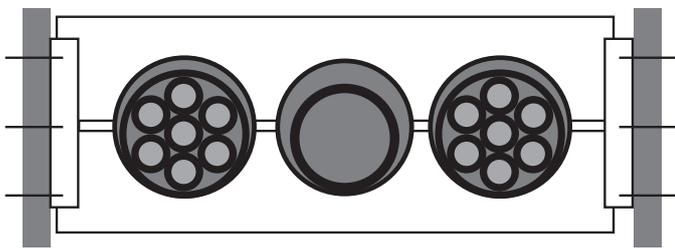


■ INSTALLATION MANUAL

Cable installation in drag chains

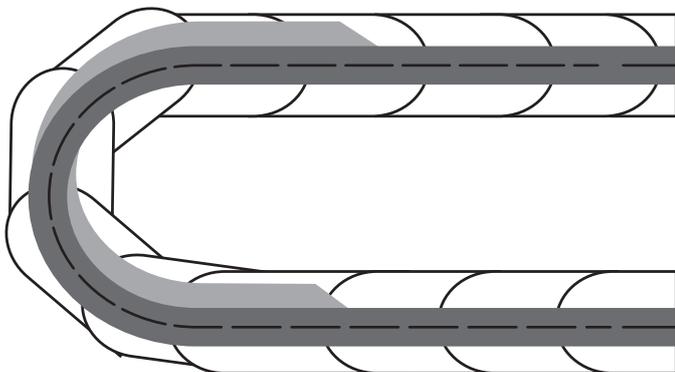
The control cables in drag chains undertake an important task for the controlling and power technique, must be good synchronized with each other in the power chain systems. Further the installation of the cables and protection tubes in the power drag

chains must be conducted with great care. An efficient usage upon accurate and exact cable installation. The following basic points should be noticed:



1. Where flat and round cables are mixed in one drag tray, then these should be installed loosely next to one another. The guide stays should be installed between the cables laid side by side. Try and avoid placing different sizes of round cables next to one another. Due to the limited space relationship cables arranged one above the other, frame stays are to be installed.

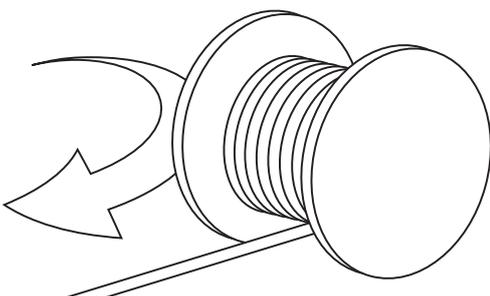
2. The cables must be installed with guide stays, dividers or in separate hole stays so as to move freely in the drag tray guides. As free space for the cables in the guide stay should be at least 10% of the cable \varnothing .



3. Always ensure that the cable can follow the drag trays motions without appearing to be forced.

4. If the cables are to be installed in the drag tray in layers then it is important to check upon installation that the cables are laid in such a way that they do not block each other when the drag tray alters direction.

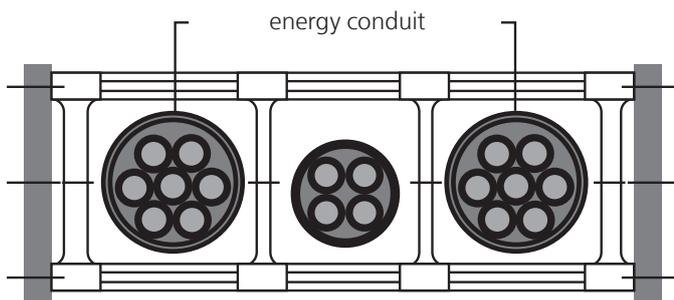
5. Cables should always be installed in nonkinking and nontwisting flat position into the drag trays. The cables must be reeled down tangential from the reels or drums; the cables should not be lifted up in twisted or looping form over head. Before the installation, the cables must be laid in straight and non-twisted form on plane surface. The cables must have an additional length of at least 10% of the whole length so that these can be laid freely without twisting in drag chains.





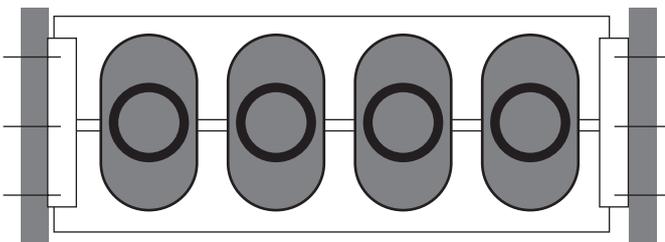
Download Questionnaire for Energy Drag Chain Systems:

You can download the Questionnaire for Energy Drag Chain Systems simply under: www.helukabel.de/Questionnaire-Energy.pdf



6. In case that is not possible to lay the cables as described under 6.1, in order to lay several multi core high flexible cables with an outer diameter $< 10 \text{ mm}$, we recommend the use of a guiding tube, in which these cables should loosely laid. This tube is then integrated into the drag system. The cross section of this tube has to be much larger as the sum of the cross sections of the cables. For the free movement of the flexible energy conduits, the guide or divider stays must be installed.

7. In case that pressure- or hydraulic tubes are integrated in a power drag system, those should be able to expand and to shrink under alternating charges without interrupting the functionality of the drag system.



8. In order to maintain a balanced running of the drag chain it is necessary to ensure that the weight of the cables inside is divided up evenly, with the heavier cables installed on the edges and the lighter types in the middle. All cables must be securely fixed at one end of the drag chain. Thus assuring that the cores are securely fastened to one side with the other, open, side allowing enough slack to take up the drag chain's motion. Generally it is recommended, if possible, not to use cables with a multi layer construction, e.g. > 25 cores, but to split the necessary number of conductors over several cables.

