



TROXLER

The leader in construction test equipment

New Technology Oven (NTO)

NCAT Ignition Method for Measuring Asphalt Content Model 4730/4731

The quality of hot-mix asphalt pavement is typically characterized by two very important factors — the asphalt binder content and the gradation of aggregates. Troxler Electronic Laboratories, an industry leader in precision test and measurement instruments for the construction industry, has developed and patented a more advanced method for determining asphalt content in hot-mix asphalt.



The Troxler New Technology Oven (NTO) utilizes advanced infrared (IR) technology to measure asphalt content using the National Center for Asphalt Technology (NCAT) ignition method.

The hot mix asphalt sample is ignited using an infrared element. This produces a very clean and efficient burning of the asphalt while limiting the aggregate degradation. The NTO combines this sophisticated oven with an integrated weighing system to continuously measure the bituminous weight loss during combustion and to automatically display the percent of asphalt in the mix. The remaining aggregate can be sieved for gradation analysis.

First introduced in 1999, the infrared-based NTO has proven to be fast, accurate and friendlier for the environment. In a 2003 study of asphalt ignition ovens, it was concluded that “both types of furnaces (convection and infrared) when properly calibrated, can produce similarly accurate results, regardless of mix tested.”*

*Evaluation of Infrared Ignition Furnance for Determination of Asphalt Content. Hurley and Prowell. Transportation Research Record 186, Paper No. 03-2494-2003.



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New Technology Oven (NTO)

How the NTO Operates

The Troxler NTO is simple to use. Weigh and spread the heated asphalt mixture across 2 sample baskets and place the baskets into the NTO chamber. Enter the sample mass, 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.



test results and positive or negative results can be used for a mixture. Data stored in the console can be printed or downloaded to a computer through the RS-232 serial interface.

Special NTO Burn Profiles

The NTO has an unlimited ability to control the burn sequence during every minute of a burn cycle. 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.

DEFAULT — This is the optimum profile for most types of aggregates.

OPTION 1 — The profile of choice for very soft aggregates with higher correction factors, such as dolomites and some limerocks. 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.

Improved Burn Characteristics

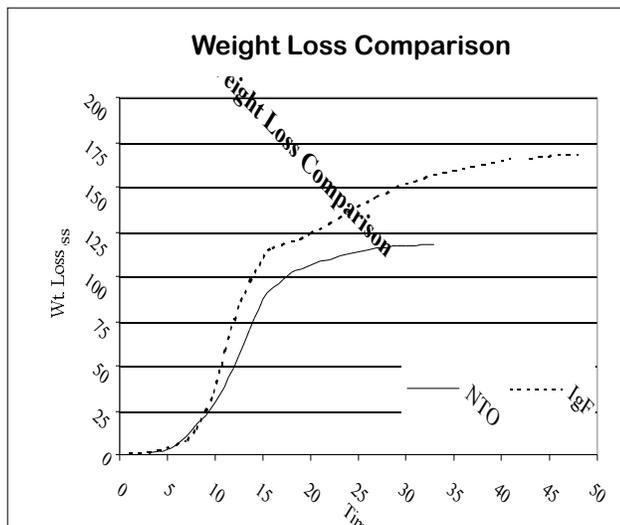


Figure 1

Figure 1 compares a first generation ignition furnace (IgF) and the NTO. This chart shows the results of actual burns conducted at an asphalt production plant. The same mixture and approximately same sample mass were tested in each device. The chart illustrates how much faster the burn is completed in the NTO as compared to the same burn in a convection ignition furnace. In addition, a lower aggregate correction factor is utilized due to lower burn temperatures.

