LAPP Asia Pacific Webinar Series 2020

GETTING THE MOST OUT OF YOUR DRAG CHAIN

The Speaker

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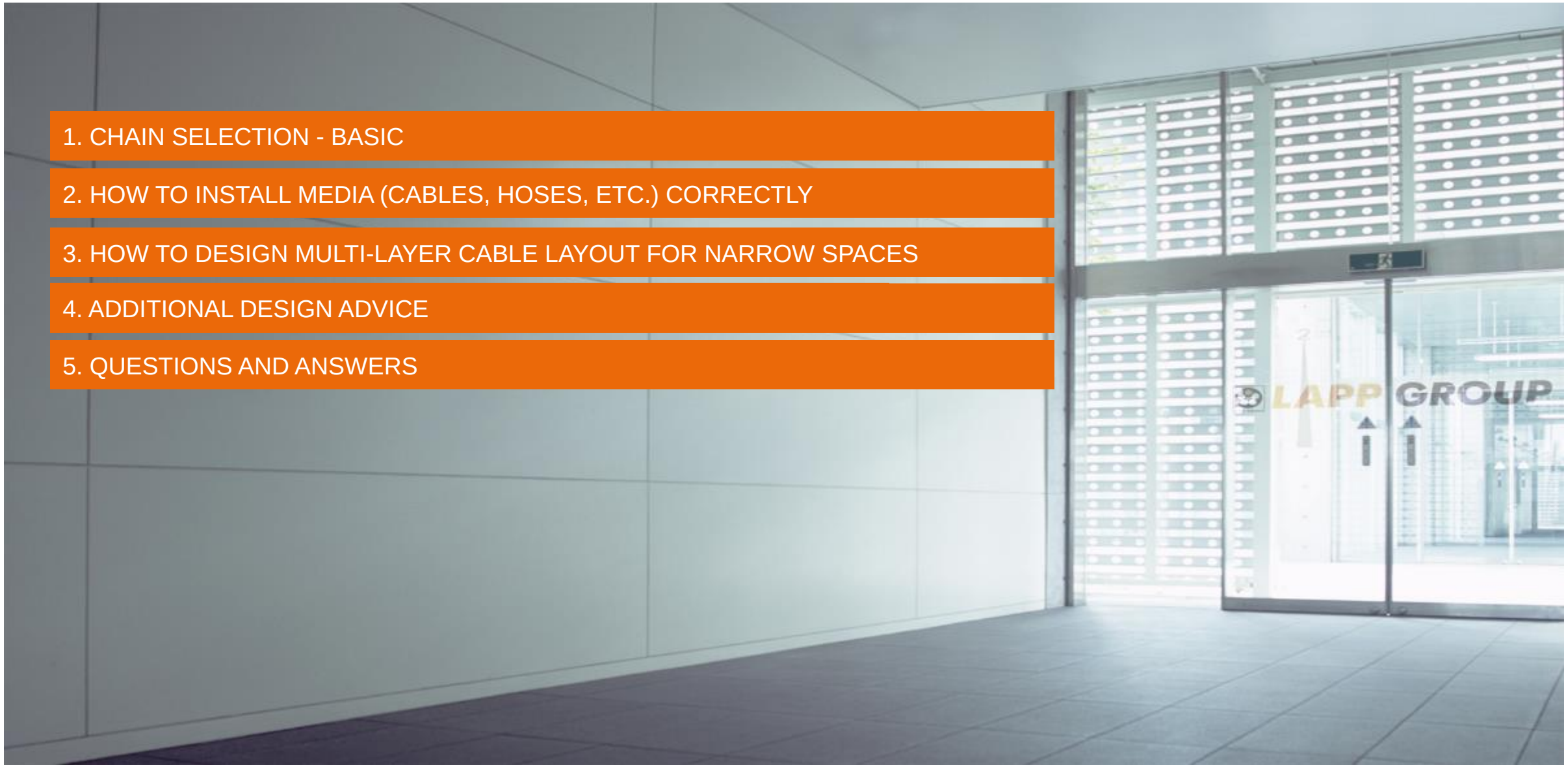
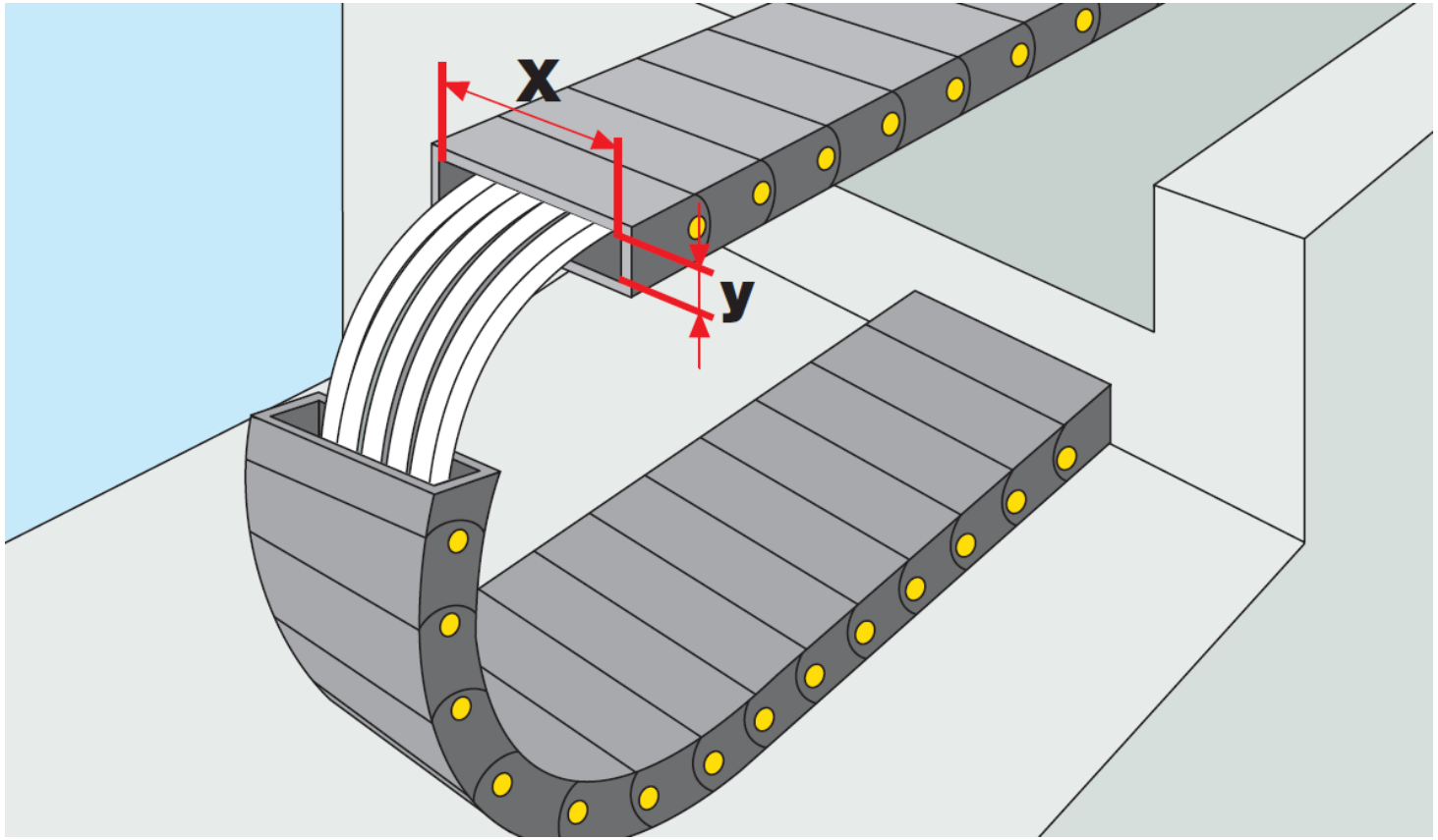
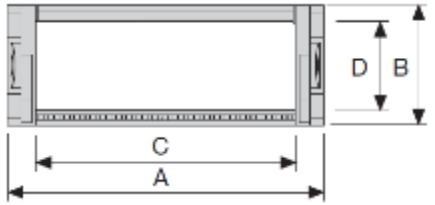
VDE-Reg.-Nr. 7030
RoHS
ÖLFLEX° SERVO FD 796 CP
DESINA.


LAPP KABEL STUTTGART
ETHERLINE® HEAT CAT. 7
LAPP KABEL STUTTGART
UNITRONIC® BUS PB FD


1. CHAIN SELECTION - BASIC
2. HOW TO INSTALL MEDIA (CABLES, HOSES, ETC.) CORRECTLY
3. HOW TO DESIGN MULTI-LAYER CABLE LAYOUT FOR NARROW SPACES
4. ADDITIONAL DESIGN ADVICE
5. QUESTIONS AND ANSWERS
LAPP GROUP

1. CHAIN SELECTION BASIC

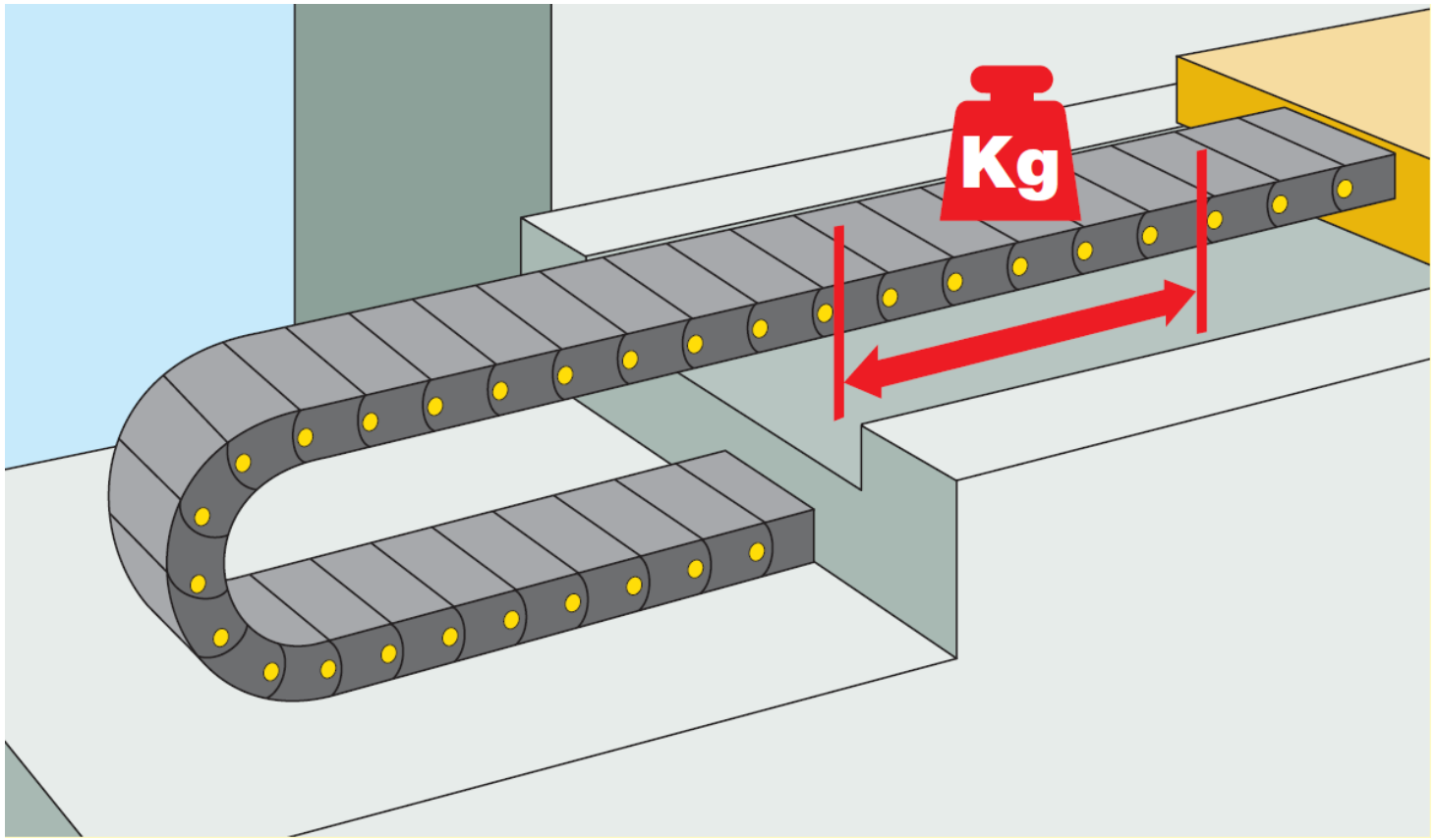


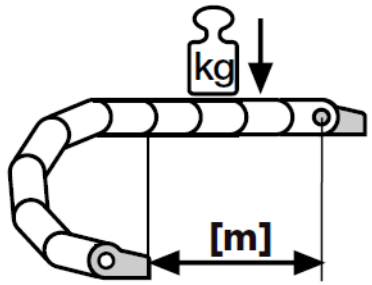


1. Dimensioning Power Chain

Determine the size of the Power Chain based on the specified installation space of your machine and/or of the selected filling (such as the number of cables/outer diameter of cable).

The dimensions of the cable chain in relationship to the dimensions of cables/hoses.

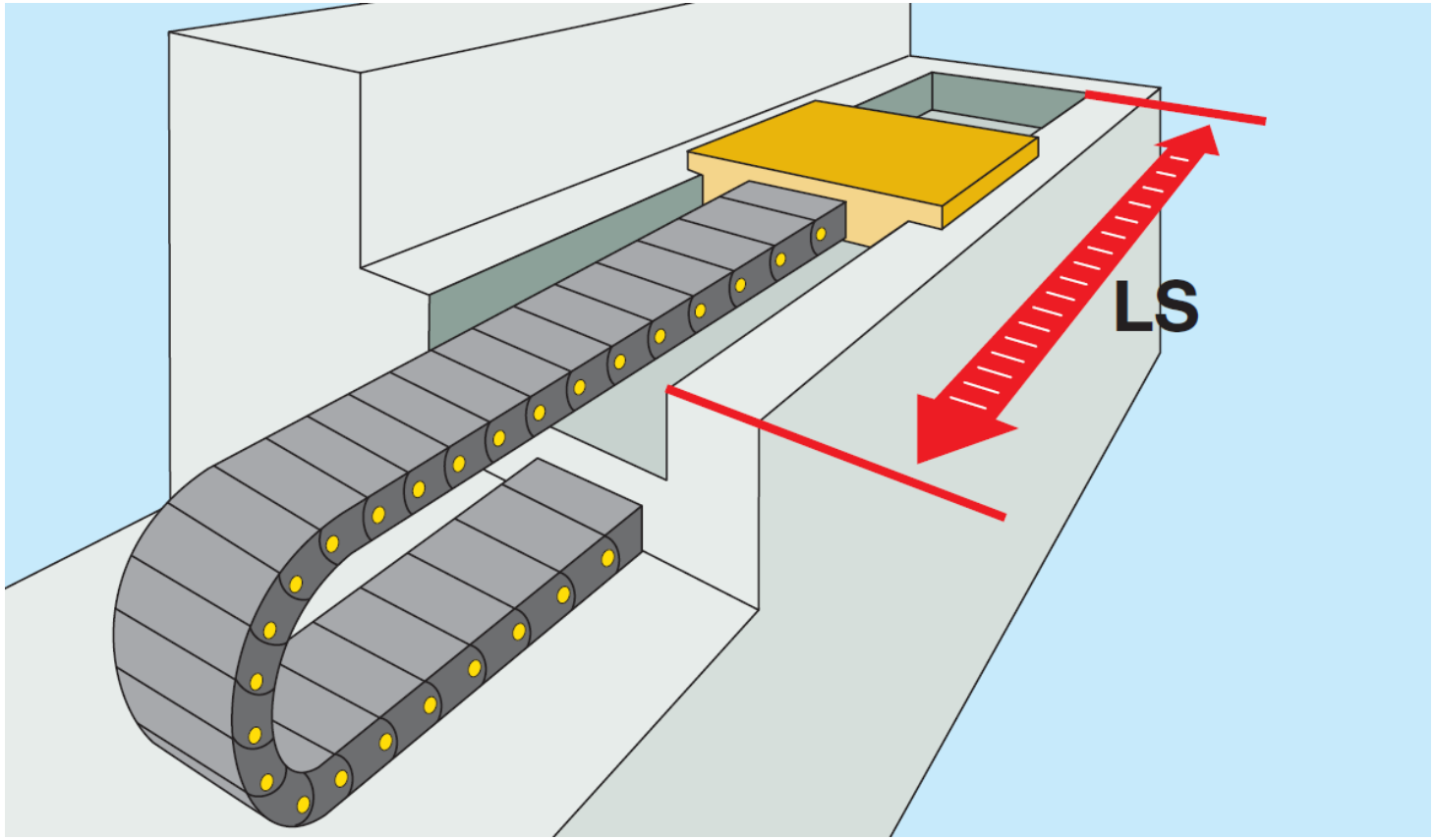


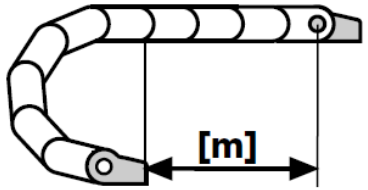


2. Determine fill weight

Determine fill weight of (cables and/or media hoses) in [kg/m] using Lapp Catalogue for Quick Selection or manufacturer specification.

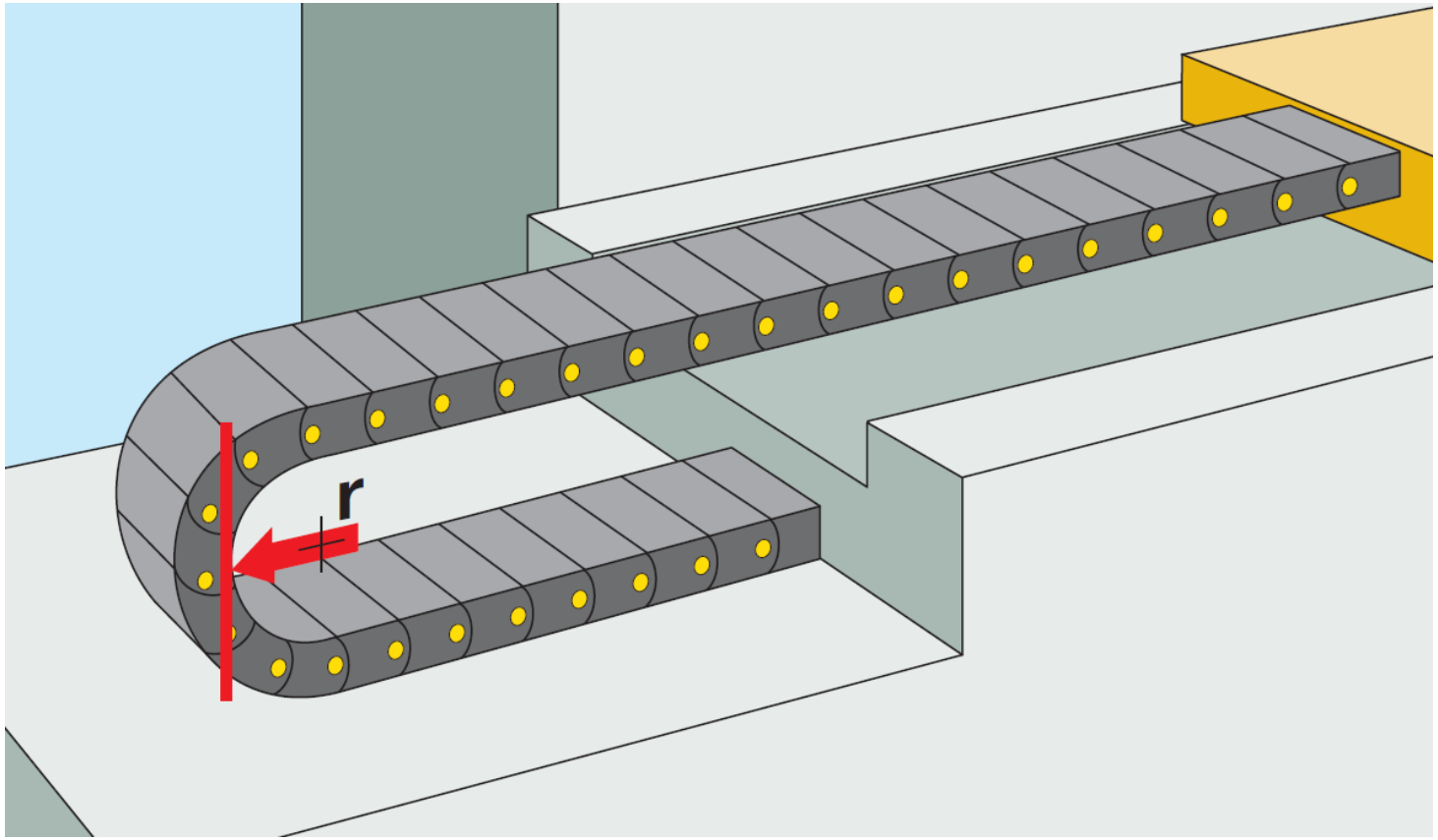
Verifying the self-supporting capacity of the cable chain in relationship to the weight per meter of cables/hoses.

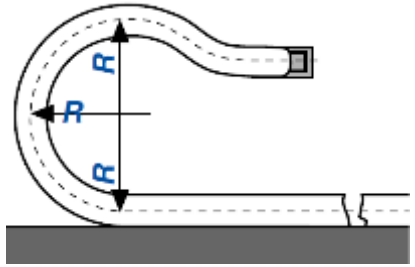




3. Determine length of travel

Compare the fill weight calculated in (point 2) to the maximum fill weight of the selected Power Chain and check suitability for "unsupported application".

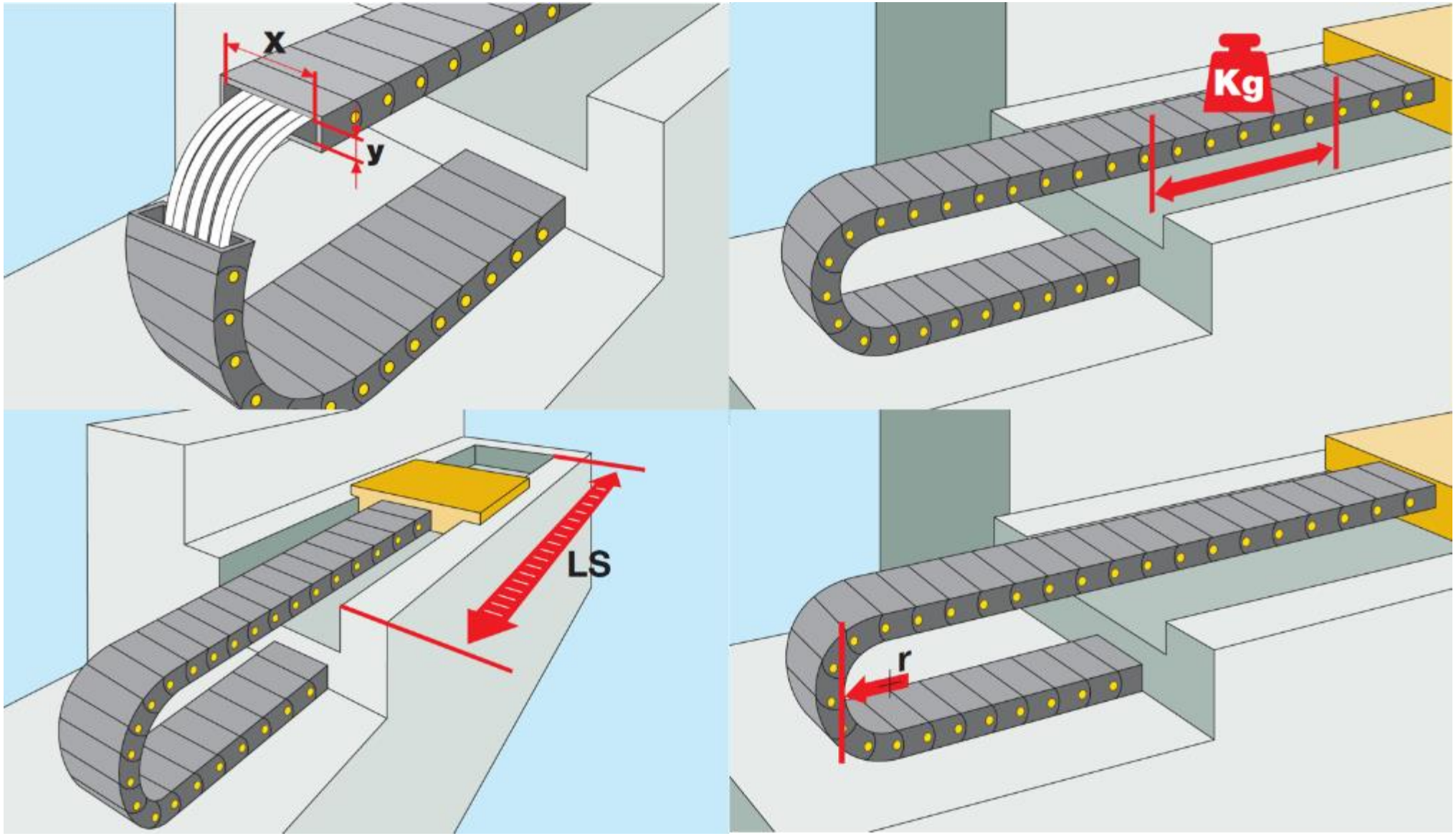




4. Bending radius R

Determine the possible Bending Radius R [mm] of the Power Chain with respect to the cable diameter.

The bending radius of the Power chain should be selected based on the recommendations of the cable or hose manufacturer.
The selection of a larger radius than the minimum will positively affect service life. The specification of minimum bending radii for cables and hoses refers to use at normal temperatures - other bending radii may be recommended.


x
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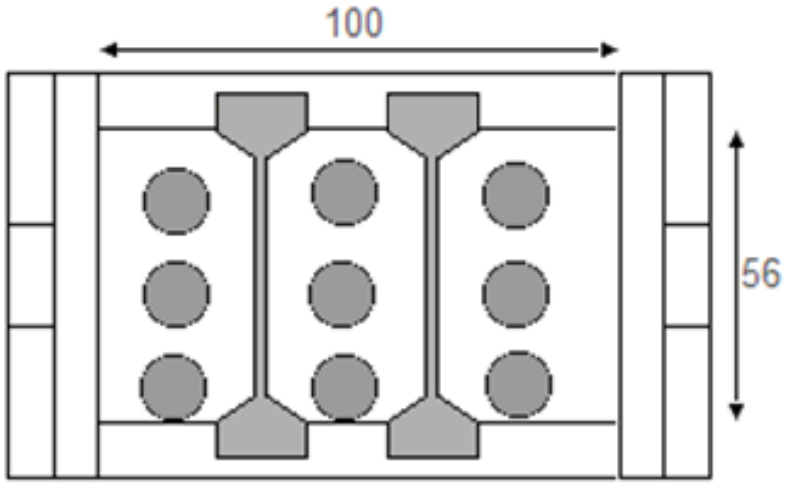
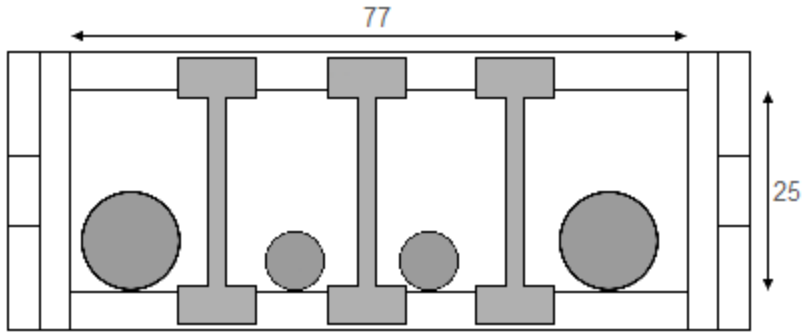
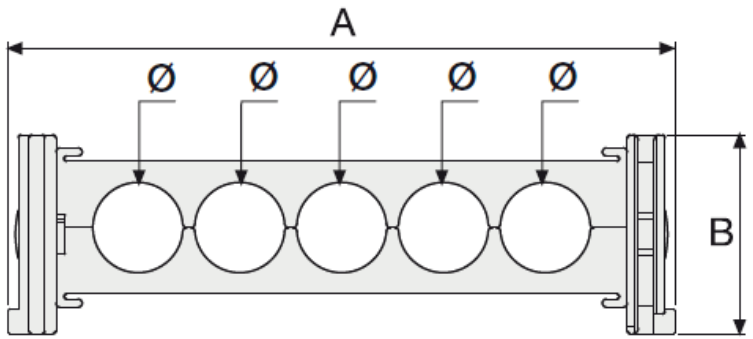
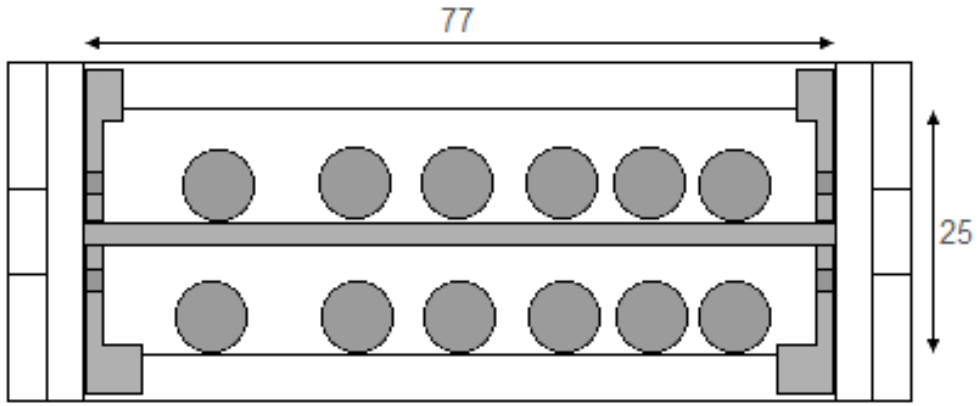


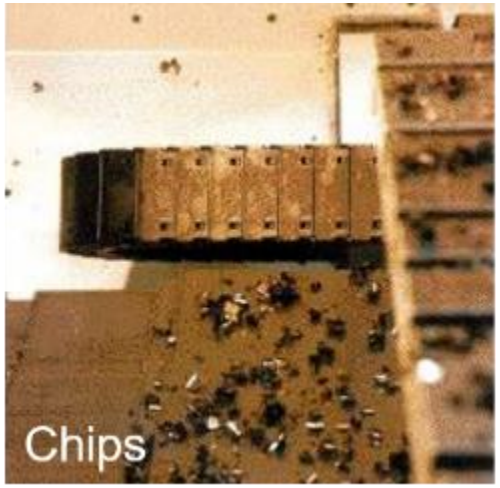






5. Types of Interior Layout and Design

Depending on the number of fillings and the space available, we will help customer to decide the best layout inside the chain.



