Toyo Seiki Seisaku-sho, Ltd. 5-15-4, Takinogawa, Kita-ku, Tokyo 114-8557, Japan

No.607 Cone Calorimeter
Model C4

Combustion Analysis System

■APPLICATION

The probability that a fire will occur, and the potential harm to life and damage to property resulting from its occurring. Traditional approach in which fire studies have been made by independently using physical small scale test, which measures single parameter.

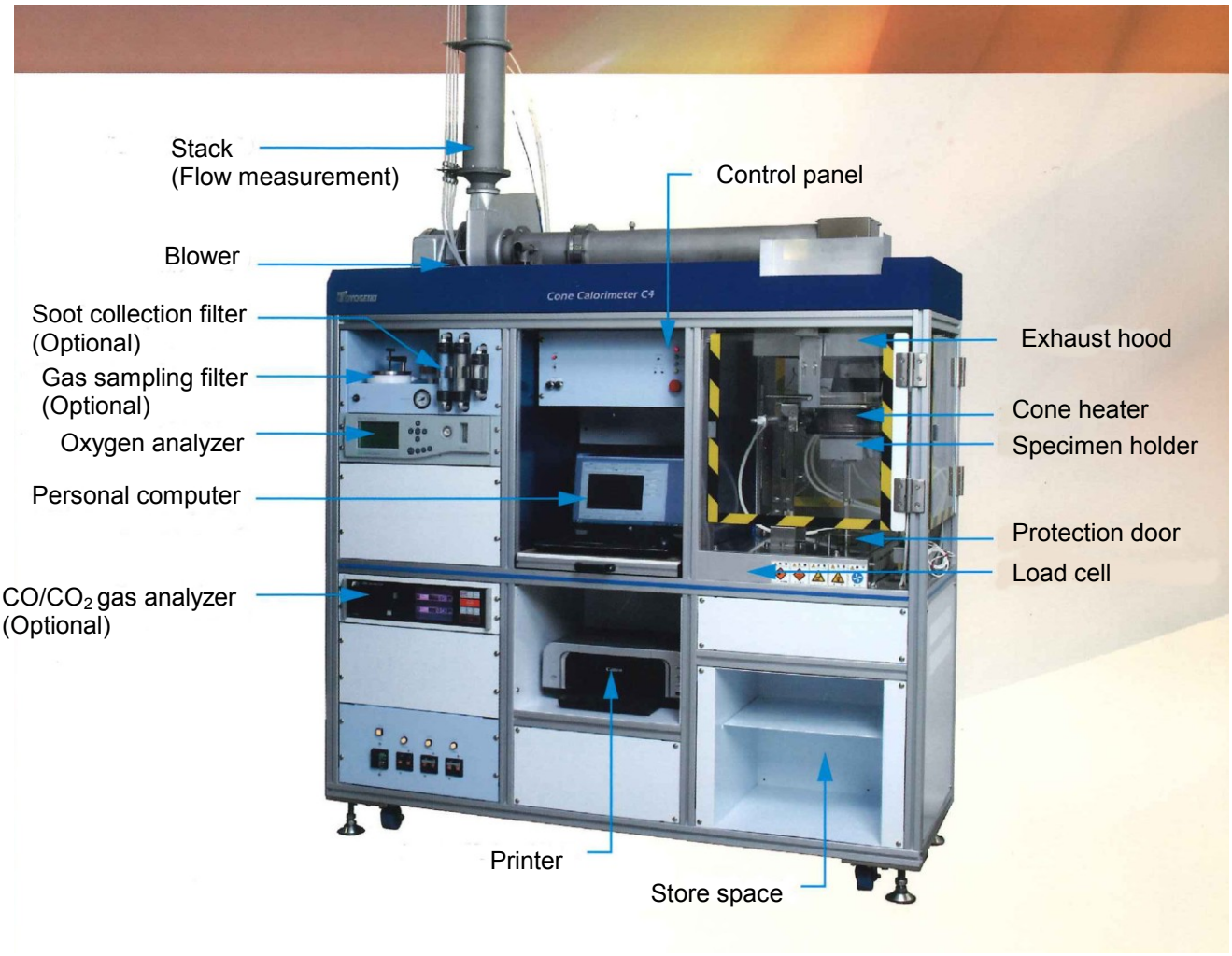
Materials are exposed to external heat radiation from pre-ignition to fire-out. The Cone Calorimeter is the result from the search for the method with more scientific way to analyze total fire behavior. It is based on the principal of oxygen consumption – approx. 13.1MJ of heat are released per 1kg of oxygen consumed by a burning object. Using very precise oxygen and flow measuring equipment, the amount of oxygen consumption along with the 13.1MJ constant calculates the heat release rate in simple accurate terms. Researchers or scientists can make quick and accurate prediction on their materials by Toyoseiki **Cone Calorimeter**.

