ATEX & NFPA Technical Compliance Register: Doebritz Explosion-proof Cone Mill

ATEX & NFPA TECHNICAL COMPLIANCE REGISTER: DOEBRITZ EXPLOSION-PROOF CONE MILL

EXECUTIVE SUMMARY

The Doebritz Explosion-proof Cone Mill represents a paradigm shift in secure particle size reduction for high-risk bulk solids processing. Engineered specifically for ATEX Zone 1/21 and NFPA 70E Class II hazardous environments, this unit combines flameproof motor isolation, advanced shaft sealing, and a precision-ground conical rotor-stator gap to deliver consistent particle sizing without ignition risk. Designed for continuous duty in pharmaceutical, chemical, and food processing plants where dust explosion hazards are critical, the Doebritz Cone Mill eliminates external arc paths and contains any internal pressure spike below 10 barg.

HOUSING & ROTOR METALLURGY

The monobloc housing is investment-cast from 316L stainless steel as standard, with Hastelloy C22 and duplex SS options for corrosive environments. The cone rotor features a helical vane profile CNC-machined to a surface finish of Ra ≤ 0.8µm, ensuring non-retentive processing of sticky or hygroscopic powders. All product-contact surfaces are polished to SF4 finish (Ra ≤ 0.4µm) and fully drainable. The mill head incorporates a double-acting flameproof labyrinth seal with pressurized air purge interface that prevents dust ingress to the bearing housing even under 700 mbar differential pressure.

KEY FEATURES

- Explosion-flameproof Drive Enclosure: ATEX II 2D Ex tb IIIC Db, IP66, with certified flame paths and surface temperature limitation to T125°C.

- Isolated Outboard Bearing Architecture: Bearings housed in cast iron pedestals separated from product zone by double mechanical seals + nitrogen purge ports.

- Non-Jamming Cone Geometry: 4°, 6°, or 8° rotor-stator cone angles available; clearance adjustable from 0.25mm to 2.0mm without tooling disassembly.

- Rapid Discharge Design: Cantilevered rotor allows screen removal and internal washdown in less than 5 minutes via swing-away milling chamber.

- Volumetric Feed Control: Integrated rotary feeder upstream option permits closed-system milling under inert gas blanket.

COMPLIANCE & SAFETY STANDARDS

The Doebritz Explosion-proof Cone Mill is fully certified for ATEX Directive 2014/34/EU (Equipment Category 1D/2D) and NFPA 652 for combustible dusts. Additional compliance includes: IECEx (Ex tb IIIC Db), 3-A Sanitary Standard 04-28 (for dairy and food applications), and EHEDG Type EL Class I for CIP/SIP compatibility. Each unit undergoes 100% factory hydrostatic testing at 1.5x MAWP (maximum allowable working pressure) and spark-testing of all flameproof joints per EN 14986. A full documentation package includes Declaration of Conformity, Certificate of Specific Construction (CES), and an ATEX Process Safety Data Sheet.

TECHNICAL SPECIFICATIONS

Rotor Tip Speed: 8 to 25 m/s (VFD-controlled)

Throughput Range: 0.5 to 25,000 kg/h (depending on material density and screen perforation)

Screen Perforations: 0.5mm, 0.8mm, 1.0mm, 1.5mm, 2.0mm, 3.0mm round or square hole

Max Inlet Particle Size: ≤ 20mm (friable materials) / ≤ 10mm (fibrous)

Max Inlet Temperature: -20°C to +180°C (with PTFE seals)

Surface Finish: Ra ≤ 0.4µm (electropolished optional)

Motor Power: 2.2kW to 37kW, IE3 efficiency, flameproof EEx d IIC T4

Material Certifications: 3.1 EN 10204 with full traceability

Parameter	**Specification**
Capacity / Throughput	0.5 – 25,000 kg/h (material-dependent)
Flange Standard	DIN 2633 PN16 / ANSI 150# RF / Tri-Clamp 3"
Drive Configuration	ATEX Ex d IIC T4 motor + VFD, Chain or Direct Drive
Explosion Class	ATEX II 2D Ex tb IIIC Db / NFPA Class II Division 1

Max Rotor Speed	3,600 RPM (25 m/s tip speed max)
Cone Angle (Rotor)	4°, 6°, or 8° standard, custom pitch available
Sealing System	Double mechanical + nitrogen purge (0.2–0.5 barg)
Surface Finish	Ra ≤ 0.4 µ m (SF4 electropolished optional)
Max Working Pressure	3.5 barg (static) / 0.7 barg (differential)
Operating Temperature	-20°C to +180°C (higher with specialty seals)
Material of Construction	316L stainless steel / Hastelloy C22 (optional)
Inspection Ports	2x hinged sightglasses with purge and lighting

INDUSTRIAL DEPLOYMENT

Typical installations include the following hazardous area applications: Active pharmaceutical ingredient (API) milling in sterile barrier isolators; Sugar grinding for confectionery (NFPA Class II Division 1); Plastic masterbatch granulation; Carbon black particle control for battery anodes; Explosive organic

peroxide drying and deagglomeration; and Powder coating pigment refinement. The mill can be integrated into a nitrogen-inerted loop with oxygen monitoring and differential pressure interlocks. Doebritz provides on-site FAT witness testing with your material, CSA/ATEX documentation packages for local authority filing, and global 24-month warranty on all explosion-proof electrical components.