



Glass Fabric

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Glass Style	Weave	Warp Count	Fill Count	Warp Yarn	Fill Yarn	Fabric Thickness Inches	Fabric Thickness mm	Fabric Nominal Weight OSY	Fabric Nominal Weight g/m2
1035	Plain	66	68	ECD 900-1/0	ECD 900-1/0	0.0011	0.028	0.88	30
1067	Plain	70	70	ECD 900-1/0	ECD 900-1/0	0.0014	0.035	0.91	31
106	Plain	56	56	ECD 900-1/0	ECD 900-1/0	0.0013	0.033	0.73	25
1078	Plain	54	54	ECD 900-1/0	ECD 900-1/0	0.0017	0.043	1.41	48
1086	Plain	60	60	ECD 450-1/0	ECD 450-1/0	0.0022	0.056	1.60	54
1080	Plain	60	47	ECD 450-1/0	ECD 450-1/0	0.0021	0.053	1.45	49
2113	Plain	60	56	ECE 225-1/0	ECD 450-1/0	0.0031	0.079	2.31	78
2313	Plain	60	64	ECE 225-1/0	ECD 450-1/0	0.0033	0.084	2.38	81
3313	Plain	60	62	ECDE 300-1/0	ECDE 300-1/0	0.0033	0.084	2.43	82
2116	Plain	60	58	ECE 225-1/0	ECE 225-1/0	0.0037	0.094	3.22	109
1652	Plain	52	52	ECG 150-1/0	ECG 150-1/0	0.0045	0.114	4.09	142
7628	Plain	44	31	ECG 75-1/0	ECG 75-1/0	0.0068	0.173	6.00	203

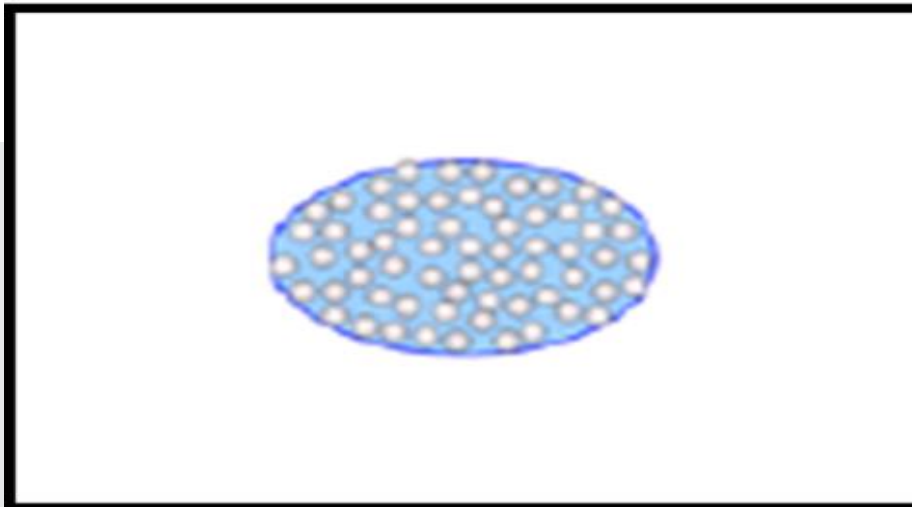
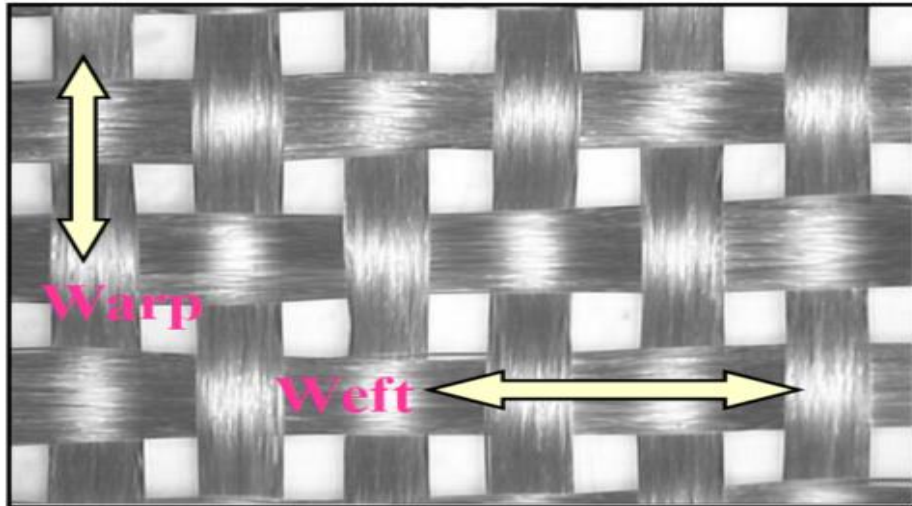
Fiberglass Yarn Nomenclature

- 1st Letter* E = e-glass (electrical grade)
- 2nd Letter* C = Continuous Filaments
- 3rd Letter* Filament Diameter - C, D, E, DE, G
- 1st Number* Yardage in one pound
- 2nd Number* Number of strands in a yard/strands plied or twisted

