

TRACE REPORT

Tremco Roof Analysis Core Evaluation

Prepared especially for:

TREMCO R&D

Beachwood, OH

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TREMCO ROOF ANALYSIS CORE EVALUATION (TRACE)

TRACE provides laboratory analysis information helpful in making informed decisions related to your bituminous build-up roof. All testing provided is based upon standard ASTM test procedures and NVLAP test methods. This report contains data which is not covered by the NVLAP accreditation. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the United States Government.

The laboratory (NVLAP LAB CODE 101188) is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP) to provide Asbestos fiber analysis by the NVLAP Test method code 18/A01-Test Method Designation: 40 Code of Federal Regulations Chapter I (1-1-1987 edition) Part 763, Subpart F, Appendix A, Pages 293-299 or the current U.S. Environmental Protection Agency method for the analysis of asbestos in building materials by polarized light microscopy.

Typical TRACE roof analysis includes sampling the roof system, labeling the core sample and location, analysis of the core, and finally, a written report listing the results of the laboratory analysis.

The laboratory analysis includes the estimated weight of the waterproofing membrane, the type and weight of the surfacing and interply bitumen, the penetration of the bitumen, softening point of the bitumen, the type of plies used in the construction including an asbestos analysis of each ply, and finally, the tensile strength of the membrane in both the machine and cross machine directions.

WEIGHT OF THE WATERPROOFING MEMBRANE - The weight of the waterproofing membrane is indicative of the quantity of material installed during application of the roof. An analysis of this quantity and comparison to systems of similar construction may indicate if the quantity of the material is sufficient for adequate performance of the system. Listed is a summary of the surfacing bitumen weight, weight of the plies, and interply bitumen weight.

BITUMEN TYPE - It is necessary to know the type of bitumen that is used in the construction as coal tar pitch (produced by the destructive distillation of coal) and asphalt (produced by the refining of oil products) are not completely chemical compatible. The mineral spirits solvent test is utilized to determine the bitumen type.

PENETRATION - Penetration is complex viscosity measure. It is determined by measuring how far a standard needle penetrates vertically into a sample material under specified conditions of loading, time and temperature. The penetration for a bituminous material is indicative of how hard that it has become. Aged bitumens tend to become harder or have lower penetration numbers which indicates a loss of ductility. The unit of measure is dmm (decimillimeters - 1/10 of a millimeter). Unaged asphalt penetration ranges are given below.

ASPHALT

Type I - 18 - 60 dmm	Type III - 15 - 35 dmm
Type II - 18 - 40 dmm	Type IV - 12 - 25 dmm

SOFTENING POINT - The softening point analysis for bitumens is indicative of the degree of oxidation of the bitumen. Higher softening points indicate a greater degree of oxidation for the same bitumen. The original softening point of the tested material is impossible to determine: however, the unaged classification are given below.

ASPHALT

Type I - 135-151F
Type II - 158-176F
Type III - 185-205F
Type IV - 210-225F

COAL TAR

Type I - 126-140F
Type III - 133-147F

TYPE AND NUMBER OF PLIES - The number and type of plies in the system affect the strength, and performance of the system. Variance in the number of plies in multiple core samples from the same roof may be indicative of poor quality control in the assembly of the system. The results of this analysis represents the number of plies found in the sample tested and do not necessarily indicate the number of plies of the roof as phased construction or base sheets may affect the total count. Non-whole numbers in the results may indicate a lap or partial ply. The most common ply types are organic, fiberglass, asbestos, and polyester.

TENSILE STRENGTH - The tensile strength of the system indicates how much force is necessary to break the roof membrane by pulling it in a single direction in the plane of the roof. The results of this analysis may be useful when used in concert with the other results provided in the TRACE analysis. The results are reported in units of pounds per inch which shows the actual value obtained for testing of the core sample in both the machine and cross machine directions. The machine direction for plies is the direction parallel to the length of the roll and cross machine is perpendicular to this direction in the same plane. In general, roofing plies are weaker in the cross machine direction than in the machine direction. In 1971, the National Bureau of Standards, under the direction of Bill Cullen, recommended a minimum acceptable standard whereby a roof system should exhibit a tensile strength of 200lb/in when tested at 0F and 0.05in/min crosshead speed to be considered an adequate system.

