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GEC ALSTHOM INSTALLATION EQUIPMENT LIMITED

COMPACT
LV HRC FUSE LINKS

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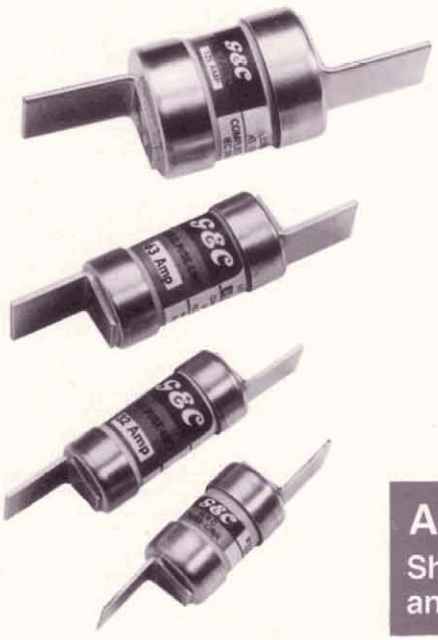
'SAFECLIP'

Compact fuse links to BS88:Parts 1 or 6: 1988 for use in 'SAFECLIP' fuse holders and fuse switches.



AC performance

ASTA 20 certified at 80kA, 440V* to BS88 : Part 1 or Part 6 : 1988.

**SS types are certified at 16.5kA, 240V, and the NS32M40 and ES63M80 at 80kA, 415V.*

Protection of PVC insulated cables

Standard ratings of 'SAFECLIP' fuse links provide complete protection to PVC insulated cables when applied in accordance with rule 433-2 of 15th Edition, IEE Wiring Regulations (ie, when their current ratings are equal to, or less than, those of the cables).

Discrimination

'SAFECLIP' fuse links will discriminate with each other at fault levels up to 80kA, 440V when the ratio between major and minor current ratings is 2:1. (See Application Notes below).

Protection against electric shock

The values of maximum earth loop impedance (Zs) given in Table 41A2(a) of 15th Edition, IEE Wiring Regulations are applicable to circuits protected by 'SAFECLIP' fuse links, to give good protection against electric shock in fixed installations.

Energy conservation

All 'SAFECLIP' fuse links have low power loss values, well within the limits specified in BS88 : 1988.

Motor starting ability

All 'SAFECLIP' fuse links are suitable for use in motor circuits and have superior motor starting ability (see page 2/4)

Approvals

Manufactured to BS5750 : Part 1 : 1987, 'Quality systems : design/ development, production, installation and servicing', and approved by leading authorities such as Lloyds.

Application notes

Short circuit energy limitation and discrimination

The designers of electrical equipment such as switches and contactors have to prove their products under the worst possible conditions (i.e at maximum breaking capacity, at 110% rated voltage, very low power factor, and with faults initiated at the most onerous points on the voltage wave), and they require relevant data from the fuse link manufacturer. This is given in the cut-off current characteristics and I^2t Values on Pages 2/5 and 2/7.

However, in service the short circuit fault conditions are usually less exacting than those produced in proving tests. In particular, the circuits are usually three-phase with relatively high power factor. In practice, therefore, the I^2t values of 'SAFECLIP' fuse links are significantly less than those tabulated and they will discriminate with each other if the ratio between major and minor fuse links in series is 2:1. Where 'SAFECLIP' fuse links are used as the minor rating in series with a 'T' range fuse link as the major rating then discrimination at 415V/240V will be achieved with a ratio of 1.6:1.

