

Electrolink N^o 6

January 2011

INTERFERENCE WITH SUPPLY TO OTHER CUSTOMERS

INTRODUCTION

The purpose of this Electrolink is to give general guidance to customers concerning possible interference with the supply to other customers.

Experience has shown that certain electrical equipment may give rise to voltage disturbances that affect the supply to premises of other customers and cause conditions that interfere with the proper use of the electricity supply.

The rights of customers are protected by Regulations and provide in extreme cases for the disconnection of a customer, whose use of electrical equipment or of the electricity network connection causes interference with the supply to other customers. Fortunately, such action is rarely taken but it may become necessary to require the modification or disconnection of the equipment giving rise to interference.

TYPE OF INTERFERENCE

1. Voltage Fluctuations

Sudden voltage changes (due, for example, to the starting of electric motors or the control of heating loads by burst-firing of thyristors) may cause lighting systems to “flicker” in an annoying manner. The degree of annoyance depends on the magnitude of the voltage change and the frequency of occurrence. Voltage depressions of less than 0.5% may cause complaints if the repetition rate is about 10 times per second. However, where the cause of the voltage depressions is infrequent (ie occurs at intervals of more than 2 hours) then depressions of up to 3% in voltage may be acceptable.

2. Harmonics

Non-linear loads (eg thyristor controls involving “chopping” of the 50Hz waveform by variation of the firing angle) can produce significant harmonics of the fundamental waveform. These may interfere with communication circuits, sensitive electronic equipment and may cause damage to power factor correction capacitors. Sub-harmonic frequencies can sometimes be generated and these may cause particular difficulty.

3. Voltage Unbalance

Single-phase and other unbalanced loads may cause the three-phase electricity distribution network to become unbalanced. Unbalance in excess of 2% may cause overheating of electric motors. Normally unbalance of the supply at 33kV and 132kV is restricted to less than 1.0% and at lower voltages to less than 1.3%.

4. Voltage Transients

Switching, especially of inductive loads, can generate voltage transients (“spikes”) with magnitudes of several hundred volts and durations of fractions of a microsecond. These can disrupt the operation of computers and other digital equipment. Reference should be made to the Electrolink N^o 7 “Computers and Mains Electricity Supply”.

5. Communications Signals

A number of devices are now available which use the customer’s internal wiring as a communication path. These are not approved for communication between premises by means of Electricity North West’s electricity distribution network and the customer should ensure that the signals from such devices are confined to his installation.

ADVICE CONCERNING SOME TYPES OF EQUIPMENT

1. Electric Welders

An application for connection for welding purposes should state clearly the type, rating and supply voltage of the welding equipment before any arrangement is made for its installation. The connection of welding equipment is subject to the following factors that will be taken into account on receipt of an Application form.

- (a) Welders for connection between phase and neutral lines (nominally 230V) can be accepted for ratings only of 5kVA and below.
- (b) Welders above 5kVA rating where the connection to the customer is not at high voltage should be connected between phases of the three-phase supply (nominally 400V).
- (c) Provision should be made for the correction of the power factor of the installation, which, because of the connection of welding equipment, may be unduly low.

The foregoing factors are applicable to most parts of Electricity North West's electricity distribution network but there may be special cases where even these factors will be subject to modification.

- (d) Welders, such as resistance types, having high ratings may require a supply delivered to the premises at high voltage and are the subject of special negotiations with Electricity North West for each individual case.

2. Electric Motors - Starting Conditions

On receipt of applications for connection of a.c. motors Electricity North West will indicate the limits (if any) which should be applied to the starting current taken by motors, the rating of which exceeds those noted below, and for motors operating passenger lifts and goods hoists of any rating.

Motors, other than lift and hoist motors, up to and including the following sizes may be started by any method –

Single-phase	230V	0.75 kW (ie 1HP)
Single-phase	460V	3.0 kW (ie 4HP)
Three-phase	400V	4.5 kW (ie 6HP)

When supplied from transformers below approximately 100 kVA, these motors may cause excessive voltage dips.

Lift and hoist motors (and others subject to similar duty involving very frequent starting) up to the following sizes may be accepted for connection on Electricity North West's electricity distribution network without qualification as to the starting current or method of starting:-

Single-phase	230V	0.37 kW	(ie ½HP)
Single-phase	460V	1.5 kW	(ie 2HP)
Three-phase	400V	2.25 kW	(ie 3HP)

3. Converters and Thyristor A.C. Power Controllers (A.C. Regulators)

The maximum sizes of individual converter or a.c. regulator equipments that may be connected to any 400V, 6.6kV or 11kV electricity distribution network (s) without detailed consideration by Electricity North West of the harmonic currents produced are given in the table below:-

Electricity Distribution Network Supply Voltage (kV) at Point of Common Coupling	Three-phase Converters			Three-phase a.c. Regulators	
	3-Pulse (kVA)	6-Pulse (kVA)	12-Pulse (kVA)	6-Thyristor (kVA)	3-Thyristor/3-Diode (kVA)
0.400	8	12		14	10
6.6 and 11	85	130	250*	150	100

* This limit applies to 12-pulse devices, and to combinations of 6-pulse devices always operated as 12-pulse devices, employing careful control of the firing angles and the d.c. ripple to minimise non-characteristic harmonics, eg 3rd, 5th and 7th.

Single-phase converters etc, which theoretically produce no even harmonics and which are intended for industrial type equipment and battery charging should not exceed 5kVA capacity at 230V, or 7.5kVA at 400V or 460V. The use of single-phase equipment that does produce both odd and even harmonics is deprecated.

ELECTRICITY NORTH WEST'S RESPONSIBILITY

The advice contained within this Electrolink is given in good faith based on information available. No guarantee can be given, however, that the information will not change in the future. Electricity North West cannot be held responsible for costs incurred due to inaccuracies or subsequent changes.

Other publications in the Electrolink series:

- Electrolink N^o 1 - The Application of Protective Multiple Earthing to Customers' Electrical Installations.
- Electrolink N^o 2 - Estimation of Prospective Short Circuit Current.
- Electrolink N^o 3 - Temporary Electricity Connections for Construction Sites - up to 20/60kVA.
- Electrolink N^o 4 - Meter Board Arrangements for New Single-Phase Domestic Supply up to 20kVA.
- Electrolink N^o 5 - Outdoor Meter Reading Facilities.
- Electrolink N^o 7 - Computers and Mains Electricity Supply.
- Electrolink N^o 8 - Temporary Electricity Connections for Construction Sites - 60kVA to 300kVA.

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