

NORTON

2010 2011

STOCK PRE-ENGINEERED EXPRESS MADE-TO-ORDER

DIAMOND AND cBN WHEELS



**ADVANCING THE SCIENCE
OF GRINDING**

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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



Norton No-Risk Test Policy

There is no better time to improve productivity in your abrasive operations. Saint-Gobain's new No-Risk Productivity Policy is designed to help you improve any of your production goals including improved cycle times, lower total production costs, higher quality parts, or improved finish, while eliminating any risk. You define the metrics that determine a successful test as well as what is necessary to eliminate any risks, and our technical salesperson will identify the right product to help you meet your production needs, no matter what competitive product you are currently using.

WHAT DOES NO RISK MEAN?

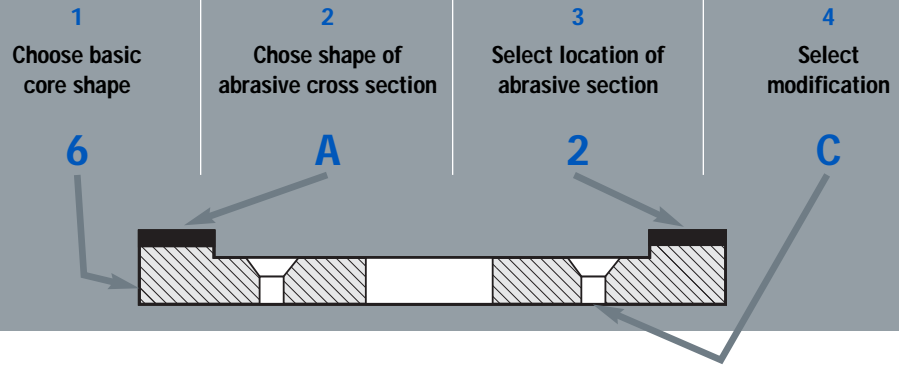
- 1 You have absolutely nothing to lose and everything to gain.
- 2 You define the application requirements and the metrics of a successful test.
- 3 You define the definition of No-Risk in terms of cost to test, downtime, part rejection, and any other risk that is important to you.
- 4 You define the time period of the test.

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

| | | | | |
|---|----|----|----|----|
| | | | | |
| 1 | 2 | 3 | 4 | 6 |
| | | | | |
| 9 | 11 | 12 | 14 | 15 |

2. ABRASIVE CROSS SECTIONS AND MARKS

| | | | | | | | | | | | | |
|---|----|---|----|----|---|----|----|----|---|----|---|---|
| | | | | | | | | | | | | |
| A | AH | B | C | CH | D | DD | E | EE | F | FF | G | H |
| | | | | | | | | | | | | |
| J | K | L | LL | M | P | Q | QQ | S | U | V | Y | |

3. LOCATION OF ABRASIVE SECTION AND MARKS

| | | | | | | | |
|---------------|----------|----------------|-------------------------|--------------------------|-----------------------|------------------|--------------|
| | | | | | | | |
| 1 - PERIPHERY | 2 - SIDE | 3 - BOTH SIDES | 4 - INSIDE BEVEL OR ARC | 5 - OUTSIDE BEVEL OR ARC | 6 - PART OF PERIPHERY | 7 - PART OF SIDE | 9 - CORNER |
| | | | | | | | |
| | | | | | | 8 - THROUGHOUT | 10 - ANNULAR |

4. POPULAR MODIFICATIONS AND MARKS

| | | | | | | |
|-------------------------------|---------------------------|--------------------------------|---|-------------------------------|--------------------|--|
| | | | | | | |
| B - DRILL AND COUNTERBORE | C - DRILL AND COUNTERSINK | H - PLAIN HOLE | K - KEYWAY | M - HOLES PLAIN AND THREADED | T - THREADED HOLES | P - RELIEVED ONE SIDE |
| | | | | | | |
| Q - ABRASIVE SECTION INSERTED | R - RELIEVED TWO SIDES | S - ABRASIVE SECTION SEGMENTED | SS - ABRASIVE SECTION SEGMENTED AND SLOTTED | V - ABRASIVE SECTION INVERTED | W - STEMMED | Y - ABRASIVE SECTION INSERTED AND INVERTED |

WHEEL SHAPE INDEX

| ILLUSTRATION ■ DIAMOND OR cBN MATERIAL | WHEEL SHAPE | AVAILABILITY | | | | | |
|---|-----------------------|--------------|------------------------|------------------------------|---|----------------------------|----------------------------------|
| | | NORTON STOCK | NORTON/WINTER TOOLROOM | NORTON B99 EXPRESS MTO RESIN | CNC WHEELS: NORTON UNIVEL NORTON G-FORCE NORTON/WINTER NORTON | NORTON/WINTER SAW GRINDING | NORTON SILVER EAGLE SAW GRINDING |
| | DW | 16 | | | | | |
| | HH1 | 16 | | | | | |
| | HH2 | 16 | | | | | |
| | 1A1 | 16–17 | 24 | 35 | 61, 64 | 70 | 82, 87 |
| | 1A1 ASSEMBLY | | | 36 | | | |
| | 1A1R | 18 | 24 | 36 | 61 | 70 | 82 |
| | 1A1W | | | | | 70 | |
| | 1A8 | | | 37 | | | |
| | 1B1 | | | 37 | 61, 64 | | |
| | 1E1 | | | 37 | | | |
| | 1EE1 | | | 37 | | | |
| | 1F1 | | | 38 | 61 | | |
| | 1FF1 | | | 38 | 61 | | |
| | 1V1 | 18 | 24–25 | 39 | 62, 64 | | |
| | 2A2T | | 25 | 40 | | | 82 |
| | 3A1 | | | 41 | | 70 | 82, 87 |
| | 4A2 & 4A2P | 19 | 26 | 42 | | 71–72 | 83, 87 |
| | 4Y1 | | | 43 | | | |

SEE THE NORTON/WINTER SECTIONS FOR SHAPES UNIQUE TO NORTON/WINTER:
1M+B1, 1V1R, 1V+C1R, 3A1R, 3A2, 4A9, 4C9, 4V+F9, 9A3, 11C9, 11V2, 11V5, 14V1, AND 14V5



WHEEL SHAPE INDEX

| ILLUSTRATION ■ DIAMOND OR cBN MATERIAL | WHEEL SHAPE | AVAILABILITY | | | | | |
|--|-------------|--------------|------------------------|------------------------------|---|----------------------------|----------------------------------|
| | | NORTON STOCK | NORTON/WINTER TOOLROOM | NORTON B99 EXPRESS MTO RESIN | CNC WHEELS: NORTON UNIVEL NORTON G-FORCE NORTON/WINTER NORTON | NORTON/WINTER SAW GRINDING | NORTON SILVER EAGLE SAW GRINDING |
| | 6A2 | | 27 | 44 | 62, 65 | 72 | 83 |
| | 6A2C | 19 | | 45-46 | | | |
| | 6A2H | 19 | | | | | 83 |
| | 6A9 | | | 47 | | | 87 |
| | 6VV5 | | | | | 73 | |
| | 11A2 | 19 | 27 | 48 | 62, 65 | | 84 |
| | 11V9 | 20-21 | 29 | 49-51 | 63, 66 | 73, 78 | 84, 87 |
| | 12A2 | 22 | | 51-52 | | | 84, 88 |
| | 12VV5 | | | | | 74-75 | |
| | 12V9 | 22 | 30 | 53-54 | 63, 66 | 74-75, 78 | 85, 88 |
| | 14A1 | | 31 | 55 | | | 85 |
| | 14F1 | | | | 63 | 76 | 85-86, 88 |
| <small>SEE ANSI PAGE 5 ABRASIVE CROSS SECTION "F" NEED A CURVED RADIUS ON BOTH SIDES OF OUTSIDE OF DIAMOND SECTION</small> | 14FF1 | | 31 | | | 76, 79 | |
| | 14M1 | | | | | 77 | 86 |
| | 15A2 | | | 56 | | | |
| | 15V4 | | | 57 | | | |
| | 15V9 | 22 | | 58-59 | | 77, 79 | |

SEE THE NORTON/WINTER SECTIONS FOR SHAPES UNIQUE TO NORTON/WINTER: 1M+B1, 1V1R, 1V+C1R, 3A1R, 3A2, 4A9, 4C9, 4V+F9, 9A3, 11C9, 11V2, 11V5, 14V1, AND 14V5



Norton Diamond Product Identification System / Usage Information

ASD 120 – R 75 B99 1/8

| ABRASIVE TYPE | GRIT SIZE | GRADE | CONCENTRATION | BOND | ABRASIVE DEPTH |
|---|--|--|---|---|--|
| ASD <ul style="list-style-type: none"> Used with B99 and B105 bonds Armored Durable Versatile Wet or dry Carbide/steel operations CD <ul style="list-style-type: none"> Used with B99 bond D <ul style="list-style-type: none"> Used with B99 bond Micron-sized diamond; finishing M3D <ul style="list-style-type: none"> Used with M99 bond M4D <ul style="list-style-type: none"> Used with M99 bond Armored Durable; for non-metallics RMD <ul style="list-style-type: none"> Used with V99 bond SD <ul style="list-style-type: none"> Used with B99 and V99 bonds Norton standard Wet or dry Free cutting Low horsepower (3/4 hp or less) | <ul style="list-style-type: none"> 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 | Resin Bond R – Norton standard N – Free cutting Metal Bond N – Norton standard Vitrified Bond P – Norton standard R – Most durable | 50 <ul style="list-style-type: none"> Most economical For broad area of contact 75 <ul style="list-style-type: none"> Norton standard Freer cutting than 100 Dry grinding with ASD 100 <ul style="list-style-type: none"> Very durable For flood coolants Use with 220 grit or finer Use for cutting-off 115 <ul style="list-style-type: none"> For CNC grinding machines 125 <ul style="list-style-type: none"> Form holding For high volume, high pressure coolant, precision applications on high-speed tool steels | B99 <ul style="list-style-type: none"> Resin bond Wet or dry Tool making; resharpening B105 <ul style="list-style-type: none"> Premium resin bond Advanced heat-reducing bond Dry; reconditioning B610 and B80 <ul style="list-style-type: none"> For CNC grinding machines M99 <ul style="list-style-type: none"> Metal bond 1A1R cut-off Glass and ceramics MSL <ul style="list-style-type: none"> Metal single layer Type 6A2C only Dry Offhand reconditioning/finishing carbide V99 <ul style="list-style-type: none"> Vitrified bond Offhand finishing of carbide tools Plunge grinding | 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 | GRIT SIZE | GRADE | BOND | ABRASIVE DEPTH |
|---|---|--|---|---|
| CB – cubic Boron Nitride <ul style="list-style-type: none"> Used with B99 bond Armored Wet or dry BAM & BX – cubic Boron Nitride <ul style="list-style-type: none"> For CNC grinding machines | <ul style="list-style-type: none"> 100 – Roughing 120 – Roughing/cutting-off 150 – Combined roughing and finishing 180 – Improving finish 220, 320, 400 – For finishing only | Q <ul style="list-style-type: none"> Approx. 50 concentration Type 6A2 Broad area of contact T <ul style="list-style-type: none"> Approx. 75 concentration Norton standard First choice Lower horsepower Broad area of contact Dry grinding Resharpening applications W <ul style="list-style-type: none"> Approx. 100 concentration Most durable High volume coolant Flute polishing Surface grinding Cylindrical grinding | B99 <ul style="list-style-type: none"> Resin bond Wet or dry BXD3037 and WBB & WBE <ul style="list-style-type: none"> For CNC grinding machines Aztec III <ul style="list-style-type: none"> Premium resin bond Dry Tool resharpening Aztec .007 <ul style="list-style-type: none"> Premium resin bond Dry Increased feed rates Heavy stock removal Heavier cuts | 1/16" 1/8" 1/4" 1/2" (New!) Solid |

