

### BRITISH TRANSFORMER MANUFACTURING

## Bowers Low Loss Energy Saving Voltage Reduction Transformer Range

Bowers Electricals Ltd Low Loss Energy Reduction Transformers are specially designed to provide our customers with substantial savings in their Electricity bills and Carbon emission (Co2) reduction.

Because all our Transformers are of our own British in house manufacture and design, we can also offer bespoke Transformer solutions, where space is at a premium, or specific requirements are needed.

#### Savings by Low loss Design

The Losses which occur in Transformers can be divided into two groups:

- No load Losses - referred to as Iron Losses
- Load losses -  $I^2R$  losses & stray losses also known as Copper Losses

**No load losses** are the losses within the Transformer core and are attributed to the Hysteris loss (magnetising current) and eddy currents lost in fluxing the core of the Transformer. These losses are permanently evident as soon as the Transformer is energised, regardless of the load, as they are the power required to flux the Transformer core. As the maximum value of flux hardly varies between no load and full load, they are considered constant at all loads.

*Bowers Low Loss Transformers are manufactured using Low Loss Core steel usually with a lower flux density. The cores are manufactured to the highest standards and building techniques using specialist materials, which result in considerable reduction in the no load loss value*

**Load losses** are the losses attributed to the primary and secondary windings generally considered the  $I^2R$  losses and other stray losses and are proportional to the square of the load.

*Bowers Low Loss Transformers are manufactured using high grade low resistance copper with a larger cross sectional area, providing lower resistance values thereby reducing the  $I^2R$  loss value.*

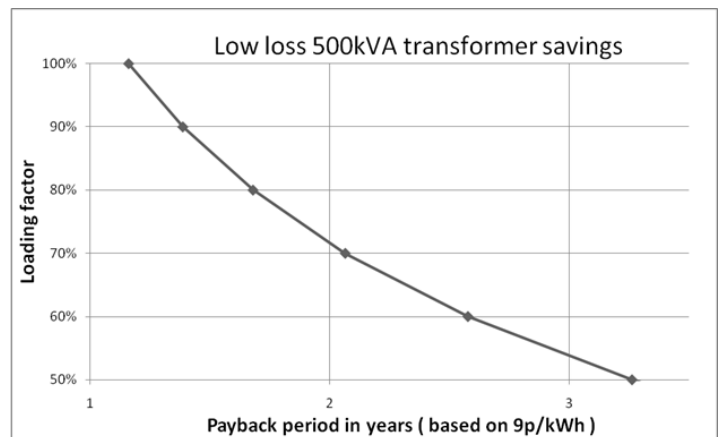
*Specialist winding techniques are also used in the manufacturing process, variants of which include strip bar and foil winding*

#### Return on Investment (ROI)

Although the cost of a Low Loss Transformer is more than a typical distribution Transformer, the additional initial outlay is soon recovered as a result of the reduction in Power consumption leading to reduced electricity bills.

The Graph below shows the typical payback period comparing a standard 500kVA Transformer and a Low loss design Transformer both working on the 11000 / 433volt tap.

As can be seen, the additional cost of the low loss design Transformer is recovered in a little over 2 years at 70% loading.



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#### Savings by Voltage reduction

There are many voltage optimisation products currently in the market place, but they principally all work on the same basis which is the installation of an intermediate low voltage transformer to reduce the voltage being supplied to the site in question. It has been proved that in certain circumstances a reduction in supply voltage can produce a considerable saving in the cost of the electricity bill by reducing the power consumption to the site.

The principal works on the basis that most companies receive their single phase power at around the 240V mark, and reducing the voltage down to 220V single phase will produce savings because many types of electrical equipment do not need this high level of voltage, especially with a lot of equipment now coming from Europe being designed for operation at lower European voltages, and hence by reducing the voltage the overall power consumption can be reduced.

Many machines will also run more efficiently and give longer life if run at this lower voltage i.e. in the case of induction motors supplying at optimum voltage will help prevent excess heat and vibration and the motor will still provide the same output torque and speed if it is designed to run at a lower spot wound voltage and will therefore last longer and run more efficiently.