ASBESTOS CORE TESTING - Finally, the TRACE analysis includes a polarized light microscopy analysis of the plies of the sample to determine the type and quantity of asbestos in each ply, if any. This information is particularly important if asbestos is present as the special handling which is often legally mandated for asbestos containing systems may dramatically affect the cost of any work which is planned for the roof.

TRACE provides the basic laboratory test information necessary to develop a sound program for your roof. *The analysis of the information requires an overview of not only the data from the core analysis but must be used in concert with information obtained through visual system analysis and consideration of the particular use of the building and roof as well as other factors. Your representative is capable of providing the combined analysis which will enable you to make optimum use of the data provided in this report.*

TRACE ANALYTICAL REPORT FOR TREMCO R&D

Core: **Penthouse, Core #1**
Identification Number: **00000000**

<u>Analysis</u>	<u>Procedure</u>	<u>Result</u>
Core Size:	ASTM D 2829-95	18.00 x 14.00 sq in
Estimated Weight of Membrane:	ASTM D 2829-95	256 lbs/100 sq ft
Surfacing Bitumen Type:	SOLVENT TEST	Asphalt
Surfacing Bitumen Weight:	TRC 875	64 lbs/100 sq ft
Softening Point of Surfacing Bitumen:	ASTM D 3461-85	235 degree F
Penetration of Surfacing Bitumen: (@ 77 degree F)	ASTM D 5-95	5 dmm
Interply Bitumen Type:	SOLVENT TEST	Asphalt
Softening Point of Interply Bitumen below the First Ply	ASTM D 346-85	215 degree F
Penetration of Interply Bitumen below the First Ply (@ 77 degree F)	ASTM D 5-95	8 dmm
Ply Type	ASTM D 2829-95 & NVLAP Test Method Code 18/A01	Fiberglass
Number of Plies	ASTM D 2829-95	4
Interply Bitumen Weight	ASTM D 2829-95	24 lbs/100 sq ft
Tensile Strength, Machine Direction (@ 0 degree F, 0.05 in/min)	ASTM D 2523-78	250 lbf/in
Tensile Strength, Cross-Machine Direction (@ 0 degree F, 0.05 in/min)	ASTM D 2523-78	233 lbf/in
Comments:		

ACT ANALYTICAL REPORT FOR TREMCO R&D

ASBESTOS CORE TESTING

Core: **Penthouse, Core #1**

Identification Number: **000000000**

NVLAP Test Code: **18/A01**

NVLAP Lab Code: **101188**

Test Method: **EPA/600/R-93/116**

Treatment: **Methylene Chloride Solvent Extraction**

Homogeneity: **Layered**

Layer	Color	Asbestos Type, %	Other Fibrous Type, %	Nonfibrous Type, %
One	white	None Detected	Fiberglass 95	Binder 10
Two	white	None Detected	Fiberglass 95	Binder 10
Three	white	None Detected	Fiberglass 95	Binder 10
Four	white	None Detected	Fiberglass 95	Binder 10
MASTIC		None Detected		Asphalt 100
TOTAL		None Detected	Fiberglass 4	Asphalt 76 Binder 20

Notice: The results of this analysis are based on findings determined from laboratory analysis of individual roof core samples and include the inherent uncertainty of measurement for estimating percentages by polarized light microscopy. Tremco accepts no liability or responsibility for any costs associated with asbestos containing material which were not sampled or analyzed for asbestos content for inclusion in this report. The result relate only to the items tested; and the report shall not be reproduced except in full, without written approval of the laboratory.

APPROVED: _____ **DATE:** _____