	MCB					
Product reference	**MSNxxx**	**NTxxxC**	**NDNxxxA**	**HMFxxxT**	**HMCxxxT**	**HMDxxxT**
Standards Approval	AS/NZS 60898				AS/NZS 60898 IEC 60947.2	
kA - Breaking Capacity to IEC60898	6kA	10kA			15kA	
No of Poles	1 / 2 / 3		1 / 2 / 3 / 4	1 / 2 / 3	1 / 2 / 3 / 4	
Magnetic Tripping Characteristic	C curve		D curve	C curve		D curve
Rated Current (In)	6 - 63A	2 - 63A	6 - 63A	80, 100, 125A		
Rated Operating Votage (Un)	240V / 415V					
Rated Operating Frequency (f)	50Hz					
Rated Insulation Voltage (Ui)	500V					
Rated Impulse Voltage (Uimp)	4kV				6kV	
Electrical Endurance (min)	4000 cycles					
Calibration Temperature	30°C			30°C		
Operating Temperature	-25 to 60°C			-5 to 60°C		

Connection Capacity (max)

Flexible	16mm^2		35mm^2	
Solid / Stranded	25mm^2	35mm^2	70mm^2	
Mounting	35mm DIN rail			
Working Position	Vertical , Horizontal or Flat			

MCB Power Loss

The power (watt) loss is calculated on the basis of the voltage drop across the main terminals measured at the device rated current.

Rated current (A)	2	4	6	10	16	20	25	32	40	50	63	80	100	125
Watt loss per pole (W)	1.5	1.8	1.4	1.9	2.8	3	3.2	3.8	4.5	5.1	6.4	8.2	9.1	11.9

Application notes

Appropriate MCB selection requires consideration of operating conditions that can affect their electrical characteristics.
The following factors need to be considered.

a) Temperature Derating
b) Grouping Factor
c) Frequency Effect

Temperature Derating

MCBs are designed and calibrated to carry the nominal rated current at 30°C reference temperature. Installation / operation at higher ambient temperature requires progressively less current to trip the MCB within the designated time/current zone. The derating table below describes the effect of temperature on MCB thermal tripping characteristic. For example a 16A MCB will trip on 13.4A thermal current when operating at 50°C ambient. (In – nominal thermal tripping current)

In (A)	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
2	2.56	2.48	2.4	2.32	2.24	2.16	2.08	2	1.92	1.84	1.76	1.68	1.6	1.52
4	5.12	4.96	4.8	4.64	4.48	4.32	4.16	4	3.84	3.68	3.52	3.36	3.2	3.04
6	7.68	7.44	7.2	6.96	6.72	6.48	6.24	6	5.76	5.52	5.28	5.04	4.8	4.56
10	12.8	12.4	12	11.6	11.2	10.8	10.4	10	9.6	9.2	8.8	8.4	8	7.6
13	16.6	16.1	15.6	15.1	14.6	14.0	13.5	13	12.5	12.0	11.4	10.9	10.4	9.9
16	20.5	19.8	19.6	18.6	17.9	17.3	16.6	16	15.4	14.7	14.1	13.4	12.8	12.2
20	25.6	24.8	24	23.2	22.4	21.6	20.8	20	19.2	18.4	17.6	16.8	16	15.2
25	32	31	30	29	28	27	26	25	24	23	22	21	20	19
32	41.0	39.7	38.4	37.1	35.8	34.6	33.3	32	30.7	29.4	28.2	26.9	25.6	24.3
40	51.2	49.6	48	46.4	44.8	43.2	41.6	40	38.4	36.8	35.2	33.6	32	30.4
50	64	62	60	58	56	54	52	50	48	46	44	42	40	38
63	80.6	78.1	75.6	73.1	70.6	68.0	65.5	63	60.5	58.0	55.4	52.9	50.9	47.9
80	95.1	93.1	91.0	88.9	86.8	84.6	82.3	80	77.6	75.1	72.6	70	67.2	64.4
100	121.1	118.3	115.5	112.5	109.5	106.5	103.3	100	96.6	93.1	89.4	85.6	81.6	77.5
125	144.3	141.7	139.0	136.3	133.6	130.8	127.9	125	121.9	118.9	115.7	112.4	109.1	105.6

Grouping Factor

Inside enclosure the heating effect of MCBs installed in close proximity (in groups) needs to be taken into consideration. Certain amount of watt loss from each device will contribute to raise the ambient temperature of the breaker above the ambient temperature of the enclosure. Apply Grouping factor K(g) to derate MCB thermal trip current accordingly.

No of Device (n)	1	2≤ n < 4	4 ≤ n <6	6 ≤ n
K(g)	1	0.95	0.9	0.85

Frequency effect

MCB magnetic trip characteristic are affected by the supply voltage frequency by the factor K(f).

Frequency (Hz)	Up to 60 Hz	400 Hz
K(f)	1	1.5

Application example

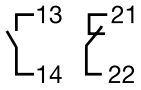
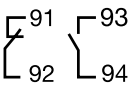
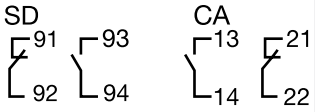
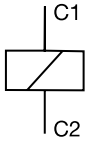
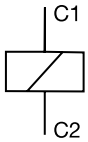
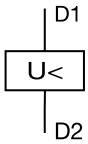
Three MCBs are to be installed side by side inside an enclosure. The ambient temperature inside the enclosure is at 40°C. The required maximum load current draw per MCB = 22A. Determine whether 25A MCB would provide suitable solution.

- **From the Temperature Derating table,**
  The nominal trip current (In) of 25A MCB operating at 40°C is derated to 23A
- **From the Grouping Factor table,**
  Three MCBs installed side by side has a grouping factor K(g) = 0.95
- **Combined effect of temperature derating & grouping factor,**
  23 x 0.95 = 21.85A

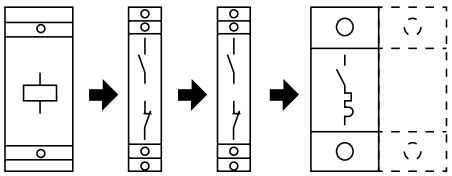
In this application the 25A MCB would trip at 21.85A and therefore be unsuitable to supply the max 22A load that is required. In this case a 32A MCB should be selected instead.

