GRP CABLE MANAGEMENT

LADDER AND TRAY SYSTEMS

DELIVERING INNOVATION
www.marshall-tufflex.com

UK OWNED
UK MANUFACTURER

Marshall Tufflex

GLASS REINFORCED POLYESTER (GRP)

Glass reinforced polyester (GRP) cable management systems are vitally important for use in the transport, petrochemical and construction industries where it is used to provide lightweight yet mechanically strong materials which replace heavier, more energy consuming materials such as aluminium, steel and concrete. It is a highly competent engineering material, capable of being specified for a large number of construction applications.

GRP cable management systems are well suited to aggressive environments where there might be extreme weather or high temperatures. They are extremely robust, considerably lighter than aluminium or steel, and have excellent resistance against fire and corrosion resulting in a very long life span. GRP systems have a large cable capacity, and offer fast and flexible installation solutions, with the ability of on-site assembly and configuration.

Marshall-Tufflex can offer a wide range of GRP systems including trays, ladders, ground ducts, troughing, accessories and fittings, fixings and supports.

What is RISQS?

RISQS, formerly known as Achilles Link-up, has been developed to provide a service for the qualification of suppliers for all products and services that are procured by the industry. RISQS supports Network Rail, LUL/Transport for London, train operators and other rail products and services providers in the management of supply chain risk. RISQS is an independent, third party qualification assessment of a supplier's capability to supply products and services.

Marshall-Tufflex is registered with the RISQS Railway Industry Supplier Qualification scheme

Approvals

Mechanical Behaviour

- Breaking point to NEMA FG1
- Tensile strength at break point to ISO 527-5
- Modulus of elasticity to ISO 527-5
- Accelerated aging to ISO 4892-2 & ISO 9227
- IEC 61537

Electrical behaviour

- Surface resistivity to IEC 6079-0
- Breakage voltage to IEC 60243-1
- Comparative tracking index IEC 60112
- IEC 60093

Fire resistance to DIN 4102 part 12

Linear Thermal Expansion to DIN 53752

Water Absorption to ISO 62

Environmental & sustainability

- Analysis shows GRP to have one of the best environmental impact profiles of any strong building material.
- GRP is easily dismantled and cut up to use in road metalling and can be re-used in other buildings.
- Buildings using GRP within their infrastructure are lighter and require less energy to heat; with building performance life of 40 to 50 years.
- Light weight and easy handling can result in considerable fuel savings.
- Reduction in the need for motorised cranes and platform lift vehicles.
- Use of acetone has been eliminated.
- Recycling trials for composite parts are progressing satisfactorily in several European programmes, using GRP as a source of heat energy and the resultant residue as raw material in cement manufacture.

EMI protection

- Not applicable for this material.

Fire performance

- Excellent fire performance. GRP is a self-extinguishing composition, halogen-free and with low smoke and fume properties.

Fire Behaviour

- Inflammability to IEC 60695-2-12/ UL94
- Spread of flame to BS 476 part 7 class 2 / ASTM E84 (Up to Class 1 on request)
- Fire propagation to BS 476 Part 6
- Smoke emissions to BS 6853 App B53
- Fire standard to DIN 4102 part 12
- UL 723

Marshall-Tufflex LS0H GRP systems are very robust and particularly suitable for interior and exterior areas where resistance to corrosion is a requirement. They are considerably lighter than aluminium or steel and have excellent fire performance.

Pressed tray

50 x 50mm to 400 x 80mm

A complete range of pressed GRP trays for extended support span up to 3metres.

Page 5

Pultruded ladder

200 x 53mm to 900 x 150mm

A pultruded ladder system for installation into tunnels, bridges, railways, underground, offshore and marine environments.

Page 11

GRP industrial support systems

for supporting large power cables

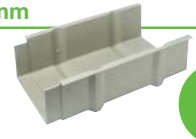
Brackets, bolts and rails for use with other GRP systems.

Page 15

Ground ducts

250 x 140mm to 450 x 176mm

Self-supporting systems ideal for railway applications.



Page 16

Cable troughing

150 to 250 x 150mm

Suited to railway applications where cable ducts cannot be buried.

