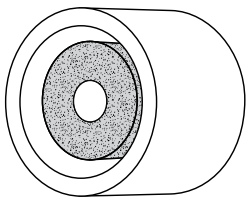


D	T	H
TYPE 1A8 – ID WHEELS		
1/4	1/8	1/8
5/16	1/4	1/8
3/8	1/32	1/8
3/8	1/4	1/8
3/8	3/8	1/8
3/8	1/2	1/8
3/8	1/2	3/16
7/16	3/8	1/8
7/16	1/2	1/8
1/2	1/4	1/8
1/2	1/4	1/4
1/2	3/8	1/8
1/2	1/2	1/8
1/2	1/2	3/16
1/2	1/2	1/4
1/2	5/8	1/4
9/16	1/2	1/4
9/16	3/4	1/4

CONTINUED

D	T	H
TYPE 1A8 – ID WHEELS (CONT'D)		
5/8	1/4	1/4
5/8	3/8	1/4
5/8	1/2	3/16
5/8	1/2	1/4
5/8	5/8	1/4
5/8	3/4	1/4
3/4	1/32	3/16
3/4	1/16	1/8
3/4	1/4	1/4
3/4	3/8	1/4
3/4	1/2	1/4
3/4	3/4	1/4
7/8	1/2	1/4
7/8	5/8	1/4
1	1/16	1/4
1	1/4	1/4
1	1/2	1/4

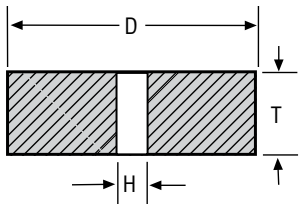
STANDARD PACKAGE = 1 WHEEL



Type 1A8

D - DIAMETER
T - THICKNESS
H - HOLE
ABRASIVE IS SOLID TO HOLE

LISTINGS AVAILABLE IN DIAMOND OR cBN



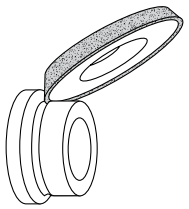
D	T	V	X
TYPE 1B1			
3	1/16	5° – 45°	1/8
3	1/16	5° – 71°	1/4
3	3/32	5° – 33°	1/8
3	3/32	5° – 63°	1/4
4	1/16	5° – 45°	1/8
4	1/16	5° – 71°	1/4
4	3/32	5° – 33°	1/8
4	3/32	5° – 63°	1/4
6	1/16	5° – 45°	1/8
6	1/16	5° – 71°	1/4
6	3/32	5° – 33°	1/8
6	3/32	5° – 63°	1/4

STANDARD PACKAGE = 1 WHEEL

D	T	V	X
TYPE 1E1			
3	3/32	74° & LARGER	1/8
4	1/16	53° & LARGER	1/8
4	1/8	90° & LARGER	1/8
6	1/16	53° & LARGER	1/8
6	3/32	74° & LARGER	1/8
6	1/8	90° & LARGER	1/8

STANDARD PACKAGE = 1 WHEEL

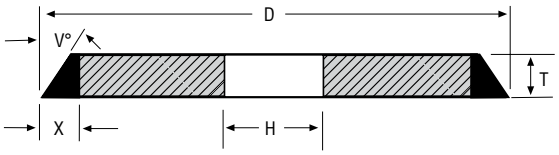
D	T	V	X
TYPE 1EE1			
3	1/8	60°	1/8
3	1/8	70°	1/8
3	1/8	90°	1/8
3	3/16	60°	1/8
3	3/16	90°	1/8
3	1/4	60°	1/8
3	1/4	70°	1/8
3	1/4	90°	1/8
3	1/4	60°	1/4
3	1/2	90°	1/8
4	1/8	30°	1/8
4	1/8	45°	1/8
4	1/8	50°	1/8
4	1/8	60°	1/8
4	1/8	70°	1/8
4	1/8	90°	1/8
4	1/8	120°	1/8
4	1/4	45°	1/8
4	1/4	60°	1/8
4	1/4	70°	1/8
4	1/4	90°	1/8
4	1/4	60°	1/4
4	3/8	90°	1/8
4	3/8	120°	1/8
4	3/8	90°	1/4
4	3/4	45°	1/8
4	3/4	60°	1/8
5	1/8	45°	1/8
5	1/8	90°	1/8
5	3/8	90°	1/8
5	3/8	90°	1/4
6	1/8	60°	1/8
6	1/8	70°	1/8
6	1/8	90°	1/8
6	1/4	30°	1/8
6	1/4	45°	1/8
6	1/4	60°	1/8
6	1/4	70°	1/8
6	1/4	90³	1/8
6	1/4	60°	1/4
6	1/4	90°	1/4
6	3/8	30°	1/8
6	3/8	60°	1/8
6	3/8	90°	1/8
6	1/2	60°	1/8
6	1/2	90°	1/8
6	3/4	90°	1/8
7	1/8	60°	1/8
7	1/8	90°	1/8
7	1/4	45°	1/8
7	1/4	60°	1/8
7	1/4	70°	1/8
7	1/4	90°	1/8
7	3/8	60°	1/8
7	3/8	90°	1/8
7	3/8	120°	1/8
7	1/2	60°	1/8
7	1/2	90°	1/8
7	1/2	100°	1/8

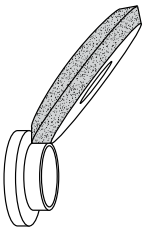


Type 1B1

D - DIAMETER
T - THICKNESS
V - FACE ANGLE
X - ABRASIVE DEPTH
H - HOLE

LISTINGS AVAILABLE IN DIAMOND OR cBN

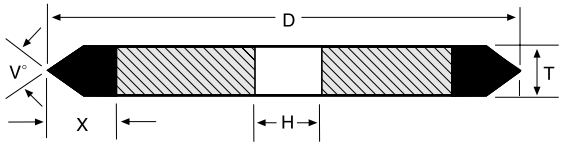


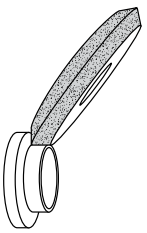


Type 1E1

D - DIAMETER
T - THICKNESS
V - FACE ANGLE
X - ABRASIVE DEPTH
H - HOLE

LISTINGS AVAILABLE IN DIAMOND OR cBN

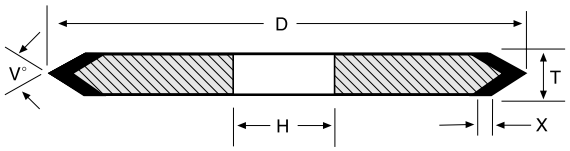




Type 1EE1

D - DIAMETER
T - THICKNESS
V - FACE ANGLE
X - ABRASIVE DEPTH
H - HOLE

LISTINGS AVAILABLE IN DIAMOND OR cBN



CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

D	T	MIN. R	X
TYPE 1F1 – RADIUS WHEELS			
3	1/16	1/32	1/8
			1/4
3	3/32	3/64	1/8
			1/4
4	1/16	1/32	1/8
			1/4
4	3/32	3/64	1/8
			1/4
4	1/8	1/16	1/8
			1/4
4	3/16	3/32	1/8
			1/4
5	1/16	1/32	1/8
			1/4
5	3/32	3/64	1/8
			1/4
6	1/16	1/32	1/8
			1/4
6	3/32	3/64	1/8
			1/4
6	1/8	1/16	1/8
			1/4
6	1/4	1/8	1/4

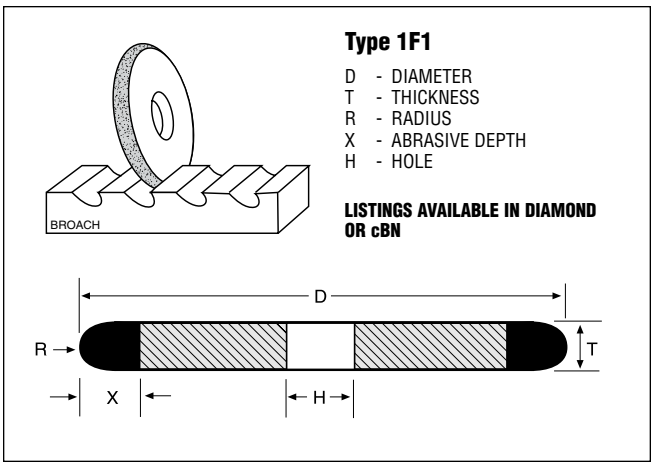
STANDARD PACKAGE = 1 WHEEL

D	T	R	X
TYPE 1FF1 – RADIUS WHEELS			
3	1/8	1/16	1/8
3	1/4	1/8	1/8
3	3/16	3/32	1/8
3	3/8	3/16	1/8
3	1/2	1/4	1/8
4	1/8	1/16	1/8
4	5/32	5/64	1/8
4	3/16	3/32	1/8
4	7/32	7/64	1/8
4	1/4	1/8	1/8
			1/4
4	5/16	5/32	1/8
4	3/8	3/16	1/8
4	1/2	1/4	1/8
5	1/8	1/16	1/8
5	3/16	3/32	1/8
5	1/4	1/8	1/8

CONTINUED

D	T	R	X
TYPE 1FF1 – RADIUS WHEELS (CONT'D)			
6	1/8	1/16	1/8
6	5/32	5/64	1/8
6	3/16	3/32	1/8
			1/4
6	1/4	1/8	1/8
6	5/16	5/32	1/4
6	3/8	3/16	1/8
6	1/2	1/4	1/8
6	5/8	5/16	1/8
7	1/8	1/16	1/8
7	3/16	3/32	1/8
7	1/4	1/8	1/8
7	3/8	3/16	1/8
7	1/2	1/4	1/8

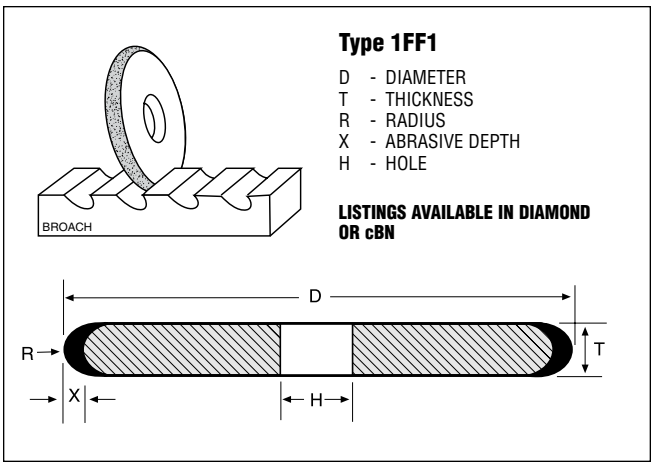
STANDARD PACKAGE = 1 WHEEL



Type 1F1

D - DIAMETER
T - THICKNESS
R - RADIUS
X - ABRASIVE DEPTH
H - HOLE

LISTINGS AVAILABLE IN DIAMOND OR cBN



Type 1FF1

D - DIAMETER
T - THICKNESS
R - RADIUS
X - ABRASIVE DEPTH
H - HOLE

LISTINGS AVAILABLE IN DIAMOND OR cBN

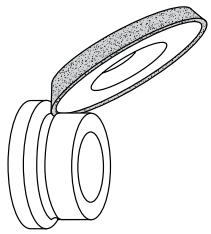
CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

D	T	V	X
TYPE 1V1			
2	1/8	20°	1/8
2	1/8	30°	1/8
2	1/8	45°	1/8
2	1/4	30°	1/8
2	1/4	45°	1/8
3	1/8	15°	1/8
3	1/8	30°	1/8
3	1/8	45°	1/8
3	1/8	60°	1/8
3	1/8	30°	1/4
3	1/8	45°	1/4
3	1/4	20°	1/8
3	1/4	30°	1/8
3	1/4	45°	1/8
4	1/8	15°	1/8
4	1/8	20°	1/8
4	1/8	30°	1/8
4	1/8	45°	1/8
4	1/8	15°	1/4
4	3/16	15°	1/8
4	3/16	20°	1/8
4	3/16	30°	1/8
4	3/16	45°	1/8
4	1/4	15°	1/8
4	1/4	20°	1/8
4	1/4	25°	1/8
4	1/4	30°	1/8
4	1/4	45°	1/8
4	1/4	15°	1/4
4	3/8	15°	1/8
4	3/8	20°	1/8
4	3/8	25°	1/8
4	3/8	30°	1/8
4	3/8	45°	1/8
4	1/2	15°	1/8
4	1/2	30°	1/8
4	1/2	45°	1/8
5	1/8	45°	1/8
5	3/16	45°	1/8
5	1/4	30°	1/8

CONTINUED

D	T	V	X
TYPE 1V1 (CONT'D)			
5	1/4	15°	1/4
5	1/4	25°	1/4
5	1/4	30°	1/4
5	3/8	15°	1/4
6	1/8	45°	1/8
6	1/8	15°	1/4
6	1/8	20°	1/4
6	1/8	30°	1/4
6	1/8	45°	1/4
6	3/16	30°	1/8
6	3/16	45°	1/8
6	3/16	15°	1/4
6	1/4	15°	1/8
6	1/4	25°	1/8
6	1/4	30°	1/8
6	1/4	45°	1/8
6	1/4	15°	1/4
6	1/4	30°	1/4
6	1/4	45°	1/4
6	5/16	15°	1/8
6	5/16	12°	1/4
6	3/8	45°	1/8
6	3/8	10°	1/4
6	3/8	20°	1/4
6	3/8	30°	1/4
6	1/2	20°	1/8
6	1/2	45°	1/8
7	1/8	60°	1/8
7	1/4	10°	1/8
7	1/4	20°	1/8
7	1/4	30°	1/8
7	1/4	45°	1/8
7	3/8	10°	1/8
7	3/8	20°	1/8
7	3/8	45°	1/8
7	1/2	25°	1/8
7	1/2	30°	1/8
7	1/2	35°	1/8
7	1/2	45°	1/8

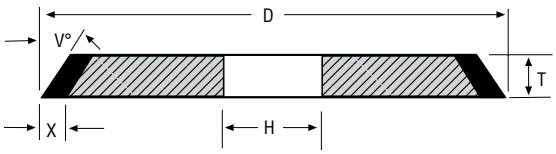
STANDARD PACKAGE = 1 WHEEL



Type 1V1

D - DIAMETER
T - THICKNESS
V - FACE ANGLE
X - ABRASIVE DEPTH
H - HOLE

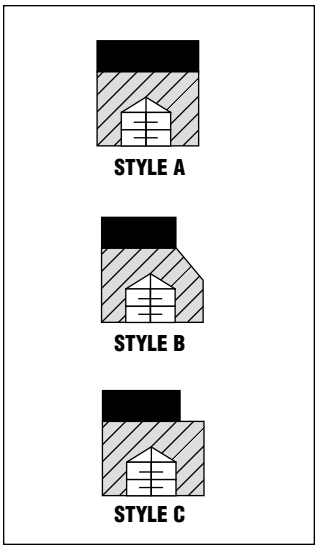
LISTINGS AVAILABLE IN DIAMOND OR cBN

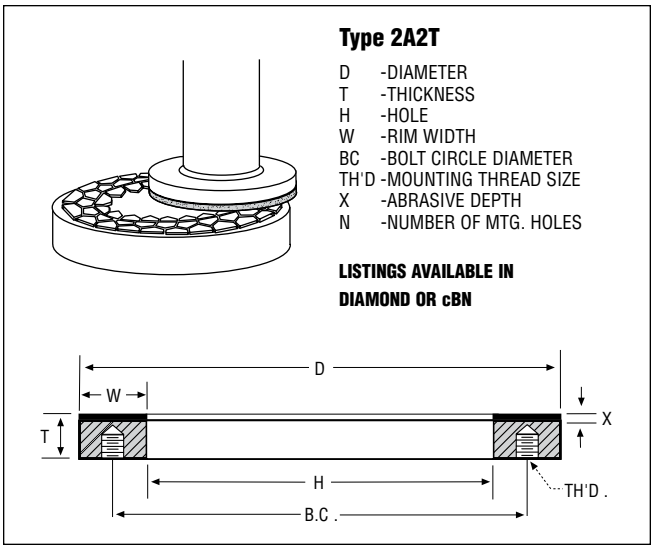


CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.
REMEMBER TO CHECK NORTON STOCK AND NORTON/WINTER STOCK AVAILABILITY FIRST, FOR THE FASTEST DELIVERY AND LOWEST PRICE.

STYLE	BLUEPRINT NUMBER	D	T	H	W	N	B.C.	TH'D	X
TYPE 2A2T – RING WHEELS									
C	MC37792	10	13/16 15/16	8	1/4	6	9.000	3/8-16 NC	1/8 1/4
B	ME69812	10	13/16	8	3/8	6	9.000	3/8-16 NC	1/8
B	ME65611	10	7/8 1	8	1/2	6	9.000	3/8-16 NC	1/8 1/4
A	ME39973	10	3/4 7/8	9	1/2	6	9.500	1/4-20 NC	1/8 1/4
B	MC93183	10	3/4	8	3/4	6	9.000	3/8-16 NC	1/8
A	MC35771	10	3/4	8	1	6	9.000	3/8-16 NC	1/8
C	MB91584	11	13/16	9	1/4	6	10.000	3/8-16 NC	1/8
C	MC41891	11	13/16 15/16	9	1/2	6	10.000	3/8-16 NC	1/8 1/4
A	MC45060	11	3/4 7/8	9-1/2	3/4	6	10.250	5/16-18 NC	1/8 1/4
A	MB39846	11	3/4	9	1	6	10.000	3/8-16 NC	1/8
A	MC90807	16	3/4	15	1/2	12	15.500	1/4-20 NC	1/8 1/4
B	MC87885	18	7/8 1	16-9/16	1/4	12	17.250	5/16-18 NC	1/8 1/4
B	ME73188	18	7/8 1	16-1/2	3/8	12	17.250	5/16-18 NC	1/8 1/4
B	MC88985	18	7/8 1	16	1/2	12	17.000	3/8-16 NC	1/8 1/4
A	MC47306	18	7/8 1	16-1/2	3/4	12	17.250	5/16-18 NC	1/8 1/4
A	MC38343	18	3/4 7/8	16	1	12	17.000	3/8-16 NC	1/8 1/4

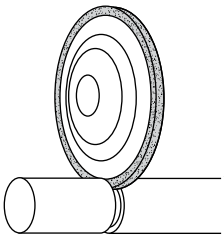
NOTE: 2A2T DOES NOT INCLUDE ADAPTER. CONTACT YOUR LOCAL NORTON DISTRIBUTOR FOR PRICE, DELIVERY AND APPLICATION INFORMATION. STANDARD PACKAGE = 1 WHEEL





BLUEPRINT NUMBER	D	T	U	J	D2	X
TYPE 3A1 – HUB 1-SIDE WHEELS						
ME114297	3-1/2	1/4	1/8	2-3/4	2-15/16	1/8
ME92383	5	5/16	1/16	3-3/4	4-3/16	1/8
ME66716	5	3/8	1/8	3-3/4	4-3/16	1/8
ME74734	6	1/4	1/8	5-1/16	5-1/4	1/8
ME60795	6	3/8	1/8	5	5-1/2	1/8
ME87172	6	3/8	1/16	4-13/16	5-7/16	1/8
ME87805	6	3/8	1/32	4-15/16	5-5/8	1/8
ME128352	12-1/4	3/8	3/16	11-3/4	—	1/8

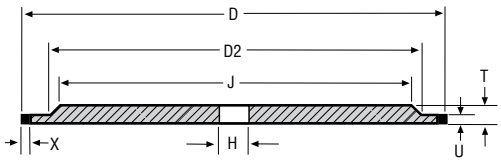
STANDARD PACKAGE = 1 WHEEL



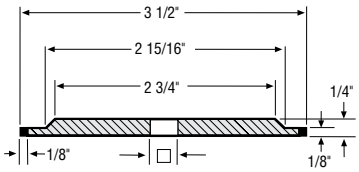
Type 3A1

D - DIAMETER
T - THICKNESS
H - HOLE
U - ABRASIVE THICKNESS
J - HUB DIAMETER
D2 - LARGE HUB DIAMETER
X - ABRASIVE DEPTH

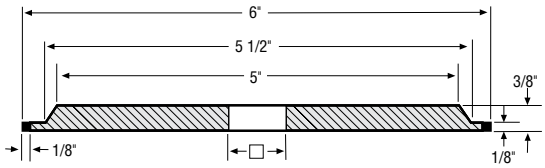
LISTINGS AVAILABLE IN DIAMOND OR cBN



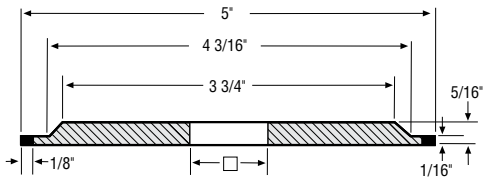
Type 3A1 – Specific Blueprints



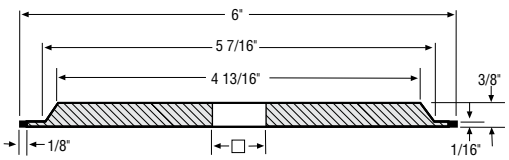
ME114297



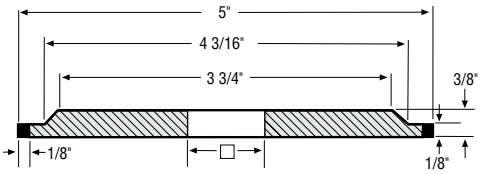
ME60795



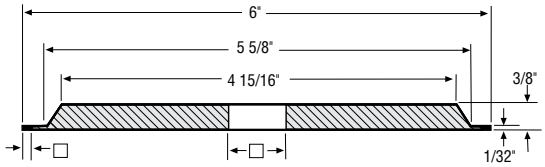
ME92383



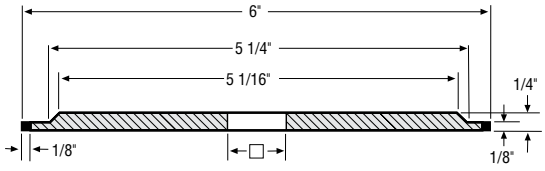
ME87172



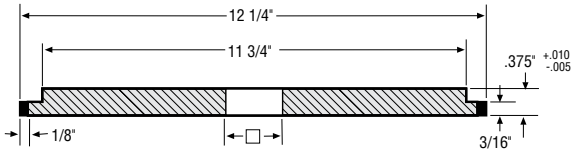
ME66716



ME87805



ME74734



ME128352

☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

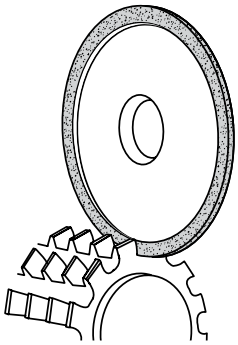
BLUEPRINT NUMBER	D	T	W	J	X
TYPE 4A2P – DISH (SAW SHARPENING) WHEELS					
ME84209	6	3/8 7/16	1/8	2-1/4	1/16 1/8
ME80016	6	3/8 7/16	3/16	2-1/4	1/16 1/8
ME94471	6	1/2 9/16	3/16	3-1/2	1/16 1/8
ME105175	6	17/64 21/64	1/4	3	1/16 1/8
ME88369	6	3/8 7/16	1/4	2-1/4	1/16 1/8
ME97016	6	3/8	1/4	3	1/16
ME91942	6	3/8 7/16	1/4	4-1/4	1/16 1/8
ME83387	6	3/8 7/16	3/8	3	1/16 1/8

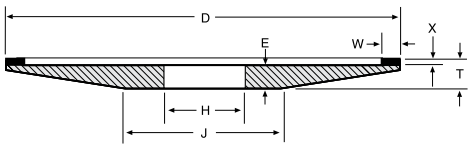
STANDARD PACKAGE = 1 WHEEL

Type 4A2P

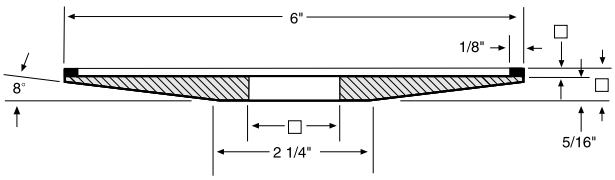
D - DIAMETER
T - THICKNESS
H - HOLE
J - HUB DIAMETER
W - RIM WIDTH
X - ABRASIVE DEPTH

LISTINGS AVAILABLE IN DIAMOND OR cBN

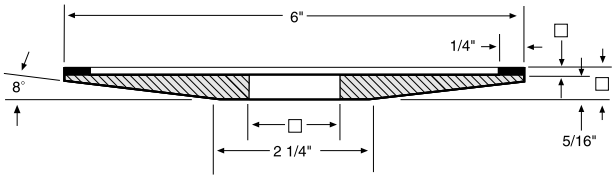




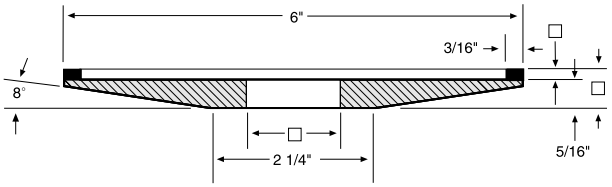
Type 4A2P – Specific Blueprints



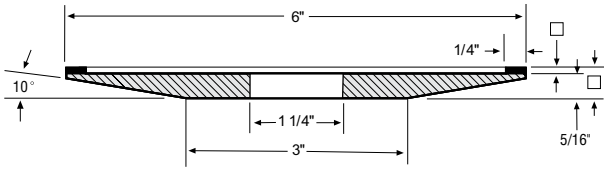
ME84209



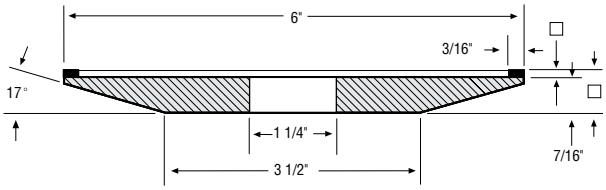
ME88369



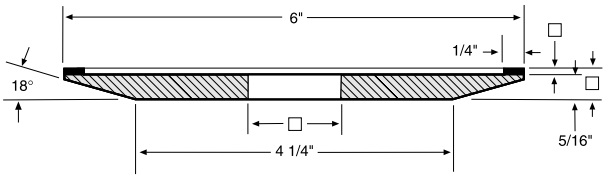
ME80016



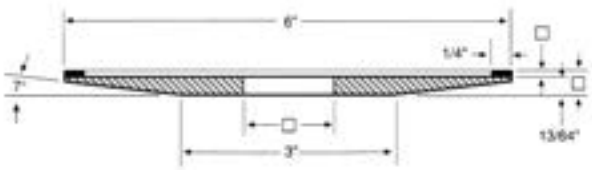
ME97016



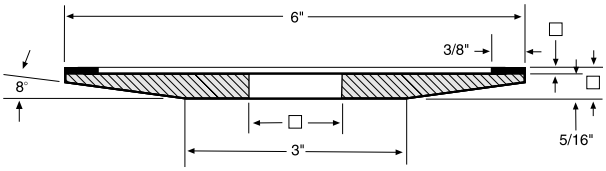
ME94471



ME91942



ME105175

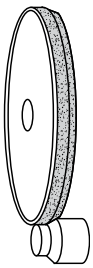


ME83387

☐ **VARIABLE**

BLUEPRINT NUMBER	D	T	F	V	X
TYPE 4Y1					
ME35789	6	1/8	1/16	45°	1/8
ME65953	6	1/4	1/8	30°	1/8
ME54623	6	1/4	1/8	45°	1/8
ME54649	6	3/8	3/16	45°	1/8
ME38936	6	1/2	1/4	45°	1/8
ME98975	6	1/2	1/4	45°	1/8
ME57664	7	1/4	1/8	45°	1/8
ME68742	7	3/8	3/16	45°	1/8

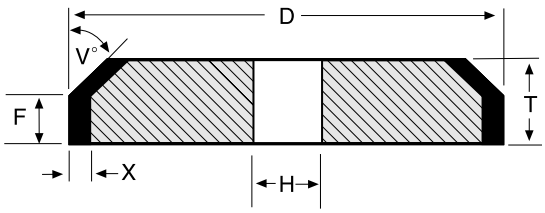
STANDARD PACKAGE = 1 WHEEL



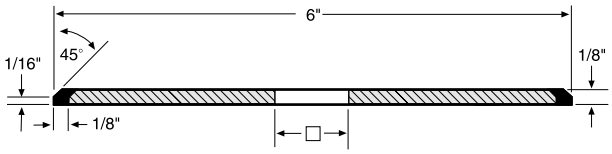
Type 4Y1

D - DIAMETER
T - THICKNESS
H - HOLE
V - FACE ANGLE
F - ABRASIVE FLAT
X - ABRASIVE DEPTH

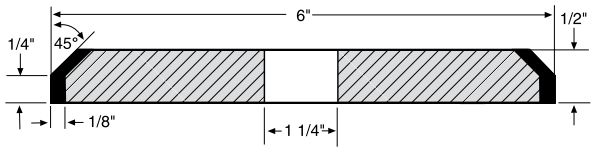
LISTINGS AVAILABLE IN DIAMOND OR cBN



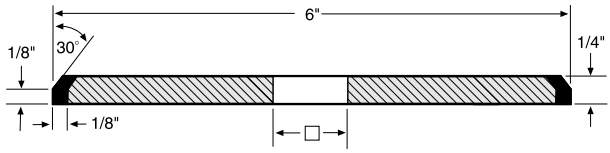
Type 4Y1 – Specific Blueprints



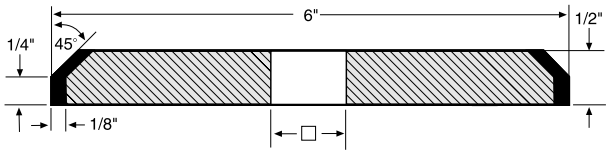
ME35789



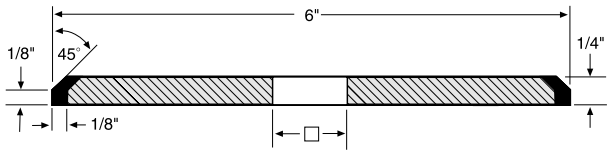
ME38936



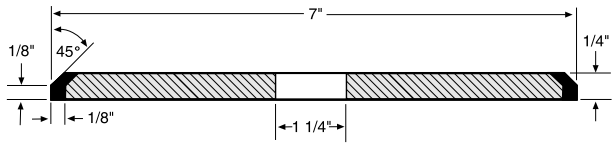
ME65953



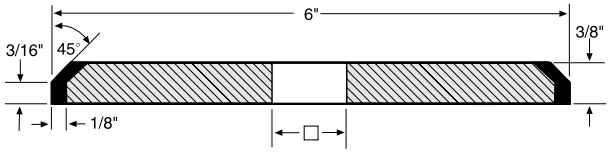
ME98975



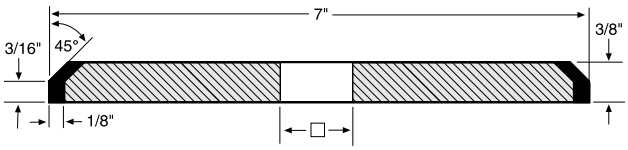
ME54623



ME57664



ME54649

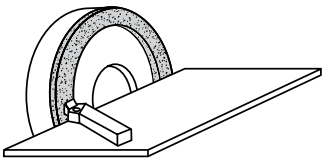


ME68742

□ **VARIABLE**

BLUEPRINT NUMBER	D	T	W	E	X
TYPE 6A2 – STRAIGHT CUP WHEELS					
ME156751	2	1/2 9/16	1/2	1/4	1/16 1/8
ME156752	3	3/4 13/16	3/8	3/8	1/16 1/8
ME156755	4	3/4 13/16	1/4	3/8	1/16 1/8
ME156756	4	3/4 13/16	3/8	3/8	1/16 1/8
ME156754	4	3/4 13/16	1/2	3/8	1/16 1/8
ME156757	5	3/4 13/16	3/8	3/8	1/16 1/8
ME156758	6	9/16 5/8	1/4	3/8	1/16 1/8
ME156763	6	3/4 13/16	1/8	3/8	1/16 1/8
ME156761	6	3/4 13/16	3/16	3/8	1/16 1/8
ME156764	6	3/4 13/16	1/4	3/8	1/16 1/8
ME156759	6	3/4 13/16	3/8	3/8	1/16 1/8
ME156762	6	3/4 13/16	1/2	3/8	1/16 1/8
ME156760	6	3/4 13/16	3/4	3/8	1/16 1/8
ME156765	6	3/4 13/16	1	3/8	1/16 1/8
ME156766	6	1.575 1.637	1/2	5/8	1/16 1/8
ME156767	7	3/4 13/16	1/2	3/8	1/16 1/8
ME156768	8	3/4 13/16	3/4	3/8	1/16 1/8
ME156769	10	15/16 1	1	1/2	1/16 1/8

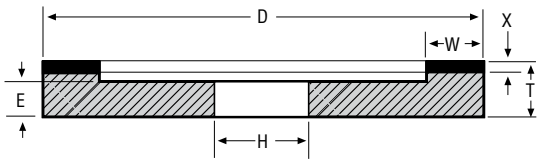
STANDARD PACKAGE = 1 WHEEL



Type 6A2

D - DIAMETER
T - THICKNESS
H - HOLE
W - RIM WIDTH
E - BACK THICKNESS
X - ABRASIVE DEPTH

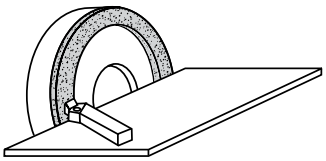
LISTINGS AVAILABLE IN DIAMOND OR cBN



CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

BLUEPRINT NUMBER	D	T	W	N	D	E	B.C.	X
TYPE 6A2C – STRAIGHT CUP WHEELS WITH MOUNTING HOLES								
ME36743	6	3/4 13/16	1/4	4	9/32	7/16	3-1/4	1/16 1/8
ME27852	6	3/4 13/16 13/16	3/8	4	9/32	7/16	3-1/4	1/16 1/8 1/4
ME30621	6	3/4 13/16 13/16	1/2	4	9/32	7/16	3-1/4	1/16 1/8 1/4
ME27853	6	3/4 13/16 13/16	3/4	4	9/32	7/16	3-1/4	1/16 1/8 1/4
ME27854	6	3/4 13/16	1	4	9/32	7/16	3-1/4	1/16 1/8
ME54263	7	1-1/4 1-5/16	1	4	9/32	1/2	1-7/8	1/16 1/8
ME34522	10	1 1-1/16	3/4	6	11/32	3/4	3-1/2	1/16 1/8
ME34647	10	1 1-1/16	1	6	11/32	3/4	3-1/2	1/16 1/8

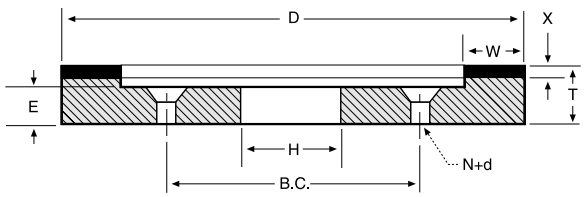
STANDARD PACKAGE = 1 WHEEL



Type 6A2C

D - DIAMETER
T - THICKNESS
H - HOLE
X - ABRASIVE DEPTH
E - BACK THICKNESS
W - RIM WIDTH
BC - BOLT CIRCLE
N - # OF MTG. HOLES
d - DIA. OF MTG. HOLES

LISTINGS AVAILABLE IN DIAMOND OR cBN



SEE SPECIFIC TYPE 6A2C BLUEPRINTS ON THE FOLLOWING PAGE.

NORTON OFFERS A COMPREHENSIVE STOCK PRODUCT SELECTION TO SERVICE MOST OF YOUR NEEDS – WITH THE FASTEST DELIVERY AND LOWEST PRICES.
SEE THESE CATALOG SECTIONS FIRST:

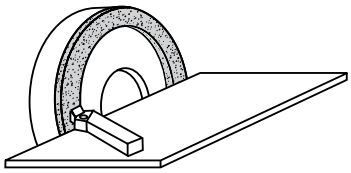
- Norton Stock B99 Products
- Norton/Winter Stock Toolroom Products

Can't find the specification in the above sections?

Then refer to this B99 Express Made-to-Order Resin Product section.

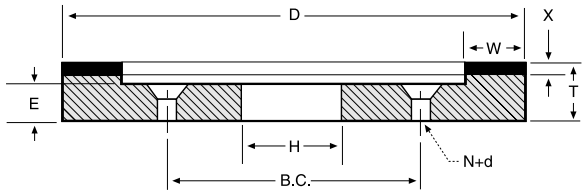
If a product can not be found in the B99 Express offering:

Contact your Norton sales representative or distributor for a custom-made product recommendation.



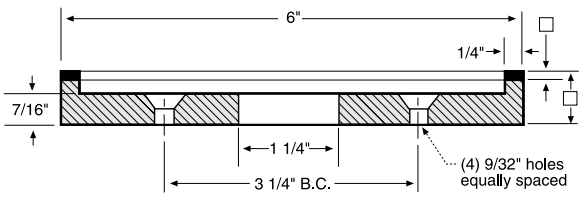
Type 6A2C

D - DIAMETER
T - THICKNESS
H - HOLE
X - ABRASIVE DEPTH
E - BACK THICKNESS
W - RIM WIDTH
BC - BOLT CIRCLE
N - # OF MTG. HOLES
D - DIA. OF MTG. HOLES

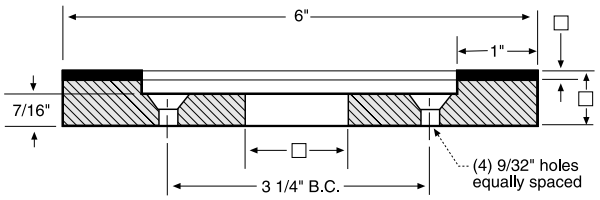


LISTINGS AVAILABLE IN DIAMOND OR cBN

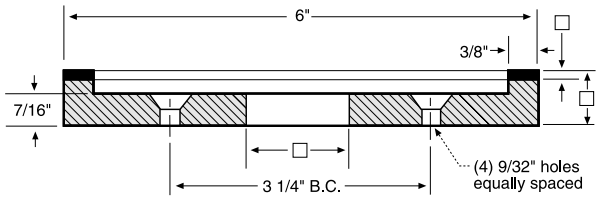
Type 6A2C – Specific Blueprints (Continued)



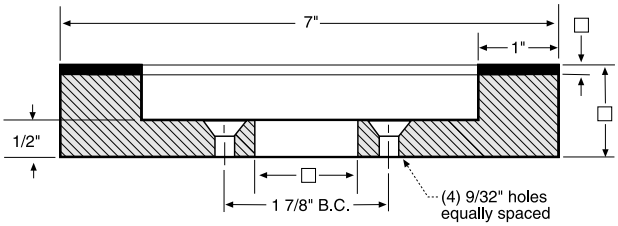
ME36743



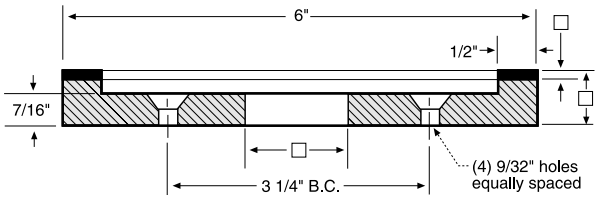
ME27854



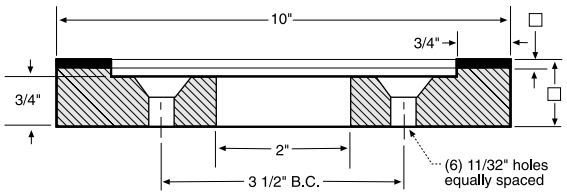
ME27852



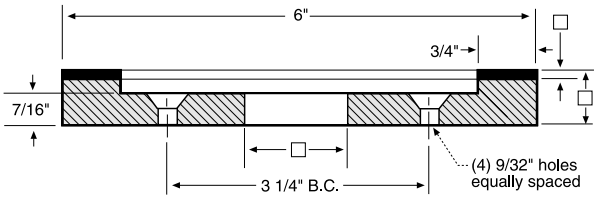
ME54263



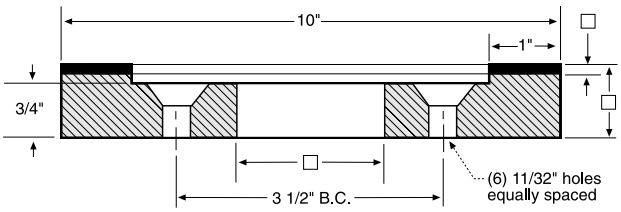
ME30621



ME34522



ME27853



ME34647

☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

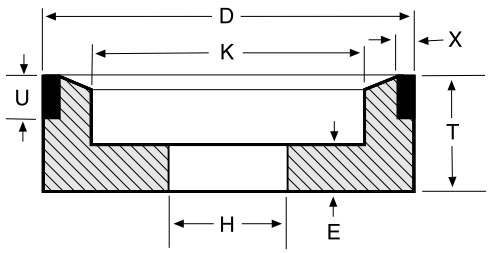
BLUEPRINT NUMBER	D	T	U	E	K	X
TYPE 6A9 – STRAIGHT CUP WHEELS						
ME57851	3	1-1/2	1/2	3/8	2-1/2	1/16 1/8
ME59701	4	1-1/4	3/8	1/2	3	1/16 1/8
ME57805	5	1-1/2	7/16	1/2	4-1/4	1/16 1/8
ME41681	6	1-1/2	7/16	1/2	5-1/16	1/16 1/8
ME100028	8	2	1/2	3/4	7-1/4	1/8
ME106885	12	1-3/8	1/4	1-1/16	11-1/8	3/16

STANDARD PACKAGE = 1 WHEEL

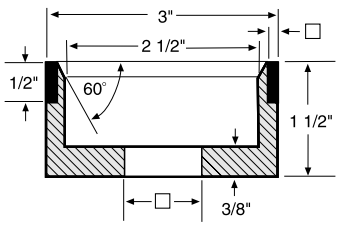
Type 6A9

D - DIAMETER
T - THICKNESS
H - HOLE
E - BACK THICKNESS
U - INSERT LENGTH
K - INSIDE DIAMETER
X - ABRASIVE DEPTH

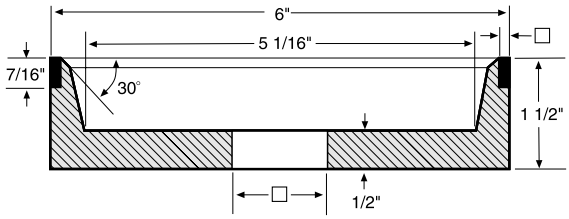
LISTINGS AVAILABLE IN DIAMOND OR cBN



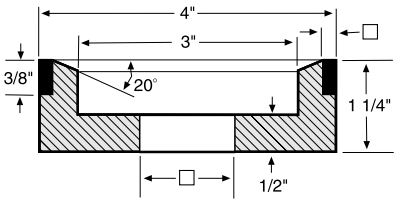
Type 6A9 – Specific Blueprints



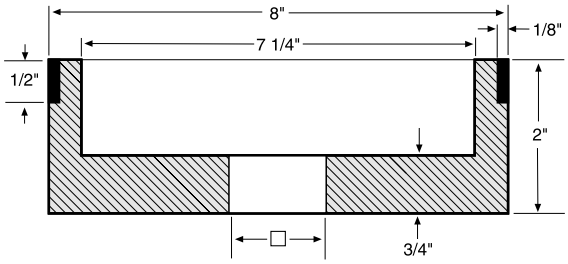
ME57851



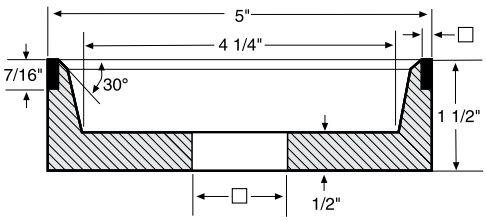
ME41681



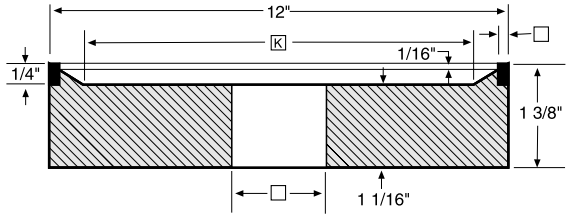
ME59701



ME100028



ME57805

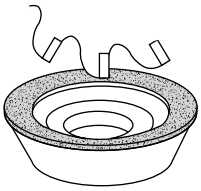


ME106885

☐ **VARIABLE**

BLUEPRINT NUMBER	D	T	W	E	K	X
TYPE 11A2 – CUP WHEELS						
ME26849	3	7/8	3/8	5/16	1-3/4	1/8
ME31815	3	1-5/16	3/8	3/8	1-3/4	1/8
ME28280	3-1/2	1-5/16	3/8	3/8	2-1/4	1/8
ME27793	4	1-1/4	1/2	1/2	2-1/4	1/8
ME33862	5	1-3/4	3/8	1/2	3-1/2	1/8
ME101095	6	1-9/16	3/8	1/2	5-9/64	1/8
		1-11/16				1/4
ME100998	6	1-1/2	1/2	1/2	4-11/16	1/8
		1-5/8				1/4
ME128467	6	1-1/2	1/4	1/2	5-1/32	1/8
					5-3/16	1/4

STANDARD PACKAGE = 1 WHEEL

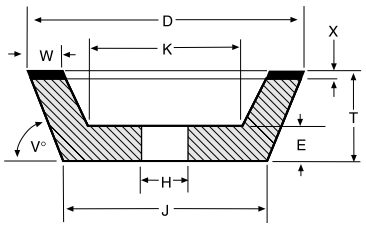


Type 11A2

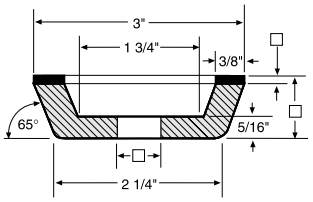
D - DIAMETER
T - THICKNESS
H - HOLE
E - BACK THICKNESS
J - HUB DIAMETER

K - INSIDE DIAMETER OF FLAT
W - RIM WIDTH
X - ABRASIVE DEPTH

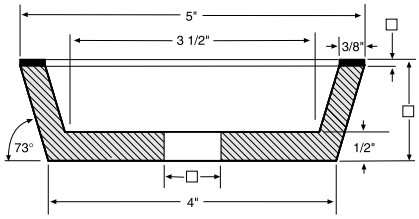
LISTINGS AVAILABLE IN DIAMOND OR cBN



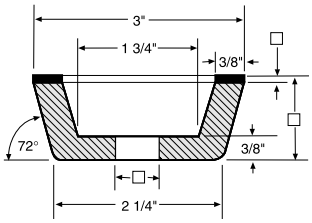
Type 11A2 – Specific Blueprints



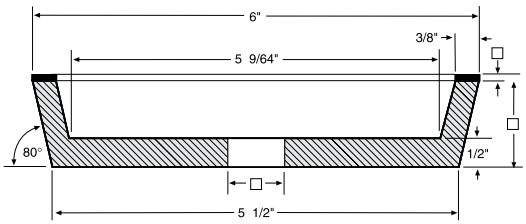
ME26849



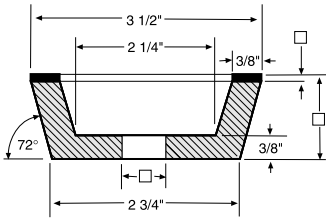
ME33862



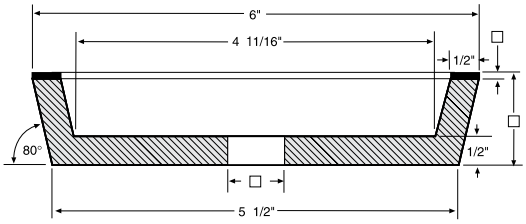
ME31815



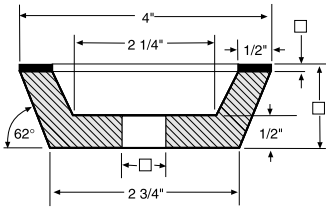
ME101095



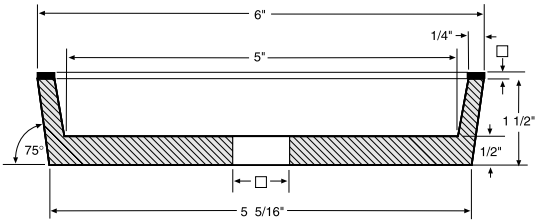
ME28280



ME100998



ME27793



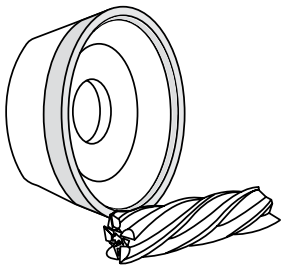
ME128467

☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

STYLE	BLUEPRINT NUMBER	D	T	S	U	X
TYPE 11V9 – FLARING CUP WHEELS						
B	ME51239*	1	5/8	80°	1/4	1/16 1/8
A	ME88398*	1-1/2	5/8	80°	1/4	1/8
B	ME51238*	1-1/2	5/8	80°	1/4	1/8
B	ME58512*	1-1/2	7/8	70°	1/4	1/16
B	ME89516*	2	5/8	60°	1/4	3/32
B	ME55562*	2	7/8	60°	5/16	1/16 1/8
B	ME42599*	2	1	75°	3/8	1/16 1/8
A	ME93912	3	1-1/4	70°	3/8	1/16 1/8
A	ME92192	3-3/4	1-1/2	70°	3/8	1/16 1/8
A	ME130503	100MM	35MM	70°	6MM	1.5MM 3.0MM
A	ME130500	100MM	35MM	70°	10MM	1.5MM 3.0MM
A	ME130501	125MM	40MM	70°	10MM	1.5MM 3.0MM
A	ME98298	5	1-3/4	70°	7/16	1/16 1/8
A	ME85913	6	1-3/4	70°	1/2	1/16 1/8

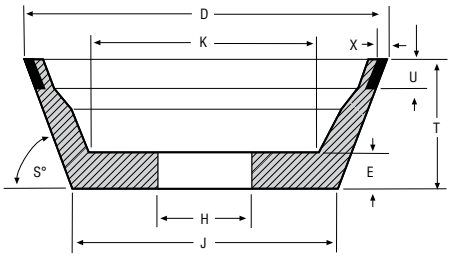
***SEE BLUEPRINT FOR MAXIMUM HOLE SIZE. STANDARD PACKAGE = 1 WHEEL**



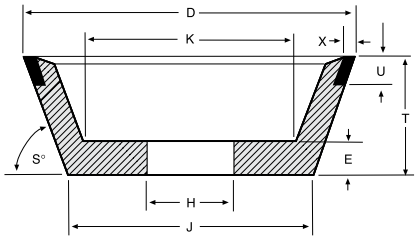
Type 11V9

D - DIAMETER
T - THICKNESS
H - HOLE
E - BACK DIAMETER
J - HUB DIAMETER
K - INSIDE DIAMETER OF FLAT
U - INSERT LENGTH
S - FACE ANGLE
X - ABRASIVE DEPTH

LISTINGS AVAILABLE IN DIAMOND OR cBN

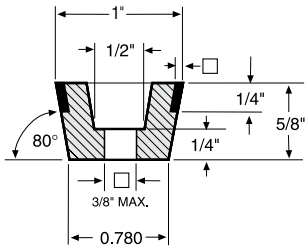


STYLE A

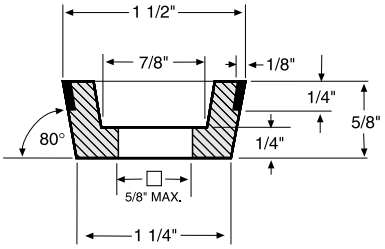


STYLE B

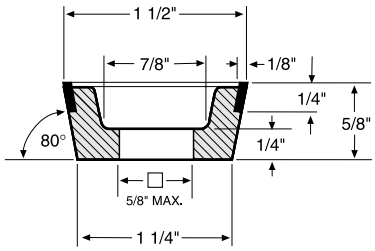
Type 11V9 – Specific Blueprints



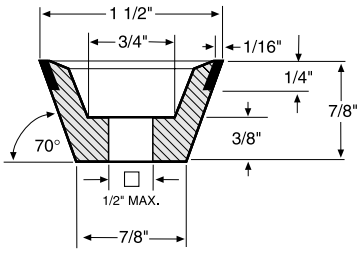
ME51239



ME51238



ME88398

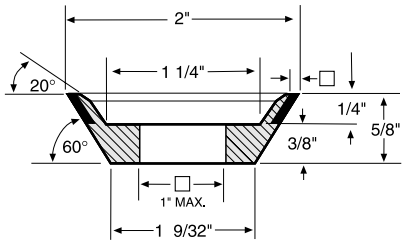


ME58512

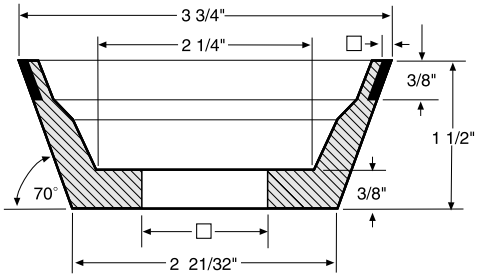
☐ **VARIABLE**

SEE ADDITIONAL TYPE 11V9 BLUEPRINTS ON THE FOLLOWING PAGES.