Application notes

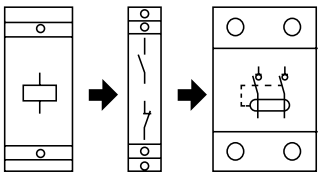
Auxiliaries in the table below are suitable for the following protection devices such as:
MCB >> NTxxxC / NDNxxxA , HMFxxxT , HMCxxxT, HMDxxxT
RCBO (2 Module) >> Axx5xxT
RCCB >> CDAxxxT, CDxxxT, CExxxT

Cat. ref.	Description	Suitable for	Ratings	
MZ201	Aux (1NO + 1NC) - Remote Indication of MCB / RCBO Status	MCBs & RCBOs as listed above	Contact Rating : 6A (AC-1), 230V AC	
MZ202	1 Aux + 1 Alarm - Aux Contact for Remote Indication of Toggle Status - Alarm Contact for Indication when MCB / RCBO tripped under fault - Mechanical Flag to indicate Alarm Status	MCBs & RCBOs as listed above	Contact Rating : 6A (AC-1), 230V AC	
CZ001	Combo (MZ202 + MZ201) - Must be used as coupler for RCCB to connect Release Auxiliaries	RCCBs as listed above		
MZ203	Shunt Trip Release - Remote Trip Operation of MCB / RCBO	MCBs, RCBOs & RCCBs as listed above	Coil Voltage 230V - 415V AC 110V - 130V DC Power Consumption 15VA	
MZ204	Shunt Trip Release - Remote Trip Operation of MCB / RCBO	MCBs, RCBOs & RCCBs as listed above	Coil Voltage 24 – 48V AC 12 – 48V DC Power Consumption 30VA	
MZ206	Under Voltage Release - Turns off MCB / RCBO when supply voltage falls between 35% - 70% of nominal coil voltage	MCBs, RCBOs & RCCBs as listed above	Coil Voltage 230V AC Power Consumption 3.5VA	

Combining Auxiliaries
On 2, 3 and 4 pole MCBs it is possible to associate 3 auxiliaries (2 indication auxiliaries and 1 release auxiliary). In this case, it is important to first fix the indication auxiliaries (MZ201 and MZ202) and then the release auxiliary (MZ203 or MZ204 or MZ206)

