FANDELI®

Coated Abrasives

PLYWOOD and PANELS
INFORMATION MANUAL

Index

About Us

Founded in 1927, **FANDELI** is one of the best examples of industrial development. Manufacturing plants have computerized control and optimization systems for all productive processes and operations. Continuous improvement enables us to deliver positive results reflected in the final product.

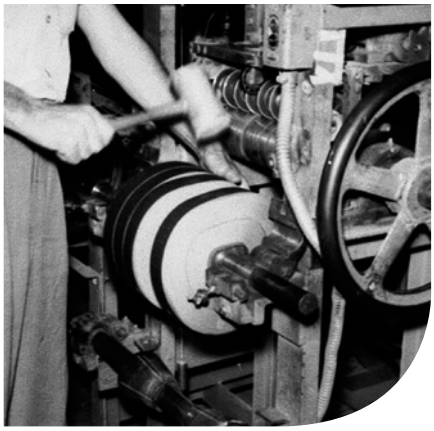
FANDELI quality systems are certified to **ISO 9001:2008** in all processes. **FANDELI** also features a **CLEAN INDUSTRY** certification issued by **PROFEPA** (Federal Environmental Protection Bureau) and the **Self-Management Program for Health and Safety in the Workplace** (PASST), which ensures labor standards in the plants are keep completely safe and without risks.

With 58 lines of coated abrasive products in 450 grades and thousands of finished goods, 12 lines of nonwoven fibers and cut-off wheels **FANDELI, a 100% Mexican company,** and is the only manufacturer in Mexico, offering comprehensive, effective, and efficient solutions for heavy grinding, intermediate grinding, finishing, polishing and micro finishing processes all over the world. **FANDELI** has the broadest portfolio of products to meet the needs of its customers in all industries: **woodworking, metalworking, automotive plants, aftermarket, glass, leather, etc.**

With **five distribution centers** in Mexico, the United States and commercial representatives in different countries, **FANDELI** exports a third of its production to more than 25 countries, with the vision of being:

"THE BEST OPTION IN ABRASIVE PRODUCTS WITH HIGH-LEVEL SERVICE AND AN OPTIMUM COST-BENEFIT"

Year 1927



Year 1939

About FANDELI

Mission
To provide comprehensive solutions, effective and efficient processes for cutting, grinding and finishing.

Vision
Be the best option in abrasive products in the domestic market to countries which export, with a high-level service and optimum cost/benefit relation.

Values
Our people, social responsibility, commitment, respect, customer focus, teamwork and integrity.

Quality

1. ISO 9001:2008

As part of our continuous efforts to exceed our customer expectations Fandeli engages our mission, vision and values, to **guarantee that quality** is the number one priority. This enables us to respond to international market standards. Our processes have been certified by one of the most prestigious organizations, **UL** (Undewriters Laboratories).

DQS UL audits, verify that the management system fully complies with the requirements set for ISO 9001:2008.

2. PASST

FANDELI´s pride in its people as an outstanding value; inspired the company to pursue and receive a certification in (PASST) the **Self-Management Program in Health and Safety in the Workplace**. The company promotes a culture of safety in the workplace by means of self-diagnostics that contribute to a **SAFE INDUSTRY** culture in the company and by its personal.

About FANDELI

Technology

FANDELI products are manufactured with high technology and selected quality materials in order to meet market demands.

FANDELI has state-of-the-art manufacturing equipment with stringent and innovative controls. This has enabled the company to be competitive at a global level.

Environment

From its beginning, **FANDELI** has been conscious of the environment and ensures that standards set by the **Environmental Protection Voluntary Program** are met.

This program sets standards for social commitment in environmental matters. As a result of the program, our company constantly invests in improvements to processes and infrastructure to assure sustainable development and prevent environmental damage especially emphasizing best security and health practices.

FANDELI is certified in the **"Clean Industry"** program; a self-management program by **PROFEPA** (Federal Environmental Protection Bureau). Companies that meet the guidelines are certified showing their social commitment to the protection of the environment.

Plants and Distribution Centers

FANDELI is the trade name of **Fábrica Nacional de Lija S.A. de C.V.** The first and largest coated abrasive manufacturer in **Mexico and Latin America and has been existent for almost 90 years.**

With three states of the art manufacturing plants and a R&D abrasives center, **FANDELI** offers a broad catalog of abrasives intended to exceed the expectations of our customers and end users.

- **Plants:**
  1.- Plant 1 Tlalnepantla, Mexico
  2.- Plant 2 Tlalnepantla, Mexico
  3.- Plant 3 Queretaro, Mexico
  4.- Fabric team plant, Mexico

- **Distribution Centers:**
  1.- Tlalnepantla, México
  2. - Monterrey, México
  3. - Guadalajara, México
  4. - Querétaro, México
  5. - Houston, Texas, USA

- **Sales Offices:**
  1. - Tijuana, México
  2. - Quito, Ecuador
  3. - Chile, South America

Customer Services

At **FANDELI,** our priority is to meet the most demanding requirements of our customers, users and distributors. Due to this, our distribution chain extend through **México, United States, Central America, and South America**, providing an effective and reliable service.