Page 17

Case Study

GRP is the material of choice for a wide range of cable management projects in the rail network.

With more than 200 million passenger journeys a year, durability and ease of installation were key considerations for contractors leading a multi-million pound upgrade of a high profile UK rail station.

Rail projects have some of the most challenging cable management requirements due to the harsh, and sometimes hazardous, environment of their locations. With its lightweight construction, long life span and resistance to fire and corrosion, Marshall-Tufflex's Glass Reinforced Polyester (GRP) cable management system provided the perfect solution. More than 700m of perforated GRP tray with standard covers has helped deliver power and data provision for station signalling, lighting, tannoys and surveillance systems. The installation formed part of renovations to bring old platforms back into use and extend current platforms to accommodate longer trains.

The robust product is specifically designed for challenging environments with the material effective at temperatures from -80°C to over 130°C. It is both corrosion and fire resistant with low thermal conductivity and self-extinguishing properties that make it fully compliant with fire standards and regulations.

Weighing 40% less than steel it is also easier to move around and install. The trays require fewer fasteners and benefit from interlocking and self-adjusting couplings making them quick and easy to assemble and configure on site. The flexibility of the system helped save time and labour costs, both critical in ensuing platforms were reopened on time and within budget.

Note: you may use the rule on the left of this page to check profile sizes.

GRP cable management systems incorporate non-conductive and self-extinguishing properties, as well as stability, wherever they are subjected to high levels of UV and extreme temperatures. GRP systems are ideal solutions for installation in tunnels, bridges, railways, underground, offshore and marine environments.

Rail:

Optimum safety:

- Self-extinguishing UL94 - V0
- In the event of fire, no halogen toxic fumes (fire classification: M1, i0, F0; ASTM E84, Class 2 or Class 1; BS 476 Part 7, Class 2 or 1)
- No sharp edges or burrs, from cutting or drilling

Flexibility and easy mounting:

- Reduces installation costs with unique self coupling mechanism
- No earthing required
- Very strong mechanical resistance, even with high temperature variation
- 10 times lighter than concrete
- Excellent vibration resistance

Sea:

Resists corrosion: atmospheric, UV, saline

Save installation time and costs:

- Reduces use of bolts with clip-on splice plates and fixings
- No expensive protection accessories or coatings necessary
- No sharp edges or burrs, from cutting or drilling
- Ensures strong mechanical resistance with a lighter weight than metal
- Excellent vibration resistance

Road:

Resists corrosion: combustion gas, salt

Optimum safety:

- Self-extinguishing UL94 - V0
- Does not emit halogen or smoke (fire classification: M1, i0, F0; ASTM E84, Class 2 or Class 1; BS 476 Part 7, Class 2 or 1)
- No sharp edges or burrs, from cutting or drilling

Flexibility and easy mounting:

- Reduces installation costs with unique self coupling mechanism
- Save time and money as no earthing is required
- Ensures strong mechanical resistance with a lighter weight than metal
- No expensive protection accessories or coatings necessary
- Excellent vibration resistance

Petrochemical and Process Plant Industries:

Cut down corrosion and maintenance costs
Reduce installation costs

- No earthing required
- No expensive protection accessories or coating
- No sharp edges or burrs, from cutting or drilling

Ensures strong mechanical resistance and a lighter weight
Reduces weight of structure

- Saves 40% against stainless steel
- Saves 15% against aluminium

Energy Distribution:

Very strong mechanical resistance, even with high temperature variation
No expensive protection accessories or coating necessary

Optimum safety:

- Self-extinguishing UL94 - V0
- No toxic fumes or halogen in case of fire (fire classification: M1, i0, F0; ASTM E84, Class 2 or Class 1; BS 476 Part 7, Class 2 or 1)
- No sharp edges or burrs, from cutting or drilling

STANDARD SPAN PRESSED TRAY

GRP standard span cable tray and fittings are pressed from glass reinforced polyester resin, using hot moulding technology and facilitating the manufacture of smooth intricate shapes. The system is ideal for installation into tunnels, bridges, railways, underground, offshore and marine environments.

