OWENS CORNING Trumbull

Technical Report

Effects on asphalt softening points of various time and temperature operating conditions

Contractors should be aware that operating asphalt kettles at high temperatures or for long periods of time can significantly affect the softening point of the asphalt. This is because of a phenomenon known as "fallback," which is explained in this report.

In general, the higher the temperature or the longer the asphalt is exposed to heat, the lower the softening point will become. This can result in material sliding downhill on the roof-and taking BUR with it-or simply staying constantly soft at high ambient temperatures.

Potential solutions to this problem are to:
(1) use higher softening point material;
(2) decrease the temperature of the kettle;
(3) insure that material in kettle is used more quickly to reduce exposure time;
(4) insulate all lines that carry asphalt from the kettle to the roof.

Environmental regulations require that roofing contractors keep their asphalt kettles closed in order to avoid leaking contaminants into the air. Therefore, Trumbull has performed a series of tests to determine how various operating time and temperature combinations affect the softening point of our asphalt products under field conditions with closed kettles.

New rules, new methods

Under previous conditions, when kettles were kept open, the light oils in the asphalt were evaporated as the material reached the 450°F. to 500°F. range. This resulted in an increase in the softening point of the asphalt, with the product becoming progressively harder and more brittle.

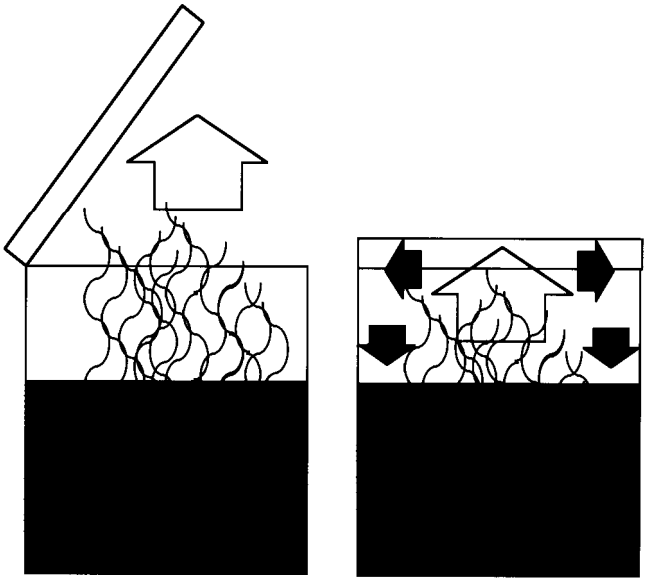
With kettles closed, however, just the opposite happens; the softening point *decreases.* As the light oils in the asphalt boil off, they condense on the inside of the kettle and re-mix with the asphalt in a phenomenon known variously as "fallback" or "dropoff" or "refluxing."

The BUR goes, too

As the softening point of asphalt decreases, the material becomes prone to sliding downhill on the roof or staying soft when the roof is exposed to high ambient temperatures. When the asphalt slides on the roof surface, it can easily take built-up roofing material with it, causing significant damage to the roof.

Continued on page three

Open vs. closed kettles: Watch for reductions in asphalt softening point.



When kettles were left open (left), light oils boiled off and escaped to the atmosphere, thereby raising the softening point of the asphalt. With kettles closed (right), as is now required by environmental regulations, the boiled-off oils condense on the inside of the kettle and "fallback" into the asphalt-which decreases its softening point.