We have developed a training center for abrasives which provides instructional and technical assistance to different end users, as well as to our distributors and sales force.

We also have our own **R&D Department**, where we design new and innovative products to ensure total satisfaction for our customer needs.

Plywood Panels

Plywood Panels are sheets or parts manufactured by applying heat and pressure over particles of wood (chips, sawdust, shavings) and other lignocelullosic particulate materials (radiata pine, eucalyptus, pine and others) to which resin is added. The expression "particleboard" is synonymous to "chipboard" (MDF, HDF, MDP, OSB).

What is a particle board?

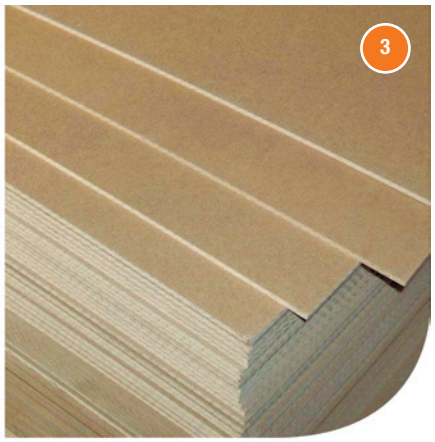
It is a product manufactured with resinated particles to which heat and pressure are applied.

These are classified as:

- **Single-layer:** Similar-sized particles in all thicknesses.
- **Multi-layer:** Formed by two external layers of fine particles, and a core of larger size particles.
- **Gradual:** Particle sizes gradually changes from smaller on the outside to larger on the core.

Different types of boards with particular features and purposes exist, which are classified according to the size of particles:

1. **MDP** (Medium Density Particleboard)
2. **MDF** (Medium Density Fiberboard)
3. **HDF** (High Density Fiberboard)
4. **OSB** (Oriented Strand Board)
5. **PLYWOOD AND LAMINATED BOARDS**



Plywood Panels

Manufacturing

For the manufacturing of **MDP, MDF, HDF, OSB** binding resins are mixed with wooden particles or residues from the processing of wood, in order to obtain stable heat-pressed panels.

Plywood and laminated boards are manufactured similarly. In this process sheets of wood or thin veneers, are resinated and then heat pressed.

E1 (European standard) panel with low formaldehyde content (max 8 mg / m2.)

Classification

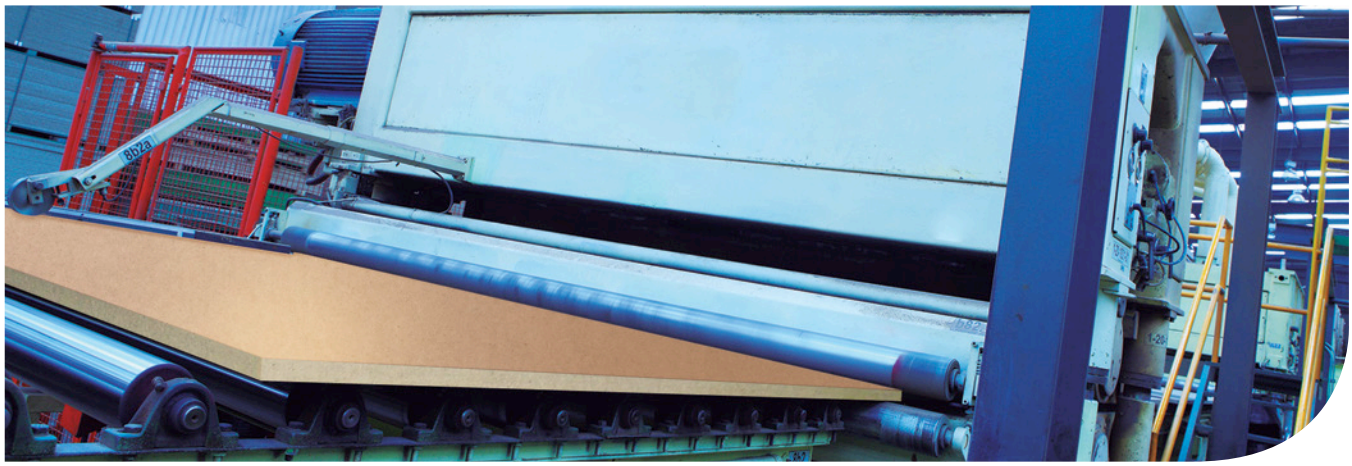
Panels are classified according to density and appearance (unfinished). Panels are often laminated with melamine sheets or natural woods.

