

Maximum lengths of busways in the TN system

Maximum length in metres of busways in the TN system⁽¹⁾ protected against indirect contacts by circuit breakers

Correction factor to be applied to the lengths given

		$m = \frac{S_{phases}^{(2)}}{S_{PE}}$			
		1	2	3	4
400 V networks ⁽³⁾	Copper cable	1	0.67	0.50	0.40
Phase-to-phase	Aluminium cable	0.62	0.41	0.31	0.25

P25M

Three-phase network in 400 V, copper cable,
Sph = S_{PE}, U_L = 50 V,
in the TN system.

Sphases mm ²	Calibre (A)												
	0.16	0.24	0.4	0.6	1	1.6	2.4	4	6	10	16	20	25
1.5				730	426	255	170	102	68	42	27	21	17
2.5				710	425	284	170	113	71	44	35	28	
4					681	454	272	181	113	71	56	45	
5 (2 x 2.5)					851	568	340	227	142	89	71	56	

B curve C60, C120 and NG125

Three-phase network in 400 V, copper cable,
Sph = S_{PE}, U_L = 50 V,
in the TN system.

Sphases mm ²	Rating (A)															
	2	3	4	6	10	13	16	20	25	32	40	50	63	80	100	125
1.5	613	409	307	204	123	94	77	61	49	38	31	25	19	15	12	10
2.5	681	511	341	204	157	128	102	82	64	51	41	32	28	20	16	
4	1090	818	545	327	252	204	164	131	102	82	65	52	41	33	26	
6	818	491	377	307	245	196	153	123	98	78	61	49	39			
10	818	629	511	409	327	256	204	164	130	102	82	65				
16	818	654	523	409	327	262	208	164	131	105						
25	818	639	511	409	325	258	204	164								
35	894	716	572	454	358	288	229									
50	818	649	511	409	311											

C curve C60, C120 and NG125

Three-phase network in 400 V, copper cable,
Sph = S_{PE}, U_L = 50 V,
in the TN system.

Sphases mm ²	Rating (A)															
	2	3	4	6	10	13	16	20	25	32	40	50	63	80	100	125
1.5	307	204	153	102	61	47	38	31	25	19	15	12	10	8	6	5
2.5	511	341	256	170	102	79	64	51	41	32	26	20	16	13	10	8
4	818	545	409	273	164	126	102	82	65	51	41	33	26	20	16	13
6	818	613	409	245	189	153	123	98	77	61	49	39	31	25	20	
10	681	409	315	256	204	164	128	102	82	65	51	41	33			
16	654	503	409	327	262	204	164	131	104	82	65	52				
25	786	639	511	409	319	256	204	162	128	102	82					
35	894	716	572	447	358	286	227	179	143	114						
50	818	639	511	409	325	258	204	156								

(1) ■ IT system with distributed neutral, apply a coefficient of 0.50
 ■ IT system with non-distributed neutral, apply a coefficient of 0.72

(2) ■ Sphases : phase conductor cross-section in mm².
 ■ S_{PE} : protective conductor cross-section in mm².

(3) ■ for phase-to-phase 237 V networks, also apply a coefficient of 0.57
 ■ for single-phase 237 V networks (between phase and neutral), do not apply this additional coefficient.

Maximum lengths of busways in the TN system

D curve C60, C120 and NG125

K curve C60

Three-phase network in 400 V, copper cable,
Sph = S_{PE}, U_L = 50 V,
in the TN system.

Sphases mm ²	Rating (A)																
	1	2	3	4	6	10	13	16	20	25	32	40	50	63	80	100	125
1.5	438	219	146	110	73	44	34	27	22	18	14	11	9	7	5	4	2
2.5	730	365	243	183	122	73	56	46	37	29	23	18	15	12	9	7	4
4		584	389	292	195	117	90	73	58	47	37	29	23	19	14	12	7
6		876	584	438	292	175	135	110	88	70	55	44	35	28	21	18	10
10			974	730	487	192	225	183	146	117	91	73	58	46	35	29	16
16				779	467	359	292	234	187	146	117	93	74	58	47	26	
25					730	562	456	365	292	228	183	146	116	88	73	41	
35						786	639	511	409	319	258	204	162	123	102	57	
50							913	730	584	456	365	292	232	178	146	78	

MA curve C60, NG125

Three-phase network in 400 V, copper cable,
Sph = S_{PE}, U_L = 50 V,
in the TN system.

Sphases mm ²	Rating (A)										
	1,6	2,5	4	6,3	10	12,5	16	25	40	63	80
1.5	274	175	110	70	44	35	27	18	11	7	5
2.5	456	292	183	116	73	58	46	29	18	12	9
4	730	467	292	186	117	93	73	47	29	19	14
6		701	438	279	175	140	110	70	44	28	21
10			730	465	292	234	183	117	73	46	35
16				743	467	374	292	187	117	74	58
25					730	584	456	292	183	116	88
35						818	639	409	256	162	123
50							913	584	365	232	178

Conventional calculation method

In most cases this method will be sufficient and results in limiting the length of the various electrical circuits

Principle

This consists of applying Ohm's law only to the feeder concerned by the fault, assuming that the voltage between the faulty phase and the PE (or PEN) continues to be greater than 80 % of nominal phase voltage.

This coefficient globally takes account of all the upstream impedances.

In LV, when the protective conductor is routed alongside the corresponding phase conductors, conductor reactance can be ignored compared with resistance: this approximation is considered acceptable up to cross-sections of 120 mm².

Beyond this value, resistance is increased as follows:

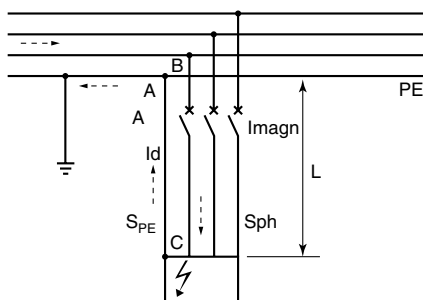
Cross-section (mm ²)	Resistance
150	R + 15 %
185	R + 20 %
240	R + 25 %

The maximum length of a circuit in the TN system is given by the following formula:

$$L_{\max} = \frac{0,8 \times U_0 \times S_{ph}}{\rho \times (1 + m) \times I_a}$$

In which:

- L_{max} : maximum length in metres
- U₀: phase voltage:
 - 230 V for 230/400 V network
- ρ: resistivity at normal operating temperature:
 - for copper: 22.5 10³ Ω x mm²/m
 - for aluminium: 36 10³ Ω x mm²/m
- I_a is equal to the current (A):
 - for operation of the circuit breaker magnetic trip unit
 - ensuring fuse blowing within the specified time
- m: S_{ph}/S_{PE}
- S_{ph}: phase cross-section in mm²
- S_{PE} : protective conductor cross-section in mm²



Calculation of L_{max} in the TN system using the conventional method