How to size cable tray according to IEC standard and BS standard

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The cable tray size is described in two dimensions: width and height. Calculating the size of a cable tray means calculating its width.

The final size of a cable tray depends on the following:

1- The number of cables on the cable tray

2- The size and overall diameter of each cable

3- The future expansion

The general rule for sizing the cable tray is that all the cables must be installed in a single layer, and there must be a space between each two cables:

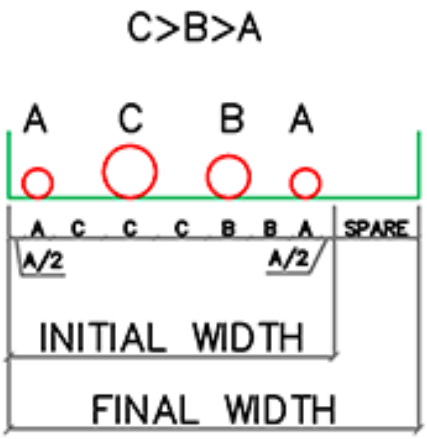
1- The space between two multi core cables equals the diameter of bigger cable.

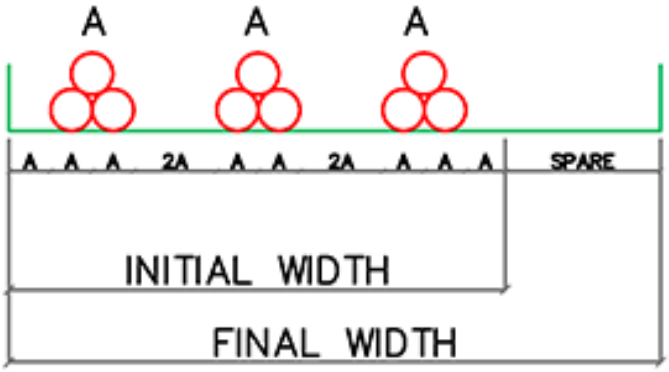
2- The space between three single core cables in trefoil formation and other trefoil cables equals the double of the diameter of the bigger cable.

Then, we measure the overall width of the previous arrangement to find the initial cable tray width, then add the future expansion.

Final cable tray width= initial cable tray width*(1+expantion percentage)

We round the final cable width to the nearest biggest standard width, which equals 50, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800, 900 mm (Can be different according to the manufacturer).





Example:

Find the cable tray size which will carry the following cables. Consider future expansion = 20%.

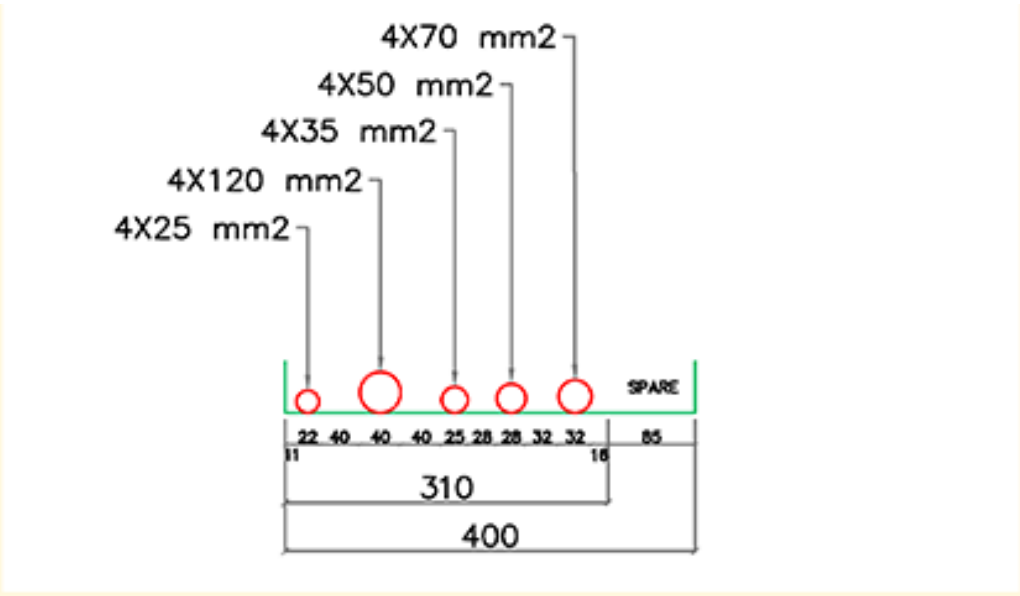
4x25mm2 CU/XLPE/PVC cable, diameter= 22.0 mm

