Cordierite Kiln Furniture

Typical Properties

PRESSED MATERIALS		STD General use	HTR Improved surface	FFR Fast-firing	TUS Extruded tubes	LWS Ultra lightweight	GZR Glaze resistant	LTS Glost cranks
Composition								
Al_2O_3	%	38	46	42	47	38	25	45
SiO_2	%	50	44	47	44	50	42	45
MgO	%	8	6.5	7	6.5	8	8.5	6.5
Other Oxides	%	-	-	-	-	-	20% (ZrO_2)	-
Property								
Max Service Temperature	°C (°F)	1300 (2400)	1300 (2400)	1300 (2400)	1300 (2400)	1250 (2300)	1250 (2300)	1250 (2300)
Bulk Density	g/cm^3	1.85	1.95	2.00	2.00	1.10	2.20	2.00
Open Porosity	%	27	26	24	26	57	25	25
Modulus of Rupture (room temp)	MPa	15	12.5	12	11	10	14	16
Modulus of Rupture (1250°C)	GPa	11	13	12	12	10	12	12
Thermal Expansion (20-1000°C)	$x10^{-6}/K$	2.5	2.9	2.2	2.4	2.7	2.4	2.8
Specific Heat	(kJ/kg.K)	1.0	1.0	1.0	1.0	0.8	1.2	1.0
Thermal Conductivity	W/mK	0.5	0.5	0.5	-	0.3	-	-

This information is given in good faith but does not constitute a specification or guarantee.

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General Guidance

IPS kiln furniture materials are often called 'cordierite', but a more accurate description would be 'cordierite/mullite' as the material is a mixture of both minerals. There is also a small amount of silica glass that forms a glassy-bond between the larger grains, and sometimes small amounts of corundum and/or zircon. Cordierite kiln furniture is the material of choice for firing and heat-treatment processes below 1300°C due to the unique blend of properties:-

- **Thermal Cracking** – the low thermal expansion of cordierite (which minimises thermal stresses), combined with a coarse grog microstructure (that impedes crack growth), helps to minimise the risk of cracking when repeatedly thermally cycled, or when rapidly heated or cooled.
- **Compatibility** – our materials do not react with clay-based ceramics such as earthenware or other pottery bodies. A coating of batt-wash can be applied to kiln furniture to prevent sticking of very vitreous bodies or to protect from glaze deposits.
- **Kiln atmospheres** - cordierite materials are stable in oxidising and slightly reducing atmospheres and can also be used in vacuum furnaces. They are not recommended for use in hydrogen rich atmospheres firing above 1200°C due to the risk of reduction of the silica component.
- **Long life** - because our materials are a blend of minerals and each mineral has a different melting point, the bulk material has a 'melting-range' rather than a melting point. Below 1100°C very little creep (hot-bending) takes place and cordierite kiln furniture can have a service life of over 10 years. Above 1100°C, the 'glassy-bond' between the larger mullite grains starts to soften and items will start to slowly bend after many firings, but good service life can still be achieved at temperatures up to 1300°C with careful design.

STD	This is our 'standard' material, suitable for a wide range of applications; a great balance between cost and performance.
HTR	This material has a smoother, whiter surface.
FFR	Improved thermal shock resistance for fast-fire applications or where cracking has previously been a problem.
TUS	A slightly coarser-grain material used for extruded tubes.
LWS	An ultra lightweight cordierite for CNC machining and other specialist items.
GZR	Used for low temperature glost firings; added zircon improves resistance to attack by glaze vapour.
LTS	Used for low temperature glost firings; higher strength reduces the risk of breakage of thin items (e.g. T and Y-cranks).

Kiln furniture products can absorb water during their manufacture, transportation, or storage. Wet products may crack if exposed to temperatures of more than 100°C (210°F) as the absorbed water will create uneven rates of heating across the product. Due to this: -

ALL KILN FURNITURE PRODUCTS MUST BE DRIED BEFORE USE.

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