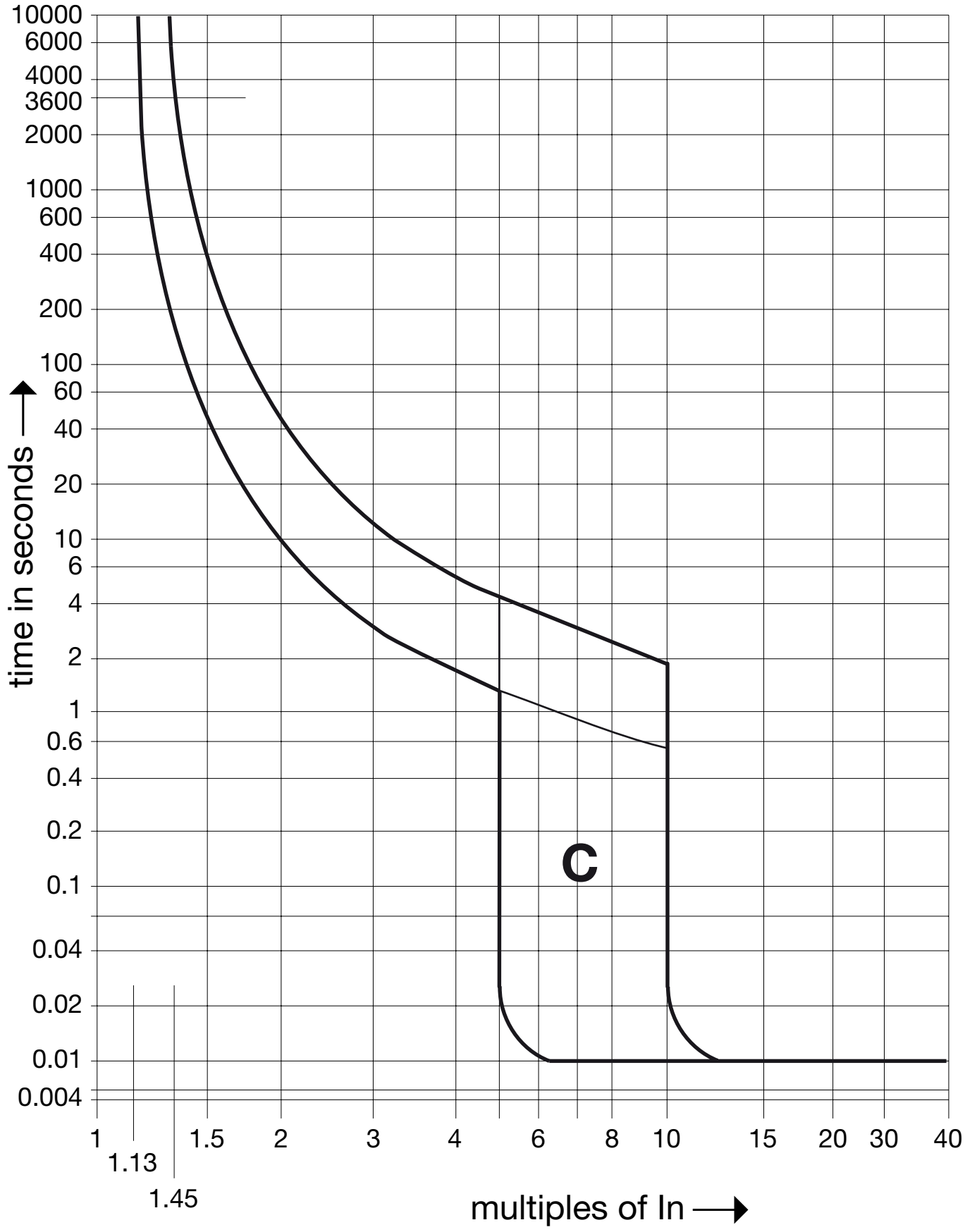


The CZ001 must be used as a coupler for an RCCB to connect Release Auxiliaries



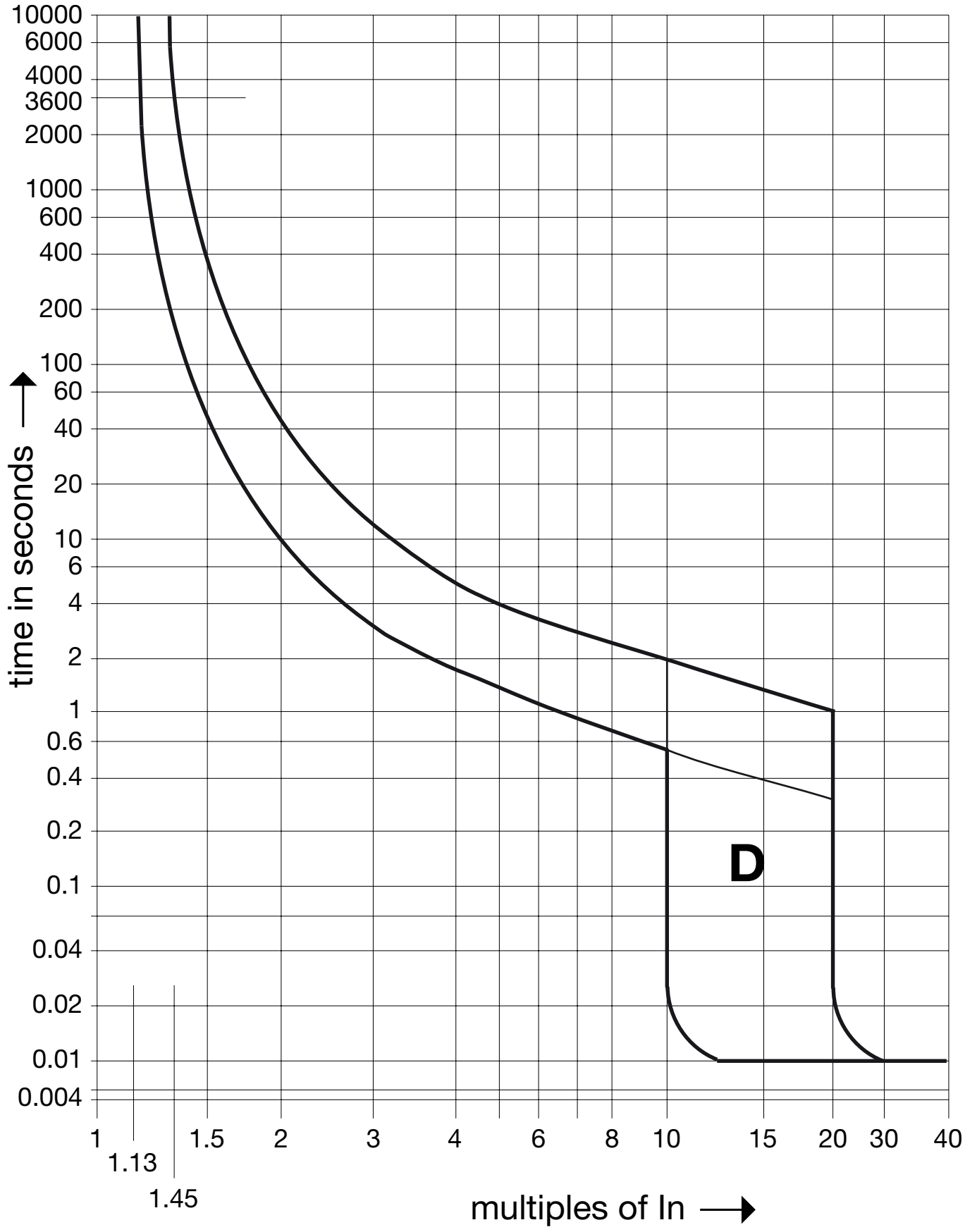
C curve

The graph below is suitable for the following protection devices:
MSNxxxx NTxxxC, HMFxxxT and HMCxxxT



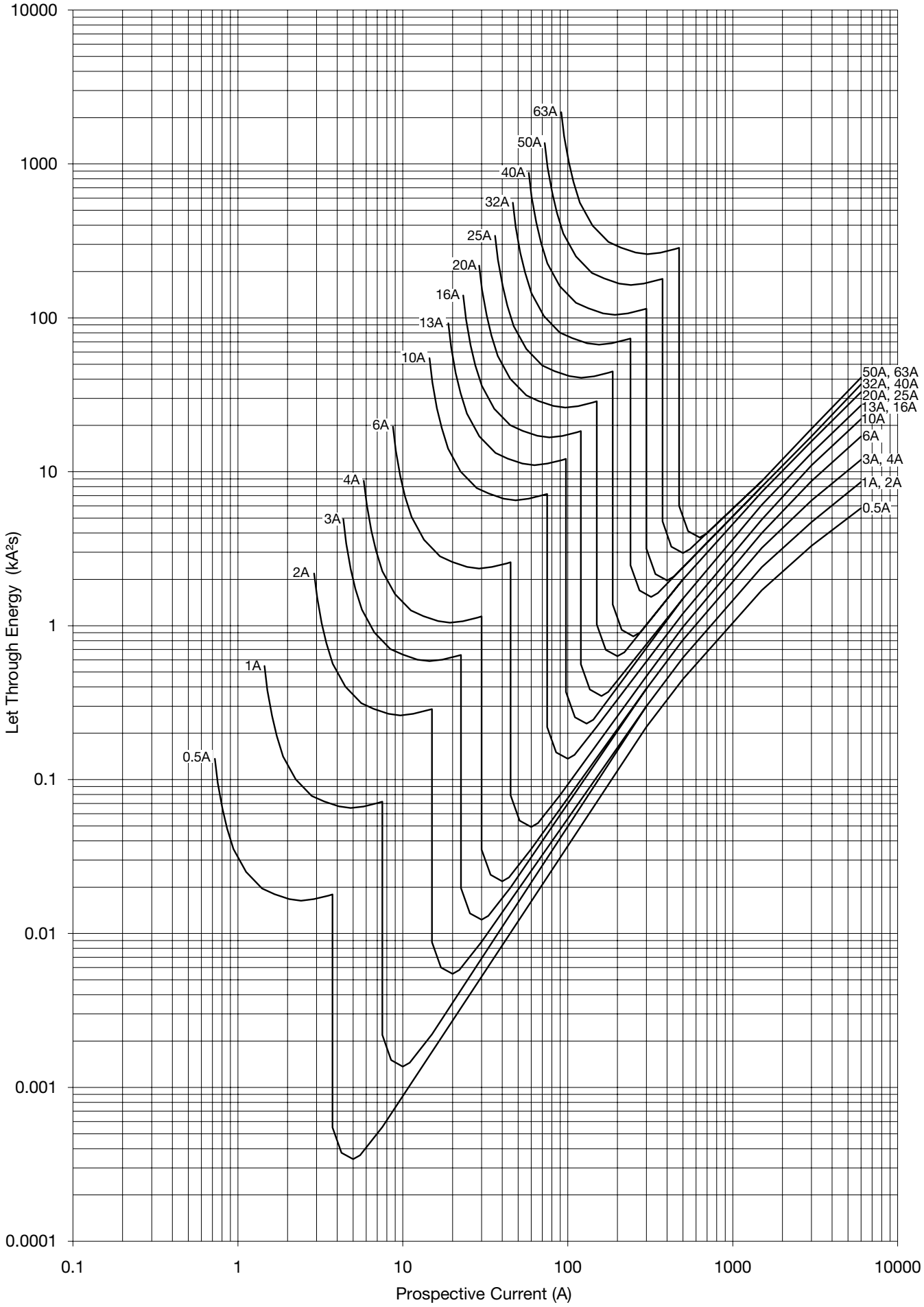
D curve

The graph below is suitable for the following protection devices:
NDNxxxA and HMDxxxT

