ASAHI DIAMOND

SILICON PROCESSING TOOLS for SOLAR CELLS

SOLAR

B-51

SOLAR

SILICON PROCESSING TOOLS for SOLAR CELLS

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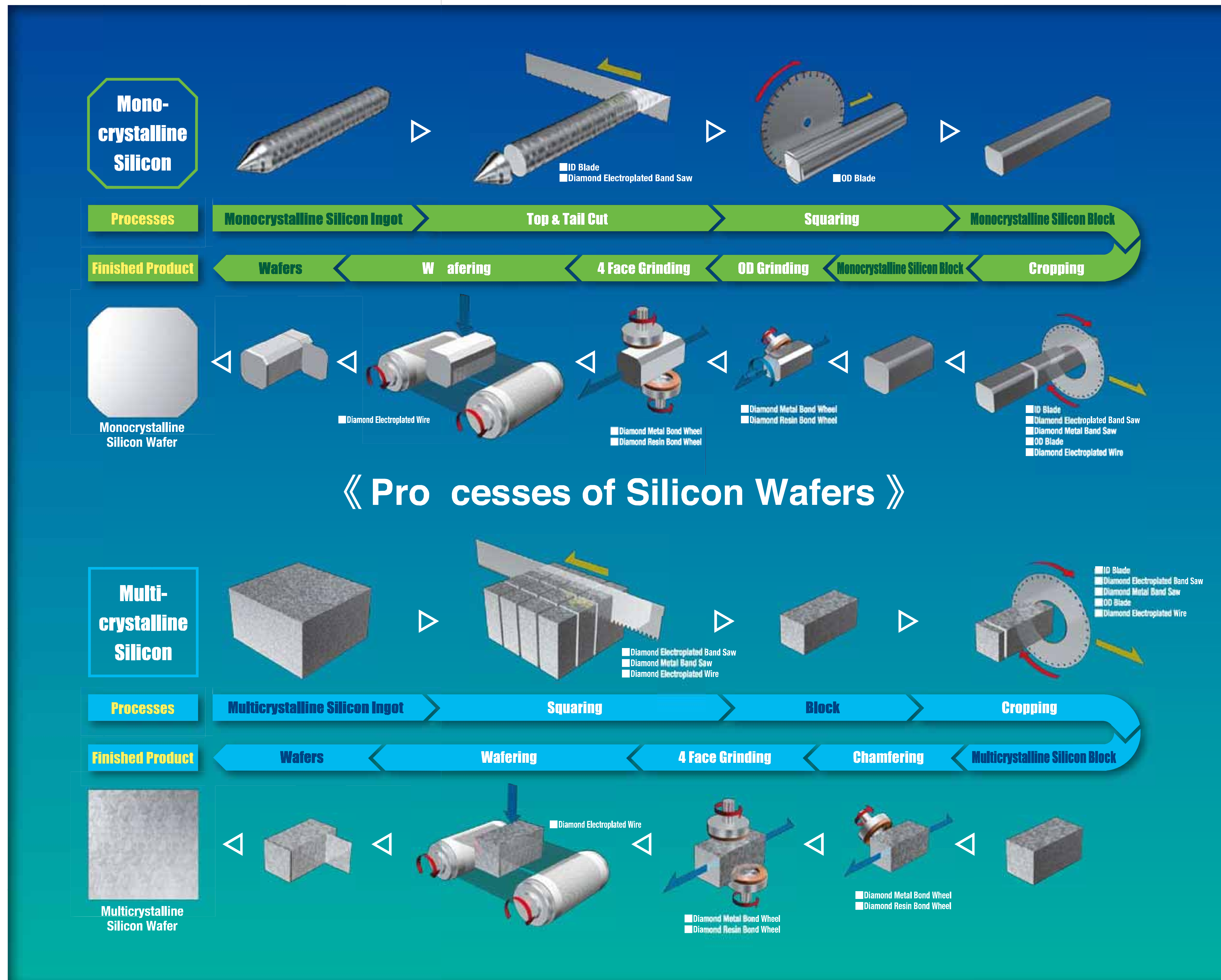


Diamond Band Saw Blades

Top & Tail Cut ／ Squaring ／ Cropping

Electroplated Diamond Band Saw Blades

Several blade edge designs are available and selection depends on material to be cut and cutting conditions. Electroplated blades allow for accurate cutting and improved saw efficiency with reduced kerf loss.

