

The right cable layout for drag-chains

LAPP Harnessing Solutions

The right cable layout for drag-chains

- 1 How to install media (cables, hoses, etc.) correctly
- 2 How to design multi-layer cable layout for narrow spaces
- 3 Additional design advice
- 4 Questions and answers

1. How to install media (cables, hoses, etc.) correctly

Why is it important to have a proper filling in the drag-chain?

The main reason is to increase the service life of the system.

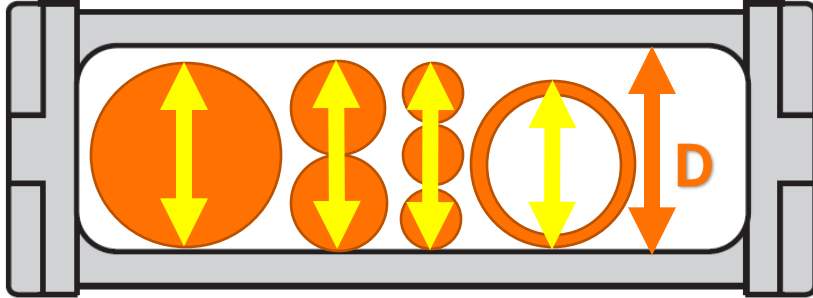
Proper separators and shelves usage will help to improve the service life of cables and hoses.

Maximum filling



What is the maximum diameter of a cable or a hose permitted in a drag-chain?

Maximum filling



D = Chain inner height - total clearance (example: D = 50 mm)

Max electric cables OD: Inner height - 10%

Example:

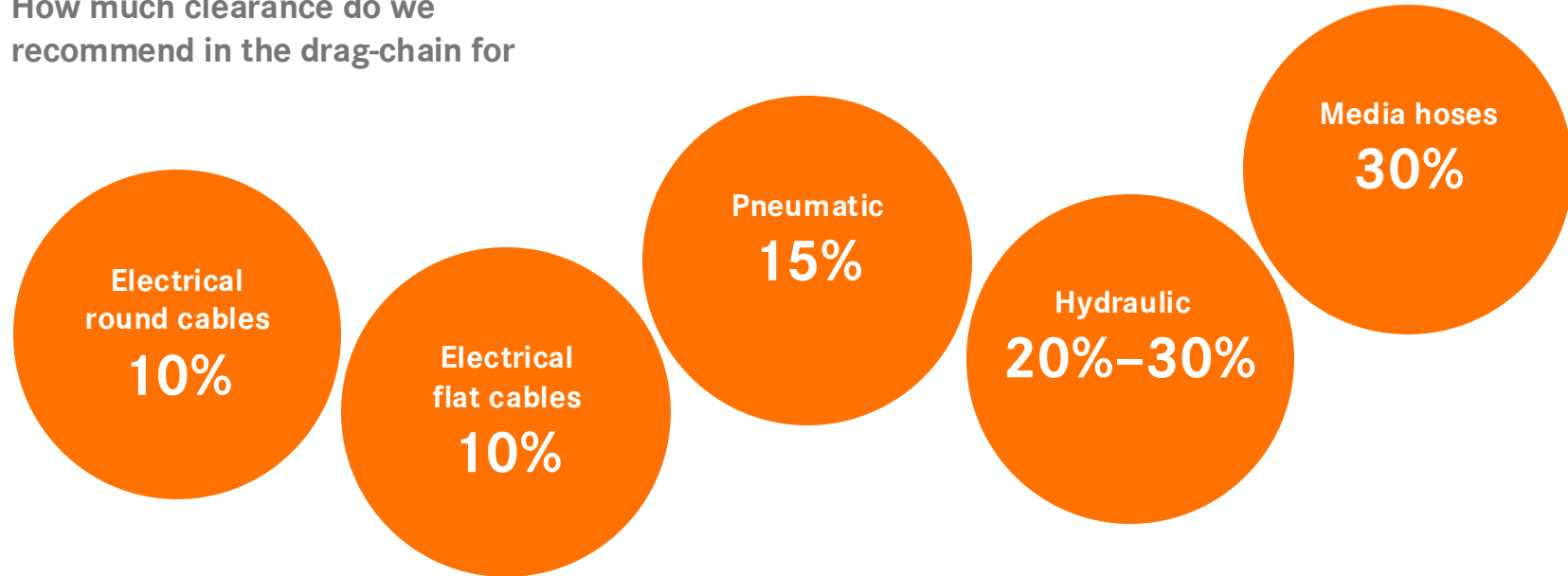
$50 \text{ mm} - 10\% = 45 \text{ mm}$

$22.5 \text{ mm} + 22.5 \text{ mm} = 45 \text{ mm}$

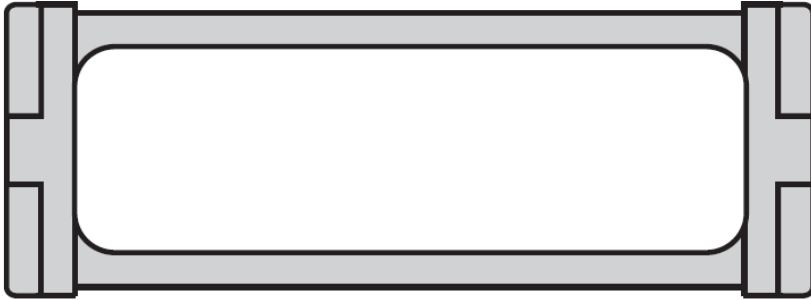
$15 \text{ mm} + 15 \text{ mm} + 15 \text{ mm} = 45 \text{ mm}$

Maximum filling

How much clearance do we recommend in the drag-chain for

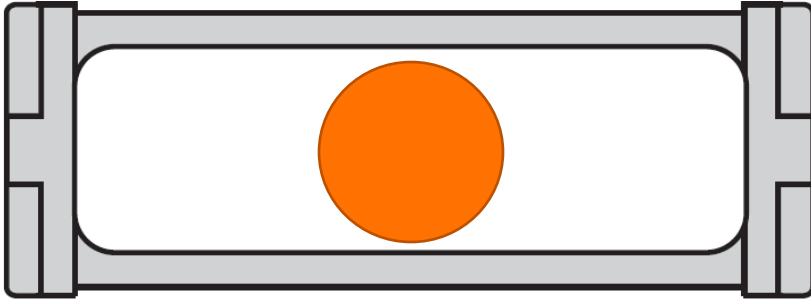


Maximum filling



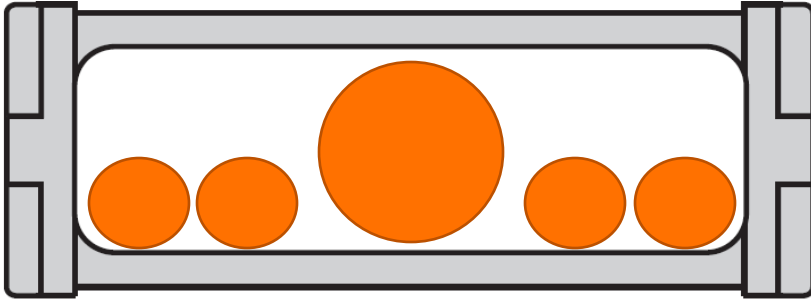
How much should a drag-chain be filled?

Maximum filling



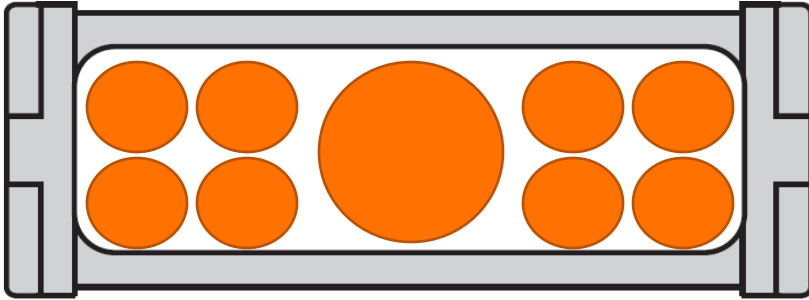
How much should a drag-chain be filled?

Maximum filling



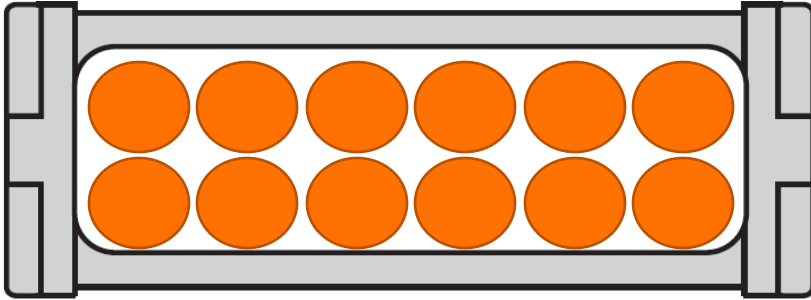
How much should a drag-chain be filled?