6. Environments

Temperature and other surrounding influences.

Just as important as the dynamic parameters to provide information regarding the environmental conditions. Whether chips, concrete, ice and snow, or waste - anything is possible - if the appropriate measures are taken.

Appropriate action may be that the drag-chain must be an enclosed type in order to protect them from dirt or ice. If not, the chain may break or wear out in a very short time.

7. Drag chain style / types – Closed - Open - Snap-openable one side or two-sides

Another criterion for the selection of the drag-chain is the question of the opening options.

And that leads us to the final point of the selection criteria...

S$ € RM

฿ ₱ Rp

8. The Price

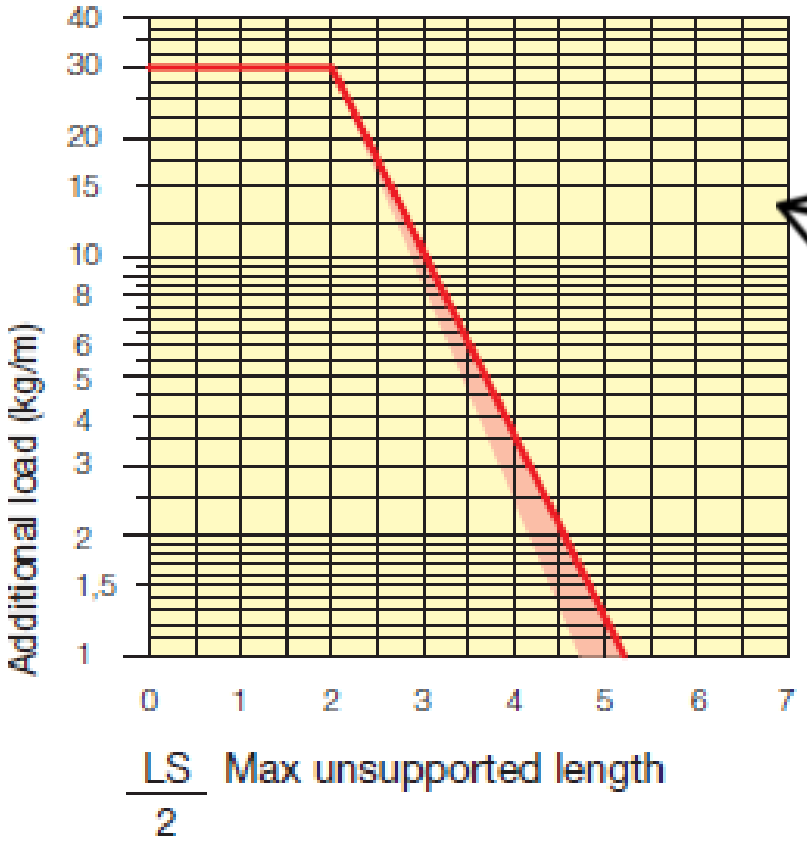
Usually there is more than one way to solve the application.

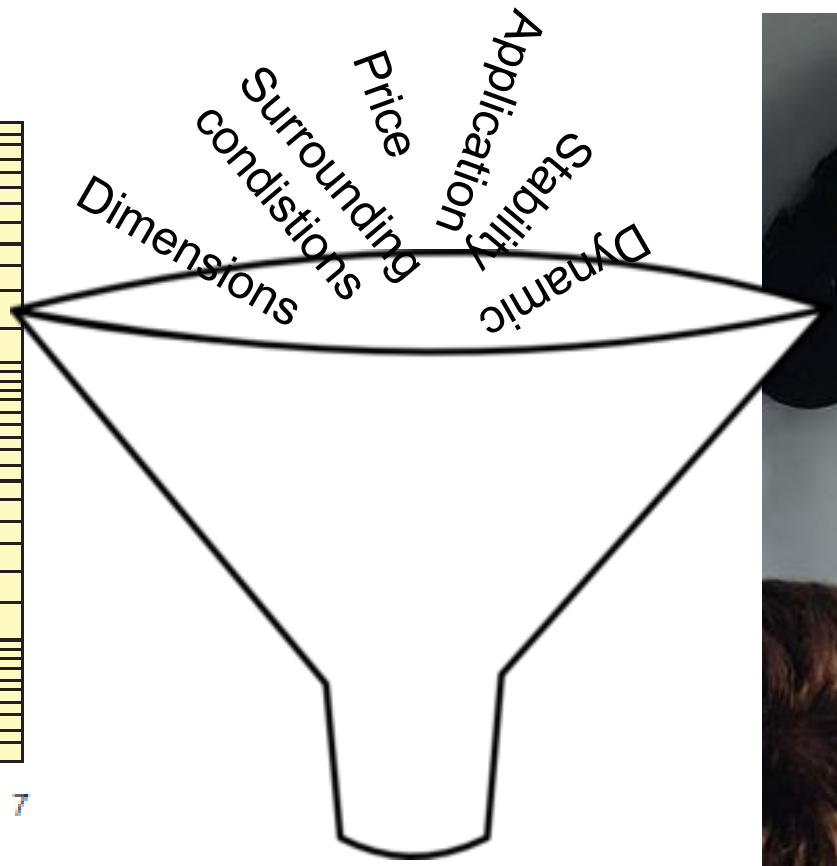
In addition to the options in earlier slide the opening of the drag-chain or power tube of the price always play an important role.

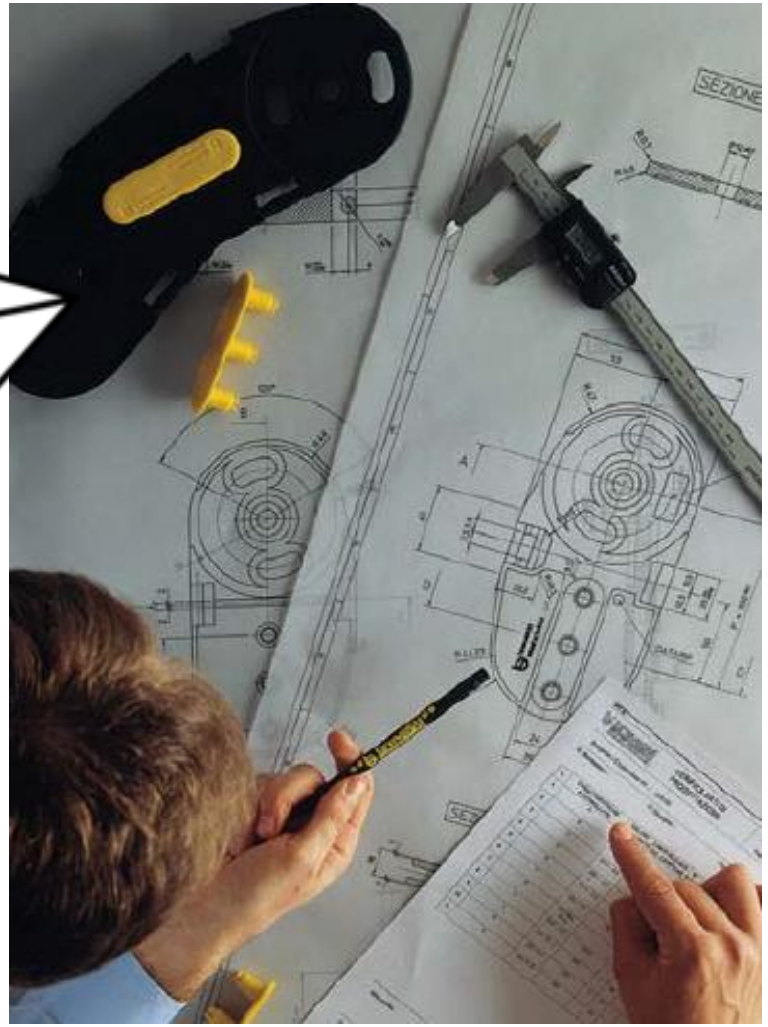
Simplified one can say: the more stable and easier to open, more features, more components, the higher the price.

At Lapp, we believed the cheapest solution that work is the best option for customer!

Datasheet + **Selection criteria** + **Engineering**







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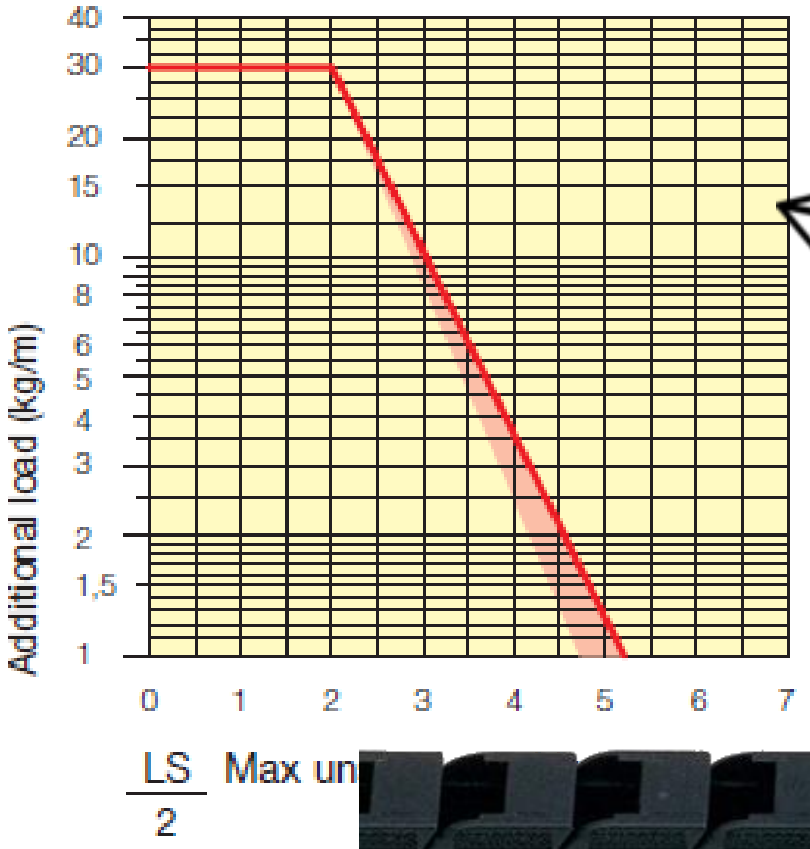

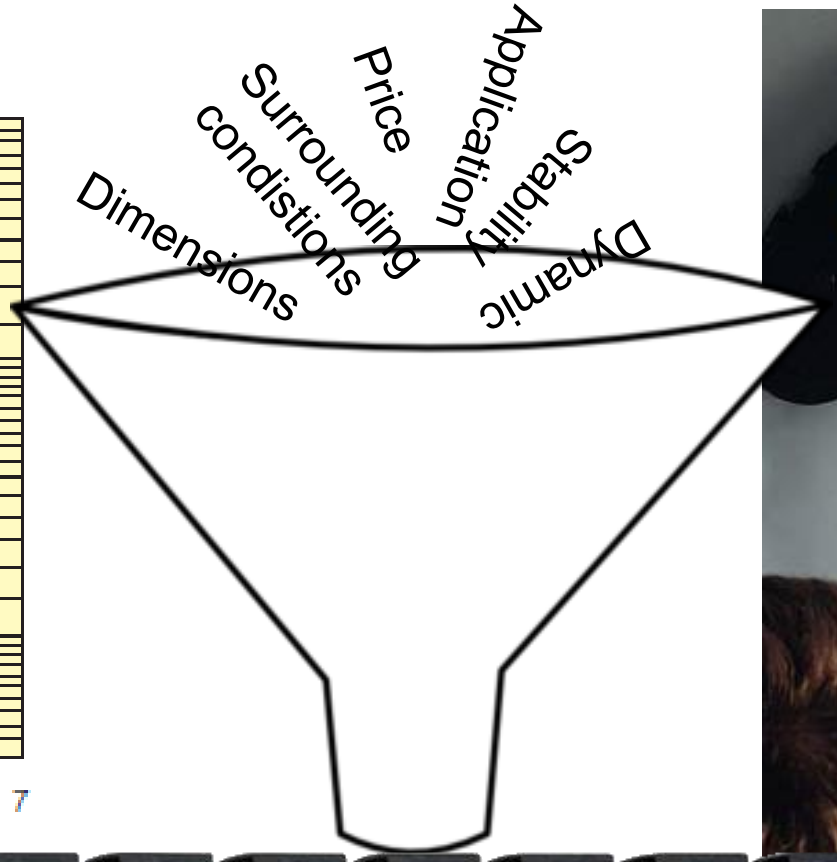

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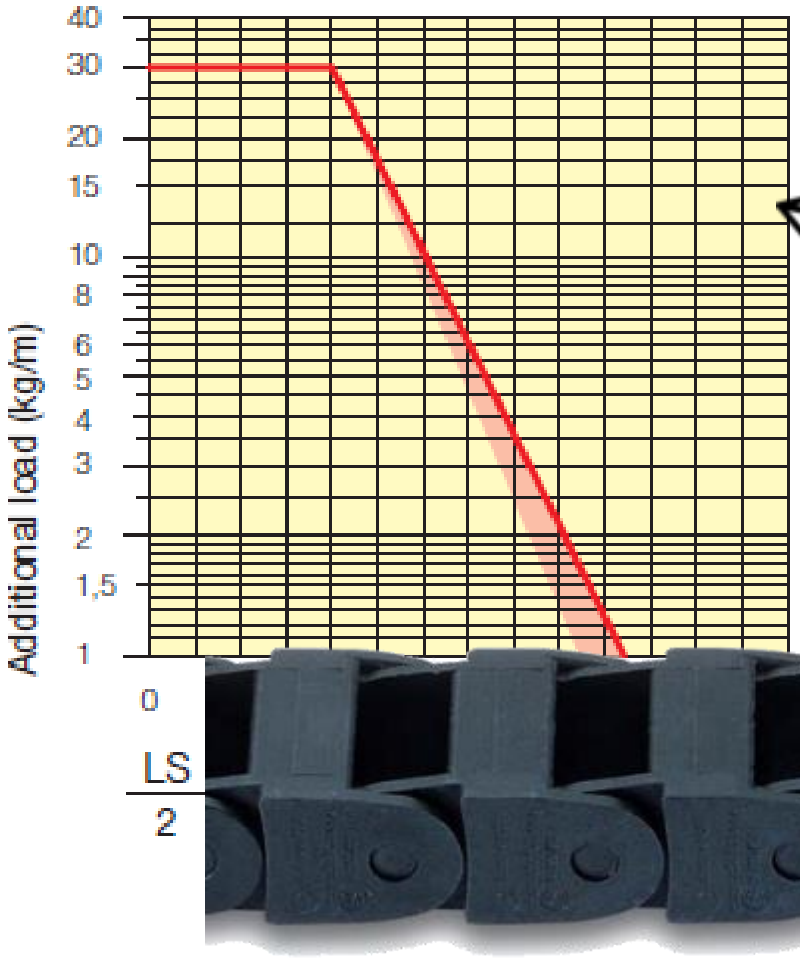

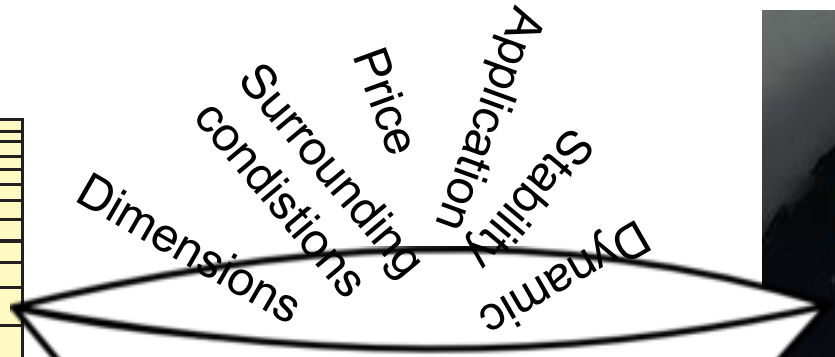

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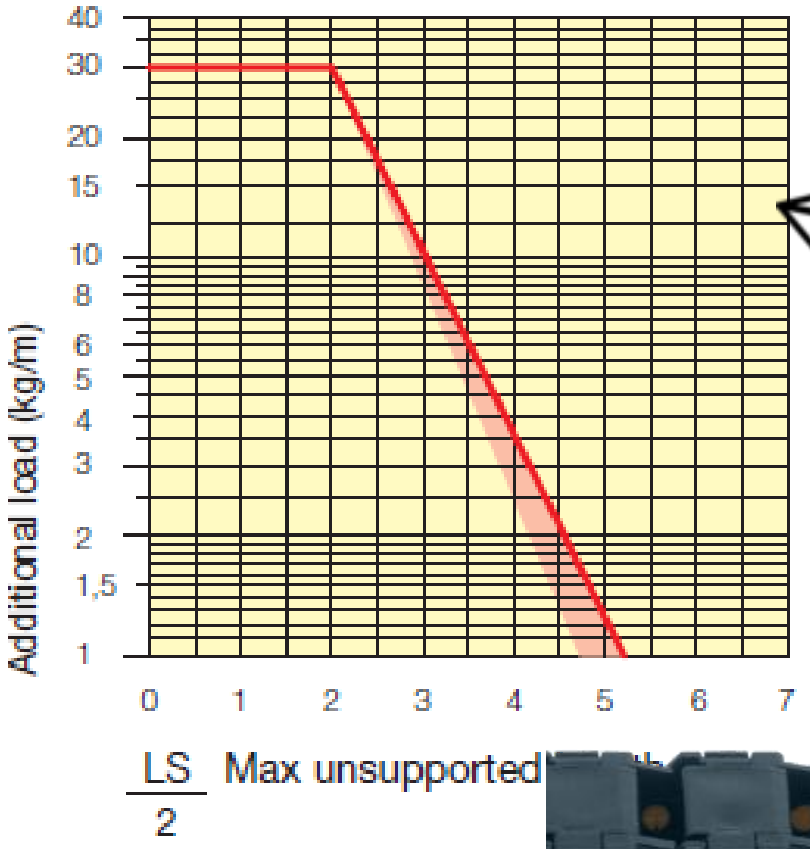

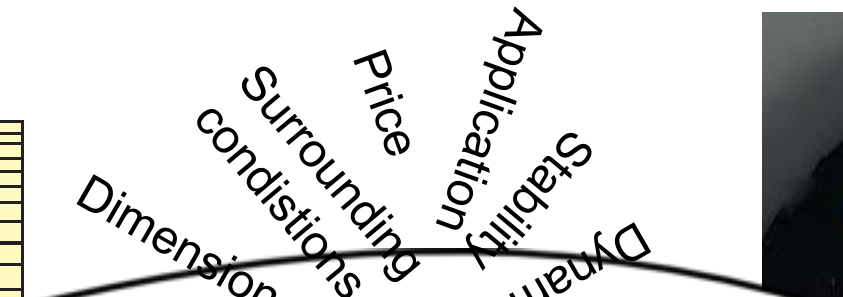

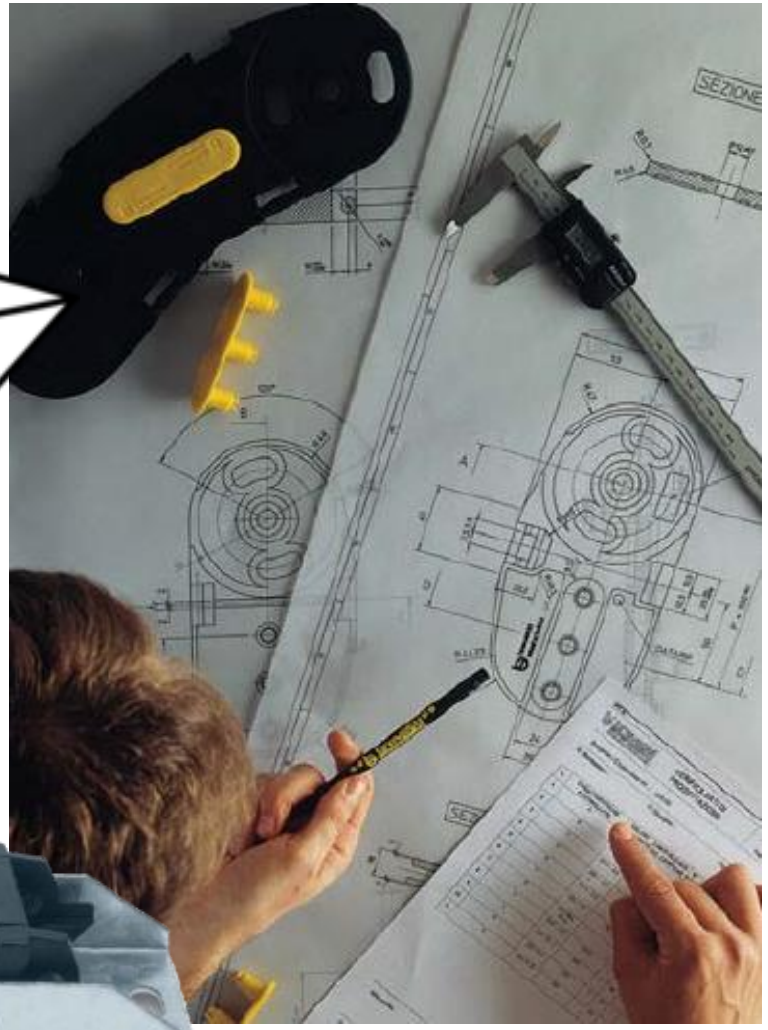

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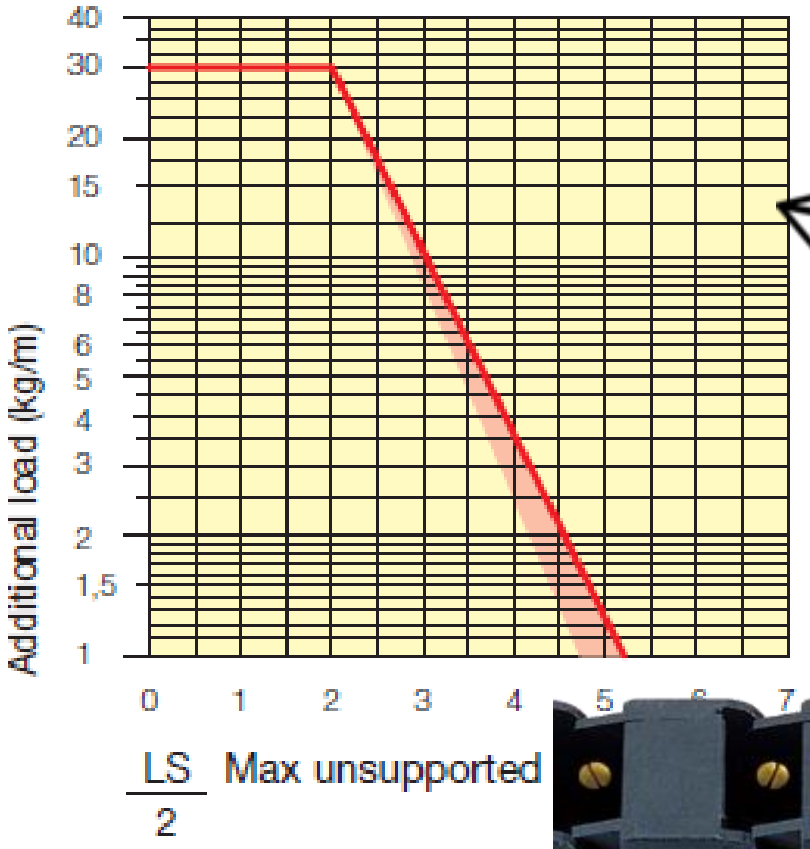