Applications

Equipment	Refer to Publication number for details	Fuse link type accommodated in equipment				
		SS	NS	ES	XS	OS
'SAFECLIP' HRC Fuse holders and Fuse banks	IEF/402	•	•	•		•
'SAFECLIP' Distribution Fuse boards	IEF/403	•	•	•		•
'SAFECLIP' Fuse Combination Units – Type MSS	IEF/442		•	•	•	
'SAFECLIP' Wall Mounting Fuse Combination Units – Type WMS	IEF/445		•	•	•	
'SAFECLIP' Panel boards	IEF/450		•	•	•	
Type MST100 Fuse switch	IEF/404					•
Type WMST1003N Wall Mounting Fuse Switch	IEF/405					•

List numbers and Dimensions

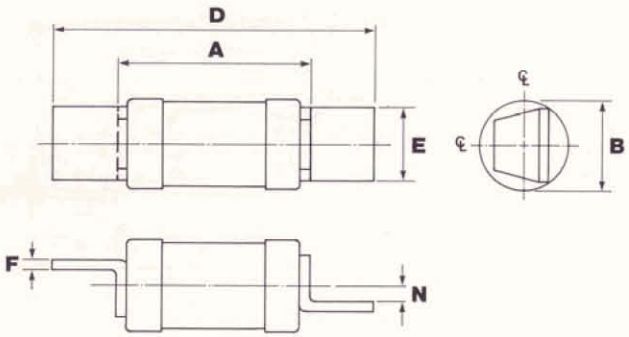


Figure I

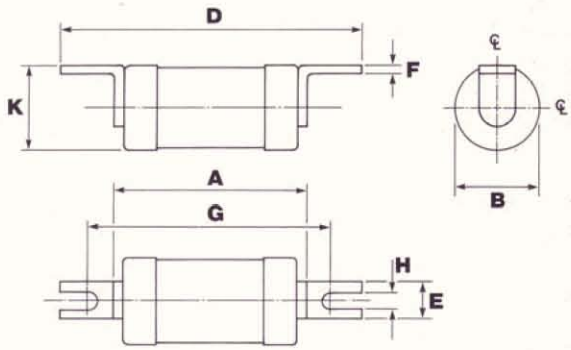


Figure II

List number prefix	Current rating Amp	Figure number	Dimensions *in millimetres*					
			A max	B max	D max	E	F	N
SS	2*, 4*, 6, 10, 16, 20	I	25	14·5	51	11	0·8	3·6
NS	2, 4, 6, 10, 16, 20, 25, 32, 32M40*	I	35·5	14·5	62	11	0·8	3·6
ES	40, 50, 63, 63M80*	I	39	17·5	69	15	1·25	3·6
XS	20*, 32*, 63*, 80*, 100*, 125*	I	39	26·4	80	19	1·6	3·6

			A	B	D	E	F	G	H	K
OS	80*, 100*, 100M125*	II	58	26·4	90·5	12·7	1·2	22·2	6·2	27·8

*These types are ASTA Certified to BS88 : Part 1 : 1988

Select HRC fuse links to protect 3-phase motor circuits as follows:

1) Obtain motor full load current from Table 1.
2) The following motor starting conditions are assumed:
   Direct-On-Line:
   Up to 1 kW: 5 × FLC for 5 secs.
   1·1 to 7·5 kW: 6 × FLC for 10 secs.
   7·6 to 55 kW: 7 × FLC for 10 secs.
   Assisted Start:
   Up to 1 kW: 2·5 × FLC for 20 secs.
   Greater than 1 kW: 3·5 × FLC for 20 secs.
3) Choose the recommended fuse link for the motor FLC and starting condition from Table 2 (DOL start) or Table 3 (assisted start).

The recommended fuse link ratings apply for up to 8 starts per hour at stated starting conditions. They may need to be adjusted if any of following conditions occur singly or in combination.

a) Starting currents in excess of assumed ones.
b) Longer starting times than those stated.
c) Large number of starts per operating cycle.
d) High enclosure temperature.

