



LAPP GROUP TEST CENTER

Stuttgart, Germany





LAPP GROUP TEST CENTER

Top Quality is the foundation of our success!!

In order to offer our Customers the optimal product, stringent durability testing of our cables and other LAPP Group products are performed on state-of-the-art equipment at our Test Centers. Only high performance products that are capable of withstanding the testing procedures are included in our family of products.

At the LAPP Test Center, our products are tested under the most severe test conditions, the smallest bending radius, at varying speeds and alternate bending cycles of flexing, bending, twisting as well as flame testing.

Only by means of such severe test conditions can we demonstrate that our products will meet the performance demands of our customers in tough daily use.

The LAPP Test Center is proof of our dedication to our customers and of *our own* performance standards.



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Power Chain Test



Continuous testing unit for testing high flexibility power chain cables – e.g. OLFLEX FD[®] and UNITRONIC-FD[®] series – under extreme conditions with regard to minimum bend radii, varying travel length and speeds and bending cycles. On this unit, cables are tested with a bend radius of 100-300mm.

New products must undergo testing of up to 10 million bending cycles; manufacturing control of standard products up to 6 million bending cycles. All cables are electrically checked for core breaks and short circuits.

Conditions	Metric	Feet
Bending Radius	100-300mm	4-12 in
Travel length	6.0 m	19.5 ft
Travel speed	0.8 m/s – 5.0 m/s	2.7 – 16.4 ft/s
Acceleration	1.0 m/s ² - 5.0 m/s ²	3.2 - 16.4 ft/s ²
Test capacity	40 cables	40 cables
Temperature Range During Test	+10°C to +22°C	+10°C to +22°C



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The Flex Drag Chain Test



Continuous testing unit for high flexible power chain cables – under extreme conditions with regard to minimum bend radii, varying travel length, speeds and bending cycles.

New products must undergo testing of up to 10 million bending cycles. All cables are electrically checked for core breaks.

Conditions	Metric	Feet
Bend Radius	25-100mm	4-12 inches
Travel length	5.0 m	16.5 Feet
Travel speed	1.0 m/s ² - 5.0 m/s ²	3.2 -16.5 ft/s ²
Test capacity power chain	Maximum 20cables	
Test capacity pulley-bending	Maximum 4 cables	
Temperature Range During Test	+10°C to +22°C	



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Power Chain & Pulley-Bending Test



Combined test unit for testing of power and control cables in power chains and also bending against pulleys.

The bending test is in accordance with HD 21.2 S 3 or VDE 0281-2.

In the bending test, all flexible cables have to pass 60,000cycles minimum.

All cores are electrically checked for core breaks.

Conditions	Metric	Feet
Bend Radius	100-300mm	4-12 in
Travel length	5.0 m	16.5 ft
Travel speed	1.0 m/s ² - 5.0 m/s ²	3.2 -16.5 ft/s ²
Test capacity power chain	Maximum 20cables	
Test capacity pulley-bending	Maximum 4 cables	
Temperature Range During Test	+10°C to +22°C	



