NOMEX®
only by DuPont

CUTTING AND MACHINING OF NOMEX® PRESSBOARD

TECHNICAL DATA SHEET

Introduction

DuPont pressboards come in three specific densities, offering a range of mechanical properties to meet a variety of applications. Low density Type 992 is available in two thicknesses. Medium density Type 993 is available in six thicknesses. Type 994 is a densified version of Type 993 and comes in fourteen thicknesses.

No special equipment is required to cut, mill, sand, drill, rout or punch NOMEX® brand pressboard. Standard equipment used with other insulating materials such as cellulose board or polyester/glass laminates works very well.

Since all pressboard is sensitive to moisture, prolonged exposure to a humid environment is not advised. Store pressboard in low relative humidity areas and/or wrap it in plastic or a similar air impermeable material.

In addition to facilitating efficient cutting and machining, the tools, methods, and recommendations outlined in this brochure also encourage high-yield operations with limited waste. Waste can add substantial cost to the finished product.

Be sure to follow all standard safety precautions when performing any of the various cutting or machining operations outlined in this brochure. Power equipment will generate dust. Use a dust collection system or wear a NIOSH-approved mask.

Cutting

Shears

Pressboard Types 992 and 993

Pressboards with thicknesses up to .160" (4.0 mm) may be cut with shears.

Pressboard Type 994

Pressboard with thicknesses up to ~0.080" (2.0 mm) can be cut with shears. Since Type 994 is more dense, thicker varieties are best cut with a circular saw, band saw, or reciprocating saw.

Cutlery Products and Services	(315) 449-3050	
Fiskar Industrial	(800) 289-8288	www.fiskars.com
Gingher Inc.	(800) GINGHER	www.gingher.com
Izumi International	(864) 288-8001	www.izumiinternational.com
Judson Cutlery Inc.	(800) 541-1487	www.judsoncutlery.com
Pen Associates, Inc.	(302) 239-6866	

Circular saw

Use any fine-tooth, raker set blade that is appropriate for wood [e.g., 10" (250 mm) diameter, carbide tipped for longer life, 60 teeth or 7-1/4" (184 mm) diameter carbide blade with 24 teeth].

	Cellulose	Poly/glass laminate	Type 992	Type 993 / Type 998	Type 994
Circular Saw: Blade	60 teeth	60 teeth (min.)**	60 teeth	60 teeth	24 – 40 teeth
Speed	Max	Max	Max	Max	Max
Feed	Fast	Slow	Fast	Fast	Fast

Note: Table comparison using 10" (250 mm) diameter blade
** Back the exit side of the material with masking tape. In addition, use masonite, LUCITE® or an equivalent material as an exit side bushing.

Black and Decker (saw & blades)	(800) 544-6986	www.blackanddecker.com
DeWalt (saw & blades)	(800) 4DEWALT	www.dewalt.com
DoAll Company (blades)	(800) 92DOALL	www.doall.com

Wire — diamond wire

Wire cutting generates very little heat. Kerf loss is small and yield is high.

Wire diameter:	0.010" (.25 mm)
Wire speed:	200"/min. (5.1 m/min)
Cut gap:	0.012" (.30 mm)
Feed Rate:	0.50"/min. (12.7 mm/min)

Black and Decker (regular wire)	(800) 544-6986	www.blackanddecker.com
Laser Technology West Ltd (diamond wire)	(800) 394-8270	www.lasertechwest.com
Sears (regular wire)	(800) MYSEARS	www.sears.com

High-speed Jewelers Saw Blade

This is an effective, high-yield method for cutting pressboard. However, it is slow.

Diameter:	2" (51 mm)
Cut gap:	0.030" (.76 mm)
Thickness:	0.032" (.81 mm)
Speed:	12,500 RPM (water lube)
Feed Rate:	3"/minute (76 mm/min)

Thurston Manufacturing	(401) 331-0243	www.thurstonsaws.com

Band Saw

Some fuzz will occur on bottom of cut. However, fuzzing can be reduced by closing the tolerance on the support plate.

Backing the pressboard also reduces fuzzing. Use tempered masonite or equivalent as an exit side bushing. At the minimum, if this material is unavailable, back the pressboard with masking tape.

