Built up Roofs

LEXSUCO
INCORPORATED

ENGINEERED LEXSUCO PRODUCTS FOR THE CONSTRUCTION INDUSTRY

4815 LEXINGTON AVENUE
CLEVELAND 3, OHIO
TELEPHONE EXPRESS 1-3888

August 10, 1955

PLAINTIFF'S EXHIBIT
BIR-942

Mr. Stanley S. Sallie
Chief Chemist, Building Materials Division
Bird & Son, Inc.
East Walpole, Mass.

Dear Mr. Sallie:

We are pleased to enclose the Factory Mutual Laboratories' report on our Lexsuco Fire Test conducted on May 12, 1955 at Norwood, Massachusetts.

This report definitely proves the superior fire-retardant qualities of the Lexsuco Vapor Barrier and Securement Construction. In addition to this excellent qualification, it is also important to point out that the Lexsuco construction (1) provides an excellent barrier against vapor transmission, (2) reduces possibility of wind damage and (3) eliminates bitumen drippage.

We sincerely appreciate the opportunity of submitting this report to you and wish to advise that additional copies are available upon request.

Sincerely yours,

LEXSUCO, INCORPORATED

Frank W. Curtis
Vice President & General Manager

FWC:sb
Encl.

Sweet's

Koroseal* NATIONAL DISTRIBUTOR OF B. F. GOODRICH COMPANY
FLEXIBLE FILM AND RIGID MATERIAL FOR CONSTRUCTION USES

* T. M. REG. U. S. PAT. OFF.

Examination

of

LEXSUCO ABOVE DECK CONSTRUCTION ON 100 FT X 20 FT TEST STRUCTURE

from

Lexsuco, Incorporated
4815 Lexington Avenue
Cleveland 3, Ohio

Laboratory Report
No. 12911
July 28, 1955

FACTORY MUTUAL ENGINEERING DIVISION

FACTORY MUTUAL LABORATORIES

1151 Boston-Providence Turnpike, Norwood, Mass.

Form No 180 Lab-Rev May 1955

BIRD 013959

FACTORY MUTUAL ENGINEERING DIVISION

FACTORY MUTUAL LABORATORIES

1151 BOSTON-PROVIDENCE TURNPIKE, NORWOOD, MASS.

REPORT NO. 12911

DATE July 28, 1955

CLASS NO. 4450

FROM Lexsuco, Incorporated
4815 Lexington Avenue
Cleveland 3, Ohio

EXAMINATION OF
Lexsuco Above Deck Construction
on 100 Ft x 20 Ft Test Structure

I ABSTRACT

Lexsuco, Incorporated requested a large scale test of their Lexsuco Vapor Barrier and securement construction on steel roof deck which incorporated their Koroseal Vapor Barrier and "nonflammable" Lexsuco Adhesive (B. F. Goodrich R907T) in order to determine how it would compare with other types of steel roof deck construction already tested under the same conditions of exposure. Their Lexsuco Adhesive is used both to secure the Koroseal to the steel deck and the insulation to the Koroseal.

A preliminary exploratory test was first conducted on the Construction Materials Calorimeter, developed by the Factory Mutual Laboratories. This test indicated that the Lexsuco construction represented a substantial improvement over other constructions tested with and without a vapor barrier. It was decided, therefore, to proceed with the large scale test.

Large scale test results confirmed the results obtained on the Calorimeter. Based upon these test results, it is concluded that the Lexsuco Vapor Barrier-Adhesive makes no contribution to the spread of fire within a building. When used with combustible 1 in. vegetable fiberboard insulation, extensive spread of fire beyond the zone of direct exposure did not occur.

The Lexsuco construction tested consisted of a cold process type waterproofing surface. This had no bearing on the test results, since this test, as well as those conducted previously for the Metal Roof Deck Technical Institute, proved that the waterproofing surface above the insulation contributed nothing to the spread of fire within the building.

II OBJECT

A. At the request of Lexsuco, Incorporated, a large scale test was conducted in order to compare a steel roof deck which incorporated their Koroseal Vapor Barrier and Lexsuco Adhesive with other types of steel roof deck construction already tested in cooperation with the Metal Roof Deck Technical Institute. The chief criterion of the test was to determine, under the same conditions of exposure and using the same test structure, to what extent the "Lexsuco above-deck construction" would contribute to the spread of fire beneath the steel deck.

BIRD 013960

B. For purposes of identification, small scale laboratory tests were made of the flash, fire and autoignition temperatures and the total combustible content of each component of the above-deck construction. Details are on file at the Factory Mutual Laboratories.

C. Furthermore, it was deemed advisable to conduct a Calorimeter test of a 5 ft x 9 ft sample in order to rank the Lexsuco construction with other types.

III APPARATUS

A. Metal Roof Deck Test Structure

1. The Structure (See Appendix Sheet 1)

This structure is 100 ft long by 20 ft wide by 10 ft high. Side walls and one end wall are constructed of mineral tile, supported on an exterior framework. All joints between tiles are carefully grouted with asbestos cement.

The end remote from the exposure burners is open except for a 3 ft deep corrugated iron draft curtain.

There is no floor other than the earth itself.

Sixteen 12JB 11.8 steel purlins, spaced 6 ft 8 in. on centers, supported the 1-1/2 in. deep, 18 gauge steel roof deck, supplied by Metal Roof Deck Technical Institute, to which the Lexsuco construction, insulation and weather surface were applied.

Purlins pass through the walls and are supported on an exterior steel framework. They are free to expand without restraint in order to limit the extent of replacement following a test. Earlier tests confirmed the fact that with the purlins restrained from expanding, the exposure fire alone would cause buckling of purlins without any contribution of fire from above the steel deck.

Spaces between the walls and the purlins and between tops of walls and steel deck were carefully filled with mineral wool to seal the structure and reduce convection heat losses to a minimum.

2. Exposure Burners and Excess Air (See Appendix Sheet 2)

Four air ducts enter the exposure end of the structure, through which air is supplied at a steady rate of 5500 cfm throughout the test. Two of the ducts supply combustion air for the gasoline fuel while the other two supply a limited quantity of excess air to burn other combustibles within the structure.

BIRD 013961

During the test, the gasoline flow to the burners is regulated according to a predetermined schedule which will follow very closely the ASTM time-temperature curve in the first 20 ft of the structure with an entirely noncombustible roof.

3. Instrumentation

a. Temperature Measurement

(1) Twenty-four thermocouples were located as shown on Appendix Sheet 3. Temperatures at these locations were automatically recorded continuously throughout the 30 minute test.

(2) As an indication of temperature conditions within the space below the deck and in order to demonstrate both that excess air was present and that combustible materials could ignite spontaneously without physical contact with the exposure fire, fifteen wooden heat targets and four heavy machine oil heat targets were placed as shown on Appendix Sheet 3. These targets are also shown in the second photograph on Appendix Sheet 1.

b. Photographs and Visual Observation

Five trained observers compiled a complete record of observations throughout the test. Exterior still pictures were taken of significant events. At the open end of the structure, a 16 mm movie camera, arranged for time-lapse photography, took pictures of the interior of the structure at 1 second intervals throughout the test.

B. Calorimeter Furnace

As shown on Appendix Sheet 4, this furnace is a horizontal structure of rectangular cross section, the walls and roof being constructed of materials which have excellent insulating and refractory properties. At one end is a firing chamber into which gasoline fuel and air are introduced at accurately controlled rates. The gasoline fuel rate is under volumetric control and is maintained constant throughout the test. Air is introduced on a constant weight basis, regardless of the atmospheric temperature. More than three times as much air is introduced as that needed to burn the exposure fuel.

By means of baffles, excess air is thoroughly mixed with hot products of combustion in the firing chamber and is thus readily available to combine with combustibles which may be distilled from the sample under test.

BIRD 013962

The central portion of the furnace supports the sample and confines the distilled products which unite with excess air.

Further mixing of gases and any unused air takes place in a mixing chamber beyond the sample. From this mixing chamber, gases pass into a short horizontal flue where a group of thermocouples measure the temperature. This temperature is continuously plotted against time throughout the 30 minute test period.

This furnace requires a 5 ft x 9 ft sample of the material under test.

IV THE LEXSUCO ROOF (Refer to Appendix Sheets 5 and 6 for Material Specifications)

A. Steel Deck

The Lexsuco construction was applied to 1-1/2 in. deep, 18 gauge steel roof deck, supplied by the Metal Roof Deck Technical Institute. This deck was laid on the purlins in the usual manner except that, instead of welding directly to the purlins, the ribs were welded to 4 in. wide by 3/16 in. thick steel strips laid on top of the purlins. This arrangement permitted expansion of the deck independent of the purlins. Previous tests have shown this arrangement to be satisfactory.

B. Lexsuco Adhesive

As shown in Photograph No. 1 on Appendix Sheet 5, Lexsuco Adhesive was first applied to the steel deck by means of a roller coater.

