

Series C F-frame circuit breaker time current curves

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Note:

Time/current characteristic curves for Series C® F-frame circuit breakers—voltages shown in curve headings are maximum at which the breaker may be applied. Interrupting capacity of individual breaker is tabulated on each curve.

Time Current Curves are engineering reference documents for application and coordination purposes only. For field testing molded case circuit breakers, refer to NEMA AB 4 guidelines.

Revision notes

Note: Unless noted below, all curves remain unchanged from their prior revision.

Revision	Curve number	Page	Date
Changed FDCE, 600V interruption rating from 35 to 25	TC01203015	6	05-24-17
Deleted curves: SC-4146-87B, SC-4147-87B, SC-4148-87B, SC-4149-87B, SC-6970-98, SC-5805-94A, SC-5528-93A, SC-5529-93A, SC-5530-93A, SC-5531-93A, SC-6871-98.	See revision note.	43-48, 61-65 (old page #'s)	05-24-17
Added 7 new curves, combining FDC data with all other frame data. New curve #'s are: TC012029EN, TC012030EN, TC012031EN, TC012032EN, TC012033EN, TC012034EN, TC012035EN.	See revision note.	43-49 (new page #'s)	05-24-17
Added 3 new curves, demonstrating let-through current at 240V, 480V and 600V.	AD-29-166A AD-29-166B AD-29-166C	62-64 (new page #'s)	05-24-17
Corrected maximum single pole trip time curves 110A, 125A.	TC012030EN TC012031EN	44-45	04-01-18
Deleted curves: SC-5516-93A, SC-5517-93A, SC-5518-93A, SC-5519-93A, SC-5520-93A, SC-5521-93A, SC-5522-93A, SC-5523-93A, SC-5524-93A, SC-5525-93A, SC-5526-93A, SC-5527-93A.			04-01-18
Added 12 new curves, combining FDC data with all other frame data. New curve #'s are: TC012036EN , TC012037EN, TC012038EN, TC012039EN, TC012040EN, TC012041EN, TC012042EN, TC012043EN, TC012044EN, TC012045EN, TC012046EN, TC012047EN.	See revision note.	31-42	04-01-18

Catalog Number Selection

This information is presented only as an aid to understanding catalog numbers. It is not to be used to build catalog numbers for circuit breakers or trip units.

Table 1. F-Frame Circuit Breakers with 310+ Electronic Trip Unit Technology

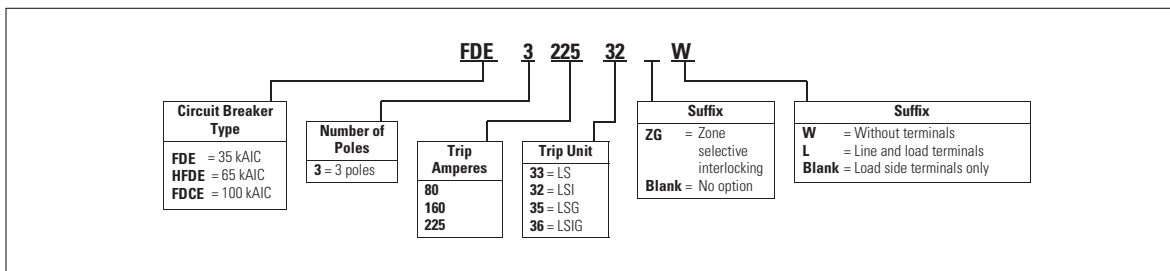


Table 2. F-Frame Circuit Breakers with 210+ Electronic Trip Unit Technology

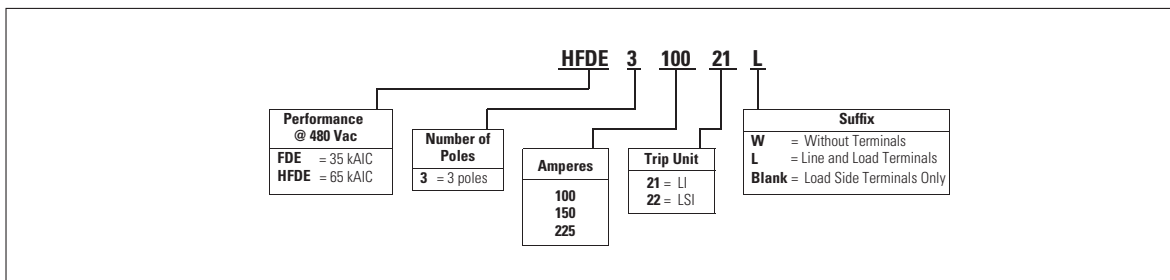
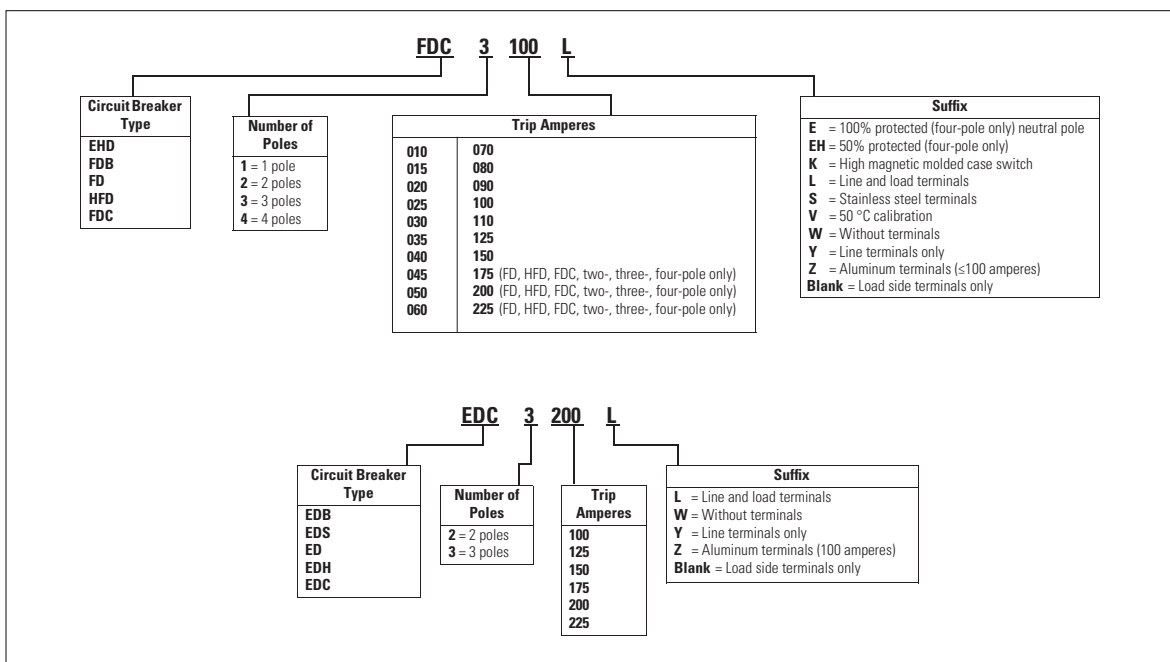


Table 3. F-Frame Circuit Breakers with Thermal-Magnetic Trip Unit Technology



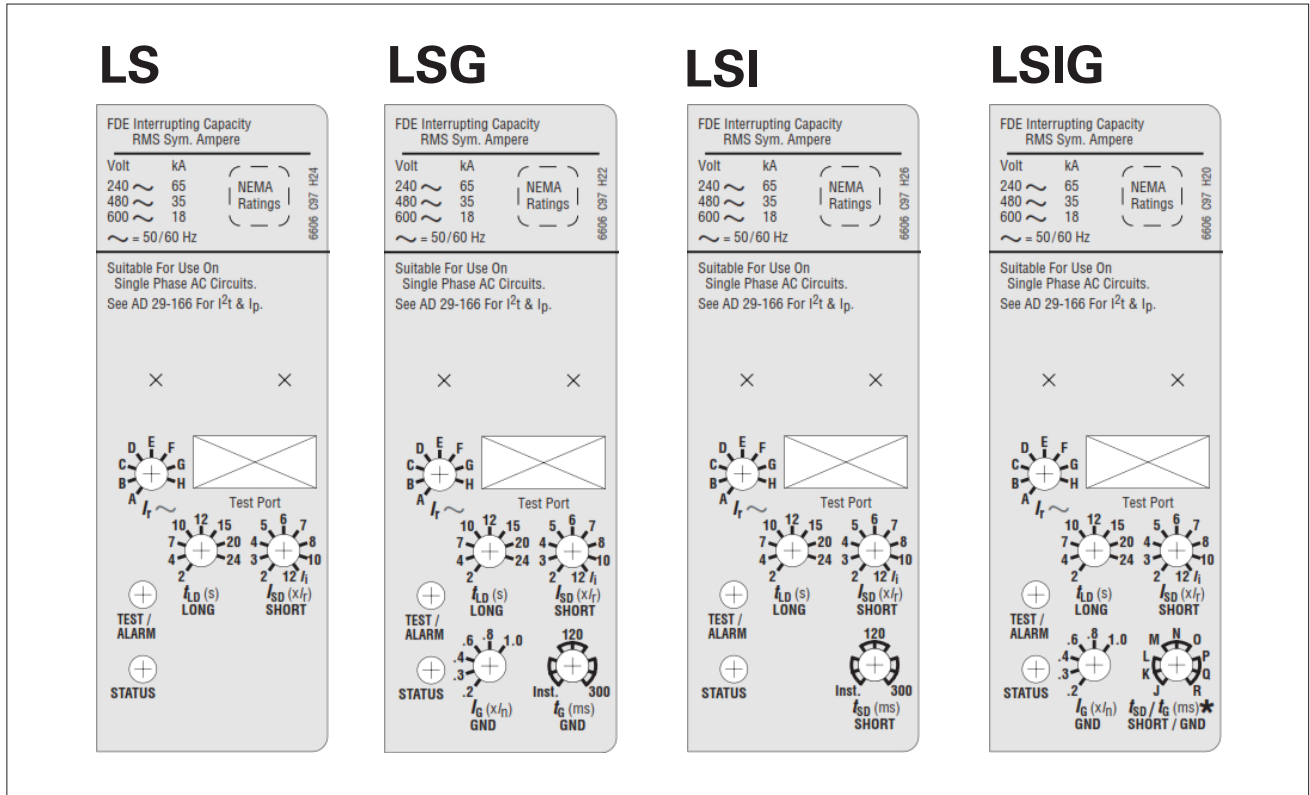


Figure 1. Digitrip 310+ Nameplates

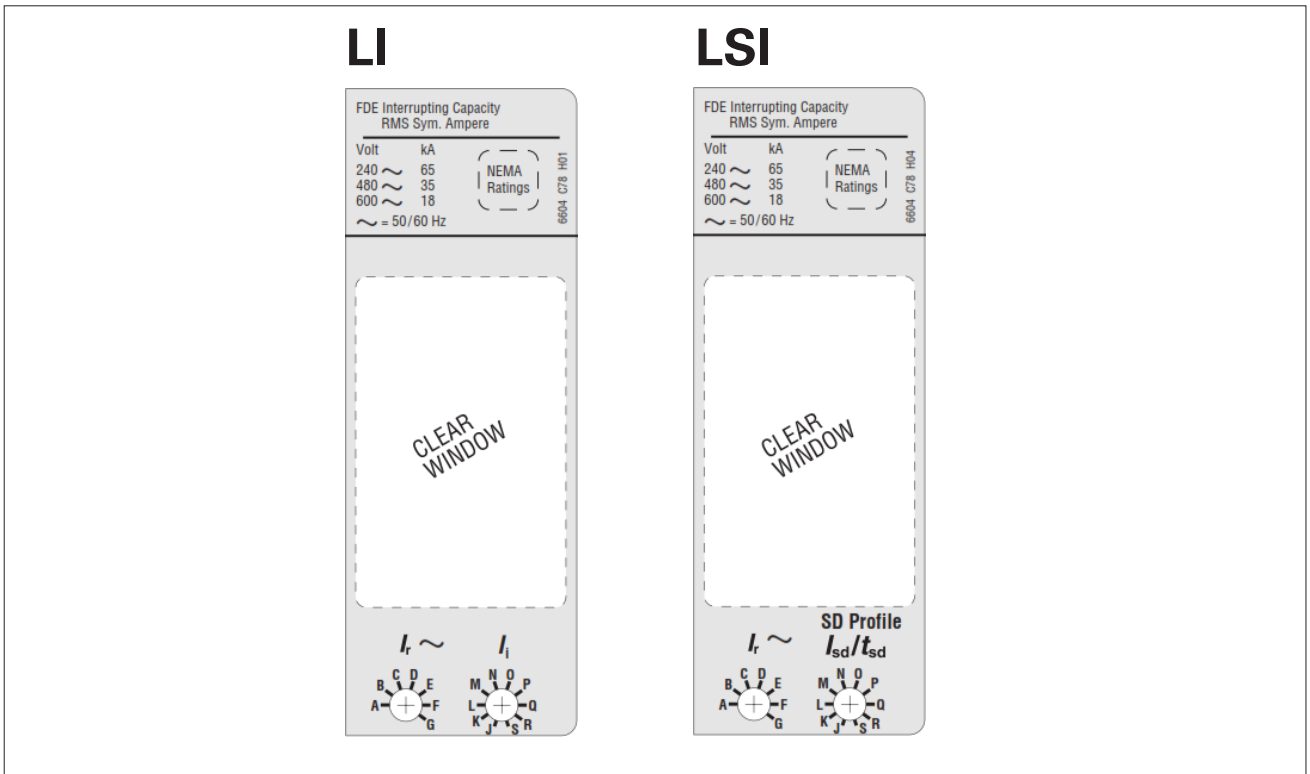
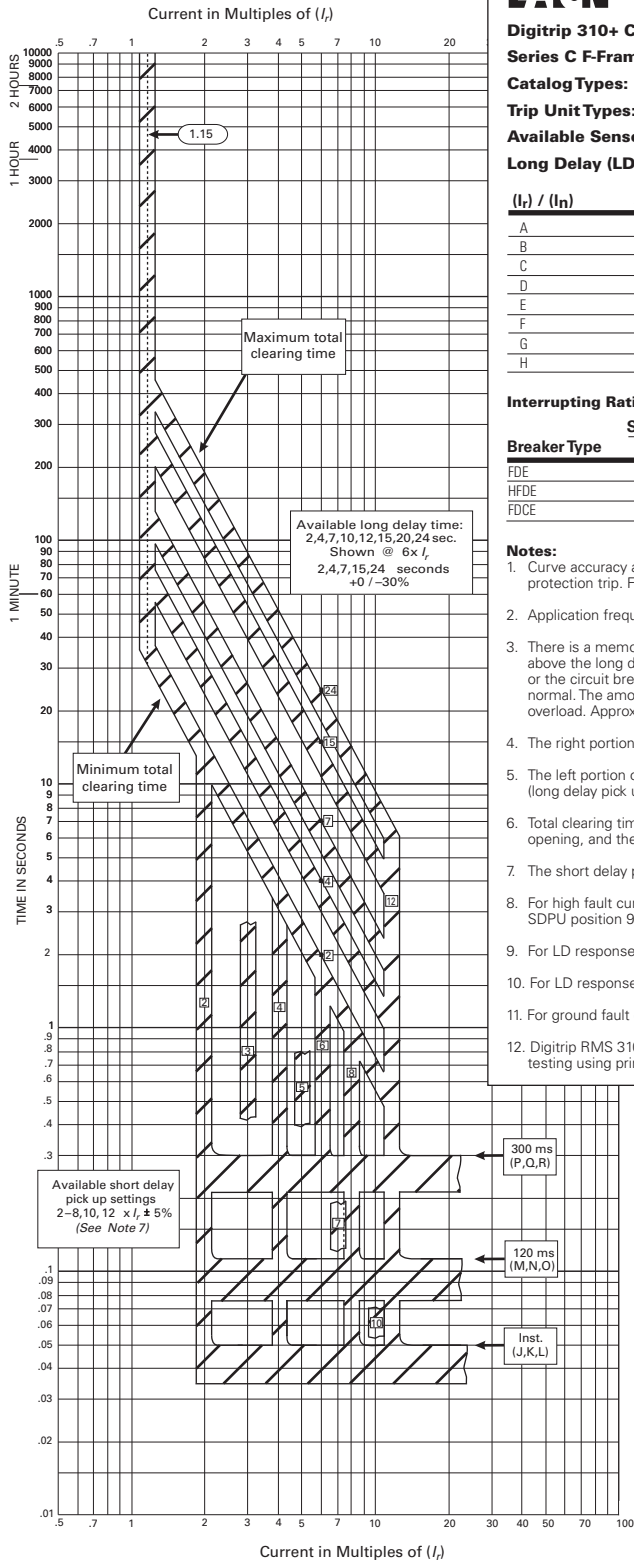


Figure 2. Digitrip 210+ Nameplates



Digitrip 310+ Circuit Breaker Time/Current Curves (Phase Current)

Series C F-Frame Circuit Breakers

Catalog Types: FDE, HFDE, FDCE

Trip Unit Types: 32 (LSI), 36 (LSIG)

Available Sensors (I_n): 80A, 160A, 225A

Long Delay (LD) and Short Delay (SD) with Flat Response

(I _r) / (I _n)	80A	160A	225A
A	15A	60A	100A
B	20A	70A	110A
C	30A	80A	125A
D	40A	90A	150A
E	50A	100A	160A
F	60A	125A	175A
G	70A	150A	200A
H	80A	160A	225A

Interrupting Rating—50/60 Hz

Breaker Type	Symmetrical RMS amperes (kAS) UL/CSA		
	240V	480V	600V
FDE	65	35	18
HFDE	100	65	25
FDCE	200	100	25

Notes:

1. Curve accuracy applies from -20C to +55C ambient. Temperatures above +85C cause an overtemperature protection trip. For possible continuous ampere derating for ambient above 40C, refer to Eaton.
2. Application frequency is 50/60 Hz.
3. There is a memory effect that can act to shorten the long delay. The memory effect comes into play if a current above the long delay pick up value exists for a time and then is cleared by the tripping of a down stream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately five minutes is required between overloads to completely reset memory.
4. The right portion of the curve is determined by the interrupting rating of the circuit breaker.
5. The left portion of the curve is shown as a multiple of the long delay setting. (long delay pick up = 115% of I_n). Range is 110%–120%.
6. Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.
7. The short delay pick up has nine settings/positions, 2–8, 10, 12.
8. For high fault current levels an additional fixed instantaneous hardware override is provided (corresponding to SDPU position 9) at 12x (I_n) and designated as 12I_n. Instantaneous tolerance is +/-20%.
9. For LD response and SD with flat response (this curve): TC01203015E.
10. For LD response and SD with I²T response curve, see: TC01203016E.
11. For ground fault delay response curve, see: TC01203017E.
12. Digitrip RMS 310+ trip units are suitable for functional field testing with test kit Cat. No. MTS120V. For field testing using primary injection methods, follow NEMA publication AB-4-2003.

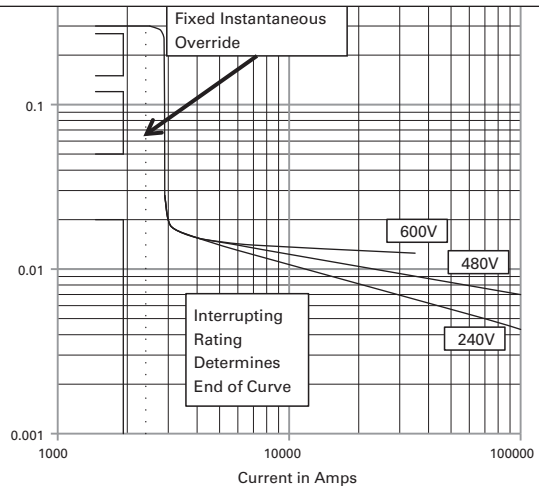


Figure 3. Types FDE, HFDE, and FDCE 225A—Long/Short Delay—Curve Number TC01203015E

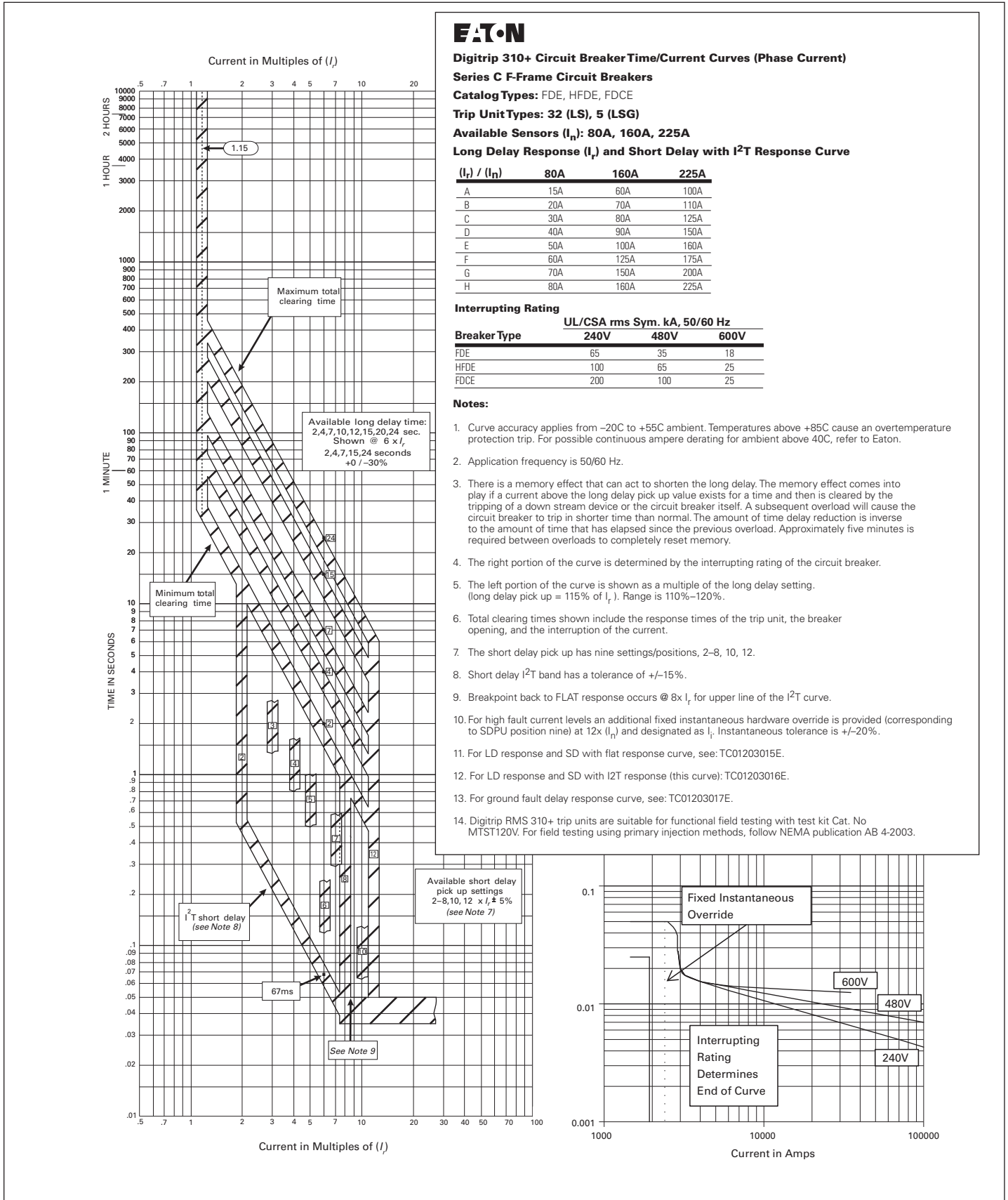
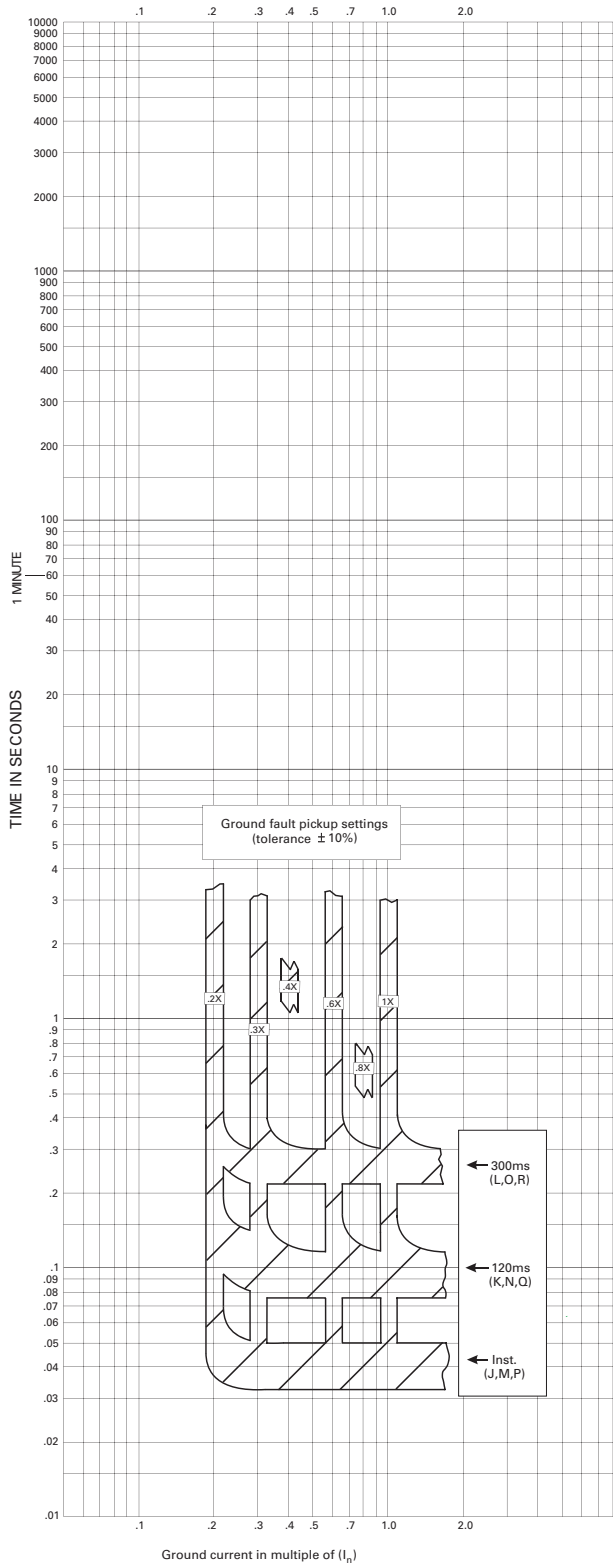


Figure 4. Types FDE, HFDE, and FDCE 225A—Long Short Delay and I²T—Curve Number TC01203016E



Digitrip 310+ Circuit breaker time/current curves (ground current)

Series C F-Frame Circuit Breakers

Catalog Types: FDE, HFDE, FDCE, industrial circuit breakers

Ground fault delay response

Switch Setting	t_{SD}	t_{GF}	$(I_r) / (I_n)$	80A	160A	225A
J	Inst.	Inst.	A	15A	60A	100A
K	Inst.	120	B	20A	70A	110A
L	Inst.	300	C	30A	80A	125A
M	120	Inst.	D	40A	90A	150A
N	120	120	E	50A	100A	160A
O	120	300	F	60A	125A	175A
P	300	Inst.	G	70A	150A	200A
Q	300	120	H	80A	160A	225A
R	300	300				

Notes:

- Curve accuracy applies from -20C to +55C ambient. Temperatures above +85C cause an overtemperature protection trip. For possible continuous ampere derating for ambient above 40C, refer to Eaton.
- Application frequency is 50/60 Hz.
- Trip units are suitable for functional field testing with test kit style # 70C1056G52.
- For LD response and SD with flat response curve, see: TC01203015E.
- For LD response and SD with I²T response curve, see: TC01203016E.
- For ground fault delay response (this curve): TC01203017E.

