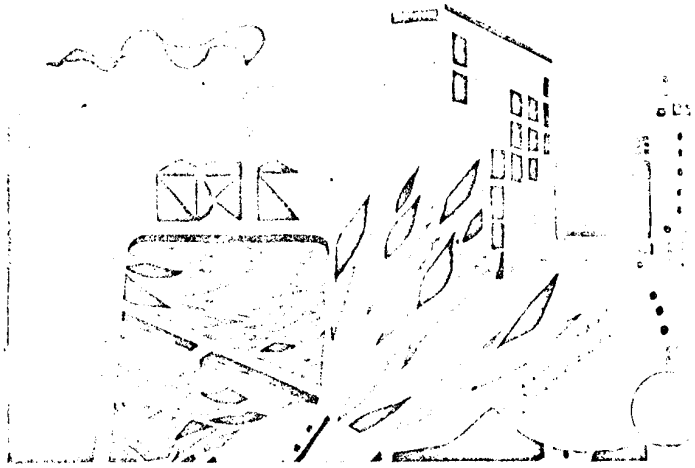
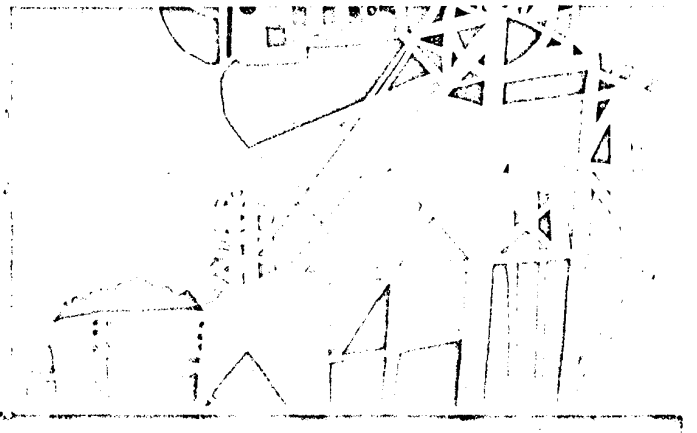


Where Pyroclor Transformers are used



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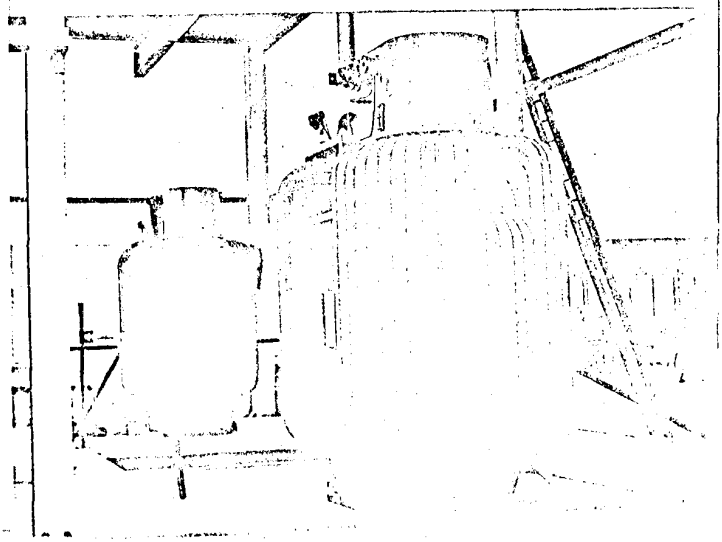
Two Pyroclor fire-resistant transformers are installed on the flat roof of the Ford Motor Co. Ltd., Basildon Works, with a light enclosure around them. In the event of a fire in the factory below there is no risk of the transformer cooling fluid spreading the blaze.



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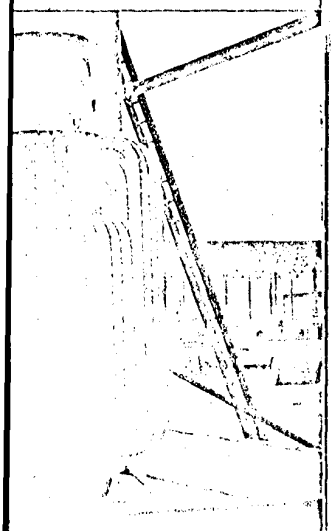

Fifty-three Pyroclor transformers on Motor Company rooftops

Pyroclor transformers solved a factory planning problem for the Ford Motor Co. Ltd. new tractor production plant at Basildon, Essex.

Although the plant covers 800,000 square feet the planners ruled that, in order to permit maximum flexibility in production layout, there should be no permanent obstructions in the floor area. This meant that the many transformers required to supply the manufacturing and assembly operations could not be placed inside the building at floor level. Owing to the immense size of the building, transformers sited externally would have meant long runs of expensive low-voltage cables to connect with the many load centres required. The obvious place was the roof.

But conventional transformers in this location would have meant an unacceptable fire risk—not so much from the possibility of a transformer itself starting a fire, but from the likelihood of it becoming involved in an extraneous blaze and its fluid carrying the fire to other parts of the building. Modern single-storey open-plan factories in fact constitute a major fire hazard since there are no solid walls to prevent the lateral spread of flames and smoke.

Nevertheless, the roof had undeniable attractions and Ford decided to carry on with the scheme using 11 Pyroclor fire-resistant transformers.

In addition, 18 Pyroclor-filled transformers are sited at the Ford Motor Co. Ltd., Dagenham, works and 14 at the new car assembly plant at Halewood. All transformers are on the roof, so too are the 10 units at the Caterpillar Tractor Co. plant at Glasgow.

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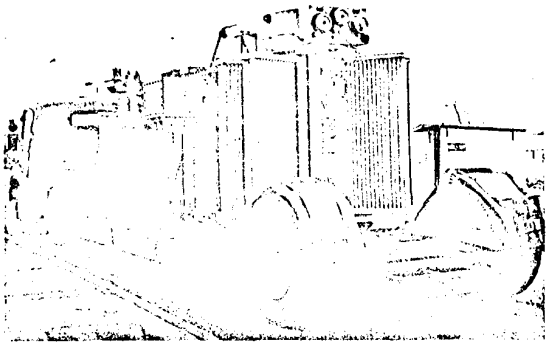
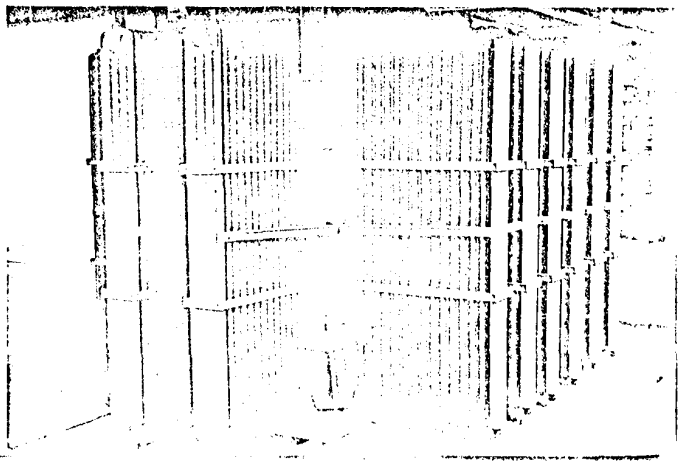


Pyroclor transformers *en route* to
Steel Company of Wales.

