



CL CURRENT-LIMITING FUSES

RATINGS

Nominal 2.4 through 13.8 KV
Interrupting to 600 MVA

APPLICATION

For application to primary-voltage distribution systems with metal-enclosed interrupter switchgear and unit substations. The high continuous-current ratings and interrupting capacity of the CL fuse provide a wide range of applications on power-transformer and capacitor-bank circuits.

NOISELESS, FLAMELESS, GASLESS

The non-explosive, completely contained interruption occurs without noise or expulsion of gas vapor, liquid, flame or metal parts...making the CL fuse highly desirable for installation in a confined space without special precautions. Fusible elements are pure silver and fitted with beads to obtain pre-determined points or arc initiation...thus insuring satisfactory handling of very small fault currents. Under short-circuit conditions, total volatilization of the silver elements immediately fuses the fine quartz-sand filler, resulting in the formation of an insulating rope.

ALUMINA-PORCELAIN BARRELS

This high-strength ceramic provides exceptional resistance to thermal and mechanical shock. Barrels are hermetically sealed with compression joints at the ends of the tube, and in addition, have an epoxy-resin seal between the silver-plated ferrule and outer surface of barrel.

COMPLETELY TESTED

CL fuses have been completely tested to meet all applicable IEEE, NEMA and ASA standards.

TYPICAL TIME-CURRENT CHARACTERISTICS

Power-fuse speed ratios are an indication of time-current characteristic slope and are defined in NEMA Standards Publication SG2:

For fuses rated 100E and below—
Min. melt. current @ 0.1 sec
$$S = \frac{\text{Min. melt. current @ 0.1 sec}}{\text{Min. melt. current @ 300 sec.}}$$

For fuses rated above 100E—
Min. melt. current @ 0.1 sec.
$$S = \frac{\text{Min. melt. current @ 0.1 sec.}}{\text{Min. melt. current @ 600 sec.}}$$

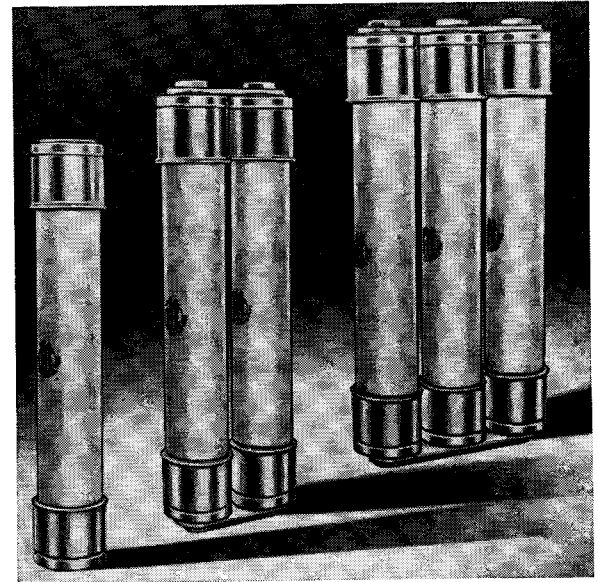


Fig. 1

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For application to transformers, power fuses must withstand 12x transformer full load current 0.1 second. Therefore, higher speed ratios mean higher inrush withstand with lower rated fuses.

