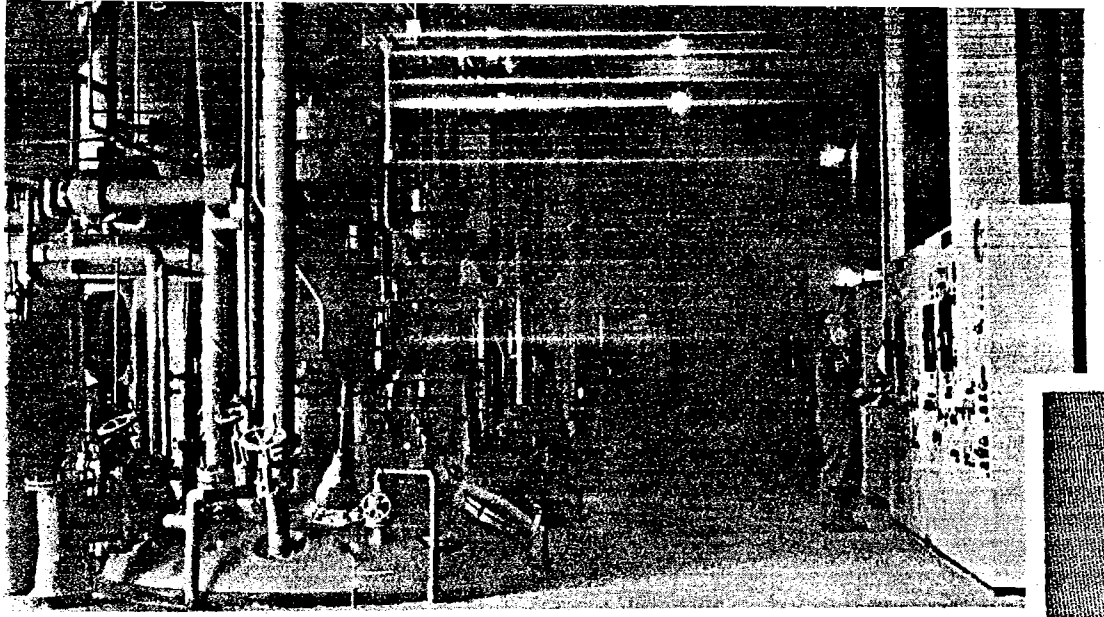
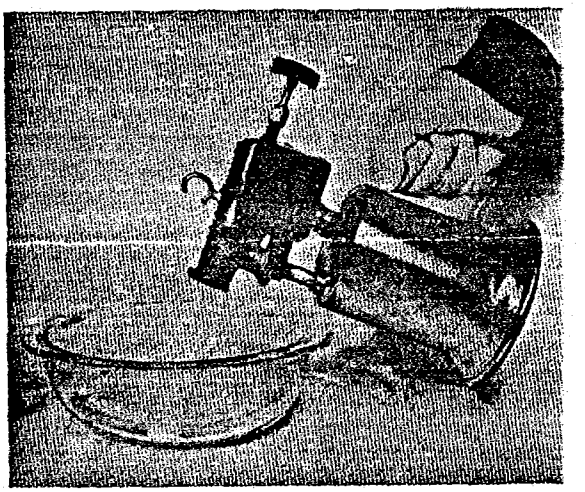


Fire-resistant chlorinated-biphenyl heat-transfer fluid provides safe, precisely controlled heat for the reaction of flammable resin materials in these 3,500 gallon kettles of a modern surface-coatings plant.



Simple "blow torch" test of new chlorinated-biphenyl heat-transfer fluid demonstrates its extreme fire resistance. To date it is the only heat-transfer fluid to obtain Underwriters' Laboratories, Inc. listing.

Fire-resistant Fluids Give New Safety to Heat Transfer

A new class of process heating has become available to industry following the recent Underwriters' Laboratories, Inc., listing of a family of heat-transfer fluids which operate at atmospheric pressures and which are far less a potential fire hazard than are the petroleum oils and synthetic fluids now commonly used in low-pressure heat-transfer systems.

Heat — at ever higher temperatures — is an increasingly important processing tool of industry. And in "putting on the heat," industry has turned to the economy, flexibility and precise temperature control obtainable through fluid heat transfer. It is not only common but also indispensable in the production of chemicals, food products, paints, petroleum, etc.