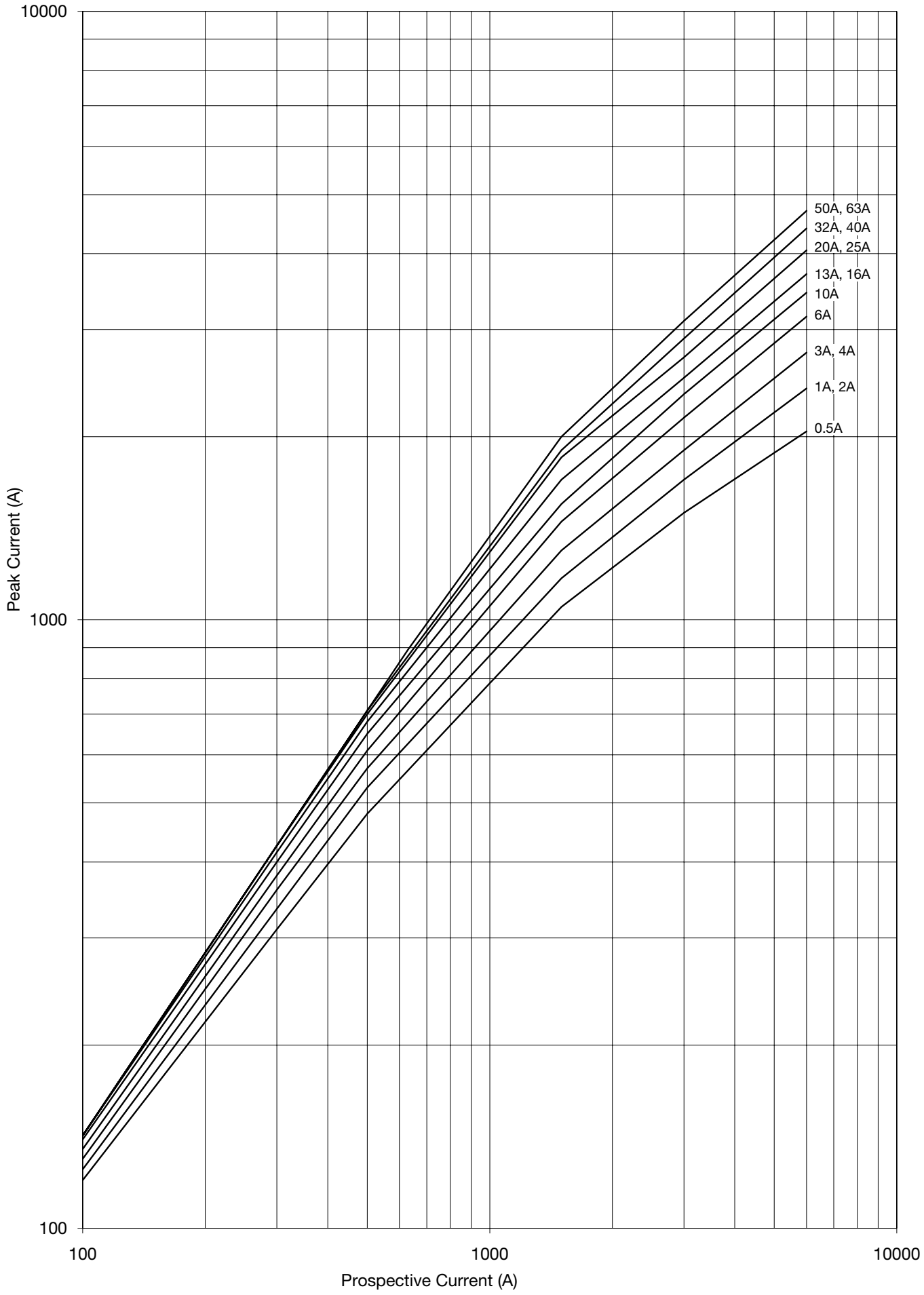


MSNxxxx I^2t curve

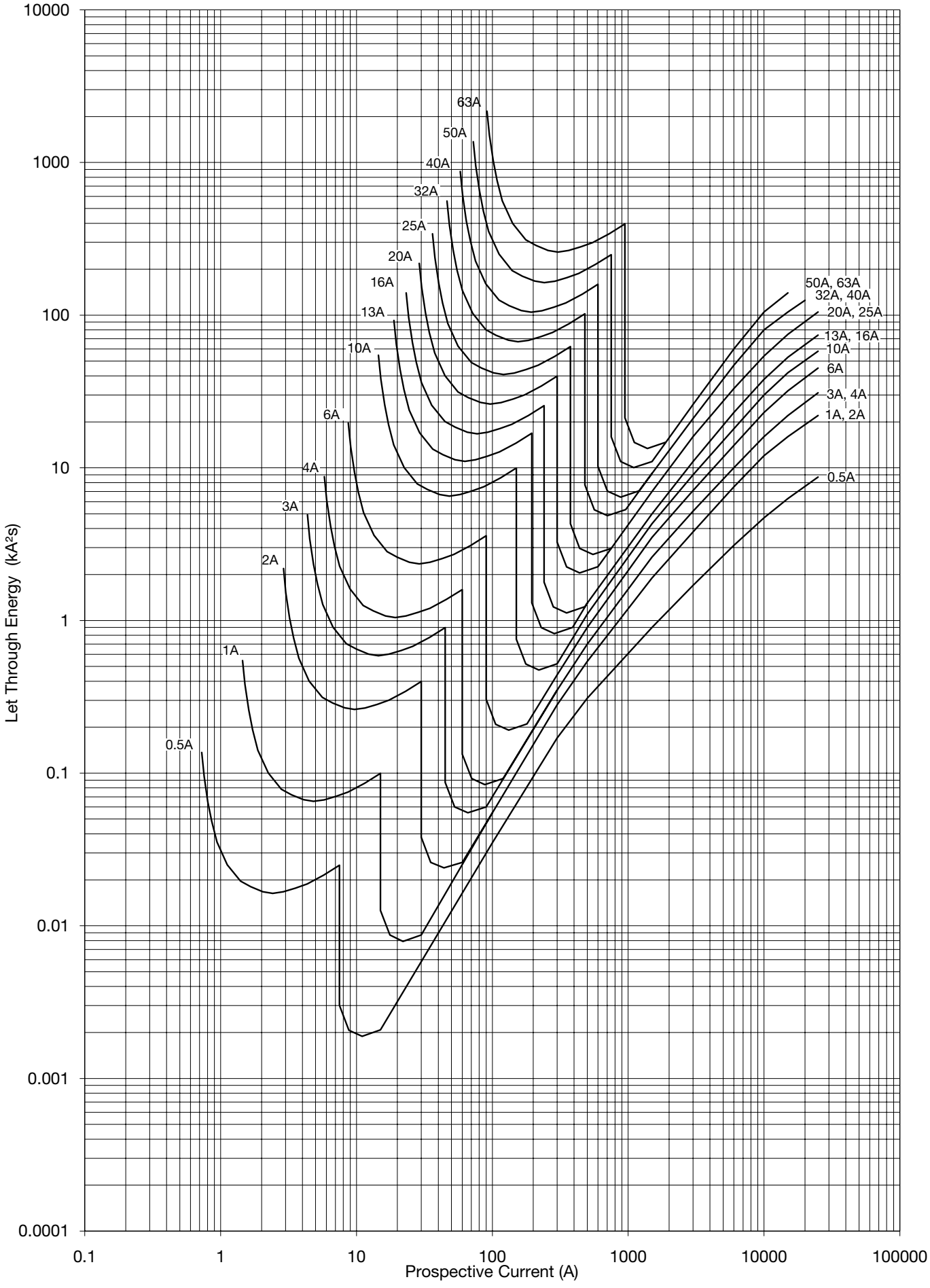
IEC 60898 C curve (240/415V)