Saw speed:	5,200'/min. (1585 m/min)
Blade type:	Raker set
Blade Depth:	3/16" (4.8 mm)
Blade Thickness:	0.014" (.36 mm)
Teeth Per Inch:	14
Feed Rate:	24"/min. (610 mm/min)
Cut Gap:	0.023" (.58 mm)

	Cellulose	Poly/glass laminate	Type 992	Type 993 / Type 998	Type 994
Band Saw: Blade	14 TPI	6TPI*	14TPI	14TPI	14TPI
	raker set	raker set, carbide tipped	raker set	raker set	raker set
Speed	Max	Max	Max	Max	Max
Feed	Normal	Slow	Fast	Fast	Fast

*Back the exit side of the material with masking tape. In addition, use masonite, LUCITE® or an equivalent material as an exit side bushing.

DoAll Company (saws and blades)	(800) 92DOALL	www.doall.com
L.S.Starrett Co. (blades)	(978) 249-3551	www.starrett.com
Sears (blades)	(800) MYSEARS	www.sears.com
Simmons Engineering (blades)	(800) BLADE81	www.simcut.com

Water Jet Cutter

Causing no warpage, delamination or fuzzing on the edges, the water jet is an excellent way to cut pressboard. However, pressboard is sensitive to moisture and must be wiped dry soon after cutting. Be sure to store it on a flat surface in a dry area with low relative humidity.

Equipment is expensive, but there are businesses available that provide water jet cutting for hire.

Cut gap: 0.035" (0.89 mm) width cutting stream (Often depends on machine specs).

Nozzle orifice: 0.009" (0.23 mm) (Often depends on machine specs).

Pressure: 40,000-45,000 lbs/in^2 (27.6-31.0 kN/cm^2)

Feed Rate: 24"/min. (610 mm/min) [With or without sand; with for a much better cut].

Rate depends on the thickness of the material and the finish requirements.

Note: Because all pressboard is sensitive to moisture, prolonged exposure to a humid environment is not advised. Store pressboard in low relative humidity areas and/or wrap it in plastic or a similar air impermeable material.

DuPont (machining services)	(302) 999-5916	www.dupont.com
Flow International (equipment)	(800) 446-3569	www.flowcorp.com
Hydro-Abrasive Machining, Inc. (services)	(323) 587-1342	www.hydromachine.com
Ingersoll Rand Co. (equipment)	(800) 826-9274	www.irwj.com
Jet Edge Corp. (equipment)	(800) 538-3343	www.jetedge.com

Ultrasonic Cutting

Because they cut pressboard in a slicing action, ultrasonic machines can leave a slightly raised edge which, depending on processing requirements, may require some light sanding. In addition, ultrasonics can cause some discoloration due to the "charring" of the pressboard. Note: There is no waste with this method.

A hand-held ultrasonic cutting knife is available for light cutting and trimming. For your safety, wear a protective glove of KEVLAR® on the non-cutting hand. Heavy duty ultrasonic knives can cut pressboard Type 994.

American GFM (all types)	(757) 487-2442	www.agfm.com
Branson Ultrasonic (hand held)	(203) 796-0400	www.branson-plasticsjoin.com
Eagle Automation (all types)	(610) 458-9300	www.eagleautomation.com

Laser Cutter

Particles can distort the laser beam to cause inaccurate cutting. In addition, laser cutting causes "charring" (discoloration) along the edges of the NOMEX® brand pressboard. This cutting method is not recommended.

Cast Cutter

For specialty work, when speed is not a consideration, the cast cutter is a surprisingly safe and effective way to cut pressboard. High speed oscillation produces the cutting action. The blade cuts on both the forward and the backward stroke, and if it touches the operator, in most cases, it will do no harm.

Blades: #840-40-300 Ti-Ni Coated SST, 2" (51 mm) or #840-40-350 Ti-Ni Coated SST, 2 1/2" (64 mm)

Stryker Instruments	(800) 253-3210	www.inst.strykercorp.com

Die Cutting

Die cutting is a quick, efficient method ideal for mass production work. There are all sorts of dies available to processors, including steel ruled dies, presharpened self-standing dies, heavyweight forged dies, and machined dies for complicated cuts. Matching the right die to the application is essential. Key considerations are the pressboard type and thickness and the edge quality requirements. A consultation with a professional die/punch manufacturer can be most beneficial.