Norton/Winter Diamond Product Identification System / Usage Information

D 220 – C 100 K+ 925 Y A

| ABRASIVE TYPE | GRIT SIZE | GRADE | CONCENTRATION | BOND | BOND MODIFIER #1 | BOND MODIFIER #2 | CORE |
|--------------------|---|------------------|------------------------------|--|---|--|--|
| D – Diamond | <ul style="list-style-type: none"> • 100 – Roughing • 120 – Roughing/cutting-off • 150 – Combined roughing and finishing • 180 – Improving finish • 220+ – Finishing | C J N R | 50 75 90 100 125 | K+ <ul style="list-style-type: none"> • Diamond Resin Reptilla <ul style="list-style-type: none"> • Economical free-cutting, resin M+ <ul style="list-style-type: none"> • Diamond metal | 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 | X – Use when small percentage of steel is present Y – Use when wet grinding | A – Aluminum B – Resin D – Bakelite E – Steel H – Powered Aluminum None – Resin with metal fillers (for most specs) |



Norton/Winter cBN Product Identification System / Usage Information

B 220 – V 240 KSS 920 Y A

| ABRASIVE TYPE | GRIT SIZE | GRADE | CONCENTRATION | BOND | BOND MODIFIER #1 | BOND MODIFIER #2 | CORE |
|----------------|--|------------------|--|--|---|---------------------------|---|
| B – cBN | <ul style="list-style-type: none"> • 120 – Roughing/cutting-off • 150 – Combined roughing and finishing • 220 – Finishing | J N R V | V120 – 50 V180 – 75 V240 – 100 V300 – 125 | KSS <ul style="list-style-type: none"> • cBN resin | 10 <ul style="list-style-type: none"> • Primarily dry grinding bond; toolroom grinding with cup wheels 63 <ul style="list-style-type: none"> • Variation of the standard resin bond – used with a more friable abrasive 920 <ul style="list-style-type: none"> • Dry and wet grinding with narrow-rim straight wheels; wear-resistant bond for cup wheels in wet grinding | Y – Use when wet grinding | A – Aluminum D – Bakelite E – Steel None – Resin with metal fillers (for most specs) |



COMPETITIVE CROSS REFERENCE

| | 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 / US Diamond | | | | | 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 |



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 |
| • NEW! Two week (and less) lead-times | • Minimal time from order to production floor |

NEW SEE OUR NEW 1-WEEK EXPRESS LEAD TIMES!

NORTON B99 EXPRESS MADE-TO-ORDER RESIN BOND LEAD-TIMES

| 1 WEEK LEAD-TIME: | 2 WEEK LEAD-TIME: | 3 WEEK LEAD-TIME: |
|--|-------------------------------------|--|
| All 1A1 aluminum core wheels with stock pre-forms All 1A1R wheels with diameter <14" All 11V9 wheels All 12V9 resaloy core wheels All 15V9 resaloy core wheels All composite core wheels, with thickness < 1/8" • 1A1, 1B1, 1E1, 1F1 | All other wheels with diameter <14" | All wheels with diameter >= 14" All wheels with 80 grit and coarser |

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. | Note: Standard made-to-order lead-times apply to 14" and larger wheels. |
| 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. SD Free cutting standard. Can be used wet or dry; should be used on low horsepower (3/4 hp or less) machines. | 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 | Select the grit size based on finish and material removal rate required. Note: Standard made-to-order lead-times apply to 80 grit and coarser wheels. |
| GRADE | R Resin bond standard | The hardness of the wheel |
| CONCENTRATION | 50 Shape 2A2T only. For broad area of contact grinding. 75 Norton standard. Freer cutting than 100 and the most economical for dry grinding with ASD diamond. 100 V ery 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. | Select the concentration based on grinding wet or dry, material removal rates, and form holding requirements. |
| 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. 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. | Select the bond based on the material being ground and grinding application.. |
| ABRASIVE DEPTH | 1/16 1/8 1/4 1/2 NEW! | 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/Winter Saw Grinding Products
- Norton Silver Eagle Saw Grinding 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.

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 | <p>100 Roughing. The most common grit size for roughing operations.</p> <p>120 For roughing where 100 is too coarse. Also for cut-off applications.</p> <p>150 Medium stock removal plus good finish. For combined roughing and finishing applications.</p> <p>180 Medium stock removal plus good finish. To improve finish.</p> <p>220 Finishing</p> <p>320 Finishing</p> <p>400 Fine finishing</p> | <p>Select the grit size based on finish and material removal rate required.</p> <p>Note: Standard made-to-order lead-times apply to 80 grit and coarser wheels.</p> |
| GRADE | <p>T 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.</p> <p>W Very Durable. Approximately 100 concentration, W is recommended for high volume coolant operations: flute grinding from solid, flute polishing, surface, and cylindrical grinding.</p> <p>Z 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.</p> | The hardness of the wheel |
| BOND | <p>B99E Norton standard resin bond. Pre-engineered for optimal performance with cBN abrasive. Available in all shapes.</p> <p>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.</p> | Select the bond depending on the type of grinding application. |
| ABRASIVE DEPTH | <p>1/16</p> <p>1/8</p> <p>1/4</p> <p>1/2 NEW!</p> | Usable abrasive |

NEW SEE OUR NEW 1-WEEK EXPRESS LEAD TIMES!

NORTON B99 EXPRESS MADE-TO-ORDER RESIN BOND LEAD-TIMES

1 WEEK LEAD-TIME:

All 1A1 aluminum core wheels with stock pre-forms
 All 1A1R wheels with diameter <14"
 All 11V9 wheels
 All 12V9 resaloy core wheels
 All 15V9 resaloy core wheels
 All composite core wheels, with thickness < 1/8"
 • 1A1, 1B1, 1E1, 1F1

2 WEEK LEAD-TIME:

All other wheels with diameter <14"

3 WEEK LEAD-TIME:

All wheels with diameter >= 14"
 All wheels with 80 grit and coarser

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

NORTON B99 EXPRESS PRODUCTS

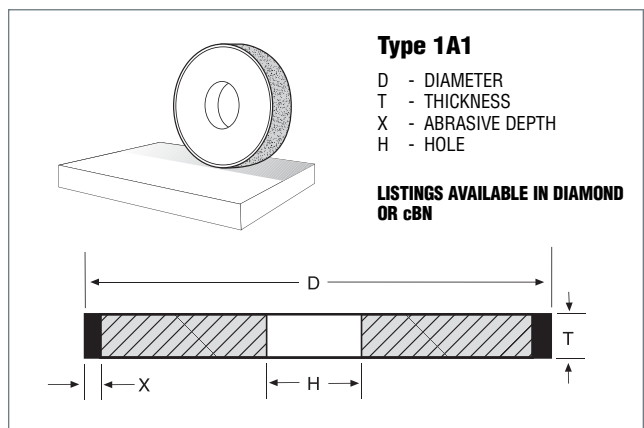
| D | T | X |
|-----------------------------------|------|-----|
| TYPE 1A1 – STRAIGHT WHEELS | | |
| 1 | 1/16 | 1/8 |
| 1 | 3/32 | 1/8 |
| 1 | 1/8 | 1/8 |
| 1 | 1/4 | 1/8 |
| 1 | 3/8 | 1/8 |
| 1 | 1/2 | 1/8 |
| 1 | 5/8 | 1/8 |
| 1 | 3/4 | 1/8 |
| 1 | 1 | 1/8 |
| 1-1/8 | 1/4 | 1/8 |
| 1-1/8 | 1/2 | 1/8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

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

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

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

STANDARD PACKAGE = 1 WHEEL



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| D | T | X |
|----------------------------|---|------------|
| TYPE 1A1 – ASSEMBLY | | |
| 12 | 2 | 1/4 1/2 |
| 12 | 3 | 1/4 1/2 |
| 12 | 4 | 1/4 1/2 |
| 14 | 2 | 1/4 1/2 |
| 14 | 4 | 1/4 1/2 |

| D | T | X |
|----------------------------|---|------------|
| TYPE 1A1 – ASSEMBLY | | |
| 16 | 2 | 1/4 1/2 |
| 16 | 4 | 1/4 1/2 |
| 18 | 2 | 1/4 1/2 |
| 20 | 4 | 1/4 1/2 |
| 20 | 6 | 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 1A1 Assembly

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

LISTINGS AVAILABLE IN DIAMOND OR cBN

Assembly wheels are made up of sections. The “T” dimension selected determines the number of sections. Straight seams are provided.

Type 1A1R

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

LISTINGS AVAILABLE IN DIAMOND OR cBN

Type 1A8

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

LISTINGS AVAILABLE IN DIAMOND OR cBN

Type 1B1

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

LISTINGS AVAILABLE IN DIAMOND OR cBN



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

NORTON B99 EXPRESS PRODUCTS

| 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 |
| 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

| 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

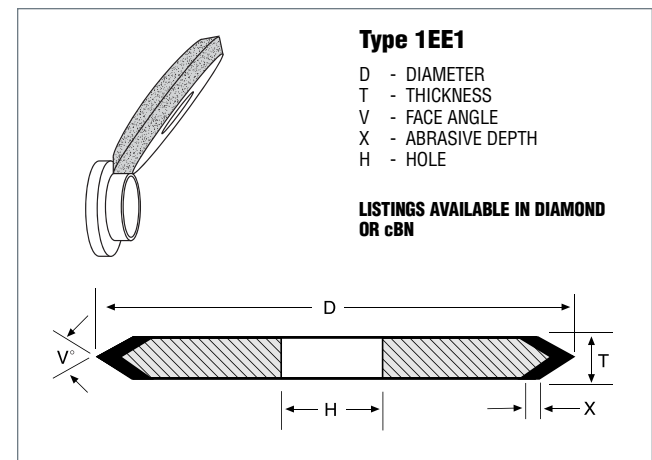
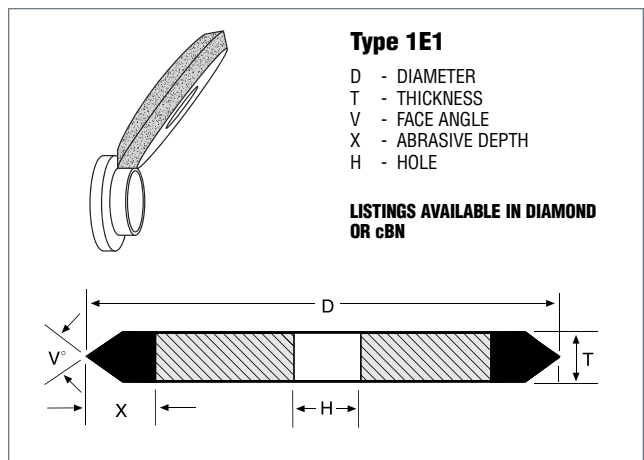
| D | T | V | X |
|------------------|------|------|-----|
| TYPE 1EE1 | | | |
| 3 | 1/8 | 60° | 1/8 |
| 3 | 1/8 | 70° | 1/8 |
| 3 | 1/8 | 90° | 1/8 |
| 3 | 3/16 | 60° | 1/8 |
| 3 | 3/16 | 90° | 1/8 |
| 3 | 1/4 | 60° | 1/8 |
| 3 | 1/4 | 70° | 1/8 |
| 3 | 1/4 | 90° | 1/8 |
| 3 | 1/2 | 90° | 1/8 |
| 4 | 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 |