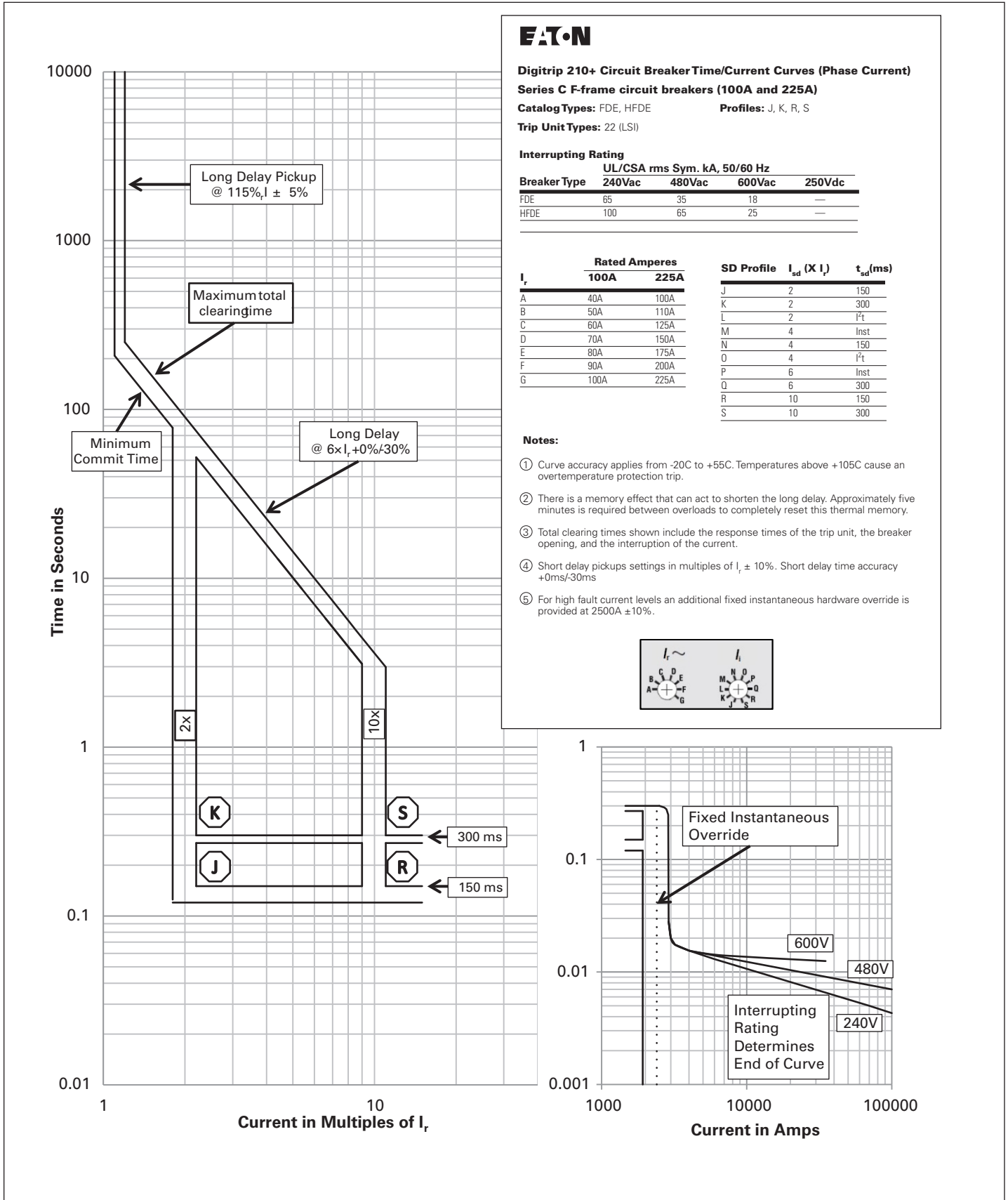


Figure 6. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with Flat Response and Override (LSI, Profiles K, J, S, R) Curve Number TD012001EN, June 2015

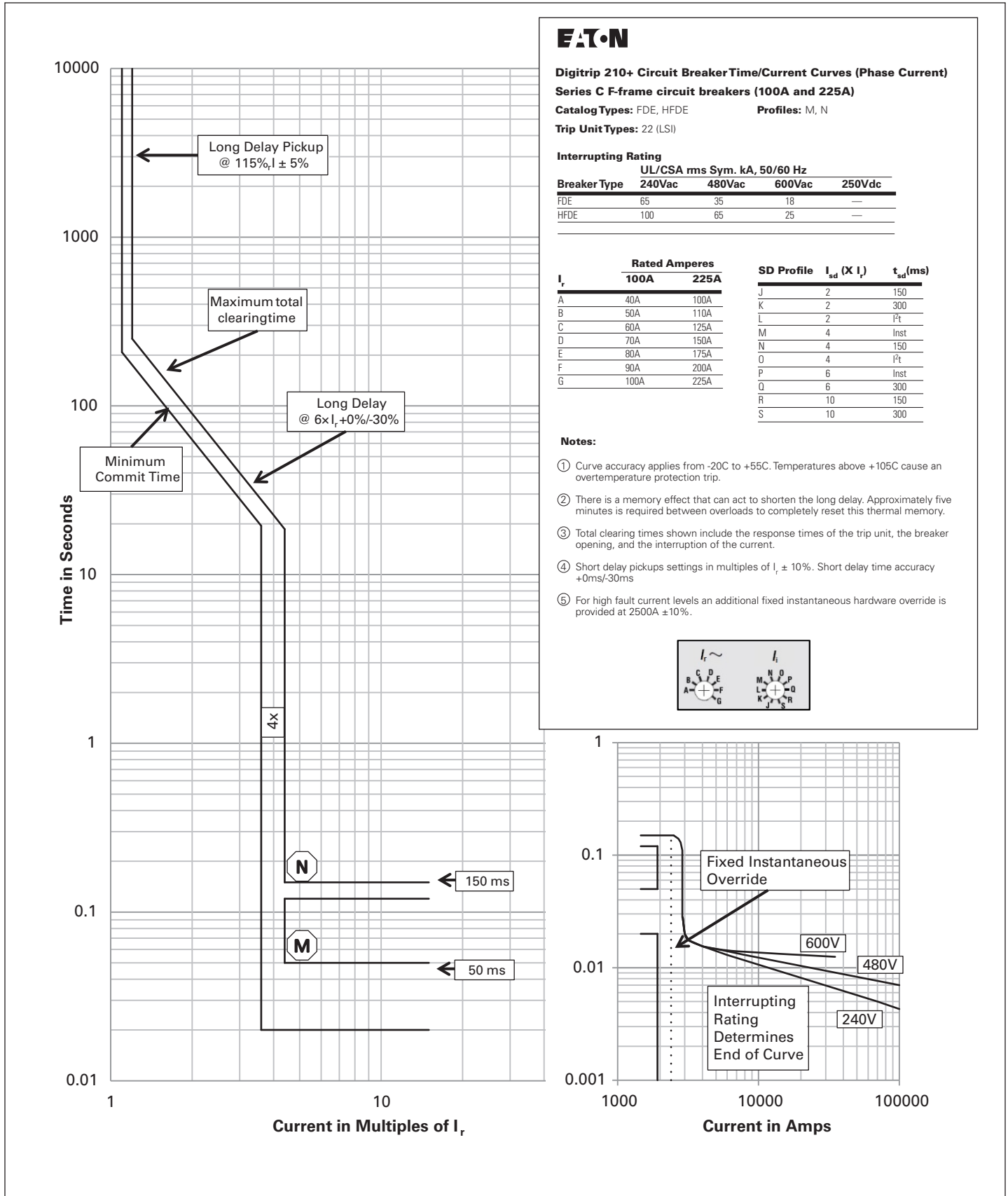


Figure 7. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with Flat Response and Override (LSI, Profiles N, M) Curve Number TD012002EN, June 2015

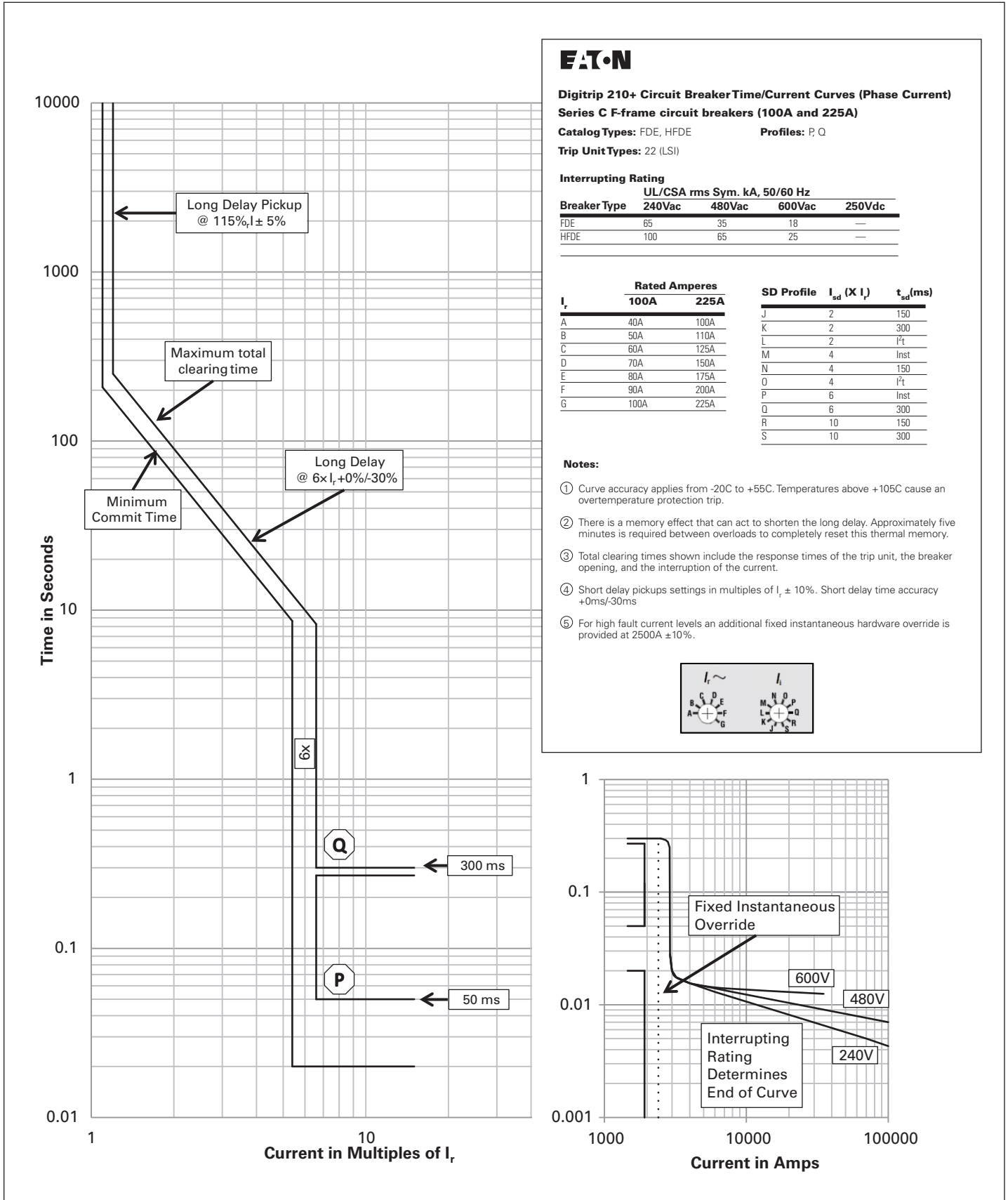
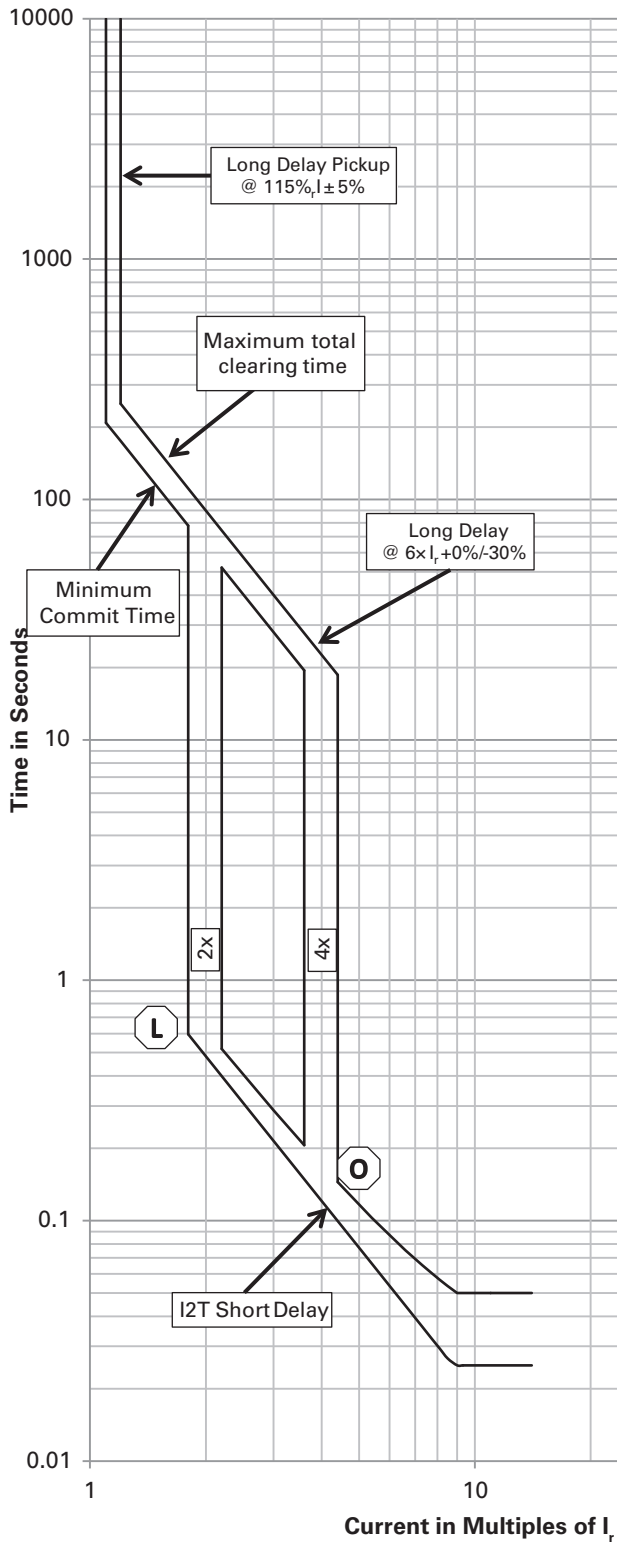


Figure 8. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with Flat Response and Override (LSI, Profiles Q, P) Curve Number TD012003EN, June 2015



Digitrip 210+ Circuit Breaker Time/Current Curves (Phase Current)
Series C F-frame circuit breakers (100A and 225A)

Catalog Types: FDE, HFDE **Profiles:** L, O
Trip Unit Types: 22 (LSI)

Interrupting Rating

Breaker Type	UL/CSA rms Sym. kA, 50/60 Hz			250Vdc
	240Vac	480Vac	600Vac	
FDE	65	35	18	—
HFDE	100	65	25	—

I _r	Rated Amperes		SD Profile	I _{sd} (X I _r)	t _{sd} (ms)
	100A	225A			
A	40A	100A	J	2	150
B	50A	110A	K	2	300
C	60A	125A	L	2	I ² t
D	70A	150A	M	4	Inst
E	80A	175A	N	4	150
F	90A	200A	O	4	I ² t
G	100A	225A	P	6	Inst
			Q	6	300
			R	10	150
			S	10	300

Notes:

- Curve accuracy applies from -20C to +55C. Temperatures above +105C cause an overtemperature protection trip.
- There is a memory effect that can act to shorten the long delay. Approximately five minutes is required between overloads to completely reset this thermal memory.
- Total clearing times shown include the response times of the trip unit, the breaker opening, and the interruption of the current.
- Short delay pickups settings in multiples of I_r ± 10%. Short delay time accuracy +0ms/-30ms
- For high fault current levels an additional fixed instantaneous hardware override is provided at 2500A ±10%.

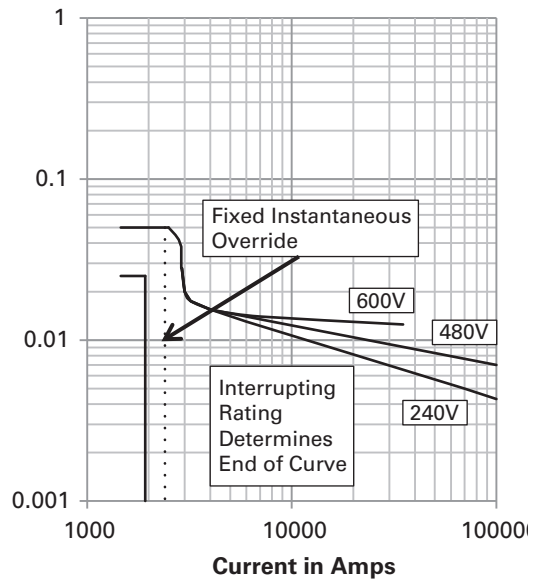


Figure 9. Digitrip 210+ Trip Units (100 & 225A), Long Delay and Short Delay with I2t Response and Override (LSI, Profiles L, O)
Curve Number TD012004EN, June 2015

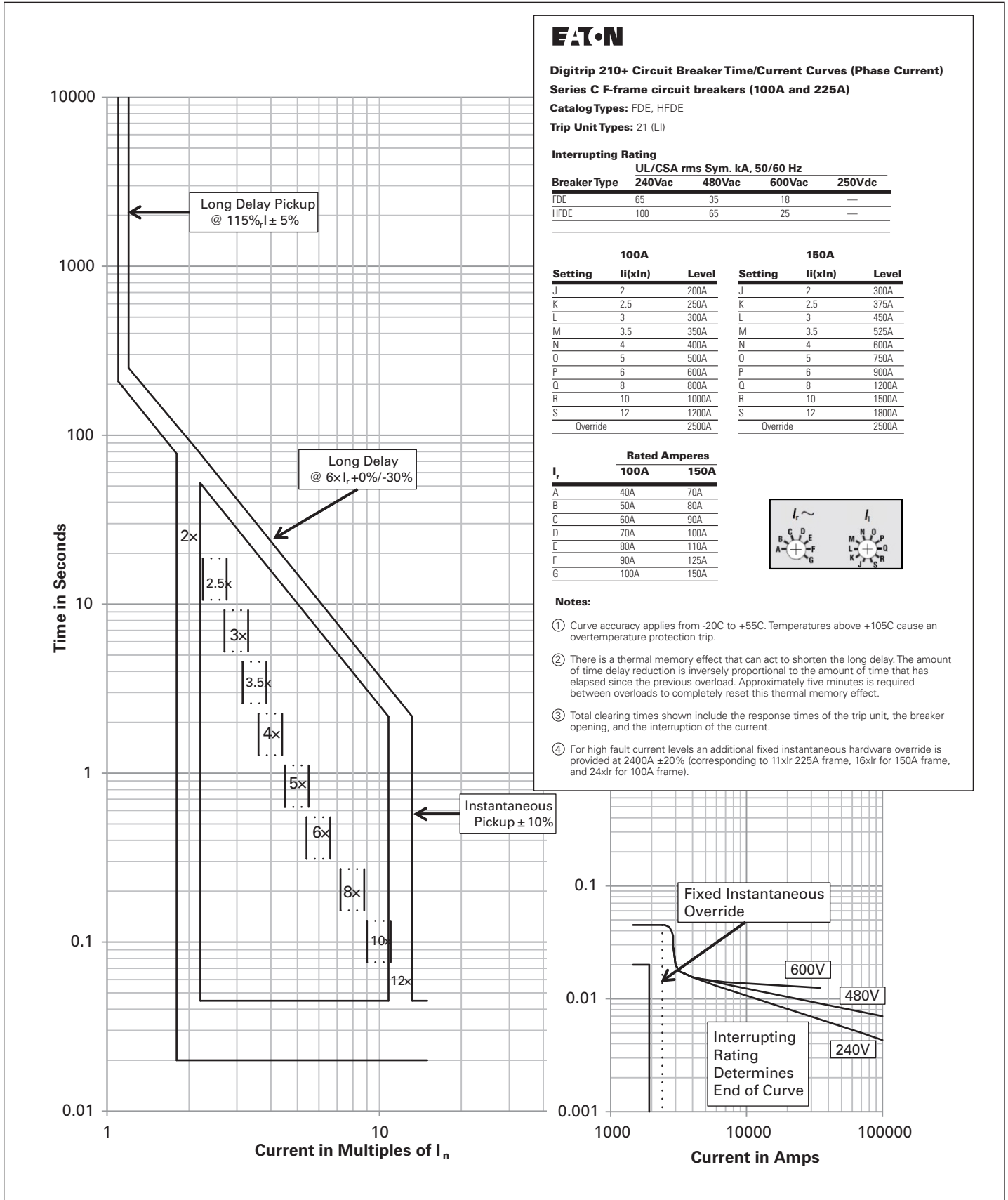


Figure 10. Digitrip 210+ Trip Units (100 & 150A), Long Delay, Instantaneous Pickups and Override (LI)
Curve Number TD012005EN, June 2015

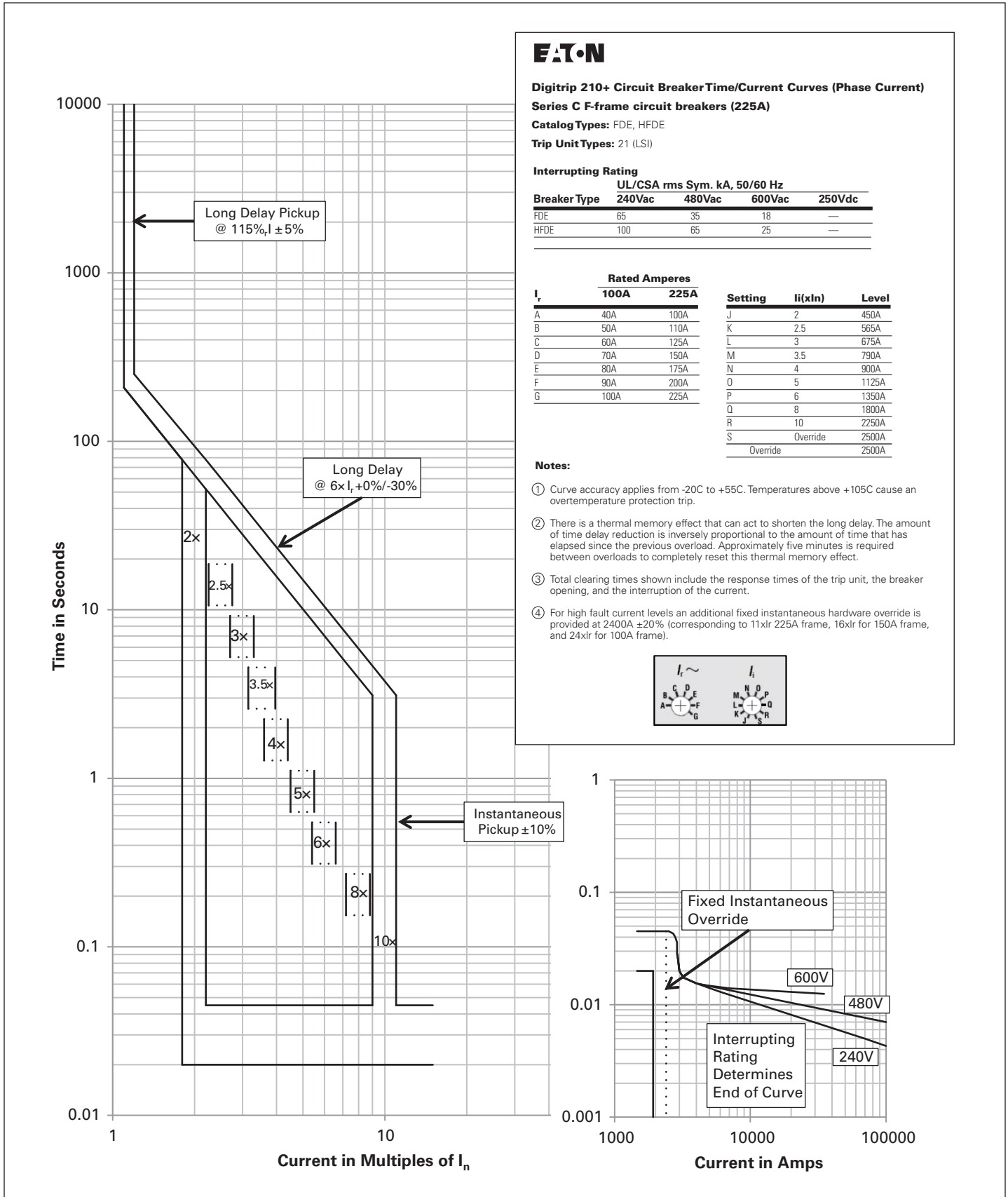


Figure 11. Digitrip 210+ Trip Units (225A), Long Delay, Instantaneous Pickups and Override (LI)
Curve Number TD012006EN, June 2015