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The Linear Unit

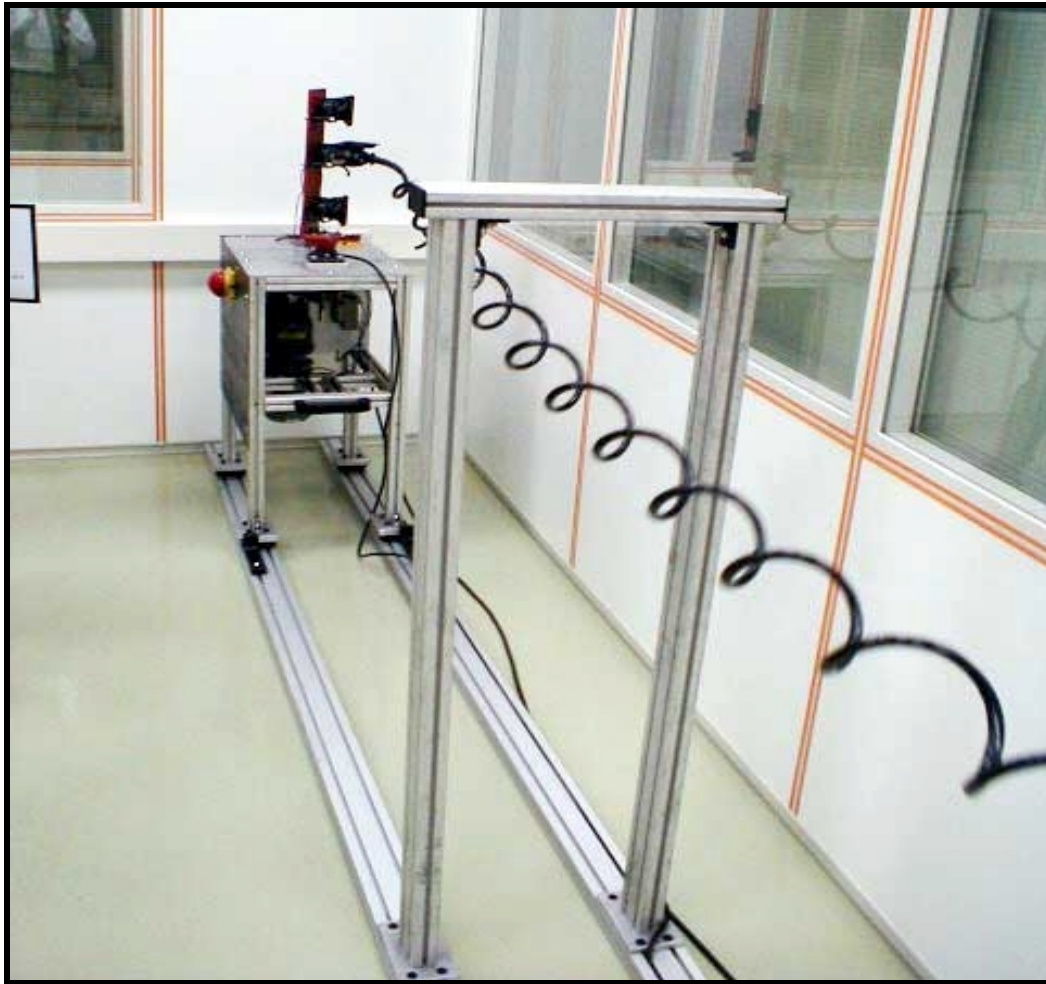


Test unit for testing varying types of cables.

Conditions	Metric	Feet
Travel length	1.1 m	3.5 feet
Travel speed	1.0 m/s ²	3.2ft/ s ²
No. of cycles	15,000 cycles in 24 hours	
Temperature Range During Test	+10°C to +22°C	



Spiral Test Unit



Test unit for testing the bending resistance of spiral cables

Conditions	Metric	Feet
Bending angle	+/- 90°	
Extended length	up to 4.5 m	14.5 feet
Test capacity	3 Spirals	
No. of cycles	. 30,000cycles in 24 hours	
Temperature Range During Test	+10°C to +22°C	



