Medium Voltage "R" Rated Fuses for 2.4 and 4.8 kV Motors

List of Ratings

2.4 kV System Voltage		
Catalog Symbol	Current Rating Amperes at 40°C	Figure Number
2.75 VFRHA 2R	70	1
2.75 VFRHA 3R	100	
2.75 VFRHA 4R	130	
2.75 VFRHA 6R	170	
2.75 VKRHA 9R	200	
2.75 VKRHA 12R	230	
2.75 VKRHK 18R	390	2
2.75 VKRHK 24R	450	

4.8 kV System Voltage		
Catalog Symbol	Current Rating Amperes at 40°C	Figure Number
5.5 VFNHA 2R 70		3
5.5 VFNHA 3R 100		
5.5 VFNHA 4R 130		
5.5 VFNHA 6R 170		
5.5 VKNHA 9R 200		
5.5 VKNHA 12R	230	
5.5 VKNHK 18R	390	4
5.5 VKNHK 24R	450	
5.5 VKNHK 30R	450	
5.5 VKNHK 36R	500	
5.5 VKNHK 40R	600	
5.5 VKNHK 48R	650	

Notes:
1. Interrupting rating - 80,000 amperes asymmetrical 60Hz.
2. These fuses are dimensionally interchangeable with corresponding R-Rated fuses produced by other leading North American manufacturers.

Dimensions

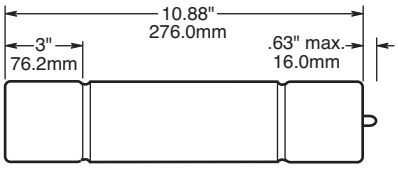


Figure 1

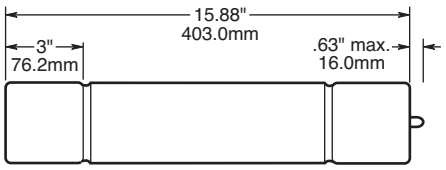
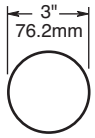


Figure 3



Figures 1 & 3

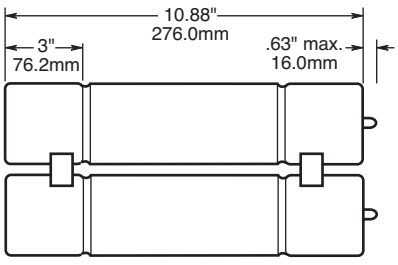


Figure 2

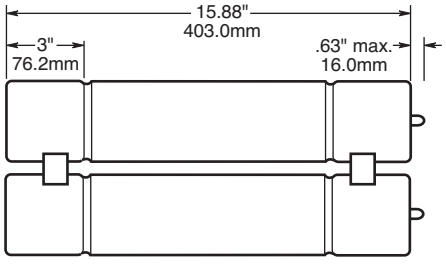
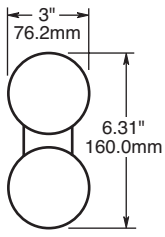


Figure 4



Figures 2 & 4

R-RATED MEDIUM VOLTAGE FUSES FOR MOTOR CIRCUITS

Medium voltage fuses for motor circuits offer the following user benefits:

- Performance complies with latest ANSI Standards
- Dramatic reduction in energy let-thru
- Lower power dissipation
- Low arc voltage during operation
- Low minimum breaker current values
- Includes heavy duty striker to IEC 282-1

ADVANTAGES OF EDISON MOTOR FUSES

During the full voltage starting of motors the fuse elements reach a considerably higher temperature than normally occurs under continuous operation. The resulting expansion and contraction of the fuse element can cause premature operation. The Edison motor circuit fuse incorporates provisions in the design of the element to minimize this effect and hence avoid the necessity of having to use a much larger size of fuse.

Edison fuses operate very quickly on heavy fault currents. This results from the steepness of the time/current characteristic, which also facilitates co-ordination with the other components of the circuit.

Lower power dissipation helps to ensure low temperature rise of, for example, multi-tier starters.

