

## ITEM 18403.9999 M - ROLLING THIN FILM OVEN

### DESCRIPTION

The Rolling Thin Film Oven (RTFO) procedure serves two purposes. One is to provide an aged asphalt binder that can be used for further testing of physical properties and the other is to determine the mass quantity of volatile lost from the asphalt during the process. Volatile mass loss is an indication of the aging that may occur in the asphalt during mixing and construction operations. The RTFO ages the binders to simulate oxidative hardening that occurs during hot mixing and placing. Some asphalts even gain weight during the RTFO procedure because of the oxidative products formed. The RTFO continually exposes fresh films of binder to heat and air flow. In some cases, its rolling action keeps modifiers (e.g., some polymers) dispersed in the asphalt.

This method indicates approximate change in properties of asphalt during conventional hot-mixing at about 105° C as indicated by viscosity measurements, penetration, or ductility measurements which may also be made if desired. It yields a residue which approximates the asphalt condition as incorporated in the pavement.

### MATERIALS

#### *ROLLING THIN FILM OVEN*

The Rolling Thin Film Oven (RTFO) supplied shall meet the following requirements.

- A. **Standards:** The RTFO shall conform to all the requirements of and perform testing as outlined in AASHTO T240, latest version.
- B. **Oven:** The RTFO shall be a double-walled electrically heated convection type oven.
  1. **Observation Panel:** The RTFO shall contain a double glass observation panel symmetrically located within the oven door constructed of two sheets of heat resistant glass separated by an air space. The window shall permit an unobstructed view of the interior of the oven.
  2. **Heating Element:** The RTFO shall contain a heating element located below the oven floor adequate to maintain the required temperature.
  3. **Venting:** The RTFO shall be vented top and bottom with the bottom vents located symmetrically to supply incoming air around the heating elements. The top vents shall be symmetrically arranged in the upper part of the oven.
  4. **Plenum:** The RTFO shall have an air plenum covering the side walls and ceiling.
  5. **Squirrel Cage Fan System:** The RTFO shall have a squirrel cage type fan at the midpoint in width, that is turned by an externally mounted motor. The squirrel cage fan shall be set so that the fan turns in an opposite direction to its vanes. The air flow characteristics of the fan-plenum system shall be suction from the floor of the oven through the wall plenums and exiting through the fan.

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- 6. Temperature Control Thermostat:** The RTFO shall be equipped with a proportional solid state temperature control that includes digital readout for temperature. The heating controls shall be capable of bringing the fully loaded oven back to the test temperature within a 10-minute period after insertion of the samples in a pre-heated oven.
- 7. Rotating Test Rack:** The RTFO shall be provided with a rotating test rack (vertical circular carriage) provided with suitable openings and clips for firmly holding eight (8) glass containers in a horizontal position. The vertical carriage shall be mechanically driven at a rotation speed of  $15 \pm 0.2$  RPM using a Bodine synchronous motor with speed reducer.
- 8. Air Jet:** The RTFO shall be equipped with an air jet positioned to blow heated air into each bottle at its lowest point of travel. The air jet shall have an outlet orifice connected to 7.62 meter length of copper tubing (air supply tube) to be rack mounted. This tubing shall be coiled to lie flat on the bottom of the oven and lead to a source of fresh dried, dust-free, regulated air.
- 9. Flow Meter:** The RTFO shall be equipped with a flow meter capable of accurately measuring the air flow at a rate of 4,000 ml per minute at the outlet of the copper tube.
- 10. Additional Requirements:** The RTFO shall be supplied with the following additional equipment:
- Air regulator
  - Moisture Indicator
  - Needle Valve and Gauge
- C. Containers:** The RTFO containers in which the samples are to be tested shall be of heat resistant glass conforming to dimensions described in AASHTO T240.
- D. Balance:** The balance required when loss-on-heating is desired shall be a "Class B" balance conforming to the requirements of AASHTO M231. If only the residue is desired, a "Class G2" balance conforming to M321 may be used.
- E. Power Requirements:** The RTFO shall operate on 208-230 volt, 60 Hz., single phase AC with neutral wire for 115 volt motors.
- F. Glass Containers:** The RTFO shall be supplied with thirty two (32) glass containers for asphalt conforming to AASHTO T240 and two (2) glass container tongs.
- G. Manuals:** Clear and simple operating and instruction manuals supplied for the RTFO.
- H. Warranty:** The warranty will cover parts and labor for a period of two years.

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***ROLLING THIN FILM OVEN POTENTIAL VENDOR LISTING***

Applied Test Systems, Inc  
348 New Castle Road  
P.O. Box 1529  
Butler, PA 16003

James Cox & Sons, Inc  
P.O. Box 674  
Colfax, CA 95713

Gilson Company  
P.O. Box 677  
Worthington, Ohio 43085

ELE International, Inc  
Soiltest Products Division  
P.O. Box 8004  
86 Albrecht Drive Lake Bluff, IL 60044-8004

**CONSTRUCTION DETAILS**

Within sixty-days of the award of the bid the Rolling Thin Film Oven shall be delivered to the New York State Department of Transportation - Materials Bureau, Building 7, Room 206, State Office Campus, 1220 Washington Ave, Albany, New York, 12232.

**METHOD OF MEASUREMENT**

Payment will be made at the lump sum price bid for this Item.

**BASIS OF PAYMENT**

The price bid for this Item shall include the cost of the Rolling Thin Film Oven, thirty two (32) glass containers for asphalt conforming to AASHTO T240, and all other miscellaneous materials, equipment, and labor to complete the requirements of this Item.

Payment will be made as follows:

100% of the lump sum price will be paid after the RTFO is delivered to the address shown in the Construction details.

Payment will be made under:

<b><u>ITEM NO.</u></b>	<b><u>ITEM</u></b>	<b><u>PAY UNIT</u></b>
18403.9999M	Rolling Thin Film Oven	Lump Sum