CONTINUED

| D | T | V | X |
|---------------------------|-----|------|-----|
| TYPE 1EE1 (CONT'D) | | | |
| 6 | 1/4 | 45° | 1/8 |
| 6 | 1/4 | 60° | 1/8 |
| 6 | 1/4 | 70° | 1/8 |
| 6 | 1/4 | 90° | 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 |

STANDARD PACKAGE = 1 WHEEL

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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

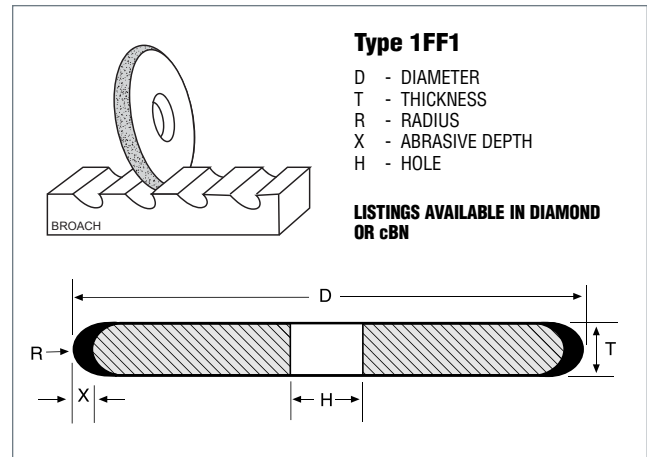
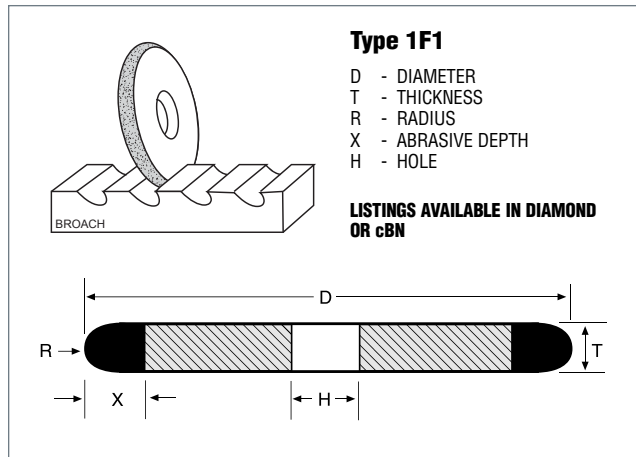
| D | T | R | X |
|--------------------------------------|------|------|------------|
| TYPE 1FF1 – RADIUS WHEELS | | | |
| 3 | 1/8 | 1/16 | 1/8 |
| 3 | 1/4 | 1/8 | 1/8 |
| 3 | 3/16 | 3/32 | 1/8 |
| 3 | 3/8 | 3/16 | 1/8 |
| 3 | 1/2 | 1/4 | 1/8 |
| 4 | 1/8 | 1/16 | 1/8 |
| 4 | 5/32 | 5/64 | 1/8 |
| 4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

**CUSTOMER TO SPECIFY
HOLE SIZE, SUBJECT TO
SAFETY STANDARDS.**



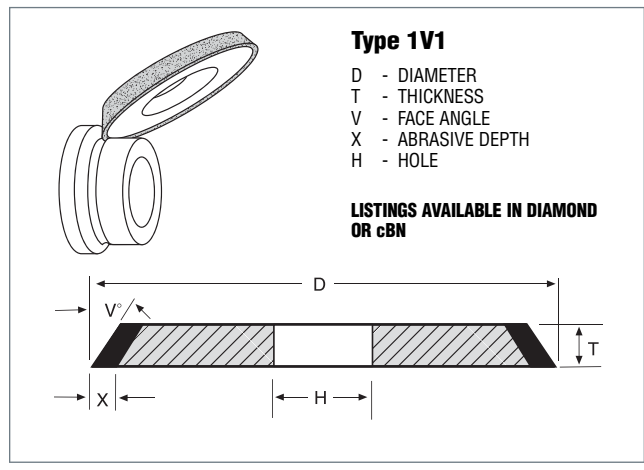
NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 | 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



CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

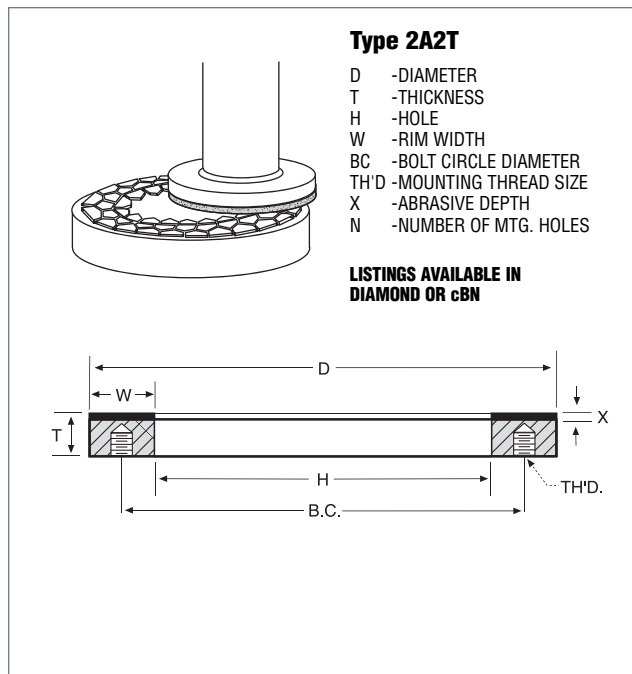
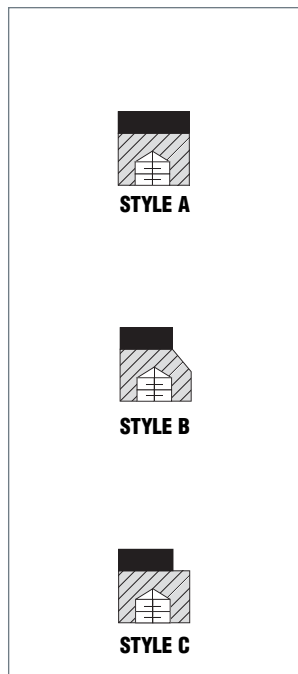
REMEMBER TO CHECK NORTON STOCK AND NORTON/WINTER STOCK AVAILABILITY FIRST, FOR THE FASTEST DELIVERY AND LOWEST PRICE.



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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

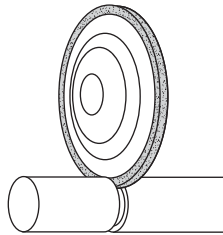


NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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

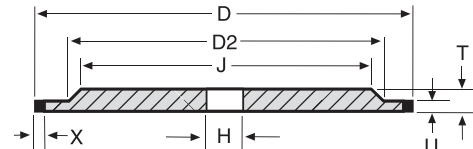
CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.



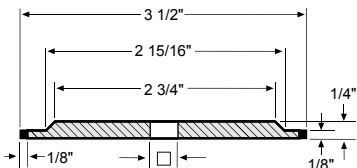
Type 3A1

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

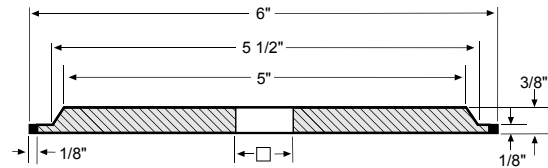
LISTINGS AVAILABLE IN DIAMOND OR cBN



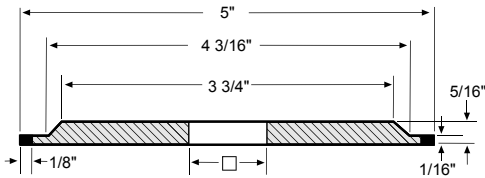
Type 3A1 – Specific Blueprints



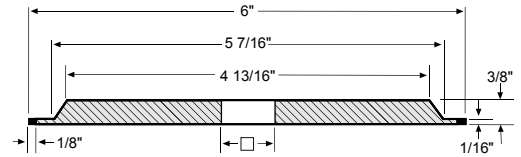
ME114297



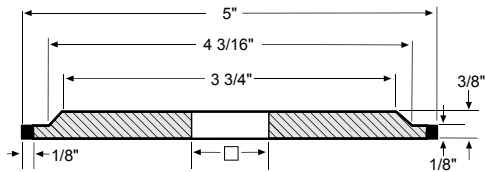
ME60795



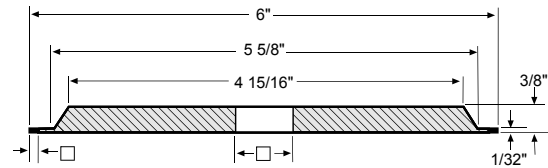
ME92383



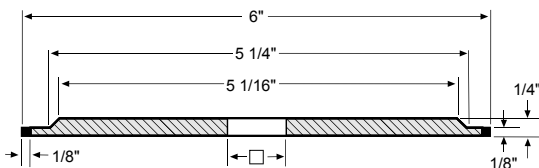
ME87172



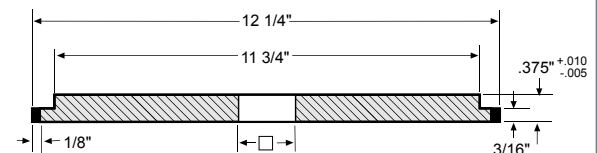
ME66716



ME87805



ME74734



ME128352

VARIABLE



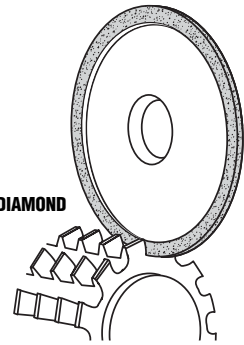
NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

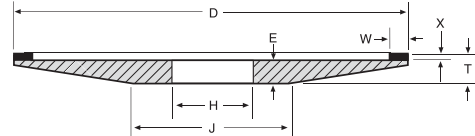
STANDARD PACKAGE = 1 WHEEL

Type 4A2P

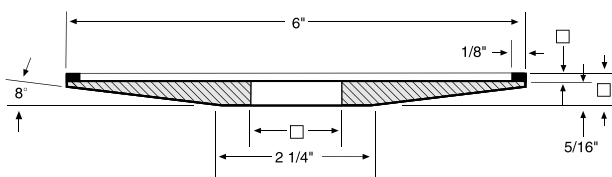
- D - DIAMETER
- T - THICKNESS
- H - HOLE
- J - HUB DIAMETER
- W - RIM WIDTH
- X - ABRASIVE DEPTH