Board type classification by density

Density	(lb/ft3)
Low density or insulating quality	15.60 - 24.97
Medium density	24.97 - 49.94
High density or hard panels	49.94 - 68.67

Most common densities and thicknesses

Thickness (in)	0.35"	0.47"	0.59"	0.71"	0.94"	1.26"
Type of Emitter	E1	E1	E1	E1	E1	E1
Density (lb/ft3)	43.7 +-1.25	37.46 +-20	39.96 +-20	39.33 +-20	37.46 +-20	35.59 +-20

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FANDELI

FANDELI Product Portfolio

FANDELI has a line of products and service portfolio focused on our customers needs and satisfaction. Products are aligned with our strategy providing the best cost-benefit relation.

The **FANDELI** portfolio for the plywood panels is ideal for heavy and intermediate grinding, as well as for finishing. The products included in this portfolio are:

Belts

- S-99
- S-98
- HT98 *
- R-98
- Y-98
- Y088

*Manufactured under special request

Associated Products

- Natural Felt Roll
- Thermoplastic Foam Roll
- Graphite Canvas

Product line
S-99

FEATURES	
Line	S-99 Segmented and wide belts
Abrasive	Silicon Carbide
Adhesive	Synthetic resin
Backing	Polyester
Special treatment	Antistatic
Coating	Closed
FEPA P Grits Coarse	36, 40, 50
Intermediate	60 and 80
Fine	100, 120, 150, 180
Width / length (mm) (in)	1400 min - 3300 max / 2500 min - 3850 max 55.12 min - 129.92 max / 98.43 min -151.57 max
Splice tape	On the coated side

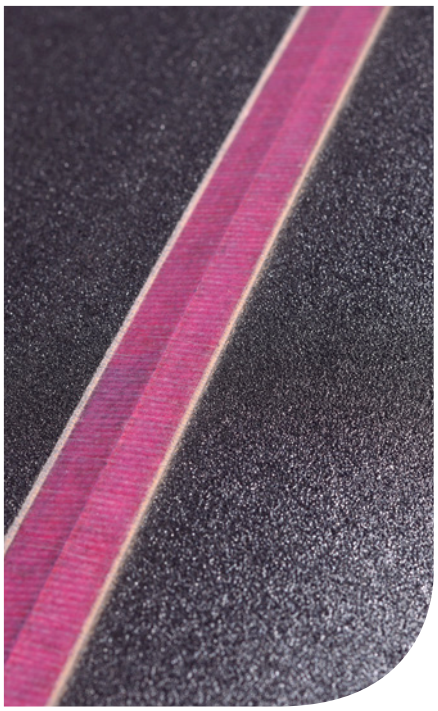
Benefits

- Highly resistant backing to stress and tearing
- Intermediate and coarse grit ideal for heavy grinding operations
- Coated with antistatic additive prevents premature clogging on the belt
- Backing coated with graphite to reduce wear and tear on the graphite canvas
- Long lasting performance
- Coarse and intermediate grit, high performance for high-removal operations
- Fine grits for consistant finishing

Packaging:
Coarse Grits: 2 belts per box
Intermediate and fine grits: 4 belts per box

S-98

FEATURES	
Line	S-98 Segmented and wide belts
Abrasive	Silicon Carbide
Adhesive	Synthetic resin
Backing	Polyester
Special treatment	Antistatic
Coating	Closed
FEPA P Grits interm.	60 and 80
Fine	100, 120, 150, 180, 220
Width / length (mm) (in)	1400 min - 3300 max / 2500 min - 3850 max 55.12 min - 129.92 max / 98.43 min - 151.57 max
Splice tape	On the coated side



Benefits

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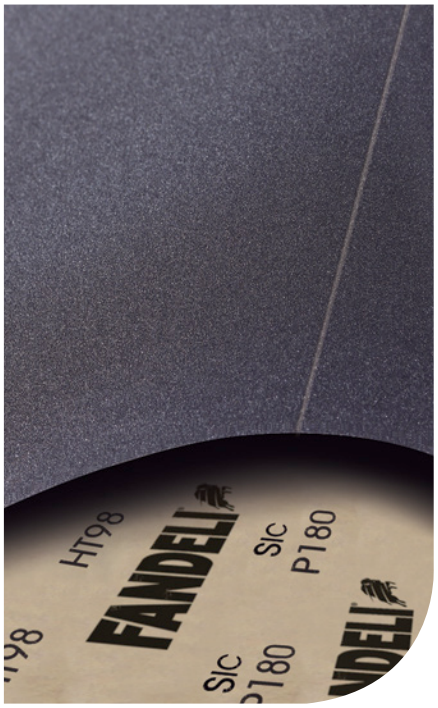
- Coated with antistatic additive prevents premature clogging on the belt
- Backing coated with graphite to reduce wear and tear on the graphite canvas
- Long lasting performance
- Coarse and intermediate grit, high performance for high-removal operations
- Fine grits for consistant finishing