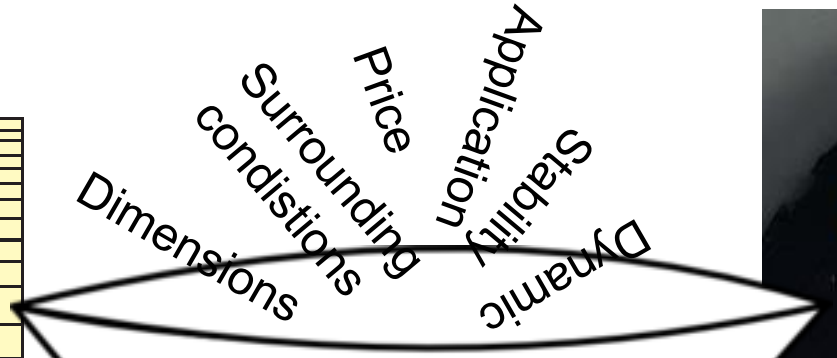

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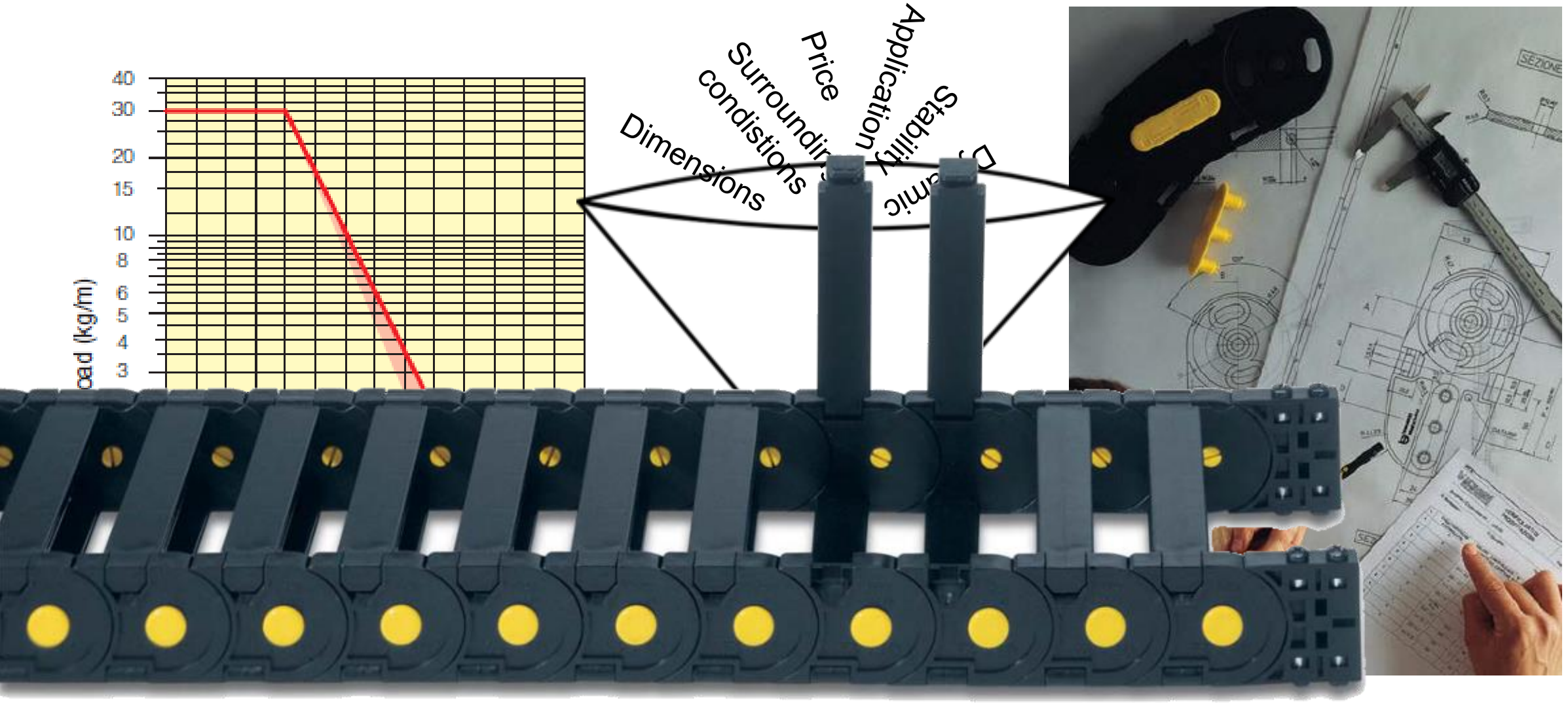

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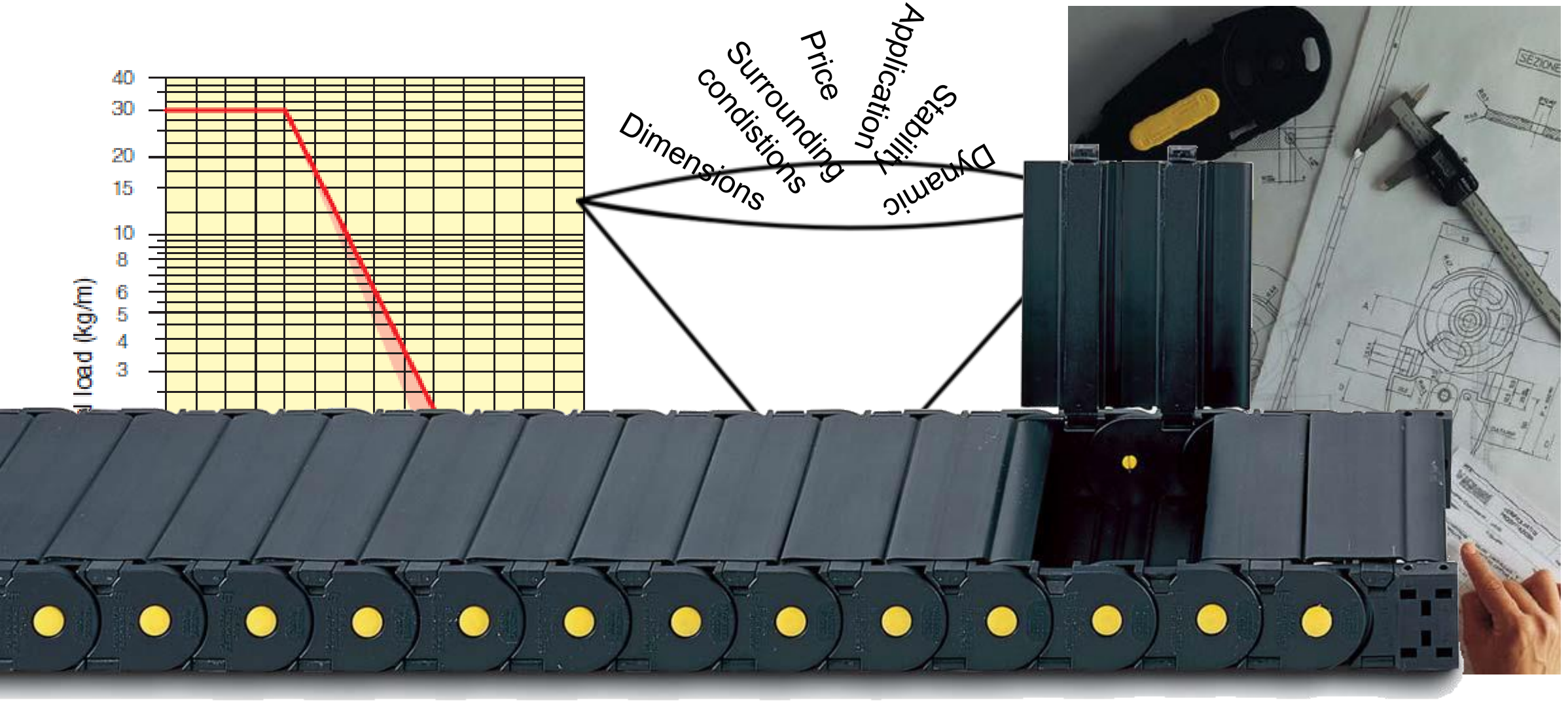

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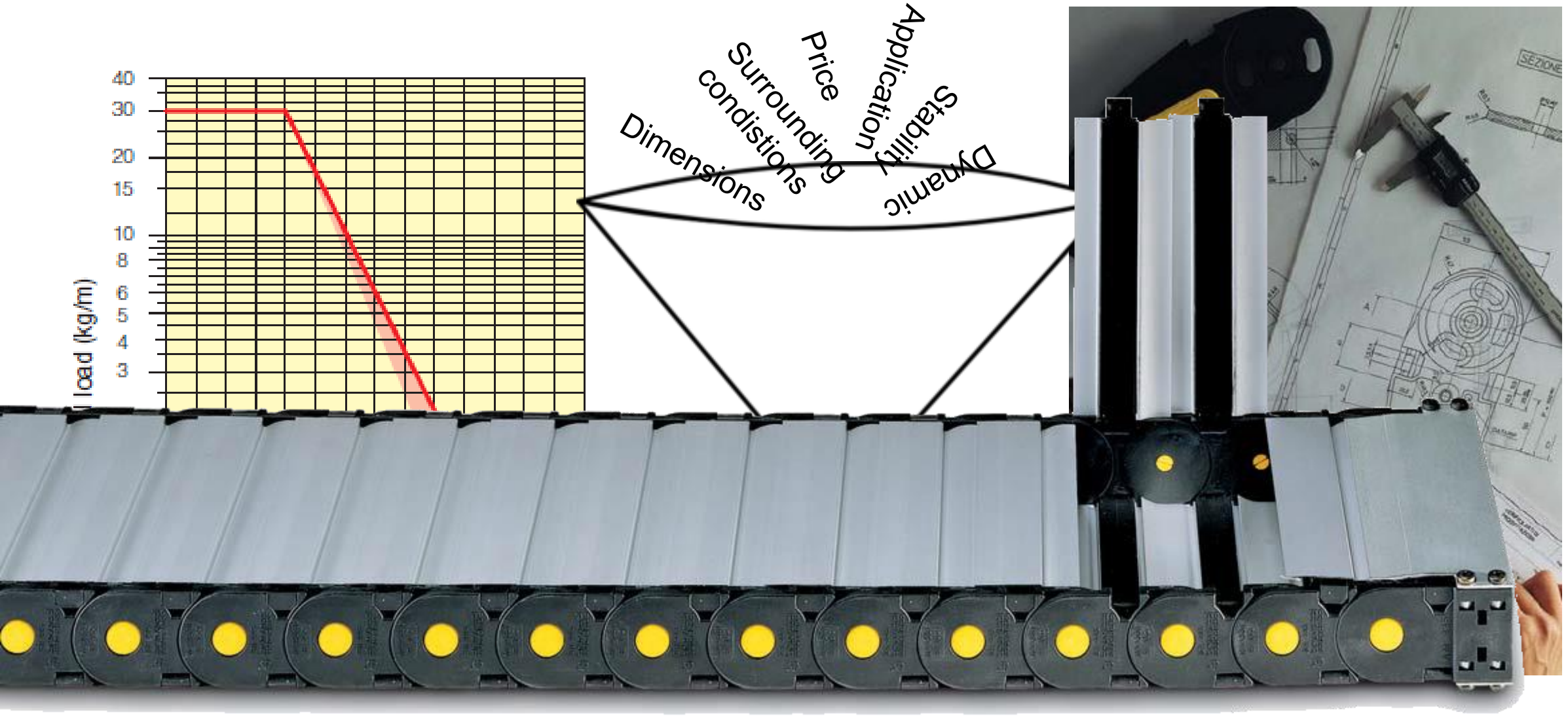

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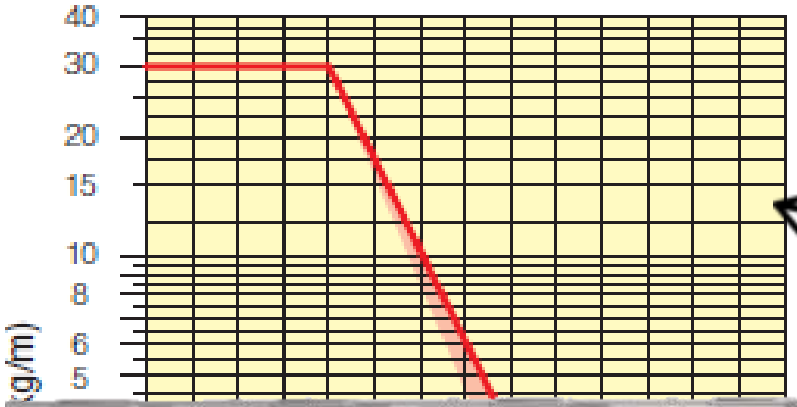
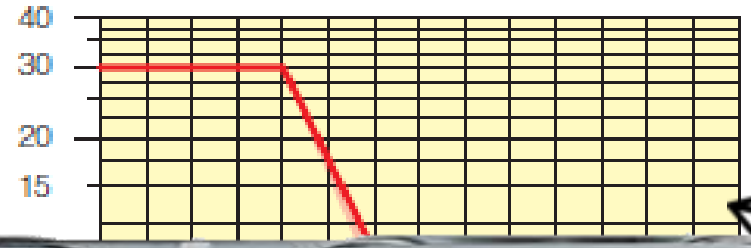


Dimensions
Surrounding condistions
Price
Application
Stability
Dynamic

Datasheet + **Selection criteria** + **Engineering**



Dimensions
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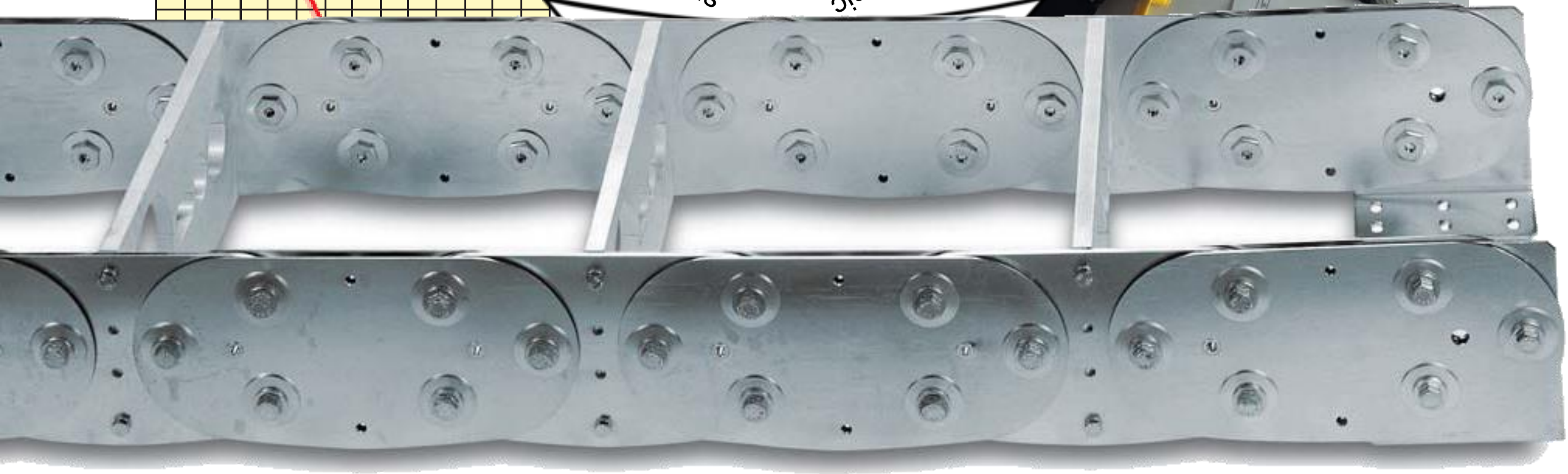
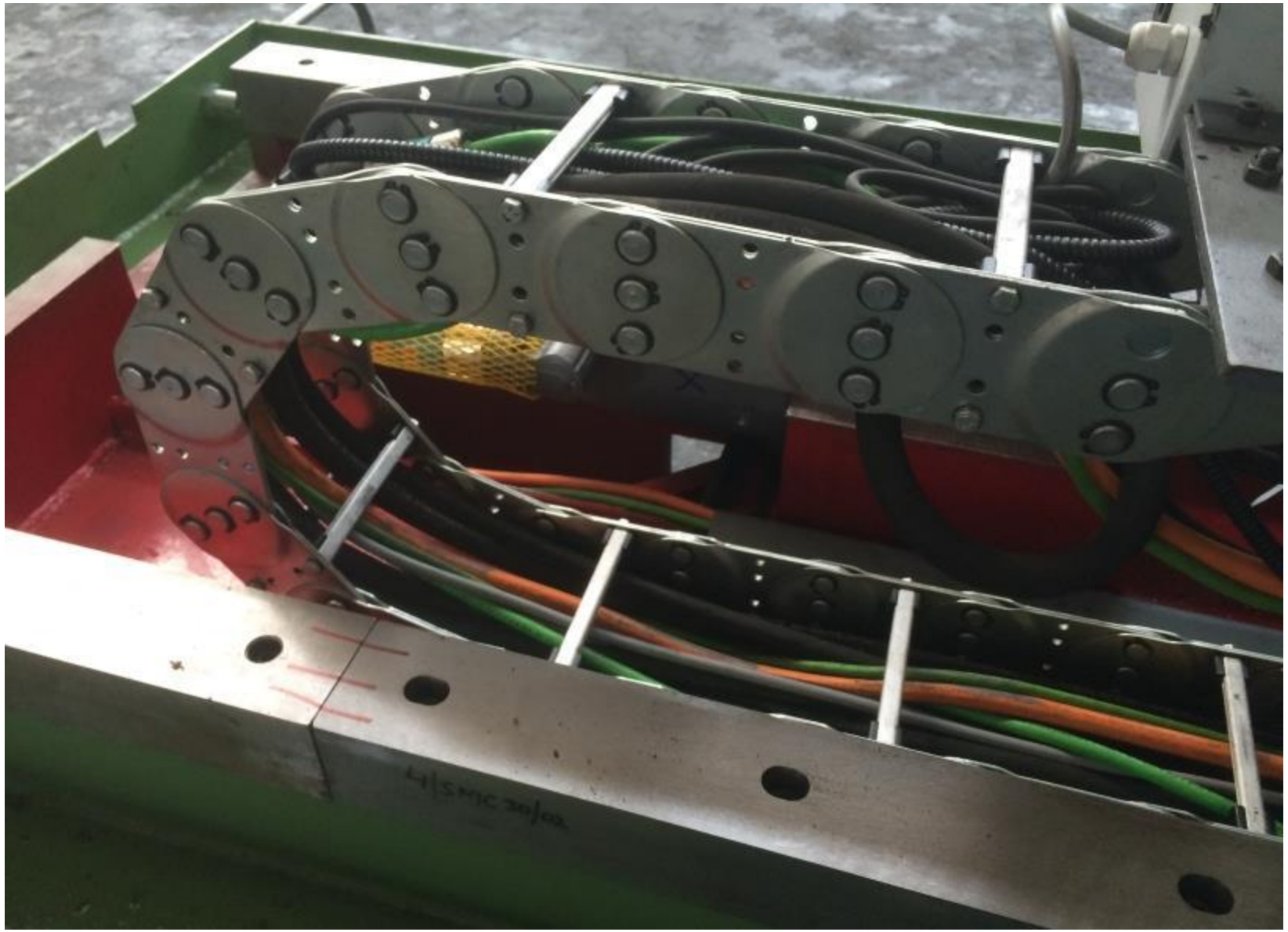


2. HOW TO INSTALL MEDIA (CABLES, HOSES, ETC.) CORRECTLY

Why is it important to have a propper filling drag-chain?

- The main reason to increase the service life of the system.
- With proper seperators and shelves usage will help to improve the service life of cables and hoses.

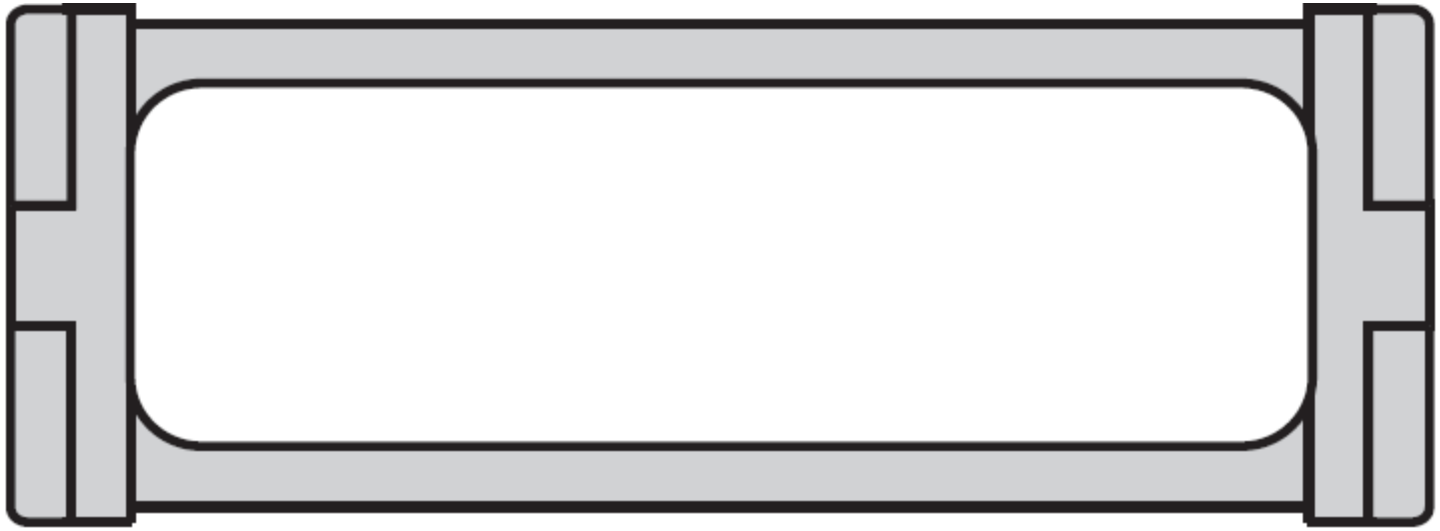



We want to avoid these!

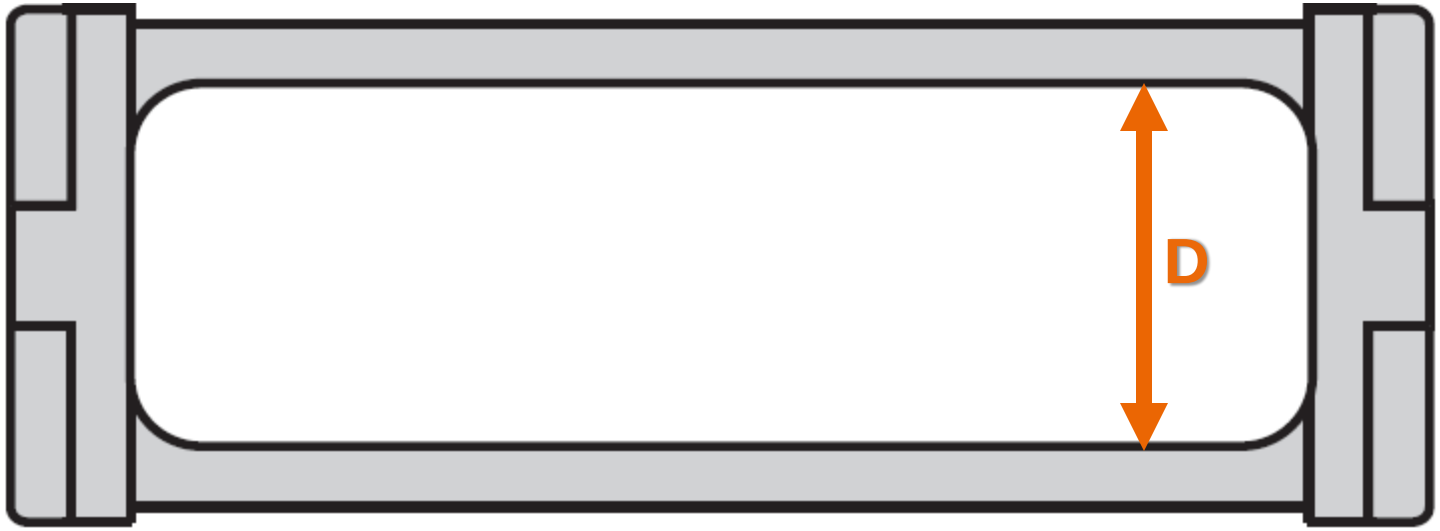
MAXIMUM FILLING


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

Maximum Filling

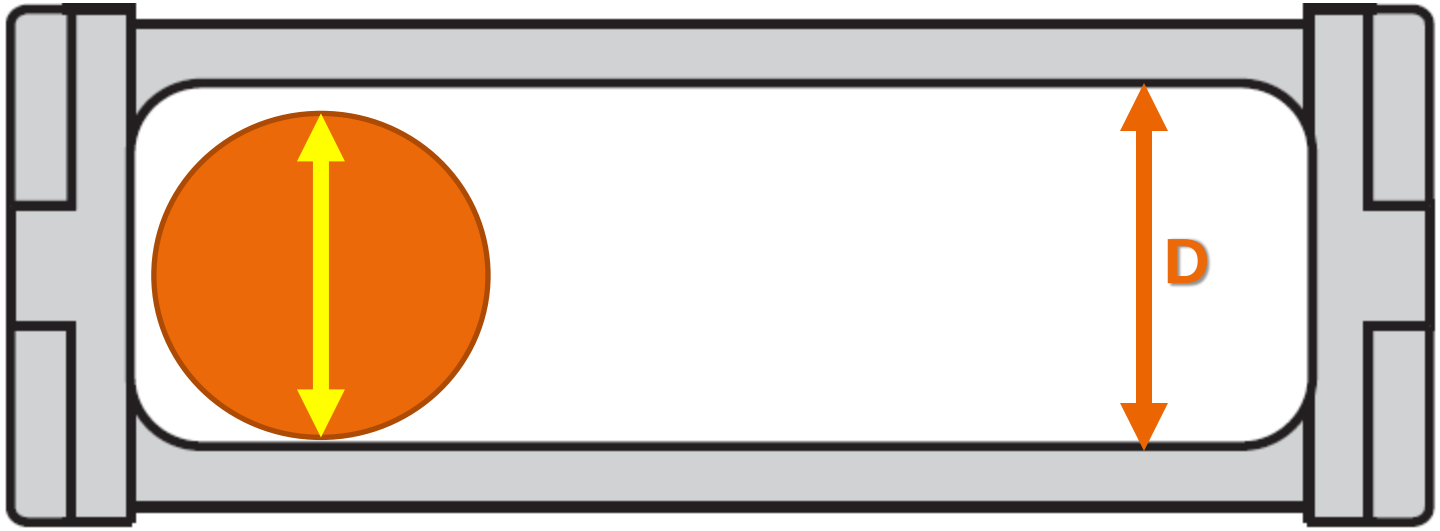


Maximum Filling



D = Chain Inner height – total clearance (eg: D = 50mm)

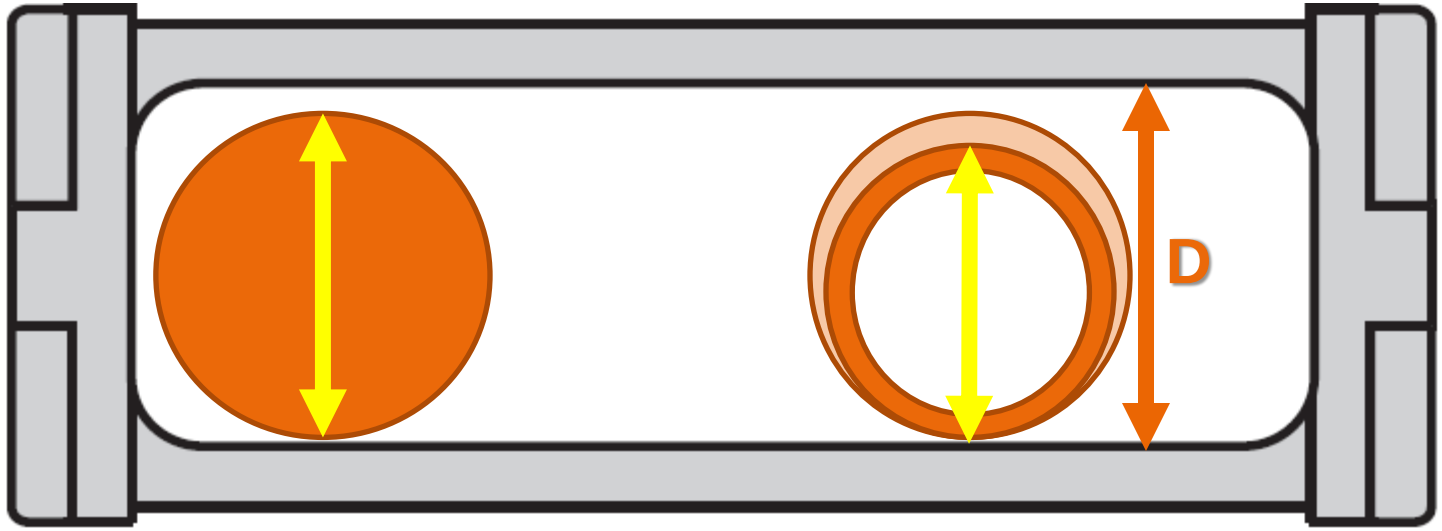
Maximum Filling



D = Chain Inner height – total clearance (eg: D = 50mm)

Max Electric Cables OD: Inner Height-10% (eg: 50mm-10% = 45mm)

