Cover letter + return post card in book — also Cover copy (see layout)

DATE May 19, 1970

JOB Space Heating Brochure

INSIDE FRONT COVER — table of contents

TITLE: (A) A New Answer To Old Problems In Heating System Design

COPY: Therminol high temperature liquid phase heating offers new answers to questions you may be facing in heating system design. Questions like:

* How do you lower the capital investment for heating/cooling equipment?
* How do you cut operating costs -- particularly rising labor expenses?
* How do you save valuable floor space?
* How can your system meet rapid changes in heat demand?
* How can heating system safety be maximized?

A liquid phase system designed around Therminol heat transfer fluid -- in a new building or in the modernization of an old one -- may be your answer to many or all of these questions.

0431772

Monsanto

TOWOLDMON0032120
WATER_PCB-00016589

plus - 2 photo diagrams

PAGE 1

TITLE: Convert To Therminol For Dramatic Savings

COPY: (Bold-face)

When the need to modernize a heating system arises, you will find that Therminol liquid phase heating offers:

* Superior operating efficiency.
* ~~Elimination of licensed boiler operators in many cities~~.
* Maintenance reduced by up to 80 percent.
* Easy conversion and installation, in less space than you are using now.

B

SUBHEAD: Operating Savings

COPY: The use of high temperature Therminol eliminates the need for system pressurization. A high temperature primary loop (see diagram NEXT PAGE below) is vented to atmosphere, and thus the heaters usually are not classified as pressure vessels. This ~~in turn~~ eliminates the need for ~~a crew of~~ licensed ~~low pressure~~ boiler operators, a major cost factor in ~~the cost of~~ many old systems, for the operation of other equipment

SUBHEAD: Cut Maintenance Costs As Much As 80%

COPY: Operation of the new plant is entirely automatic except for preventive and operational maintenance and system shutdown and startup. These operations can be performed by the regular building maintenance staff.

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SUBHEAD: Easy Conversion and Installation

COPY: Installation basically involves replacing steam boilers with fluid heaters. A ~~steam generator~~ portable heating unit can furnish hot water during the conversion to minimize inconvenience to your building's occupants.

In a typical installation Each of the fluid heaters are connected to heat exchangers. These converters generate hot water or steam for building heating ~~and~~ domestic hot water heating ~~and steam for~~ kitchen equipment, garage heating systems and ~~the~~ building ventilation systems. Two pumps recirculate the fluid between heaters and converters.

SUBHEAD: Space No Problem

COPY: All system changes can be confined to the previous boiler room area. Existing piping and equipment for the secondary services, including building heating service pumps, domestic hot water pumps, and condensate receivers remain in place. Thus, your building's services can continue to utilize water and steam as before.

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CUTLINES

(B)

River House Cooperative Apartments - Detroit

plus caption

This system, which has been in operation for more than five years, provides an annual savings of $36,000* compared to the old steam system; $25,000 through the elimination of licensed boiler operators and $11,000 through reduced fuel costs. The latter saving results from an increase in overall efficiency from 60 percent with the old system to 83 percent with the new, and from switching to gas firing.

*In terms of 1965 dollars

Holy Cross Hospital - Detroit

plus caption

The conversion of this 250-bed hospital addition to Therminol liquid phase heating yielded an annual savings of $40,000 in operating costs. This saving was estimated to pay for the cost of conversion in three years. Moreover, the improved efficiency of the system added additional savings through lower fuel costs. J. P. Noble, Detroit consulting engineer, received ~~the first honor~~ an achievement award for mechanical engineering in the 1968 awards competition of the Consulting Engineers Council of Michigan for his design of this system.

plus - caption + legend -

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TITLE: Total Therminol Systems In New Buildings

COPY: From open flame, to steam, to liquid phase fluids. Unhappy with early direct-fired heating, engineers centralized the ~~fire~~ and used high pressure steam to bridge the heating gap. Now you can bridge that gap more efficiently with new, high temperature liquid phase heating. Some examples of the ways others have designed Therminol into their heating systems are detailed below.

SUBHEAD: Therminol Versus Steam In An Eleven Story Hospital

COPY: Kaiser Engineers sought the most economical heating system for their Oakland Tower addition to the Oakland Hospital. Consequently, they made a detailed analysis of steam versus Therminol for their 243,000 square foot expansion. Their findings:

* Therminol's initial installation cost is $21,850 less than steam; a 17 percent savings.
* Therminol's operating cost is $33,019 less than steam; a 55 percent annual savings.

These savings came primarily from Therminol's lack of pressure and no need for licensed boiler operators plus lower replacement costs. They projected a 40 percent replacement of heavy equipment for the steam

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system over twenty years compared to only a three percent annual fluid make-up for the Therminol system.

In addition to these outstanding cost savings, the study found Therminol:

1. Needed less mechanical equipment space.
2. Developed higher thermal efficiency.
3. Provided excellent response to building load changes.
4. Created no venting problems.
5. Offered increased safety because of the non-pressure characteristics of the system.

On this basis, ~~one~~ hospitals have Therminol systems incorporated into their designs, ~~one is now under construction.~~

On this basis, a number of hospitals have used Thinminol in their heating systems or incorporated into their designs

Diagrams detailing the design of these two systems are on the next page

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AKRON CUTLINE

PHOTO

(D)

This Monsanto office and laboratory building in Akron, Ohio, was the first to use a high temperature, non-pressurized, fire-resistant fluid system for all direct heat needs. This completely automatic and unattended system provides ~~These include~~ refrigeration, pre-heat, re-heat, base-board, steam generation and hot water heating. ~~The completely automatic and unattended system~~ Moreover, it utilizes conventional off-the-shelf heating and air conditioning hardware.

