Separation in Energy Chains®

- Cables with extremely varying diameters should be installed so that they are separated from one another. The separation is provided by means of separators.
- Cables must never have the possibility of being able to push themselves over one another. This is why the clear height of a compartment with several equally thick cables lying next to one another must **never amount to more than the cable diameter plus 50%.**

Expressed in rules, this means:

Rule 1:
If **D1 + D2 > 1.2 x chain inner height**, no separation must be made between the two cables. Two cables should never be allowed to lie on top of one another in unguided form or become tangled.

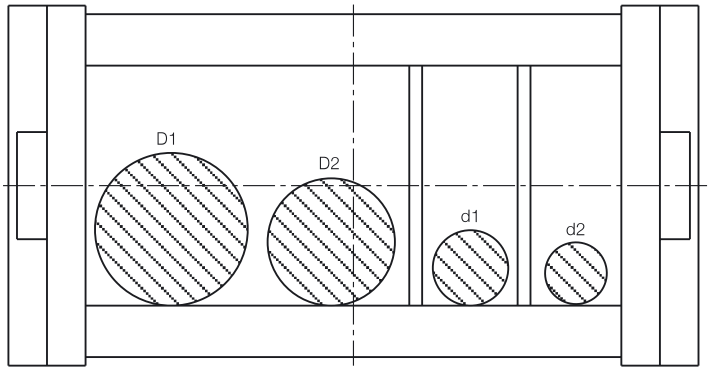
Rule 2:
If **d1 + d2 ≤ 1.2 x chain inner height**, a separator or a modular compartment bottom must be installed in order to reduce the inner height. This is done in order to prevent d1 and d2 from becoming "mixed up".

The reason for these rules is:
The cables must be installed and fastened so that they can move freely in longitudinal direction at any time and do not exert any tensile force in the radius on the Energy Chains®.

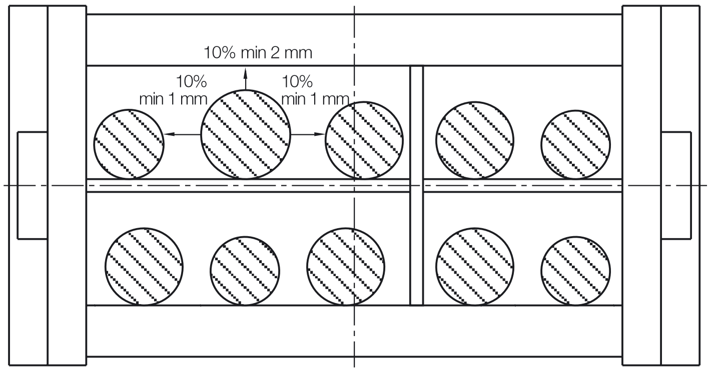
In case of applications with high travel velocities and many load cycles, no cables are allowed to be placed on top of one another **without a horizontal separation.**
The guidance values for these applications are:

Travel velocity exceeding **0.5 m/s** and load cycles exceeding **10,000 p.a.**

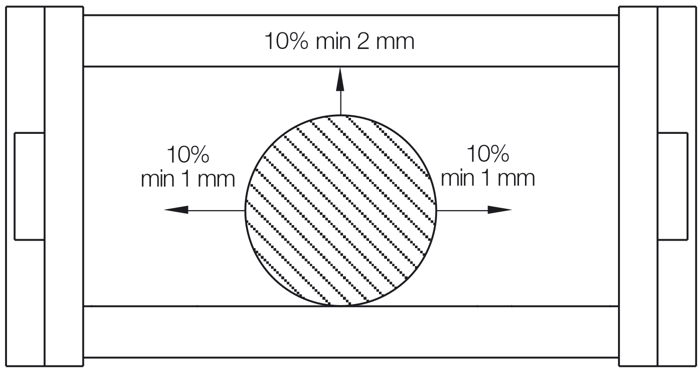
The igus® interior separation offers a reliable solution for these applications.



D1 + D2 > 1,2 x hi **d1 + d2 ≤ 1,2 x hi**



d1 + d2 ≤ 1,2 x hi



Reserve space "all-round" for electrical round cables

**Reserve space capacities in %
for various cables**

Cables	Reserve space "all-round"
Electrical round cables	10 %
Electrical flat cables	10 %
Pneumatics	5 - 10%
Hydraulics	20 %
Media hoses	15 - 20 %

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The values from the tables on the side of this page have been taken from the standard DIN VDE 0298, Part 4. These values have been simplified and only apply approximately. For each user, it is advisable to obtain and comply with the regulations that apply to each individual case of application (e.g. measures for protection in case of indirect contact in accordance with DIN VDE 0100 Part 410, overcurrent protective devices in accordance with DIN VDE 0100 Part 430 or voltage drop in accordance with DIN VDE 0100 Part 520). It is not possible to provide all the regulations or overviews in this catalog. Due to the harmonization that has been carried out, it is possible that different load-carrying values may be permissible for the same cable in some cases. For the selection of the relevant cross sections, the load capacity in undisturbed operation is the determining factor, i.e. the use with permissible operating temperature or permissible maximum temperature on the conductor.

The load-bearing capacity according to Table 1 on this page applies to operating-current-carrying conductors. Normally, these are 2 loaded conductors in the case of 2-core and 3-core cables, as well as 3 loaded conductors in the case of 4-core and 5-core cables. Please take this into account when planning for the use of multi-core cables in electrical installation conduits or Energy Chains®. This information is based on an ambient temperature of 30°C and a non-loaded cable. Please apply the conversion factors according to Table 2 in case the air temperature is increased due to the heat loss of the cables (please take thermal radiation into account as well, e.g. effects of exposure to the sun).

The possible cable installation types in Energy Chains® result in such a broad range of loading profiles that no generalized conversion factors can be mentioned for this large accumulation of cables. The installation type and the conversion factors must be looked up in Table 3 according to each individual application.

Table 3: Conversion factors for multi-core cables with cable cross sections up to 10 mm²

Loaded cores	Conversion factor
5	0,75
7	0,65
10	0,55
14	0,50
19	0,45
24	0,40
40	0,35
61	0,30

Table 1: Cables for fixed installation in energy-conducting chains and tubes

Insulation material	PVC	TPE
Chainflex® type	CF2, CF5, CF6 CF7, CF8 CF130.UL CF140.UL	CF170.D, CF180, CF9, CF10 CF98, CF99, CF11, CF12 CF260, CF21.UL, CF27 CF30, CF31, CF34, CF35, CF300.UL, CF310.UL
Number of cores	2 or 3	2 or 3
Installation		

Nominal cross section Nominal cross of copper cable in mm²	Load-carrying capacity in amperes PVC insulation	 TPE insulation
0,14	2,5	2,5
0,25	4	5
0,34	5	7
0,50	8	10
0,75	12	14
1	15	17
1,50	18	21
2,50	26	30
4	34	41
6	44	53
10	61	74
16	82	99
25	108	131
35	135	162
50	168	202
70	207	250
95	250	301
120	292	352
150		404
185		461

Table 2: Conversion factors in case of varying ambient temperatures

Ambient temperature °C	Conversion factor PVC insulation	 TPE insulation
10	1,22	1,15
15	1,17	1,12
20	1,12	1,08
25	1,06	1,04
30	1,00	1,00
35	0,94	0,96
40	0,87	0,91
45	0,79	0,87
50	0,71	0,82
55	0,61	0,76
60	0,50	0,71
65	–	0,65
70	–	0,58
75	–	0,50
80	–	0,41
85	–	0,29
90	–	0,14