C. Koroseal Vapor Barrier

Photograph No. 1 on Appendix Sheet 5 shows the Koroseal Vapor Barrier in place to the right.

D. Lexsuco Adhesive

On Appendix Sheet 5, Photograph No. 2 shows the method of applying ribbons of Lexsuco Adhesive over the Koroseal Vapor Barrier prior to laying the insulation.

E. Insulation

The insulation was plain 1 in. vegetable fiberboard. Photograph 2 on Appendix Sheet 5 shows the application.

BIRD 013963

F. Lexsuco Adhesive and 30 Lb Asphalt Asbestos Felt

Photograph 3 on Appendix Sheet 5 shows a coated strip of the 30 lb asbestos felt, coated with Lexsuco Adhesive, being laid down on top of the insulation.

The felt was doubled back and the exposed side coated with Lexsuco Adhesive. The coated side was then laid on the insulation, following which, the uncoated half was doubled back, coated, and laid down on the insulation.

G. Glasfab

Photograph No. 4 on Appendix Sheet 5 shows the method of application of the Glasfab membrane fabric.

H. Lexsuco Fibrated Roof Coating

Photograph No. 4 on Appendix Sheet 5 shows how the Lexsuco Fibrated Roof Coating was squeegeed into and covered the Glasfab to form a tight, resilient, weatherproof surface.

J. The surface of the roof was covered with a layer of gravel, as shown in Photograph 4 on Appendix Sheet 5.

V TESTS

A. Calorimeter

A 5 ft x 9 ft sample, made up in the same manner as the 100 ft x 20 ft roof, was tested on the Construction Materials Calorimeter.

Before the test was started, the furnace and sample were carefully preheated and held at approximately 100 F for two hours.

Exposure burners were then turned on and the constant exposure rate maintained for 30 minutes. Appendix Sheet 7 shows the following time-temperature curves:

1. At a point 1 ft inside the edge of a blank noncombustible sample at the burner end and on the centerline of the sample.

2. In the flue for an entirely noncombustible sample.

3. In the fuel for a sample consisting of 1 in. vegetable fiberboard insulation clipped to the deck.

4. In the flue for the Lexsuco sample.

5. In the flue for 1 in. vegetable fiberboard insulation strip mopped to the deck with asphalt at the rate of 12 lb asphalt per square.

BIRD 013964

6. Standard ASTM curve, for comparison with No. 1.

These results showed that the Lexsuco construction which was tested contributed substantially less heat within the furnace than did the vegetable fiberboard panel clipped directly to the deck.

B. Metal Roof Deck Test Structure

A review of observations recorded on Appendix Sheet 9 will show that flaming under the roof did not advance beyond 57 ft from the firing end. Vigorous flaming under the deck ended between ten and eleven minutes after the start of the test, although some intermittent flaming at isolated locations was reported until the end of the 30 minute test.

It is interesting to note that in this test, practically all gases given off around the edges of the firing end of the structure were white, similar to steam in appearance, as contrasted with black and yellow fumes produced in previous tests when asphaltic material was present between the insulation and the deck. The white smoke was generally confined to the firing end of the structure and was in considerably less volume than when asphaltic materials were present. Throughout the test there was no appreciable volume of smoke which, in an actual fire, would interfere with manual fire fighting. Gasoline exposure burners were visible throughout the test.

Appendix Sheet 8 shows pictures taken during the test and some of the damaged purlins, following the test.

Appendix Sheet 10 shows time-temperature curves plotted for various significant points in the structure. It will be seen that the average temperature at P2 and P3 rises above the standard ASTM curve because of the contribution from above the deck in this region.

Curves showing steel and air temperatures at P7 indicate the lag due to thermal inertia of the steel.

As an indication of the temperature gradient between roof and floor, the curve for a point 5 ft below P7 may be contrasted with that for a point 2 in. below.

Appendix Sheet 11 (parts a, b, and c), shows the temperature gradients which existed within the structure at 10 min, 20 min, and 30 min for the Lexsuco test, the blank noncombustible test, the test of vegetable fiberboard insulation clipped to the steel deck, vegetable fiberboard strip mopped (12 lb asphalt per 100 sq ft) to the deck and a 2-ply, 3-mop vapor barrier with vegetable fiberboard.

BIRD 013965

Appendix Sheet 12 shows photographs of three-dimensional models of time, temperature and distance for the five tests mentioned above. The difference in volume between any test and the blank gives an indication of the amount of heat contributed by the sample.

VI DISCUSSION

A. Results of the Construction Materials Calorimeter tests (Appendix Sheet 7) clearly show that the Lexsuco construction contributed less heat than did the vegetable fiberboard insulation clipped to the deck. No attempt was made to evaluate the Lexsuco test in absolute terms of Btu/sq ft/min.

Following the Calorimeter test, the sample was opened and examined in order to compare it with the vegetable fiberboard sample. While the latter was charred completely through over a large area, the Lexsuco construction remained largely intact. Charring did not penetrate more than 50% into the insulation.

B. Large Scale Tests

1. The photographs on Appendix Sheet 8 show purlin and steel deck damage which was confined to the firing end of the large structure. Only four purlins were damaged beyond reuse, as compared with seven for vegetable fiberboard clipped to the deck.

2. The following summarizes the condition of the insulation on the steel deck after the test:

a. Center Line P16 - P15 - Sample 1 sq ft Koroseal Vapor Barrier gone as well as most of the Lexsuco Adhesive. Coked residue of Koroseal and Lexsuco Adhesive shiny black with a metallic appearance. Insulation discolored from dark brown reducing to normal in color at 50% of thickness.

b. Center Line P12 - P13 - Same as (a) except coked residue duller in appearance.

c. Center Line P9 - P10 - Same as (b) except although depth of discoloration was the same, it was much darker in appearance.

d. Center Line P7 - P8 - Coke residue same as (c). Insulation charred to a depth of 1/8 in. and discolored 5/8 in.

e. Center Line P4 - P5 - Same as (d) except insulation charred to a depth of 3/8 in. and discolored 5/8 in.

BIRD 013966

f. Center Line P2 - P3 - South Side - Insulation completely charred but still intact (reduced to 50% thickness). The Lexsuco Adhesive used to attach the felt to the insulation still adhered to the felt and retained its plasticity.

3. It is significant that at no time during this test was it necessary to apply water to the wooden protective shield at the exit end of the structure, although in all previous tests such protection was needed.

4. From the curves on Appendix Sheet 10, it will be seen that contribution from the roof was a maximum around 15 minutes and then diminished slowly. (Air temperature under P7.)

The increase in average temperature at P2 and P3 after 20 minutes is explained by the sag which occurred in the first 20 ft bay, bringing these thermocouples closer to the exposure fire.

5. At first glance, it may seem paradoxical that Appendix Sheets 11 and 12 show lower temperatures in the first 40 ft of structure at 20 and 30 minutes for the vegetable fiberboard test than for the Lexsuco test. However, this phenomenon is easily explained. After 20 minutes, practically all the vegetable fiberboard alone had been charred out at the firing end, thus reducing the insulation value and causing a substantial heat loss, reducing temperature within the structure.

On the other hand, temperatures at the firing end in the Lexsuco test remained at a level above that of the blank noncombustible roof.

VII CONCLUSIONS

A. Based upon these test results, it is concluded that the Lexsuco Vapor Barrier-Adhesive combination tested (see Section IV of this report) makes no contribution to the spread of fire within a building. When used with combustible 1 in. vegetable fiberboard insulation, extensive spread of fire beyond the zone of direct exposure did not occur under the test conditions.

B. Any of the following combinations, which Lexsuco, Incorporated is prepared to furnish, would contribute no more to fire spread within a building than the construction tested:

1. Same as construction tested except glass fiber insulation or cellular glass insulation substituted for vegetable fiberboard.

BIRD 013967

2. Same as construction tested except Lexsuco clips used instead of Lexsuco Adhesive to fasten down the Koroseal Vapor Barrier and insulation. The insulation could also be glass fiber, as described in 1 above.

3. Any of the foregoing without the Koroseal Vapor Barrier.

4. Any of the foregoing with standard built-up weather surfaces instead of asbestos felt, Glasfab and Lexsuco Fibrated Roof Coating.

C. The small volume of smoke and vapor noted during the test would not interfere with manual fire fighting operations.

D. Where the Lexsuco constructions are used in conjunction with a noncombustible supporting structure, automatic sprinklers may be omitted where permissible under the standards of the Factory Mutual Engineering Division.