Product information

- A variety of sizes from 50 x 50mm to 400 x 80mm
- 2.5 times lighter than steel
- Completely corrosion resistant against salt spray, H25, acid build up from exhaust gases and brake dust along roads and railways
- No need for painting or protective coating
- Classified LS0H material
- Self-extinguishing
- Low conductivity
- Earthing not required
- Antimagnetic and resistant to electromagnetic pulses
- Effective at temperatures between -80˚C to +130˚C
- Lower life cycle cost
- Fast installation with fewer fasteners
- Easy to cut and drill
- Load characteristics in accordance with IEC 61537 (for load or other calculations and values, please refer to the technical section)

Reduced use of bolts

GRP is a non-conductive material with excellent fire performance and high corrosion resistance

Basic components

Non-perforated pressed tray – 3 metres

code	size	pack
KK5050	50 x 50mm	1 x 3m
KK10050	100 x 50mm	1 x 3m
KK15050	150 x 50mm	1 x 3m
KK20050	200 x 50mm	1 x 3m
KK30050	300 x 50mm	1 x 3m
KK10080	100 x 80mm	1 x 3m
KK15080	150 x 80mm	1 x 3m
KK20080	200 x 80mm	1 x 3m
KK30080	300 x 80mm	1 x 3m
KK40080	400 x 80mm	1 x 3m

Perforated pressed tray – 3 metres

code	size	pack
KKL5050	50 x 50mm	1 x 3m
KKL10050	100 x 50mm	1 x 3m
KKL15050	150 x 50mm	1 x 3m
KKL20050	200 x 50mm	1 x 3m
KKL30050	300 x 50mm	1 x 3m
KKL10080	100 x 80mm	1 x 3m
KKL15080	150 x 80mm	1 x 3m
KKL20080	200 x 80mm	1 x 3m
KKL30080	300 x 80mm	1 x 3m
KKL40080	400 x 80mm	1 x 3m

Tray cover – 3 metres

code	to fit	pack
KKD50	50 x 50mm	1 x 3m
KKD100	100 x 50/80mm	1 x 3m
KKD150	150 x 50/80mm	1 x 3m
KKD200	200 x 50/80mm	1 x 3m
KKD300	300 x 50/80mm	1 x 3m
KKD400	400 x 80mm	1 x 3m

See page 8 for quick reference chart

Fittings

Tray cover clip

code	size	pack
DF50	50mm	50
DF80	80mm	50

Tray end cap

code	to fit	pack
KKKE5050	50 x 50mm	1
KKKE10050	100 x 50mm	1
KKKE15050	150 x 50mm	1
KKKE20050	200 x 50mm	1
KKKE30050	300 x 50mm	1
KKKE10080	100 x 80mm	1
KKKE15080	150 x 80mm	1
KKKE20080	200 x 80mm	1
KKKE30080	300 x 80mm	1
KKKE40080	400 x 80mm	1

Tray internal bend base

code	to fit	pack
KKBI5050	50 x 50mm	1
KKBI10050	100 x 50mm	1
KKBI15050	150 x 50mm	1
KKBI20050	200 x 50mm	1
KKBI30050	300 x 50mm	1
KKBI10080	100 x 80mm	1
KKBI15080	150 x 80mm	1
KKBI20080	200 x 80mm	1
KKBI30080	300 x 80mm	1
KKBI40080	400 x 80mm	1

Tray internal bend cover

code	to fit	pack
KKBID5050	50 x 50mm	1
KKBID10050	100 x 50mm	1
KKBID15050	150 x 50mm	1
KKBID20050	200 x 50mm	1
KKBID30050	300 x 50mm	1
KKBID10080	100 x 80mm	1
KKBID15080	150 x 80mm	1
KKBID20080	200 x 80mm	1
KKBID30080	300 x 80mm	1
KKBID40080	400 x 80mm	1

Tray external bend base

code	to fit	pack
KKBA5050	50 x 50mm	1
KKBA10050	100 x 50mm	1
KKBA15050	150 x 50mm	1
KKBA20050	200 x 50mm	1
KKBA30050	300 x 50mm	1
KKBA10080	100 x 80mm	1
KKBA15080	150 x 80mm	1
KKBA20080	200 x 80mm	1
KKBA30080	300 x 80mm	1
KKBA40080	400 x 80mm	1