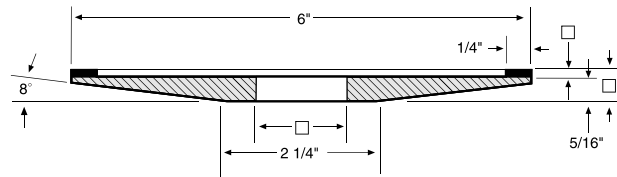
LISTINGS AVAILABLE IN DIAMOND OR cBN



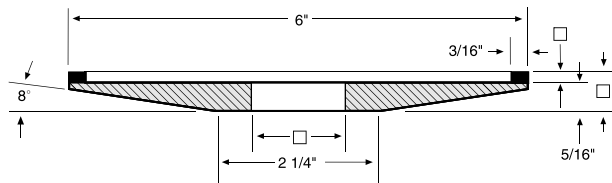
Type 4A2P – Specific Blueprints



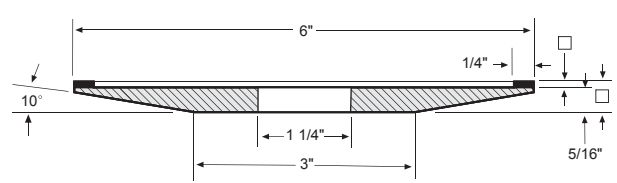
ME84209



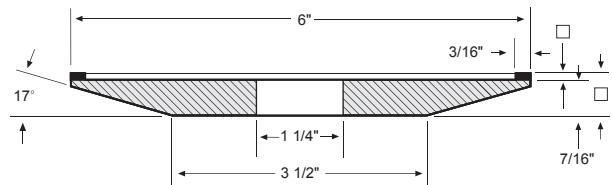
ME88369



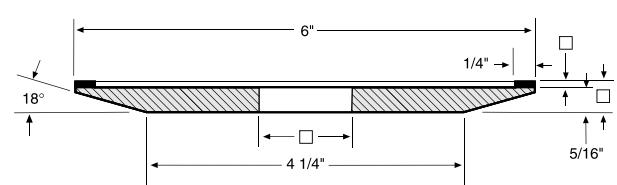
ME80016



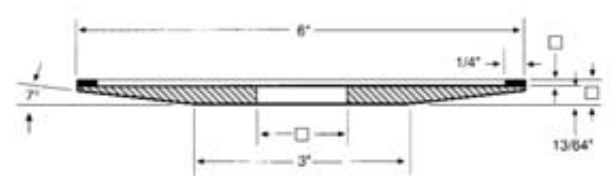
ME97016



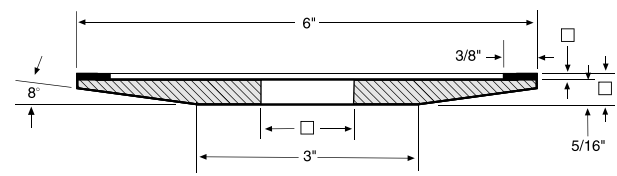
ME94471



ME91942



ME105175



ME83387

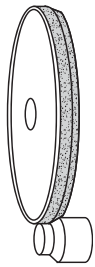
□ VARIABLE



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

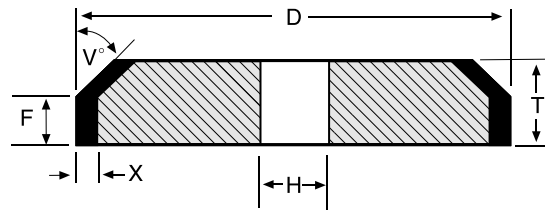
STANDARD PACKAGE = 1 WHEEL



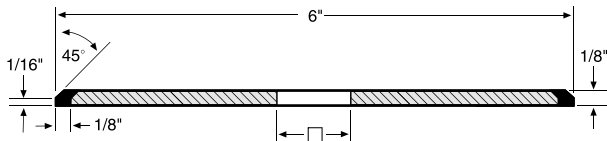
Type 4Y1

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

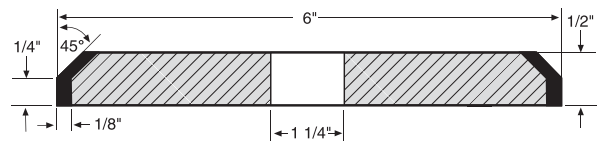
LISTINGS AVAILABLE IN DIAMOND OR cBN



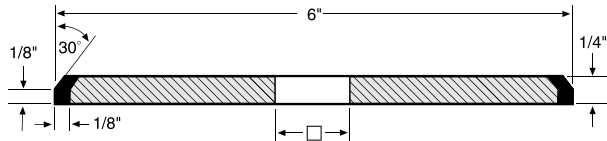
Type 4Y1 – Specific Blueprints



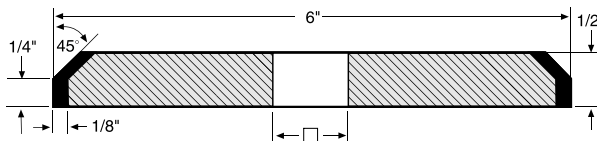
ME35789



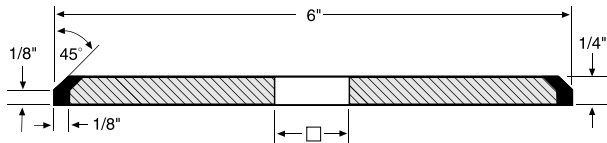
ME38936



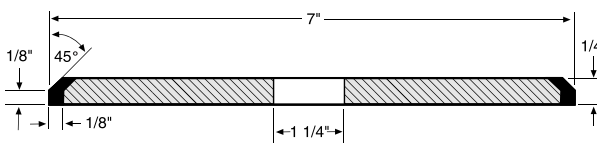
ME65953



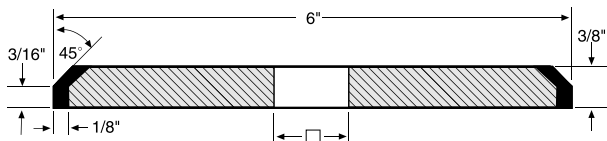
ME98975



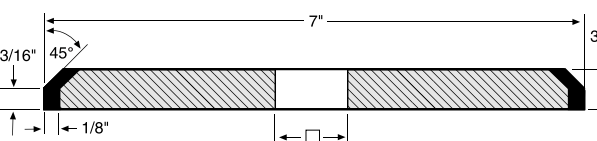
ME54623



ME57664



ME54649



ME68742

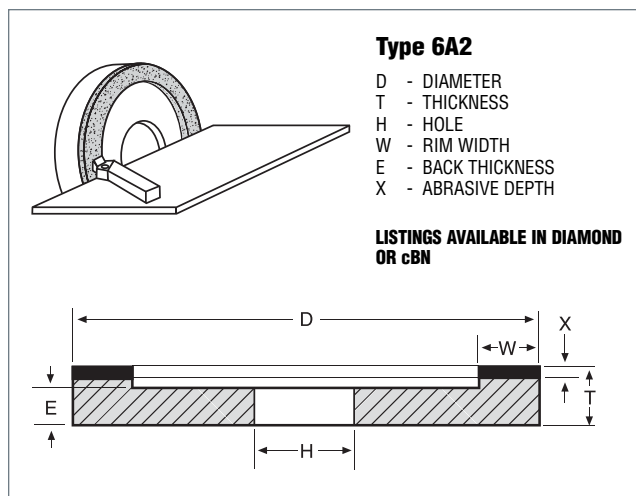
VARIABLE



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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

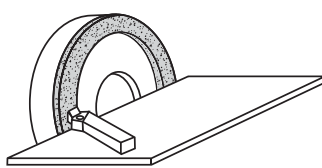


**CUSTOMER TO SPECIFY
 HOLE SIZE, SUBJECT TO
 SAFETY STANDARDS.**

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

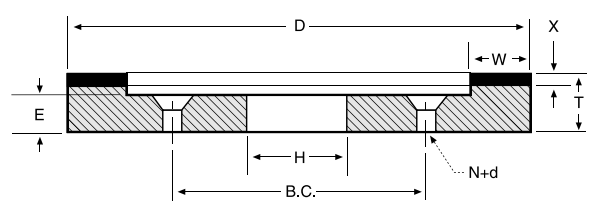
STANDARD PACKAGE = 1 WHEEL



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:

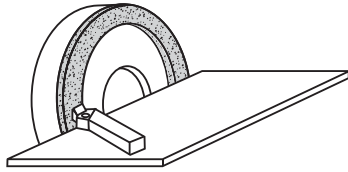
- Norton Stock B99 Products
- Norton/Winter Stock Toolroom Products
- Norton/Winter Saw Grinding Products
- Norton Silver Eagle Saw Grinding Products

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:

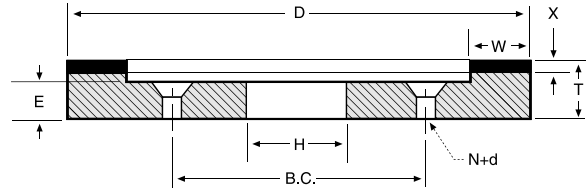
Contact your Norton sales representative or distributor for a custom-made product recommendation.



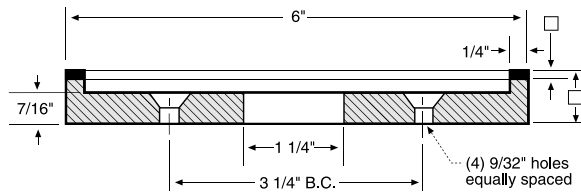
Type 6A2C

- 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

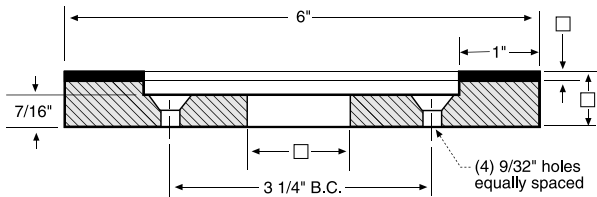
LISTINGS AVAILABLE IN DIAMOND OR cBN



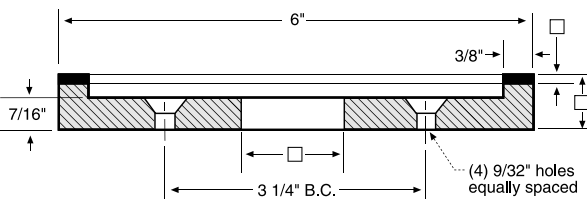
Type 6A2C – Specific Blueprints (Continued)



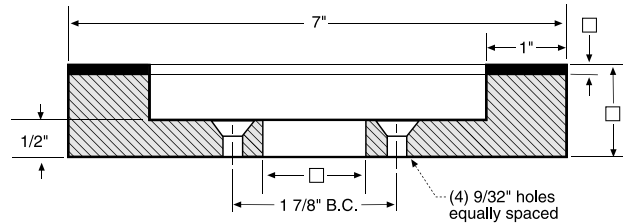
ME36743



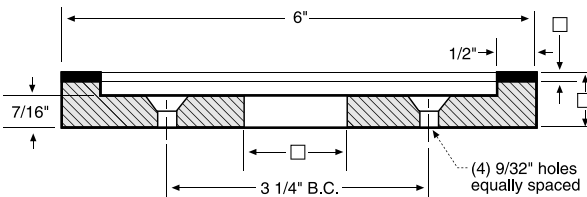
ME27854



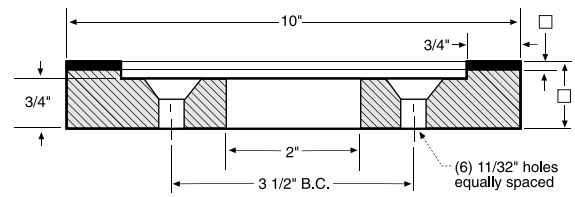
ME27852



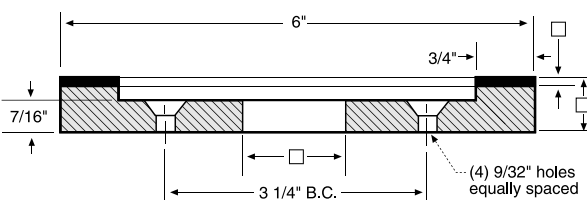
ME54263



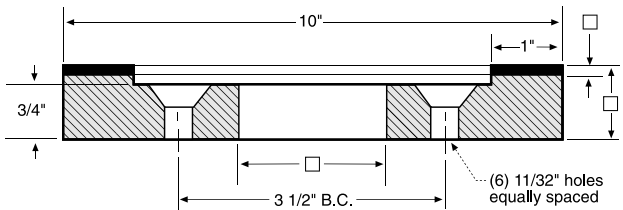
ME30621



ME34522



ME27853



ME34647

VARIABLE

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

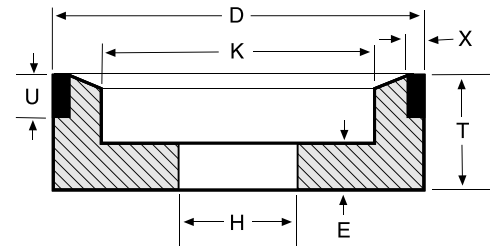
| BLUEPRINT NUMBER | D | T | U | E | K | X |
|---------------------------------------|----|-------|------|--------|--------|-------------|
| TYPE 6A9 – STRAIGHT CUP WHEELS | | | | | | |
| ME57851 | 3 | 1-1/2 | 1/2 | 3/8 | 2-1/2 | 1/16 1/8 |
| ME59701 | 4 | 1-1/4 | 3/8 | 1/2 | 3 | 1/16 1/8 |
| ME57805 | 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

