



## GLOW WIRE TEST APPARATUS Model T4-08



### COMPLIANCE

It is constructed in compliance with IEC 60695-2-10, IEC 60950-1, IEC 60335-1, IEC 60884-1, IEC 60238, IEC 60695-2-11, IEC 60695-2-12, IEC 60745-1, IEC 60400, IEC 60730-1, IEC 60598-1, IEC 61050, IEC 60320-1, IEC 61058-1, IEC 60742, IEC 60669-1, UL 746A, BS EN 60695-2-1, BS 6458, NF C20-921-1, IS: 11000, EN, TS, SIST ...

<http://domino.iec.ch/webstore/webstore.nsf/artnum/026440?opendocument>

### INTRODUCTION

As it is usually the case with other flammability tests also with this test it is not easy to obtain repeatable results. Therefore we designed GLOW WIRE TEST APPARATUS with goal of improved repeatability of test results and ease of operation. The **BOLD** features below are some of advantages that were introduced to reach these goals.

### MAIN FEATURES

- Fully automatic, motorized forward & reverse motion of carriage with test specimen
- **Dual speed** - both speeds adjustable - **rate of approach is reduced** before contact (adjustable position of speed reduction)
- **Remote controlled** – enables its operation inside test chamber (T1-14 or similar), to avoid health hazards and to prevent air movement – stable temperature
- Microprocessor controlled current regulator – **stabilizer**, maintains set current throughout the test. It works without temperature feedback mechanism.

- Wire loop Ni/Cr (80:20), 4 mm dia, shaped as specified in standard, **mirror polished** tip to enable easier cleaning (hole dia. 0,6 or 1,1 mm depending on thermocouple selection). Wire loop is **hard soldered** to connection discs and easy user replaceable. Each loop is **engraved** with its serial number to enable its traceability/calibration.
- **Timer that automatically starts** when the sample contacts the wire loop and triggers the reverse motion of carriage after set time (30 seconds)
- Precise temperature adjustment in two ranges - 10 turn numeric potentiometer (0-999)
- Thermocouple type K, class 1 (see IEC 60584-2), mineral-insulated, metal-sheathed, fine-wire with an insulated junction, outside diameter 0,5 mm (optional 1 mm), Metal sheath resistant to 1000 deg. C.
- **Mirror polished** stainless surface, on which wooden board with wrapping tissue is positioned, enables easy cleaning of burned plastic and other burning residues
- Micro-controller based thermometer with ambient temperature compensation, short circuit protection, thermocouple breakage protection and overheating protection.
- Adjustable penetration limiter
- Penetration scale with slider, for reading penetration depth
- Carriage with 4 wheels with precise **stainless steel** ball bearings, moving on 2 tracks, preloaded with force of 1 N when sample is in contact with wire loop.
- On the carriage is mounted perforated stainless steel specimen support that enables precise sample positioning (**4 adjustments**)
- Precision scale for measuring flame height
- 20 pcs. Silver foil with a purity of 99,99 %, cut to approximately 2 mm<sup>2</sup> and 0,06 mm thick for calibration of temperature measuring system, purity certificate included
- 200 pcs. paper - wrapping tissue, as specified in 6.86 of ISO 4046, soft and strong, lightweight wrapping tissue of grammage between 28 g/m<sup>2</sup>
- Anodized aluminum front plate, with inscriptions that clearly explain the function of each component on the front plate

## DESCRIPTION

T4-08 GLOW WIRE TEST APPARATUS – MOTOR DRIVEN – REMOTE CONTROLLED - AUTOMATIC is intended for testing the flammability and ignitability of components and materials. It includes electronic feed back heating current stabilizer - regulator, A-meter, thermometer, motor drive, timer and remote controller.

Apparatus consists of control unit and mechanical unit.