Tray external bend cover

code	to fit	pack
KKBAD5050	50 x 50mm	1
KKBAD10050	100 x 50mm	1
KKBAD15050	150 x 50mm	1
KKBAD20050	200 x 50mm	1
KKBAD30050	300 x 50mm	1
KKBAD10080	100 x 80mm	1
KKBAD15080	150 x 80mm	1
KKBAD20080	200 x 80mm	1
KKBAD30080	300 x 80mm	1
KKBAD40080	400 x 80mm	1

Tray flat angle base (small radius)

code	to fit	pack
KKW5050	50 x 50mm	1
KKW10050	100 x 50mm	1
KKW15050	150 x 50mm	1
KKW20050	200 x 50mm	1
KKW30050	300 x 50mm	1
KKW10080	100 x 80mm	1
KKW15080	150 x 80mm	1
KKW20080	200 x 80mm	1
KKW30080	300 x 80mm	1
KKW40080	400 x 80mm	1

Tray flat angle cover (small radius)

code	to fit	pack
KKWD50	50 x 50mm	1
KKWD100	100 x 50/80mm	1
KKWD150	150 x 50/80mm	1
KKWD200	200 x 50/80mm	1
KKWD300	300 x 50/80mm	1
KKWD400	400 x 80mm	1

Tray flat angle base (large radius)

code	to fit	pack
KKB15050	150 x 50mm	1
KKB20050	200 x 50mm	1
KKB30050	300 x 50mm	1
KKB10080	100 x 80mm	1
KKB15080	150 x 80mm	1
KKB20080	200 x 80mm	1
KKB30080	300 x 80mm	1
KKB40080	400 x 80mm	1

Tray flat angle cover (large radius)

code	to fit	pack
KKBD150	150 x 50/80mm	1
KKBD200	200 x 50/80mm	1
KKBD300	300 x 50/80mm	1
KKBD100	100 x 80mm	1
KKBD400	400 x 80mm	1

Tray flat angle 135° base (large radius)

code	to fit	pack
KKC10080	100 x 80mm	1
KKC15080	150 x 80mm	1
KKC20080	200 x 80mm	1
KKC30080	300 x 80mm	1
KKC40080	400 x 80mm	1

Tray flat angle 135° cover (large radius)

code	to fit	pack
KKCD100	100 x 80mm	1
KKCD150	150 x 80mm	1
KKCD200	200 x 80mm	1
KKCD300	300 x 80mm	1
KKCD400	400 x 80mm	1

Tray flat tee base (small radius)

code	to fit	pack
KKSS5050	50 x 50mm	1
KKSS10050	100 x 50mm	1
KKSS15050	150 x 50mm	1
KKSS20050	200 x 50mm	1
KKSS30050	300 x 50mm	1
KKSS10080	100 x 80mm	1
KKSS15080	150 x 80mm	1
KKSS20080	200 x 80mm	1
KKSS30080	300 x 80mm	1

Tray flat tee cover (small radius)

code	to fit	pack
KKSSD50	50 x 50mm	1
KKSSD100	100 x 50mm	1
KKSSD150	150 x 50mm	1
KKSSD200	200 x 50mm	1
KKSSD300	300 x 50mm	1
KKSSD100	100 x 80mm	1
KKSSD150	150 x 80mm	1
KKSSD200	200 x 80mm	1
KKSSD300	300 x 80mm	1

Tray flat tee base (large radius)

code	to fit	pack
KKST10050	100 x 50mm	1
KKST15050	150 x 50mm	1
KKST20050	200 x 50mm	1
KKST30050	300 x 50mm	1
KKST10080	100 x 80mm	1
KKST15080	150 x 80mm	1
KKST20080	200 x 80mm	1
KKST30080	300 x 80mm	1
KKST40080	400 x 80mm	1

Tray flat tee cover (large radius)

code	to fit	pack
KKSTD100	100 x 50/80mm	1
KKSTD150	150 x 50/80mm	1
KKSTD200	200 x 50/80mm	1
KKSTD300	300 x 50/80mm	1
KKSTD400	400 x 80mm	1

