CANTROL®

Construction Materials
Testing Equipment

# Asphalt Binder Ignition Furnace Instruction Manual


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# 1. Introduction

This manual provides instructions for the safe and effective operation and maintenance of the Asphalt Binder Ignition Furnace. This equipment is designed to determine the asphalt binder content of hot mix asphalt (HMA) mixtures by igniting the sample in a controlled environment. The results obtained from this test are crucial for quality control and quality assurance in asphalt production and paving.

Please read this manual thoroughly before operating the furnace. Proper operation and maintenance are essential for accurate results, safe operation, and the longevity of the equipment.

# 2.Key Features & Benefits

- **Environmentally Safe Operation:** Eliminates the use and disposal of harmful chlorinated solvents, reducing environmental impact and improving operator safety.
- **Rapid & Accurate Results:** Provides accurate binder content determination typically within 30-45 minutes (depending on sample size and mix type), significantly faster than solvent methods.
- **High-Efficiency Heating:** Advanced heating elements and optimized chamber design ensure uniform temperature distribution and rapid temperature ramp-up for efficient combustion.
- **Integrated Weighing System:** A high-precision internal balance continuously monitors and automatically records the sample weight throughout the combustion process, ensuring accurate calculation of binder content.
- **User-Friendly Interface:** Intuitive touchscreen display allows for easy test parameter setup, real-time monitoring of test progress, and data storage.
- **Comprehensive Data Management:** Integrated printer for direct report generation.
- **Durable Construction:** heavy-gauge painted steel construction for extended service life in demanding laboratory environments.

- **Safety Features:** over-temperature protection, emergency stop button, Cool-Touch Exterior, Circuit Breaker/Overload Protection, Fume temperature Monitoring.
- **Low Maintenance:** Designed for minimal maintenance with easily accessible components.
- **Compliant with Standards:** Meets or exceeds requirements of:
    - ASTM D6307
    - AASHTO T 308
    - EN 12697-39

# 3. Safety Precautions

Operating an ignition furnace involves high temperatures and potential hazards. Always follow these safety precautions:

- **Read the Manual:** Familiarize yourself with all operating procedures and safety guidelines before use.
- **Personal Protective Equipment (PPE):** Always wear appropriate PPE, including heat-resistant gloves, safety glasses or a face shield, and a lab coat.
- **Ventilation:** Operate the furnace in a well-ventilated area or under a fume hood to remove combustion by-products.
- **High Temperatures:** The furnace chamber and surrounding surfaces become extremely hot during operation and cool-down. Avoid contact with hot surfaces.
- **Fire Hazard:** Ensure no flammable materials are near the furnace during operation.
- **Sample Handling:** Use appropriate tools to handle hot sample baskets and trays.
- **Electrical Safety:** Ensure the furnace is properly grounded and the power cord is in good condition. Do not operate with wet hands or in wet conditions.

- **Cool-down:** Allow the furnace and samples to cool completely before handling or removing them.
- **Maintenance:** Disconnect the power supply before performing any maintenance or cleaning.
- **Emergency Procedures:** Know the location of the nearest fire extinguisher and emergency power shut-off.

# 4. Equipment Description

The Asphalt Binder Ignition Furnace consists of the following components:

- **Furnace Chamber:** The insulated chamber where the asphalt sample is ignited.
- **Heating Elements:** Electric elements that heat the chamber to the required temperature.
- **Temperature Controller and Weighing System:** Allows setting and monitoring the furnace temperature and an internal balance for weighing the sample before, during and after ignition.
- **Basket and Tray:** Stainless steel basket and tray to hold the asphalt sample during ignition.
- **Exhaust Port:** Allows for the removal of combustion gases.

# 5. Operating Procedures

Follow these steps for operating the asphalt binder ignition furnace.

1. **Preparation:**
    - Ensure the furnace is clean and free of debris from previous tests.
    - Verify the power supply is connected and the furnace is properly grounded.
    - Prepare the asphalt sample according to the relevant testing standard (e.g., ASTM D6307, AASHTO T 308). This typically

involves obtaining a representative sample and reducing it to a manageable size.

- Weigh the empty sample basket and tray and record the mass(W1).
- Place the prepared asphalt sample in the basket and tray.
- Weigh the sample, basket, and tray together and record the mass(W0).