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Torsion / bending Test Unit



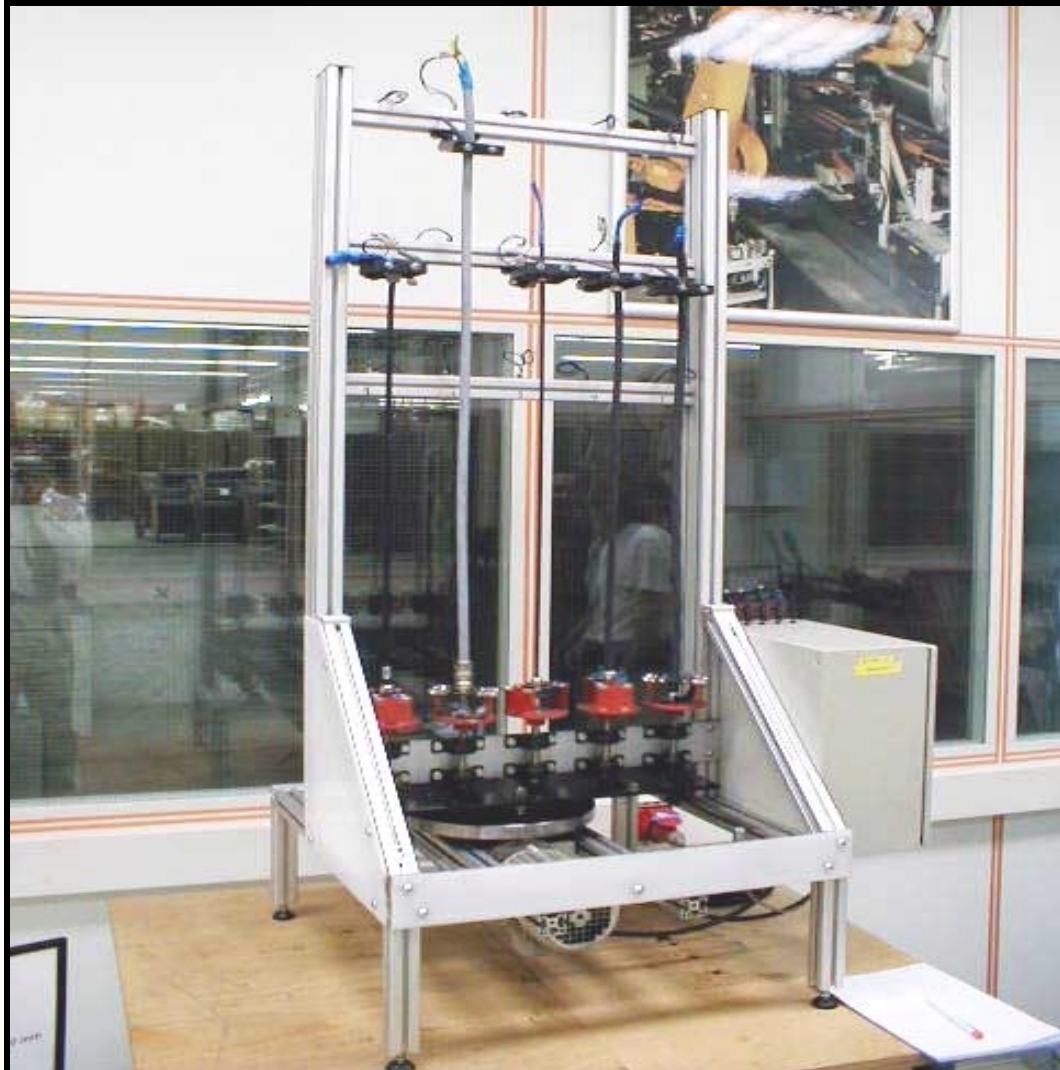
For simultaneous testing of the torsion and bending loads upon OLFLEX ROBOT® cables. The angle of bending can be adjusted in steps of +/- 15°

Torsion angle	Maximum +/- 180°
Bending angle	Maximum +/- 180°
Test capacity	8 cables
No. of cycles	35,000 cycles in 24 hours
Temperature Range During Test	+10°C to +22°C