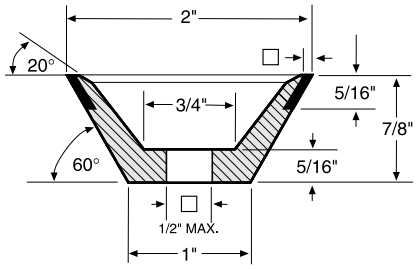
Type 11V9 – Specific Blueprints (continued)



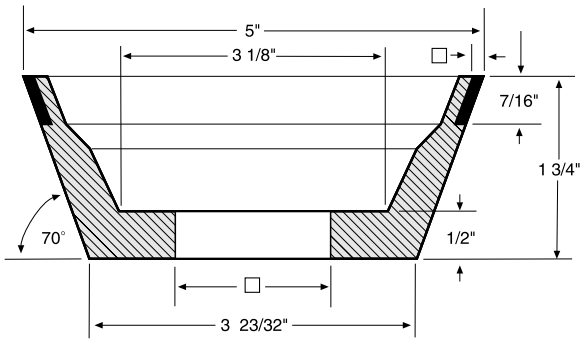
ME89516



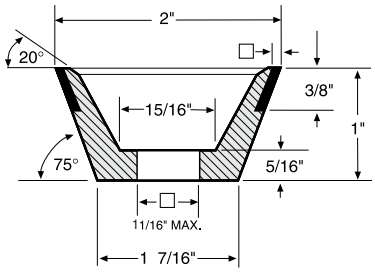
ME92192



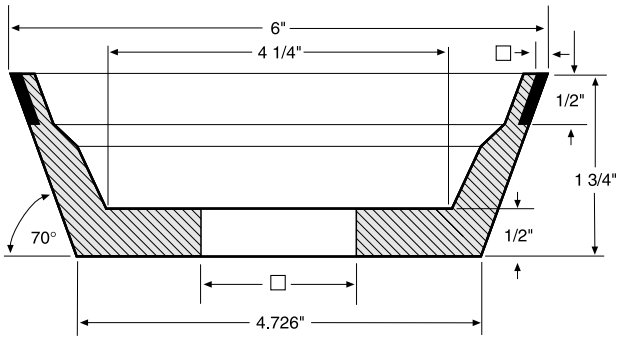
ME55562



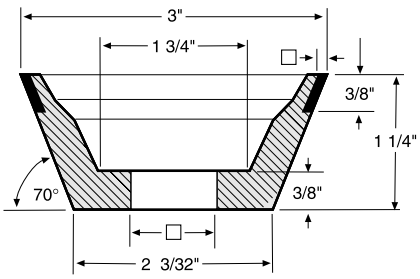
ME98298



ME42599



ME85913

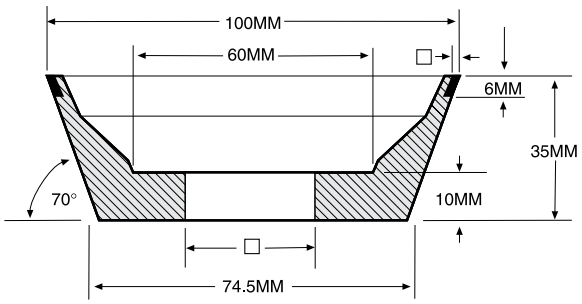


ME93912

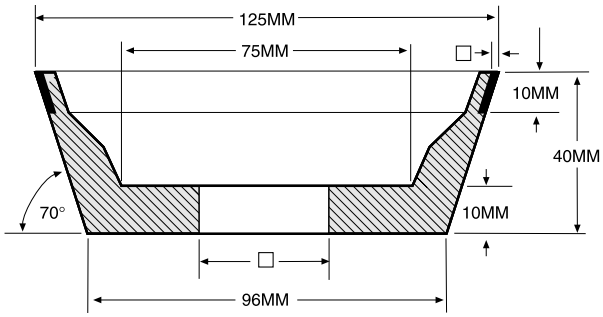
☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

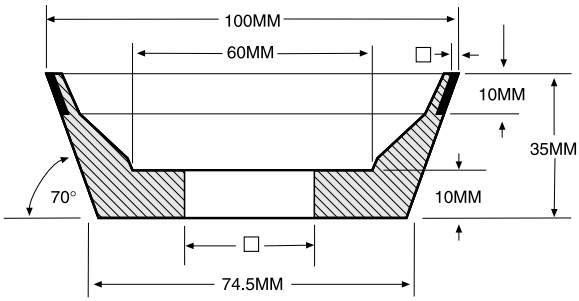
Type 11V9 – Specific Blueprints – Metric



ME130503



ME130501

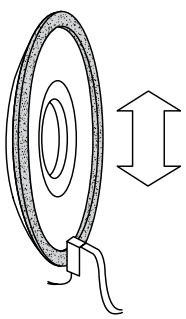


ME130500

☐ **VARIABLE**

BLUEPRINT NUMBER	D	T	W	E	K	X
TYPE 12A2 – DISH WHEELS						
ME40747	3	9/16	1/4	5/16	1-1/2	1/8
ME27757	3	15/16	1/8	3/8	1-1/2	1/8
ME27174*	3	15/16	1/4	3/8	1-1/2	1/8
ME40745	4	9/16	1/4	5/16	2-1/4	1/8
ME40746	4	9/16	3/8	5/16	2-1/4	1/8
ME73686	6	9/16	3/16	5/16	3-1/4	1/8
ME27758	6	1-1/16	3/16	1/2	2-5/8	1/8
ME27175	6	1-1/16	1/4	1/2	2-5/8	1/8
ME33914	6	1-1/16	3/8	1/2	2-5/8	1/8
ME73752	8	1-3/32	3/8	15/16	4-5/8	5/32

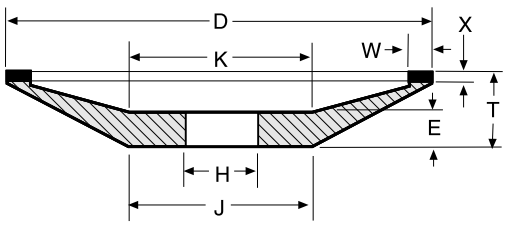
***SEE BLUEPRINT FOR MAXIMUM HOLE SIZE.**
STANDARD PACKAGE = 1 WHEEL



Type 12A2

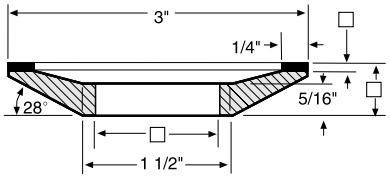
D - DIAMETER
T - THICKNESS
H - HOLE
E - BACK THICKNESS
J - HUB DIAMETER
K - INSIDE DIAMETER OF FLAT
W - RIM WIDTH
X - ABRASIVE DEPTH

LISTINGS AVAILABLE IN DIAMOND OR cBN

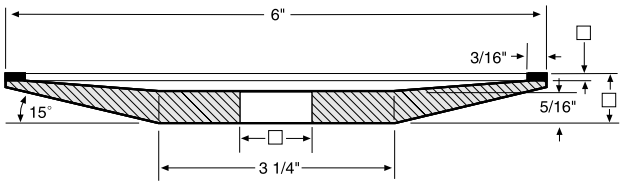


SEE SPECIFIC TYPE 12A2 BLUEPRINTS ON THE FOLLOWING PAGE.

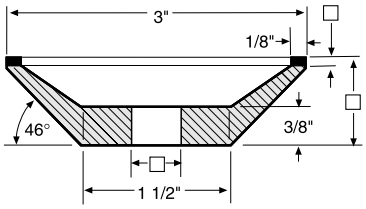
Type 12A2 – Specific Blueprints (continued)



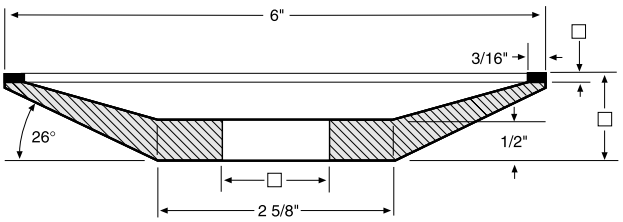
ME40747



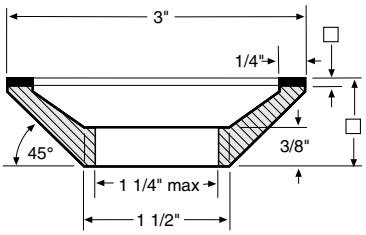
ME73686



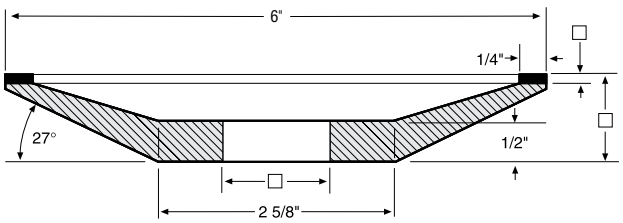
ME27757



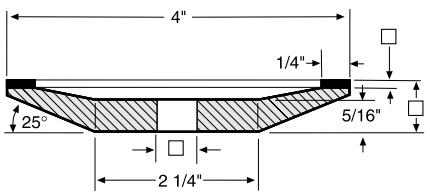
ME27758



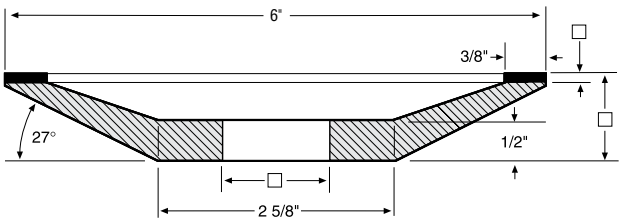
ME27174



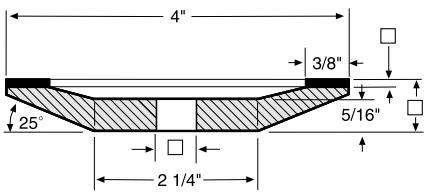
ME27175



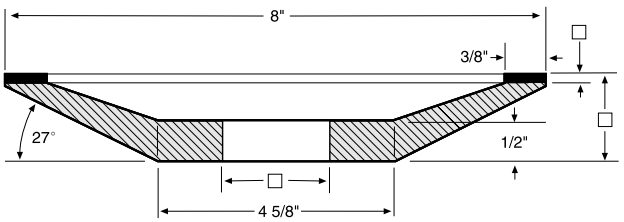
ME40745



ME33914



ME40746



ME73752

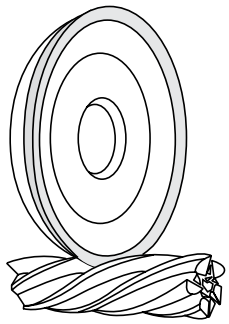
☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

REMEMBER TO CHECK NORTON STOCK AND NORTON/WINTER STOCK AVAILABILITY FIRST, FOR THE FASTEST DELIVERY AND LOWEST PRICE.

BLUEPRINT NUMBER	D	T	E	K	S	U	X
TYPE 12V9 – DISH WHEELS							
ME41755	3	7/16	5/16	1-1/2	30°	7/16	1/16 1/8
ME78406*	3	1/2	1/4	1-1/2	30°	1/4	1/8
ME69978	3	13/16	3/8	1-3/8	45°	11/32	1/16 1/8
ME37191*	3	13/16	3/8	1-3/8	45°	1/2	1/16 1/8
ME58734	4	1/2	1/4	2-1/4	30°	1/4	1/16 1/8
ME80849	4	7/8	3/8	2-1/4	45°	13/32	1/16 1/8
ME120095	5	.709	.394	3-13/32	45°	.394	3/32
ME73312	6	1/2	5/16	4-17/64	30°	3/8	1/16 1/8
ME109758	6	3/4	3/8	2-1/4	25°	1/2	1/16
ME98875	6	3/4	.610	2-1/2	25°	1/2	.148
ME48666	6	3/4	3/8	3-13/32	30°	3/8	1/16 1/8
ME118022	6	1	1/2	3-1/32	30°	1/2	1/16 1/8
ME44377	6	1	1/2	4	45°	3/8	1/8
ME54386	6	1-1/2	3/8	3	45°	17/32	1/16

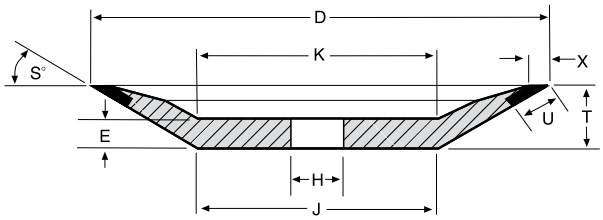
***SEE BLUEPRINT FOR MAXIMUM HOLE SIZE. STANDARD PACKAGE = 1 WHEEL**



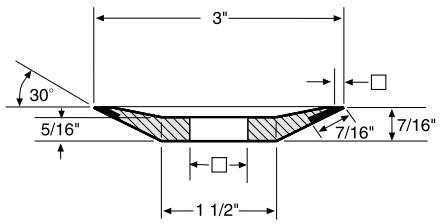
Type 12V9

D - DIAMETER
T - THICKNESS
H - HOLE
E - BACK THICKNESS
J - HUB DIAMETER
K - INSIDE DIAMETER
U - INSERT LENGTH
S - FACE ANGLE
X - ABRASIVE DEPTH

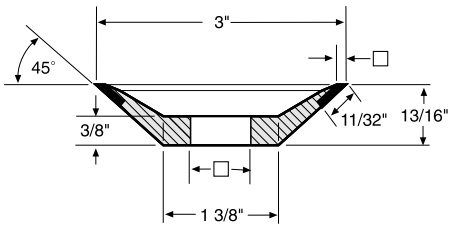
LISTINGS AVAILABLE IN DIAMOND OR cBN



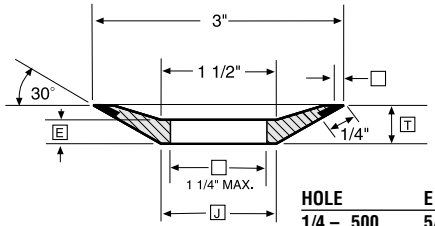
Type 12V9 – Specific Blueprints



ME41755

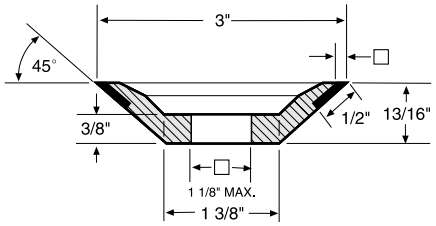


ME69978



ME78406

HOLE	E	T	J
1/4 – .500	5/16	1/2	1-17-64
.501 – 1-1/4	1/4	7/16	1-33/64

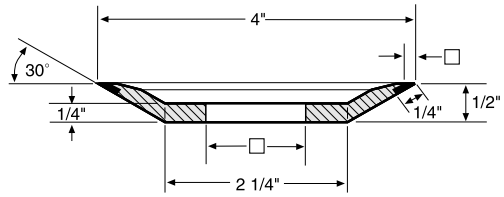


ME37191

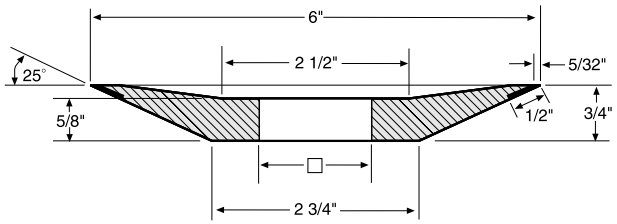
☐ **VARIABLE**

SEE ADDITIONAL SPECIFIC TYPE 12V9 BLUEPRINTS ON THE FOLLOWING PAGE.

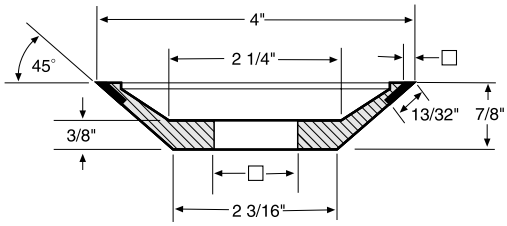
Type 12V9 – Specific Blueprints (Continued)



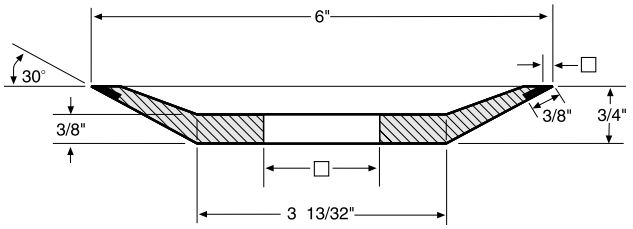
ME58734



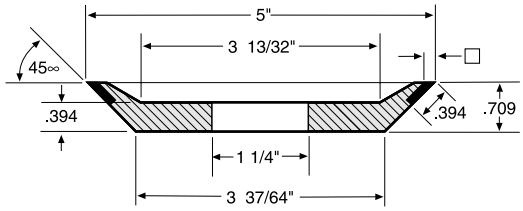
ME98875



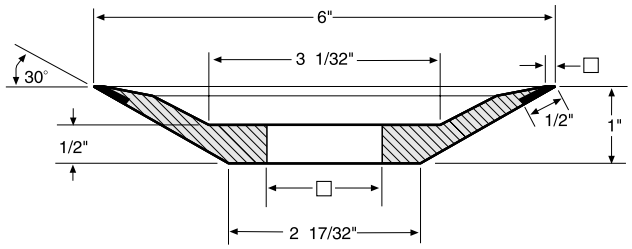
ME80849



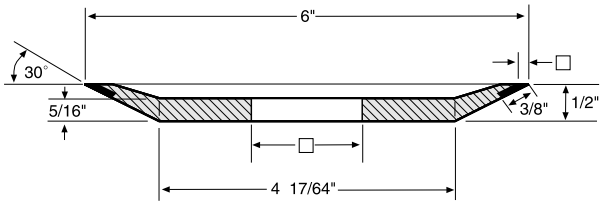
ME48666



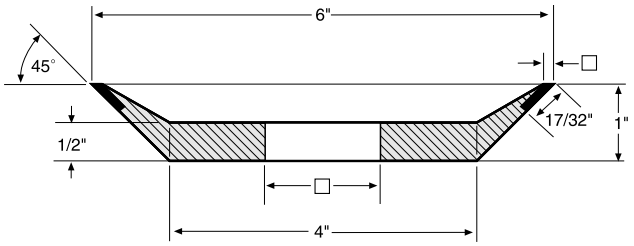
ME120095



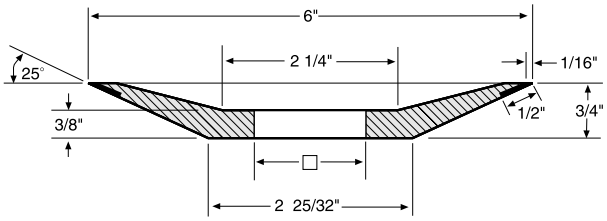
ME118022



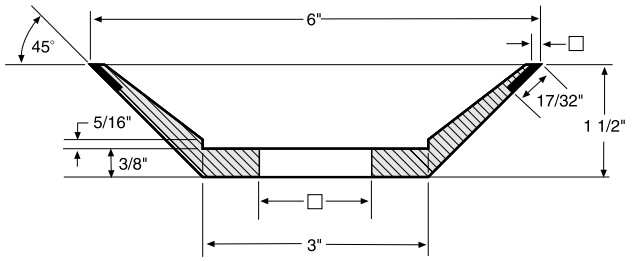
ME73312



ME44377



ME109758



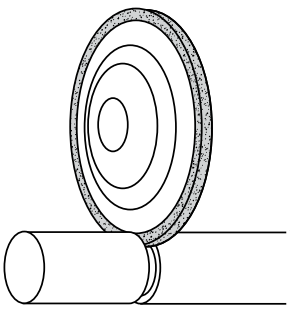
ME54386

☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

BLUEPRINT NUMBER	D	T	J	U	X
TYPE 14A1 – HUB 2-SIDES WHEELS					
ME54382	6	1/2	4-15/16	1/16	1/8
ME41276	6	1/2	4	1/8	1/16 1/8
ME34745	7	1/2	3-15/16	1/8	1/16 1/8
ME41385	10	1/2	7	1/4	1/16 1/8

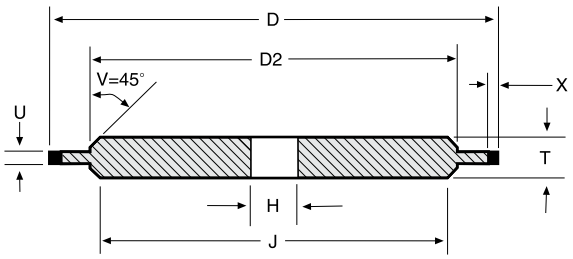
STANDARD PACKAGE = 1 WHEEL



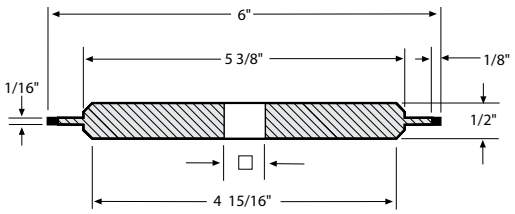
Type 14A1

D - DIAMETER
T - THICKNESS
H - HOLE
D2 - LARGE HUB DIAMETER
X - ABRASIVE DEPTH
U - ABRASIVE THICKNESS
J - HUB DIAMETER

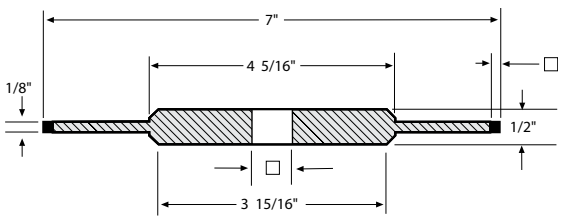
LISTINGS AVAILABLE IN DIAMOND OR cBN



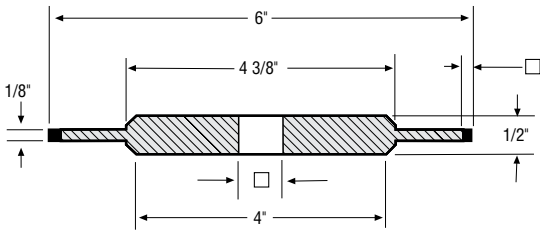
Type 14A1 – Specific Blueprints



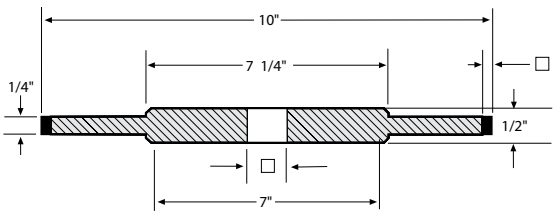
ME54382



ME34745



ME41276



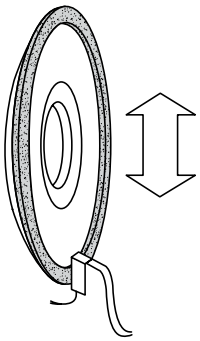
ME41385

☐ **VARIABLE**

REMEMBER TO CHECK NORTON STOCK AND NORTON/WINTER STOCK AVAILABILITY FIRST, FOR THE FASTEST DELIVERY AND LOWEST PRICE.

BLUEPRINT NUMBER	D	T	W	E	K	S	X
TYPE 15A2 – DISH WHEELS							
ME32717	6	13/16	1/8	7/16	3-1/8	45°	1/8
ME32718	6	13/16	3/16	7/16	3-1/8	45°	1/8
ME32719	6	13/16	1/4	7/16	3-1/8	45°	1/8
ME32720	6	13/16	3/8	7/16	3-1/8	45°	1/8

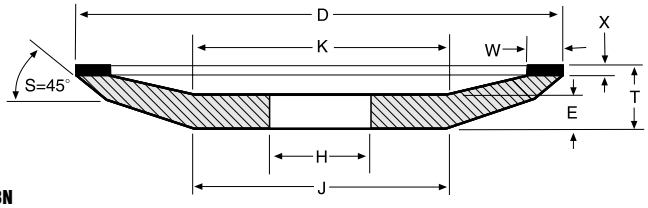
STANDARD PACKAGE = 1 WHEEL



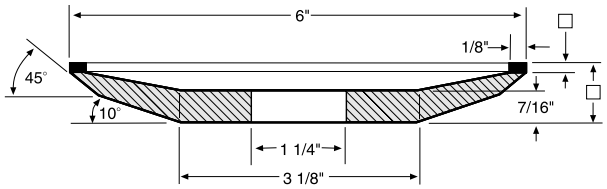
Type 15A2

D - DIAMETER
T - THICKNESS
H - HOLE
X - ABRASIVE DEPTH
J - HUB DIAMETER
W - RIM WIDTH
E - BACK THICKNESS
K - INSIDE DIAMETER OF FLAT

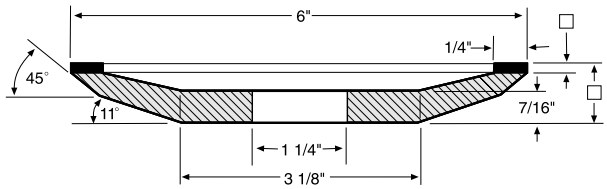
LISTINGS AVAILABLE IN DIAMOND OR cBN



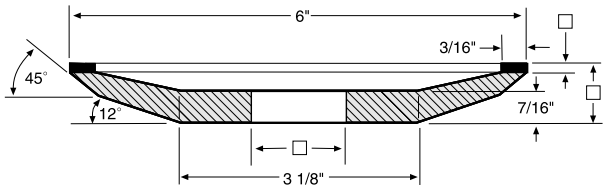
Type 15A2 – Specific Blueprints



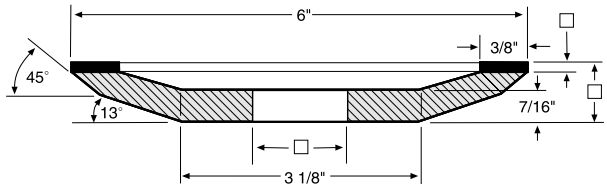
ME32717



ME32719



ME32718



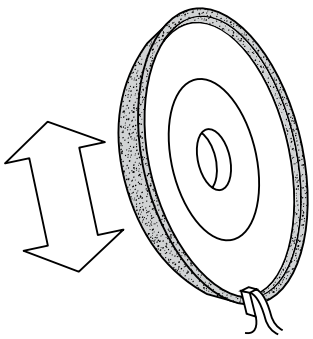
ME32720

☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

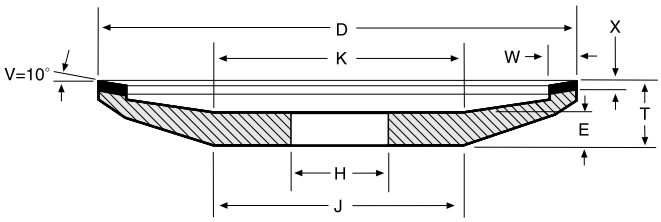
BLUEPRINT NUMBER	D	T	W	E	K	S	X
TYPE 15V4 – DISH WHEELS							
ME29109	3	15/16	1/8	3/8	1-1/2	30°	1/8
ME40846	6	13/16	1/8	7/16	3-1/8	45°	1/8
ME40847	6	13/16	3/8	7/16	3-1/8	45°	1/8
ME40844	6	1-1/16	1/8	1/2	2-5/8	30°	1/8

STANDARD PACKAGE = 1 WHEEL



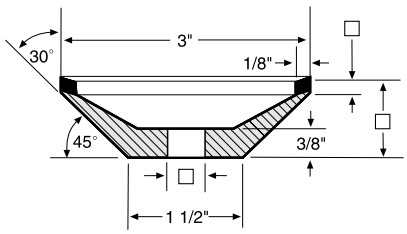
Type 15V4

D - DIAMETER
T - THICKNESS
H - HOLE
E - BACK THICKNESS
K - INSIDE DIAMETER OF FLAT
X - ABRASIVE DEPTH
V - FACE ANGLE = 10°
W - RIM WIDTH
J - HUB DIAMETER
S - BACK ANGLE

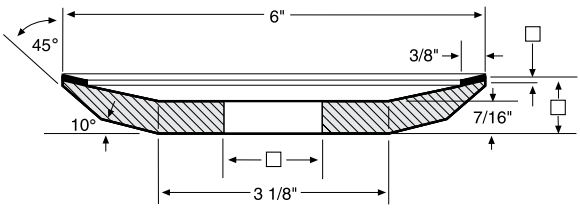


LISTINGS AVAILABLE IN DIAMOND OR cBN

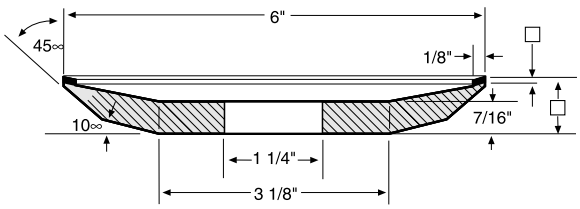
Type 15V4 – Specific Blueprints



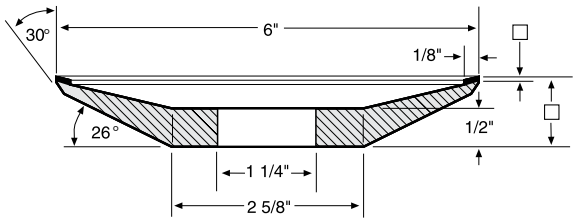
ME29109



ME40847



ME40846



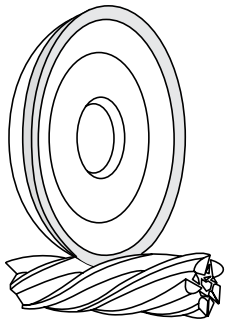
ME40844

☐ **VARIABLE**

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

BLUEPRINT NUMBER	D	T	E	S	U	X
TYPE 15V9 – DISH WHEELS						
ME78452*	2	1/2	5/16	45°	3/16	1/8
ME95738*	2-1/2	1/2	3/8	45°	1/4	1/16
ME70688	3	1/2	1/4	45°	5/16	1/16 1/8
ME106011	3-1/2	3/4	7/16	45°	3/8	1/16
ME109735	4	1/2	5/16	45°	9/32	1/16 1/8
ME54577	4	3/4	7/16	45°	9/32	1/16 1/8
ME68744	5	3/4	7/16	45°	9/32	1/8
ME52205	5	1-3/8	1/2	45°	1/2	1/16 1/8
ME75786	6	3/4	3/8	30°	3/8	1/16 1/8
ME40633	6	3/4	7/16	45°	3/8	1/16 1/8
ME55489	8	3/4	7/16	45°	3/8 13/32	1/16 1/8

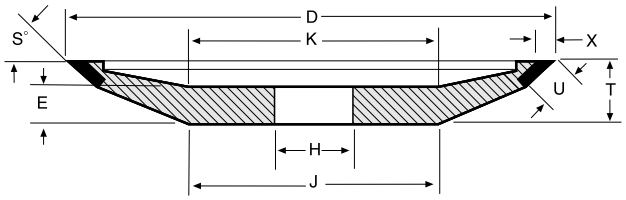
***SEE BLUEPRINT FOR MAXIMUM HOLE SIZE.**
STANDARD PACKAGE = 1 WHEEL



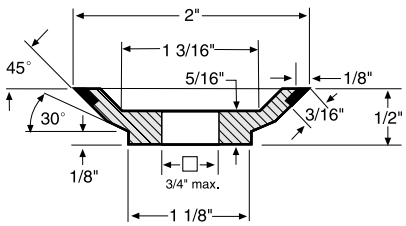
Type 15V9

D - DIAMETER
T - THICKNESS
H - HOLE
X - ABRASIVE DEPTH
E - BACK THICKNESS
J - HUB DIAMETER
K - INSIDE DIAMETER
U - INSERT LENGTH
S - FACE ANGLE

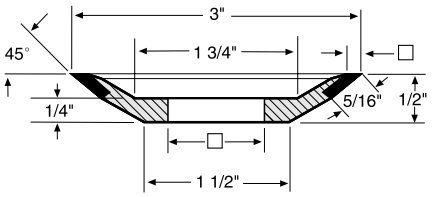
LISTINGS AVAILABLE IN DIAMOND OR cBN



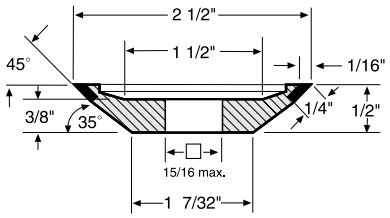
Type 15V9 – Specific Blueprints



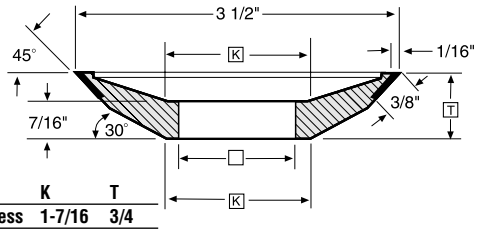
ME78452



ME70688



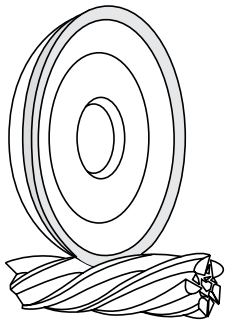
ME95738



HOLE	K	T
1-3/16 or less	1-7/16	3/4
1-1/4	1-1/2	47/64

ME106011

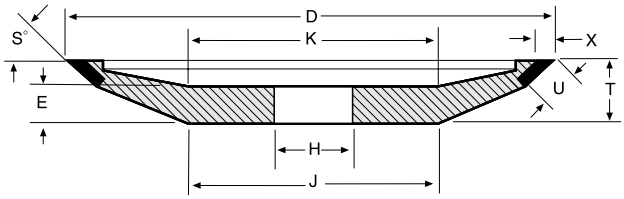
☐ **VARIABLE**



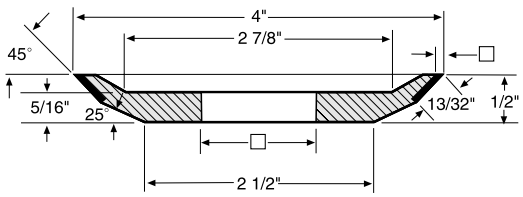
Type 15V9

D - DIAMETER
T - THICKNESS
H - HOLE
X - ABRASIVE DEPTH
E - BACK THICKNESS
J - HUB DIAMETER
K - INSIDE DIAMETER
U - INSERT LENGTH
S - FACE ANGLE

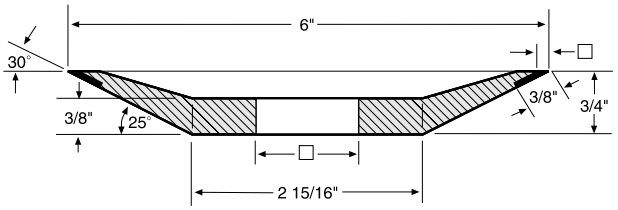
LISTINGS AVAILABLE IN DIAMOND OR cBN



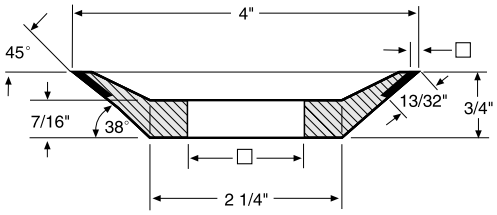
Type 15V9 – Specific Blueprints



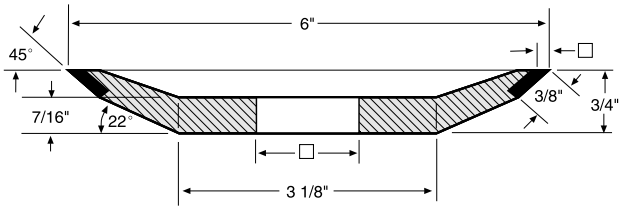
ME109735



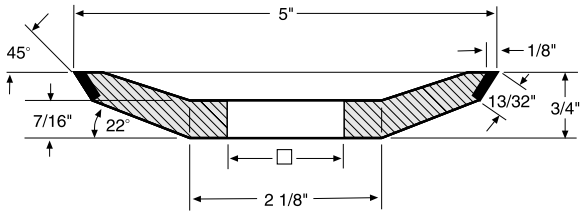
ME75786



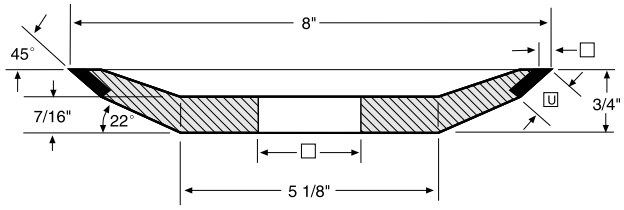
ME54577



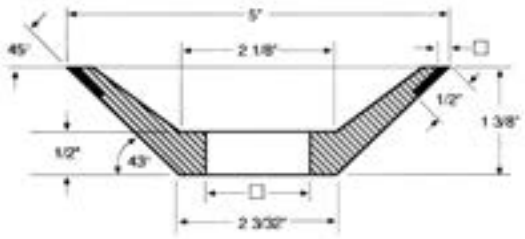
ME40633



ME68744



ME55489



ME52205

☐ **VARIABLE**

REMEMBER TO CHECK NORTON STOCK AND NORTON/WINTER STOCK AVAILABILITY FIRST, FOR THE FASTEST DELIVERY AND LOWEST PRICE.

NORTON SAINT-GOBAIN

NORTON SAINT-GOBAIN PARADIGM

NORTON SAINT-GOBAIN GFORCE™

NORTON SAINT-GOBAIN Univel

These superior, pre-engineered wheels have been specifically developed to meet the demanding needs of precision cutting tool manufactures as well as re-sharpeners. The use of the highest quality diamond and cBN abrasives matched to superior high temperature bond systems, guarantees high performing wheels. These wheels are manufactured under the strictest quality control protocols ensuring the same, consistent, high-performing product. Cutting tool manufactures who use these wheels report much improved dimensional accuracy and superior cutting edges.

This product offering provides wheel sizes for most CNC machines and wheels shapes to produce the required cutting tool geometries. If you do not find a wheel in this offering to suit your specific needs, a custom-made wheel can be provided.

TYPICAL APPLICATIONS

- CNC round tool grinding

BEST

NORTON PARADIGM DIAMOND WHEELS – FOR CNC WC ROUND TOOL MANUFACTURING
NORTON G-FORCE CBN WHEELS – FOR CNC HSS ROUND TOOL MANUFACTURING

FEATURES	BENEFITS
Truable	Online and offline truable for maximum productivity
Wear and load resistant	Superior grinding on 6% to 12% cobalt Better control over core growth
High grain retention; uniform structure	High G-ratio; up to 2.5 times longer life and 30% higher MRR than existing superabrasive wheels
Low specific cutting energy	Faster grinding with lower power draw and less burn

BETTER

NORTON G-FORCE AND POLYIMIDE DIAMOND WHEELS – FOR CNC WC ROUND TOOL MANUFACTURING

FEATURES	BENEFITS
Univel and G-Force premium products	
Polyimide bond systems	Superior form-holding and lower-power requirements compared to premium competitive wheels Reduced frequency of dresses Decreased chances of burn and heat damage to the part
G-Force	
Unique bond technology	Excels on round, carbide and steel tools Abrasive is strongly held – and wear-resistant
Self-dressing	Maintains a consistently sharp grinding edge
The only product on the market that is truly rotary dress-able	Allows for lights-out manufacturing
Leads the industry in depth of cut, traverse rates and form holding	Reduces total grinding costs by 30% or more

GOOD

NORTON/WINTER AND NORTON CNC WHEELS – FOR SHORT RUNS AND FREQUENT GEOMETRY CHANGES

FEATURES	BENEFITS
Norton/Winter	
A price competitive alternative to Univel and G-Force	The product of choice for short-run manufacturing jobs where frequent wheel profile changes are required, and premium wheels can not be cost-justified Can be reshaped for numerous short runs Great performance/price ratio
Norton	
Ideal for resharpening and short-run manufacturing operations	Competitively-priced while providing premium performance
Free cutting phenolic specifications formulated for oil coolants	Grind with less heat and pressure – eliminating burning
Consistent wheel-to-wheel performance	Reduced cycle times, less dressing = longer wheel life
Precision tolerances	Repeatable part geometry

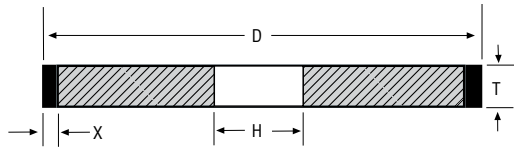
SEE PRODUCT IDENTIFICATION SYSTEM/USAGE INFORMATION ON PAGES 9-10 FOR ADDITIONAL INFORMATION.

DIAMOND CNC WHEELS

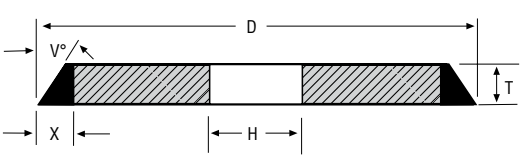
		BEST			BETTER			GOOD		
		NORTON PARADIGM			NORTON G-FORCE/UNIVEL			NORTON/WINTER AND NORTON		
ABR. WIDTH U,W	ANGLE V	SPECIFICATION	ABR. DEPTH X	UPC #	SPECIFICATION	ABR. DEPTH X	UPC #	SPECIFICATION	ABR. DEPTH X	UPC #
TYPE 1A1 – DIAMOND FLUTE										
4 x 1/2 x 1-1/4		SD320-D168-P100C	3/8	07958783055*	AD320-UP061 G-Force	1/4	60157663909	A4D180-R115B610	1/4	69014118200
								D220-C100-K+925	6mm	60157623605
5 x 3/8 x 1-1/4		SD320-D168-P100C	1/2	07958783058*	AD320-UP061 G-Force	1/2	60157668409	A4D220-R115B610	1/2	69014118255
								D220-C100-K+925	6mm	60157625123
5 x 1/2 x 1-1/4		SD320-C176-P100C	1/2	07958783061	AD320-UP061 G-Force	1/2	60157662240	A4D180-R115B610	1/2	69014118202
								D220-C100-K+925	6mm	60157613099
5 x 5/8 x 1-1/4		SD320-C176-P100C	1/2	07958783063*	AD320-UP061 G-Force	1/2	60157663486*	A4D180-R115B610	1/2	69014118203*
6 x 1/2 x 1-1/4		SD320-C176-P100C	1/2	07958783064	AD320-UP061 G-Force	1/4	60157682133*	A4D180-R115B610	1/4	69014118216*
								D280-N100K+1421	6mm	60157624551
TYPE 1A1 – DIAMOND POLISH										
5 x 1/2 x 1-1/4					80D1000-100UP731 Univel	1/2	07958784316*			
TYPE 1A1 – DIAMOND RELIEF										
6 x 1/2 x 1-1/4		SD320-E168-P100C	1/2	07958783073*	AD320-UP892 G-Force	1/2	69014117684*	A4D180-R115B610	1/2	69014118217*
								D280-N100-K+1421	6mm	60157624551
TYPE 1A1RN – DIAMOND FLUTE										
5 x 3/8 x 1-1/4		SD320-D168-P100C	1/2	07958783067*	AD320-UP061 G-Force	1/2	60157663501	A4D180-R115B610	1/2	69014118201
								D220-C100-K+925	6mm	60157625123
5 x 1/2 x 1-1/4					AD220-UP061 G-Force	1/2	66260322280			
5 x 5/8 x 1-1/4					AD220-UP061 G-Force	1/2	60157664141			
TYPE 1B1 – DIAMOND FLUTE										
4 x 3/8 x 1-1/4	V=20°	SD320-D168-P100C	3/8	07958783054						
TYPE 1B1 – DIAMOND FLUTE/GASH										
5 x 3/8 x 1-1/4	V=45°	SD320-E168-P100C	1/2	07958783065						
TYPE 1B1 – DIAMOND GASH										
5 x 1/2 x 1-1/4	V= 45°	SD320-E168-P100C	1/4	07958783062*						
5 x 1/2 x 1-1/4	V=60°	SD320-E168-P100C	1/4	07958783060*						
5 x 1/2 x 1-1/4	V=30°	SD320-E168-P100C	3/4	07958783070*				A4D320-R115B610	3/4	69014118207
								D220-C100-K+925	6mm	60157613112
5 x 1/2 x 1-1/4	V=45°	SD320-E168-P100C	3/4	07958783068*	AD320-UP531 G-Force	3/4	66260329603	A4D320-R115B610	3/4	69014118208
								D220-C100-K+925	6mm	60157623673
TYPE 1V1 – DIAMOND FLUTE										
4 x 3/8 x 1-1/4	V=20°				AD320-UP061 G-Force	1/4	66260316591	A4D180-R115B610	1/4	69014118263
5 x 1/2 x 1-1/4	V=10°	SD320-C176-P100C	1/2	07958783071*	AD320-UP061 G-Force	1/2	66260116723	A4D180-R115B610	1/2	69014118204
5 x 1/2 x 1-1/4	V=20°	SD320-C176-P100C	1/2	07958783074	AD320-UP061 G-Force	1/2	60157693843	A4D180-R115B610	1/2	69014118205
								D220-C100-K+925	6mm	60157623953
5 x 1/2 x 1-1/4	V=30°	SD320-C176-P100C	1/2	07958783085*	AD320-UP671 G-Force	1/2	60157693841	A4D180-R115B610	1/2	69014118206

*** NON-STOCK: CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**
ALL HOLES (BORES) ARE MACHINED TO (H7) CLASS FIT.

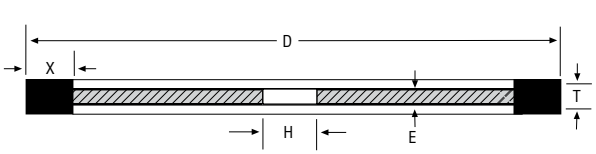
Type 1A1



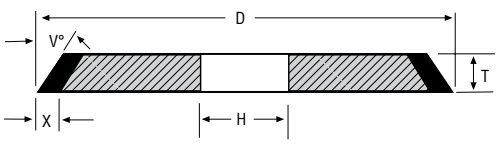
Type 1B1



Type 1A1R



Type 1V1

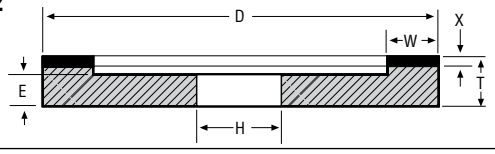


DIAMOND CNC WHEELS

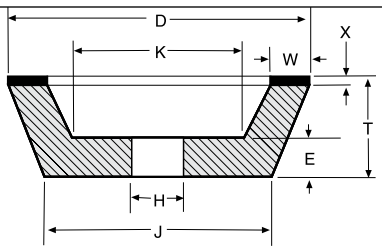
	BEST			BETTER			GOOD		
	NORTON PARADIGM			NORTON G-FORCE/UNIVEL			NORTON/WINTER AND NORTON		
ABR. WIDTH U,W / ANGLE V	SPECIFICATION	ABR. DEPTH X	UPC #	SPECIFICATION	ABR. DEPTH X	UPC #	SPECIFICATION	ABR. DEPTH X	UPC #
TYPE 1V1 – DIAMOND FLUTE/GASH									
5 x 3/8 x 1-1/4 V=45°				AD320-UP531 G-Force	1/2	60157696562	A4D320-R115B610	1/2	69014118257
TYPE 1V1 – DIAMOND GASH									
5 x 1/2 x 1-1/4 V= 45°				AD320-UP531 G-Force	1/4	66260329604	A4D320-R115B610	1/4	69014118209
5 x 1/2 x 1-1/4 V=60°				AD320-UR331 Univel	1/4	66260329469	A4D320-R115B610	1/4	69014118210
TYPE 6A2 – DIAMOND POINT									
4 x 1-1/4 x 1-1/4 W=1/4	SD320-E168-P100C	1/4	07958783057*	AD320-UP251 G-Force	1/4	69014118644*	ASD320C-R100B56	1/4	69014118219*
TYPE 11A2 – DIAMOND RELIEF									
3 x 1-1/4 x 1-1/4 W=1/4				10D320-NB100U Univel	1/4	60157692199			
4 x 1-1/4 x 1-1/4 W=1/4	SD320-E168-P100C	1/4	07958783059*	AD320-UP701 G-Force	1/4	60157696315	ASDC320-R100B80	1/4	69014118213
4 x 1-1/4 x 1-1/4 W=1/4				AD320-UP561 G-Force	1/4	69014118479*	ASDC320-R100B80	1/4	69014118265*
TYPE 11V5 – DIAMOND RELIEF									
4 x 1-1/4 x 1-1/4 W=1/4 V=30°				AD320-UP561 G-Force	1/4	69014117838	ASDC320-R100B80	1/4	69014118211
4 x 1-1/4 x 1-1/4 W=3/8 V=10°				AD320-UP561 G-Force	1/4	69014117812	ASDC320-R100B80	1/4	69014118212
TYPE 11V9 – DIAMOND RELIEF									
3-3/4 x 1-1/2 x 1-1/4 U=3/8				10D240-PB125-U Univel	1/8	66260322134	ASDC320-R100B80	1/8	69014118259
5 x 1-3/4 x 1-1/4 U=5/8				10D240-PB125-U Univel	1/8	66260118300	ASDC320-R100B80	1/8	69014118215
							D280-R100-K+4821	3mm	60157612443
TYPE 12V9 – DIAMOND RELIEF									
4 x 3/4 x 1-1/4 U=3/8				AD320-UP531 G-Force	1/8	66260127950*	ASDC320-R100B80	1/8	69014118221*
							D280-R100K+4821	3mm	60157612442
5 x 3/4 x 1-1/4 U=1/2				AD320-UP531 G-Force	1/8	66260127911*	ASDC320-R100B80	1/8	69014118222*

*** NON-STOCK: CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**
ALL HOLES (BORES) ARE MACHINED TO (H7) CLASS FIT.

