

VECTORSOLUTIONS[®]
Technical Services



**Mahogany Company
Airlite Panels
11.6.12**



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Mahogany Company, Airlite Panels

Laminate Construction

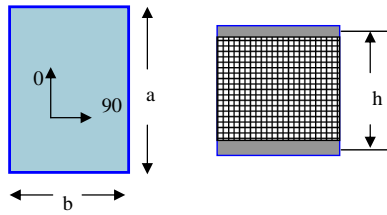
| Laminate # -> | 1 | 2 | 3 | 4 | 5 |
|----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Name | 15mm - E-LT 1800 | 15mm - E-QX 2600 | 15mm - E-QX 3500 | 20mm - E-QX 2600 | 20mm - E-QX 3500 |
| Layer 1 | E-LT 1800 - Press Molded | E-QX 2600 - Press Molded | E-QX 3500 - Press Molded | E-QX 2600 - Press Molded | E-QX 3500 - Press Molded |
| Layer 2 | Airex C70.75 - 15mm | Airex C70.75 - 15mm | Airex C70.75 - 15mm | Airex C70.75 - 20mm | Airex C70.75 - 20mm |
| Layer 3 | E-LT 1800 - Press Molded | E-QX 2600 - Press Molded | E-QX 3500 - Press Molded | E-QX 2600 - Press Molded | E-QX 3500 - Press Molded |

Laminate Properties

| Laminate # -> | 1 | 2 | 3 | 4 | 5 | |
|-----------------------------|------------------|------------------|------------------|------------------|------------------|----------|
| Laminate | 15mm - E-LT 1800 | 15mm - E-QX 2600 | 15mm - E-QX 3500 | 20mm - E-QX 2600 | 20mm - E-QX 3500 | |
| Thickness | 0.632 | 0.649 | 0.675 | 0.846 | 0.871 | in. |
| Thickness | 16.064 | 16.494 | 17.134 | 21.494 | 22.134 | mm |
| Resin Wt. | 0.14 | 0.20 | 0.29 | 0.20 | 0.29 | lb/sq.ft |
| Fiber Wt. | 0.25 | 0.35 | 0.50 | 0.35 | 0.50 | lb/sq.ft |
| Laminate Wt. | 0.64 | 0.80 | 1.03 | 0.88 | 1.12 | lb/sq.ft |
| Vf | 45.00 % | 45.00 % | 45.00 % | 45.00 % | 45.00 % | by Vol. |
| Mf | 63.39 % | 63.39 % | 63.39 % | 63.39 % | 63.39 % | by Wt. |
| 0° Modulus, Ex | 0.24 | 0.26 | 0.39 | 0.20 | 0.30 | MSI |
| 0° Modulus, Ex | 1.64 | 1.78 | 2.68 | 1.39 | 2.10 | GPa |
| 90° Modulus, Ey | 0.24 | 0.26 | 0.37 | 0.20 | 0.29 | MSI |
| 90° Modulus, Ey | 1.64 | 1.77 | 2.58 | 1.38 | 2.02 | GPa |
| Shear Modulus, Gxy | 0.04 | 0.10 | 0.11 | 0.08 | 0.09 | MSI |
| Shear Modulus, Gxy | 0.28 | 0.67 | 0.77 | 0.52 | 0.60 | GPa |
| 0° Flex. Stiffness | 13,066 | 16,301 | 25,816 | 28,459 | 44,534 | lb-in |
| 90° Flex. Stiffness | 13,066 | 16,189 | 24,876 | 28,264 | 42,918 | lb-in |
| 0° Ult. B. Moment | 965.6 | 1,081.9 | 1,716.3 | 1,449.6 | 2,291.7 | in.lb/in |
| 90° Ult. B. Moment | 965.6 | 1,074.4 | 1,653.8 | 1,439.6 | 2,208.6 | in.lb/in |
| N.Axis - X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | in. |
| N.Axis - Y | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | in. |
| 0° Ten. Ult. Stress | 4.5 | 4.9 | 7.4 | 3.8 | 5.8 | KSI |
| 90° Ten. Ult. Stress | 4.5 | 4.9 | 7.1 | 3.8 | 5.6 | KSI |
| Shear Ult. Stress | 0.8 | 1.8 | 2.1 | 1.4 | 1.6 | KSI |
| 0° Ten. Ult. Stress | 31.1 | 33.8 | 50.7 | 26.4 | 39.7 | MPa |
| 90° Ten. Ult. Stress | 31.1 | 33.5 | 48.9 | 26.2 | 38.3 | MPa |
| Shear Ult. Stress | 5.7 | 12.6 | 14.5 | 9.8 | 11.4 | MPa |
| 0° Comp. Ult. Stress | 4.5 | 4.9 | 7.4 | 3.8 | 5.8 | KSI |
| 90° Comp. Ult Stress | 4.5 | 4.9 | 7.1 | 3.8 | 5.6 | KSI |
| 0° Comp. Ult. Stress | 31.1 | 33.8 | 50.7 | 26.4 | 39.7 | MPa |
| 90° Comp. Ult Stress | 31.1 | 33.5 | 48.9 | 26.2 | 38.3 | MPa |

