NanoFract

MATERIAL DATA SHEET 01 · MICRO & NANO GRINDING

What we make out of your material.

Documented grinding results across 16 material classes – from polymers and minerals to fibrous natural materials. Without cryogenic milling.

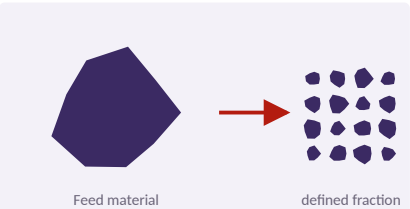
3.0 µm
finest volume-weighted d50, documented on post-consumer PVC

311
verified individual measurements from 56 test and measurement reports

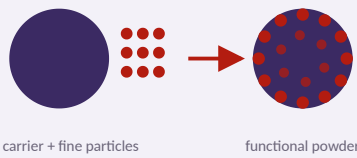
16
material classes with documented results, 2022–2026

0 %
cryogenic share – all results achieved without liquid nitrogen

Micro and nano grinding



Particle coating

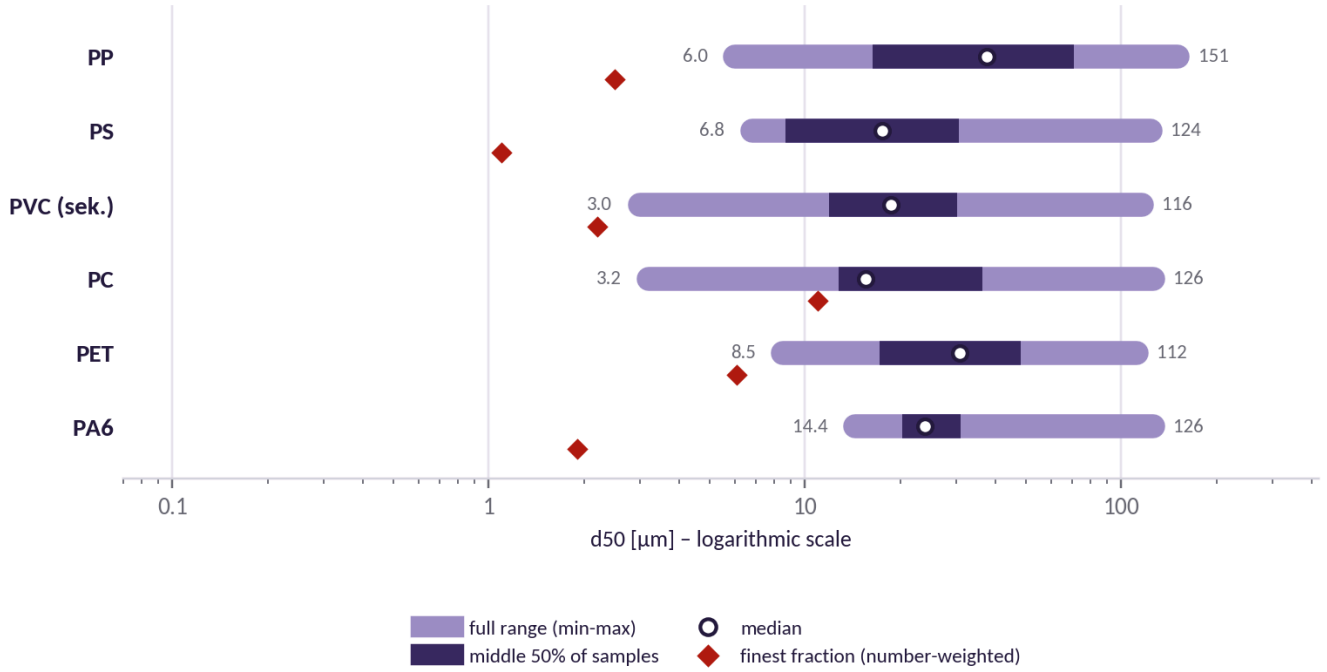


All values originate from documented measurements of completed projects (2022–2026) and have been checked for distribution type and data provenance. All d50 figures are rounded indicative values from completed projects and do not constitute warranted properties; the binding specification results from the respective trial grind. For every batch we issue a measurement report with d10/d50/d90 and the distribution type stated. Values are material-dependent and do not constitute warranted properties; binding specifications result from the respective trial grind.

