Water Heating by Electricity

Methods Used in the Home

A COMPLETE review of the various electrical methods of attaining a satisfactory installation of hot water in the home is given in this article by Mr. George Lauchlan, assistant general manager, Electrical Department, Wellington City Council. Readers interested will find the article fully authoritative and informative.

CIRCUMSTANCES have forced the electrical engineers of New Zealand to investigate and experiment with the heating of water. This is primarily due to the electrification of the home and the development of cooking by electricity, it being realised that the electrification of the home could not be completed without a satisfactory and economical electrical hot-water system. The results have been eminently satisfactory, and I can safely say that the demonstrations given at the recent Electrical Exhibition were such as to satisfy the most sceptical.

In order to give an economical service, the engineer started on the basis that the supply must be on the storage principle, this being due to the necessity for keeping the demand off the peak load, and assisting in the development of an "off-peak" load.

With our hydro-electric development, and the system of charging for same on the maximum demand basis, every inducement is given to the engineer to get near to 100 per cent. load factor. To the uninitiated I might explain that any demand which occurs during the hours when the general supply is being used, means extra expenditure in the purchase of current, whereas a demand made in the "off peak" hours, say from 9 p.m. to 7 a.m., does not cost any more for current.

In saying this, I am speaking in a general sense, as there is a difference in the hours of demand between town and country supply authorities. This will be easily understood when you realise that the demand in the cities is created by the industrial and domestic load, whereas the country load is in many cases governed by the demand for dairying use—this diversity in the demand, however, is easily adjusted.

As illustrating the interest which has been taken in the hot-water question, a glance at the proceedings of the Power Board Engineers' Conference will show that at the last two conferences, this question was treated as of paramount importance, and the result of their investigations and discussion resulted in the adoption of a model specification for installations. I have no hesitation in saying that today engineers in New Zealand are in the forefront with regard to the application of electricity for the heating of water for domestic use.

THE systems in use for the heating of water may be classified into three classes, as follows:—

(a.) Storage system whereby water is heated in bulk during the night or other "off peak" hours.

(b.) Storage system whereby water is heated, and the elements are controlled by a thermostatic switch which cuts off at any time when the water has reached a predetermined temperature.

(c.) System whereby the water is heated as required on the geyser principle.

Geysers.

I PROPOSE to deal with this latter system very briefly, as from an engineering point of view it is very undesirable. To give satisfactory service, high loading is necessary—an ordinary bath-heater requiring 14 k.w. or over 18 h.p.—and even this takes 20 minutes in order to get an average bath at a temperature of 105 degrees.

To my mind, the supply authority rightly discourages this type of heater, on the grounds that it makes an excessive demand and creates an unprofitable load.

This statement applies more to New Zealand, where the current is purchased on the maximum demand.

As the supply authorities' engineers have decided against allowing instantaneous heaters, I will not further discuss them.

Night Storage.

THE storage system under class "a" is the one which is most commonly used, and encouraged by the supply engineer for the reason previously stated, that the demand for current is regulated so as to be taken during the "off peak" time; this time varies with different authorities. For instance, in Wellington we welcome any demand for current between the hours of 10 p.m. and 7 a.m.

We have practically 10,000 k.w. at our disposal, and which will not cost us anything for generating. This is the reason we encourage the use of night storage systems—the low tariffs available make it an economic proposition.

In deciding on a storage system, the consumer is recommended to procure expert advice, as there are many different types on the market. Experience has taught us that the habits of the people vary appreciably, and not always in proportion to the size of the house. For instance, a 30-gallon cylinder may be ample for one family, whereas another family in the same sized house would require double the capacity.

I am of the opinion that satisfactory service can be obtained by having separate units for the bathroom and kitchen use. The temperature of the water required in the kitchen is much higher than is necessary in the bathroom, and a big saving is made through the shorter run of the pipes, eliminating radiation losses. A model specification can be obtained which may be taken as a guide for anyone installing a storage system.

Insulation Very Necessary.

THE question of insulating or lagging the cylinder and pipes is of paramount importance. We had recently to investigate a complaint from a consumer, that they were not getting a satisfactory service, and on examination we found that the cylinder was not insulated, and furthermore, the lady concerned did not want it insulated, as she dried the baby's clothes there. I had then to explain as best I could "that you could not eat your cake and still have it."

Another source of complaint is caused through installing an element of too low a capacity. Our Continental friends have adopted the system of using smaller cylinders than we do, but raising the water to a much higher temperature.

We had a case recently where a consumer complained that his supply was insufficient, and he was proposing to put in another cylinder. I advised him against this, and suggested that if the heating elements were increased, it would probably meet his requirements—this was done with satisfactory results—the temperature being raised from 140 deg. to 160 deg.

As previously stated, the insulation is an important factor in a storage system, and there are naturally different opinions as to the most efficient material to use; my own opinion is that granulated cork is the best, but as this is not easily procurable here, the following materials can be used satisfactorily:—Hair felt, silicated cotton, or slag-wool, asbestos and pumice.

It is possible to insulate a cylinder so that the losses do not exceed 1 deg. per hour.

Thermostatic Storage.

I WILL now refer to the storage heater, which is thermostatically controlled. These need not be of such a large capacity as the storage heaters previously referred to, for the reason that the current is on for longer periods, and immediately the temperature falls, through the replacement of water drawn off, it automatically cuts in and raises the water to the predetermined temperaure. One great advantage of this type of heater is that it is automatic, and heats your water without any attention whatever, and, still more important, when the water is hot, automatically switches off the current. This

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