



PARTICLE IMPACT TEST SYSTEM CAPABILITIES

SUMMARY

In this test method, samples are impacted by a single particle or multiple particles entrained in a flow stream of gaseous oxygen. The particle is accelerated by the flow stream and impacts the face of the sample. The conditions (pressure, temperature, and particle velocity) are varied to determine a material's susceptibility to ignition by particle impact.

TEST APPARATUS AND PROCEDURE

Multiple test systems are used in particle impact testing. The subsonic test system consists of an injector, photocell housing, a sample, and a downstream orifice. The orifice in the subsonic injector can be changed to accommodate different flow rates at different pressures. The supersonic test system consists of an injector, a flow straightener, a convergent-divergent nozzle, and a sample. The convergent-divergent nozzle accelerates the gases to a supersonic velocity immediately downstream from the throat by allowing the gases to expand. In both systems the particle or particulate are introduced into the flow stream upstream from the sample.

TEST SAMPLES

Samples are typically metallic, but can be made from other materials, such as polymers. However, non-metallic materials require a special holder configuration. Subsonic test samples are configured in a disk shape (Figure 1). Supersonic samples are configured in a cup shape (Figure 2).

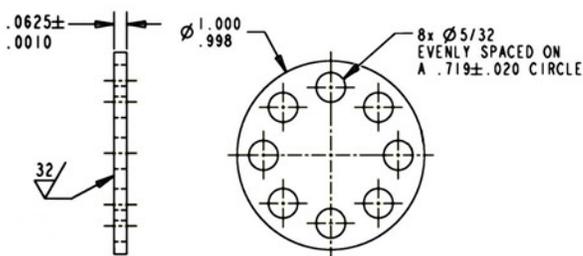


Figure 1: Subsonic Test Sample

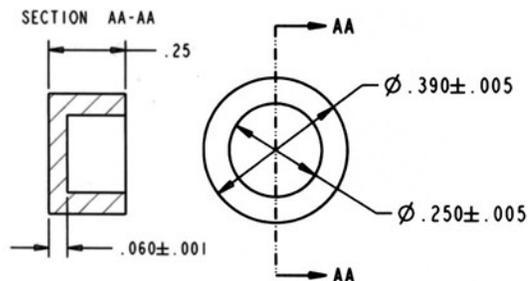


Figure 2: Supersonic Test Sample

TEST CAPABILITIES

Subsonic tests can be conducted at pressures of up to 29.2 MPa (4235 psi), a temperature of up to 538 °C (1000 °F), and a flow rate of up to 2.0 kg/s (4.6 lbm/s) (depending on pressure and temperature). Supersonic tests can be conducted at upstream pressures of up to 39 MPa (5700 psi) and temperatures of up to 538 °C (1000 °F). NOTE: The pressure on the face of the sample in supersonic tests is significantly lower than the upstream pressure (~9.7 MPa (1400 psi) at the sample for an upstream pressure of 29.3 MPa (4250 psi)).

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