FACTORY MUTUAL LABORATORIES

Norman J. Thompson,
Director

MHN:MR-330

TESTS COMPLETED: May 12, 1955

RESEARCH NOTEBOOK NO. 116

TESTS BY: P. E. Cotton,
W. E. Durkee, and
Test Station Staff

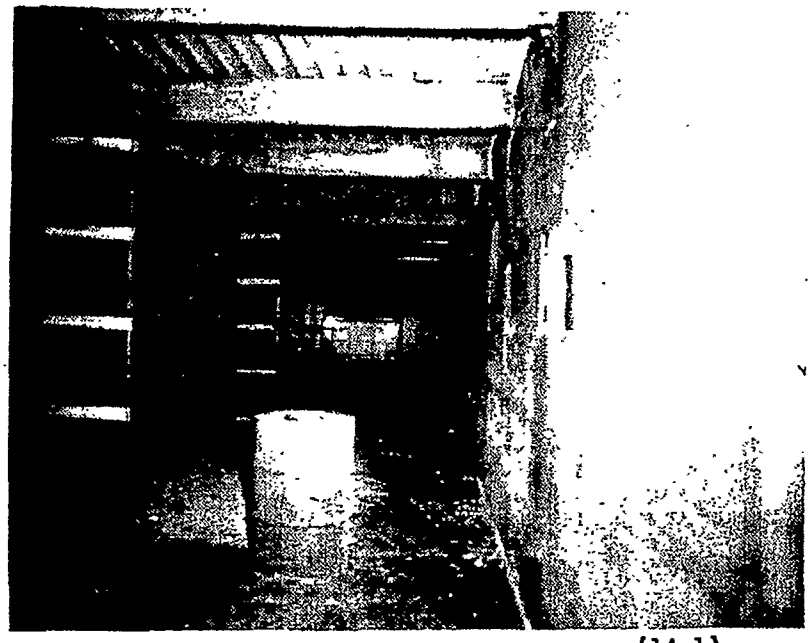
REPORT BY: M. H. Nickerson

ATTACHED: Appendix Sheets 1 - 12

BIRD 013968

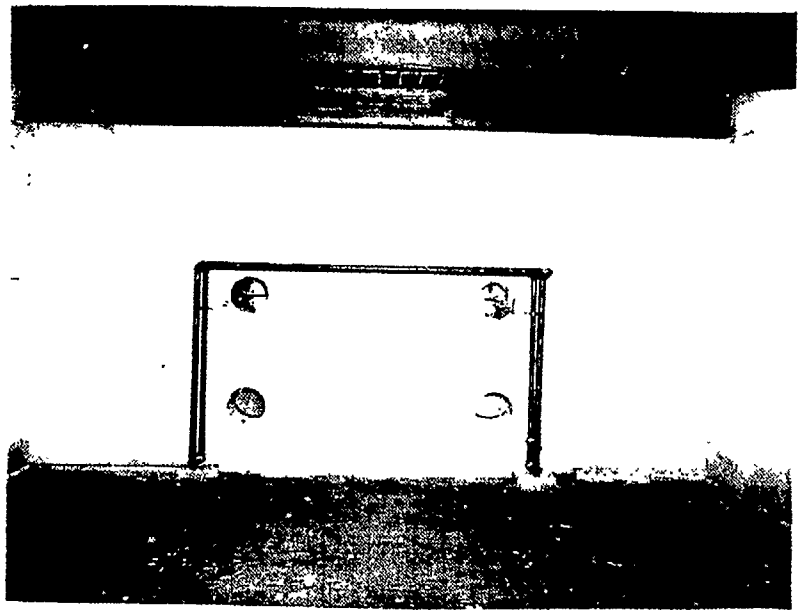


EXTERIOR VIEW OF METAL ROOF DECK TEST STRUCTURE FROM FIRING END (47-73)



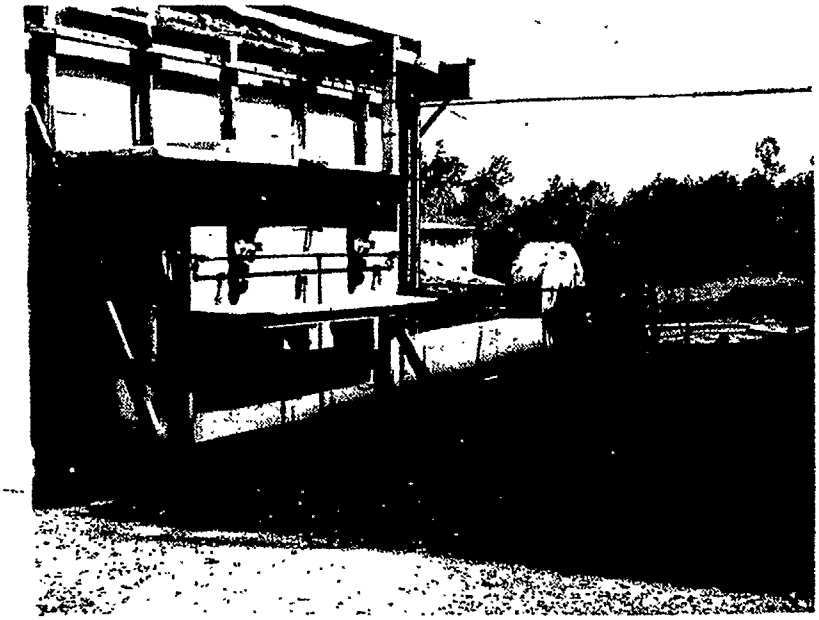
(14-1)

INTERIOR VIEW OF METAL ROOF DECK TEST STRUCTURE FROM EXIT END 0 MIN. - 15 SEC. AFTER START OF TEST



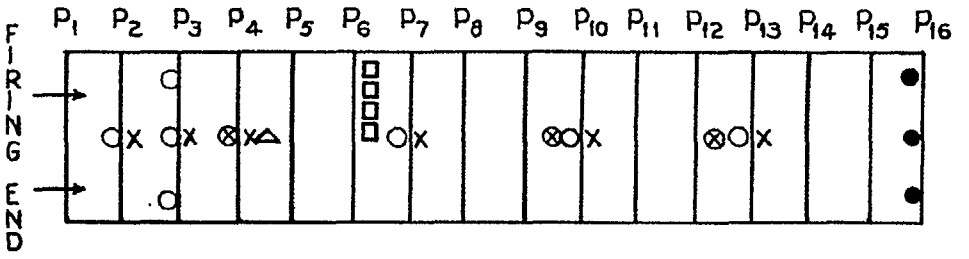
(47-74)

VIEW OF EXPOSURE BURNERS



(47-192)

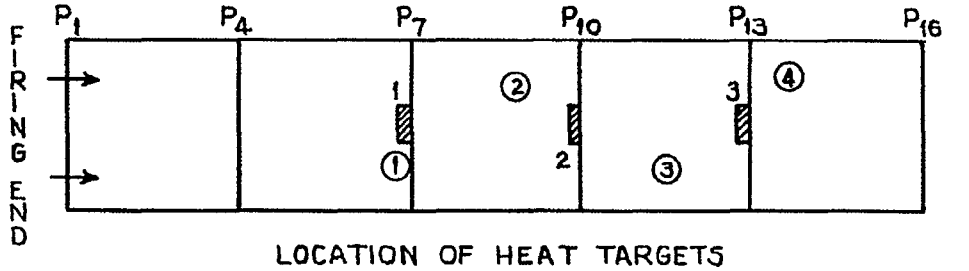
VIEW OF AIR SUPPLY DUCTS
AND BURNER CONTROLS



THERMOCOUPLE LOCATIONS
METAL ROOF DECK TEST STRUCTURE

KEY

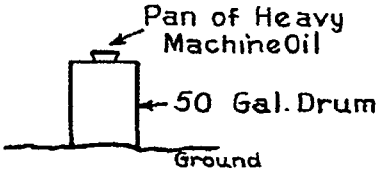
- ○ In Air 2 In. Below Lower Purlin Flange
- × Peened Into Lower Flange of Purlin
- ⊗ At Under Surface of Deck
- △ Peened Into Web of Purlin
- ● In Air 6 In. Below Bottom Edge of Exit Curtain
- □ In Air 1 Ft., 3 Ft., 5 Ft., And 7 Ft. Below Bottom Flange of Purlin 7