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Torsion Test Unit



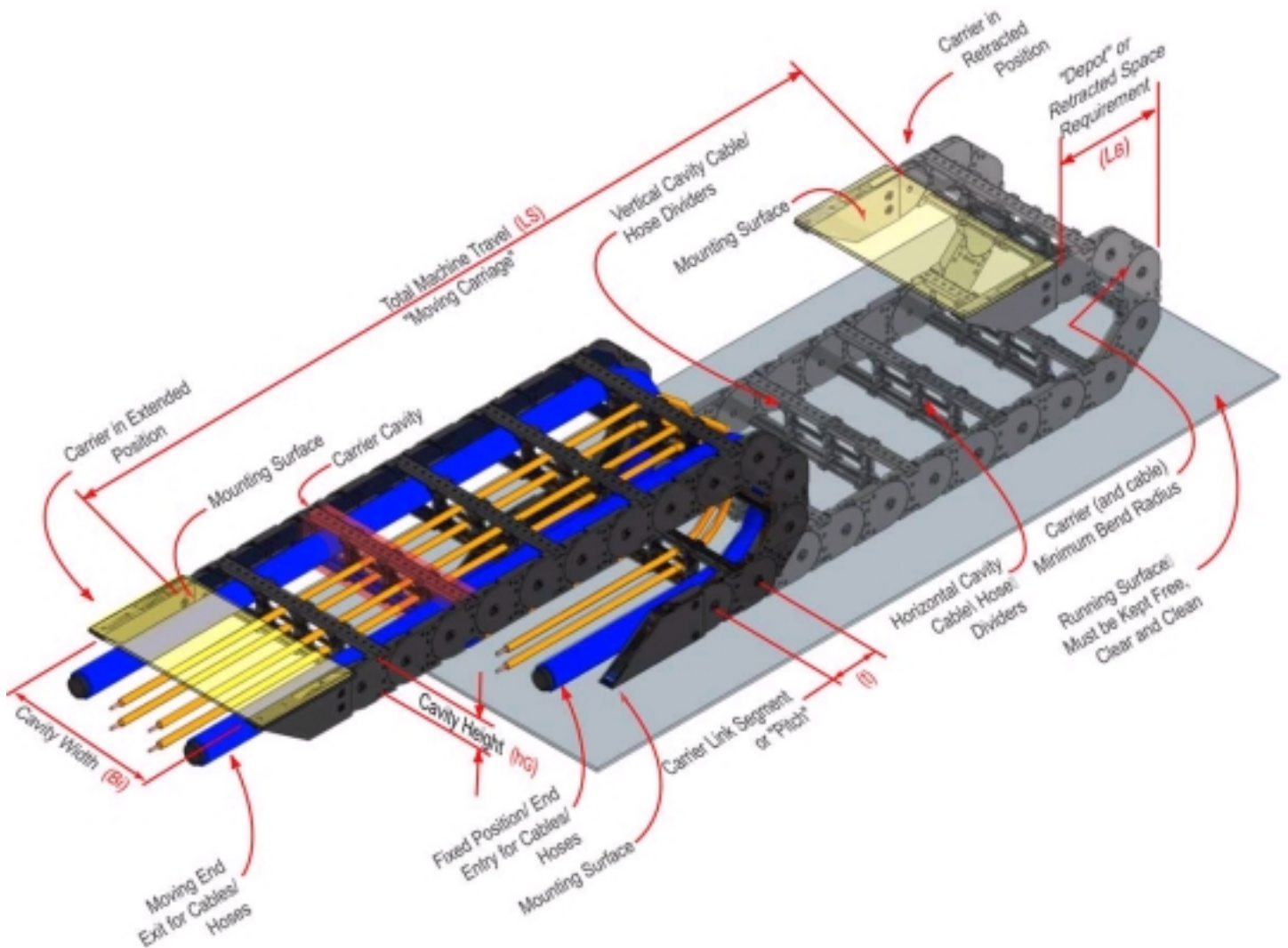
For testing torsion resistance of OLFLEX ROBOT[®] cables.

Conditions	Metric	Feet
Torsion angle	+/- 450°	
Test lengths	500 mm, 750 mm and 1000mm	1.6 ft, 2.4 ft and 3.28 ft
Test capacity	5 cables	
No. of cycles	20,000cycles in 24 hours	
Temperature Range During Test	+10°C to +22°C	



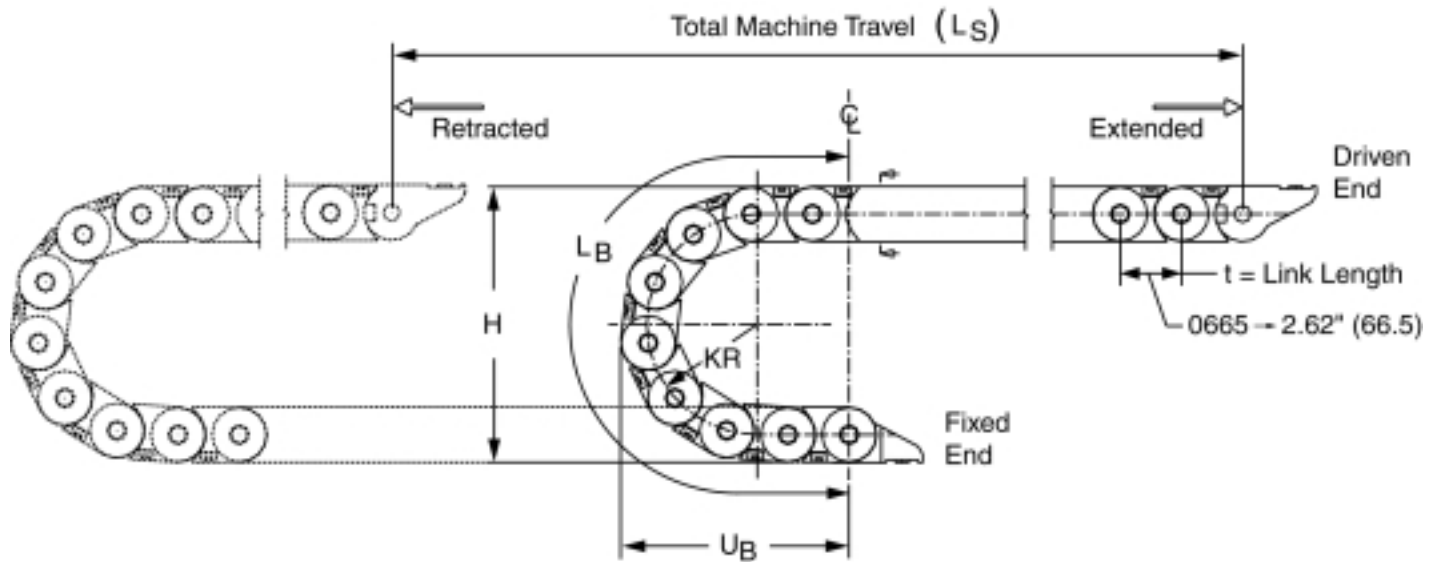
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Cable Track and Design Fundamentals