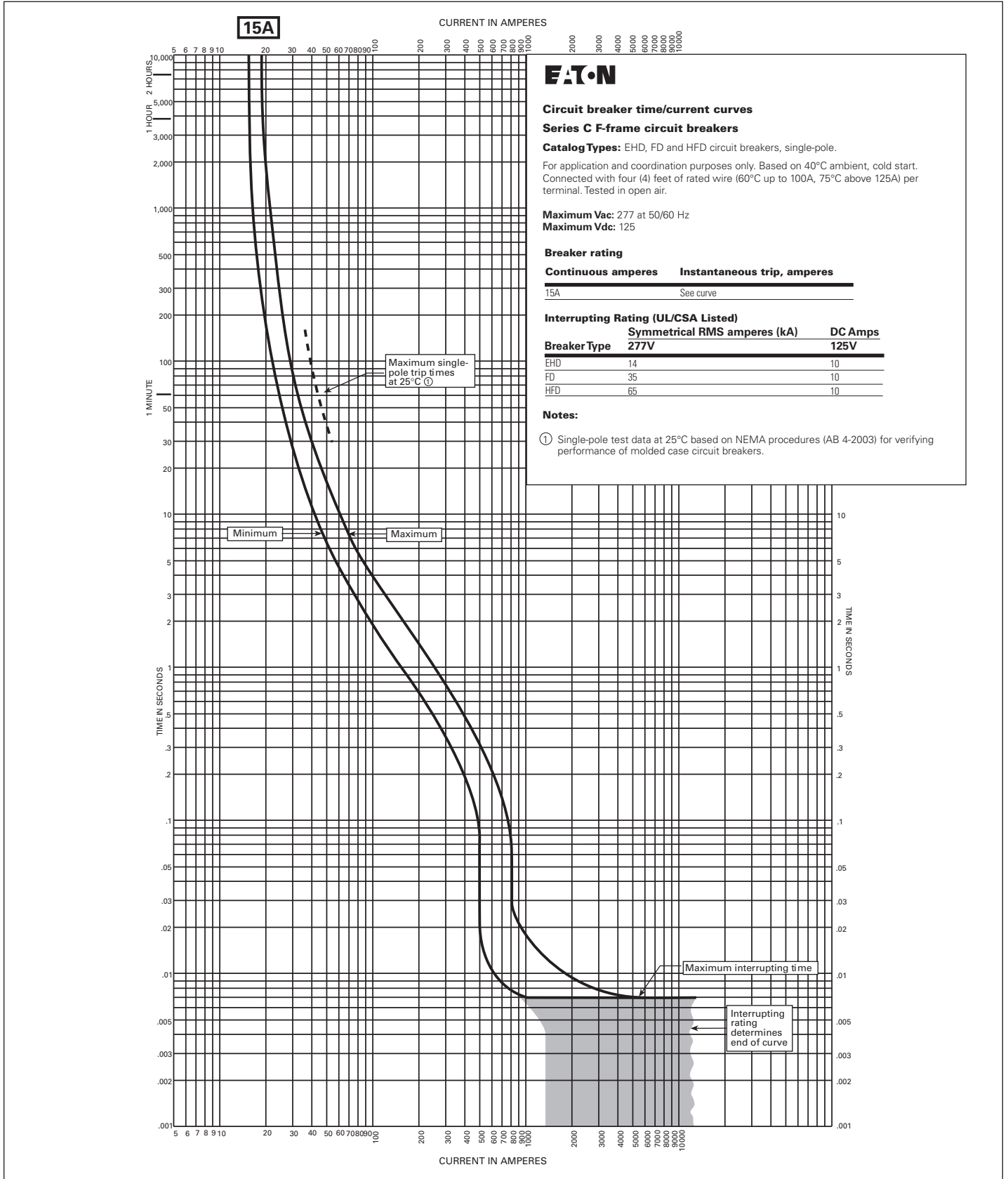


Figure 12. Single Pole, Series C, Types EHD, FD, and HFD 15A—Curve Number SC-4423-88A

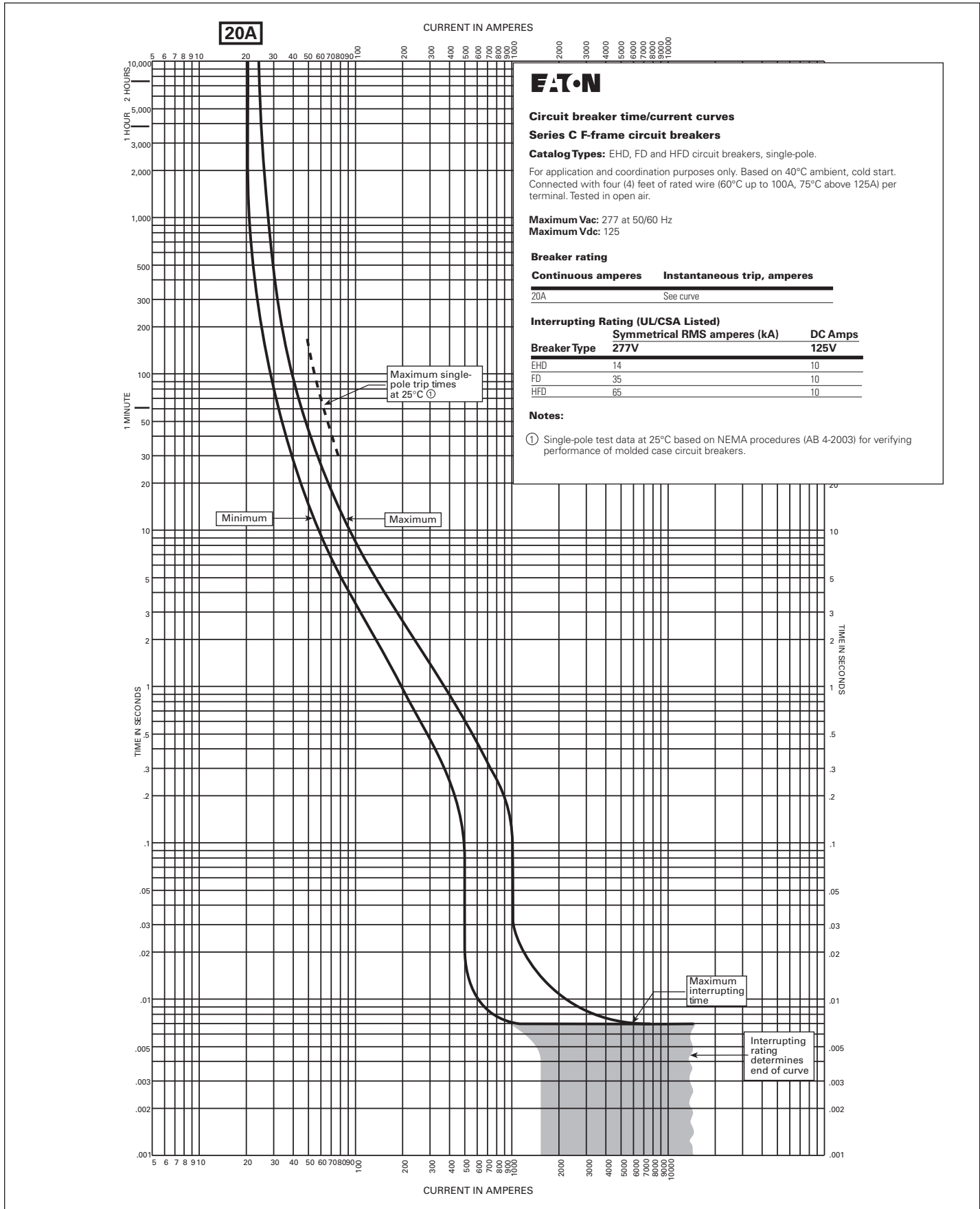


Figure 13. Single Pole, Series C, Types EHD, FD, and HFD 20A—Curve Number SC-4424-88A

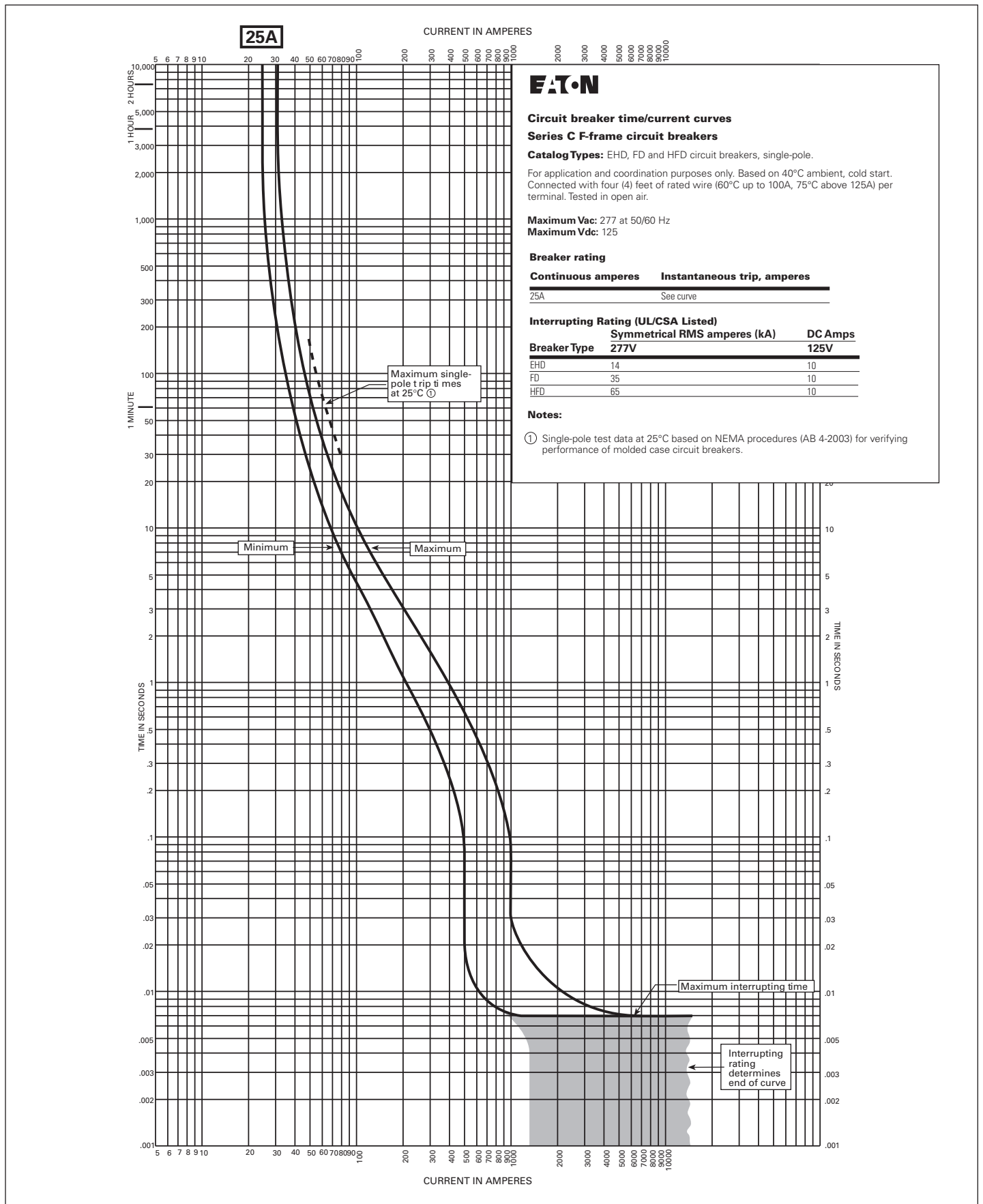


Figure 14. Single Pole, Series C, Types EHD, FD, and HFD 25A – Curve No. SC-4425-88A

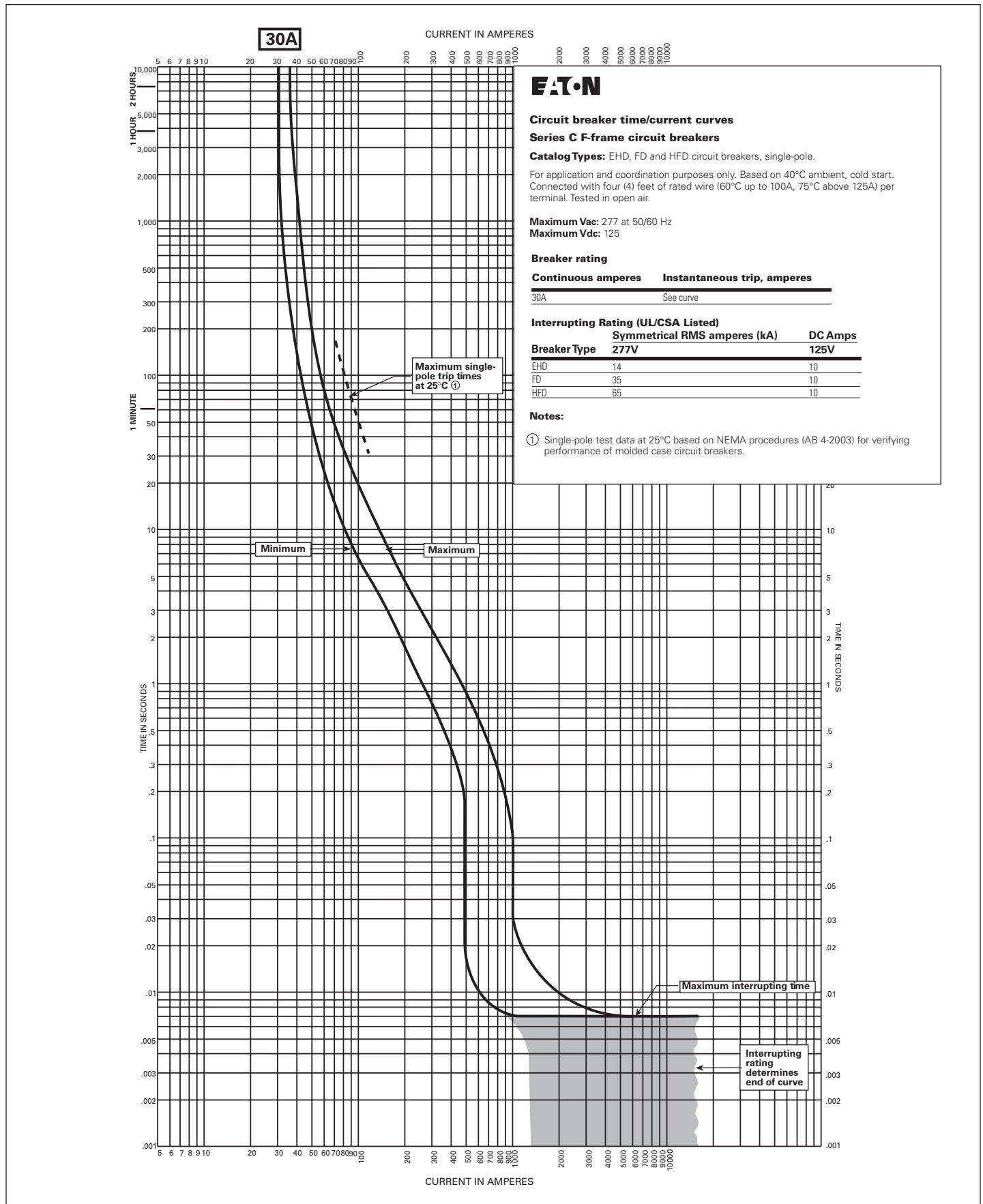


Figure 15. Single Pole, Series C, Types EHD, FD, and HFD 30A – Curve Number SC-4426-88A

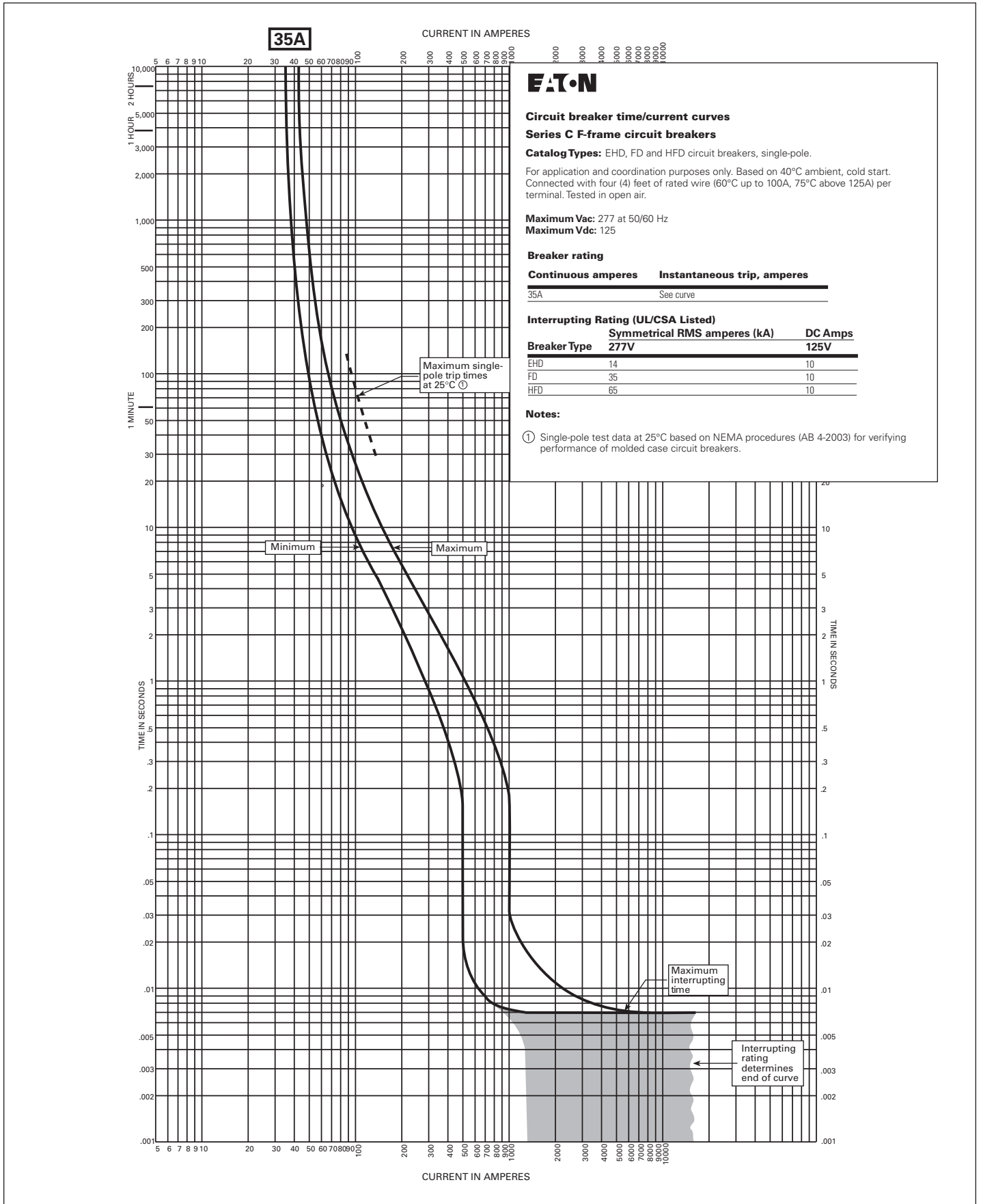


Figure 16. Single Pole, Series C, Types EHD, FD, and HFD 35A – Curve Number SC-4427-88A

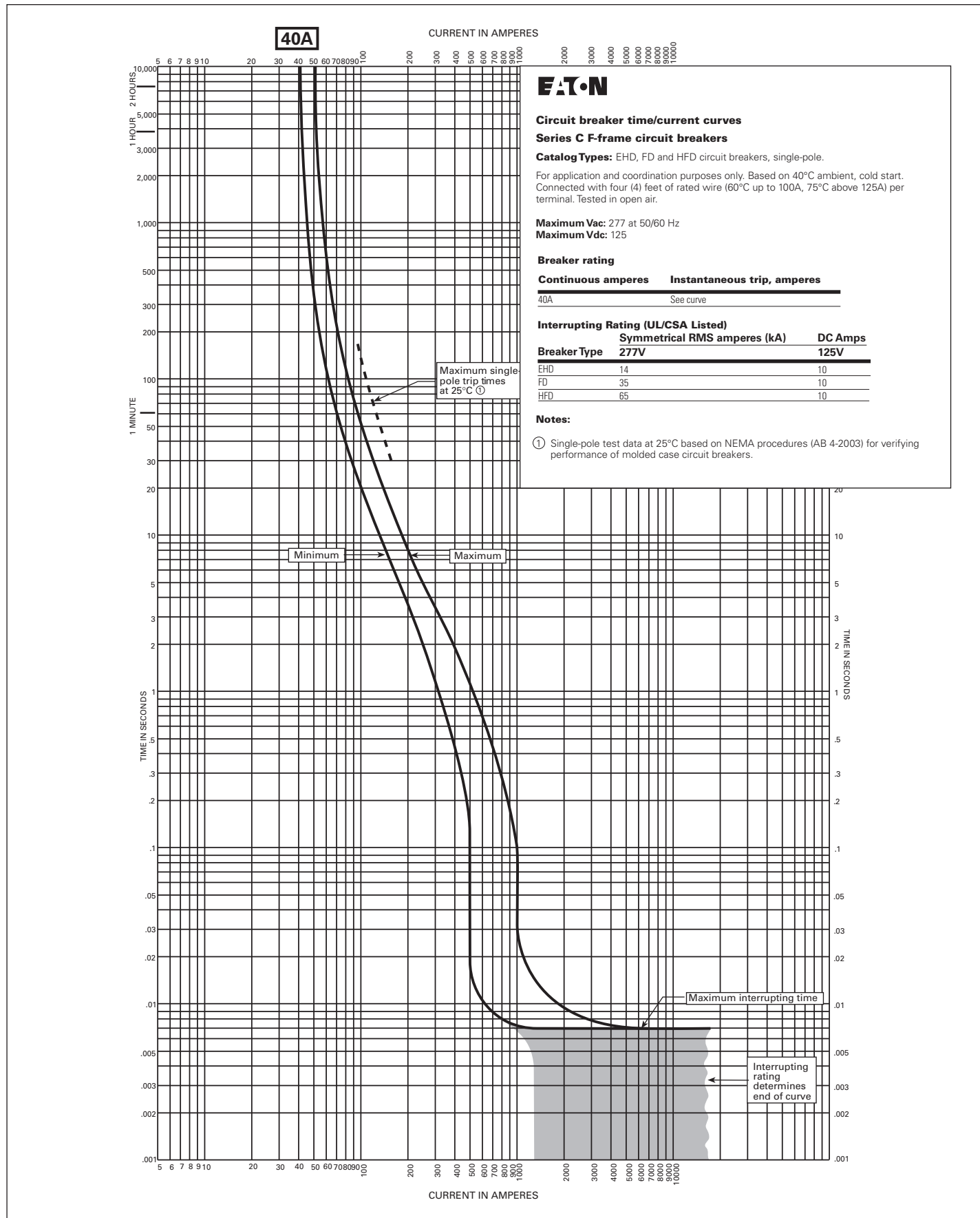


Figure 17. Single Pole, Series C, Types EHD, FD, and HFD 40A—Curve Number SC-4428-88A

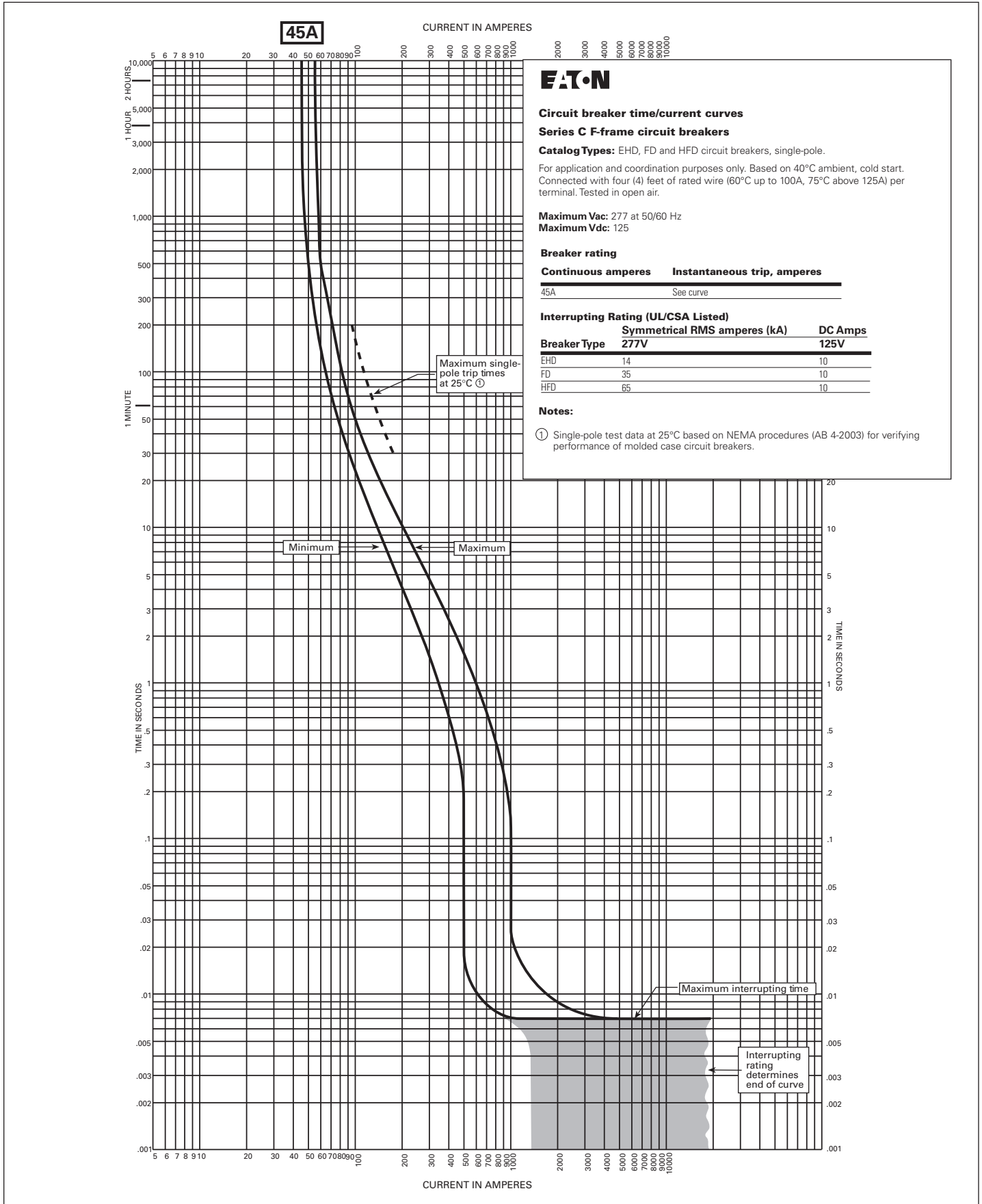


Figure 18. Single Pole, Series C, Types EHD, FD, and HFD 45A – Curve No. SC-4429-88A