Average fallback in softening point of five different asphalt types stored at three different temperatures for 24 hours

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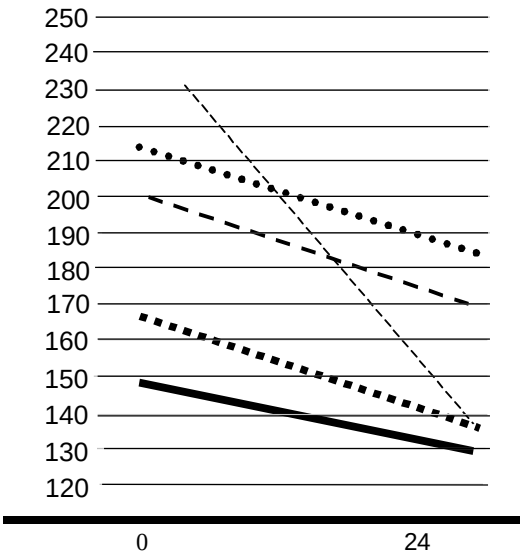
Legend

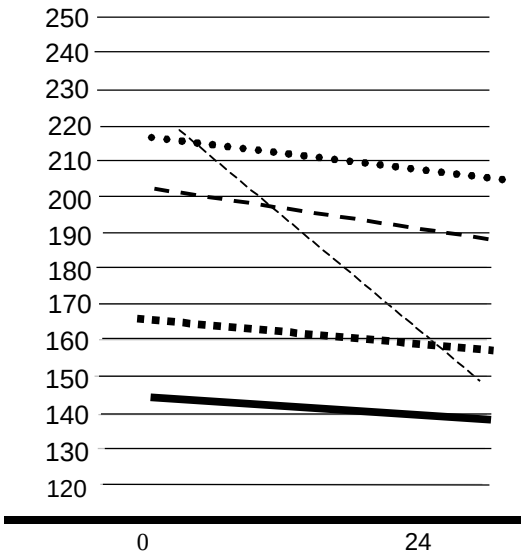
TYPE: Dead level Type 2 Type 3 Type 4 PermaMop¨

550° F. Operating Temperature



KETTLE OPERATING HOURS; Yaxis-SOFTENING POINT(°F)

500° F. Operating Temperature



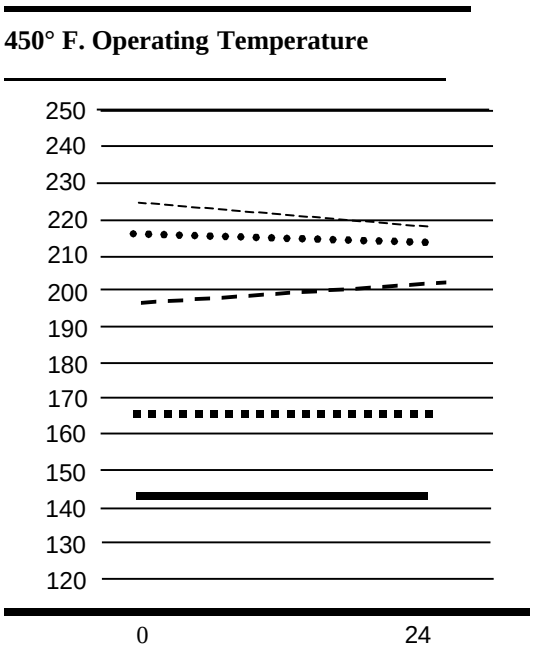
KETTLE OPERATING HOURS; Yaxis-SOFTENING POINT(°F)

24-HR. TEST RESULTS (SOFTENING POINTS IN° F)

TYPE	BEG S.P.	2 hrs.	4 hrs.	8 hrs.	24 hrs.
Dead level	144	140	140	138	135
Type 2	173	166	164	160	148
Type 3	203	199	197	194	173
Type 4	219	216	212	208	189
PermaMop¨	220	220	211	198	148

24-HR. TEST RESULTS (SOFTENING POINTS IN° F)

TYPE	BEG S.P.	2 hrs.	4 hrs.	8 hrs.	24 hrs.
Dead level	144	145	141	143	141
Type 2	173	167	166	167	159
Type 3	203	200	197	197	188
Type 4	219	219	213	215	204
PermaMop¨	220	227	225	212	148



24-HR. TEST RESULTS (SOFTENING POINTS IN °F)

TYPE	BEG S.P.	2 hrs.	4 hrs.	8 hrs.	24 …hrs.
Dead level	144	146	147	146	146
Type 2	173	169	168	169	168
Type 3	203	200	200	204	201
Type 4	219	221	222	222	223
PermaMop™	220	224	223	229	217

Continued from page one

The higher the temperature at which asphalt is stored, the greater the fallback. Therefore, kettle temperature should only be as high as necessary to compensate for heat loss during travel from the kettle to the roof. In other words, kettle temperature should be no more than application temperature (EVT) minus heat loss in transport to the roof.