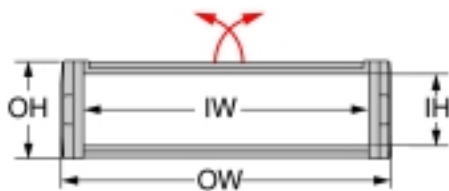


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L_S = Total Travel Length
 L_B = Loop Length
 KR = Bend Radius
 H = Mounting Height
 U_B = Depot

For Example - 0665.030.175



IW = Inside Width
 OW = Outside Width
 IH = Inside Height
 OH = Outside Height
 KR = Bend Radius
 H = Mounting Height
 t = Link Length



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Application

- Know the requirements & the limitations of equipment
- Design and Selection of cable management products & accessories
- Installation Variations: Which fits the best?

Various Types of Cable Tracks

- **Plastic** (Nylon)
 - * Chemical
 - * Cheaper
 - * Flexible and not as rigid
 - * Lighter in weight
- **Metal** (Zinc Plated Steel)
 - * Needs less support
 - * Operating higher temperature
 - * Durable in harsh environment

Types of Accessories

- Divider: Nylon: Verticals (more common) & Horizontal
- Brackets: Nylon (one or two piece), Metals (two pieces)
- Standard Frame Stay:
 - Nylon –Standard, In/Out Hinges
 - Cover Strip
 - RL/RV - Twist In/Out Aluminum Bar
 - RS – Bolted Aluminum
 - RM – Heavy duty bolted on aluminum bar
- Metal Guide Channels - for support & guides of the track, available in the industry - too costly

Products we offer

Versa Trax, Plastitrak
 Plastitrak Model 32
 Varitrak, 650K, 900K
 Available in the industry
 Available in the industry

Fundamentals & Abbreviations

Ls: Travel length **Lb:** Loop Length **t:** Link Length **KR:** Bend Radius **H:** Mounting Height
IW: Inside Width **OW:** Outside Width **IH:** Inside Height **OH:** Outside Height

Determine the amount of track needed

- Determine the travel length & type of mount center or off center
- Determine the fixed and moving motion & Type of movement

Formulas:

Center Mounting (CM): $CM = (Ls / 2) + Lb$ # of links = CM / t

Off-Center Mounting (OCM): $OCM = (Ls / 2) + \text{Off-center} + Lb$ # of links = OCM / t

Determine the proper carrier type and size

- Determine the minimum bend radius of the components inside the track.
Choose a track that is slightly larger than minimum bend radius:
- Rule of thumb: The **cable** manufacturer will assign minimum radius.
For **hoses** it should be 5 x diameter, **hydraulic** lines: 7.5 x diameter, confirm with customer
- **Width** clearances for **cable** inside the cable track is **10%**, for hoses is **20%**
- **Height** clearance for **cable & hoses** is approx. **20%**
- Distribute the weight inside the track and put the heavy components on the outside
- Calculate the weight of components inside the track





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- Check Travel length for unsupported length (optional)
- Select the proper carrier type and size for the application

Rules for Dividers

- Use when there is more than 3 conductors
- Separate the cables and hoses inside the cavity so they can move independently
- Every customer may have their own preferences on dividers, Ask the question?
- Every other link