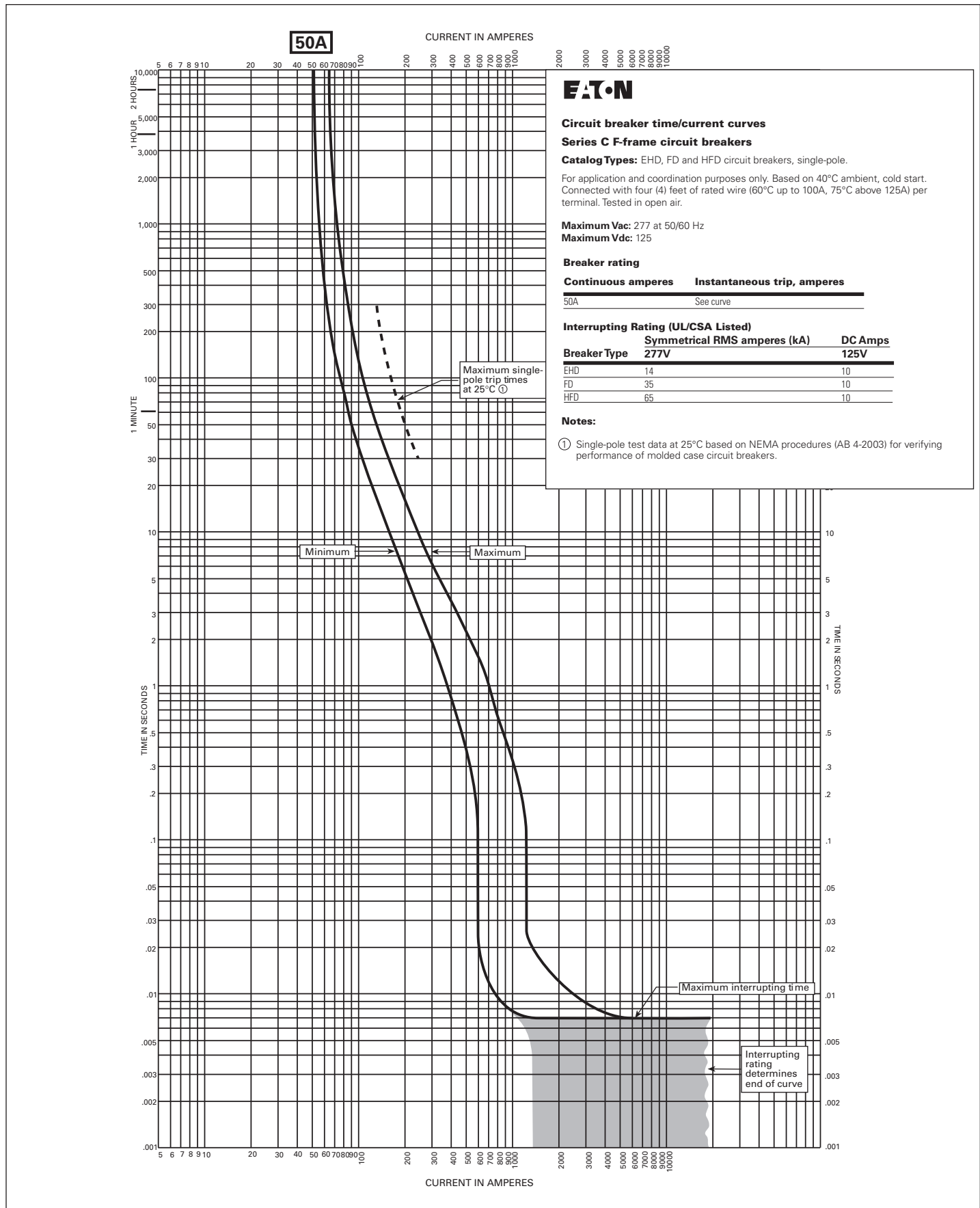


Figure 19. Single Pole, Series C, Types EHD, FD, and HFD 50A – Curve Number SC-4430-88A

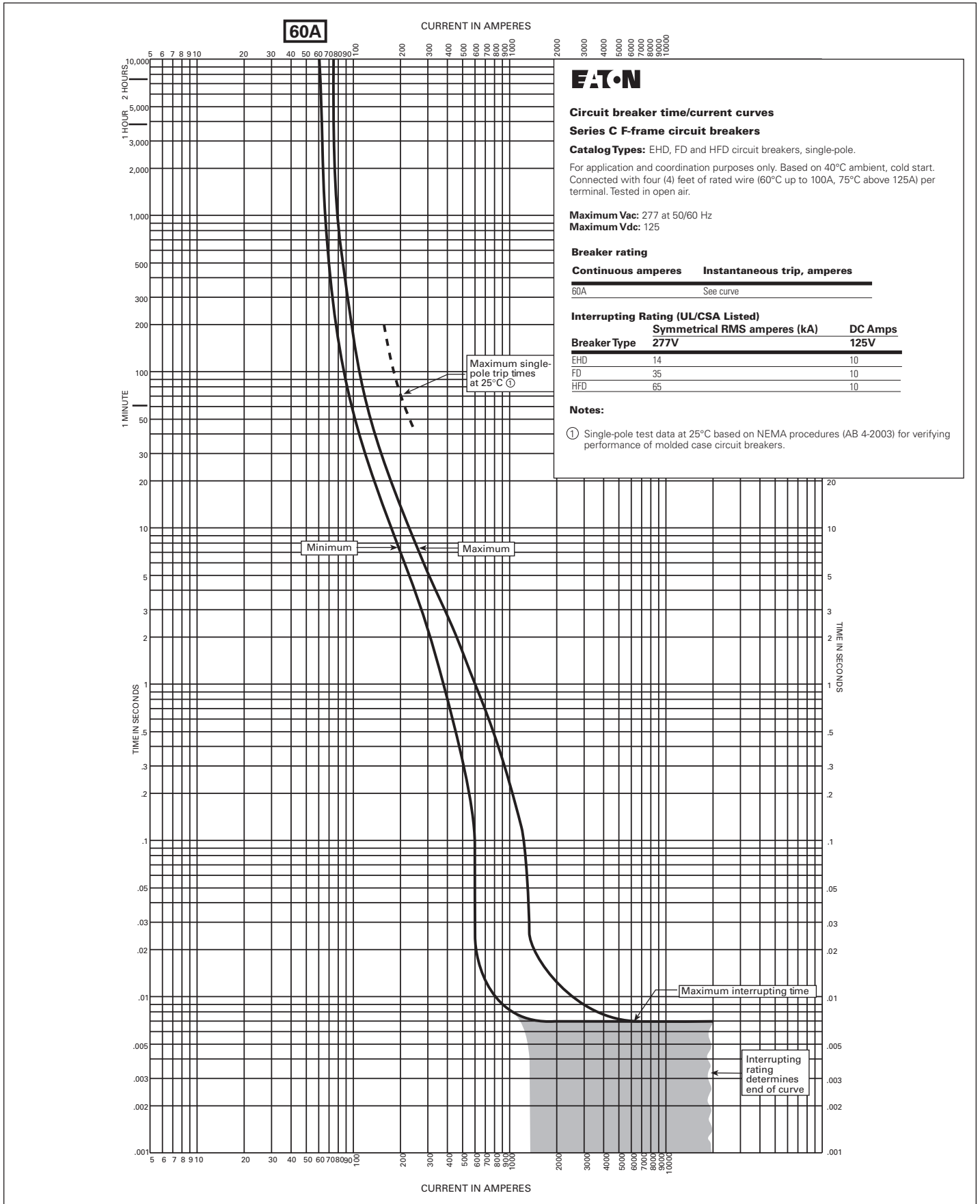


Figure 20. Single Pole, Series C, Types EHD, FD, and HFD 60A – Curve Number SC-4431-88A

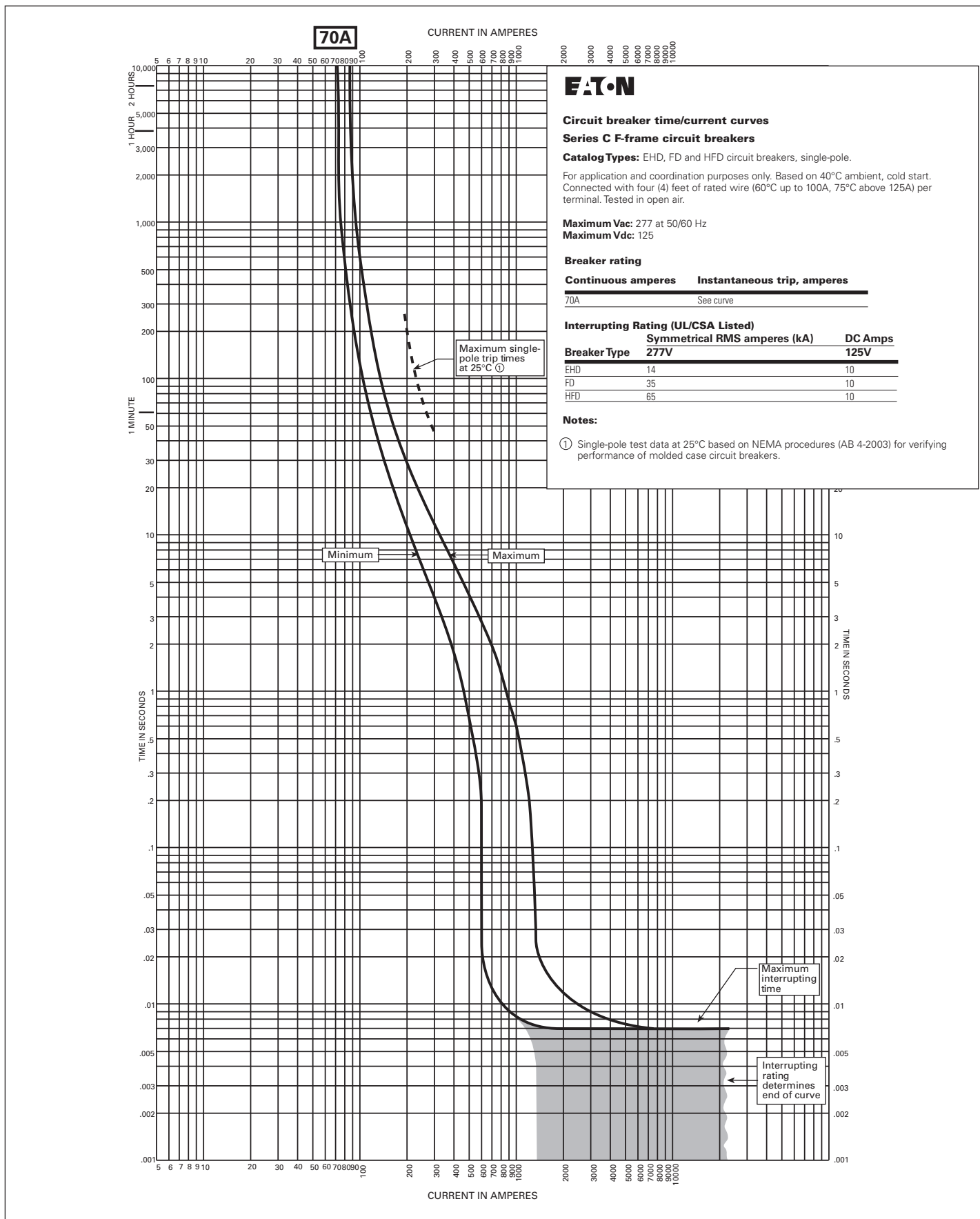


Figure 21. Single Pole, Series C, Types EHD, FD, and HFD 70A – Curve Number SC-4432-88A

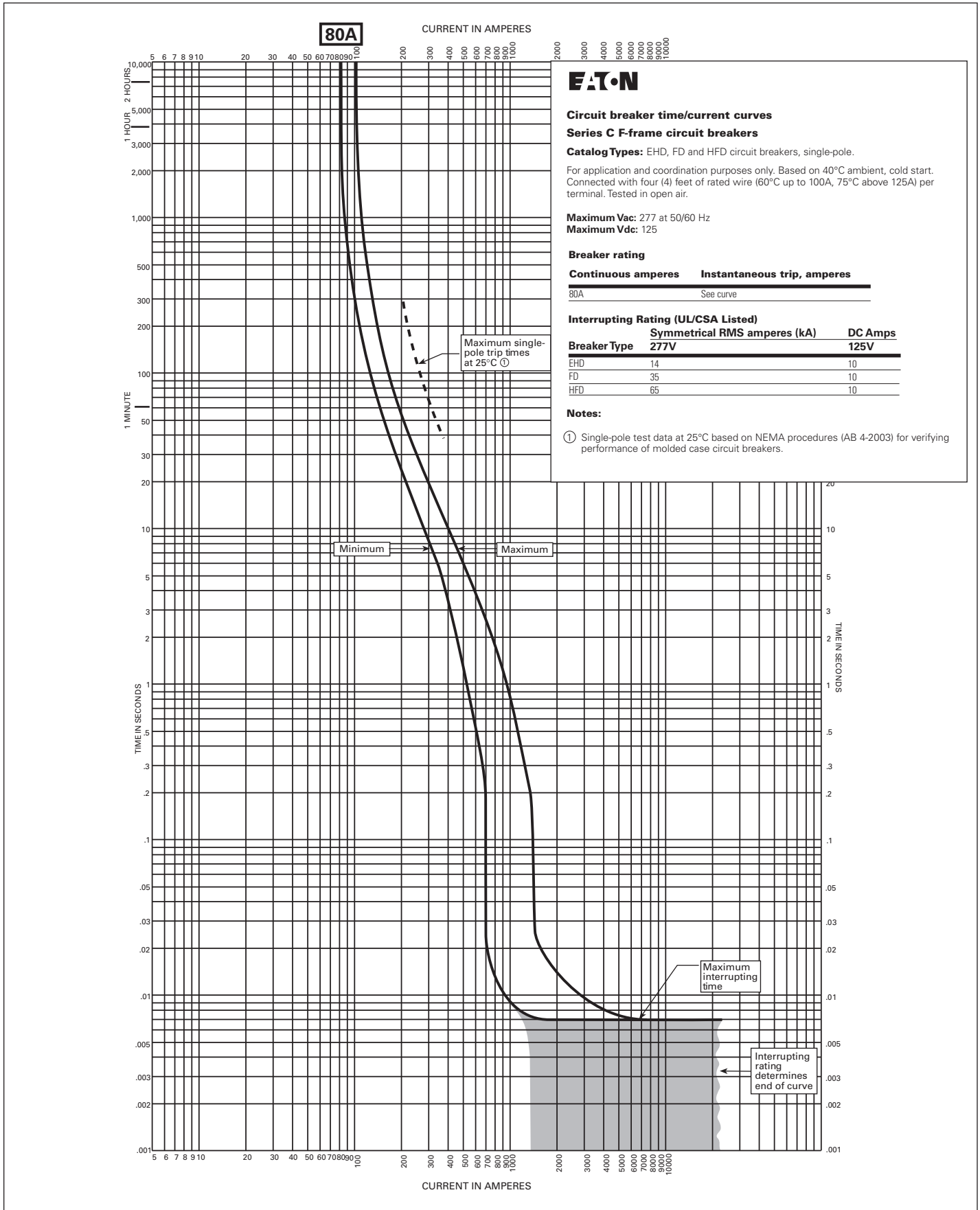


Figure 22. Single Pole, Series C, Types EHD, FD, and HFD 80A – Curve Number SC-4433-88A

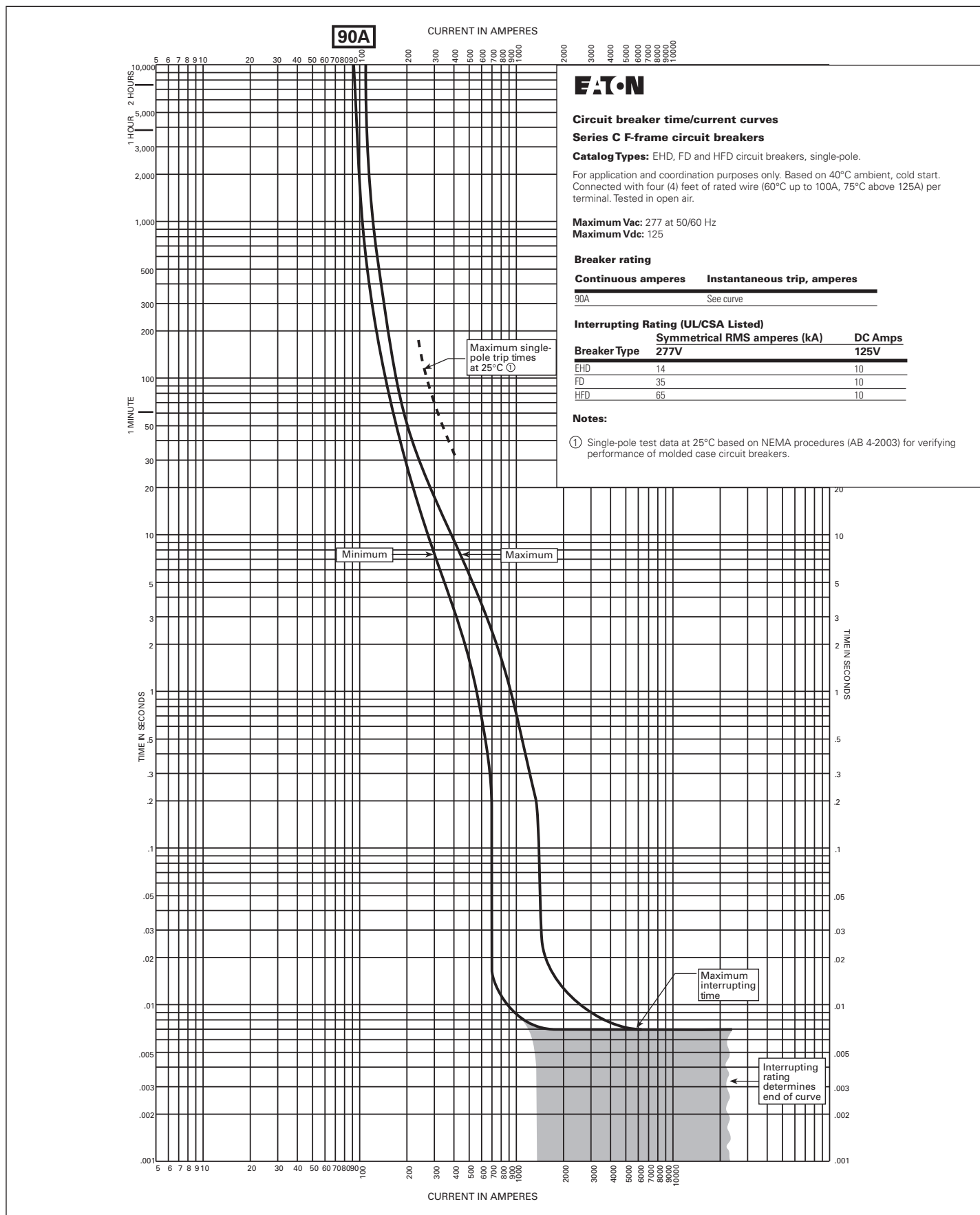


Figure 23. Single Pole, Series C, Types EHD, FD, and HFD 90A – Curve Number SC-4434-88A

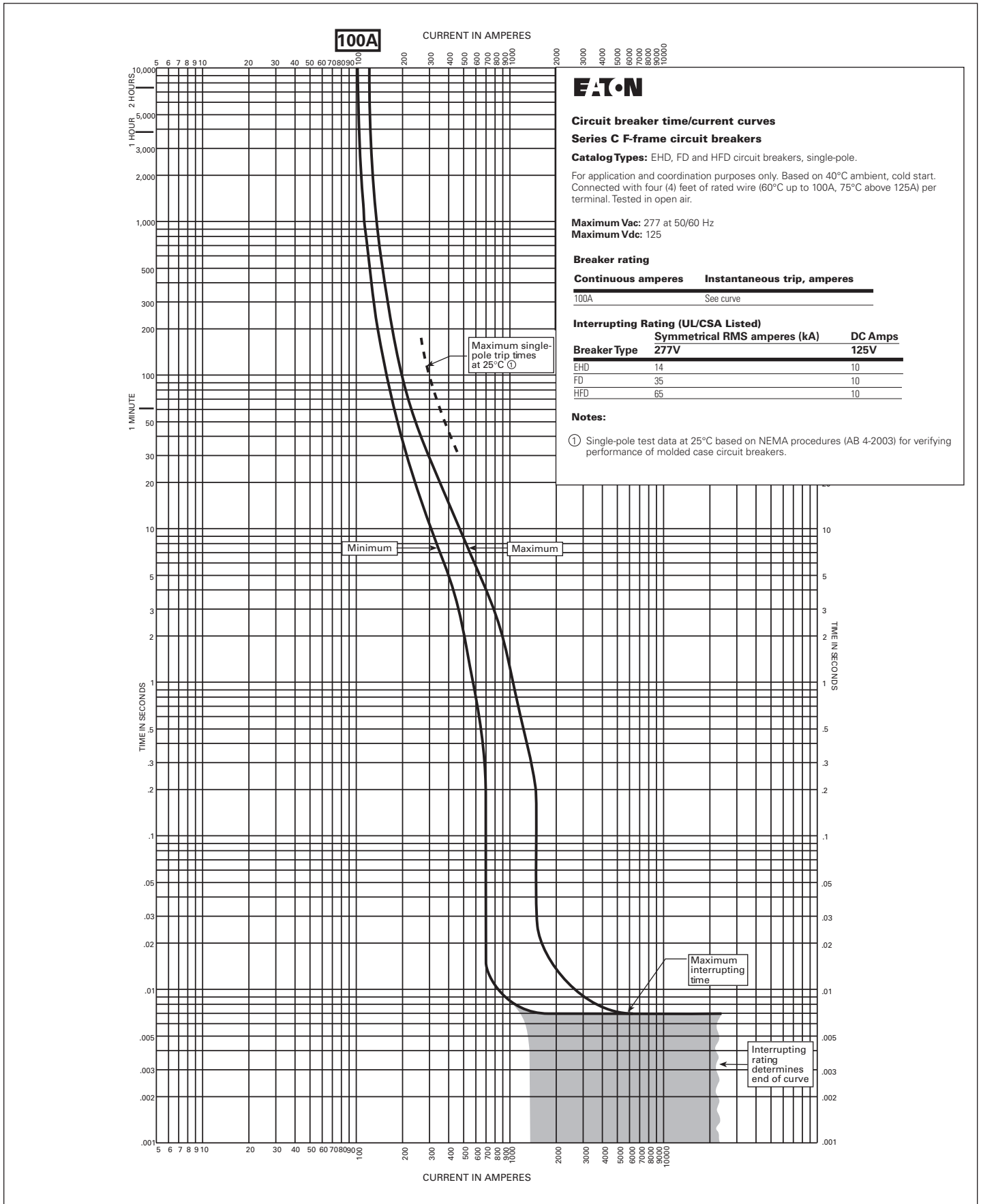


Figure 24. Single Pole, Series C, Types EHD, FD, and HFD 100A—Curve Number SC-4435-88A