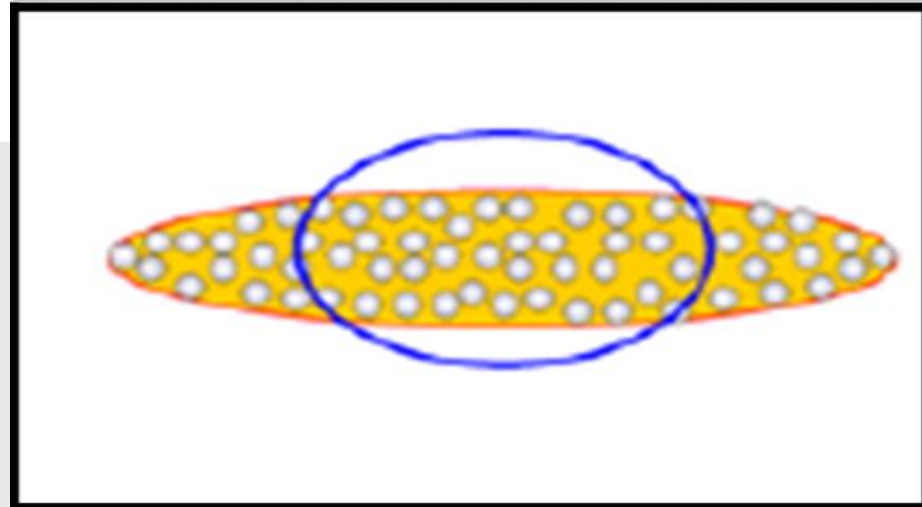
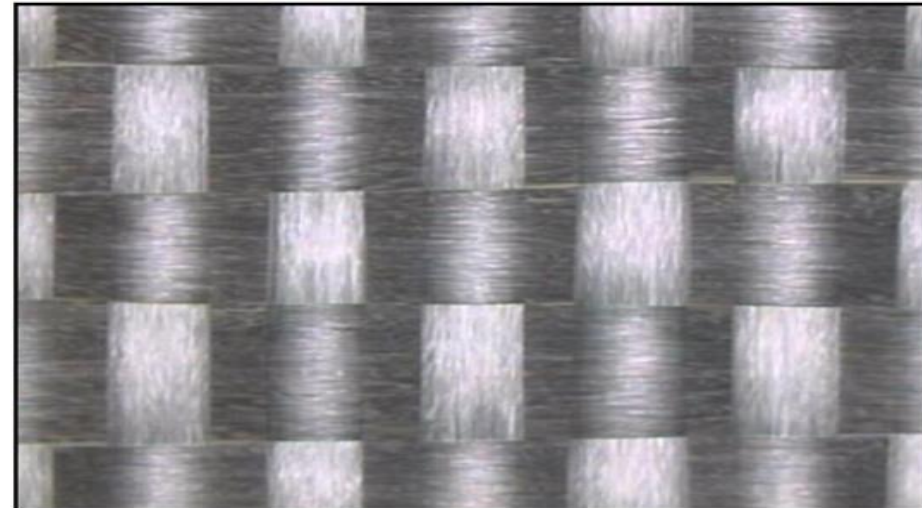
Definitions:

- **Spread Glass** – Glass is spread out in various processes
 - Currently, spread in both directions is industry standard
- **Square Weave** – Glass that has a Balanced Density and/or Yarn Counts in Warp and Fill Directions.

Standard



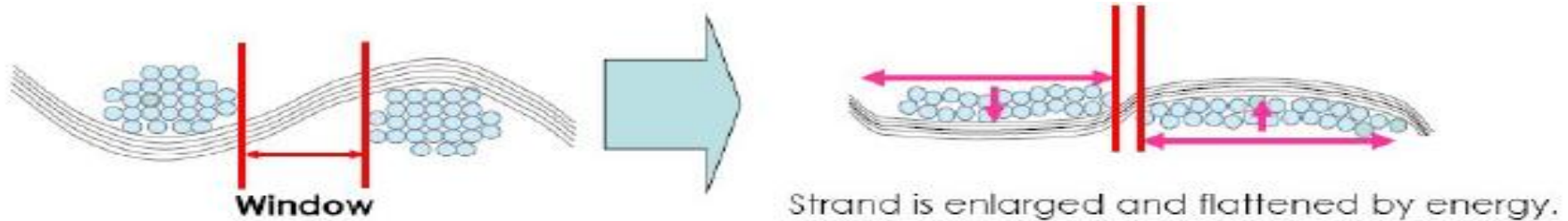
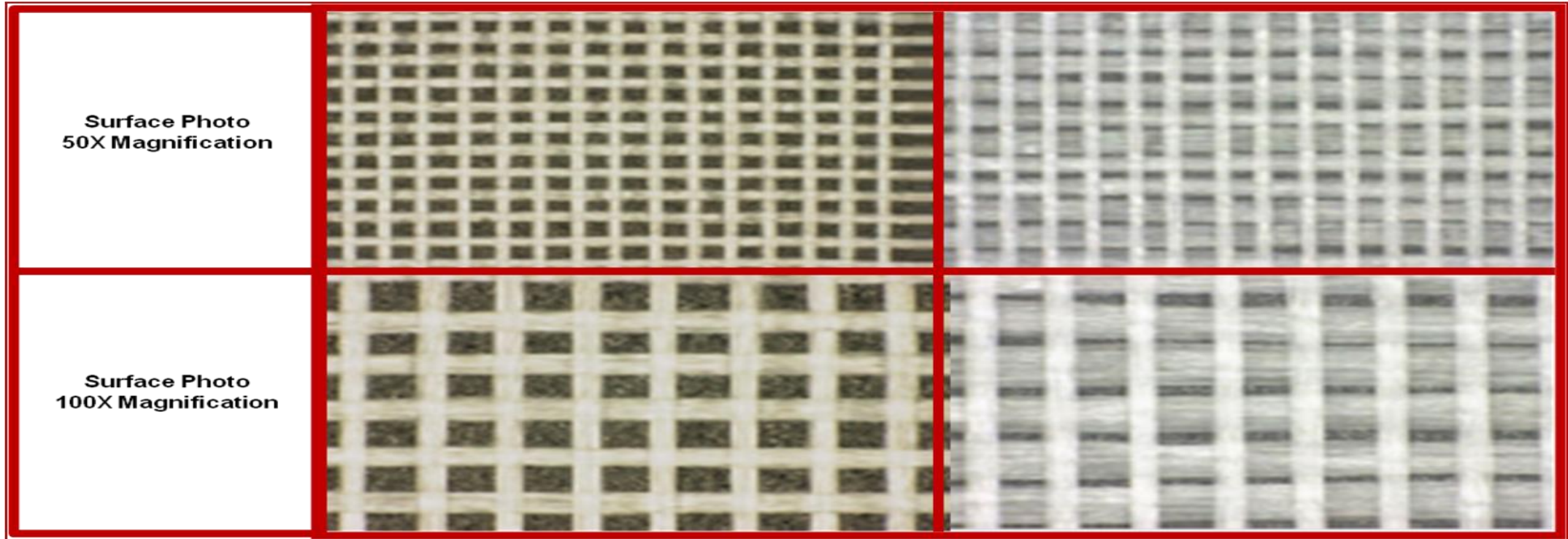
Spread