Pyroclor-filled transformer units at
Richard Thomas and Baldwins Ltd.



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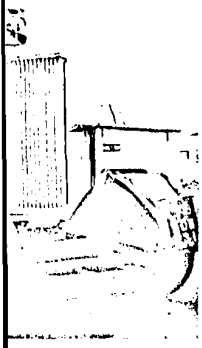
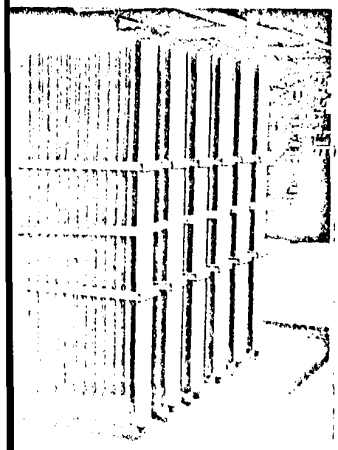


Basement locations in Steelworks eliminate fire hazard

At the world's most advanced steelworks, the Spencer Works of Richard Thomas & Baldwins in South Wales, Pyroclor transformers are installed in the basement of one of the rolling mills to eliminate fire hazard. The basement houses part of the main power distribution and control systems and even minor damage there could result in a complete plant stoppage.



Two Pyroclor-filled transformers supply rectifiers providing direct current for the main drive motors of the two 60-inch temper mills which give the final finish to the cold-rolled wide strip. These 11 kV transformers are rated at 2625/4280 kVA.

This installation is only one of several completed in recent years in British steelworks. The Steel Company of Wales, at its Port Talbot Works, uses three Pyroclor-filled transformers for the 56-inch high-speed temper mill, and the Appleby-Frodingham Steel Company, at Scunthorpe, has 11 units, supplying mercury-arc rectifiers.

In all these three installations, in basement locations, air-cooled transformers with the British Class H insulation (180° C.) were considered but Pyroclor was preferred on cost grounds and because of the dusty environments. The modern steelworks depends on an unfailing supply of electricity. Even if a minor fire damaged the power distribution system this could have far-reaching repercussions.

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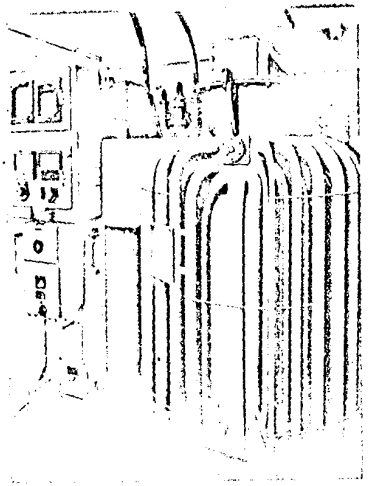
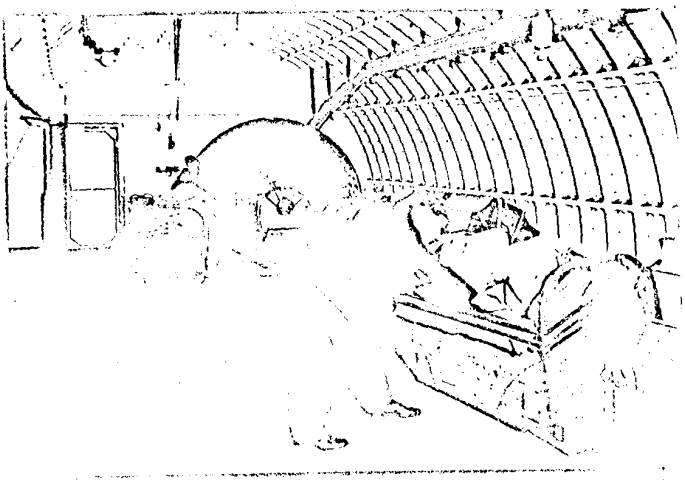


Left: A Pyroclor-filled transformer of the type used by the British Post Office at its Mount Pleasant, London, sorting office.

Below: At the Post Office private underground railway, power for traction, signalling and lighting comes from transformers filled with Pyroclor fire-resistant cooling fluid.



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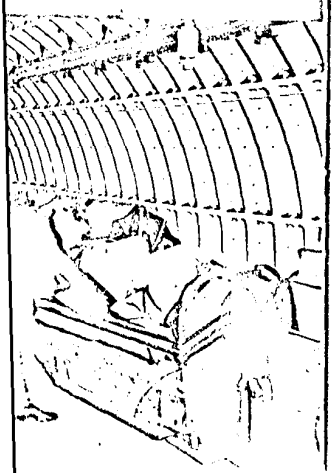
Left: A Pyroclor-filled transformer of the type used by the British Post Office at its Mount Pleasant London sorting office.

Below: At the Post Office private underground railway, power for traction, signalling and lighting comes from transformers filled with Pyroclor fire-resistant cooling fluid.



Compact, dust free, Pyroclor units below ground for Railway power

Recent modernisation on the British Post Office's private underground railways, which link eight postal depots in the busiest parts of London, included the installation of Pyroclor fire-resistant transformers.

In the event of the transformers becoming heated due to a fire in the vicinity there is no risk of burning fluid spreading the conflagration through the underground tunnel systems. For static rectification of alternating current, the combination of Pyroclor transformers and mercury-arc rectifiers has proved extremely reliable and economic.

At Mount Pleasant the sub-station is below the platform on which the mail-bags are handled. Pyroclor transformers were chosen because no enclosures or CO_2 equipment were required. They were preferred to air-cooled units because they are more compact, an important consideration below ground. In Lisbon, Portugal, the Metro has installed seven Pyroclor transformers for a sunken rectifier sub-station and The Pennsylvania Railroad Co. has now used Pyroclor units for 25 years. Every one of the company's 215 electric locomotives is now equipped with this type of transformer.