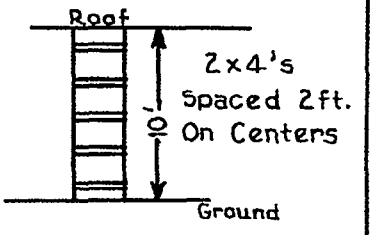
LOCATION OF HEAT TARGETS
METAL ROOF DECK TEST STRUCTURE

KEY

- Ladder Target
- ○ Oil Target



OIL TARGET



LADDER TARGET

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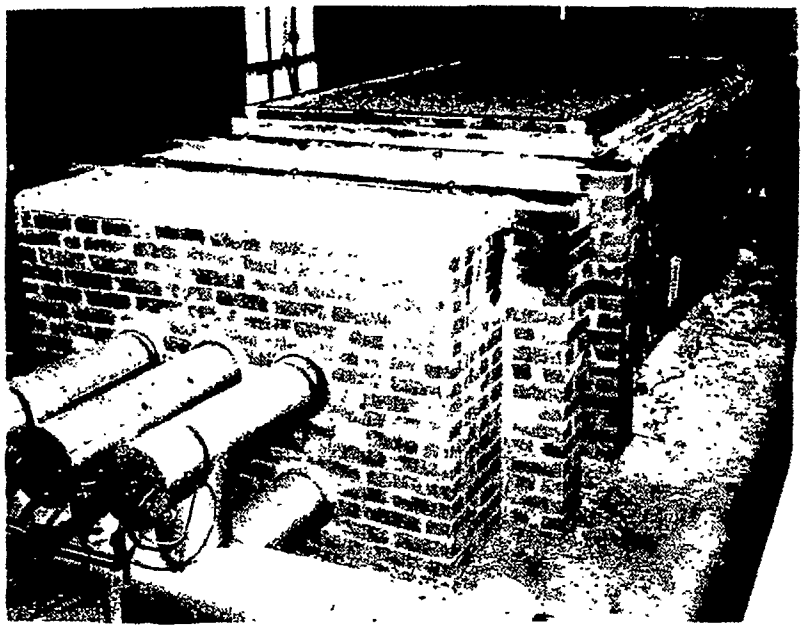
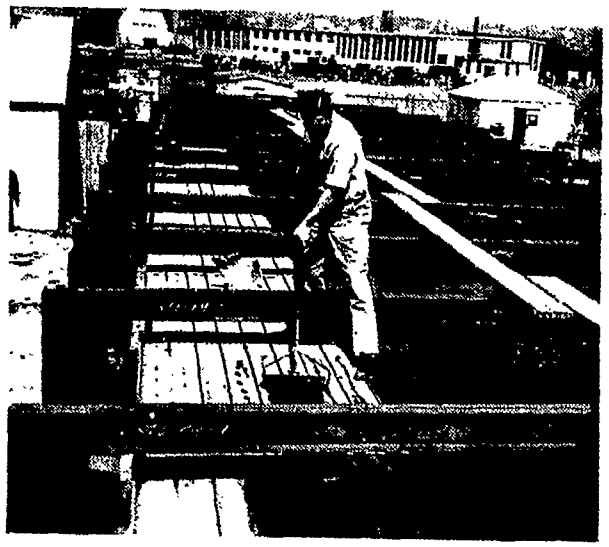


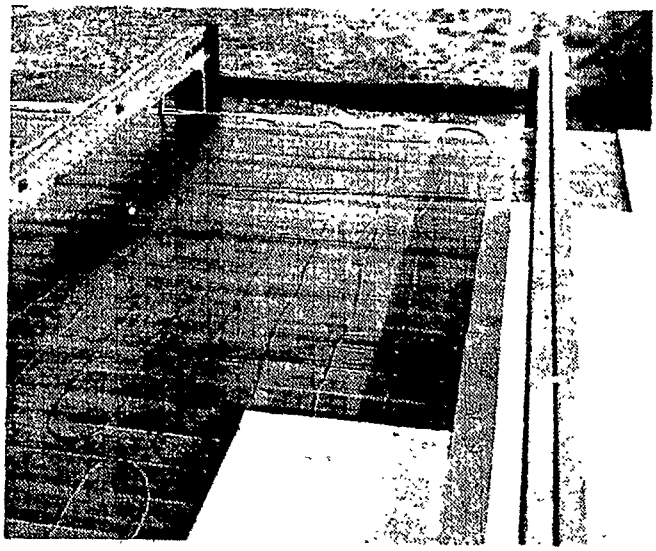
(50-1)

CONSTRUCTION MATERIALS CALORIMETER



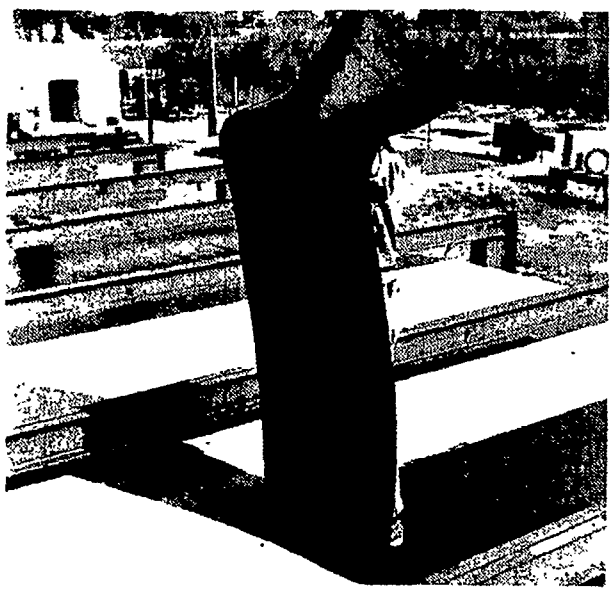
Photograph No.1 (14-16)

SHOWING APPLICATION OF LEXSUCO ADHESIVE AND KOROSEAL VAPOR BARRIER



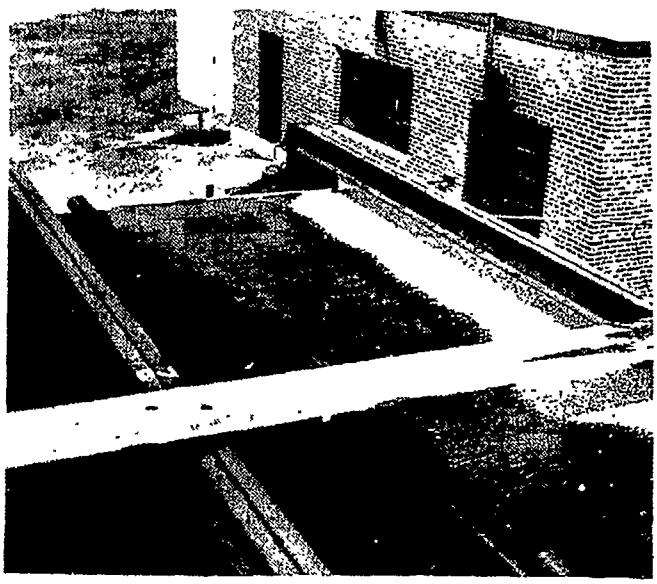
Photograph No. 2 (14-21)

SHOWING APPLICATION OF LEXSUCO ADHESIVE AND VEGETABLE FIBER BOARD INSULATION



Photograph No.3 (14-24)

SHOWING APPLICATION OF 30 LB. ASBESTOS FELT



Photograph No.4 (14-18)

SHOWING APPLICATION OF GLASFAB, LEXSUCO FIBRATED ROOF COATING AND GRAVEL

Compiled by
Lexsuco, Inc.
Cleveland 3, Ohio

Lexsuco Roof Specifications

	Material	Weight per square (pounds)
1.	Solid coat of non-flammable Lexsuco Adhesive applied to 1-1/2 steel roof deck (250 sq ft per gal coverage)	1.7*
2.	Koroseal Vapor Barrier rolled into non-flammable Lexsuco Adhesive with 1 in. minimum laps and secured with same adhesive	2.8
3.	Ribbons of nonflammable Lexsuco Adhesive 6 in. apart applied to Koroseal Vapor Barrier (250 sq ft/gal coverage)	1.7*
4.	1 in. plain wood fibre insulating board laid into ribbons of nonflammable Lexsuco Adhesive for securement to Koroseal Vapor Barrier	156
5.	Solid coat of nonflammable Lexsuco Adhesive applied to 30 lb Asphalt Asbestos Felt (125 sq ft/gal coverage)	3.4*
6.	30 lb Asphalt Asbestos Felt secured to wood fibre insulation with nonflammable Lexsuco Adhesive	32
7.	1 ply of Glasfab laid dry	1.3
8.	Glasfab impregnated and covered with Lexsuco Fibrated Roof Coating (3-1/2 gal/square)	28
		226.9 227
9.	Roof covered with gravel (350 lb/square)	350
		577

*Dry Adhesive Film

Materials Specifications

NONFLAMMABLE LEXSUCO ADHESIVE R907T

Description	Lexsuco Adhesive is a tacky liquid bonding material readily applied with squeegee, brush or roller coater. Manufactured for Lexsuco, Inc. by B. F. Goodrich Co.
Base	Reclaimed Rubber
Color	Black
Total Solids	39-42%
Solvent	Chlorinated solvent, nontoxic

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Film Life	Indefinite...compounded with antioxidants
Flexibility	Does not become brittle at low temperatures.. remains elastic indefinitely.
Strength	100 lb/sq in.
Water Resistant	Yes
Fire Retardant	Yes - dry film will not support combustion..chars at 850-900 F.