### CONTROL UNIT

Electric circuit is built in compact housing on which is located mechanism for performing the test. Measuring instruments and components for controlling the operation of apparatus are located on the front plate of apparatus. The source of heating current is toroidal transformer that is controlled (its primary side) through ERT-200. Electronic circuit ERT-200 operates as regulator of heating current and from the selected moment on, as heating current stabilizer. The circuit includes microprocessor that continually monitors the amplitude of heating current. The current level information is obtained through the measuring current transformer. Potentiometer, that is located on the front plate, is intended for heating current regulation (adjustment).

To enable more precise current (temperature) regulation ten-turn potentiometer with 1000 digital dial is built-in. It is also divided in two ranges. When the requested temperature stabilizes, push-button should be pressed. In this moment the microprocessor memorizes the current information that matches requested temperature. Processor monitors the changes in current amplitude that can be generated as a consequence of mains voltage variation (fluctuation) or the change of resistance in heating circuit. Processor corrects all changes in heating current (standard requests that the heating current should remain stable during the test). When current stabilization is turned on the lamp in the push-button is lit. During this time it is not possible to adjust the heating current by potentiometer. Stabilization can be also turned off.

Electric circuit also contains control and switching elements for controlling the electric motor drive that slowly moves tested sample to the wire loop after its activation by remote controller. Just before the sample contacts the glow wire loop it slows down, and at the time of contact the timer is activated which, after 30 seconds (or other set time), returns the carriage with the sample to the start position. According to the latest standard the test shall be done in the test chamber (see. our T1-14). Test chamber is necessary to avoid contamination with toxic gasses that might be produced during the test and to minimize air movement during the test.

## MECHANICAL UNIT

Mechanism with wire loop, thermocouple and motor drive is located on the cover of electric unit. Heating transformer and current transformer are mounted on the bottom side of the cover, so that complete cover is easy removable. Carriage with sample mounting support is so designed that it can be easily removed from the guiding tracks. All regulating elements of the mechanism are equipped with handle-screws to enable easy operation. Wire loop and thermocouple are easily exchangeable. Apparatus also has scales for depth of penetration and flame height reading with zero point adjustments.

## PROTECTION

The apparatus is protected against overheating, short circuit and break off in the circuit. In the thermometer are built in three limit comparators, of which the first is used as protection against too high temperature that could shorten the life time of the thermocouple. It switches off the heating of glow wire at a temperature 1000°C, which is 40°C over max. temperature that is requested by standard (960°C).

In case of short circuit between the loop carrying rods or between the heating current leads in manual or stabilization mode, processor detects irregular conditions and turns the heating off. This is indicated by blinking of signal push-button. After the cause of interruption has been removed, heating can be turned on by pressing "STOP" and "START" push-button. In case of break off in the circuit or bad connection in the heating current in manual or stabilization mode, processor detects irregular conditions and turns the heating off. This is indicated by blinking of signal push-button. Heating can be turned on by pressing "STOP" and "START" push-button.

## DESIGN

Table top apparatus, solid case, Non-sensitive, scratch-resistant surfaces through powder-coating, side panels, Al extrusion, RAL 7016, Frame, Al die-cast, RAL 7016, Base and cover, Al, 1.5 mm, RAL 9006, with GND/earthing connection, adjustable case feet with anti-slip protection, front plate and rear panel anodized aluminum 2,5 mm.

Internal and external dimensions in accordance with: IEC 60297-3. Type of protection IP 20 in accordance with IEC 60529, Protective GND/earthing connections in accordance with: IEC 61010, DIN EN 50178 / VDE 0160, DIN EN 60950 / VDE 0805, DIN EN 61010-1 / VDE 0411 part 1, DIN EN 61010-1A2 / VDE 0411 part 1/A1.

All parts of mechanism are nickel plated or made of stainless steel (AISI 304, DIN W. No. 1.4301 X5CrNi18-10) [http://en.wikipedia.org/wiki/Stainless\\_steel](http://en.wikipedia.org/wiki/Stainless_steel).