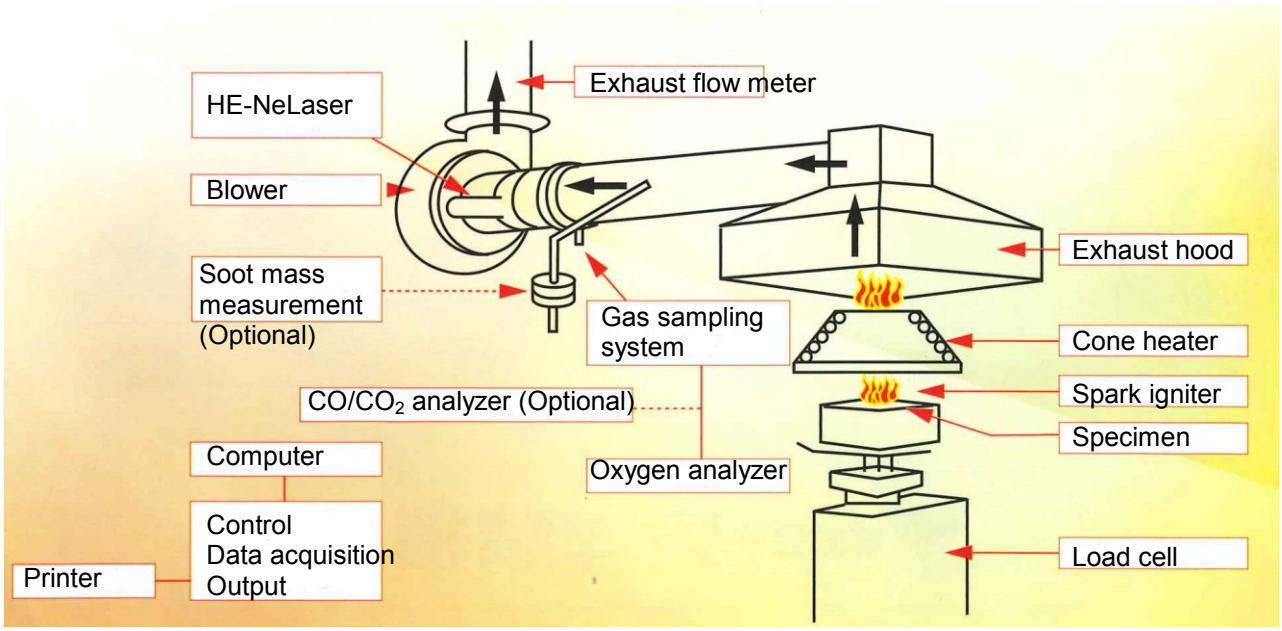
■TEST STANDARDS

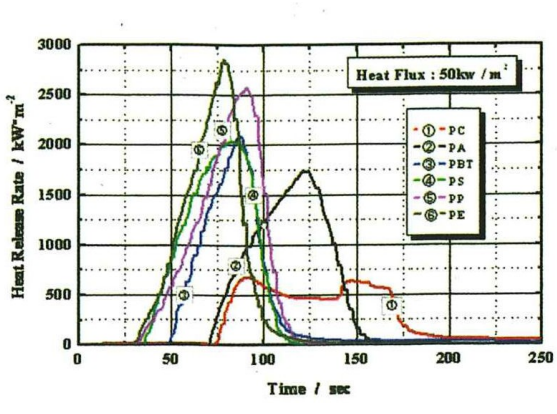
- ISO 5660
- ASTM E1354
- New fire protection material certification test (Japanese building standards act)