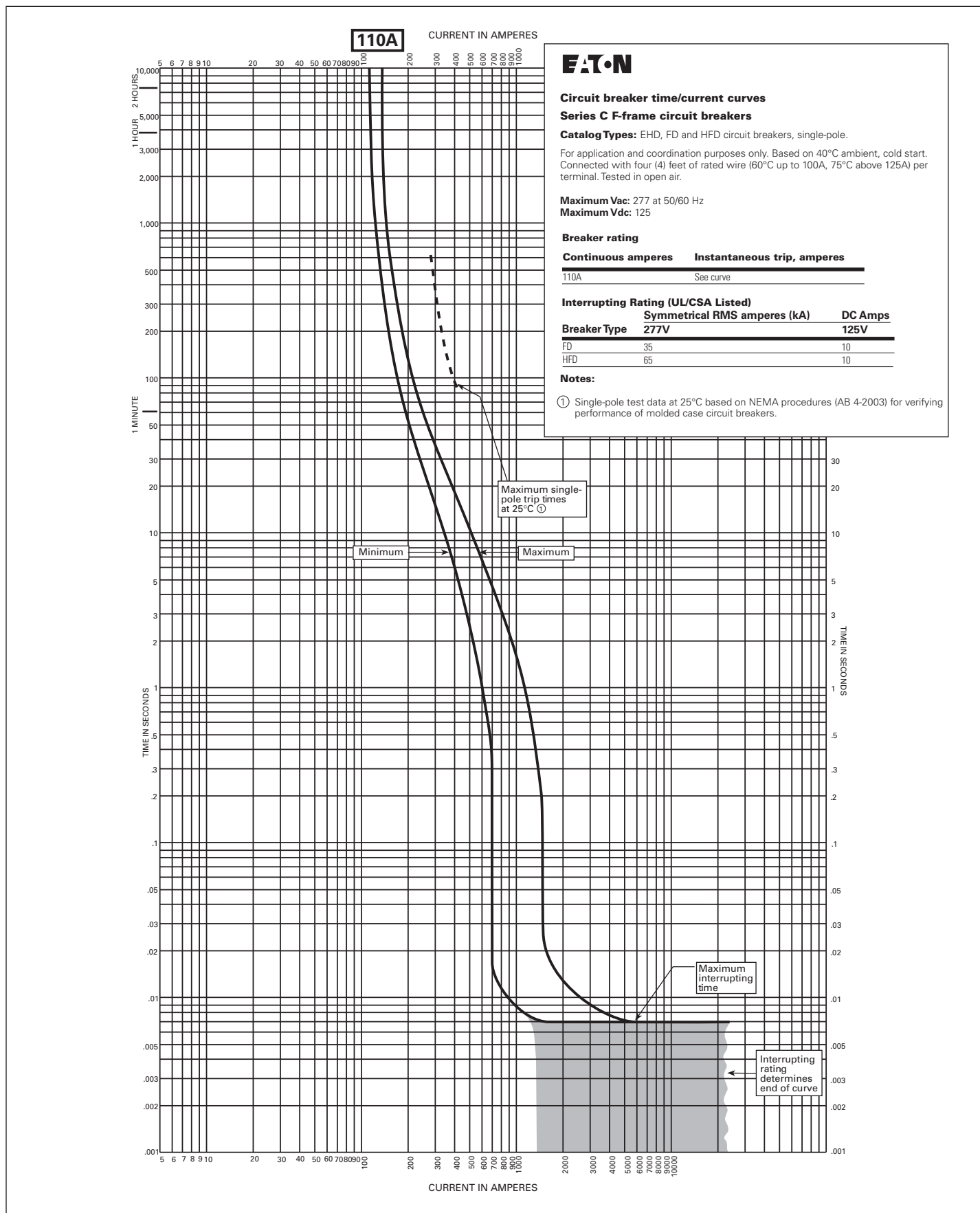


Figure 25. Single Pole, Series C, Types FD and HFD 110A—Curve Number SC-4436-88A

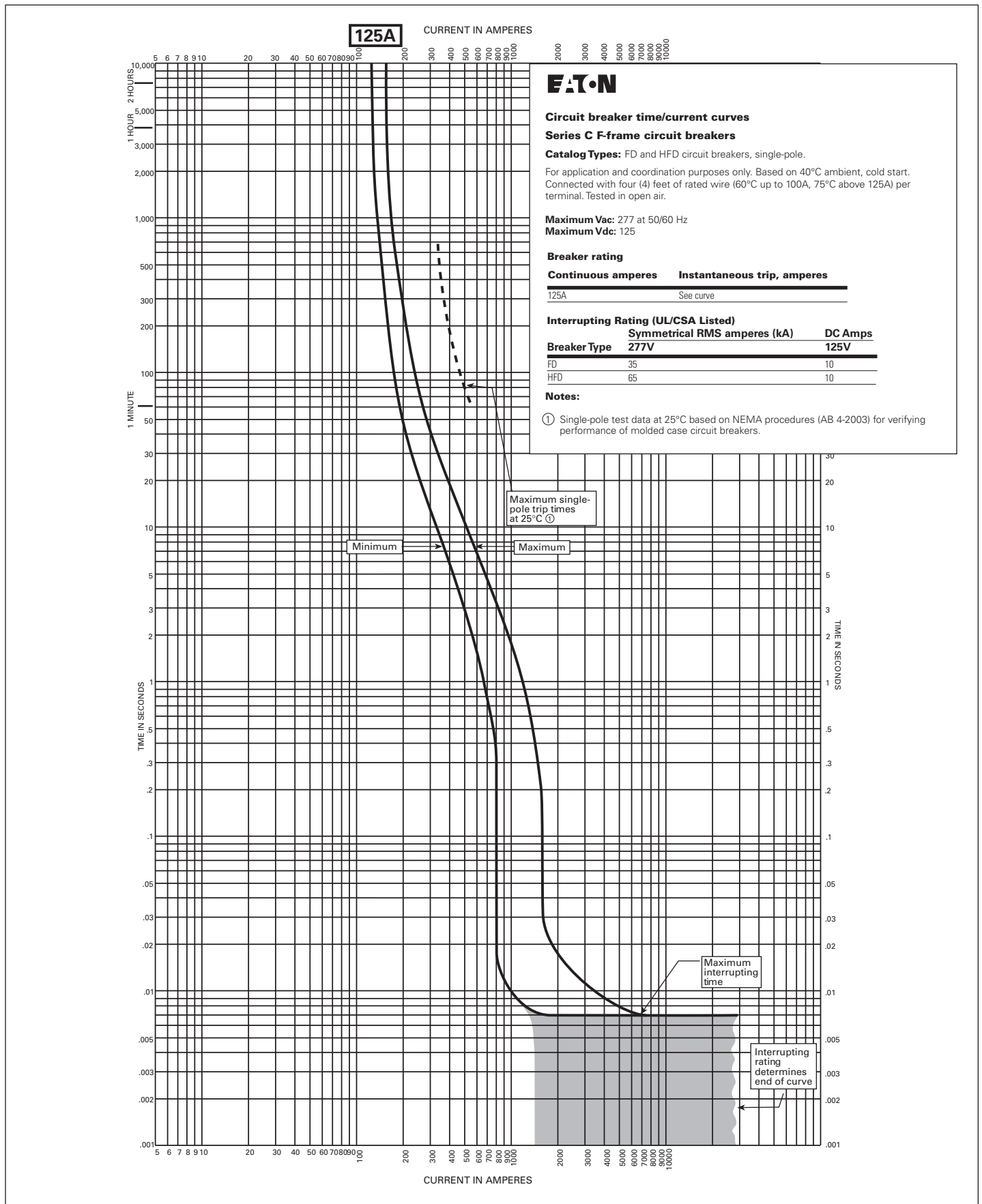


Figure 26. Single Pole, Series C, Types FD and HFD 125A – Curve Number SC-4437-88A

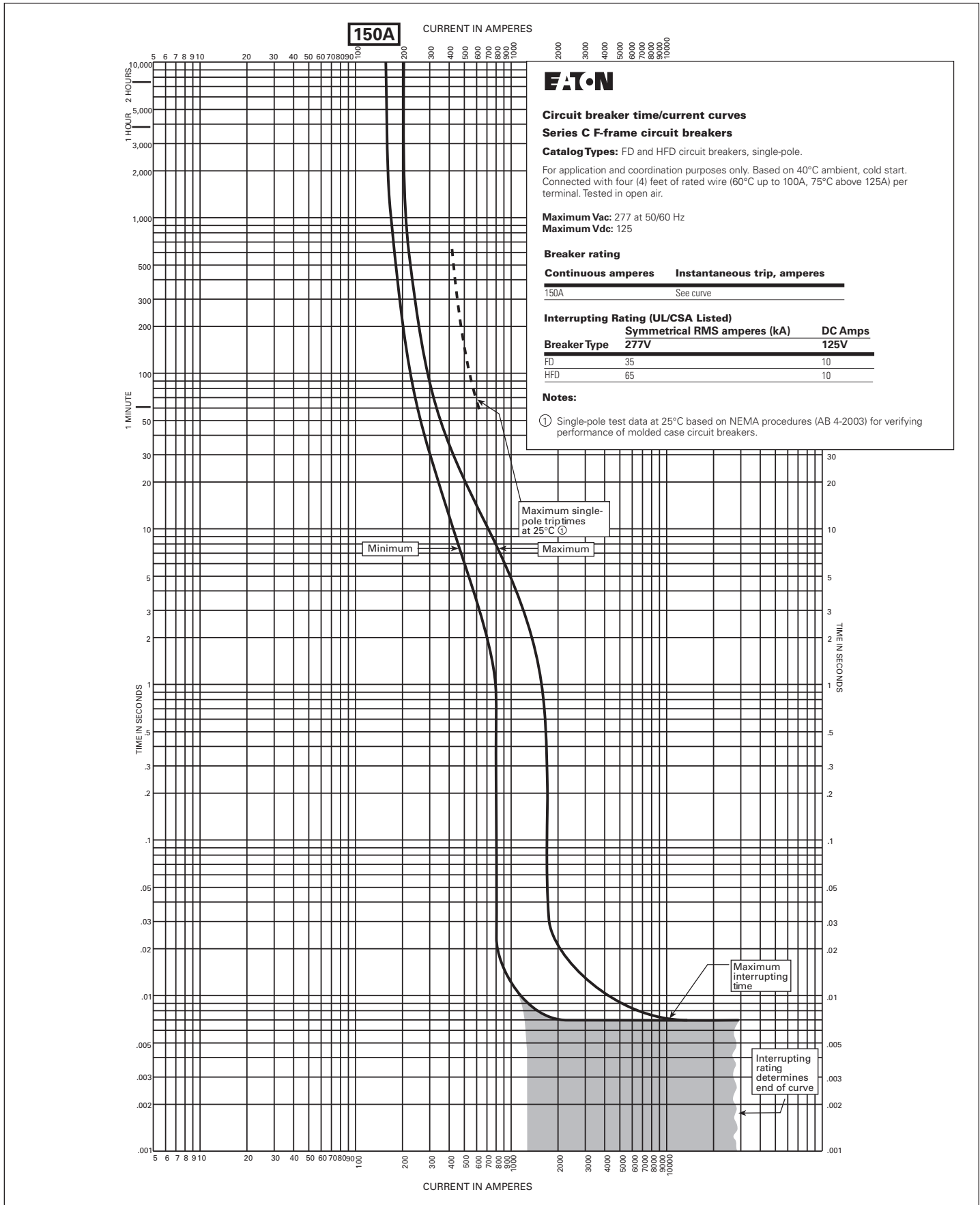


Figure 27. Single Pole, Series C, Types FD and HFD 150A – Curve Number SC-4438-88A

AB DE-ION Circuit Breakers—two-, three-, and four-poles

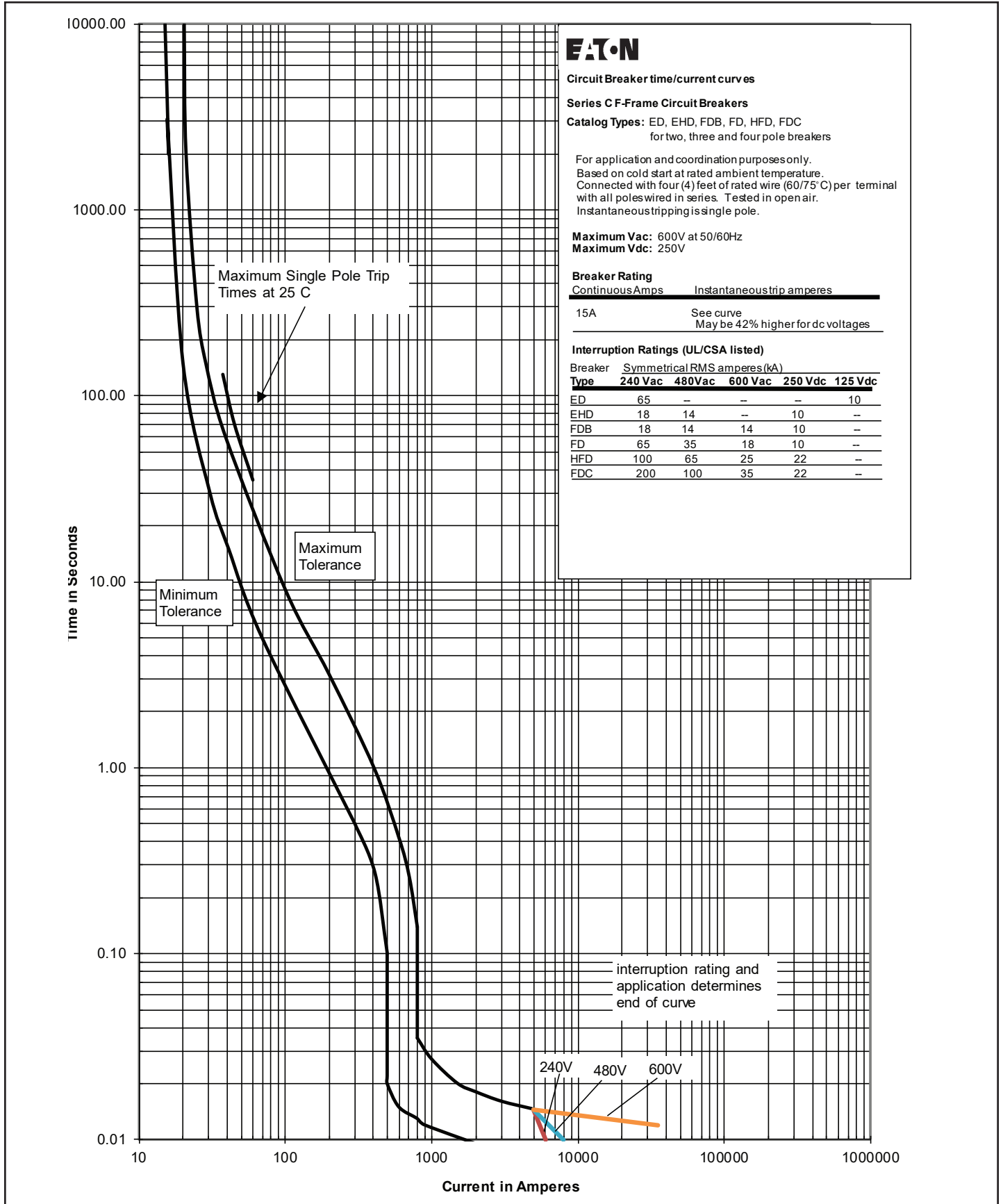


Figure 28. Types ED, EHD, FDB, FD, FDC, and HFD 15A 2, 3 & 4 pole—Curve Number TC012036EN

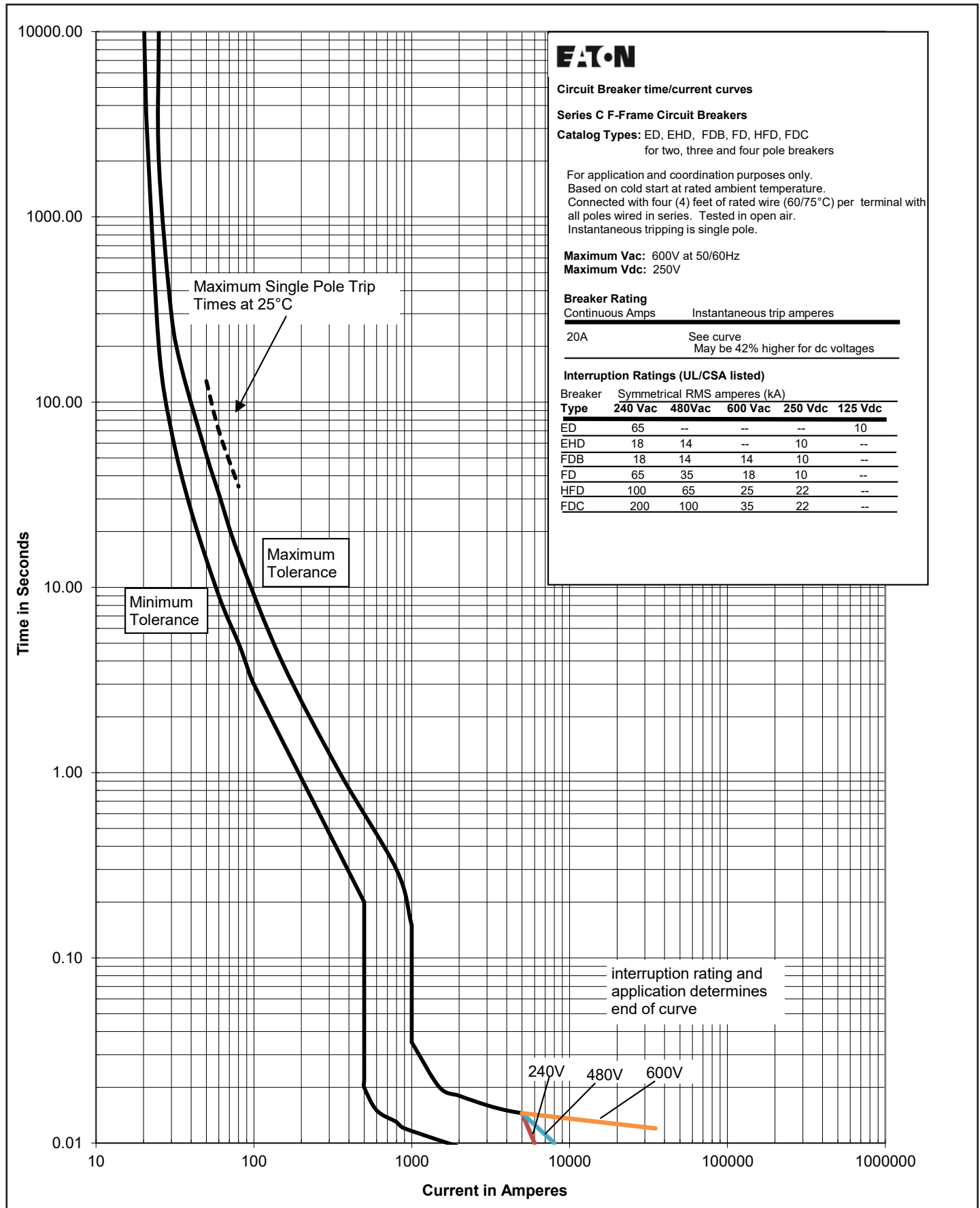


Figure 29. Types ED, EHD, FDB, FD, FDC, and HFD 20A 2, 3 & 4 pole—Curve Number TC012037EN

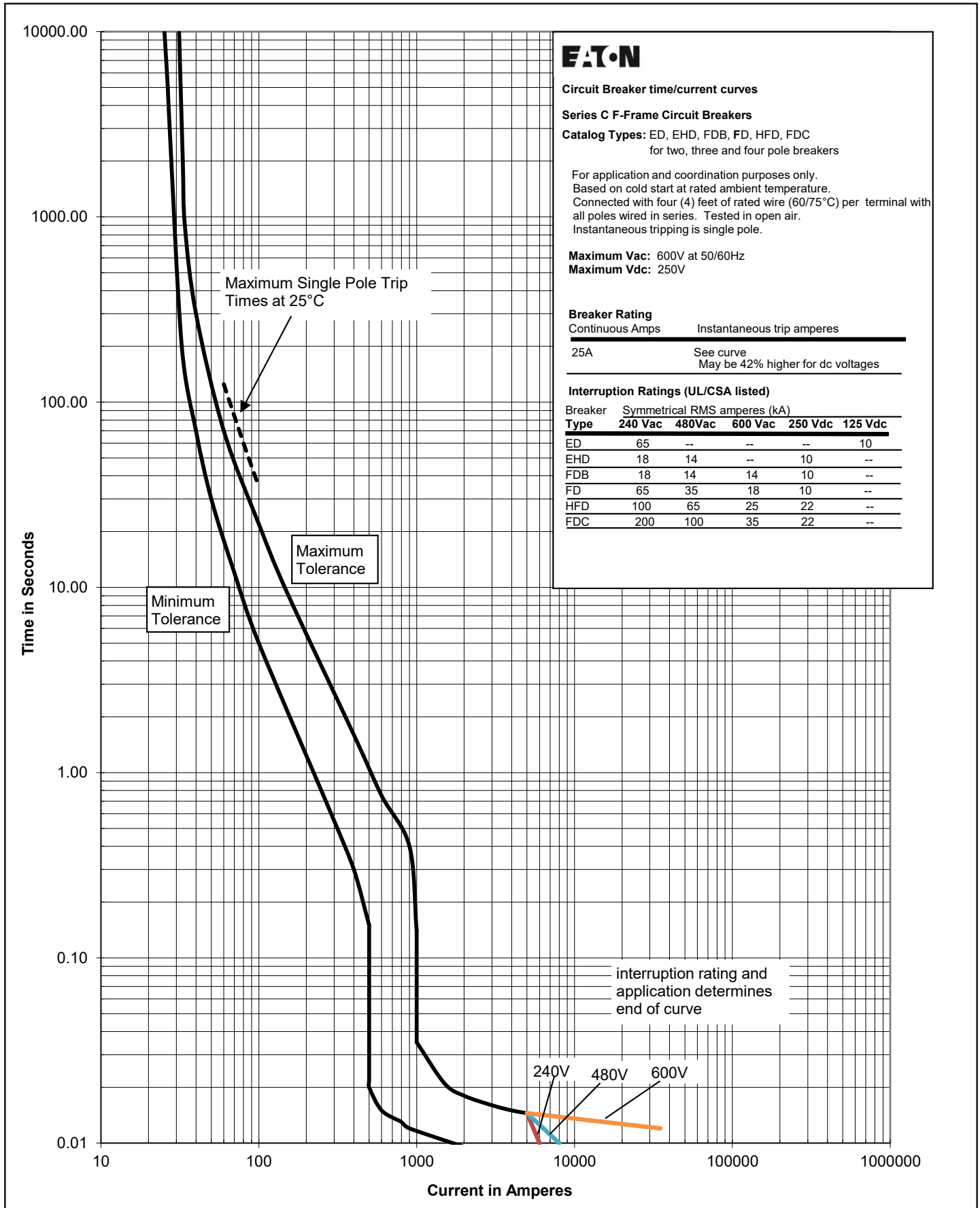


Figure 30. Types ED, EHD, FDB, FD, FDC, and HFD 25A 2, 3 & 4 pole—Curve Number TC012038EN

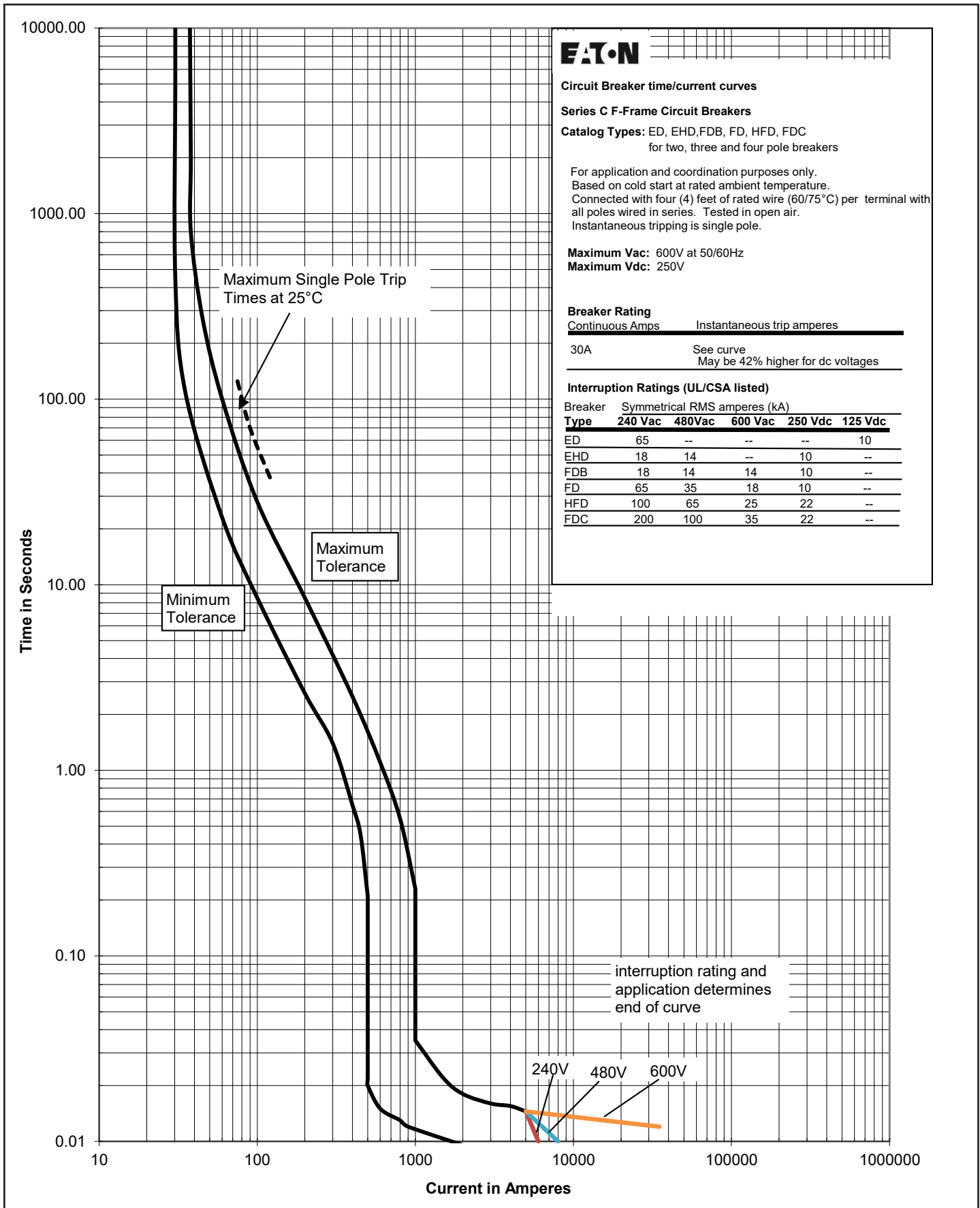


Figure 31. Types ED, EHD, FDB, FD, FDC, and HFD 30A 2, 3 & 4 pole—Curve Number TC012039EN

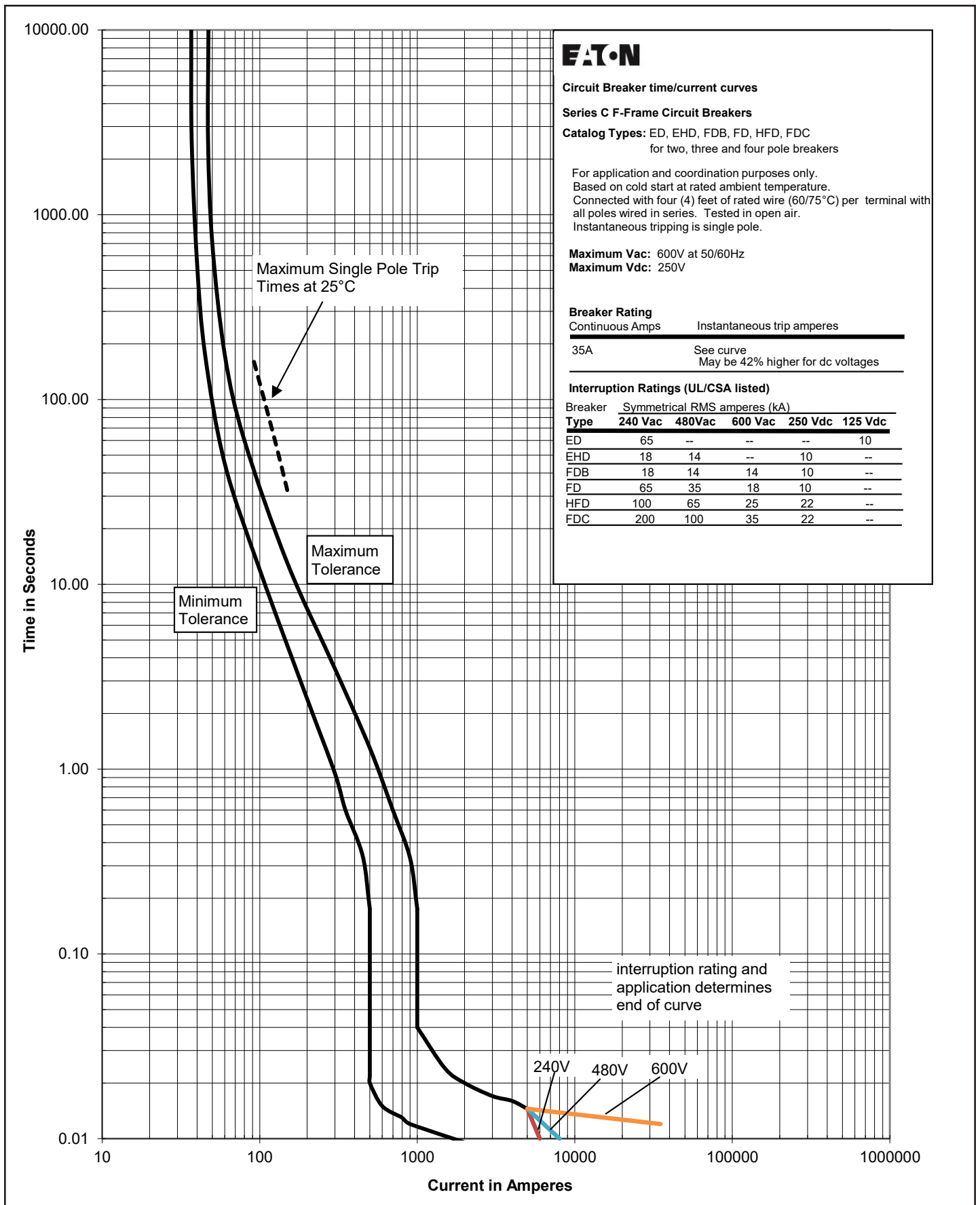


Figure 32. Types ED, EHD, FDB, FD, FDC, and HFD 35A 2, 3 & 4 pole—Curve Number TC012040EN