Maximum Filling

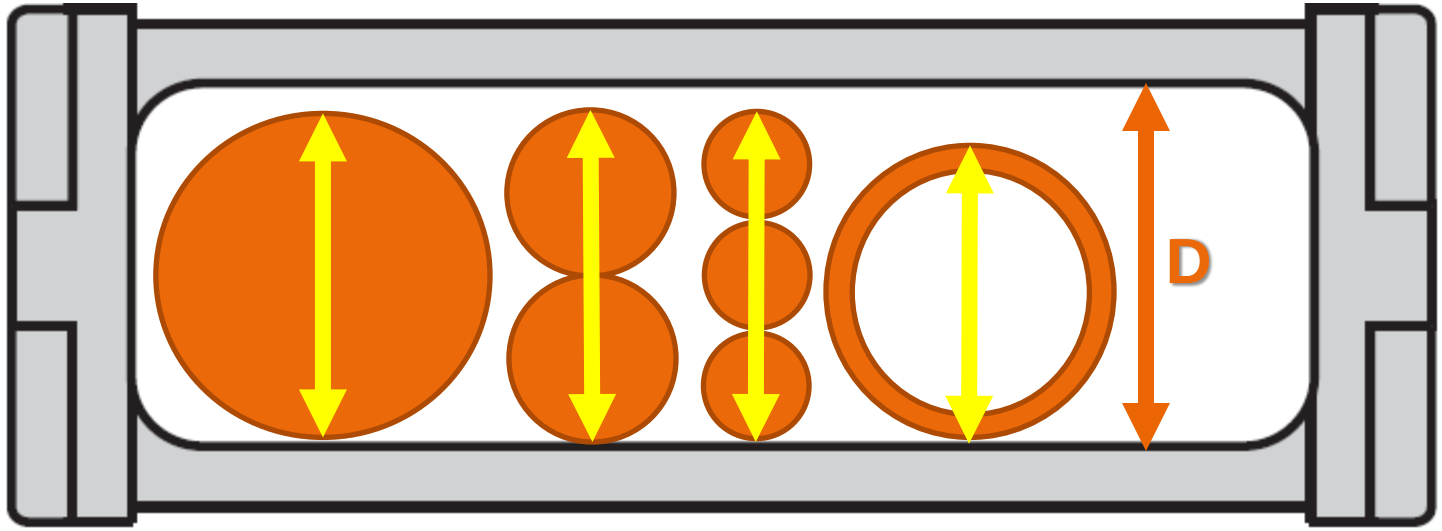


D = Chain Inner height – total clearance (eg: D = 50mm)

Max Electric Cables OD: Inner Height-10% (eg: 50mm-10% = 45mm)

Max Hoses OD: Inner Height-20% (eg: 50mm-20% = 40mm)

Maximum Filling



D = Chain Inner height – total clearance (eg: D = 50mm)

Max Electric Cables OD: Inner Height-10% (eg: 50mm-10% = 45mm)

OR

22.5mm + 22.5mm = 45mm

15mm + 15mm + 15mm = 45mm

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

Electrical round cables **10%**

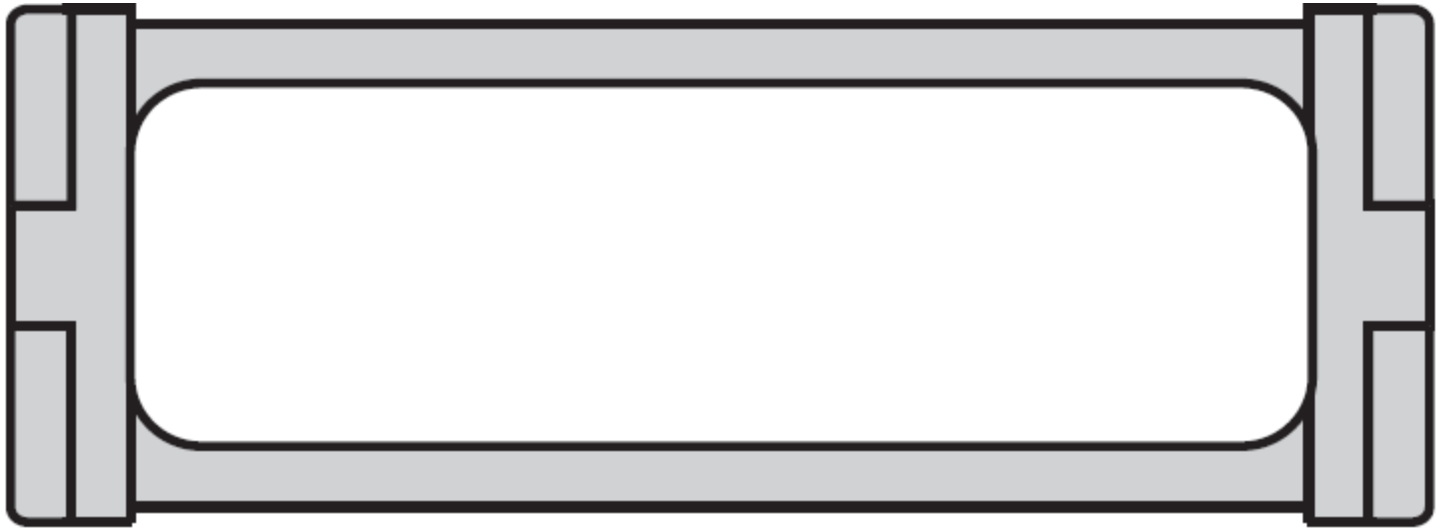
Electrical flat cables **10%**

Pneumatic **15%**

Hydraulic **15% ~ 30%**

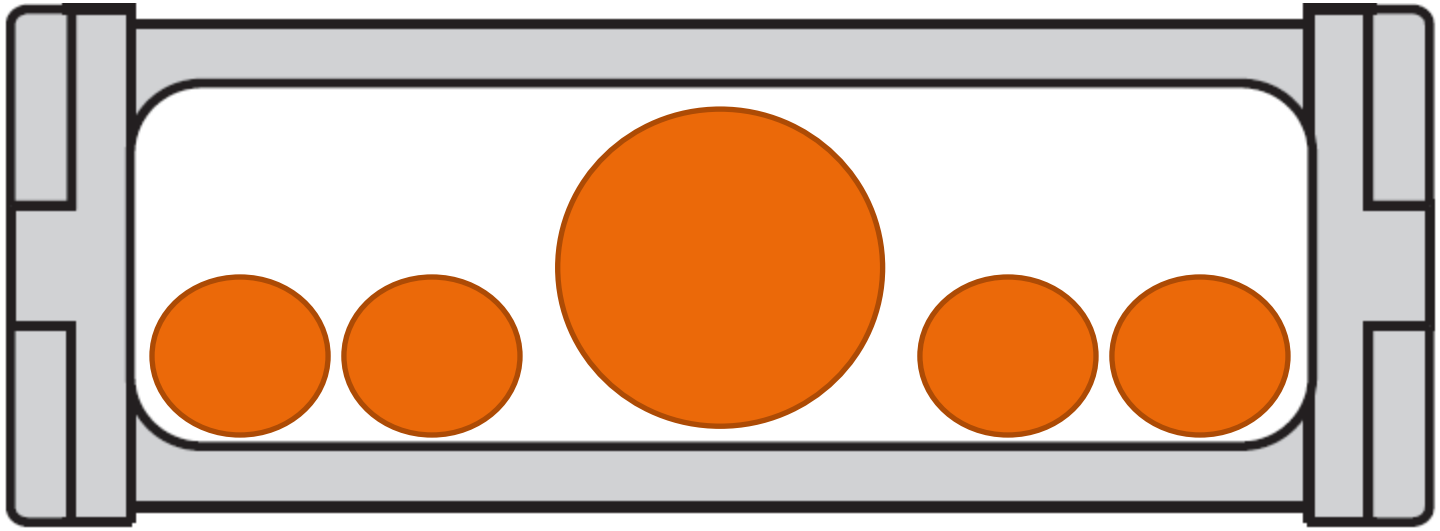
Media hoses **>30%**

Maximum Filling



Q How much should a drag-chain be filled?

Maximum Filling



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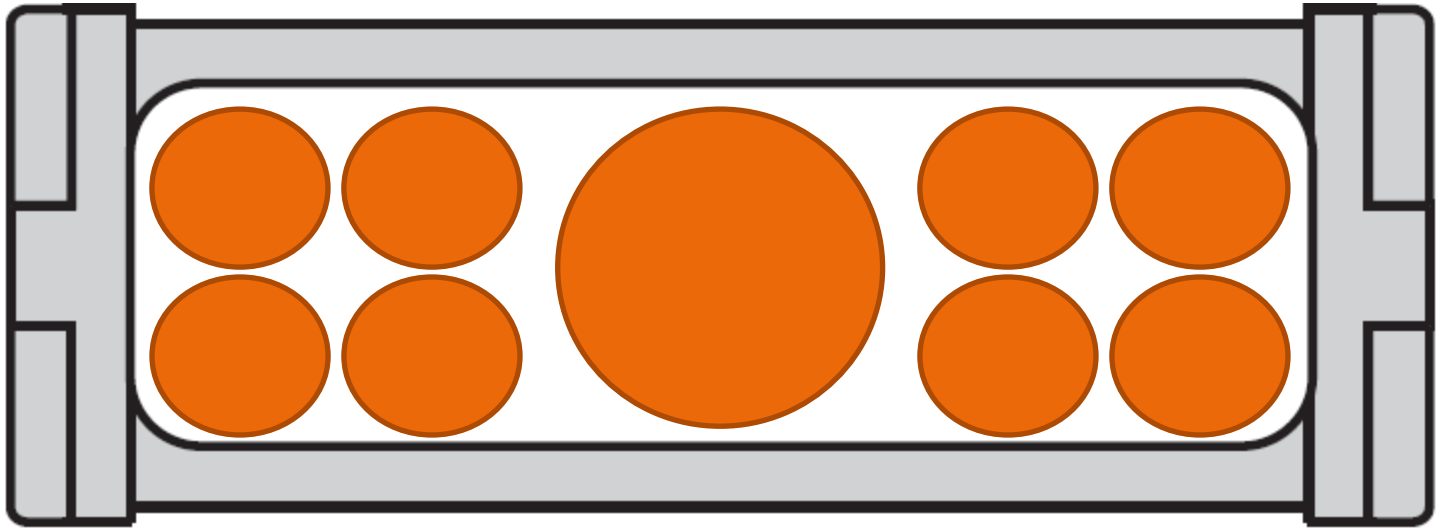

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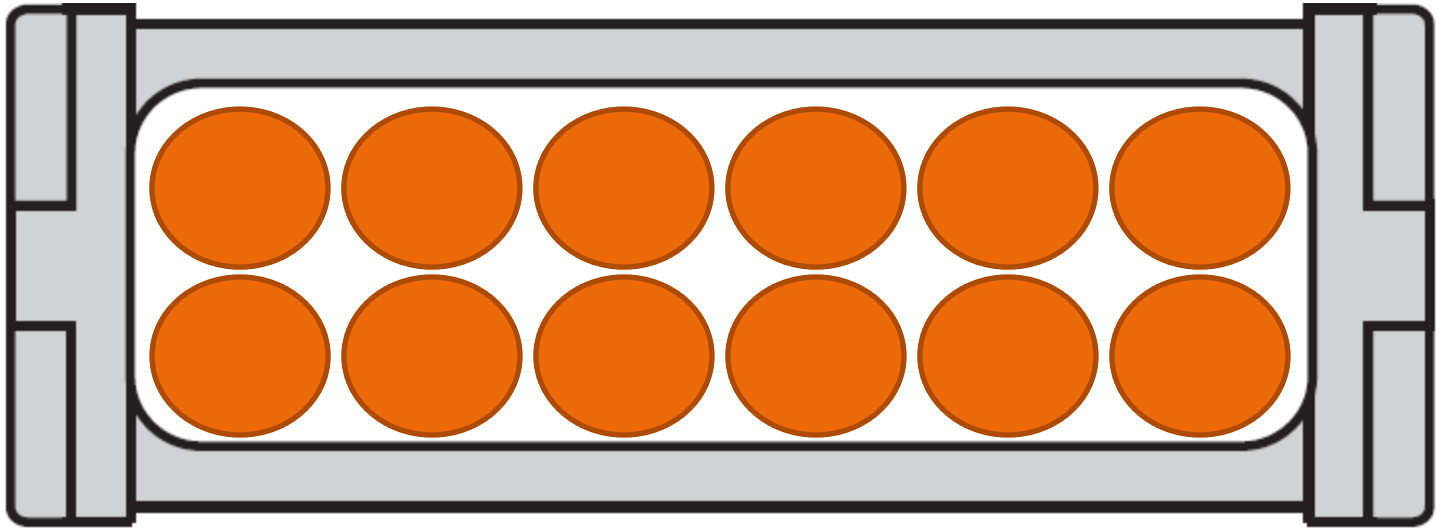

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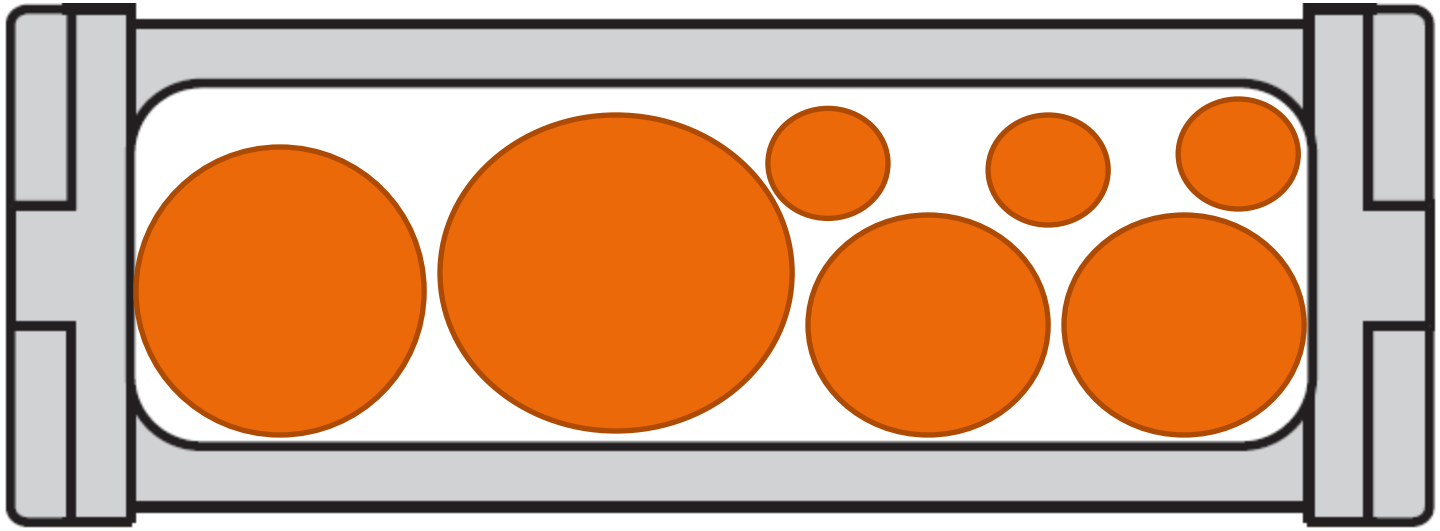

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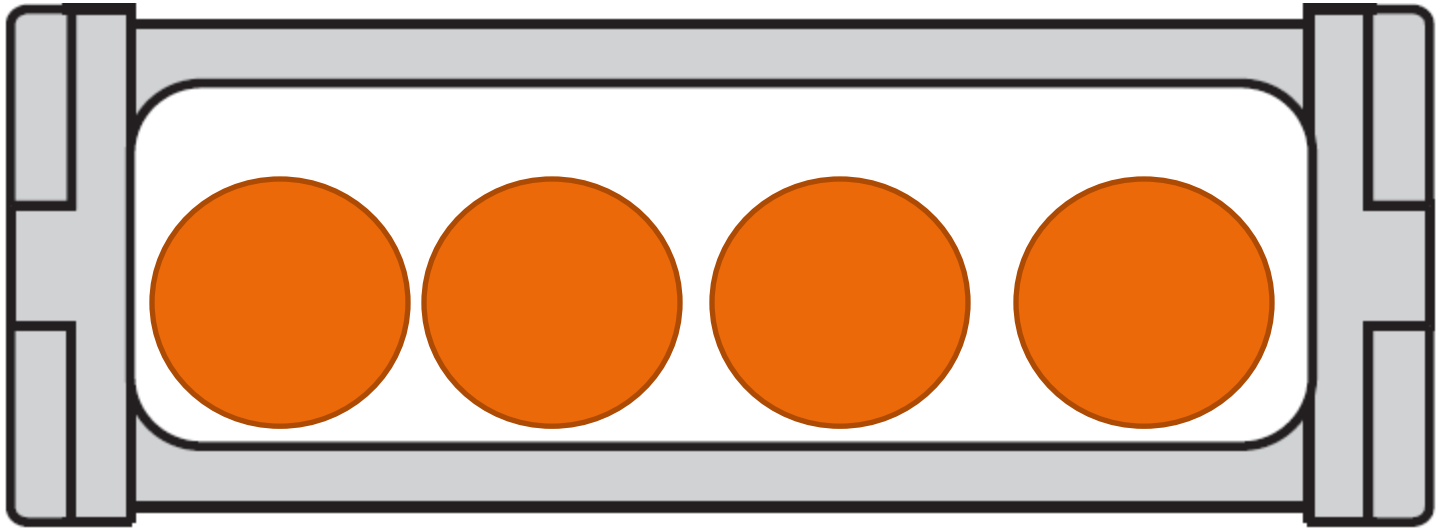
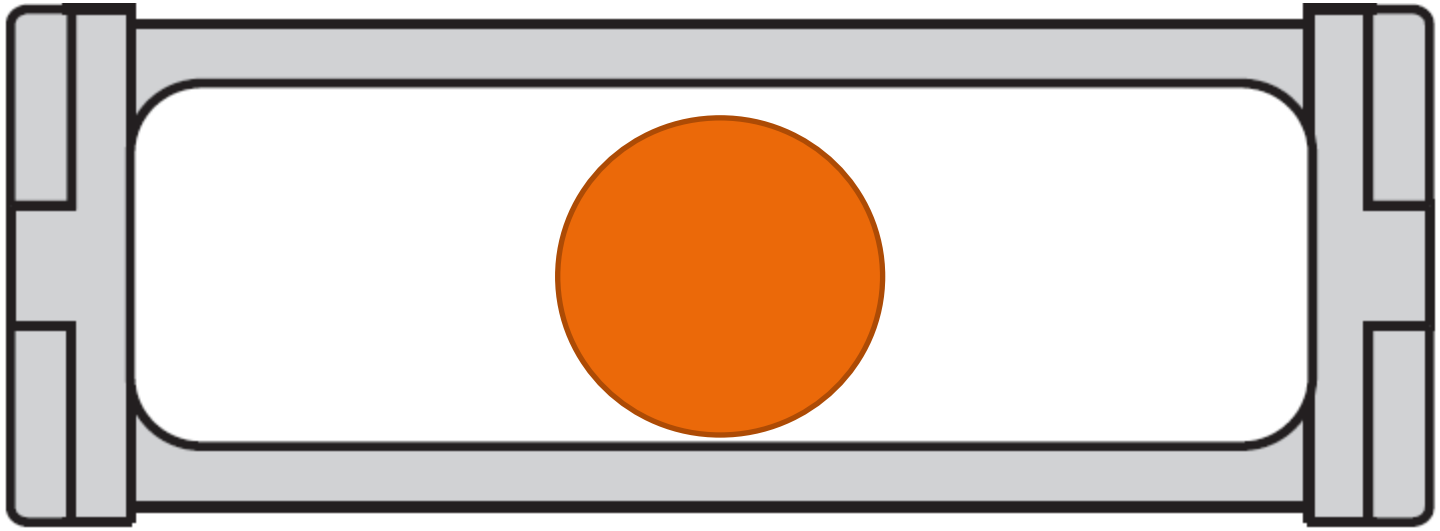


Q How much should a drag-chain be filled?

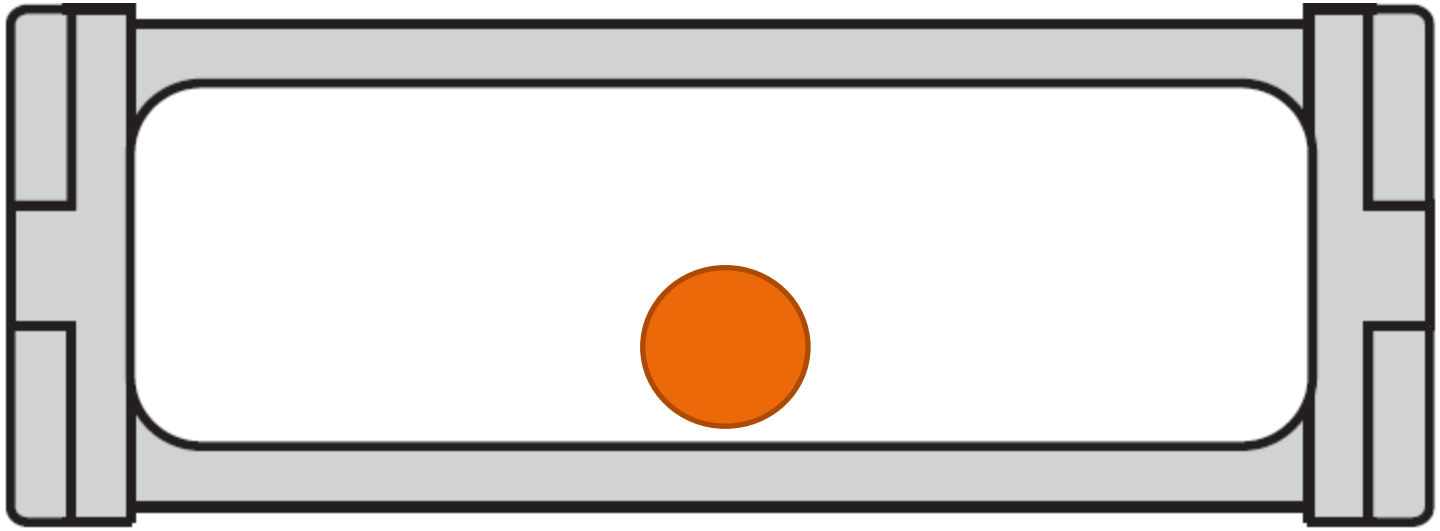
From LAPP, as cable specialist, we recommend not more than 80% of space in the drag-chain. A

Maximum Filling



This is OK.

Maximum Filling



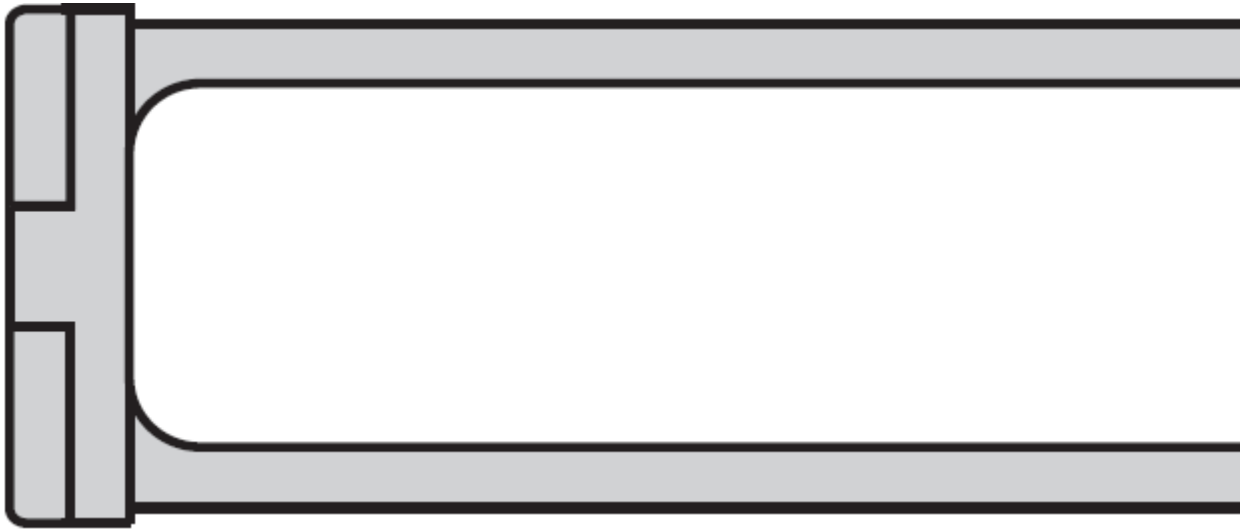
This is OK too.

(situation dependent)

WHEN TO USE A SEPARATOR

When to use a separator

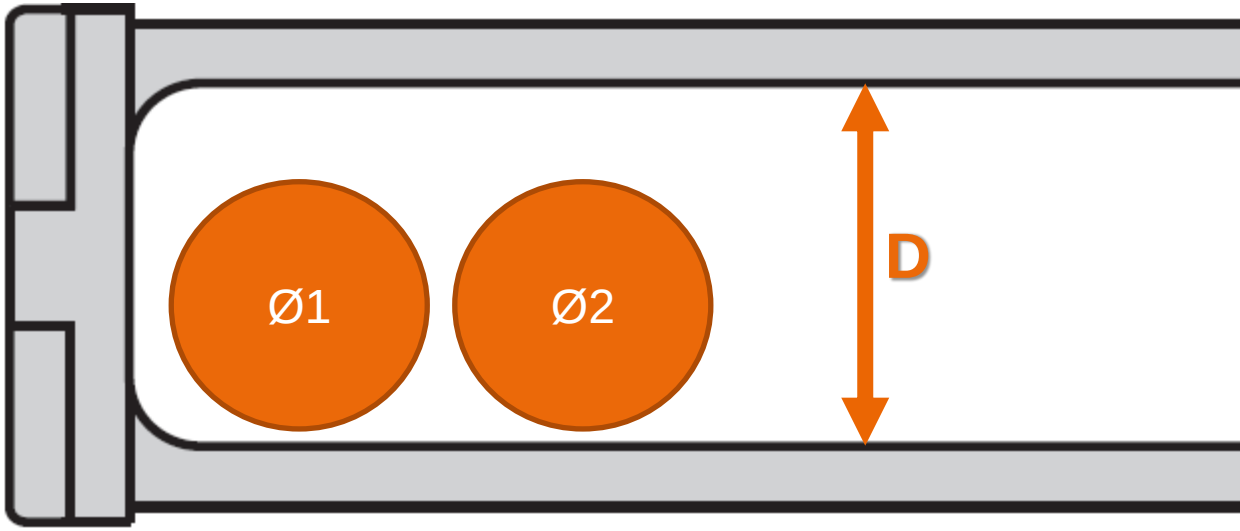
× Separator <u>not needed</u>, when



When to use a separator

× Separator <u>not needed</u>, when

Ø1 + Ø2 > D*1.2



× Separator <u>not needed</u>, when

Ø1 + Ø2 > D*1.2

Example:

