

## Jet Fuel heated by THERMOSAFE®



Thermosafe Induction drum heater, with a test Sikorsky S-92 aircraft being fuelled from a barrel of hot JP-8 fuel at 136°F

Introducing a completely new aircraft into commercial or military service requires extensive certification testing before customer deliveries can begin. The Sikorsky S-92 is an advanced transport helicopter that incorporates the latest design safety features such as flaw tolerance, bird strike capability, turbine burst containment and benchmark crashworthiness.

As part of the performance flight tests for FAA certification, Sikorsky needed to safely pre-heat JP-8 jet fuel in standard 55 US gallon drums, to 136°F (58°C), and deliver it to the aircraft's tank through an approved ground fuel pump with filtration. The drums needed to be vented, so fuel vapour with a flash point of only around 100°F is present, and the potential fire risk very high.

Sikorsky approached LMK for a solution as the THERMOSAFE® Induction Drum Heater does not use traditional radiant heating elements. The heater always stays cooler than the drum, with the steel drum wall being heated by the induction effect. Thus its key safe use criteria is the auto-ignition temperature of the hazardous vapour. JP-8 is a kerosene type fuel with an auto-ignition temperature well above the safety rating of 170°C (T3) given to the THERMOSAFE® under its European ATEX and International IECEx approvals for hazardous area use.

The drum wall and fuel temperatures were separately monitored for the duration of the tests, conducted at Sikorsky's Florida facilities, and the results logged onto a laptop computer running analyses software. The project was very successfully completed well within the allotted time frame. Charles Greenberg, co-ordinator at Sikorsky commented "Safety has to be our number one priority, and LMK's Induction Heater helped us resolve all the potential issues. Technical support from their UK headquarters during the crucial planning and preparation stages was excellent, and we were delighted with the results".

Sikorsky is a subsidiary of United Technologies Corp (NYSE:UTX) of Hartford, Conn, USA, which provides a broad range of high-technology products and support services to the aerospace and building systems industries. LMK Thermosafe Ltd manufacture a wide range of drum and container heating products used in process industries world-wide, including the award winning THERMOSAFE® induction heater.

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# Agrochemical Bulk Production

LMK Thermosafe Ltd has built a strong global reputation for quality and high reliability, designing, and manufacturing hazardous area certified industrial heaters for over 30 years.

Herbicides, fungicides and insecticides are very closely controlled by all national and EU licencing authorities. There are serious health and safety implications for incorrect storage, use, or disposal. Ingredients may include pendimethalin, chlorpyrifos & surfactants.



Manufacturers in the global Agrochemicals Industry have purchased specialist heaters from LMK Thermosafe Ltd where process audits and safety dictate that the highest standards are maintained at all times during production and blending. Potentially explosive ingredients in steel drums need to be heated to very precise temperatures as fast as possible. The safety and repeatability of performance of our THERMOSAFE® Heaters are ideal for these tasks.

In some sectors, solvent free formulations have required new raw materials to be blended into the batch. These are often semi-solids delivered in 1000 litre IBC's and require heating to over 40°C to liquefy and agitate for consistency prior to pumping. The "Thermulate" IBC3 has been carefully designed and tested to meet the stringent needs of such processes.

A factory manager at one large plant stated:

*"We have used Thermosafe drum heaters for over twelve years and know they will be safe and reliable. In recent years, their flexible heating jackets have proven to be equally reliable heating IBC's of very viscous materials"*





# Industrial Gas Cylinder Heating Jackets



LMK Thermosafe Ltd. have manufactured robust hazardous and safe area industrial heaters for drums and containers for over 30 years.

Standard product groups include a selection of sizes for pressurized gas cylinders, using designs with adjustable surface temperature thermostats for safe areas or INTELIHEAT™ Flexiplus where there is risk of explosion.



Many laboratory and industrial processes require a constant flow of gas to be delivered, and this is normally supplied from pressurised cylinders containing gas in liquid phase. If the level of liquid reduces fast, frosting can occur on the surface of the cylinder and flow rates can be adversely affected. Our gentle and insulated heating solutions can prevent this phenomenon and restore stability to the flow rate. This is particularly important when using calibration gases where repeatability is vital. Note that separate over-pressure safety systems should always be in place to meet health and safety requirements.

We can design jackets for most cylinder sizes, with our standard “HHG” being a popular size normally available for immediate delivery. Where adequate environmental protection is available, larger horizontally mounted outdoor cylinders can also be heated. The IHF/G certified jacket does not normally require temperature control, but a thermostat is available as an option in some circumstances.