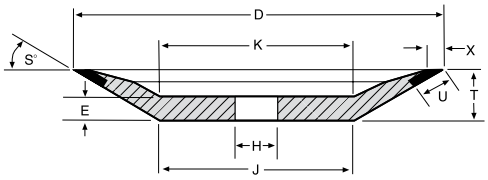
Type 6A2



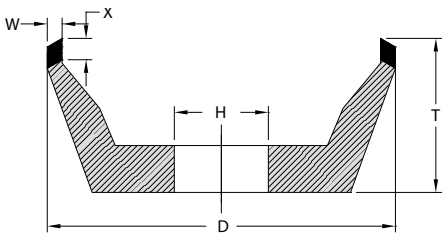
Type 11A2



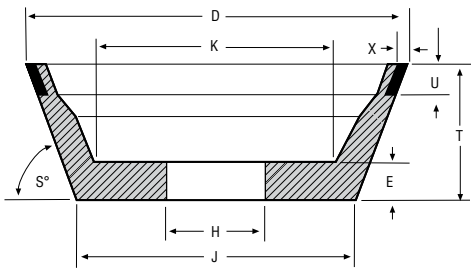
Type 12V9



Type 11V5



Type 11V9



CBN CNC WHEELS

ABR. WIDTH U,W	ANGLE V	BEST NORTON G-FORCE/UNIVEL SPECIFICATION	ABR. DEPTH X	UPC #	GOOD NORTON/WINTER AND NORTON SPECIFICATION	ABR. DEPTH X	UPC #
TYPE 1A1 – cBN FLUTE							
4 x 1/2 x 1-1/4		BX220-UP241 G-Force	1/4	60157669935*	BAM180-WBXD3037	1/4	69014118223*
					B220-V240-KSS920	6mm	60157623498
5 x 3/8 x 1-1/4		BX220-UP241 G-Force	1/2	69014118436*	BAM320C-WBXD3037	1/2	69014118256*
5 x 1/2 x 1-1/4		BX220-UP241 G-Force	1/2	60157670869*	BAM180-WBXD3037	1/2	69014118224*
					B220-V240-KSS920	6mm	60157602944
5 x 5/8 x 1-1/4		BX220-UP241 G-Force	1/2	66260329385*	BAM180-WBXD3037	1/2	69014118225*
6 x 1/4 x 1-1/4		BX240-UP241 G-Force	1/4	69014118435*	BAM180-WBXD3037	1/4	69014118240*
TYPE 1A1 – cBN RELIEF							
6 x 1/2 x 1-1/4		BX320-UP892 G-Force	1/2	69014117679*	BAM180-WBXD3037	1/2	69014118237*
TYPE 1A1RN – cBN FLUTE							
5 x 1/4 x 1-1/4		BX150-UP241 G-Force	1/2	07958773216*			
5 x 3/8 x 1-1/4		BX150-UP241 G-Force	1/2	07958773217*			
5 x 1/2 x 1-1/4		BX150-UP241 G-Force	1/2	69014141373*			
TYPE 1B1 – cBN GASH							
5 x 1/2 x 1-1/4	V=30°	BX320-UP701 G-Force	3/4	66260329388*	BAM320C-WBXD3037	3/4	69014118229*
5 x 1/2 x 1-1/4	V=45°	BX320-UP531 G-Force	3/4	66260329391*	BAM320C-WBXD3037	3/4	69014118230*
					B220-V240-KSS920	6mm	60157623542
TYPE 1V1 – cBN FLUTE							
4 x 3/8 x 1-1/4	V=20°	BX220-UP241 G-Force	1/4	69014118342*	BAM180C-WBXD3037	1/4	69014118264*
5 x 1/2 x 1-1/4	V=20°	BX220-UP241 G-Force	1/2	60157680042*	BAM180-WBXD3037	1/2	69014118227*
					B220-V240-KSS920	6mm	60157623944
5 x 1/2 x 1-1/4	V=30°	BX220-UP241 G-Force	1/2	60157691380*	BAM180-WBXD3037	1/2	69014118228*
5 x 1/2 x 1-1/4	V=10°	BX220-UP241 G-Force	1/2	66260119876*	BAM180-WBXD3037	1/2	69014118226*
TYPE 1V1 – cBN FLUTE/GASH							
5 x 3/8 x 1-1/4	V=45°	BX220-UP531 G-Force	1/2	60157697699*	BAM320C-WBXD3037	1/4	69014118262*
					B220-V240-KSS920	6mm	60157623524
TYPE 1V1 – cBN GASH							
5 x 1/2 x 1-1/4	V=60°	BX320-UR331 Univel	1/4	66260329461*	BAM320C-WBXD3037	1/4	69014118232*
5 x 1/2 x 1-1/4	V=45°	BX320-UP531 G-Force	1/4	66260329275*	BAM320C-WBXD3037	1/4	69014118231*
					B220-V240-KSS920	6mm	60157623776
TYPE 6A2 – cBN POINT							
4 x 1-1/4 x 1-1/4 W=1/4		BX320-UP241 G-Force	1/4	69014118543*	CB320C-WBB	1/4	69014118239*
5 X 1-1/4 X 1-1/4 W=1/2		BX320-UP241 G-Force	1/4	69014118447*	CB320C-WBB	1/4	69014118238*

*** NON-STOCK: CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**
ALL HOLES (BORES) ARE MACHINED TO (H7) CLASS FIT.

TECHtip

DIAMOND GRINDS:
In general, diamond is used to grind non-ferrous materials, because it reacts with iron.

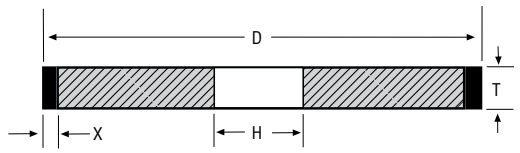
- Cemented carbide
- Glass
- Ceramics
- Fiberglass
- Plastics
- Stone
- Abrasives
- Electronic components and materials

cBN GRINDS:
cBN is used to grind ferrous materials.

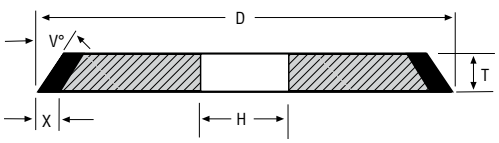
- High-speed tool steels
- Die steels
- Hardened carbon steels
- Alloy steels
- Aerospace alloys
- Hardened stainless steel
- Abrasion-resistant ferrous materials

It is the user's responsibility to refer to and comply with ANSI B7.1

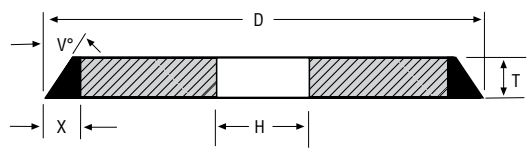
Type 1A1



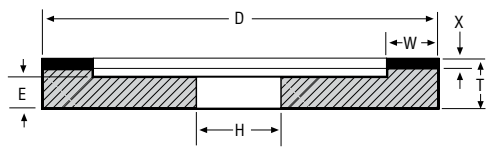
Type 1V1



Type 1B1



Type 6A2



SEE PRODUCT IDENTIFICATION SYSTEM/USAGE INFORMATION ON PAGES 9-10 FOR ADDITIONAL INFORMATION.

CBN CNC WHEELS

ABR. WIDTH U,W	ANGLE V	BEST NORTON G-FORCE/UNIVEL SPECIFICATION	ABR. DEPTH X	UPC #	GOOD NORTON/WINTER AND NORTON SPECIFICATION	ABR. DEPTH X	UPC #
TYPE 11A2 – cBN RELIEF							
5 x 1-1/2 x 2 W=1/4		BX320-UP531 G-Force	1/4	69014118406*	BAM220-WBE	1/4	69014118254*
TYPE 11A2 – cBN RELIEF							
4 x 1-1/4 x 1-1/4 W=1/4		BX320-UP531 G-Force	1/4	69014118445*	BAM220-WBE	1/4	69014118266*
TYPE 11V5 – cBN RELIEF							
4 x 1-1/4 x 1-1/4 W=1/4	V=30°	BX320-UP701 G-Force	1/4	69014117833*	BAM220-WBE	1/4	69014118233*
					B220-J240-KSS63Y	6mm	60157623563
4 x 1-1/4 x 1-1/4 W=3/8	V=10°	BX320-UP701 G-Force	1/4	69014117820*	BAM220-WBE	1/4	69014118234*
TYPE 11V9 – cBN RELIEF							
3-3/4 x 1-1/2 x 1-1/4 U=3/8		90B240-PB125-U Univel	1/8	69014118345*	BAM220-WBE	1/8	69014118260*
TYPE 11V9 – cBN RELIEF							
3-3/4 x 1-1/2 x 1-1/4 U=3/8		90B240-PB125-U Univel	1/8	69014118029*	BAM220-WBE	1/8	69014118235*
5 x 1-3/4 x 2 U=3/8		90B240-PB125-U Univel	1/8	69014118043*	BAM220-WBE	1/8	69014118248*
TYPE 12V9 – cBN RELIEF							
4 x 3/4 x 1-1/4 U=3/8		BX320-UP531 G-Force	1/8	69014118470*	BAM220-WBE	1/8	69014118241*
5 x 3/4 x 1-1/4 U=1/2		BX320-UP531 G-Force	1/8	69014118441*	BAM220-WBE	1/8	69014118242*

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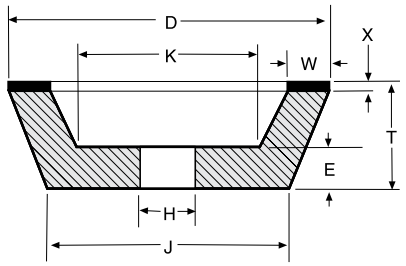
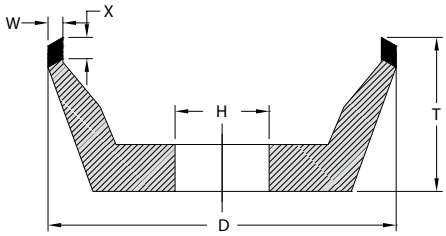
ALL HOLES (BORES) ARE MACHINED TO (H7) CLASS FIT.

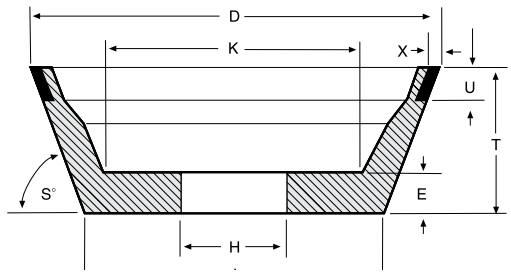
Type 11A2



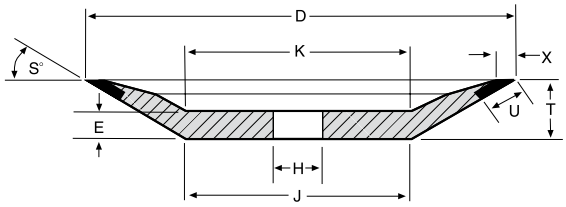
Type 11V5



Type 11V9



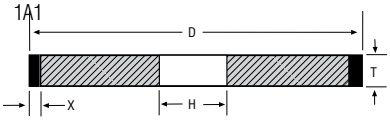
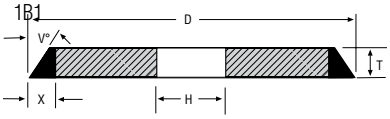
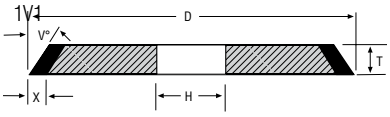
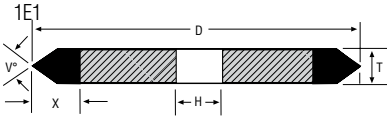
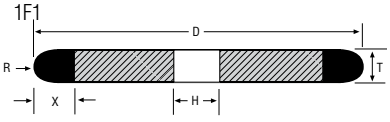
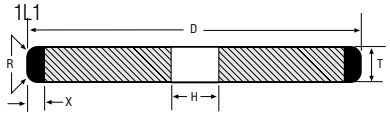
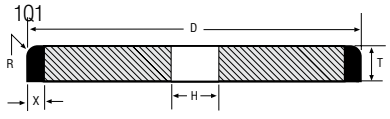
Type 12V9



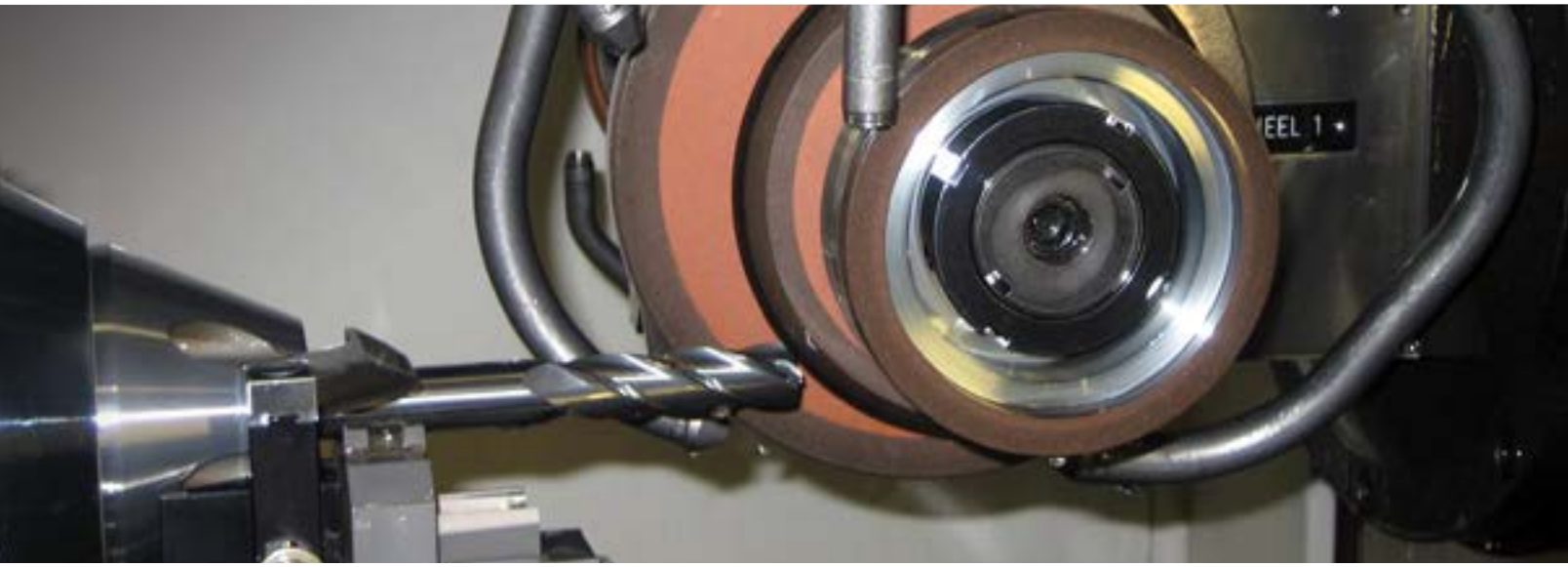
SEE PRODUCT IDENTIFICATION SYSTEM/USAGE INFORMATION ON PAGES 9-10 FOR ADDITIONAL INFORMATION.

NORTON CNC EXPRESS MADE-TO-ORDER WHEELS

Blank Stock Inventory to be altered to your specifications with 5-10 days

Wheel Shape	Tool Material	Application	G-Force Specification AD = Diamond BX = cBN	Diameter D	THK. T	Hole H	Abr. Depth X	Angle (V) or Radius (R)
1A1 	WC	Fluting	AD320-UP061E	5	7/16" min. to 1/2" max.	1/2" min. to 2" max.	1/2"	–
	HSS	Fluting	BX320-UP241E	5				
	WC	Fluting	AD320-UP061E	6				
1B1 	WC	Fluting	AD320-UP061E	5				1 deg. - 30 deg.
	WC	Fluting	AD320-UP061E	6				
	HSS	Fluting	BX320-UP241E	5				
1V1 	WC	Gashing	AD320-UP531E	5				1 deg. - 55 deg.
	HSS	Gashing	BX320-UP531E	5				
1E1 	WC	Fluting	AD320-UP061E	5				90 deg. to 178 deg.
	HSS	Fluting	BX320-UP241E	5				
	WC	Fluting	AD320-UP061E	6				
1F1 	WC	Fluting	AD320-UP061E	5				T/2 or greater
	HSS	Fluting	BX320-UP241E	5				
	WC	Fluting	AD320-UP061E	6				
1L1 	WC	Fluting	AD320-UP061E	5				Less than T/2
	HSS	Fluting	BX320-UP241E	5				
	WC	Fluting	AD320-UP061E	6				
1Q1 	WC	Fluting	AD320-UP061E	5				Less than T/2
	HSS	Fluting	BX320-UP241E	5				
	WC	Fluting	AD320-UP061E	6				

Note: all of the wheel shapes listed can also be designated to have .010 relief(s) 1 side, or 2 sides on 1A1P and 1A1RN wheels.

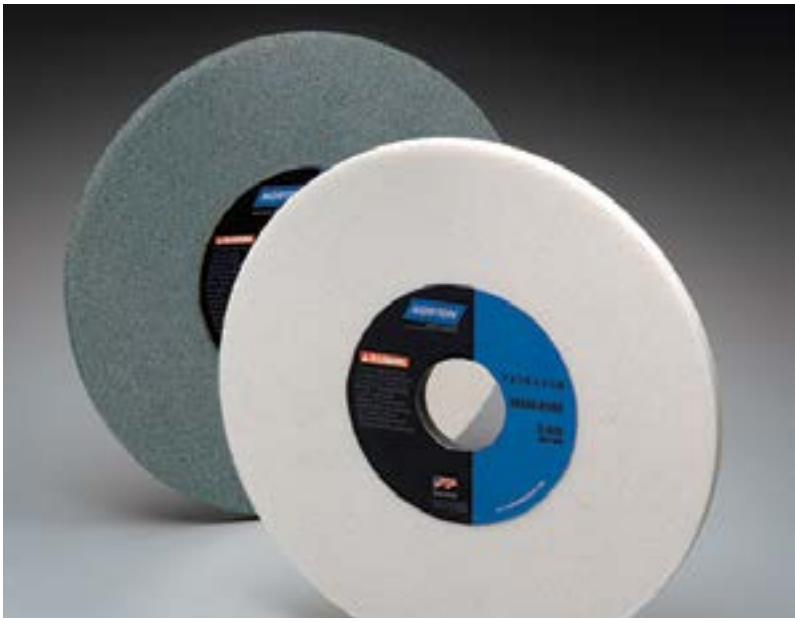


Off-line truing is a process used to restore wheel truth to the axis of rotation, wheel profiles, or proper geometry in response to grinding wheel breakdown. Norton truing wheels are available in silicon carbide (39C) or aluminum oxide (38A) formulations.

Silicon Carbide 39C grain is a hard and sharp grain, best used on bond systems like Metal Bond, Polyimide bonds, and very durable phenolic resin bonds.

Aluminum Oxide 38A is a more friable grain, best suited for eroding bond in the truing process. Use this on softer phenolic resin and Paradigm technologies.

MicroDressing Wheels should be used to dress 400 grit or finer diamond and cBN grinding wheels. They can be used in dry or wet dressing conditions.



CONVENTIONAL TRUING WHEELS

SIZE D x T x H	SPECIFICATION	UPC #	STD. PKG.
TYPE 1			
7 x 1/4 x 1-1/4	39C80-JVK	66252940007	10
	39C100-IVK	66252940109	10
	39C120-IVK	66252940111	10
	38A60-IVBE	66252939696	10
	38A60-JVBE	66252939698	10
	38A60-KVBE	66252939700	10
	38A80-IVBE	66252939808	10
	38A80-JVBE	66252939809	10
	38A80-KVBE	66252939812	10
	38A100-IVBE	66252939823	10
	38A100-JVBE	66252939826	10
	38A100-KVBE	66252939827	10
7 x 1/2 x 1-1/4	39C80-IVK	66252941617	10
	39C80-JVK	66252941618	10
	39C100-HVK	66252941622	10
	39C100-IVK	66252941624	10
	39C120-IVK	66252941632	10
	38A60-IVBE	66252941036	10
	38A60-JVBE	66252941038	10
	38A60-KVBE	66252941041	10
	38A80-IVBE	66252941048	10
	38A80-JVBE	66252941049	10
	38A80-KVBE	66252941054	10
	38A100-IVBE	66252941163	10
	38A100-JVBE	66252941165	10
	38A100-KVBE	66252941168	10
7 x 3/4 x 1-1/4	39C80-JVK	66252942096	10
	39C100-JVK	66252942104	10
	38A60-IVBE	66252942207	10
	38A60-KVBE	66252942060	10

SIZE D x T x H	SPECIFICATION	UPC #	STD. PKG.
TYPE 1 (CONTINUED)			
8 x 1/4 x 1-1/4	39C80-IVK	66253014526	10
	38A60-IVBE	66253043431	10
	38A60-JVBE	66253043432	10
	38A60-KVBE	66253010825	10
	38A80-IVBE	66253043437	10
	38A80-JVBE	66253043439	10
	38A80-KVBE	66253043461	10
	38A100-IVBE	66253043445	10
	38A100-KVBE	66253043447	10
8 x 3/8 x 1-1/4	39C80-IVK	69936664144	10
8 x 1/2 x 1-1/4	39C80-IVK	66253044015	10
	39C100-IVK	66253044017	10
	38A60-IVBE	66253043757	10
	38A60-JVBE	66253043758	10
	38A60-KVBE	66253043761	10
	38A80-IVBE	66253043766	10
	38A80-JVBE	66253013787	10
	38A80-KVBE	66253043869	10
	38A100-KVBE	66253043877	10
8 x 3/4 x 1-1/4	39C80-IVK	66253350645	10
	39C100-IVK	66253044314	10
	38A60-IVBE	66253044184	10

MICRO DRESSING WHEEL

SIZE D x T x H	SPECIFICATION	UPC #	STD. PKG.
TYPE 1			
200mm x 10mm x 31.75mm	320 S/C Organic	66253296349	1

TECHtip

- Wheel direction of rotation during truing must match the direction or rotation during use.
- Set the speed ratio in SFPM of truing wheel to superabrasive wheel to 3:1
- Use a minimum Truing wheel speed of 4500 SFPM
- Stick dress wheels after truing is recommend when extra abrasive exposure is required.

It is the user's responsibility to refer to and comply with ANSI B7.1

NORTON BRAKE-CONTROLLED TRUING DEVICES

Designed for truing diamond and cBN wheels rapidly, effectively, and with a minimum of superabrasive loss. Recommended for wheels up to 12" in diameter.

TYPICAL APPLICATIONS

- Truing straight, cup and cylinder wheels:
- Straight wheels, used on chip breaker, tool and cutter, surface, and cylindrical grinding machines
- Cup wheels, used on vertical spindle surface grinders
- Internal grinding wheels
- Cut-off wheels

BETTER 4597 TRUING DEVICE

The 4597 is engineered for heavier and more frequent truing applications. The adjustable speeds allow for varying conditions (between 1050 and 1500 SFPM). It comes complete with a reusable case, "True to Form, Dress to Cut" training video, two 3" 38A60-M8VBE* vitrified wheels, Truing Device Tips book and a dressing stick. It can be rebuilt using the 4597RK Rebuild Kit.

Worn #4597 Brake Controlled Truing Devices (UPC 66260195350) in need of reconditioning (beyond new shoes and springs) may be returned to be rebuilt. Contact Customer Service for return instructions and quote.

BETTER 3597 PACESETTER TRUING DEVICE

The Pacesetter model is ideal for light-duty use. The pre-set brake speed requires no adjusting. This model includes one 3" 38A60-M8VBE* vitrified wheel and can be rebuilt using the 3597RK Rebuild Kit.

*The 3" 38A60-MVBE wheel is ideal for general purpose truing of 100 to 180 grit diamond and cBN wheels.

BETTER 4597RK AND 3597RK REBUILD KITS

The truing devices can be rebuilt with these kits, consisting of 3 brake shoes, 3 springs, and 3 screws

	BETTER		GOOD	
ITEM	PRODUCT #	UPC #	PRODUCT #	UPC #
TRUING DEVICES				
4597 Brake-Controlled Truing Device	4597	66260195350		
3597 Pacesetter Brake-Controlled Truing Device	3597	66260135578		
TRUING DEVICE REBUILD KITS				
4597 Rebuild Kit	4597RK	66260195351		
3597 Pacesetter Rebuild Kit	3597RK	66260135595		
REPLACEMENT WHEELS				
3 x 1 x 1/2			38A60-MVBE	66243529145
			38A80-MVBE	66243529146
			37C60-MVK	66243529166
			37C80-HVK	66243529170
			37C80-MVK	66243529171
			37C100-HVK	66243529172
			37C100-MVK	66243529070

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TRUING DIAMOND AND cBN WHEELS

SUPERABRASIVE WHEEL	TRUING WHEEL SPECIFICATION
RESIN AND VITRIFIED BOND	
80, 100 and 120 grit	38A60-MVBE, 37C60-MVK
150, 180 and 220 grit	38A80-MVBE, 37C80-MVK
320 and finer grits	37C100-HVK
METAL BOND	
80, 100 and 120 grit	38A60-MVBE
150, 180 and 220 grit	38A80-MVBE
240 and finer grits	37C80-HVK

TECHtip

- Prior to truing the wheel, run a wax crayon over the wheel face. Important: do NOT use any liquid-based ink on superabrasive wheels.
- Any crayon left on the wheel face after truing will reveal untrued areas.
- Indicate the superabrasive wheel runout before starting... usually within .001" to .002", to minimize wheel loss.
- Mount the device spindle parallel to the wheel spindle to ensure proper straight face truing.
- For cup shaped wheels, the device spindle will be mounted perpendicular to the wheel spindle.
- Always use the Brake Controlled Truing Device dry.
- Bring the diamond/cBN wheel and the truing wheel together until they almost touch.
- Start the diamond/cBN wheel to normal speed; spin the truing wheel in the same direction at point of contact.
- Bring the two wheels together until they touch.
- Make sure the truing wheel is spinning at time of contact.
- Traverse the wheel back and forth at 30 to 60 inches/minute.
- Downfeed .0005" to .001" at the end of each traverse.
- At the end of truing, the diamond/cBN wheel should be smooth and in truth.
- Apply a dressing stick to sharpen the wheel.

⚠ It is the user's responsibility to refer to and comply with ANSI B7.1

DIAMOND AND CBN WHEEL MOUNTING, TRUING AND DRESSING GUIDE

To achieve the best results using Norton diamond and cBN products, the following steps for mounting, truing and dressing should be practiced:

MOUNTING – Putting Wheel on Machine Spindle

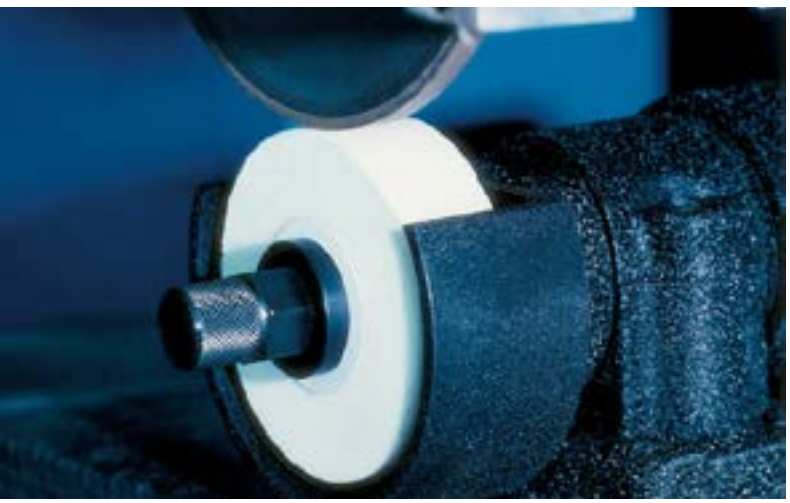
- Examine wheel flanges and spindle carefully.
- Be sure flanges' surfaces are clean and free of damage.
- Ensure that the mounting flanges are flat and of equal diameter, especially on wheels with rigid centers, such as vitrified bond wheels.
- Paper or plastic blotters should only be used when mounting superabrasive wheels with vitrified cores. Using paper or plastic blotters on any other core material may result in the wheel loosening during grinding.
- Inspect machine spindle for excessive runout.
  - TIR (Total Indicated Runout) should be no greater than 0.0002".
- Mount wheel between hand-tightened flanges.
- Using a dial indicator, tap the wheel lightly with a rubber or wooden block to minimize runout to less than .0010".
- Tighten flange securely and recheck with indicator.
- Allow a newly mounted wheel to operate for one full minute before grinding.
- The use of one permanent mounting for the life of the wheel is recommended whenever possible:
  - If the grinding machine has a tapered spindle, mount each straight, flaring cup or dish wheel on a separate collet or adapter.
  - When changing wheels the entire unit is removed, keeping the wheel in running truth.
  - When needed again, the entire unit can be placed directly on the spindle or arbor, thereby eliminating the time and abrasive lost in retruing.

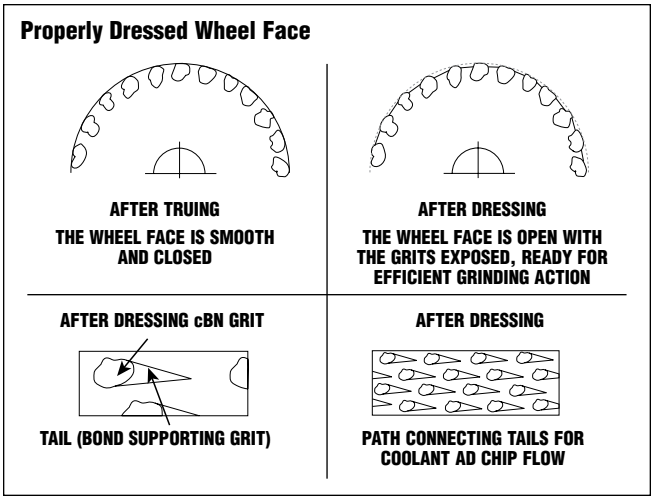
TRUING – Making Wheel Round and Concentric with the Spindle Axis

- Prior to truing the wheel, run a wax crayon over the wheel face. Important: do not use any liquid-based ink on superabrasive wheels.
- Any crayon left on the wheel face after truing will reveal untrued areas.
- Indicate the superabrasive wheel runout before starting... usually within .001" to .002", to minimize wheel loss.
- Norton brake-controlled truing devices are most commonly used to true Diamond and cBN straight, cup and cylinder wheels.
  - Mount the device spindle parallel to the wheel spindle to ensure proper straight face truing.
  - For cup wheels, the device spindle will be mounted perpendicular to the wheel spindle.
  - Always use brake-controlled truing device dry.
  - Bring the diamond/cBN wheel and the truing wheel together until they almost touch.
  - Start the diamond/cBN wheel to normal speed; start the truing wheel in the same direction.
  - Bring the two wheels together until they touch.
  - Make sure the truing wheel is spinning at time of contact.
  - Traverse the wheel back and forth at 30 to 60 inches per minute.
  - Downfeed .0005" to .001" at the end of each traverse.
  - At the end of truing, the diamond/cBN wheel should be smooth and in truth.
  - Apply a dressing stick to sharpen the truing wheel.

DRESSING – Opening the Face of a Trued Wheel

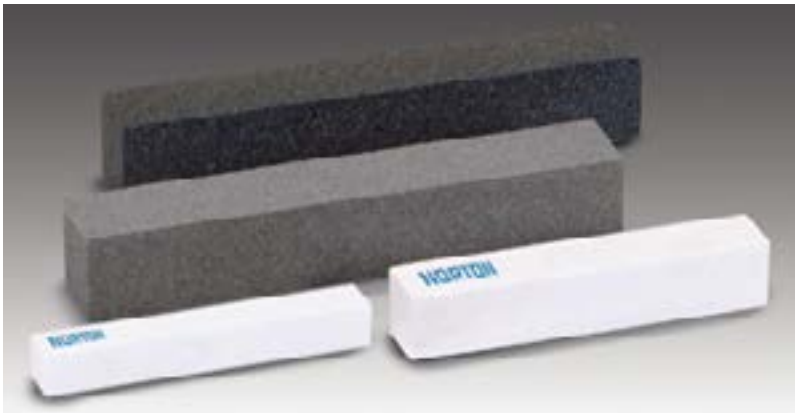
- Dressing the abrasive – a cleaning/sharpening process to expose sharp, free-cutting grit:
  - For resinoid and vitrified bond wheels, the dressing stick should be one or two grit sizes finer than the abrasive in the diamond/cBN wheel – in a soft grade such as H or I.
  - For metal bond wheels, choose a stick with the same grit or one grit coarser than the wheel abrasive – in a medium grade (K – N).
  - See the "Dressing Stick" section for recommendations.
- Dressing the core – The core material (the part of the wheel that holds and supports the abrasive-bearing section) should never contact the work piece during grinding; rubbing will generate excessive heat. As the abrasive section of a cup wheel wears, the core material might become exposed, necessitating dressing.
  - Use a single-point carbide or steel tool to dress an exposed resaloy core.
  - Clamp the tool in a vise.
  - Direct the cutting edge accurately to leave a 1/16" of abrasive section exposed.





Regular use of properly selected dressing sticks will help you achieve maximum performance from your diamond and cBN wheels.

Selecting the appropriate dressing stick for each application depends on the wheel size, type, speed, specification, and grit size, as well as the material being worked. Initial starting specifications are listed below. We recommend testing several sticks to find the best one for your application.



VITRIFIED DRESSING STICKS

SIZE T x W x L	STD. PKG.	SPECIFICATION	UPC #
DRESSING STICKS – ALUMINUM OXIDE			
For dressing cBN wheels, but also work well for diamond wheels			
1/2 x 1/2 x 4	5	38A220-HVBE	61463610555
1/2 x 1/2 x 6	5	38A150-IVBE	61463610303
		38A220-HVBE	61463610103
3/4 x 3/4 x 4	5	38A150-HVBE	61463610291
		38A150-IVBE	61463610368
		38A220-HVBE	61463610290
3/4 x 3/4 x 8	5	38A220-HVBE	61463610280
1 x 1 x 6	5	38A150-HVBE	61463610405
		38A150-IVBE	61463610453
		38A220-HVBE	61463610406
1 x 1 x 8	5	38A120-IVBE	61463610390
		38A150-IVBE	61463610455
DRESSING STICKS – SILICON CARBIDE			
For dressing metal bond diamond wheels			
1/2 x 1/2 x 6	5	37C150-KV	61463610205
		37C220-KV	61463610214
3/4 x 3/4 x 6	5	37C150-LV	61463610375
1 x 1 x 6	5	37C80-NV	61463610393
		37C150-KV	61463610438
		37C220-KV	61463610398

VITRIFIED SUPERFINE STICKS

SIZE T x W x L	STD. PKG.	SPECIFICATION	UPC #
SUPERFINE STICKS – ALUMINUM OXIDEE			
For dressing fine grit diamond and cBN wheels			
1 x 1 x 6	5	PCD Coarse – 400 grit	61463647865
		PCD Fine – 800 grit	61463647867
1 x 1 x 8	5	NSA320-H8V	61463610597
SUPERFINE STICKS – SILICON CARBIDE			
For dressing fine grit diamond and cBN wheels			
1/2 x 1/2 x 6	5	NMVC320-J5VCA	61463610599
		NMVC400-J5VCA	61463650324
1 x 1 x 6	5	NMVC320-J5VCA	61463610605
		NMVC400-J5VCA	61463650450

TECHtip

DRESSING RESIN AND VITRIFIED BOND, DIAMOND AND CBN WHEELS

- Choose a dressing stick one or two grit sizes finer than the abrasive in the wheel – in a soft grade (H or I).

METAL BOND, DIAMOND AND cBN WHEELS

- Choose a stick the same grit size or one grit size coarser than the abrasive in the wheel – in a medium grade (K–N).

It is the user's responsibility to refer to and comply with ANSI B7.1

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STARTING RECOMMENDATIONS – DRESSING DIAMOND AND cBN WHEELS

Selecting the appropriate dressing stick for each application depends on the wheel size, type, speed, specification, and grit size, as well as the workpiece material. Initial starting specifications are listed below. We recommend testing several sticks to find the best one for your application.

SUPERABRASIVE WHEEL	VITRIFIED STICK	
	PRODUCT	SPECIFICATION
RESIN AND VITRIFIED BOND WHEELS		
80, 100 and 120 grit	Dressing Stick	38A150-HVBE
150, 180 and 220 grit	Dressing Stick	38A220-HVBE
320 and finer grits	Superfine Stick	NMVC400-J5VCA
METAL BOND		
80, 100 and 120 grit	Dressing Stick	37C80-NV
150, 180 and 220 grit	Dressing Stick	37C150-KV
240 and finer grits	Dressing Stick	37C220-KV

NORTON
SAINT-GOBAIN

NORTON
SAINT-GOBAIN
WHEELdRESSING

METHODS OF TRUING AND DRESSING

FORM ROLL: PLUNGE DRESSING

- Diamond roll geometry matches geometry of part to be ground
- Roll is fed into grinding wheel to generate the desired form and wheel surface condition
- Used where lowest cycle time and highest accuracy is required

DRESSING DISC: UNI-AXIAL TRAVERSE DRESSING

- Diamond dressing disc has a thin diamond section that is traversed across the face of the grinding wheel
- Profile is generated with a CNC program or template
- Used for simple profiles or where flexibility is necessary

DRESSING SPINDLES

HORSEPOWER	RPM
NORTON AC DRESSING SPINDLES	
0.5 hp	5,500
1.0 hp	3,600
1.5 hp	7,000
NORTON MAXTORQ – DC BRUSHLESS DRESSING SPINDLES	
0.5 hp	8,000
1.0 hp	12,000
2.0 hp	6,000
NORTON HYDRO – HYDRAULIC DRESSING SPINDLES	
1.5 hp	1,800, 2,400, 3,600, 12,000
3.0 hp	7,000
4.0 hp	2,400
*HP LISTED AT 100% EFFICIENCY, 500 PSI @ 5 GPM	
NORTON HEAVY-DUTY TWIN GRIP SPINDLES	
For heavy duty applications, Norton offers a twin grip heavy duty belt driven system with outboard bearing support. Horsepower and rpm can be customized for the application.	
NORTON QUICK-CHANGE HYDRAULIC SYSTEM	
For quick changeover, Norton offers an electric motor driven, hydraulic centers clamping system. This is available on select systems with outboard roller support	

ACCESSORIES

Various accessories are available for dressing spindles and devices:

- Acoustic Emission Sensors
- Custom Mounting Brackets
- Electrical Enclosure
- Cables
- Drives (DC)
- Suitcase Demo Kit

TYPES OF FORM ROLLS

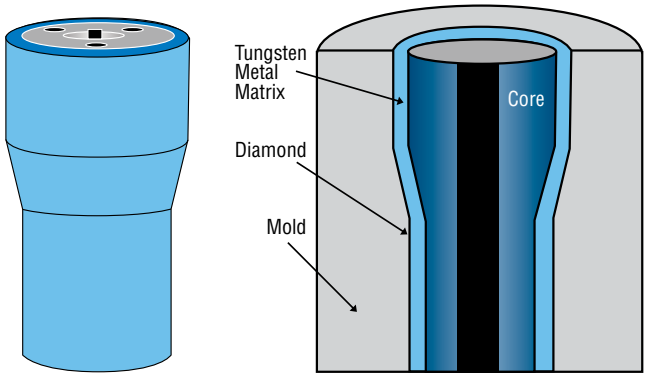
Norton manufactures two types of plunge dressing rolls: infiltrated diamond form rolls and reverse plated diamond rolls. The following lists comparisons between the two types.

INFILTRATED DIAMOND FORM ROLLS

- Powder Metal-High Temp Proc
- “Lapped” for precision
- Manual setting of diamond
- Lower cost for simple rolls
- Ability to be re-conditioned
- Rugged (good in abusive ops)

REVERSE PLATED DIAMOND FORM ROLLS

- Electroplated Nickel- Low Temp Proc
- Precision built in process
- Mechanical setting of diamond
- Lower cost for complex rolls
- Reconditioning not recommended
- Fragile (Heat and Impact)



INFILTRATED DIAMOND FORM ROLLS

Each diamond is hand set and secured in place with a very tough tungsten/bronze matrix which allows for a wide range of customizable options (concentration, patterns, reinforcement, grit type, etc.). The toughness of the tungsten based matrix makes these diamond rolls ideal for aggressive and harsh environments.

INFILTRATED TECHNOLOGY

Strengths

- Rugged product can withstand rougher treatment
- Can be reconditioned (“relapped”) to extend life
- Broad size range offering (small and large)
- Can be customized (grit size, type, reinforcement, etc.)

Weaknesses

- High labor content (setting and lapping) adds cost to complex forms
- Diamond “lapped” to obtain form accuracy, may close wheel
- High labor content controls lead-times

WHEN TO USE INFILTRATED FORM ROLLS

- Simple Profiles/Forms
- Short Runs- job shop applications
- Abusive operations or applications
- Geometries with thin, tall fins
- Customers with reconditioning programs
- Dry applications, or high heat (like with resin bond)

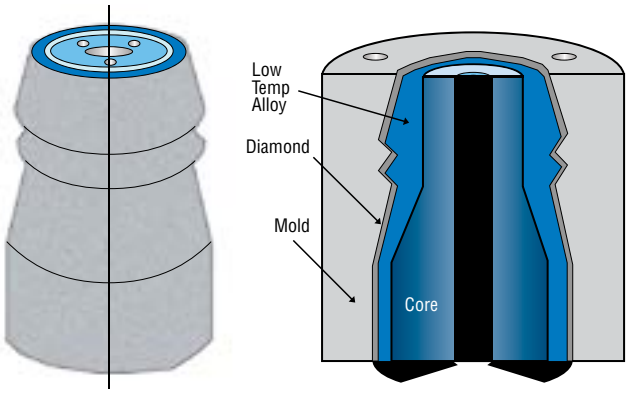
SPECIFICATIONS EXAMPLE: IFR - D - 2025 - LOC

ROLL TYPE	DIAMOND TYPE	GRIT SIZE	SPECIAL MODIFIERS (FOR INTERNAL USE)
IFR - Infiltrated Form Roll	**D** - Natural Diamond	**Crushed Grit**	Combination of up to 11 letters for internal manufacturing use
	SD1 - Medium Quality Synthetic	1618 - 16/18 Mesh	
	SD2 - High Quality Synthetic	1820 - 18/20 Mesh	
		2025 - 20/25 Mesh	
		2530 - 25/30 Mesh	
		3040 - 30/40 Mesh	
		3035 - 30/35 Mesh	
		3540 - 35/40 Mesh	
		4050 - 40/50 Mesh	
		4550 - 45/50 Mesh	
		5060 - 50/60 Mesh	

REVERSE-PLATED DIAMOND FORM ROLLS

Diamond is secured with an electroplated nickel matrix. Diamond is randomly distributed throughout the form roll, with a very high concentration. Because the precision of the diamond profile is designed into the manufacturing process, the diamond is not usually shaped or “lapped”. By not lapping the diamond, the sharp, natural points provide a good dressing action resulting in a open grinding wheel, lower grinding forces and thus a more accurate part. For profiles requiring extremely tight tolerances, lapped reverse-plated form rolls are also available.

This technology is very sensitive to heat and impact and must be used in highly controlled processes



CLOSE-UP OF REVERSE-PLATED DIAMOND FORM ROLL

REVERSE-PLATED TECHNOLOGY

Strengths

- Relative low cost for complex, intricate forms
- High diamond concentration extends form holding / life
- Close tolerances “out of the mold” (±0.005mm / ±.0002”)
- Sharper diamonds, with little or no lapping

Weaknesses

- Fragile! Sensitive to heat and impact
- Reconditioning “re-lap” not usually recommended (closes wheel)
- Not available in smallest sizes (<40mm OD, <12mm wide)
- Electroplating cycle controls lead-times

WHEN TO USE REVERSE-PLATED FORM ROLLS

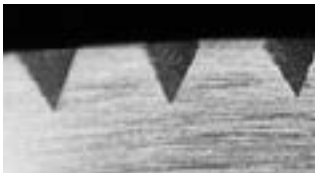
- Continuous Dress Creep Feed
- Complex forms
  - Fuel injection
  - Thread forms
  - Aerospace root / tree forms
- Long form life
  - Higher diamond concentration
- Most Bearing and Aerospace Customers
  - Exceptions for old equipment or unskilled work force

SPECIFICATIONS EXAMPLE: RPC - D - 2025 - AEP

ROLL TYPE	DIAMOND TYPE	GRIT SIZE	SPECIAL MODIFIERS (FOR INTERNAL USE)
RPC - Reverse Plated Form Roll	**D** - Natural Diamond	**Crushed Grit**	Combination of up to 11 letters for internal manufacturing use
	SD1 - Medium Quality Synthetic	1618 - 16/18 Mesh	
	SD2 - High Quality Synthetic	1820 - 18/20 Mesh	
		2025 - 20/25 Mesh	
		2530 - 25/30 Mesh	
		3040 - 30/40 Mesh	
		3035 - 30/35 Mesh	
		3540 - 35/40 Mesh	
		4050 - 40/50 Mesh	
		4550 - 45/50 Mesh	
		5060 - 50/60 Mesh	
		6070 - 60/70 mesh	
		7080 - 70/80 Mesh	
		8001 -80/100 Mesh	
		0112 - 100/120 Mesh	

INFILTRATED DRESSING DISCS

- Infiltrated dressing discs use the same tough tungsten matrix as infiltrated form rolls making them ideal for aggressive dressing applications.
- Available using synthetic, natural, or CVD log diamonds
- For use where the smallest included angles are needed (down to 0.005" radius)
- Like infiltrated form rolls – these rolls are hand set and can be customized for your application needs.
- Ideal for profiling ceramic and A/O conventional grinding wheels
- Can be re-lapped to achieve longer life



MICROSCOPIC VIEW OF A CVD INFILTRATED DRESSING DISCS EDGE

MICROSCOPIC VIEW OF A CONVENTIONAL INFILTRATED CNC DRESSING DISC EDGE

CLOSE-UP OF INFILTRATED DRESSING DISC EDGE

SPECIFICATIONS EXAMPLE: ICD - CVD - 201006 - CEF

ROLL TYPE	DIAMOND TYPE	GRIT SIZE	SPECIAL MODIFIERS (FOR INTERNAL USE)
ICD - Infiltrated CNC Dressing Disc	**D** - Natural Diamond	**Crushed Grit**	Combination of up to 11 letters for internal manufacturing use
	SD1 - Medium Quality Synthetic	1618 - 16/18 Mesh	
	SD2 - High Quality Synthetic	1820 - 18/20 Mesh	
	CVD - CVD Synthetic Diamond	2025 - 20/25 Mesh	
		2530 - 25/30 Mesh	
		3040 - 30/40 Mesh	
		3035 - 30/35 Mesh	
		3540 - 35/40 Mesh	
		4050 - 40/50 Mesh	
		4550 - 45/50 Mesh	
		5060 - 50/60 Mesh	
		6070 - 60/70 mesh	
		7080 - 70/80 Mesh	
		8001 -80/100 Mesh	
		0112 - 100/120 Mesh	
		CVD Grit (For ICD Rolls Only)	
		6 digit number indicating H x L x W of CVD Ex. 300606 = 3 x 0.6 x 0.6 CVD	

BPR DRESSING DISCS

- BPR dressing discs consist of a single consumable layer of high quality synthetic diamond secured with a brazed metal matrix
- Diamond and metal matrix are chemically bonded so diamond retention is not depended on pocket size
- Single layer of consumable diamond eliminates need for lapping resulting in improved life
- Available in 0.005", 0.010", 0.015", 0.020", and 0.025" radii
- Best for truing and dressing Vitrified cBN wheels but can also be used for conventional wheels with low depth of dress.

BPR DRESSING DISC EDGE CLOSE-UP

SPECIFICATIONS EXAMPLE: BPR - SD2 - 2025 - ALO

ROLL TYPE	DIAMOND TYPE	GRIT SIZE	SPECIAL MODIFIERS
BPR - BPR CNC Dressing Disc	**SD2** - High Quality Synthetic	**Crushed Grit**	Combination of up to 11 letters for internal manufacturing use
		1820 - 18/20 Mesh	
		2025 - 20/25 Mesh	
		2530 - 25/30 Mesh	
		3040 - 30/40 Mesh	
		3035 - 30/35 Mesh	
		3540 - 35/40 Mesh	
		4050 - 40/50 Mesh	
		4550 - 45/50 Mesh	
		5060 - 50/60 Mesh	
		6070 - 60/70 mesh	
		7080 - 70/80 Mesh	

IDW DRESSING DISCS

- This type of dressing disc consists of diamonds bonded in a hot-pressed metal matrix for superior durability
- Consumable layer of diamond allows for superior life
- Usually up to 2mm flat diamond section width (no radius) – wider widths available based on application.
- This is a specialty product used for straight profiling of Vitrified cBN wheels and is not recommended for use on conventional wheels.
- Has seen most success in straight dressing vitrified cBN wheels in automotive applications (cam and crank).
- Typically available in 30/40 and 40/50 grit mesh sizes – other sizes available based on application needs.

CLOSE-UP OF IDW DRESSING DISC DIAMOND EDGE

SPECIFICATIONS

EXAMPLE: **IDW - D - 4050 - ALO**

ROLL TYPE	DIAMOND TYPE	GRIT SIZE	SPECIAL MODIFIERS
IDW - IDW CNC Dressing Disc	**D** - Natural Diamond	**Crushed Grit**	Combination of up to 11 letters for internal manufacturing use
		3040 - 30/40 Mesh	
		4050 - 40/50 Mesh	

DRESSING DISC RECOMMENDATIONS

WHEEL TECHNOLOGY	OD STRAIGHT	OD SIMPLE PROFILE	OD COMPLEX PROFILE	OD AND FACE
CONVENTIONAL VITRIFIED ALUMINUM OXIDE	INFILTRATED	INFILTRATED	INFILTRATED	INFILTRATED
CERAMIC VITRIFIED (NORTON QUANTUM X, SG, QUANTUM VS3)	INFILTRATED WITH CVD	INFILTRATED WITH CVD	INFILTRATED WITH CVD	IINFILTRATED WITH CVD
RESIN CBN OR DIAMOND (NORTON G-FORCE, B99, ETC)	BPR	BPR	BPR	BPR CUP
VITRIFIED CBN OR DIAMOND	IDW	IDW	BPR	BPR CUP

HOW TO ORDER ROTARY DRESSING TOOLS

Provide the following information to your local sales representative or customer service representative

Legible blueprint of roll, wheel, or part with the following geometry:

- Overall diameter
- Overall length
- Bore size and tolerances required
- Mounting pattern
- Any feature with tolerances less than 0.0002" (5 um) must be clearly defined for engineering review.
- If designing from a part, a fully dimensioned part drawing is required
- Abrasive type (natural diamond, synthetic diamond, CVD stones, etc.)
- Specification of wheel to be dressed (need at least the grit type and size)
- Dressing type (Plunge or CNC Profiling)

GEOMETRIC AVAILABILITY

Diameter: 2.000" - 12.000" [50.80mm - 304.80mm]

Width: 1.000" - 8.500" [25.40mm - 215.90mm] (one piece)

Form Tolerances:

Profile: +/- 0.000080" [0.002mm]
Radius: +/- 0.0002" [0.005mm]
Step Relationship: +/-0.00005" [0.0013mm]
Profile Angularity: +/- 0.00005" [0.0013mm]

Concentricity Band to Bore TIR: 0.00008" [0.002mm]

Diamond to Bore TIR: 0.0002" [0.005mm]

Bore Diameter Tolerance: (+0.0001", -0.0000") [+0.004mm, -0.000mm] up to 4" length

* AVAILABILITY LISTED ABOVE MAY NOT BE AVAILABLE FOR CERTAIN DIAMOND ROLL FORMS OR DIAMOND ROLL TYPES. ALL AVAILABILITY IS SUBJECT TO REVIEW BY NORTON'S DESIGN ENGINEERING TEAM.

NORTON STATIONARY DIAMOND DRESSING TOOLS

NORTON
SAINT-GOBAIN

NORTON LEADS THE TRUING AND DRESSING TOOL INDUSTRY IN ENGINEERING AND MANUFACTURING TECHNOLOGY

Stock Tools

The broadest line of stationary diamond dressing tools and brake-controlled truing devices.

Custom-engineered Tools

We have custom tools for virtually every application. When Norton quality stock products do not fulfill your requirements for diamond quality or geometry, your Norton distributor, Norton sales representative and our product engineering staff will work with you to ensure that you get the right stationary diamond tool for your job on a custom design basis.

Resetting and Relapping Service

Norton offers expert resetting (removing single point diamond, rotating and exposing sharp, new point) and relapping (reconditioning form tool diamonds) of many of our tools – at a significant cost savings vs. new manufacture. Contact the Norton Customer Service group for a quote, current lead-times, and return procedures.