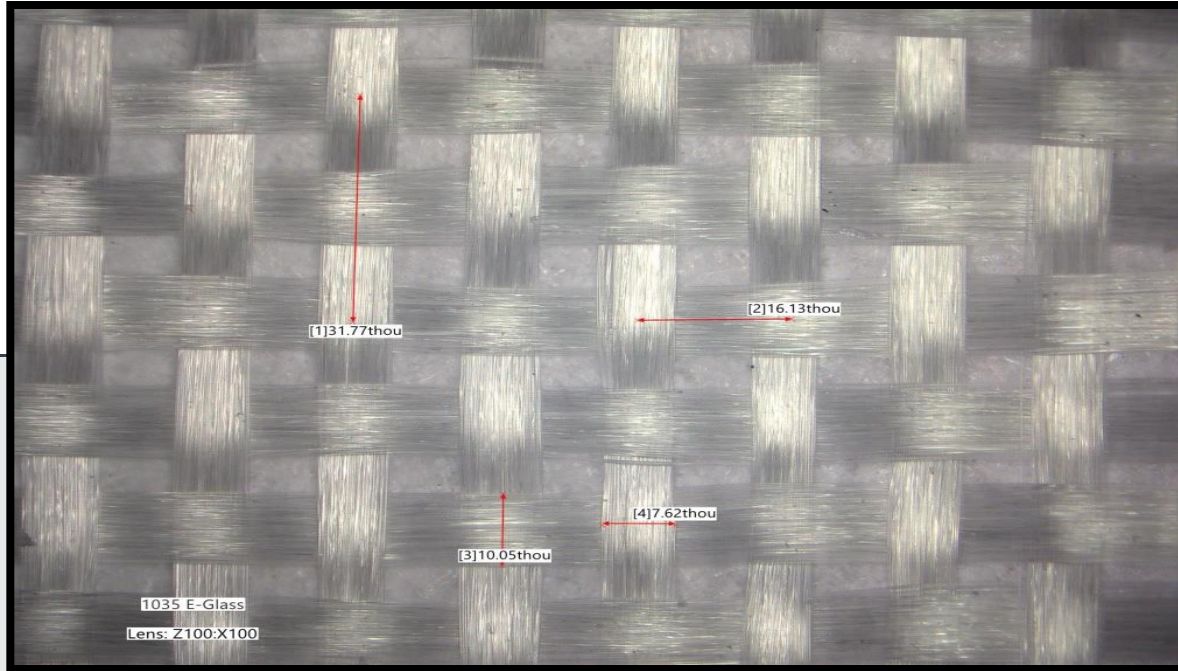


106 Glass Examples

Standard Glass

Spread Glass

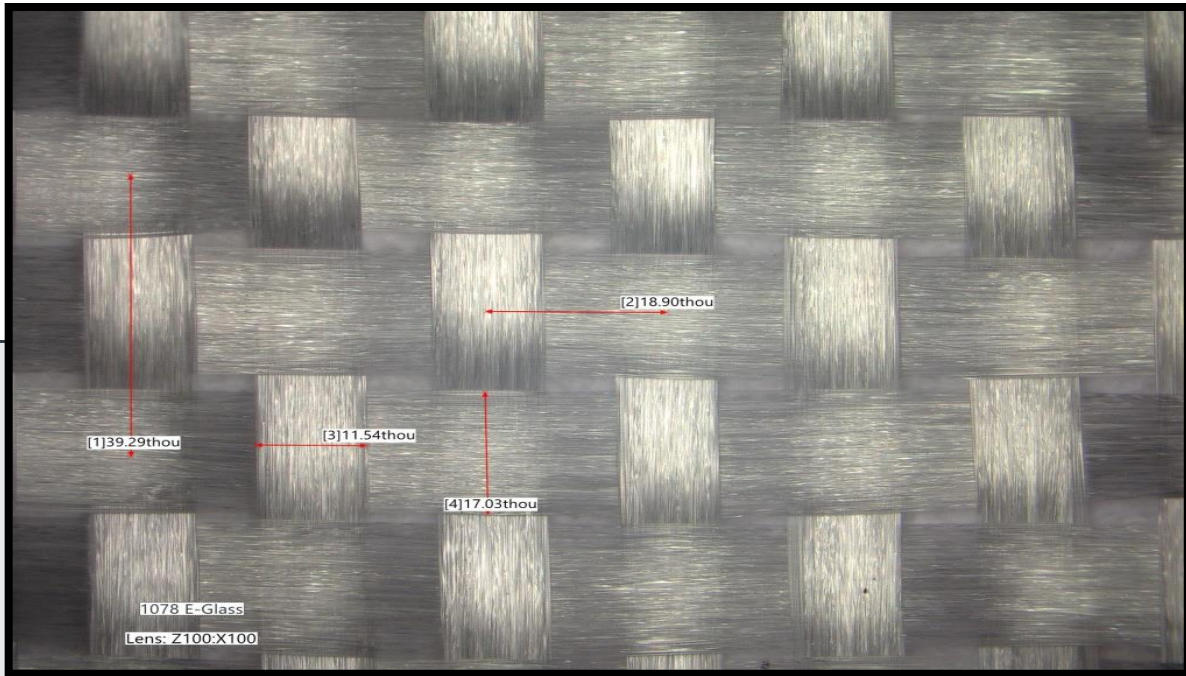




✓ 1035

- > **Warp & Fill Count:** 66 x 68 (ends/in)
- > **Thickness:** 0.0011" / 0.028 mm

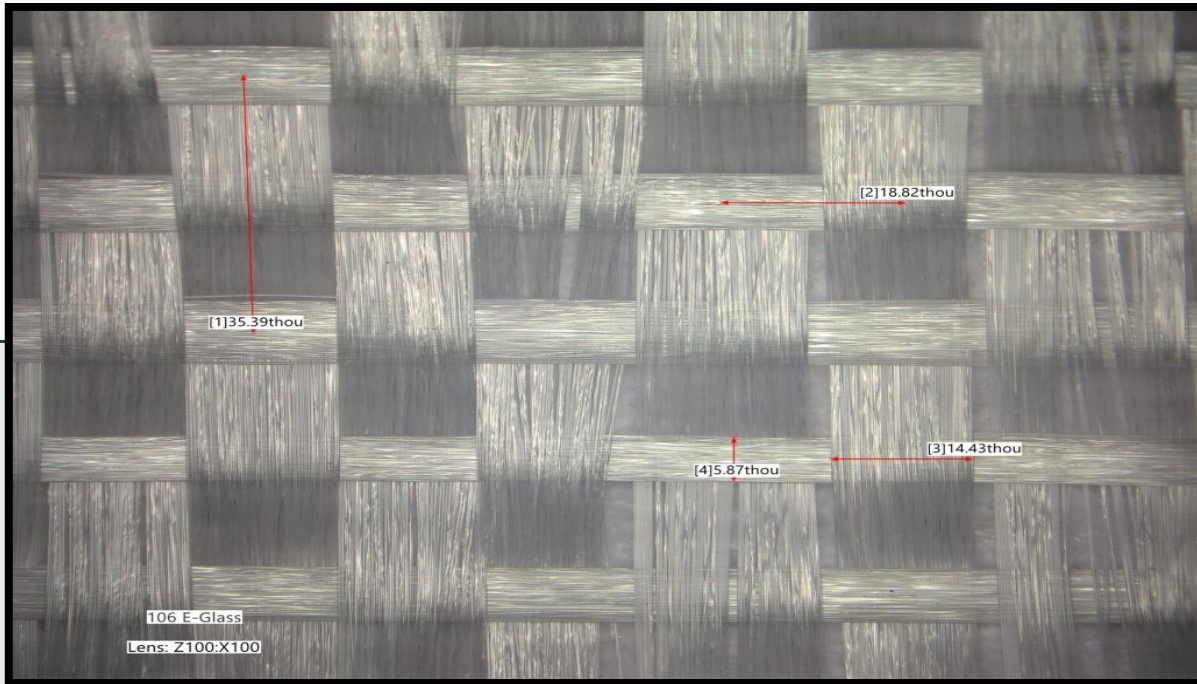
Photos courtesy of Isola R & D Laboratories