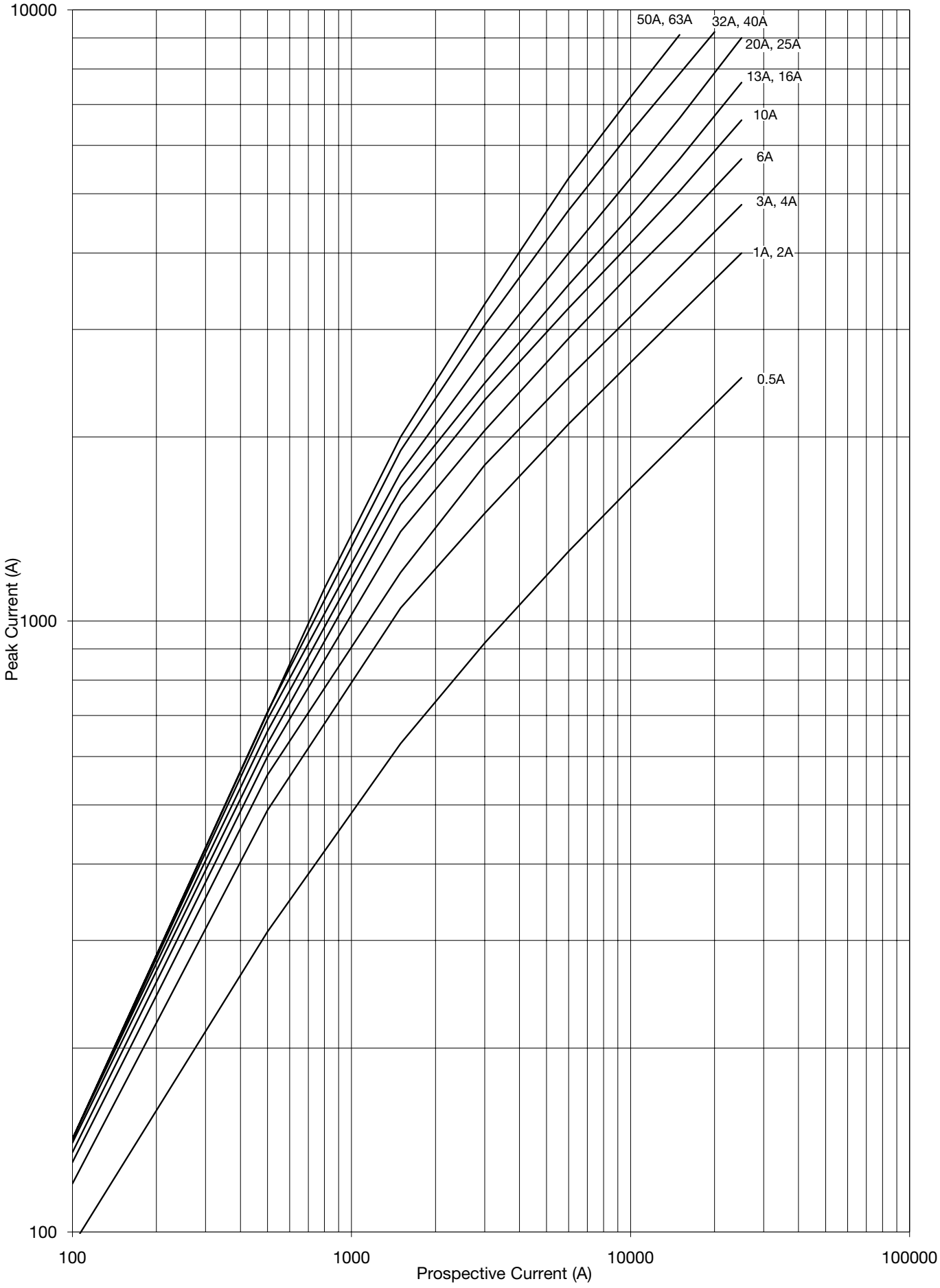
MSNxxxx I peak curve IEC 60898 C curve (240/415V)



NDNxxxA I^2t curve IEC 60898 D curve (240/415V)