4x120mm2 CU/XLPE/PVC cable, diameter= 39.9 mm

4x35mm2 CU/XLPE/PVC cable, diameter= 25.4 mm

4x50mm2 CU/XLPE/PVC cable, diameter= 28.3 mm

4x70mm2 CU/XLPE/PVC cable, diameter= 32.1 mm



Initial cable tray size= 310 mm

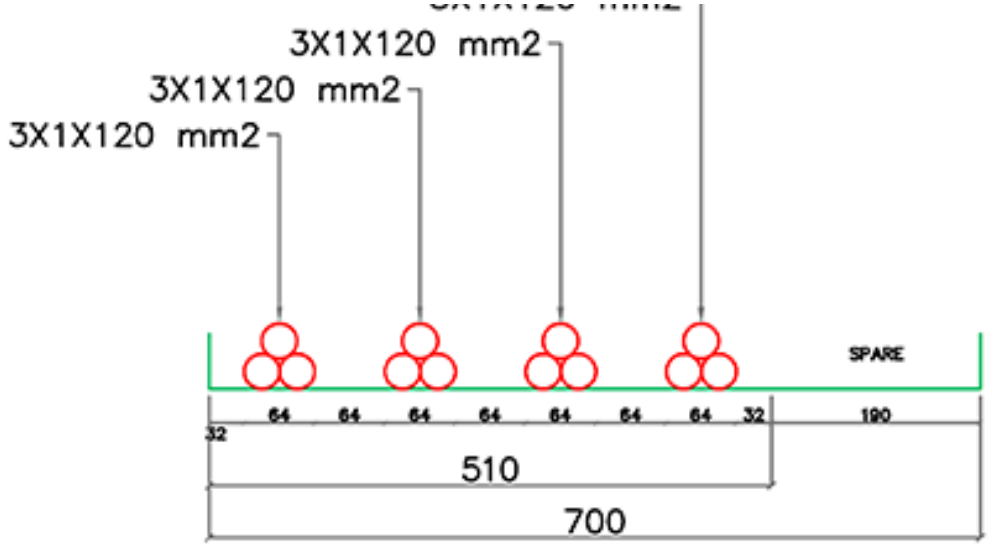
Final cable tray size= 310*1.2= 372 mm

We round this value to the nearest bigger cable tray standard value = 400 mm

Example:

Find the cable tray which will carry the following cables. Consider future expansion = 20%.