Table 1 Full load currents of typical 3-phase induction motors at voltages shown

Motor rating kW	Motor rating HP	220V	380V	415V	440V
0·37	0·5	2·0	1·15	1·05	1·0
0·55	0·75	2·7	1·6	1·5	1·4
0·75	1	3·9	2·3	2·0	1·9
1·1	1·5	4·7	2·8	2·5	2·4
1·5	2	6·5	3·8	3·5	3·3
2·2	3	9·3	5·4	5·0	4·7
3	4	12	7·1	6·5	6·1
4	5·5	15·4	9·0	8·4	7·9
5·5	7·5	20·7	11·9	11	10·3
7·5	10	28	16·1	14·4	14
11	15	39·1	23	21	19·8
15	20	52·8	30·5	28	26·4
18·5	25	66	38	35	33
22	30	77	45	41	39
30	40	103	60	55	52
37	50	–	75	69	65
45	60	–	87	80	75
55	75	–	107	98	92

Table 2 Direct-on-line starting

Motor FLC Amp From	Motor FLC Amp to	Fuse Current Rating Amp	Fuse Type
0	0·7	2	NS
0·8	1·4	4	
1·5	2·0	6	
2·1	3·0	10	
3·1	6·1	16	
6·2	9·0	20[3]	
9·1	11	25	
11·1	14·4	32[3]	
14·5	18	40[1]	ES
18·1	22	50	
22·1	28	63[3]	
28·1	38	80[2]	XS
38·1	53	100	
53·1	72	125	
28·1	45	80	OS
45·1	58	100	
58·1	80	100M125	

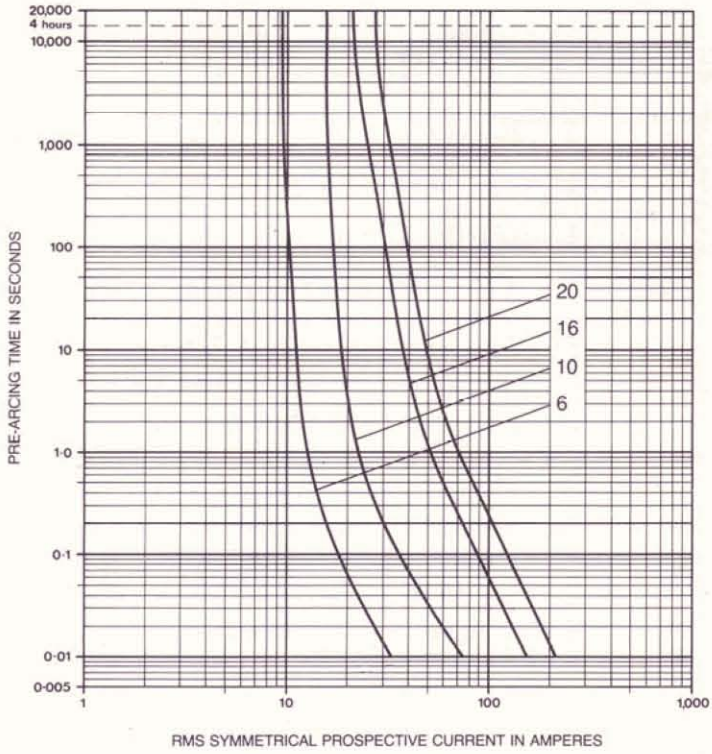
1) *NS32M40 is alternative type if FLC does not exceed 32A & voltage is 415V or less.*
2) *ES63M80 is alternative type at 415V or less.*
3) *XS type is available in this rating.*

Table 3 Assisted starting (star/delta, etc)*.

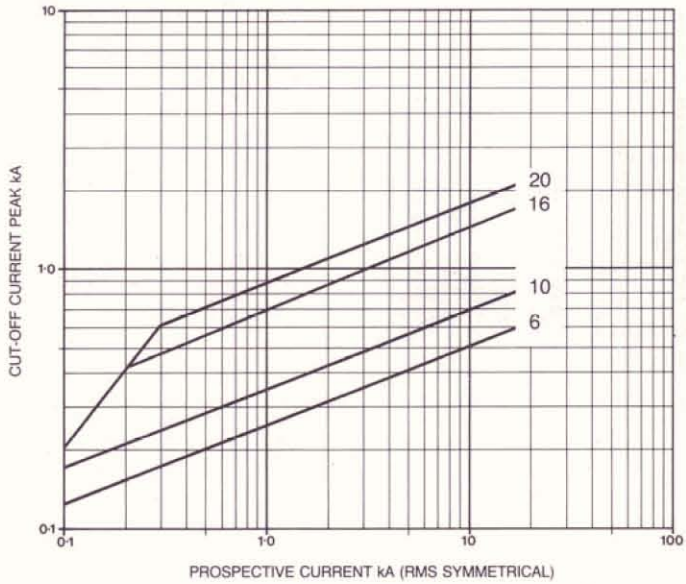
Motor FLC Amp From	Motor FLC Amp to	Fuse Current Rating Amp	Fuse Type
0	1·4	2	NS
1·5	2·1	4	
2·2	3·1	6	
3·2	5·5	10	
5·6	10	16	
10·1	14	20[3]	
14·1	18	25	
18·1	22	32[3]	
22·1	32	40[1]	ES
32·1	40	50	
40·1	51	63[3]	
51·1	80	80	OS or XS
80·1	100	100	
100·1	125	125	XS