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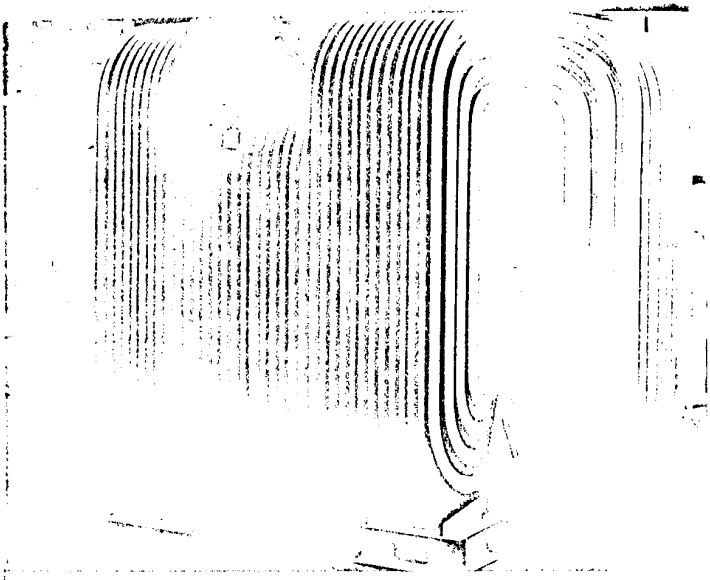

Pyrector transformers were chosen to be installed in a remote-controlled water-pumping station in Yorkshire.

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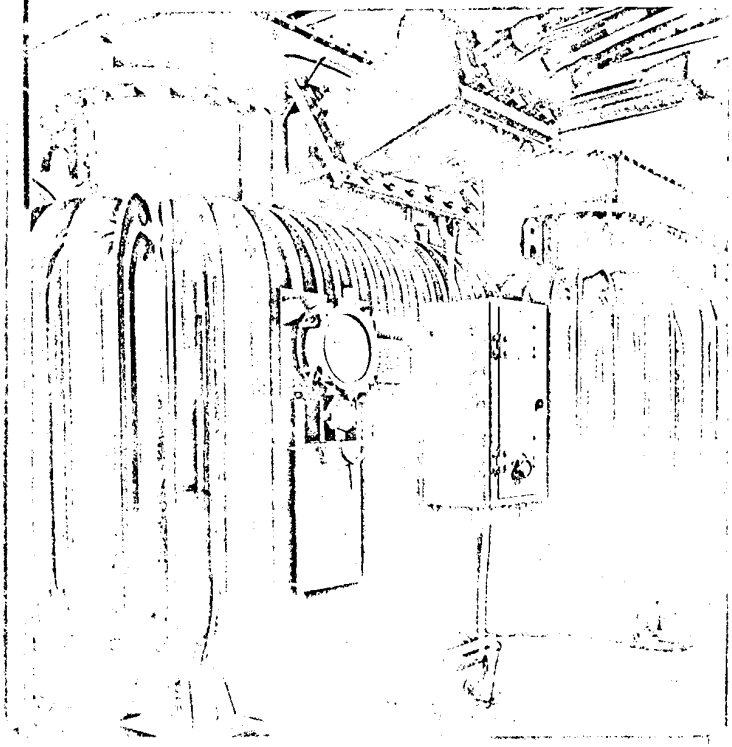
Installed in 1941 and still in service—Pyroclor transformers at Trafford Generating Station, Manchester



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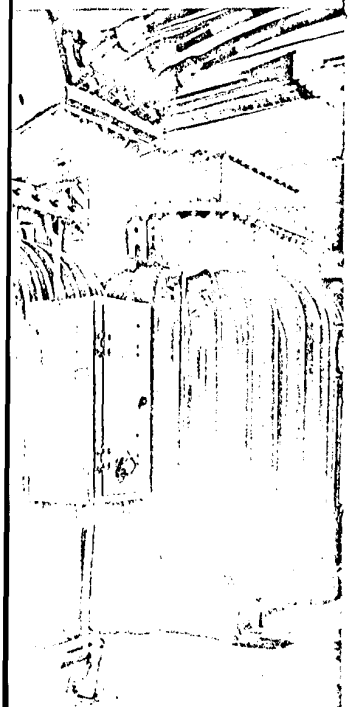
Almost twenty-five years service in Electricity Generating stations



The oldest transformers in Britain using Pyroclor are at Trafford, Manchester, power station of the Central Electricity Generating Board. Installed in a basement there as long ago as 1941, they are still in service. The units are of 500 and 800 kVA.

More recently, Pyroclor transformers have gone into the San Esteban and Mallorca power stations in Spain, and in India transformers of this type form part of the huge Damador Valley development in West Bengal, at the Bokara and Durgapur steam power stations.

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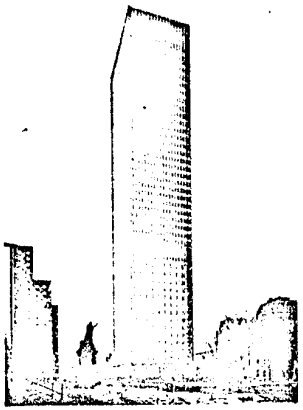
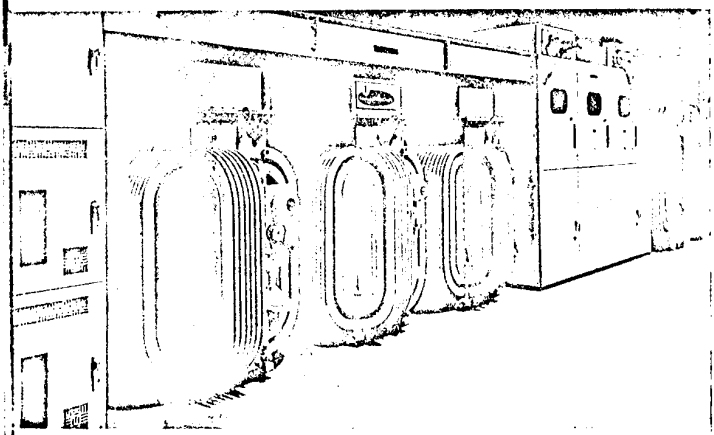


Pyroclor transformers have been installed on the 42nd floor of the Canadian Imperial Bank of Commerce, Dominion Square, Montreal, Canada



An interior view of the sub-station at the Canadian Imperial Bank of Commerce

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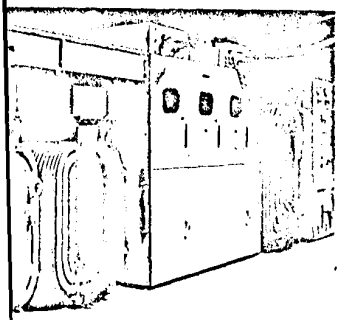
Sub-stations in tall buildings

Pyroclor transformers have been installed on the 42nd floor of the Canadian Imperial Bank of Commerce, Dominion Square, Montreal, Canada



Pyroclor-filled transformers are ideal for supply services in tall buildings. Freedom from fire risk is important in overcrowded areas and these transformers can be sited anywhere, in the basement or at the bottom of a lift shaft, for example, without special fire protection.