LOWER YOUR COST PER DRESSING APPLICATION

Diamonds are a rare commodity. The larger the stone and the better the quality, the higher the initial cost. The key to successful diamond tool purchasing and use is based on the "cost per dress." Normally, higher quality diamond dressing tools and a proactive resetting program will result in lowest "cost per dress."

In those situations where a resetting program is not feasible, or low, initial cost is the primary purchasing criteria, Norton offers an extensive line of non-resettable tools.

See page 109 for information needed for a "Competitive Tool Analysis" – to help you convert to a quality Norton diamond dressing tool.

HOW TO CHOOSE THE CORRECT DIAMOND DRESSING TOOL FOR YOUR APPLICATION

1 If you know the tool:
Find the appropriate tool section, then match your tool to the drawings in that section.

2 If you don't know the tool, but know the wheel form needed:
Find the type of wheel form to be dressed using the wheel form symbols shown throughout the book. Note the appropriate tool(s).

3 If you don't know the tool, but know the machine:
Use the "Stationary Diamond Tool Recommendations by Machine Type" chart on pages 105-108. Note the appropriate tool(s).

4 Then review the recommended tools' features and benefits in their catalog sections to choose the best tool for your operation. If you need engineering assistance, contact your local Norton representative.

RESETTING – MINIMIZING YOUR COST

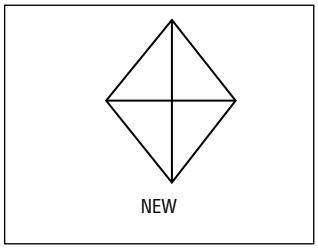
Buying a higher quality diamond is your best value, especially if you participate in a proactive resetting program. Although initial cost may be higher, the payback comes through several factors:

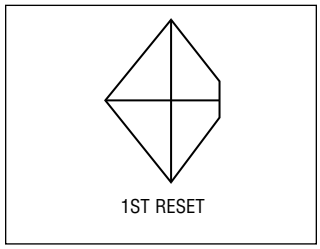
- Diamond durability, providing longer tool life
- Tighter form tolerances
- Consistent finish rates
- Resetting the diamond lowers the overall tooling cost

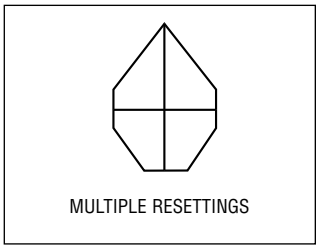
Used properly, the overall cost of a higher quality, resettable diamond will compare favorably with that of an inexpensive, non-resettable diamond. Initially, the best diamond point is selected for use. When returned, the next best diamond point is selected for resetting, and so on.

To ensure you get the best value for your diamond:

- Rotate the diamond tool ¼ turn periodically to maintain a sharp point
- Use proper flow of coolant to protect the diamond from heat which can create fracturing of the diamond
- Excessive wear on the diamond point may impact the ability to reset the diamond. The widest point of the diamond is referred to as the girth. The diamond girth is buried in a powder metal matrix. Using a diamond into the girth zone might impact the ability to reset other diamond points







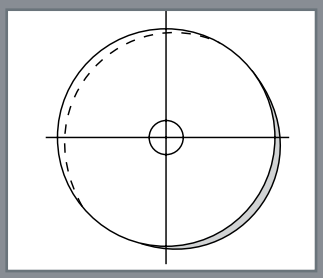
TECHtip

WHEEL CONDITIONING

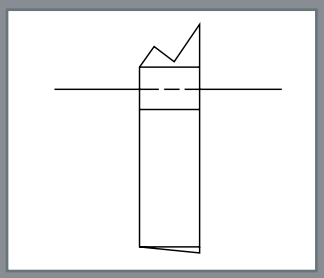
Stationary diamond dressing tools are used to condition grinding wheels. Wheel conditioning involves two operations: truing and dressing.

Truing the Wheel:

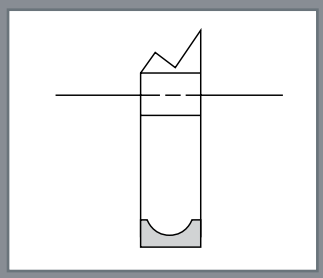
Primarily done during the initial set-up, truing involves three basic operations:



CLEANING THE WHEEL TO MAKE IT RUN TRUE WITH THE AXIS OF ROTATION



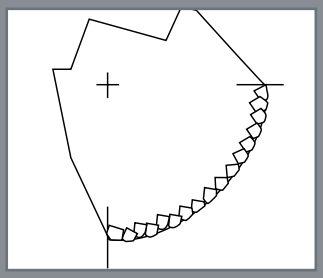
RESTORING THE WHEEL PROFILE TO PROPER GEOMETRY IN RESPONSE TO WHEEL BREAKDOWN



CHANGING THE PROFILE OF THE WHEEL TO THE DESIRED SHAPE

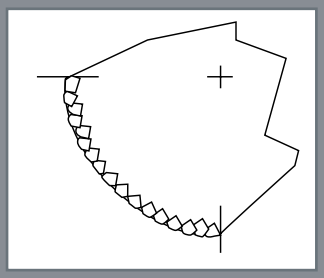
Dressing the Wheel:

Dressing is done intermittently throughout the operation – after a certain number of parts are ground, as wheel loads, closes up, etc. – to keep the wheel at peak performance.



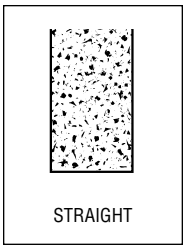
REMOVING DULL ABRASIVE PARTICLES OPENS THE WHEEL, INCREASING STOCK REMOVAL RATES, DECREASING SURFACE FINISH QUALITY.

DULLING THE ABRASIVE PARTICLES CLOSES THE WHEEL, INCREASING SURFACE FINISH QUALITY, DECREASING STOCK REMOVAL RATES.

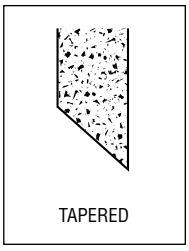


REMOVING FOREIGN MATERIAL FROM A "LOADED" WHEEL OPENS THE WHEEL, EXPOSING NEW CUTTING GRAINS.

TYPICAL WHEEL FORMS DRESSED BY STATIONARY DIAMOND TOOLS



STRAIGHT



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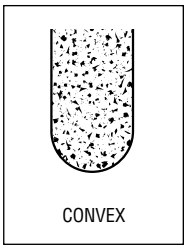
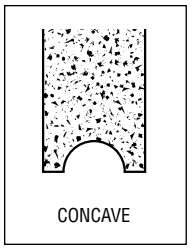
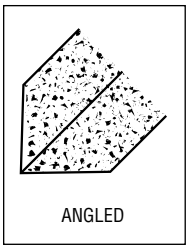


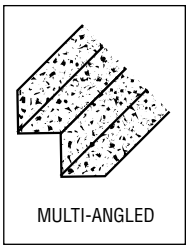
CONVEX



CONCAVE



ANGLED



MULTI-ANGLED

SPEC*check*

GUIDELINES FOR LEAD SELECTION

Use the optimum traverse rate of a diamond tool to appropriately condition the wheel face for your grinding operation.

Slower lead (and traverse rate) tends to close up the wheel face to provide:

- Better finishes (low RMS/Ra readings)
- Lower stock removal rates

Faster lead (and traverse rate) tends to open up the wheel face to provide:

- Faster stock removal rates (“hungry” wheel)
- Rougher finishes (high RMS/Ra readings)

Formula for Traverse Rate: Speed of Wheel (RPM) x Lead Selection Per Wheel Revolution = Traverse Rate (Inches Per Minute)

To Convert RPM to SFPM: Multiply wheel diameter in inches X RPM X 0.262

TOOL TYPE	LEAD SELECTION / TRAVERSE RATE	
Single Point Tools **Form Tools**	Coarse Finish = .008" - .010" per wheel revolution Medium Finish = .005" - .007" per wheel revolution Fine Finish = .002" - .004" per wheel revolution	
	EXAMPLE – SINGLE POINT	
	Wheel:	14 x 1-1/2 x 5" 5SG60-KVS
	Tool:	SG5M7 (1/2 carat Single Point)
	Wheel Speed:	6500 SFPM = 1773 RPM
	Stock Removal/Finish:	Medium/32 RMS
	Lead Selection:	.006" per wheel revolution
	Travers Rate:	1773 x .006 = 10.6" per minute traverse
Multi-Point (Grit) Tools **Blade Tools** **Cluster Tools**	Coarse Finish = .023" - .030" per wheel revolution Medium Finish = .013" - .022" per wheel revolution Fine Finish = .006" - .012" per wheel revolution	
	EXAMPLE – MULTI-POINT	
	Wheel:	7 x 1 x 1-1/4" 32A60-KVBE
	Tool:	1R6J6 (1/4" round tool)
	Wheel Speed:	6500 SFPM = 3547 RPM
	Stock Removal/Finish:	Coarse/64 RMS
	Lead Selection:	.024" per wheel revolution
	Traverse Rate:	3547 x .024 = 85.1" per minute traverse

POSITIVE INFLUENCES ON STATIONARY TOOLS

Coolant – Dress Wet

- Use coolant with ample pressure, volume, and filtration whenever possible.
- A stationary tool used with coolant will last longer than a tool used without coolant.

Rigid Tool Holder

- A rigid tool holder will keep vibration to a minimum.
- Vibration in the tool holder will create an inconsistent surface on the grinding wheel and eventually cause the diamond in the tool to crack.

Minimal Infeeds

- Using manufacturer's suggested amounts will allow for maximum tool life.
- Avoid excessive infeeds – excessive infeed creates damaging heat and a tendency to damage the diamond.

Proper Alignment

- Blade and Chisel-type tools require proper alignment to perform correctly and obtain maximum life expectancy.

SPEC*check*

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSES	SUGGESTED CORRECTION
Chatter	Tool not secure Diamond traversing too slowly Wheel loaded Worn diamond	Remount or check for worn or loose holder Use faster traverse Dress more frequently Rotate tool or replace
Burn	Tool traversing too slowly Poor coolant on part and tool Diamond too flat Diamond too large	Increase traverse rate Increase coolant flow at point of contact Rotate or replace tool Reduce size or try multi-point tool
Scratches	Wheel too rough Coolant	Slow down traverse Check filtration
Diamond lines	Traversing too fast No dwell time	Slow down dress rate Increase sparkout
Inaccuracies in parts	Cam worn Poor mounting Worn tool Tool too tight	Replace temple and follower Check mounting and alignment Check rest and locations for movement Tool is bent. Replace.
Parts too hot	Dressing too slowly Diamond too flat	Increase crossfeed rate Rotate or replace tool
Wheel is loaded	Dressed too infrequently Infeed too light	Dress more often Increase infeed amount
Wheel acts too soft	Overdressing	Reduce infeed rate and slow crossfeed
Wheel doesn't cut	Wheel closed	Increase infeed rate and increase crossfeed
Short diamond life	Vibration Lack of coolant Infeed cycle Poor mounting Hogging	Remove shock from diamond contact area Clean coolant line Reduce excessive infeed Secure tool, do not over-tighten, seat into holder properly Do not exceed recommended infeeds If single-point - rotate tool, use drag angle If multi-point - must be flush with wheel face, increase from single-point crossfeed rate, break in tool correctly
Diamond Breakage	Storage Pressure Temperature	Keep protected from shock Reduce heavy infeed Control sudden changes

SINGLE POINT TOOLS

The unparalleled, Norton line of single point tools sets the industry standard for straight and simple form dressing applications. Our extensive offering of numerous, high quality diamond tools includes: resettable and non-resettable products, tools for all abrasive types (conventional and advanced ceramic grains) and the technology-leading Norton "Indexable" tool design.

WHEEL FORMS DRESSED BY THESE TOOLS

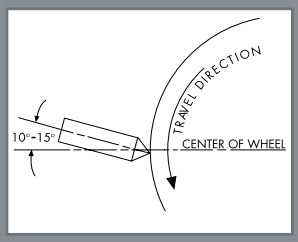
STRAIGHT

TAPERED

CONVEX

TECHtip

- Rigidly mount single point tools at a 10° - 15° angle to the wheel centerline with a line drawn through the center of the wheel, pointing in the direction of wheel travel.
- Point of contact should be slightly below centerline of wheel as shown.
- Use coolant whenever possible.
- Normal infeed is .001" per pass.
- Lead selections range from .002" – .010" per wheel revolution.
- Rotate the tool 1/4 turn periodically to maintain a sharp point.



To optimize applications using ceramic abrasives and/or tools, normal dressing parameters must change. Reduce infeed by 25%. Significant reductions in the amount of infeed and frequency of dress will result in substantially lower cost per part ground.

SINGLE POINT DRESS TRAVERSE RATE

Select a Lead Value based on desired Surface Finish and run the formula below.

FINISH	LEAD VALUE (PER WHEEL REVOLUTIONS)
For Coarse Finish (approx. 64 RMS)	.008" to .010"
For Medium Finish (approx. 32 RMS)	.005" to .009"
For Fine Finish (approx. 16 RMS)	.002" to .004"

LEAD VALUE X WHEEL SPEED (RPM) = TRAVERSE RATE IN INCHES/MINUTE

- Slower traverse rates result in a closed wheel face and lower surface finish readings on the workpiece.
- Faster traverse rates result in an open wheel face that produces greater stock removal and a rougher workpiece finish.

It is the user's responsibility to refer to and comply with ANSI B7.1

NORTON SINGLE POINT DIAMOND QUALITY LEVEL DESIGNATIONS

Norton adheres to the Industrial Diamond Association's standards for diamond weight tolerances.

QUALITY LEVEL	SETTABLE POINTS	STRUCTURE AND SHAPE	INTEGRITY
AA	Four settable points	Well defined octahedron or dodecahedron	Smooth surfaces, free of cracks, seams or surface imperfections
SG	Three settable points	Well defined dodecahedron with minor surface irregularities	Free of major cracks, may have seams or imperfections
A	Three settable points	Blocky, pointed structure, octahedrons or dodecahedrons, with minor surface irregularities	Free of major cracks, may have seams or imperfections
NS Norton Standard	Two settable points	Blocky structure, octahedrons, or dodecahedrons, with minor surface irregularities	May have cracks, seams or defects away from point
BCSG	One point; non-resettable	One well defined dodecahedron point	May have cracks, seams or defects away from point
BC	One point; non-resettable	Blocky-shaped octahedron with rough surface and irregularities	May have cracks/seams/defects around point. Defects may decrease average tool life
Octahedron:	An 8-sided diamond which can have a maximum of six pyramid-shaped points.		
Dodecahedron:	A 12-sided diamond which can have a maximum of six broader-shaped points.		

SPEC*check*

SELECTION GUIDE

Stock Tools for Ceramic Abrasive Wheels

SG/Ceramic Engineered for use on ceramic (SG, NQ, Targa, etc.) wheels but may also provide significant benefits when used on conventional abrasive products. These tools are furnished with top quality specially selected diamonds.

BCSG/Ceramic Economical alternative to an "SG" tool. Best choice when a disposable tool is preferred.

Stock Tools for Conventional Abrasive Wheels

NS Engineered for use on conventional abrasives. These high-quality, value-priced tools can be used for a variety of dressing applications.

BC Economical alternative to an "NS" tool. Best choice when a disposable tool is preferred.

SELECTING THE CORRECT SINGLE POINT TOOL:

- Identify the wheel abrasive type: A/O, S/C or Ceramic
- Determine the wheel diameter – to select the optimum carat weight
- Determine the tool holder size – to select appropriate shank diameter

EXAMPLES OF SINGLE POINT TOOL SELECTION

Conventional Wheel Spec: 32A46-IVBE 7" x 1/2" x 1-1/4"
Customer's machine has a 7/16" tool holder

Tool Selections:
Resettable: NS2M7 or NSUD2 (Indexable)
Non-Resettable: BC2M7 or BCUD2 (Indexable)

Ceramic Wheel Spec: 5SG60-JVS or 5NQ60-IVS 10" x 1" x 3"
Customer's machine has a 3/8" tool holder

Tool Selections:
Resettable: SG3M6
Non-Resettable: BCSG3M6

DETERMINING THE BEST VALUE

- Remember that diamonds are a rare commodity—the larger the stone and the better the quality, the higher the initial cost. The key to successful diamond tool productivity and use is based on the "cost per dress." Normally, higher quality diamonds and a proactive resetting program will result in the lowest "cost per dress."
- In those situations where a resetting program is not feasible or low initial cost is the primary purchasing consideration, Norton offers a complete line of non-resettable tools.

STOCK SINGLE POINT TOOL MARKING SYSTEM

DIAMOND QUALITY	DIAMOND SIZE	SHANK DESIGN	SHANK DIAMETER
SG/Ceramic	1 = 1/5 (.20) carat	M	6 = 3/8"
BCSG/Ceramic	2 = 1/4 (.25) carat	J	7 = 7/16"
NS	3 = 1/3 (.33) carat		
BC	5 = 1/2 (.50) carat		
	7 = 3/4 (.75) carat		
	10 = 1 carat		

EXAMPLE: **NS 2 M 6**

SHANK J

NON-STOCK SINGLE POINT TOOL MARKING SYSTEM

TOOL TYPE	DIAMOND SIZE	DIAMOND QUALITY	SHANK DESIGN	SHANK DIAMETER
SP	1 = 1/5 (.20) carat	AA	M	6 = 3/8"
	2 = 1/4 (.25) carat	A	J	7 = 7/16"
	3 = 1/3 (.33) carat	NS		
	5 = 1/2 (.50) carat	BC		
	7 = 3/4 (.75) carat			
	10 = 1 carat			

EXAMPLE: **SP 5 A M 7**

SHANK M

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

SINGLE POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES

SG/CERAMIC SINGLE POINT TOOLS

FEATURES	BENEFITS
Specially selected broad-shaped, diamond	Withstands the increased grinding pressures of ceramic abrasives
Each diamond is hand selected for stone shape, quality and structural integrity	Consistent tool performance
Multi-purpose	Accommodates most straight dressing and simple form dressing applications Stands up to ceramic (SG, NQ,TG, etc.) abrasive sharpness; can also be used to dress conventional abrasives

BEST — RESETTABLE SG/CERAMIC SINGLE POINT TOOLS

- Norton high quality diamond and a proactive resetting program will result in the lowest dressing cost per part

GOOD — NON-RESETTABLE BCSG/CERAMIC SINGLE POINT TOOLS

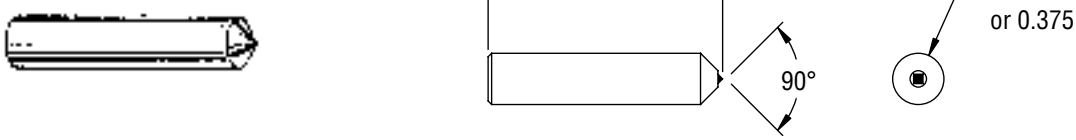
- The best selection when a resetting program is not feasible or low initial cost is the primary purchasing consideration

				BEST		GOOD	
WHEEL DIAMETER	TOOL CARAT WEIGHT	TOOL DIAMETER	TOOL LENGTH	PRODUCT #	3 SETTABLE PTS (2 RESETS) UPC #	PRODUCT #	NON-RESETTABLE UPC #
STOCK SINGLE POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES							
Up to 7"	1/4 (.25)	3/8"	2"	SG2M6	66260195365	BCSG2M6	66260157007
		7/16"	2"	SG2M7	66260195366	BCSG2M7	66260156905
8" to 10"	1/3 (.33)	3/8"	2"	SG3M6	66260195367	BCSG3M6	66260157008
		7/16"	2"	SG3M7	66260195368	BCSG3M7	66260156906
11" to 14"	1/2 (.50)	3/8"	2"	SG5M6	66260195369	BCSG5M6	66260157009
		7/16"	2"	SG5M7	66260195370	BCSG5M7	66260156907
15" to 20"	3/4 (.75)	3/8"	2"	SG7M6	66260195371		
		7/16"	2"	SG7M7	66260195372	BCSG7M7	66260156908
21"+	1 (1.00)	7/16"	2"			BCSG10M7	66260157010

NON-STOCK SG RESETTABLE SINGLE POINT TOOLS ARE ALSO AVAILABLE.
STANDARD PACKAGE = 1 TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT TAPERED CONVEX



SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES

CONVENTIONAL SINGLE POINT TOOLS

FEATURES	BENEFITS
Consistent diamond structure and shape	Repeatable dressing performance
Well defined, sharp diamond point	Durable; maximum cost effectiveness for dressing conventional abrasives
Steeper 60 degree included angle head design	Greater machine and part clearance produce forms with tighter tolerances

BEST — RESETTABLE NS (NORTON STANDARD) SINGLE POINT TOOLS

- High quality diamonds, value priced
- Selection of the correct tool and a proactive resetting program will result in the lowest dressing cost per part

GOOD — NON-RESETTABLE BC SINGLE POINT TOOLS

- The best selection when a resetting program is not feasible or low initial cost is the primary purchasing consideration

SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES (CONTINUED)

			BEST		BETTER		BETTER		GOOD	
			4 SETTABLE PTS (3 RESETS)		3 SETTABLE PTS (2 RESETS)		2 SETTABLE PTS (1 RESET)		NON-RESETTABLE	
WHEEL DIAMETER	TOOL CARAT WEIGHT	TOOL DIAMETER	PRODUCT #	UPC #	PRODUCT #	UPC #	PRODUCT #	UPC #	PRODUCT #	UPC #
STOCK SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES										
Internal Wheel	1/5 (.20)	3/8"							BC1M6	66260195021
		7/16"							BC1M7	66260195022
Up to 7"	1/4 (.25)	3/8"					NS2M6	66260195116	BC2M6	66260195000
		7/16"					NS2M7	66260195117	BC2M7	66260195001
8" to 10"	1/3 (.33)	3/8"					NS3M6	66260195121	BC3M6	66260195002
		7/16"					NS3M7	66260195122	BC3M7	66260195003
11" to 14"	1/2 (.50)	3/8"					NS5M6	66260195126	BC5M6	66260195004
		7/16"					NS5M7	66260195127	BC5M7	66260195005
15" to 20"	3/4 (.75)	7/16"					NS7M7	66260195132	BC7M6	66260195006
		7/16"					NS7J7	66260195130	BC7M7	66260195007
21" +	1 (1.00)	3/8"					NS10M6	66260195136	BC10M6	66260195008
		7/16"					NS10M7	66260195137	BC10M7	66260195009
		7/16"					NS10J7 *	66260195135		
*** J-SHANK TOOLS ARE AVAILABLE IN 7/16" DIAMETER WITH 5/8" HEAD**										
NON-STOCK SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES										
Internal Wheels	1/5 (.20)	3/8"	SP1AAM6	66260195990	SP1AM6	66260196014				
		7/16"	SP1AAM7	66260195991	SP1AM7	66260196015				
Up to 7"	1/4 (.25)	3/8"	SP2AAM6	66260195994	SP2AM6	66260196018				
		7/16"	SP2AAM7	66260195995	SP2AM7	66260196019				
8" to 10"	1/3 (.33)	3/8"	SP3AAM6	66260195998	SP3AM6	66260196022				
		7/16"	SP3AAM7	66260195999	SP3AM7	66260196023				
11" to 14"	1/2 (.50)	3/8"	SP5AAM6	66260196002	SP5AM6	66260196026				
		7/16"	SP5AAM7	66260196003	SP5AM7	66260196027				
15" to 20"	3/4 (.75)	3/8"	SP7AAM6	66260196006	SP7AM6	66260145772				
		7/16"	SP7AAM7	66260196007	SP7AM7	66260145778				
21" +	1 (1.00)	3/8"	SP10AAM6	66260160468	SP10AM6	66260196034				
		7/16"	SP10AAM7	66260196011	SP10AM7	66260196035				

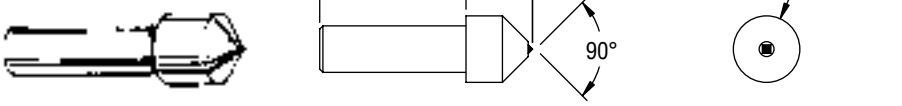
NON-STOCK "AA" AND "A" DIAMOND QUALITY LEVEL RESETTABLE PRODUCTS ARE TYPICALLY USED FOR PRECISION APPLICATIONS.

ADDITIONAL NON-STOCK AVAILABILITY:

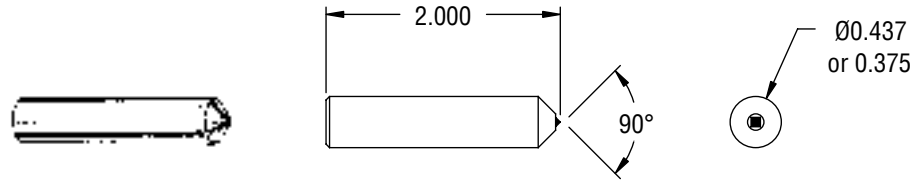
- **NON-STOCK TOOLS WITH A "J" SHANK ARE AVAILABLE IN 7/16" DIAMETER WITH 5/8" HEAD**
- **LARGER CARAT WEIGHT DIAMONDS**

STANDARD PACKAGE = ONE TOOL

SHANK J



SHANK M



WHEEL FORMS DRESSED BY THESE TOOLS

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

INDEXABLE SINGLE POINT TOOLS

Indexable tools are specifically designed to alleviate any misalignment issues and are the tools of choice for CNC grinders. They feature a two-part construction with the head and shank as separate pieces. After the initial installation, operators simply turn the indexable head with a wrench, while the tool shank remains secure (and aligned) in the tool holder.

INDEXABLE SINGLE POINT TOOLS

FEATURES	BENEFITS
▮ Easily turned without removing tool from the holder	▮ Easier for operators to turn than conventional tools increasing frequency of beneficial tool turning ▮ Extended life; less downtime and increased productivity
▮ U-Dex-It and Mini-Dex tools have a 60° included angle head design	▮ Provides additional form versatility through machine and part clearance ▮ Excellent choice for regulating wheels

INDEXABLE SINGLE POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES

GOOD — NON-RESETTABLE BCSGUD/CERAMIC U-DEX-IT INDEXABLE SINGLE POINT TOOLS

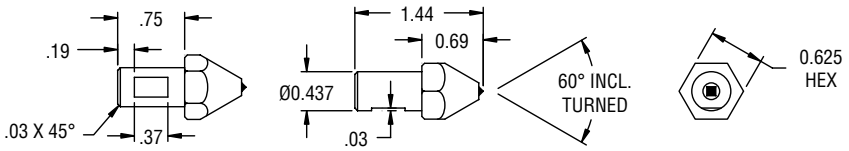
- These U-Dex-It tools contain specially selected diamonds to withstand increased ceramic (SG, Norton Quantum NQ, Targa TG, etc.) grinding pressures
- Ideal for centerless grinders; the head can be turned, using standard 5/8" wrench, through the hole in the side of the wheel guard without removing the guard
- The best selection when a resetting program is not feasible or low initial cost is the primary purchasing consideration

			GOOD	
WHEEL DIAMETER	TOOL CARAT WEIGHT	TOOL SIZE	PRODUCT #	NON-RESETTABLE UPC #
STOCK INDEXABLE SINGLE POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES				
Up to 7"	1/4 (.25)	7/16" x 1-7/16" with 5/8" head	BCSGUD2	66260162669
8" to 10"	1/3 (.33)	7/16" x 1-7/16" with 5/8" head	BCSGUD3	66260162668 +
11" to 14"	1/2 (.50)	7/16" x 1-7/16" with 5/8" head	BCSGUD5	66260159894

STANDARD PACKAGE = ONE TOOL

+ Available as stock while supplies last, then available as non-stock.

U-DEX-IT



WHEEL FORMS DRESSED BY THESE TOOLS

INDEXABLE SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES

BETTER — RESETTABLE NORTON STANDARD NSUD U-DEX-IT INDEXABLE SINGLE POINT TOOLS

- High quality diamonds, value priced
- Ideal for centerless grinders; the head can be turned, using standard 5/8" wrench, through the hole in the side of the wheel guard without removing the guard
- Selection of the correct tool and a proactive resetting program will usually result in the lowest dressing cost per part

BETTER — RESETTABLE NORTON STANDARD NSMD MINI-DEX INDEXABLE SINGLE POINT TOOLS

- High quality diamonds, value priced
- • Use a standard 7/16" wrench to turn; designed for internal, bearing race and twist drill flute machines
- • Selection of the correct tool and a proactive resetting program will usually result in the lowest dressing cost per part

GOOD — NON-RESETTABLE BCUD U-DEX-IT INDEXABLE SINGLE POINT TOOLS

- Ideal for centerless grinders; the head can be turned, using standard 5/8" wrench, through the hole in the side of the wheel guard without removing the guard
- The best selection when a resetting program is not feasible or low initial cost is the primary purchasing consideration

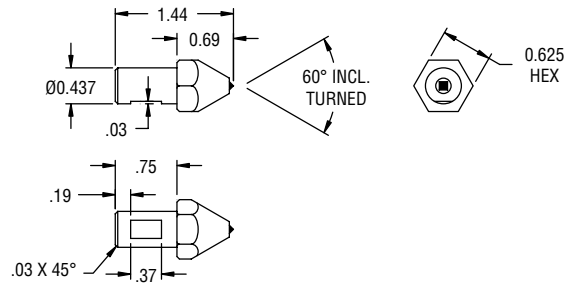
INDEXABLE SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES (CONTINUED)

WHEEL DIAMETER	TOOL CARAT WEIGHT	TOOL SIZE	BETTER PRODUCT #	BETTER 2 SETTABLE PTS (1 RESET) UPC #	GOOD PRODUCT #	GOOD NON-RESETTABLE UPC #
STOCK INDEXABLE SINGLE POINT TOOLS FOR TRUING/DRESSING CONVENTIONAL ABRASIVES						
Up to 7"	1/4 (.25)	7/16" x 1-7/16" with 5/8" head			BCUD2	66260195023
		1/4" x 1-3/16" with 7/16" head	NSMD2	66260195171		
8" to 10"	1/3 (.33)	7/16" x 1-7/16" with 5/8" head	NSUD3	66260195162	BCUD3	66260195024
		1/4" x 1-3/16" with 7/16" head	NSMD3	66260195172		
11" to 14"	1/2 (.50)	7/16" x 1-7/16" with 5/8" head	NSUD5	66260195163	BCUD5	66260195025
		1/4" x 1-3/16" with 7/16" head	NSMD5	66260195173 +		
15" to 20"	3/4 (.75)	7/16" x 1-7/16" with 5/8" head	NSUD7	66260195164		

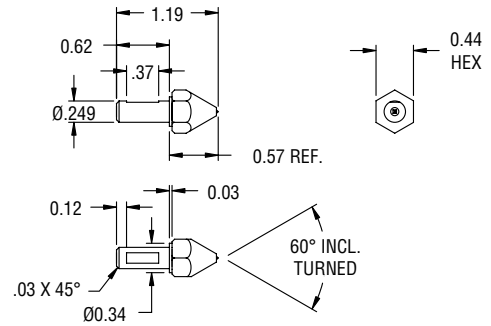
STANDARD PACKAGE = ONE TOOL

+ AVAILABLE AS STOCK WHILE SUPPLIES LAST, THEN AVAILABLE AS NON-STOCK.

U-DEX-IT



MINI-DEX



INTERNAL GRINDING TOOLS

BEST RESETTABLE INTERNAL GRINDING TOOLS

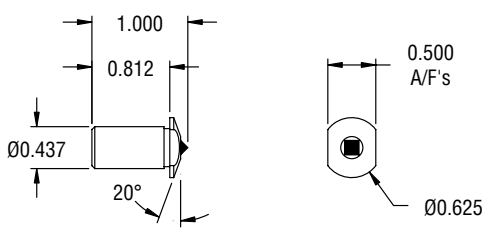
- Q style shank is used on a Heald internal grinder (resettable).

MACHINE TYPE	CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	BEST 2 SETTABLE PTS (1 RESET) PRODUCT #	BEST 2 SETTABLE PTS (1 RESET) UPC #
STOCK INTERNAL GRINDING TOOLS					
Heald	1/5 (.20)	7/16"	1"	NI21Q7	66260195180

STANDARD PACKAGE = 1 TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

SHANK Q FOR HEALD MACHINE



THREAD GRINDING TOOLS

BEST RESETTABLE SG/CERAMIC THREAD GRINDING TOOLS

- These wheels are used on J & L and Excello thread grinding machines to accurately dress the grinding wheels that form the desired thread configuration (non-resettable).

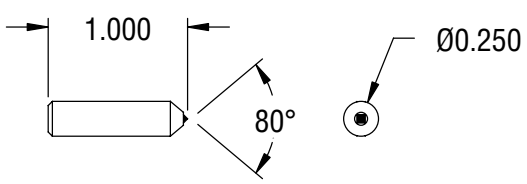
MACHINE TYPE	SHANK DIAMETER	TOOL LENGTH	INCLUDED ANGLE	MAX RADIUS ON POINT	BEST PRODUCT #	BEST NON-RESETTABLE UPC #
STOCK THREAD GRINDING TOOLS						
J & L	1/4"	1"			38RL4	66260195100
J & L	1/4"	1"	80°	.010"	NT1L4	66260195187
EXCELLO	3/8"	1-5/8"	60°	.010"	NT106	66260195190
NON-STOCK THREAD GRINDING TOOLS						
J & L	1/4"	1"	80°	.010"	NX-57475	66260195185
EXCELLO	3/8"	1-5/8"	60°	.010"	48-4105	66260195188

STANDARD PACKAGE = 1 TOOL

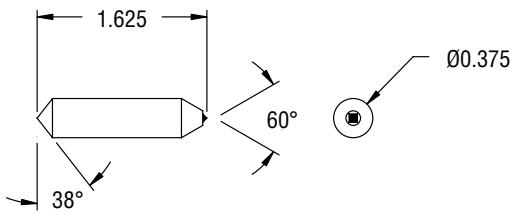
WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT TAPERED

NT1L4 FOR JONES & LAMSON MACHINE



NT106 FOR EXCELLO MACHINE



CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

TOOLROOM TOOLS

Norton Toolroom Dressing Tools are primarily used on surface grinders to form the grinding wheel to an exact concave or convex radius. Although some tools are designed for use on a specific machine, many radius tools can be used on any grinder having the correct set-up.

Used generally on 8" diameter and smaller vitrified toolroom wheels, Norton offers a selection of phono-point, conventional radius, and full ball radius tools.

WHEEL FORMS DRESSED BY THESE TOOLS

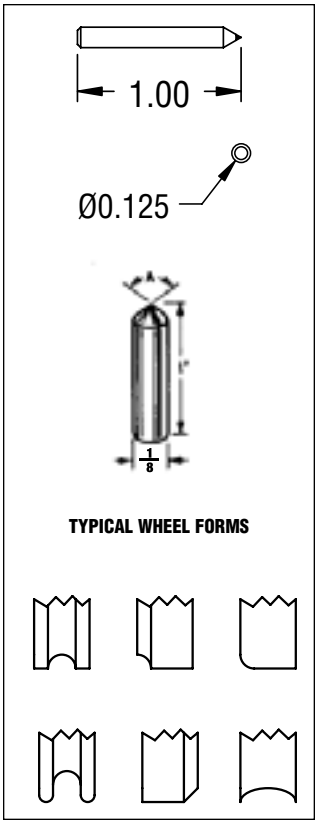
PHONO-POINT TOOLS

For general toolroom concave and convex dressing on small diameter grinding wheels. Not resettable.

			BETTER		GOOD	
INCLUDED ANGLE	SHANK DIAMETER	TOOL LENGTH	PRODUCT #	NON-RESETTABLE UPC #	PRODUCT #	NON-RESETTABLE UPC #
STOCK PHONO-POINT TOOLS						
60°	1/8"	1"	NP1M2	66260195225	BCPP-60	66260195017
	3/16"		NP1M3	66260195226		
	1/4"		NP1M4	66260195227		
75°	1/8"	1"	NP2M2	66260195228	BCPP-75	66260195018
	1/4"		NP2M4	66260195230		
90°	1/8"	1"	NP3M2	66260195231	BCPP-90	66260195019
	3/16"		NP3M3	66260195232		
	1/4"		NP3M4	66260195233		

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS



TECHtip

HOW TO USE TOOLROOM TOOLS

- We recommend dressing with coolant. However, if dressing totally dry, allow three to five seconds between passes for diamond to cool.
- Use extremely light cuts from .0002" to .001" maximum.
- Rotate tool if the application and set-up allow.
- Full Ball Radius Tools should be returned for relap after minimum wear.

SPECcheck

PHONO-POINT TOOL MARKING SYSTEM

TOOL TYPE	INCLUDED ANGLE ON DIAMOND	SHANK STYLE	SHANK DIAMETER
NP	1 = 60°	M	2 = 1/8"
BCPP	2 = 75°		3 = 3/16"
	3 = 90°		4 = 1/4"

EXAMPLE: **NP 1 M 3**

RADIUS TOOLS

Concave Radius Tools

This line offers a specially-shaped single point diamond, designed for forming concave radii on small diameter grinding wheels. Not resettable.

Convex Radius Tools

This line offers a specially-shaped single point diamond, designed for forming convex radii on small diameter grinding wheels. Not resettable.

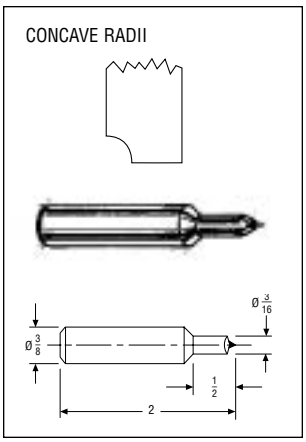
Half-Circle Concave Radius Tools (Available as Non-stock Only)

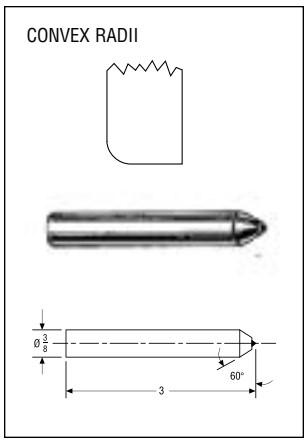
This line offers a specially-shaped diamond set in the side of the shank for forming half-circle radii on small diameter grinding wheels. The tool is rotated to form the radius. Commonly called a “rat tail dresser.” Not resettable.

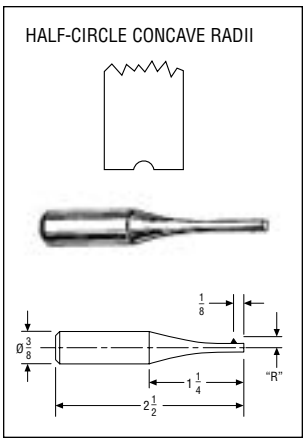
		BEST			GOOD		
RADIUS SIZE TO BE DRESSED	SHANK DIAMTER	TOOL LENGTH	PRODUCT #	NON-RESETTABLE UPC #	TOOL LENGTH	PRODUCT #	NON-RESETTABLE UPC #
STOCK CONCAVE RADIUS TOOLS							
.010" to .015"	3/8"	2"	NR1P6	66260195210			
.016" to .020"	3/8"	2"	NR2P6	66260195211			
.021" to .032"	3/8"	2"	NR3P6	66260195212			
.033" to .062"	3/8"	2"	NR4P6	66260195213	2"	BCRD	66260195016
.063" to .125"	3/8"	2"	NR5P6	66260195214	2"	BCRD	66260195016
.126" to .250"	3/8"	2"	NR6P6	66260195215	2"	BCRD	66260195016
STOCK CONVEX RADIUS TOOLS							
.020" to .125"	3/8"	2"	NR2M6	66260195216			
.126" to .250"	3/8"	2"	NR12M6	66260195217			
.251" to .500"	3/8"	2"	NR25M6	66260195218			
NON-STOCK HALF-CIRCLE CONCAVE RADIUS TOOLS							
.032"	3/8"	2-1/2"	NR3N6	66260195219 *			
.062"	3/8"	2-1/2"	NR6N6	66260195220 *			
.125"	3/8"	2-1/2"	NR12N6	66260195221 *			

STANDARD PACKAGE = ONE TOOL

*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

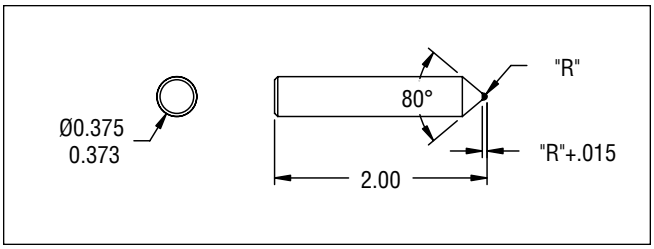






FULL BALL RADIUS TOOLS

For precision plunge form dressing, Full Ball Radius tools are designed to plunge dress a concave radius in the center of a grinding wheel. Frequent turning of the tool will maintain accuracy over a long period of use. Can be relapped.



RADIUS SIZE TO BE DRESSED	SHANK DIAMETER	TOOL LENGTH	BETTER PRODUCT #	BETTER RELAPPABLE UPC #
NON-STOCK FULL BALL RADIUS TOOLS				
.010"	3/8"	2"	FB10	66260195255
.015"	3/8"	2"	FB15	66260195256
.020"	3/8"	2"	FB20	66260195257
.025"	3/8"	2"	FB25	66260195258
.030"	3/8"	2"	FB30	66260195259
.035"	3/8"	2"	FB35	66260195260
.040"	3/8"	2"	FB40	66260195261
.045"	3/8"	2"	FB45	66260195262
.050"	3/8"	2"	FB50	66260195263

LARGER RADIUS SIZES ARE AVAILABLE UPON REQUEST.
STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

CONCAVE

SPECcheck

FULL BALL RADIUS TOOL MARKING SYSTEM

TOOL TYPE	RADIUS REQUIRED ON DIAMOND IN THOUSANDS OF AN INCH
FB	10 = .010"
	15 = .015"
	20 = .020"
	25 = .025"
	30 = .030"
	35 = .035"
	40 = .040"
	45 = .045"
	50 = .050"

EXAMPLE: **FB 25**

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

MULTI-POINT (GRIT) TOOLS

Since Norton conventional and high-performance Multi-Point tools never need turning or resetting, they are the most economical way to accomplish a variety of straight, tapered, and step dressing operations on all sizes of cylindrical, centerless, surface, and toolroom grinding wheel applications.

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT

TAPERED

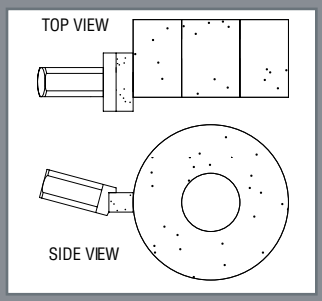
NORTON MULTI-POINT TOOLS

FEATURES	BENEFITS
Uniformly distributed diamonds in a tough, durable matrix	Consistent performance throughout tool life
Fresh, multiple diamond points exposed in truing operation; no turning or resetting required	Faster, more consistent straight face dressing with maximum efficiency and longer tool life than single point tools
Overall diamond weight exceeds equivalent single point tool	The most economical way to dress straight and tapered forms

TECHtip

MULTI-POINT TOOLS – STRAIGHT FACE DRESSING AND TRUING

- Most multi-point tools are used for straight face dressing.
- Tool should have full face contact with the wheel.
- With new tool, 3–5 passes at .005" per pass should be taken to expose diamonds.
- Infeed per pass .001" - .002"
- Use coolant whenever possible.
- Use appropriate lead (and traverse rate).



- Contact your Norton representative for proper tool selection for Targa wheels.

MULTI-POINT DRESS TRAVERSE RATE

Select a Lead Value based on desired Surface Finish and run the formula below.

FINISH	LEAD VALUE (PER WHEEL REVOLUTIONS)
For Coarse Finish (approx. 64 RMS)	.023" to .030" (.58mm – .76mm)
For Medium Finish (approx. 32 RMS)	.013" to .022" (.33mm – .57mm)
For Fine Finish (approx. 16 RMS)	.006" to .012" (.15mm – .33mm)

LEAD VALUE X WHEEL SPEED (RPM) = TRAVERSE RATE IN INCHES/MINUTE

- Slower traverse rates result in a closed wheel face that produces less stock removal and improved workpiece finish.
- Faster traverse rates result in an open wheel face that produces greater stock removal and a rougher workpiece finish.

It is the user's responsibility to refer to and comply with ANSI B7.1

SPECcheck

SELECTING THE CORRECT MULTI-POINT TOOL

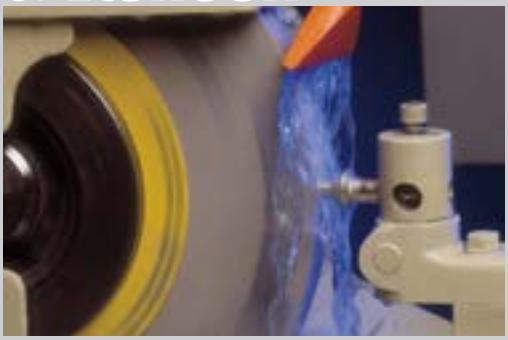
- Identify the wheel abrasive type: ceramic (SG, Norton Quantum NQ, Targa TG), A/O, or S/C
- Determine the wheel diameter and grit size
- Determine the tool's approach angle to the centerline of the wheel
- Identify the tool holder diameter
- Use 1E shape for angular wheel slide, cylindrical grinding and for shoulder or step truing

EXAMPLES OF MULTI-POINT TOOL SELECTION

Conventional Wheel Spec: 32A46-IVBE 7" x 1/2" x 1-1/4"
Customer's machine has a 3/8" tool holder
Tool Selection: 1R6J6

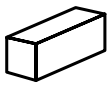
Ceramic Wheel Spec: 5SG60-JVS or 5NQ60-IVS 10" x 1" x 3"
Customer's machine has a 7/16" tool holder
Tool Selections: SG1R6J7

SPECcheck

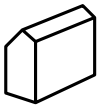


MULTI-POINT TOOL DIAMOND SECTION SPECIFICATIONS

SHAPE	WIDTH	LENGTH	DEPTH	TOOL APPROACH ANGLE TO WHEEL	FOR WHEEL DIAMETER
1A	1/4"	3/4"	5/16"	0°	Over 20"
2A	1/4"	1/2"	3/8"	0°	15" – 20"
3A	5/32"	3/8"	1/4"	0°	Over 20"
1E	5/32"	3/8"	5/16"	–	
2E	1/4"	1/2"	1/2"	–	20" x 2" and up
1R	1/4" Round		1/4"	0°	Up to 10"
2R	3/8" Round		3/8"	0°	11" – 14"



A SHAPE IS USED PRIMARILY FOR STRAIGHT FACE DRESSING.



E SHAPE (DOUBLE ANGLE TOP FACE) IS USED FOR STANDARD N-FACE WHEELS, ANGULAR WHEELS, FACE AND SIDE TRUING OF CYLINDRICAL WHEELS, AND IN STEP DRESSING.

R SHAPE IS USED FOR STRAIGHT FACE DRESSING WHERE THE TOOL HOLDER IS PERPENDICULAR TO THE WHEEL FACE (NO DRAG ANGLE), AND ON THREAD GRINDING MACHINES.

MULTI-POINT TOOL MARKING SYSTEM

DIAMOND SHAPE	TOOL DIAMOND SIZE		TO DRESS GRINDING WHEELS WITH GRIT SIZE OF:	SHANK DESIGN	SHANK DIAMETER
1A	4	=	46 grit	See the following	6 = 3/8"
2A	6	=	54 - 100 grit	pages for shank	7 = 7/16"
3A	8	=	120 - 150 grit	configurations	8 = 1/2"
1E	12	=	150+ grit		
2E	14	=	Special Applications		
1R					
2R					

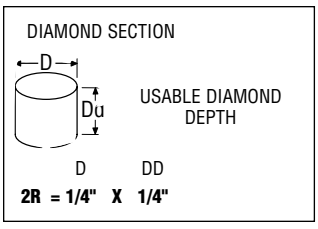
EXAMPLE: **1A 6 A 7**

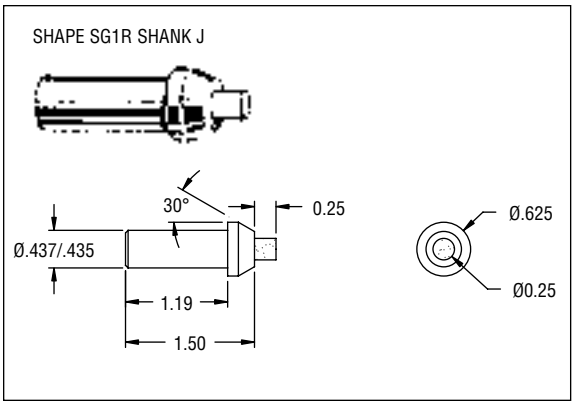
MULTI-POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES

Tool Shape and Shank Availability

SG1R

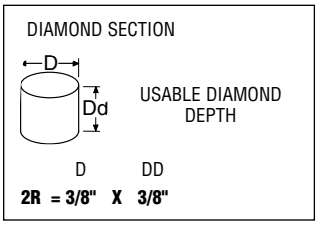
For general purpose dressing of toolroom, cylindrical, and surface grinding wheels up to 10" in diameter.

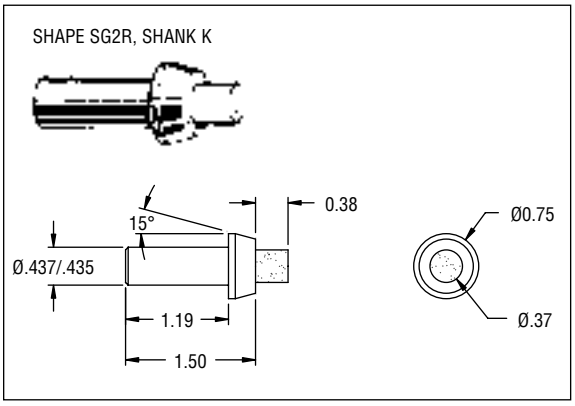




SG2R

For use on cylindrical, centerless, and surface grinding wheels 11" to 14" in diameter.





TECHtip

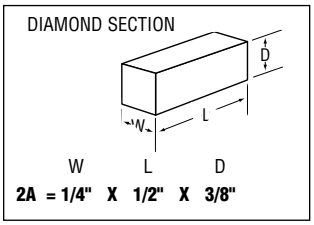
- To optimize applications using ceramic abrasives/tools, normal dressing parameters must change. Significant reductions in the amount of infeed and frequency of dress will result in significantly lower cost per part ground.
- While all Norton SG/Ceramic tools have been designed to improve the efficiency of ceramic grinding applications, they can also offer significant benefits in many applications using conventional abrasives.
- When first using a Norton SG/Ceramic tool, make 3 to 5 passes at .005" infeed to ensure full face contact between the dressing tool and wheel face.
- Reduce normal dressing infeed by half. Do not exceed infeed of .002" per pass.
- The lead selection should be between .006"-.030" per wheel revolution. Faster traverse with a Norton SG/Ceramic tool generally provides an open wheel face that can maximize productivity of the ceramic abrasive.

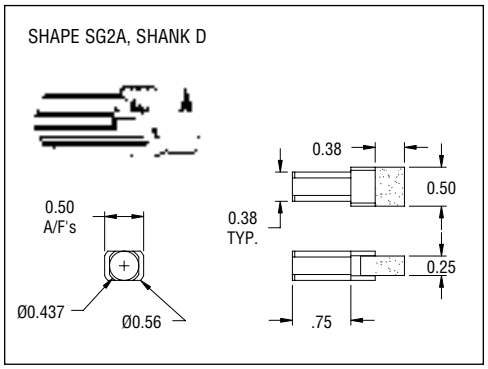
MULTI-POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES (CONTINUED)

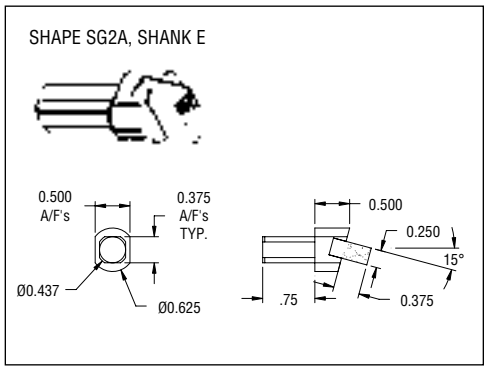
Tool Shape and Shank Availability

SG2A

For use on 15" to 20" diameter cylindrical, surface or centerless grinding wheels.