■FEATURES

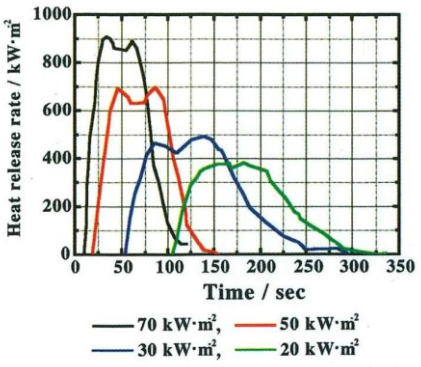
1. Judgment software based on Japanese building standard act is available. (Optional)
2. Pneumatic insertion water-cooled thermal shutter eliminates human errors.
3. Regardless of specimen mass change, a load cell maintains constant distance between a specimen and a heater.
4. Optional features permits selection of various tests and parameters.
   - Soot collection
   - Combustion chamber glass
   - CO/CO_2 gas analyzer
   - NO_X/SO_X gas analyzer
   - Low oxygen atmosphere system
5. Automatic pressure compensation and temperature compensation circuits incorporated in the oxygen analyzer increase the precision measurement of oxygen depletion.
6. The igniter is inserted downward through heater to assure uniform heat exposure on the surface. And the igniter can easily escape from the contact with inflating specimen.


Stack
(Flow measurement)
Blower
Soot collection filter
(Optional)
Gas sampling filter
(Optional)
Oxygen analyzer
Personal computer
CO/CO2 gas analyzer
(Optional)
Control panel
Exhaust hood
Cone heater
Specimen holder
Protection door
Load cell
Printer
Store space
Cone Calorimeter C4

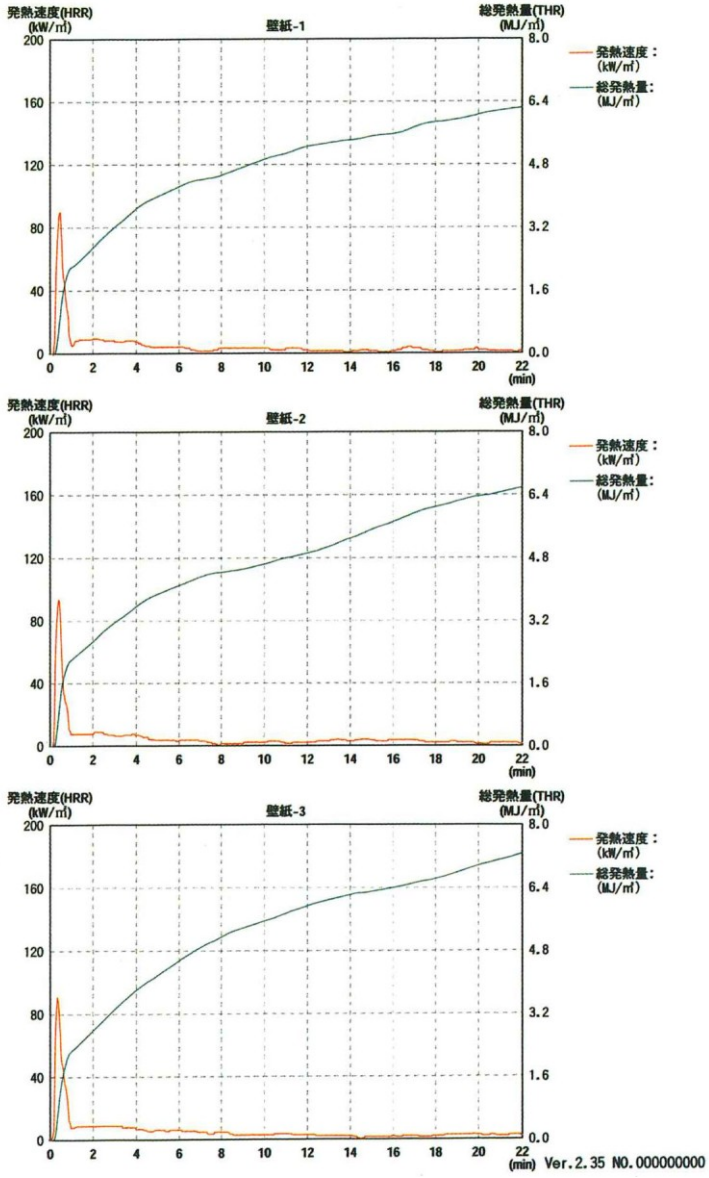

HE-NeLaser
Blower
Soot mass
measurement
(Optional)
Computer
Control
Data acquisition
Output
Printer
Exhaust flow meter
Gas sampling
system
CO/CO2 analyzer (Optional)
Oxygen analyzer
Exhaust hood
Cone heater
Spark igniter
Specimen
Load cell