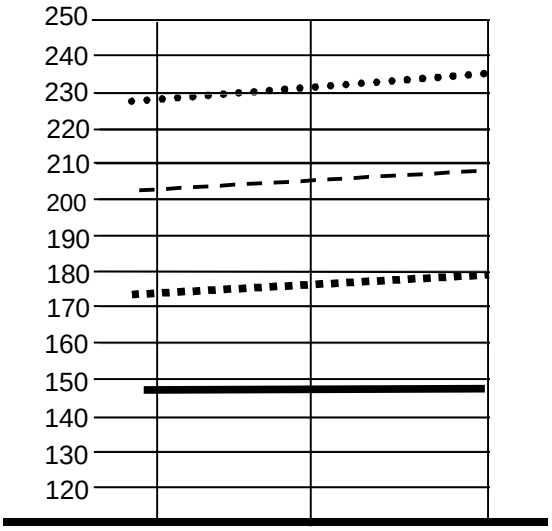
As a practical example, PermaMop™ roofing asphalt has a recommended application temperature of 380°F. The kettle temperature for PermaMop™ should rarely, if ever, exceed 450°F and should never exceed 500°F.

This report summarizes the results of laboratory testing of Trumbull asphalt materials from four areas of the U.S.: Kearny, New Jersey; Summit (Chicago), Illinois; Oklahoma City, Oklahoma; and Martinez, California (Northern California).

If you have questions about the test results or methodology or need more information, please contact your local Trumbull representative.

Long-term storage test results: Summit, IL (Chicago area)

350° F. Operating Temperature

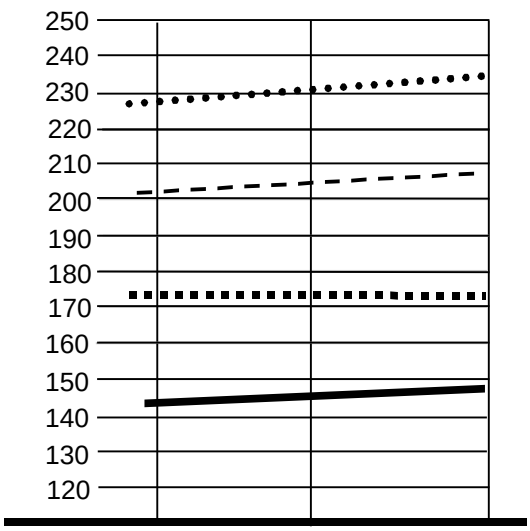


TANK STORAGE TIME; Y axis- SOFTENING POINT(°F)

21-DAY RESULTS (° F)

TYPE	BEG S.P.	7 days	14 days	21 days
Dead level	144	147	147	147
Type 2	169	176	177	180
Type 3	195	204	205	207
Type 4	221	227	232	231

250° F. Operating Temperature



TANK STORAGE TIME; Y axis- SOFTENING POINT(°F)

21-DAY RESULTS (° F)

TYPE	BEG S.P.	7 days	14 days	21 days
Dead level	144	147	147	147
Type 2	169	176	177	180
Type 3	195	204	205	207
Type 4	221	227	232	231

NOTE: The reasons that softening points tend to increase during long-term, lower-temperature storage are: (1) storage tanks must be vented, and in that condition, light oils can boil off and escape to the atmosphere, thereby increasing the softening point; (2) asphalt undergoes less fallback at the lower temperatures of long-term storage.

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