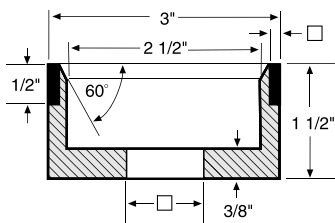
Type 6A9

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

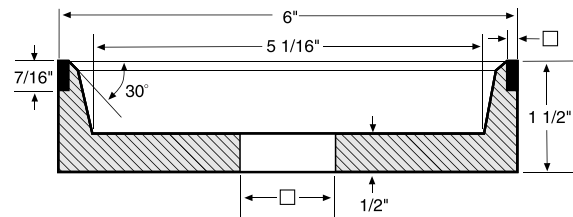
LISTINGS AVAILABLE IN DIAMOND OR cBN



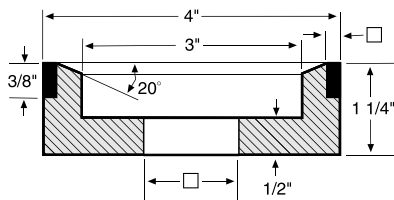
Type 6A9 – Specific Blueprints



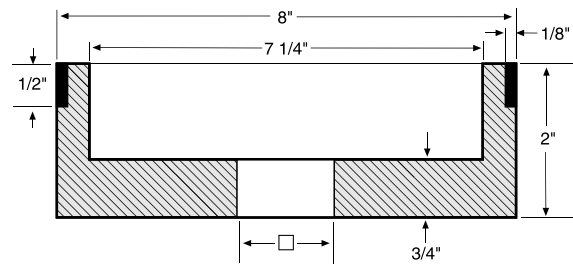
ME57851



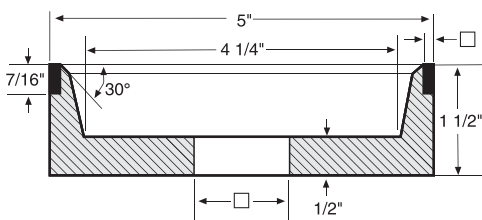
ME41681



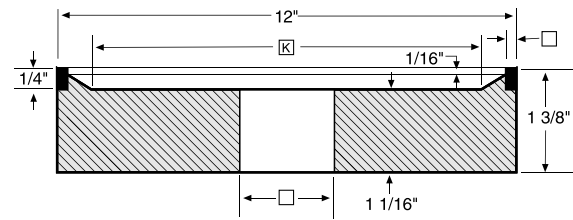
ME59701



ME100028



ME57805



ME106885

VARIABLE

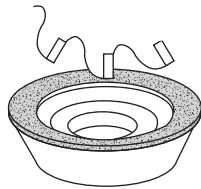


NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 1-11/16 | 3/8 | 1/2 | 5-9/64 | 1/8 1/4 |
| ME100998 | 6 | 1-1/2 1-5/8 | 1/2 | 1/2 | 4-11/16 | 1/8 1/4 |
| ME128467 | 6 | 1-1/2 | 1/4 | 1/2 | 5-1/32 5-3/16 | 1/8 1/4 |

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

STANDARD PACKAGE = 1 WHEEL

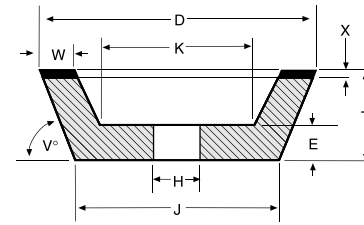


Type 11A2

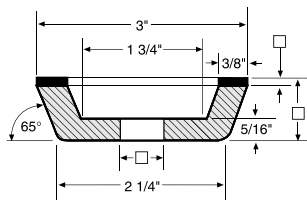
- D - DIAMETER
- T - THICKNESS
- H - HOLE
- E - BACK THICKNESS
- J - HUB DIAMETER

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

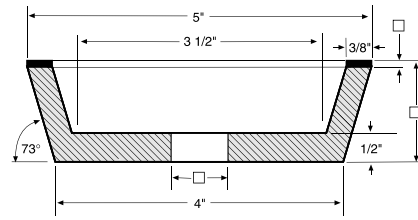
LISTINGS AVAILABLE IN DIAMOND OR cBN



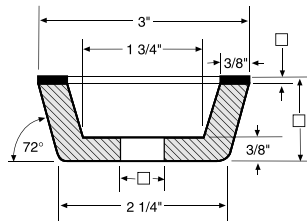
Type 11A2 – Specific Blueprints



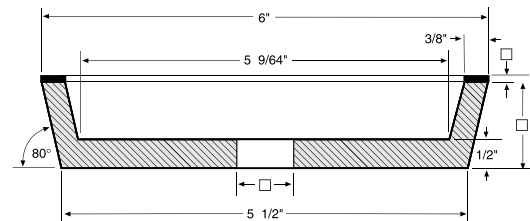
ME26849



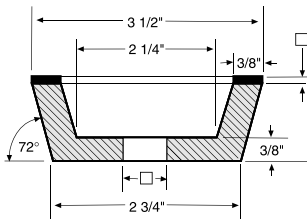
ME33862



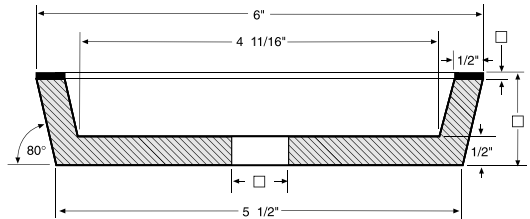
ME31815



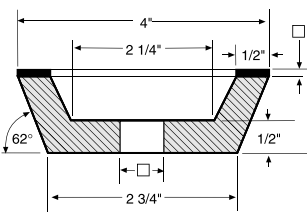
ME101095



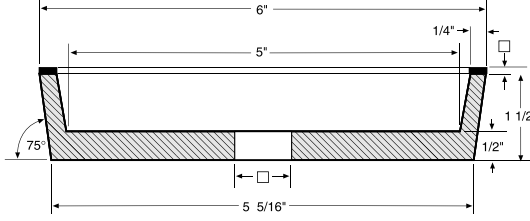
ME28280



ME100998



ME27793



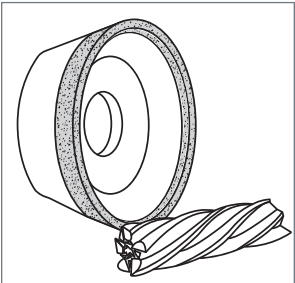
ME128467

VARIABLE



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

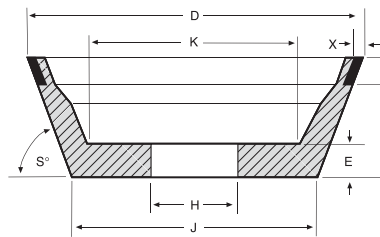


Type 11V9

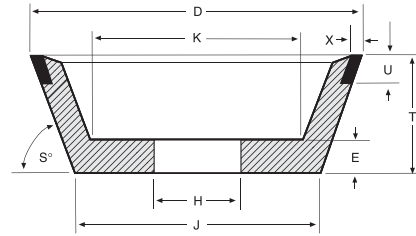
- D - DIAMETER
- T - THICKNESS
- H - HOLE
- E - BACK DIAMETER
- J - HUB DIAMETER
- K - INSIDE DIAMETER OF FLAT
- U - INSERT LENGTH
- S - FACE ANGLE
- X - ABRASIVE DEPTH

LISTINGS AVAILABLE IN DIAMOND OR cBN

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

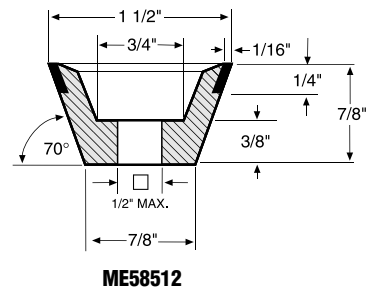
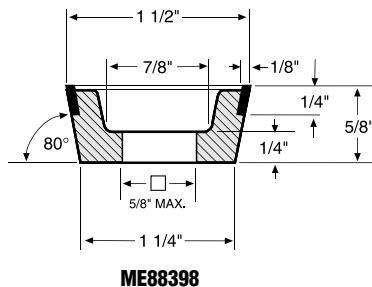
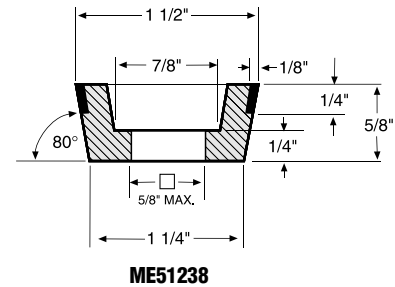
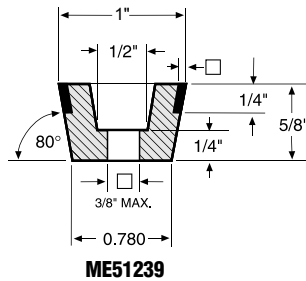


STYLE A



STYLE B

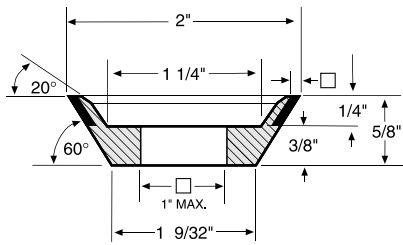
Type 11V9 – Specific Blueprints



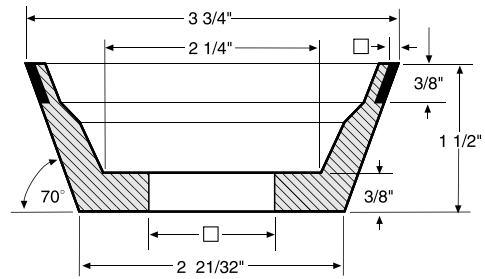
VARIABLE

SEE ADDITIONAL TYPE 11V9 BLUEPRINTS ON THE FOLLOWING PAGES.