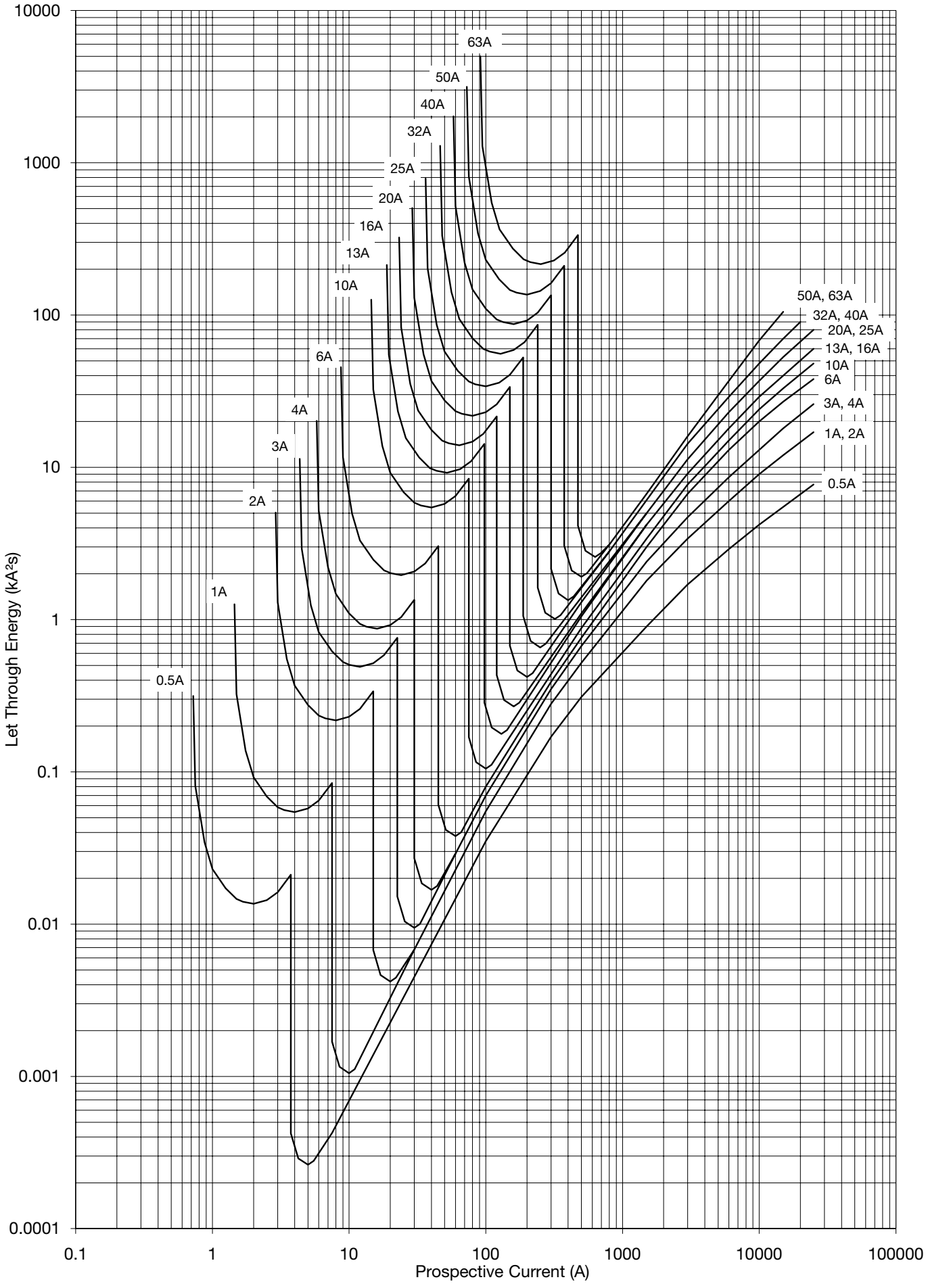


NDNxxxA I peak curve IEC 60898 D curve (240/415V)



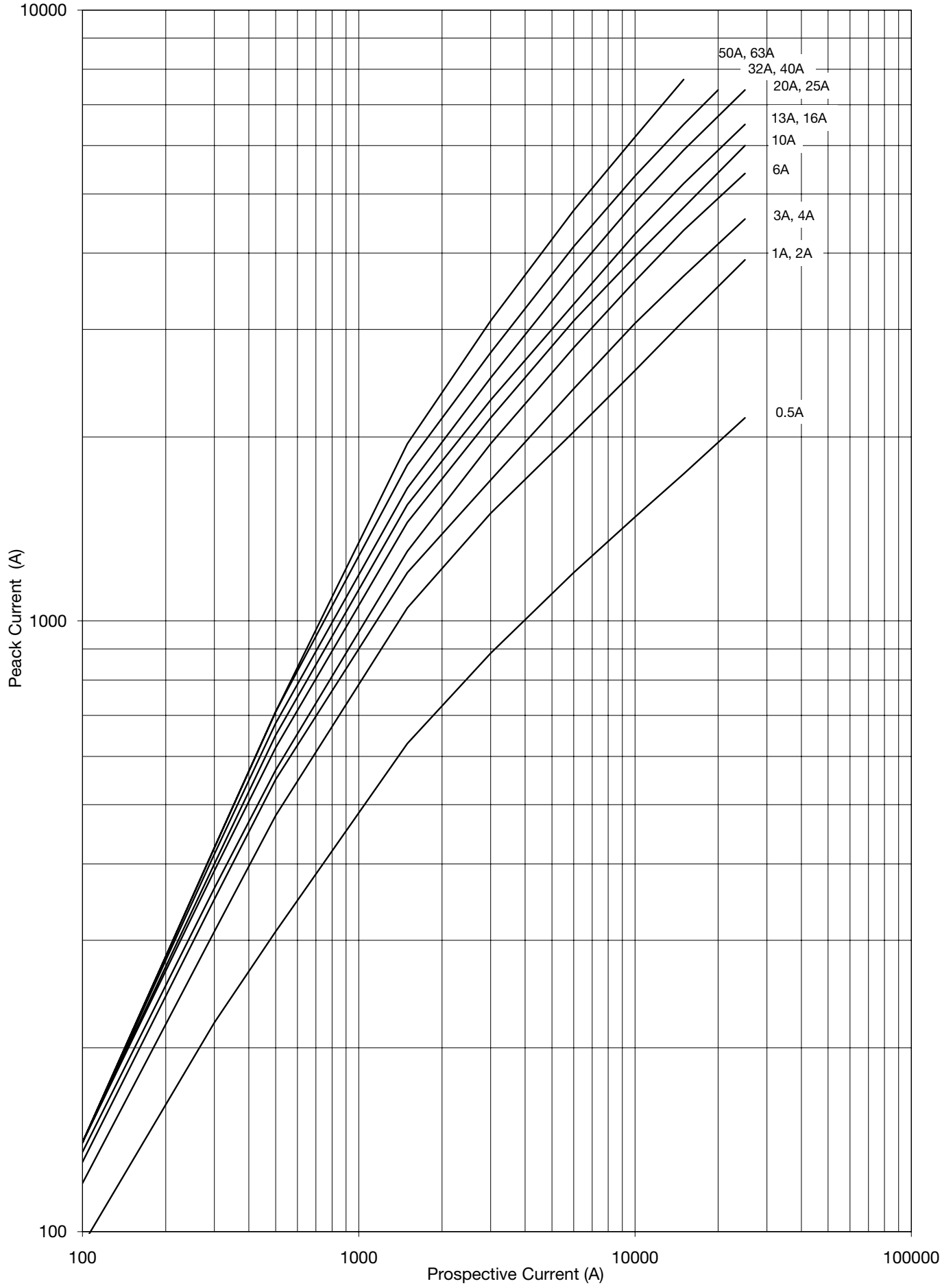
NTxxxC I^2t curve

IEC 60898 C curve (240/415V)