In all cases, be sure to back the pressboard with a high quality cutting pad made of nylon, rubber composition, or polypropylene. Mount the pad to a 1" (25 mm) thick die board or marine plywood to ensure quality results. After extensive use, cutting pads can be resurfaced by sanding or milling. As a general rule, the cutting pad should be as hard as or harder than the material being die cut. Type 994 — die cutting is usually limited to thicknesses no greater than 0.125" (3.2 mm).

Note: Die cutting may leave a slightly raised edge.

Ontario Die Company of America	(810) 987-5060	www.ontariodie.com
Prima Die Co., Inc.	(323) 268-3434	www.primasales.com
Progressive Service Die Co.	(717) 766-8004	www.psdcdies.com

Sanding

When working with a belt sander, use 120 to 320 grit aluminum oxide or silicon carbide sanding belts. It is always a good idea to experiment first with different sanding belts to determine which work best. A rotary sander will also work well.

Use standard equipment. No special equipment is required. Remember, power equipment will create dust. Use a dust collection system or wear a NIOSH-approved mask.

Black and Decker	(800) 544-6986	www.blackanddecker.com
Snap-On-Tools	(800) 926-5544	www.snapon.com

Milling

Pressboard Types T992 and T993

Use standard milling equipment, the same equipment used with cellulose board.

Pressboard Type T994

Because of its density, Type 994 can melt if cut too fast. It's best to work at slower speeds to prevent the material from overheating. It's advisable to first test feed and speed rates.

Bits: Use carbide tipped milling cutters and titanium nitride coated drills. Brad point drill works best.

	*Spindle Speeds	Feed Rate
Planing [.062" (1.55 mm) depth of cut]	2000 to 4000 RPM	150" (381 cm) per minute
End Milling	2000 to 4000 RPM	75" (190 cm) per minute
Dovetail Milling	4000 RPM	40" (102 cm) per minute
Drilling	3000 RPM	Slow

*dependant on cutter diameter

International Carbide Corp. (bits)	(800) 422-8665	www.icctool.com

Punching

When punching NOMEX® brand pressboard, as with die cutting, key considerations include the type and thickness of the pressboard and the edge quality requirements. Unfortunately, misapplication of tooling is quite common as processors all too often opt for too much rather than what is appropriate to do the job. A consultation with a professional punch/die manufacturer can be most beneficial.

Pressboard options: Use a punch and die set with tight tolerances — 0.0002" - 0.0005" (5.1 - 12.7 µm) maximum on the diameter. Ideally, the punch should be made of tungsten carbide and used to size the tool steel die. In some situations, a male/female tool in a die set for use in a punch press is appropriate. In others, a simple hole punch and a quality cutting pad made of nylon, rubber composition, or polypropylene (to back the pressboard) will suffice. Once again, matching the right tool to the application is fundamentally important. Type 994 — Punching is usually limited to thicknesses no greater than 0.125" (3.2 mm). NOTE: Punching may leave a slightly raised edge.

Progressive Service Die Co.	(717) 766-8004	www.psdcdies.com

Drilling

Use bits normally recommended for wood and masonite. The carbide tipped variety will have a much longer life span. A typical twist drill will work well at speeds above 1000 RPM. For best hole quality, use a brad point drill with two flutes at 3000 RPM.

Normally, this drill type is not required. With both drills types, a slow feed rate works best.

George Lucas Associates	(856) 428-7308	
International Carbide Corp. (brad point drill)	(800) 422-8665	www.icctool.com
Snap-On-Tools	(800) 926-5544	www.snapon.com

Routing

Use a split helix router bit (tungsten carbide for longer life) with either two or four helixes. Operating speed should be between 20,000 and 27,000 RPM.

