

APPENDIX D

TYPICAL DEVICE AND EQUIPMENT RATINGS

D-1. Molded Case Circuit Breaker Ratings

a. Ampere ratings. Standard ampere ratings for inverse time circuit breakers are included in NFPA 70 as follows: 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000, and 6000 amperes.

b. Voltage ratings. For ac distribution systems, molded case circuit breakers are available with one or more of the following voltage ratings: 120, 120/240, 240, 277, 480Y/277, 480, and 600 volts. For specific applications, voltage ratings to 1000 volts ac are available.

(1) For dc application, molded-case circuit breakers are available with one or more of the following voltage ratings: 125, 125/250, 250, 500, or 600 volts dc.

(2) For specific application or other voltage

ratings, consult the manufacturer.

c. Interrupting ratings. Typical ac molded-case circuit breaker interrupting ratings in rms symmetrical amperes are as follows:

5,000	22,000	50,000	125,000
7,500	25,000	60,000	150,000
10,000	80,000	65,000	200,000
14,000	35,000	70,000	
18,000	42,000	85,000	
20,000	45,000	100,000	

(1) Typical dc interrupting ratings are 5,000, 10,000, and 20,000 amperes.

(2) The use of two-pole circuit breakers in three-phase, corner-grounded delta applications requires special considerations. Unless the breaker is marked and rated for this application, consult the manufacturer.

Table D-1. Low Voltage Fuse Ratings

UL Class	Voltage	Current	Time Delay	Current Limiting	Interrupting Rating	Application
L	600V	601-6000A	NTD	Yes	200kA	1 High Interrupting capacity in small package.
J	600V	0-600A	NTD	Yes	200kA	
K1	600V	0-600A	TD	High	50kA	2
	250V		NTD		100kA 200kA	
K5	600V	0-600A	TD	Moderate	50kA	2
	250V		NTD		100kA 200kA	
RK1	600V	0-600A	TD	High	200kA	Residential use only. Inadequate for industrial or commercial.
RK5	250V	0-600A	NTD	Moderate	200kA	
	600V		TD			
H	250V	0-600A	NTD	No	10kA	
	600V		NTD			
	V250V					

¹ Coordination with upstream devices is complicated by the fact that some manufacturers offer time delay Class L fuses (10 seconds at 500 percent). If time delay fuse is used for service or main feeder protection, coordination with utility transformer primary fuse is almost impossible.

² Class K fuses cannot be labeled as current limiting because they are interchangeable with Class H fuses.

Table D-2. Distribution Fuse Cutouts

Voltage, kV	Current, A	Interrupting, kA (sym)
4.8	100, 200	12.5
7.2	100, 200	15.0
14.4	100, 200	13.2
25.0	100	8.0
34.5	100	5.0

Table D-3. Expulsion-Type Power Fuses

Voltage, kA	Current, A	Interrupting, kA (sym)
8.3	100, 200, 300, 400	12.5
15.5	100, 200, 300, 400	16.0
25.8	100, 200, 300, 400	20.0
38.0	100, 200, 300, 400	20.0
48.3	100, 200, 300, 400	25.0
72.5	100, 200, 300, 400	20.0
121.0	100, 200	16.0
145.0	100, 200	12.5
169.0	100, 200	12.5

Table D-4. Boric Acid-Type Power Fuses

Voltage, kV	Current, A	Interrupting, kA (sym)
17.0	200	14.0
27.0	200	12.5
38.0	100, 200, 300	6.7, 17.5, 33.5

Table D-4. Boric Acid-Type Power Fuses—Continued

Voltage, kV	Current, A	Interrupting, kA (sym)
48.3	100, 200, 300	5.0, 13.1, 31.5
72.5	100, 200, 300	3.35, 10.0, 25.0
121.0	100, 250	5.0, 10.5
145.0	100, 250	4.2, 8.75

Table D-5. Current-Limiting Power Fuses

Voltage, kV	Current, A	Interrupting, kA (sym)
2.75	225, 450, 750, 1350	50.0, 50.0, 40.0, 40.0
2.75/4.76	450	50.0
5.5	225, 400, 750, 1350	50.0, 62.5, 40.0, 40.0
8.3	150, 250	50.0, 50.0
15.5	65, 100, 125, 200	85.0, 50.0, 85.0, 50.0
25.8	50, 100	35.0, 35.0
38.0	50, 100	35.0, 35.0

Table D-6. Typical Tap Ranges and Settings of Time-Overcurrent Relays

Tap Range	Tap Settings
0.5-2.5 (OR 0.5-2)	0.5, 0.6, 0.8, 1.0, 1.2, 1.5, 2.0, 2.5
0.5-4	0.5, 0.6, 0.7, 0.8, 1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 4.0
1.5-6 (OR 2-6)	1.5, 2, 2.5, 3, 3.5, 4, 5, 6
4-16 (OR 4-12)	4, 5, 6, 7, 8, 10, 12, 16
1-12	1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 3.5, 4, 5, 6, 7, 8, 10, 12

Table D-7. Typical Reactances of Three-Phase Synchronous Machines

	Turbine-generators					
	2-pole		4-pole		Salient-pole generators	
	Conventional cooled	Conductor cooled	Conventional cooled	Conductor cooled	With dampers	Without dampers
Xd	1.76	1.95	1.38	1.87	1	1
Xd'	0.21	0.33	0.26	0.41	0.32	0.32
Xd''	0.13	0.28	0.19	0.29	0.2	0.30