KOROSEAL VAPOR BARRIER

Description	Koroseal Vapor Barrier is a specially compounded tough, fire-retardant plasticized poly-vinyl chloride material manufactured for Lexsuco, Inc. by B. F. Goodrich Co.
Color	Opaque Black
Film Thickness	0.004 in. (4 mils)
Size of roll	32 in. wide x 405 lineal feet
Square feet/roll	1080
Weight/roll	30
Specific gravity	1.27
Vapor Permeability	Less than 0.1 perms (grains per sq ft per hour per inch of mercury vapor pressure difference)
Fire-Retardancy	Will not support combustion, chars and decomposes into ash at 350 to 400 F.
Tensile Strength	2000 lb/sq in. at 70 F.
Tear Strength	Excellent; 400 grams at 73 F by Elmendorf Tear Method
Aging Resistance	Excellent; no oxidizing, checking, cracking or peeling.
Puncture Resistance	Good
Abrasion Resistance	Good (similar materials used for flooring).
Flexibility	Superior to rubber; flexibility at all normal working temperatures as low as -10 F.
Chemical Resistance	High resistance to attack by most acids, alkalies and salt solutions

ASPHALT ASBESTOS BASE FELT

Asbestos felt resists drying out action of the sun because the asbestos fibres cannot act as a wick to dissipate asphalt, and asbestos fibres have greater life than rag fibres.

Square feet/roll	216 (2 squares coverage)
Weight/roll	64 lb
Width of roll	32 in.

GLASFAB

Description	Glasfab is an inert waterproofing membrane loom woven entirely of inorganic Fiberglas yarn. It has a smooth, flat open-mesh weave and the clean nonirritating textile fibres retain their high flexibility at all normal working temperatures.
Weight/sq ft	0.2 ounces
Thread count	20 x 20
Tensile Strength	94 lb/sq in.

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Char resistance	Unaffected by heat up to 1000 F.
Compatibility	Compatible with all accepted waterproofing and coating compounds.
Flexibility	No cracking of the combination of coating and Glasfab takes place on bending over a 1/32 in. mandrel through an arc of 180° in one direction and then through 360° over the same mandrel in the opposite direction.
No wicking action	Glasfab does not exhibit capillary action as its fibres are not hollow.
Open weave	Develops keying action of coating from both sides of Glasfab.

LEXSUCO FIBRATED ROOF COATING

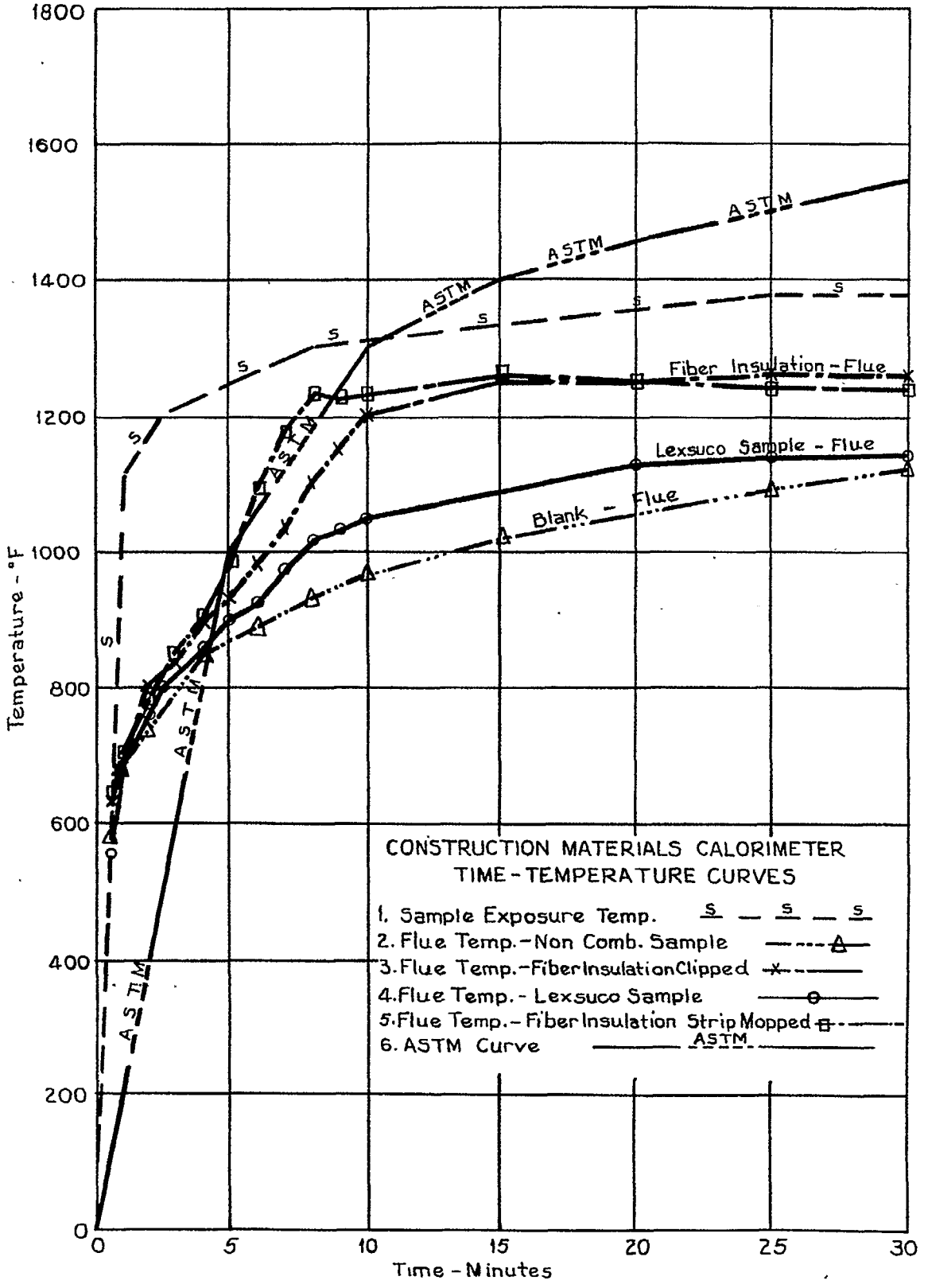
Description	Lexsuco Fibrated Roof Coating consists of homogeneous mixture of Asphalt Cut-Back and Asbestos Fibres.
Asphalt Cut-Back	Viscosity 150-225 Saybolt Furol at 122 F. Softening point of residue between 160 - 180 F.
Asbestos Filler	4 to 6%. 7D Canadian Fibre or equivalent.

PLAIN VEGETABLE FIBERBOARD INSULATION

One inch homogeneous thickness of vegetable fibres compressed into rigid insulating board.

Size of sheets	2 ft x 4 ft
Weight/Sq Ft	1-1/2 lb

BIRD 013976



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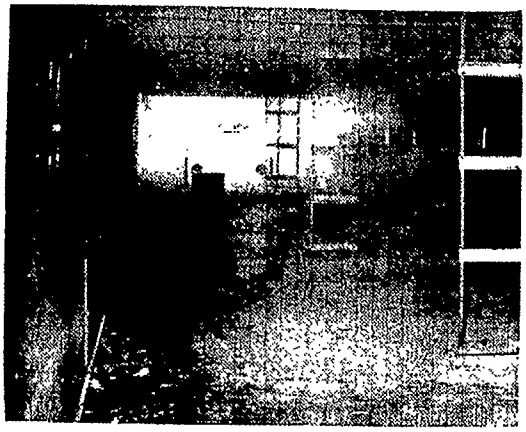
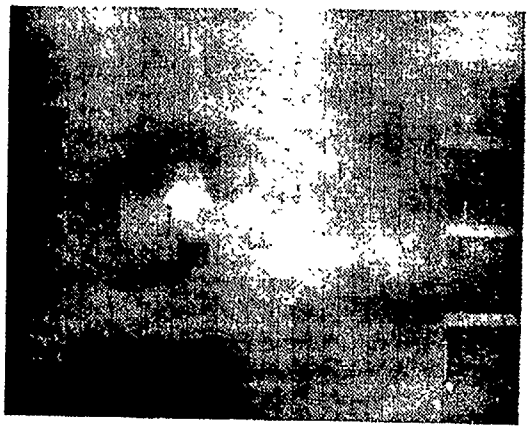
FACTORY MUTUAL LABORATORIES
Norwood, Mass.

Report No. 12911
July 28, 1955

BIRD 013977



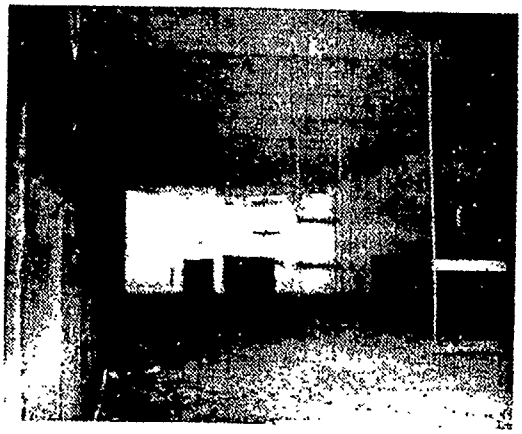
4 Min.