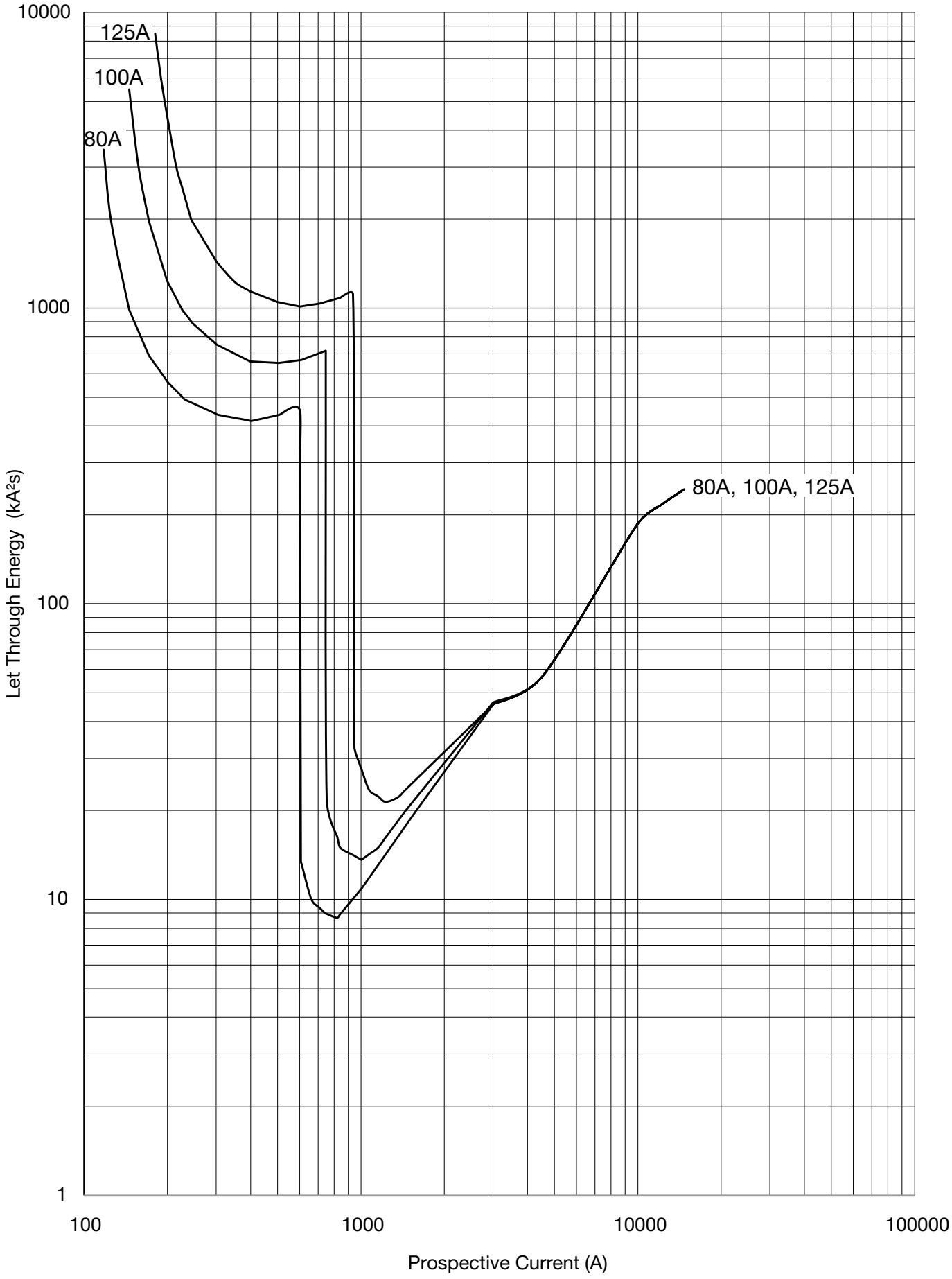


NTxxxC I peak curve

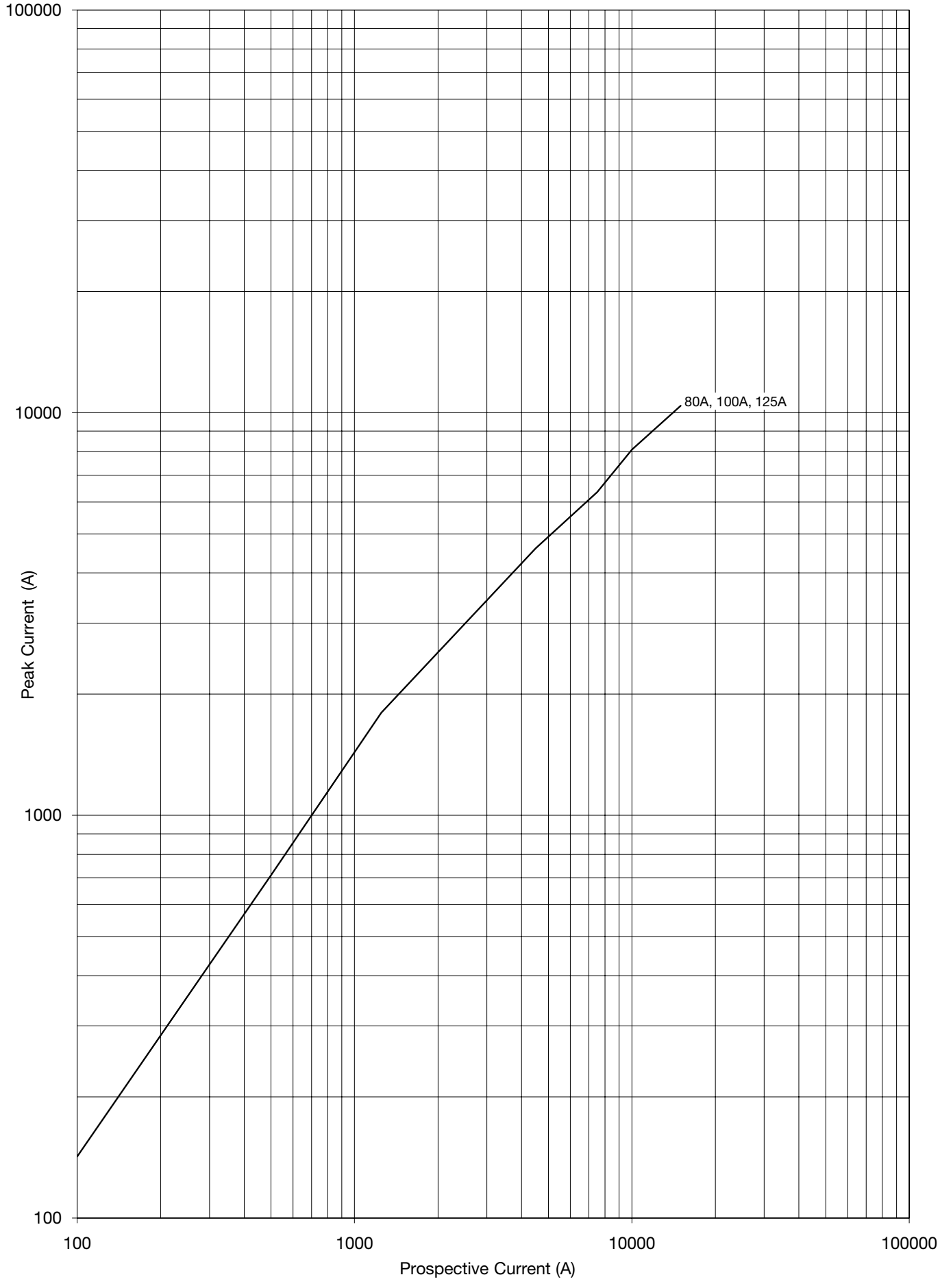
IEC 60898 C curve (240/415V)



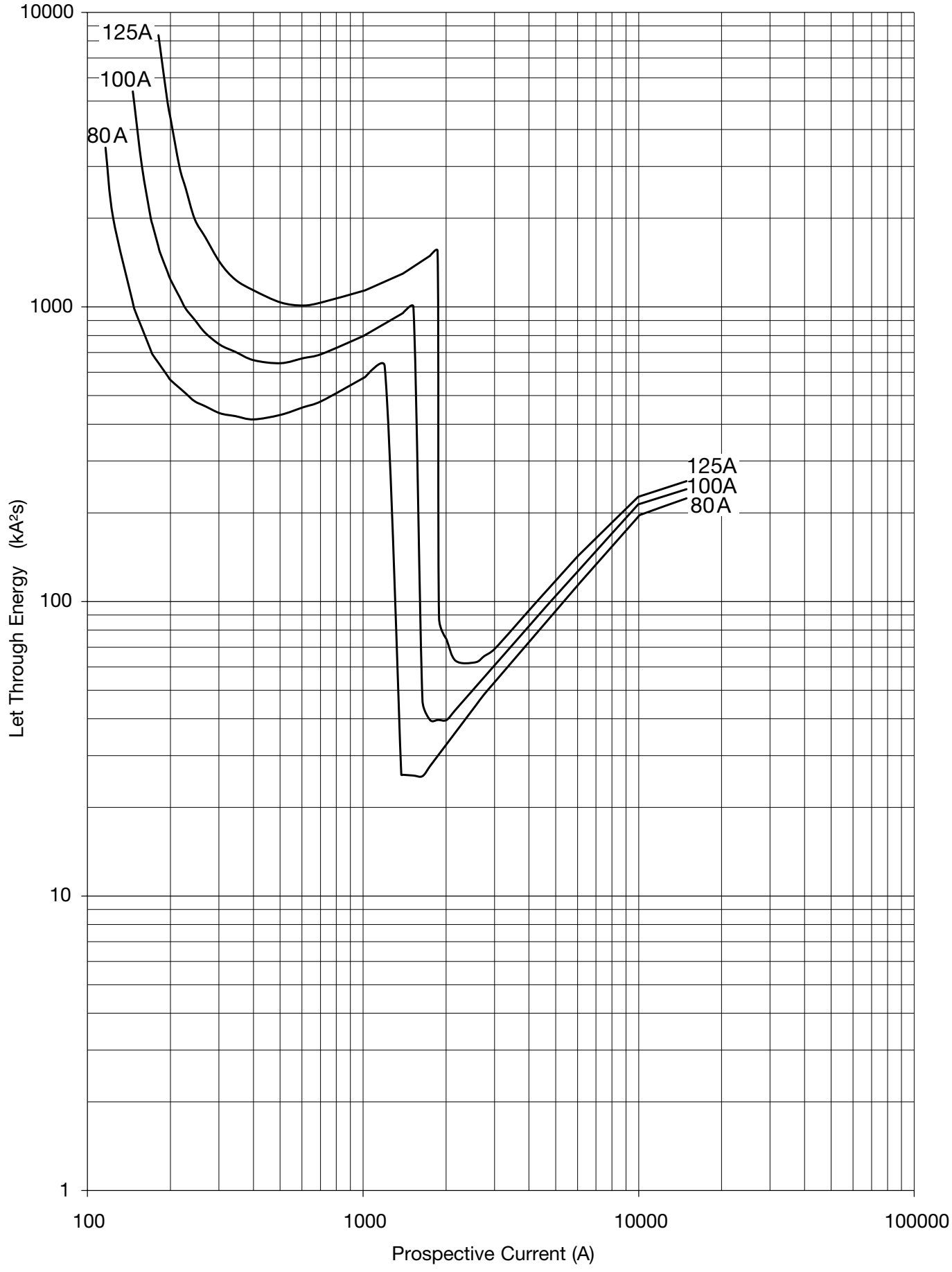
HMFxxxT / HMCxxxT IEC 60898 C curve (240/415V)
I^2t curve



HMFxxxT / HMCxxxT IEC 60898 C curve (240/415V)
I peak curve



HMDxxxT I²t curve IEC 60898 D curve (240/415V)



HMDxxxT I peak curve IEC 60898 D curve (240/415V)