Switching (arc) voltages are appreciably less than permitted values and fall with lower values of system voltage. Thus the 5.5kV fuses are equally suitable for use in 4.8kV, 4.16kV and 2.4kV circuits.

The superior low-overcurrent breaking performance is of advantage whether or not the striker is used to open the contactor.

"R" RATING

The "R" rated motor circuit fuses should be selected to coordinate with the motor and controller to provide short circuit protection.

The actual "R" rating signifies a 20 second blow point at 100 times the "R" rating of the fuse.

For example:
2R fuse opens in 20 seconds at 200 amperes.
12R fuse opens in 20 seconds at 1200 amperes.

MOTOR STARTING APPLICATION

Application Procedure

For any motor the fuse current rating is determined by magnitude and duration of starting current, except in a few situations where the starting conditions are very light. The fuse current rating should be selected as follows.

Direct On-Line Starting

In the absence of specific information the starting current can usually be taken to be six times the motor full load current. The starting time will depend on the type of drive but will be approximately as follows:

Pump Motors - 6 seconds
Mill Motors - 10 to 15 seconds
Fan Motors - 60 seconds

These are average values and the appropriate figures for starting current and starting time for the actual installation should be obtained wherever possible. Multiply the starting current by 1.6 and using this value of current and the starting time (it is recommended that a minimum time of 8 seconds be adopted) plot this point on the minimum melting time-current characteristics of the fuses. The correct current rating of fuse is then chosen as being the one immediately to the right of the point so plotted. The chosen fuse must also have a current rating of at least 1.3 times the full-load current of the associated motor.

The rating thus chosen will be adequate for normal applications where the associated motor is not started more than twice in any given period of one hour. For applications involving more frequent starting duties, a greater derating factor must be applied as shown in the following table.

DERATING FACTOR

Maximum of 2 starts per hour	Derating factor 1.6
Maximum of 4 starts per hour	Derating factor 1.7
Maximum of 8 starts per hour	Derating factor 2.0
Maximum of 16 starts per hour	Derating factor 2.2

The figures in the above table apply only when the Minimum Melting Time Current Characteristic Curve is used.

For applications involving more frequent starting duty than 16 times per hour or where unusual duty cycles are involved consult Edison Fusegear for advice.

Assisted Starting

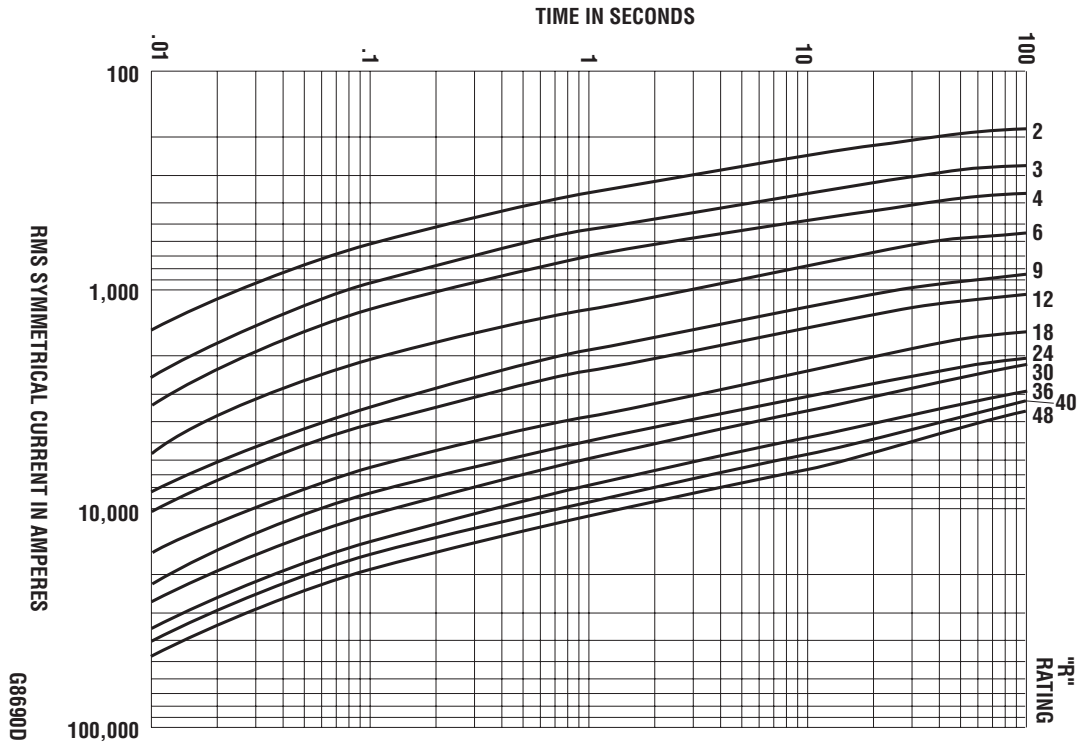
A similar method of fuse selection may be used as for direct-on-line starting (see above) but it must be noted that the normal running current of the motor is likely to be closer in value to the nominal current rating of the fuse than for direct-on-line applications.