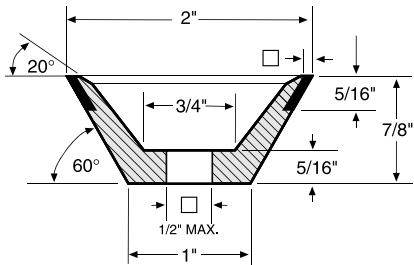
Type 11V9 – Specific Blueprints (Continued)



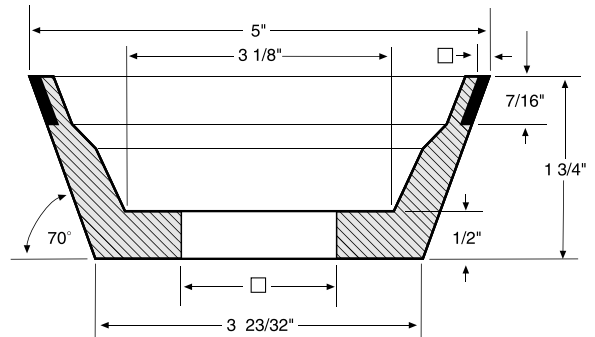
ME89516



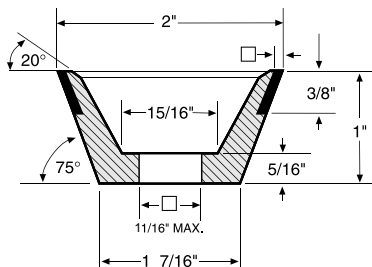
ME92192



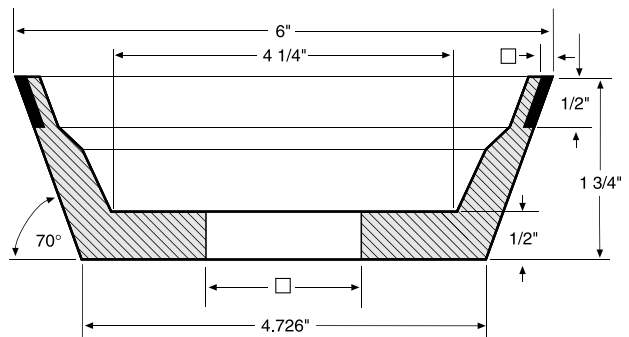
ME55562



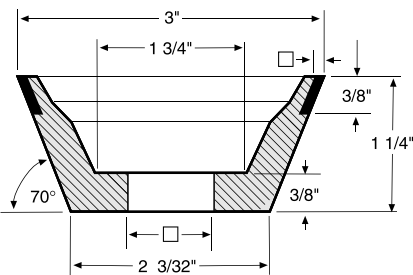
ME98298



ME42599



ME85913

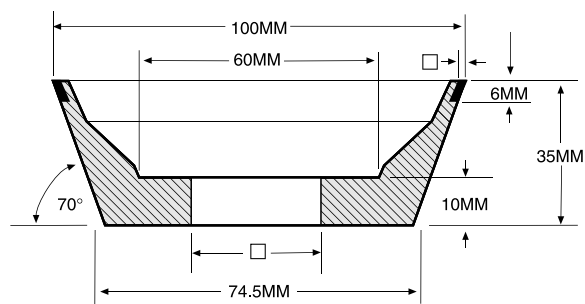


ME93912

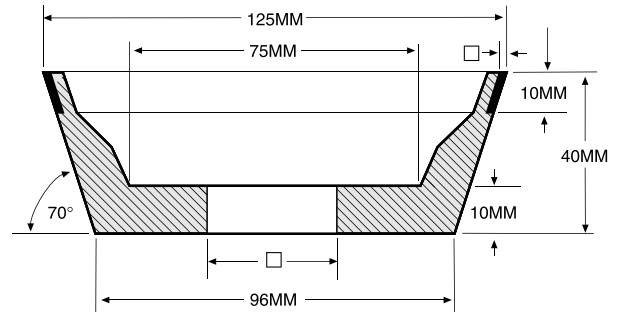
VARIABLE

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

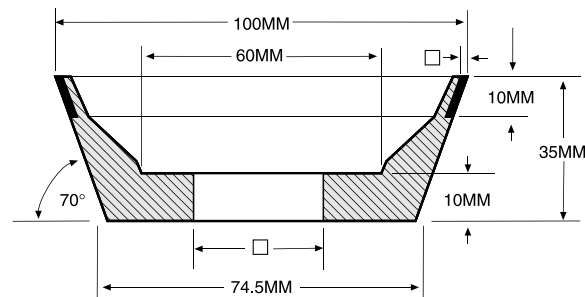
Type 11V9 – Specific Blueprints – Metric



ME130503



ME130501



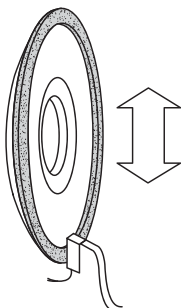
ME130500

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.

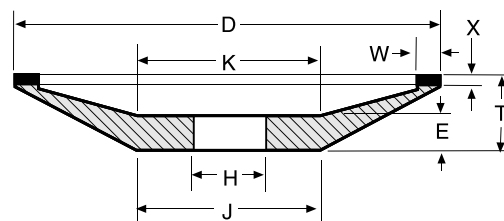
STANDARD PACKAGE = 1 WHEEL



Type 12A2

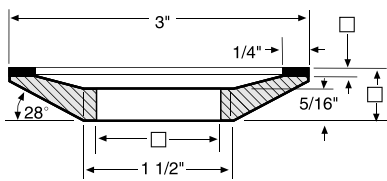
- D - DIAMETER
- T - THICKNESS
- H - HOLE
- E - BACK THICKNESS
- J - HUB DIAMETER
- K - INSIDE DIAMETER OF FLAT
- W - RIM WIDTH
- X - ABRASIVE DEPTH

LISTINGS AVAILABLE IN
DIAMOND OR cBN

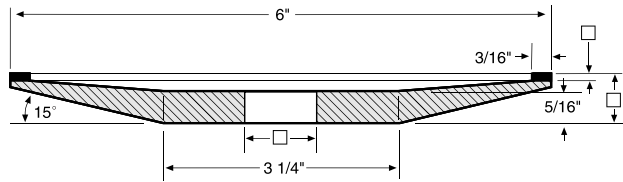


SEE SPECIFIC TYPE 12A2 BLUEPRINTS ON THE FOLLOWING PAGE.

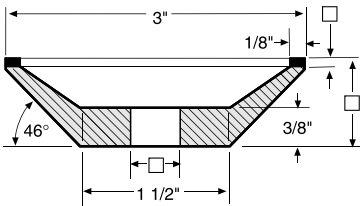
Type 12A2 – Specific Blueprints (Continued)



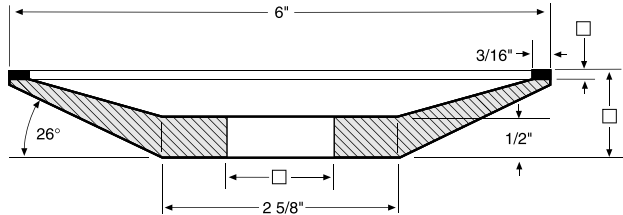
ME40747



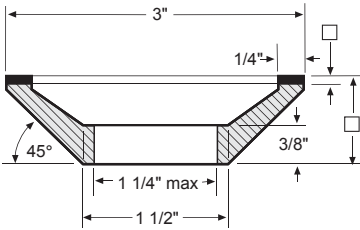
ME73686



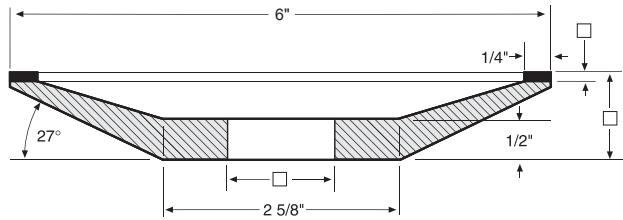
ME27757



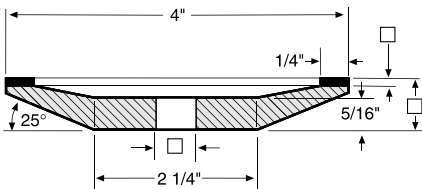
ME27758



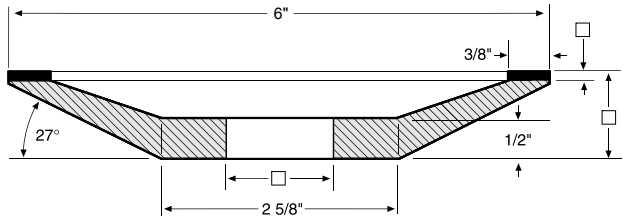
ME27174



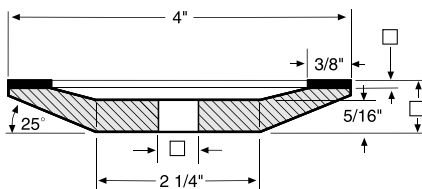
ME27175



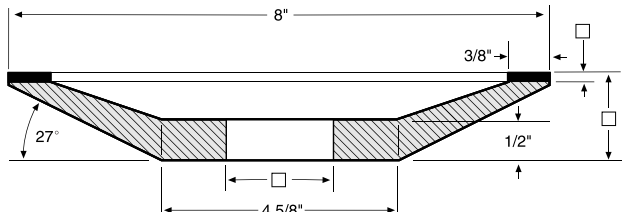
ME40745



ME33914



ME40746



ME73752

VARIABLE

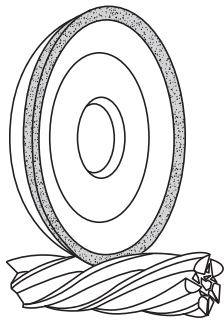
CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

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

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

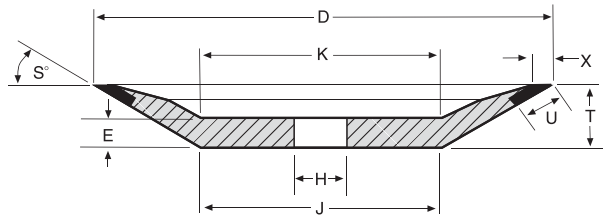
*SEE BLUEPRINT FOR MAXIMUM HOLE SIZE. STANDARD PACKAGE = 1 WHEEL



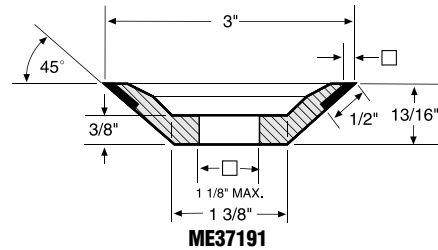
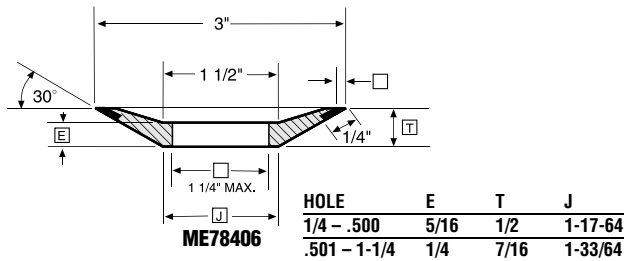
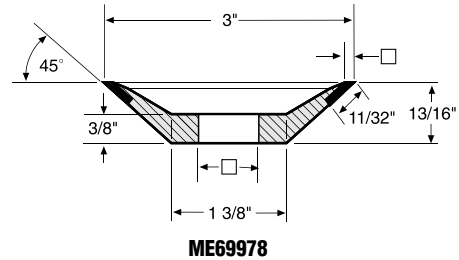
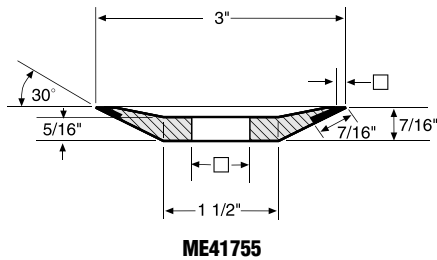
Type 12V9

- 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

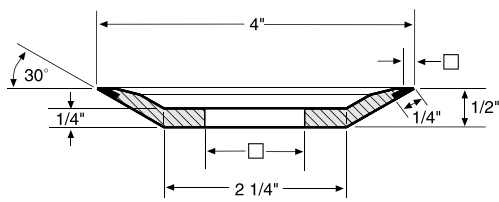


VARIABLE

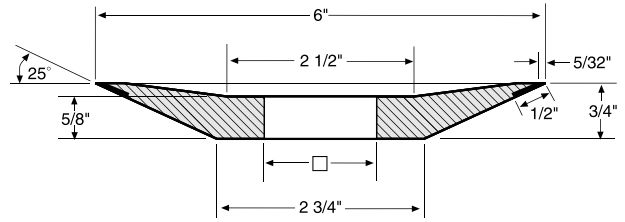
SEE ADDITIONAL SPECIFIC TYPE 12V9 BLUEPRINTS ON THE FOLLOWING PAGE.