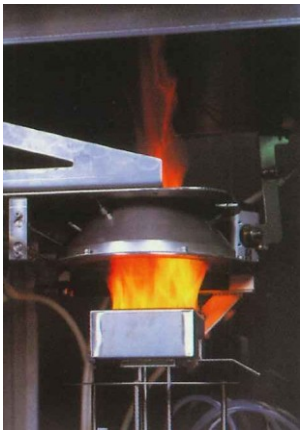
Heat release rate of various materials



Heat release rate when the amount of heat is changed (Polyacrylonitrile)



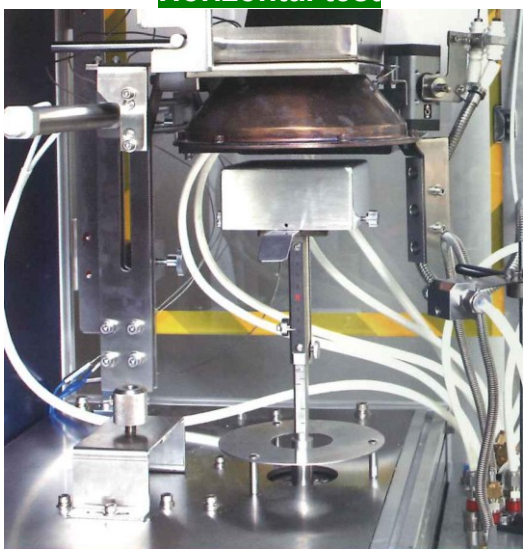
Data output example (Gypsum board + vinyl wall covering)



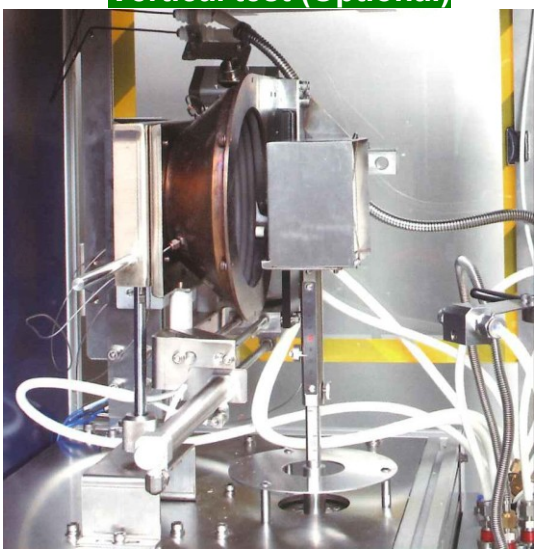
The cone derives its name from the conical shaped heater used for uniformly irradiate a specimen. The specimen is positioned on a load cell that constantly measures its mass throughout test. The heated specimen is ignited by a high voltage spark. After ignition, combustion gasses flow in a closed flow system at a known rate and are collected for analysis. Smoke obscuration is measured too by means of a laser photometer system. Data for each parameter is processed by a personal computer.