POLYMERS

Seven polymers, six orders of magnitude of experience

The overview below aggregates every verified particle size measurement from completed customer and research projects. All values are laser diffraction measurements on real production batches – no model calculations, no catalogue figures.



POLYMER	VOLUME-WEIGHTED D50 [MM]	MIDDLE 50 % OF SAMPLES	FINEST FRACTION (NUMBER-WEIGHTED)	SAMPLES
Polypropylene (PP)	6.0 – 151	16 – 71	2.5 µm	32
Polystyrene (PS)	6.8 – 124	9 – 31	1.1 µm	16
PVC (post-consumer)	3.0 – 116	12 – 30	2.2 µm	37
Polycarbonate (PC)	3.2 – 126	13 – 36	11.0 µm	31
PET	8.5 – 112	17 – 48	6.1 µm	28
Polyamide 6 (PA6)	14.4 – 126	20 – 31	1.9 µm	31

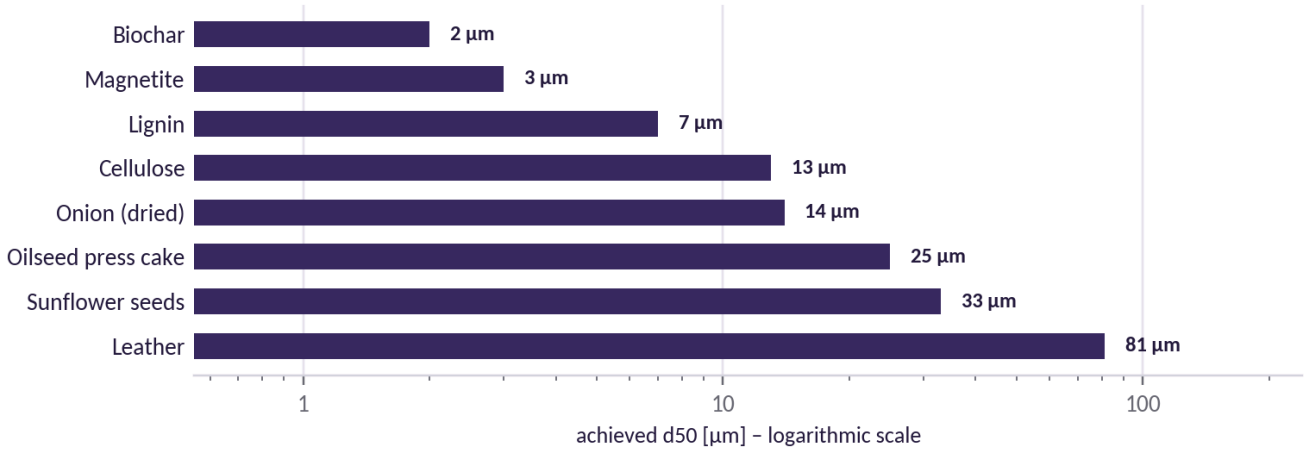
Why we report two distribution types

Number-weighted and volume-weighted distributions yield substantially different d50 values for the same sample. We report both separately: the volume-weighted distribution as the robust process figure, the number-weighted one as evidence of the finest fraction actually produced. Figures published without this distinction are not technically comparable – a common flaw in supplier documentation.

OTHER MATERIALS

What standard mills cannot do

Soft, fibrous, temperature-sensitive, tough: most of our projects start because the material has already failed somewhere else. The results below come from real customer and development projects.



