

Explosion Hazard Testing of *Microthene F* Powders

The explosibility of a powder depends on a number of parameters, some of which include:

1. The physical and chemical properties of the dust (particle size and distribution, and chemical composition)
2. The concentration of dust in the dust/air mixture
3. The homogeneity and turbulence of the dust/air mixture
4. The type, energy and location of the ignition source
5. Geometry of the vessel that the explosion is occurring
6. Initial pressure, temperature and humidity of the dust/air mixture

Safety Consulting Engineers, Inc., Schaumburg, IL., tested a series of *Microthene-F* powders for some of the standard explosibility parameters. The results are given for the tests in Table 1.

Due to the lower cohesive energy, and therefore the better dispersibility in air, the explosibility hazard will generally be higher for the flow-enhanced grades of *Microthene F* (FN519, FA709). However, the data indicate that the non-flow-enhanced grades can also represent a significant risk if enough energy is applied to the powder to cause a polymer particle air dispersion. In this testing some of the powders were too cohesive to be dispersed under the normal testing conditions. This does not preclude these

powders from being hazardous if processed under different conditions outside the scope of the testing.

Note: This report does not recommend any guidelines for the safe handling of these powders.

WARNING: Polymer dust particles in the atmosphere can be combustible and present a potential explosion hazard. Keep away from heat, sparks, flame and all other ignition sources. Prevent dust accumulations and dust clouds. Keep container closed. Clean up dust accumulations. For proper safety of personnel and property, the container should be emptied in compliance with NFPA 654, "Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical and Plastics Industries." Processes using spray application or fluidized bed operation should be in accordance with NFPA 33, "Standard for Spray Application Using Flammable and Combustible Materials." Exercise caution when dispensing this product in or around combustible environments as the possible occurrence of a static discharge could ignite dust or vapors and cause a fire or explosion.

Evaluate the need for grounding of equipment and containers. Any modification or use of these products in a way that enhances the dispersion of the particles in the atmosphere could significantly increase the potential of an explosion.

Explosion Hazard Testing of *Microthene F* Powders (continued)

Explosibility Data Summary

Table 1: Summary of Explosibility Data

Parameter	FN510	FN519	FA700	FA709	FE532
MIE Capacitor Energy (milliJ)	60	33	52	31	>28,800
MIE Spark Energy (milliJ)	5.9	2.5	4.8	1.8	>28,800
MEC (gm/m ³)	25	25	25	23	300
Pmax (psig)	120	116	131	131	91
Pressure Rise rate (psi / sec)	7,410	8,720	7,850	10,460	3,760
Kst (bar.m/sec)	139	163	147	196	71
Powder Size (D50) (um)	15	15	17	17	11
UYS (lb/ft ²)	128	61	105	65	182

- UYS -The powder flow (Unconfined Yield Strength) was measured on the Johanson Indicizer using the established procedures (300 lbs. – Compression, 20 degree angle of friction, approximately 23 g. of sample).

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