Black and Decker (router)	(800) 544-6986	www.blackanddecker.com
Cooper Power Tools (Dotco) (router)	(800) 845-5629	www.cooperpowertools.com
International Carbide Corp. (router bits)	(800) 422-8665	www.icctool.com
Pen Associates, Inc. (router bits)	(302) 239-6866	

METHODS AND YIELDS COMPARISON CHART

Rectangular Sticks [.5" x 59" x .25" strips from a 14" x 59" board]

	Circular Blade Cutting	Cast Blade Cutter	Water Jet Cutting	Diamond Wire Cutting	Band Saw Cutting	Jewelers Blade Cutting	Ultrasonic Knife
Stick length	59"	59"	59"	59"	59"	59"	59"
Stick width	0.5"	0.5"	0.5"	0.5"	0.5"	0.5"	0.5"
Stick thickness	0.25"	0.25"	0.25"	0.25"	0.25"	0.25"	0.25"
Cut Gap	0.166"	0.1"	0.035"	0.01"	0.022"	0.03"	N/A
Sticks/board	21.02	23.33	26.1	27.45	26.8	26.4	28.0
Cut Yield	0.7508	0.8333	0.9346	0.9804	0.9579	0.9434	1.00
Sticks/board	21	23	26	27	26	26	28
Parts Yield	0.75	0.8214	0.9285	0.9643	0.9285	0.9285	1.00
Cutting Speed	Fast	Slow	Fast	Slow	Medium	Slow	

Rectangular Sticks (12.7 x 1500 x 6.35 mm from a 355.6 x 1500 mm board)

	Circular Blade Cutting	Cast Blade Cutter	Water Jet Cutting	Diamond Wire Cutting	Band Saw Cutting	Jewelers Blade Cutting	Ultrasonic Knife
Stick length	1500 mm	1500 mm	1500 mm	1500 mm	1500 mm	1500 mm	1500 mm
Stick width	12.7 mm	12.7 mm	12.7 mm	12.7 mm	12.7 mm	12.7 mm	12.7 mm
Stick thickness	6.35 mm	6.35 mm	6.35 mm	6.35 mm	6.35 mm	6.35 mm	6.35 mm
Cut Gap	4.22 mm	2.54 mm	0.89 mm	0.25 mm	0.56 mm	0.76 mm	N/A
Sticks/board	21.02	23.33	26.1	27.45	26.8	26.4	28.0
Cut Yield	0.7508	0.8333	0.9346	0.9804	0.9579	0.9434	1.00
Sticks/board	21	23	26	27	26	26	28
Parts Yield	0.75	0.8214	0.9285	0.9643	0.9285	0.9285	1.00
Cutting Speed	Fast	Slow	Fast	Slow	Medium	Slow	

Source Address and Contact Information

American GFM
1200 Cavalier Blvd.
Chesapeake, VA 23323
Phone: (757) 487-2442
Website: www.agfm.com
Ultrasonic Cutting Machines

Black and Decker
701 East Joppa Rd.
Towson, MD 21286
Phone: (800) 544-6986
(410) 716-3900
Website: www.blackanddecker.com
Circular Saw Blades, Regular Wire, Router Bits, Sanding Equipment

Branson Ultrasonic
41 Eagle Road #1
Danbury, CT 06810
Phone: (203) 796-0400
Fax (203) 796-9838
Website: www.branson-plasticsjoin.com
Ultrasonic Cutting Knifes

Cooper Power Tools (Dotco)
P. O. Box 1410
Lexington, SC 29071
Phone: (800) 845-5629
(803) 359-1200
Fax: (803) 359-0822
Website: www.cooperpowertools.com
Router Bits

Cutlery Products and Services
136 Beattie Street
Syracuse, NY 13224
Phone: (315) 449-3050
Shears

DeWalt
P. O. Box 158
Hampstead, MD 21074
Phone: (800) 4DEWALT
Website: www.dewalt.com
Circular Saw Blades

DoAll Company
254 North Laurel Ave.
Des Plaines, IL 60016
Phone: (800) 92DOALL
(847) 824-8191
Fax: (847) 824-4340
Website: www.doall.com
Band Saw and Circular Saw Blades

DuPont
Chestnut Run Plaza - 702 Bldg.
Wilmington, DE 19880-0702
Phone: (302) 999-5916
Website: www.dupont.com
Water Jet Cutting Service

Eagle Automation
640 Rice Blvd.
Exton, PA 19341-1146
Phone: (610) 458-9300
Fax: (610) 458-0606
Website: www.eagleautomation.com
Ultrasonic Cutting Machines

Fiskar Industrial
2620 Stewart Ave., Suite 18
Wausau, WI 54402-1405
Phone: (800) 289-8288
(715) 845-3802
Fax: (715) 848-3342
Website: www.fiskars.com
Shears