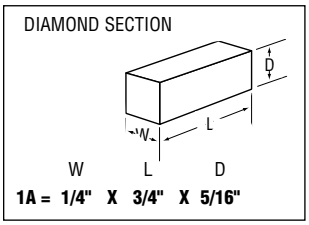


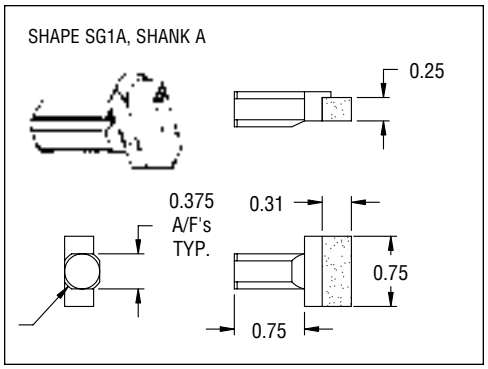


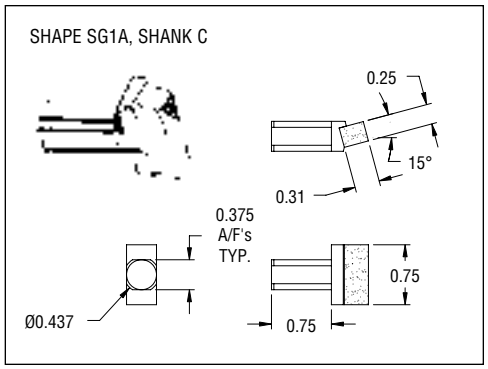


SG1A

For use on cylindrical, centerless, and surface grinding wheels over 20" in diameter







BEST SG/CERAMIC MULTI-POINT TOOLS

- Designed specifically for use on ceramic (SG, Norton Quantum NQ, Targa TG. etc.) abrasives, SG tools contain a higher diamond concentration to withstand the increased grinding pressures generated by the ceramic abrasives. These tools have improved life and dress quality; they can also offer significant benefits in many applications using conventional abrasives.

				BEST	
WHEEL DIAMETER	WHEEL GRIT SIZE	TOOL APPROACH ANGLE	TOOL DIAMETER	CERAMIC ABRASIVES PRODUCT #	UPC #
STOCK MULTI-POINT TOOLS FOR TRUING/DRESSING CERAMIC ABRASIVES					
Up to 10"	54 to 100	0°	7/16"	SG1R6J7	66260195377
11" to 14"	54 to 100	0°	7/16"	SG2R6K7	66260195378
15" to 20"	54 to 100	0°	7/16"	SG2A6D7	66260195375
		15°	7/16"	SG2A6E7	66260195376
21" +	54 to 100	0°	7/16"	SG1A6A7	66260195373
		15°	7/16"	SG1A6C7	66260195374

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHTT

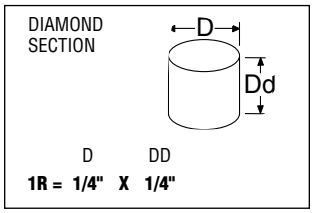
CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

MULTI-POINT TOOLS FOR TRUING AND STRAIGHT DRESSING CONVENTIONAL ABRASIVES

Tool Shape and Shank Availability

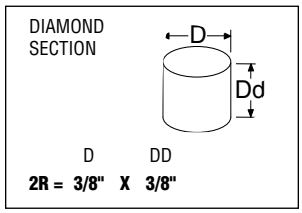
1R

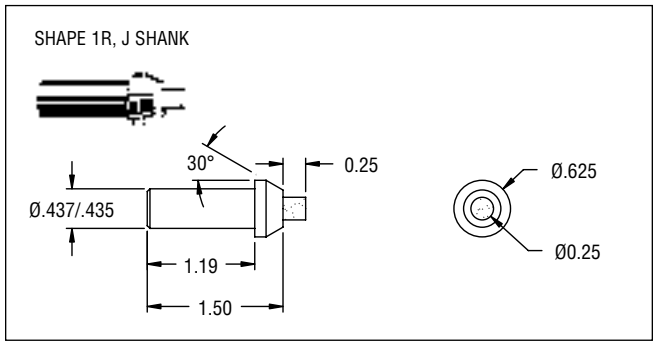
For general purpose dressing of toolroom, cylindrical, and surface grinding wheels up to 10" in diameter.
Diamond Size Availability: 6, 8

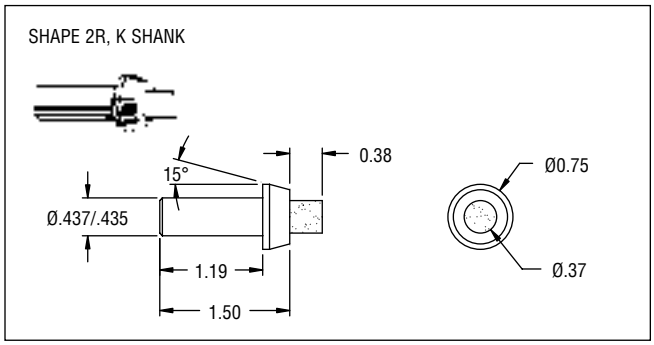


2R

For use on cylindrical, centerless and surface grinding wheels 11" to 14" in diameter.
Diamond Size Availability: 4, 6, 8

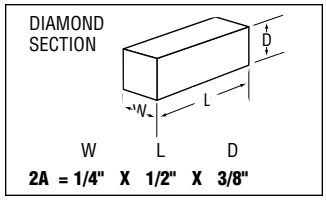


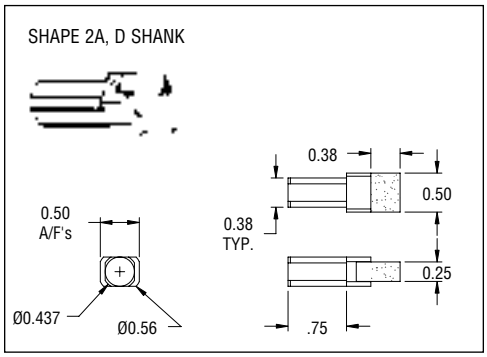


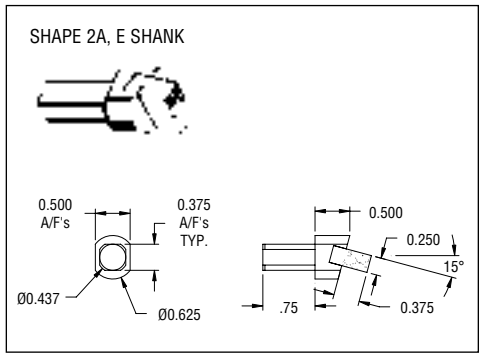


2A

For use on 15" to 20" cylindrical, surface, and centerless wheels.
Diamond Size Availability: 4, 6, 8

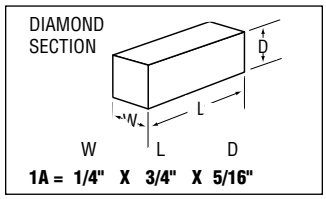


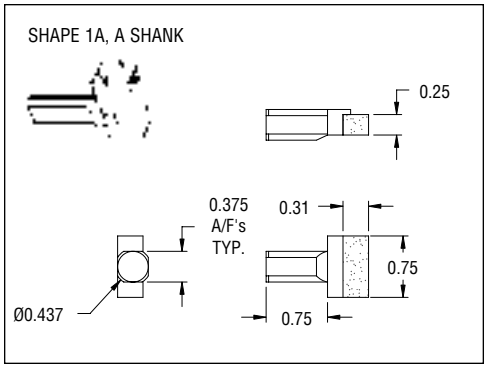


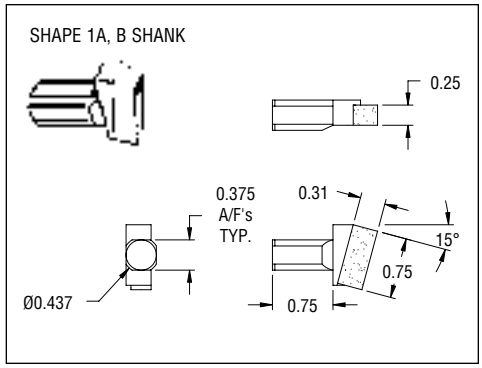


1A

For use on cylindrical and surface grinding wheels over 20" in diameter.
Diamond Size Availability: 4, 6, 8

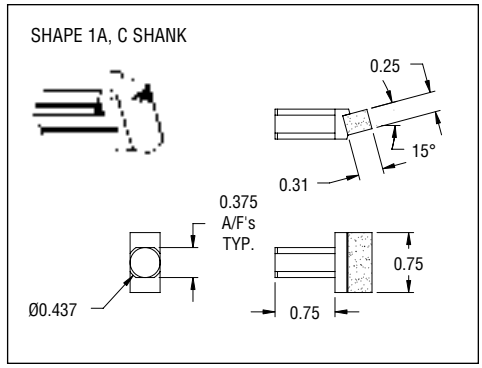






DIAMOND SIZE KEY

DIAMOND SIZE	TO DRESS WHEEL WITH GRIT SIZE OF:
4	46
6	54 - 100
8	120 - 150



MULTI-POINT TOOLS FOR TRUING AND STRAIGHT DRESSING CONVENTIONAL ABRASIVES (CONT'D)

BETTER STANDARD MULTI-POINT TOOLS

The best selection for use on conventional abrasives in high-production applications

WHEEL DIAMETER	WHEEL GRIT SIZE	TOOL APPROACH ANGLE	TOOL DIAMETER	BETTER PRODUCT #	BETTER UPC #
STOCK MULTI-POINT TOOLS FOR STRAIGHT DRESSING CONVENTIONAL ABRASIVES					
Up to 10"	54 to 100	0°	7/16"	1R6J7	66260195088
		0°	3/8"	1R6J6	66260195085
11" to 14"	46	0°	7/16"	2R4K7	66260195095
	54 to 100	0°	7/16"	2R6K7	66260195096
	120 to 150	0°	7/16"	2R8K7	66260195097
15" to 20"	46	0°	7/16"	2A4D7	66260195045
		15°	7/16"	2A4E7	66260195048
		15°	7/16"	IB4D7	66260195060
	54 to 100	0°	7/16"	2A6D7	66260195046
		15°	7/16"	2A6E7	66260195049
	120 to 150	0°	7/16"	2A8D7	66260195047
		15°	7/16"	2A8E7	66260195050
21" +	46	0°	7/16"	1A4A7	66260195030
		15°	7/16"	1A4C7	66260195038
	54 to 100	0°	7/16"	1A6A7	66260195031
		15°	7/16"	1A6B7	66260195035
		15°	7/16"	1A6C7	66260195039
NON-STOCK MULTI-POINT TOOLS FOR STRAIGHT DRESSING CONVENTIONAL ABRASIVES					
Up to 10"	120 to 150	0°	7/16"	1R8J7	66260195089
		0°	3/8"	1R8J6	66260195086
21" +	46	15°	7/16"	1A4B7	66260195034
	120 to 150	0°	7/16"	1A8A7	66260195032
		15°	7/16"	1A8B7	66260195036
		15°	7/16"	1A8C7	66260195040

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHTT

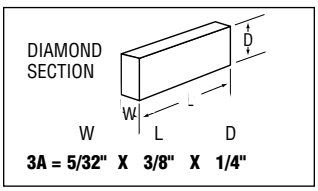
SPECIALTY MULTI-POINT TOOLS FOR FORM, SHAPE, OR STEP TRUING CONVENTIONAL ABRASIVES

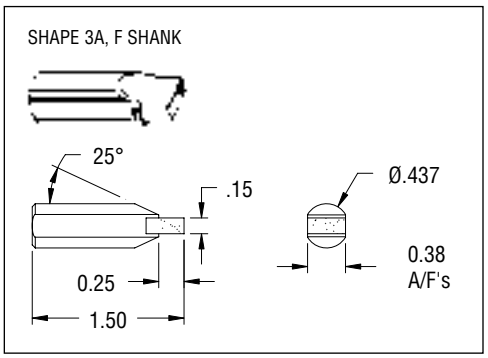
Tool Shape and Shank Availability

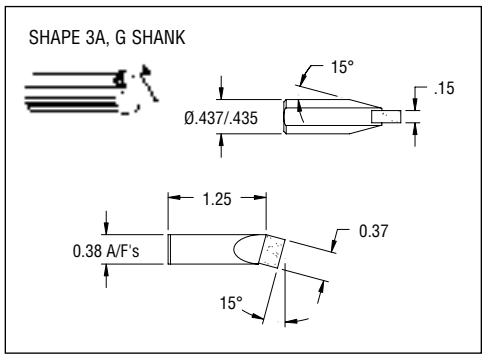
3A

For use on all types of grinders where form, shape or step truing is required.

Diamond Size Availability: 6, 8







WHEEL DIAMETER	WHEEL GRIT SIZE	TOOL APPROACH ANGLE	TOOL DIAMETER	BETTER PRODUCT #	BETTER UPC #
STOCK SPECIALTY MULTI-POINT TOOLS FOR CONVENTIONAL ABRASIVES					
All	54 to 100	0°	7/16"	3A6F7	66260195055
		15°	7/16"	3A6G7	66260195975
	120 to 150	15°	7/16"	3A8G7	66260195058
NON-STOCK SPECIALTY MULTI-POINT TOOLS FOR CONVENTIONAL ABRASIVES					
All	120 to 150	0°	7/16"	3A8F7	66260195056

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT TAPERED

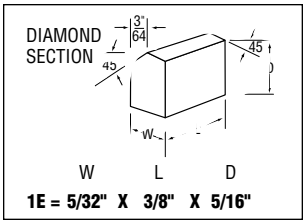
MULTI-POINT TOOLS FOR ANGULAR DRESSING CONVENTIONAL ABRASIVES

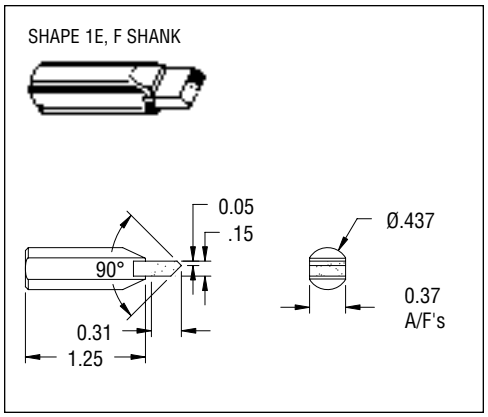
Tool Shape and Shank Availability

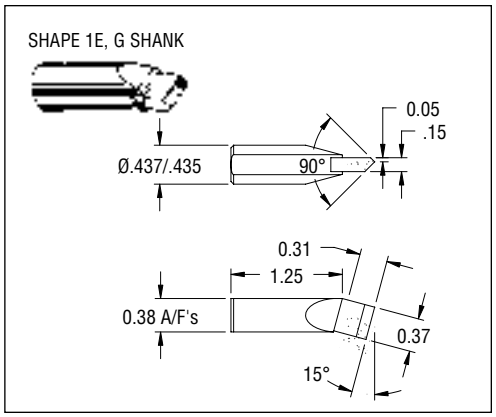
1E

For use on angular grinding machines with wheels up to 24" in diameter.

Diamond Size Availability: 6



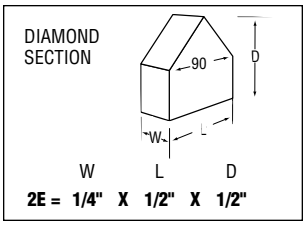


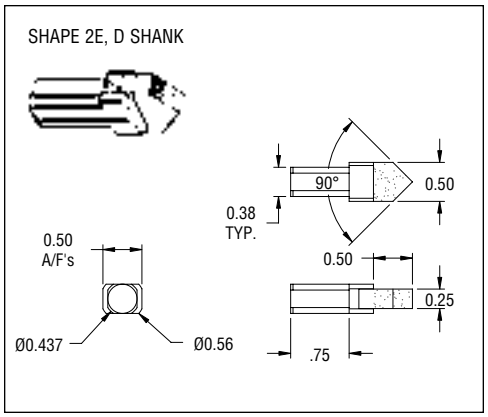


2E

For use on angular grinding machines, with wheels up to 30" in diameter.

Diamond Size Availability: 6





WHEEL DIAMETER	WHEEL GRIT SIZE	TOOL APPROACH ANGLE	TOOL DIAMETER	BETTER PRODUCT #	BETTER UPC #
STOCK MULTI-POINT TOOLS FOR ANGULAR DRESSING CONVENTIONAL ABRASIVES					
All	54 to 100	0°	7/16"	1E6F7	66260195080
NON-STOCK MULTI-POINT TOOLS FOR ANGULAR DRESSING CONVENTIONAL ABRASIVES					
All	54 to 100	15°	7/16"	1E6G7	66260195081
		0°	7/16"	2E6D7	66260195083

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

DIAMOND SIZE KEY

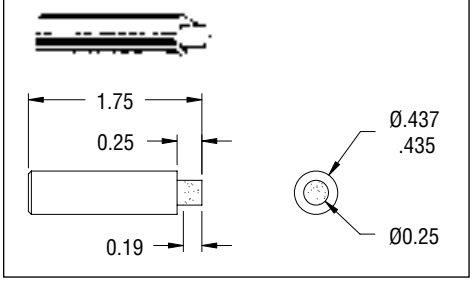
DIAMOND SIZE	TO DRESS WHEEL WITH GRIT SIZE OF:
4	46
6	54 - 100
8	120 - 150

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

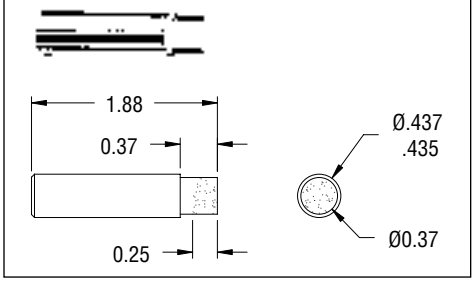
MULTI-POINT TOOLS FOR TRUING/DRESSING TOOLROOM ABRASIVES

Tool Shape and Shank Availability

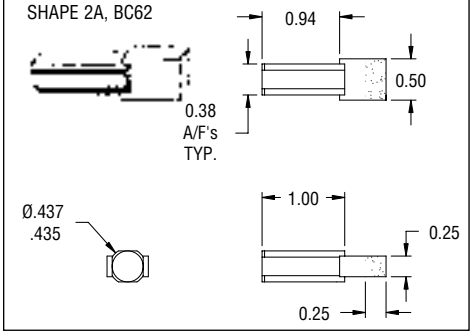
SHAPE 1R, BC64



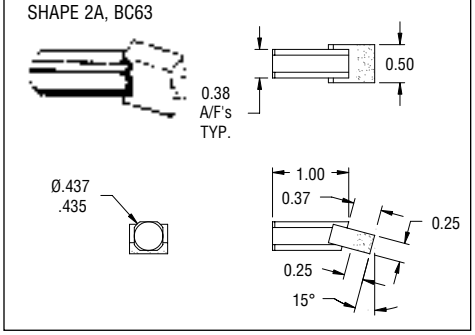
SHAPE 1R, BC65



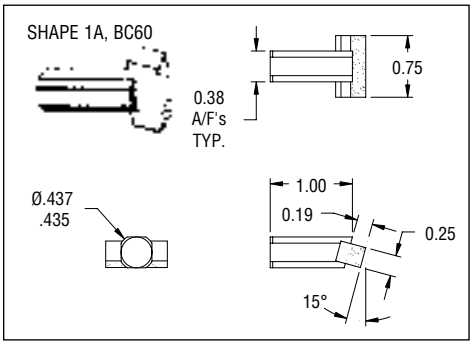
SHAPE 2A, BC62



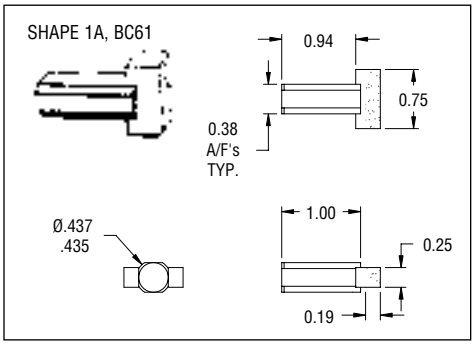
SHAPE 2A, BC63



SHAPE 1A, BC60



SHAPE 1A, BC61



BC

All "BC" Multi-Point tools contain a specially selected diamond size for a broad range of dressing applications.

REFER TO PREVIOUS PAGES FOR EACH TOOL SHAPES APPLICATION DETAILS.

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHTT

GOOD BC MULTI-POINT TOOLS

These general purpose tools are the ideal selection for conventional toolroom applications

WHEEL DIAMETER	WHEEL GRIT SIZE	TOOL APPROACH ANGLE	TOOL DIAMETER	GOOD PRODUCT #	GOOD UPC #
STOCK MULTI-POINT TOOLS FOR TRUING CONVENTIONAL TOOLROOM ABRASIVES					
Up to 10"	54 to 100	0°	7/16"	BC64	66260195014
11" to 14"	54 to 100	0°	7/16"	BC65	66260195015
15" to 20"	54 to 100	0°	7/16"	BC62	66260195012
		15°	7/16"	BC63	66260195013
21" +	54 to 100	0°	7/16"	BC61	66260195011
		15°	7/16"	BC60	66260195010

STANDARD PACKAGE = ONE TOOL

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

MACHINE TYPE	WHEEL DIAMETER	DIAMOND SECTION SIZE	SHANK DIAMETER	SHANK LENGTH UNDER HEAD	GOOD PRODUCT #	GOOD UPC #
MULTI-POINT TOOLS FOR TRUING cBN TOOLROOM ABRASIVES						
Cylindrical	Up to 12"	1/4 x 3/4 x 5/16 @ 15° Angle	7/16	3/4	1A14C7	66260195041*
		3/8 dia x 3/8 long	7/16	1-13/16	2R14K7	66260195098*
Surface	6" and less	1/4 dia x 1/4 long	7/16	1-13/16	1R14J7	66260195090*
	6" – 12"	3/8 dia x 3/8 long	7/16	1-13/16	2R14K7	66260195098*
Toolroom	Up to 12"	3/8 dia x 3/8 long	7/16	1-13/16	2R14K7	66260195098*

NOTE: FOR WHEEL DIAMETERS >12", CONTACT YOUR LOCAL NORTON REPRESENTATIVE FOR A RECOMMENDATION.

*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIME.**

HIGH PERFORMANCE GRIT TOOLS

Norton High Performance Grit Tools are used in the same manner as multi-point tools, but are designed to produce a superior finish. They are used on 120 - 150 grit wheels. The traverse rates are equal to or faster than ordinary tools. Mounted on standard shanks, standard High Performance Grit Tools have a 3/8" wide by .100" thick diamond impregnated blade with a greater number of sharp points than in ordinary multi-point tools. Since High Performance Grit Tools contain a higher concentration of diamond than found in standard multi-point tools, they are well suited for ceramic abrasive applications.

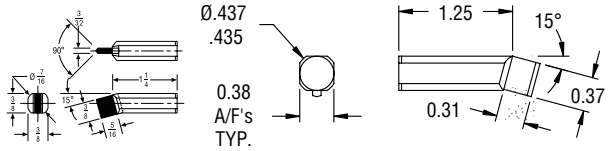
Typical Machines and Applications

- Large angle-head cylindrical machines, grinding shoulders, faces, and bearing diameters
- Cylindrical machines used for grinding main bearings and lobes on camshafts
- Centerless machines that plunge grind on multi-diameter shafts
- Centerless machines used for step grinding

Standard High Performance Grit Tool Shapes

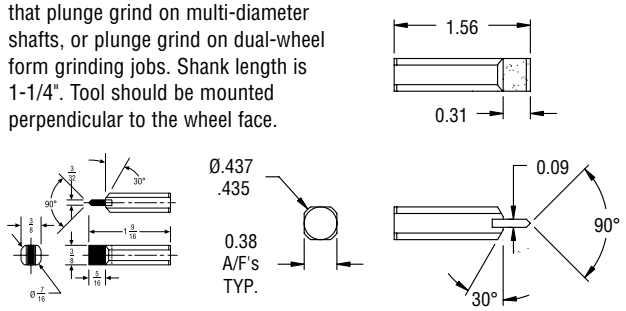
HP4439

HP4439 is designed for cylindrical machines, grinding thrust walls, bearing diameters, and multi-diameter shafts with radii. Shank length is 1-1/4" with 15° angle.



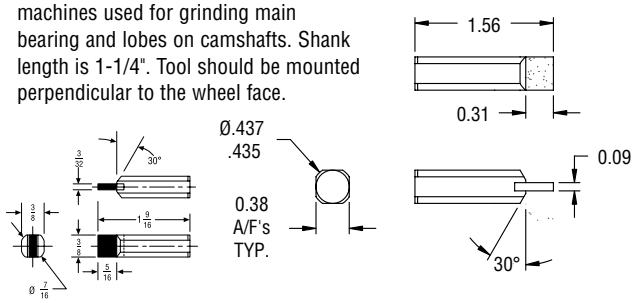
HP4511

HP4511 is designed for angular machines that plunge grind on multi-diameter shafts, or plunge grind on dual-wheel form grinding jobs. Shank length is 1-1/4". Tool should be mounted perpendicular to the wheel face.



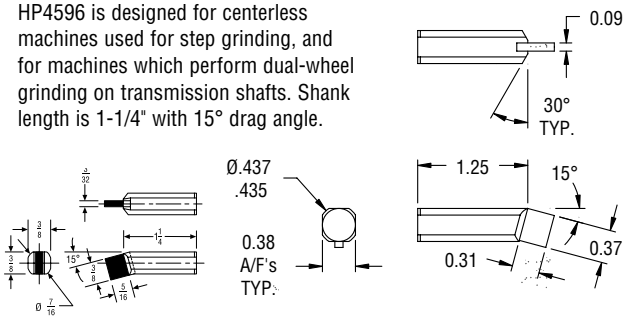
HP4595

HP4595 is designed for cylindrical machines used for grinding main bearing and lobes on camshafts. Shank length is 1-1/4". Tool should be mounted perpendicular to the wheel face.



HP4596

HP4596 is designed for centerless machines used for step grinding, and for machines which perform dual-wheel grinding on transmission shafts. Shank length is 1-1/4" with 15° drag angle.



WHEEL DIAMETER	WHEEL GRIT SIZE	SHANK DIAMETER	TOOL LENGTH	BEST PRODUCT #	BEST UPC #
STOCK HIGH PERFORMANCE GRIT TOOLS					
Up to 20"	120 to 150	7/16"	1-9/16"	HP4439	66260195270
Up to 20"	120 to 150	7/16"	1-9/16"	HP4511	66260195271
Up to 20"	120 to 150	7/16"	1-9/16"	HP4595	66260195272
Up to 20"	120 to 150	7/16"	1-9/16"	HP4596	66260195273

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

BLADE TOOLS

With the choice of natural and synthetic diamond in three performance/price tiers, Norton blade tools can meet all your angle, step, and radius dressing requirements for cylindrical, surface, and centerless grinding.

WHEEL FORMS DRESSED BY THESE TOOLS

BEST — SYNTHETIC BLADE TOOLS

FEATURES	BENEFITS
▮ USB	▮ For dressing aluminum oxide
▮ Norton Quantum (NQ)	▮ For dressing ceramics and silicon carbide
▮ Synthetic diamond with a controlled diamond shape provides a constant cross section of diamond to the wheel throughout the life of the tool	▮ Provides consistent wheel conditioning from the first dress to last ▮ Ideal for close tolerance wheel dressing on manual and CNC grinders, long production runs, and critical form and finish applications (e.g. automotive cam, crank, and valve grinding) ▮ Economical, long-lasting alternative to chisel-type tools for centerless form grinding

BETTER — MULTI-CUT BLADE TOOLS

FEATURES	BENEFITS
▮ Manufactured with top quality elongated-shaped natural diamond	▮ The best choice when natural diamond is preferred on surface, cylindrical, and centerless grinders ▮ Durable performing tools in a medium price range

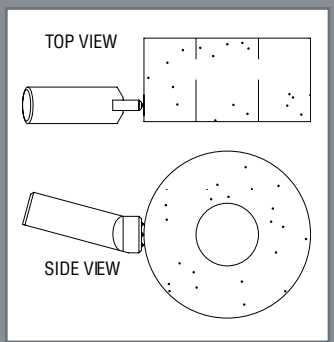
GOOD — LONG LIFE BLADE TOOLS

FEATURES	BENEFITS
▮ Manufactured with processed elongated shaped natural diamond	▮ Developed as the first generation of the blade tool line for surface, cylindrical, and centerless grinders ▮ The choice when initial price is the primary purchasing consideration

TECHtip

MOUNTING BLADE TOOLS

- Blade Tools should be mounted with the centerline of the wheel. The tool is mounted so that all the diamonds are perpendicular to the wheel face. This illustrates the proper dressing position and angle for common centerless and cylindrical applications.
- Mounted with a 15° post holder, the shank of the tool is at a 15° angle with the wheel centerline.
- On straight applications, the tool is mounted perpendicular to the wheel face with no drag angle.



HOW TO USE BLADE TOOLS

- Mount the tool on a flat, so that the tool is square in the holder. Tools that are offset will cause the form to cut wide.
- Mount the tool so that all the diamonds are vertical to the wheel face.
- When using a layer tool, the tool may become dull between layers. Four or five heavy infeed passes at .002" to .004" will correct this situation.
- Blade Tools are not resettable and should not be rotated.
- Use a 3/8" stream of coolant at the point of contact ensuring that both sides of the diamond section are protected.
- Use appropriate truing lead.
- Whenever mounting a new grinding wheel, make certain that the truing system is fully retracted.

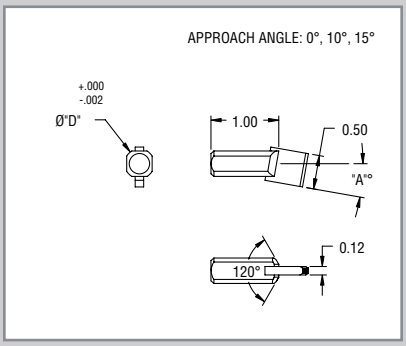
⚠ It is the user's responsibility to refer to and comply with ANSI B7.1

SPEC*check*

USB BLADE TOOL MARKING SYSTEM

SYNTHETIC DIAMOND TYPE	NUMBER OF DIAMONDS	TOOL APPROACH ANGLE	DIAMOND SETTING POSITION	SHANK DIAMETER	MINIMUM RADIUS TO BE DRESSED
USC = CVD	2	0°	A = Angled	7 = 7/16"	.008"
	3	10°		6 = 3/8"	.0"
	5	15°		11 = 11mm	.05"

EXAMPLE: **USC 3 10 A 7**



USB Blade Tools

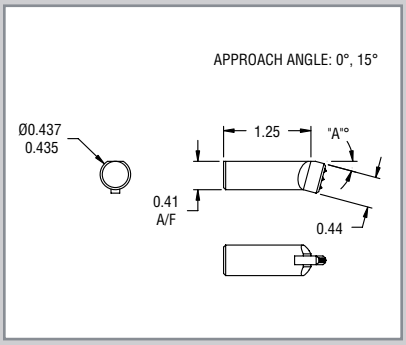
- Use a 3/8" diameter stream of coolant directed at point of contact with the wheel.
- Normal infeed should not exceed .001" for aluminum oxide wheels. Decrease by 25% when dressing ceramic SG and Norton Quantum NQ wheels and by 50% when dressing ceramic Targa TG wheels.
- To calculate traverse rate (the speed the tool moves across the wheel): Wheel RPM x .015" = Traverse Rate inches/minute

  A slower traverse rate equals lower surface finish readings.
- Mount tools with all diamonds contacting the wheel. Position row of diamonds vertically.

MULTI-CUT BLADE TOOL MARKING SYSTEM

TOOL TYPE	NUMBER OF DIAMONDS	APPROXIMATE DIAMETER OF DIAMONDS	MINIMUM AND CONCAVE RADIUS TO BE DRESSED
MC = 15° Drag Angle	2 = 1 layer of 2 diamonds	55 = .055"	.028"
MCS = 0° Drag Angle	3 = 1 layer of 3 diamonds	75 = .075"	.038"
		90 = .090"	.045"

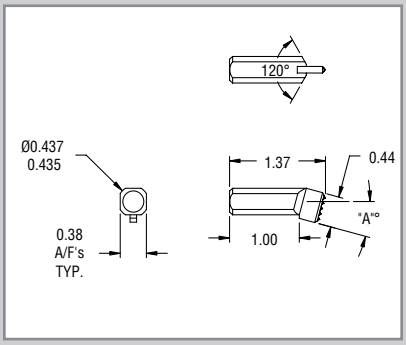
EXAMPLE: **MC 3 75**



LONG LIFE BLADE TOOL MARKING SYSTEM

TOOL TYPE	STYLE	NUMBER OF LAYERS	APPROXIMATE DIAMETER OF DIAMONDS	MINIMUM RADIUS TO BE DRESSED
LL = Long Life	20 = 5 stones @ 15° Drag Angle	1 = 1 layer	A = .030"	.015"
	27 = 5 stones @ 0° Drag Angle	Non-stock: 2 and 3 layers are available on request	B = .040"	.020"
			C = .050"	.025"
			D = .060"	.030"

EXAMPLE: **LL 20 1 A**



BLADE TOOLS

			BEST NQTOOLS		BEST USB TOOLS		BETTER MULTI-CUT TOOLS		GOOD LONG LIFE TOOLS	
WHEEL DIAMETER (WIDTH < = 9")	TOOL APPROACH ANGLE	SHANK DIAMETER	PRODUCT #	UPC #	PRODUCT #	UPC #	PRODUCT #	UPC #	PRODUCT #	UPC #
STOCK BLADE TOOLS										
12" to 17"	0	7/16	NQ20A7	07958747944						
	15°	7/16"	NQ215A7	07958747945			MC355	66260195266		
18" to 29"	0	7/16	NQ30A7	07958747946						
	15°	7/16"	NQ315A7	07958747947			MC375	66260195267		
30" to 36"	0	7/16	NQ50A7	07958747948						
	15	7/16	NQ515A7	07958747950						
NON-STOCK BLADE TOOLS										
Up to 11"	0°	7/16"					MCS255	66260148412	LL271A	66260196447
	15°	7/16"					MC255	66260195265	LL201A	66260196446
12" to 17"	0°	7/16"			USC20A7	66260103532	MCS355	66260195268	LL271B	66260196449
	10°	7/16"			USC210A7	66260103534				
	15°	7/16"			USC215A7	66260103535			LL201B	66260196448
18" to 29"	0°	7/16"			USC30A7	66260103305	MCS375	66260148417	LL271C	66260196451
	10°	7/16"			USC310A7	66260103545				
	15°	7/16"			USC315A7	66260103303			LL201C	66260196450
30" to 36"	0°	7/16"			USC50A7	66260103306	MCS390	66260148418	LL271D	66260196453
	10°	7/16"			USC510A7	66260103555				
	15°	7/16"			USC515A7	66260103307	MC390	66260196266	LL201D	66260196452

THESE TOOLS ARE NOT RESETTABLE OR RELAPPABLE.
OTHER SHANK DIAMETERS AND CONFIGURATIONS ARE AVAILABLE.
BLADE TOOLS FOR DRESSING WHEEL WIDTHS > 9" ARE ALSO AVAILABLE.
STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT TAPERED ANGLED MULTI-ANGLED

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

FORM TOOLS

Norton Form Tools have diamond lapped to specific angles and radii required for a particular application, machine, contour dressing system or CNC operation. Due to the high degree of accuracy necessary, the diamond is of special shape and quality.

WHEEL FORMS DRESSED BY THESE TOOLS

TECHtip

HOW TO USE FORM DRESSING TOOLS

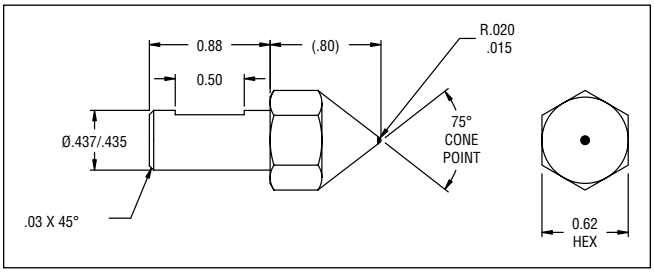
- Form Tools should be used in compliance with the guidelines established for the machine or dress.
- Proper centerline and light infeeds are essential to minimize side pressure. Excessive pressure will cause the diamond to fracture.
- Chisel Point Tools should be rotated 180° when dulling or contour problems occur.
- Cone point tools should be rotated approximately 1/4 turn daily.

BEST **CONE POINT TOOLS**

- The Norton vacuum braze technology used in the manufacturing of cone points surpasses all traditional diamond retention methods.
- Benefits of this technology include absolute diamond retention, diamond pullout prevention during the dressing cycle, and longer tool life through multiple relaps.
- Because the diamond is accurately coned to the specific included angle and radius, these tools are ideal when the most intricate, precise forms and radii are required.
- Can be relapped.

U-DEX-IT CONE POINT TOOL

Used for precision dressing of intricate forms and radii. Specially designed with 5/8" indexable head for easy turning during use. These tools can be relapped.



					BEST	
INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAM.	TOOL LENGTH	NPRODUCT #	RELAPPABLE UPC #
STOCK U-DEX-IT CONE POINT TOOL						
75°	.020"	.50	7/16"	1.678"	CPUD720-7	66260158981

STANDARD PACKAGE = ONE TOOL

WHEEL FORMS DRESSED BY THESE TOOLS

SPE Ccheck

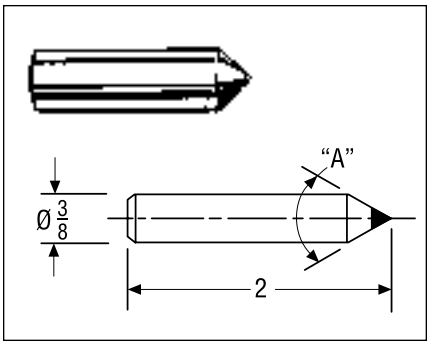
CONE POINT TOOL MARKING SYSTEM

TOOL TYPE	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	CARAT WEIGHT	SHANK DIAMETER
CP	6 = 60° 7 = 75° 9 = 90°	05 = .005" 10 = .010" 15 = .015" 20 = .020" 25 = .025" 30 = .030"	L = .10 - .15 M = .20 - .25 H = .33 X = .50	6 = 3/8" 7 = 7/16"

EXAMPLE: **CP 6 10 M-6**

STANDARD CONE POINT TOOLS

These tools are used for precision dressing when the most intricate forms and radii are required. Can be relapped.



					BEST	
INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	PRODUCT #	RELAPPABLE UPC #
STOCK STANDARD CONE POINT TOOLS						
60°	.010"	.20 – .25	3/8"	2"	CP610M-6	66260195240

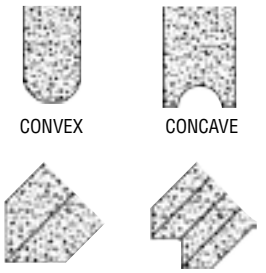
STANDARD PACKAGE = ONE TOOL

NON-STOCK STANDARD CONE POINT TOOLS

						BEST	
WHEEL DIAMETER	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	PRODUCT #	RELAPPABLE UPC #
NON-STOCK STANDARD CONE POINT TOOLS							
Up to 10"	60°	.005"	.10 - .15	3/8"	2"	CP65L-6	66260196098
11" - 14"			.20 - .25			CP65M-6	66260196100
15" - 20"			0.33			CP65H-6	66260196103
21" - 24"			0.50			CP65X-6	66260196109
Up to 10"	60°	.010"	.10 - .15	3/8"	2"	CP610L-6	66260196099
11" - 14"			.20 - .25			CP610M-6	66260195240*
15" - 20"			0.33			CP610H-6	66260196104
21" - 24"			0.50			CP610X-6	66260196110
Up to 10"	60°	.015"	.10 - .15	3/8"	2"	CP615L-6	66260195176
11" - 14"			.20 - .25			CP615M-6	66260196101
15" - 20"			0.33			CP615H-6	66260196105
21" - 24"			0.50			CP615X-6	66260196111
Up to 10"	60°	.020"	.10 - .15	3/8"	2"	CP620L-6	
11" - 14"			.20 - .25			CP620M-6	66260196102
15" - 20"			0.33			CP620H-6	66260196106
21" - 24"			0.50			CP620X-6	66260196112
Up to 10"	60°	.025"	.10 - .15	3/8"	2"	CP625L-6	
11" - 14"			.20 - .25			CP625M-6	66260151328
15" - 20"			0.33			CP625H-6	66260196107
21" - 24"			0.50			CP625X-6	66260196113
Up to 10"	60°	.030"	.10 - .15	3/8"	2"	CP630L-6	
11" - 14"			.20 - .25			CP630M-6	66260151357
15" - 20"			0.33			CP630H-6	66260196108
21" - 24"			0.50			CP630X-6	66260196114

***STOCK**

WHEEL FORMS DRESSED BY THESE TOOLS



TECHtip

HOW TO ORDER NON-STOCK CONE POINT TOOLS

- Order by tool type, included angle, radius, and carat weight required.
- Unless otherwise specified, tools will be furnished in 3/8" x 2" shank as illustrated. Prices for radii not listed and/or other included angles will be quoted upon request.
- 7/16" diameter shank is available at no additional cost.

SPECcheck

CONE POINT TOOL MARKING SYSTEM

TOOL TYPE	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	CARAT WEIGHT	SHANK DIAMETER
CP	6 = 60° 7 = 75° 9 = 90°	05 = .005" 10 = .010" 15 = .015" 20 = .020" 25 = .025" 30 = .030"	L = .10 - .15 M = .20 - .25 H = .33 X = .50	6 = 3/8" 7 = 7/16"

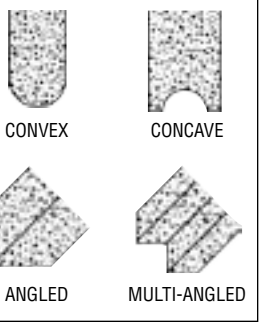
EXAMPLE: **CP 6 10 M-6**

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

NON-STOCK STANDARD CONE POINT TOOLS (CONTINUED)

WHEEL DIAMETER	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	BEST PRODUCT #	BEST RELAPPABLE UPC #
NON-STOCK STANDARD CONE POINT TOOLS (CONTINUED)							
Up to 10"	75°	.005"	.10 - .15	3/8"	2"	CP75L-6	66260196115
11" - 14"			.20 - .25			CP75M-6	66260196117
15" - 20"			0.33			CP75H-6	66260196120
21" - 24"			0.50			CP75X-6	66260196126
Up to 10"	75°	.010"	.10 - .15	3/8"	2"	CP710L-6	66260196116
11" - 14"			.20 - .25			CP710M-6	66260195241
15" - 20"			0.33			CP710H-6	66260196121
21" - 24"			0.50			CP710X-6	66260196127
Up to 10"	75°	.015"	.10 - .15	3/8"	2"	CP715L-6	
11" - 14"			.20 - .25			CP715M-6	66260196118
15" - 20"			0.33			CP715H-6	66260196122
21" - 24"			0.50			CP715X-6	66260196128
Up to 10"	75°	.020"	.10 - .15	3/8"	2"	CP720L-6	
11" - 14"			.20 - .25			CP720M-6	66260196119
15" - 20"			0.33			CP720H-6	66260196123
21" - 24"			0.50			CP720X-6	66260196129
Up to 10"	75°	.025"	.10 - .15	3/8"	2"	CP725L-6	
11" - 14"			.20 - .25			CP725M-6	66260151448
15" - 20"			0.33			CP725H-6	66260196124
21" - 24"			0.50			CP725X-6	66260196130
Up to 10"	75°	.030"	.10 - .15	3/8"	2"	CP730L-6	
11" - 14"			.20 - .25			CP730M-6	
15" - 20"			0.33			CP730H-6	66260196125
21" - 24"			0.50			CP730X-6	66260196131
Up to 10"	90°	.005"	.10 - .15	3/8"	2"	CP95L-6	66260196132
11" - 14"			.20 - .25			CP95M-6	66260196134
15" - 20"			0.33			CP95H-6	66260196137
21" - 24"			0.50			CP95X-6	66260196143
Up to 10"	90°	.010"	.10 - .15	3/8"	2"	CP910L-6	66260196133
11" - 14"			.20 - .25			CP910M-6	66260195242
15" - 20"			0.33			CP910H-6	66260196138
21" - 24"			0.50			CP910X-6	66260196144
Up to 10"	90°	.015"	.10 - .15	3/8"	2"	CP915L-6	66260158012
11" - 14"			.20 - .25			CP915M-6	66260196135
15" - 20"			0.33			CP915H-6	66260196139
21" - 24"			0.50			CP915X-6	66260196145
Up to 10"	90°	.020"	.10 - .15	3/8"	2"	CP920L-6	
11" - 14"			.20 - .25			CP920M-6	66260196136
15" - 20"			0.33			CP920H-6	66260196140
21" - 24"			0.50			CP920X-6	66260196146
Up to 10"	90°	.025"	.10 - .15	3/8"	2"	CP925L-6	
11" - 14"			.20 - .25			CP925M-6	66260151645
15" - 20"			0.33			CP925H-6	66260196141
21" - 24"			0.50			CP925X-6	66260196147
Up to 10"	90°	.030"	.10 - .15	3/8"	2"	CP930L-6	
11" - 14"			.20 - .25			CP930M-6	66260151673
15" - 20"			0.33			CP930H-6	66260196142
21" - 24"			0.50			CP930X-6	66260196148

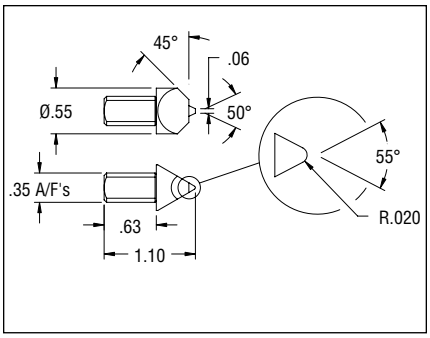
WHEEL FORMS DRESSED BY THESE TOOLS



CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

CHISEL POINT TOOL FOR TOYODA GRINDERS

High precision chisel point tool designed for forming intricate shapes and radii. Specifically engineered to fit Toyoda machine series GL32 and GL4, it can also be used on various straight and angle-head grinders – for dressing conventional and ceramic abrasive wheels, sizes 12" to 24". This tool can be reset/relapped.



					BEST	
INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	PRODUCT #	RELAPPABLE UPC #
STOCK CHISEL POINT TOOL						
55°	.020"	.75	7/16"	1.10"	CHT520-7	66260103741

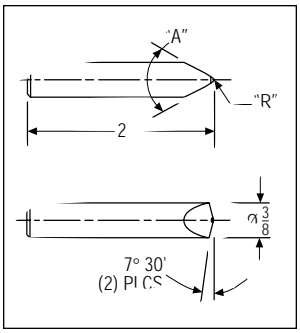
STANDARD PACKAGE = ONE TOOL

TECHtip

Chisel Point Tools should be rotated 180° when dulling or contour problems occur.

NON-STOCK STANDARD CHISEL POINT TOOLS

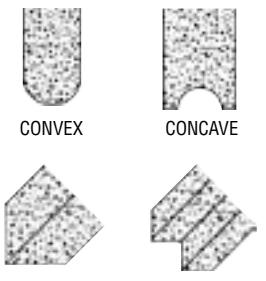
This line offers precision tools designed to form intricate radii, steps or contours on toolroom-type applications. Can be relapped or reset/relapped.



						BEST	
WHEEL DIAMETER	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	PRODUCT #	RELAPPABLE UPC #
NON-STOCK STANDARD CHISEL POINT TOOLS							
Up to 10"	60°	.005"	.10 - .15	3/8"	2"	CH65L-6	66260196150
11" - 14"			.20 - .25			CH65M-6	66260196154
15" - 20"			0.33			CH65H-6	66260196160
21" - 24"			0.50			CH65X-6	66260196166
Up to 10"	60°	.010"	.10 - .15	3/8"	2"	CH610L-6	66260196151
11" - 14"			.20 - .25			CH610M-6	66260196155
15" - 20"			0.33			CH610H-6	66260195245
21" - 24"			0.50			CH610X-6	66260196167
Up to 10"	60°	.015"	.10 - .15	3/8"	2"	CH615L-6	66260196152
11" - 14"			.20 - .25			CH615M-6	66260196156
15" - 20"			0.33			CH615H-6	66260196161
21" - 24"			0.50			CH615X-6	66260196168
Up to 10"	60°	.020"	.10 - .15	3/8"	2"	CH620L-6	
11" - 14"			.20 - .25			CH620M-6	66260196157
15" - 20"			0.33			CH620H-6	66260196162
21" - 24"			0.50			CH620X-6	66260196169
Up to 10"	60°	.025"	.10 - .15	3/8"	2"	CH625L-6	
11" - 14"			.20 - .25			CH625M-6	66260196158
15" - 20"			0.33			CH625H-6	66260196163
21" - 24"			0.50			CH625X-6	66260196170
Up to 10"	60°	.030"	.10 - .15	3/8"	2"	CH630L-6	
11" - 14"			.20 - .25			CH630M-6	66260158176
15" - 20"			0.33			CH630H-6	66260196164
21" - 24"			0.50			CH630X-6	66260196492
Up to 10"	75°	.005"	.10 - .15	3/8"	2"	CH75L-6	66260196172
11" - 14"			.20 - .25			CH75M-6	66260196176
15" - 20"			0.33			CH75H-6	66260196182
21" - 24"			0.50			CH75X-6	66260196189
Up to 10"	75°	.010"	.10 - .15	3/8"	2"	CH710L-6	66260196173
11" - 14"			.20 - .25			CH710M-6	66260196177
15" - 20"			0.33			CH710H-6	66260196183
21" - 24"			0.50			CH710X-6	66260196190

CONTINUED

WHEEL FORMS DRESSED BY THESE TOOLS

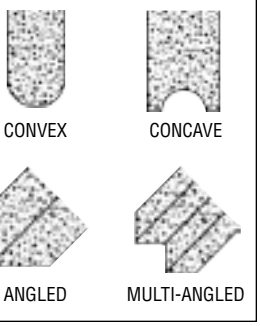


CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

NON-STOCK STANDARD CHISEL POINT TOOLS (CONTINUED)

WHEEL DIAMETER	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	TOOL CARAT WEIGHT	SHANK DIAMETER	TOOL LENGTH	BEST PRODUCT #	BEST RELAPPABLE UPC #
NON-STOCK STANDARD CHISEL POINT TOOLS							
Up to 10"	75°	.015"	.10 - .15	3/8"	2"	CH715L-6	66260196174
11" - 14"			.20 - .25			CH715M-6	66260196178
15" - 20"			0.33			CH715H-6	66260196184
21" - 24"			0.50			CH715X-6	66260196191
Up to 10"	75°	.020"	.10 - .15	3/8"	2"	CH720L-6	
11" - 14"			.20 - .25			CH720M-6	66260196179
15" - 20"			0.33			CH720H-6	66260196185
21" - 24"			0.50			CH720X-6	66260196192
Up to 10"	75°	.025"	.10 - .15	3/8"	2"	CH725L-6	
11" - 14"			.20 - .25			CH725M-6	66260196180
15" - 20"			0.33			CH725H-6	66260196186
21" - 24"			0.50			CH725X-6	66260196193
Up to 10"	75°	.030"	.10 - .15	3/8"	2"	CH730L-6	
11" - 14"			.20 - .25			CH730M-6	
15" - 20"			0.33			CH730H-6	66260196187
21" - 24"			0.50			CH730X-6	66260196194
Up to 10"	90°	.005"	.10 - .15	3/8"	2"	CH95L-6	66260196196
11" - 14"			.20 - .25			CH95M-6	66260196202
15" - 20"			0.33			CH95H-6	66260196208
21" - 24"			0.50			CH95X-6	66260196215
Up to 10"	90°	.010"	.10 - .15	3/8"	2"	CH910L-6	66260196197
11" - 14"			.20 - .25			CH910M-6	66260196203
15" - 20"			0.33			CH910H-6	66260196209
21" - 24"			0.50			CH910X-6	66260196493
Up to 10"	90°	.015"	.10 - .15	3/8"	2"	CH915L-6	66260196198
11" - 14"			.20 - .25			CH915M-6	66260196204
15" - 20"			0.33			CH915H-6	66260196210
21" - 24"			0.50			CH915X-6	66260196216
Up to 10"	90°	.020"	.10 - .15	3/8"	2"	CH920L-6	
11" - 14"			.20 - .25			CH920M-6	66260196205
15" - 20"			0.33			CH920H-6	66260196211
21" - 24"			0.50			CH920X-6	66260196217
Up to 10"	90°	.025"	.10 - .15	3/8"	2"	CH925L-6	
11" - 14"			.20 - .25			CH925M-6	66260196206
15" - 20"			0.33			CH925H-6	66260196212
21" - 24"			0.50			CH925X-6	66260196218
Up to 10"	90°	.030"	.10 - .15	3/8"	2"	CH930L-6	
11" - 14"			.20 - .25			CH930M-6	66260163376
15" - 20"			0.33			CH930H-6	66260196213
21" - 24"			0.50			CH930X-6	66260196219

WHEEL FORMS DRESSED BY THESE TOOLS



TECHtip

HOW TO ORDER NON-STOCK CHISEL POINT TOOLS

- Order by tool type, included angle, radius, and carat weight required.
- Tools will be furnished in 3/8" x 2" shank as illustrated. Prices for radii not listed and/or other included angles will be quoted upon request.
- 7/16" diameter shank is available at no additional cost.

