

HT COMPOSITE SHAPES AND SHEETS

The Material

HT Composite is an oxide ceramic matrix composite. It is composed of high-temperature-resistant ceramic endless fibers and matrices, based on metal oxides like Al_2O_3 , SiO_2 and mullite.

With **HT Composite sheet** the positive properties of classical monolithic ceramics like temperature resistance, corrosion resistance and hardness are combined with the well – known good properties of metals like damage tolerance and thermal shock resistance.

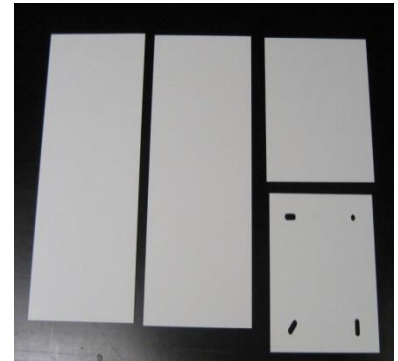
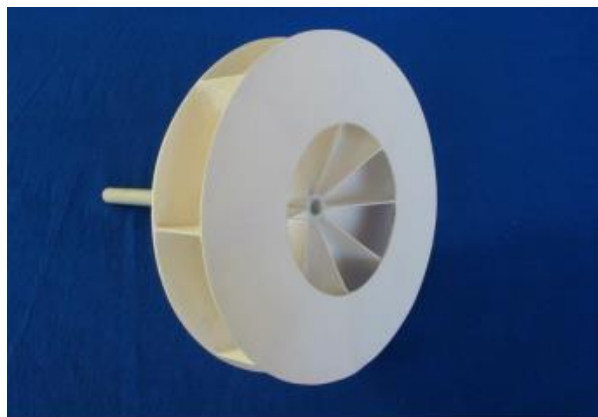
The manufacturing of shapes is done with similar laminating processes known from fiber-reinforced plastics. With comparable forms, processes and special technical equipment it is possible to produce plates, tubes and complex, thin-walled lightweight structures.

Properties of “sheet ceramic”

HT Composite sheet is a material, which unites the theoretical reflections of fiber-reinforced composites. It is the function of those fibers to keep the monolithic ceramic matrices together, which are porous and have a lot of micro cracks. Applied forces will be diverted at the matrix-fiber interface. This means that structures, whose outermost matrix layer will be destroyed, can work further at lower mechanical load.

Energy absorbing mechanisms like fiber pull-out and crack diversion are responsible for this effect. This has a positive influence on damage tolerance and thermal shock resistance.

- Temperature resistant
- Thermal-shock resistant
- Damage tolerant
- Corrosion resistant
- Thin walled
- Lightweight



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Material characteristics

High temperature composite type (HT-C)	A-1150	A-1150 Plus	N-1350	N-1350 Plus	AZ-1350	AZ-1350 Plus
Fiber	Nitivity	Nitivity	Refrex	Refrex	Refrex	Refrex
Fabric thickness (mm)	0,75	0,50	0,50	0,25	0,5	0,25
Matrix	85% Al ₂ O ₃ 15% SiO ₂	85% Al ₂ O ₃ 15% SiO ₂	85% Al ₂ O ₃ 15% SiO ₂	85% Al ₂ O ₃ 15% SiO ₂	85% Al ₂ O ₃ 15% 3YSZ	85% Al ₂ O ₃ 15% 3YSZ
Bending strength [MPa]						
- at room temperature	50-60	60-70	120-130	160-170	273	310-320
- at service temperature	50-60	60-70	-	-	-	-
Modulus of elasticity in flexure [GPa] at room temperature	-	-	50	78	82	92
Tensile strength [MPa]						
- at room temperature	-	-	-	55-65	153	133
Tensile modulus at room temperature [MPa]	-	-	-	78	74	93
Modules of elasticity in tensile [GPa] at room temperature	-	-	-	62	216	207
Compressive resistance [MPa] at room temperature	-	-	-	93	70	123
Modulus of elasticity in compressive [GPa] at room temperature	-	-	-	10,5	17	17
Shearing resistance (IISR) [MP] at room temperature	-	-				
Thermal extension [10 ⁻⁶ 1/K]	6 – 8	6 – 8	-	-	8,49	8,49
Thermal conductivity [W/mK300	<1,5	<1,5				
600			2,44	2,44	3,80	3,80
900			1,89	1,89	2,81	2,81
1100			1,63	1,63	2,30	2,30
			1,52	1,52	2,02	2,02
Maximum continuous service temperature with mechanical load (°C)	< 1100	< 1100	1250	1250	1250	1250
Maximum continuous service temperature without mechanical load (°C)	< 1150	< 1150	1350	1350	1350	1350

* Not for specification purposes