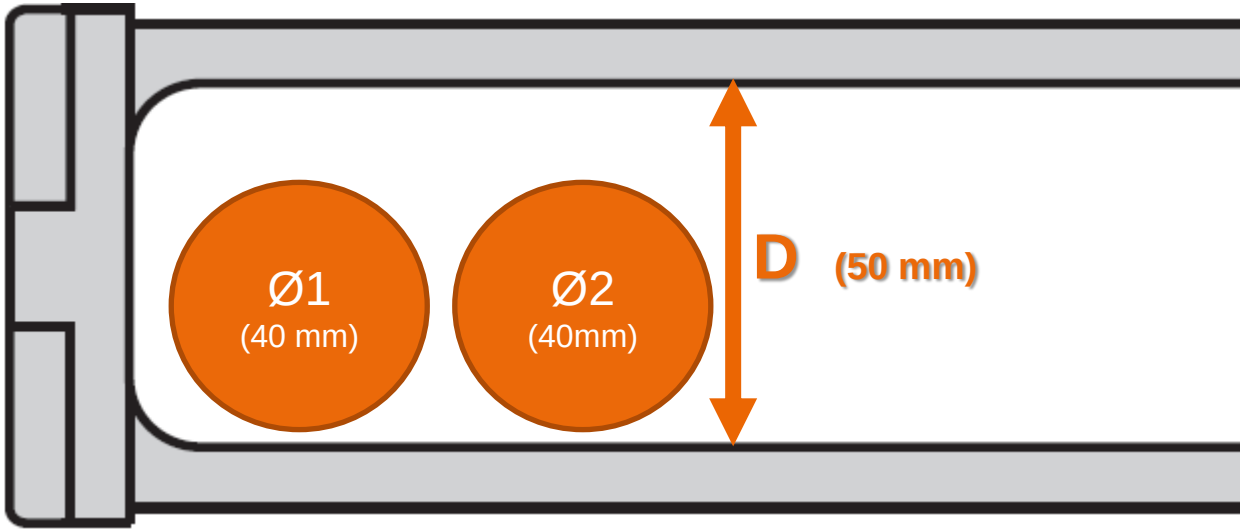
Ø1 = 40 mm

Ø2 = 40 mm

D = 50 mm

40 mm + 40 mm = 80 mm

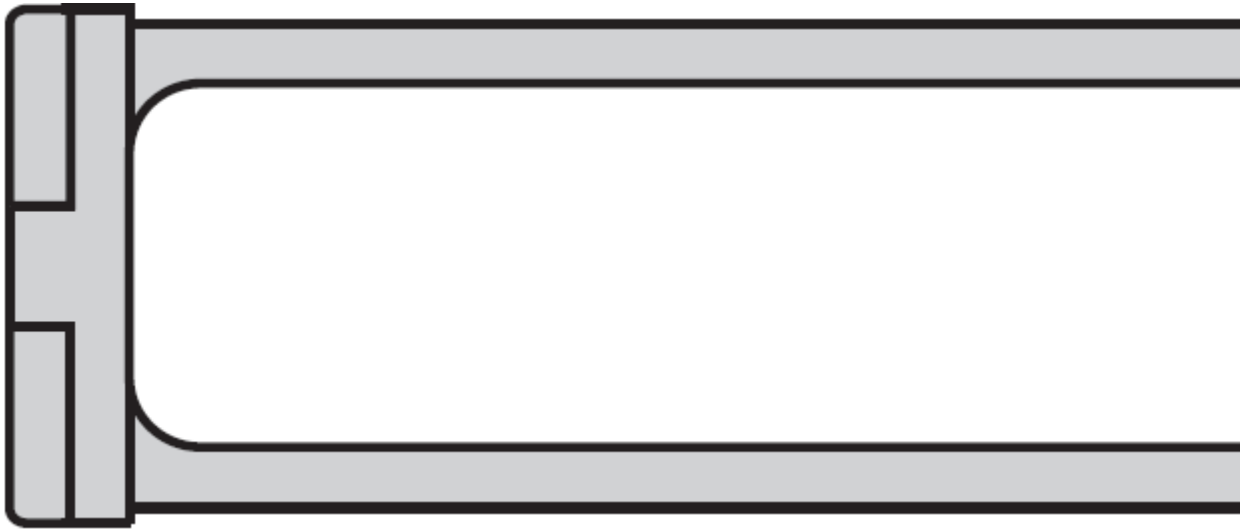
50 mm * 1.2 = 60 mm



80 > 60 = **No Separator Needed**

When to use a separator

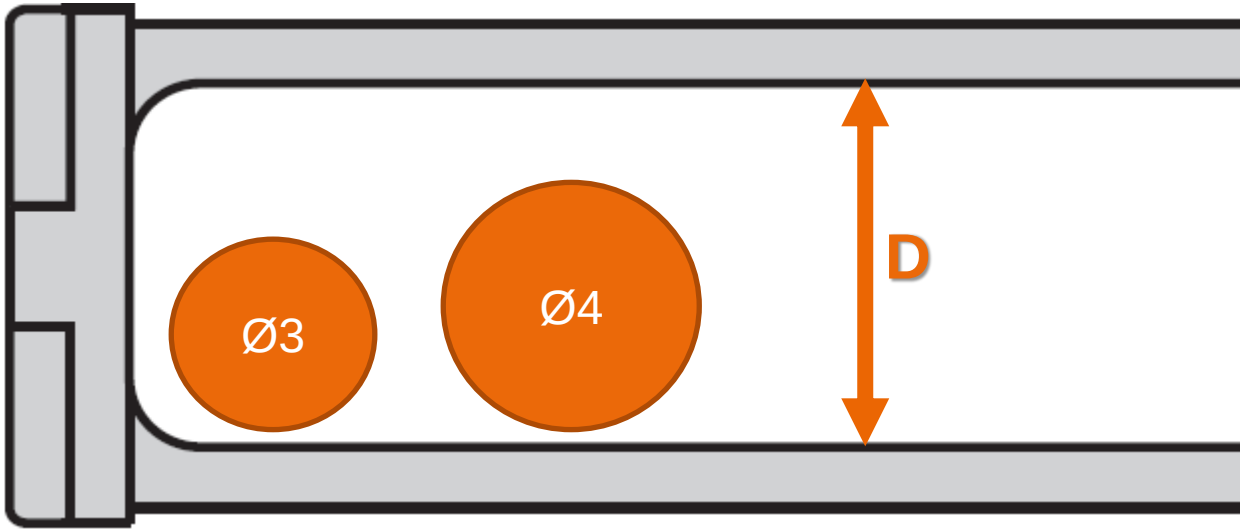
- ✓ Separator <u>is needed</u>, when



When to use a separator

- ✓ Separator <u>is needed</u>, when

Ø3 + Ø4 ≤ D*1.2



✓ Separator is needed, when

Ø3 + Ø4 ≤ D*1.2

Example:

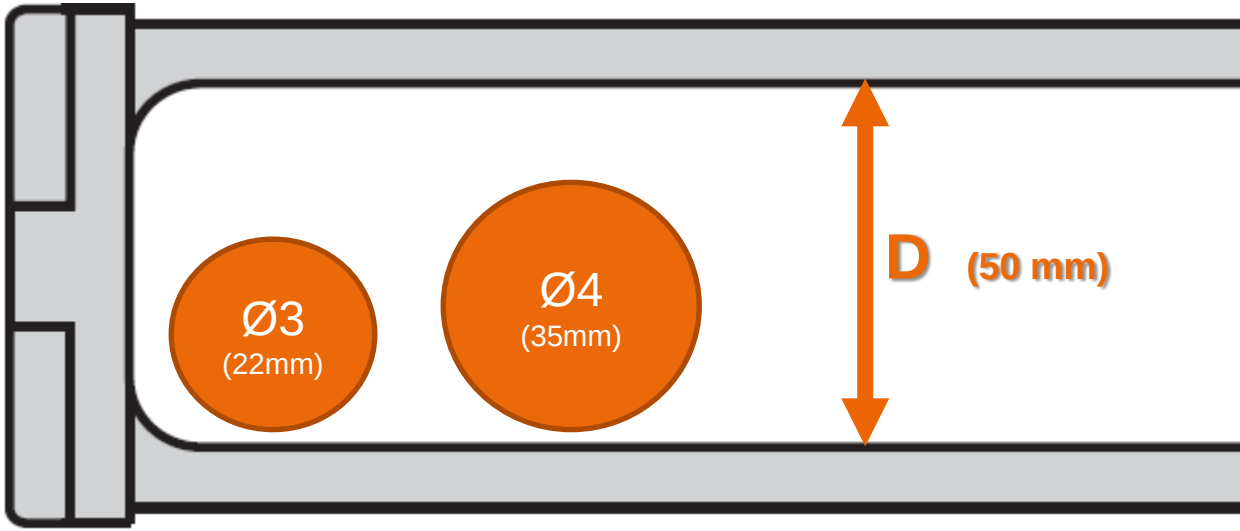
Ø3 = 22 mm

Ø4 = 35 mm

D = 50 mm

22 mm + 35 mm = 57 mm

50 mm * 1.2 = 60 mm



57 ≤ 60 = **Separator is Needed**

✓ Separator is needed, when

Ø3 + Ø4 ≤ D*1.2

Example:

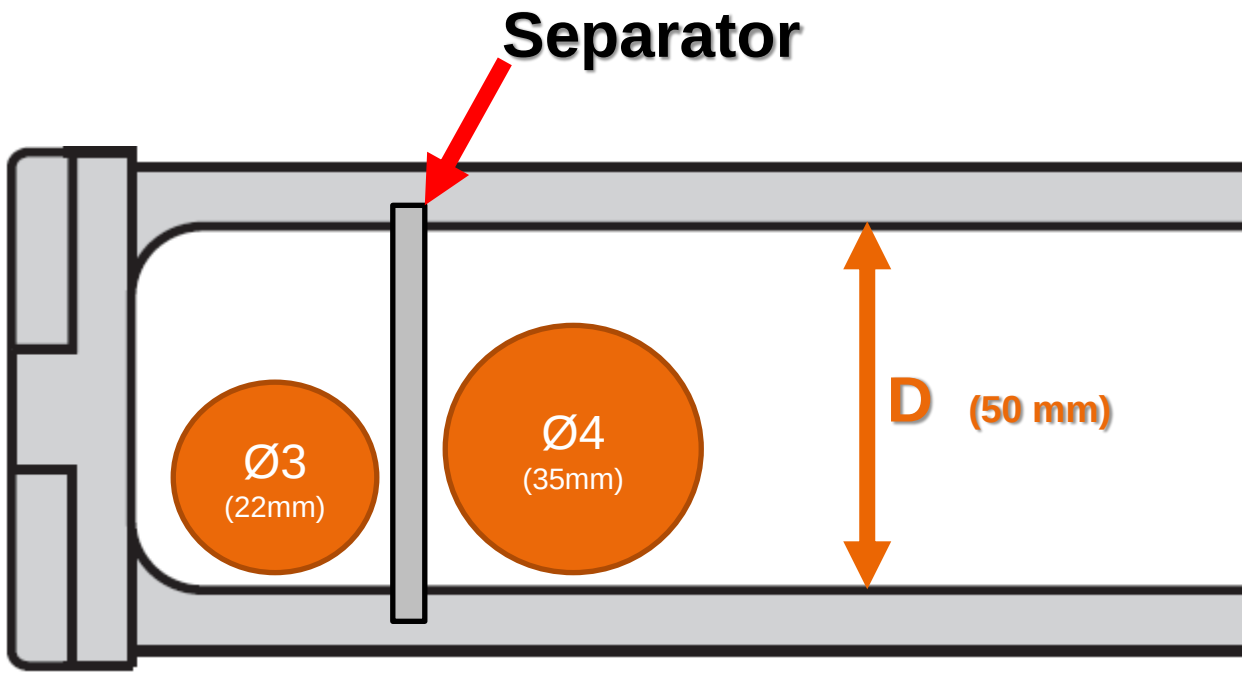
Ø3 = 22 mm

Ø4 = 35 mm

D = 50 mm

22 mm + 35 mm = 57 mm

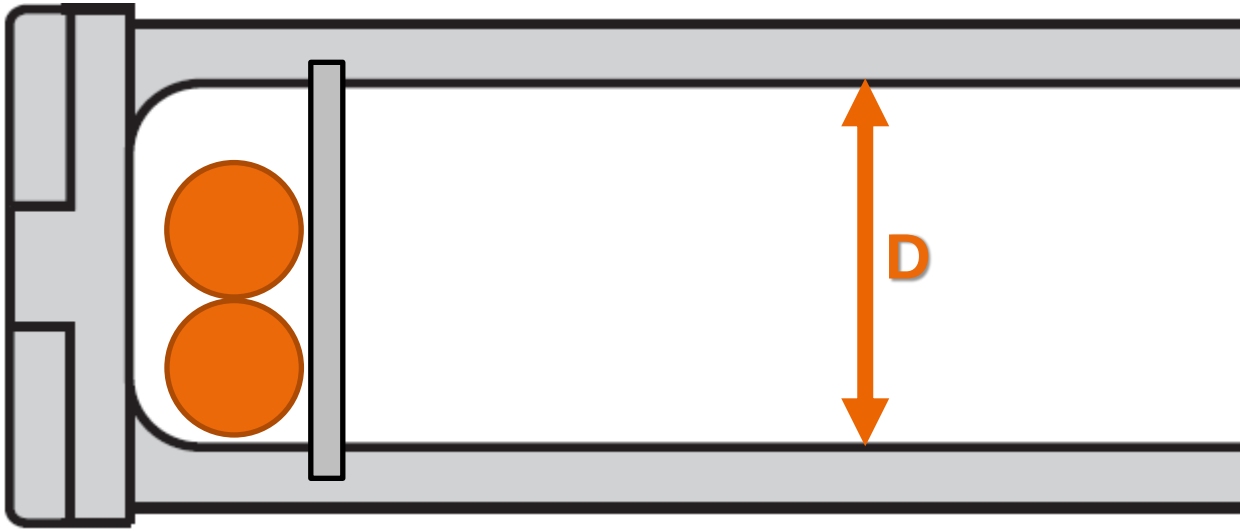
50 mm * 1.2 = 60 mm



57 ≤ 60 = **Separator is Needed**

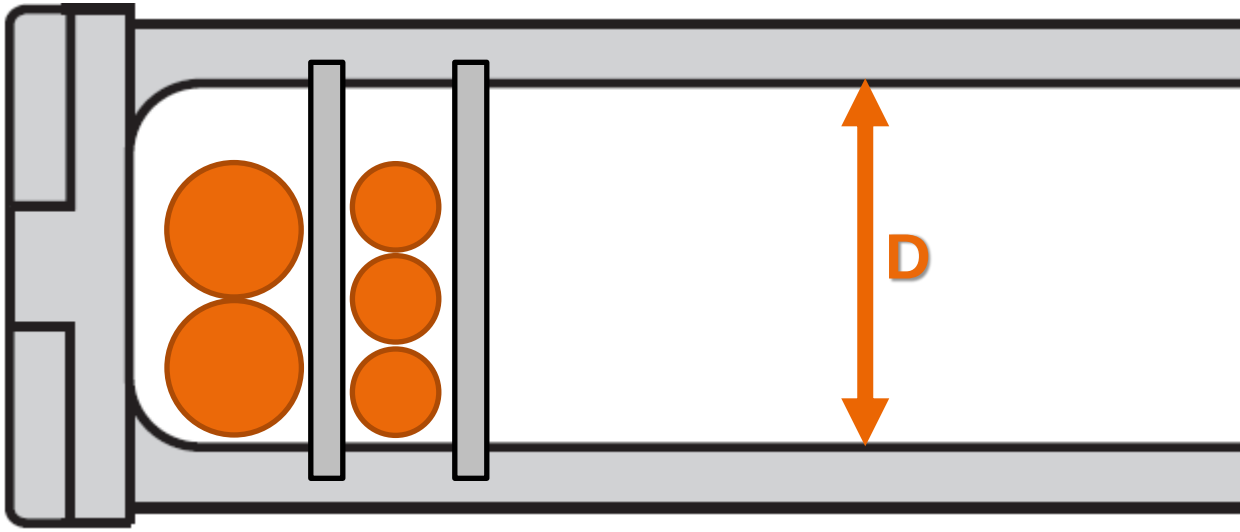
- ✓ Separator <u>is needed</u>, when

Cables are placed on top of each other



- ✓ Separator <u>is needed</u>, when

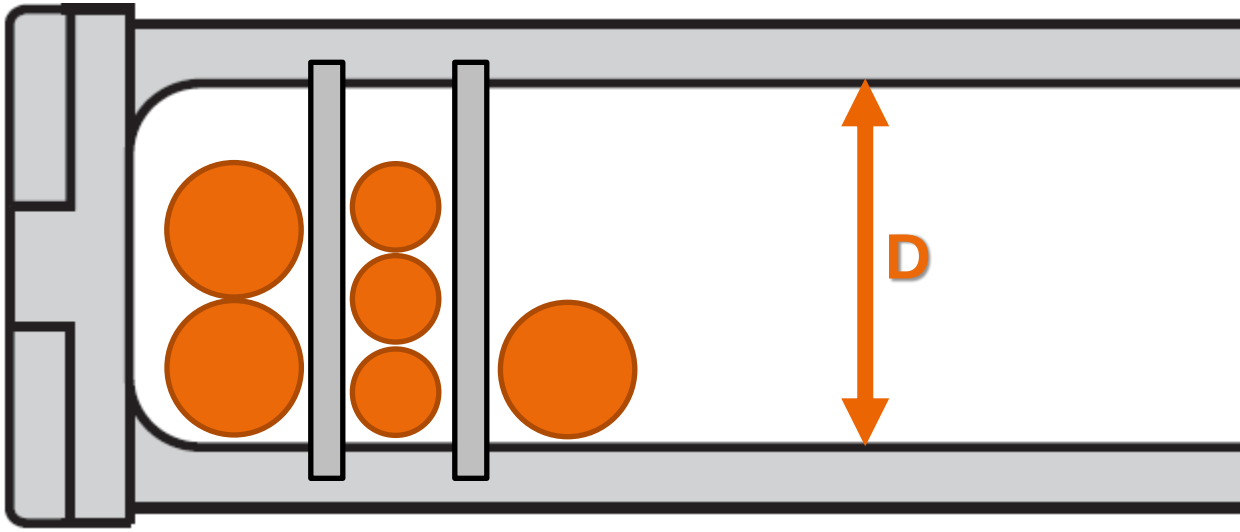
More cables are placed on top of each other



When to use a separator

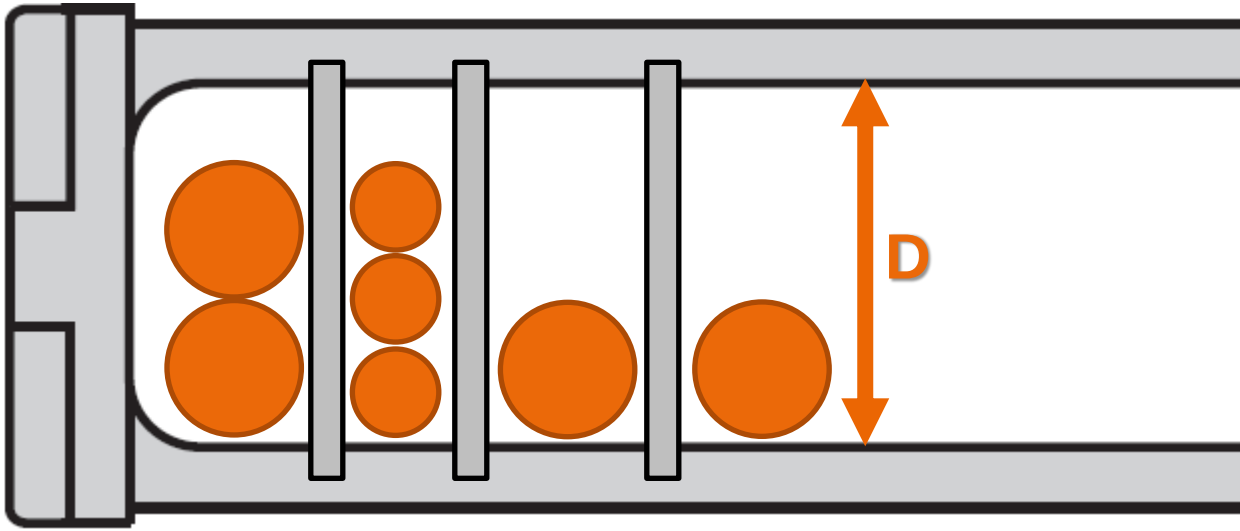
- ✓ Separator <u>is needed</u>, when

… or one next to it



- ✓ Separator <u>is needed</u>, when

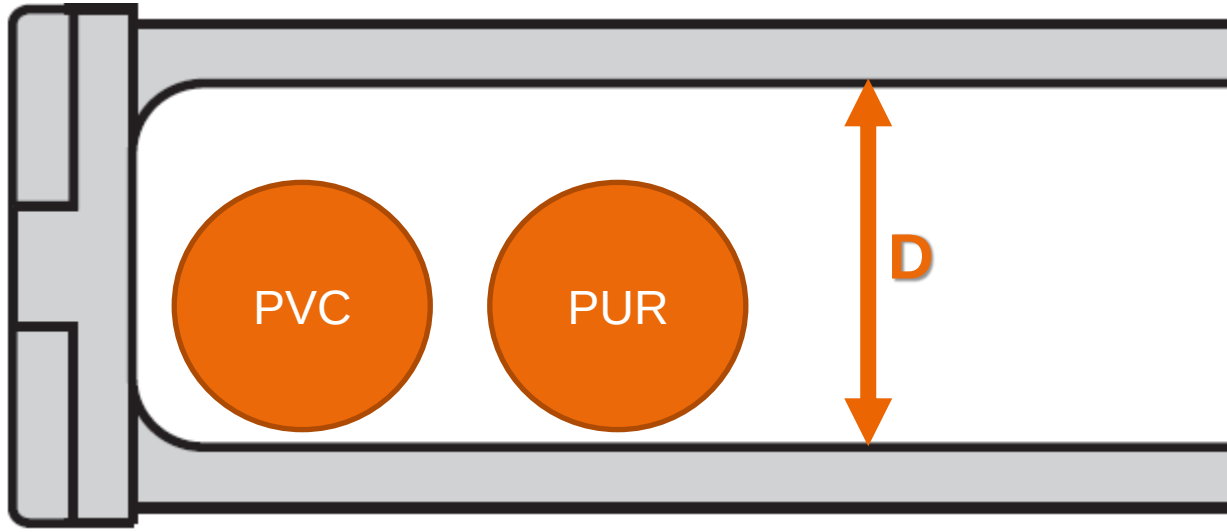
… or one next to each other



Separators are Needed

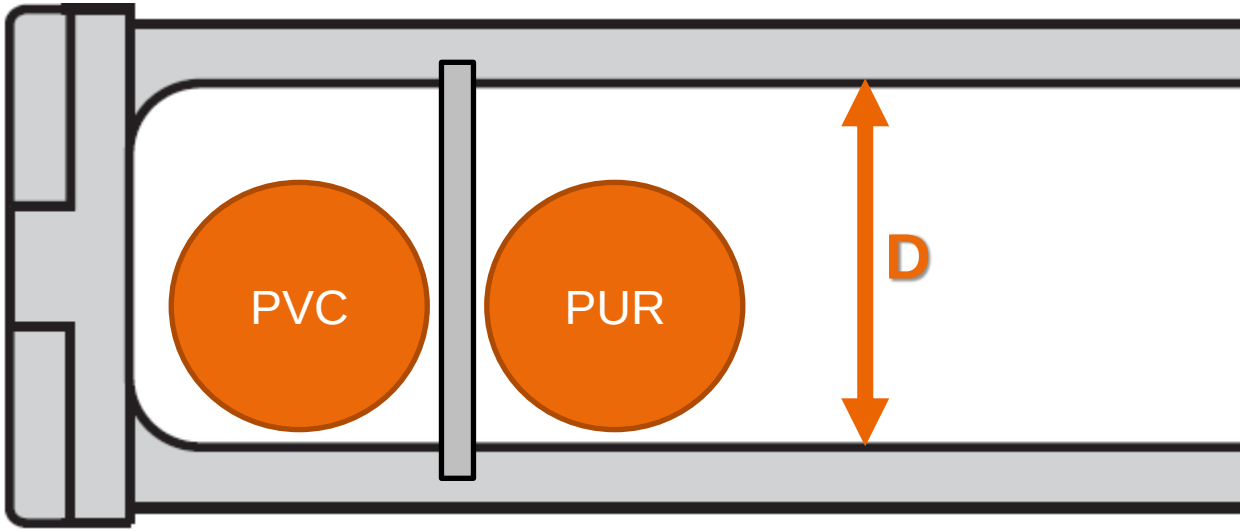
- ✓ Separator <u>is needed</u>, when

Two different outer jacket material are together



- ✓ Separator <u>is needed</u>, when

Two different outer jacket material are together

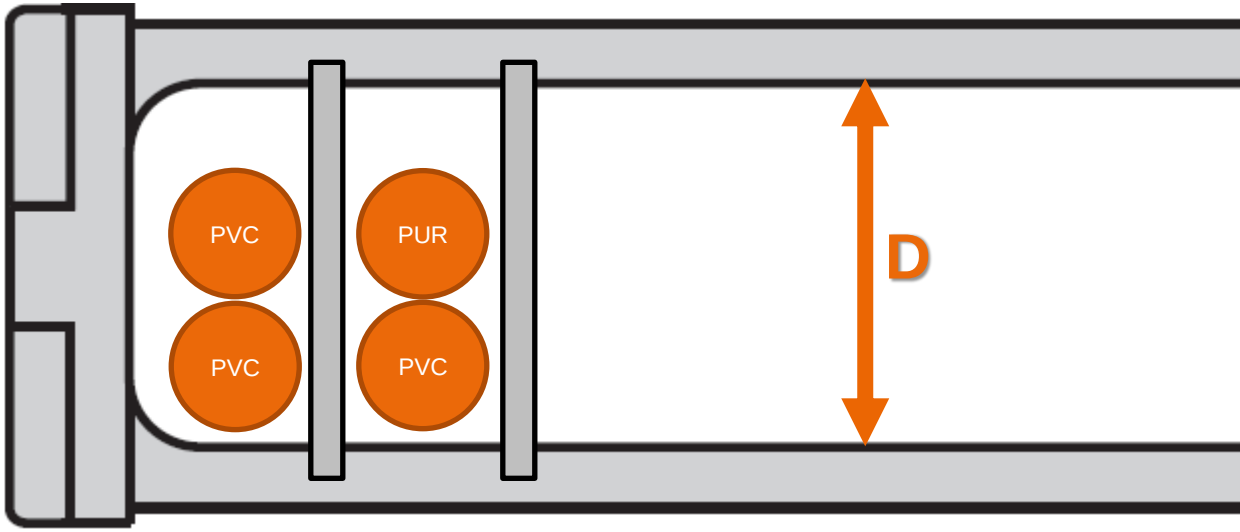


Separator is Needed

When to use a separator

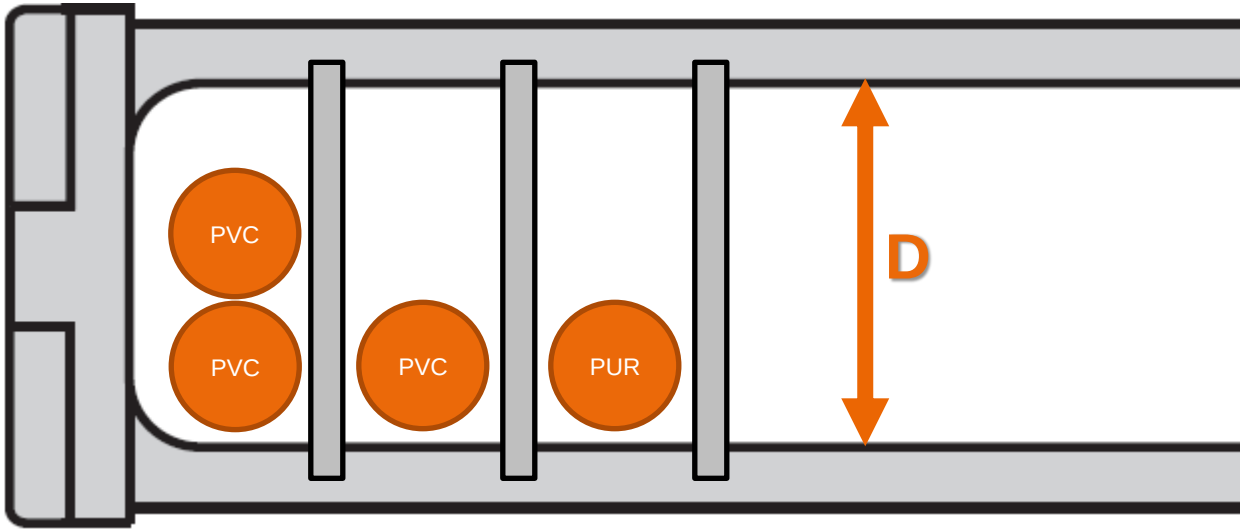
- ✓ Separator <u>is needed</u>, when

Two different outer jacket material are together



- ✓ Separator <u>is needed</u>, when

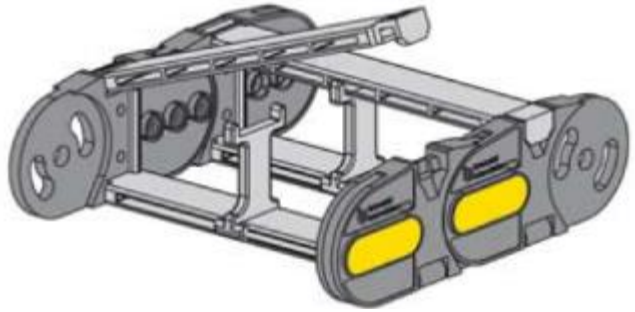
Two different outer jacket material are together