1078

- > Warp & Fill Count: 54 x 54 (ends/in)
- > Thickness: 0.0017" / 0.043 mm

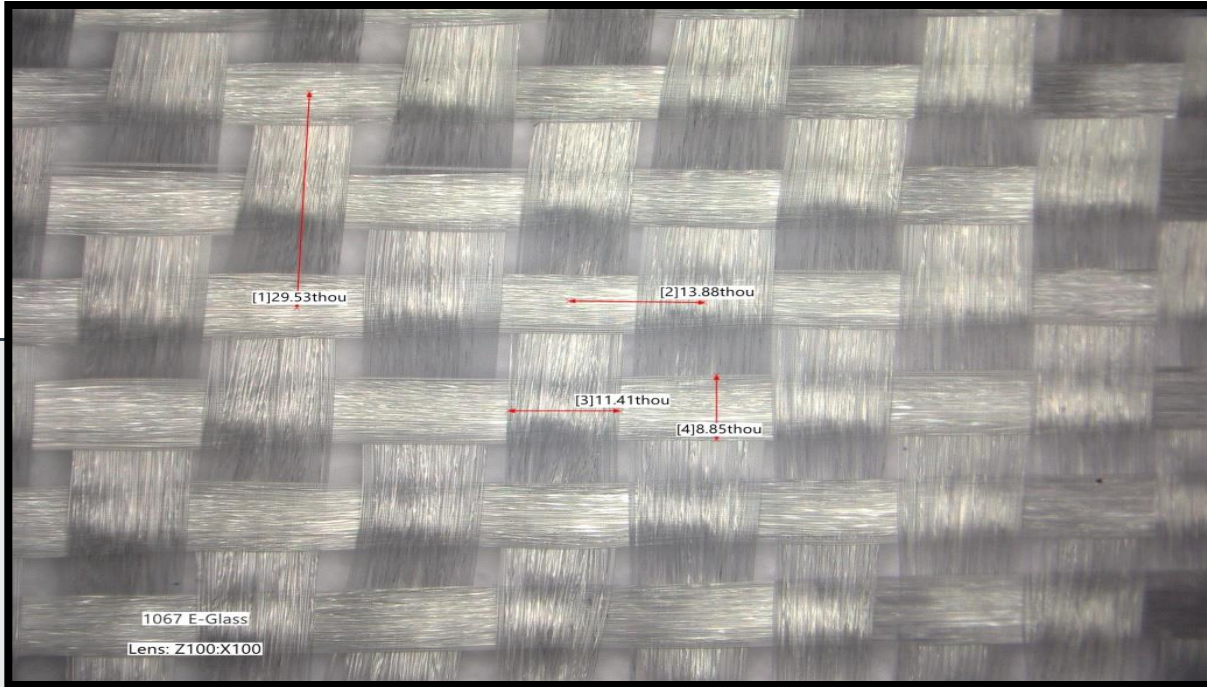
Photos courtesy of Isola R & D Laboratories



106

- > **Warp & Fill Count:** 56 x 56 (ends/in)
- > **Thickness:** 0.0013" / 0.033 mm

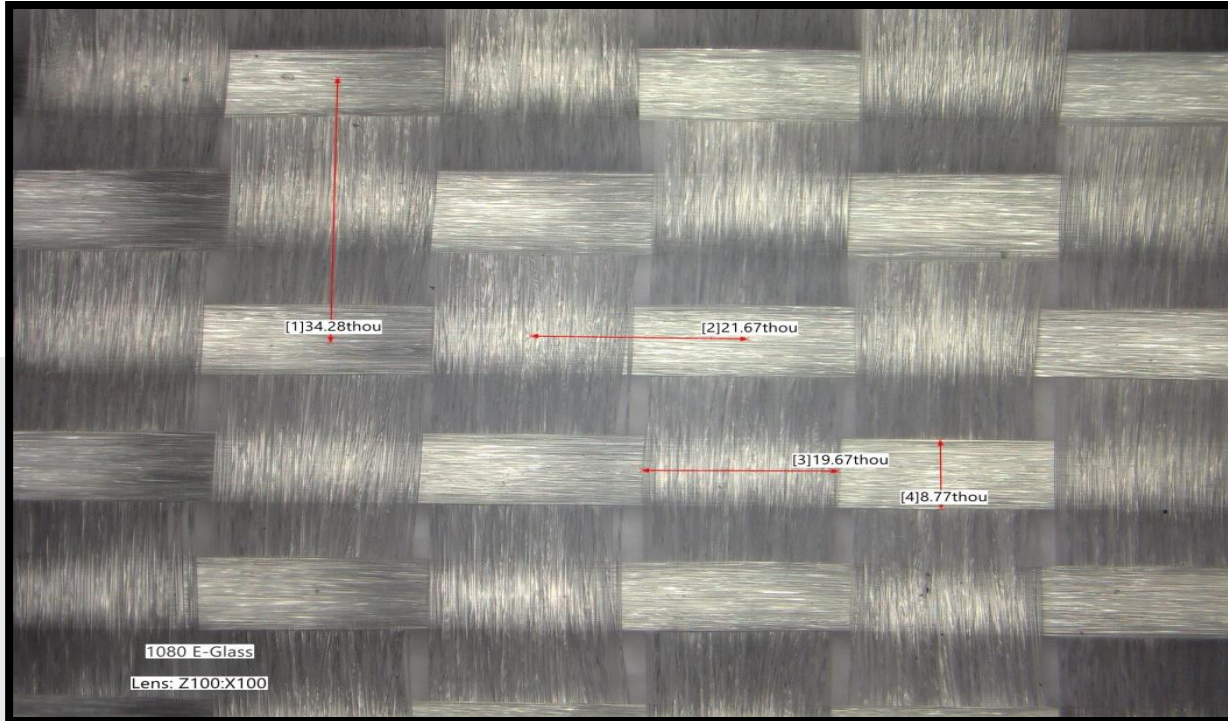
Photos courtesy of Isola R & D Laboratories



