

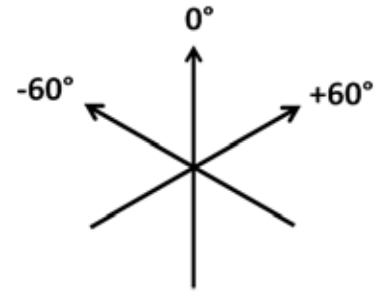


TenCate's TC275-1 with A&P Technology's QISO[®] Fabric

Improved mechanical performance, efficiency and value over woven fabric-based prepregs.

Optimal replacement over woven fabric based laminates

- ✓ Demonstrates improved mechanical strength in composite laminates
- ✓ Provides efficiency gains and manufacturing robustness
- ✓ Reduces material cost by eliminating material waste from $\pm 45^\circ$ ply layers
- ✓ Provides enhanced damage tolerance



MECHANICAL RESULTS OF TENCATE TC275-1 COMPARING QISO[®] LIGHT AS4-C WITH 3K PLAIN WEAVE AS4-C

Room Temperature Mechanical Properties*	Test Methods at RTD	QISO [®] Light Fabric	Plain Weave	QISO [®] vs PW Fabric
Tensile Strength 0° (MPa)	ASTM 3039	775	657	18%
Compressive Strength 0° (MPa)	ASTM D6641	603	465	30%
OHT 0° (MPa)	ASTM D5766	494	378	30%
OHC (MPa)	ASTM D6484	374	298	26%
CAI (MPa)	ASTM D7136/D7137	240	227	6%

* Comparative properties from equal weight laminates of plain weave vs QISO[®] fabric. Laminate construction was 9 plies of 272 faw QISO vs plain weave in quasi isotropic orientation for total areal weight of 2448. Fiber architecture used was AS4-C 3k for both materials and values were normalized to 55% fiber volume.

Summary: This unique balanced quasi-isotropic fabric offers users:

- Improved mechanical performance,
- Reduced ply counts and less waste (each ply of QISO[®] fabric represents a balanced 0°/±45°/90° construction)
- Improves nesting efficiency for cutting, kitting and more robust layups
- Overall value compared to woven fabrics
- An attractive option over woven fabric composite part construction



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Background

A&P Technology's QISO[®] quasi-isotropic braided fabrics are based upon a 0°, $\pm 60^\circ$ degree quasi-isotropic orientation. This allows users to fabricate quasi-isotropic laminates without the need for $\pm 45^\circ$ orientations, eliminating material waste. In addition, further efficiencies may be realized in automated kitting and cutting nesting.

Currently, QISO[®] quasi-isotropic fabrics are utilized in primary aircraft structure in a variety of applications to enhance strength and damage tolerance.

Testing

Using TenCate's TC275-1 prepreg resin, A&P Technology's QISO[®] quasi-isotropic fabrics were compared to plain weave fabrics. In preliminary single lot comparisons with a standard plain weave fabric, the QISO fabrics demonstrated improvements in tensile, compressive and open hole properties.

Mechanical Properties Benefits

Above is a comparison of mechanical properties using QISO[®] quasi-isotropic laminates vs a plain weave laminate prepregged with TenCate's TC275-1 resin. Both laminates were of equal weight. Additional data and comparisons with QISO[®] heavy quasi-isotropic fabrics at 536 gsm FAW may be found on A&P Technology's website.

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