

GAS EXPLOSION LIMIT TESTER



Gas Explosion Limit Tester - ToronFT™ GEL

ToronFT™ GEL Gas Explosion Limit Tester is a precision laboratory instrument designed for determining the explosion limits (flammable limits) of combustible gases in air at normal atmospheric pressure. Knowing the lower explosive limit (LEL) and upper explosive limit (UEL) of a combustible gas is fundamental to the hazard classification of flammable gases and is essential for safe process design, facility hazard assessment, and regulatory compliance in industries handling flammable and explosive gas mixtures.

The ToronFT™ GEL uses a cylindrical quartz reaction tube (explosion tube) with a 15 kV high-voltage electronic spark ignition system to accurately determine the concentration boundaries at which a combustible gas mixture will and will not sustain flame propagation. The instrument complies with ISO 10156, the primary international standard for gas explosion limit determination, and is designed for use in research, safety testing, and industrial quality laboratories.

APPLICATIONS

Gas Explosion Limit Tester - ToronFT™ GEL Applications

The ToronFT™ GEL is applicable for combustible gas explosion limit determination in the following fields:

- Determination of lower explosive limit (LEL) and upper explosive limit (UEL) of combustible gases and gas mixtures in air
- Hazard classification of flammable gases for transportation, storage, and handling safety assessment
- Process safety evaluation in chemical, petrochemical, and gas manufacturing industries
- Research and development of new gas formulations and mixtures requiring explosion limit characterization
- Industrial hygiene and workplace safety testing for environments with potential combustible gas accumulation
- Regulatory compliance testing of gas products for explosion hazard classification per ISO 10156

- Verification of inerting and dilution strategies for combustible gas explosion prevention



Standards

The ToronFT™ GEL is designed to comply with the following international standards for combustible gas explosion limit testing:

- ISO 10156: Gases and gas mixtures: Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets
- ASTM E681: Standard Test Method for Concentration Limits of Flammability of Chemicals (Vapors and Gases)
- EN 1839: Determination of explosion limits of gases and vapors
- IEC 60079-20-1: Explosive atmospheres: Material characteristics for gas and vapour classification

FEATURES

Gas Explosion Limit Tester - ToronFT™ GEL Key Features

- Complete integrated test system — includes reaction tube (explosion tube), 15 kV electronic ignition device, stirring device, vacuum pump, pressure gauge, solenoid valve, and all ancillary components for combustible gas explosion limit determination
- Cylindrical quartz reaction tube (explosion tube) with tube length 1400 mm $\pm$ 50 mm, inner diameter 60 mm $\pm$ 5 mm, and wall thickness greater than 2.0 mm — providing the optical clarity and thermal resistance required for accurate combustible gas ignition observation
- Pressure relief valve at the tube base with diameter greater than 25 mm ensures safe venting of combustion pressure after each gas explosion test, protecting the operator and equipment
- 15 kV high-voltage electronic spark ignition (spark ignition) system delivers consistent, reproducible ignition energy — current 30 mA — for reliable combustible gas explosion limit boundary detection
- Touchscreen-programmable ignition duration of 0.1–1.0 seconds allows the ignition energy to be precisely tailored to the requirements of different combustible gas test protocols

- Electrode spacing adjustable from 1–6.5 mm enables fine-tuning of the spark gap to optimize ignition energy delivery for different combustible gas and air mixture compositions
- Vacuum-based gas mixture preparation method ensures accurate, reproducible combustible gas mixture concentrations — critical for precise explosion limit determination
- Stirring device homogenizes gas mixtures prior to ignition, eliminating concentration gradients that could introduce error in explosion limit measurements
- Complies with ISO 10156 and ASTM E681, ensuring combustible gas explosion limit test results are internationally recognized for hazard classification and regulatory submissions

THEORY & METHOD

Theory and Method

Combustible gas explosion limits are determined by progressively varying the concentration of the combustible gas in air and testing each mixture for ignition and flame propagation using a standardized spark ignition source. The lower explosive limit (LEL) is the minimum combustible gas concentration at which the mixture will ignite and propagate a flame; the upper explosive limit (UEL) is the maximum concentration beyond which the mixture is too rich to sustain combustion.

In the ToronFT™ GEL, test gas mixtures are prepared inside the quartz reaction tube (explosion tube) using a vacuum-based preparation method — the tube is evacuated by the vacuum pump, and precise volumes of combustible gas and air are introduced to achieve the target mixture concentration. The stirring device homogenizes the mixture before ignition. The 15 kV high-voltage electronic spark ignition system delivers a precisely timed spark (0.1–1.0 seconds, touchscreen-adjustable) at the center of the tube. Visual or photosensor detection of flame propagation determines whether the mixture is within the combustible gas explosion limits. The pressure relief valve at the tube base safely vents combustion pressure following each test.

TECHNICAL SPECIFICATIONS

Gas Explosion Limit Tester - ToronFT™ GEL Technical Specifications

Parameter	Specification
Model	ToronFT™ GEL
Product Name	Gas Explosion Limit Tester — ToronFT™ GEL
Test Device Components	Reaction tube (explosion tube), ignition device, stirring device, vacuum pump, pressure gauge, solenoid valve
Reaction Tube Material	Cylindrical quartz
Tube Length	1400 mm ± 50 mm
Tube Inner Diameter	60 mm ± 5 mm
Tube Wall Thickness	>2.0 mm
Pressure Relief Valve Diameter	>25 mm
Ignition Type	15 kV high-voltage electronic spark ignition
Ignition Current	30 mA
Ignition Duration	0.1–1.0 seconds (touchscreen-adjustable)
Electrode Spacing	1–6.5 mm
Compliance Standards	ISO 10156; ASTM E681; EN 1839



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