

CARBOLVE

Graphite Material Selection Guide

Material Grades for Graphite Plates, Rods, Molds, EDM Electrodes and Custom Graphite Parts

Isostatic Graphite	Extruded Graphite	Molded Graphite
Fine-Grain Graphite	High-Purity Graphite	Custom Graphite Parts

Version 1.0 | Development Target Values

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1. Material Grade Overview

CARBOLVE graphite materials are organized by forming route, grain structure, density, strength, conductivity and purity. The same CVG grade may be machined into plates, rods, molds, crucibles, heaters, EDM electrodes or custom graphite parts.

Series	Material Family	CARBOLVE Grades	Typical Applications
CVG-ISO	Isostatic Graphite	ISO20 / ISO30 / ISO35 / ISO40	Precision parts, molds, heaters, premium graphite components
CVG-EX	Extruded Graphite	EX20 / EX30 / EX40	Plates, rods, blocks, crucibles, large industrial parts
CVG-MD	Molded Graphite	MD20 / MD30 / MD35	Molds, electrodes, crucibles, mechanical parts
CVG-FG	Fine-Grain Graphite	FG30 / FG40	EDM, fine molds, precision electrodes
CVG-HP	High-Purity Graphite	HP30 / HP40 / HP50	Semiconductor, PV, furnace and ultra-clean applications

Grade Code Example

CVG-ISO30 = CARBOLVE Graphite / Isostatic Graphite / High Strength Grade.

20 = general purpose **30** = high strength / mainstream premium **35** = fine-grain / precision direction **40+** = severe duty / high density / ultra fine.

2. Core Graphite Material Grades

The values below are provisional typical development targets for preliminary material selection.

Grade	Forming	Density g/cm³	Grain µm	Purity	Flexural MPa	Comp. MPa	Resistivity µΩ·m	Thermal W/mK	Typical Products
VG-EX20	Extruded	1.72	20-40	99.90%	32	68	10	145	Plates / rods / blocks
VG-EX30	Extruded	1.78	15-30	99.92%	38	82	8.5	155	Rods / plates / crucibles
VG-ISO20	Isostatic	1.79	8-15	99.95%	43	85	11.5	115	Precision parts / molds
VG-ISO30	Isostatic	1.85	6-12	99.97%	54	102	9.5	135	High-strength molds / heaters
VG-FG30	Fine-Grain	1.83	7-12	99.96%	55	102	10	130	EDM / precision molds
VG-HP40	High-Purity ISO	1.86	5-10	99.995% target	60	108	9	138	Semiconductor / PV parts

Core positioning

EX20 / EX30: economical industrial graphite for larger plates, rods and blocks. **ISO20 / ISO30**: isotropic precision graphite with improved strength and uniformity. **FG30**: fine-grain grade for EDM and detailed machining. **HP40**: high-purity isotropic graphite for contamination-sensitive applications.

3. Extended Material Grades

Grade	Material / Direction	Density g/cm³	Grain µm	Purity Target	Flexural MPa	Thermal W/mK	Typical Application
CVG-ISO35	Fine-Grain Isostatic	1.87	4-8	≥99.97%	62	138	Precision molds / EDM
CVG-ISO40	High-Density Isostatic	1.90	4-8	≥99.98%	68	145	Premium thermal / mold parts
CVG-EX40	Large-Size Extruded	1.76	25-50	≥99.90%	34	165	Very large blocks / furnace parts
CVG-MD20	General Molded	1.76	10-25	≥99.92%	42	120	General molds / electrodes
CVG-MD30	High-Strength Molded	1.82	8-18	≥99.95%	52	135	Molds / crucibles / fixtures
CVG-MD35	Fine-Grain Molded	1.84	5-10	≥99.96%	60	138	Fine molds / detail parts
CVG-FG40	Ultra-Fine Graphite	1.87	4-7	≥99.97%	70	135	Fine EDM / micro details
CVG-HP30	High Purity	1.82	8-15	≥99.99%	50	130	Furnace / PV fixtures
CVG-HP50	Semiconductor Grade	1.88	4-8	≥99.999% target	66	145	Ultra-clean semiconductor parts

4. Quick Material Selection Guide

Product / Operating Need	First Choice	Alternative
General graphite plate / rod / block	CVG-EX20	CVG-EX30
Higher-density plate / rod / crucible	CVG-EX30	CVG-MD30
General custom graphite part	CVG-ISO20	CVG-MD30
High-strength precision mold	CVG-ISO30	CVG-FG30
Fine EDM electrode	CVG-FG30	CVG-FG40
Micro-detail / ultra-fine EDM	CVG-FG40	CVG-ISO35
Large graphite mold / thermal fixture	CVG-EX40	CVG-MD30
Semiconductor / PV furnace part	CVG-HP40	CVG-HP50
Ultra-clean semiconductor process part	CVG-HP50	CVG-HP40

Information Required for Final Grade Selection

Product type - dimensions - forming route preference - required grain size - machining tolerance - mechanical load - thermal cycle - electrical requirement - atmosphere - purity / ash limit - surface finish - maximum block size.

Engineering note: Graphite grades should not be selected by density alone. Grain size, forming route, anisotropy, strength, conductivity, purity and actual application testing all influence final performance.

5. Technical Notes

Development status

All values in this guide are development targets intended for preliminary selection. They are not guaranteed specification limits.

Forming route

Isostatic, extruded and molded graphite should be treated as different material families because they differ in grain structure, anisotropy, strength and conductivity.

Grain size

Fine and ultra-fine grain generally support better detail and surface finish, especially in EDM, but may increase cost and reduce available block size.

Purity

4N / 5N or semiconductor-grade claims should only be used after validated impurity testing and controlled purification processes.

Anisotropy

Extruded graphite may have directional properties. Test orientation should be stated where mechanical or electrical properties are critical.

EDM performance

Physical properties alone do not establish EDM performance. Actual electrode wear, removal rate and surface finish should be validated on the intended machine/process.

Website publication

After CARBOLVE completes stable-batch validation, 'Development Target Values' can be changed to 'Typical Material Properties'.

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For material recommendations, provide your product drawing, dimensions, application, operating temperature, atmosphere and purity requirement.