1067

- > **Warp & Fill Count:** 70 x 70 (ends/in)
- > **Thickness:** 0.0014" / 0.035 mm

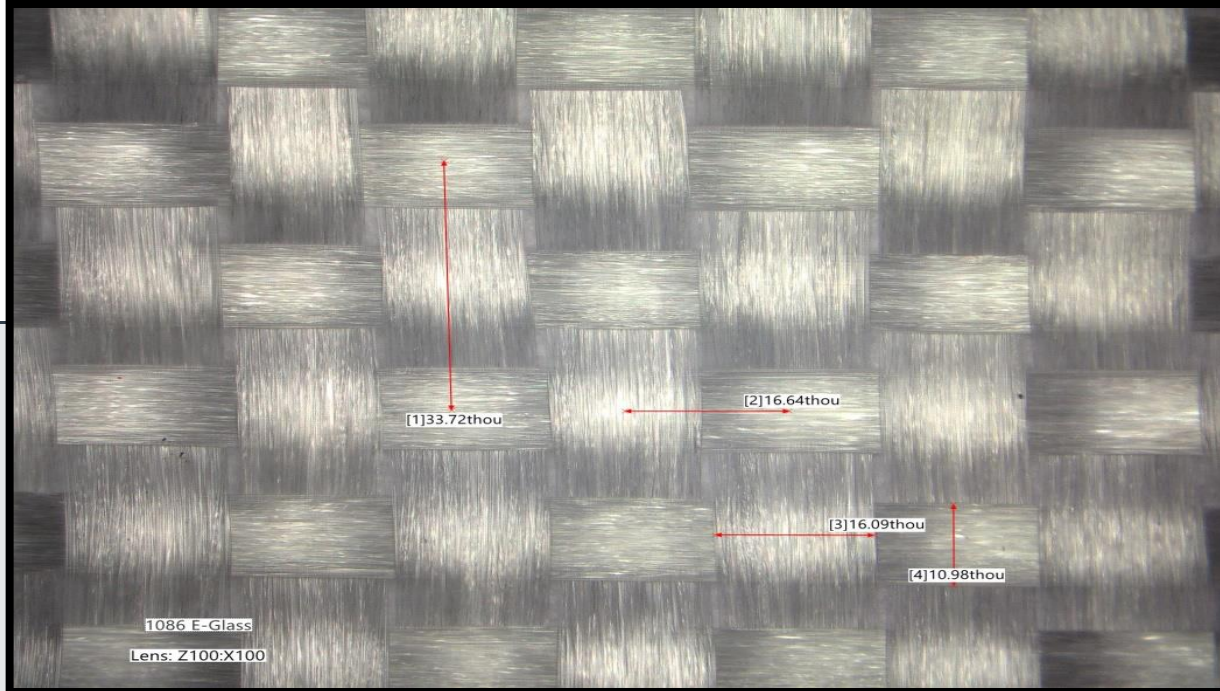
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✓ 1080

- > **Warp & Fill Count:** 60 x 47 (ends/in)
- > **Thickness:** 0.0021" / 0.053 mm

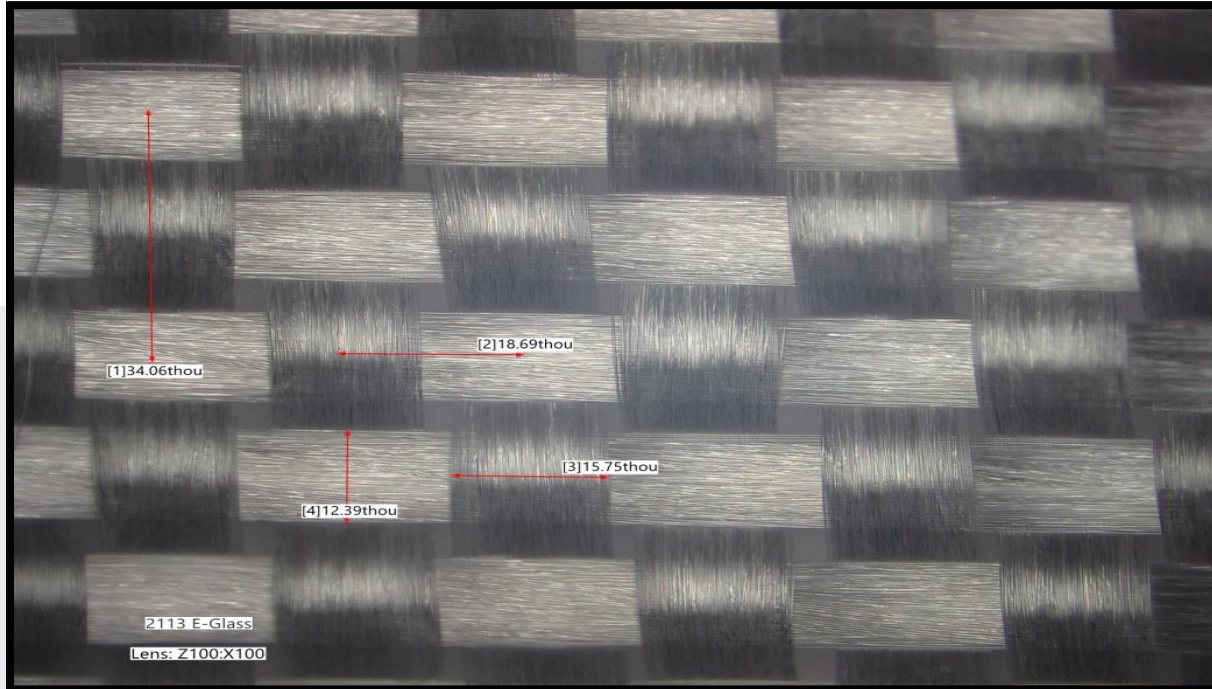
Photos courtesy of Isola R & D Laboratories



✓ 1086

- > **Warp & Fill Count:** 60 x 60 (ends/in)
- > **Thickness:** 0.0022" / 0.056 mm