Maximum filling



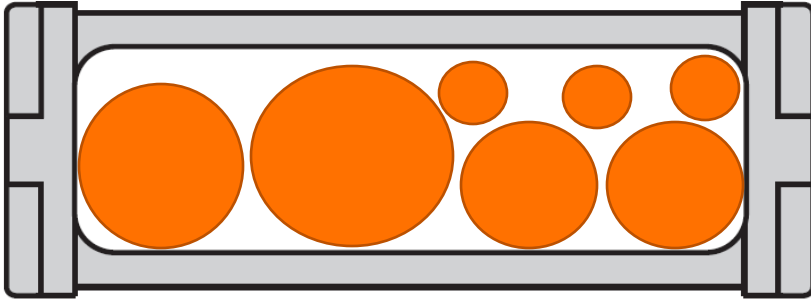
How much should a drag-chain be filled?

Maximum filling



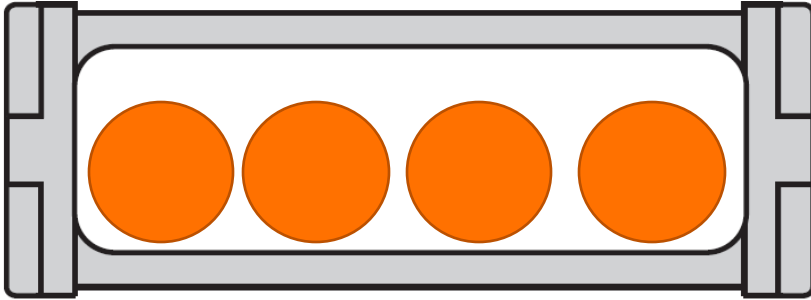
How much should a drag-chain be filled?

Maximum filling



How much should a drag-chain be filled?

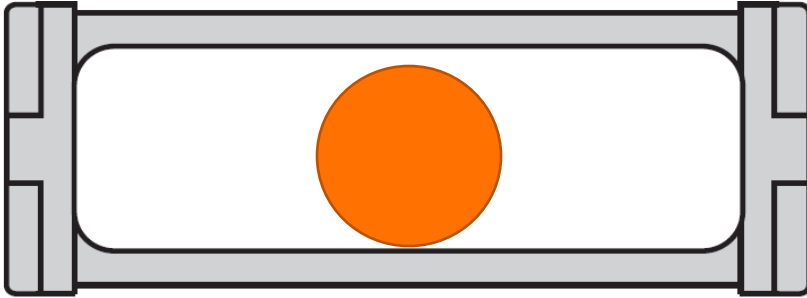
Maximum filling



How much should a drag-chain be filled?

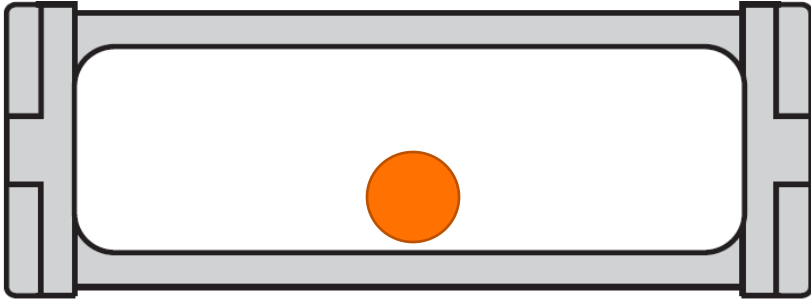
From LAPP, as cable specialist, we recommend not more than **80%** of the space in the drag-chain.

Maximum filling



This is OK.

Maximum filling



This is OK too.

(situation dependent)

When to use a separator



When to use a separator

Separator is not needed, when

$$\text{Ø1} + \text{Ø2} > \text{D} * 1.2$$

Example:

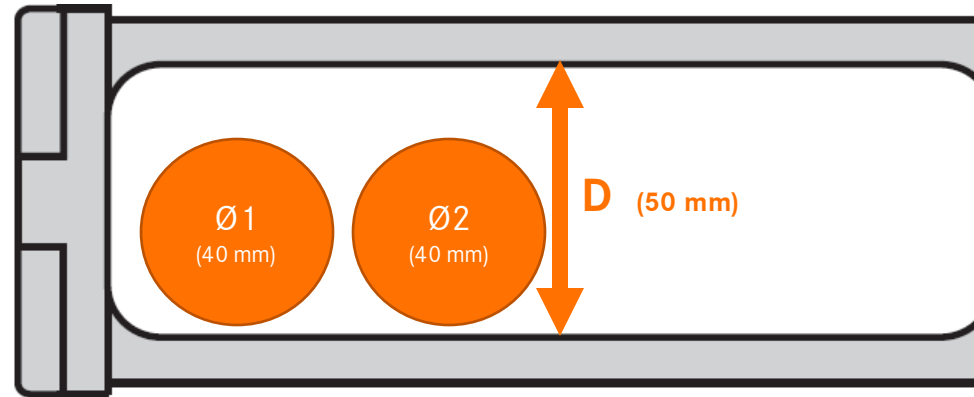
$$\text{Ø1} = 40 \text{ mm}$$

$$\text{Ø2} = 40 \text{ mm}$$

$$\text{D} = 50 \text{ mm}$$

$$40 \text{ mm} + 40 \text{ mm} = 80 \text{ mm}$$

$$50 \text{ mm} * 1.2 = 60 \text{ mm}$$



$$80 > 60 = \text{No separator needed}$$

When to use a separator

Separator is needed, when

$$\text{Ø3} + \text{Ø4} \leq D * 1.2$$

Example:

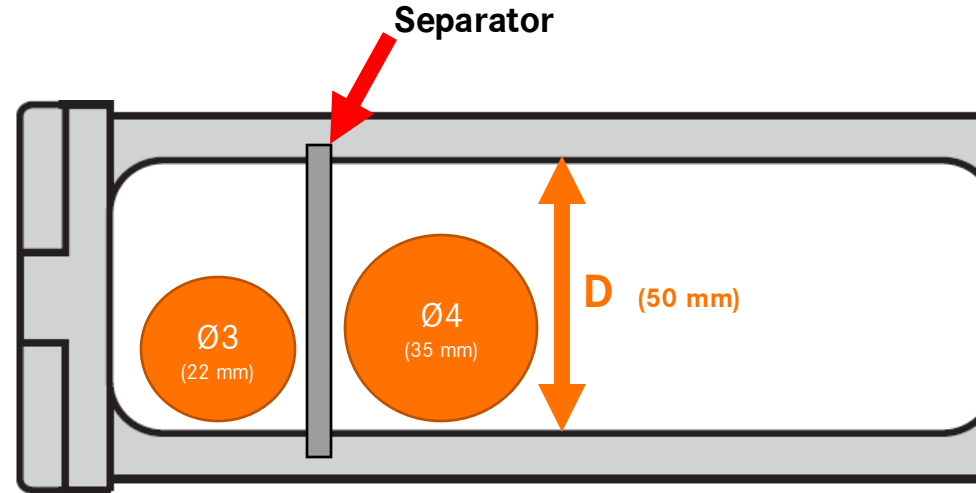
$$\text{Ø3} = 22 \text{ mm}$$

$$\text{Ø4} = 35 \text{ mm}$$

$$D = 50 \text{ mm}$$

$$22 \text{ mm} + 35 \text{ mm} = 57 \text{ mm}$$

$$50 \text{ mm} * 1.2 = 60 \text{ mm}$$

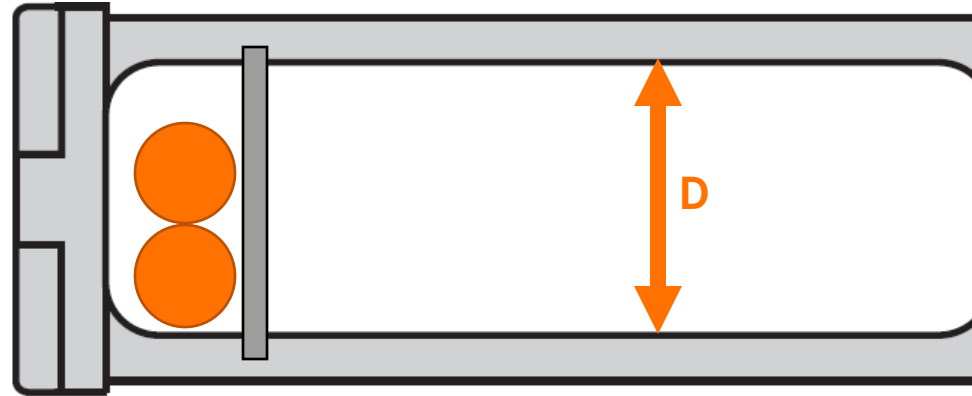


$$57 \leq 60 = \text{Separator is needed}$$

When to use a separator

Separator is needed, when

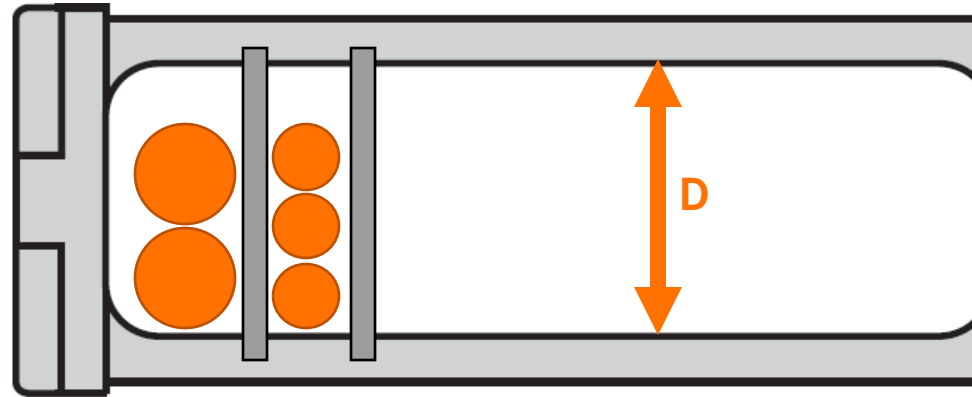
cables are placed
on top of each other



When to use a separator

Separator is needed, when

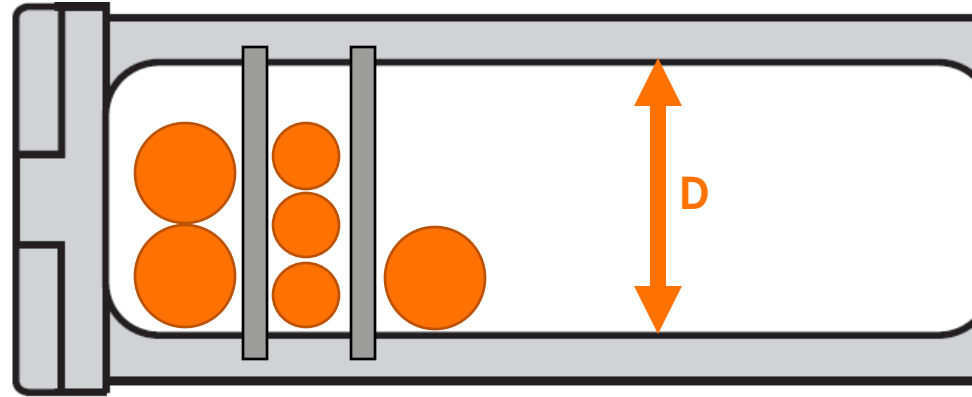
more cables are placed
on top of each other



When to use a separator

Separator is needed, when

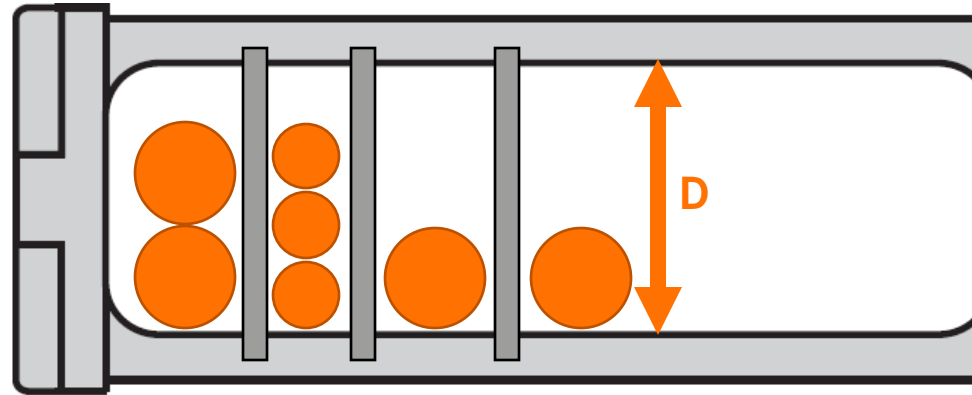
one cable are placed
next to them



When to use a separator

Separator is needed, when

cables are placed
next to each other

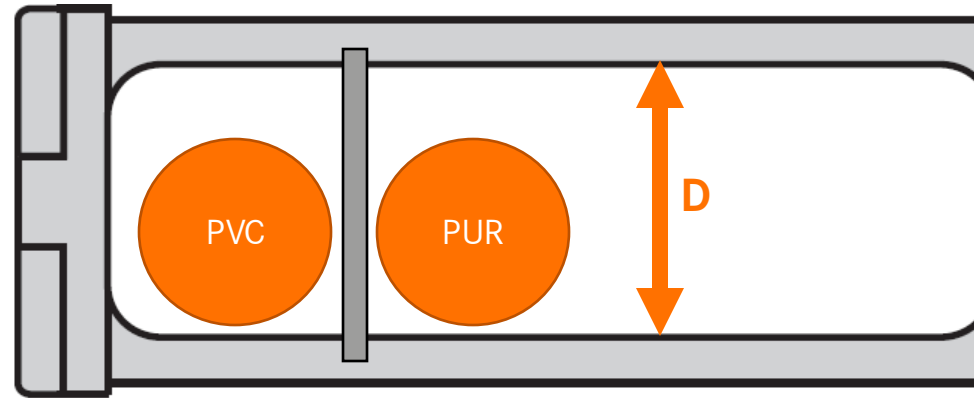


Separators are needed

When to use a separator

Separator is needed, when

two different outer
jacket materials are together

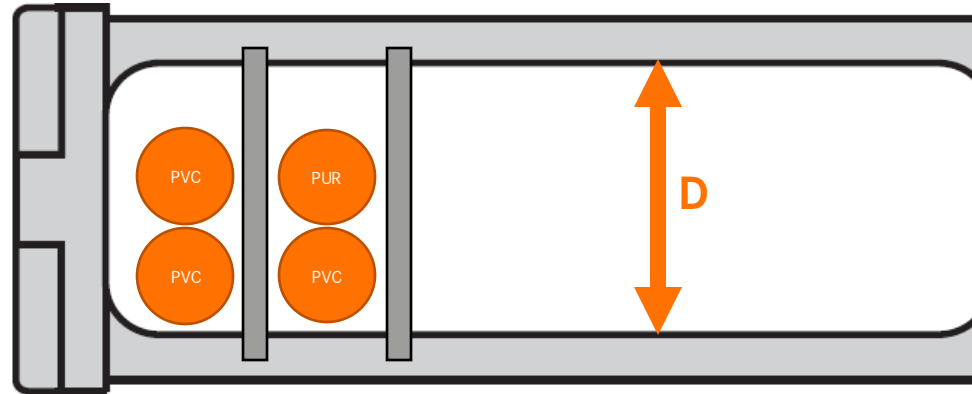


Separator is needed

When to use a separator

Separator is needed, when

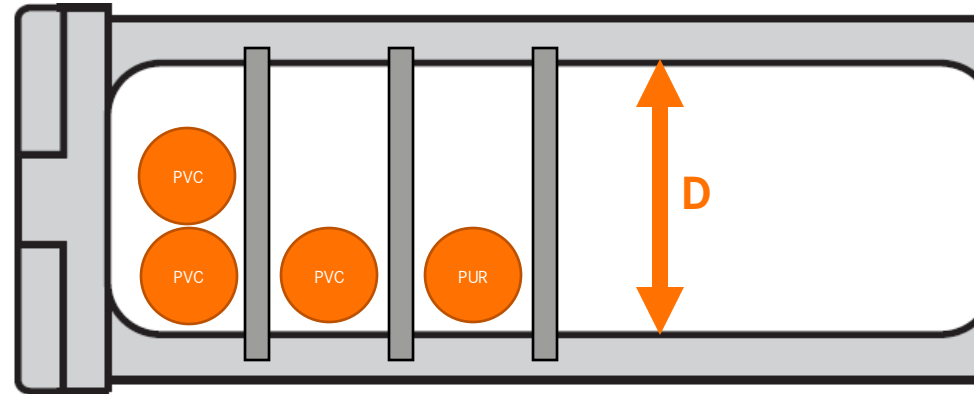
**two different outer
jacket materials are together**



