REVISED SPECS 2, 09-17-10

NESC Pressure Gauge Specification

Basic Requirement

Sixty-five (65) Pressure Gauges to be used in water drop tests of NASA's full-scale Crew Module simulator:

- 15 Pressure Gauges – 0-100 psi
  - Linear response at least 2X measurement range
  - Sensitivity minimum of 50 mV/psi, +/-20%
  - Resolution of 1 psi or better
  - Maximum pressure of at least 1000 psi
- 50 Pressure Gauges – 0-500 psi
  - Linear response at least 2X measurement range
  - Sensitivity minimum of 10 mV/psi, +/-10%
  - Resolution 1 psi or better
  - Maximum pressure of at least 1000 psi

General design

- Gauges with a piezoelectric transducer should be used to ensure necessary reliability and performance. Piezoelectric transducers provide the high-rate response required for water drop tests.
- Gauges should be voltage mode design, with self-contained signal conditioning that provides a low-noise, low-impedance output signal, given constant current excitation. This arrangement relieves the limitations on cable lengths, and susceptibility to electrical noise.
- Because water is the measurement medium (working fluid), gauges must respond to hydrodynamic loading.
- The largest possible gauge diaphragm is desired.

Gauge manufacture and support

- Pressure gauge manufacture shall provide, without additional cost, immediate 24-hour/7 day-a-week technical support for gauge installation and trouble shooting.
- Gauge should be manufactured in an ISO-9001 registered facility.

Environmental

- Water tight construction

- Corrosion resistant exterior construction, preferably stainless steel
- Gauge diaphragm should be hermetically sealed
- Operating temperature of 0 to 150 °F
- Minimal temperature sensitivity, no greater than 0.01 psi/°F

Gauge traceability and calibration

- Gauges shall be serialized from the manufacture, indelible serial number present on gauge
- Individual gauges shall be calibrated by manufacturer
- **Calibration shall be done in a laboratory accredited to ISO 17025 standards, with the scope of the accreditation covering the procedures and equipment used to calibrate the gauges**
    - **Evidence of third-party accreditation by an International Laboratory Accreditation Cooperation (ILAC) member body (US examples include, but are not limited to A2LA, ACLASS, IAS, and L-A-B) - shall be provided with the vendor's quote**
- **Manufacturer calibration shall be done by dynamic positive-pressure pulse loading**
    - **Dynamic loading pulse will have a rise time of less than 250 microseconds**
    - **Dynamic loading pulse magnitude will be at least 90% of gauge full scale pressure**
- Calibration certificates shall be supplied with gauges

Measurement performance

- Time-domain
    - Rise time less than 2.5 microsecond
    - Natural frequency as high as possible, at least 200 kHz
- Due to the impact loading the test item will experience, the gauges designed must incorporate self-contained acceleration compensation that requires no filtering or post-processing of output signal.
    - Minimal acceleration sensitivity, no greater than 0.05 psi /g
    - Minimum peak vibration tolerance 1000 g

Electrical characteristics

- Positive voltage output for positive applied pressure
- Output impedance no greater than 100 Ohm
- Discharge time constant of 1 second or greater
- Excitation
    - 18 to 30 VDC
    - 3 to 5 mA Constant current capable
- 8 to 14 Output bias voltage of 10-12VDC nominal with
- No greater than + 10VDC swing on output bias, with a minimum deflection of 5V FS
- Female 10-32 coaxial connector

Mounting

- Mounting adapters must allow gauge diaphragm to be positioned flush with outer surface
- Adapters external thread must be 3/8-24 for installation into test

Delivery

- NASA Wallops Flight Facility 34200 Fulton Street
  Wallops, VA 23337