TROXLER NTO

New Technology Oven

NCAT Ignition Method

Troxler Infrared Technology Excites Your Asphalt

TROXLER®

Troxler Electronic Laboratories, Inc.
PO Box 12057 • 3008 Cornwallis Rd. • Research Triangle Park, NC 27709
Phone: (919) 549-8661 • Fax: (919) 549-0761 • Web site: www.troxlerlabs.com

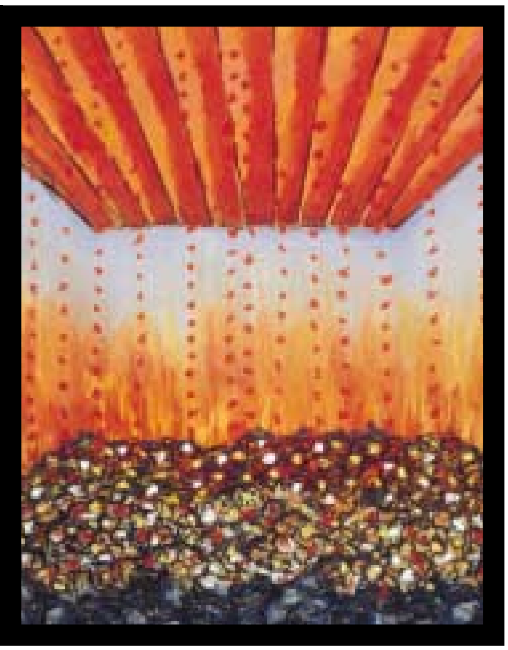
New Technology Oven NTO

Heat Transfer Technology

In order to burn the binder in an ignition oven, heat must be transferred from a source to the asphalt material. In nature, heat transfer may occur by conduction, convection, or electromagnetic energy waves.

Conduction requires the heat source and object to be in direct contact. An example of this is a hot water heater where the heater element is submerged in water. The heat generated by the current in the element is directly transferred to the surrounding water.

With convection transfer, the heat is first transferred to the boundary of air that is close to and in contact with the heater element. The object is then heated by the air currents. All ignition furnaces currently in use rely on convection heat transfer. This requires that the chamber air surrounding the asphalt sample be heated sufficiently to transfer the heat to the asphalt.



Artist rendering of infrared energy transfer inside NTO

The third means of transfer is by electromagnetic energy waves. An example of electromagnetic heating is the Sun warming the surface of the Earth. The space between the Sun and the Earth is transparent to the energy waves from the Sun. The thermal energy from the Sun is absorbed in the Earth's surface and the air surrounding the Earth is warmed by convection; yet the atmosphere at 10,000 feet has a temperature well below zero. In the case of the **Troxler New Technology Oven**, the energy waves come from the Infrared portion of the electromagnetic spectrum. Infrared transfers heat energy directly to the sample by exciting the molecules in the asphalt mixture without heating the surrounding air in the chamber. As a secondary effect, the chamber air is heated by conduction transfer from the material directly excited with the infrared thermal energy.

No Temperature Correction Factor Needed

Convection furnaces in use today require the entry of a temperature correction factor to account for airflow around the weighing device. The Troxler NTO uses a proprietary process design that eliminates this potential source of error. This is one less step that your operator has to remember to perform.

ASTM/AASHTO

The NTO uses the NCAT Ignition Method. It meets or exceeds ASTM D6307-98, Standard Test Method for Asphalt Content of Hot-mix Asphalt by Ignition Method and AASHTO T-308-99, Standard Method of Test for Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method.

- **New Technology**
  – NCAT Ignition Method
- **Patented Infrared Technology**
  – a quicker, better burn
- **Time Savings**
  – faster test results compared to other methods
- **Portable**
  – Weighs only 63.5 kg/140 lbs.
- **Cleaner Burns**
  – 2/3 less emissions than produced by current technology
- **Power**
  – Choice of 15 amp, 120 V or 20 amp, 208/240 V line
- **Easy to Clean**
- **Sample size up to 5000 grams**
- **No Solvents**
- **Delivered fully assembled**

Special NTO Burn Profiles

By testing a broad cross section of asphalt mixes from across the United States and Canada, Troxler has developed a series of burn profiles which allow the operator to fine tune each burn based on aggregate types or mixtures.

Optimum - This is the optimum profile for granite and other hard aggregates.

Option 1 - The profile of choice for very soft aggregates such as dolomites or limerock. Any mixture with a large aggregate correction (>1.0%) will probably apply option 1.

Option 2 - Covers some very rich Superpave mixtures with special modifiers. In addition, this option may work well with base (large stone) type mixtures.

The NTO has an unlimited ability to control the burn sequence during every minute of a burn cycle (This is not offered by other competitive furnaces).

How it operates

The Troxler NTO is very easy to use. Spread the heated asphalt mixture across 2 sample baskets and place the baskets into the NTO chamber. Close the oven door and press the start key to begin the combustion process. Built-in scales automatically measure mass loss and % loss. An internal printer provides a constant record of test data. The NTO stores up to 300 test results and correction factors. Either positive or negative aggregate correction factors can be used for a specific mixture. Data stored in the console can be downloaded to a computer through the RS-232 serial interface.