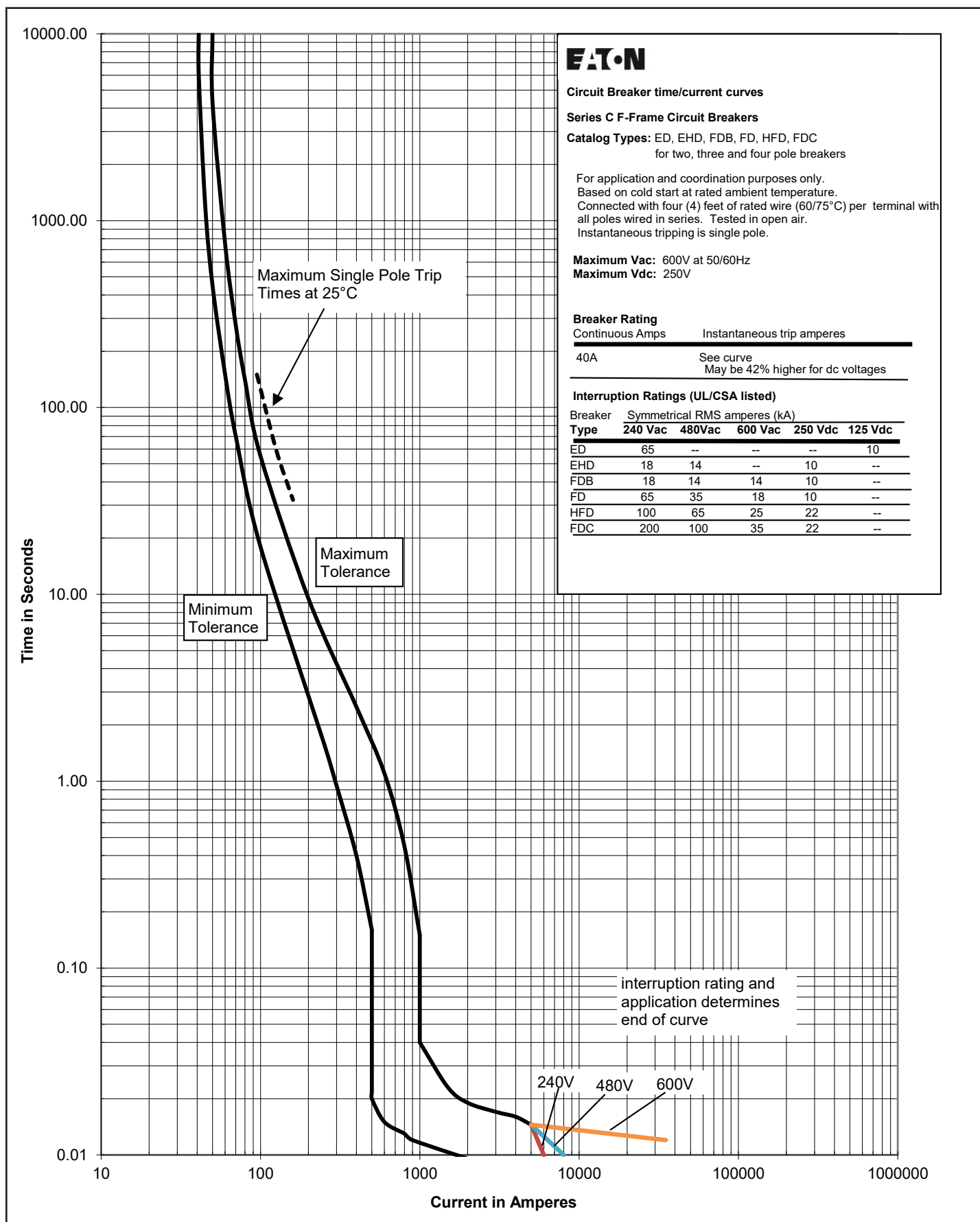


Figure 33. Types ED, EHD, FDB, FD, FDC, and HFD 40A 2, 3 & 4 pole—Curve Number TC012041EN

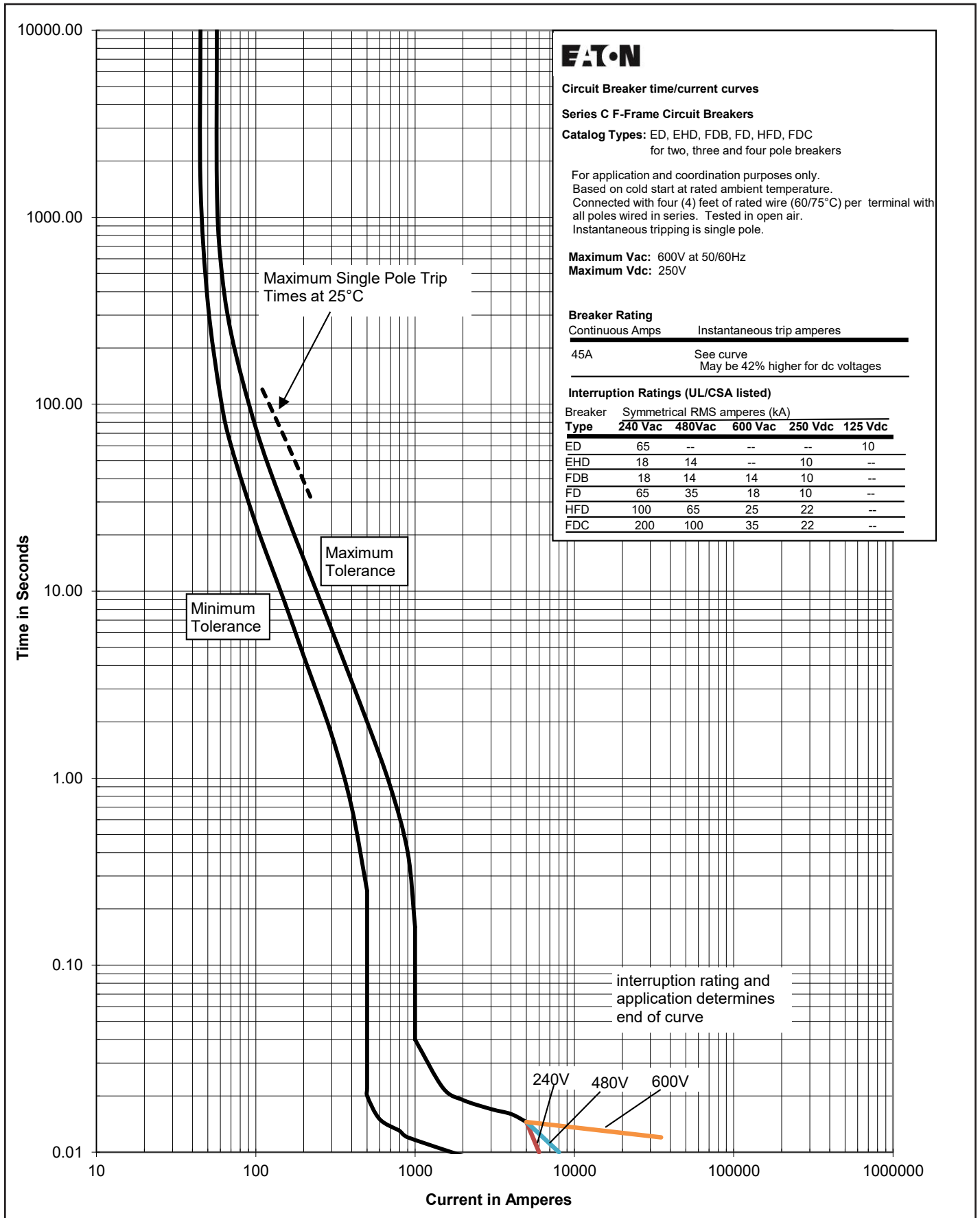


Figure 34. Types ED, EHD, FDB, FD, FDC, and HFD 45A 2, 3 & 4 pole—Curve Number TC012042EN

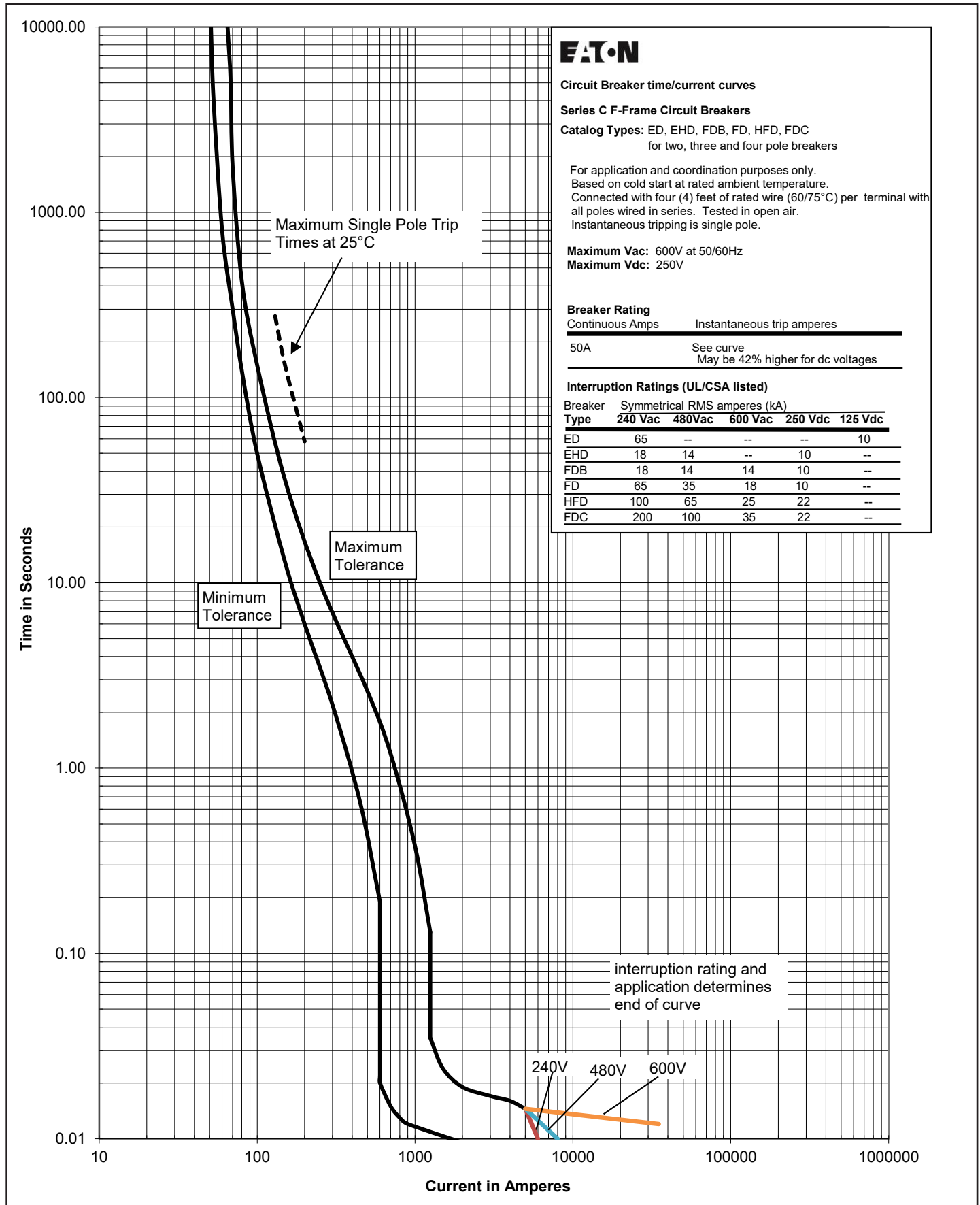


Figure 35. Types ED, EHD, FDB, FD, FDC, and HFD 50A 2, 3 & 4 pole—Curve Number TC012043EN

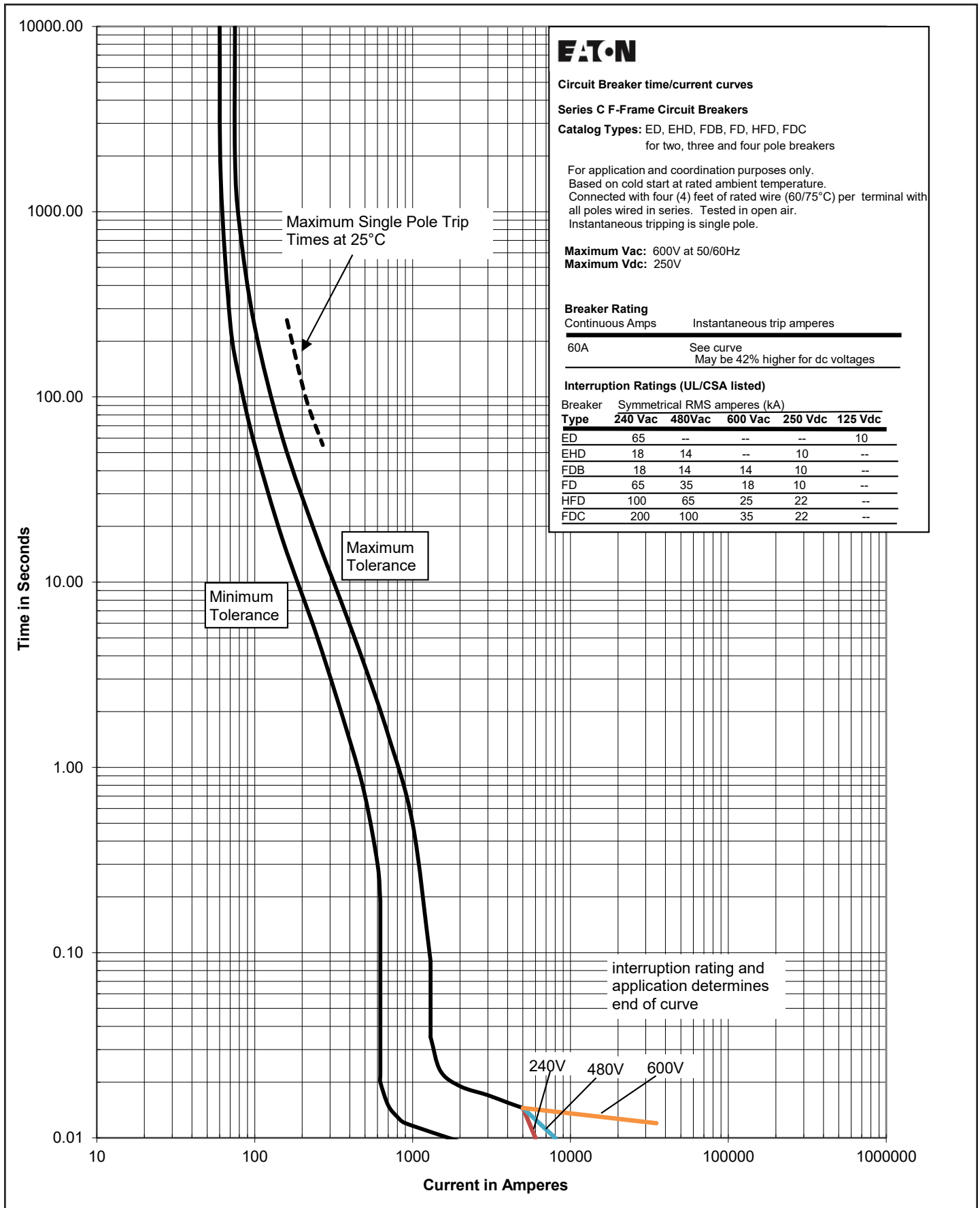


Figure 36. Types ED, EHD, FDB, FD, FDC, and HFD 60A 2, 3 & 4 pole—Curve Number TC012044EN

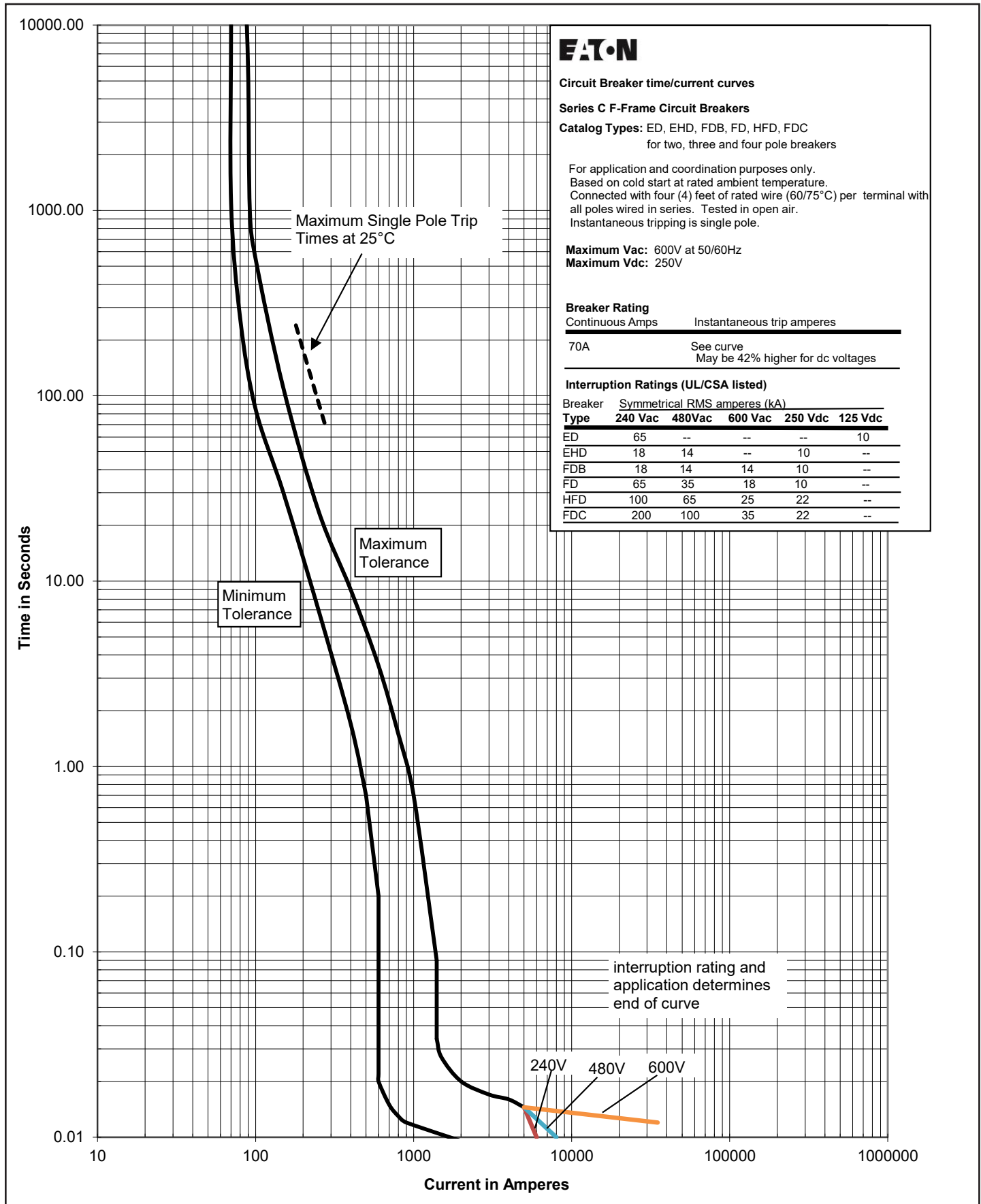


Figure 37. Types ED, EHD, FDB, FD, FDC, and HFD 70A 2, 3 & 4 pole—Curve Number TC012045EN

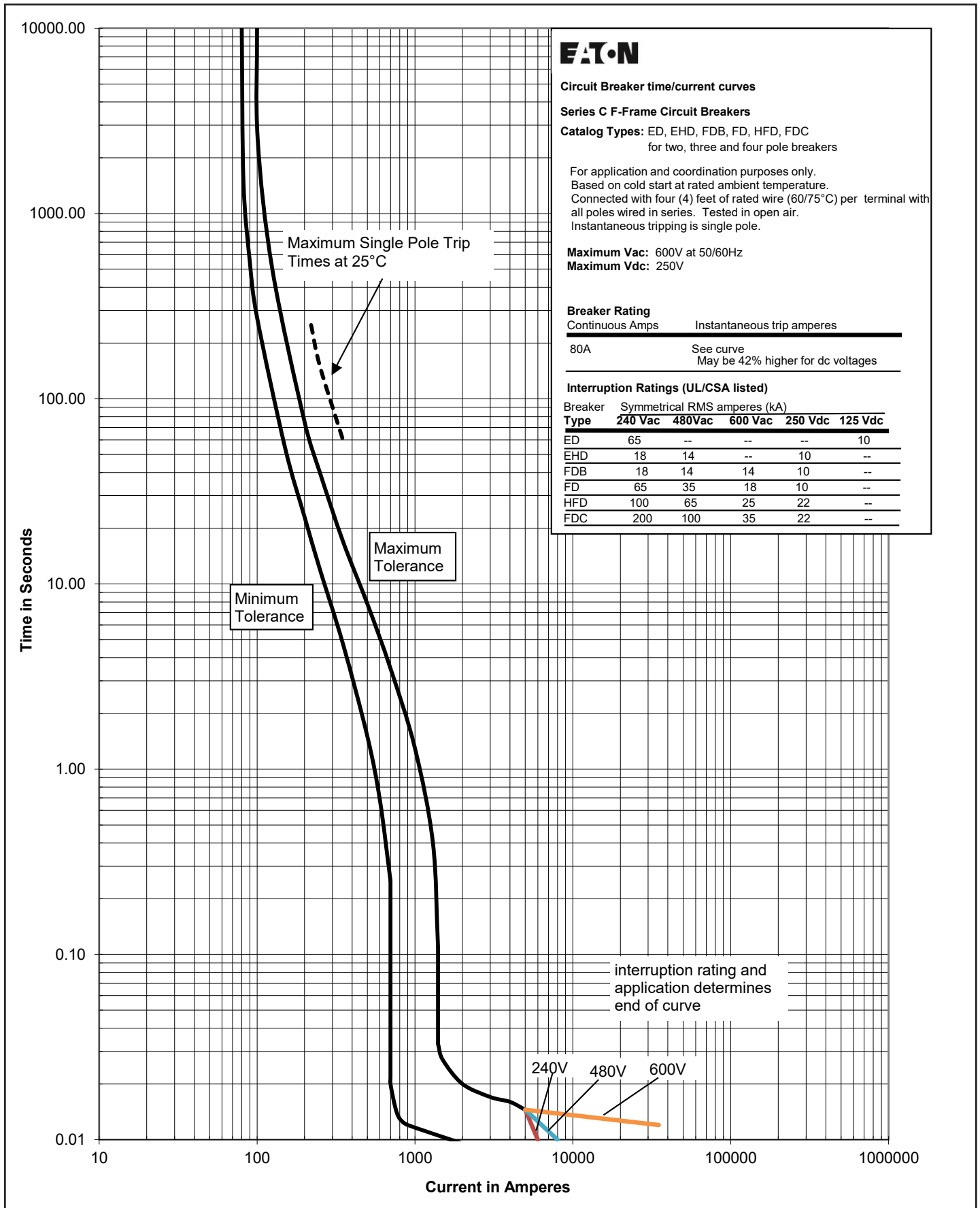


Figure 38. Types ED, EHD, FDB, FD, FDC, and HFD 80A 2, 3 & 4 pole—Curve Number TC012046EN