SPECcheck

CONE POINT TOOL MARKING SYSTEM

TOOL TYPE	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	CARAT WEIGHT	SHANK DIAMETER
CH = Natural Diamond	6 = 60° 7 = 75° 9 = 90°	05 = .005" 10 = .010" 15 = .015" 20 = .020" 25 = .025" 30 = .030"	L = .10 - .15 M = .20 - .25 H = .33 X = .50	6 = 3/8" 7 = 7/16"

EXAMPLE: **CH 9 5 M-6**

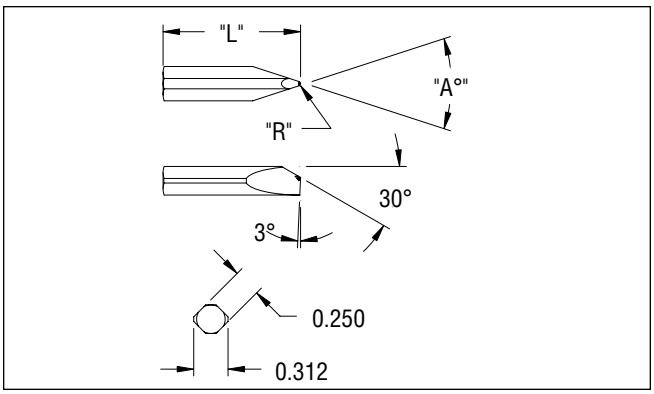
STANDARD FORM TOOLS FOR JONES & LAMSON MACHINES

BEST **FORM TOOLS – JONES & LAMSON MACHINES**

- Used primarily on Jones & Lamson machines; 9/32" x 1-1/4" shank
- The applications dictates the tool to choose
- Can be relapped or reset/relapped

INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	BEST PRODUCT #	BEST RELAPPABLE UPC #
NON-STOCK JONES & LAMSON FORM TOOLS			
50°	0.005"	JL105	66260158847
	0.010"	JL110	66260159824
	0.015"	JL115	66260141699
	0.020"	JL120	66260141700
40°	0.005"	JL205	66260142524
	0.010"	JL210	66260155893
	0.015"	JL215	
	0.020"	JL220	
30°	0.005"	JL305	66260141701
	0.010"	JL310	66260142528
	0.015"	JL315	66260142529
	0.020"	JL320	66260158989

STANDARD PACKAGE = 1 TOOL



WHEEL FORMS DRESSED BY THESE TOOLS

SPECcheck JONES & LAMSON TOOL MARKING SYSTEM

TOOL TYPE	INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND
JL = Natural Diamond	1 = 50°	05 = .005"
	2 = 40°	10 = .010"
	3 = 30°	15 = .015"
		20 = .020"

EXAMPLE: **JL 1 10**

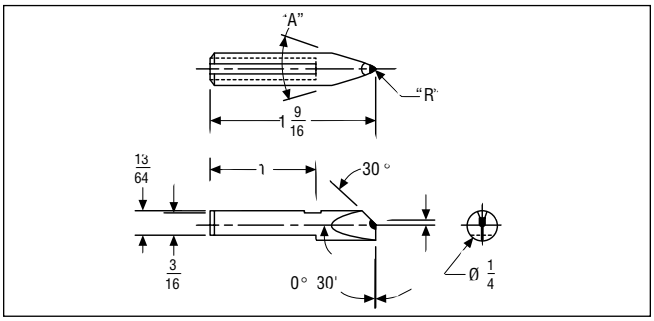
STANDARD FORM TOOLS FOR MOORE PANTOGRAPH MACHINES

BEST **FORM TOOLS – MOORE PANTOGRAPH MACHINES**

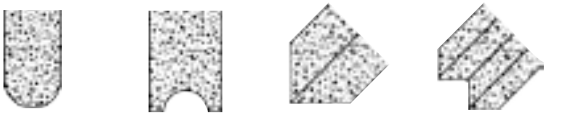
- Used primarily on Moore Pantograph machines; 1/4" x 1-9/16" shank
- The applications dictates the tool to choose
- Can be relapped or reset/relapped

INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	BEST PRODUCT #	BEST RELAPPABLE UPC #
NON-STOCK MOORE PANTOGRAPH FORM TOOLS			
30°	0.005"	M053056	66260195280
	0.010"	M0103056	66260195281
	0.015"	M0153056	66260195282
	0.020"	M0203056	66260196282
	0.025"	M0253056	66260196283
60°	0.005"	M056056	66260196276
	0.010"	M0106056	66260196277
	0.015"	M0156056	66260196278
	0.020"	M0206056	66260196286
	0.025"	M0256056	66260196287

40° AND 90° INCLUDED ANGLES ARE ALSO AVAILABLE.
STANDARD PACKAGE = 1 TOOL



WHEEL FORMS DRESSED BY THESE TOOLS



SPECcheck MOORE PANTOGRAPH TOOL MARKING SYSTEM

TOOL TYPE	RADIUS ON DIAMONDS	INCLUDED ANGLE ON DIAMOND	SHANK DIAMETER
MO =	05 = .005"	30 = 30°	56 = 1-9/16"
Natural	10 = .010"	40 = 40°	
Diamond	15 = .015"	60 = 60°	
	20 = .020"	90 = 90°	
	25 = .025"		

EXAMPLE: **MO 5 30 56**

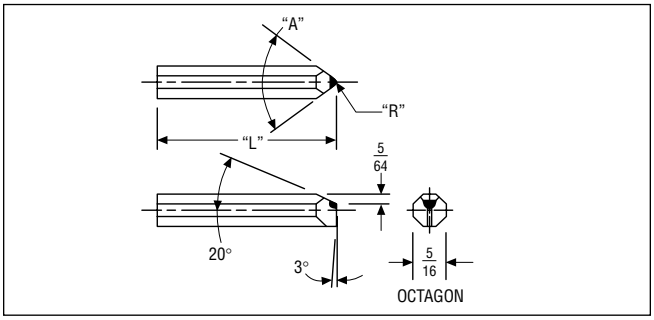
STANDARD FORM TOOLS FOR HOGLUND MACHINES

BEST **FORM TOOLS – HOGLUND MACHINES**

- Used primarily on Hoglund machines
- The applications dictates the tool to choose

		BEST	
INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	PRODUCT #	UPC #
NON-STOCK HOGLUND FORM TOOLS			
42°	0.005"	HG54262	66260142466
	0.010"	HG104262	66260142489
	0.015"	HG154262	66260142346
	0.020"	HG204262	66260142403
	0.025"	HG254262	66260142459
60°	0.005"	HG56062	66260142470
	0.010"	HG106062	66260142294
	0.015"	HG156062	66260142351
	0.020"	HG206062	66260142407
	0.025"	HG256062	66260142463

48° AND 72° INCLUDED ANGLES ARE ALSO AVAILABLE, AS ARE 1-1/2 AND 1-3/4 " TOOL LENGTHS. STANDARD PACKAGE = 1 TOOL



WHEEL FORMS DRESSED BY THESE TOOLS

SPECcheck HOGLUND TOOL MARKING SYSTEM

TOOL TYPE	RADIUS ON DIAMOND	INCLUDED ANGLE ON DIAMOND	TOOL LENGTH
HG =	05 = .005"	42 = 42°	50 = 1-1/2"
Natural	10 = .010"	48 = 48°	62 = 1-5/8"
Diamond	15 = .015"	60 = 60°	75 = 1-3/4"
	20 = .020"	72 = 72°	
	25 = .025"		

EXAMPLE: **HG 10 42 62**

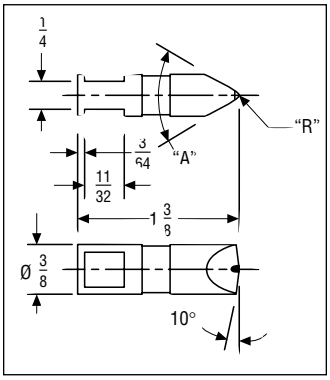
STANDARD FORM TOOLS FOR DIA-FORM MACHINES

BEST **FORM TOOLS – DIA-FORM MACHINES**

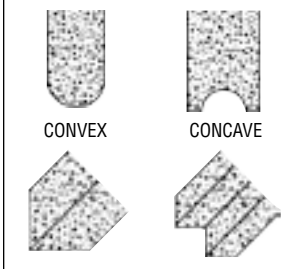
- Used primarily on Dia-Form machines
- The applications dictates the tool to choose
- Can be relapped or reset/relapped

		BEST	
INCLUDED ANGLE ON DIAMOND	RADIUS ON DIAMOND	PRODUCT #	RELAPPABLE UPC #
NON-STOCK DIA-FORM TOOLS			
40°	0.005"	DI052138	66260196310
	0.010"	DI102138	66260196311
	0.015"	DI152138	66260196312
	0.020"	DI202138	66260196314
	0.025"	DI252138	66260196316
60°	0.005"	DI051138	66260195289
	0.010"	DI101138	66260195290
	0.015"	DI151138	66260195292
	0.020"	DI201138	66260196313
	0.025"	DI251138	66260196315

1-3/4" AND 2-1/4" TOOL LENGTHS ARE ALSO AVAILABLE.
STANDARD PACKAGE = 1 TOOL



WHEEL FORMS DRESSED BY THESE TOOLS



SPECcheck DIA-FORM TOOL MARKING SYSTEM

TOOL TYPE	RADIUS ON DIAMOND	INCLUDED ANGLE ON DIAMOND	TOOL LENGTH
DI =	05 = .005"	1 = 60°	138 = 1-3/8"
Natural	10 = .010"	2 = 40°	175 = 1-3/4"
Diamond	15 = .015"		225 = 2-1/4"
	20 = .020"		
	25 = .025"		

EXAMPLE: **DI 05 1 138**

CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK, CUSTOM CONFIGURATION QUESTIONS, REQUESTS FOR QUOTES, ETC.

CLUSTER TOOLS

Norton Cluster Tools are designed specifically for straight face dressing of large diameter, coarse grit grinding wheels on single or double disc, centerless, or surface grinders.

WHEEL FORMS DRESSED BY THESE TOOLS

CONVEX

TAPERED

MULTI-POINT CLUSTER TOOLS

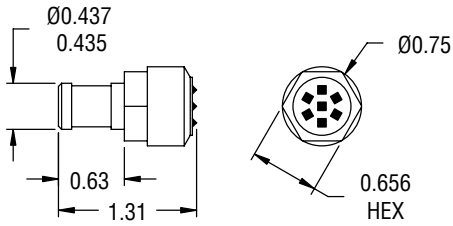
Multi-Point Cluster tools are typically used for straight face dressing on disc and centerless operations. For greatest efficiency, these tools should be mounted at a 15° angle so that three diamonds are in contact with the wheel face at all times. The tool should be rotated at frequent intervals. Not resettable.

DIAMONDS ON FACE	SHANK DIAMETER	TOOL LENGTH	BETTER PRODUCT #	BETTER NON-RESETTABLE UPC #
STOCK MULTI-POINT CLUSTER TOOLS				
7	7/16"	1-5/16"	NC7K7	66260195206

STANDARD PACKAGE = 1 TOOL

DIAMONDS ON FACE	SHANK DIAMETER	TOOL LENGTH	BEST PRODUCT #	BEST NON-RESETTABLE UPC #
NON-STOCK MULTI-POINT CLUSTER TOOLS				
7	7/16"	1-5/16"	MP77	66260195205

STANDARD PACKAGE = 1 TOOL



WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT

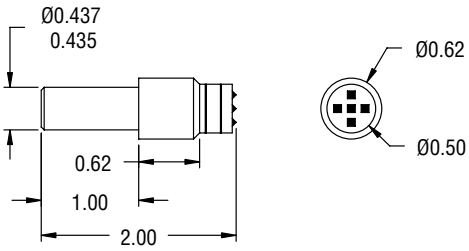
TAPERED

DIA-PAK TOOLS

Dia-Pak tools are primarily used in straight face disc grinding, but are extremely versatile and may also be used in centerless and surface operations. Designed for maximum economy, three layers of diamond are carefully arranged so that a new layer is exposed before the previous layer is completely worn away. Not resettable.

FOR WHEEL DIAMETERS	DIAMONDS PER LAYER	SHANK DIAM.	TOOL LENGTH	BETTER PRODUCT #	BETTER NON-RESETTABLE UPC #
STOCK DIA-PAK TOOLS					
Up to 14"	5-4-5	7/16"	2"	DP20	66260195200
Up to 20"	7-6-7	7/16"	2"	DP30	66260195201
Any	7-6-7	7/16"	2"	DP35	66260195202

STANDARD PACKAGE = 1 TOOL



WHEEL FORMS DRESSED BY THESE TOOLS

STRAIGHT

TAPERED

TECHtip

CLUSTER AND DIA-PAK TOOLS – STRAIGHT FACE DRESSING OF HARD / COARSE WHEELS:

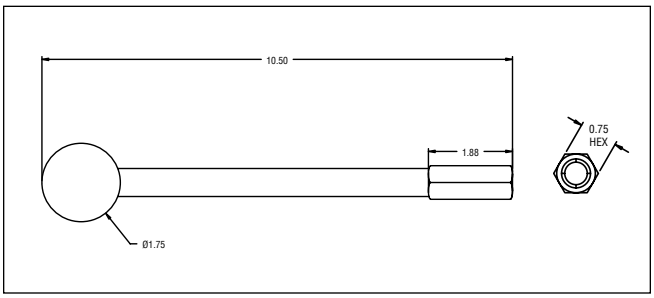
- Tool should approach the wheel at a 15° angle and be rotated periodically to keep three diamonds in contact with the wheel at all times.
- Tools can also be used at a 90° to the wheel face.
- Multi-Point Cluster Tools should be rotated at frequent intervals.
- Infeed per pass should not exceed .0015" (.001" with Norton SG/Ceramic, Norton Quantum and Targa TG wheels).
- Use coolant whenever possible.
- These tools permit a faster traverse rate providing a freer cutting wheel than when dressed by a conventional single-point tool.

ACCESSORIES

Tool holders typically used in toolroom applications.

TOOL HOLDER/HAND DRESSER

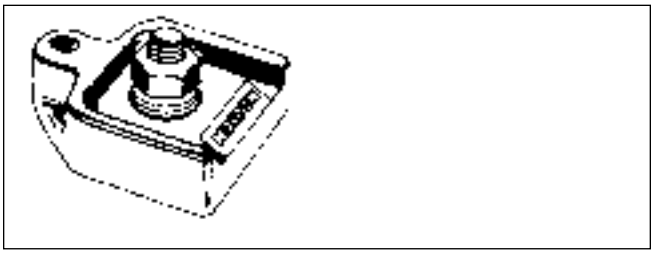
Designed for use when offhand truing and dressing on tool and cutter, or benchstand grinders. This stock hand dresser will not rust, and is 10-1/2" long, with a hollow shaft that accepts any tool shank length from 3/4" to 9". The 1-3/4" diameter plastic knob ensures a firm grip. The collet accepts a 7/16" diameter tool shank.



DESCRIPTION	UPC #
Hand Dresser	66260195020

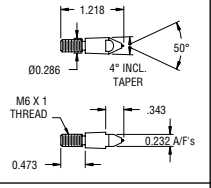
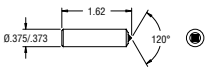
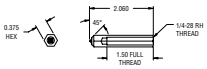
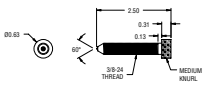
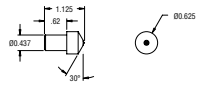
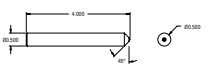
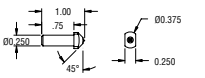
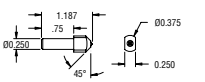
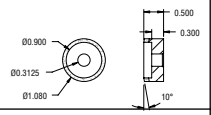
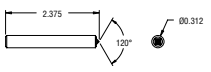
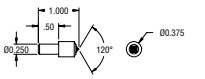
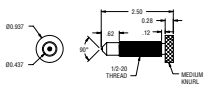
MACHINE TOOL HOLDER

Designed to be mounted directly on the table of surface and tool grinders with a bolt or magnetic chuck, our stock machine dresser is positioned vertically with the tool positioned at a 15° drag angle.

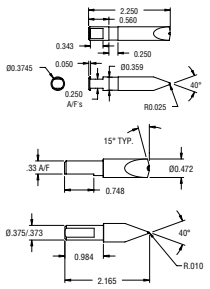
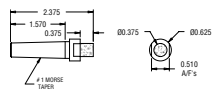
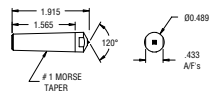
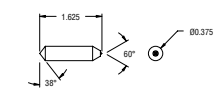
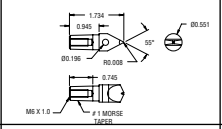
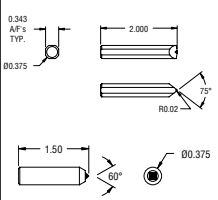
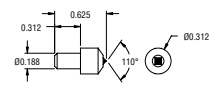
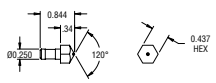
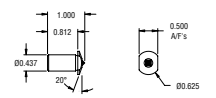
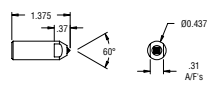


DESCRIPTION	UPC #
Machine Holder	66260195355

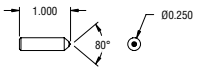
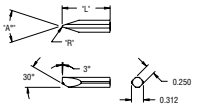
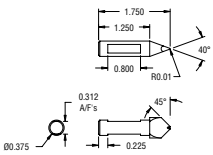
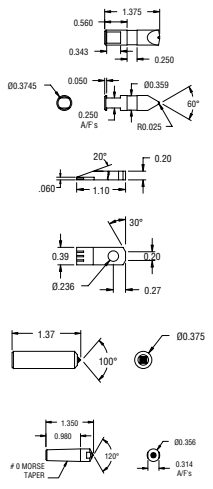
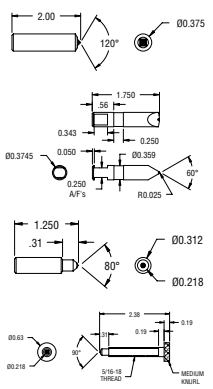
DIAMOND TOOL RECOMMENDATIONS BY MACHINE TYPE

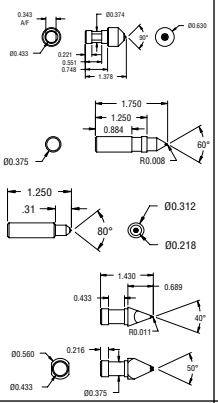
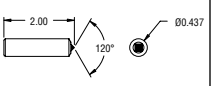
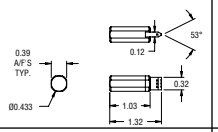
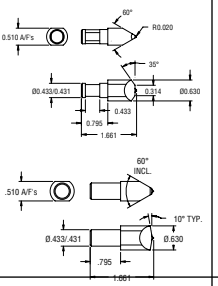
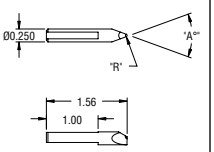
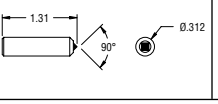
MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
AGATHON		CD8515	
ALBERTSON & CO; SIOUX GRINDERS			
Valve Refacer 112 and 30013		CD402-1-5/8"	1R6 Special ME103738A
Valve Seat Grinder 1715-B and 30190		CD-1019	1R6 Special ME103743
Valve Seat Grinders	 Please specify overall Length "L" availability:	S-2621-C	
BROWN & SHARPE			
Plain Grinder #5		CD-1537R	2A6E7•
Surface Grinder		S-2639	1R6 Special ME103737
BRYANT CHUCKING GRINDER COMPANY			
Internal Grinders #4, 4B, 5, 5A, & 5B		NI21R4•	N.A.
Internal Grinder #112		CD-225	N.A.
		CDP-10179	
CEDAR RAPIDS "KWIKWAY"			
Valve Refacer		CD401-2-3/8"	N.A.
Valve Seat Grinder		CD-1799	1R6 Special ME103740
Valve Seat Grinder		S-2622-A	1R6 Special ME103745A

• INDICATES A STOCK ITEM.

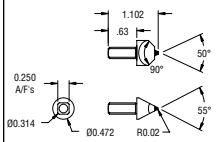
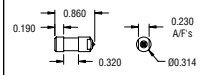
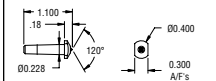
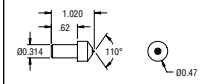
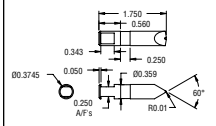
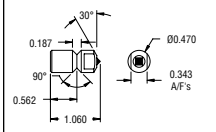
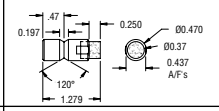
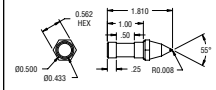
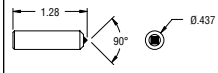
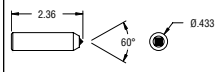
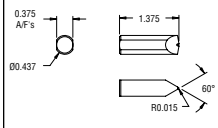
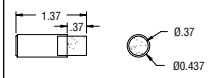
MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
CHEVALIER		CD-2221-RR CD-8346	
DANOBAT			ME162543
ESTARTA		CD-2695-C	
EXCELLO CORP.			
Thread Grinder #31		NT-106 (48-4105)	3R806•
FORTUNA		CD-7512	
G&L WINSLOWMATIC		CD-1733-JJ CD-441K-9	
GLEASON WORKS		S416	
HEALD			
Internal Grinders Internal Thread		CD-260-8	N.A.
Internal Grinders #70, 72A, 73, 74, 78, 81 &172		N121Q7•	N.A.
Rotary Surface Grinders #22, 25A & 261		CD-193	1R6J7

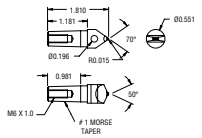
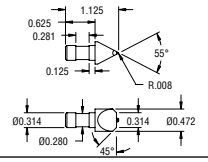
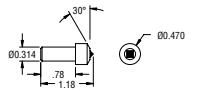
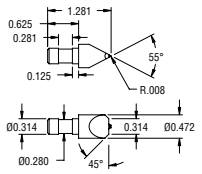
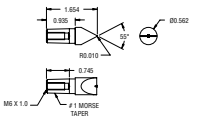
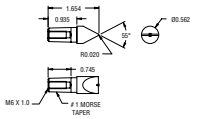
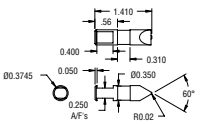
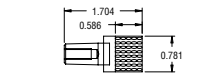
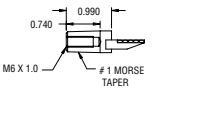
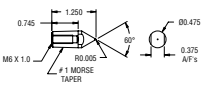
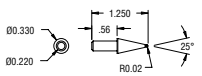
DIAMOND TOOL RECOMMENDATIONS BY MACHINE TYPE

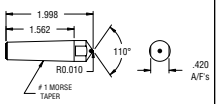
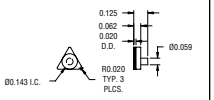
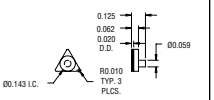
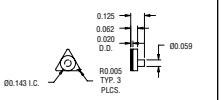
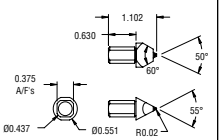
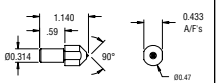
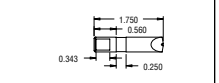
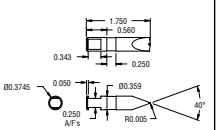
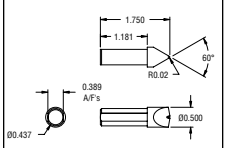
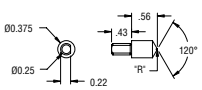
MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
JONES & LAMSON			
Thread Grinder		NT1L4 (NX-57475)	3R8L4 & 3R12L4•
Model E Form Grinder		JONES & LAMSON FORM THREAD GRINDER Specify included angle and radius on diamond.	
JONES & SHIPMAN		CD-7802-B	
KELLENBERGER		DI251138 CD-6200-V CD-441F-12 CD-6783	
K.O. LEE COMPANY		BCSG5M6• CD-6996-A S-2104-4 S-2623	

MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
KOYO		CD-5827 CD-8334 S-2104-4 CD-6768	
LANDIS TOOL CO.		BCSG10M7•	
MICRON		CD-5804	
MITSUBISHI		CD-6475 CD-8514	
MOORE PANTOGRAPH		MOORE CONTOUR DRESSER +Specify included angle and radius on diamond.	
NORMAC & HERTLIEN		CD-4895-12	

• INDICATES A STOCK ITEM.

MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
OKAMOTO		CD-8907	
		CD-7994	
		CD-5711-A	
		CD-591-48	
		CD-2221-U	
		CD-3230	
			ME124878-B
OKUMA		CD-361-AA	
		CD-5147	
OLIVER INSTRUMENT		CD-441G-25	
OVERBECK		CD-7541-A	
ROYALMASTER		CD-441G-34	
		CD-6653	
			ME85710-F
		CD-8695	

MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
SCHAUDT		CD-7513	
		CD-5357	
SHIGIYA		CD-6222	
		CD-6167	
STUDER		CD-6501	
		CD-6501-A	
		CD-7819	
		CD-6426	
		CD-5315	
		CD-7503	
		CD-6405	
		CD-6797	

MANUFACTURER AND MACHINE TYPE	TOOL DRAWING	ORDERING SPECIFICATION SINGLE POINT TOOL	MULTI-POINT TOOL
STUDER (CONTINUED)		CD-6852	
		CX-1421	
		CX-1421-A	
		CX-1421-B	
TOYODA		CD-5963	
		CD-8033	
WASINO		D1101175	
		D1052175	
WELDON		CD-7147-1	
WILSON HARDNESS TESTER		CD-1552	

COMPETITIVE TOOL ANALYSIS

A competitive tool analysis is the best method of supplying you with a product that meets your quality needs at a competitive price. Our analysis of your present unused tool may include removal of the diamond for expert evaluation. Norton will review you application information to determine if a different dressing tool design could improve your process and/or provide a quote for comparable product.

CUSTOM MADE DRESSING TOOLS

The Norton Diamond Tool Team maintains a file of over 50,000 different diamond tool designs, cross-referenced by machine builder, tool type, and other manufacturers.

New applications create the need for new tools. Our experienced staff is unmatched in designing and building custom tools.

When ordering custom tools, it is important that the following be supplied:

Workpiece Considerations

- Part forms
- Tolerances of part
- Surface finish required

Machine Data

- Tool holder size and shape
- Length of tool
- Method of fastening tool
- Contact position of tool to wheel face
- Method of generating form (from bar or CNC)
- Whether tool is used wet or dry
- Dressing parameters

Wheel Specifics

- Size (diameter x width)
- Grit size
- Abrasive type
- Total wheel specification is desirable

WE OFFER A FULL LINE OF CUSTOM-MADE STATIONARY TOOLS

For on-line tool selection, visit nortonindustrial.com/ez-tool or contact your Norton representative.

FLIESEN STATIONARY DIAMOND DRESSING TOOLS

NORTON
SAINT-GOBAIN

OPEN OR CLOSED DRESSING... YOU CAN COUNT ON FLIESEN TOOLS

Whether dressing a wheel OPEN or CLOSED you can count on Fliesen tools. Open wheels (sharp, free-cutting abrasive grains are exposed) are created by increasing the speed a Fliesen tool moves across the wheel when dressing. Generally considered the most favorable wheel conditioning, open wheels avoid workpiece burn while maximizing a wheel's ability to remove metal quickly when grinding.

Slowing a Fliesen tool as it moves across the wheel creates a closed wheel condition (abrasive grains are smoother, less sharp), a very helpful condition when trying to lower part surface finish readings.

THE BENEFITS OF FLIESEN TOOLS

Spend More Time Grinding

Single point, chisel, and cone point tools require operator attention to ensure proper tool rotation at regular intervals. Fliesen tools require no adjustments. Simply install the tool, dress the wheel to break it in, and the tool will do the rest. Operators spend more time grinding – rather than making non-productive dressing adjustments.

Longer Tool Life

Expect long life when using a Fliesen tool. Other stationary tools, made with a single diamond stone, develop flat spots ("wear flats") over time – which create chatter and burn. Fliesen tools use hand-set, fine diamond grit, eliminating the creation of wear flats.

Reliable and Cost-Effective

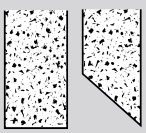
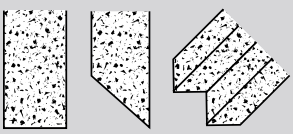
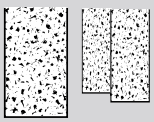
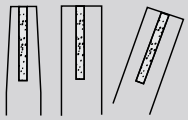
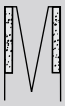
Harder, H-bond metal formulation Fliesen tools have been specifically engineered to efficiently dress durable silicon carbide and ceramic wheels. Our new Furioso Fliesen tools have a unique bond system developed for optimal performance when dressing Norton Quantum (NQ) ceramic wheels. W-bond Fliesen tools are designed for conventional aluminum oxide wheels.

FLIESEN TOOL CONFIGURATIONS

Fliesen tools are available in two basic tool configurations. The most common is a plate configuration, which is somewhat rectangular-shaped with a mounting hole. Fliesen Shank Tool configurations are plates mounted in shanks of varying sizes and shapes. Most grinding machines accommodate one or the other tool configuration. To find the correct tool configuration for your machine, check the existing dressing tool, refer to the Tools by Machine Type Index in this catalog, or consult your grinding machine manual.

CHOOSING THE CORRECT FLIESEN TOOL

Using the chart below, find your desired wheel form – then locate the preferred diamond position. Next, find the correct tool configuration for your machine: plate or shank tool. Follow down that column to find the Fliesen page for your plate or standard shank tool configuration. Go to the appropriate page. Locate the corresponding zone for your wheel diameter and width on the graph. Find that zone number in the UPC chart. Next, moving to the right, find your wheel abrasive type and grit size. Locate the UPC number for your Fliesen tool.

DESIRED WHEEL FORM					
DIAMOND POSITIONS	 BLADE ONLY FR	 SIDE-MOUNTED FRS, FAS, FBS, FCS, FDS	 CENTER-MOUNTED FAS, FBS, FCS & FDS	 DOUBLE-SIDED FCSD & FDSD	 TWIN FDST, FSST, AND 1TFAS
TOOL CONFIGURATION					
PLATES 	CONSULT CUSTOMER SERVICE	PAGE 115 – 116	PAGE 116	PAGE 117	PAGE 115, 117
SHANK TOOLS 	PAGE 118	PAGE 115, 118 CONSULT CUSTOMER SERVICE	CONSULT CUSTOMER SERVICE	CONSULT CUSTOMER SERVICE	CONSULT CUSTOMER SERVICE

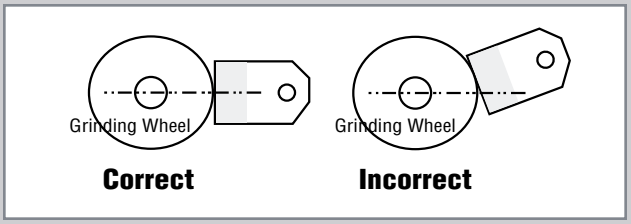
SPECcheck

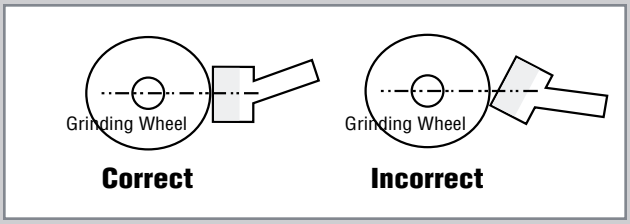
MATCH THE CORRECT FLIESEN TOOL TO YOUR GRINDING WHEEL ABRASIVE

Use Fliesen tools with W-bond specifications for aluminum oxide wheels. W-bonded tools have the standard matrix of metal surrounding the diamonds. When dressing more durable abrasive wheels, such as silicon carbide and ceramic, use our H-bonded tools, or our new Furioso tools for Norton Quantum and other ceramic wheels, which are harder and more durable. Markings on the tool indicate the tool's bond matrix. Use the right bond matrix for your abrasive application, as each is specifically engineered to perform best on the abrasive it was designed for. The catalog product charts are categorized by abrasive and appropriate bond.

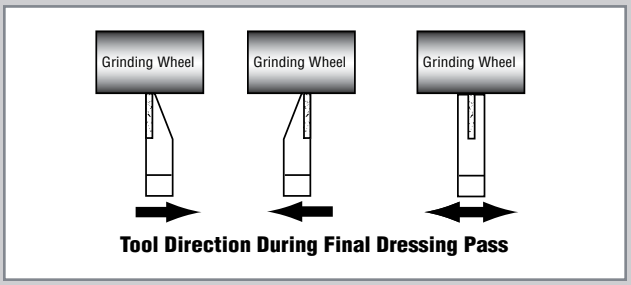
FLIESEN TOOL MOUNTING GUIDELINES

1. Be sure to mount the tool correctly. Tool contact surface should be perpendicular to wheel.





2. Mount tool with diamond on trailing edge whenever possible as shown below.



RECOMMENDED DRESSING PARAMETERS

There are three elements to proper dressing. Dresser Infeed is the amount of material the tool takes off per dress pass. Dress Traverse Rate is the speed at which the tool moves across the wheel. The third element is the Number of Passes across the wheel. We recommend the following:

1. Dresser Infeed

Dresser Infeed (amount tool moves into wheel) = .0005" to .0015" (.012mm – .038mm) for aluminum oxide wheels. Reduce by 25% when dressing silicon carbide or ceramic wheels.

2. Dress Traverse Rate

Select a Lead Value based on desired Surface Finish and run the formula below.

FINISH	LEAD VALUE (PER WHEEL REVOLUTIONS)
For Coarse Finish (approx. 64 rms)	.023" to .030" (.58mm – .76mm)
For Medium Finish (approx. 32 rms)	.013" to .022" (.33mm – .57mm)
For Fine Finish (approx 16 rms)	.006" to .012" (.15mm – .33mm)

DRESS TRAVERSE FORMULA:

Lead Value x Wheel Speed (RPM) = Inches/Minutes (mm/Min)

3. Number of Passes

One is required. Take more as needed to restore form or finish. Dress passes should always remove material from the wheel. If your tool is not cutting the wheel, it is dulling the wheel. Avoid dry or dead dress passes which do not remove wheel material.

MAXIMIZING TOOL LIFE AND EFFECTIVENESS

The goal of dressing is to maximize the wheel's sharpness – for maximum metal removal when grinding. This is best accomplished through disciplined dressing speeds and feeds. Taking too much off per dress pass, and/or moving the tool too slowly across the wheel will cause the Fliesen tool to overheat, breakdown and wear prematurely. To maximize the tool's effectiveness, increase the dress traverse rate as high as possible while maintaining part print surface finish requirements.

SPEC*check*

TOOL BREAK-IN

The diamonds in new Fliesen tools are often covered by the metal surrounding them and should undergo a break-in process before production dressing. This process ensures that the effective diamond layer is properly exposed. This is achieved by taking 3 – 5 dress passes at .005" depth of cut (on wheel radius) at normal dress traverse rates.

Because the diamonds are set at a slight angle, it is normal for some diamonds to remain buried in the metal after the break-in and during production dressing.

COOLANT SPECIFICATIONS

Fliesen tools should be used with coolant whenever possible, to avoid overheating and shortening tool life. We recommend at least a .50" (12.7mm) diameter stream of steady coolant be positioned so that the air barrier surrounding the wheel "pulls" the coolant (through the dressing action). A coolant velocity of 3% to 5% faster than the wheel's surface feet per minute works well, or enough pressure to penetrate the air barrier surrounding the wheel as it spins.

RADIUS DRESSING CAPABILITIES

For most angle-head truing and dressing applications, Fliesen tools can provide uniform and consistent radius-generation second only to chisel and cone point type tools. When dressing very intricate forms, tool selection should be driven by the smallest concave or fillet radius needed to generate the desired radii, rather than wheel grit size. Refer to the chart below for radius dressing capabilities by diamond size.

FLIESEN TOOL	DESCRIPTION	TYPICAL FILLET RADIUS (MIGHT VARY W/ APPLICATION) NEW TOOL	AFTER BREAK-IN	DRESSING WIDTH OF FLIESEN
FRS/FDS/FCS/FBS/FAS/1TFAS	75	.014	.008	.020
FRS/FDS/FCS/FBS/FAS/1TFAS	90	.014	.012	.028
FDS/FCS/FBS/FAS/1TFAS	115	.020	.018	.040
FDS/FCS/FBS/FAS/1TFAS	140	.022	.020	.044

STANDARD FLIESEN PLATE DRAWINGS

Plate or Special Mounts
FCS – W Bond Only

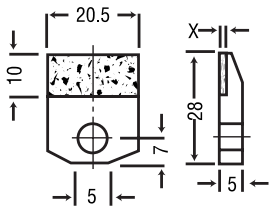


Plate- or Shank-Mounted
FCS – H Bond

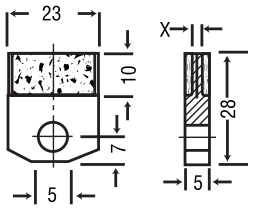


Plate or Special Mounts
FDS – W Bond Only

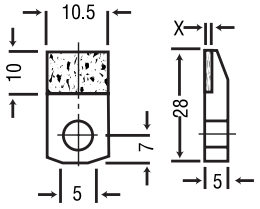


Plate- or Shank-Mounted
FDS – H Bond

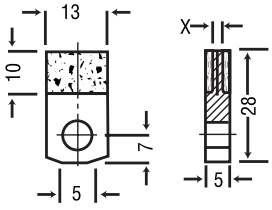


Plate- or Shank-Mounted
FRS – W Bond Only

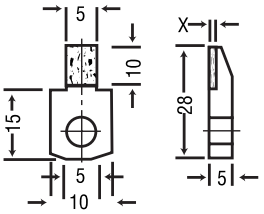


Plate- or Shank-Mounted
Twin FCS – W Bond Only

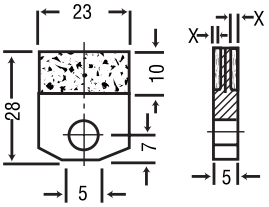
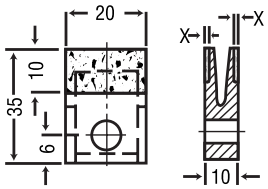
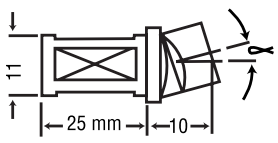


Plate Only, With Adapter
Twin FCS – W Bond Only



Typical Shank-Mounted
Design



STANDARD HOLE SIZE FOR ALL TOOLS = 6.1MM.

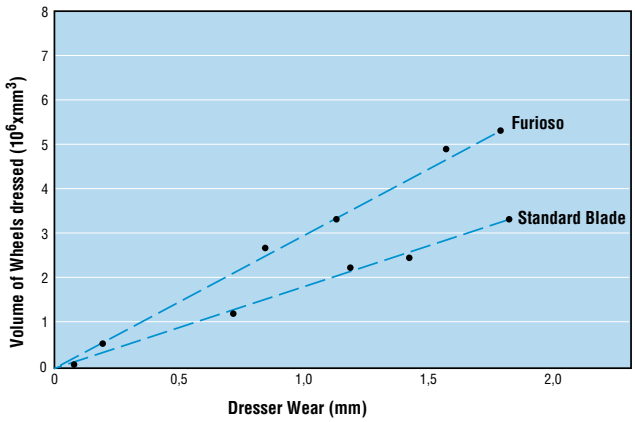
SEE THE FURIOSO TOOL PLATE DRAWINGS AND AVAILABILITY, FOR DRESSING NEW CERAMICS, SUCH AS NORTON QUANTUM WHEELS, ON THE FOLLOWING PAGES.

PLEASE CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK CUSTOM CONFIGURATION QUESTIONS, REQUEST FOR QUOTES, ETC.

The new generation of highly wear-resistant stationary diamond dressing tools for dressing modern ceramic abrasives.

Performance Advantage

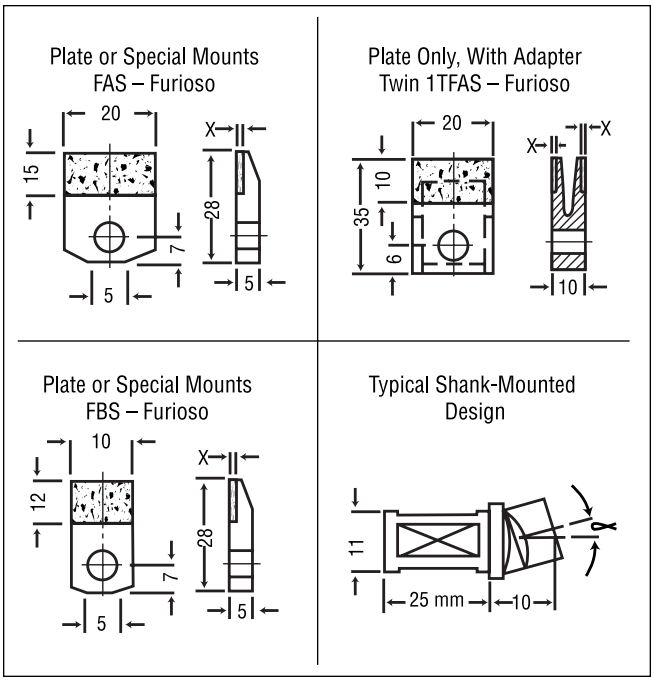
Furioso vs. Standard Blade



BEST **FURIOSO TOOLS** – FOR OPTIMUM PERFORMANCE ON NORTON QUANTUM CERAMIC WHEELS

FEATURES	BENEFITS
▮ The optimized combination of diamond quality, bond and setting pattern when dressing Norton Quantum (NQ) ceramic grinding wheels	▮ Improved wear-resistance ▮ Excellent dressing behavior ▮ Constant surface roughness

Standard Furioso Plate Drawings

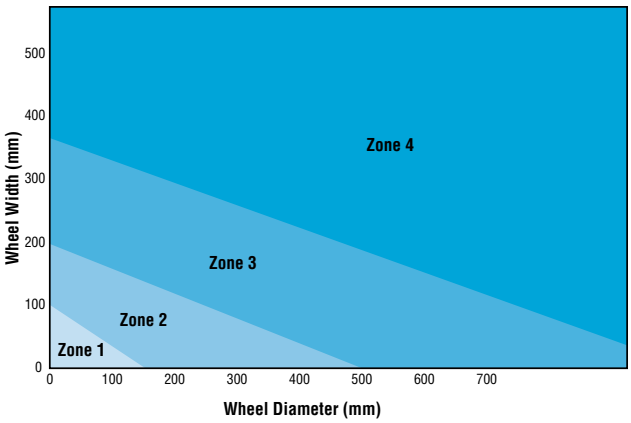


FURIOSO PLATES; SIDE-MOUNTED AND TWIN

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Furioso tool for your application.

Wheel / Furioso Tool Graph

Select Zone based on wheel diameter and width



		ZONE # / SERIES	WHEEL GRIT SIZE	BEST NORTON QUANTUM NQ CERAMIC WHEELS TOOL #	UPC #	DESCRIPTION
SIDE-MOUNTED						
		**ZONE 2**	36 - 54	DT1463	69014122948•	FBS 140 Furioso
		FBS Series	54 - 80	DT1462	69014122947•	FBS 115 Furioso
			80 - 120	DT1461	69014122946•	FBS 90 Furioso
			120 - 180	DT1460	69014122944•	FBS 75 Furioso
		**Zone 3**	36 - 54	DT1467	69014122952•	FAS 140 Furioso
		FAS Series	54 - 80	DT1466	60157690579•	FAS 115 Furioso
			80 - 120	DT1465	60157693885•	FAS 90 Furioso
			120 - 180	DT1464	69014122950•	FAS 75 Furioso
TWIN						
		**Zone 4**	36 - 54	DT1471	69014122956•	1TFAS 140 Furioso
		1TFAS Series	54 - 80	DT1470	69014122955•	1TFAS 115 Furioso
			80 - 120	DT1469	69014122954•	1TFAS 90 Furioso
			120 - 180	DT1468	69014122953•	1TFAS 75 Furioso

• ALL FURIOSO PLATES SHOWN SHIP IN 10 BUSINESS DAYS FROM RECEIPT OF ORDER.

BLADE SIZE

DESCRIPTION		DIMENSION
1	FBS	10 mm thick, 15 mm usable length
2	FAS	20 mm thick, 15 mm usable length
3	TFAS	Twin blade with cooling duct

DIAMOND GRIT SIZE

DESCRIPTION	FEPA
140	D1181
115	D1001
90	D711
75	D501

FURIOSO SHANK TOOLS

Made-to-order Furioso shank tools are also available. Ask our Norton representative for ordering assistance.

Side-Mounted Diamond Sections

Tools are available in different offset positions and angles.

OFFSET LEFT, SPECIFY ANGLE AMOUNT

ZERO OFFSET

OFFSET RIGHT, SPECIFY ANGLE AMOUNT

Tipping the Diamond Plates on Shank Tools

Diamond sections can be tipped right or left.

DIAMOND TIPPED LEFT, SPECIFY ANGLE

DIAMOND TIPPED RIGHT, SPECIFY ANGLE

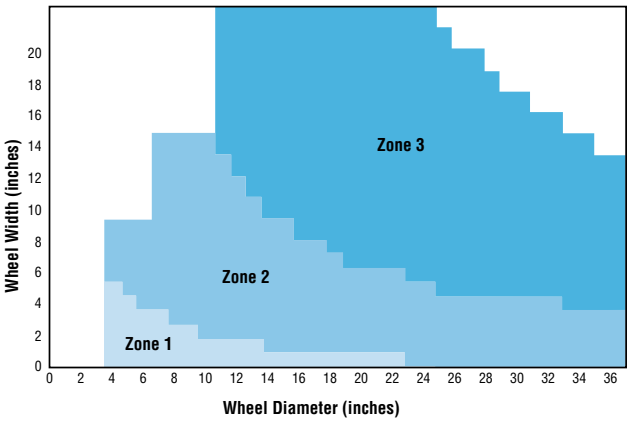
THERE ARE MANY DIFFERENT DIAMONDS MAKING UP A SINGLE PLATE AS THIS CUT-AWAY VIEW SHOWS.

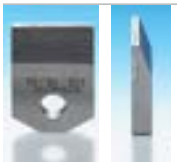
FLIESEN PLATES: SIDE- AND CENTER-MOUNTED

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Fliesen tool for your .

Wheel / Fliesen Tool Graph

Select Zone based on wheel diameter and width



	ZONE # / SERIES	WHEEL GRIT SIZE	BEST ALUMINUM OXIDE WHEELS (W-BOND) TOOL #	UPC #	DESCRIPTION	BEST CERAMIC (SG & NQ), & S/C WHEELS (H-BOND) TOOL #	UPC #	DESCRIPTION
SIDE-MOUNTED								
	**Zone 1** FRS Series	60 and Finer	DT0691	66260388852#	FRS180W	H-bond Tools are not available in these configurations		
	**Zone 2** FDS Series	36-46	DT0037	69014185737#	FDS140W			
		54-60	DT0035	69014185736#	FDS115W			
		80-100	DT0033	69014185735#	FDS90W			
		120 and Finer	DT0031	69014185747#	FDS75W			
	**Zone 3** FCS Series	36-46	DT0027	69014185716*	FCS140W			
		54-60	DT0025	69014185718#	FCS115W			
		80-100	DT0023	69014185732#	FCS90W			
		120 and Finer	DT0021	69014185746#	FCS75W			
CENTER-MOUNTED								
	**Zone 2** FDS Series	36-46	DT0246	66260114826*	FDS140W	DT0038	66260387481#	FDS140H
		54-60	DT0245	66260386661#	FDS115W	DT0036	66260387592#	FDS115H
		80-100	DT0244	66260389753#	FDS90W	DT0034	69014185738#	FDS90H
		120 and Finer	DT0243	66260114690#	FDS75W	DT0032	66260387692#	FDS75H
	**Zone 3** FCS Series	36-46	DT0233	66260382018*	FCS140W	DT0028	66260387133#	FCS140H
		54-60	DT0232	66260386801#	FCS115W	DT0026	69014185734#	FCS115H
		80-100	DT0231	66260385394#	FCS90W	DT0024	66260384227#	FCS90H
		120 and Finer	DT0230	66260114271*	FCS75W	DT0022	66260385384#	FCS75H

FLIESEN PLATE MOUNTING MECHANISMS

Fliesen Plate Holder

Tool No.: DT0085

UPC #: 66260100681

Fliesen Plate Holder

Tool #: DT0069

UPC #: 66260389554

.437" diameter shank (tool not included).

 # PLATES SHOWN SHIP 2-3 DAYS FROM RECEIPT OF ORDER.

*** MADE-TO-ORDER; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

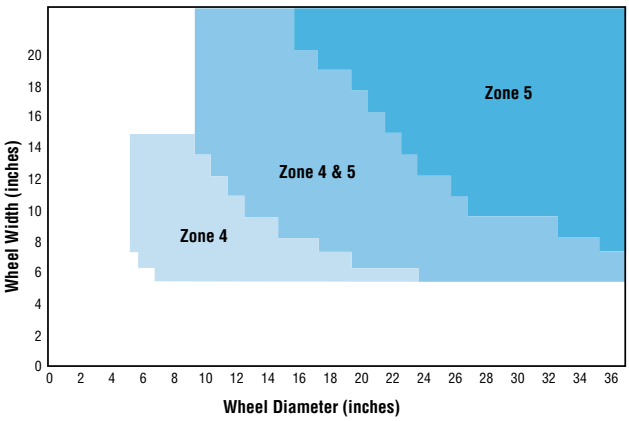
PLEASE CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK CUSTOM CONFIGURATION QUESTIONS, REQUEST FOR QUOTES, ETC.

FLIESEN PLATES: DOUBLE-SIDED AND TWIN

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Fliesen tool for your application.