Plate Analysis

This worksheet calculates stress & deflection for a plate under a uniform pressure load with either simple or fixed supports. Equations are from Structural Analysis of Laminated Anisotropic Plates



| | 15mm - E-LT 1800 | 15mm - E-QX 2600 | 15mm - E-QX 3500 | 20mm - E-QX 2600 | 20mm - E-QX 3500 |
|---|--------------------|--------------------|--------------------|--------------------|----------------------------|
| Plate Name: | 15mm - E-LT 1800 | 15mm - E-QX 2600 | 15mm - E-QX 3500 | 20mm - E-QX 2600 | 20mm - E-QX 3500 |
| Plate Type: | Sandwich | Sandwich | Sandwich | Sandwich | Sandwich |
| Plate Dimensions | | | | | |
| Plate Edge Supports | Simply Supported | Simply Supported | Simply Supported | Simply Supported | Simply Supported |
| Plate Width | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 in |
| Plate Length | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 in |
| Design Pressure | | | | | |
| Design Pressure (Without safety factor) | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 psi |
| Deflection Limit is % of : | Span | Span | Span | Span | Span |
| Deflection Limit % | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| Deflection Limit | 0.450 | 0.450 | 0.450 | 0.450 | 0.450 in |
| Compression Face Laminate | | | | | |
| | E-LT 1800 | E-QX 2600 | E-QX 3500 | E-QX 2600 | E-QX 3500 |
| Thickness | 0.021 | 0.029 | 0.042 | 0.029 | 0.042 in |
| Weight | 0.20 | 0.28 | 0.39 | 0.28 | 0.39 lb/sq.ft |
| Core Material | | | | | |
| | Airex C70.75, msmv | Airex C70.75, msmv | Airex C70.75, msmv | Airex C70.75, msmv | Airex C70.75, msmv |
| Thickness | 0.591 | 0.591 | 0.591 | 0.787 | 0.787 in |
| Weight | 0.25 | 0.25 | 0.25 | 0.33 | 0.33 lb/sq.ft |
| Tension Face Laminate | | | | | |
| | E-LT 1800 | E-QX 2600 | E-QX 3500 | E-QX 2600 | E-QX 3500 |
| Thickness | 0.021 | 0.029 | 0.042 | 0.029 | 0.042 in |
| Weight | 0.20 | 0.28 | 0.39 | 0.28 | 0.39 lb/sq.ft |
| Plate Properties | | | | | |
| Thickness | 0.633 | 0.650 | 0.675 | 0.846 | 0.871 in |
| Weight | 0.64 | 0.80 | 1.03 | 0.88 | 1.11 lb/sq.ft |
| Stiffness | | | | | |
| Deflection at Design pressure | 0.441 | 0.272 | 0.196 | 0.160 | 0.117 in |
| Deflection at First Ply Failure | 1.430 | 1.228 | 1.278 | 0.958 | 1.012 in |
| Pressure for 1 inch Deflection: | 14.163 | 22.941 | 31.947 | 39.147 | 53.639 psi/in |
| Specific Stiffness | 3,196.256 | 4,146.008 | 4,455.631 | 6,417.218 | 6,932.783 (psi/in) / (psi) |
| Strength | | | | | |
| Pres. for First Failure | 0.8 | 1.1 | 1.6 | 1.5 | 2.2 psi |
| Pres. for Plate Ultimate Failure | 2.2 | 3.6 | 4.9 | 4.8 | 6.5 psi |
| Pres. for Core Shear Failure | 5.5 | 5.5 | 5.5 | 7.3 | 7.3 |
| First Ply Failure Mode | T.Face, 0° FPF | T.Face, 90° FPF | T.Face, 90° FPF | T.Face, 90° FPF | T.Face, 90° FPF |
| Ultimate Failure Mode | Face Wrinkling | Face Wrinkling | Face Wrinkling | Face Wrinkling | Face Wrinkling |
| Specific Strength | 501.74 | 651.04 | 685.73 | 786.40 | 845.02 psi / (psi) |
| Safety Factors | | | | | |
| Deflection | 1.0198 | 1.6517 | 2.3002 | 2.8186 | 3.8620 >=1 |
| First Ply Failure | 3.2408 | 4.5063 | 6.5332 | 6.0012 | 8.6874 >=2 |
| Ultimate Skin Failure | 8.8932 | 14.4092 | 19.6666 | 19.1891 | 26.1519 >=3 |
| Core Shear Failure | 21.9882 | 21.9882 | 21.9882 | 29.2804 | 29.2804 >=2.5 |
| Failure Pressures | | | | | |
| Pres. for C.Face FPF Stress | 3.079 | 3.659 | 6.207 | 4.873 | 8.253 psi |
| Pres. for T.Face FPF Stress | 0.810 | 1.127 | 1.633 | 1.500 | 2.172 psi |
| Pres. for C.Face Ult Stress | 6.766 | 9.408 | 13.640 | 12.529 | 18.137 psi |
| Pres. for T.Face ULT Stress | 6.766 | 9.408 | 13.640 | 12.529 | 18.137 psi |
| Face Wrinkling Pres. | 2.223 | 3.602 | 4.917 | 4.797 | 6.538 psi |
| Pres. for Core Shear | 5.497 | 5.497 | 5.497 | 7.320 | 7.320 psi |

Plate Chart 70