Water and steam are excellent and universal heat-transfer media, of course. But, above temperatures of 350°-450° F., in certain applications, the need for expensive high pressure equipment may rule out steam systems in favor of those using high-boiling fluids. These may be petroleum oils with relatively high flash points or, more often, thermally stable and noncorrosive synthetic fluids designed for the purpose. In some instances, these fluids vaporize at about 500° F. to simulate steam operation, but at much lower pressures for any given temperature.

Up until now, however, the use of petroleum oils or synthetic fluids for heat transfer has introduced the problem of potential fire hazard. These are combustible liquids which usually are circulated at temperatures at or above their fire points in closed systems. Should a break occur in such a system, personnel and equipment could be threatened by a flammable "wick" of vapor or fluid dangerously near its fire point. Consequently, all of the precautions associated with the circulation of a flammable fluid must apply to such systems.

A new class of chlorinated-biphenyl heat-transfer fluids which are thermally stable, noncorrosive and extremely fire resistant appears to offer a sorely needed method of high-temperature industrial heating with minimum hazards. The manufacturer of these fluids reports that they have undergone five years of testing by more than 200 industrial cooperators, during which time there has been no instance of a heat-transfer fluid fire implicating any of these chlorinated-biphenyl fluids.

Industrial field use of these fluids has included the heating of resin kettles, reaction vessels, metalworking press platens, cooking fats for deep frying, steam production in a non-fired heat exchanger and even the heating of hazardous jet engine fuels for high-temperature tests of engine performance.

In one reported instance of a chlorinated-biphenyl heat-transfer fluid installation in a paint manufacturing plant, a tube-bundle failure in the fluid heater caused the fluid to pour out into the fire box. Although there was a heavy fuming of the vaporizing fluid up the stack of the heater, there was no visible flame nor fire damage to the plant. With the repair of the tube bundle — and a fresh supply of fluid — the plant was back in production with a minimum of expense and work interruption.

Underwriters' Laboratories, Inc., has rated the new chlorinated-biphenyl heat-transfer fluids at 2-3 in respect to fire hazard, according to its Standard Classification of Liquids in which ratings are:

Ether	100
Gasoline	90-100
Alcohol (ethyl)	60-70
Kerosene	30-40
Paraffin oil	10-20

High-pressure-boiler codes are not fully applicable to systems employing the chlorinated-biphenyl fluids which are used in equipment operating at atmospheric pressure. In addition, since these fluids do not support combustion in their heat-transfer application, it appears that safety precautions now considered necessary for oil or synthetic-fluid heat-transfer systems may be modified for this class of fire-resistant fluids. Each installation must be considered individually, of course, because of other fire hazards which may be present in a given industrial plant.

Reprinted from
August, 1962 FIA Sentinel, Factory Insurance Association

DSW 433875

STLCOPCB4086983

Heat transfer medium . . .
Adds Safety, Works at Normal Pressures

PROBLEM: At Reynolds Metals Co. St. Lawrence Plant in Massena, N. Y., where temperatures dip as low as −40 F, coal tar pitch, used in making anode paste for producing primary aluminum, has to be held at up to 450 F. The pitch hardens and can't be used when it cools.

Pitch is unloaded from heated RR tank cars and dumped into either of two 150,000 gal outdoor tanks where heaters on the tank floors maintain a 392 F temperature. Lines 4″ diam carry the pitch from the tanks to pumps, and 3″ lines take it from the pumps to the carbon plant where the pitch is mixed with other materials to make the anode paste.

Throughout the system, the pitch has to be maintained at temperature or it becomes useless.

Steam wasn't considered for this system because of the need for traps at critical points and boilers to maintain heat and pressure.

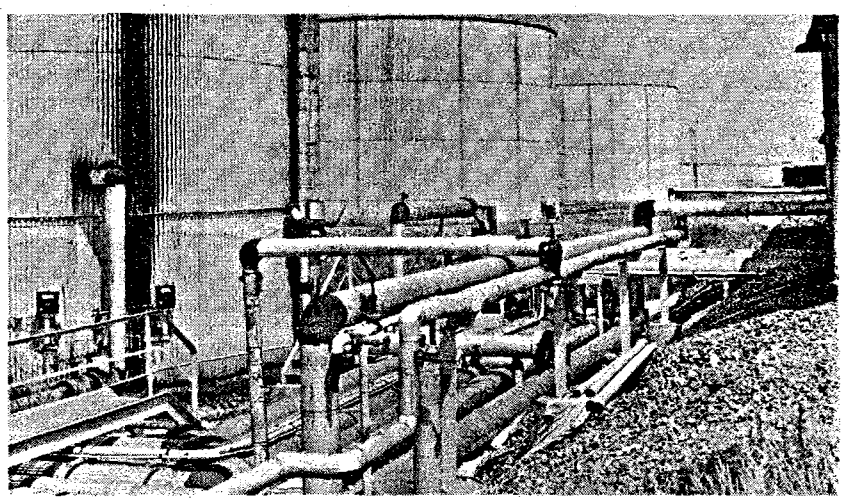
SOLUTION: A closed heat transfer system using more than 6500 gal of fire resistant, nonpressurized liquid called Therminol maintains the pitch at temperature through the entire line.

