

MICRONISED MELAMINE CYANURATE (MCA)

Halogen-Free Nitrogen Flame Retardant for Polyamide and Selected TPU Systems

Polymer Add offers MCA-10 and MCA-20, controlled micronised grades of melamine cyanurate with target maximum particle sizes of D100 below 10 µm and 20 µm respectively.

The grades are produced from selected melamine cyanurate feedstock by controlled micronisation. Their fine and controlled particle-size distributions support uniform incorporation and consistent flame-retardant performance in polyamide and selected thermoplastic polyurethane formulations.

Melamine cyanurate is a halogen-free, nitrogen-based flame retardant formed as a 1:1 complex of melamine and cyanuric acid. It is used principally in unfilled and mineral-filled polyamide systems where low smoke generation, low corrosivity and retention of electrical properties are important.

Micronisation reduces coarse particles, improves distribution through the polymer matrix and supports more consistent performance in thin-wall mouldings, electrical components and other applications requiring fine dispersion.

General chemical properties

Property	Description
Chemical name	Melamine cyanurate
Common abbreviation	MCA
Other name	Melamine-cyanuric acid complex (1:1)
CAS number	37640-57-6
Molecular formula	C ₃ H ₃ N ₃ O ₃
Molecular weight	Approximately 255.19 g/mol
Appearance	Fine white crystalline powder
Thermal behaviour	Decomposes above approximately 300°C; grade dependent
Water solubility	Very low at ambient temperature
Principal function	Halogen-free nitrogen flame retardant
Storage	Store sealed in a cool, dry location and protect from moisture and contamination

Available micronised grades

GRADE NAME	CLASSIFICATION	PARTICLE SIZE	COMPOSITION
MCA-10	Ultra-fine micronised	Target D100 <10 µm	Melamine cyanurate
MCA-20	Fine micronised	Target D100 <20 µm	Melamine cyanurate

D50 values will be reported as typical batch data after final product trials.

The principal grade specification is the target D100 value.

Why particle size is important

Melamine cyanurate remains present as a finely dispersed solid in the polymer. A controlled particle-size distribution improves distribution through the resin, reduces coarse inclusions and supports more uniform flame-retardant action while limiting unnecessary loss of mechanical and surface properties.

PRODUCT	APPLICATION	BENEFITS OF MICRONISATION
Unfilled PA6	Electrical, electronic and general injection-moulded components	Fine distribution, fewer coarse inclusions and consistent flame-retardant action

PRODUCT	APPLICATION	BENEFITS OF MICRONISATION
Mineral-filled PA6	Dimensionally stable electrical and appliance components	Uniform distribution through the mineral-filled compound and controlled surface quality
Selected PA66 systems	Unfilled or mineral-filled components processed within a suitable thermal window	Reduced coarse particles and improved consistency of additive distribution
Thermoplastic polyurethane	Selected cable, film and moulded technical applications	Improved dispersion where MCA is technically compatible with the TPU grade
Polyamide fibres and monofilaments	Applications requiring fine filtration and minimum coarse particles	Lower risk of coarse inclusions and more uniform additive distribution
Flame-retardant masterbatch	Concentrates for controlled addition into compatible polymers	Consistent feedstock particle size and improved distribution in the carrier resin

Product handling and formulation

Fine MCA powders have greater surface area than standard coarse grades and therefore require controlled handling to minimise dust generation, compaction, contamination and moisture pickup.

MCA-10 and MCA-20 should be stored sealed in a cool, dry location. During compounding, the powder should be incorporated under controlled feeding and dispersion conditions appropriate to the polymer and equipment.

The final dosage, drying requirement and processing conditions depend on the polymer grade, reinforcement level, part thickness and required flammability classification. Customers should confirm performance through compounding, mechanical-property and UL 94 trials.

MCA is used most effectively in unfilled and mineral-filled polyamide formulations. In glass-fibre-reinforced polyamides, MCA alone may not provide the required flame-retardant performance and should be evaluated as part of a suitable synergistic system.

Applications and grade-selection guide

Principal application	Application requirement	Suggested grade
Thin-wall electrical components	Minimum coarse particles and highly uniform dispersion	MCA-10
Unfilled PA6 compounds	Fine dispersion with controlled mechanical and surface properties	MCA-10 or MCA-20
Mineral-filled PA6 compounds	Consistent additive distribution through the filled polymer	MCA-20
Selected PA66 systems	Controlled particle size within a validated processing formulation	MCA-10 or MCA-20
Selected TPU compounds	Fine dispersion after confirmation of polymer compatibility	MCA-10
Flame-retardant masterbatch	Controlled distribution in a compatible carrier resin	MCA-10 or MCA-20

Toll micronisation service

Customer-supplied standard or coarse-powder MCA grades can be micronised in dedicated production batches. A typical minimum batch is 500 kg. The service can include micronisation,

particle-size testing and repacking. Final feasibility, achievable particle size, processing yield and commercial terms are confirmed after evaluating the customer's specific feedstock.

Final product selection, dosage, processing conditions and flame-retardant performance should be confirmed through customer formulation and UL 94 trials.