Flow International
23500 64th Ave. S
Kent, WA 98032
Phone: (800) 446-3569
(253) 850-3500
Fax: (253) 813-3285
Website: www.flowcorp.com
Water Jet Cutter

George Lucas Associates
1519 Hillside Drive
Cherry Hill, NJ 08003
Phone: (856) 428-7308
Drill Bits

Gingher Inc.
322-D Edwardia Drive
Greensboro, NC 27409
Phone: (800) GINGHER
(336) 292-6237
Fax: (336) 292-6250
Website: www.gingher.com
Shears

Hydro-Abrasive Machining, Inc.
8831 Miner St.
Los Angeles, CA 90002
Phone: (323) 587-1342
Fax: (323) 587-1889
Website: www.hydromachine.com
Water Jet Cutting Service

Ingersoll Rand Co.
635 W 12th St.
Baxter Springs, KS 66713
Phone: (800) 826-9274
(316) 856-2151
Fax: (316) 856-5050
Website: www.irwj.com
Water Jet Cutter

International Carbide Corp.
305 B Creek St. NE
Yelm, WA 98597-8665
Phone: (800) 422-8665
(360) 458-1603
Fax: (800) 701-2081
Website: www.icctool.com
Drill , Milling and Router Bits

Izumi International
1 Pelham Davis Circle
Greenville, SC 29615
Phone: (864) 288-8001
Fax: (864) 288-7272
Website: www.izumiinternational.com
Shears

Jet Edge Corp.
12070 43rd Street NE
Saint Michael, MN 55376
Phone: (800) 538-3343
(763) 497-8700
Website: www.jetedge.com
Water Jet Cutter

Judson Cutlery Inc.
1320 Lincoln Ave. #9
Holbrook, NY 11741
Phone: (800) 541-1487
(631) 981-4083
Website: www.judsoncutlery.com
Shears

L.S.Starrett Co.
121 Crescent St.
Athol, MA 01331
Phone: (978) 249-3551
Fax: (978) 249-8495
Website: www.starrett.com
Band Saw Blades

Laser Technology West Limited
1605 South Murray Blvd.
Colorado Springs, CO 80916
Phone: (800) 394-8270
(719) 570-1150
Fax: (719) 570-1176
Website: www.lasertechwest.com
Diamond Wire

Ontario Die Company of America
2735 20th Street
Port Huron, MI 48061-0397
Phone: (810) 987-5060
Fax: (810) 987-3688
Website: www.ontariodie.com
Drill Bits

Pen Associates, Inc.
201 Pine Knoll Circle
Hockessin, DE 19707
Phone: (302) 239-6866
Router Bits and Shears

Prima Die Co., Inc.
3546 East 15th Street
Los Angeles, CA 90023
Phone: (323) 268-3434
Fax: (323) 268-3434
Website: www.primasales.com
Forged Dies

Progressive Service Die Co.
1 Taylor Blvd.
New Kingstown, PA 17072
Phone: (717) 766-8004
Website: www.psdcdies.com
Forged Dies, Punching Sets

Sears
Any Outlet Store (reciprocating wire)
Phone: (800) MYSEARS
Website: www.sears.com
Band Saw Blades, Regular Wire

Simmons Engineering
1200 Willis Ave.
Wheeling, IL 60090
Phone: (800) BLADE81
(847) 419-9800
Fax: (847) 419-1500
Website: www.simcut.com
Band Saw Blades

Snap-On-Tools
1330 Enterprise Dr.
West Chester, PA 19380
Phone: (800) 926-5544
(610) 431-2080
Website: www.snapon.com
Drill Bits, Sanding Equipment

Stryker Instruments
4100 East Milham Ave.
Kalamazoo, MI 49001
Phone: (800) 253-3210
(616) 323-7000
Website: www.inst.strykercorp.com
Cast Cutters

Thurston Manufacturing
45 Borden Street
Providence, RI 02901
Phone: (401) 331-0243
Website: www.thurstonsaws.com
Jewelers Saw Blade

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5401 Jefferson Davis Highway
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Fax: (905) 821-5177
e-mail: products@can.dupont.com

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e-mail: nomexpaper@hkg.dupont.com

DuPont on the web:
www.dupont.com/nomex

Product safety information is available upon request
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