Costly runs of L.V. cable are avoided with Pyroclor sub-stations on several levels of a tall office block. The clean lines and modern appearance of present-day architecture are not marred by obtrusive outbuildings or cages. Pyroclor transformers can be installed indoors, out of the way, and assist improved architectural planning.

The Canadian Imperial Bank of Commerce, Montreal, installed Pyroclor transformers on the 42nd floor, further proof that these units can be safely installed anywhere—even at the top of the Commonwealth's tallest skyscraper!

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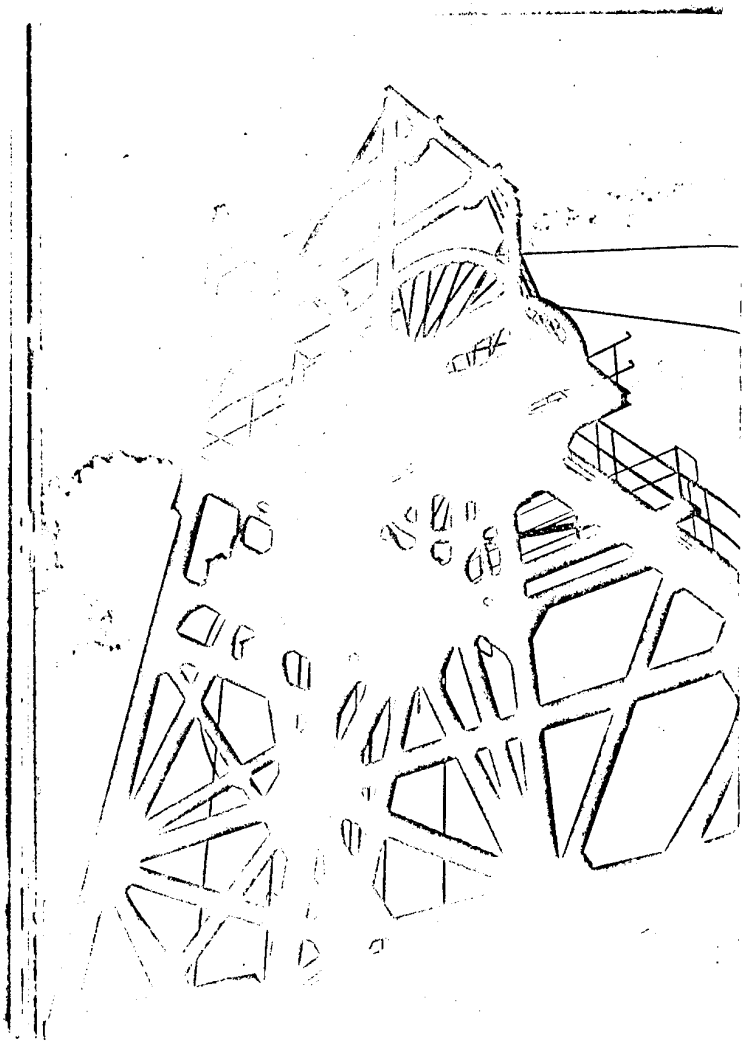

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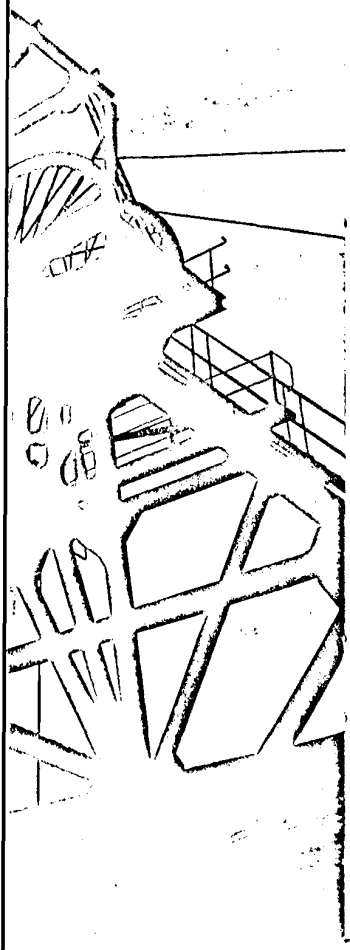

In collieries

Several modern colliery winding installations in Britain have been equipped with Pyroclor fire-resistant transformers.

In the event of the transformers becoming heated due to a fire in the vicinity there is no risk of burning oil pouring down the mine shaft to spread the conflagration.

The North Western Division of the National Coal Board, for example, has installed 14 Pyroclor-filled transformers for rectifier duties at collieries in the Lancashire area. These are installed in the winding towers immediately above the pit shafts and, according to an NCB official, "the fire hazard associated with the difficulty of containing such a large volume of oil from reaching the shaft, made it essential to use a non-flammable fluid if the transformers were to be mounted in this position and avoid long and costly copper connections". Very similar installations have been completed at two collieries in the Durham Division of the National Coal Board.

Photo courtesy of The National Coal Board

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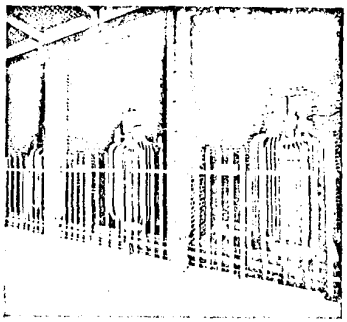
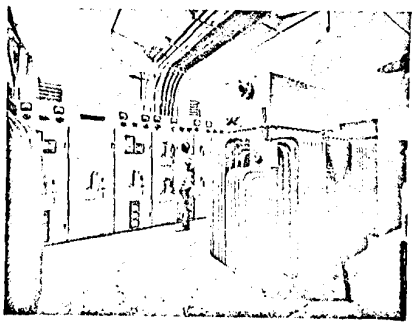


Pyroclor transformers have reduced installation and maintenance costs at the Monsanto plant, Fawley, Hants.