Packaging:
Coarse Grits: 2 belts per box
Intermediate and fine grits: 4 belts per box

HT98*

*Manufactured under special request

FEATURES	
Line	HT98 segmented belts
Abrasive	Silicon Carbide
Adhesive	Synthetic resin
Backing	H weight Paper
Special treatment	Antistatic
Coating	Closed
FEPA P Grits	120, 150, 180
Width / length (mm) (in)	1400 min – 3300 max / 2500 min – 3850 max 55.12 min - 129.92 max / 98.43 min - 151.57 max
Splice tape	Overlap



Benefits

- Highly resistant backing to tearing
- Ideal for finishing operations
- Coated with antistatic additive that prevents premature clogging on the belt
- High performance and excellent consistant finishing

Y088

FEATURES	
Line	Y088 wide belts
Abrasive	Aluminum Oxide
Adhesive	Synthetic resin
Backing	Y wt. Polycotton
Special treatment	None
Coating	Open
FEPA P grits coarse	24, 36, 40, 50
Intermediate	60 and 80
Fine	100, 120, 150, 180, 220
Width / length (mm) (in)	940 min - 1370 max / 2000 min - 3850 max 37 min - 53.94 max / 78.74 min - 151.57 max
Splice tape	Grits 24 to 60 on the backing side Grits 80 to 220 on the coat side

Benefits

- Resistant backing
- Coarse grit suitable for heavy grinding operations
- Intermediate and fine grits ideal for finishing operations
- Good performance and durability in heavy grinding operations
- Intermediate and fine grits of high durability and excellent finishing

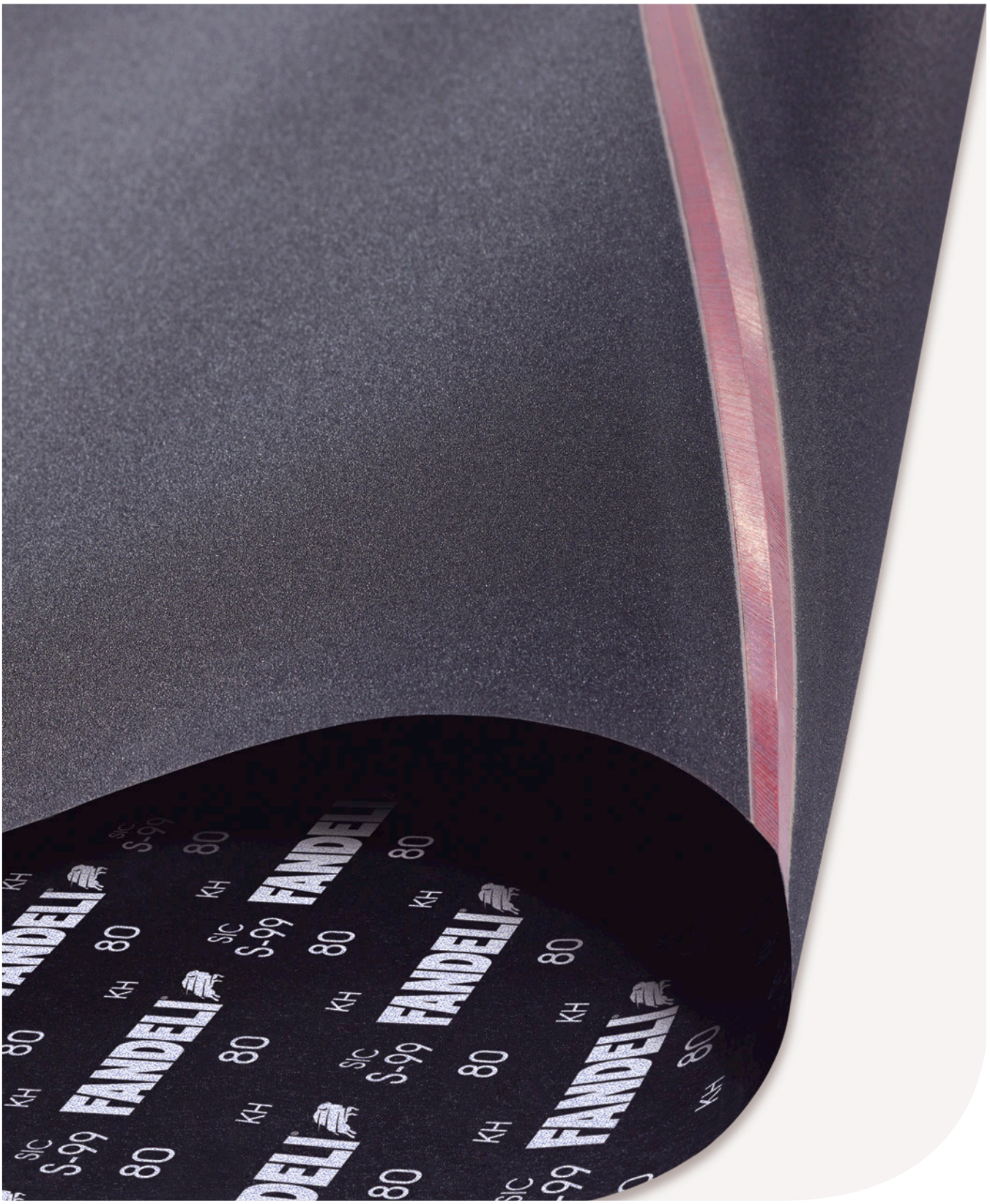
Packaging:
Coarse Grits: 2 belts per box
Intermediate and fine grits: 4 belts per box

