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AROCLOR DIELECTRICS
ELECTRICAL UTILITIES COMPANY
LA SALLE, ILLINOIS

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Not since 1956 have things been so profitable as today for Electrical Utilities Aroclor capacitor business. During intervening years General Electric's carousel production of miniaturized ballast capacitors all but forced EUC out of this segment of the business. Miniaturized designs and price squeeze, now attributed largely to Westinghouse, practically forced EUC out of the utility line power correction capacitor business.

However, EUC has developed good business in the motor-run capacitor area, for large appliances and air conditioners. Their concern in this area is the advent of General Electric's Pyranol II diepoxide additive which certainly works to scavenge HCl and functions as an impressive "sales tool". Moreover, some important customers' specifications now allow G.E. to use less costly paper when their Pyranol II additive is incorporated in their motor-run capacitors. This gives G.E. economic leverage. Aerovox now attempt to combat this by incorporating activated alumina, a good idea. EUC wonder whether G.E. may license them on Pyranol II. G. E. will probably not grant a domestic license as long as they feel their additive gives them an advantage in the market place.

But, Monsanto should probe G. E. for a Pyranol II license for use in overseas markets. MCL may need this to combat recent announcement by Prodelec of France that they offer an additive to scavenge HCl, similar to Pyranol II. G.E. has granted Pyranol II to their affiliate in Italy and to Automaticos in Mexico. They may grant us a license for overseas use to help us, if needed to combat Prodelec.

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A very impelling reason for recent good business at EUC is their position as the only independent supplier of power capacitors for the new and fast growing induction heating market for working steel and most all metals. Now all steel mills, foundrys and metal workers in general are interested in induction heating procedures. As Aroclor power capacitors constitute about 25% of the cost of this equipment, it is a very attractive new market outlet for us. EUC, Westinghouse and G.E. are the suppliers of the capacitors.

For example, McLouth Steel Corporation's new one hundred five million dollar mill expansion at Trenton, Michigan will have \$7.2 million induction slab heaters to heat the slabs from the continuing casting line of the mill. The system will use more electric power than a city of 160,000 homes.

More than one quarter million KVA of power will flow into the induction heating coils. Electrical apparatus includes six power transformers to step down 120 KV to working voltage. (We know that askarel transformers have been requested for this purpose but at such high voltage excess insulation required over mineral oil units results in excessive cost for the askarel transformers. Therefore mineral oil will be used. The nature of transformer askarel's limitation is understood, but there is no solution to the problem at hand).

There will also be 18 regulating transformers installed. These may well be askarel filled, depending on their location regards safety.

The installation will require Aroclor capacitor banks totaling 750,000 KVAR. This about \$1.1-million of capacitors will use near one half million pounds of Aroclor 1242 valued at \$75,000, based on the 1967 conventional Aroclor-paper power capacitor design.

An even larger induction heating system is being installed at Caterpillar in Peoria. It is expected that this new large-scale use for power capacitors will become widespread in the metal working industries. Even quenching operations are being replaced by induction heating to better control case hardening, etc.

The Peoria system which will be in operation in about a year from now is being fitted with G.E.'s new plastic film-Aroclor 1242 power capacitors. Without getting into details of design, for the purpose at hand it will suffice to estimate that the plastic film capacitor will use only about half as much Aroclor 1242 as is used in the 1967 conventional paper capacitor. This relationship will hold not only for induction heating capacitors but for power capacitors in general

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pending success of the plastic film design. This is now limited to a maximum hot spot of 85°C., but biaxially oriented, heat set polypropylene useable to a 100°C. and possibly even 120°C. hot spot in combination with Aroclor 1242, is anticipated.

Fortunately induction heating capacitors are water cooled, as needed due to their heavy operating loads. Obviously cooling the plastic film -Aroclor 1242 capacitors for this use is nothing to gamble with, as G.E. designers must well know.

While the purpose of this writing is not to get into capacitor design details, the following is of interest. The 1967 Aroclor-paper power capacitor uses 7.5 to 8.6 cents of Aroclor 1242 per KVAR. The new plastic film capacitor is not likely to use over 4 cents of Aroclor 1242 per KVAR. According to design our business in this segment of the overall Aroclor capacitor business will be cut in half as the plastic film power capacitors attain large scale production. However, the consensus is that increased use for this type capacitor will gradually offset this Aroclor design reduction.

Also, the consensus is that the plastic film-Aroclor 1242 design is not foreseen for use in ballast and motor-run capacitors. Accordingly these large segments of our business will not be altered by the film development now underway.

The reason use of Aroclor will increase for induction heating capacitors is because this work will now be done at relatively low frequency, e.g. 180 cycles. In the past high frequencies were used out of the useful range for Aroclor.

Roughly it may be concluded that:

1. We will not sell, in the near term, about four million pounds annually of Aroclor 1242 that we would have sold if the plastic film design had not arrived.
2. However, last year and now our Aroclor dielectric sales are far ahead of prior years and we find difficulty in supplying the needed quality and amount, with even several of our large customers shut down by long strikes. There is very strong demand for electrical apparatus, including Aroclor filled, and we have taken on world-wide commitments.

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3. Out of about 12 producers of polypropylene film, only Hercules has the biaxially oriented film sufficiently thin and free of pin holes to be useful for capacitors. It sells for \$1.05 to \$1.40 a pound depending on thickness. Each million pounds of film used will replace around 1.9 million pounds of paper which sells for 81 to 90 cents a pound. Even greater paper replacement is sought, i.e. the total plastic film capacitor, but paper still is used merely to serve as a wick to hold the Aroclor uniformly against the plastic.

The Hercules position seem so envied that most likely General Electric is studying the possibility of producing their own film or will consider setting up another producer if they do not wish to manufacture.

Unquestionably all of our customers would be most pleased to have Monsanto supply a suitable film for Aroclor capacitors. Potentially this is about a 15 million dollar annual business, far larger than our Aroclor sales.

At this time it is not foreseen that we can offer a suitable film, but this should be studied.



P. G. Benignus

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