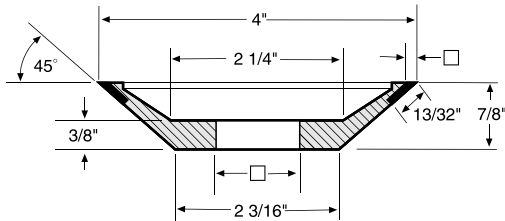
Type 12V9 – Specific Blueprints (Continued)



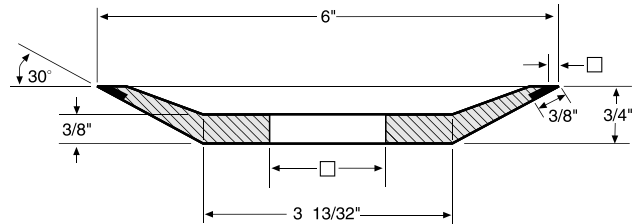
ME58734



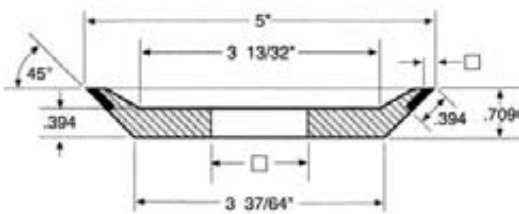
ME98875



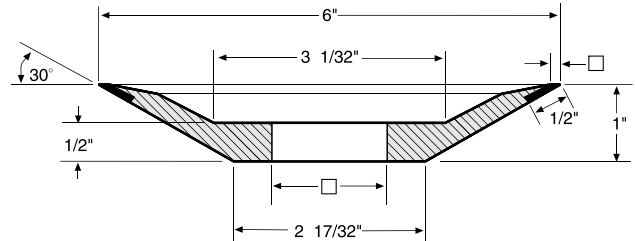
ME80849



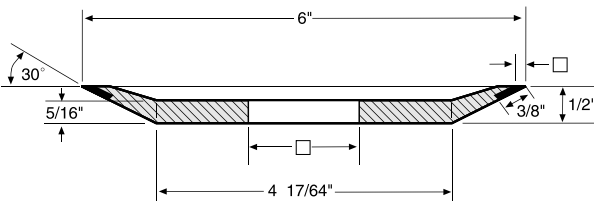
ME48666



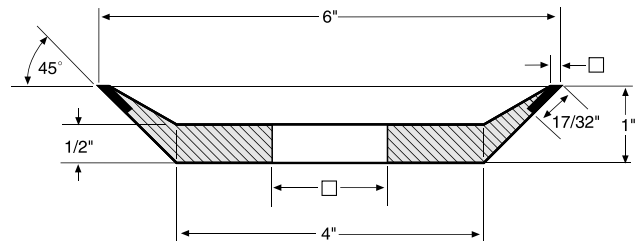
ME120095



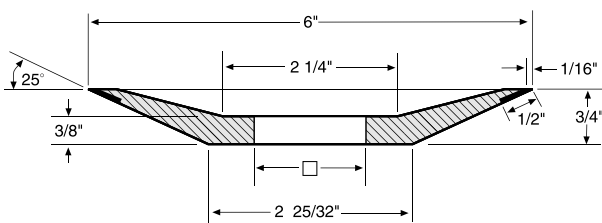
ME118022



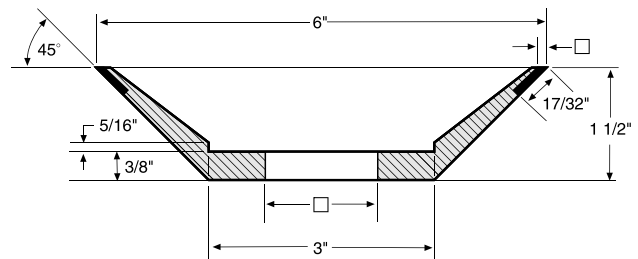
ME73312



ME44377



ME109758



ME54386

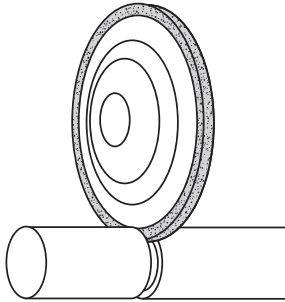
VARIABLE

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

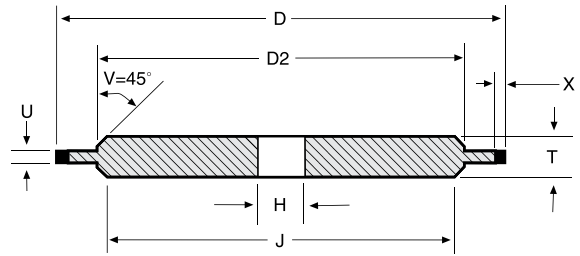
STANDARD PACKAGE = 1 WHEEL



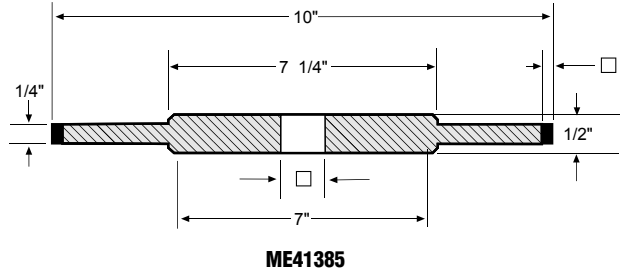
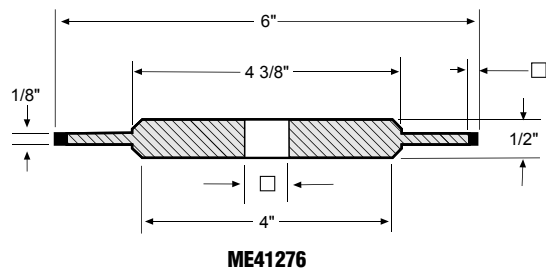
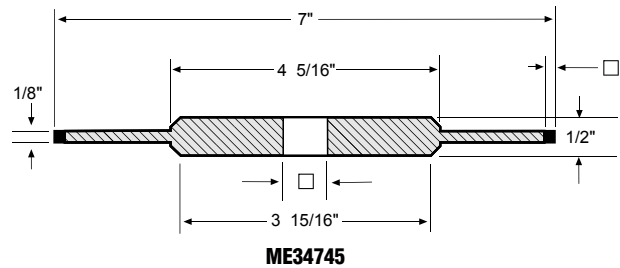
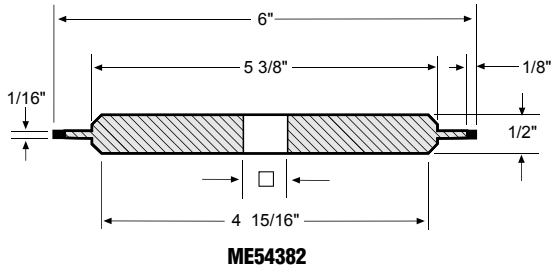
Type 14A1

- 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



VARIABLE

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

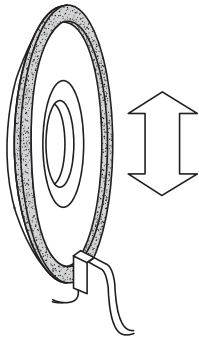


NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.

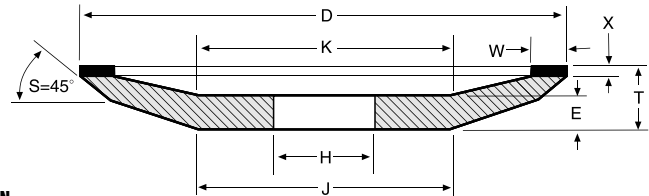
STANDARD PACKAGE = 1 WHEEL



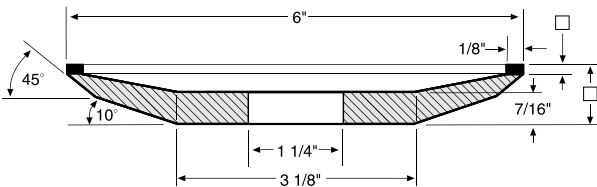
Type 15A2

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

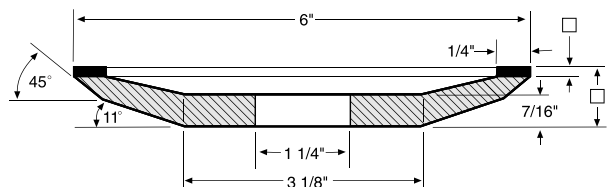
LISTINGS AVAILABLE IN DIAMOND OR cBN



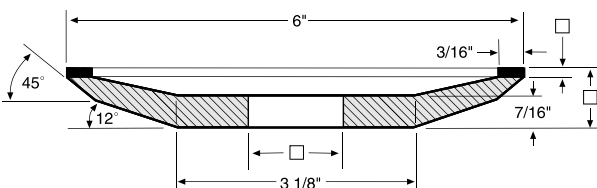
Type 15A2 – Specific Blueprints



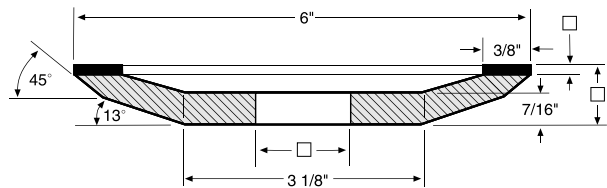
ME32717



ME32719



ME32718



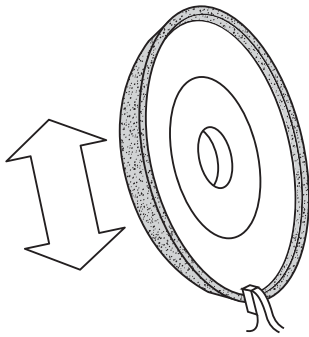
ME32720

VARIABLE

NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

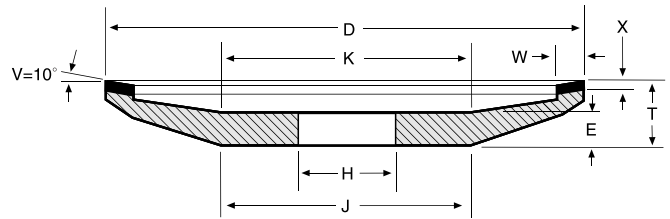
| BLUEPRINT NUMBER | D | T | W | E | K | S | X |
|--------------------------------|---|--------|-----|------|-------|-----|-----|
| TYPE 15V4 – DISH WHEELS | | | | | | | |
| ME29109 | 3 | 15/16 | 1/8 | 3/8 | 1-1/2 | 30° | 1/8 |
| ME40846 | 6 | 13/16 | 1/8 | 7/16 | 3-1/8 | 45° | 1/8 |
| ME40847 | 6 |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