The rating of fuse chosen will need to be appreciably greater than the motor running current to allow for restricted cooling inside control gear cubicles, particularly where multi-tier starters are involved. In case of doubt refer to Edison Fusegear for further guidance.

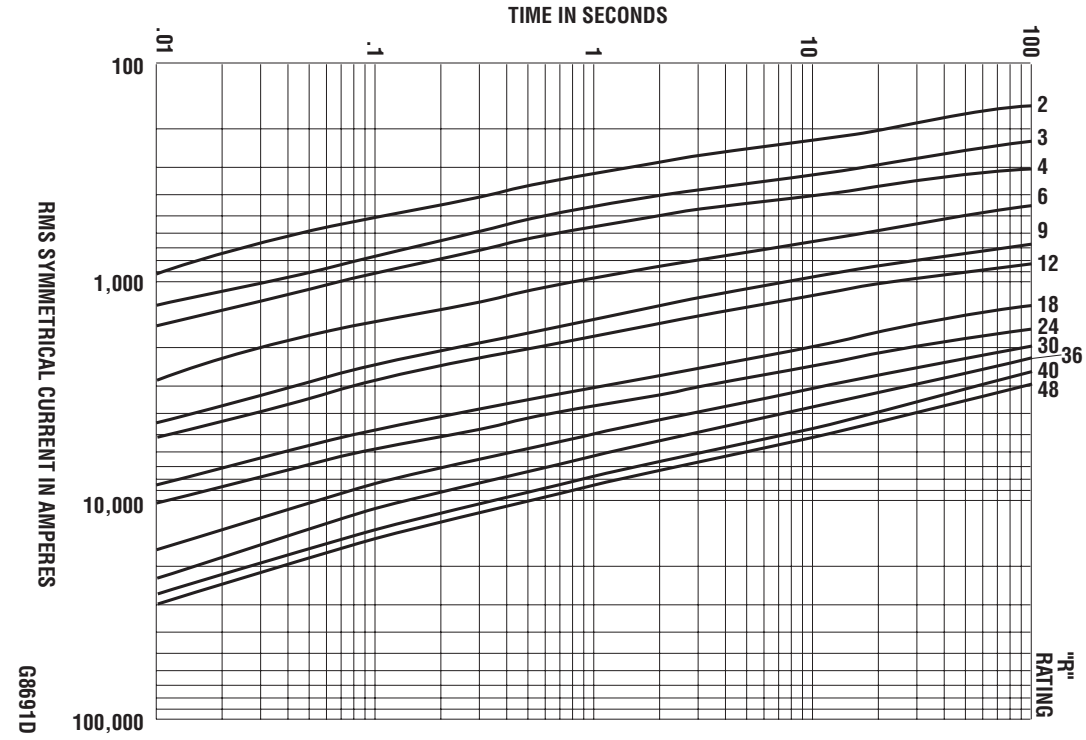
Time-Current Characteristics for 5.5 kV and 2.75 kV Fuses.