.... and at the Chemstrand Ltd. plant, Coleraine, N. Ireland.

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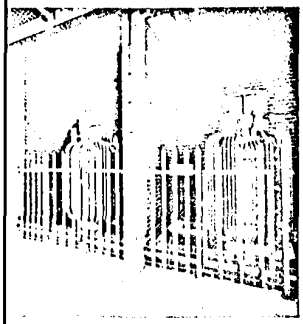





.... and at the Chemstrand Ltd. plant, Coleraine, N. Ireland.

Low-voltage power supply at Chemical Processing plants

Some chemical processes involve the use of highly inflammable base materials. Large amounts of electric power may also be required, and the provision of suitable low voltage supplies under flameproof conditions can present problems.

At the Coleraine works of Chemstrand Ltd., where Acrilan fibre is made, the necessary power is obtained from 8 x 1000 kVA (11 kV/415 V) and 6 x 500 kVA (11 kV/415 V) transformers. Four of the main distribution sub-stations are located in the main factory building. This location was made possible by the choice of Pyroclor transformers which have reduced both installation and running costs.

At Baglan Bay, where Forth Chemicals Ltd. manufacture styrene monomer, the whole factory compound has been declared a flameproof area; consequently the 4 x 500 kVA transformers which supply the works are Pyroclor-filled, even though they are sited out of doors. Similarly three 800 kVA and one 1500 kVA (11 kV/3.3 kV) and two 100 kVA (11 kV/415 V) transformers for the Monsanto polyethylene plant at Fawley have been located adjacent to the buildings involving ethylene processing.

In neither of these cases would it have been economical to use dry transformers, since these would have required protection from wind-blown dust and driving rain.

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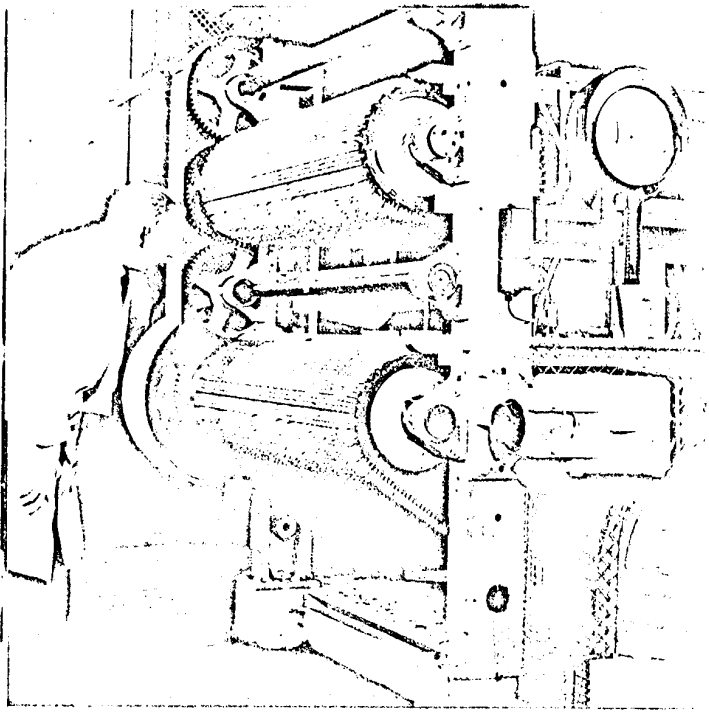

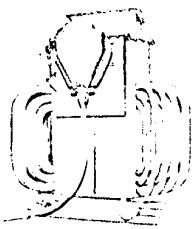

Pyroclor transformers below the basement of Bryant & May Ltd. match factory.

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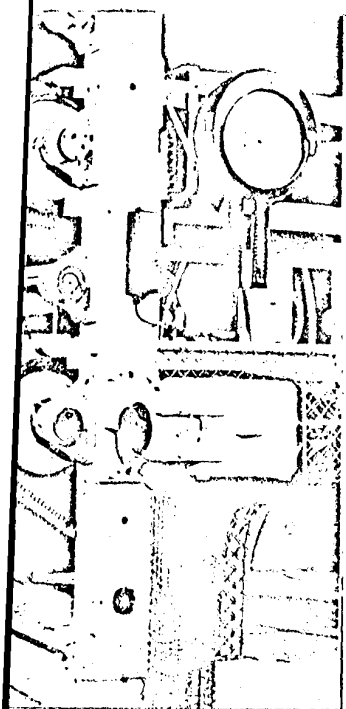

mers below the
ant & May Ltd.

Eliminating fire hazard in a Match factory

The basement of the Bryant & May Ltd. match factory could not be used for production owing to lack of ventilation. It was therefore the ideal place to site two 300 kVA Pyroclor Transformers, one at each end of the basement with a distribution switchboard in between.

The highly inflammable nature of some of the materials used in the manufacture of matches ruled out the use of any but fire-resistant transformers. This meant that the choice lay between air-cooled units and those containing a fire resistant dielectric. The difficulty of keeping air-cooled transformers free from dirt and dust in a factory basement and their higher cost were key factors in the decision to install Pyroclor transformers.

There was also the question of maintenance in a space only just large enough to contain the transformers and the main switchboard. Because Pyroclor is chemically inert no maintenance is required and the initial charge of fluid should last for at least 30 years without replenishment or attention.

Because the transformers are close to the main switchboards and to the plant (risers from the main switchboard supply each floor individually), long runs of costly low-tension cable—as well as the power losses caused by such cable—have been avoided. Economies made in this way are considerable. The utilisation of otherwise dead space and the savings made all along the line fully justified the choice of Pyroclor transformers for this particular application.