10 Min.



15 Min.



20 Min.



25 Min.

VIEWS OF INTERIOR OF STRUCTURE DURING TEST, SHOWING EXCELLENT VISIBILITY. NOTE EXPOSURE FIRES VISIBLE THROUGHOUT THE TEST.

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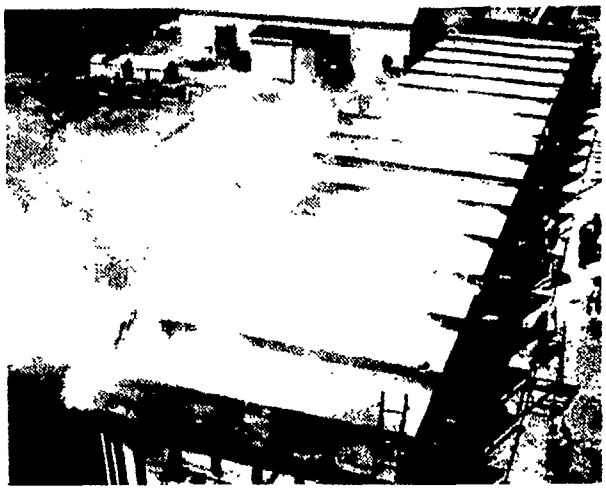

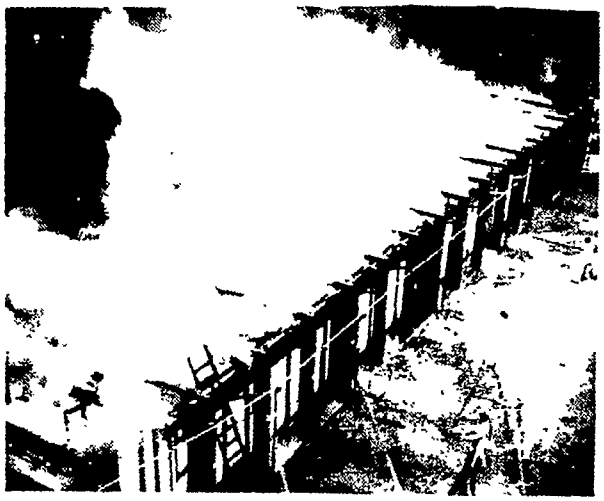

LEXSUCO TEST

TWO PLY THREE MOP

These pictures show the absence of dense volumes of smoke during the Lexsuco Test as compared with the test of a two ply three mop vapor barrier containing asphalt.



EXTERIOR VIEW OF SAG IN ROOF BETWEEN P_2 & P_3 FOLLOWING TEST

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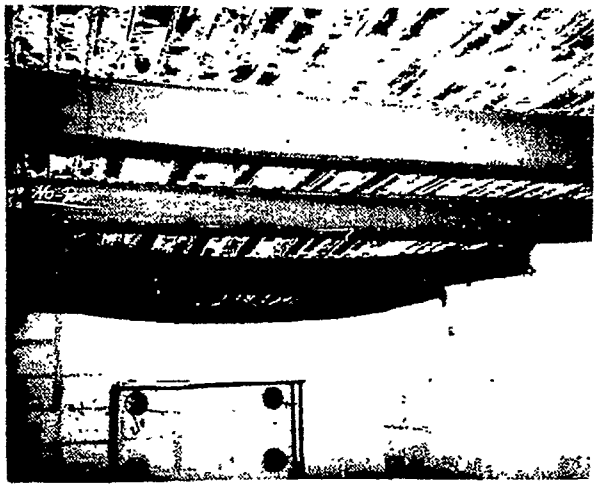

INTERIOR VIEW, SHOWING SAG AND DAMAGED PURLINS

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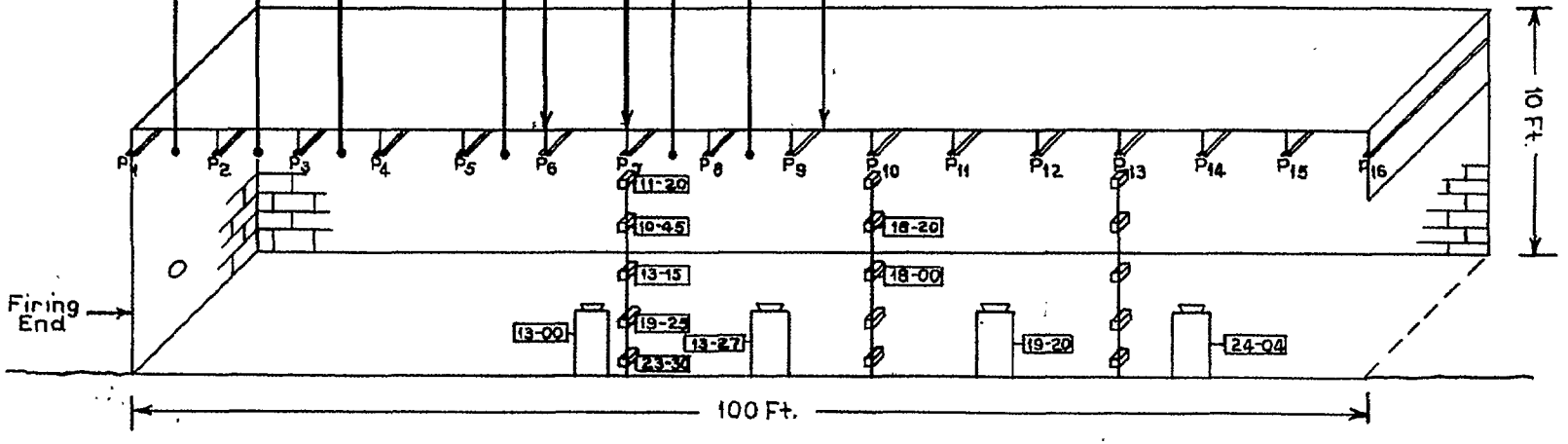
Transcript Of Significant Observations During Test

Min.-Sec.	
0 - 00	Burners On
3 - 10	Traces Of Flame Under Deck Between P_1 & P_2
6 - 0	Flames Extending Beyond P_3
6 - 30	Flaming Established Between P_2 & P_3
7 - 45	Flaming Established Between P_3 & P_4
9 - 00	Flaming Established Between P_5 & P_6
10 - 15	Blanket Of Fire 2Ft. Deep Under Deck As Far As
10 - 25	Large Blister (About 4 In. High) Under Surface, Nort Side, Between P_3 & P_4. Volumes Of White Vapor Fro Edges Of Roof At Firing End & Sides. Trace Of Sag Between P_2 & P_3
12 - 00	No General Flaming Now Under Deck, But Flames Race Across Area To P_7 At Infrequent Intervals
13 - 15	Occasional Flames Between P_7 & P_8
15 - 00	Deep Sag Between P_2 & P_3
17 - 00	Traces Of Flame Between P_8 & P_9
29 - 00	Local Area Of Flaming 3 Ft. Beyond One End Of P_9 (This Is Greatest Distance Flaming Noted, About 57 Ft.)



