

MICRONISED DICYANDIAMIDE (DICY)

Latent Curing Agent for Epoxy Resin Systems

Polymer Add offers three specialised micronised grades of dicyandiamide, differentiated by guaranteed maximum particle sizes of D100 below 10, 20 and 30 µm.

All three grades contain **2.5% hydrophilic fumed silica** as an anticaking and flow-control agent. The silica is incorporated immediately after micronisation by gentle tumbling in a double-cone blender. This helps minimise re-agglomeration and maintain powder flow and particle-size stability during storage and transportation.

Dicyandiamide is a solid, heat-activated latent curing agent widely used in one-component epoxy formulations. It provides long formulation stability at room temperature and reacts with epoxy resin when activated by heat.

Micronisation improves its dispersion in epoxy resin, reduces settling and coarse inclusions, and promotes faster and more uniform activation during curing.

General chemical properties

Property	Description
Chemical name	Dicyandiamide
Common abbreviations	DICY, DCD
Other name	Cyanoguanidine
CAS number	461-58-5
Molecular formula	C ₃ H ₄ N ₄
Molecular weight	84.08 g/mol
Appearance	Fine white powder
Melting/decomposition range	Approximately 207–212°C
Odour	Odourless
Principal function	Latent curing agent for epoxy resins
Anticaking agent	2.5% hydrophilic fumed silica
Storage	Store sealed in a cool, dry location and protect from moisture

Available micronised grades

GRADE NAME	CLASSIFICATION	PARTICLE SIZE	HYDROPHILIC FUMED SILICA
DCY-10	Ultra-fine	D100 <10 µm	2.5%
DCY-20	Fine	D100 <20 µm	2.5%
DCY-30	Standard micronised	D100 <30 µm	2.5%

D50 values are reported as typical batch data.

The principal grade specification is the guaranteed D100 value.

[Insert comparative PSA graphs for DCY-10, DCY-20 and DCY-30]

Why particle size is important

Dicyandiamide has limited solubility in liquid epoxy resin at room temperature and is therefore normally incorporated as a dispersed solid. Controlled micronisation improves its distribution and curing performance.

PRODUCT	APPLICATION	BENEFITS OF MICRONISATION
One-component structural epoxy adhesives	Bonding of metal and composite components	Improved dispersion in thin adhesive layers, more uniform curing and reduced coarse inclusions
Heat-curing epoxy adhesives and sealants	Industrial assembly and structural bonding	Reduced settling, fewer undispersed particles and more consistent heat activation
Carbon-fibre and glass-fibre prepregs	Automotive, wind-energy, industrial and sporting components	Uniform curing-agent distribution and consistent curing throughout the composite structure
Encapsulation and potting compounds	Protection and insulation of electrical and electronic components	Reduced coarse particles, improved dispersion and more uniform curing
Epoxy laminates	Electrical insulation and printed-circuit-board production	Fewer inclusions and improved consistency within thin resin layers
Epoxy powder coatings	Industrial, automotive, appliance and electrical coatings	Uniform incorporation, consistent cure and reduced risk of localised under-cure
Bisphenol A, Bisphenol F and epoxy novolac formulations	General one-component heat-curing epoxy systems	Increased contact with epoxy resin, faster activation and more uniform curing

[Insert SEM comparison: standard dicyandiamide versus micronised dicyandiamide]

[Insert SEM photographs of DCY-10, DCY-20 and DCY-30]

Hydrophilic fumed silica

Finer powders have greater surface area and surface energy and consequently show a stronger tendency to re-agglomerate after micronisation.

All three Polymer Add grades are sufficiently fine to require effective protection against re-agglomeration. The products are therefore standardised with **2.5% hydrophilic fumed silica**.

The hydrophilic fumed silica is added immediately after micronisation and gently distributed through the powder using a double-cone blender. It functions as an anticaking and flow-control agent by:

- Reducing direct contact between micronised DICY particles
- Minimising re-agglomeration
- Improving powder flow
- Reducing caking during storage
- Supporting redispersion in epoxy resin

- Maintaining particle-size stability during handling and transportation

The fumed silica is not added as a curing accelerator. Its principal purpose is to stabilise the physical condition and handling characteristics of the micronised powder.

Applications and grade-selection guide

Principal application	Application requirement	Suggested grade
One-component structural adhesives	Minimum coarse particles, finest dispersion and thin adhesive layers	DCY-10
One-component structural adhesives	General structural bonding	DCY-10 DCY-20
High-performance composites and prepregs	Uniform curing-agent distribution and consistent curing	DCY-10 DCY-20
Electrical and electronic systems	Critical applications requiring minimum coarse particles	DCY-10
Encapsulation and potting compounds	Fine dispersion and uniform curing	DCY-20
General one-component epoxy systems	Balance between dispersion and processing economy	DCY-20
Epoxy powder coatings	Uniform incorporation and consistent cure	DCY-20 DCY-30
Industrial adhesives, sealants and film adhesives	Selection according to bond-line thickness and formulation requirements	DCY-10 DCY-20 DCY-30
General industrial adhesives	Controlled micronised grade for less particle-sensitive formulations	DCY-30
Cost-sensitive epoxy formulations	Economical controlled micronised grade	DCY-30

Toll micronisation service

Customer-supplied Micronised Dicyandiamide 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 and curing conditions should be confirmed through customer formulation trials.