**The assisted starting recommendations apply for ambient temperatures up to 35°C. At higher temperatures, some ratings may need to be derated. Consult GEC ALSTHOM Installation Equipment Limited for further information.*

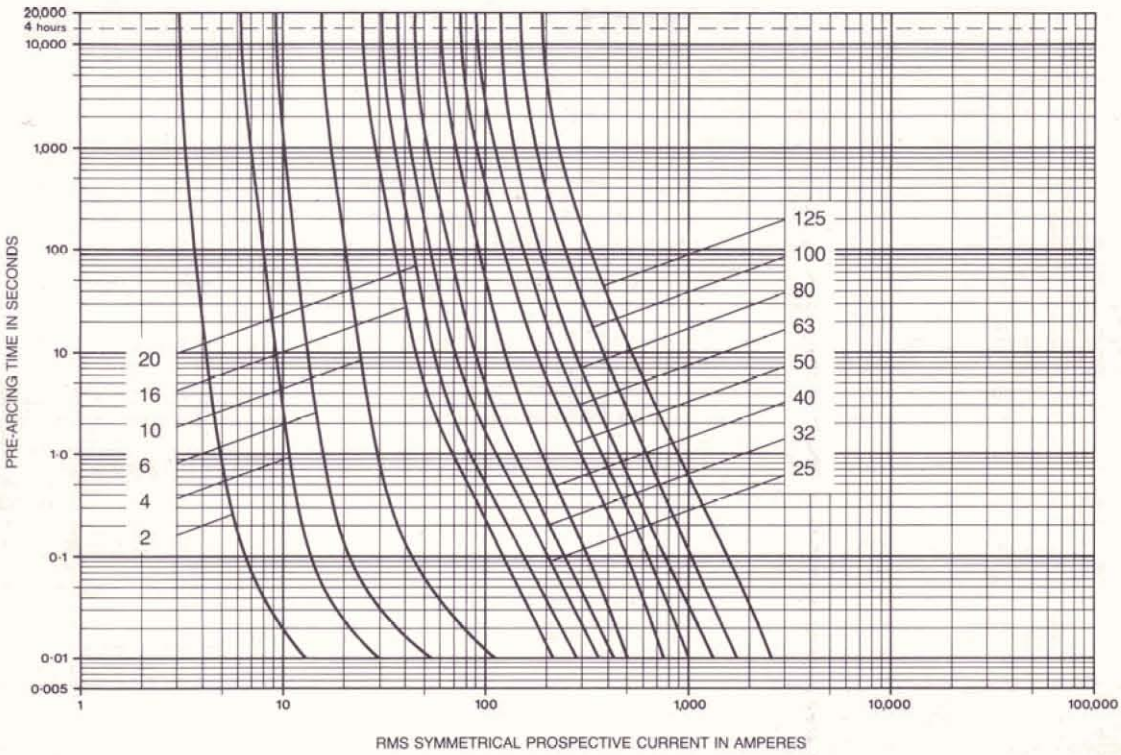
'SAFECLIP' Type SS Time/Current Characteristics 6-20 Amp