A reduction in voltage can also reduce the reactance of some electrical equipment which can result in improvement in power factor giving further financial savings.

Low Loss Bowers Energy Reduction Transformers are manufactured with an extra +7.5% HV tap which can be used to reduce the secondary volts by up to 7.5% thereby reducing the voltage level to a similar voltage achieved with a voltage optimisation product.

Most voltage optimisation companies claim a reduction in energy costs of between 15 to 20% as result of this voltage reduction so in principle a similar saving should be achieved utilising a lower voltage output transformer. This saving though is subject to the types of load on site and it is possible that some equipment may not operate correctly at this lower voltage resulting in the need for localised voltage adjustment. Bowers will offer to survey your site and advise what loads are suitable for reduction and a recommended voltage level for the site in question.

We can then evaluate as to whether reducing site voltage is likely to contribute to saving in Power consumption and ensure the Transformers are set to the optimal tap position for the site in question.

We have recently been installing similar Low energy Bowers Transformers at a major supermarket chain and as a result of the lower loss design and the additional voltage tapping reduction they have made considerable savings in the cost of their energy bill.

We have found that upgrading the transformer to a low loss unit with additional tapplings of this nature can therefore very quickly pay for itself and start producing major savings in the energy bill thus justifying the changeover cost in a short period of time. The supermarket chain involved was not eligible for government loans and has financed this upgrade works themselves because the savings were so substantial.

By carrying out voltage reduction the cost of changing the Transformer to a low loss extra tap unit can be recovered in as little as 2 years



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#### Advantages of Bowers low Loss Transformers

- Bowers Transformers are designed and manufactured exclusively in the UK,-
- Production in Britain supports our British industry, and saves worldwide emissions as result of importation pollution.
- Low Loss design produces Energy savings cutting Electricity Bills.
- Installation of a low loss Transformer will produce savings based on reduced losses and increased efficiency
- Carbon Emissions (CO2) reduction meeting governments requirements for industry to reduce emissions.
- Climate change levy cost reduction(CCL)
- Design life in excess of 25 years.
- Low Loss Transformers will continue to make savings throughout the life of the Transformer regardless of any changes in voltage regulations/harmonisation
- Bowers Transformers are built for stock and are generally available immediately or on relatively short lead times.
- Bowers Transformers can be designed for bespoke applications
- Our Engineering team can design Transformer to fit in specific areas or replace other bespoke units.
- Our Transformers are manufactured in accordance with BSEN60076 and EATS 35-1 and can be fitted with complimenting HV and LV switchgear during manufacture
- Bowers will remove the obsolete higher loss incoming Transformers during the installation of the replacement Low loss unit and will purchase back the redundant unit if required or dispose of the redundant unit in accordance with current waste regulations.(including PCB contaminated units)

#### Advantages against Voltage optimisation Products (VOPs)

- Correction in voltage at the incoming Transformer means no additional equipment required.
- .VOPs cannot reduce primary losses in the incoming Transformer and add additional losses by their installation
- VOPs are expensive compared to upgrading of the incoming Transformer
- VOP's require maintenance as they are generally air cooled products in ventilated enclosures and not always suitable for heavy industrial environments.
- VOP's are an additional item in the network that require protection and can reduce the reliability of the network as they are an additional piece of equipment to maintain.
- Where site supply voltage is already low V.O.C's will generally state they cannot make savings and often will not offer. Installation of a low loss Transformer will still produce savings based on reduced losses and increased efficiency.

#### Financing your project with the Carbon Trust and Salix

As a result of the savings above it may also be possible should you wish to consider upgrading your distribution Transformers to obtain assistance in the form of interest free loans from the Carbon Trust and associations such as Salix. (See attached information)



#### Associated products

Bowers are also a Brook Crompton motors stockist and Drive centre holding high efficiency energy saving motors that can be used in conjunction with our Transformers to further reduce the cost of your industrial supplies.