## Product Specification: “K” size gas cylinder (others available to order)

Adjustable length: 680-830mm Overall Height: 1050mm Power supply: 110vac or 240vac  
Power rating: Standard HHG with 0-90C (or -5 to 40C) adjustable thermostat: 450 watts  
Power rating: Hazardous area IHF/G 100 watts at 240v, rated II 2 G Ex e IIC T4 Gb

## THERMOSAFE® used to heat Bitumen in Cable Factory

LMK Thermosafe Induction drum heaters have been providing solutions for drum and container heating projects in hazardous areas for around thirty years. Their unique design and award winning energy efficiency have made them an essential element in a multitude of process plants and factories around the world.

Pirelli Cable Accessories provide a wide range of accessories for the power distribution of high voltage cables up to 400kv. Certain applications require stainless steel pressure balancing cable tanks to be buried into the ground along with the cables. Additional protection is given by encapsulating the tank with bitumen inside a concrete shell. During the assembly process, the pressure tank is placed within the concrete shell and liquid bitumen is pumped between the pressure tank and the shell.



To enable the bitumen to be poured, which is solid in its normal state at ambient temperature, Pirelli use Thermosafe Induction Heaters, raising the bitumen to its melt-point of approximately 160°C.



“The Thermosafe Induction Heater has proved to be fast, efficient and reliable and additional units have been purchased for other applications within Cable Accessories and the Pirelli group due to the success of this project” commented the Pirelli Manager responsible for the installation.

Designed to heat 205 litre drums or smaller steel vessels, Thermosafe is a single induction coil, wholly encapsulated in a cylinder made from very high performance GRP resin specifically developed for chemical plants. The heater is simply placed over the drum; physical contact is not required.

Thermosafe possesses full ATEX and IECEx certification as a system, allowing it to be used in Zones 1 and 2 hazardous areas for both gases and dusts. As there are no radiant elements, the heater remains substantially cooler than the drum being heated. The complete absence of hot elements and the encapsulation of all critical electrical components enables safe and unattended use, overnight if required. The heating coil will not be damaged by accidental spillage of drum contents, and personnel can work comfortably in close proximity. Complete access to the drum while heating enables pumps and stirrers to be employed.

Thermosafe has proved to be 2-4 times faster than traditional drum ovens and independent figures have demonstrated energy savings of over 50% when compared with conventional radiant drum heaters, and more than 90% in comparison with drum ovens.

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## INDUCTION HEATING – THE RIGHT BLEND FOR ESSO

The Esso Petroleum Company Ltd blends lubricating oils at a site in Purfleet, Essex. There are 120 employees.

### THE PROBLEM

Two steam heated ovens were used to heat 45 gallon drums containing oil additives. This is necessary to reduce their viscosity before they are emptied into the main mixing tank.

Each oven could accommodate four drums at a time and took approximately eight hours to reach the required temperature of 60-70°C.

Esso was unhappy with this procedure because it lacked flexibility. All of the drums had to be heated to the same temperature irrespective of the individual requirements of the different types of additive. So ovens often operated only part full with resulting loss of efficiency. There was often inconsistency in the final product because the steam ovens failed to give a complete melt. The ovens – plus the associated area for handling the barrels with fork lift trucks – also consumed valuable working space. And the whole time-consuming process encouraged corrosion, resulting in a high drum reject rate.

### THE SOLUTION

Esso has now closed down its steam heated ovens and installed electric induction drum heaters. Because of their compactness the new heaters have been installed along a wall adjacent to the mixing tank and are serviced by a small overhead crane. The crane lifts the heater out of the way while the drum of additives is positioned beneath it.



### THE BENEFITS

The cost and performance benefits of Esso's new induction system can be summarised as follows:

- Process time reduced from eight hours to two hours
- Heating costs down by 92%
- 50% reduction in additive wastage
- 25 sq metres of floor space released for more productive use
- More consistent oil mixture quality
- No risk of additive degradation, due to better temperature control
- Reduced corrosion – fewer drums rejected

"In addition to all these benefits the electric induction heaters have cut our previous maintenance burden down to practically zero," comments Esso's Maintenance Manager, Mr A Tidey. "The working environment is cleaner, cooler, quieter and safer. Reducing running costs was not the



major consideration – even so, payback should take no more than three years. The new electric drum heating system is making a major contribution to our current modernisation programme.

Industrial Sales Engineer: Richard Jupp

Electrical Equipment Supplier:  
LMK Engineering Ltd., Harlow, Essex.

Electrical Contractor: Esso Petroleum Ltd

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