

List of needed material properties

Characteristics	Value [range] @ 1000°C (excepted for specific heat)	Unit	Available data for RNFF-sg	Available data for RNFF-sag
Density	$1800 < \rho < 1900$	kg/m ³	1.4	1.75
Coefficient of thermal expansion	Direction 1: $< 1.5 \times 10^{-6}$	1/K	Data available but with large dispersion from samples to samples	Not available
	Direction 2: $< 1.5 \times 10^{-6}$			
	Direction 3: $< 3 \times 10^{-6}$			
Specific heat	> 1.8 @ 800°C	kJ/(kg×K)	No data, the specific heat of graphite was used in simulations	
Thermal conductivity	Direction 1 & 2: > 50 Direction 3: > 30	W/(m×K)	No data (same as 1.75 g/cc in simulations)	Available but source unclear (CVT?)
Stress strain curves			No data Needed at 1500°C	
Strain at Failure			No data Needed at 1500°C	
Strain at failure at high strain rate			No data Ideally at high T	
Young's modulus	Direction 1: < 46	GPa	No data (same as 1.75 g/cc in simulations)	2.8 at RT only Needed at 1500°C
	Direction 2: < 65			10 at RT only Needed at 1500°C
	Direction 3: < 12			10 at RT only Needed at 1500°C
Tensile strength According to EN 658-1	Direction 1: > 180	MPa	No data (same as 1.75 g/cc in simulations)	No data
	Direction 2: > 180			84 at RT only Needed at 1500°C
	Direction 3: > 30			61 at RT only Needed at 1500°C
Compressive strength	Direction 1: > 130	MPa		69 at RT only Needed at 1500°C

According to EN 658-2	Direction 2: > 130		No data (same as 1.75 g/cc in simulations)	88 at RT only Needed at 1500°C
	Direction 3: > 80			82 at RT only Needed at 1500°C
Shear modulus (In directions 2 and 3)	≤ 5	GPa	No data	No data
Poisson number (The given range shall be valid for all the three main directions)	[0.08 ; 0.2]		$v_{xy} = v_{xz} = 0.0378$ (Massida) $v_{zx} = v_{yx} = 0.135$ $v_{yz} = 0$	
Shear strength (The given threshold shall be valid for all the three main directions)	> 25	MPa	No data	No data