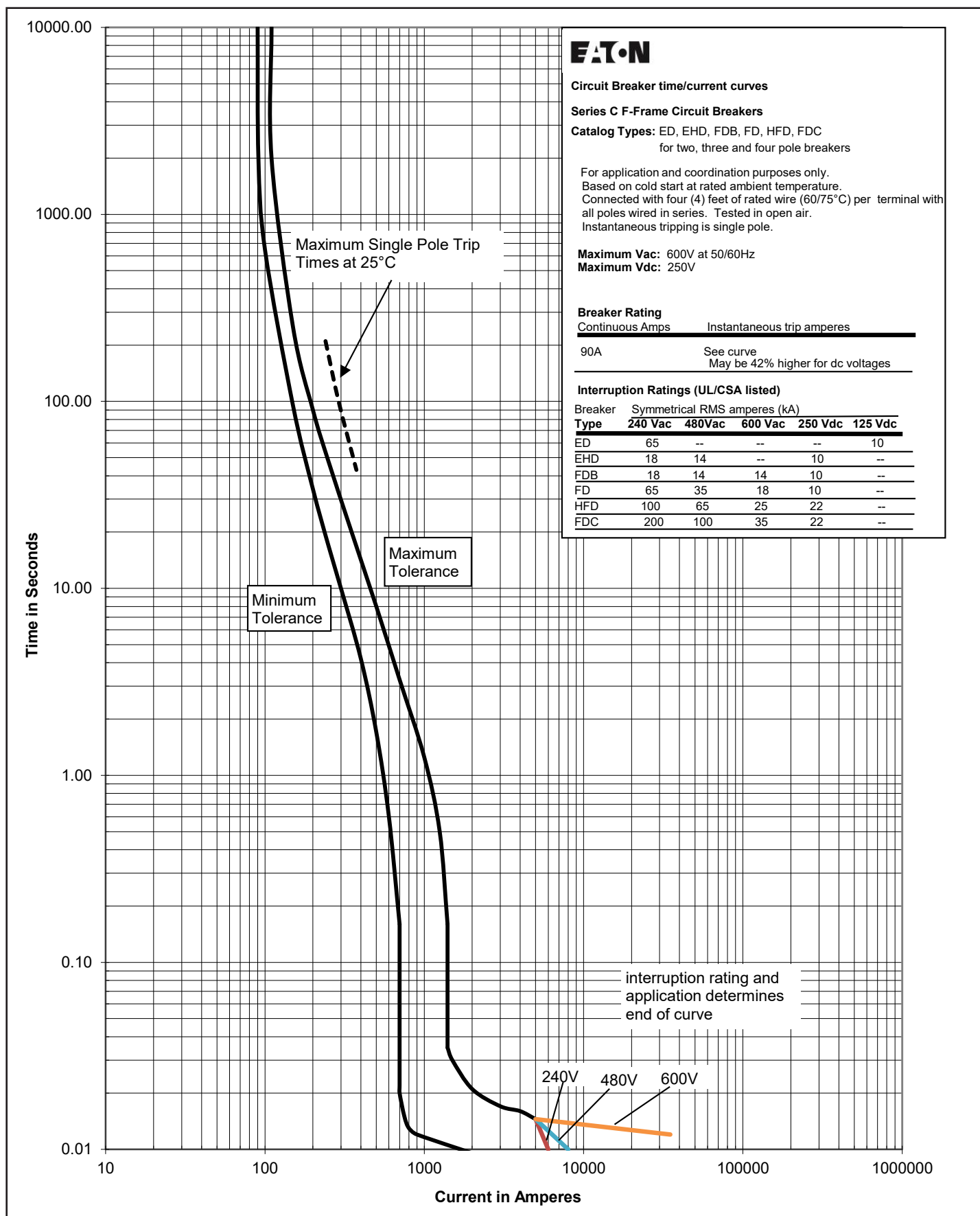


Figure 39. Types ED, EHD, FDB, FD, FDC, and HFD 90A 2, 3 & 4 pole—Curve Number TC012047EN

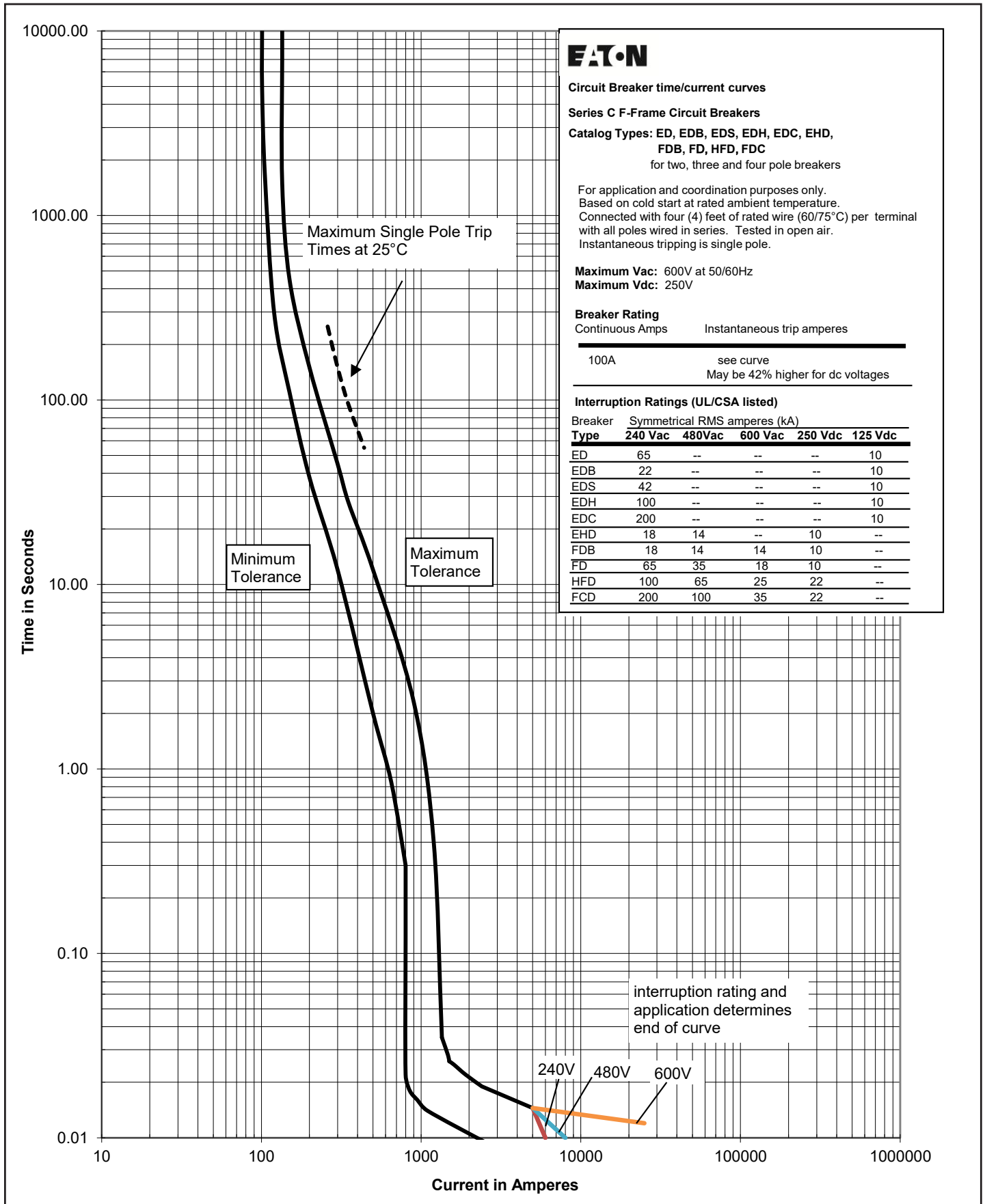


Figure 40. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 100A 2, 3 & 4 pole—Curve Number TC012029EN

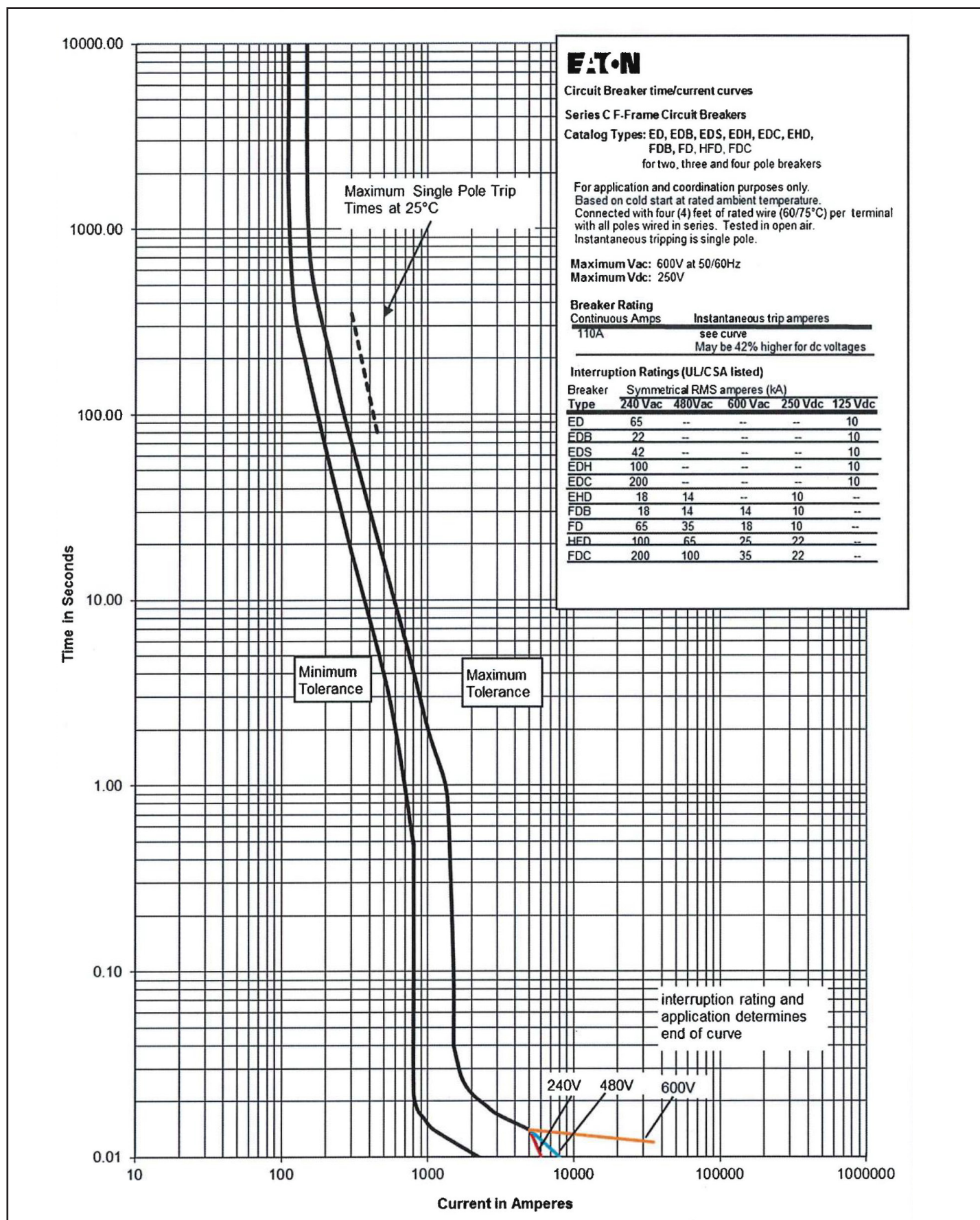


Figure 41. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 110A 2, 3, & 4 pole—Curve Number TC012030EN

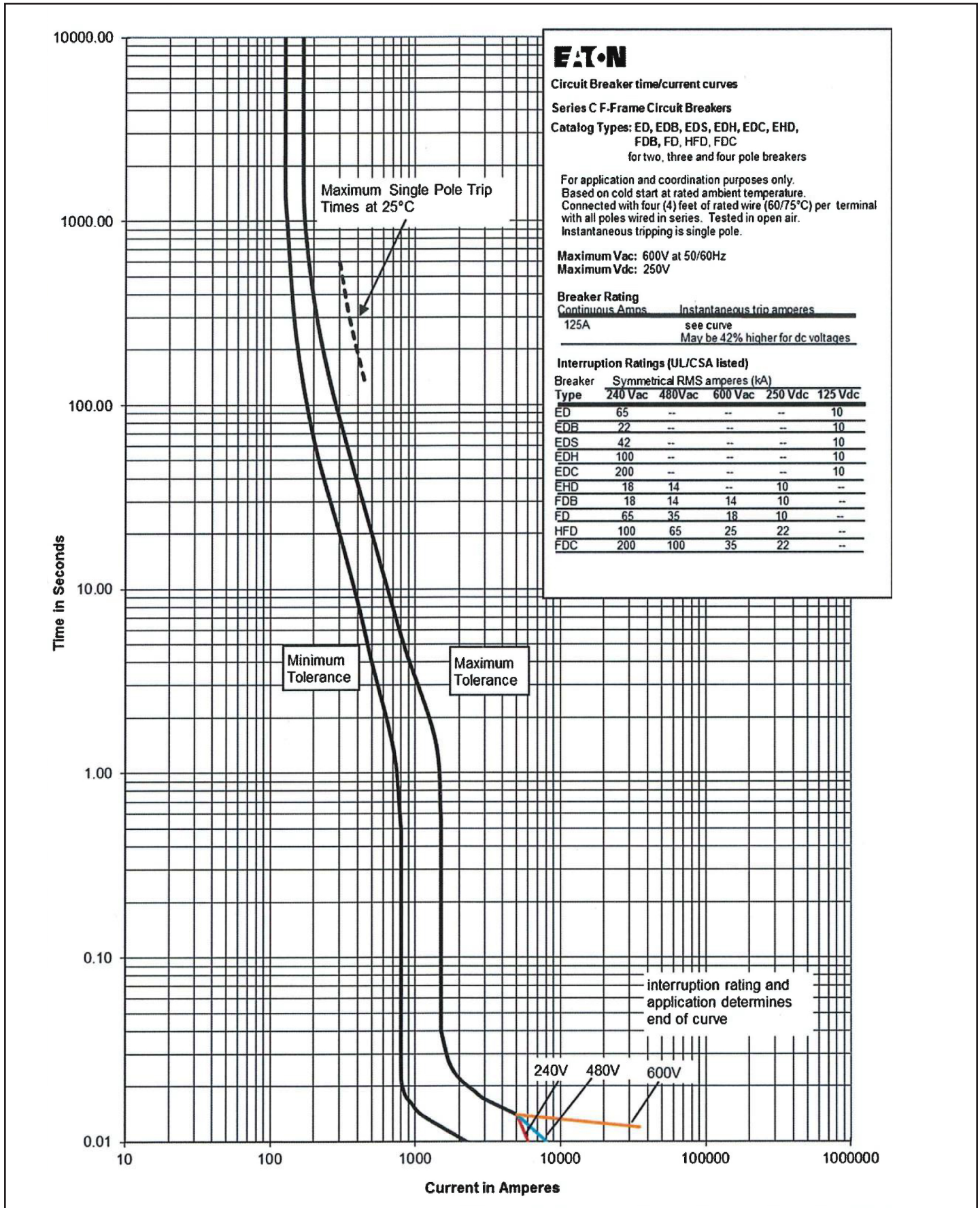


Figure 42. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 125A 2, 3, & 4 pole—Curve Number TC012031EN

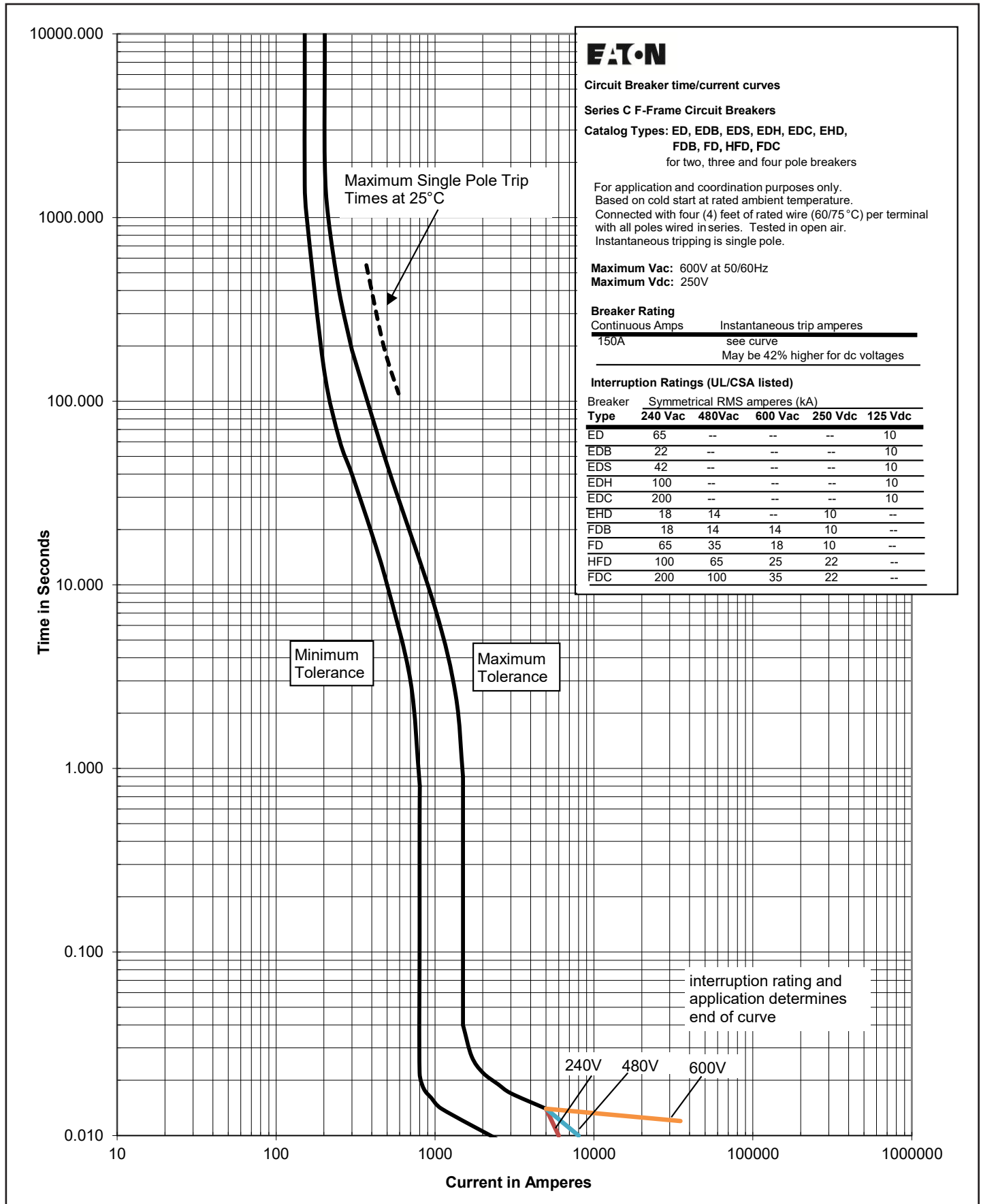


Figure 43. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 150A 2, 3, & 4 pole—Curve Number TC012032EN

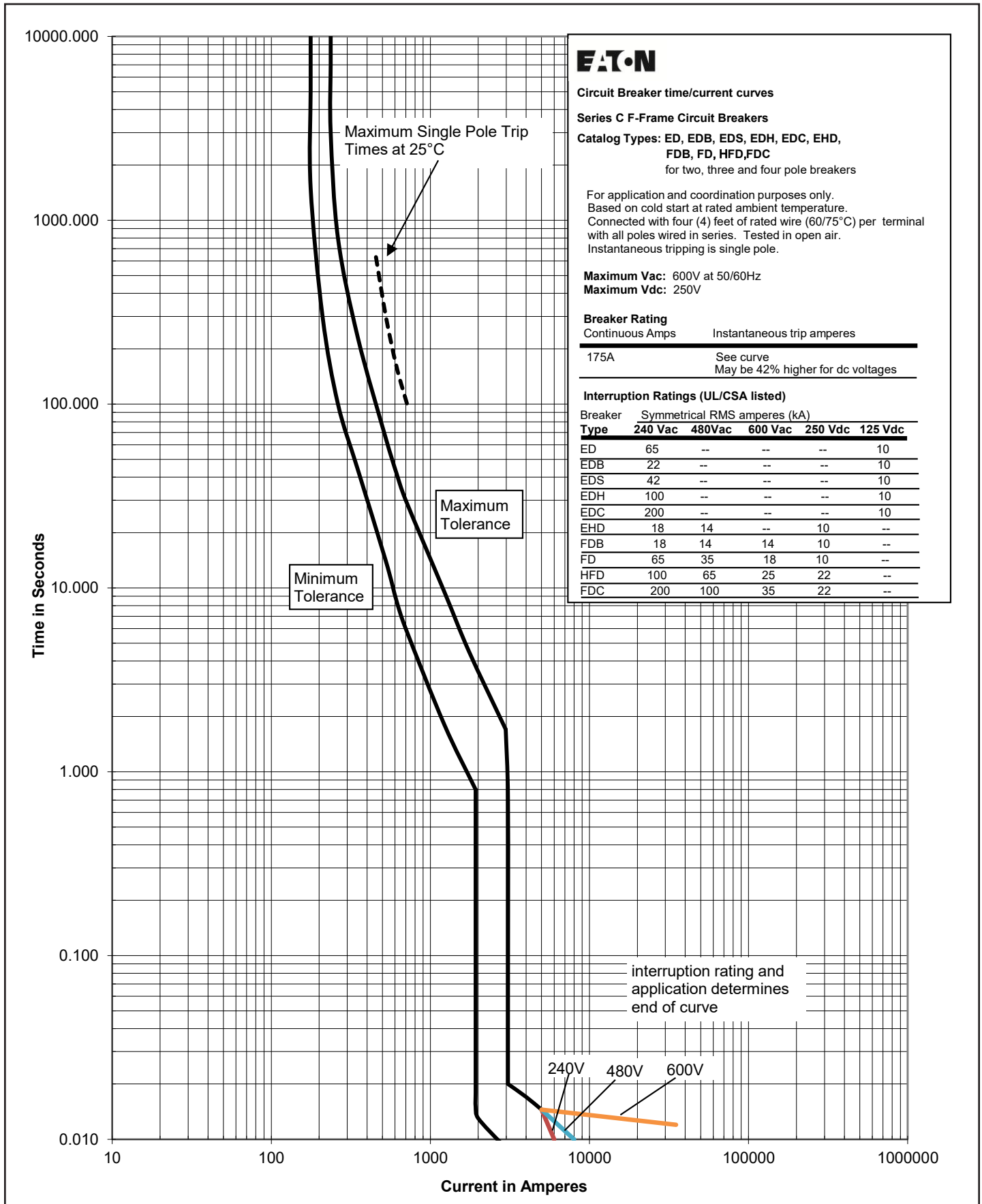


Figure 44. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 175A 2, 3 & 4 pole—Curve Number TC012033EN

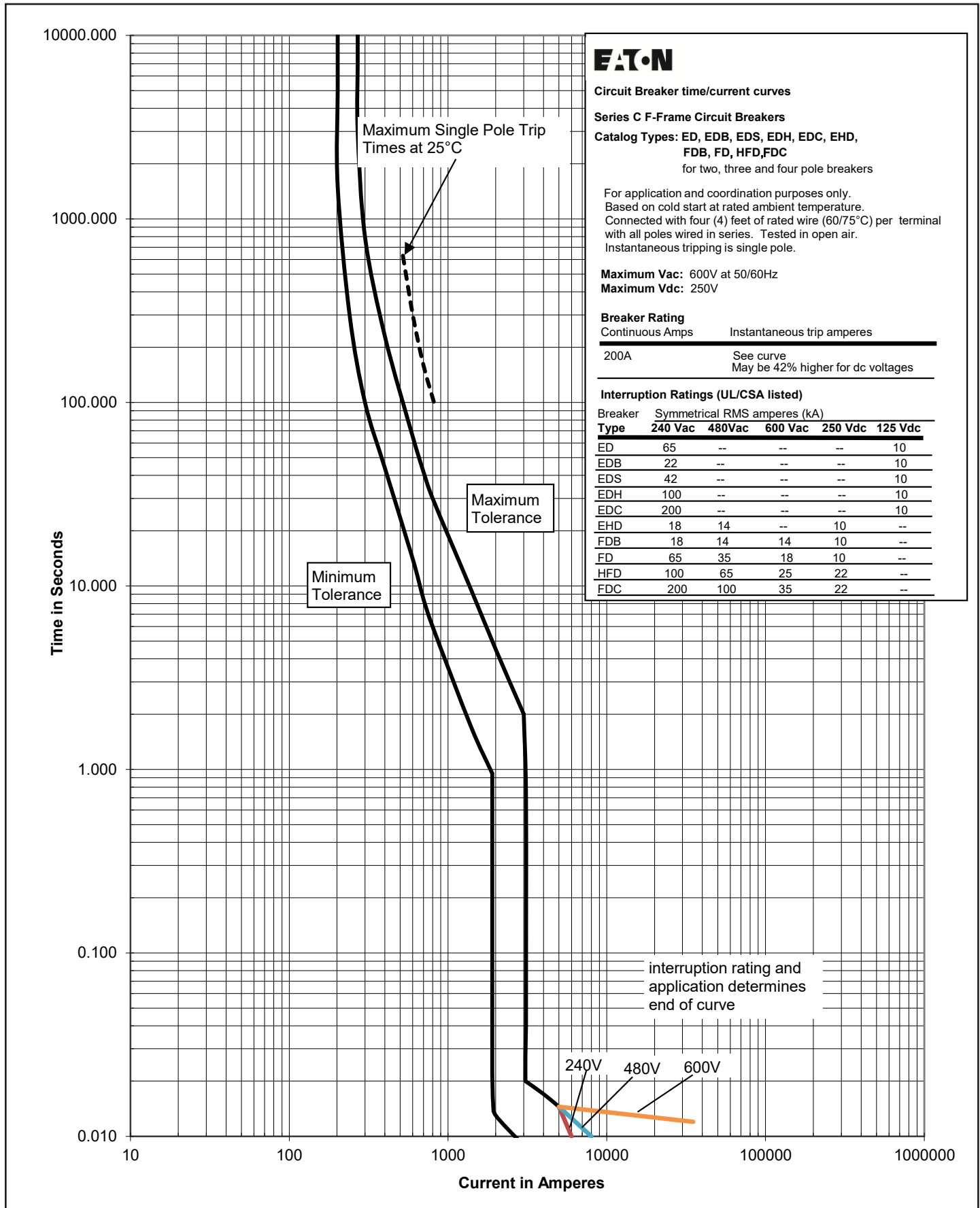


Figure 45. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 200A 2, 3, & 4 pole—Curve Number TC012034EN