Y-98

FEATURES	
Line	Y-98 wide belts
Abrasive	Silicon Carbide
Adhesive	Synthetic resin
Backing	Y wt. Polycotton
Special treatment	None
Coating	Closed
FEPA P grits coarse	50
Intermediate / Fine	60 and 80 / 100 and 120
Width / length (mm) (in)	940 min - 1372 max / 2000 min - 3850 max 37 min - 54.02 max / 78.74 min - 151.57 max
Splice tape	Grits 50 and 60 on the backingside Grits 80 to 120 on the coat side

Benefits

- Backing resistant to stress
- Excellent durability and performance
- Intermediate and fine grits ideal for intermediate grinding operations, and finishing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KH
80
SiC
S-99

R-98

FEATURES	
Line	R-98 wide belts
Abrasive	Silicon Carbide
Adhesive	Synthetic resin
Backing	Polycotton
Special treatment	None
Coating	Closed
FEPA P Grits inter.	80
Fine	120, 150, 180
Width / length (mm) (in)	940 min - 1372 max / 2000 min - 3850 max 37 min - 54.02 max / 78.74 min - 151.57 max
Splice tape	On the coated side

Benefits

- Backing resistant to stress
- Ideal for intermediate grinding operations
- Excellent durability and performance
- Finishing uniformity

Packaging: Coarse Grits: 2 belts per box / Intermediate and Fine Grits: 4 belts per box

Natural Felt

FEATURES	
Line	Natural Felt
Material	100% wool
Converted form	Roll
Color	White
Density	* Medium
Application	Intermediate grinding

MEASURES		
Width (in)	Length (ft)	* Thickness (in)
1.57	91.8	.12
1.85	91.8	.12
2.64	91.8	.12
3.03	91.8	.12
4.21	91.8	.12

* Other densities and thicknesses, available upon request.

Thermoplastic Foam

FEATURES	
Line	Thermoplastic Foam
Material	Thermoplastic
Converted Form	Roll
Color	Black
Density / Hardness	Low 0.08 (g/cm3) / Soft)
Resistance to heat	212º F
Special treatment	Adhesive (PSA)
Application	Finishing

MEASURES		
Wide (in)	Length (ft)	Thickness (in)
1.57	100	.2
1.85	100	.2
2.64	100	.2
3.03	100	.2
4.21	100	.2

Graphite Canvas

FEATURES	
Line	Graphite Canvas
Converted Form	Roll
Color	Black
Resistance to heat	212º F
Special treatment	Flake graphite
Application	For intermediate grinding and finishing

MEASURES	
Wide (in)	Length (ft)
5.98	150
7.01	150

Reference Chart by Type of Substrate and Abrasive Line

SEGMENTED BELTS

Sanding Operation	Type of Substrate					
	OSB	MDP	HDF	MDF	PLYWOOD	TYPE OF SPLICE
S-99						
Heavy	■	■	■	■	■	 Butt on the coat side
Intermediate		■	■	■	■	
Finishing		■	■	■		
S-98						
Heavy		■	■	■	■	 Butt on the coat side
Intermediate		■	■	■	■	
Finishing		■	■	■		
HT98						
Heavy						 Overlap
Intermediate						
Finishing			■	■		

■ RECOMMENDED ■ UNRECOMMENDED ■ NOT RECOMMENDED

- **OSB** (Oriented Strand Board)
- **MDP** (Medium Density Particleboard)
- **HDF** (High Density Fiberboard)
- **MDF** (Medium Density Fiberboard)
- **Plywood and laminated boards**

These products are recommended to use on calibrating equipment from 2 to 6 sanding heads. Maximum belt length 134.5 ft or longer with 3 segments and 3 splices cut at an angle of 80°. Other sizes available upon request.