Size Table

Length (mm)	Core Width (mm)	Core Thickness (mm)
2,500～10,000	26～125	0.15～1.33

＊Please consult with our salesmen for details to determine band configuration.

Blade Edge Shapes

Segmented Type (Half Moon Type)

◆ For cutting hard and brittle materials

◆ Superior tool life and cutting ability in MONO silicon processing

◆ Allows greater flexibility in customizing blade edge width and pitch

Serrated Type

◆ Wide width band saw blades possible

◆ For cutting difficult-to-cut materials

◆ Reduced-loading saw tooth design encourages chip evacuation

Continuous Type

◆ A variety of band core width available

◆ Continuous rim design reduces the saw marks on the materials

◆ Suitable in cutting hard materials

For Cropping and Squaring MONO and MULTI crystalline silicon ingots for the PV industry.
Electroplated and Metal Bond Diamond Band Saw Blades are available.

Metal Bond Diamond Band Saw Blades

Long-lasting metal bond saw blades can cut large workpieces with high accuracy using high strength steel core and optimum segment design.

Size Table

Length (mm)	Core Width (mm)	Core Thickness (mm)
3,700～9,800	50～155	0.5～1.25

*Please consult with our salesmen for details to determine band configuration.

Blade Edge Shapes

Serrated Type

- ◆ Slotted design minimizes brazing heat effect
- ◆ Flexibility in customizing bond matrix and diamond particle size
- ◆ Allows greater flexibility in customizing blade edge pitch and dimension

Cutting Conditions

Type of Blades	Workpieces	Cutting Speed (mm/min)	Peripheral Speed (m/min)	Tension (N/mm²)
Electroplated Band Saw	MONO Si	10～50	1,000～1,200	100～200
	MULTI Si	5～40		
Metal Bond Band Saw	MONO Si MULTI Si	3～30	800～1,200	100～200

*Maintain optimum blade condition with periodic dressing using recommended dressing sticks

Selection Guidelines

Electroplated Band Saw	Metal Bond Band Saw	Selection Guidelines
MONO Crystalline Silicon		Reduced kerf loss, improved saw efficiency
	MULTI Crystalline Silicon	Long lasting

OD Blades for MONO & MULTI crystalline Silicon Ingots and Bricks

Squaring ／ Cropping

Used for end-cutting, removing brick inclusions and squaring MONO and MULTI silicon.

Applications

◆ Squaring MONO silicon ingot
◆ Squaring and end-cutting MONO seed silicon
◆ End-cutting MULTI silicon bricks to remove inclusions

Blade Shapes

Standard type

Balances blade life and sawing ability

Slotted type

Good cutting ability

Wave type

Special specification for reducing chipping

Cutting Condition

Surface Speed	Feed Speed	Process
1500～2000m/min	20～40mm/min	Plunge Cut

To improve blade performance:

◆ Supply sufficient quantity of coolant/water during cutting
◆ Insure ingot/brick is firmly attached to base to reduce triangle-shaped exit-chipping
◆ Maintain optimum blade condition with periodic dressing using recommended dressing sticks

