SPONGE-JET®

Sponge Blasting System

Determining Minimum Explosibility Concentration

Sponge-Jet has recently done extensive testing of our Sponge Media within explosive atmospheres. One concern that has been brought to our attention is the small amounts of airborne dust, generated by the sponge polymer, working around welding sparks or heat from incandescent filament sources etc. In response to this concern, we have had the following tests conducted in hope to answer all questions.

I have attached the original report from the testing laboratory, but I have summarized the procedures and results in the following paragraphs:

Sponge-Jet sent two different samples of Silver Sponge-Jet Media to Fenwal Safety Systems-Combustion Research Center in Marlborough, Massachusetts. Sample One was blasted and recycled 8 times on a steel plate to simulate used media typically seen in the field. Sample Two was blasted and recycled 18 times on a steel plate to simulate over blasted media, normally not seen in the field, but would be finer in texture and create a finer dust cloud for testing.

The first test conducted was the (Go/No Go test) Kuhner 20 liter spherical explosion test (See attached diagram). This test determined whether or not the dust cloud created at different concentrations was explosible. This is done by taking varying concentrations of our media and introducing them into the 20 liter chamber, creating a dust cloud, and introducing an ignition source. The ignition source, in this particular case was the two 5 kJ Sobbe pyrotechnic igniters (equivalent to an M80 firecracker). You can see these two devices in the schematic diagram, they are the two electrodes that extend into the middle of the spherical chamber. The results are either an explosion occurs or it does not. In all cases, both our sample's of media at different concentration dust clouds, were non-explosive, No Go.

The second test performed was the Alundum Tube Furnace. One gram of the dust from both of the samples of media are pneumatically injected into the tube furnace. The temperature inside the tube furnace is 1400 ^{0}F, this is different than the previous test, where the temperature was not elevated. As the dust cloud moves downward through the super-heated air, combustion can occur, they are able to view this with a mirror at the bottom of the tube. The results are either combustion, in the form of a visible flame, or no reaction. In all cases, both our media's created no flame, No Go.

FENWAL
Safety Systems

COMBUSTION RESEARCH CENTER

700 Nickerson Road
Marlborough, Massachusetts 01752
(508) 481-5800 Fax: (508) 485-3115

18 November 1997

Ms. Holly Spaulding
Sponge-Jet Inc.
95C Dow Highway (Route 236)
P.O. Box 243
Eliot, Maine 03903

Dear Ms. Spaulding:

The two samples you submitted were subjected to testing in "as received" condition to determine the Minimum Explosibility Concentration (MEC). A summary of the results is attached. Both samples consisted of a variety of particle sizes including a significant fraction larger than 1 mm. Both of your samples are combustible. However, they are not explosible when tested in as received condition. Please be advised that this does not mean that the smaller particles could not form explosive dust clouds.

Since a complete MEC test series was not necessary, we have taken the liberty of reducing your bill for the test services.

We wish to thank you for the opportunity to be of service to you. If we can be of any further assistance, please do not hesitate to call.

Very truly yours,

Thomas E. Forcier
Project Engineer, Combustion Research Center
Industrial Explosion Protection Group

Summary of Screening Test for Dust Cloud Combustibility

Two test samples named below has been supplied by

Ms. Holly Spaulding
Sponge-Jet Inc.
95C Dow Highway (Route 236)
P.O. Box 243
Eliot, Maine 03903
Telephone: (207) 439-0211

for the purpose of assessing the Minimum Explosibility Concentration (MEC). Material was to be tested in "as received" condition. These tests were conducted under Fenwal Combustion Research Center project No. TS-5161.

Both samples consisted of a variety of particle sizes, including a significant fraction larger than 1 mm. Both samples were found to be combustible.

In the first series of tests to determine the MEC, both samples did not show any explosive behavior. Since the dust is combustible, the non-explosive behavior is likely to be caused by the large size of the sample particles. With such large particles which tend to settle quickly, the quality of the dust cloud suspension in the closed test volume at the time of ignition is unknown.