Wheel / Fliesen Tool Graph

Select Zone based on wheel diameter and width



	ZONE # / SERIES	WHEEL GRIT SIZE	BEST ALUMINUM OXIDE WHEELS (W-BOND) TOOL #	UPC #	DESCRIPTION	CERAMIC (SG & NQ), & S/C WHEELS (H-BOND) TOOL #	UPC #	DESCRIPTION
DOUBLE-SIDED								
	**Zone 4** FDSD Series	54-60	DT0741	69014123079*	FDSD115W	H-bond Tools are not available in these configurations		
	**Zone 5** FCSD Series	54-60	DT0259	66260112980*	FCSD115W			
		80-100	DT0411	66260111494*	FCSD90W			
TWIN								
	**Zone 4** FDST Series	54-60	DT0969	66260391021*	FDST115W			
	**Zone 5** FCST Series	54-60	DT0442	66260112444#	FCST115W			
		80-100	DT0439	66260114225#	FCST90W			
		120 and Finer	DT0733	69014123080*	FCST75W			

 # PLATES SHOWN SHIP 2-3 DAYS FROM RECEIPT OF ORDER.

*** MADE-TO-ORDER; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

TECHtip

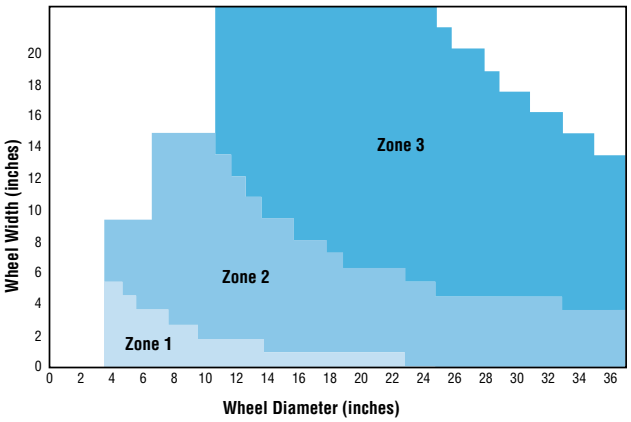
Because Double-sided and Twin Fliesen tools have twice the surface contact area on the wheel as single-sided Fliesen tools, they should traverse across the wheel nearly twice as fast. Also, with twice the diamond volume as single-sided Fliesen tools, they last twice as long.

FLIESEN SHANK TOOLS: BLADES AND SIDE-MOUNTED

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Fliesen tool for your application.

Wheel / Fliesen Tool Graph

Select Zone based on wheel diameter and width



			BEST					
	ZONE # / SERIES	WHEEL GRIT SIZE	ALUMINUM OXIDE WHEELS (W-BOND) TOOL #	UPC #	DESCRIPTION	CERAMIC (SG & NQ), & S/C WHEELS (H-BOND) TOOL #	UPC #	DESCRIPTION
BLADES								
	**Zone 1** FR Series 0° Offset Angle	60 and Finer	DT1101-A	66260329400•	FR180W	H-bond Tools are not available in these configurations		
	**Zone 1** FR Series 15° Offset Angle	60 and Finer	DT1101	66260100826•	FR180W			

• SHANK TOOLS SHOWN SHIP IN 10 BUSINESS DAYS FROM RECEIPT OF ORDER.

Side-Mounted Diamond Sections

Tools are available in different offset positions and angles. Contact your Norton representative for ordering assistance.

OFFSET LEFT, SPECIFY ANGLE AMOUNT

ZERO OFFSET

OFFSET RIGHT, SPECIFY ANGLE AMOUNT

Tipping the Diamond Plates on Shank Tools

Diamond sections can be tipped right or left. Contact your Norton representative for ordering assistance.

DIAMOND TIPPED LEFT, SPECIFY ANGLE

DIAMOND TIPPED RIGHT, SPECIFY ANGLE

THERE ARE MANY DIFFERENT DIAMONDS MAKING UP A SINGLE PLATE AS THIS CUT-AWAY VIEW SHOWS.

SEE OUR FURIOSO SHANK TOOLS ON PAGE 114 FOR DRESSING MODERN CERAMIC WHEELS.

PLEASE CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK CUSTOM CONFIGURATION QUESTIONS, REQUEST FOR QUOTES, ETC.

TRIANGLE INSERT DRESSING TOOLS

Designed for special machines requiring insert style tool configurations.

			BEST	
			ALL ABRASIVE TYPES	
MACHINE TYPE	INNER CIRCLE (IC)	TIP RADIUS	TOOL #	UPC #
Studer	3.48mm	0.005"	PO0590	66260166700•
Tschudin		0.010"	PO0585	66260102369•
Vomard		0.020"	PO0591	66260166174•
Kellenberger	3.93mm	0.005"	PO0830	60157625728*

• THESE TOOLS SHIP IN 10 BUSINESS DAYS FROM RECEIPT OF ORDER

*** MADE-TO-ORDER; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

DIAMOND TRUING PAD

Designed for truing cBN grinding wheels on surface grinders. Use with coolant. Subsequent stick dressing is required to ensure proper wheel conditioning prior to grinding.

TOOL #	UPC #
DT0084	66260110959

THIS TRUING PAD IS A STOCK ITEM

TECHtip

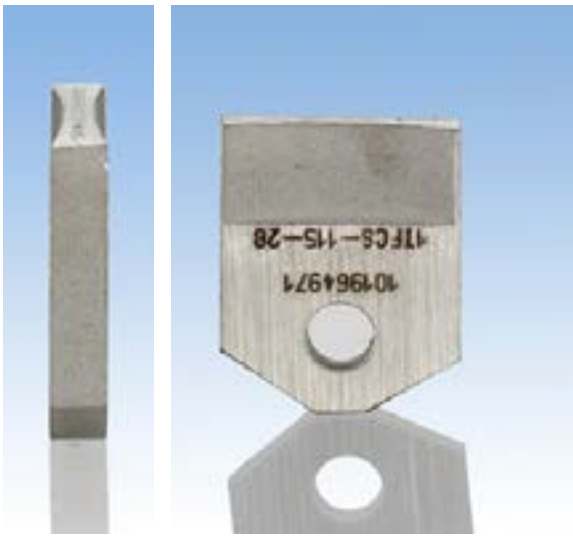
ACCIDENTALLY DAMAGE YOUR FLIESEN TOOL?

Simply dress the wheel several times with your Fliesen Tool to wear away the damaged layer, and uncover a new layer of sharp diamonds.

Unlike damaged chisel tools and cone point tools, which must be removed, inspected, and often replaced, Fliesen Tools can be quickly restored to optimum working order.

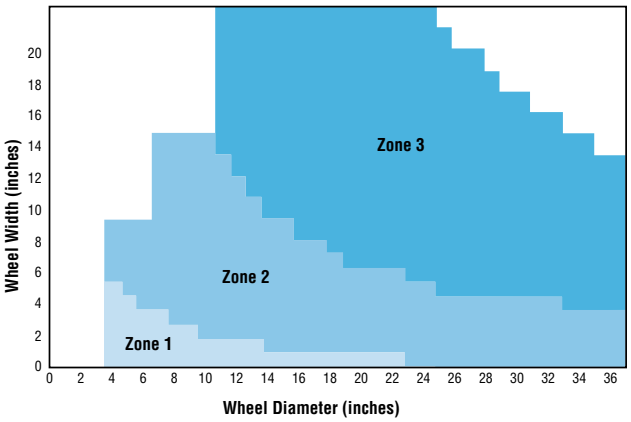
PLEASE CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK CUSTOM CONFIGURATION QUESTIONS, REQUEST FOR QUOTES, ETC.

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Fliesen tool for your application.



Wheel / Fliesen Tool Graph

Select Zone based on wheel diameter and width



	ZONE # / ANGLE	WHEEL GRIT SIZE/RADIUS	BEST ALUMINUM OXIDE WHEELS (W-BOND) TOOL #	UPC #	DESCRIPTION	BEST CERAMIC (SG & NQ), & S/C WHEELS (H-BOND) TOOL #	UPC #	DESCRIPTION
CINCINNATI CENTERLESS								
	**Zone 2**	36-46	DT0246	66260114826	FDS140W	DT0038	66260387481	FDS140H
	0° Offset Angle	54-60	DT0245	66260386661	FDS115W	DT0036	66260387592	FDS115H
		80-100	DT0244	66260389753	FDS90W	DT0034	69014185738	FDS90H
		120 and Finer	DT0243	66260114690	FDS75W	DT0032	66260387692	FDS75H
	**Zone 3**	36-46	DT0233	66260382018	FCS140W	DT0028	66260387133	FCS140H
	0° Offset Angle	54-60	DT0232	66260386801	FCS115W	DT0026	69014185734	FCS115H
		80-100	DT0231	66260385394	FCS90W	DT0024	66260384227	FCS90H
		120 and Finer	DT0230	66260114271	FCS75W	DT0022	66260385384	FCS75H
	**Zone 2**	36-46	DT0434	66260100744	FDS140W	DT0218	60157603873	FDS140H
	15° Offset Angle	54-60	DT0234	66260100716	FDS115W	DT0217	66260100708	FDS115H
		80-100	DT0183	66260100687	FDS90W	DT0216	66260100707	FDS90H
		120 and Finer	DT0433	66260100984	FDS75W	DT0215	66260102106	FDS75H
	**Zone 3**	36-46	DT0437	66260100747	FCS140W	DT0210	66260100703	FCS140H
	15° Offset Angle	54-60	DT0436	66260100746	FCS115W	DT0209	66260100702	FCS115H
		80-100	DT0251	66260100722	FCS90W	DT0208	66260100701	FCS90H
		120 and Finer	DT0435	66260100745	FCS75W	DT0207	66260100700	FCS75H
SCHAUDT								
	Chisel Tool	.016" Radius	TP1082	66260329714				
	70° Included Angle							
	.50ct							

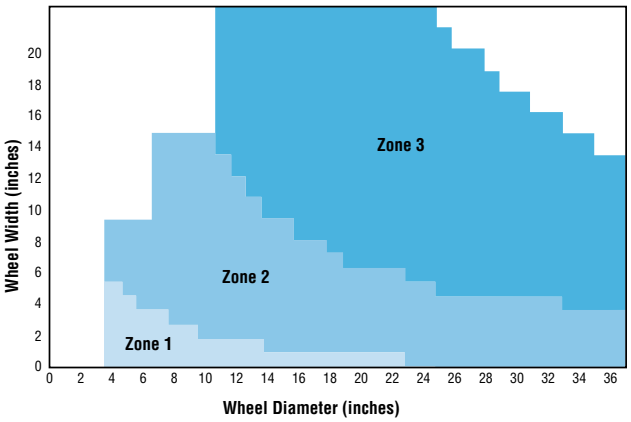
CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.

PLEASE CONTACT YOUR NORTON REPRESENTATIVE FOR ALL YOUR NON-STOCK CUSTOM CONFIGURATION QUESTIONS, REQUEST FOR QUOTES, ETC.

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Fliesen tool for your application.

Wheel / Fliesen Tool Graph

Select Zone based on wheel diameter and width



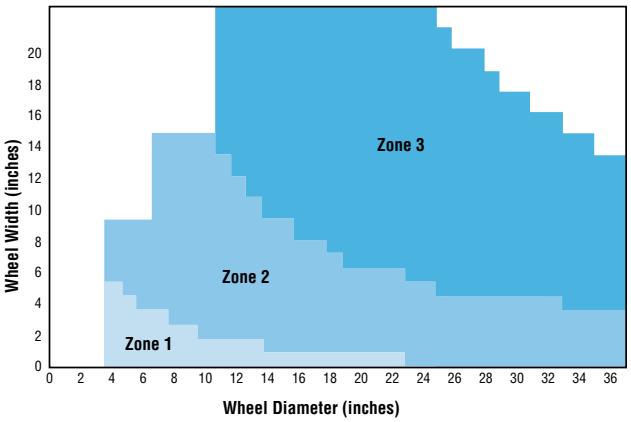
		ZONE # / OFFSET ANGLE	WHEEL GRIT SIZE/RADIUS	BEST ALUMINUM OXIDE WHEELS (W-BOND) TOOL #	UPC #	DESCRIPTION	BEST CERAMIC (SG & NQ), & S/C WHEELS (H-BOND) TOOL #	UPC #	DESCRIPTION
OKUMA									
		**Zone 2**	54-60	DT0489	66260101515	FDS115W			
		5° Offset Angle	80-100	DT0511	66260101453	FDS90W			
			120 and Finer	DT1126	60157604435	FDS75W	DT0523	66260102408	FDS75H
		**Zone 3**	54-60	DT0589	60157604098	FCS90W			
		5° Offset Angle							
		Cone Point Tools							
		55° Included	.008" Radius	TP1077	66260329663				
		Angle	.015" Radius	TP1078	66260329670				
		70° Included	.008" Radius	TP1079	66260329675				
		Angle .50ct	.015" Radius	TP1080	66260329680				
TOYODA									
		**Zone 2**	36-46	DT0690	60157604139	FDS140W	DT0557	66260100803	FDS140H
		10° Offset Angle	54-60	DT0527	66260101271	FDS115W	DT0529	66260102768	FDS115H
			80-100	DT0488	66260101495	FDS90W	DT0528	66260101454	FDS90H
			120 and Finer	DT0526	66260100786	FDS75W	DT0513	66260100779	FDS75H
		**Zone 3**	36-46	DT0428	66260100742	FCS140W	DT0432	60157604008	FCS140H
		10° Offset Angle	54-60	DT0427	66260100741	FCS115W			
			80-100	DT0426	66260100740	FCS90W			
			120 and Finer	DT0425	60157604003	FCS75W	DT0429	66260100743	FCS75H

CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.

Use the Wheel/Tool Graph to identify your grinding wheel's Zone number, and the chart below to find the Fliesen tool for your application.

Wheel / Fliesen Tool Graph

Select Zone based on wheel diameter and width



		ZONE # / SHANK/ANGLE	WHEEL GRIT SIZE/RADIUS	BEST ALUMINUM OXIDE WHEELS (W-BOND) TOOL #	UPC #	DESCRIPTION	BEST CERAMIC (SG & NQ), & S/C WHEELS (H-BOND) TOOL #	UPC #	DESCRIPTION
STUDER									
		Zone 2 19mm Long MT1 Shank	54-60 80-100 120 and Finer	DT0444 DT0474 DT0443	66260100751 66260100759 66260100936	FDS115W FDS90W FDS75W	DT1049 DT1047	66260166122 66260101129	FDS115H FDS90H
		Zone 3 19mm Long MT1 Shank	54-60	DT0558	66260100805	FCS115W	DT1005	60157604315	FCS115H
		Zone 2 40mm Long Shank	54-60 80-100 120 and Finer	DT0761 DT0595 DT0547	66260320977 66260100816 66260100798	FDS115W FDS90W FDS75W	DT0550	60157604072	FDS115H
		Zone 3 40mm Long MT1 Shank	54-60 80-100	DT0051	66260100670	FCS115W	DT0287	66260100731	FCS90H
STUDER & FORTUNA									
		Chisel Tool Zone 3 55° Offset Angle .50 ct	.005" Radius .008" Radius .010" Radius .015" Radius .020" Radius	TP1083 TP1084 TP1085 TP1086 TP1087	66260329681 66260329688 66260329696 66260329705 66260329709				
ROYAL MASTER									
		Zone 2 10° Offset Angle	36-46 54-60 80-100 120 and Finer	DT1114 DT1113 DT1112 DT1111	60157604423 66260100820 66260100821 60157604420	FDS140W FDS115W FDS90W FDS75W			

CALL YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.

FLIESEN TOOL COMPETITIVE CROSS REFERENCE

CINCINNATI TOOL #	NORTON TOOL #
CM300	DT233
CM300-7/16-1	DT424
CM300-7/16-1-0	DT424
CM300-7/16-1-10	DT428
CM300-7/16-1-15	DT437
CM301	DT232
CM301-7/16-1	DT423
CM301-7/16-1-0	DT423
CM301-7/16-1-10	DT276
CM301-7/16-1-15	DT436
CM301N	DT1385
CM302	DT231
CM302-7/16-1-10	DT426
CM302-7/16-1-15	DT251
CM303	DT230
CM303-7/16-1	DT421
CM303-7/16-1-0	DT421
CM303-7/16-1-10	DT425
CM303-7/16-1-15	DT435
CM304	DT411
CM304-7/16-1-15	DT441
CM306	DT85

CINCINNATI TOOL #	NORTON TOOL #
CM308	DT439
CM309	DT442
CM334	DT246
CM334-7/16-1	DT420
CM334-7/16-1-0	DT420
CM334-7/16-1-10	DT690
CM334-7/16-1-15	DT434
CM335	DT245
CM335-7/16-1	DT419
CM335-7/16-1-0	DT419
CM335-7/16-1-10	DT527
CM335-7/16-1-15	DT234
CM336	DT244
CM336-7/16-1	DT290
CM336-7/16-1-0	DT290
CM336-7/16-1-10	DT488
CM336-7/16-1-15	DT183
CM337	DT243
CM337-7/16-1	DT296
CM337-7/16-1-0	DT296
CM337-7/16-1-10	DT526
CM337-7/16-1-15	DT433

CINCINNATI TOOL #	NORTON TOOL #
CM338	DT28
CM338-7/16-1	DT206
CM338-7/16-1-0	DT206
CM338-7/16-1-10	DT432
CM338-7/16-1-15	DT210
CM339	DT26
CM339-7/16-1	DT205
CM339-7/16-1-0	DT205
CM339-7/16-1-15	DT209
CM340	DT24
CM340-7/16-1	DT204
CM340-7/16-1-0	DT204
CM340-7/16-1-15	DT208
CM341	DT22
CM341-7/16-1	DT203
CM341-7/16-1-0	DT203
CM341-7/16-1-10	DT429
CM341-7/16-1-15	DT207
CM358	DT38
CM358-7/16-1	DT214
CM358-7/16-1-0	DT214
CM358-7/16-1-10	DT557

CINCINNATI TOOL #	NORTON TOOL #
CM358-7/16-1-15	DT218
CM359	DT36
CM359-7/16-1	DT213
CM359-7/16-1-0	DT213
CM359-7/16-1-10	DT529
CM359-7/16-1-15	DT217
CM360	DT34
CM360-7/16-1	DT212
CM360-7/16-1-0	DT212
CM360-7/16-1-10	DT528
CM360-7/16-1-15	DT216
CM361	DT32
CM361-7/16-1	DT211
CM361-7/16-1-0	DT211
CM361-7/16-1-10	DT513
CM361-7/16-1-15	DT215
CM370	DT259
CM370-7/16-1	DT476
CM370-7/16-1-0	DT476
CM370-7/16-1-10	DT262
CM370-7/16-1-15	DT261

NORTON
SAINT-GOBAIN

ENGINEERING TO MEET DIVERSE DEMANDS

Our extensive offering of stock diamond and cBN electroplated products has been engineered to met the divers demands of traditional and emerging tool and die, ceramic, and composite applications.

Applications include small hole/ID grinding, deburring, cleaning, honing, precision drilling, forming dies and molds, routing, reaming, blending radii, notching and cutting-off with saw blades in ceramic, tool and die, and composite applications.

IDENTIFYING TARGET MARKETS:

An industry key is provided beside each product. This key identifies markets that typically use the product:

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

PLACING AN ORDER

Our many products and services can be ordered through our network of quality industrial distributors. To ensure accurate and rapid order fulfillment, please provide your distributor with:

- **UPC Number: the 11-digit number found in each product availability chart in the first left-hand column**
- **Product Description: such as a cBN mounted point or a diamond wheel**
- **Dimensions and Wheel Shape: such as 6 x 7/16 x 1-1-1/4 Type 6A2C diamond wheel**
- **Product Specification: such as 100 grit, diamond**
- **Order quantity**

STRIP AND REPLATE SERVICES AND CUSTOM-MADE PRODUCTS

Ask Customer Service for information and quotations on our complete strip and replate services on many electroplated products.

And, when your application calls for a product design not available from our standard offering, Norton can provide a made-to order product engineered to your drawings.

CONTACT YOUR NORTON DISTRIBUTOR OR NORTON CUSTOMER SERVICE

US Customer Service
Phone Toll Free: (800) 551-4413
Fax Toll Free: (800) 551-4416
Local Phone: (254) 918-2313
Local Fax: (254) 918-2314

Canadian Customer Service
Telephone: (800) 263-6565
Fax: (800) 561-9490

TECHNICAL INFORMATION

To ensure correct usage and maximum performance of our products, refer to the following General Information and Tech Tip pages.

ABRASIVE APPLICATIONS

Although diamond and cBN (cubic Boron Nitride) are both superabrasives, the use of diamond and cBN varies, depending upon the materials to be ground.

Diamond Grinds:

- Cemented carbide
- Glass
- Ceramics
- Fiberglass
- Plastics
- Composites
- Abrasives
- Stone
- Electronic components and materials

cBN Grinds:

- High-speed tool steels
- Die steel
- Hardened carbon steels
- Hardened stainless steels
- Alloy steels
- Aerospace alloys
- Abrasion-resistant ferrous materials

In general, cBN is used to grind ferrous materials. Diamond is used to grind non-ferrous materials, because it reacts with iron.

SURFACE FINISH

Use this chart only as a guide. Surface finish is affected by a number of variables: machine type and condition, type of material, coolant, wheel speed, bond system, etc.

Expected RMS Finish

GRIT SIZE	ELECTROPLATED
80	90-125
100	64-90
120	48-64
150	32-48
180	24-32
220	20-24
240	16-20
320	16-20
400	14-20
500	12-13
600	12
800	12
1200	12
1500	12

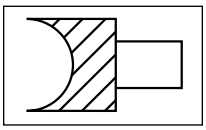
MADE-TO-ORDER ELECTROPLATED PRODUCT GUIDE

The stock electroplated products offered on the following pages have been engineered to meet the diversity of demands typical in today's manufacturing environment.

When special forms, shapes and configurations are required, Norton electroplated diamond and cBN products can be fabricated in almost any geometry. In addition, strip and replate services are available.

Customers may prefer to manufacture their own preforms/blanks for custom products and in many cases this can reduce cost and lead times.

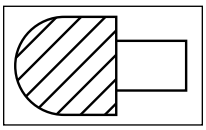
The instructions below detail the necessary allowances for each grit size. Please refer to these whenever manufacturing blanks.



Area to be plated (female radius)

Female radius must be larger than the finished size required.

Example – If a .500 female radius is required with 60/80 grit, then the blank should be manufactured .011 larger = .511



Area to be plated (male radius)

A male radius must be smaller than the finished size required.

Example – If a .500 male radius is required with 60/80 grit, then the blank should be manufactured .011 smaller = .489

GRIT SIZE ALLOWANCE FOR PLATED PRODUCTS

GRIT SIZE	ALLOWANCE/ PARTICLE SIZE
20/30	.035
30/40	.025
40/50	.018
60/80	.011
80/100	.008
100/120	.007
120/140	.006
140/170	.005
170/200	.004
200/230	.0035
270/325	.003
4.5 Micron – 400	.0025
30 Micron – 600	.0016
15 Micron – 1200	.001

THIS SHOULD BE USED AS A GUIDE WHEN MANUFACTURING BLANKS TO BE PLATED WITH DIAMOND OR CBN.

TECHtip

COOLANTS

Although coolants may not be necessary, using a coolant produces superior surface finishes, a longer tool life, higher performance, and reduces tool loading.

FEEDS

Suggested feeds for jig or internal grinding are from .0002" – .0004" per pass.

SPEEDS

Maximum Operating Speeds (MOS)

Never exceed the maximum operating speed marked on the superabrasive product being used.

Electroplated Products: 25,000 SFPM

Maximum speeds of Mounted Point wheels are a function of the length of overhang and size of the product. Refer to "Safe Operating Speeds"in form #2872, provided with your product.

Recommended Operating Speeds

The preceding speed is the maximum safe speed and not necessarily the most efficient. Superabrasive products operate most effectively at speeds lower than the maximum. The following are general recommendations. cBN products, in many cases, are used effectively at higher speeds.
Electroplated Diamond Products: 5,000 to 10,000 SFPM

Electroplated cBN Products: 8,000 to 10,000 SFPM

Calculating Operating Speed

The following formula may be used to quickly calculate wheel speed:
RPM = Revolutions Per Minute
SPFM = Surface Feet Per Minute

To convert SFPM to RPM: (Multiply SFPM x 3.82) divided by wheel diameter in inches

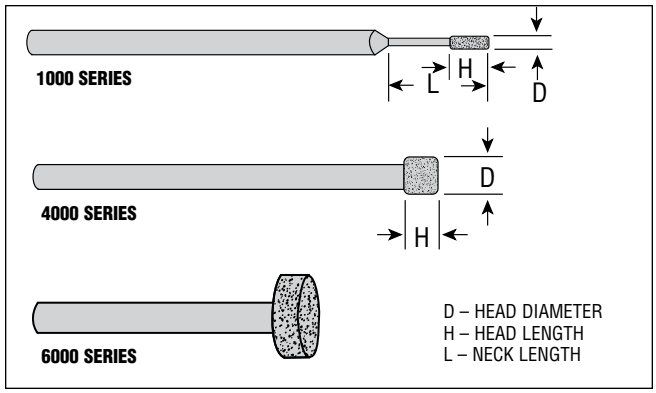
ELECTROPLATED MOUNTED POINTS

DIAMOND AND cBN MOUNTED POINTS ● ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action
Variety of tools and grit sizes available as stock	Satisfies most tool and die and deburring requirements
Mandrels are made of high-speed tool steel	Withstand operating pressure

Use Norton diamond mounted points for precise, small hole, jig and internal grinding of carbide, ceramics, sapphire, glass, and a variety of tough, super alloys.

For grinding tough, high carbon, high chrome steel, use cBN mounted points.



UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	NECK LENGTH	GRIT SIZE
1000 SERIES – DIAMOND					
1/8" Shank x 2-1/4" Overall Length					
66260392429	1016FD	.016	.079	1/8	200
66260392432	1020MD	.020	.079	1/8	150
66260392431	1020FD	.020	.079	1/8	200
66260392436	1025MD	.025	.079	1/8	150
66260392435	1025FD	.025	.079	1/8	200
66260392440	1030MD	.030	.079	1/4	150
66260392439	1030FD	.030	.079	1/4	200
66260392445	1035CD	.035	.118	1/4	100
66260392444	1035MD	.035	.118	1/4	150
66260392443	1035FD	.035	.118	1/4	200
66260392451	1040CD	.040	.118	1/4	100
66260392450	1040MD	.040	.118	1/4	150
66260392449	1040FD	.040	.118	1/4	200
66260392457	1045CD	.045	.118	1/4	100
66260392456	1045MD	.045	.118	1/4	150
66260392455	1045FD	.045	.118	1/4	200
66260392463	1050CD	.050	.118	1/2	100
66260392462	1050MD	.050	.118	1/2	150
66260392461	1050FD	.050	.118	1/2	200
66260392469	1050LCD	.050	.118	1	100
66260392468	1050LMD	.050	.118	1	150
66260392467	1050LFD	.050	.118	1	200
66260392475	1055CD	.055	.118	1/2	100
66260392474	1055MD	.055	.118	1/2	150
66260392473	1055FD	.055	.118	1/2	200
66260392481	1060CD	.060	.157	1/2	100

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	NECK LENGTH	GRIT SIZE
1000 SERIES – DIAMOND (CONT'D)					
1/8" Shank x 2-1/4" Overall Length					
66260392480	1060MD	.060	.157	1/2	150
66260392479	1060FD	.060	.157	1/2	200
66260392487	1060LCD	.060	.157	1	100
66260392486 +	1060LMD	.060	.157	1	150
66260392485 *	1060LFD	.060	.157	1	200
66260392493 *	1065CD	.065	.157	1/2	100
66260392492	1065MD	.065	.157	1/2	150
66260392491	1065FD	.065	.157	1/2	200
66260392499	1070CD	.070	.157	1/2	100
66260392498	1070MD	.070	.157	1/2	150
66260392497	1070FD	.070	.157	1/2	200
66260392505 +	1070LCD	.070	.157	1	100
66260392504 *	1070LMD	.070	.157	1	150
66260392503 *	1070LFD	.070	.157	1	200
66260392511	1075CD	.075	.157	1/2	100
66260392510	1075MD	.075	.157	1/2	150
66260392509	1075FD	.075	.157	1/2	200
66260392517	1080CD	.080	.157	1/2	100
66260392516	1080MD	.080	.157	1/2	150
66260392515	1080FD	.080	.157	1/2	200
66260392523	1080LCD	.080	.157	1	100
66260392522 *	1080LMD	.080	.157	1	150
66260392521	1080LFD	.080	.157	1	200
66260392529	1085CD	.085	.157	1/2	100
66260392528	1085MD	.085	.157	1/2	150
66260392527 *	1085FD	.085	.157	1/2	200
66260392535	1090CD	.090	.157	1/2	100
66260392534	1090MD	.090	.157	1/2	150
66260392533	1090FD	.090	.157	1/2	200
66260392541	1090LCD	.090	.157	1	100
66260392540	1090LMD	.090	.157	1	150
66260392547	1095CD	.095	.157	1/2	100
66260392546	1095MD	.095	.157	1/2	150
66260392545 +	1095FD	.095	.157	1/2	200
66260392553	1100CD	.100	.157	1/2	100
66260392552	1100MD	.100	.157	1/2	150
66260392551	1100FD	.100	.157	1/2	200
66260392559 +	1100LCD	.100	.157	1	100
66260392565	1105CD	.105	.157	1/2	100
66260392564 *	1105MD	.105	.157	1/2	150
66260392563	1105FD	.105	.157	1/2	200
66260392571 *	1105LCD	.105	.157	1	100

CONTINUED

ELECTROPLATED MOUNTED POINTS

DIAMOND AND cBN MOUNTED POINTS ● ▲

UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	NECK LENGTH	GRIT SIZE
1000 SERIES – DIAMOND (CONT'D)					
1/8" Shank x 2-1/4" Overall Length					
66260392570 *	1105LMD	.105	.157	1	150
66260392569 *	1105LFD	.105	.157	1	200
66260392577	1110CD	.110	.157	1/2	100
66260392576	1110MD	.110	.157	1/2	150
66260392575 *	1110FD	.110	.157	1/2	200
66260392583	1110LCD	.110	.157	1	100
66260392581 *	1110LFD	.110	.157	1	200
66260392589	1115CD	.115	.157	1/2	100
66260392588	1115MD	.115	.157	1/2	150
66260392595	1120CD	.120	.157	1/2	100
66260392594	1120MD	.120	.157	1/2	150
66260392593	1120FD	.120	.157	1/2	200
66260392601	1125CD	.125	.157	1/2	100
66260392600	1125MD	.125	.157	1/2	150
66260392599	1125FD	.125	.157	1/2	200
66260392607	1130CD	.130	.197	1	100
66260392606	1130MD	.130	.197	1	150
66260392605 *	1130FD	.130	.197	1	200
66260392613	1135CD	.135	.236	N/A	100
66260392612	1135MD	.135	.236	N/A	150
66260392611	1135FD	.135	.236	N/A	200
66260392619	1140CD	.140	.236	N/A	100
66260392618 *	1140MD	.140	.236	N/A	150
66260392617 *	1140FD	.140	.236	N/A	200
66260392625	1156CD	.156	.236	N/A	100
66260392624	1156MD	.156	.236	N/A	150
66260392623	1156FD	.156	.236	N/A	200
66260392731 +	1171CD	.171	.236	N/A	100
66260392730	1171MD	.171	.236	N/A	150
66260392737	1187CD	.187	.312	N/A	100
66260392736 *	1187MD	.187	.312	N/A	150
66260392735	1187FD	.187	.312	N/A	200
66260392743 *	1203CD	.203	.312	N/A	100
66260392742	1203MD	.203	.312	N/A	150
66260392741	1203FD	.203	.312	N/A	200
66260392749 *	1218CD	.218	.312	N/A	100
66260392748	1218MD	.218	.312	N/A	150
66260392747	1218FD	.218	.312	N/A	200
66260392755	1250CD	.250	.312	N/A	100
66260392754	1250MD	.250	.312	N/A	150
66260392753	1250FD	.250	.312	N/A	200
66260363450	W10MD	.750	.035	N/A	150
1000 SERIES – cBN					
1/8" Shank x 2-1/4" Overall Length					
66260392430 *	1016FC	.016	.079	1/8	200
66260392434	1020MC	.020	.079	1/8	150
66260392433 *	1020FC	.020	.079	1/8	200
66260392438 *	1025MC	.025	.079	1/8	150
66260392437 *	1025FC	.025	.079	1/8	200
66260392442	1030MC	.030	.079	1/4	150
66260392441 +	1030FC	.030	.079	1/4	200
66260392448 *	1035CC	.035	.118	1/4	100
66260392446 *	1035FC	.035	.118	1/4	200
66260392454 *	1040CC	.040	.118	1/4	100
66260392453	1040MC	.040	.118	1/4	150

CONTINUED

UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	NECK LENGTH	GRIT SIZE
1000 SERIES – cBN (CONT'D)					
1/8" Shank x 2-1/4" Overall Length					
66260392460	1045CC	.045	.118	1/4	100
66260392459 *	1045MC	.045	.118	1/4	150
66260392458 *	1045FC	.045	.118	1/4	200
66260392466	1050CC	.050	.118	1/2	100
66260392465	1050MC	.050	.118	1/2	150
66260392464	1050FC	.050	.118	1/2	200
66260392472 *	1050LCC	.050	.118	1	100
66260392471 *	1050LMC	.050	.118	1	150
66260392478 *	1055CC	.055	.118	1/2	100
66260392477 *	1055MC	.055	.118	1/2	150
66260392484	1060CC	.060	.157	1/2	100
66260392483	1060MC	.060	.157	1/2	150
66260392482	1060FC	.060	.157	1/2	200
66260392490 *	1060LCC	.060	.157	1	100
66260392489 *	1060LMC	.060	.157	1	150
66260392488 *	1060LFC	.060	.157	1	200
66260392496	1065CC	.065	.157	1/2	100
66260392494 *	1065FC	.065	.157	1/2	200
66260392502	1070CC	.070	.157	1/2	100
66260392501	1070MC	.070	.157	1/2	150
66260392500	1070FC	.070	.157	1/2	200
66260392508 *	1070LCC	.070	.157	1	100
66260392507 *	1070LMC	.070	.157	1	150
66260392506 *	1070LFC	.070	.157	1	200
66260392514	1075CC	.075	.157	1/2	100
66260392513 *	1075MC	.075	.157	1/2	150
66260392512	1075FC	.075	.157	1/2	200
66260392520	1080CC	.080	.157	1/2	100
66260392519 *	1080MC	.080	.157	1/2	150
66260392518 *	1080FC	.080	.157	1/2	200
66260392526 +	1080LCC	.080	.157	1	100
66260392525 *	1080LMC	.080	.157	1	150
66260392524 *	1080LFC	.080	.157	1	200
66260392532	1085CC	.085	.157	1/2	100
66260392531	1085MC	.085	.157	1/2	150
66260392538	1090CC	.090	.157	1/2	100
66260392537	1090MC	.090	.157	1/2	150
66260392536	1090FC	.090	.157	1/2	200
66260392544	1090LCC	.090	.157	1	100
66260392543	1090LMC	.090	.157	1	150
66260392542 *	1090LFC	.090	.157	1	200
66260392550 *	1095CC	.095	.157	1/2	100
66260392549 +	1095MC	.095	.157	1/2	150
66260392548 *	1095FC	.095	.157	1/2	200
66260392556	1100CC	.100	.157	1/2	100
66260392555 +	1100MC	.100	.157	1/2	150
66260392554	1100FC	.100	.157	1/2	200
66260392562 *	1100LCC	.100	.157	1	100
66260392561	1100LMC	.100	.157	1	150
66260392568	1105CC	.105	.157	1/2	100
66260392567	1105MC	.105	.157	1/2	150
66260392566 *	1105FC	.105	.157	1/2	200
66260392574 *	1105LCC	.105	.157	1	100
66260392573 *	1105LMC	.105	.157	1	150
66260392572 *	1105LFC	.105	.157	1	200

CONTINUED

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.

*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

ELECTROPLATED MOUNTED POINTS

DIAMOND AND cBN MOUNTED POINTS ● ▲

UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	NECK LENGTH	GRIT SIZE
1000 SERIES – cBN (CONT'D)					
1/8" Shank x 2-1/4" Overall Length					
66260392580	1110CC	.110	.157	1/2	100
66260392579 *	1110MC	.110	.157	1/2	150
66260392578	1110FC	.110	.157	1/2	200
66260392586 *	1110LCC	.110	.157	1	100
66260392584 *	1110LFC	.110	.157	1	200
66260392592 *	1115CC	.115	.157	1/2	100
66260392591 *	1115MC	.115	.157	1/2	150
66260392590 *	1115FC	.115	.157	1/2	200
66260392598	1120CC	.120	.157	1/2	100
66260392597 *	1120MC	.120	.157	1/2	150
66260392596 *	1120FC	.120	.157	1/2	200
66260392604	1125CC	.125	.157	1/2	100
66260392603	1125MC	.125	.157	1/2	150
66260392602	1125FC	.125	.157	1/2	200
66260392610	1130CC	.130	.197	1	100
66260392609 *	1130MC	.130	.197	1	150
66260392608	1130FC	.130	.197	1	200
66260392616	1135CC	.135	.236	N/A	100
66260392615	1135MC	.135	.236	N/A	150
66260392614 *	1135FC	.135	.236	N/A	200
66260392622	1140CC	.140	.236	N/A	100
66260392621 *	1140MC	.140	.236	N/A	150
66260392620 *	1140FC	.140	.236	N/A	200
66260392628	1156CC	.156	.236	N/A	100
66260392627	1156MC	.156	.236	N/A	150
66260392626	1156FC	.156	.236	N/A	200
66260392734	1171CC	.171	.236	N/A	100
66260392733	1171MC	.171	.236	N/A	150
66260392732 *	1171FC	.171	.236	N/A	200
66260392740	1187CC	.187	.312	N/A	100
66260392739	1187MC	.187	.312	N/A	150
66260392738	1187FC	.187	.312	N/A	200
66260392746 *	1203CC	.203	.312	N/A	100
66260392745	1203MC	.203	.312	N/A	150
66260392744 *	1203FC	.203	.312	N/A	200
66260392752	1218CC	.218	.312	N/A	100
66260392751	1218MC	.218	.312	N/A	150
66260392750 *	1218FC	.218	.312	N/A	200
66260392758	1250CC	.250	.312	N/A	100
66260392757	1250MC	.250	.312	N/A	150
66260392756 *	1250FC	.250	.312	N/A	200
4000 SERIES – DIAMOND					
1/4" Shank x 3" Overall Length					
66260392630	4156CD	.156	.250	1	100
66260392629	4156FD	.156	.250	1	200
66260392634	4187CD	.187	.250	1	100
66260392633	4187FD	.187	.250	1	200
66260392638	4203CD	.203	.250	1	100
66260392637+	4203FD	.203	.250	1	200
66260392642	4218CD	.218	.250	1	100
66260392641	4218FD	.218	.250	1	200
66260392646	4236CD	.236	.250	1	100
66260392645	4236FD	.236	.250	1	200
66260392650	4250CD	.250	.250	1	100
66260392649	4250FD	.250	.250	1	200
66260392654	4282CD	.282	.250	N/A	100
66260392653	4282FD	.282	.250	N/A	200
66260392658	4312CD	.312	.375	N/A	100

CONTINUED

UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	NECK LENGTH	GRIT SIZE
4000 SERIES – DIAMOND (CONT'D)					
1/4" Shank x 3" Overall Length					
66260392657	4312FD	.312	.375	N/A	200
66260392662	4375CD	.375	.375	N/A	100
66260392661	4375FD	.375	.375	N/A	200
66260392666	4390CD	.390	.375	N/A	100
66260392665	4390FD	.390	.375	N/A	200
66260392670	4406CD	.406	.375	N/A	100
66260392669 *	4406FD	.406	.375	N/A	200
66260392674	4437CD	.437	.375	N/A	100
66260392673 *	4437FD	.437	.375	N/A	200
66260392678	4500CD	.500	.375	N/A	100
66260392677	4500FD	.500	.375	N/A	200
66260392682	4730CD	.730	.375	N/A	100
66260392681 *	4730FD	.730	.375	N/A	200
66260392685 *	4864FD	.864	.375	N/A	200
66260392690	41000CD	1.000	.375	N/A	100
66260392689	41000FD	1.000	.375	N/A	200
4000 SERIES – cBN					
1/4" Shank x 3" Overall Length					
66260392632	4156CC	.156	.250	1	100
66260392631	4156FC	.156	.250	1	200
66260392636	4187CC	.187	.250	1	100
66260392635	4187FC	.187	.250	1	200
66260392640	4203CC	.203	.250	1	100
66260392639	4203FC	.203	.250	1	200
66260392644	4218CC	.218	.250	1	100
66260392643	4218FC	.218	.250	1	200
66260392648	4236CC	.236	.250	1	100
66260392647	4236FC	.236	.250	1	200
66260392652	4250CC	.250	.250	1	100
66260392651	4250FC	.250	.250	1	200
66260392656	4282CC	.282	.250	N/A	100
66260392655	4282FC	.282	.250	N/A	200
66260392660	4312CC	.312	.375	N/A	100
66260392659	4312FC	.312	.375	N/A	200
66260392664	4375CC	.375	.375	N/A	100
66260392663	4375FC	.375	.375	N/A	200
66260392668	4390CC	.390	.375	N/A	100
66260392667+	4390FC	.390	.375	N/A	200
66260392672	4406CC	.406	.375	N/A	100
66260392671+	4406FC	.406	.375	N/A	200
66260392676	4437CC	.437	.375	N/A	100
66260392675	4437FC	.437	.375	N/A	200
66260392680	4500CC	.500	.375	N/A	100
66260392679	4500FC	.500	.375	N/A	200
66260392684	4730CC	.730	.375	N/A	100
66260392683	4730FC	.730	.375	N/A	200
66260392688 *	4864CC	.864	.375	N/A	100
66260392687 *	4864FC	.864	.375	N/A	200
66260392692	41000CC	1.000	.375	N/A	100
66260392691 *	41000FC	1.000	.375	N/A	200

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

ELECTROPLATED MOUNTED POINTS, MANDRELS AND TAPERED HONES

DIAMOND AND cBN MOUNTED POINTS ● ▲

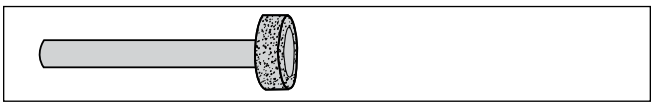
UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	GRIT SIZE
6000 SERIES – DIAMOND				
3/8" Shank x 3-3/4" Overall Length				
66260392694	6406CD	.406	.375	80
66260392693	6406MD	.406	.375	150
66260392698	6437CD	.437	.375	80
66260392697	6437MD	.437	.375	150
66260392702	6500CD	.500	.375	80
66260392701	6500MD	.500	.375	150
66260392706	6562CD	.562	.375	80
66260392710	6625CD	.625	.375	80
66260392709	6625MD	.625	.375	150
66260392714 *	6687CD	.687	.375	80
66260392713 *	6687MD	.687	.375	150
66260392718	6750CD	.750	.375	80
66260392717	6750MD	.750	.375	150
66260392722 *	6875CD	.875	.400	80
66260392721	6875MD	.875	.400	150
66260392726	61000CD	1.000	.500	80
66260392725	61000MD	1.000	.500	150

UPC #	PRODUCT #	HEAD DIAMETER INCHES	HEAD LENGTH	GRIT SIZE
6000 SERIES – cBN				
3/8" Shank x 3-3/4" Overall Length				
66260392696	6406CC	.406	.375	80
66260392695	6406MC	.406	.375	150
66260392700	6437CC	.437	.375	80
66260392699	6437MC	.437	.375	150
66260392704	6500CC	.500	.375	80
66260392703	6500MC	.500	.375	150
66260392708	6562CC	.562	.375	80
66260392707 *	6562MC	.562	.375	150
66260392712	6625CC	.625	.375	80
66260392711	6625MC	.625	.375	150
66260392716	6687CC	.687	.375	80
66260392715	6687MC	.687	.375	150
66260392720	6750CC	.750	.375	80
66260392719	6750MC	.750	.375	150
66260392724	6875CC	.875	.400	80
66260392723 *	6875MC	.875	.400	150
66260392728	61000CC	1.000	.500	80
66260392727	61000MC	1.000	.500	150
9000 SERIES – DIAMOND				
3/4" Shank x 3-3/4" Overall Length				
66260308354	91000CD	1.000	.500	80

cBN HEAVY STOCK REMOVAL MANDRELS ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action
Super coarse abrasive grit	Long tool life

For heavy stock removal on jig, internal, and offhand operations on tool steels and hardened aerospace alloys.

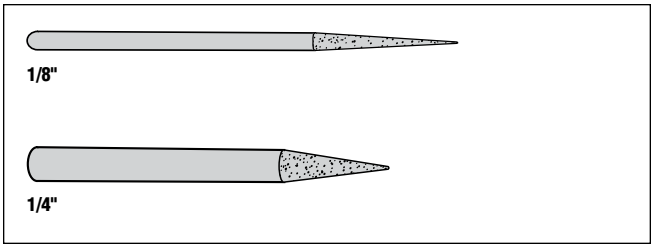


UPC #	PRODUCT #	HEAD DIAMETER	HEAD LENGTH	SHANK DIAMETER	OVERALL LENGTH	GRIT SIZE
HSR SERIES – cBN						
66260395426	HSR-1/4	1/4	1/4	3/8	3	60
66260395427+	HSR-5/16	5/16	5/16	3/8	3	60
66260395428	HSR-3/8	3/8	3/8	3/8	3	60
66260395429	HSR-1/2	1/2	3/8	3/8	3-1/2	60
66260395430 *	HSR-5/8	5/8	3/8	3/8	3-1/2	60
66260395431	HSR-3/4	3/4	3/8	3/8	3-1/2	60
66260395432	HSR-1	1	3/8	3/8	3-1/2	60

DIAMOND TAPERED HONES FOR DRAWING DIES ● ▲ ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Economical	Single layer of abrasive
Exposed particles	Aggressive cutting action

Used primarily for forming carbide drawing dies, but can be used for small hole honing in ceramics, fiberglass, plastics, and composite materials.



UPC #	PRODUCT #	INCLUDED ANGLE	SHANK DIAMETER	GRIT SIZE
TAPERED HONES FOR DRAWING DIES – DIAMOND				
3" Overall Length				
66260395540	TH12-6MD	6°	1/8	150
66260395541	TH12-8MD	8°	1/8	150
66260363371	TH25-12CD	12°	1/4	100
66260395542	TH12-12MD	12°	1/8	150
66260395543	TH25-12MD	12°	1/4	150
66260395544	TH25-14MD	14°	1/4	150
66260395545	TH25-16MD	16°	1/4	150

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

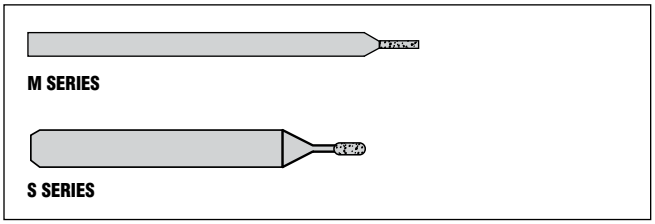
TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

ELECTROPLATED MICRO DRILLS AND ROUTERS

DIAMOND MICRO DRILLS ● ▲ ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

A modification of Norton mounted points, these tools are specifically designed for drilling holes in the .007" to .065" diameter range. Perfect for drilling sapphire and high density alumina ceramics for hybrid micro-circuit substrates.



M SERIES

S SERIES

UPC #	PRODUCT #	DIAMETER INCHES	HEAD LENGTH	OVERALL LENGTH	GRIT SIZE
M-SERIES MICRO DRILLS – DIAMOND					
Shank Diameter .040" (1MM)					
66260395516	M7	.007	.028	11/16	600
66260395517	M10	.010	.049	11/16	400
66260395518	M12	.012	.056	13/16	325
66260395519	M15	.015	.077	13/16	325

CAREFULLY-SIZED, UNIFORMLY-SHAPED DIAMOND PARTICLES ARE USED ON ALL M-SERIES DRILLS.

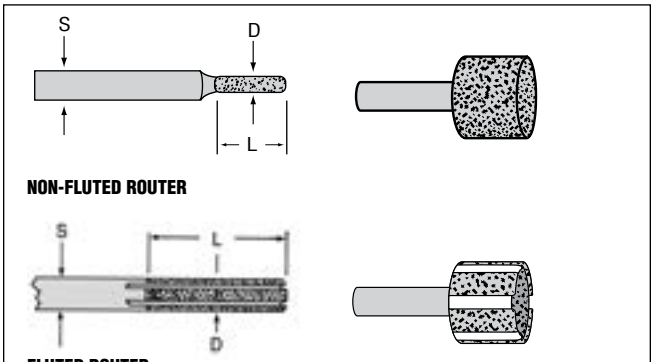
UPC #	PRODUCT #	DIAMETER INCHES	HEAD LENGTH	OVERALL LENGTH	GRIT SIZE
S-SERIES MICRO DRILLS – DIAMOND					
1/8" Shank x 1" Overall Length					
66260395520	S16FD	.016	.062	.093	200
66260392841	S18FD	.018	.062	.125	200
66260395521	S20FD	.020	.062	.125	200
66260395522	S25FD	.025	.093	.156	200
66260395523	S30MD	.030	.093	.156	150
66260395524	S35MD	.035	.093	.187	150
66260395525	S40MD	.040	.125	.218	150
66260395526	S45CD	.045	.125	.218	100
66260395527	S50CD	.050	.125	.250	100
66260395528	S60CD	.060	.125	.312	100
66260395529	S65CD	.065	.125	.312	100

RECOMMENDED FOR ADAPTING TO ULTRASONIC DRILL HEADS.

DIAMOND ROUTERS ● ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

Used with hand operated tools, drill presses, and milling machines. Ideal for routing and reaming the highly-abrasive materials of alumina, fiberglass, plastics, and other nonmetallic composite materials.



D – HEAD DIAMETER
L – LENGTH OF DIAMOND
S – SHANK DIAMETER

UPC #	PRODUCT #	HEAD DIAMETER	LENGTH OF DIAMOND	SHANK DIAMETER	OVERALL LENGTH	GRIT SIZE
NON-FLUTED ROUTERS – DIAMOND						
66260364305 *	RNF1812CD	1/8	1/2	1/4	2-1/2	60
66260364304 +	RNF1810CD	1/8	1	1/4	2-1/2	60
66260364303 *	RNF1412CD	1/4	1/2	1/4	2-1/2	40
66260364302	RNF1410CD	1/4	1	1/4	2-1/2	40
66260302707 *	RNF3812CD	3/8	1/2	1/2	2-1/2	40
66260302709 *	RNF3810CD	3/8	1	1/2	2-1/2	40
66260302711 *	RNF1212CD	1/2	1/2	1/2	2-1/2	40
66260302712 *	RNF1210CD	1/2	1	1/2	2-1/2	40
66260302714 *	RNF3412CD	3/4	1/2	1/2	2-1/2	40
66260302717 *	RNF3410CD	3/4	1	1/2	2-1/2	40
66260364301 *	RNF1012CD	1	1/2	1/2	2-1/2	40
66260302720 *	RNF1010CD	1	1	1/2	2-1/2	40
66260302721 *	RNF11212CD	1-1/2	1/2	1/2	3	40
66260302725 *	RNF2012CD	2	1/2	1/2	3	40
66260302728 *	RNF2010CD	2	1	1/2	3	40
FLUTED ROUTERS – DIAMOND						
66260364310	RSF1812CD	1/8	1/2	1/4	2-1/2	60
66260364309	RSF1810CD	1/8	1	1/4	2-1/2	60
66260364308	RSF1412CD	1/4	1/2	1/4	2-1/2	40
66260364307	RSF1410CD	1/4	1	1/4	2-1/2	40
66260302710 *	RSF3810CD	3/8	1	1/2	2-1/2	40
66260364306 *	RSF1212CD	1/2	1/2	1/2	2-1/2	40
66260302713 *	RSF1210CD	1/2	1	1/2	2-1/2	40
66260302715	RSF3412CD	3/4	1/2	1/2	2-1/2	40
66260302716 *	RSF3410CD	3/4	1	1/2	2-1/2	40
66260302718 *	RSF1012CD	1	1/2	1/2	2-1/2	40
66260302719 *	RSF1010CD	1	1	1/2	2-1/2	40
66260302722 *	RSF11212CD	1-1/2	1/2	1/2	3	40
66260302724 *	RSF11210CD	1-1/2	1	1/2	3	40
66260302726 *	RSF2012CD	2	1/2	1/2	3	40
66260302727 *	RSF2010CD	2	1	1/2	3	40

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

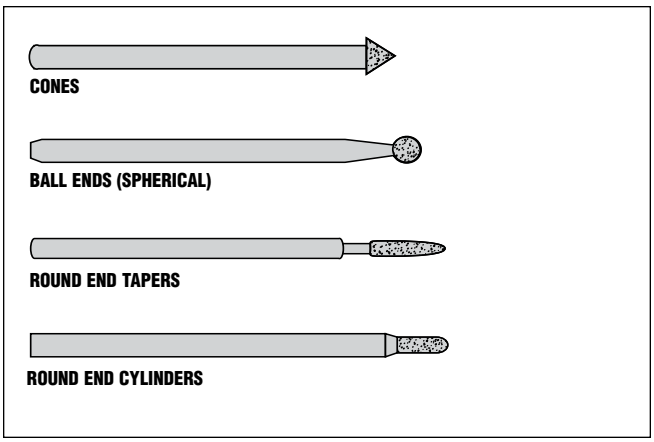
TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

ELECTROPLATED MOUNTED CONTOUR TOOLS

DIAMOND AND cBN MOUNTED CONTOUR TOOLS ● ▲ ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action
Variety of tool shapes available as stock	Satisfies most tool and die and deburring requirements

For contour grinding applications on carbide, ceramics, glass, ferrites, and many tough alloys and cements. Best suited for blending radii and deburring operations. Operating speeds: 15,000-20,000 RPM range.