When to use a separator

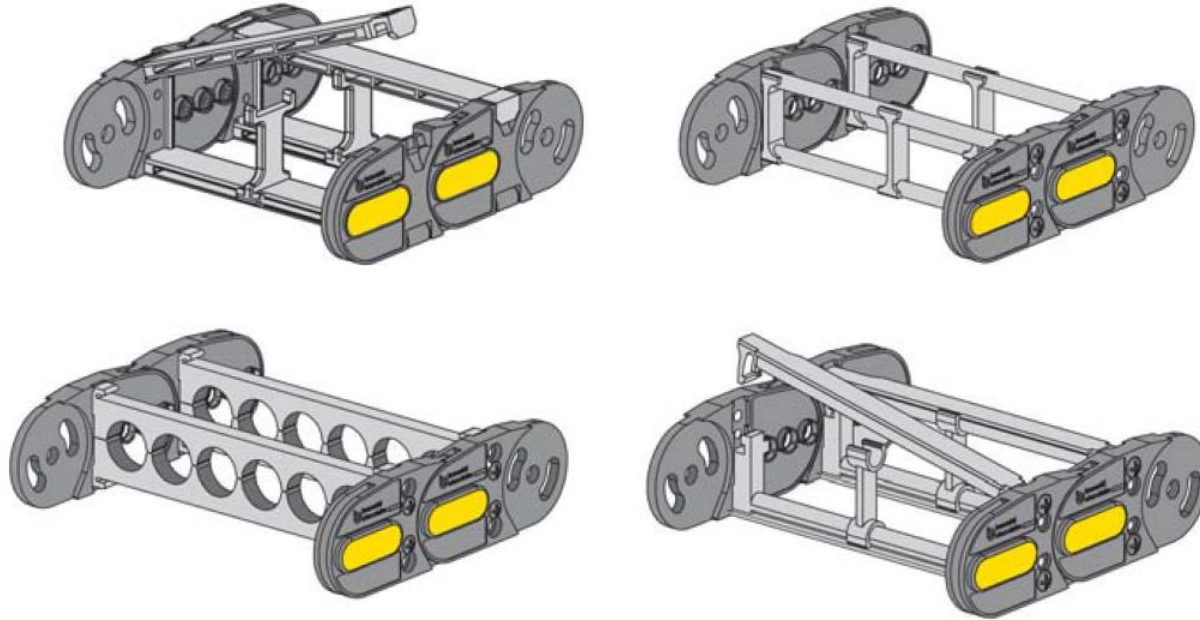
Separator is needed, when

two different outer
jacket materials are together



Separator is needed

Interior shelving examples:



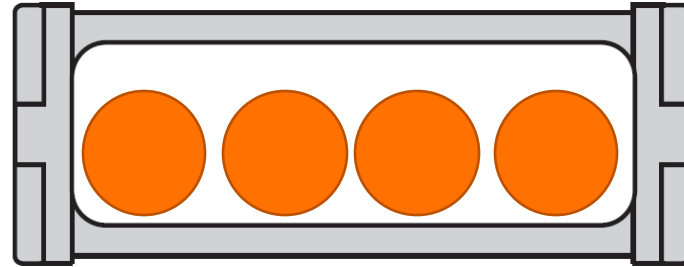
2. How to design multi-layer cable layout for narrow spaces

Drag chain system design – basic

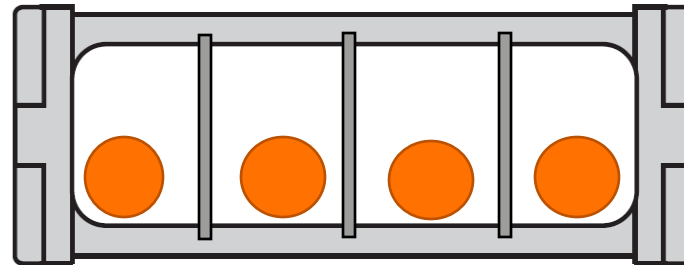


Cables laying next to each other (single row)

a) without separator

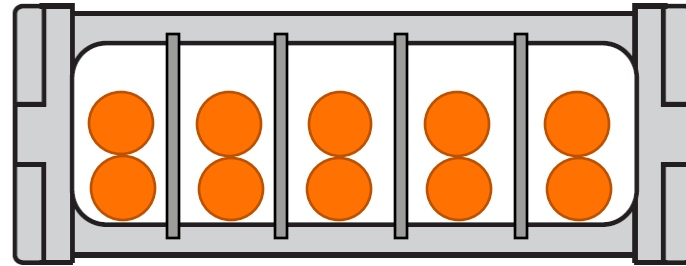


b) with separator

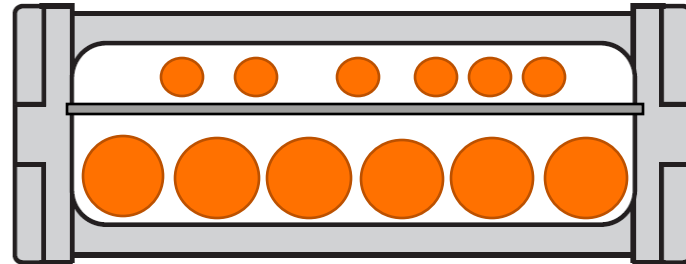


Cables on top of each other (two rows)

a) with separators

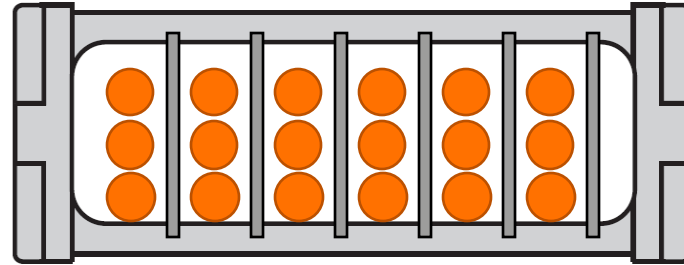


b) with shelving system



Cables on top of each other (three rows)

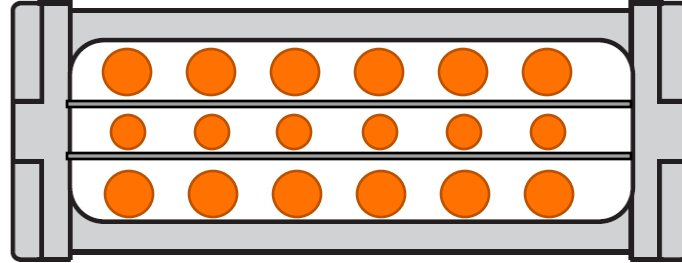
a) with separators



If possible, avoid placing 3 or more similar and/or different cables or hoses into one cavity compartment.

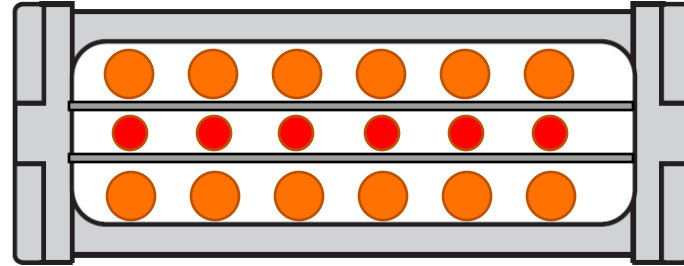
Design to avoid when possible

What is not so good with this solution?



