Workplace Health and Safety
Bulletin
WORK SAFE ALBERTA

Combustible Gas Meters – Function Testing

Before starting work that involves exposure to an atmosphere that may contain a flammable or explosive gas, the atmosphere should be tested with a combustible gas meter. It is extremely important that the meter provides accurate measurements and is fully functional.

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Conditions affecting meter function

A variety of conditions can affect the reliability of a combustible gas meter. These conditions include:

- *moisture condensing on sensor filaments* — this may cause filaments to short circuit or fracture
- *exposure to high concentrations of combustible gases* — this will shorten the effective life of the sensor
- *exposure to high concentrations of dust* — gas sensor filters can be slowed or blocked
- *exposure to catalytic sensor poisons* — substances such as silicone compounds e.g. WD-40, sulphur compounds, or chlorine can coat, corrode or inactivate sensor filaments
- *mechanical damage* — sensors can stop working if a meter is dropped

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- *immersion in water* — sensors can stop working if a meter is immersed in water.

Function or bump test

The only way to ensure that a combustible gas meter is accurate and fully functional is to complete a function or "bump" test before use.

A functional or bump test is a field test that is done at the start of each shift or before the meter is used. The test makes sure that the meter is working properly. During a function test, the meter is exposed to a known concentration of calibration gas. If the monitor responds within predetermined limits defined by the manufacturer, the instrument is ready for use. No attempt is to be made to re-calibrate the meter during a function test. A meter that fails the function test must immediately be taken out of service and returned to a qualified person or facility for a complete inspection and recalibration.

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CSA and Electrical Code requirements

The Canadian Standards Association (CSA) provides "Certificates of Compliance" to manufacturers of combustible gas meters that meet all the requirements of CSA Standard C22.2 No. 152-M1984, *Combustible Gas Instruments*. This standard describes the function testing and calibration requirements for a combustible gas meter. Meters that have received certificates of compliance bear a CSA certification mark and may be used in Class 1 hazardous locations. As part of the certification procedure, meters are also required to meet various criteria listed in other CSA electrical safety standards.

Section 18, Hazardous Locations, of the Canadian Electrical Code Part I, Safety Standards for Electrical Installations, lists many rules that apply to hazardous locations. Rules 18-050 and 18-066 make it clear that the section applies to battery-powered equipment intended for use in hazardous locations. Specifically, battery-powered equipment that may be carried into or located within a hazardous location must be "approved". This applies to equipment such as flashlights, paging receivers, vibration monitors, tachometers, battery-powered telephones, portable test equipment and combustible gas meters.

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In most cases, “approved” means that the combustible gas meter bears a CSA certification mark. The approval marks of other testing organizations recognized by Alberta Municipal Affairs are also acceptable. Whatever the approval mark, the meter must meet all the requirements of CSA Standard C22.2 No. 152.

Warning required in manual

Clause 5.3.1(k) of CSA Standard C22.2 No. 152 states that instruction manuals for intermittent duty and continuous duty portable gas detection instruments must contain the following warning:

“CAUTION: BEFORE EACH DAY’S USAGE SENSITIVITY MUST BE TESTED ON A KNOWN CONCENTRATION OF _____ (SPECIFY GAS) EQUIVALENT TO 25-50% OF FULL SCALE CONCENTRATION. ACCURACY MUST BE WITHIN –0 - +20% OF ACTUAL. ACCURACY MAY BE CORRECTED BY _____ (SPECIFY ADJUSTMENT PROCEDURE):
Note: Tighter tolerances on accuracy may be stated if desired. (See clause 3.6)”

Function testing required

Section 12(d) of the Occupational Health and Safety Code requires equipment to be function tested and/or calibrated according to the manufacturer’s specifications. It is clear from the warning shown above that manufacturers must have their meters function tested.

Meters must be function tested.

Failure to perform the required testing and/or calibration means that the requirements of section 12(d) are not being met. This may result in workers being exposed to unsafe and potentially dangerous conditions because of a meter that may not be functioning properly. It may also result in a stop work order being issued to an employer or worker who disregards the warning.

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