Reference Chart by Type of Substrate and Abrasive Line

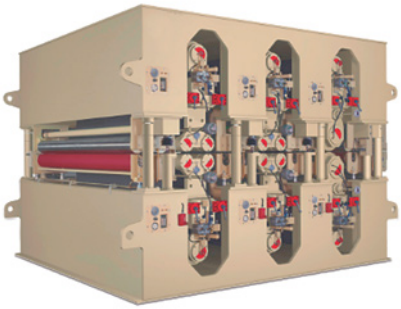
WIDE BELTS

Sanding Operation	Type of Substrate					TYPE OF SPLICE
	OSB	MDP	HDF	MDF	PLYWOOD	
Y-98						Butt on the backside 
Heavy		■	■	■	■	
Intermediate		■	■	■	■	 Butt on the coat side
Finishing						
Y088						Butt on the backside 
Heavy	■				■	
Intermediate					■	
Finishing					■	Butt on the coat side
R-98						
Heavy						
Intermediate		■	■	■	■	
Finishing		■	■	■	■	Butt on the coat side

■ RECOMMENDED ■ UNRECOMMENDED ■ NOT RECOMMENDED

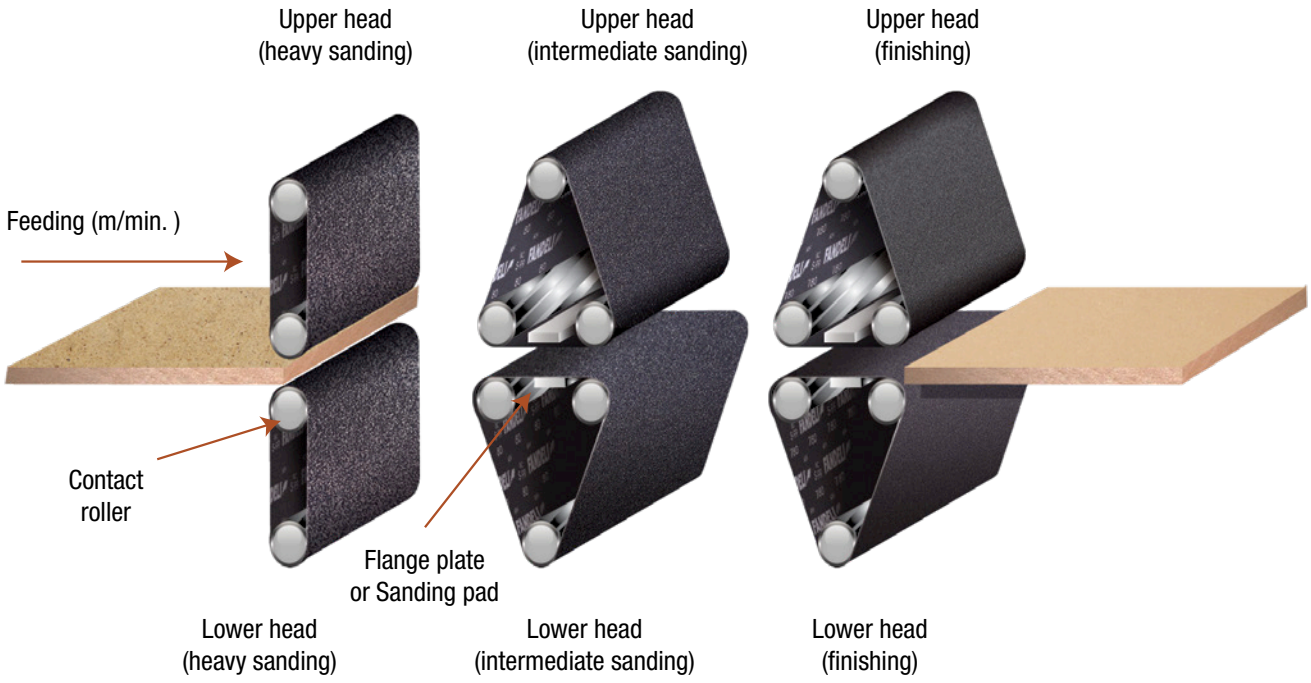
- **OSB** (Oriented Strand Board)
- **MDP** (Medium Density Particleboard)
- **HDF** (High Density Fiberboard)
- **MDF** (Medium Density Fiberboard)
- **Plywood and laminated boards**

Calibrating and Sanding Equipment for Heavy, Intermediate and Finishing Operations



Equipment Schematics

6-head sander machine with upper and lower heads



Technical Consulting Service and Product Training

Technical Consulting Srevice

Customized technical consulting providing specific knowledge on abrasives and their applications in Particle board and Plywood panels.

Product Training

Several courses delivered by specialists are available. The courses offered are listed below:

- Coated Abrasives Overview
- Preventive Predictive Maintenance (TPM) technics
- Specific Coated Abrasives for Plywood and Panel Industry.