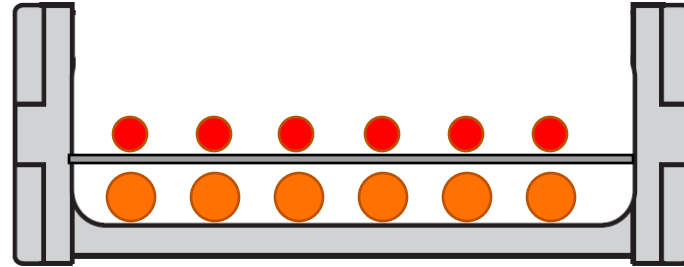
Design to avoid when possible

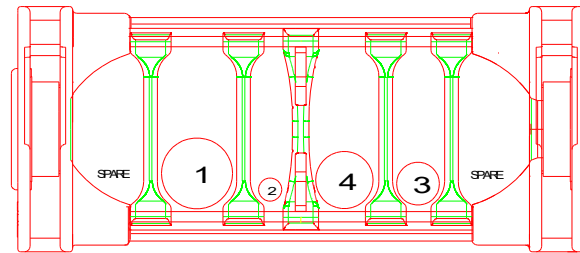
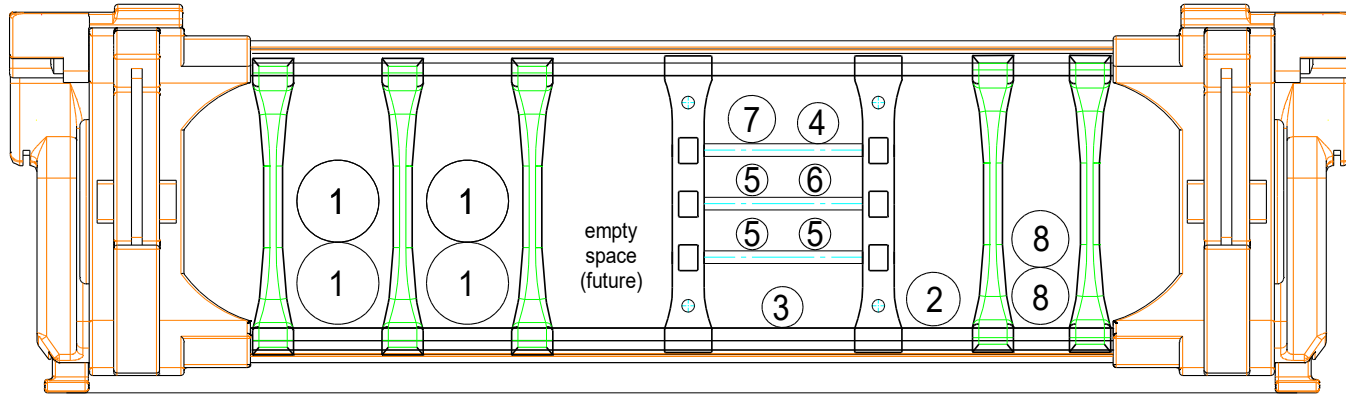
- Cables in the middle layer cannot be reached when changing them
- If the damaged cable is pre-assembled with a connector, the customer will need to remove a lot of cables from the drag-chain to install the replacement cable.

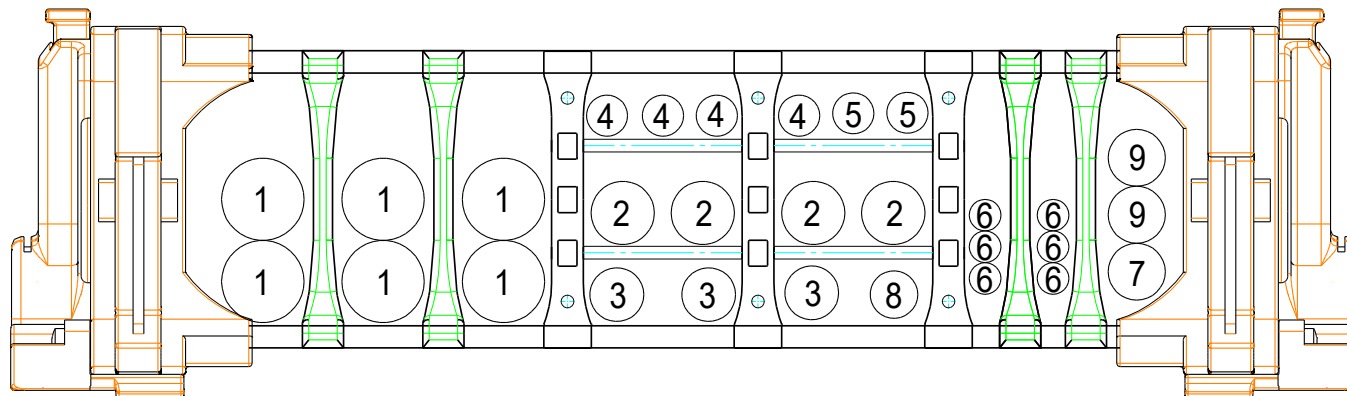
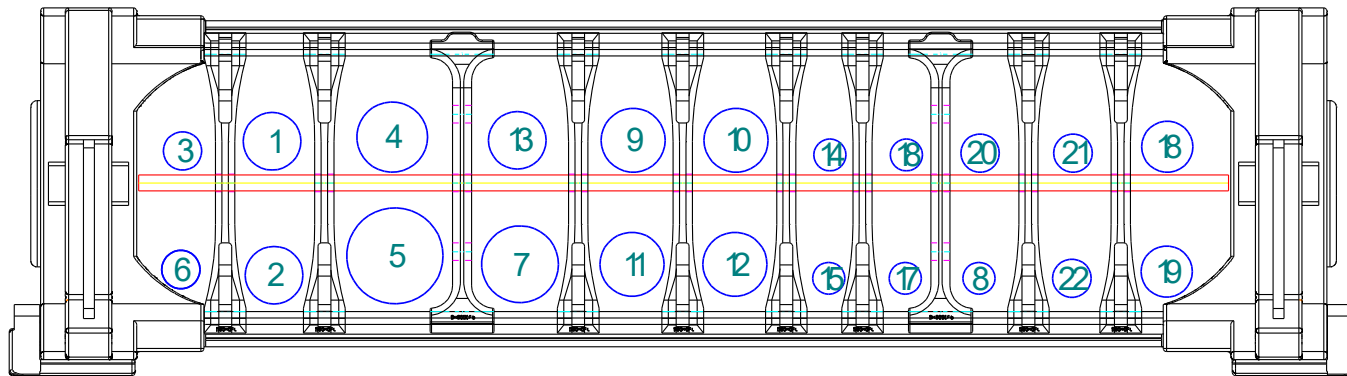


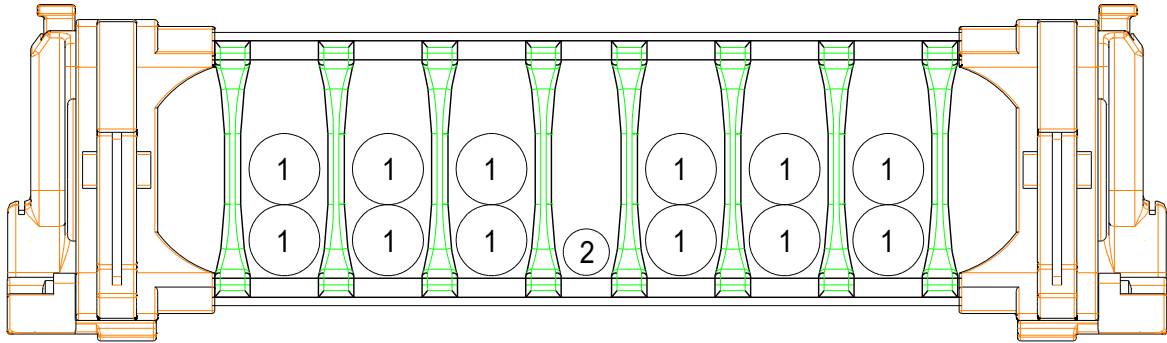
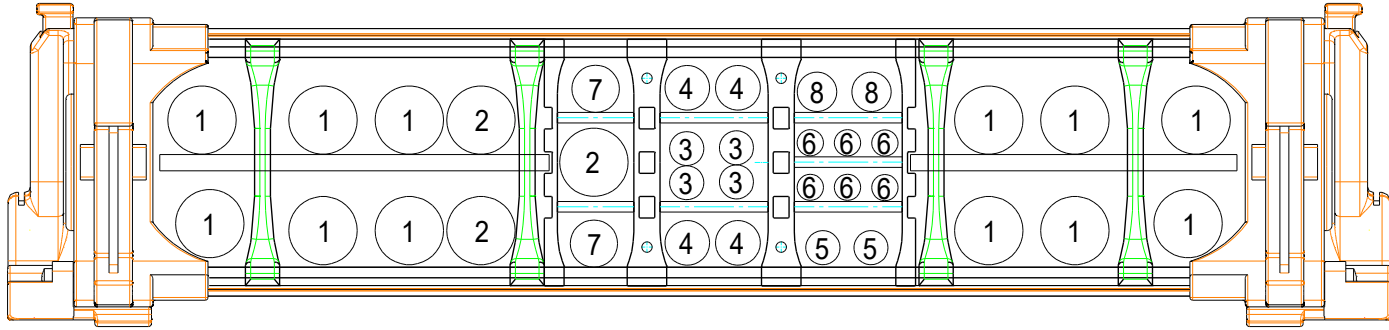
Design to avoid when possible