UPC #	PRODUCT #	CONE BASE DIAMETER	INCLUDED ANGLE	CONE LENGTH	GRIT SIZE
CONES – DIAMOND					
1/8" Shank x 2" Overall Length					
66260395484	C14CD	1/8	14°	1/2	100
66260395486 +	C26CD	3/16	26°	13/32	100
66260395488	C35CD	5/32	35°	1/4	100
66260395490	C60CD	11/64	60°	5/32	100
66260395492	C90CD	3/16	90°	3/32	100
CONES – cBN					
1/8" Shank x 2" Overall Length					
66260395483	C14CC	1/8	14°	1/2	100
66260395485	C26CC	3/16	26°	13/32	100
66260395487	C35CC	5/32	35°	1/4	100
66260395489	C60CC	11/64	60°	5/32	100
66260395491	C90CC	3/16	90°	3/32	100

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

UPC #	PRODUCT #	BALL DIAMETER	GRIT SIZE
BALL ENDS (SPHERICAL) – DIAMOND			
1/8" Shank x 2" Overall Length			
66260395434	BE1CD	3/64	100
66260395436	BE2CD	1/16	100
66260395438	BE3CD	5/64	100
66260395440	BE4CD	3/32	100
66260395442	BE5CD	1/8	100
66260395444	BE6CD	3/16	100
66260395446 +	BE7CD	1/4	100
66260395448	BE8CD	3/8	100
66260395450	BE9CD	1/2	100
BALL ENDS (SPHERICAL) – cBN			
1/8" Shank x 2" Overall Length			
66260395433 *	BE1CC	3/64	100
66260395435 *	BE2CC	1/16	100
66260395437	BE3CC	5/64	100
66260395439	BE4CC	3/32	100
66260395441	BE5CC	1/8	100
66260395443	BE6CC	3/16	100
66260395445	BE7CC	1/4	100
66260395447 *	BE8CC	3/8	100
66260395449 *	BE9CC	1/2	100

UPC #	PRODUCT #	SMALL HEAD DIAMETER	LARGE HEAD DIAMETER	HEAD LENGTH	INC. ANGLE	GRIT SIZE
ROUND END TAPERS – DIAMOND						
1/8" Shank x 2" Overall Length						
66260395506	RT44CD	.044	.066	5/16	4°	100
66260395508 *	RT60CD	.060	.082	5/16	4°	100
66260395510	RT78CD	.078	.110	5/16	6°	100
ROUND END TAPERS – cBN						
1/8" Shank x 2" Overall Length						
66260395505 *	RT44CC	.044	.066	5/16	4°	100
66260395507 *	RT60CC	.060	.082	5/16	4°	100
66260395509	RT78CC	.078	.110	5/16	6°	100

UPC #	PRODUCT #	HEAD DIAMETER	HEAD LENGTH	GRIT SIZE
ROUND END CYLINDERS – DIAMOND				
1/8" Shank x 2" Overall Length				
66260395494	RE1CD	1/16	1/4	100
66260395496	RE2CD	5/64	1/4	100
66260395498	RE3CD	3/32	1/4	100
66260395500	RE4CD	1/8	1/4	100
66260395502	RE5CD	3/16	5/16	100
66260395504	RE6CD	1/4	5/16	100
ROUND END CYLINDERS – cBN				
1/8" Shank x 2" Overall Length				
66260395495	RE2CC	5/64	1/4	100
66260395497 *	RE3CC	3/32	1/4	100
66260395499 +	RE4CC	1/8	1/4	100
66260395501 *	RE5CC	3/16	5/16	100
66260395503 *	RE6CC	1/4	5/16	100

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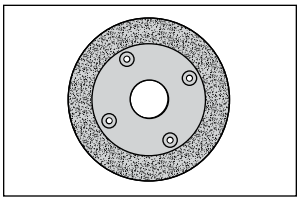
ELECTROPLATED GRINDING WHEELS AND FILES

DIAMOND TYPE 6A2C CUP WHEELS ● ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

Extremely fast acting wheels for coarse work (100 grit) and fine finishing (200 grit) of carbide tool bits, etc.



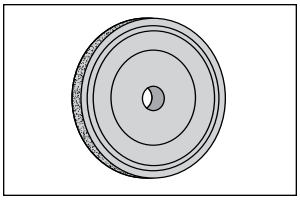
UPC #	PRODUCT #	DIMENSIONS D x T x H	DESCRIPTION	GRIT SIZE
TYPE 6A2C CUP WHEELS WITH MOUNTING HOLES				
Rim 1" – Diamond				
66260300203*	6A2CCD	6 x 7/16 x 1-1/4	6A2C Cup Wheel	100
66260300202*	6A2CFD	6 x 7/16 x 1-1/4	6A2C Cup Wheel	200
66260302135*		6 x 5/16 x 1-1/4	Back-up Plate 6"	

FOUR 9/32" HOLES ON A 3-1/4" BOLT CIRCLE.

DIAMOND TYPE 1A1 BENCH AND PEDESTAL WHEELS ● ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action
Bakelite core	Lightweight Adaptable to standard bench grinders
Maintains flat on O.D.	Eliminates down time for dressing

Ideal for off-hand grinding. These wheels stay flat without dressing for accurate tool edges. Grind carbide, ceramic and other materials more cost effectively than with conventional silicon carbide abrasive wheels. Available in two grit sizes; 100 grit for roughing and 200 grit for finishing.



UPC #	PRODUCT #	DIMENSIONS D x T x H	MAX. RPM	GRIT SIZE
TYPE 1A1 BENCH AND PEDESTAL WHEELS – DIAMOND				
66260302087*	A1PG-CD	6 x 1 x 1	7,635	100
66260302086*	A1PG-FD	6 x 1 x 1	7,635	200

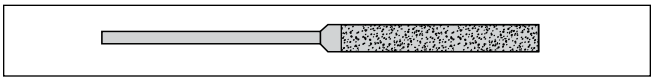
1/2", 5/8", 3/4" AND 7/8" CENTER HOLE REDUCING BUSHINGS ARE INCLUDED.

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

DIAMOND MACHINE FILES ● ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

For use in reciprocating hand profiling machines. Ideal for reworking and finishing carbide dies and molds, blending radii, and deburring and cleaning slots and grooves.



UPC #	PRODUCT #	DIMENSIONS	ABRASIVE LOCATION	GRIT SIZE
MACHINE FILES – DIAMOND				
5/8" Diamond Length, 1/8" Shank, 2" Overall Length				
66260395585	1ECD	.020 x .125		100
66260395586	2ECD	.030 x .125		100
66260395587	3ECD	.040 x .125		100
66260395588 *	2FCD	.079 x .040		100

CONTINUED

UPC #	PRODUCT #	DIMENSIONS	ABRASIVE LOCATION	GRIT SIZE
MACHINE FILES – DIAMOND (CONT'D)				
5/8" Diamond Length, 1/8" Shank, 2" Overall Length				
66260395589	3FCD	.120 x .040		100
66260395590	4FCD	.157 x .040		100
66260395591	5FCD	.203 x .078		100
66260395592	6FCD	.120 x .040		100
66260395593	1CCD	.098 x .196		100
66260395594	2CCD	.120 x .250		100
66260395596	3TCD	.127 side		100
66260395598	1RCD	.042 diam.		100
66260395599	2RCD	.080 diam.		100
66260395600	3RCD	.127 diam.		100
66260395601	4RCD	.157 diam.		100
66260395602 *	1HRCD	.040 radius		100

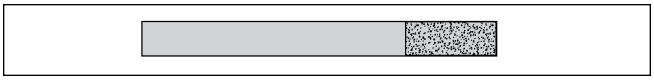
+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

ELECTROPLATED FILES

DIAMOND HAND FILES ● ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

Indispensable aid for the toolroom. All purpose hand-held tool useful for deburring, notching, dressing, and honing hard, brittle materials.



UPC #	PRODUCT #	DIMENSIONS	ABRASIVE LOCATION	GRIT SIZE
HAND FILES – DIAMOND				
6" Overall Length, 1-1/2" Diamond Length				
66260395605	DF1CD	1/8 x 1/8		100
66260392842 +	DF1FD	1/8 x 1/8		200
66260395606	DF2CD	1/8 x 1/4		100

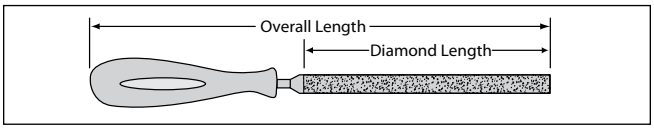
CONTINUED

UPC #	PRODUCT #	DIMENSIONS	ABRASIVE LOCATION	GRIT SIZE
HAND FILES – DIAMOND (CONT'D)				
6" Overall Length, 1-1/2" Diamond Length				
66260392843	DF2FD	1/8 x 1/4		200
66260395607	DF2WCD	1/8 x 1/4		100
66260395608	DF3CD	1/8 x 3/8		100
66260392844	DF3FD	1/8 x 3/8		200
66260395609	DF3WCD	1/8 x 3/8		100
66260364241	DF3SCD	1/8 x 1/2		100
66260395611	DF4CD	1/8		100
66260392845 *	DF4FD	1/8		200
66260300134	DF4WCD	1/4		100
66260395613	DF5CD	1/8		100
66260392846	DF5FD	1/8		200
66260395614	DF5WCD	1/4		100
66260395615	DF6CD	1/8		100
66260392847 *	DF6FD	1/8		200

DIAMOND NEEDLE FILES ● ▲

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

Indispensable aid for the toolroom. An all purpose hand-held tool, useful for deburring, notching, dressing, and honing hard, brittle materials.



UPC #	PRODUCT #	DIMENSIONS	ABRASIVE LOCATION	SHAPE	GRIT SIZE
NEEDLE FILES – DIAMOND					
4-1/4" Diamond Length, 8-1/2" Overall Length					
66260302432	LNF2CD	.400 x .100		Equaling	100
66260305611	LNF2FD	.400 x .100		Equaling	200
66260302898	LNF3CD	.45 x .150		Half Round	100
66260305612	LNF3FD	.485 x .150		Half Round	200
2-3/4" Diamond Length, 5-3/4" Overall Length, With Handle					
66260391729	1571	.055 x .190		Flat	100
66260391730	1572	.075 x .210		Half Round	100
66260391731	1573	.145 x .145		Triangle	100
66260391732	1574	.100 x .100		Square	100
66260391733	1575	.120		Round	100
66260391734	1576	.055 x .190		Pointed Flat	100
3" Diamond Length, 5-1/2" Overall Length, With Handle					
66260395575	NF1FD	.150 x .105		Oval	200
66260395576	NF2FD	.218 x .072		Half Round	200
66260395577	NF3FD	.205 x .058		Equaling	200
66260395578	NF4FD	.096 x .096		Square	200

CONTINUED

UPC #	PRODUCT #	DIMENSIONS	ABRASIVE LOCATION	SHAPE	GRIT SIZE
NEEDLE FILES – DIAMOND (CONT'D)					
3" Diamond Length, 5-1/2" Overall Length, With Handle					
66260395579	NF5FD	.138 x .138		Triangle	200
66260395580	NF6FD	.118		Round	200
66260395581+	NF7FD	.197 x .088		Crossing	200
66260395582+	NF8FD	.205 x .067		Barrette	200

UPC #	PRODUCT #	GRIT SIZE
NFK-6 NEEDLE FILE KIT – DIAMOND		
66260364008	NFK-6	contains one each of the following:
	NF1FD	200
	NF2FD	200
	NF3FD	200
	NF4FD	200
	NF5FD	200
	NF6FD	200
DFS-6 DIE FILE KIT – DIAMOND		
66260391830	DFS-6	contains one each of the following:
	1571	100
	1572	100
	1573	100
	1574	100
	1575	100
	1576	100

NEEDLE FILE SHAPE AND APPLICATION KEY:

Barrette: A triangle with diamond on the bottom side only

Crossing: Elongated oval, with more pointed ends than an oval file; has diamonds all around

Equaling: A rectangle with diamond on all four sides; ideal for filing both sides of an ID simultaneously

Pointed Flat: A cone with a flat top with diamond on the sides of the cone

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

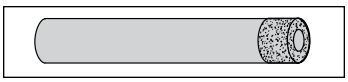
+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

ELECTROPLATED DRILLS

DIAMOND CORE DRILLS ● ■

FEATURES	BENEFITS
▮ Nickel alloy matrix	▮ Tough, durable bond
▮ Single layer of abrasive	▮ Economical
▮ Exposed particles	▮ Aggressive cutting action

High performance on glass and ceramic applications while providing fast, reliable cutting. Submersed drilling is highly recommended for optimum operating performance.

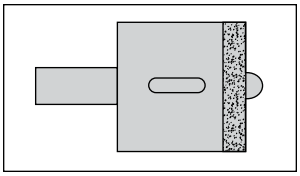


UPC #	PRODUCT #	OUTER DIAMETER	INNER DIAMETER	GRIT SIZE
CORE DRILLS – DIAMOND				
Straight Tube Type, 2" Overall Length				
66260395530	A1MD	1/16	.023	150
66260395531	A2MD	3/32	.048	150
66260395532	A3MD	1/8	.075	150
66260395533	A4MD	5/32	.110	150
66260395534	A5CD	3/16	.140	100
66260395535	A6CD	1/4	.195	100
66260395536	A7CD	5/16	.255	100
66260395537	A8CD	3/8	.325	100
66260395538 *	A9CD	7/16	.373	80
66260395539 +	A10CD	1/2	.398	80

DIAMOND MOUNTED CORE DRILLS ● ■

FEATURES	BENEFITS
▮ Nickel alloy matrix	▮ Tough, durable bond
▮ Single layer of abrasive	▮ Economical
▮ Exposed particles	▮ Aggressive cutting action
▮ Removable pilot (bulb-like extension)	▮ Provides added stability ▮ Ensures smooth drilling with less wobbling
▮ 1/8" wrap: additional 1/8" of electroplated diamond on the blade core	▮ Increases life of blade on deep cuts, reduces binding and grinding on the core

High performance results on glass and ceramic applications.



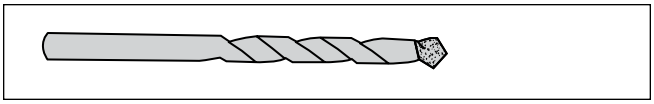
UPC #	PRODUCT #	OUTER DIAMETER	PILOT DIAMETER	GRIT SIZE
MOUNTED CORE DRILLS – DIAMOND				
1/8" Wrap, 3/8" Shank Diameter, 3.45" Overall Length				
66260392850	CD.750	3/4	1/4	40
66260392854 *	CD2.000	2	1/4	40

PILOTS ARE REMOVABLE.

DIAMOND TWIST DRILLS ● ■

FEATURES	BENEFITS
▮ Nickel alloy matrix	▮ Tough, durable bond
▮ Single layer of abrasive	▮ Economical
▮ Exposed particles	▮ Aggressive cutting action

Recommended for precision drilling on circuit boards containing fiberglass, nylon, and similar tough, abrasive materials. Diamond twist drills are also useful for drilling plastics and resin composites and have been successful in drilling soft ductile materials as well as “green” carbide. Operating procedures are similar to those of standard twist drills.



UPC #	PRODUCT #	DRILL DIAMETER	DRILL LENGTH	GRIT SIZE
TWIST DRILLS – DIAMOND				
66260395549	TW-1/16	1/16	1-3/4	100
66260395550	TW-1/8	1/8	2-3/4	100
66260395551	TW-1/4	1/4	4	100
66260395552	TW-3/8	3/8	5	100

DIAMETER TOLERANCE EQUALS + OR – 1/64.

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

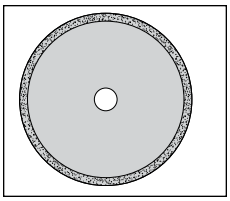
TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

ELECTROPLATED SAW BLADES

DIAMOND CONTINUOUS RIM CUT-OFF SAW BLADES ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

Ideal for cutting-off highly-abrasive materials such as alumina, fiberglass, plastics, and other nonmetallic composite materials.



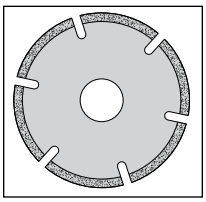
Additional Diamond Slotted and Continuous Rim Cut-off Saw Blades, with extended wraps to avoid binding, are available as made-to-order products. Please contact your Norton representative.

UPC #	PRODUCT #	DIAM.	OVERALL THICKNESS	HOLE SIZE	GRIT SIZE
CONTINUOUS RIM CUT-OFF SAW BLADES – DIAMOND					
66260301990	DS2062-250	2	1/16	1/4	40
66260391474	DS2094-250	2	3/32	1/4	40
66260391473	DS3094-250	3	3/32	1/4	40
66260363036	DS3094-375	3	3/32	3/8	40
66260395554	DS4094-500	4	3/32	1/2	40
66260300197	DS4094-750	4	3/32	3/4	40
66260312207 *	DS5094-500	5	3/32	1/2	40
66260395555 *	DS6094-500	6	3/32	1/2	40
66260395556 *	DS7062-500	7	1/16	1/2	40
66260395557	DS8094-625	8	3/32	5/8	40
66260391464 *	DS10125-625	10	1/8	5/8	40

DIAMOND SLOTTED CUT-OFF SAW BLADES ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action
3/4" wrap: additional 3/4" of electroplated diamond on the blade core	Increases life of blade on deep cuts, reduces binding and grinding on the core

Ideal for cutting-off highly abrasive materials such as alumina, fiberglass, plastics, and other nonmetallic composite materials.

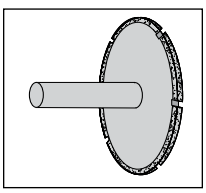


UPC #	PRODUCT #	DIAM.	OVERALL THICKNESS	HOLE SIZE	GRIT SIZE
SLOTTED CUT-OFF SAW BLADES – DIAMOND					
66260301989	DSS2062-250	2	1/16	1/4	40
66260364258	DSS3094-250	3	3/32	1/4	40
66260363015	DSS4094-375	4	3/32	3/8	40
66260395559	DSS4094-500	4	3/32	1/2	40
66260300360 +	DSS4094-750	4	3/32	3/4	40
66260395560	DSS6094-500	6	3/32	1/2	40
66260395561 *	DSS8094-500	8	3/32	1/2	40
66260362981	DSS10125-625	10	1/8	5/8	40
66260395563	DSS12125-500	12	1/8	1/2	40
66260362985 *	DSS12125-1	12	1/8	1	40
66260364253	DSS14156-500	14	5/32	1/2	40
66260362989	DSS14156-1	14	5/32	1	40
66260395565	DSS16156-1	16	5/32	1	40
66260395566	DSS18156-1	18	5/32	1	40
66260395567 *	DSS20156-1	20	5/32	1	40
SLOTTED CUT-OFF SAW BLADES WITH 3/4" WRAP – DIAMOND					
66260313422 *	DSSW4094-500	4	3/32	1/2	40
66260313423	DSSW4094-750	4	3/32	3/4	40
66260313433 *	DSSW5094-750	5	3/32	3/4	40

DIAMOND MOUNTED SAW BLADES ■

FEATURES	BENEFITS
Nickel alloy matrix	Tough, durable bond
Single layer of abrasive	Economical
Exposed particles	Aggressive cutting action

Ideal for cutting off highly abrasive materials such as alumina, fiberglass, plastics, and other nonmetallic composite materials.



UPC #	PRODUCT #	DIAM.	OVERALL THICKNESS	HOLE SIZE	GRIT SIZE
MOUNTED SAW BLADES – DIAMOND					
2" Overall Length					
66260395422	MDS1CD	1	3/32	1/4	40
66260395423	MDS1-1/2CD	1-1/2	3/32	1/4	40
66260395424	MDS2CD	2	3/32	3/8	40

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

NORTON DIAMOND LAPPING COMPOUND

DIAMOND LAPPING COMPOUND ● ▲

FEATURES	BENEFITS
▮ Diamond powders uniformly distributed in a liquid vehicle	▮ Aggressive polishing ▮ Consistent part quality
▮ Easy to use plastic syringe	▮ Quick clean-up

Performs on all materials – hard and soft. Excellent for mold, die and tool polishing, polishing to final tolerance of ceramic parts, initial charging of lapping plates and discs, and other processes that require mirror finish and close tolerance performance. Use oil soluble when solvent is used for clean-up, and water soluble when soap/water is used for clean-up.

PRODUCT #	MICRON GRADE		COLOR	UPC #
DIAMOND COMPOUND – WATER SOLUBLE				
5 Gram Syringes				
5PS1/4WSSTD	1/4	Ultra Fine	Gray	66260300362
5PS1/2WSSTD	1/2	Ultra Fine	Lt. Gray	66260300417
5PS1WSSTD	1	Ultra Fine	Ivory	66260300368
5PS3WSSTD	3	Super Fine	Yellow	66260300667
5PS6WSSTD	6	Super Fine	Orange	66260300372
5PS9WSSTD	9	Super Fine	Green	66260300375
5PS12WSSTD	12	Super Fine	Aqua	66260300376
5PS15WSSTD	15	Fine	Blue	66260300379
5PS20WSSTD	20	Fine	Auburn	66260300381 *
5PS30WSSTD	30	Fine	Red	66260300383
5PS45WSSTD	45	Fine	Brown	66260300384
5PS60WSSTD	60	Fine	Purple	66260300388
5PS90WSSTD	90	Fine	Black	66260300389
18 Gram Syringes				
18PS1/4WSSTD	1/4	Ultra Fine	Gray	66260300392
18PS1/2WSSTD	1/2	Ultra Fine	Lt. Gray	66260300394
18PS1WSSTD	1	Ultra Fine	Ivory	66260300396
18PS3WSSTD	3	Super Fine	Yellow	66260300398
18PS6WSSTD	6	Super Fine	Orange	66260300400
18PS9WSSTD	9	Super Fine	Green	66260300402
18PS12WSSTD	12	Super Fine	Aqua	66260300404 *
18PS15WSSTD	15	Fine	Blue	66260300406
18PS20WSSTD	20	Fine	Auburn	66260300408
18PS30WSSTD	30	Fine	Red	66260300410 *
18PS45WSSTD	45	Fine	Brown	66260300412 *
18PS60WSSTD	60	Fine	Purple	66260300414 *
18PS90WSSTD	90	Fine	Black	66260300416 *
Polishing Kit	Kit Includes: four 5 gram syringes of diamond paste: 3u, 6u, 15u, 30u; 4 pieces of substrate; 1 bottle of lubricant			07660702462 *

+ AVAILABLE AS STOCK WHILES SUPPLIES LAST; THEN AVAILABLE AS NON-STOCK.
*** NON-STOCK; CONTACT YOUR NORTON REPRESENTATIVE FOR CURRENT LEAD-TIMES.**

PRODUCT #	MICRON GRADE		COLOR	UPC #
DIAMOND COMPOUND – OIL SOLUBLE				
5 Gram Syringes				
5PS1/4OSSTD	1/4	UltraFine	Gray	61463691123 *
5PS1/2OSSTD	1/2	UltraFine	Lt. Gray	66260300363
5PS1OSSTD	1	UltraFine	Ivory	61463691133
5PS3OSSTD	3	Super Fine	Yellow	61463691138
5PS6OSSTD	6	Super Fine	Orange	61463691143
5PS9OSSTD	9	Super Fine	Green	61463691148
5PS12OSSTD	12	Super Fine	Aqua	66260300377 *
5PS15OSSTD	15	Fine	Blue	61463691153
5PS20OSSTD	20	Fine	Auburn	66260300380 *
5PS30OSSTD	30	Fine	Red	61463691158
5PS45OSSTD	45	Fine	Brown	61463691163
5PS60OSSTD	60	Fine	Purple	66260300386
5PS90OSSTD	90	Fine	Black	66260300390
18 Gram Syringes				
18PS1/4OSSTD	1/4	UltraFine	Gray	66260300391
18PS1/2OSSTD	1/2	UltraFine	Lt. Gray	66260300393 *
18PS1OSSTD	1	UltraFine	Ivory	61463691134 *
18PS3OSSTD	3	Super Fine	Yellow	61463691139
18PS6OSSTD	6	Super Fine	Orange	66260300399
18PS9OSSTD	9	Super Fine	Green	61463691149 *
18PS12OSSTD	12	Super Fine	Aqua	66260300403 *
18PS15OSSTD	15	Fine	Blue	61463691154
18PS20OSSTD	20	Fine	Auburn	66260300407
18PS30OSSTD	30	Fine	Red	66260300409
18PS45OSSTD	45	Fine	Brown	61463691164 *
18PS60OSSTD	60	Fine	Purple	66260300413
18PS90OSSTD	90	Fine	Black	66260300415

TARGET MARKET SYMBOLS: ● CERAMICS ▲ TOOL & DIE ■ COMPOSITES

MARKING SYSTEM

5 PS 1/4 OS STD

SYRINGE SIZE	CARTRIDGE TYPE	MICRON GRADE	VEHICLE TYPE	CONCENTRATION
5 Gram	**PS**	**1/4 – Gray**	**OS**	**Standard**
18 gram	(Plastic Syringe)	½ – Light Gray	(Oil Soluble)	
		1 – Ivory	WS	
		3 – Yellow	(Water Soluble)	
		6 – Orange		
		9 – Green		
		12 – Aqua		
		15 – Blue		
		20 – Auburn		
		30 – Red		
		45 – Brown		
		60 – Purple		

SPECcheck

DIAMOND COMPOUND APPLICATION GUIDE

APPLICATION	MICRON GRADE	MICRON RANGE	MESH SIZE EQUIVALENT	COLOR	CONC.
ULTRA FINE	1/4	(0-1/2)	100,000	Gray	Std.
Applying finest finishes	1/2	(0-1)	60,000	Lt. Gray	Std.
on metals and ceramics	1	(0-2)	14,000	Ivory	Std.
SUPER FINE	3	(2-4)	8,000	Yellow	Std.
Final finishing for	6	(4-8)	3,000	Orange	Std.
dies, molds, seals, most	9	(8-12)	1,800	Green	Std.
applications (RMS 4-12)	12	(9-15)	1,500	Aqua	Std.
FINE FINISH	15	(12-22)	1,200	Blue	Std.
Preparatory lapping	20	(15-25)	800	Auburn	Std.
(RMS 12-20)	30	(22-36)	600	Red	Std.
	45	(36-45)	325	Brown	Std
	60	(54-80)	230	Purple	Std.
	90	(80-100)	170	Black	Std.

TECHtip

AVOID GRINDING STEEL

- Avoid steel when grinding with diamond wheels. Keep the amount of steel ground to an absolute minimum.
- On brazed tools, use aluminum oxide wheel to back off the steel shank.
- A high lubricity grinding fluid should be used.
- For some steels, an armored (AMD) diamond wheel may prove most economical.

USE RIGID WORK SUPPORT

- All workpieces should be supported firmly during the grinding process. Any amount of vibration will cause wheel wear and produce chatter or wave marks on the ground surface.
- On work ground between centers, centerholds should be properly prepared.
- Minimize work overhang.
- If the ground work is supported by a work finger, ensure the finger is strong enough to provide vibration-free support.

COOLANT – GRIND WET

- Diamond wheels should be used with a full flood coolant properly directed toward the grinding zone. Water with a rust inhibitor is recommended.
- Vitrified diamond wheels should be used only with a coolant.
- When flood application can't be used, try mist or spray application.
  - Use compressed air to "atomize" water or soluble oil.
  - Direct the spray at the grinding zone to help dissipate heat and prevent heat damage to the work.

AVOID EXCESSIVE FEEDS

- Excessive feeds will result in premature wheel wear. Excessive feed rates are characterized by:
  - A hard grinding sound
  - Chatter
  - Burn
  - High wheel wear rate
  - Vibration

SPECcheck

TROUBLESHOOTING GUIDE – DRY GRINDING

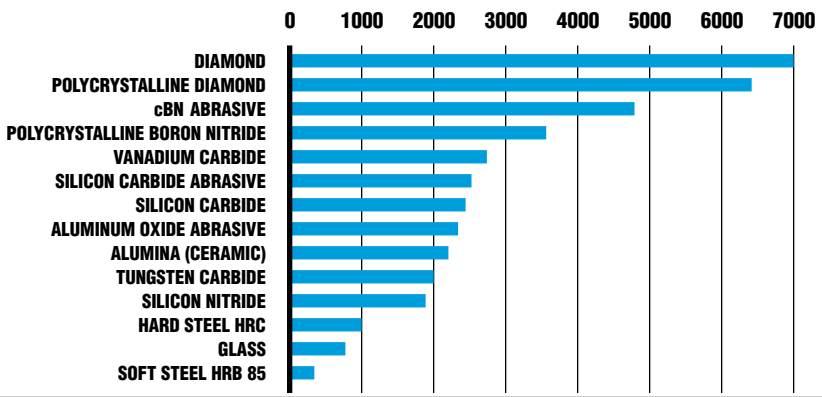
PROBLEM	POSSIBLE CAUSES	SUGGESTED CORRECTION
Burning (excessive heat)	Wheel loaded or glazed	Dress wheel with a dressing stick
	Excessive feed rate	Reduce infeed of wheel or workpiece
	Wheel too durable	Use freer cutting specification or slow down wheel speed
Poor finish	Grit size too coarse	Select a finer grit size
	Excessive feed rate	Reduce infeed of wheel or workpiece
Chatter	Wheel out of truth	True wheel; ensure it is not slipping on mount (See "Mounting, Truing and Dressing Guide")

TROUBLESHOOTING GUIDE – WET GRINDING

PROBLEM	POSSIBLE CAUSES	SUGGESTED CORRECTION
Burning (excessive heat)	Wheel glazed or loaded	Re-dress wheel
	Poor coolant placement	Apply coolant directly to wheel/workpiece interface
	Excessive material removal rate	Reduce downfeed and/or crossfeed
Poor finish	Excessive dressing	Use lighter dressing pressure Stop dressing as soon as wheel starts to consume stick rapidly
	Grit size too coarse	Select a finer grit size
	Poor coolant flow or location	Apply heavy flood so it reaches wheel/work interface
Chatter	Wheel out of truth	True wheel; ensure it is not slipping on mount
Wheel will not cut	Glazed by truing	Dress lightly until wheel opens up
	Wheel loaded	Dress lightly until wheel opens up Increase coolant flow to keep wheel surface clean Never run wheel with coolant turned off
Slow cutting	Low feeds and speeds	Increase feed rate; increase wheel speed (Do not exceed wheel MOS)
Short wheel life	Incorrect coolant flow	Apply coolant to flood wheel/work surface
	Low wheel speed	Increase wheel speed (observe maximum operating speed)
	Excessive dressing	Use lighter dressing pressure
	Wheel too soft or too hard	Change grit or grade; use higher concentration

MATERIAL HARDNESS SCALE

Superabrasives is a term used to describe those abrasives of extreme hardness which produce outstanding results when properly used on specific applications. The following chart provides a hardness comparison (Knoop Hardness Scale) between diamond and cBN superabrasives, aluminum oxide and silicon carbide standard abrasives, and some common materials these abrasives are used to grind.



DECIMAL AND METRIC EQUIVALENTS OF COMMON FRACTIONS

FRACTIONS OF AN INCH	DECIMALS OF AN INCH	MILLIMETERS
1/64	.0156	0.397
1/32	.0313	0.794
3/64	.0469	1.191
1/16	.0625	1.588
5/64	.0781	1.985
3/32	.0938	2.381
7/64	.1094	2.778
1/8	.1250	3.175
9/64	.1406	3.572
5/32	.1563	3.969
11/64	.1719	4.366
3/16	.1875	4.762
13/64	.2031	5.159
7/32	.2188	5.556
15/64	.2344	5.953
1/4	.2500	6.350
17/64	.2656	6.747
9/32	.2813	7.144
19/64	.2969	7.541
5/16	.3135	7.937
21/64	.3281	8.334
11/32	.3438	8.731
23/64	.3594	9.128
3/8	.3750	9.525
25/64	.3906	9.922
13/32	.4063	10.319
27/64	.4219	10.716
7/16	.4375	11.112
29/64	.4531	11.509
15/32	.4688	11.906
31/64	.4844	12.303
1/2	.5000	12.700
33/64	.5156	13.097
17/32	.5313	13.494
35/64	.5469	13.891
9/16	.5625	14.287
37/64	.5781	14.684
19/32	.5938	15.081
39/64	.6094	15.478
5/8	.6250	15.875
41/64	.6406	16.272
21/32	.6563	16.688
43/64	.6719	17.085
11/16	.6875	17.462
45/64	.7031	17.859
23/32	.7188	18.256
47/64	.7344	18.653
3/4	.7500	19.050
49/64	.7645	19.447
25/32	.7813	19.843
51/64	.7969	20.240
13/16	.8125	20.637
53/64	.8281	21.034
27/32	.8438	21.430
55/64	.8594	21.827
7/8	.8750	22.224
57/64	.8906	22.621
29/32	.9063	23.018
59/64	.9219	23.415
15/16	.9375	23.812
61/64	.9531	24.209
31/32	.9688	24.606
63/64	.9844	25.003
1	1.0000	25.400

EXPECTED SURFACE FINISH BY GRIT SIZE FOR RESIN BOND

Use these charts as guides only. Surface finish is affected by several variables: machine type and condition, type of material ground, coolant, wheel speed, bond system, etc.

Diamond

GRIT SIZE	EXPECTED FINISH MICRO INCH AA	MAXIMUM DEPTH OF CUT PER PASS FOR GRIT SIZE
100	24 to 32	0.001" to 0.002"
120	16 to 18	0.001" to 0.002"
150	14 to 16	0.001" to 0.002"
180	12 to 14	0.0007" to 0.001"
220	10 to 12	0.0007" to 0.001"
320	8	0.0004" to 0.0006"
400	7 to 8	0.0003" to 0.0005"

cBN

GRIT SIZE	EXPECTED FINISH WITH OSCILLATION	EXPECTED FINISH PLUNGE
100	35 – 40	40 – 45
120	30 – 35	35 – 40
150	25 – 30	30 – 35
180	20 – 25	25 – 30
220	15 – 20	20 – 25
320	10 – 15	15 – 20
400	4 – 8	5 – 10

REFER TO ELECTROPLATED GENERAL INFORMATION FOR FINISHES BY GRIT SIZE FOR ELECTROPLATED WHEELS.

RECOMMENDED WHEEL SPEEDS FOR DIAMOND AND cBN WHEELS

WET GRINDING

	CUP WHEELS	PERIPHERAL WHEELS
DIAMOND GRINDING WHEELS		
	11V9, 12V9, 15V9, etc.	**1A1, 1V1, 1A1R, etc.**
Resin Bond Wheels	4921 to 7874 SFPM 25 to 40 m/s	4921 to 7874 SFPM 25 to 40 m/s
Metal Bond Wheels		3937 to 5906 SFPM 20 to 30 m/s
Vitrified Bond Wheels	2953 to 5906 SFPM 15 to 30 m/s	2953 to 5906 SFPM 15 to 30 m/s
cBN GRINDING WHEELS		
Resin Bond Wheels	5906 to 9843 SFPM 30 to 50 m/s	5906 to 9843 SFPM 30 to 50 m/s

DRY GRINDING

	CUP WHEELS	PERIPHERAL WHEELS
DIAMOND GRINDING WHEELS		
	11V9, 12V9, 15V9, etc.	**1A1, 1V1, 1A1R, etc.**
Resin Bond Wheels	2756 to 3543 SFPM 14 to 18 m/s	2756 to 3543 SFPM 14 to 18 m/s
cBN GRINDING WHEELS		
Resin Bond Wheels	2953 to 5906 SFPM 15 to 30 m/s	2953 to 5906 SFPM 15 to 30 m/s

NOTE: THESE ARE NOT THE MAXIMUM OPERATING SPEEDS (MOS).
CONSULT ANSI B7.1 OR CONTACT YOUR NORTON REPRESENTATIVE FOR MOS.

WHEEL SPEED CALCULATION:

To convert m/s to SFPM:	**Multiply M/S x 196.85 = SFPM**
To convert SFPM to M/S:	**Divide SFPM by 196.85 = M/S**
To convert RPM to SFPM:	**Multiply wheel diameter in inches x RPM x 0.262**

M/S = METERS/SECOND RPM = REVOLUTIONS PER MINUTE SFPM = SURFACE FEET PER MINUTE

CONVERSION TABLE – WHEEL SPEEDS

Revolutions Per Minute for various diameters of grinding wheels – to give Surface Speed in Feet Per Minute as indicated

(for wheel marking purposes the calculated RPM figures listed below are rounded off to the next 5)

DIAMETER OF WHEEL IN INCHES	SURFACE SPEED IN FEET PER MINUTE (SFPM)																				
	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500	9,000	9,500	10,000	12,000	12,500	14,200	16,000	16,500	17,000	19,685	20,000
	REVOLUTIONS PER MINUTE (RPM)																				
1	15,279	17,189	19,098	21,008	22,918	24,828	26,737	28,647	30,558	32,467	34,377	36,287	38,196	45,836	47,745	54,240	61,116	63,025	64,935	75,190	76,395
2	7,639	8,594	9,549	10,504	11,459	12,414	13,368	14,328	15,278	16,238	17,188	18,143	19,098	22,918	23,875	27,120	30,558	31,510	32,465	37,595	38,195
3	5,093	5,729	6,366	7,003	7,639	8,276	8,913	9,549	10,186	10,822	11,459	12,096	12,732	15,278	15,915	18,080	20,372	21,010	21,645	25,065	25,465
4	3,820	4,297	4,775	5,252	5,729	6,207	6 685	7,162	7,640	8,116	8,595	9,072	9,549	11,459	11,940	13,560	15,278	15,755	16,235	18,800	19,100
5	3,056	3,438	3,820	4,202	4,584	4,966	5,348	5,730	6,112	6,494	6,876	7,258	7,640	9,168	9,550	10,850	12,224	12,605	12,985	15,040	15,280
6	2,546	2,865	3,183	3,501	3,820	4,138	4,456	4,775	5,092	5,411	5,729	6,048	6,366	7,639	7,960	9,040	10,186	10,505	10,820	12,530	12,730
7	2,183	2,455	2,728	3,001	3,274	3,547	3,820	4,092	4,366	4,638	4,911	5,183	5,456	6,548	6,820	7,750	8,732	9,005	9,275	10,740	10,915
8	1,910	2,148	2,387	2,626	2,865	3,103	3,342	3,580	3,820	4,058	4,297	4,535	4,775	5,729	5,970	6,780	7,640	7,880	8,115	9,400	9,550
9	1,698	1,910	2,122	2,334	2,546	2,758	2,970	3,182	3,396	3,606	3,820	4,032	4,244	5,092	5,305	6,030	6,792	7,000	7,215	8,355	8,490
10	1,528	1,719	1,910	2,101	2,292	2,483	2,674	2,865	3,056	3,247	3,438	3,629	3,820	4,584	4,775	5,425	6,112	6,300	6,495	7,520	7,640
12	1,273	1,432	1,591	1,751	1,910	2,069	2,228	2,386	2,546	2,705	2,864	3,023	3,183	3,820	3,980	4,520	5,092	5,250	5,410	6,265	6,365
14	1,091	1,228	1,364	1,500	1,637	1,773	1,910	2,046	2,182	2,319	2,455	2,592	2,728	3,274	3,410	3,875	4,366	4,500	4,640	5,370	5,455
16	955	1,074	1,194	1,313	1,432	1,552	1,672	1,791	1,910	2,029	2,149	2,268	2,387	2,865	2,985	3,390	3,820	3,940	4,060	4,700	4,775
18	849	955	1,061	1,167	1,273	1,379	1,485	1,591	1,698	1,803	1,910	2,016	2,122	2,546	2,655	3,015	3,396	3,500	3,605	4,175	4,245
20	764	859	955	1,050	1,146	1,241	1,337	1,432	1,528	1,623	1,719	1,814	1,910	2,292	2,390	2,715	3,056	3,150	3,245	3,760	3,820
22	694	781	868	955	1,042	1,128	1,215	1,302	1,388	1,476	1,562	1,649	1,736	2,084	2,170	2,465	2,776	2,865	2,950	3,420	3,470
24	637	716	796	875	955	1,034	1,115	1,194	1,274	1,353	1,433	1,512	1,591	1,910	1,990	2,260	2,546	2,625	2,705	3,135	3,185
26	588	661	734	808	881	955	1,028	1,101	1,176	1,248	1,322	1,395	1,468	1,762	1,840	2,090	2,352	2,425	2,495	2,890	2,940
28	546	614	682	750	818	887	955	1,023	1,092	1,159	1,228	1,296	1,364	1,637	1,705	1,940	2,182	2,250	2,320	2,685	2,730
30	509	573	637	700	764	828	891	955	1,018	1,082	1,146	1,210	1,274	1,528	1,595	1,810	2,056	2,100	2,165	2,505	2,545
32	477	537	597	656	716	776	836	895	954	1,014	1,074	1,134	1,194	1,432	1,495	1,695	1,910	1,970	2,030	2,350	2,385
34	449	505	562	618	674	730	786	843	898	955	1,011	1,067	1,124	1,348	1,405	1,595	1,796	1,855	1,910	2,210	2,245
36	424	477	530	583	637	690	742	795	848	902	954	1,007	1,061	1,273	1,330	1,510	1,698	1,750	1,085	2,090	2,120
38	402	452	503	553	603	653	704	754	804	854	904	955	1,006	1,206	1,260	1,430	1,608	1,660	1,710	1,980	2.010
40	382	430	478	525	573	620	669	716	764	812	860	908	956	1,146	1,195	1,355	1,528	1,575	1,625	1,880	1,910
42	366	409	454	500	545	591	636	682	732	775	818	863	908	1,090	1,140	1,295	1,464	1,500	1,545	1,790	1,820
44	347	390	434	478	521	564	608	651	694	737	780	824	868	1,042	1,085	1,235	1,388	1,432	1,475	1,710	1,735
46	333	375	416	458	500	541	582	624	666	708	750	791	832	1,000	1,040	1,180	1,332	1,370	1,410	1,635	1,660
48	318	358	398	438	478	517	558	597	636	676	716	756	796	956	995	1,130	1,272	1,315	1,350	1,565	1,590
53	288	324	360	395	432	468	503	539	576	612	648	683	720	864	900	1,025	1,152	1,189	1,225	1,420	1,440
60	255	287	319	350	387	414	446	478	510	542	574	606	638	774	795	905	1,020	1,050	1,080	1,255	1,275
72	212	239	265	291	318	345	371	398	424	451	477	504	530	637	665	755	849	875	905	1,045	1,060

FOR INTERMEDIATE DIAMETERS NOT LISTED USE THE FORMULA LISTED IN SECTION 1.2.10 OF ANSI B7.1 (SFPM = .262 X WHEEL DIAMETER IN INCHES X RPM.)
TO CONVERT METERS PER SECOND (M/S) TO SFPM: M/S X 196.85 = SFPM. TO CONVERT SFPM TO M/S: SFPM/196.85 = M/S. TO CONVERT RPM TO SFPM: WHEEL DIAMETER IN INCHES X RPM X 0.262 = SFPM

FOR YOUR PROTECTION

Safety Gloves

Grinding applications are conducted in harsh environments. The use of proper fitting gloves is recommended.

Face and Eye Protection

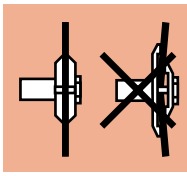
Always wear government-approved face and eye protection when using abrasive products.

Speeds

Check machine spindle speed and speed listed on machine against safe maximum operating speed marked on the grinding wheel. Do not overspeed the wheel.

Hearing Protection

Use of abrasive products may create elevated sound levels. Hearing protection must be worn where required.



Flanges

When mounting most grinding wheels, use flanges of equal diameter and bearing surface. For exceptions, see ANSI B7.1.

Wheel Guard

Always use the wheel guard as supplied by the machine manufacturer, in the proper position.

Safety Guides, MSDS and Wheel Warning Messages

Before using any abrasive materials, READ:

- The Safety Guides
- Wheel Warning Messages and
- Material Safety Data Sheets (MSDS)

Norton provides information pertaining to the safe use of all products. Please take the time to read it carefully. Contact suppliers of the workpiece and abrasive materials for copies of the MSDS if one is not readily available. Norton abrasives MSDS can be obtained on www.nortonabrasives.com

Dust Protection

Exposure to dust generated from workpiece and/or abrasive materials can result in lung damage and/or other physical injury.

Use dust capture or local exhaust as stated in the MSDS. Wear government-approved respiratory protection and eye and skin protection.

Failure to follow this warning can result in serious lung damage and/or physical injury.

This is a general dust warning and does not cover specific situations. For more information, refer to the MSDS dust warning provided with your products, and workpiece.

Blotter

Use paper or plastic blotters only when mounting superabrasive wheels with vitrified cores. Using paper or plastic blotters on any other core material may result in the wheel loosening during grinding.

Warning

This warning icon appears on our products and packaging. It is intended to draw your attention to the specific safety warning practices outlined after it.

SAFE OPERATING PRACTICES

Safe operating practices must be part of every grinding wheel user's operation. The greatest efficiency and lowest overall abrasive cost can be realized only if proven care and use techniques become standard practice.

- Be sure to read any safety material/ guidelines provided with the abrasive product.
- Always check the wheel for cracks or damage before use.
- Before mounting the wheel, use a tachometer to measure the spindle speed.
- Ensure the mounting flanges, backplate or adapter supplied by the machine manufacturer are properly used and kept in good condition. ANSI Safety Requirement B7.1 provides wheel mounting requirements. Check mounting flanges for equal and correct diameter.
- Never use a grinding wheel with a rated speed less than the grinder.
- Always mount, true and dress the wheel in conformance with the guidelines published in the ANSI Safety Requirements B7.1.
- Ensure the correct wheel guard is in place before starting the wheel. Allow the wheel to come up to full operating speed before starting to grind for a minimum of one minute, and stand out of the plane of rotation.
- NEVER use a high speed air sander as a portable grinder.
- NEVER exceed the maximum operating speed marked on the wheel being used. The following formula may be used to calculate wheel speed:
  SFPM = Spindle Speed in RPM x Wheel Diameter in inches x .262
- Avoid dropping or bumping the wheel.
- When not using the wheel, store the wheel in its original packing materials or according to ANSIB7.1. This protects the wheel and provides easy identification.

For more information on product safety, click on "Safety" on our website: www.nortonabrasives.com or ask your Norton Distributor for these publications:

- "Primer on Grinding Wheel Safety" (form 474)
- Portable Grinding Safety (form 1406)
- ANSI B7.1 "Safety Requirements for the Use, Care and Protection of Abrasive Wheels"
- Federal Hazard Communication Standard 29 CFR 1910.95, 1910.132, 1910.133, 1910.134, 1910.138 and 1910.1200.
- Material Safety Data Sheets (MSDS)
- Norton Safety Videos
- Other applicable regulations

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NORTON HAS THE MOST COMPREHENSIVE LINE OF PREMIUM SUPERABRASIVE PRODUCTS

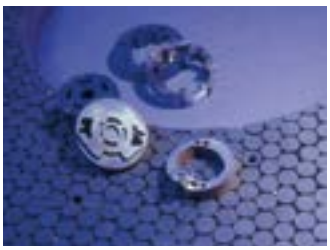
Also available:

Norton MSL (Metal Single Layer) Wheels and Tools

Get superior performance when grinding or cutting friction or composite materials. Norton MSL wheels and tools consist of a single, uniform layer of diamond or cBN in a metal bond, and always offer the advantages of long life and consistent cut rates.

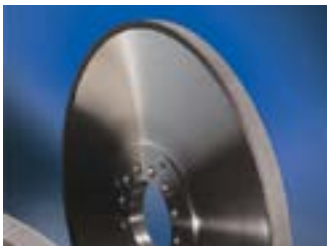
Norton/Winter Made-To-Order Electroplated Products

Our Norton/Winter quality electroplated products are engineered to your exact requirements. We will manufacture them to your blueprints or design a product to produce the desired profile from your component blueprints.



Micro-Grinding with Planetary Kinematics (GPK) Products

Engineered for high-production grinding, targeted at applications with flatness value requirements of 0.1 – 1um. Available in diamond and cBN abrasives, vitrified and resin bonds.



Vitrified cBN Wheels Excel in High-Production Applications

Achieve complex geometries, tight tolerances, and burn-free finishes on hard-to-grind materials – along with high metal removal rates.

Norton Rotary Dressing Tools

The premier dressing solutions for high-speed grinding.

Wheel Dressing and Norton Dressing Infeed Systems and Spindles

With speeds ranging from 1,000 to 20,000+ RPMs, high torque, and their compact design, these systems are ideal for any truing and dressing requirements.

All Norton Superabrasive products are manufactured in state of-the-art facilities, and are supported by a dedicated and knowledgeable team of Sales Representatives, CSRs, and Application Engineers. All these products can be ordered through our extensive network of authorized distributors.

NORTON
SAINT-GOBAIN

DIAMOND AND cBN SUPERABRASIVE
STANDARD PRODUCTS

Paradigm Diamond CNC Wheels for Round Tool and Insert Grinding

Lights out, on-line truable CNC wheels. Ground-breaking invention of an extreme porosity metal bond system. Maximize your productivity and lower your costs today with the Paradigm Shift in grinding.

G-Force/Univel CNC Wheels for Round Tool Grinding

The performance standard for carbide and steel round tool grinding with metal/hybrid technology: high form-holding capability, premium abrasives and a unique bond ensure lasting sharp cutting edges. Available in cBN and diamond abrasives.

Norton B99, B99E and Special Resin Stock Grinding Wheels

Largest diamond and cBN resin-bonded offering for wet and dry MRO and toolroom applications. Time-tested, consistent, and reliable. 250+ stock wheels and over 65,000 express lead time made-to-order wheels.

Single Layer Wheels and Tools

From mounted points to hand hones, files, and blades, a complete selection of single layer stock diamond and cBN tools for the ceramic, tool and die, composite, and MRO markets. Also available, made-to-order high-precision and production CNC single layer products for automotive, aerospace, bearing, and cutting tool applications.

Norton Stationary Dressing Tools

One of the most comprehensive stock offerings in the industry made with the highest quality diamonds for consistent performance and geometries. Our lean manufacturing facility can also make your made-to-order designs in short lead times.

BEST
Highest Productivity – Lowest Total Cost

BETTER
Excellent Blend of Performance and Price

GOOD
Consistent Performance – Low Initial Price

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