2. **Furnace Operation:**
   - In upper part of the screen, set the desired ignition temperature on screen(Set) according to the standard testing procedure (typically 538°C or 1000°F) and start controller(Start). Current temperature(Temp) is shown on display. Stop heating by Stop button.
   - After achieving desired temperature, zero the internal scale using Tare button, open the furnace door and carefully place the loaded basket and tray inside the chamber.
   - Close the furnace door securely.
   - Enter W0 on screen or read from internal scale(W) by ✓ button.
   - Enter W1 on screen.
   - By clicking the Start button, the furnace starts and operates until a constant mass is achieved (3 constant reading for 3 minutes).
   - During the test, stop the test by Stop button.
   - On screen, the elapsed time (Time) is shown.
   - The device calculates the mass loss (L) during ignition by subtracting the net mass of the residual aggregate (Wn=W-W1) from the initial net mass of the asphalt sample(W0-W1).

**Asphalt Binder Content (L%) = (Mass Loss/Initial Mass of Asphalt Sample)* 100**

- All calculations are performed by the device and will be printed during the test.


3. **Post-Ignition:**
    - After the ignition cycle is complete, stop heating process.
    - Allow the furnace and sample to cool to a safe handling temperature (below 200°C or 400°F) before opening the door.
    - Carefully open the furnace door and use heat-resistant gloves and tongs to remove the basket and tray containing the residual aggregate.
    - Allow the basket and aggregate to cool completely in ambient air away from drafts until they reach room temperature.

# 6. Maintenance

Regular maintenance is crucial for the proper functioning and longevity of the furnace.

- **Cleaning:** Clean the furnace chamber and accessories regularly to remove ash and debris. Ensure the furnace is cool and disconnected from power before cleaning. Use a vacuum cleaner with a high-efficiency filter to remove fine ash particles.

- **Temperature Sensor:** The temperature sensor (thermocouple) should be checked periodically for accuracy and replaced if faulty.
- **Weighing System:** ensure it is calibrated regularly.
- **Door Seal:** Check the door seal for damage and ensure it provides a tight seal to maintain temperature uniformity and prevent heat loss.
- **Exhaust System:** Ensure the exhaust port and any connected ventilation system are clear and functioning correctly.
- **Calibration:** Perform regular calibration of the furnace temperature and weighing system using certified standards.

# 7. Troubleshooting

Some common problems and potential solutions include:

- **Furnace Not Heating:** Check the power supply, circuit breaker, temperature controller settings, and heating elements.
- **Inaccurate Temperature Reading:** Check the temperature sensor and controller calibration.
- **Excessive Smoke:** Ensure proper ventilation and that the sample size is appropriate for the furnace capacity. Check active carbon filter and renew that if necessary.
- **Inconsistent Results:** Verify sample preparation procedures, and check furnace calibration.
- **Weighing System Errors:** Calibrate the weighing system or check for debris affecting the balance.

# 8. Specifications

- Maximum Temperature: 650°C
- Temperature Accuracy: ± 2°C
- Chamber Dimensions: 370mm*370mm*370 mm

- Power: 6 kW, 25 A, 220-240V,50/60Hz.
- Weighing Capacity: up to 4000g
- Balance Readability: 0.1 g
- External Dimensions: 700 x 800 x 1200 mm
- Weight: 200 kg
- Heating Elements: High-performance ceramic embedded elements
- Insulation: High-efficiency ceramic insulation
- Control System: PID controller with touchscreen
- Data Output: Integrated Printer
- Construction: heavy-gauge painted steel
- Exhaust Port Diameter  100 mm / 4 inches
- Compliant with Standards: ASTM D6307, AASHTO T308

# 9. Installation & Site Requirements

- **Location:** A well-ventilated area or under a suitable extraction hood is mandatory. Ensure sufficient clearance around the furnace for operation and maintenance as per the operation manual.
- **Electrical Supply:** Dedicated electrical circuit meeting the specified voltage, phase, and amperage requirements. Proper grounding is essential.
- **Exhaust Venting:** Direct venting to the outside atmosphere is required. The exhaust ducting must be made of heat-resistant material and installed according to local regulations.
- **Level Surface:** The furnace must be placed on a firm, level, and non-combustible surface capable of supporting its weight.

# 10. Accessories

- Sample Baskets/Trays (2 sets)
- Basket Handling Tools

- Cooling cage
- Protective gloves
- Exhaust Venting Kit
- Operation Manual
- Calibration Certificate (for balance and temperature)
- Printer Paper Rolls