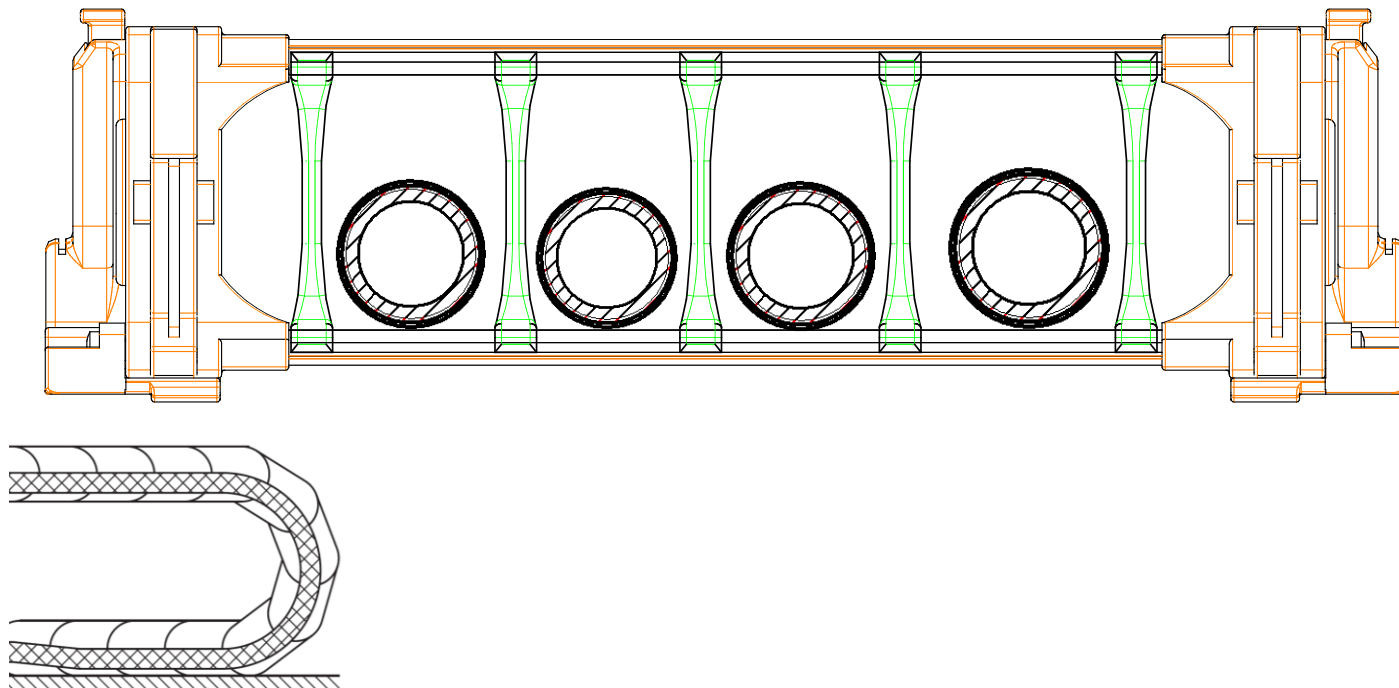
- Cables in the middle layer cannot be reached when changing them
- If the damaged cable is pre-assembled with a connector, the customer will need to remove a lot of cables from the drag-chain to install the replacement cable.











3.