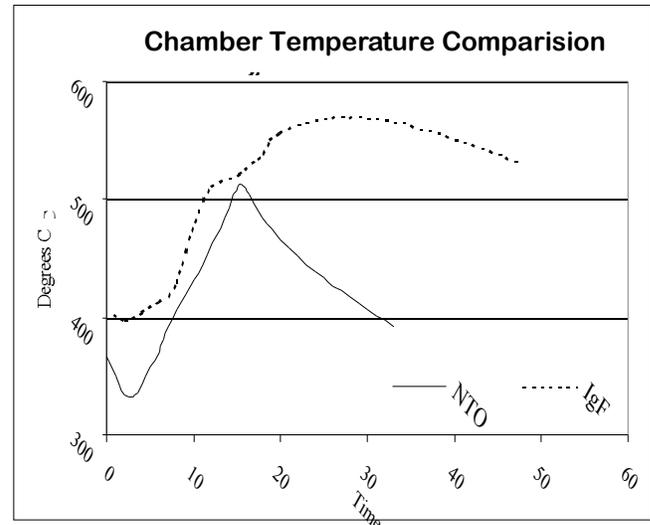


Figure 2

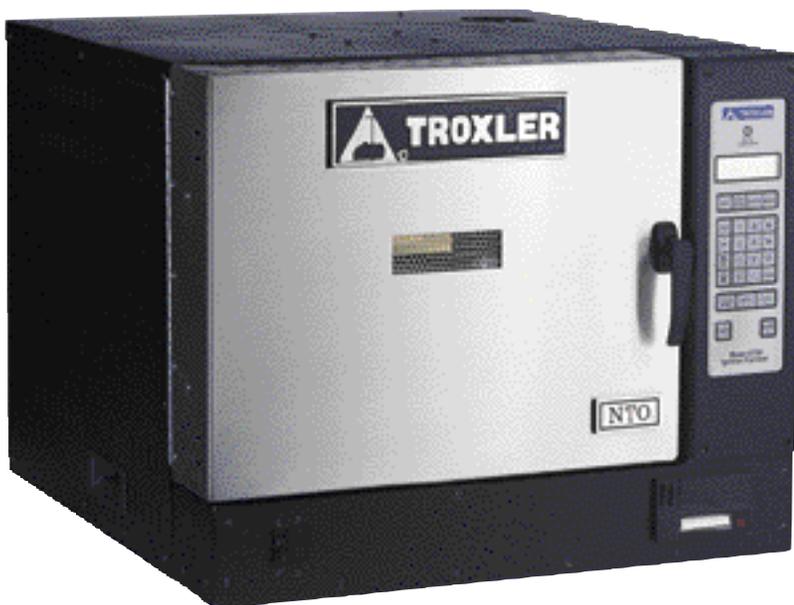
Figure 2 compares the first generation ignition furnace (IgF) and the NTO showing the lower operating temperature in the NTO. Note that the first generation ignition furnace reaches a much higher temperature whereas the NTO starts cooling the chamber immediately after reaching a lower maximum temperature to minimize the aggregate loss for more accurate gradation results.



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Features & Benefits

- **ASTM / AASHTO Compliant**
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-308-01, Standard Method of Test for Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method.
- **No Temperature Correction Factor Needed**
Convection furnaces in use today require use of a temperature correction factor to account for higher temperatures and airflow around the weighing device. The Troxler NTO uses a proprietary process design that eliminates this potential source of error.
- **Low Emissions**
One of the many benefits of the NTO is reduced emissions released into the environment compared to the ignition furnaces in use today. These low emissions are achieved without the necessity of an afterburner or filters. The NTO was developed with the intent of reducing emissions. The proprietary design enables the mixture burns to be more efficient and complete.
- **Patented Infrared Technology**
A quicker, better burn using the NCAT Ignition Method.
- **Time Savings**
Quicker "heat up" time and faster ignition/burn time than other methods.
- **Portable**
Weighs only 63.5 kg (140 lbs.).
- **Cleaner Burns**
2/3 less emissions than produced by current technology.
- **Lower Power Consumption**
Choice of 15A (120V) or 20A (208/240V) lowers utility bill.
- **Easy to Clean**
- **Sample Size up to 5,000 Grams**
- **No Solvents**
- **Software Upgradeable**
"Flash" latest software revision to NTO for current updates.
- **Delivered Fully Assembled**



USA Patent Numbers:
6,054,323 and 6,436,718
Canada Patent Number:
2,274,453

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 at right 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 NTO %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

SPECIFICATIONS

Performance

Maximum Sample Size	2500 g per sample pan (5000 g total)
Integrated Scale Resolution	0.1 g
Burn Time for 1200 g	
120V ac unit (Model 4730)	Approx. 25 mins.
240V ac unit (Model 4731)	Approx. 20 mins.
Internal Memory Capacity:	
Sample data	300 samples
Project IDs	20
Aggregate correction factors	20
Standards	ASTM D6307 AASHTO T-308

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	<u>Model 4730</u> 120 V ac	<u>Model 4731</u> 208/240 V ac
	50/60 Hz	50/60 Hz
Current	12 amps	12/13 amps
Peak Power Consumption	1400 W	2496/3120 W

Other

RS-232C Configuration	Data Terminal Equip. (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

- Circuit breaker power switch
- Internal printer
- Exhaust duct
- Single unit display & keypad
- 1 - set of sample trays
- 1 - pair high temp insulated gloves
- Sample cooling cage
- Sample carrying fixture
- 15 ft (4" diameter) metal exhaust pipe
- Operator's manual



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