## ADVANTAGES

Current stabilizer insures better repeatability of test results, by maintaining the same current as you set on beginning through the whole test, to avoid the following possibility: during the setting of heating current needed for temperature (e.g. 960 deg. C) the network voltage was 230V. At that voltage current 130 A results in 960 deg. C. Than you begin the test. The voltage in the network drops (or oscillates) to 225V, which is approx 2% and this would result in different current (e.g. 127A) and different temperature (18 deg. C difference).

If you have the current stabilization, even if the voltage drops to 225V, the heating current will be still maintained at 130A and will ensure better results - repeatability improves.

Of course if you do not like or do not need current stabilization you can switch it off.

Due to the high currents involved, the wire loop is hard soldered to two stainless steel discs with smooth and large contact surfaces that ensure constant contact resistance (which means constant current during the test). This is important because if it was not hard soldered, contact resistance between loop and stud (column) can change because of oxides formation due to the heat. That would result in change of current and temperature which are the main parameters of this test. Again repeatability of test results improves.

The temperature stability depends very much on air movements around the glow wire loop. Remote controller enables operation of glow wire test apparatus inside closed test chamber. Test chamber (e.g. T1-14) enables draught-free conditions, has volume of more than 0,5 m<sup>3</sup>, and has black painted inner walls as per standard requests. Draught-free conditions again mean more stable temperature and better repeatability of test results.

After the conditions stabilize, you can press START button on remote controller (without opening the door of T1-14), the complete test is executed automatically, just record the height and duration of the flames and start the ventilator after the test is finished.

### TECHNICAL SPECIFICATION

|                                  |  |
|----------------------------------|--|
| Power supply                     | 230(120)V $\pm$ 10%, 50(60)Hz $\pm$ 2Hz (Other optional)   |
| Temperature adjustment           | 370°C-1000°C in two ranges                                 |
| Control and Stabilization system | microprocessor, 256 steps, effective current stabilization |
| Thermocouple                     | Ni-Cr-Ni Type K $\varnothing$ 0.5 -200%1150°C              |
| Thermometer                      | digital programmable, accuracy $\pm$ 0.05%, -200%1000°C    |
| A-meter                          | digital A-meter 150 A RMS                                  |
| Heating transformer              | toroidal-separating 500VA, secondary winding 2.5 V, 150A   |
| Dimensions W x D x H:            | 500 x 350 x 470 mm, Weight: 17 kg                          |

### ACCESSORIES (Included in price)

1 pcs. T4-08B WIRE LOOP FOR GLOW WIRE TEST APPARATUS FOR THERMOCOUPLE DIA. 0,5 mm, (optional for THERMOCOUPLE DIA. 1 mm) – mirror polished tip for easier cleaning

1 pcs. T4-08A THERMOCOUPLE DIA. 0,5 mm FOR GLOW WIRE TEST APPARATUS, (optional dia. 1 mm)

20 pcs. Silver foil with a purity of 99,99 %, approximately 2 mm<sup>2</sup> and 0,06 mm thick for calibration of temperature measuring system, purity certificate included

1 pcs. Mirror polished stainless steel plate that enables easy cleaning of possible burned plastic remains

1 pcs. Flat smooth wooden board, having a minimum thickness of 10 mm

200 pcs. Paper - wrapping tissue, as specified in 6.86 of ISO 4046, soft and strong, lightweight wrapping tissue of grammage between 28 g/m<sup>2</sup>

### SPARE PARTS (only one thermocouple and one wire loop are included with apparatus)

T4-08A THERMOCOUPLE DIA. 0,5 mm FOR GLOW WIRE TEST APPARATUS

T4-08E THERMOCOUPLE DIA. 1 mm FOR GLOW WIRE TEST APPARATUS

T4-08B WIRE LOOP FOR GLOW WIRE TEST APPARATUS (FOR TC dia. 0,5 mm)

T4-08F WIRE LOOP FOR GLOW WIRE TEST APPARATUS (for TC dia. 1 mm)

T4-08D SILVER FOIL 2 mm<sup>2</sup> - 20 pcs.



### OTHER CONDITIONS

Warranty: 2 years



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