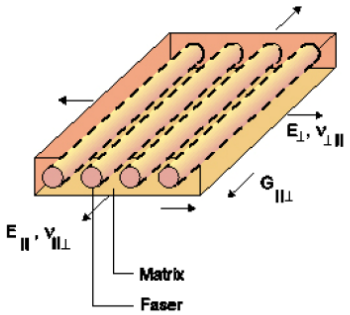
Physical characteristics for WACOSIT®

Glass- and carbon-fiber-reinforced, unidirectional and fabric-reinforced

Whereas the modulus of elasticity (E), shear module (G) and number of transverse contractions (v) are usually sufficient for calculating the elastic behavior of conventional materials (= isotropic materials), fiber composite materials (anisotropic materials) require four independent quantities: $E_{||}$, $E_{\perp}$, $v_{\perp||} = v_{||\perp} \cdot E_{||} / E_{\perp}$, $G_{||\perp}$, since the longitudinal and transverse directions give different values.

Characteristics of unidirectional fiber composite materials



$E_{||}$	Modulus of elasticity longitudinal
$E_{\perp}$	Modulus of elasticity transverse
$G_{||\perp}$	Shear module
$v_{\perp||}$	Number of transverse contractions
$v_{||\perp}$	Number of transverse contractions

Approximate values of different physical characteristics in unidirectional and fabric-reinforced layers

Properties		Units	unidirectional GFR	unidirectional CFR	fabric-reinforced GFR	fabric-reinforced CFR
Modulus of elasticity	$E_{||}$	GPa	38	145	29	66
Modulus of elasticity	$E_{\perp}$	GPa	8	9	26	66
Shear modulus	$G_{||\perp}$	GPa	4	4,5	6	4
Transverse contraction	$\nu_{\perp||}$	-	0.26	0.3	0.12	0.04
Tensile strength	$\sigma_{||z}$	MPa	1,060	1,310	480	375
Tensile strength	$\sigma_{\perp z}$	MPa	31	43	440	368
Compressive strength	$\sigma_{||d}$	MPa	610	1,220	390	279
Compressive strength	$\sigma_{\perp d}$	MPa	118	168	305	278
Shear strength	$\tau_{||\perp}$	MPa	72	48	133	46
Density	φ	g/cm³	2	1.6	2	1.6

*Fiber percentage by volume 60%; EP resin

The usually applied mixing rule allows the mechanical properties to be estimated with sufficient accuracy and, taking into account the composite components matrix and fiber, the heat expansion coefficients of the profiles to be calculated.

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