SPECIFICATIONS

Performance

Maximum sample size	2500 g per sample pan (5000 g total)
Integrated scale resolution	0.1 g
Burn time for 1200 g	
120 V ac unit (Model 4730)	Approx. 25 minutes
240 V ac unit (Model 4731)	Approx. 20 minutes
Internal memory capacity:	
Sample data	300 samples
Project IDs	20
Aggregate correction factors	20

Mechanical

Outside dimensions	66 W x 68.6 D x 55.1 H cm (26 W x 27 D x 21.7 H in)
Chamber dimensions	28 W x 43.2 D x 20.3 H cm (11 W x 17 D x 8 H in)
Sample pan dimensions (each)	20.3 W x 36.8 D x 4.1 H cm (8 W x 14.5 D x 1.6 H in)
Complete pan assembly	23.8 W x 39.4 D x 11 H cm (9.4 W x 15.5 D x 4.3 H in)
Weight	63.5 kg (140 lbs)

Electrical

Power sources	Model 4730 120 V ac 50/60 Hz	Model 4731 208/240 V ac 50/60 Hz
Current	12 amps	12/13 amps
Peak power consumption	1400 W	2496/3120 W
RS-232C configuration	Data Terminal Equipment (DTE)	
Serial data format	8 Data bits 2 Stop bits No parity	
Baud rate range	600 to 9600 baud	
Liquid crystal display	4 line x 20 character	
Keypad	25-key sealed membrane	

Standard Equipment

Furnace with circuit breaker power switch, internal printer, exhaust duct, display and keypad built into a single unit.

One set of sample trays, one pair of high temperature insulated gloves, sample cooling cage, one sample carrying fixture, 15 ft. (4″ diameter) metal exhaust pipe, manual.

Mixture Testing in the NTO

An important component of the pre-release testing of this new technology was burning many different types of asphalt mixtures in the NTO. Plant produced mixes were gathered from Delaware, North Carolina, Alabama, Florida, Illinois, Texas, Colorado, and California. These mixes were both Marshall and Superpave designs and had been tested in a convection type ignition furnace at the plant.

The table below shows the averaged results from burning these mixtures in an NTO and performance against convection burns in the field. For the majority of these samples, the % Loss is very comparable to field burns conducted. Also, the burn time using the NTO is much quicker than the field burn time.

Mix ID	Design %AC	Field % Loss	NTO %Loss	Field Burn Time	NTO Burn Time
12.5mm Superpave	4.93%	5.29%	5.39%	48	26
12.5mm Superpave	5.80%	5.92%	6.03%	-	31
19mm Superpave	5.06%	6.16%	5.81%	87	59
19mm Superpave	4.67%	5.15%	5.18%	56	45
25mm Superpave	5.26%	5.35%	5.36%	55	36
Surface Mix	5.90%	6.30%	6.28%	34	32
Surface Mix	6.61%	6.76%	6.62%	46	47
Surface Mix	5.16%	5.68%	6.26%	54	37
Binder Mix	5.14%	5.29%	5.16%	45	37
Binder Mix	4.64%	5.03%	4.84%	34	27
Binder Mix	4.16%	4.37%	3.99%	42	34
Base Mix	4.20%	4.40%	4.30%	52	46

TROXLER®

Troxler Sales & Service Centers

Northeastern Sales Office
Rockville, MD
Tel: (301) 924-3336 • Fax: (301) 924-3863
troxne@troxlerlabs.com

Northwestern Sales Office
Puyallup, WA
Tel: (253) 770-7864 • Fax: (253) 840-1142
eaglenw@att.net

Western Sales & Service Office
Rancho Cordova, CA
Tel: (916) 631-0234 • Fax: (916) 631-0541
troxca@troxlerlabs.com

Southwestern Sales & Service Office
Arlington, TX
Tel: (817) 275-0571 • Fax: (817) 275-8562
troxsw@troxlerlabs.com

Southern Sales Office
Nashville, TN
Tel: (615) 331-8537 • Fax: (615) 331-8537
joinestn@troxlerlabs.com

Midwest Sales & Service Office
Downers Grove, IL
Tel: (630) 261-9304 • Fax: (630) 261-9341
troxmidw@troxlerlabs.com

Rocky Mountain Branch Office
Lakewood, CO
Tel: (303) 969-0950 • Fax: (303) 985-0853
wils687@attglobal.net

Canadian Sales Office
Calgary, Alberta, Canada
Tel: (403) 217-2344 • Fax: (403) 217-3956
troxlerontario@yahoo.com

Canadian Sales & Service Office
Mississauga, Ontario, Canada
Tel: (905) 565-0633 • Fax: (905) 564-7092
troxler@istar.ca

Maryland Service Center
Timonium, MD
Tel: (410) 561-5850 • Fax: (410) 561-5852
troxlermd@troxlerlabs.com

Florida Service Center
Orlando, FL
Tel: (407) 681-4221 • Fax: (407) 681-3188
troxlerfl@troxlerlabs.com

Alabama Service Center
Birmingham, AL
Tel: (205) 945-0755 • Fax: (205) 945-0757
troxleral@troxlerlabs.com

Colorado Service Center
Denver, CO
Tel: (303) 298-0751 • Fax: (303) 298-0778
troxlerco@troxlerlabs.com

German Sales & Service Office
Munich, Germany
Tel: 49-8141-71063 • Fax: 49-8141-80731
troxler@t-online.de

Hong Kong Sales Office
Tseung Kwan O, N.T., Hong Kong
Tel: 852-29471535 • Fax: 852-29471535
slkhong@netvigator.com

2.5M 04/02