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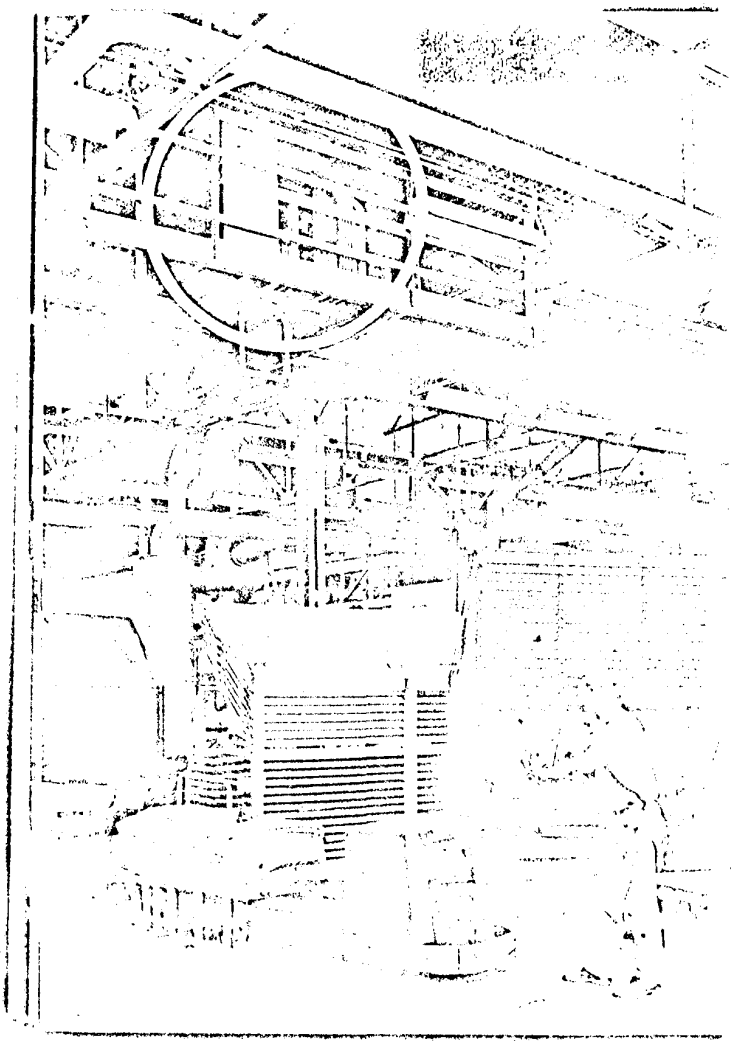

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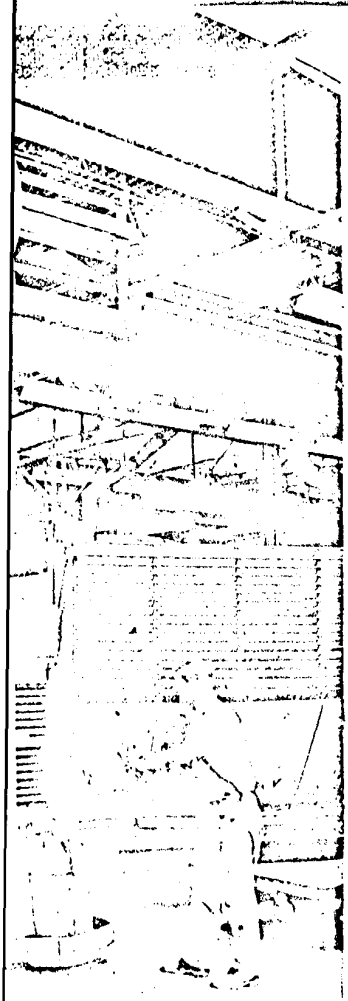

In Motor Tyre factories

As in many other modern factories it is important to locate distribution transformers close to the plant they serve and to eliminate the expense of low-tension cable runs. But if the factory has a fire hazard, as in a large motor tyre plant, such economies are impossible to achieve unless Pyroclor transformers are specified.

At the Goodyear Tyre & Rubber Company's works in Glasgow, electric power and lighting demands are met by one 1250 kVA and four smaller transformers, all sited inside the factory buildings. Three have been installed in major control rooms and the other two on platforms high above the production shops. The aim in choosing these sites was to place transformers as close as possible to the various load centres without encroaching on valuable production space at floor level. This was made possible by using Pyroclor transformers.

The main transformer installation at the Belfast factory of Michelin (Belfast) Ltd., is oil filled. Even so, the six 40 kVA transformer/transductors, six 50 kVA transformers and four 100 kVA transformers on the shop floor, where the fire hazard is greater, are filled with Pyroclor.

Pyroclor transformers are also used at the Firestone Tyre factory, South Africa. In countries where higher ambient temperatures are experienced, the high thermal stability of Pyroclor is an added advantage which has contributed to its general use in such areas.

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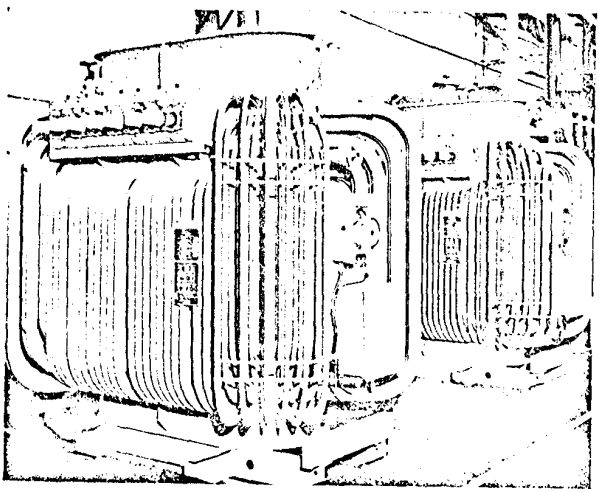
In the Sahara Desert, Pyroclor transformers for the 500-mile S.O.N.A.T.R.A.C.H. oil pipeline installation.



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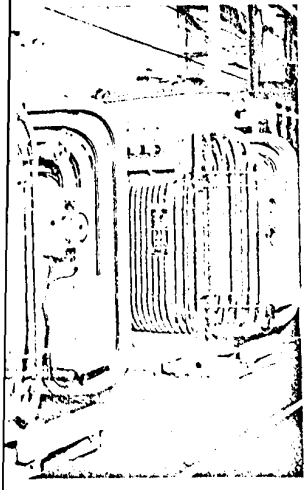
In Oil Pipeline Systems

With completion of a new 500-mile pipeline by Constructors John Brown Ltd., over the Atlas mountains, from the Sahara Desert to the Mediterranean coast, a further 10 million tons of crude oil a year will flow from the Algerian oilfields of Société Nationale de Transport et de Commercialisation des Hydrocarbures (S.O.N.A.T.R.A.C.H.).



At the Arzew terminal on the Mediterranean, where light crude oil is stored ready for loading into sea-going tankers, a 500 kVA Pyroclor transformer has been placed beside the main switchroom. Two more, one of 150 kVA and one of 200 kVA, have been installed at a nearby tanker de-ballasting station and in the maintenance workshop.

The advantage gained by installing Pyroclor-filled transformers was the freedom from fire risk when pumping a light crude oil at ambient temperatures which may vary between —2°C and +50°C. By minimising this risk it was possible to obtain better insurance rates and to conform with the practice in Algeria, where all existing oil plants have transformers with fire-resistant filling.

