



CSI-206

TPP & HTP Test Apparatus



LIFETIME
TECHNICAL
SUPPORT



Introduction

The CSI-206 (TPP) Thermal Protective Performance Tester is used to rate textiles and other materials for thermal resistance and insulation when exposed to convective and radiant energy at a level representing a flash fire or burning of solvent. The heat, which is transferred through the test material, is measured with a calibrated sensor having a response similar to that of human tissue. This heat is then compared with the thermal tolerance of human tissue to rate the test material. The result is a TPP rating, which is defined as the heat exposure (kW/m^2), which will result in heat transfer, which could cause a second-degree burn in human tissue. The test apparatus requires the use of a personal computer. The personal computer is featured with state-of-the-art test software and hardware for data acquisition and control, records the instrument readings, displays and calculates all the results. Test progress is visible on the monitor in real-time base. If a suitable printer or plotter is attached the results can be printed out and graphs plotted directly after the test is completed. Saved results may be converted to standard text format for post-processing and software validation by third party software.

The instrument consists of the following

- Operator's Front Control Panel
- Radiant & Convective Heat System with Cooling Station
- Copper Calorimeter Assembly
- Radiometer Assembly
- Auxiliary Control for Input Supplies
- Computerized Data Acquisition System

Test Standards

- ✓ ASTM F2700
- ✓ ASTM F2703
- ✓ NFPA 2112
- ✓ CAN/CGSB 155.20
- ✓ ISO 17492
- ✓ NFPA 1971
- ✓ NFPA 1977

Operator's Front Control Panel

The test chamber is comprised of a heavy-duty steel welded base with removeable rear access cover for ease of servicing and maintenance. The front panel consists of precision measurement and controls for the gas, air, water, shutter, radiant heater, calorimeter, and radiometer

- ✓ Main Power Switch, Circuit Breaker Type
- ✓ Independent Fine Adjust Potentiometer Knobs to control the temperature of the 3 Radiant Quartz Heater Stations (left, middle and right).
- ✓ Independent Radiant Quartz Heater Power Switches with Indicator Light for each of the three sections.
- ✓ Propane Gas Flowmeter, Calibrated, Range: 150 mm, Accuracy: $\pm 1\%$ FS, to control the flow rate to the Meker burners.
- ✓ Shutter Switch with 3 settings: Extend, Retracted and Auto. In the Auto position this function is automatically controlled with the test software.
- ✓ Water Flow Verification light to indicate sufficient water is flowing through the Shutter system.
- ✓ Air Pressure Gage, dual scale, 30 psi/200kPa, accuracy: $\pm 2.5\%$ FS
- ✓ Gas Pressure Gage, dual scale, 30 psi/200kPa, accuracy: $\pm 2.5\%$ FS
- ✓ Gas Enable Switch with Indicator light to indicate power is supplied to gas control electronics
- ✓ Ignition Switch to automatically ignite the 2 Meker burners
- ✓ Ignition Verification Light to indicate both Meker burner are ignited
- ✓ Calorimeter Input Connection
- ✓ Radiometer Input Connection
- ✓ Output ports for Radiometer, to give the flexibility to connect an external DAQ system such as a chart recorder

Radiant & Convective Heat System with Cooling Station

The CSI-206 is designed to expose a horizontally mounted sample to convective and radiant energy source. The convective energy is supplied by two Meker burners, which are adjusted so the flames converge at a point below the center of the specimen.

The balance of the radiant heat is derived from nine 500 watt quartz heaters. The nine heaters are broken up into 3 zones, each controlled from 0 – 100 % by three solid-state power controllers.

A cooling station using the connected water supply is used to cool down the copper calorimeter after testing. This ensures an effective and quicker method compared to air cooling.