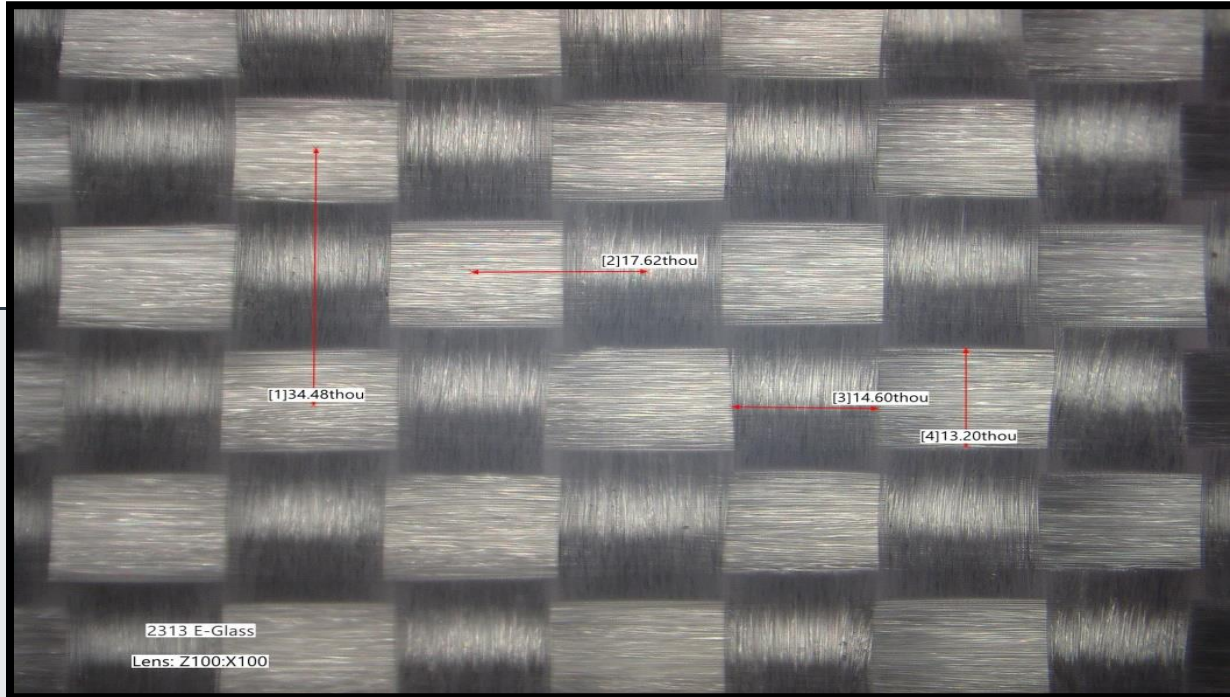
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2113

- > **Warp & Fill Count:** 60 x 56 (ends/in)
- > **Thickness:** 0.0031" / 0.079 mm
- > Glass yarn is different in x and y.

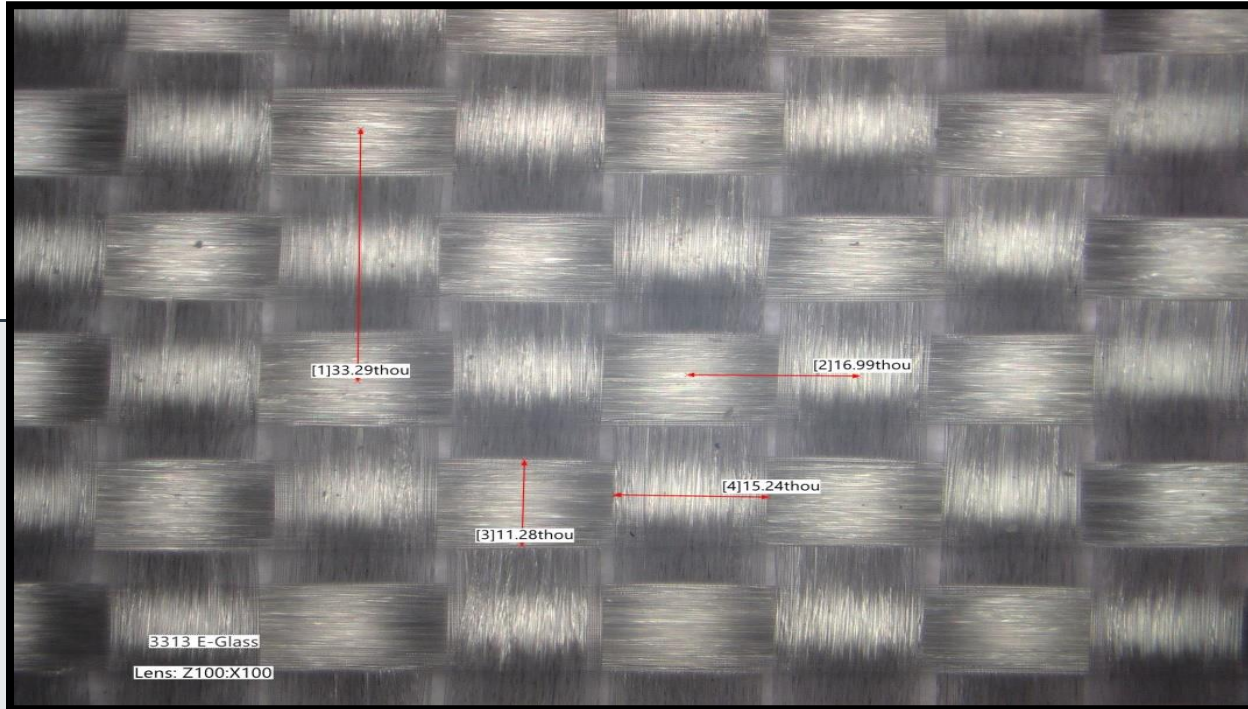
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✓ 2313

- > **Warp & Fill Count:** 60 x 64 (ends/in)
- > **Thickness:** 0.0033" / 0.084 mm