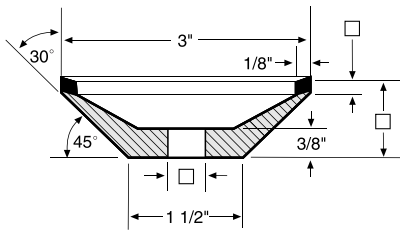
Type 15V4

- 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

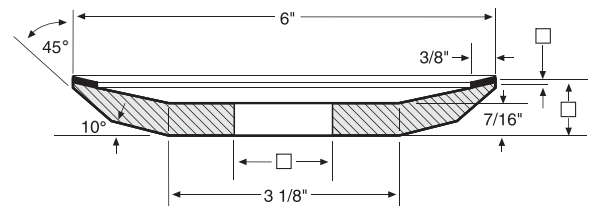


LISTINGS AVAILABLE IN DIAMOND OR cBN

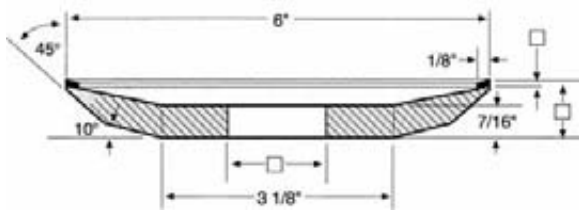
Type 15V4 – Specific Blueprints



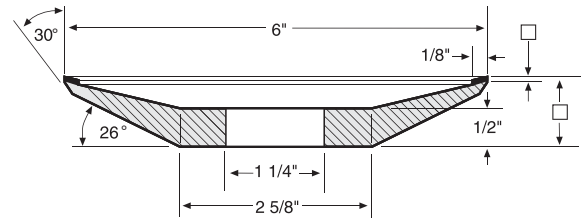
ME29109



ME40847



ME40846



ME40844

VARIABLE

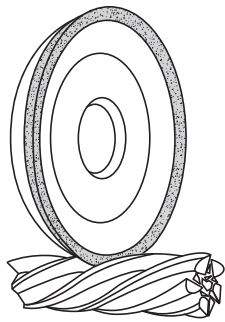
CUSTOMER TO SPECIFY HOLE SIZE, SUBJECT TO SAFETY STANDARDS.



NORTON B99 EXPRESS MADE-TO-ORDER RESIN PRODUCTS

| 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 |

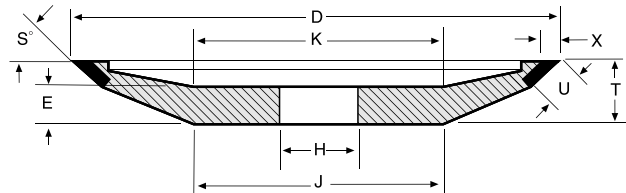
*SEE BLUEPRINT FOR MAXIMUM HOLE SIZE.
STANDARD PACKAGE = 1 WHEEL



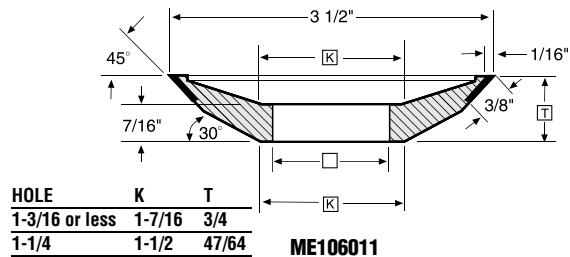
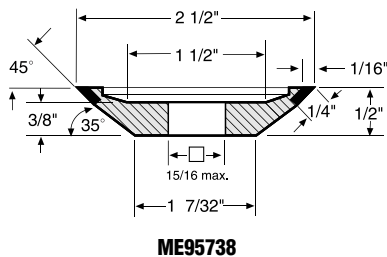
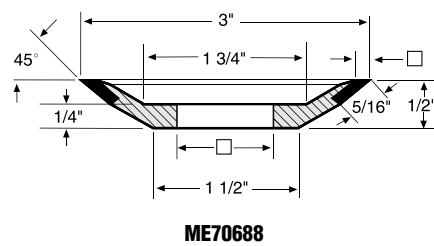
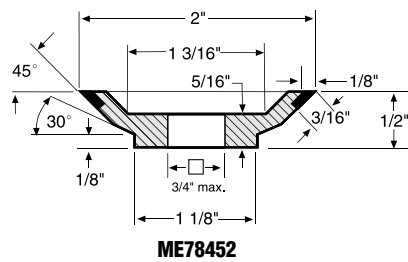
Type 15V9

- 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

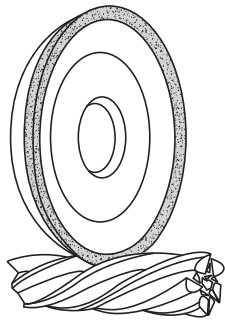


Type 15V9 – Specific Blueprints



VARIABLE

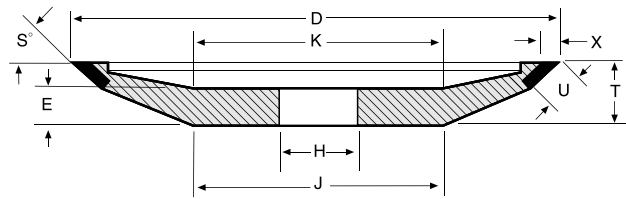




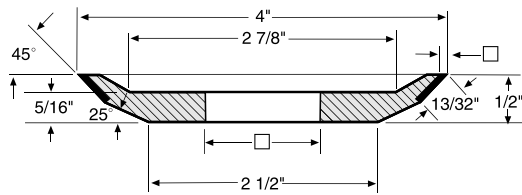
Type 15V9

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

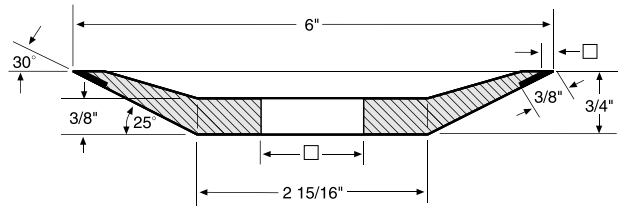
LISTINGS AVAILABLE IN DIAMOND OR cBN



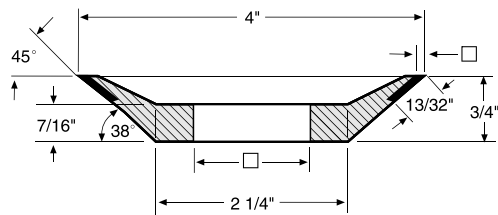
Type 15V9 – Specific Blueprints



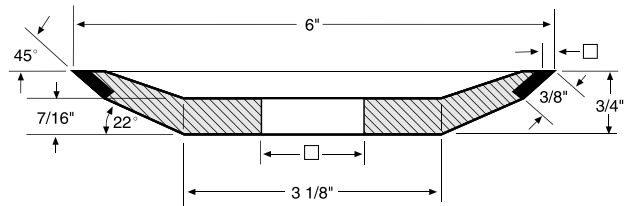
ME109735



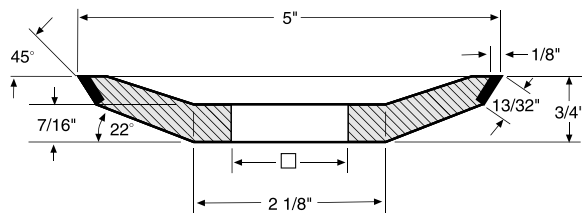
ME75786



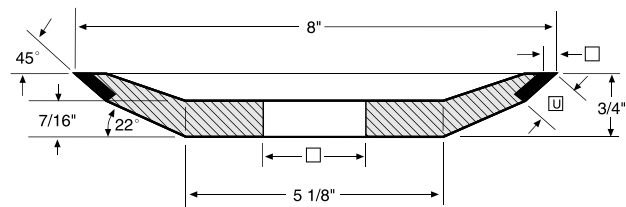
ME54577



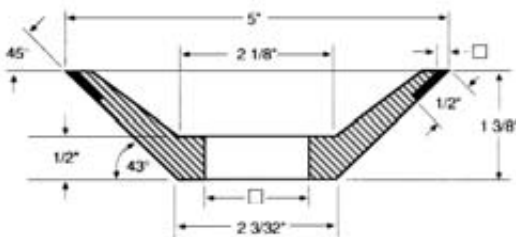
ME40633



ME68744



ME55489



ME52205

VARIABLE

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



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

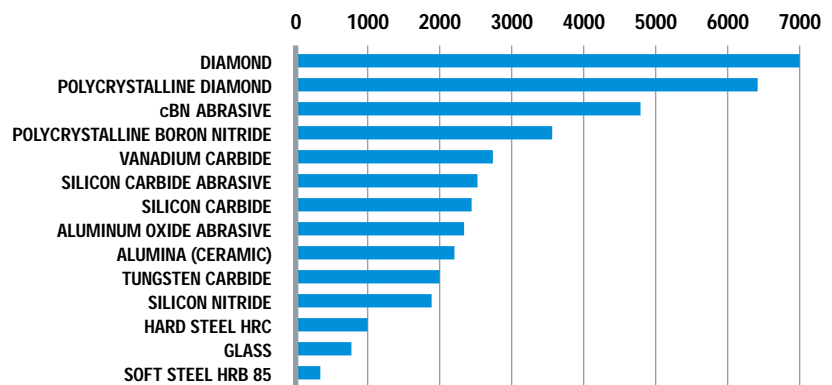
| PROBLEM | POSSIBLE CAUSES | SUGGESTED CORRECTION |
|---------------------------------|--|--|
| Burning (excessive heat) | Wheel loaded or glazed Excessive feed rate Wheel too durable | Dress wheel with a dressing stick Reduce infeed of wheel or workpiece Use freer cutting specification or slow down wheel speed |
| Poor finish | Grit size too coarse Excessive feed rate | Select a finer grit size 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 Poor coolant placement Excessive material removal rate | Re-dress wheel Apply coolant directly to wheel/workpiece interface Reduce downfeed and/or crossfeed |
| Poor finish | Excessive dressing Grit size too coarse Poor coolant flow or location | Use lighter dressing pressure Stop dressing as soon as wheel starts to consume stick rapidly Select a finer grit size 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 Wheel loaded | Dress lightly until wheel opens up 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 Low wheel speed Excessive dressing Wheel too soft or too hard | Apply coolant to flood wheel/work surface Increase wheel speed (observe maximum operating speed) Use lighter dressing pressure 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

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 |

Recommended Wheel Speeds for Diamond and cBN Wheels

WET GRINDING

| | CUP WHEELS | PERIPHERAL WHEELS |
|--------------------------------|---|---|
| DIAMOND GRINDING WHEELS | | |
| Resin Bond Wheels | 11V9, 12V9, 15V9, etc. 4921 to 7874 SFPM 25 to 40 m/s | 1A1, 1V1, 1A1R, etc. 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 | | |
| Resin Bond Wheels | 11V9, 12V9, 15V9, etc. 2756 to 3543 SFPM 14 to 18 m/s | 1A1, 1V1, 1A1R, etc. 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



SAFETY – WHEEL SPEED CONVERSION CHART

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)

SURFACE SPEED IN FEET PER MINUTE (SFPFM)

| DIAMETER OF WHEEL IN INCHES | SURFACE SPEED IN FEET PER MINUTE (SFPFM) | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 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 | 14,200 | 16,000 | 17,000 | 19,685 | 20,000 | | |
| 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 | 14,323 | 15,278 | 16,233 | 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 | 1,805 | 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 (SFPFM = 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.



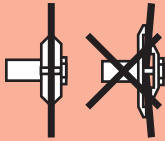
Speeds

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:

$$\text{SFPM} = \text{Spindle Speed in RPM} \times \text{Wheel Diameter in inches} \times .262$$
- 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