Size Table

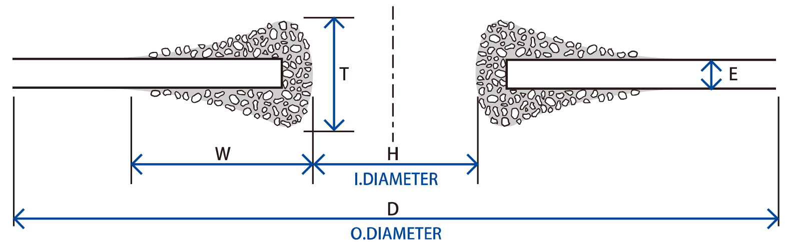
Size (Inch)	Thickness	Applications
φ400 (16)	2.5U	MONO-Si — Squaring MULTI-Si — Cropping
φ450 (18)	3.0U	
φ500 (20)	3.5U	
φ550 (22)	3.5U	
φ600 (24)	3.5U	
φ800 (32)	4.0U	MULTI-Si — Sizing — End Cutting
φ900 (36)	4.5U	
φ1000 (40)	5.0U	

＊Please consult with our salesmen for details to determine wheel configuration.

ID Blades for MONO & MULTI crystalline Silicon Ingots and Bricks

Cropping

Used for cropping MONO and MULTI silicon
ID blades are high-tensile strength thin blades with electroplated diamond edge. Advantages of ID blade slicing are cuts with high accuracy, superior flatness and minimal kerf loss.



Size Table

Size	Outer Diameter	Inner Diameter	Core Thickness	Blade Width	Blade Thickness	Grit size	Size of ingot
	D : mm	H : mm	E : mm	W : mm	T : mm	#	mm
AGI-27	690 (27 1/2")	240 (9 1/2")	0.15, 0.18	3.0	0.4～0.5	170, 200, 230	125□
AGI-34	860 (34")	305 (12")					156□

*Please consult with our salesmen for details to determine band configuration.

Case Study

Cropping	Blade size	Cutting Speed	Surface Speed	Coolant
	AGI-27(for 125□), AGI-34(for 156□)	20～50mm/min	1000～1500min^{-1}	**Water Soluble**

◆ Coolant supply is crucial during the cut.
*Maintain optimum blade condition with periodic dressing using recommended dressing sticks.

Grinding Wheels for Bricks

OD Grinding ／ 4 Face Grinding

Used for grinding bricks to final size. Metal bond and Resin bond wheels are available to fit all machine makes.

Type of Wheels

Grit Size：#200 – #500

Bond Type：① Metal Bond Wheels

Mainly used for rough grinding. Metal matrix such as Cu, Sn, Fe and Co secures diamond particles firmly for long wheel life.

② Resin Bond Wheels

Mainly used for finish grinding.

- ◆ Thermal cured resin matrix for good grinding ability and superior brick finish
- ◆ Polyimide bond for heavy grinding
- ◆ "BRIGHTSTAR" bond for super finish

Range of dimension：
- **Wheel diameter ／ ϕ50〜ϕ400**
- **Wheel width ／ 3〜10mm**
- **Slot ／ applicable**

＊Please consult with our salesmen for details.

Case Studies

Work piece：156□ MUTI Silicon Bricks

Rough Grinding ①

Wheel Spec	Surface Speed	Stock Removal	Table Feed	Surface Roughness
SD200 Metal	2,500m/min	0.8mm	400mm/min	—

Semi-Finish Grinding ①

Wheel Spec	Surface Speed	Stock Removal	Table Feed	Surface Roughness
SD500 Resin	2,500m/min	0.05mm	400mm/min	**Ra0.1μm**

Finish Grinding ②

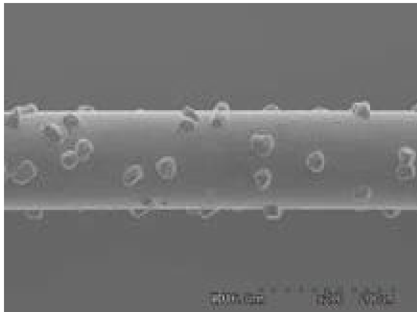
Wheel Spec	Surface Speed	Stock Removal	Table Feed	Surface Roughness
SD500 BRIGHTSTAR	2,500m/min	0.05mm	400mm/min	**Ra0.03〜0.1μm or less**