Experience with the medium at another plant proved that the heat transfer system won't cause a temperature surge when coke is added to the pitch in the mixers where temperature is critical.

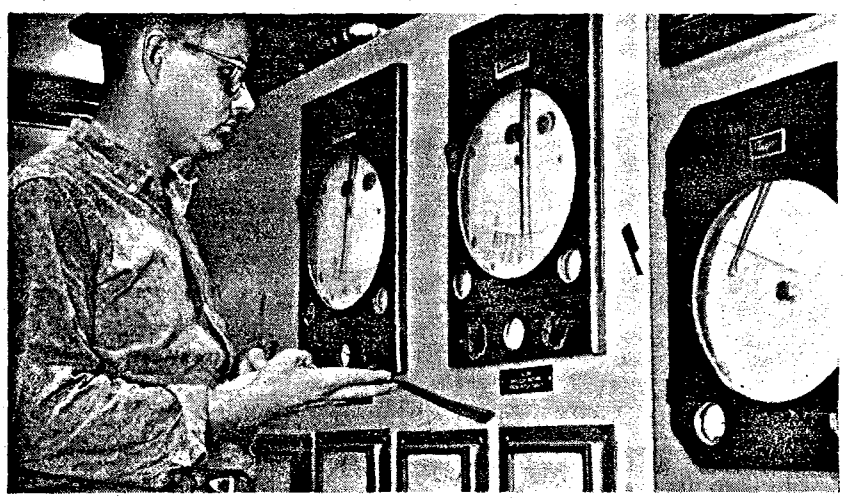
Timers start pitch flowing to the mixers at 2 or 3 hr intervals between which it remains stationary. However, the heat transfer medium continues to flow through the jacketed lines and mixers.

A single 650 gpm centrifugal pump and a 10 million Btu-hr gas heating unit, plus a standby unit for each, serve the entire system.

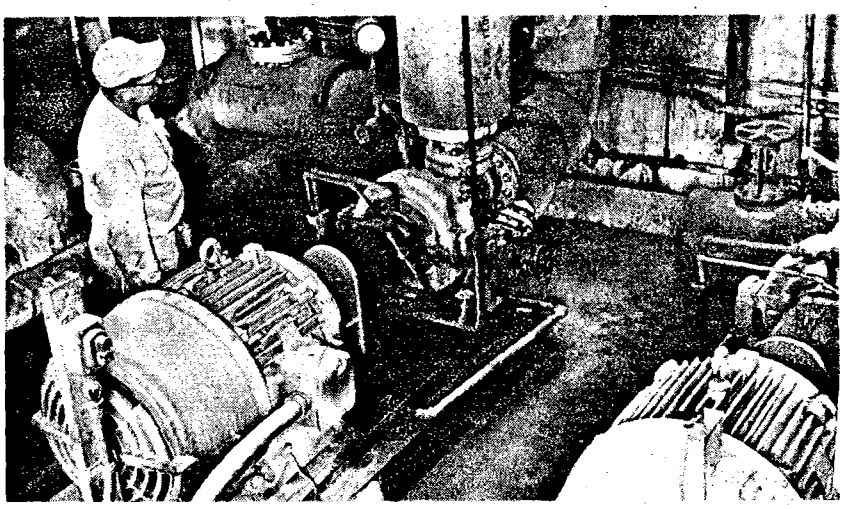
SOURCE: Monsanto Chemical Co.



OUTDOORS, even at −40 F, the system maintains pitch heat at 450 F.



GAGES indicate pressure and temperature of the heat transfer medium.



TWO PUMPS, one for standby, pump the fluid at 650 gpm at 120 psi.

DSW 433876

Reprinted from May 1964 MILL & FACTORY, 205 E. 42 St., N. Y. 17, N. Y.

STLCOPCB4086984