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Thermal Overload Capabilities of Protection Equipment

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THERMAL OVERLOAD CAPABILITIES OF PROTECTION EQUIPMENT

FOREWORD

The objective of this Technical Guidance Note (TGN) is to provide information to enable the continuous and short-term overload capability of a circuit to be assessed.

Where critical cases are being studied, further advice should be sought from Engineering and Technology (ET)

1 SCOPE

This TGN lists the continuous and short-term thermal capability of protection equipment employed on the 400 and 275 kV transmission system and associated plant.

However, the permissible overload capability of protection equipment may well be limited, for example, by its required setting in a given application rather than by its thermal overload capability. The application limitations are not covered in this TGN.

The tabulated information is applicable to protection equipment used at all system voltages. However, some of the considerations made when compiling these tables relate only to the 400 and 275 kV systems.

2 DEFINITIONS

2.1 Rating

This is a parameter (eg current) to which a value is assigned by the Manufacturer or specified by the purchaser and upon which some aspect or aspects of the performance are based.

2.2 Capability

This term denotes the current which can be carried by the equipment under the stated conditions.

Such values of current may be provided by the Manufacturer, or they may be based on assessments or tests carried out by National Grid. The use of this term in lieu of ratings is to prevent confusion as to the status of such current values.

2.3 Thermal Overload

Thermal overload is a load beyond the rating of a relay, which is limited by temperature rise.

3 REFERENCES

This TGN makes reference to or should be read in conjunction with the following documents:

NGTS 2.6	Protection
NGTS 3.2.4	Current Transformers
TGN(T) 26	Current Ratings for Overhead Lines
TPS 2.6.2	Protection Setting Policy for National Grid Company's Transmission System.

4 EQUIPMENT RATINGS

The current ratings of primary circuits are dictated by various factors, eg the capabilities of overhead line conductors, cable circuits, switchgear etc. These factors determine the choice of CT ratios upon which the ratings of protection and other secondary equipment are based (see NGTS 3.2.4).

TGN(T) 26 gives the most recent figures available for ratings for overhead line conductors. These include the continuous current capabilities together with much higher values for short duration overloads of between 3 minutes and 20 minutes duration.

These capabilities represent loads that will produce corresponding secondary current values which have to be compared with both the ratings of protection systems and, more importantly, the continuous and short-term thermal overload capabilities of protection systems.

5 EQUIPMENT CAPABILITIES

In June 1984 an agreement was reached between the Electricity Boards (EB) and the Federation of British Electrotechnical and Allied Manufacturers Associations (BEAMA) setting out the continuous and short-term thermal overload capabilities to which all protection systems and relays subsequently designed would conform. These agreed capabilities are included in NGTS 2.6 and tabulated below.

INITIAL LOAD (AMPS)	DURATION (MINUTES)	SECONDARY CURRENT (AMPS)
0 - 2.4	CONTINUOUS	2.4
0 - 2.0	20	3.0
	10	3.5
	5	4.0
	3	5.0
	2	6.0

Those protection systems and relays designed prior to June 1984 have, in general, been the subject of extensive testing to establish their actual thermal capabilities; the protection systems and relays tested having been extremely varied in design and mode of operation and different components having, therefore, been found to be limiting factors in many cases.

The continuous and short-term thermal overload capabilities of protection systems and protection relays are set out in Tables 1 and 2, respectively, of this document. The values quoted therein are either in compliance with NGTS 2.6 or are derived from test results. It should be noted that in many cases these capabilities do not meet the corresponding overhead line ratings given in TGN(T) 26.

Due to the short time-constants of the critical components in protection, it is not possible to give separate and meaningful values of current for each of the short-term durations quoted in TGN(T) 26.

Where the value of current for a particular duration is not available, the continuous capability has been