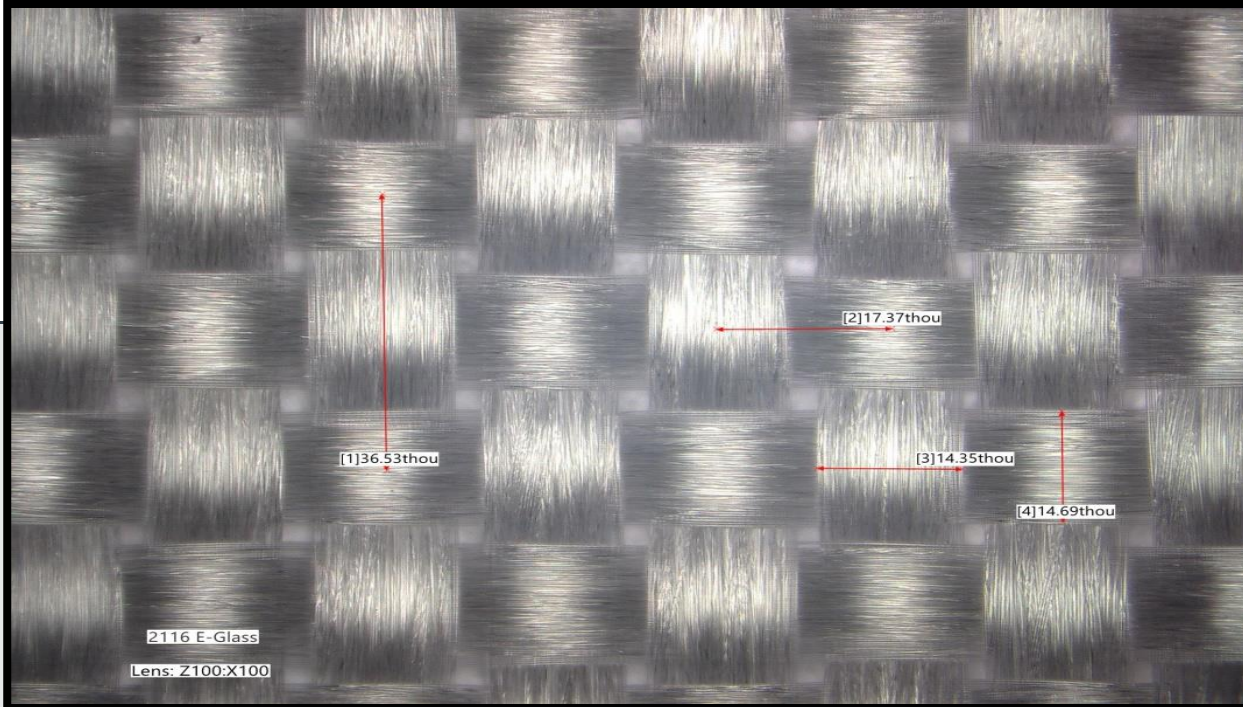
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3313

- > **Warp & Fill Count:** 60 x 62 (ends/in)
- > **Thickness:** 0.0033" / 0.084 mm

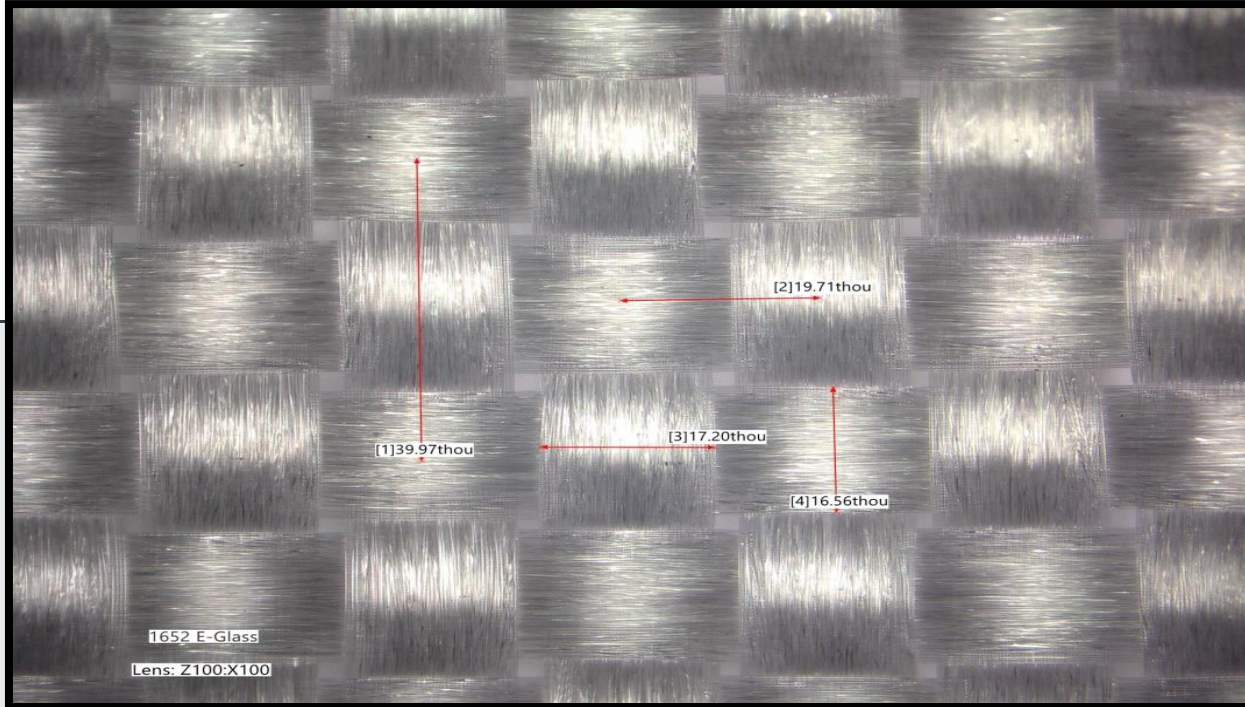
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2116

- > **Warp & Fill Count:** 60 x 58 (ends/in)
- > **Thickness:** 0.0037" / 0.094 mm

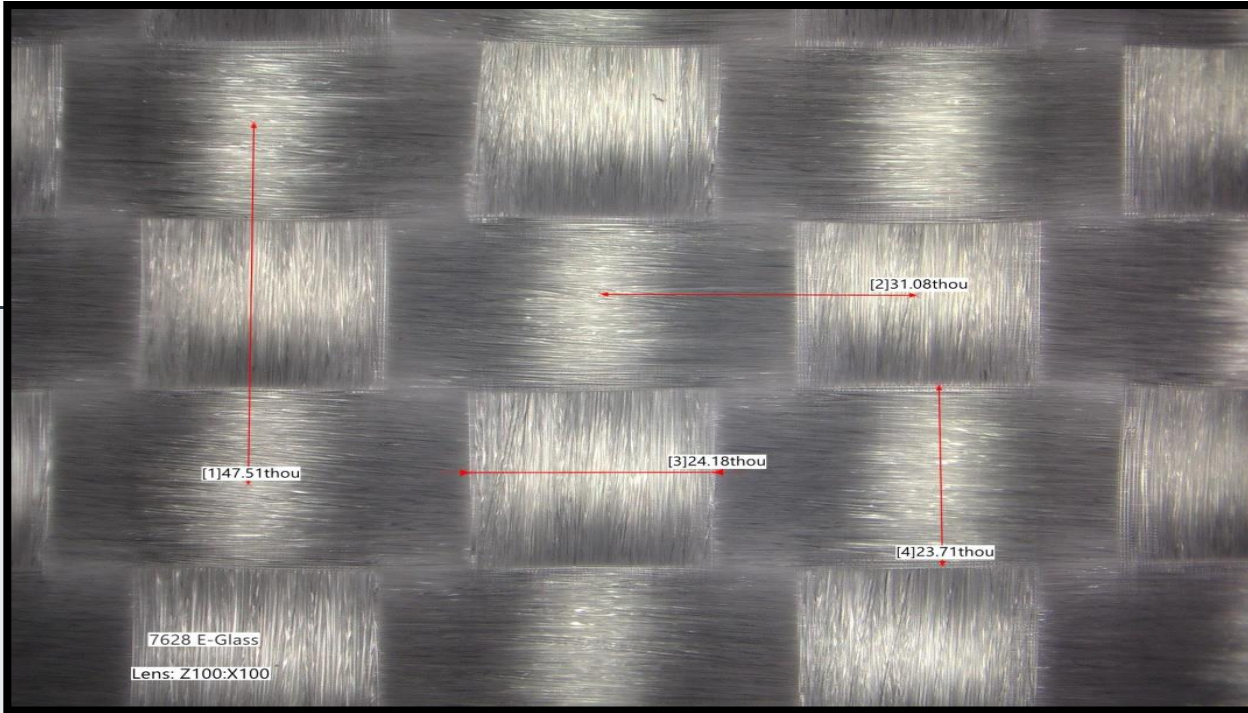
Photos courtesy of Isola R & D Laboratories