4No. of 3(1x240) mm2 CU/XLPE/PVC cable, diameter= 31.9



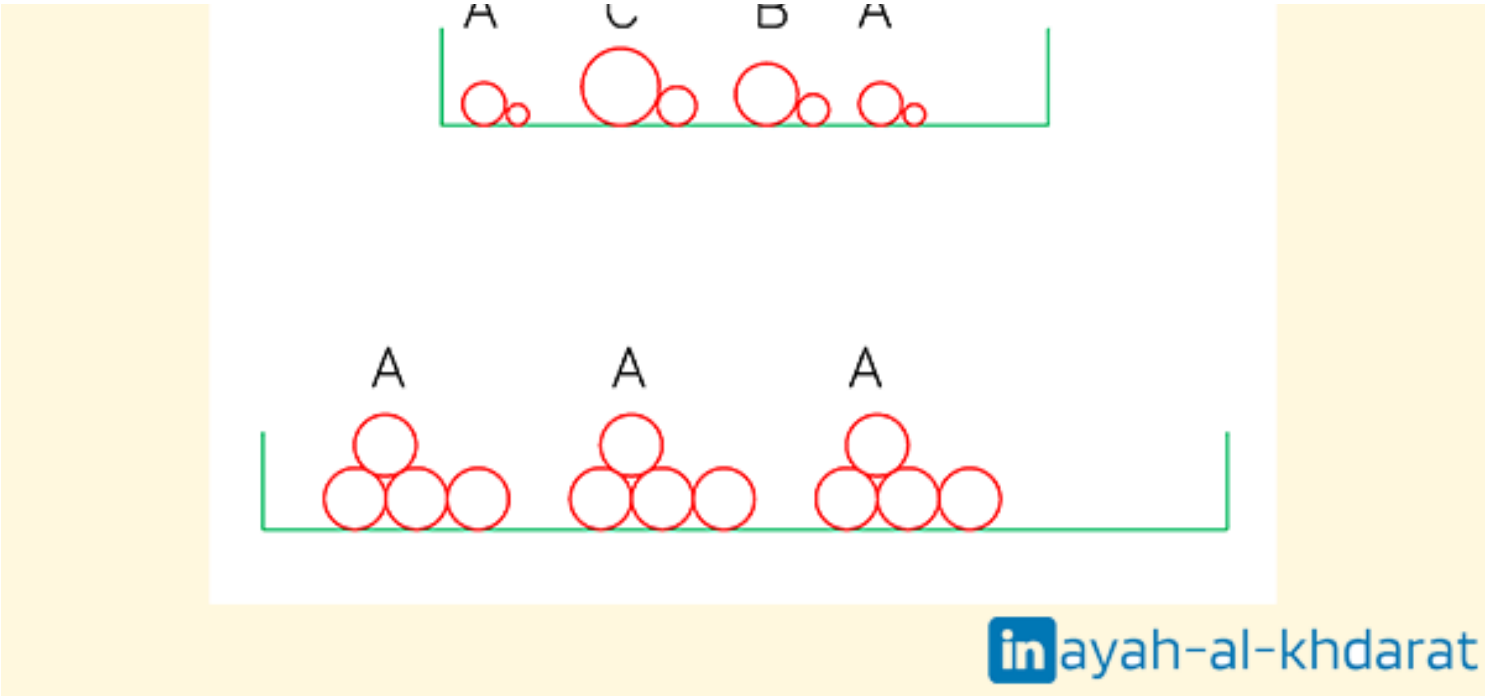
Initial cable tray size= 510 mm

Final cable tray size= 510 x 1.2= 612 mm

We round this value to the nearest bigger cable tray standard value = 700 mm

What about separate neutral and earthing conductors?

Because neutral and earthing conductors normally don't carry current, we don't put these conductors into consideration when sizing cable trays. When laying, they will be laid beside the main cable.



Why do we add space between cables?

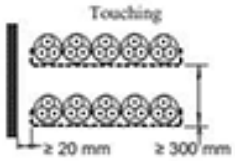
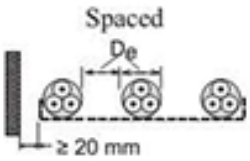
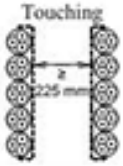
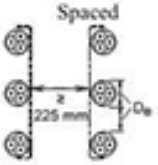
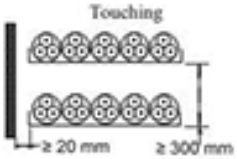
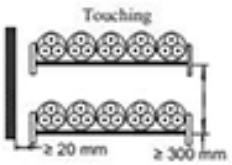
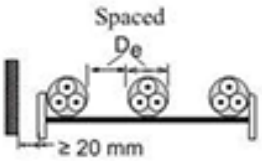
Grouping the cables without adding space on cable trays is possible, but when calculating the maximum carrying current capacity for the cables, you have to take into account the derating factor for cables when touching on the cable tray.

With reference to the tables below in BS* standard (There are similar tables in IEC** standard), we can find the derating factors for both cases; cables are touched and cables are spaced.