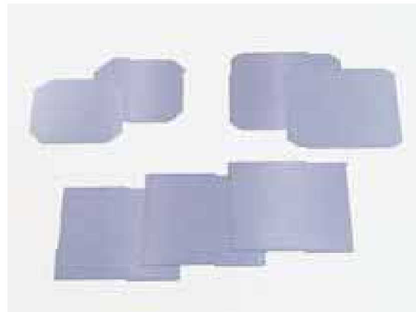
＊Brick surface finish and grind wheel life are dependent on machine rigidity and grinding conditions.

Diamond Electroplated Wire EcoMEP®

Wafering ／ Squaring ／ Cropping

EcoMEP Diamond Wire for cutting and wafering silicon and hard, brittle materials such as sapphire. Using electroplating to secure diamond particles to high tensile strength wire, EcoMEP fixed abrasive wire is superior to conventional slurry slicing by dramatically reducing process time, improving sub-surface damage and improving overall yield. Using water-based coolants enables possible reclaim and recycling of cutting chips, lowering cost of ownership.





Advantages

1. Lower overall cost of ownership

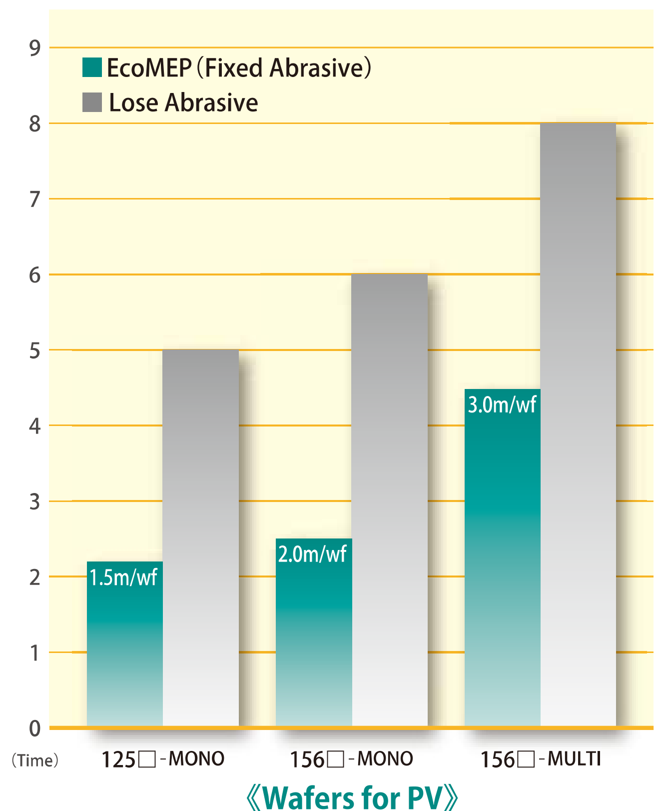
◆ Reduce process time
◆ More wafers per ingot ⇒ Possibility to slice thinner wafers with thinner wire

2. Improvement of Wafer Quality

◆ Less sub-surface damage
◆ Better thickness variation

3. Reduction of Environmental Burdens

◆ Use of water base coolant ⇒ No use of slurry ⇒ Cleaner work environment
◆ Possible recycle of silicon kerf



Spec & Application

Application	Core Diameter[mm]—Grit Size[μm](Finish Diameter mm)	Length per spool
Wafering	ϕ0.12 10—20 (ϕ0.145)	10～50km/spool
Squaring	ϕ0.25 30—40 (ϕ0.330)	

＊Other spec of wires is available.

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ISO 9001 :JCQA-0096
ISO 14001:JCQA-E-0530
Mie Factory
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Yamanashi Asahi Diamond Industrial Co., Ltd.

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2011.6.2,000

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