SECTION THROUGH TEST STRUCTURE
ALONG THE CENTERLINE

Heat Targets Shown Shematically With Times
In Min.- Sec. At Which They Ignited

SCHEMATICALLY

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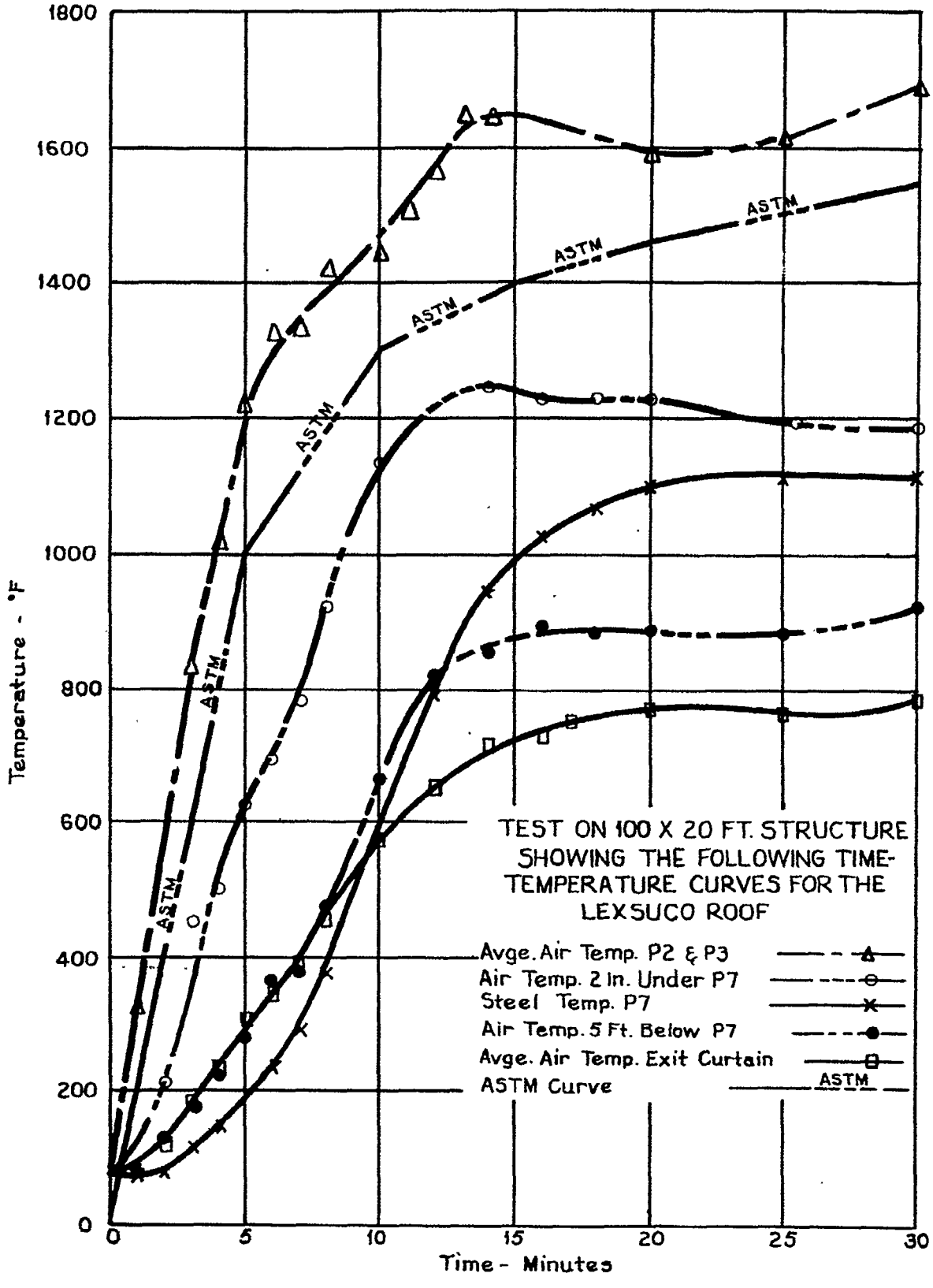
Appendix Sheet 9

BIRD 013980



DHJ - 7-25-55

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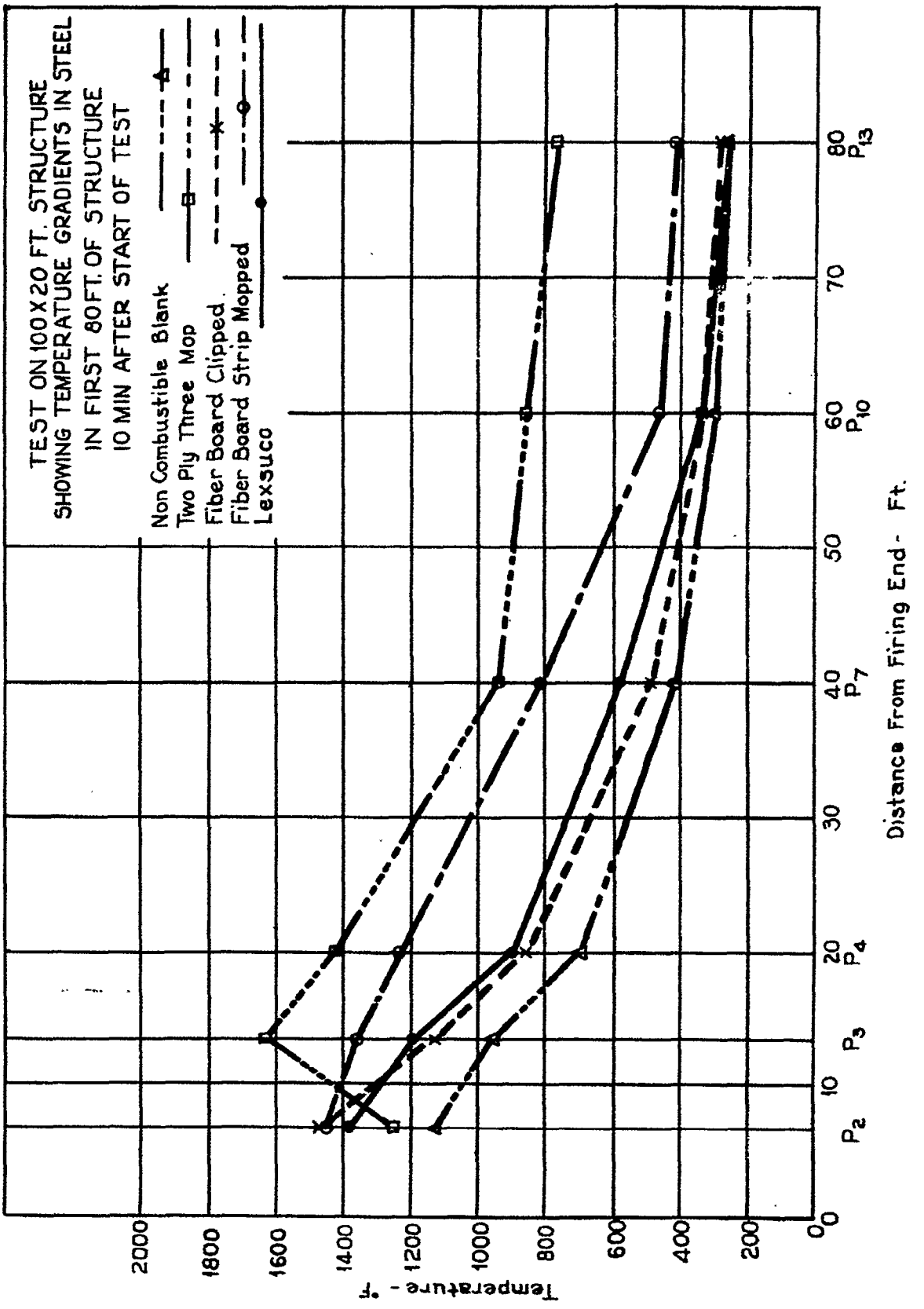
BIRD 013981



DHJ-7-25-55

FACTORY MUTUAL LABORATORIES
Norwood, Mass.

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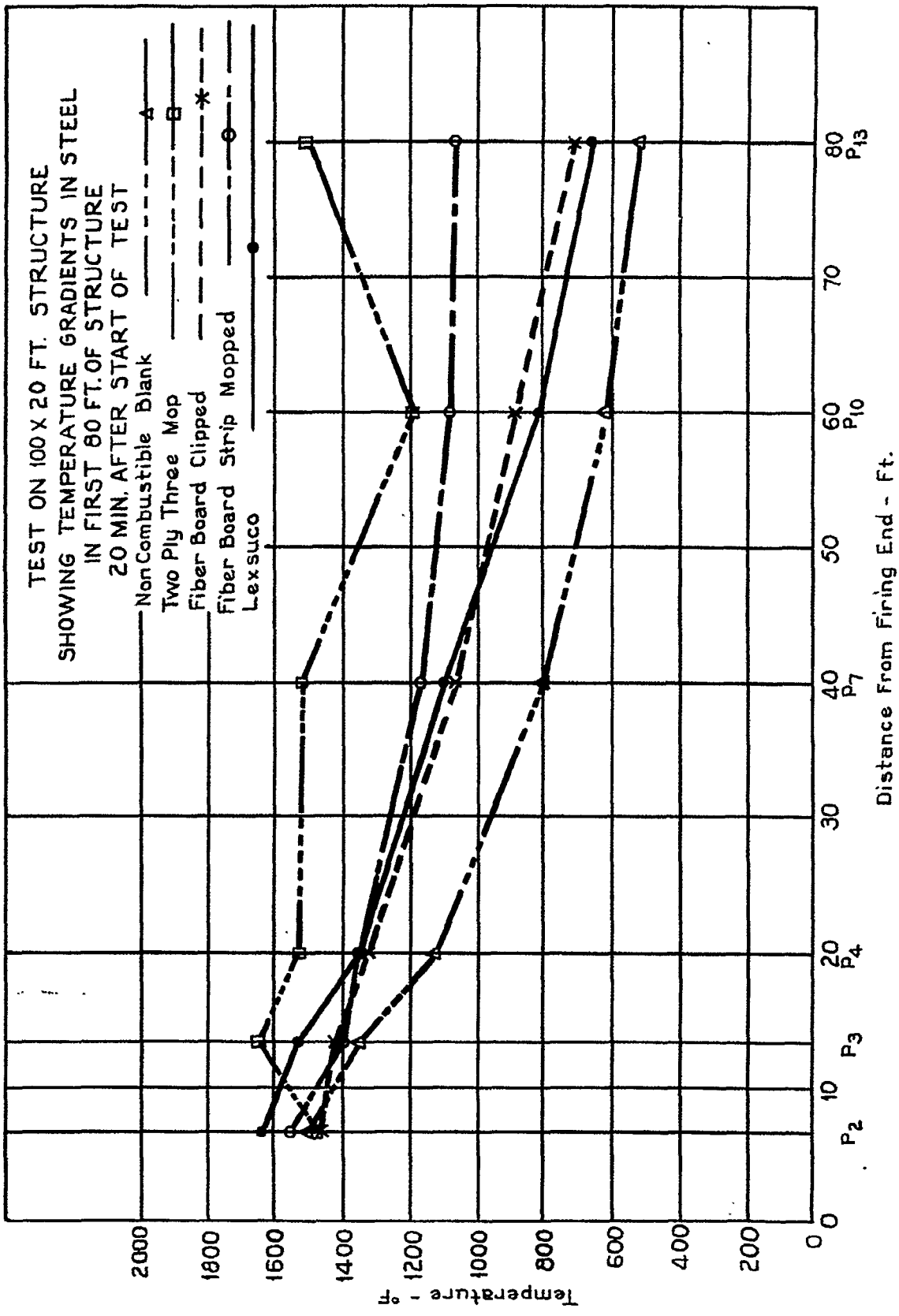
BIRD 013982