Optimal Sanding Sequence

Recommended sequence and products for MDP/OSB board sanding			
Belt	CLOTH	CLOTH	CLOTH
Process	Heavy grinding	Intermediate grinding	Finishing
Product	S-99	S-99 / S-98	S-99 / S-98
Grits	36/40	60/80	100/120
Cut %	60	30	10
Feed. Spd. (ft/min)	From 26 to 82		

Recommended sequence and products for MDF/HDF board sanding			
Belt	FABRIC-PAPER	FABRIC-PAPER	FABRIC-PAPER
Process	Medium finishing	Fine finishing	Very fine finishing
Product	S-98 / HT98	S-98 / HT98	HT98
Grits	100/120	150/180	220
Cut %	60	30	10
Feed. Spd. (ft/min)	From 65 to 131		

Recommended sequence and products for plywood and laminated board sanding			
Belt	FABRIC	FABRIC	FABRIC
Process	Heavy grinding	Intermediate grinding	Finishing
Product	Y088	Y088	Y088
Grits	36/40	60/80	120/150
Cut %	60	30	10
Feed. Spd. (ft/min)	From 26 to 82		

Recommended sequence and products for plywood, chipboard, and striped boards			
Belt	CLOTH	CLOTH	CLOTH
Process	Heavy grinding	Intermediate grinding	Finishing
Product	Y-98	Y-98 / R-98	R-98
Grits	50/60	100-120 /120-150	150/180
Cut %	60	30	10
Feed. Spd. (ft/min)	From 26 to 82		

Usage Recommendation for Segmented and Wide Belts

• **Recommendation 1.** In the woodworking industry for an optimal performance of the belts used, it is recommended to first sand soft woods and then continue with the hard ones, thus preventing clogging of the abrasive belts.

• **Recommendation 2.** An important characteristic of polyester belts is their waterproofness, as they are resistant to washing; therefore, when performing that operation it is recommended to:
1. - Remove the material adhered to the surface with pressurized water.
2. - Scrub the belt with a soft-bristle brush and a soap solution.
3. - Rinse with pressurized water until the soap solution and material residue has come off.
4. – Let it dry on a belt hanger in the shade, with a pipe not smaller than 3" in diameter.

• **Recommendation 3.** When sanding, work surfaces should be at room temperature or as close as possible, for a better performance of the abrasive belt.

• **Recommendation 4.** Do not work with partially cured or uncured boards recently sealed or varnished, as they will easily clog the belts, reducing the abrasive performance, staining or scratching the panels. For all cases, sealants and varnishes must be totally dry. Under these conditions, abrasive belts will perform at their best.

Storage and Handling

• Our belt boxes are designed to withstand up to seven stacks

• Belts must be stored horizontally and not vertically, since that could result in damage to the edges and cause them to break or being damaged

• Avoid storing belts in damp areas and/or outdoors

• Avoid placing other objects on top of the boxes or belts

• The quantity of belts in a package depends on the abrasives grit, for coarse grits two belts are packed per box, for intermediate or fine, four belts are packed per box

• Associated products are wrapped with two separate rolls in a box. Boxes are adjusted depending on the width of the rolls

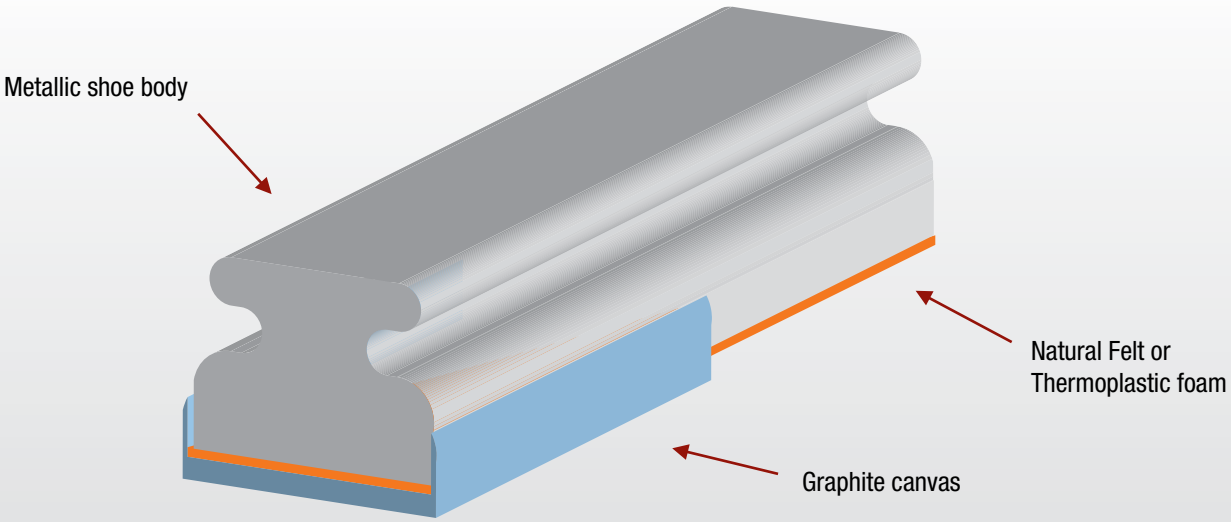
• It is recommended to store them in racks with labels facing forward as shown in the image below.

