

Electrolink N^o 2

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ESTIMATION OF PROSPECTIVE SHORT CIRCUIT CURRENT (PSCC)

INTRODUCTION

Regulation 313 of BS 7671 - Requirements for Electrical Installations (IEE Wiring Regulations), requires the designer of an electrical installation to ascertain the characteristics of the supply, including the "prospective short circuit current" (PSCC) at the origin of the installation.

The purpose of this Electrolink is to give guidance on the estimation of maximum prospective short circuit current at the supply terminals of electrical installations to be connected to Electricity North West's LV distribution network using a 20kVA single phase supply.

INCOMING SERVICE ARRANGEMENTS

Electricity North West's incoming service line will be overhead or underground and directly from a main. The service termination will normally be made using a "cut-out" unit. The "cut-out" will be fitted with a single pole fuse link to BS 1361 type II rated up to 100A and have a solidly connected neutral. The maximum supply capacity shall be 20kVA. The connections between Electricity North West's equipment and the next stage of protection, provided by the customer (eg consumer unit), are the property and responsibility of the customer. Where reliance is placed upon Electricity North West's cut-out fuse-link to provide electrical protection for these connections, the requirements of Electricity North West in respect of the installation of the connections and the protective device must be met. (See BS 7671 Regulation 434.3.) If Electricity North West's cut-out fuse-link is called upon to clear faults on any part of the customer's installation, Electricity North West cannot accept responsibility for consequent damage to the customer's installation. Electricity North West has the right to charge the customer the cost of supplying and fitting a replacement cut-out fuse-link.

PROSPECTIVE SHORT CIRCUIT CURRENT AT ELECTRICITY NORTH WEST'S CUT-OUT

The PSCC at the customer's supply terminal is determined by the overall electricity distribution network capacity and the distance from the supply source. Increasing demands may in the course of time require additional capacity to be installed. It follows therefore that during the life of any customer's installation the PSCC may increase. To avoid the need for costly changes in protective equipment, Electricity North West designs its electricity distribution network to a pre-determined maximum PSCC. All equipment used on the electricity distribution network, including the cut-out and fuse-link is then rated accordingly.

Electricity North West considers that an appropriate maximum design value of the PSCC for single phase 230V supplies is 16kA at the point of connection of the service line to Electricity North West's main low voltage distributor. The service line will attenuate the PSCC at the customer's service cut-out position. It is possible to allow for the attenuation and estimate the maximum PSCC at the origin of the installation.

The table provided shows the maximum PSCC and power factor for service line lengths up to 50m, based on 16 kA (pf 0.55) at the service tee-off point. Values are given to cover the range and sizes of cables and overhead lines in use in Electricity North West's distribution network and represent the minimum attenuation for a single 20kVA service fused at 100A. Where doubt exists at the design stage as to the size of service line it is recommended that the values in the right hand columns are taken as maxima. The service line length should be measured or estimated from site plans as the shortest distance from the edge of the footpath nearest the installation to the service cut-out. Even if the position of the main distributor is known to be on the far side of the road this additional length should not be included since it is not uncommon to increase the capacity of the LV distributor system by installing main distributors on the other side of the road.

ESTIMATION OF ATTENUATION IN PROSPECTIVE SHORT-CIRCUIT CURRENT BEYOND ELECTRICITY NORTH WEST'S CUT-OUT

For the majority of installations covered by this Electrolink the customer's switchgear will be positioned within a metre of Electricity North West's cut-out. Where this is not the case the designer may wish to allow for the additional attenuation due to the length of the connection between the cut-out and the customer's switchgear. The designer may find it convenient to add the service length estimated as above to the length of the connection within the installation and read the PSCC from the table. Alternatively the PSCC estimated above may be used as a basis for calculating this additional attenuation.

SELECTION OF PROTECTIVE DEVICES

The designer will select protective devices for the installation in accordance with BS 7671 on the basis of such requirements as PSCC, rated breaking capacity, operating characteristics, discrimination, convenience, ease of replacement or re-energisation, cost and reliability. It may be that in the course of selection some compromise between requirements is necessary.