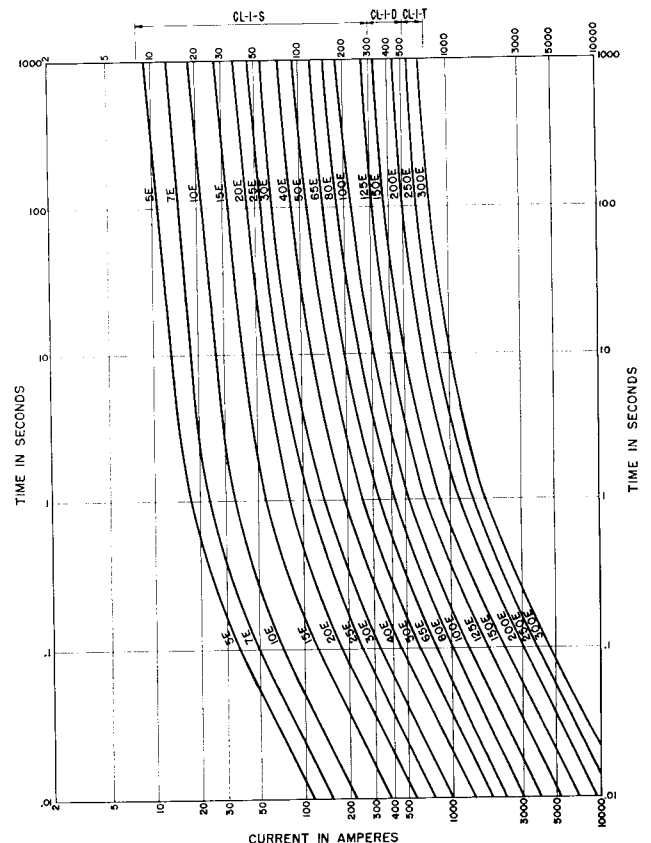


Fig. 2 Minimum melt curves shown for 2.4- and 4.8-kV CL fuses.



CL CURRENT-LIMITING FUSES

CONSTRUCTION AND OPERATION

The distinctive feature of the CL current-limiting fuse is the use of, and the arrangement of, a number of parallel solid silver wires as fusible elements, each the same length and cross section throughout.

FUSIBLE ELEMENTS

The CL time-current characteristics are obtained by additional control elements in heat-transferring relation to the fusible elements. Important features of these are their composition and placement in relation to the silver fusible elements to obtain desired characteristics.

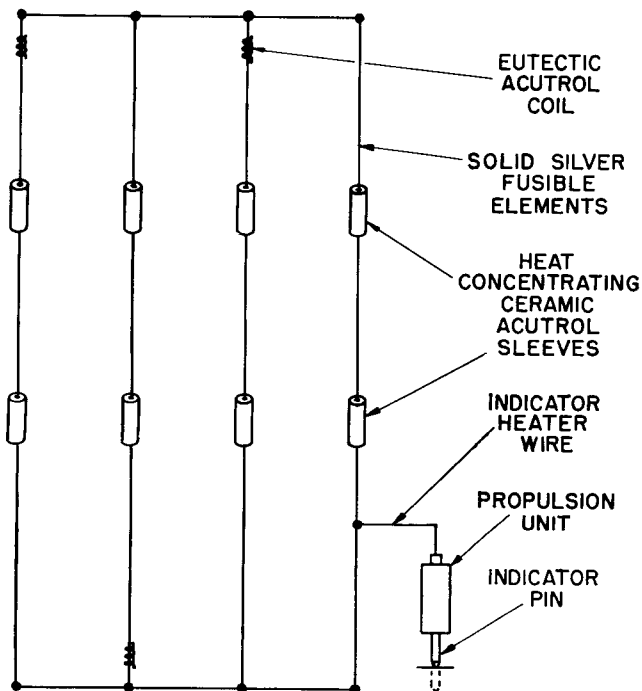


Fig. 3 Schematic of fuse construction.

The principle of the auxiliary control element has the effect of reducing the fusing current of the main silver elements. When these silver elements begin to run hot, the fixed-control element alloys with the silver, lowering its melting point. Its position on the silver element is selected so that the fuse operates in accordance with pre-determined time-current characteristics. Under conditions of severe overload or short circuit, there is insufficient time for alloying to take place. Thus the fuse then has a melting-time current characteristic similar to one with the same silver element unmodified by the additional element. It is thus possible to control separately the melting time-current characteristics for small and large melting currents.

INDICATING DEVICE

CL fuses are also equipped with an indicator device. This device is an ejectible pin which slides in its outer casing and is forced through the bottom ferrule upon operation of the fuse.

Actuation of the pin is effected by a propellant material in the closed inner end part of the casing. The propellant is set into operation by means of a heater wire connected electrically to a particular one of the several main fusible elements.

CL fuses require at least two solid-silver fusible elements. However, one fusible element does not include the additional control element and is the last element to fuse.

All main silver elements of the fuse are also equipped with short refractory enclosing tubes for heat concentration. Their purpose is to create pre-determined arcing points in each fusible element during actual fault operation.