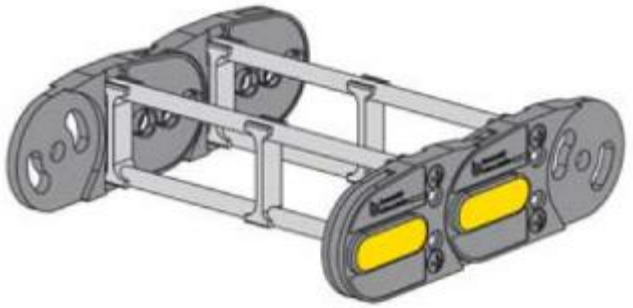
Separators are Needed

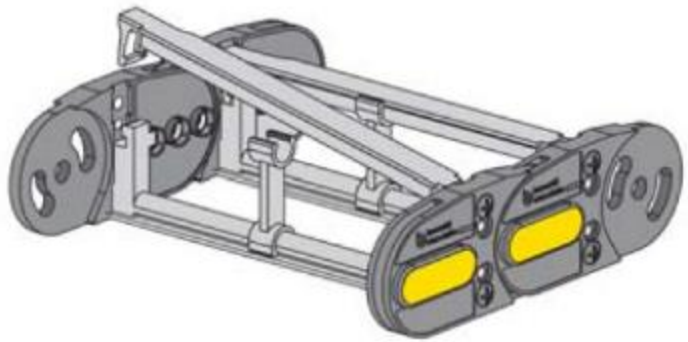
When to use a separator

Interior Shelving Examples:



Different separator options



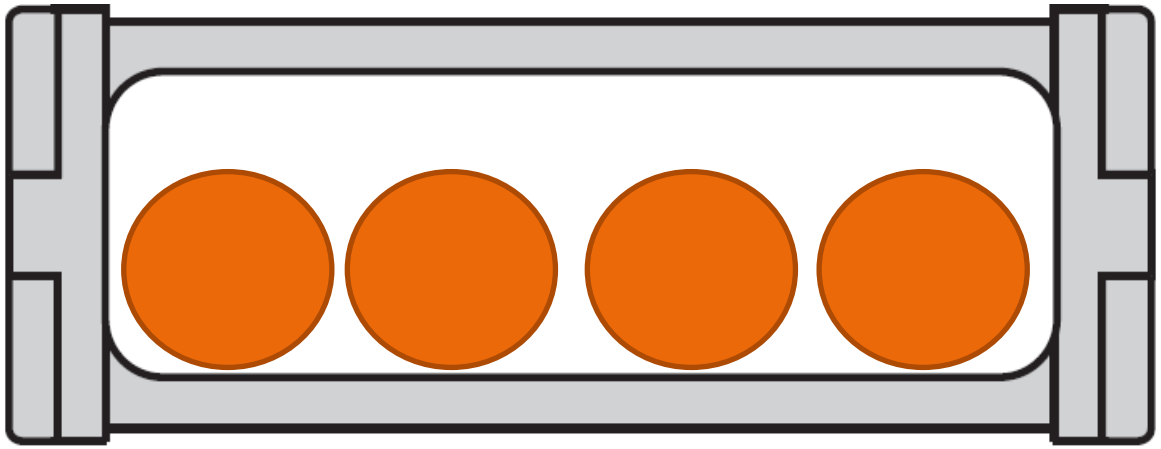


3. HOW TO DESIGN MULTI-LAYER CABLE LAYOUT FOR NARROW SPACES

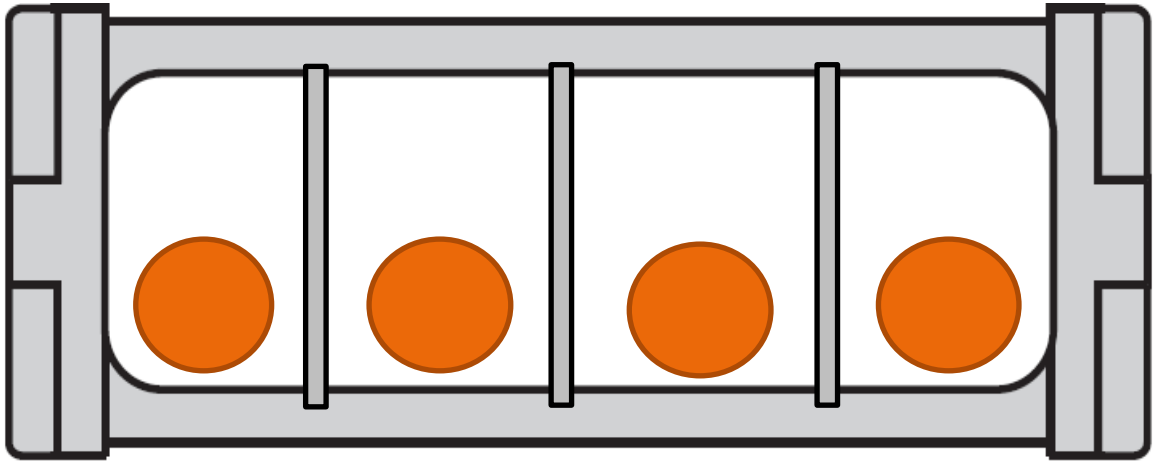
DRAG CHAIN SYSTEM DESIGN - BASIC

Cables laying next to each other (single row)

a. without separators



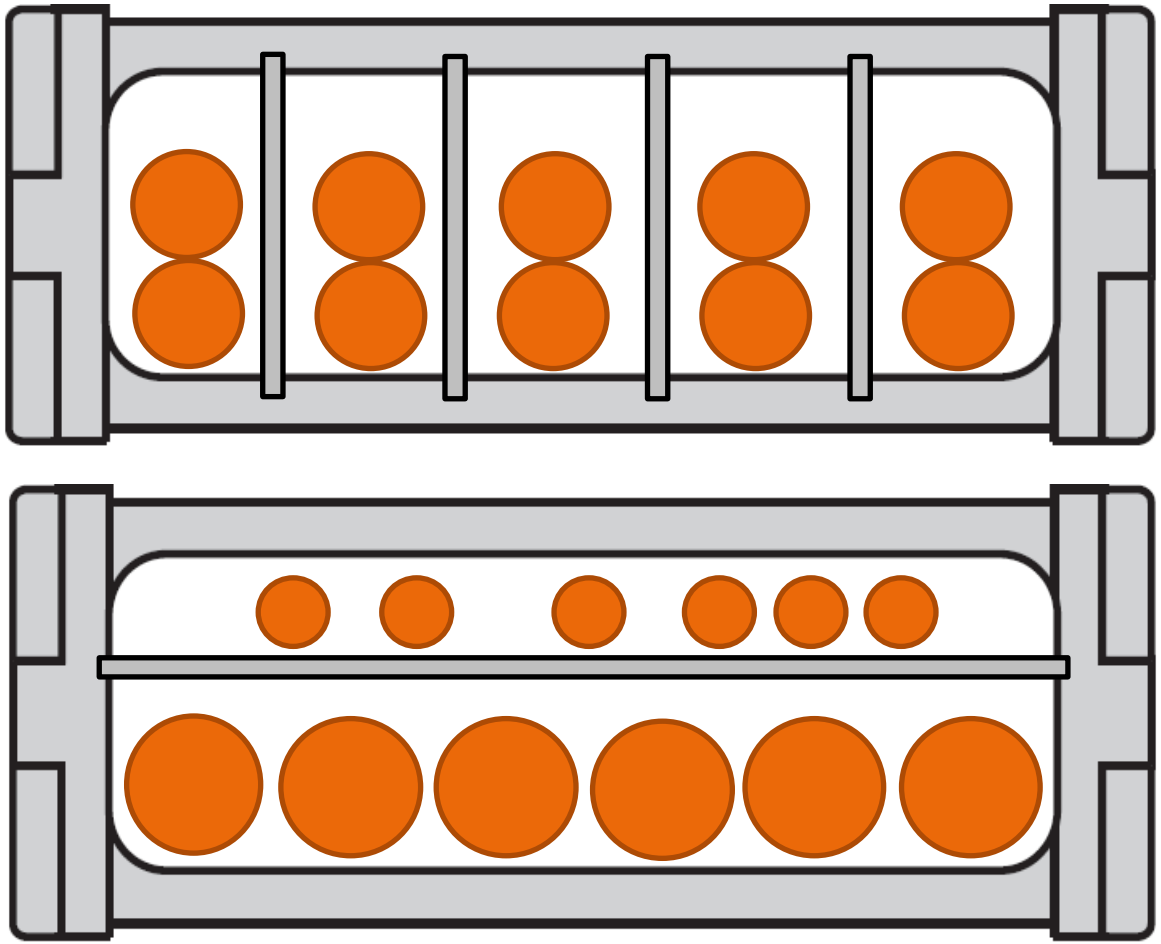
b. with separators



Cables on top of each other (two rows)

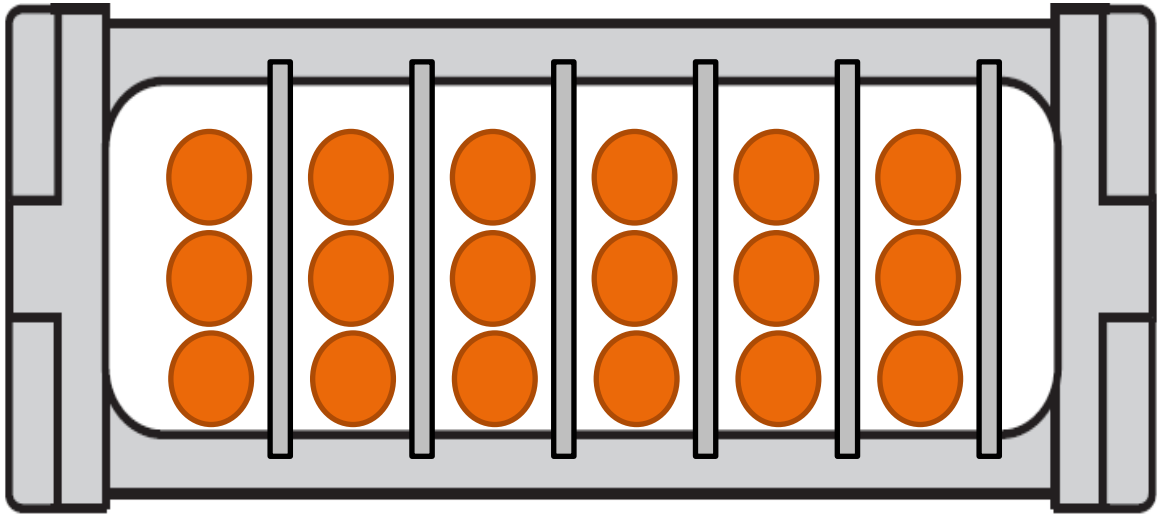
a. with separators

b. with shelving system



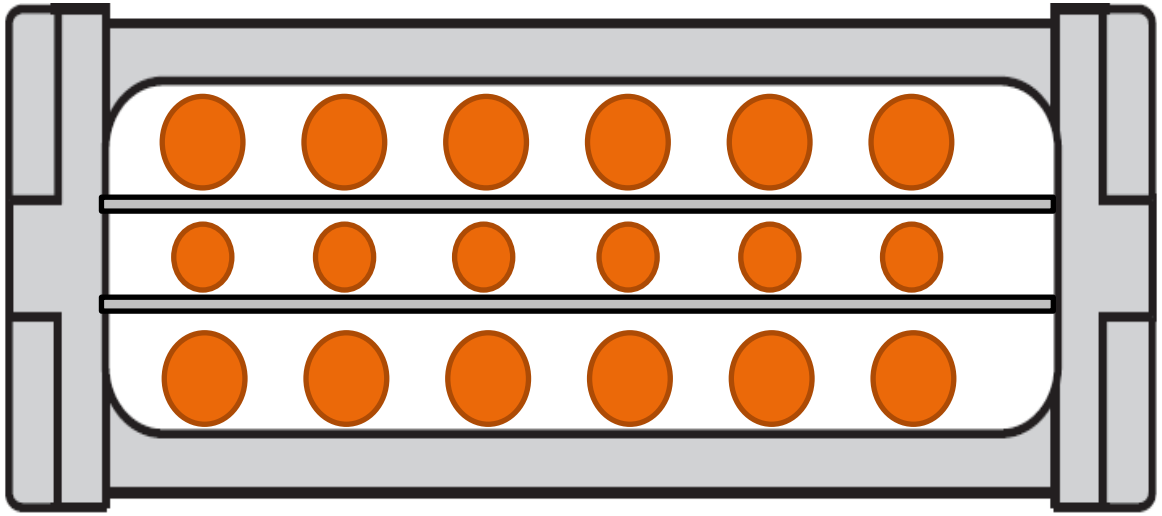
Cables on top of each other (three rows)

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

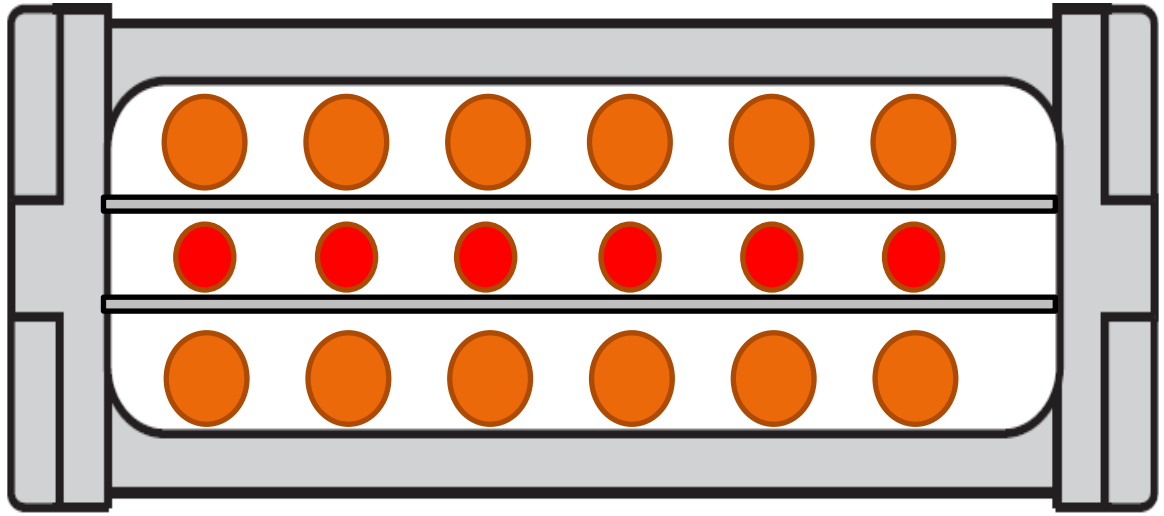


Q What‘s not so good with this design?

Design to avoid when possible

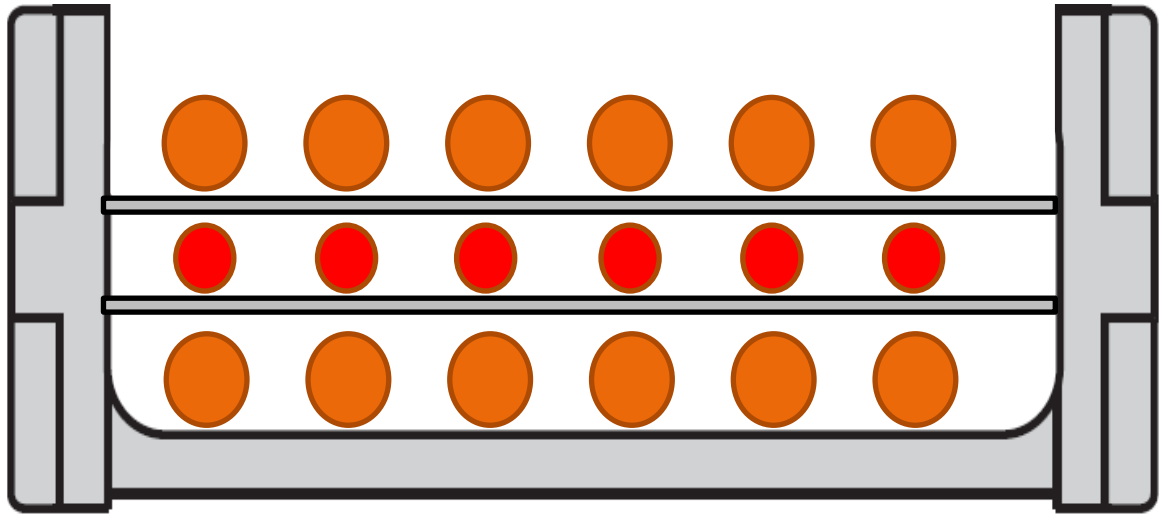
- Cables in the middle layer cannot be reached when changing them

- If the damage cable is pre-assembled with connector, 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 damage cable is pre-assembled with connector, customer will need to remove a lot of cables from the drag-chain to install the replacement cable.



Design to avoid when possible

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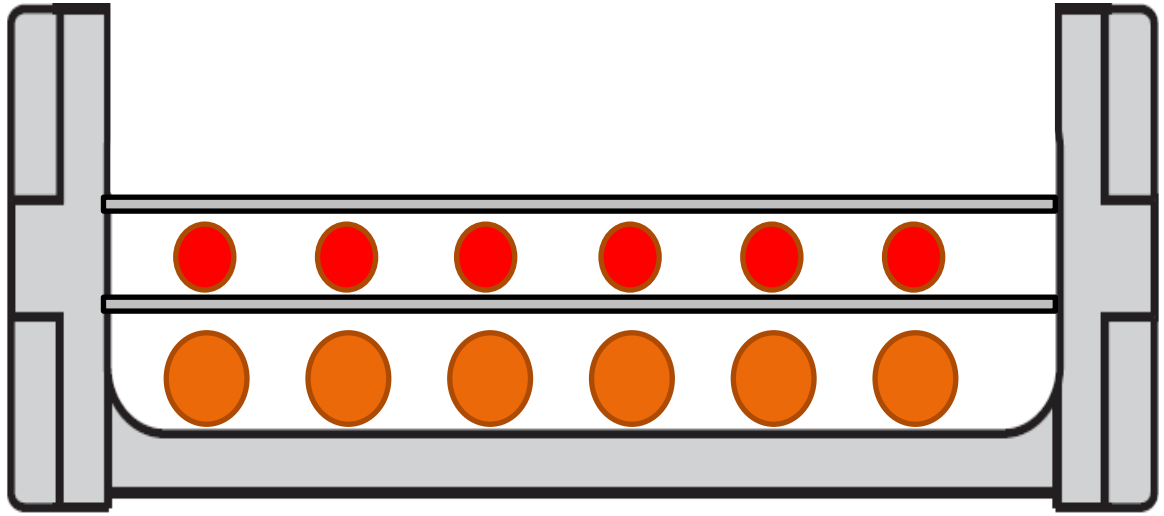

Design to avoid when possible

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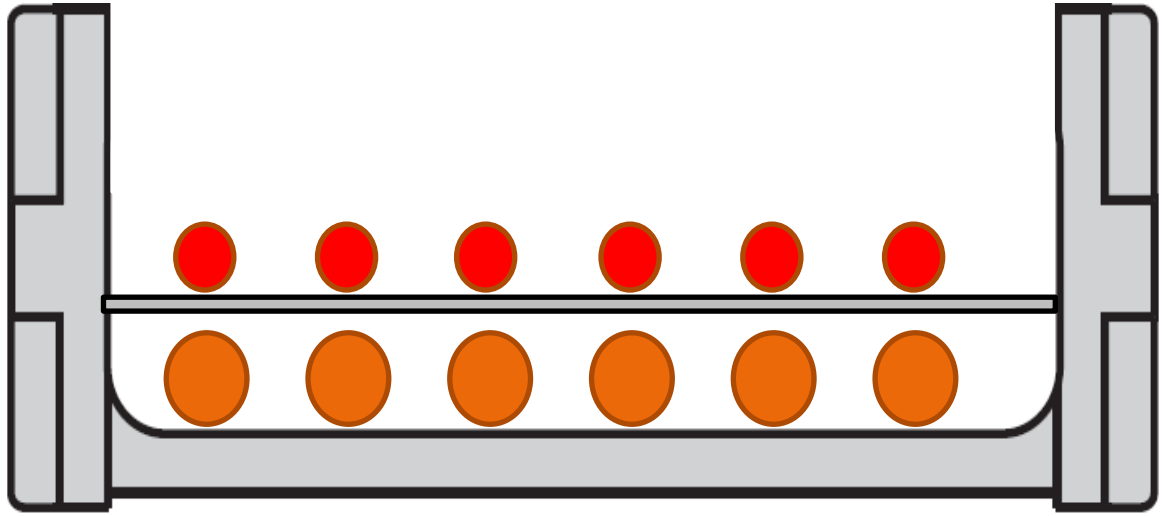
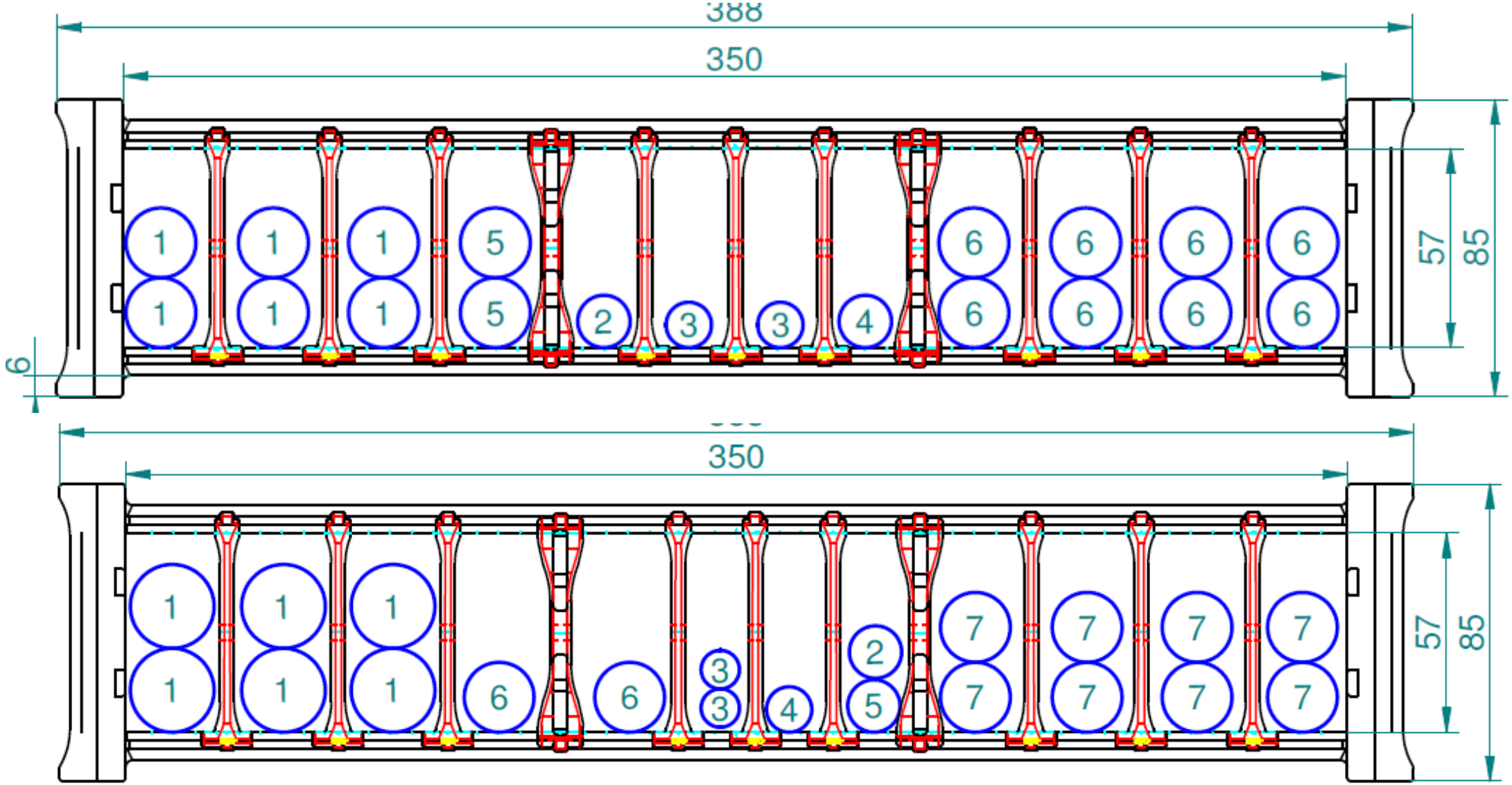
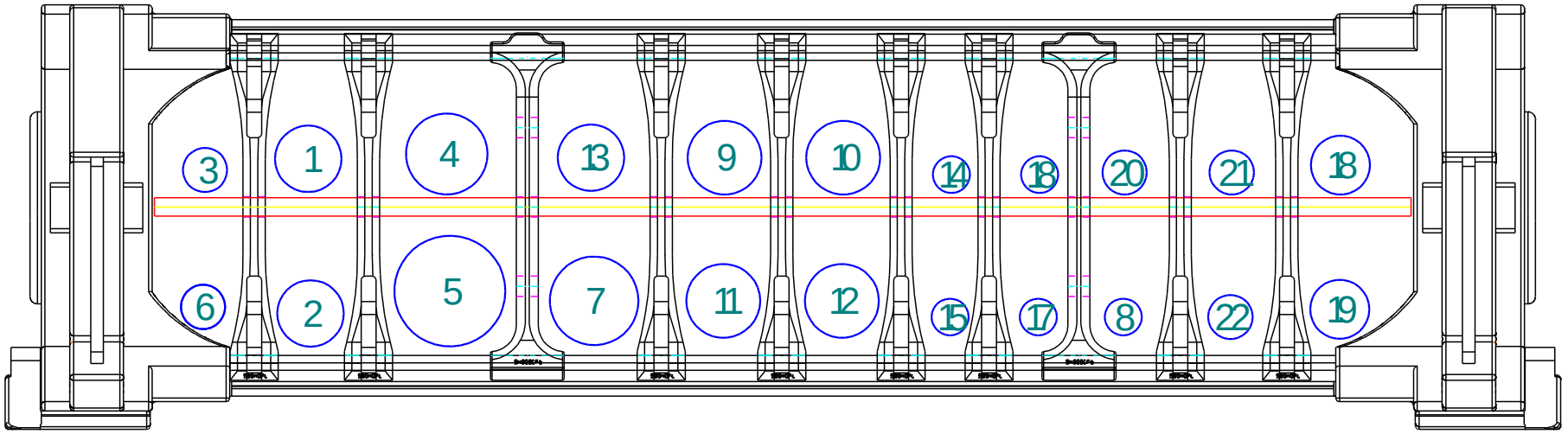
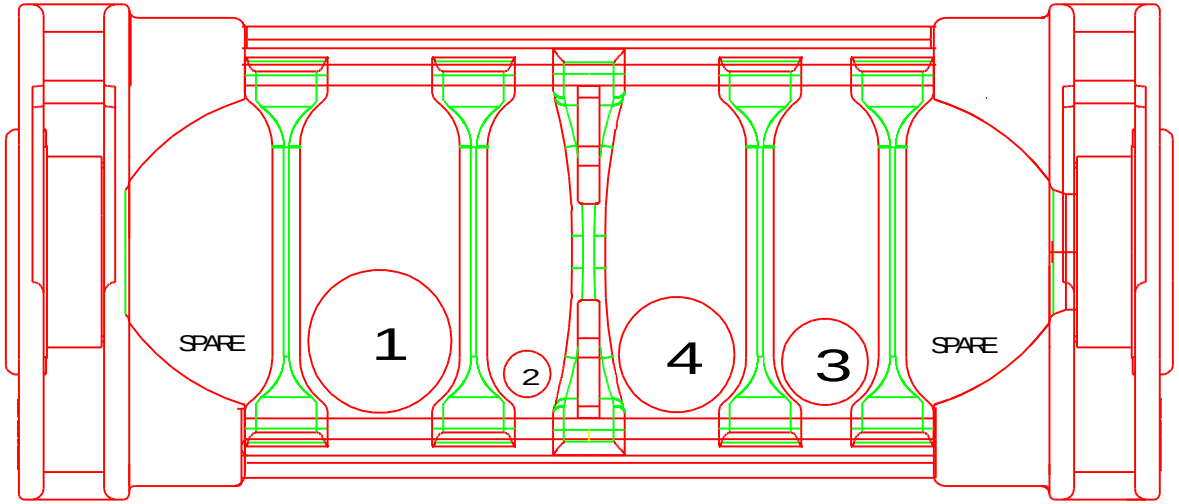
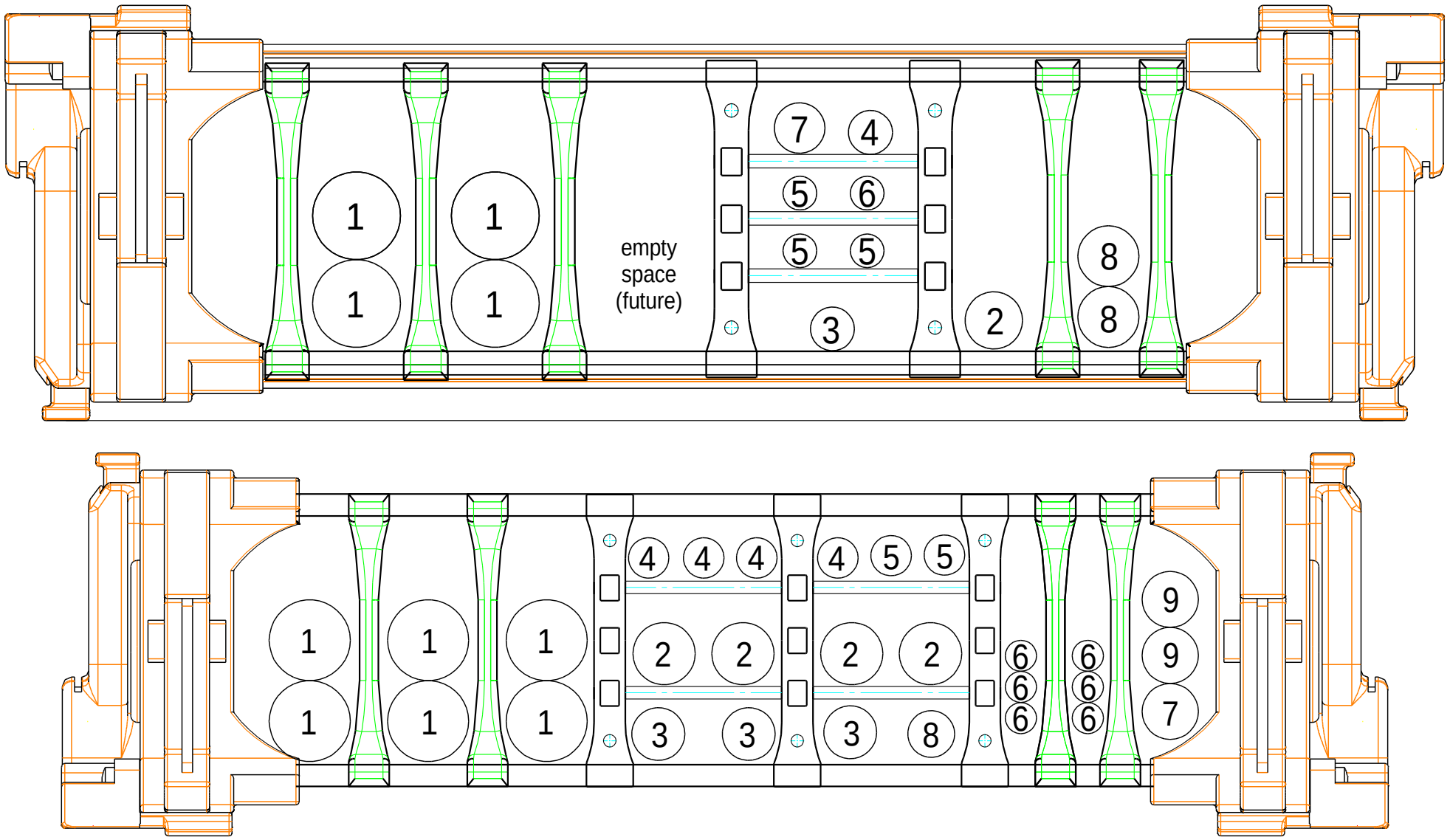
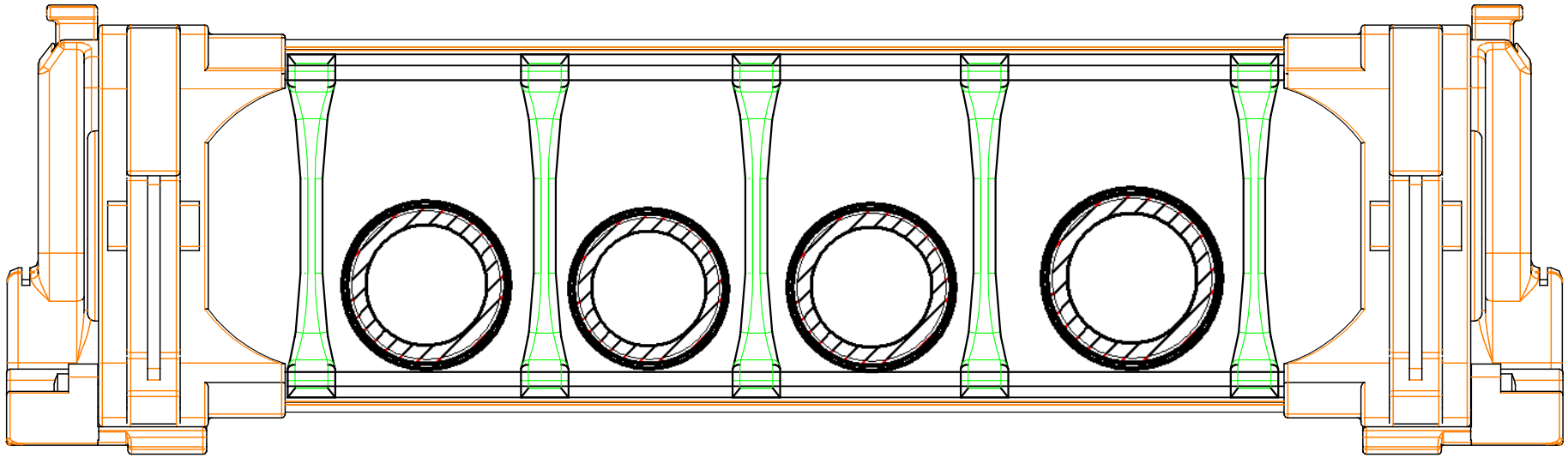