Installation costs were $10.50 per square foot, (less than 18) ~~or 15~~ percent of the total building cost.

~~AKRON~~

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PAGE 3

(E)

TITLE: Therminol For Heating And Cooling In Campus-Type Buildings

COPY: In addition to high-rise structures, Therminol heating systems offer considerable savings for campus-type buildings. Ferris & Hamig, Inc., St. Louis consulting engineers, prepared a feasibility study comparing a conventional system with high pressure steam distribution to four varieties of Therminol systems.

The Monsanto office complex in Creve Coeur, Missouri, was used as a basis for comparison. This complex comprises a powerhouse and five office buildings totalling 425,000 square feet and including a cafeteria and kitchen.

Here's a summary of the five systems and their comparative costs:

System	Description	Initial and Operating Cost*
1.	High pressure steam distribution to the five office buildings; ~~with~~ steam pressure reduced in each building to 10 lbs. pressure. Low pressure steam was distributed to heating coils in the air conditioning units. A central electric motor driven centrifugal water chilling system with condensing water pumps and cooling tower would be installed in the powerhouse. Chilled water mains would be run parallel to the steam mains in the tunnels with braches to the air conditioning units in each building.	$86,997

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2. Varies from No. 1 in that Therminol heaters replace pressure boilers. Therminol supply and return piping are used in the tunnel with branches to each building.

   At each building a booster pump with a three-way valve would be installed to reduce the temperature of Therminol from 550° to about 275° The Therminol would then be pumped to heating coils in the air conditioning units. $82,555

   The water chilling system would be the same as in No. 1.

3. This system is the same as No. 2 except that centrifugal water chillers would be replaced by absorption units in the powerhouse; the cooling tower and condensing water pumps would be increased to reject the additional heat from the absorption units. $83,514

4. This system varies from No. 3 in that individual absorption units ~~will~~ be would installed in each building. Condensing water from a central cooling tower and condensing water pumps at the powerhouse ~~will~~ supply condensing would water through the tunnel to these units. $94,806

5. This system varies from No. 4 in that individual cooling towers and condensing water pumps would be installed in each building. $77,476

* These costs do not include savings in labor.

The report's conclusion: for this campus application, a Therminol heating system costs less than a conventional system using high pressure steam. And, in addition to eliminating an operating engineer on each shift, the Therminol system would offer: no trap maintenance, no water treatment and lower liability insurance rates.

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(F)

TITLE: Therminol FR-1

COPY: The Monsanto Therminol heat transfer fluids have been used for a number of years in a variety of heat transfer applications; from rubber rolling to food processing. Therminol FR-1 represents the best fluid for space heating systems.

Therminol FR-1 is unique. It permits installation of a non-pressurized system operating with a liquid which has no fire point and will not support combustion. Therminol FR-1 is so fire-resistant, it has been listed with Underwriters' Laboratory.

Still another unique property of Therminol FR-1 is its unusual chemical inertness. It is among the most oxidation-resistant compounds known. This inertness prevents the formation of oxidation sludges if the hot fluid comes in contact with air. This extends the useful service life of the fluid; occasionally allows economies in design. However, Therminol FR-1 is not intended for use in open vessels but in properly vented, closed systems.

Chemically, Therminol FR-1 is resistant to strong acids, mild alkalies and dilute solutions of strong alkalies.

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(6) (see layout, chart +3 figures) (side back cover) 8/10 type.

new prod. identity

therminol FR

SAFETY OF HANDLING

H

On the basis of animal toxicity studies, THERMINOL FR may be considered only slightly toxic from the standpoint of accidental massive skin exposure or accidental ingestion. Similarly, single exposures to high concentrations of vapors (when heated sufficiently to volatilize) or high concentrations of decomposition products (if the fluid is accidentally discharged into the fire chamber) are not serious hazards because the irritating character of such concentrations preclude voluntary exposure.

Repeated or prolonged skin exposure should be avoided since THERMINOL FR acts as a solvent for fats and oils of the skin. Removal of these natural, protective barriers can lead to drying and chapping such as occurs with exposures to paint thinners. More important, THERMINOL FR may be absorbed if it is allowed to remain on the unbroken skin. For these reasons, we recommend that the skin be washed with soap and water if there is contact. A skin burn resulting from accidental contact with hot fluid should be treated in the normal manner for any thermal burn due to hot oils.

Because of its low vapor pressure, there is no significant vapor inhalation hazard when THERMINOL FR is at room temperature. For example, there is no vapor exposure problem while transferring the fluid from its shipping container to the heat transfer system. On the other hand, the vapors emitted by THERMINOL FR heated to elevated temperatures are injurious on prolonged exposure. It is indicated that the "threshold limit value" or atmospheric vapor concentration which cannot be safely exceeded (on a daily basis) is 0.5—1.0 milligrams of THERMINOL FR vapor per cubic meter of air in the workroom. In heat transfer installations, the fluid must be used in a closed system free from leaks with the expansion tank vented to the outdoors. Accordingly, there should be little or no opportunity for workers to come in contact with vapors.

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(Cutline for p. 4 diagrams)

Diagrams used by Kaiser Engineers to compare the cost savings of a Therminol heating system (top) and a conventional steam system (bottom).

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TYPICAL PROPERTIES

Appearance	Clear, water-white oil.
Density @ 75 F.	11.5 lbs./gal.
Pour Point	+2° F.
Flash Point	360° F.
Flame Point	None to boiling
Autoignition Temperature	1206° F.
Boiling Range (10% to dry point)	620° F. to 680° F.

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PLEASE fill out and return this postage-paid card if you want to know more about Therminol high temperature liquid phase heating systems.

Send more information.

Have a fluid specialist call.

Name _____

Address _____

City, State, Zip _____

Phone No. _____

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