If the rated breaking capacity of the proposed device is equal to or greater than the maximum PSCC at the service line tee-off point or as estimated in this Electrolink, no further consideration of these two factors is necessary.

When the rated breaking capacity is less than this maximum PSCC it is possible to allow at the design stage for the limitation in fault energy let through by Electricity North West's cut-out fuse (see BS 7671 Reg. 434.5). If this option is used, the designer should assume that the cut-out will contain a 100A fuse-link to BS 1361. The designer should also take into account the requirements in BS 7671 to avoid danger and minimise inconvenience in the event of faults (Regulation 314).

In order to assist designers in selecting protective devices in conjunction with the limitation in energy let-through of Electricity North West's cut-out fuse-link, the conditional testing procedure has been established by the BSI for type testing the devices. In this conditional test, the protective device is given a conditional rating based on the maximum PSCC it can withstand, without danger, in series with an electricity industry standard cut-out incorporating a 100A fuse-link to BS 1361, single rate credit meter and specified lengths of connecting cable.

ESTIMATED PSCC AT ELECTRICITY NORTH WEST'S CUT-OUT BASED ON DECLARED LEVEL OF 16kA (0.55pf) AT THE POINT OF CONNECTION OF THE SERVICE LINE TO THE LV DISTRIBUTING MAIN

Length of Service Line (metres)	Up to 25mm ² Al or 16mm Cu Service Cable or Overhead Line		35mm ² Al or 25mm ² Cu Service Cable or Overhead line	
	PSCC (kA)	pf	PSCC (kA)	pf
0	16.0	0.55	16.0	0.55
1	14.8	0.63	15.1	0.61
2	13.7	0.69	14.3	0.66
3	12.6	0.74	13.5	0.70
4	11.7	0.78	12.7	0.74
5	10.8	0.82	12.0	0.77
6	10.1	0.84	11.4	0.79
7	9.4	0.86	10.8	0.82
8	8.8	0.88	10.3	0.83
9	8.3	0.89	9.7	0.85
10	7.8	0.91	9.3	0.86
11	7.4	0.92	8.8	0.88
12	7.0	0.92	8.4	0.89
13	6.6	0.93	8.1	0.90
14	6.3	0.94	7.7	0.91
15	6.0	0.94	7.4	0.91
16	5.7	0.95	7.1	0.92
17	5.5	0.95	6.9	0.92
18	5.3	0.96	6.6	0.93
19	5.1	0.96	6.4	0.93
20	4.9	0.96	6.2	0.94
21	4.7	0.96	6.0	0.94
22	4.5	0.97	5.8	0.95
23	4.4	0.97	5.6	0.95
24	4.2	0.97	5.4	0.95
25	4.1	0.97	5.3	0.95
26	3.9	0.97	5.1	0.96
27	3.8	0.98	5.0	0.96
28	3.7	0.98	4.8	0.96
29	3.6	0.98	4.7	0.96
30	3.5	0.98	4.6	0.96
35	3.1	0.98	4.0	0.97
40	2.7	0.99	3.6	0.98
45	2.5	0.99	3.3	0.98
50	2.2	0.99	3.0	0.98

NOTE: This procedure is applicable to installations within the Electricity North West electricity licensed area. For installations outside this area reference should be made to the local Distribution Network Operator.

All consumer units shall comply with the requirements of BS EN 60439-3: 1994.

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 3 - Temporary Electricity Connections for Construction Sites – up to 20/60 kVA.
- 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 6 - Interference with Supply to other Customers.
- Electrolink N^o 7 - Computers and Mains Electricity Supply.
- Electrolink N^o 8 - Temporary Electricity Connections for Construction Sites – 60kVA to 300kVA.

For further information contact:

Electricity North West,
Frederick Road,
Salford,
M6 6QH.

Telephone: 0871 687 0501

Email: connections.enquiries@enwl.co.uk