DHJ - 7-25-55

FACTORY MUTUAL LABORATORIES
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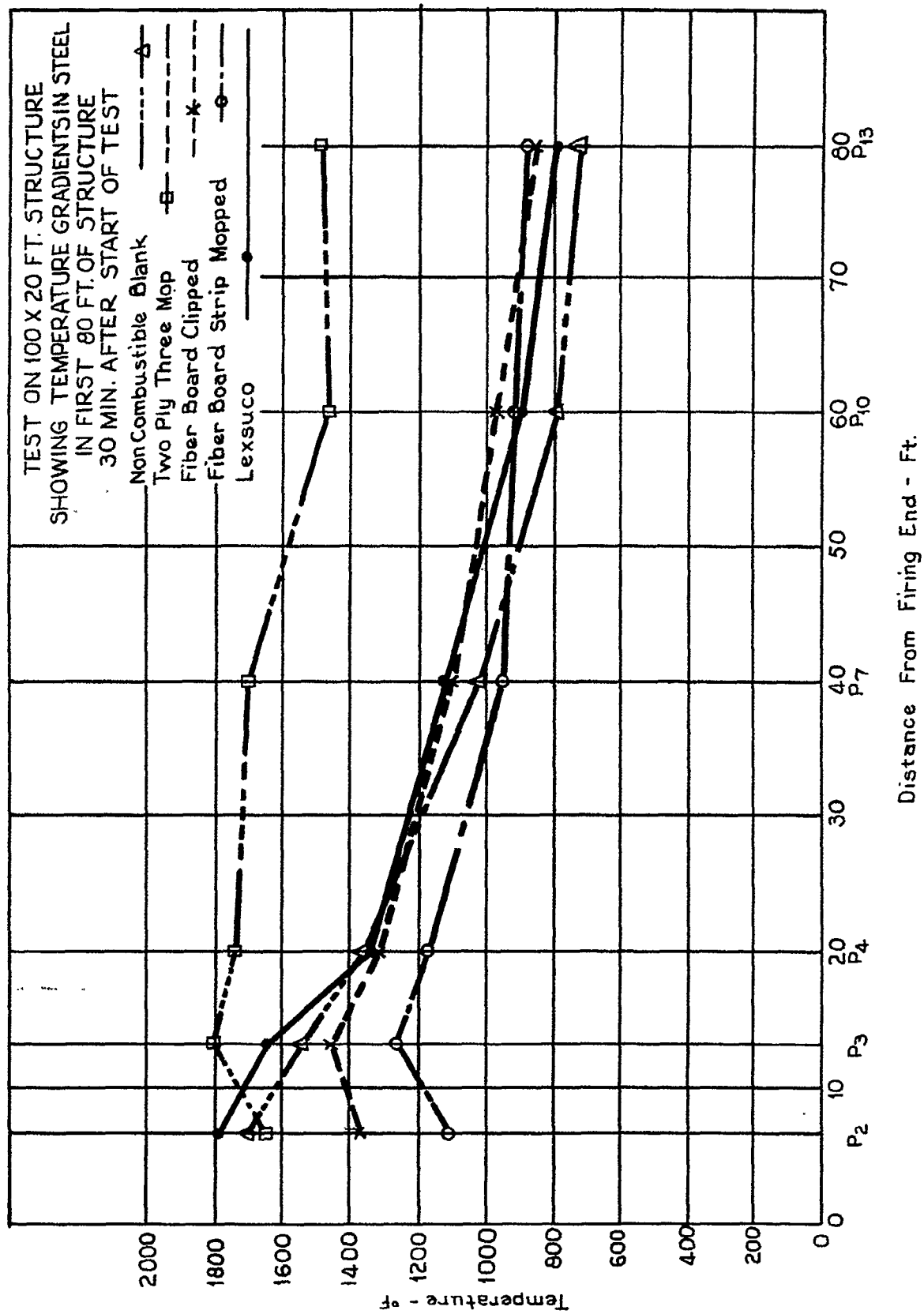
BIRD 013983



DHJ - 7-26-55

FACTORY MUTUAL LABORATORIES
Norwood, Mass.

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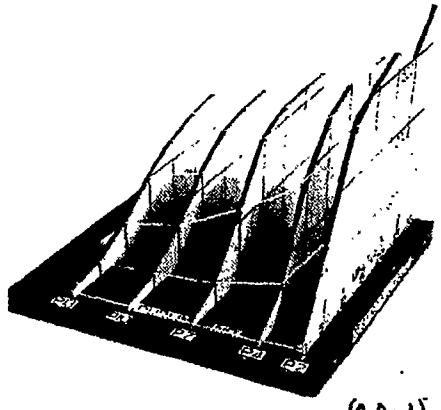
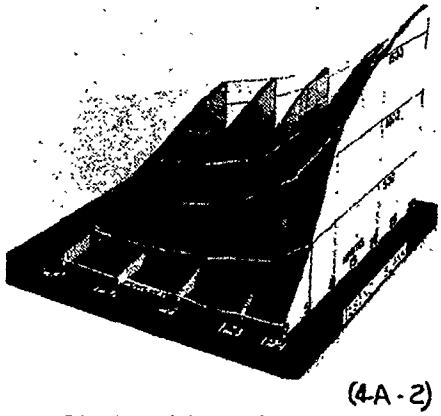
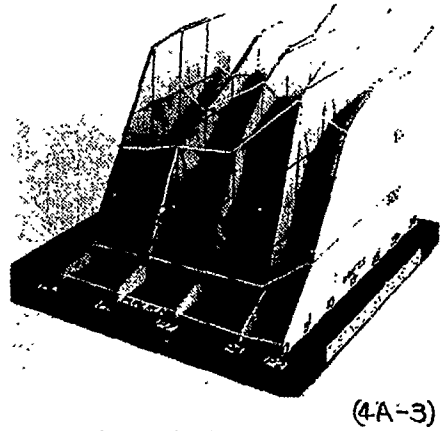
BIRD 013984



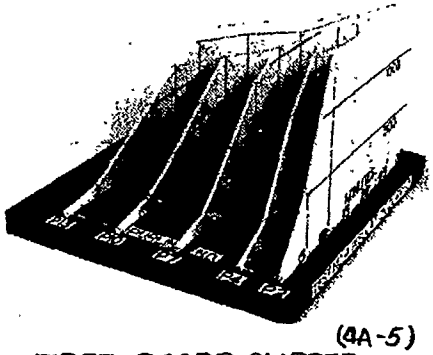
(4A-1)
LEXSUCO



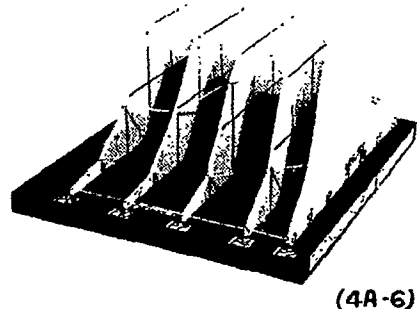
(4A-2)
NONCOMBUSTIBLE BLANK



(4A-3)
TWO PLY THREE MOP



(4A-5)
FIBER BOARD CLIPPED



(4A-6)
FIBER BOARD STRIP MOPPED

METAL ROOF DECK TEST STRUCTURE
THREE DIMENSIONAL MODELS SHOWING CONTINUOUS
TIME-TEMPERATURE PICTURE FOR COMPARISON

FACTORY MUTUAL LABORATORIES
Norwood, Mass.

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