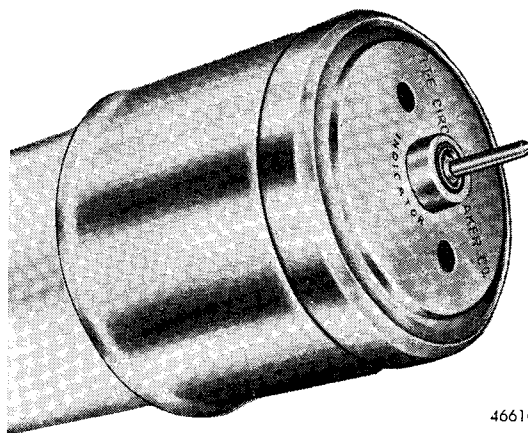


Fig. 5

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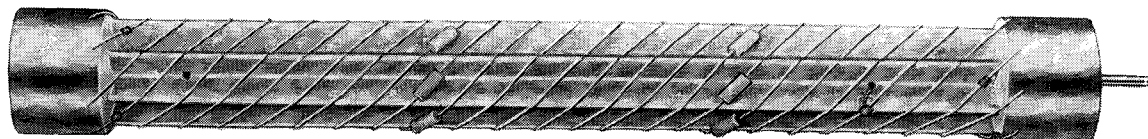


Fig. 4 Alumina-ceramic core with silver fusible and control elements.

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CL CURRENT-LIMITING FUSES
VOLTAGE/CURRENT RATINGS, CATALOG NUMBERS, DIMENSIONS

CATALOG NUMBERS AND RATINGS

CL-1

	2.4—4.8 KV			7.2 KV		13.8 KV	
	Dimensions A—12" B—15"			Dimensions A—12" B—15"		Dimensions A—15" B—18"	
	Cont. Current	Catalog Number	Fig.	Catalog Number	Fig.	Catalog Number	Fig.
CL-1	5E	427500	S	427520	S	427540	S
	7E	427501	S	427521	S	427541	S
	10E	427502	S	427522	S	427542	S
	15E	427503	S	427523	S	427543	S
	20E	427504	S	427524	S	427544	S
	25E	427505	S	427525	S	427545	S
	30E	427506	S	427526	S	427546	S
	40E	427507	S	427527	S	427547	S
	50E	427508	S	427528	S	427548	S
	65E	427509	S	427529	S	427549	D
	80E	427510	S	—	—	427550	D
	100E	427511	S	—	—	427551	D
	125E	427512	S	—	—	427552	T
	150E	427515	D	—	—	—	—
	200E	427516	D	—	—	—	—
	250E	427517	T	—	—	—	—
	300E	427518	T	—	—	—	—

CL-2

	4.8 KV See dimensions above			13.8 KV See dimensions above		
	Cont. Current	Catalog Number	Fig.	Cont. Current	Catalog Number	Fig.
CL-2	181A	427572	D	94A	427592	D
	270A	427573	D	125A	427593	D
	362A	427574	T	156A	427594	T
				170A	427595	T

INTERRUPTING RATINGS

Nominal Service Voltage	Interrupting Ratings		
	Amperes Rms Sym.	Amperes Rms Asym.*	Nom. Equiv. 3-phase MVA
2.4	36000	57600	150
4.8	30000	48000	250
7.2	28000	44800	350
13.8	25000	40000	600

*Asymmetrical amperes—1.6 x symmetrical amperes

NET WEIGHT, LB

KV	Single Barrel	Double Barrel	Triple Barrel
2.4/4.8	10	22	33
7.2	10	22	33
13.8	12	25	39

1. The CL-1, E-rated fuses meet all NEMA, ASA & IEEE standards, which in effect require that:

- a. The fuse must carry its E rating in amperes continuously without exceeding a 30° C. rise at the clips.
- b. The fuse must melt in:
 - (1). 300 seconds at 200% of its E rating for ratings 100E and below.
 - (2). 600 seconds at 220% of its E rating for ratings above 100E.

2. The CL-2, A-or ampere-rated fuses, do not necessarily meet the conditions outlined in a. and b. above, and therefore cannot be E rated. They will, however, carry their ampere rating continuously without exceeding a 50° C. rise at the clips, and all materials are selected to tolerate this temperature rise.

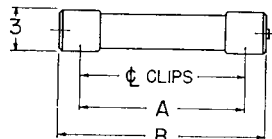


Fig. S

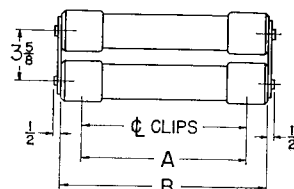


Fig. D

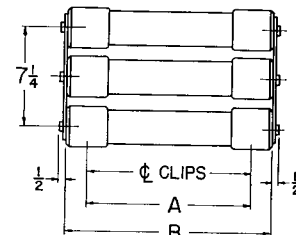


Fig. T