MATERIAL	D50 ACHIEVED	APPLICATION / BACKGROUND
Biochar	2 µm	Increased electrical conductivity; cement and construction systems, CO_2-certified batches
Magnetite	3 µm	EMC shielding, filler compounds, polymer filler, high-density special applications
Lignin	7 µm	Fine grinding of a lignocellulosic residue into a functional filler
Cellulose	13 µm	Natural fibre material as filler and carrier, repurposing of technical raw materials
Onion (dried)	14 µm	Food additives from processing residues
Oilseed press cake	25 µm	Below roughly 25 µm no longer perceptible as husk – a residual stream becomes a food ingredient
Sunflower seeds	33 µm	Food and feed applications
Leather	81 µm	Fibrous, tough-elastic material – standard mills fail here
Carbon nanotubes (CNT)	–	A special case without a d50 figure: with CNTs the task is not size reduction but disentangling agglomerates at industrial scale without shortening the tubes. Only then do the desired physical effects emerge. The process is a trade secret.

PROCESS & QUALITY

How these results are produced

Our own process – without cryogenic milling

The basis is a rotating fluidised bed process we developed ourselves. It works without liquid nitrogen and is configured individually for each material. The specific process design – equipment configuration, process parameters and material-specific know-how – is treated as a trade secret while our IP filing is still in preparation. What matters for you is the result: defined fractions for materials where standard processes fail, reproducible across multiple batches.

No liquid nitrogen

Cryogenic processes reach an overall exergy efficiency of roughly 11 % and incur ongoing nitrogen cost (around 0.75 lb N_2 per lb of material).

Gentle on the material

No additional grinding media abrasion, no cryogenically induced embrittlement of the remaining structure – relevant wherever the particle itself is the object under test.

538 kWh/t

Documented specific energy input. Specific consumption falls further as equipment scales.

Reproducible process window

For each material we define a dedicated process window and document it internally. Results stay repeatable across batches.

Metrology and evidence

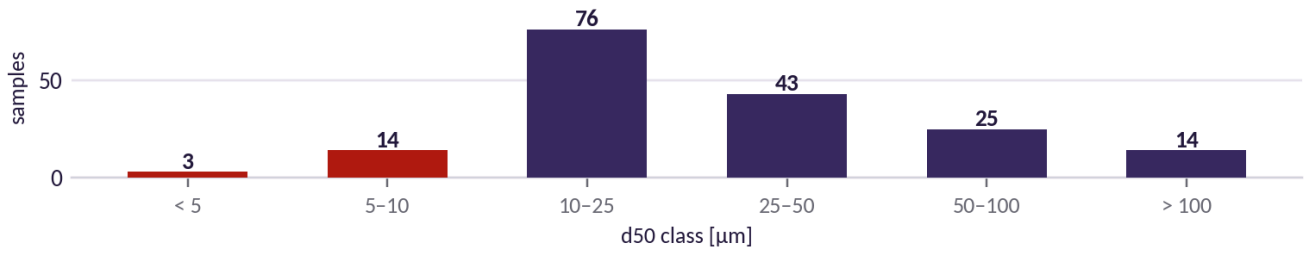
- Particle size analysis by laser diffraction (Mastersizer), distribution type reported per batch
- Fractionation by centrifugation and sieving for narrow target ranges
- Raman spectrum confirming polymer identity on request
- Batch-related measurement reports, raw data on request

From trial grind to series supply

- **Feasibility trial** – trial grind on your material with a measurement report
- **Process development** – reproducible process window for your target specification
- **Small series** – first quantities for your validation
- **Repeat programme** – recurring supply of validated batches
- **Customer plant** – transfer of the process to a mill at your site, incl. licence

Fineness distribution across all verified polymer samples

Distribution of volume-weighted d50 values across all polymers. The majority of our batches sit in the 5–50 µm window – exactly where standard contract grinding typically reaches its economic limit.



Send us your material.

We grind a sample and deliver a measurement report. If it works, we talk quantities. If it does not, we tell you why.

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