Additional design advice



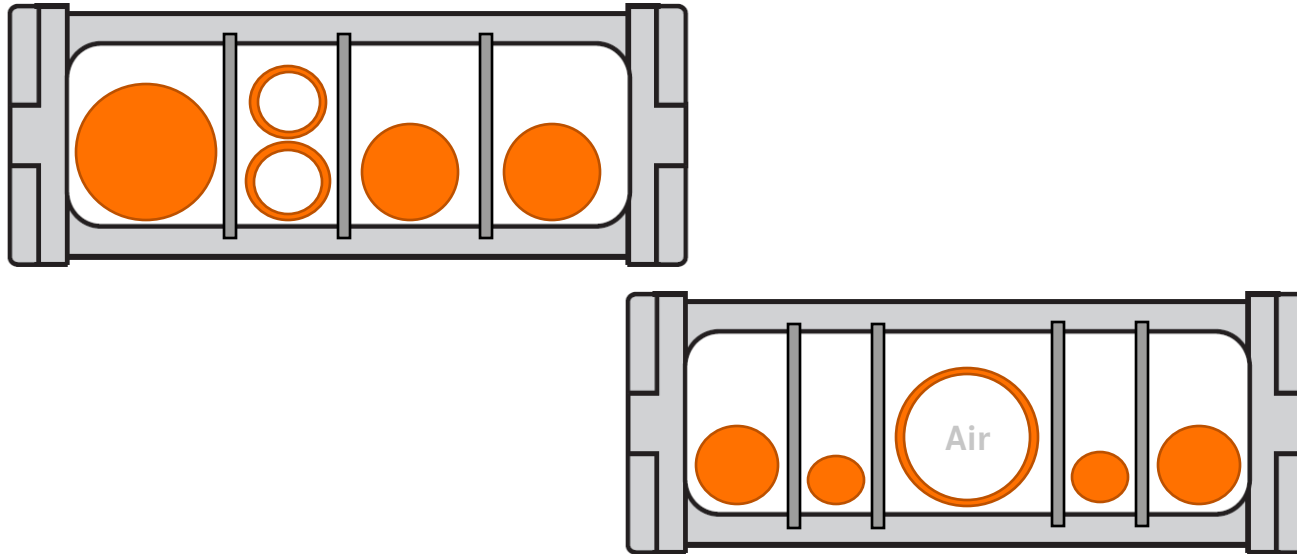
IMPORTANT Design advice

1. Separators are typically assembled every alternate link



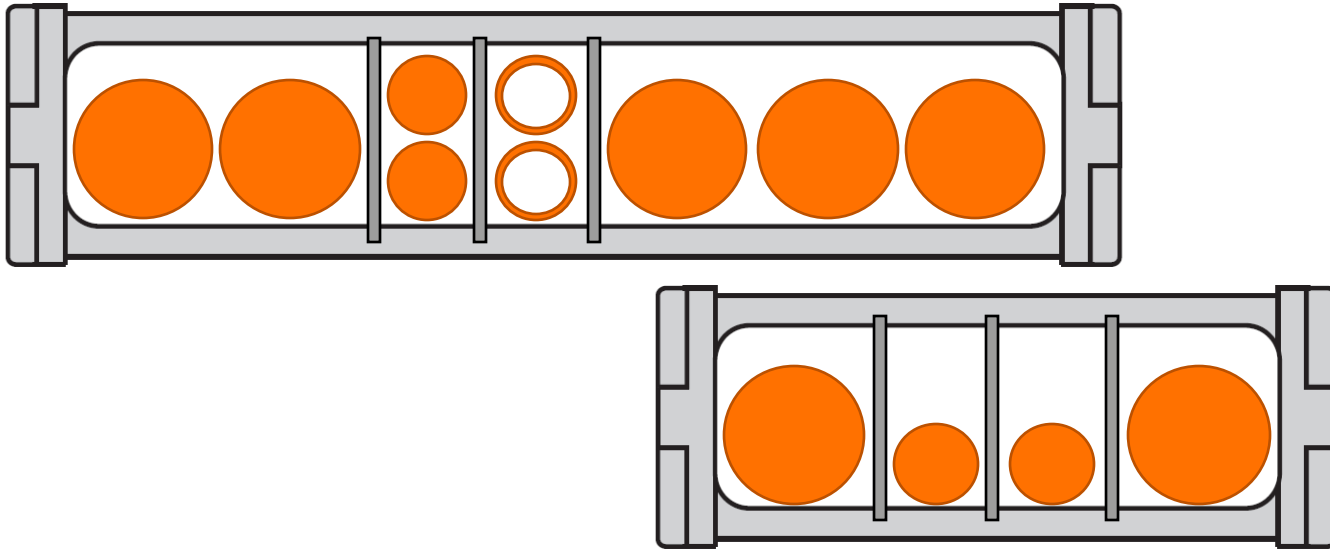
IMPORTANT Design advice

2. The cable's weight should be symmetrically distributed along the width of the drag-chain



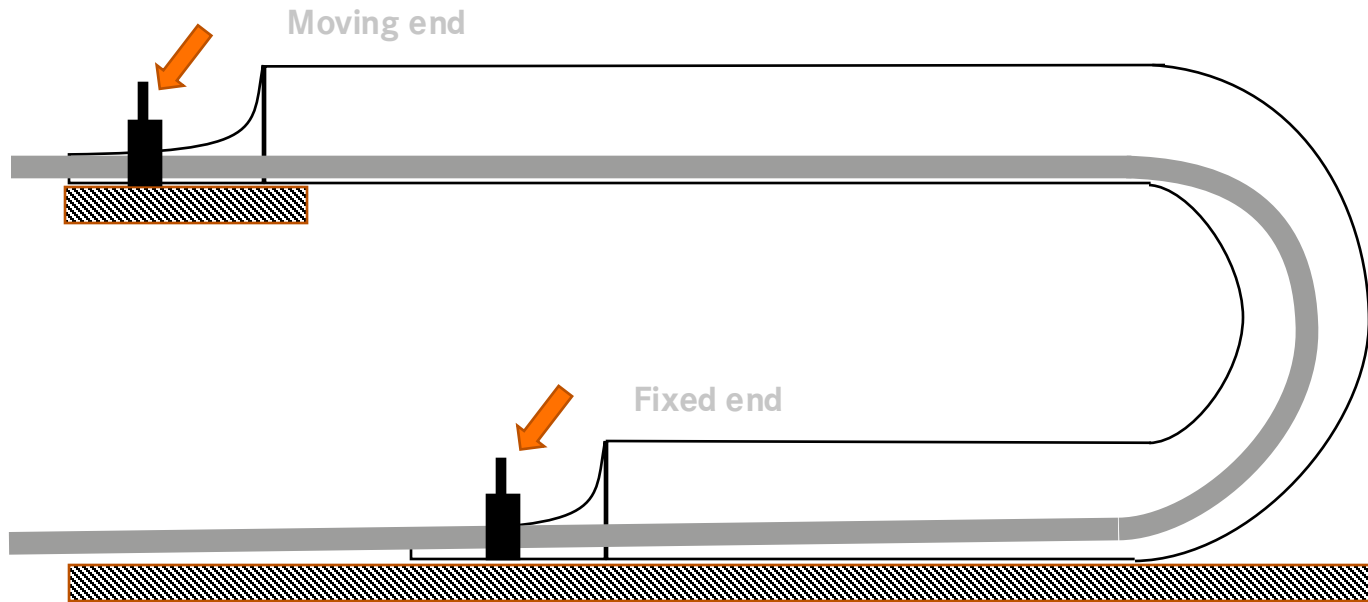
IMPORTANT Design advice

2. The cable's weight should be symmetrically distributed along the width of the drag-chain



IMPORTANT Design advice

3. Both cable ends must be fixed with strain relief



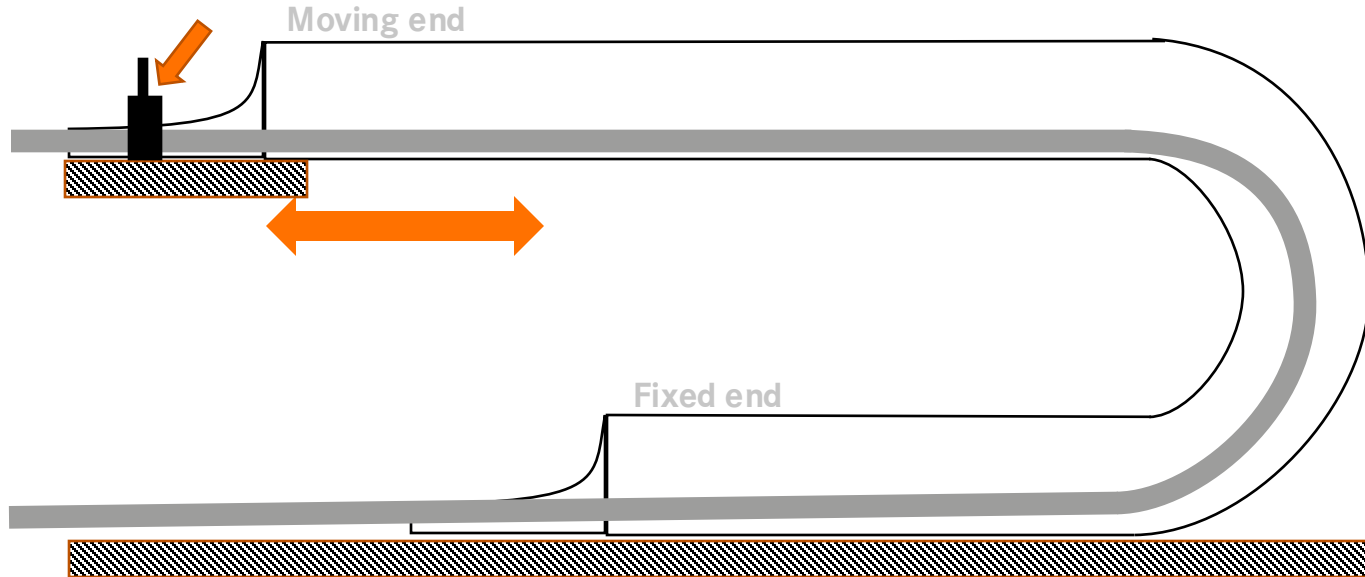
IMPORTANT Design advice

3. Both cable ends must be fixed with strain relief



IMPORTANT Design advice

4. Hoses to be fixed at moving end only.

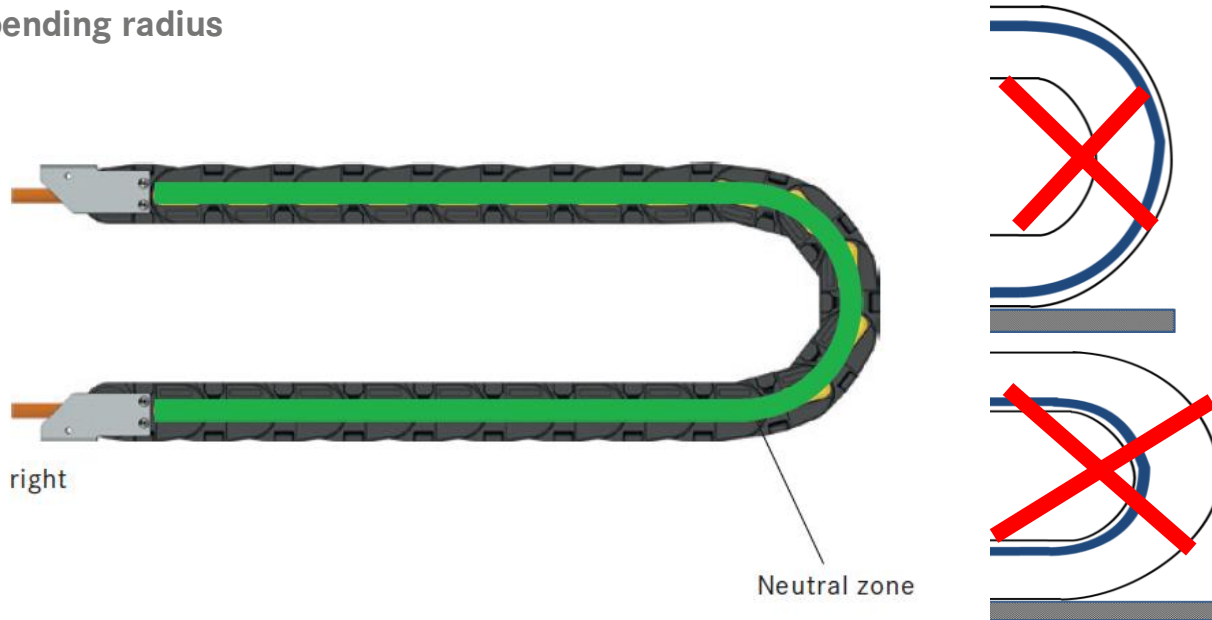


IMPORTANT Design advice

5. Never tie-wrap or fasten cables or hoses onto carrier system links or cross bars.

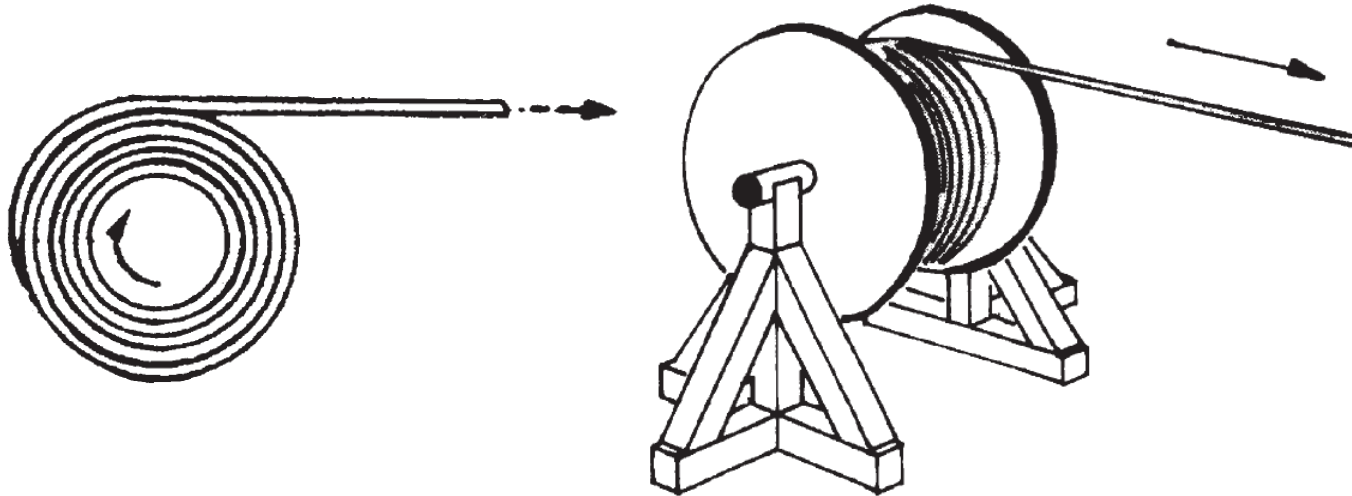
IMPORTANT Design advice

6. The cables must be able to move freely at bending radius