Time-Current Characteristics

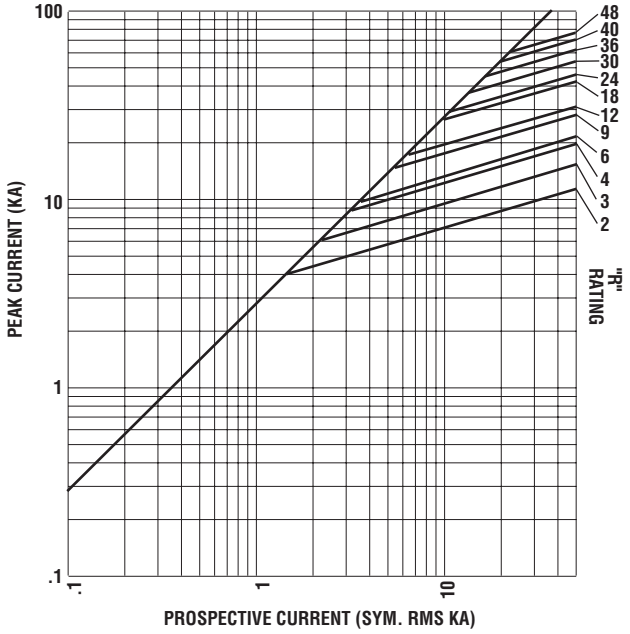
Total Clear



Minimum Melt



Peak Let-Through Current Curve (5.5kV and 2.75kV Fuses)



Application for HV Motor Circuit Fuses

The following table is a general guide only based on a number of assumptions regarding the motor duty application which are listed below. Contact Edison Fusegear for specific application information.

The application tables are based on the following assumptions:

Motor Efficiency ----------	90%	Run Up Time ------	10 Secs.
Motor Power Factor -----	0.9	Starting Method --	Full Voltage
Starting Current ----------	6 x FLC	Min. Fuse Size----	1.3 x FLC
Starts/Hour ----------	Max of 2/Hour		

	2.4 KV			4.16 KV			4.8 KV		
	FLC	FUSE		FLC	FUSE		FLC	FUSE	
HP	Amps	"R"	Amps	Amps	"R"	Amps	Amps	"R"	Amps
75	17	2R	70	–	–	–	–	–	–
100	22	2R	70	–	–	–	–	–	–
125	28	3R	70	16	2R	70	–	–	–
150	33	3R	100	19	2R	70	17	2R	70
200	44	4R	130	26	3R	100	22	2R	70
250	55	6R	170	32	3R	100	28	3R	100
300	67	6R	170	38	4R	130	33	3R	100
350	78	9R	170	45	4R	130	39	4R	130
400	89	9R	200	45	4R	130	44	4R	130
500	111	12R	230	64	6R	170	55	6R	170
600	133	18R	390	77	9R	200	67	6R	170
700	155	18R	390	90	9R	200	78	9R	200
800	177	17R	390	102	9R	230	89	9R	200
900	200	18R	390	115	12R	230	100	9R	200
1000	222	24	450	128	18R	390	111	12R	230
1100	244	24R	450	141	18R	390	122	12R	230
1200	266	24R	450	154	18R	390	133	18R	390
1400	311	30R	450	179	18R	390	155	18R	390
1600	355	36R	500	205	18R	390	177	18R	390
1800	399	40R	600	230	24R	450	200	18R	390
1900	422	40R	600	243	24R	450	211	18R	390
2000	444	40R	600	256	24R	450	222	24R	450
2200	488	48R	650	282	30R	450	244	24R	450
2400	–	–	–	307	30R	450	266	24R	450
2600	–	–	–	333	36R	500	288	30R	450
2800	–	–	–	358	36R	500	311	30R	450
3000	–	–	–	384	36R	500	333	36R	500
3500	–	–	–	448	40R	600	388	36R	500
4000	–	–	–	–	–	–	444	40R	600
4500	–	–	–	–	–	–	500	48R	650

Contact Edison for applications regarding other operating conditions.

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2.75VFRHA6R