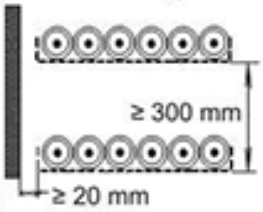
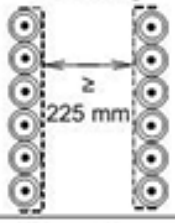
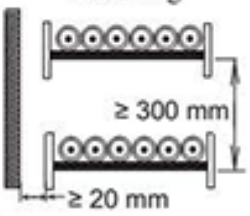
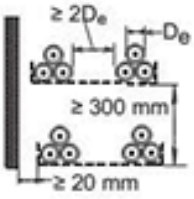
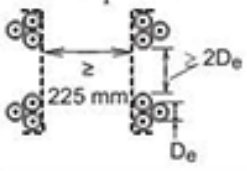
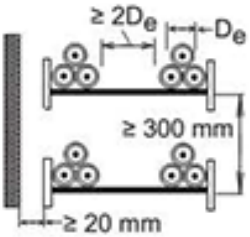
When the cables are touched, the derating factors range from 0.85 to 0.6 depending on the number of cables. Which means that the size of the cables could be nearly doubled. That will lead to an increase in the cost of cables.

But, if we look at the rating factors when cables are spaced, we find that they have a range between 1 and 0.9, which has little effect on maximum carrying current capacity.

TABLE 4C4 – Rating factors for groups of more than one multicore cable, to be applied to reference current-carrying capacities for multicore cables in free air – Reference Method E in Tables 4D2A to 4J4A

Installation Method in Table 4A2			Number of trays or ladders	Number of cables per tray or ladder					
				1	2	3	4	6	9
Perforated cable tray systems (Note 3)	31		1	See item 3 of Table 4C1					
			2	1.00	0.87	0.80	0.77	0.73	0.68
			3	1.00	0.86	0.79	0.76	0.71	0.66
			6	1.00	0.84	0.77	0.73	0.68	0.64
			1	1.00	1.00	0.98	0.95	0.91	–
			2	1.00	0.99	0.96	0.92	0.87	–
			3	1.00	0.98	0.95	0.91	0.85	–
Vertical perforated cable tray systems (Note 4)	31		1	See item 3 of Table 4C1					
			2	1.00	0.88	0.81	0.76	0.71	0.70
			1	1.00	0.91	0.89	0.88	0.87	–
			2	1.00	0.91	0.88	0.87	0.85	–
Unperforated cable tray systems	30		1	0.97	0.84	0.78	0.75	0.71	0.68
			2	0.97	0.83	0.76	0.72	0.68	0.63
			3	0.97	0.82	0.75	0.71	0.66	0.61
			6	0.97	0.81	0.73	0.69	0.63	0.58
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34		1	See item 4 of Table 4C1					
			2	1.00	0.86	0.80	0.78	0.76	0.73
			3	1.00	0.85	0.79	0.76	0.73	0.70
			6	1.00	0.84	0.77	0.73	0.68	0.64
			1	1.00	1.00	1.00	1.00	1.00	–
			2	1.00	0.99	0.98	0.97	0.96	–
			3	1.00	0.98	0.97	0.96	0.93	–

applied to reference current-carrying capacity for one circuit of single-core cables in free air – Reference Method F in Tables 4D1A to 4J3A

Installation Method in Table 4A2			Number of trays or ladders	Number of three-phase circuits per tray or ladder			Use as a multiplier to rating for
				1	2	3	
Perforated cable tray systems (Note 3)	31	Touching 	1 2 3	0.98 0.96 0.95	0.91 0.87 0.85	0.87 0.81 0.78	Three cables in horizontal formation
Vertical perforated cable tray systems (Note 4)	31	Touching 	1 2	0.96 0.95	0.86 0.84	– –	Three cables in vertical formation
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34	Touching 	1 2 3	1.00 0.98 0.97	0.97 0.93 0.90	0.96 0.89 0.86	Three cables in horizontal formation
Perforated systems (Note 3)	31		1 2 3	1.00 0.97 0.96	0.98 0.93 0.92	0.96 0.89 0.86	Three cables in trefoil formation
Vertical perforated cable tray systems (Note 4)	31	Spaced 	1 2	1.00 1.00	0.91 0.90	0.89 0.86	
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34		1 2 3	1.00 0.97 0.96	1.00 0.95 0.94	1.00 0.93 0.90	

*BS 7671 – Table 4C4 and Table 4C5

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very useful. can you pls provide details for sizing the cables also.

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Could provide me with Reference from IEC standard for percentage of future expansion and filling ration. Thank in advanced.

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