

PAGE : 1 OF 3  
DATE : 6/8/87  
REVISION : 0  
DISTRIBUTION : VOLUME 1 HOLDERS  
PREPARED BY : BRIAN KENT  
AUTHORISED BY : BRIAN KENT

STANDARDS BRANCH  
- Power Division

S1-020

**STANDARDS BULLETIN No. :**

**FUSE DE-RATINGS**

SUBJECT:

AMBIENT TEMPERATURES

Based on information received from Prospect County Council, separate ratings for H.R.C. H.V. fuses installed in switchgear located in indoor and package substations are to be introduced.

Fuse ratings for indoor substations will be based on ambient temperatures of 40 deg C whereas ratings for Kiosk substations will be based on ambient temperatures of 65 deg C.

Fuse end cap temperatures (silver plated) are limited to 105 deg C and this factor limits the continuous current ratings of fuses because of the heat generated by the fuse elements.

FUSE RESISTANCES

Previous tests by P&WA have indicated considerable variations in fuse element resistances in a range of different brand fuses.

Differing resistance values would have meant having specific derating values for each brand of fuse as the continuous current rating of air insulated fuses is directly proportional to the watts loss ( $I^2R$ ) and hence the fuse resistance. It was therefore decided to purchase only fuses with resistances which were within 10% of the L.E.L. brand fuses thus retaining specified derating values for specific switchgear.

HEAT DISSIPATION

Test results of heat runs on various brands of H.V. switchgear have enabled fuse "watts loss" dissipation values to be set for each type of switch at both ambient temperatures.

Heat run tests were carried out maintaining ambient temperatures of both 40 deg C and 65 deg C with switches configured as ring main units and with various feeder currents simultaneously applied with various fuse currents. Thermocouples were used to measure temperature rises at critical parts of the equipment.

These tests have resulted in specific values for heat dissipation being applied to switchgear for both indoor and package substation applications.

In order to simplify current ratings of fuse, it was decided not to consider various load cycles (ie. domestic or commercial) but rather to consider worst case

situations at two ambient temperatures, namely

"Indoor" - 40 deg C ambient  
 "Package Sub (Outdoor)" - 65 deg ambient

#### PREVIOUS CURRENT RATINGS

Previous fuse derating charts issued relating to ambient temperatures of 40 deg C and with the exception of the ratings for the Krone switchgear are correct.

Figures for Krone switchgear were assumed to be the same as for Hazemeyer however recent heat run tests show that larger values of heat dissipation are allowable for 40 deg C ambient temperatures. The previous figure of 30 watts can now be raised to 55 watts.

#### TRANSFORMER RATINGS

A previous consideration taken into account in the setting of the fuse ratings for transformers was the required overload capability of the transformer. This figure was previously set at 50% overload to cater for emergency situations.

This figure is now considered too high and a more realistic figure of 20% overload should be applied.

This may mean that emergency loading of two transformer substations will now be limited to 120% of single transformer rating with one transformer out of service. This figure may be able to be exceeded depending on ambient temperature and type of switchgear.

#### KRONE SWITCHGEAR APPLICATION

Krone has recently released a three phase switching device which enables switches to be operated in ganged sequence thus eliminating problems with single phase feeder switching . Krone can now be considered for use in indoor substation applications for transformers up to and including 1000 KVA.

It is also ideal for use in multi transformer applications where considerable cost savings are available over use of multiple oil ring main units.

Environmental situations must be considered and it is recommended where extreme dust or pollution situations exist that oil switches are used.

#### NEW DE-RATINGS FOR FUSE HOLDERS

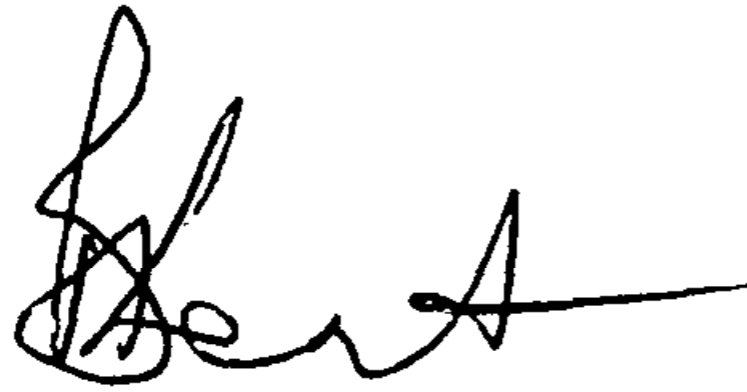
	INDOOR (40 deg C)	OUTDOOR (65 deg C)
KRONE	55 watts loss	30 watts loss
HAZEMEYER	30 watts loss	23 watts loss

Appropriate continuous current rating can be set using installed fuse internal resistances (measured at 25 deg C) and applying formulae  $I = W/R$ .

TRANSFORMER FUSING

No change from existing charts with the exception of the additional use of Krone for 1000KVA transformers utilising 100 amp L.E.L. H.V. fuse.

New fuse application charts will be issued shortly which will include the above mentioned changes.



BRIAN KENT  
STANDARDS MANAGER POWER