All units supplied for the S.O.N.A.T.R.A.C.H. project are hermetically sealed and will require little maintenance—a factor of some importance where unskilled staff are being trained to take over. And because the transformers were sited close to the plant long cable runs have been avoided.

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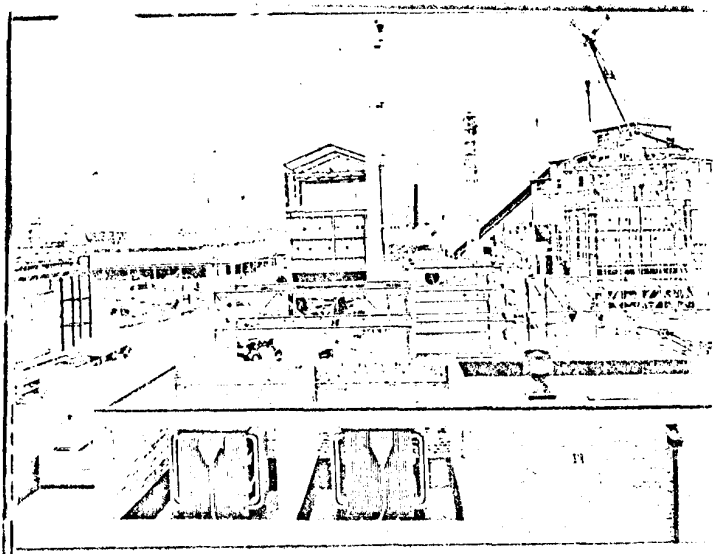

Four Pyroclor transformers in service at the North-Western Gas Board, Preston, whilst reconstruction is underway.

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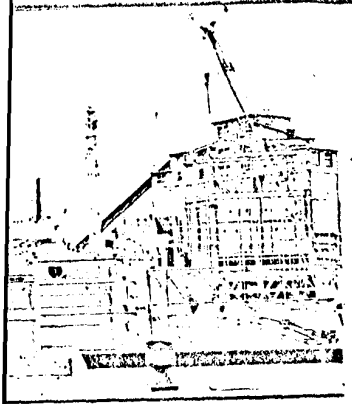

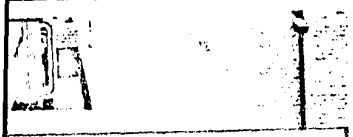

In a New Generation of Gas Works

The latest methods of town gas production are presenting plant designers with a number of new and interesting problems, derived from the inflammable nature of raw materials and from the large amounts of electric power required for the reforming process. A modern reforming plant may need up to 10MW to drive motors for fans, feed pumps, hydrogen compressors, cooling tower pumps and other machinery.

A further problem is space limitation. Most of the new plants must be erected on sites already occupied by coal-fed stations, and the latter cannot be removed until the new equipment is in full production. Both must operate together at first.

Finally, there is the question of reliability. The new installations usually comprise a number of separate gas-making units built into a common process. An electric power failure would halt the whole complex, and it might take several hours to bring a 120 million cu. ft./day output back on stream.

The North Thames Gas Board's new plant at Slough, built by Woodall Duckham Ltd. on the site formerly occupied by a coal carbonising plant, will have an output of 80 million cubic feet of gas a day. Space was a critical factor, and the only way to fit three transformers into an area set aside for two was to specify 3 x 1500kVA Pyroclor-filled units to avoid the need for fire walls between and around them. They will work in parallel with automatic protection equipment; and should any of the three units fail, the load will be automatically transferred to the other two. All are hermetically sealed and although their initial cost will be higher than equivalent oil-filled units, it is anticipated that maintenance costs will be lower.

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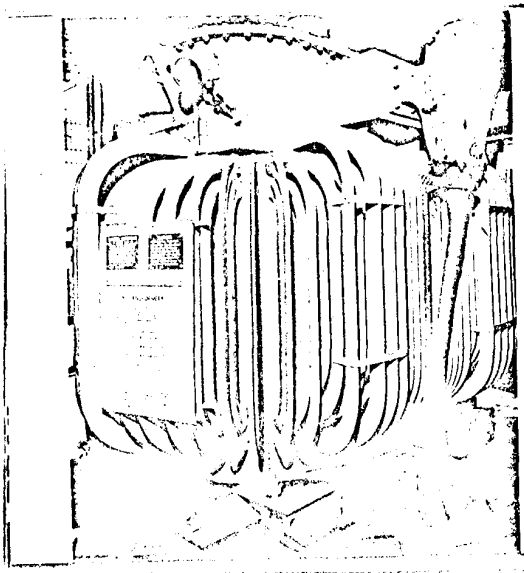
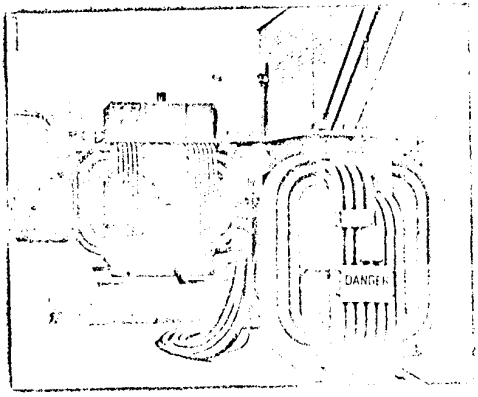


Pyroclor transformers at the North Thames Gas Board, Southall, have operated successfully since 1958.



Pyroclor transformers located at North Thames Gas Board, Slough.

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Pyroclor transformers at the North Thames Gas Board, Southall, have operated successfully since 1958.

Pyroclor transformers located at North Thames Gas Board, Slough.

On the same West London site, there is a 15-million cubic-feet-per-day peak load reforming plant which is fed with 1000 BTU methane gas. This plant is supplied with electricity from two 500kVA transformers which again are Pyroclor filled, chiefly because a gas main runs across the only site available for the unit.

Pyroclor has the advantage of being chemically inert; it does not deteriorate in any way with time, consequently no maintenance is required and the initial charge of fluid should last for at least thirty years without replenishment or attention.

This was a factor in the choice of Pyroclor transformers for the Slough Works and also for the new 120-million cubic-feet-per-day Town Gas Plant, Romford Works of the North Thames Gas Board. This is the largest capacity gas producing unit yet ordered by the British Gas Industry. Here there will be one group of 3 x 1000kVA and one group of 3 x 1500kVA Pyroclor transformers on a site which may also have to be occupied by tanks containing light distillate spirit. The reformers in this plant are fully instrumentated and will be operated by a very small staff. It is therefore important that maintenance requirements should be kept to a minimum.