Test Standard	Total Heat Flux
NFPA 1971, ASTM F2700, ISO 17492	84 kW/m ² ± 2kW/m ²



- ✓ Meker Burners, Adjustable Angle, 30 to 45 degree, 40 dia mm
- ✓ 9 Quartz Heaters, 500W
- ✓ Quartz Heater Cover, Brass, Water Cooled ensures prolonged service life
- ✓ Protective Shutter, Brass, Water Cooled, Pneumatically Actuated or Software controlled

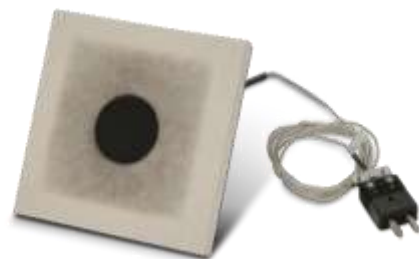


- ✓ Cooling Station, Water-Cooled, safely and quickly bring down temperature of calorimeter and radiometer to ensure long service life and effective cooling method
- ✓ Automatic Meker Burner Ignition System
- ✓ Automatic Safety Gas Shutoff System
- ✓ Safety Gas Shutoff to protect burners and Radiant heater if there is no water flow to the Shutter System
- ✓ x 3, Specimen Holder Assembly
- ✓ x 1, Specimen Holder Support Frame Assembly with swivel and ergonomic handle

Copper Calorimeter Assembly

Copper Calorimeter Assembly, including copper sensor, insulation, calibrated test weight, handle and 3 thermocouples with 1 connector. It is used for adjusting the total heat flux of the CSI-206 for performing tests according to NFPA, ISO, ASTM or other international test standards. The CSI-206 comes standard with 1 copper calorimeter.

- ✓ NIST Calibrated with data to ASTM, NFPA or ISO specification



Radiometer Assembly

The Radiometer assembly uses a ZnSe window to calibrate the Quartz Lamps Radiant Energy. It includes an insulated handle, plate, cooling lines and connector. Radiometer measurements are taken by the test software by performing a Radiant heat flux calibration.

The total incident heat flux is also adjusted using this sensor when the gas burners and quartz heaters are on. The Radiometer is cooled down with a dedicated water circulation system. The CSI-206 comes standard with 1 radiometer assembly and dedicated water circulation system.

✓ NIST calibrated with data.

Auxiliary Control for Input Supplies

The CSI-206 features durable and easy to use controls for the input gas, compressed air and water supplies.

- ✓ Precision Input Air Controls:
 - Air Regulator
 - Air Shut Off Valve
 - ¼" Compression Connection
- ✓ Precision Input Gas Controls:
 - Gas Regulator
 - Gas Shut Off Valve
 - ¼" Compression Connection
- ✓ Precision Input Water Controls:
 - Water Shut Off Valve
 - ¼" Compression Connection
 - ¼" Compression Connection (Drain)
- ✓ Data Acquisition Connection Ports

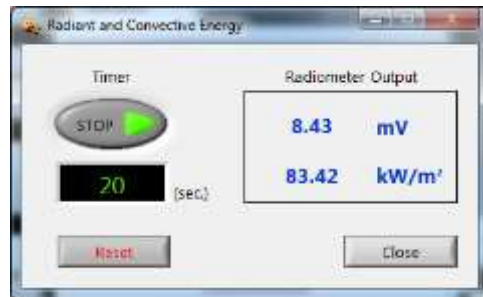
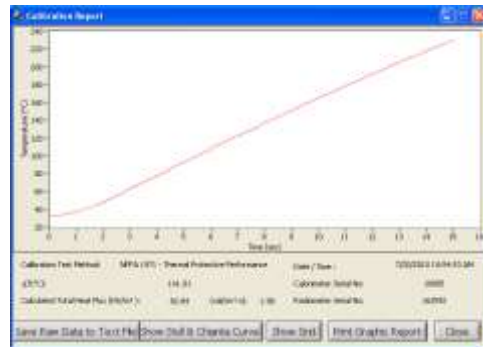
Computerized Data Acquisition System

The CSI-206 is supplied standard with a desktop computer which includes ready to use test software and data acquisition hardware. The user will be able to calibrate the tester prior to use and calibration data and test reports are saved for future use.