Due to the inability to explode the dust, the test protocol changed from MEC to a Go/No Go test. A Go/No Go test is used to determine whether or not the dust supplied is explosible. Testing is done using a 10 kJ pyrotechnic device inside the 20 liter test vessel. Several concentrations were tested and none of the concentrations were found to be explosible. The summary of the tests conducted are as follows:

Summary of Test Results

Material I.D.	Dust Concentration	Pressure Rise, bar	Conclusion
Sample 1	500 g/m^3	0.0	No Go
(media seen in field)	1000 g/m^3	0.2	No Go
Sample 2	500 g/m^3	0.0	No Go
(over blasted media)	1000 g/m^3	0.4	No Go
	2000 g/m^3	0.3	No Go

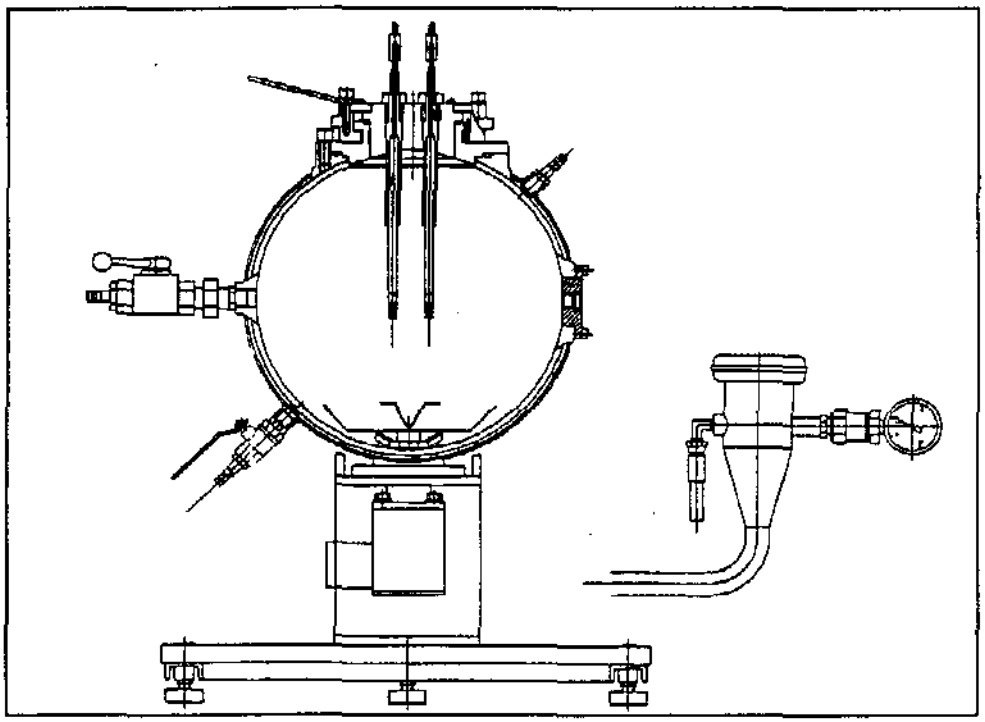
Notes 1: Material tested as-supplied.

This test for Go/No Go is also carried out in an Alundum Tube Furnace heated to 1400 ^{0}F. The dust is pneumatically ignited into the top of the furnace creating a dust cloud. As the cloud migrates downward through the super-heated air, combustion can occur in the form on visible flame which is seen at the bottom of the furnace. In the case of the samples provided by Sponge-Jet, neither sample produced visible flame in the super heated furnace, thus both are a "No Go."

Description of Test

Go/NoGo Test for Explosibility

This screening test for material explosibility is carried out in the 20 liter dust deflagration test system shown schematically below under. The ignition source used consists of two 5 kJ Sobbe pyrotechnic igniters. A single deflagration test is carried out using a sample size of 500 g/m^3. A rise in pressure, corrected for the effects of the igniter, greater than 1.0 bar is considered evidence of sustained flame propagation and is the defining criterion for an "explosible" dust. A nil pressure rise defines a "not explosible" dust. An intermediate result may indicate the need for further study.



Schematic diagram of the Kühner 20 liter spherical explosion test system.

Summary of Results:

Go/No Go Test (Kuhner 20 liter spherical explosion test system)

Testing Sample	**Dust Concentration**	**Pressure Rise**	**Conclusion**
8 Recycles	500 g/m^3	0.0	No Go
8 Recycles	1000 g/m^3	0.2 bars	No Go
18+ Recycles	500 g/m^3	0.0	No Go
18+ Recycles	1000 g/m^3	0.4 bars	No Go
18+ Recycles	2000 g/m^3	0.3 bars	No Go

Go/No Go Test (Alundum Tube Furnace)

Testing Sample	**Weight**	**Flame/No Flame**	**Conclusion**
8 Recycles	1 gram	No Flame	No Go
18+ Recycles	1 gram	No Flame	No Go

While these test results show that both samples sent to the lab are non-explosive, our media is still combustible, which means given a direct flame it will burn. Visible observation by Fenwal Labs, as well as Sponge-Jet Field Technicians, relay that the sponge does not burn with an open flame, but rather it just chars and smolders.