Other Gas Boards who have specified Pyroclor transformers for reasons of space limitation and reduced maintenance are The North Western Gas Board at Preston where four 1500 kVA units are in service whilst plant reconstruction is underway.

At the North Thames Gas Board, Southall, Europe's largest gas plant, two 600 kVA Pyroclor transformers have been operating since 1958. Pyroclor transformers were chosen because of possible fire hazard and drainage pit considerations if conventional oil-filled units had been used. Furthermore, problems of space and cost precluded the use of air-cooled transformers.

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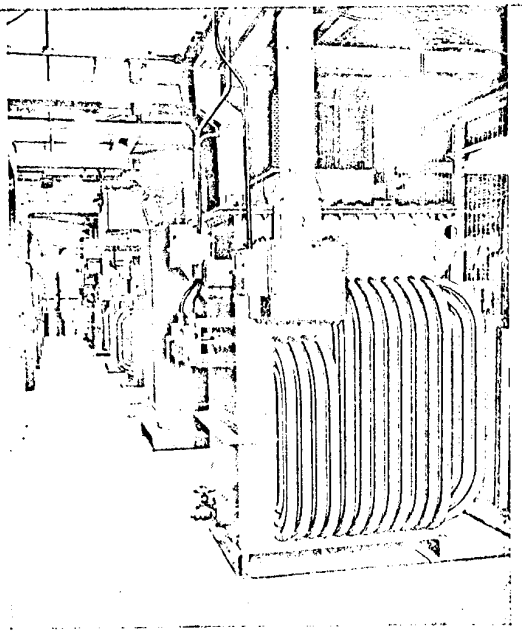
Large numbers of Pyroclor transformers performing various duties at the Chance-Pilkington Optical Works, St. Asaph, N. Wales.



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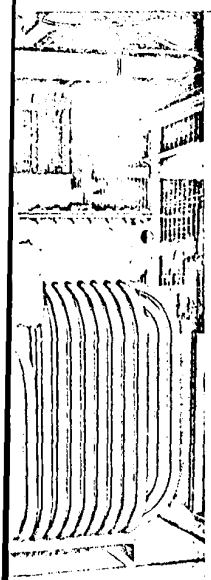
Pyroclor for Glassworks duties



Where large numbers of transformers are required for different duties as, for example, in a modern glass works with electric furnaces and electrically driven machinery, L.T. cable costs can become astronomical unless the transformers can be sited close to the equipment they are to serve. This often means that only Pyroclor fire-resistant transformers can be considered for most duties, and at Chance-Pilkington Optical Works, St. Asaph, N. Wales, a total of 19 such units have been installed.

Four 750 kVA transformers are the main source of power, with 15 special transformers and reactors, to supply the various furnaces. The latter include 1 x 200 kVA, 5 x 150 kVA, 1 x 100 kVA, 6 x 50 kVA and 2 x 37.5 kVA units. All are located at load centres inside the factory itself and the use of Pyroclor has saved fire protection costs, reduced maintenance and by far the greatest saving has come from the reduced lengths of L.T. distribution cable required.

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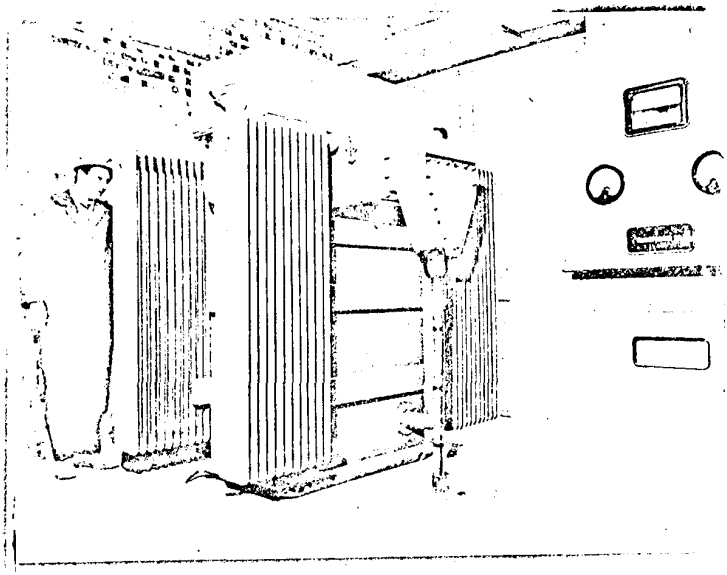

Pyroclor transformers were installed at the new Banbury Works of Alfred Bird & Sons Ltd. because of the need for adequate fire precautions.

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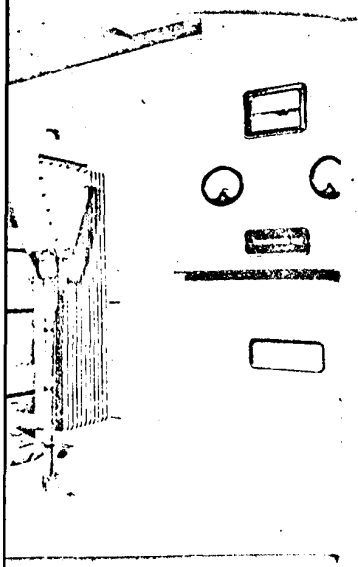

For Food Processing installations

In a modern food factory, where electric power may be required for boilers, ovens, dryers, refrigerators and furnaces as well as for mixing, grinding, sorting and packaging machinery of all kinds, the cost of L.T. distribution cable from power sources to the various load centres can be very high unless the transformers used are sited close to the equipment they are to serve.

For the new works at Banbury, England, where Maxwell House coffee is manufactured by Alfred Bird and Sons Ltd., 3 x 1000 kVA Pyroclor transformers are sited inside the building and 3 x 1750 kVA, owing to space limitations, are outside but close to the factory wall. Wherever there was space for a transformer to be installed close to the equipment it would supply, savings resulted from the reduced lengths of L.T. feeder cable.

In all cases significant economies have resulted from the choice of transformers filled with Pyroclor. Their use in place of oil-filled units has made elaborate fire-precautions such as fire walls and oil-retaining sumps or pebble drains unnecessary, with a consequent saving in space as well as direct cost. Nor did special fire-protection equipment have to be provided.

In this new £7-million factory Alfred Bird & Sons Ltd. are very conscious of the need for fire precautions and appointed the Oxfordshire County Fire Service as advisers to the architects and engineers for the new factory before detailed planning began. Consequently, fire precautions have been taken into consideration in every stage of the project, from the layout of the site roads, to give easy access for fire-fighting vehicles, to the structure of the building and the equipment used, including Pyroclor-filled transformers.

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