1652

- > **Warp & Fill Count:** 52 x 52 (ends/in)
- > **Thickness:** 0.0045" / 0.114 mm

Photos courtesy of Isola R & D Laboratories



7628

- > **Warp & Fill Count:** 44 x 31 (ends/in)
- > **Thickness:** 0.0068" / 0.173 mm

Photos courtesy of Isola R & D Laboratories

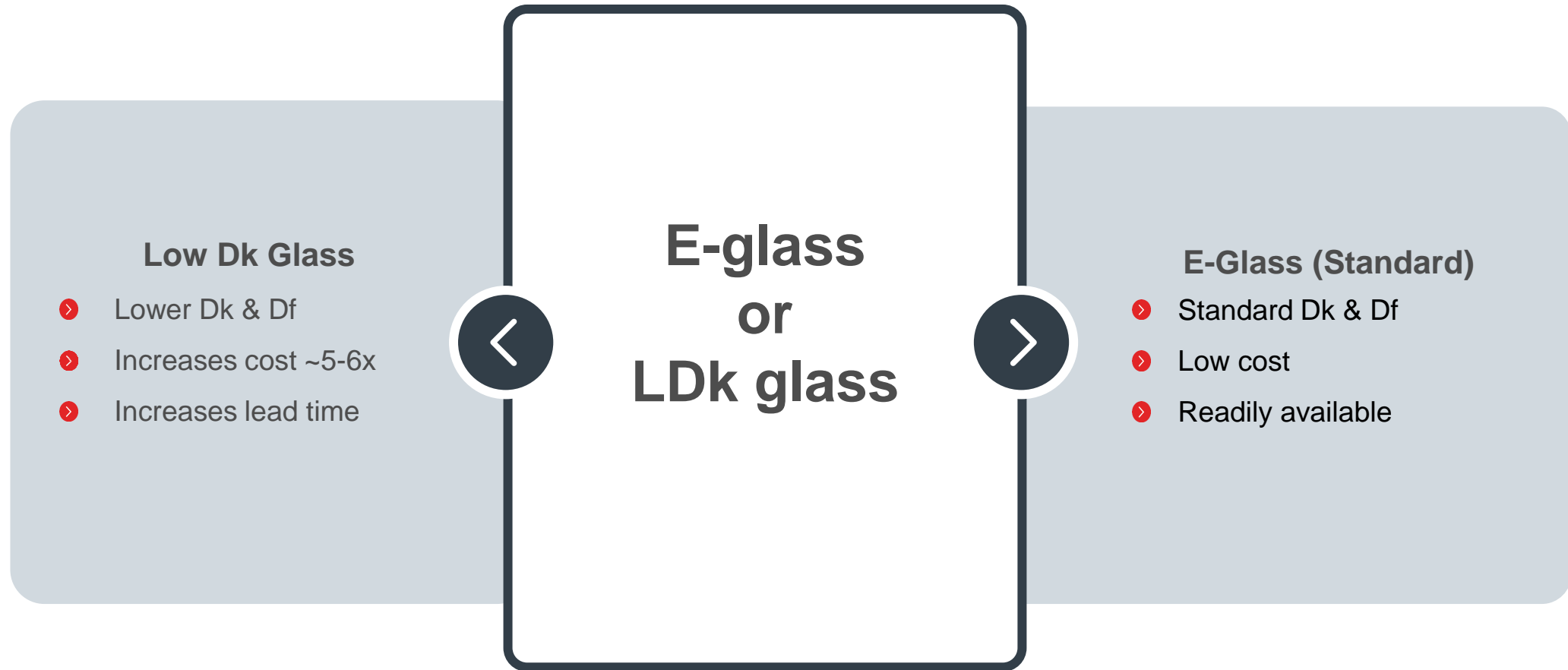
> Glass Yarn Properties

	Property		E-Glass	Low Dk			Low CTE	
	Advantage	Disadvantage		D-Glass	L-Glass	NE-Glass	T-Glass	S-Glass
SiO₂	Dk, Df	Drilability	52-56%	72-76%	52-56%	52-56%	64-66%	64-66%
CaO		Dk	20-25%	0%	0-10%	0%	0%	0-0.3%
Al₂O₃		Df	12-16%	0-5%	10-15%	10-18%	24-26%	24-26%
B₂O₃	Dk, Dk		5-10%	20-25%	15-20%	18-25%	0%	0%
MgO	Meltability	Dk	0-5%	0%	0-5%	5-12%	9-11%	9-11%
Na₂O, K₂O		Dk, Df, Durability	0-1%	3-5%	0-1%	0-1%	0%	0-0.3%
TiO₂, LiO₂	Meltability		0%	0%	0-5%	0%	0%	0%

Property	Unit	E-Glass	Low Dk Glass	Low CTE Glass
Dk @ 1GHz	Freq	6.8	4.8	5.4
Df @ 1 GHz	Freq	0.0035	0.0015	0.0043
Tensile Modulus	Gpa	75	64	86
Thermal Expansion	ppm/°C	5.6	2.8	3.3

- Composition determines the effects of glass on the composite
- Low glass CTE values increase the gap between other components of the composite

Glass Style Decision Tree



Thank You

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