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ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

THE NEW EUROPEAN VOLTAGE LEVEL AND THE REPERCUSSIONS TO EAC

FRIXOU ANDREAS

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Project report submitted by:

FRIXOU ANDREAS

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Project Supervisor: Mr. Ch. Chrysafiades
Senior Lecturer
HTI

External Supervisor: Dr. V. Efthymiou
Senior Electrical Engineer
EAC

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Frixou Andreas

ABSTRACT

Europe since January 1995 has introduced new operating voltage limits for the low voltage distribution lines of utilities in an effort to tackle effectively compatibility issues for the supply of electricity and equipment connected by consumers.

This project deals with the identification of the importance of keeping the voltage on the supply terminals within predetermined limits. In the project reference is made to the practices that will be taken by the Electricity Authority in order to meet these limits. Also in this project the implications of the new European Directive are specified and suggestions are given for meeting the objectives set out.

Due to electricity as delivered to the customers has several characteristics which are variable and which affect its usefulness to the customers. This is very important factor to be considered in order to keep the voltage on the supply terminals within predetermined limits. With respect to the use of electricity it is desirable that the supply voltage would alternate at a constant frequency, with a perfect sine wave and a constant magnitude. Of course in practice there are many factors, which cause departures from this. In contrast to normal products, applications are one of the main factors, which influence the variation of "characteristics".

Another factor that must be considered in order to keep the voltage on the supply terminals within predetermined limits is the flow of energy to the consumer's appliances that gives rise to electric currents, which are more or less proportional to the magnitudes of the customers' demands. As these currents flow through the conductors of the supply system, they give rise to voltage drops. Since each customer's demand is constantly varying and there is a further variation in the degree of coincidence between the demands of several customers, the supply voltage is also variable.

Finally another important factor for the stability of the voltage level is to keep the frequency constant. To keep it constant requires the amount of running generation capacity to be matched instant by instant to the simultaneous combined demand.

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1. INTRODUCTION.

Electricity is an energy form, which is particularly versatile and adaptable. It is utilised by being converted into several other forms of energy: heat, light, mechanical energy, and the many electromagnetic, electronic, acoustic and visual forms, which are the bases of modern telecommunications, information technology and entertainment.

Electricity as delivered to the customers has several characteristics which are variable and which affect its usefulness to the customer. This project describes characteristics of electricity in terms of the alternating voltage. With respect to the use of electricity it is desirable that the supply voltage would alternate at a constant frequency, with a perfect sine wave and a constant magnitude. In practice, there are many factors, which cause departures from this. In contrast to normal products, application is one of the main factors, which influence the variation of "characteristics".

The flow of energy to the consumer's appliances gives rise to electric currents, which are more or less proportional to the magnitudes of the customers' demands. As these currents flow through the conductors of the supply system, they give rise to voltage drops. The magnitude of the supply voltage for an individual customer at any instant is a function of the cumulative voltage drops on all the components of the system through which that customer is supplied, and is determined both by the individual demand and by the simultaneous demands of other customers. Since each customer's demand is constantly varying, and there is a further variation in the degree of coincidence between the demands of several customers, the supply voltage is also variable. For this reason, this project deals with the voltage characteristics in statistical or probabilistic terms. It is in the economic interests of the customer that the standard of supply should relate to normally expected conditions rather than to rare contingencies, such as an unusual degree of coincidence between the demands of several applications or several customers.