Associated Products Use Recommendation
(Natural felt, Thermoplastic Foam, Graphite Canvas)

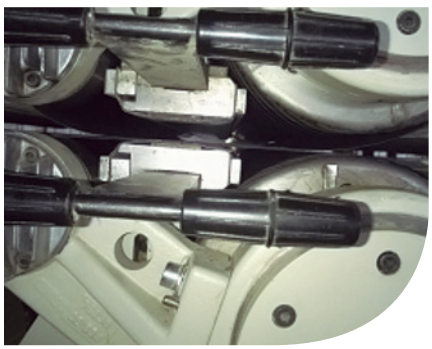
The heat generated by the friction between the abrasive belts and the sanded surface, is a factor which causes premature clogging in the belt; therefore, it is important to know the operation and behavior of the sanding platen head.

The coating of platen heads has an important role ensuring a proper operation of the belt, since they dissipate the heat produced by friction between the metal platen and the belt, thus preventing premature clogging or breaking of the belt. In addition, the padding shoe softens the aggressiveness of belts during final sanding, to produce a more homogeneous finishing.

Wool Felt tends to suffer from short term compression. Natural Felt is recommended for intermediate grinding and thermoplastic foam for final finishing. Thermoplastic Foam is more resistant to warping, as it retains its elasticity and has a higher durability.



The two latter materials combined separately with graphite canvas, since is essential for the proper operation of the belt.



Trouble Shooting and Solution During the Sanding Process

Problem in the board or machine	Failure	Probable Causes	Solutions
Board was not sanded	**1. Belt breakage**	1. Poor belt handling (paper). 2. Misaligned rollers. 3. Low tension. 4.Quick sanding. 5. Splicing problems. 6. Excess pressure.	1. Handle with care. 2. Adjust alignment. 3. Increase tension. 4. Adjust speeds to those recommended. 5. Verify tension or splicing. 6. Regulate work pressure and tension.
Machine stops	**2. Belt folds or creases**	1. Worn or broken roller. 2. Misaligned rollers. 3. Low tension. 4. Conical belt or larger in size. 5. Uneven sanding pressures. 6. Excess tension and/or pressure. 7. Very flexible belt.	1. Change or rectify. 2. Adjust alignment. 3. Adjust tension. 4. Verify and change dimensions. 5. Verify thicknesses of the piece to be sanded. 6. Adjust tension and pressure. 7. Replace with a higher-weight product.
Machine stops	**3. Belt alignment problems**	1. Problems in the sensors. 2. Conical wearing down of rollers. 3. Low tension in the belt. 4. Low cutting pressure and low belt pressure. 5. Uneven sanding pressures.	1. Check mechanism, clean or replace. 2. Rectify or replace rollers. 3. Adjust tension and verify dimensions. 4. Adjust tension and pressure. 5. Verify substrate thicknesses.
Partially sanded surface	**4. Low cut**	1. Barreled roller or worn in the center. 2. Excess pressure or work in one end of the belt. 3. Excess moisture 4. Product not recommended.	1. Rectify or replace roller. 2. Verify substrate thickness and work across the entire width of the belt. 3. Maintain the product properly stored. 4. Replace belt.
Horizontal marks on the board surface	**5. Chatter marks**	1. Equipment vibration. 2. Slack on the conveyor belt. 3. High thickness on the belts splice. 4. Rigid splice. 5. Rider roller or high-hardness plate.	1. Anchor and level the equipment. 2. Adjust conveyor belt. 3. Reduce pressure and increase speed. 4. Operate the belt without load or flex the splice. 5. Replace to one with lower hardness.
Scratches or lumps on the board	**6. Low cut and welts**	1. Dust extraction problems. 2. Glazing of the abrasive. 3. Particle scale. 4. Excess of abrasive.	1. Verify dust extraction operation. 2. Verify speeds. 3. Clean with air before and after the operation. 4. Change of production batch.
Scratched board	**7. Scratching and winding marks**	1. Problems with contact roller coating. 2. Dust adherence in contact roller and/or belt backing. 3. Belt damages on the mineral side due to substrate contamination (board). 4. Contaminant adherence on the back of the belt.	1. Rectify or replace roller. 2. Verify dust extraction system and/or clean with air before and after the operation. 3. Replace belt. 4. Check and clean the back of the belt.
No material removal	**8. Belt glazing**	1. Excessive speed. 2. Low pressures.	1. / 2. Adjust both speeds and work pressures.
Machine stops	**9. Splice failure**	1. Poorly adhered tape. 2. Problems in the platen. 3. Poor sanding operation.	1. Replace belt. 2. Adjust it. 3. Displace the piece across the belt.

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