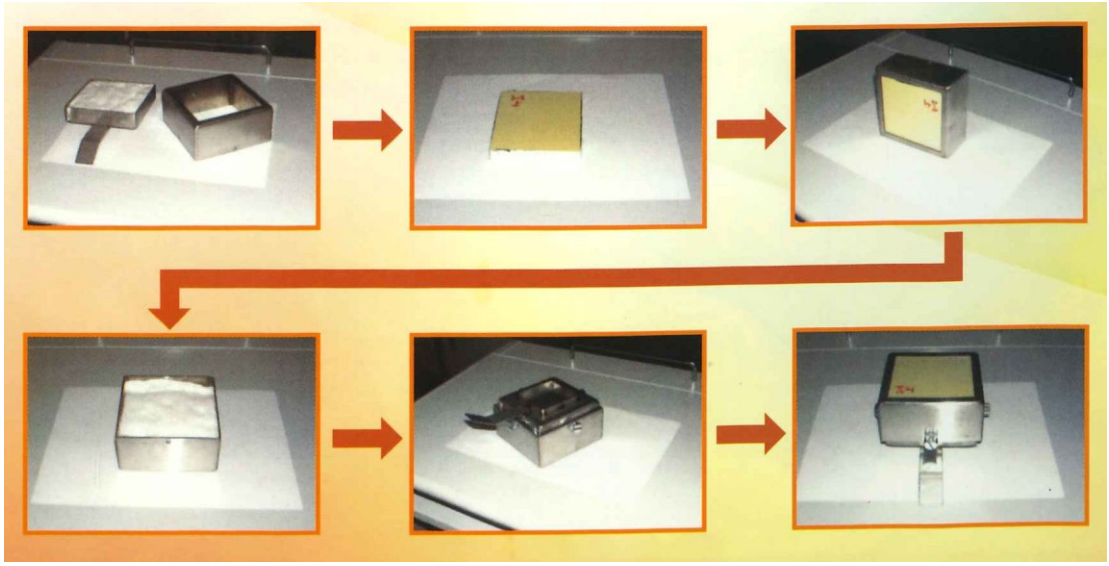
Specimen in the combustion chamber

Horizontal test



Vertical test (Optional)





Specimen installation procedure

■SPECIFICATIONS

Model		C4
Cone heater	Capacity	5kW (AC200V)
	Test method	■ Horizontal ■ Vertical (Optional)
	Thermal shutter	Water cooling
Mass loss measurement	Measurement mass	Max1.3kg (Specimen holder + specimen) Resolution 0.1g
	Measurement method	Load cell
Smoke release measurement	Light source	1.0mW He-Ne Laser
	Calibration	0.3, 0.8ND filter (Inspection data included)
Oxygen analyzer	Drift	100ppm or less / 30min.
	Measurement range	0 to 25%
	Compensation	Temperature, Pressure
Heat release rate calibration	Using gas (Calibration burner)	Methane (99.5% purity)
Heat flux meter	Accuracy	0 to 100kW/m^2±3%
Calculation items		■ Peak heat release rate (kW/m^2) ■ Average heat release rate (kW/m^2) ■ Average heat release rate at 60, 180, 300sec. (kW/m^2) ■ Total heat release rate (MJ/m^2) ■ Effective heat of combustion (MJ/kg) ■ Specific extinction area (M^2/kg) ■ Average mass loss rate (g/m2・s) ■ 200k excess duration (s) ■ Ignition time (s) ■ Combustion time (s) ■ *CO/CO_2 production (kg/kg)…Optional* ■ *Soot mass production (kg/kg)…Optional*
Utilities, dimensions etc.	Power requirement	Single-phase, AC200V, 50Hz or 60Hz, 8kVA
	Standard gases	■ Methane (99.5% purity, 8.5L/min.) ■ Oxygen-free Nitrogen (99.9% purity or more) *Note: 0.7L/min. is required when optional CO/CO_2 analyzer is selected* ■ **CO (0.95%), CO_2(9.8%), Balance Oxygen-free Nitrogen* **For optional CO/CO_2 analyzer*
	Water requirement	Tap water (3L/min. or more)
	Compressed air requirement	0.5MPa, 0.1L/min.
Dimensions		W1650 x D600 x H2500mm
Weight		Approx. 300kg
Test standards		ISO 5660 ASTM E1354

■OPTIONS

	Name	Model	Photo
1	CO/CO_2 analyzer	CO	-----
2	NO_X/SO_X gas analyzer	-----	-----
3	Fire extinguisher	EF	-----
4	Soot collection system	SO	-----
5	Vertical test	VT	-----
6	Oxygen reduction device	-----	-----
7	Calibration certificate	-----	-----
8	Software for fire protection material certification (Japanese building standards act)	VER203	-----

■CONSUMABLES & SPARE PARTS

	Name	Model (Part No.)	Photo	Minimum sell lot
1	Aluminum foil, 25μm	5140045	-----	1 box
2	Super wool blanket	4444444	-----	1 carton box (Aprox. 50 x 60cm)
3	Glass wool filter (100g/pack)	4102531	-----	1 pack
4	90mm filter (100pcs/pack)	9910027	-----	1 pack
5	Water filter (2pcs/pack)	5140040	-----	1 pack
6	Drierite	9940001	-----	1 bottle
7	Ascarite	9910028	-----	1 bottle
8	Cone heater assembly	2161600	-----	1 set
9	Spark plug	2160345	-----	1 piece

Specifications are subject to change without notice.

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