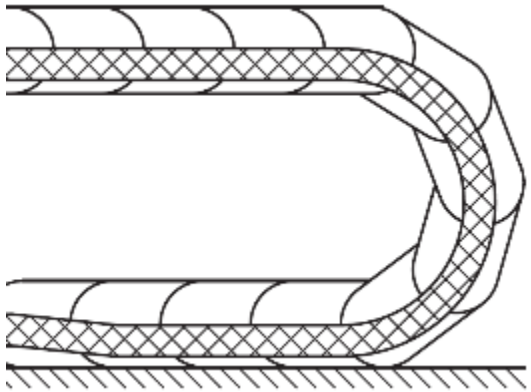

388
350
57
85
6
1
1
1
5
2
3
3
4
6
6
6
6
350
57
85
1
1
1
6
6
3
3
4
2
5
7
7
7
7


3
1
4
13
9
10
14
18
20
21
18
6
2
5
7
11
12
15
17
8
22
19


SPARE
1
2
4
3
SPARE


1
1
1
1
empty
space
(future)
7
4
5
6
5
5
3
2
8
8
4
4
4
4
5
5
1
1
1
1
1
1
2
2
2
2
3
3
3
8
6
6
6
6
6
6
9
9
7

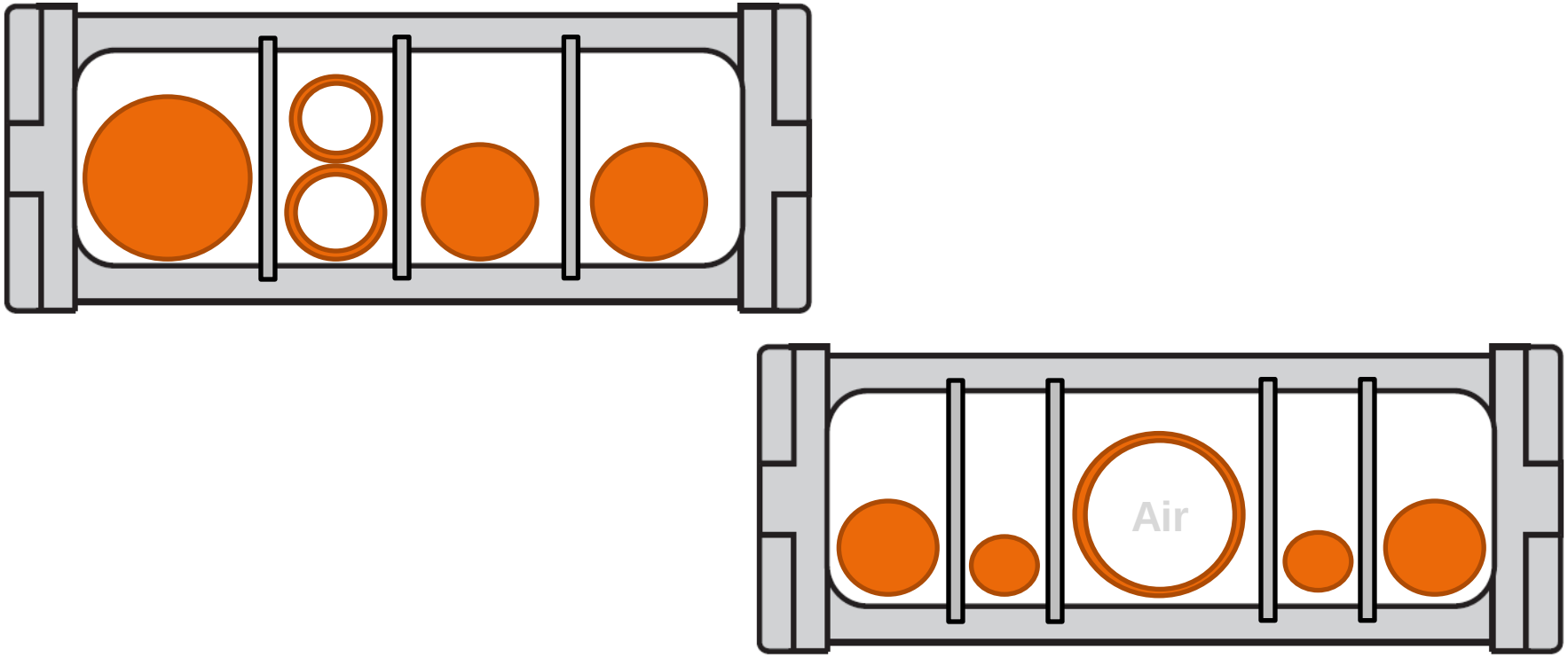




4. ADDITIONAL DESIGN ADVICE

1. Separators are typically assembled every alternate link

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



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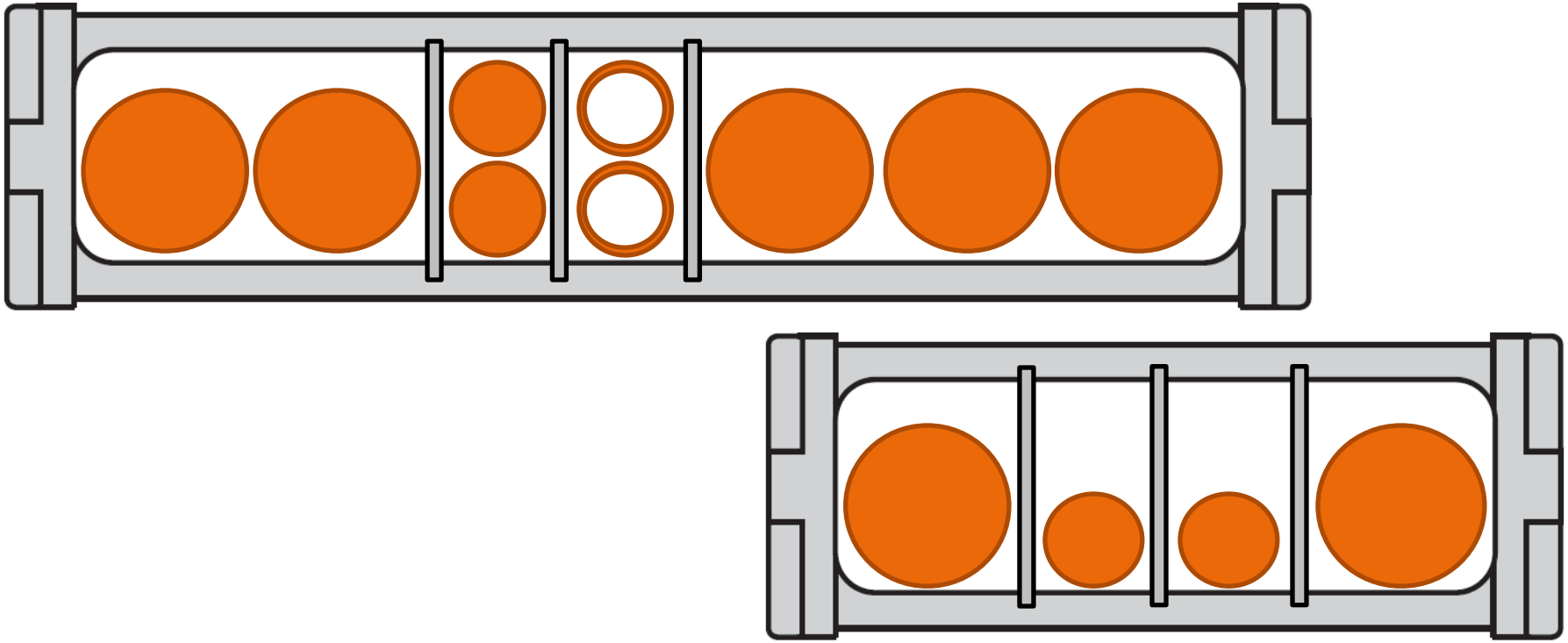
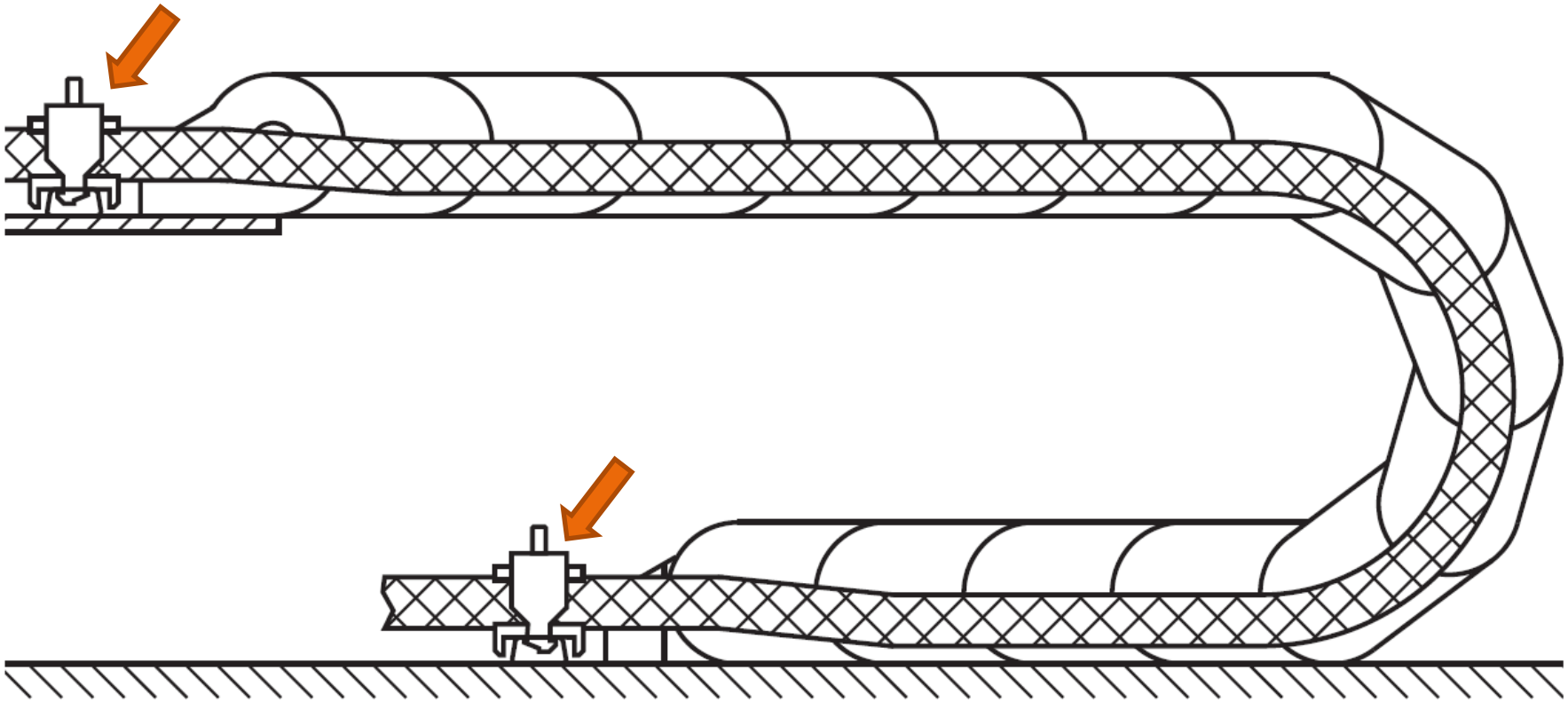


3. Both cable ends must be fixed with strain relief



IMPORTANT Design Advice

Fixation profiles

Cable clamps

Cable combs

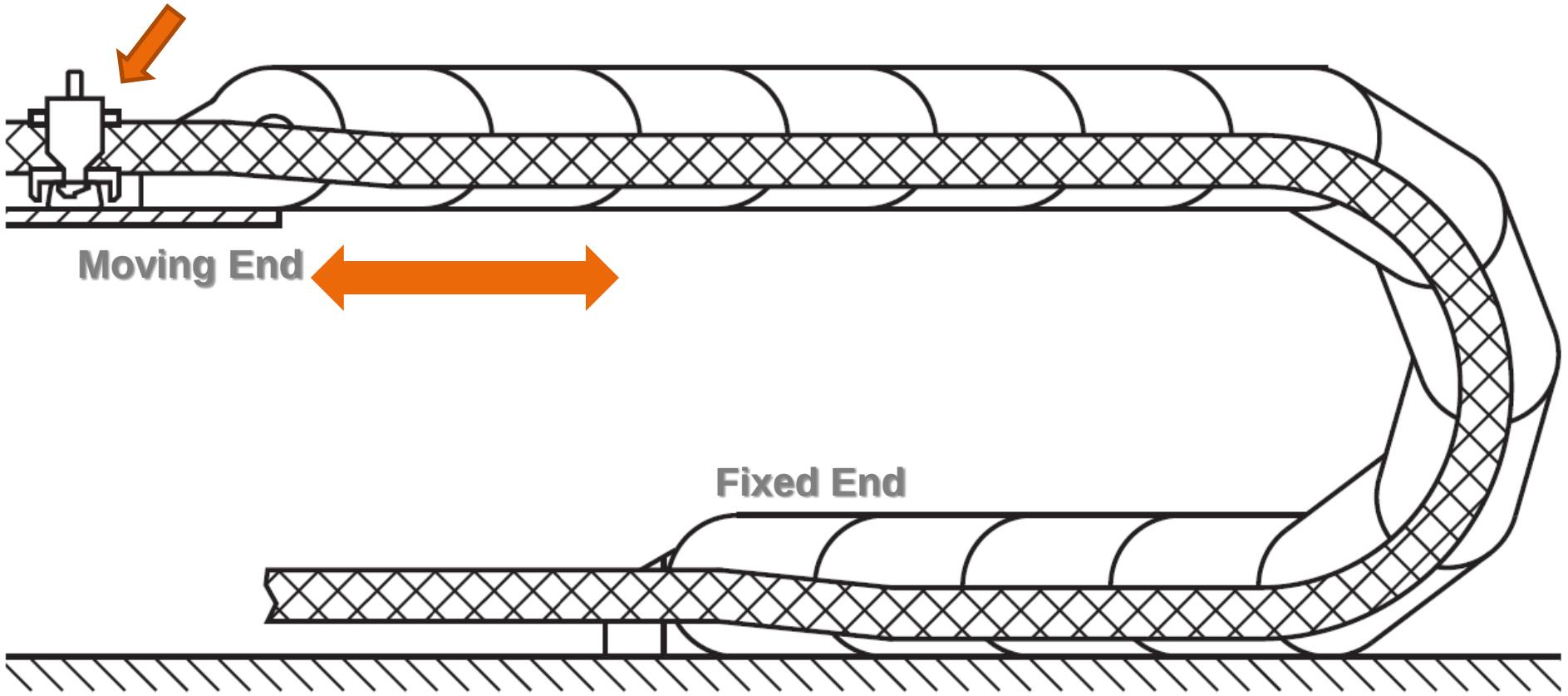
Integrated combs

Clip mounted on cross frame

Clip mounted on a profile

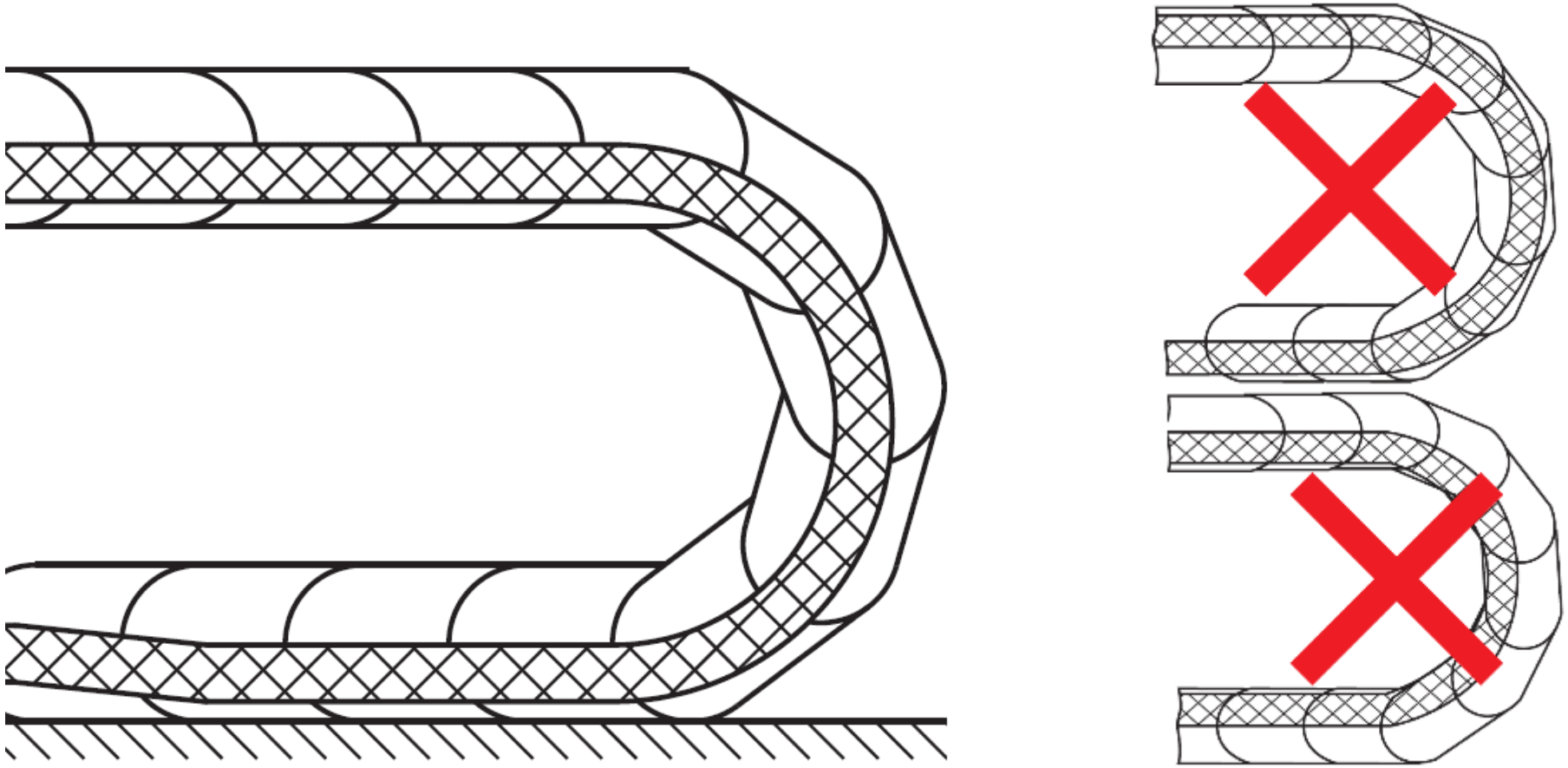
IMPORTANT Design Advice

4. Hoses to be fixed at **Moving End** only



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

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



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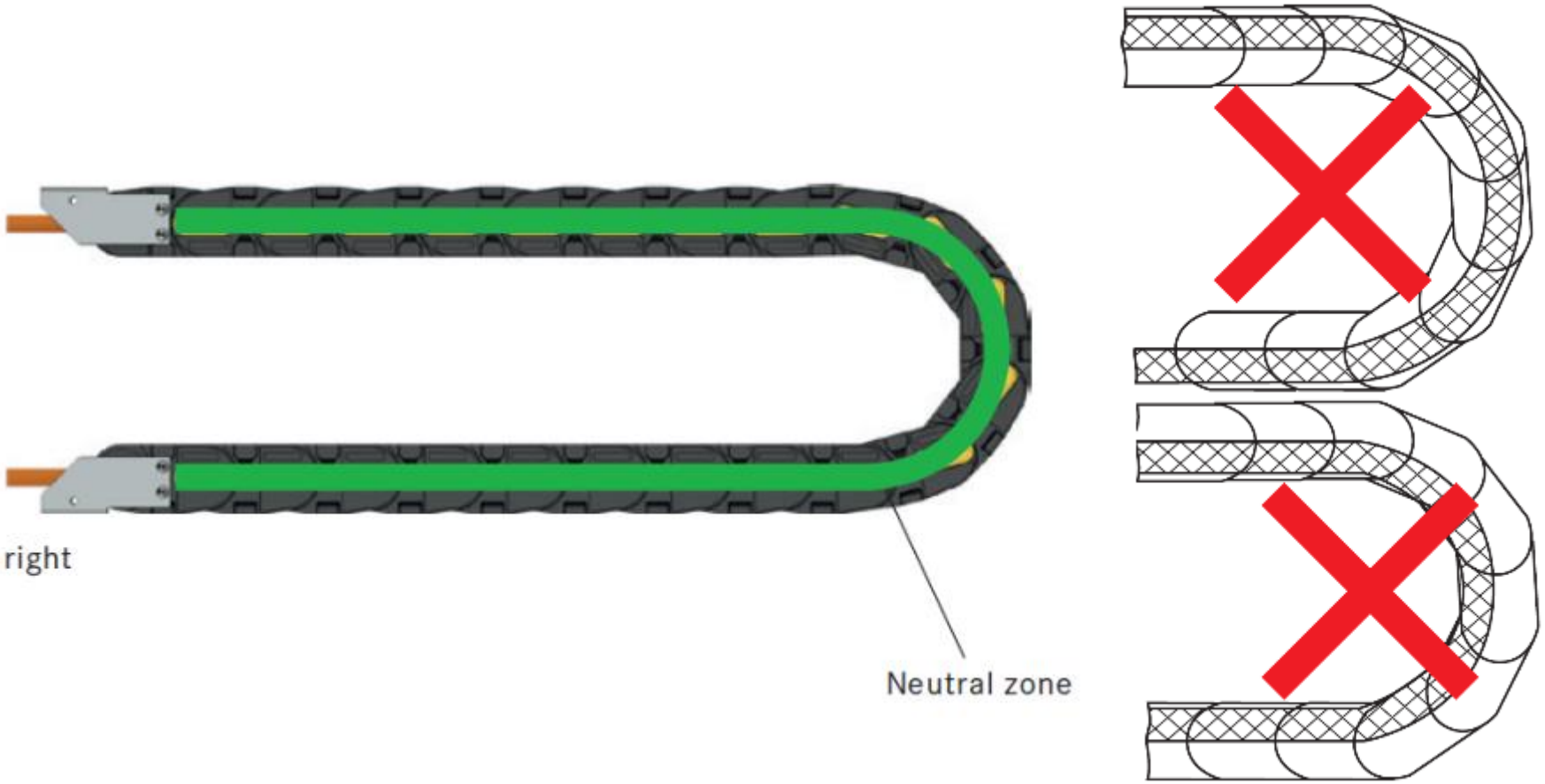
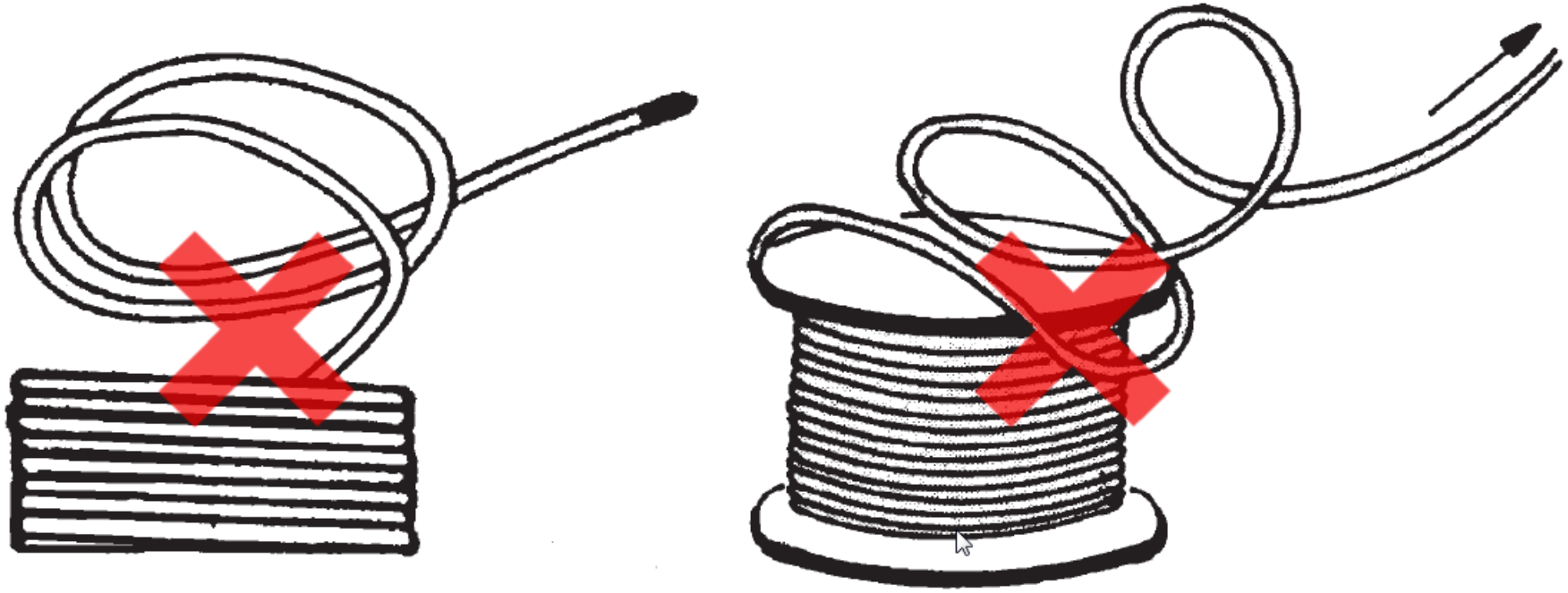
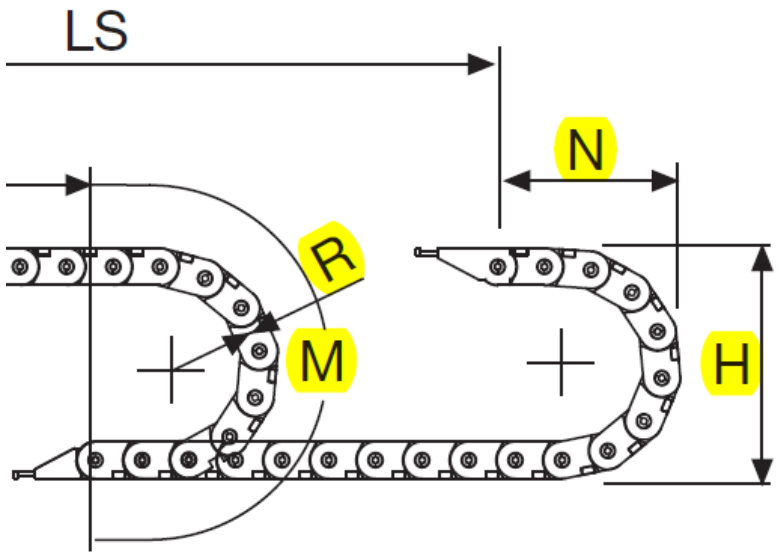