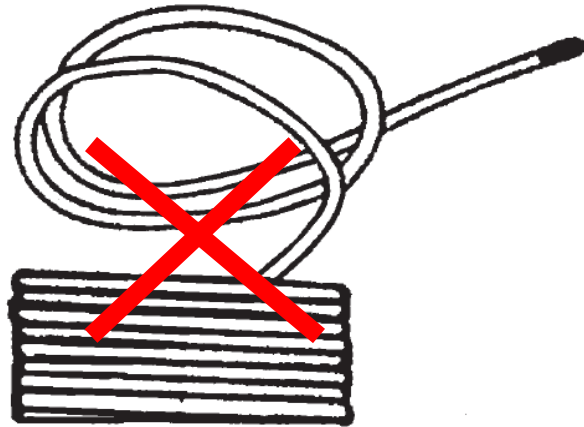
IMPORTANT Design advice

7. The cables must be installed “Twist-Free”!



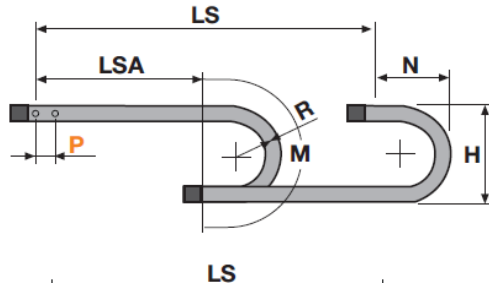
IMPORTANT Design advice

7. The cables must be installed “Twist-Free”!



IMPORTANT Design advice

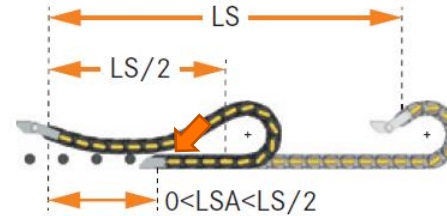
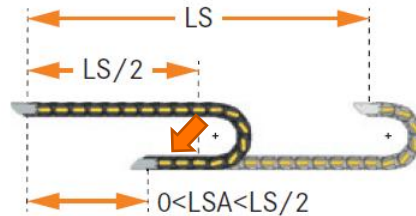
8. Drag chain installation done according to recommendation value in the catalogue



R	H	N	M
028	79	68,5	146
038	99	78,5	177
045	113	85,5	199
060	143	100,5	246
075	173	115,5	294
100	223	140,5	372

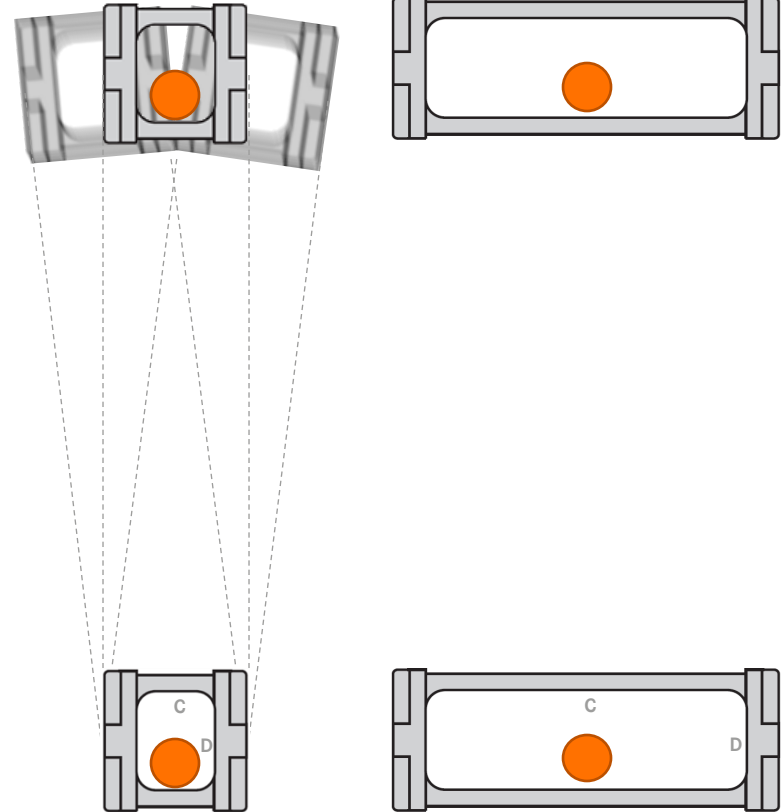
IMPORTANT Design advice

9. Always consider one extra link, this is to ensure that the drag chain ends are rested when at max travel position.

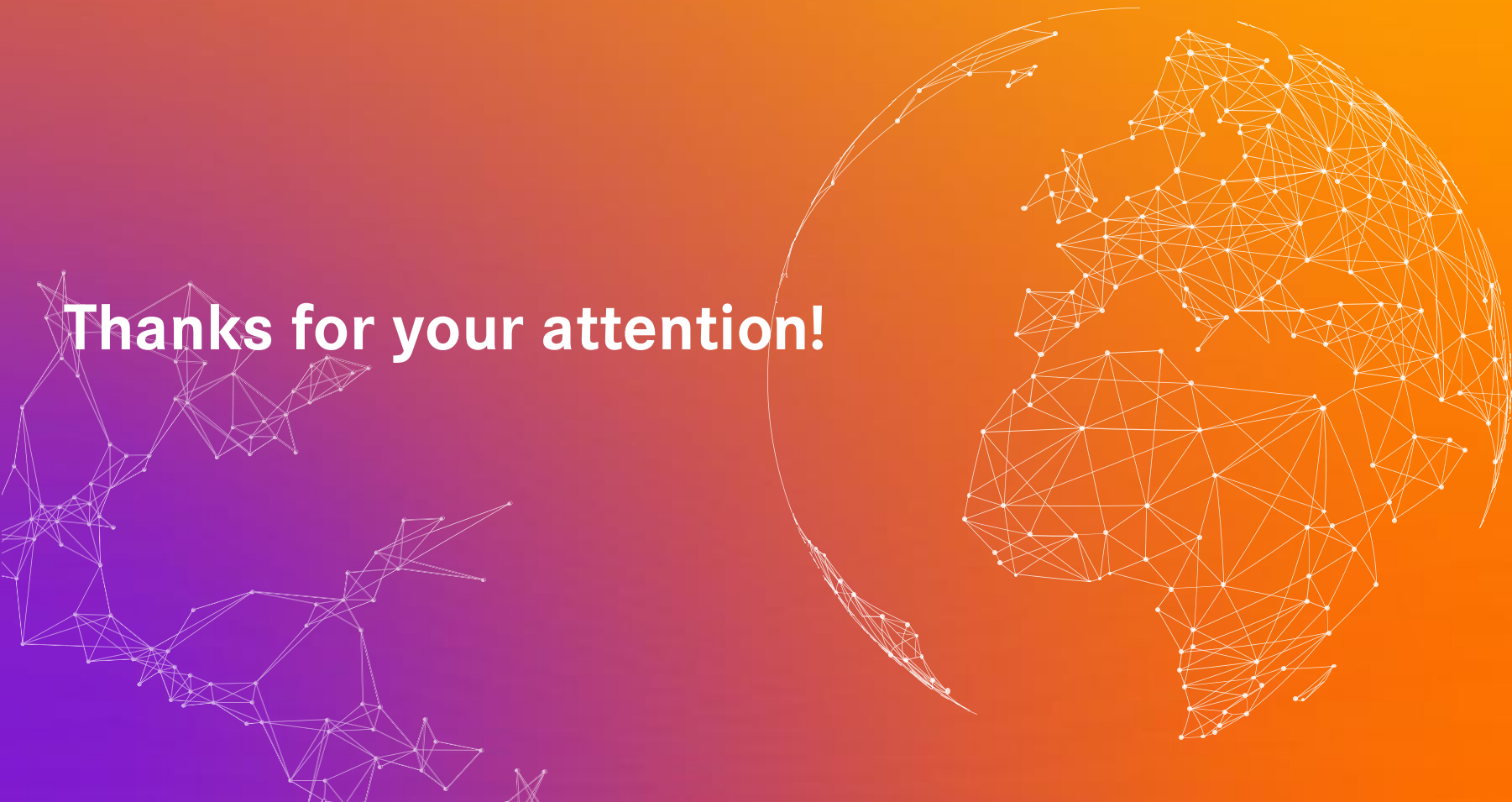


IMPORTANT Design advice

10. Carrier systems may become unstable when the inner width (C) is less than 2x the inner height (D).
Especially when the bending radius (R) selected is greater than 3x the link height.



Thanks for your attention!



alive

BY  **LAPP**