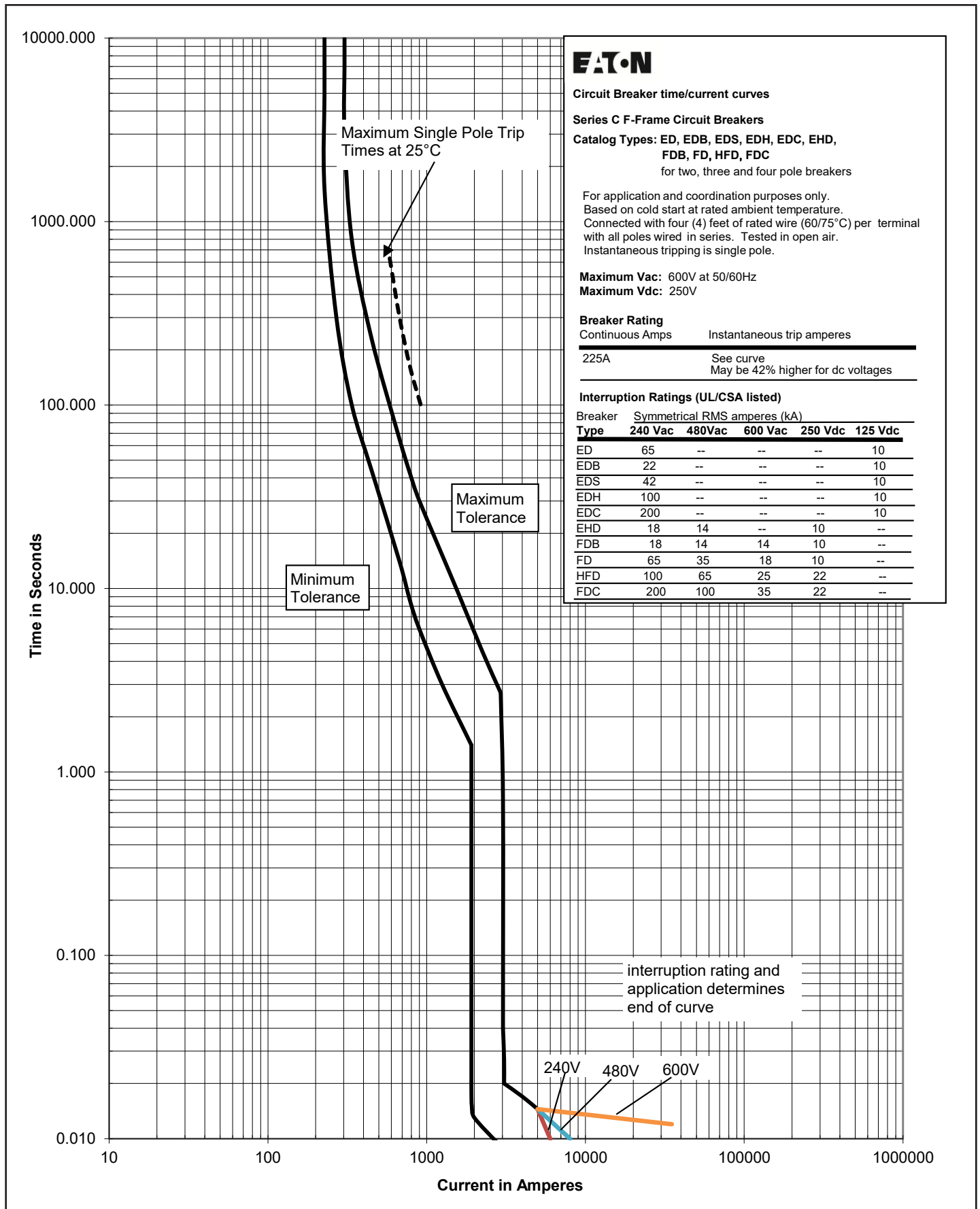


Figure 46. Types ED, EDB, EDS, EDH, EDC, EHD, FDB, FD, HFD, FDC 225A 2, 3, & 4 pole—Curve Number TC012035EN

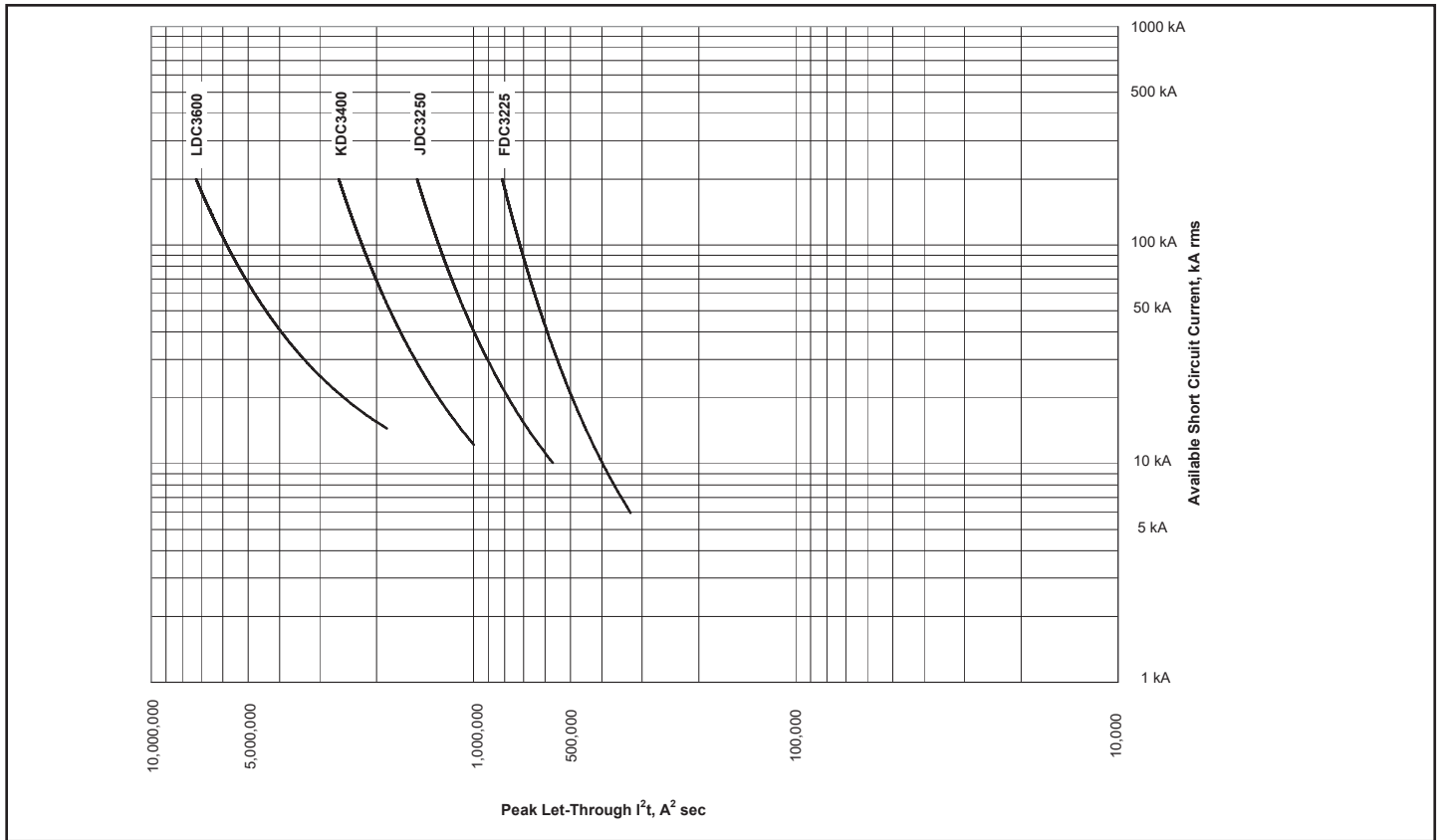


Figure 47. Series C Types FDC, JDC, KDC and LDC — 240 V (Curve No. AD-29-166A)

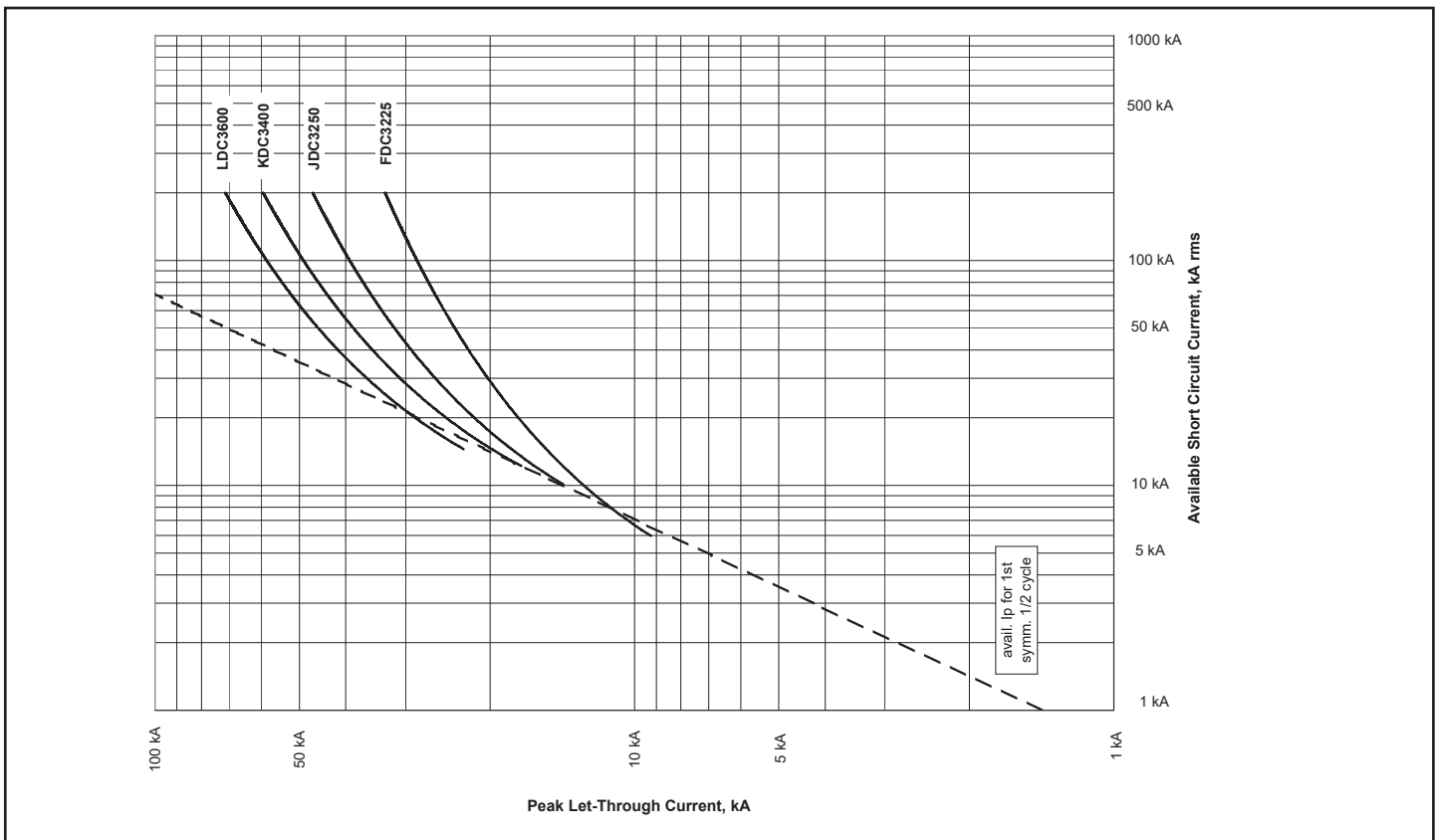


Figure 48. Series C Types FDC, JDC, KDC and LDC — 240 V (Curve No. AD-29-166A)

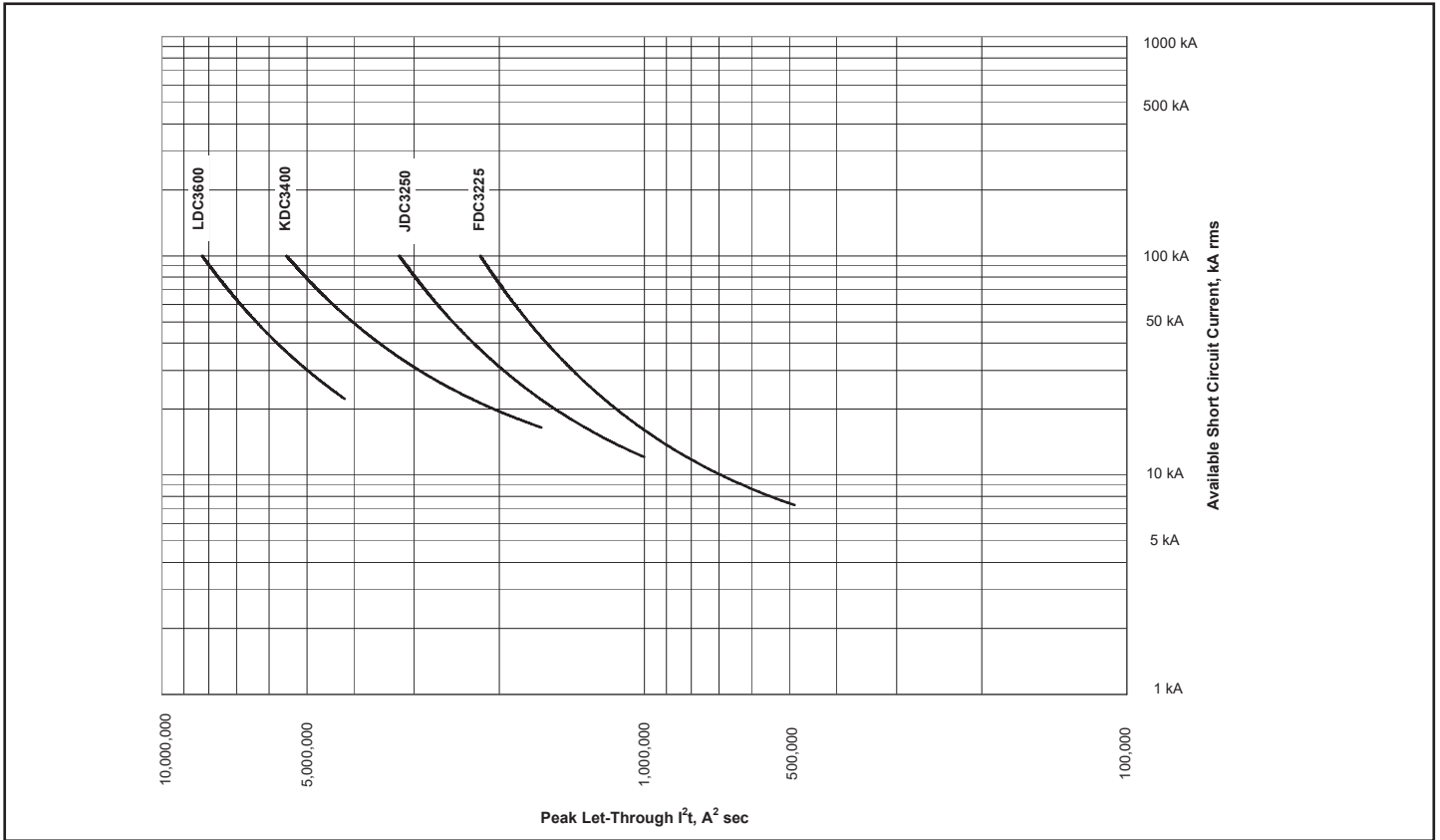


Figure 49. Series C Types FDC, JDC, KDC and LDC — 480 V (Curve No. AD-29-166B)

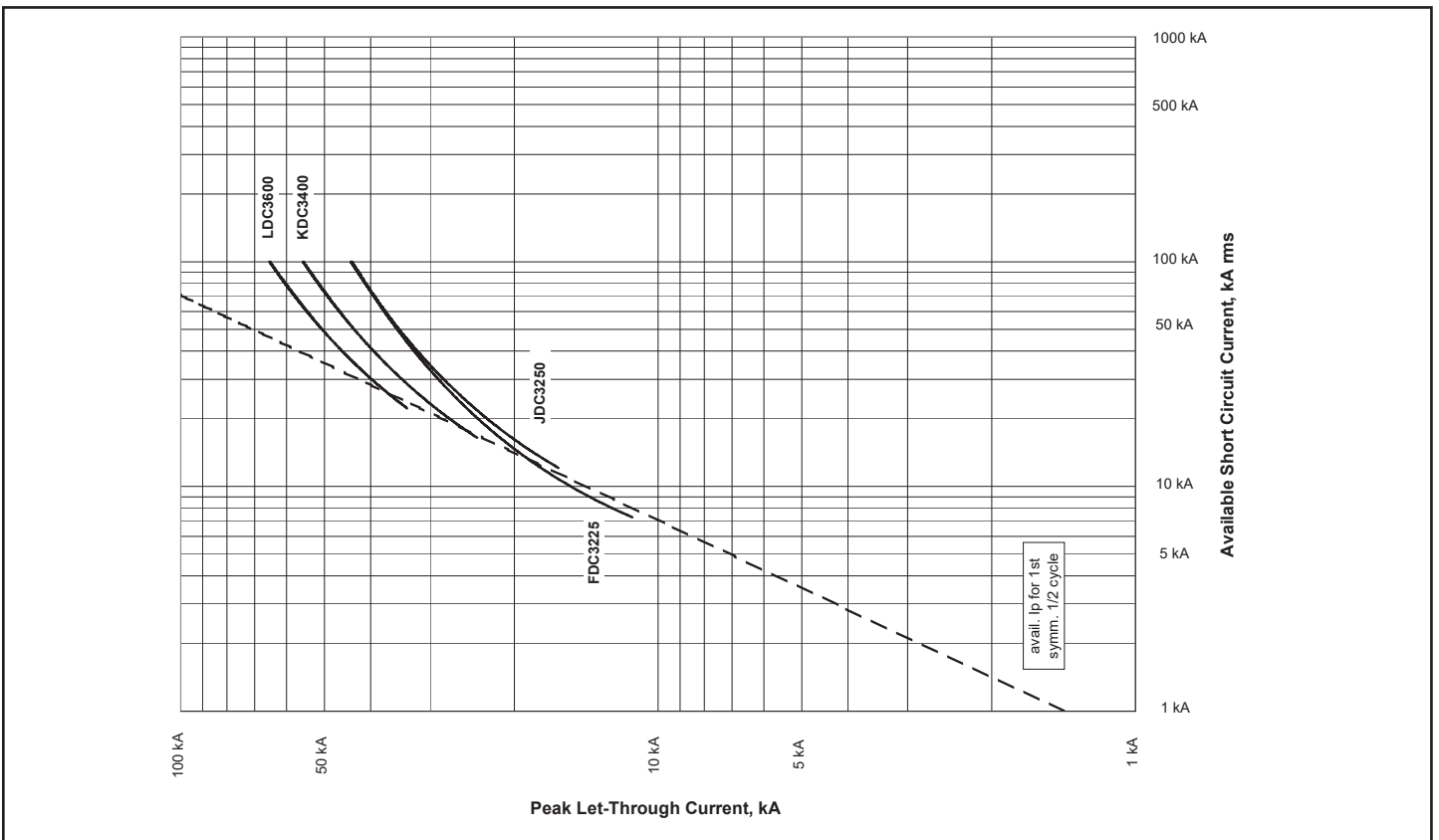


Figure 50. Series C Types FDC, JDC, KDC and LDC — 480 V (Curve No. AD-29-166B)

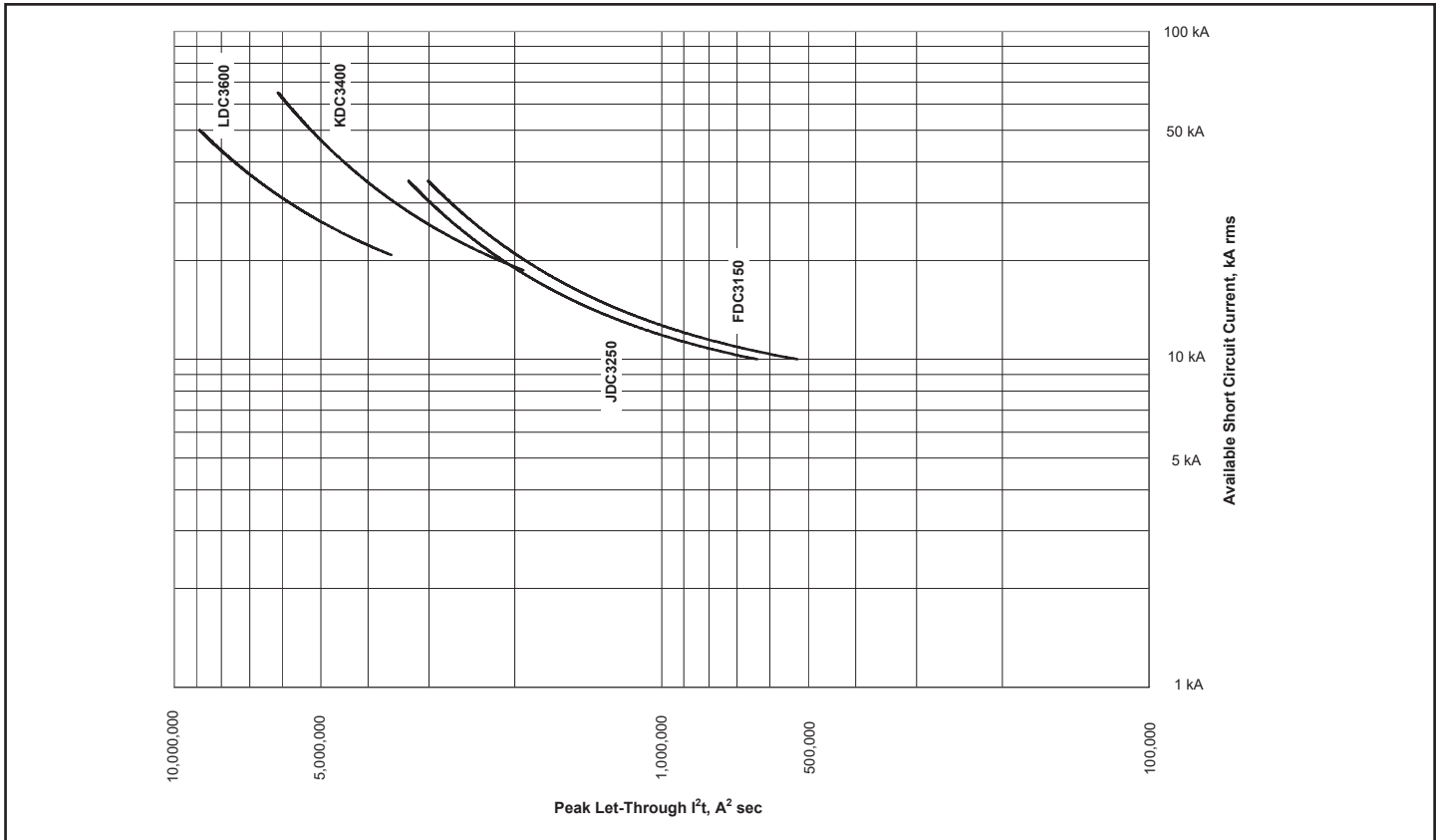


Figure 51. Series C Types FDC, JDC, KDC and LDC –600 V (Curve No. AD-29-166C)

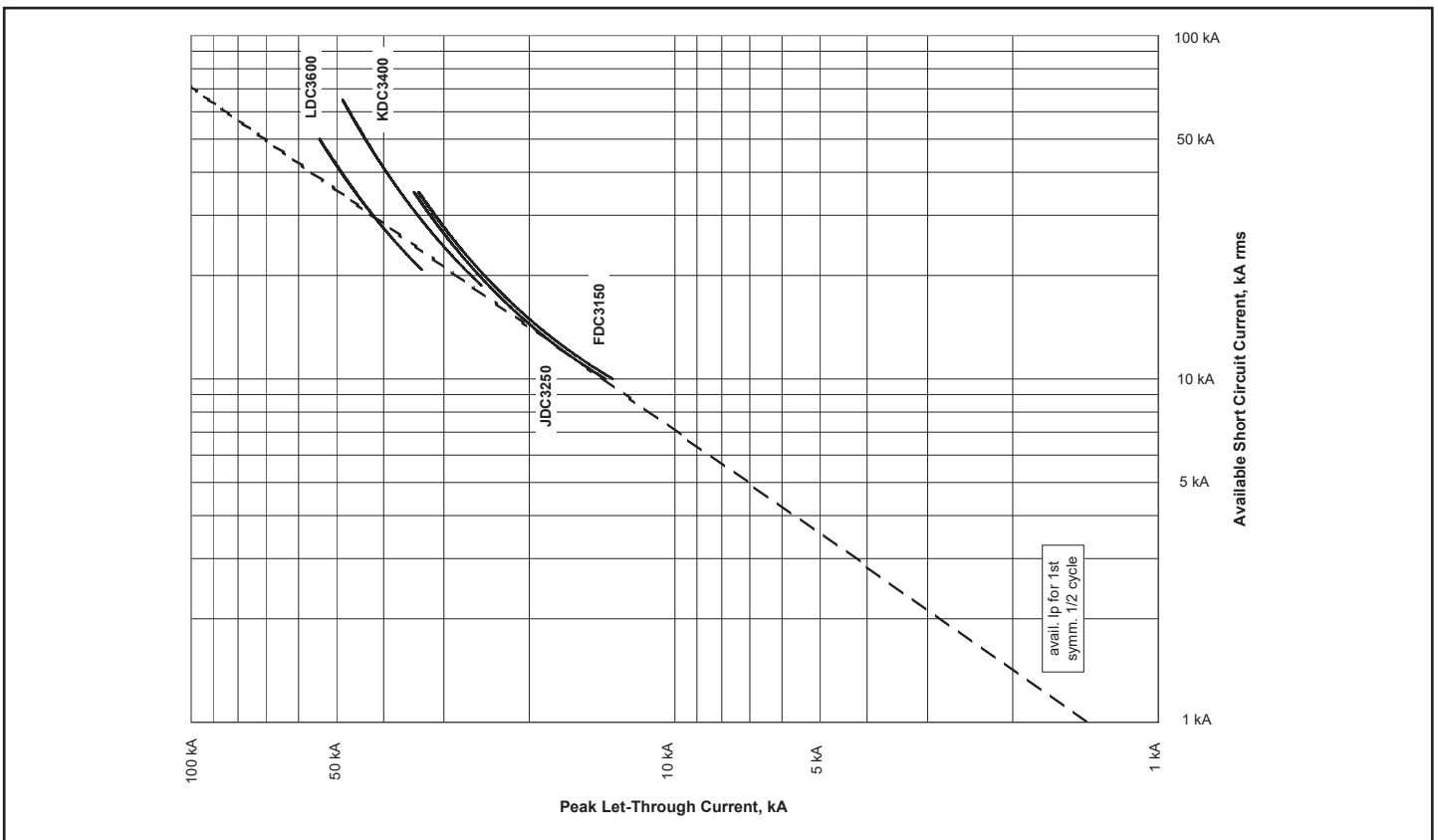


Figure 52 Series C Types FDC, JDC, KDC and LDC –600 V (Curve No. AD-29-166C)

Notes:

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