The Data Acquisition System ensures the user to perform accurate and repeatable test results, calibration, generate test reports, check system status and much more. The 3 main functions of the software:

- Calibration

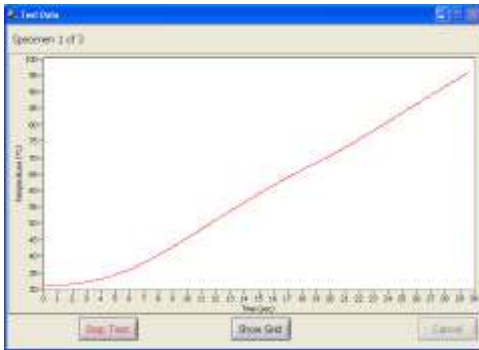
This section provides the calibration of the Radiant Energy, Radiant & Convective energy, and Total Heat Flux. Calibration reports are generated for user records. Important test parameters such as Radiant Heat Scale Coefficient, Mass of calorimeter, emissivity, etc can be updated per your testing requirements.



- Sample Testing

This function provides all of the data storage and acquisition, stabilization, test period timing, and other associated tasks for the testing of materials. The operator inputs the data file name, sensor configuration, exposure energy, sample identification, pretest comments, and other pertinent data. At the end of the test run, the user may select to run another test and use or modify the previous test parameters. The data is acquired at the rate of once per second.

The user may test several samples in one data file for the comparison of results.



○ Test Reporting of Data

The test software main menu for test reports allows the operator to view, print, save raw data and edit test information. Test Results are available in formats such as:

- General Report – displays test results for all specimens tested along with the test information and pre-test comments. You may choose to print a report.

The general report is displayed to allow the user review of the test information and data collected during the test. All pertinent information is indicated, along with the Pass/Fail condition.



- Detailed Report - allows you to visually observe the Temperature vs Time Graph produced by the sample during the test for individual samples or all runs. The basic test results graphical report is shown for the first sample run as a default. The user may press the up or down arrow in the Specimen: box to display other test runs performed. The Stoll & Chianta Curve may also be superimposed on the test data graph by clicking the key in the lower section of the graphical report.



- Save Raw Data to Text file - automatically saves the collected data from the test sample. This data is saved in a text format, and may be retrieved to be used for post-analysis using other programs such as Excel, or other analysis software.
- Edit Test Data - This feature permits the user to modify text entered during a particular test session.

Technical Specifications

Total Heat Flux Range:	0 – 100 kW/m ²
Heat Flux Accuracy:	±2%
Radiometer Heat Flux Range	0 – 100 kW/m ²
Heat Flux Accuracy:	±2%
Calorimeter Heat Flux Range	0 – 100 kW/m ²
Heat Flux Accuracy:	±2%
Temperature Range:	0 - 500°C
Temperature Accuracy:	±0.5 °C
Temperature Resolution:	0.01°C
Time Resolution	0.01 sec

Dimensions and Weights

Approx. Physical Weight:	250 lbs.
Approx. Physical Dimensions:	36" L x 30" D x 30" H
Approx Shipping Weight:	540 lbs.
Approx Shipping Dimensions:	48" L x 46" D x 45" H

Installation Requirements

Electrical Specification:	220VAC, 60Hz (50Hz), 1Ph, 30A	
Gas Supply:	Type	Liquid Propane (LP)
	Purity	95% minimum
	Input Connection	¼" Tube Compression
	Max Input Pressure	100 psi
	Regulator Required	2-stage gas regulator
Placement	The gas supply tank must be located at least 30 ft away	
Compressed Air Supply:	Type	Dry, clean, oil-less.
	Input	¼" Tube Compression Swagelok
	Filters Required	Air particle filter and Air oil filter
	Max Input Pressure	100 psi with a pressure regulator and shut off valve
	Flow rate:	1 ft ³ /min
Water Supply	Water Type:	Tap Water
	Input Connection	¼" Tube Compression
	Max Input Pressure:	60 psi
	Flow rate:	2 gal/min
Ventilation System:	Exhaust Hood Size	4 ft. minimum centered over apparatus.
	Blower	1,500 CFM (45 m ³ /min)



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