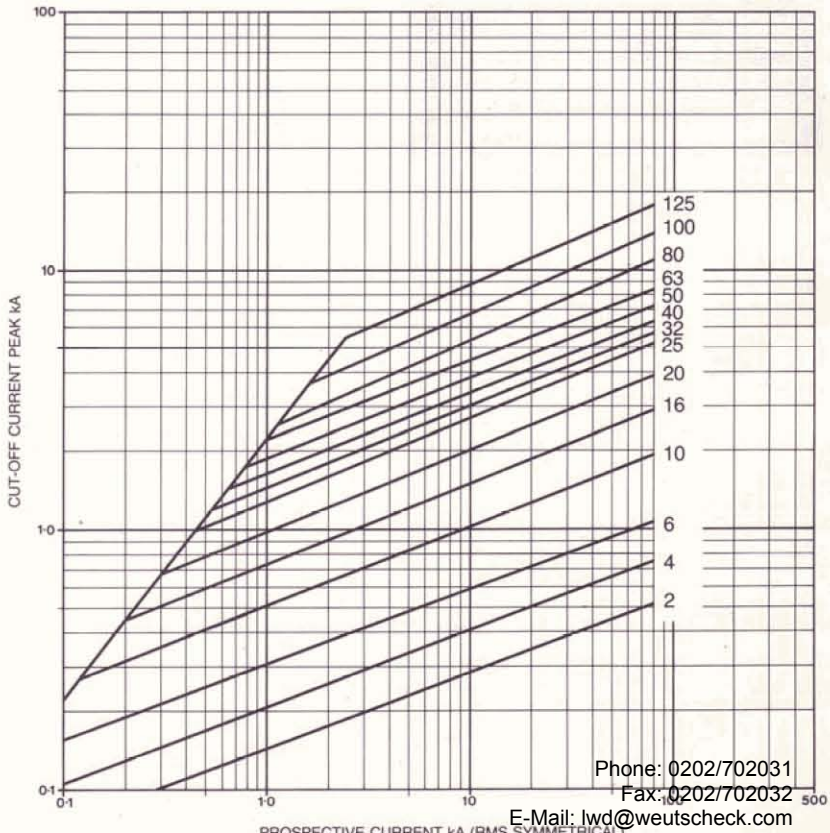
'SAFECLIP' Type SS Cut-off Current Characteristics 6-20 Amp



'SAFECLIP' Types NS, ES & XS Time/Current Characteristics 2-125 Amp



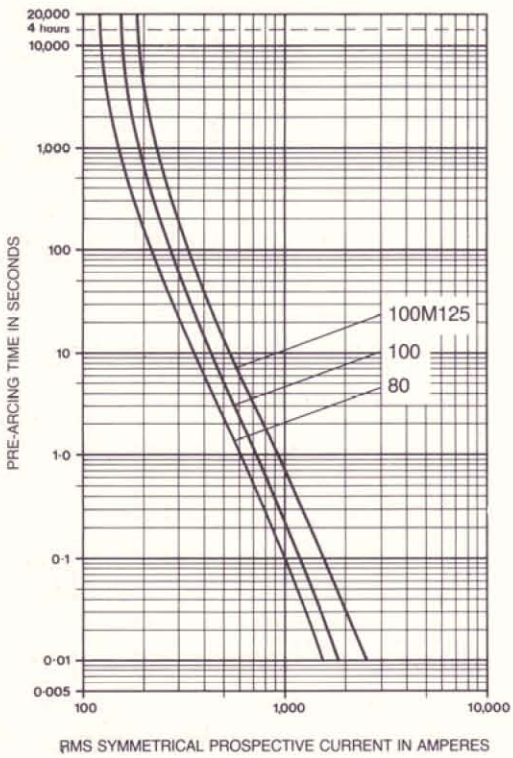
'SAFECLIP' Types NS, ES & XS Cut-off Current Characteristics 2-125 Amp