7. The cables must be installed “Twist-Free”!



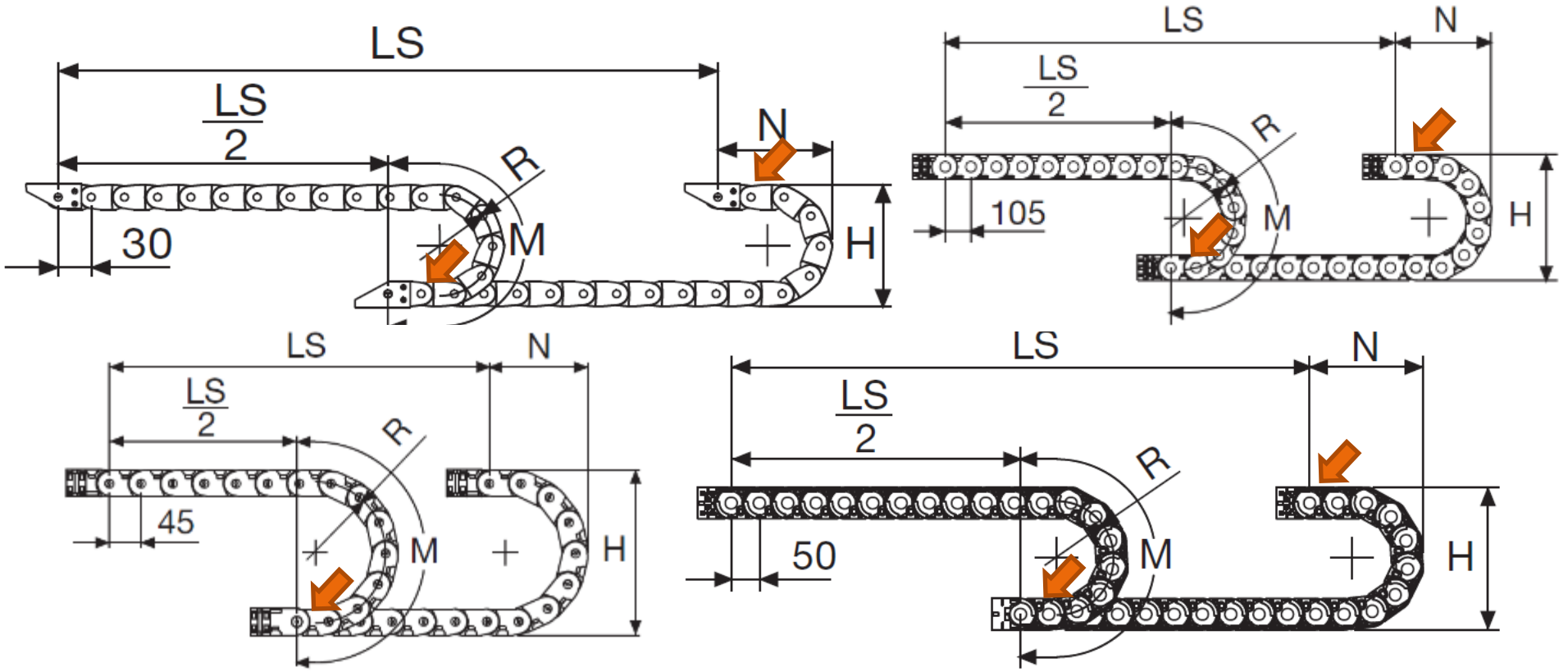
IMPORTANT Design Advice

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



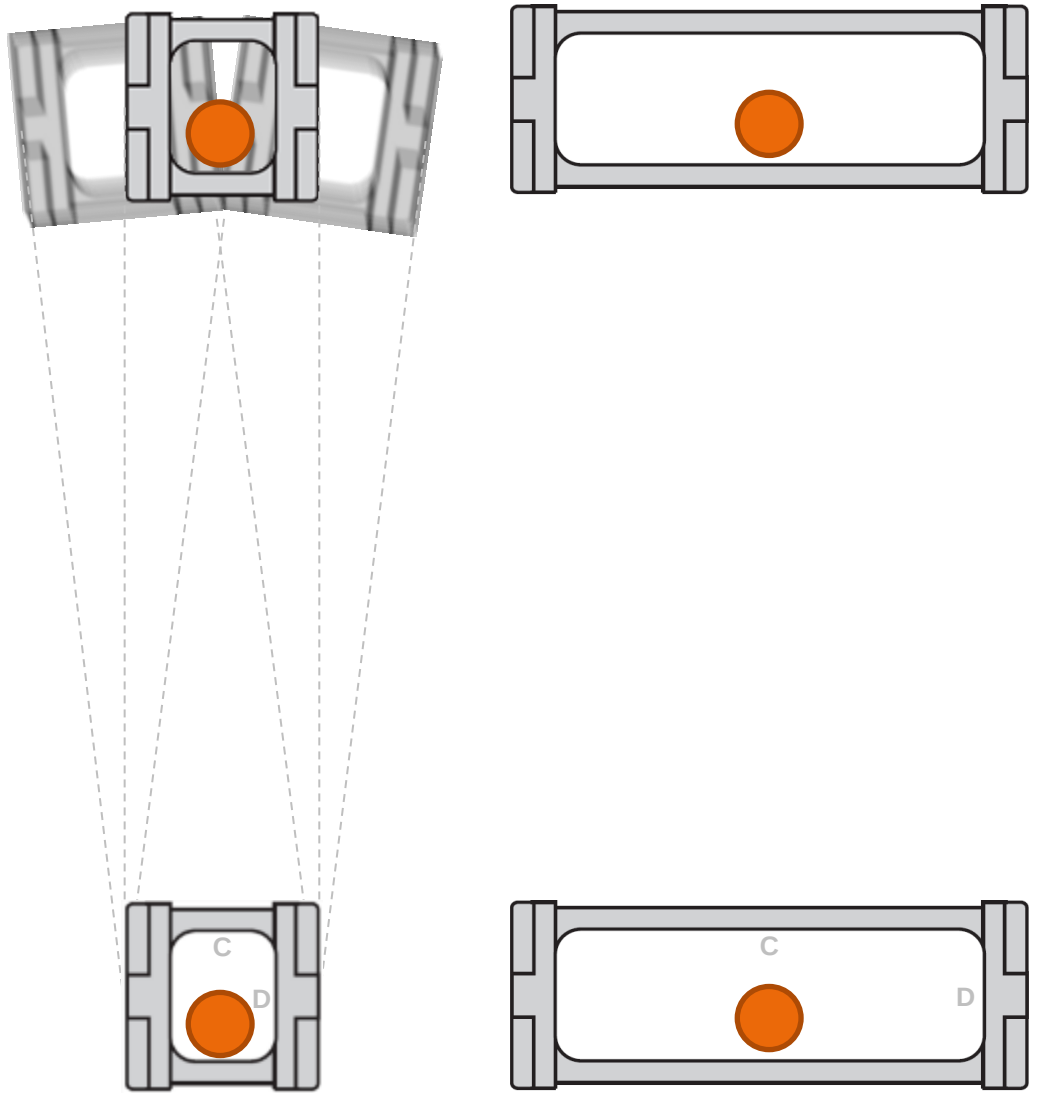
R mm	H mm	N mm	M mm
028	79	68,5	146
038	99	78,5	177
045	113	85,5	199
060	143	100,5	246
075	173	115,5	294
100	223	140,5	372

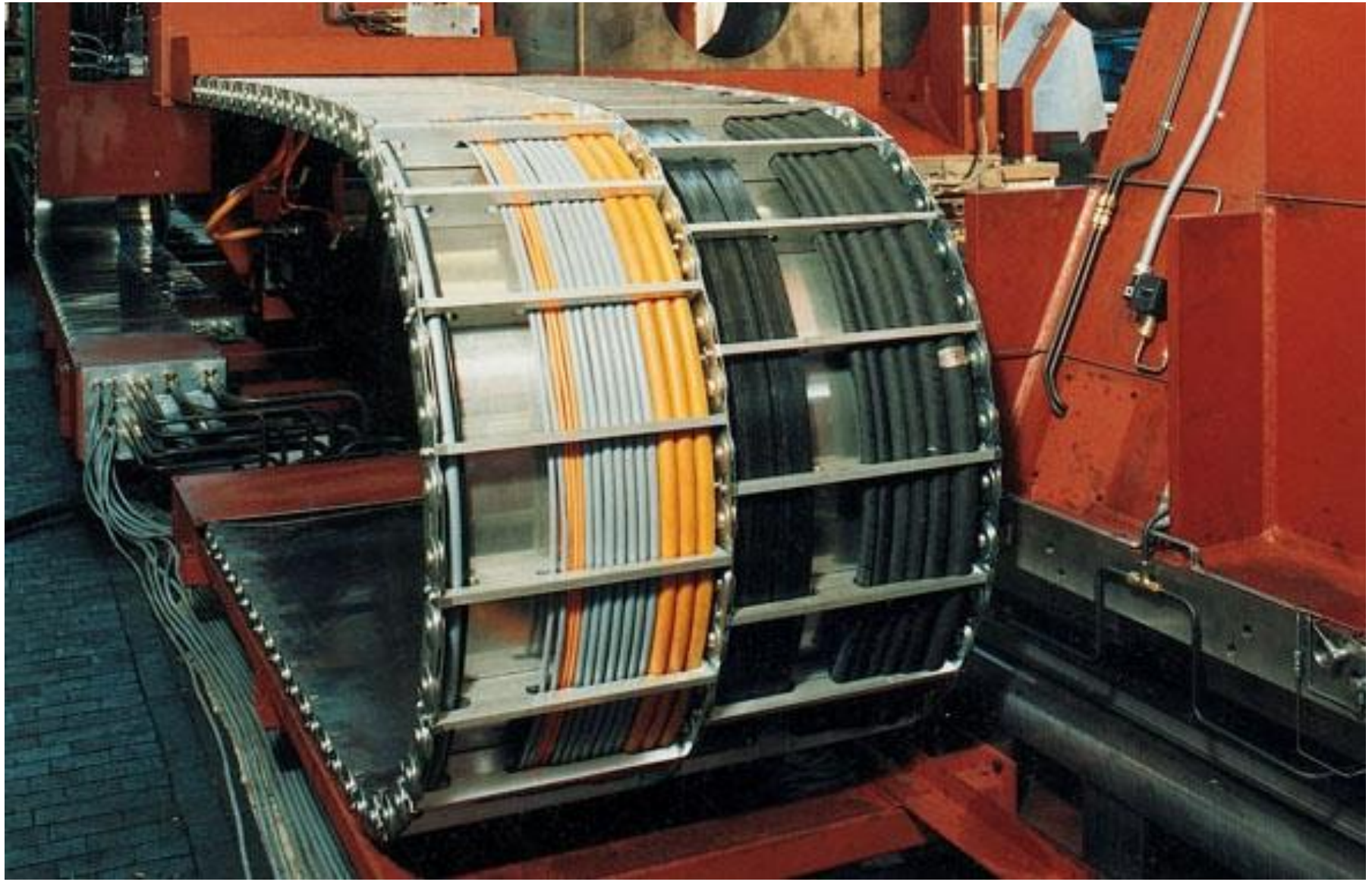
9. Always consider one extra link – this is to ensure the drag chain ends are rested when at max travel position



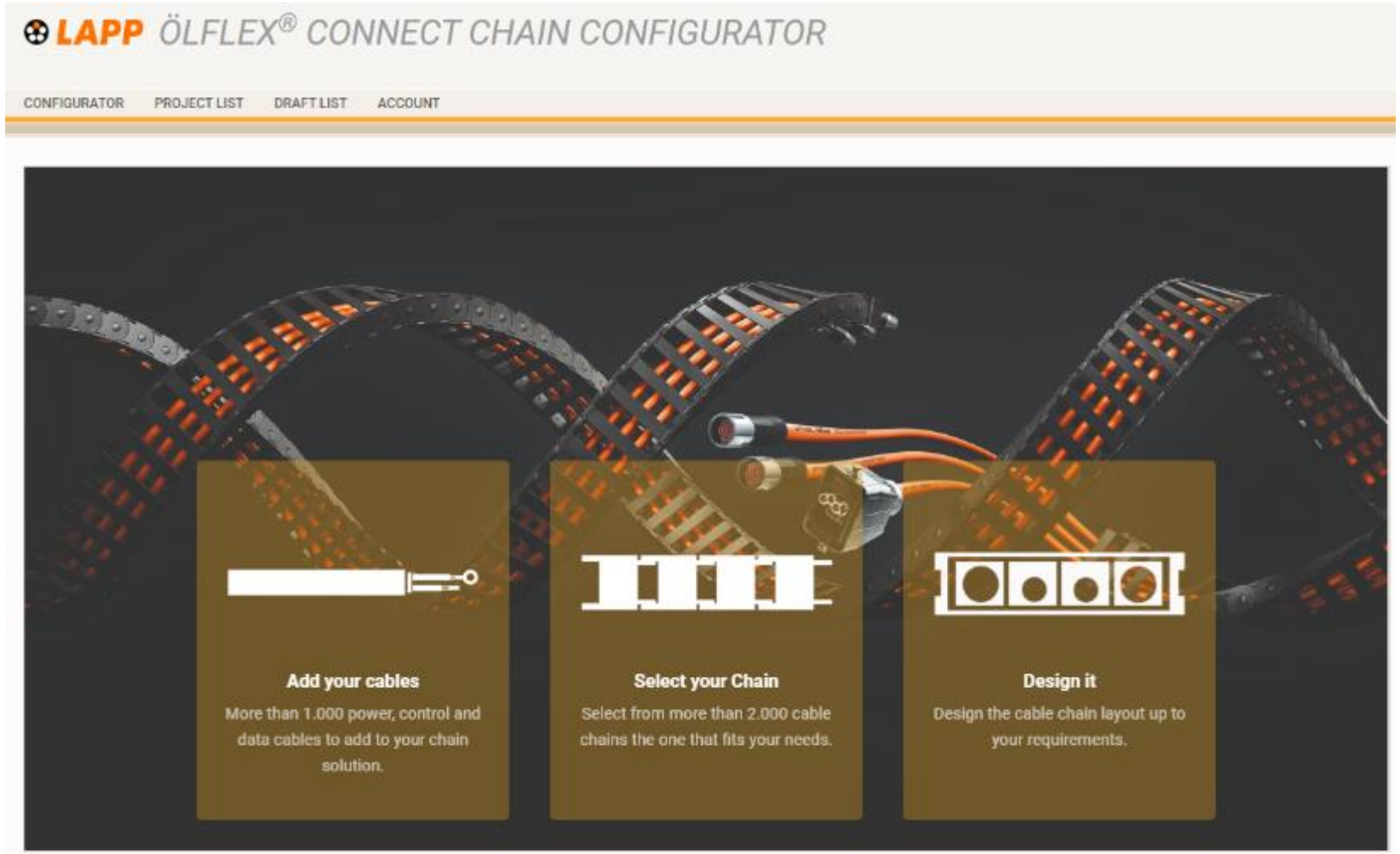
10. Carrier systems may become unstable when the inner width (**C**) is less than 2x the inner height (**D**).

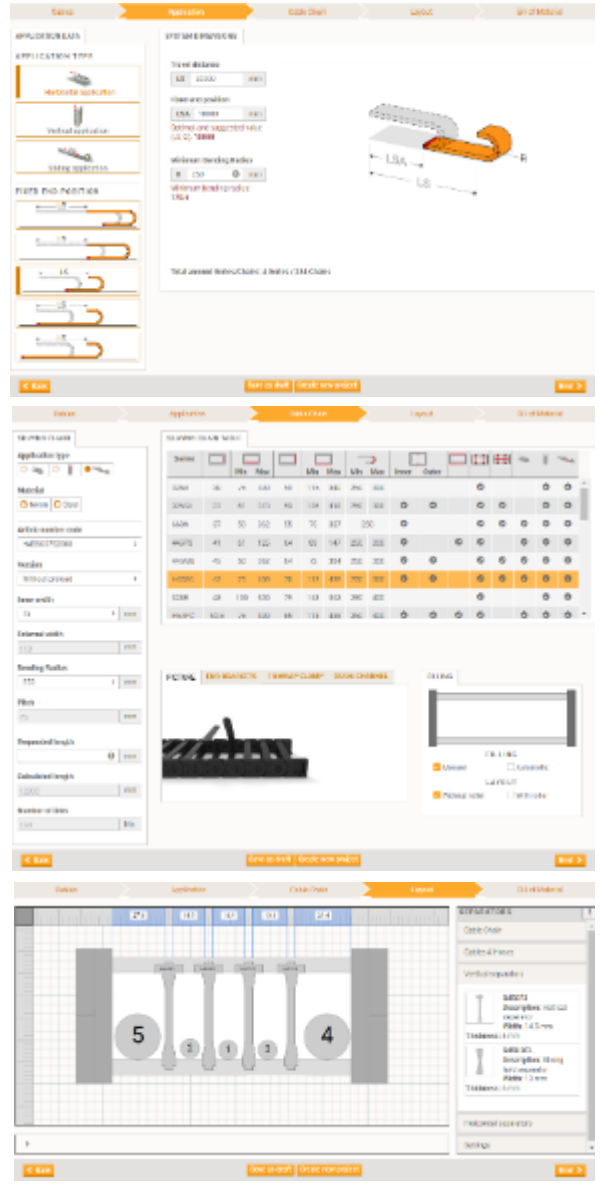
    Especially when the bending radius (**R**) selected is greater than 3x the link height.





ONLINE TOOLS....

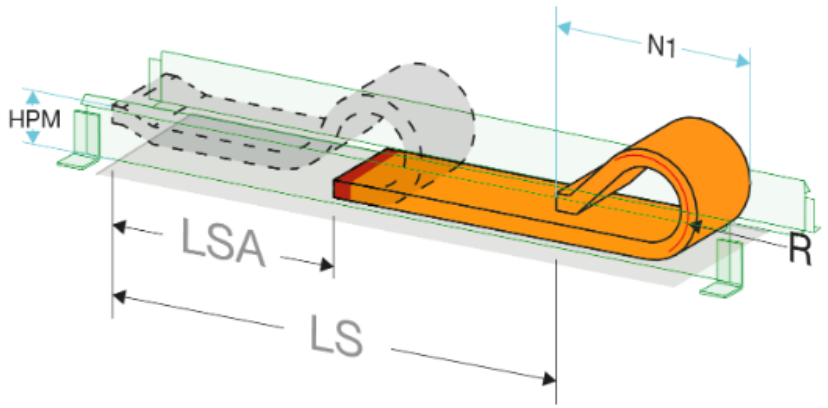




https://chainconfigurator.lappgroup.com/

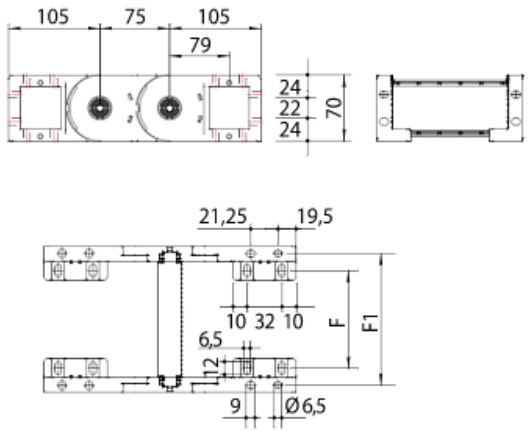
TECHNICAL DRAWING | CHAIN ITEMS | CABLE ITEMS

Lateral view



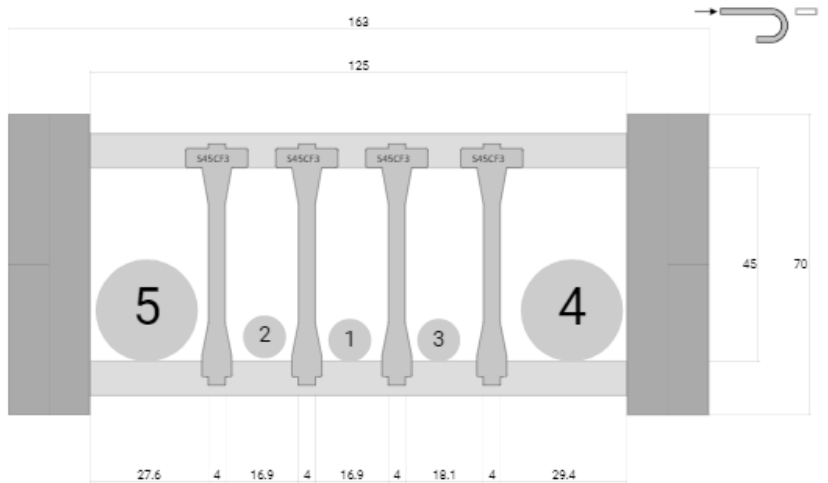
LS = 20000 LSA = 10000 R = 178.5 N1 = 990 HPM = 250

End brackets

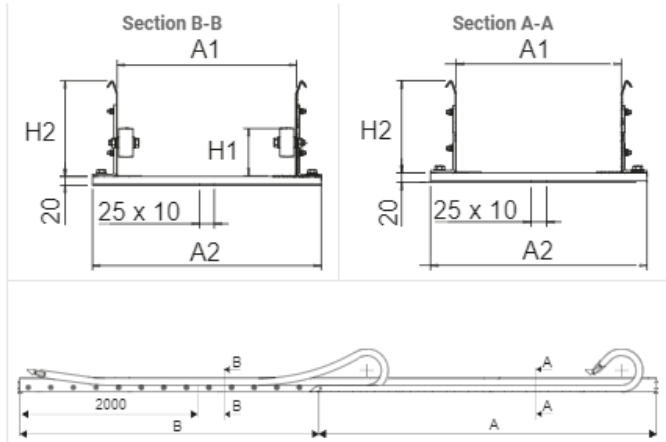


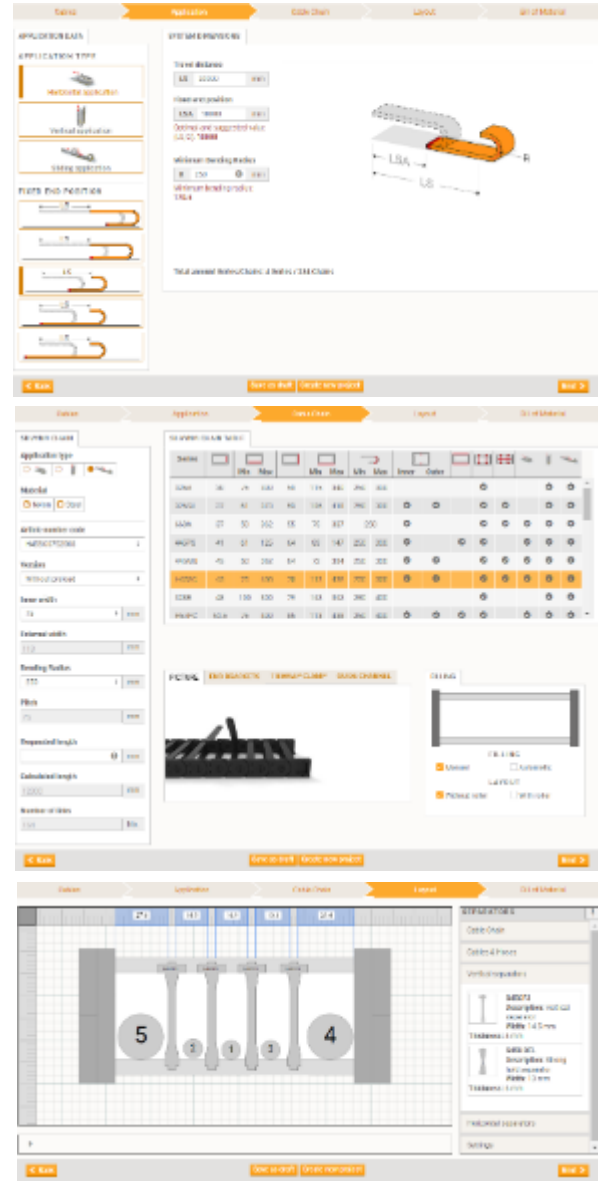
F1 = 105 F2 = 141

Chain section



Guide channel





QUESTION AND ANSWER

THANK YOU

Further technical enquiries, email to enquiry.apac.sg@lappgroup.com