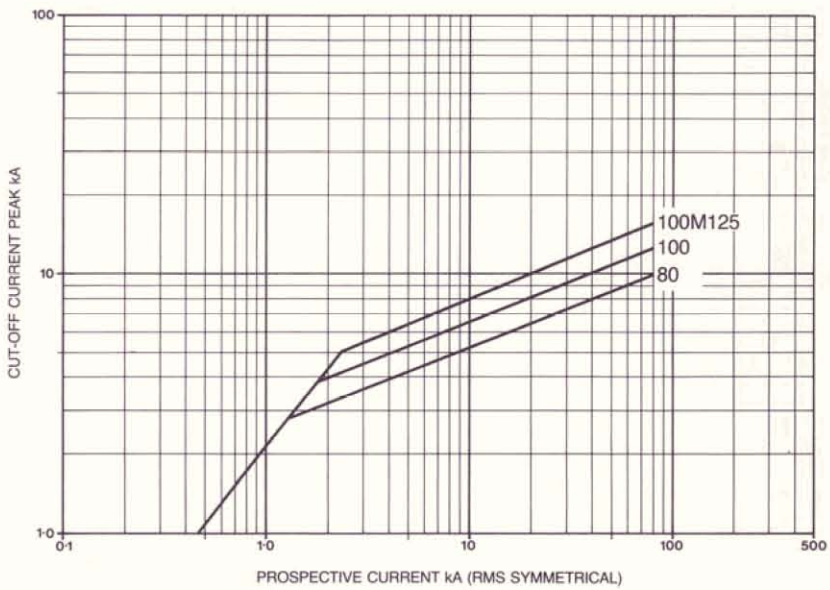
'SAFECLIP' Types NS, ES & XS I^2t Values*

Current Rating Amp	Pre-Arcing I^2t (A^2 Sec)	Total I^2t (A^2 Sec)
2	1·5	16
4	7·0	75
6	22	200
10	90	440
16	300	1300
20	520	2200
25	900	3000
32	1100	4000
40	2400	12000
50	3200	15000
63	5400	25000
80	8000	45000
100	15000	68000
125	32000	145000

Type OS Time/Current Characteristics 80-125 Amp



Type OS Cut-off Current Characteristics 80-125 Amp



Type OS I^2t Values*

Current Rating Amp	Pre-Arcing I^2t (A^2 Sec)	Total I^2t (A^2 Sec)
80	14000	40000
100	17000	60000
100M125	32000	128000

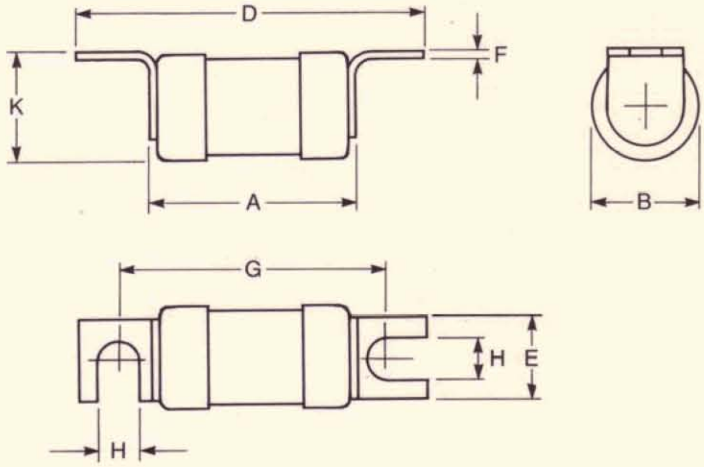
*I^2t values at 440V when tested under BS88 conditions

Non-Standard Dimensions

'SAFECLIP' HRC Fuse Links

These fuse links are generally based on 'Safeclip' range construction but are fitted with non-standard end terminations for use in 250 Volt AC street lighting cut-outs.

Types ST & LST



Type	Rating Amp	List number	Dimensions *in millimetres* A	B	D	E	F	G Fixing Centres	H	K
ST	2	ST2	25·0	14·5	46·0	11·0	0·8	35·0	4·8	15·0
	4	ST4								
	6	ST6								
	10	ST10								
	16	ST16								
	20	ST20								
	25	ST25								
LST	2	LST2	25·0	14·5	49·0	11·0	0·8	38·0	4·8	15·0
	4	LST4								
	6	LST6								
	10	LST10								
	16	LST16								
	20	LST20								
	25	LST25								

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