Fittings

Tray offset base set

code	to fit	pack
KKET10080	100 x 80mm	1
KKET15080	150 x 80mm	1
KKET20080	200 x 80mm	1
KKET30080	300 x 80mm	1
KKET40080	400 x 80mm	1

Tray offset cover set

code	to fit	pack
KKETD10080	100 x 80mm	1
KKETD15080	150 x 80mm	1
KKETD20080	200 x 80mm	1
KKETD30080	300 x 80mm	1
KKETD40080	400 x 80mm	1

Tray reducer LH base

code	reduction	pack
KKRL20080	200 to 100	1
KKRL30080	300 to 200	1
KKRL40080	400 to 300	1

Tray reducer LH cover

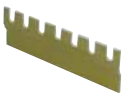
code	reduction	pack
KKRLD200	200 to 100	1
KKRLD300	300 to 200	1
KKRLD400	400 to 300	1

Tray reducer RH base

code	reduction	pack
KKRR20080	200 to 100	1
KKRR30080	300 to 200	1
KKRR40080	400 to 300	1

Tray reducer RH cover

code	reduction	pack
KKRRD200	200 to 100	1
KKRRD300	300 to 200	1
KKRRD400	400 to 300	1



Tray pin rack

code	to fit	pack
KR100	100 x 50/80mm	1
KR150	150 x 50/80mm	1
KR200	200 x 50/80mm	1
KR300	300 x 50/80mm	1
KR400	400 x 80mm	1

Components

Tray divider – 3 metres

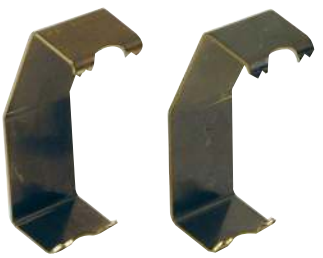
code	to fit	pack
KKT50	100 x 50mm	1
KKT80	100 x 80mm	1

* 3 x M616/V4A per length to fix to tray

Cover clips

p5

Because GRP expands in heat these unique clips have been developed to ensure the lid remains firmly in place, even when subjected to extreme heat expansion. The clips are for use with the GRP tray and ladder systems and will prevent the lid from being displaced.



GRP cover clips

code	pack
DF50	50
DF80	50

Quick reference chart

Standard span pressed tray

Tray/trunking component chart

Length: 3 metres

Pack 1

	Non-perforated pressed GRP tray	Perforated pressed GRP tray	Cover	Cover clip	Divider	End cap	Internal bend	
							Base	Cover
50 x 50mm tray	KK5050	KKL5050	KKD50	DF50	KKT50	KKKE5050	KKBI5050	KKBID5050
100 x 50mm tray	KK10050	KKL10050	KKD100	DF50	KKT50	KKKE10050	KKBI10050	KKBID10050
150 x 50mm tray	KK15050	KKL15050	KKD150	DF50	KKT50	KKKE15050	KKBI15050	KKBID15050
200 x 50mm tray	KK20050	KKL20050	KKD200	DF50	KKT50	KKKE20050	KKBI20050	KKBID20050
300 x 50mm tray	KK30050	KKL30050	KKD300	DF50	KKT50	KKKE30050	KKBI30050	KKBID30050
100 x 80mm tray	KK10080	KKL10080	KKD100	DF80	KKT80	KKKE10080	KKBI10080	KKBID10080
150 x 80mm tray	KK15080	KKL15080	KKD150	DF80	KKT80	KKKE15080	KKBI15080	KKBID15080
200 x 80mm tray	KK20080	KKL20080	KKD200	DF80	KKT80	KKKE20080	KKBI20080	KKBID20080
300 x 80mm tray	KK30080	KKL30080	KKD300	DF80	KKT80	KKKE30080	KKBI30080	KKBID30080
400 x 80mm tray	KK40080	KKL40080	KKD400	DF80	KKT80	KKKE40080	KKBI40080	KKBID40080

Product Information

All products are supplied in pack quantities of one, except cover clips and fixing bolts.

A range of Pressed GRP Trays with 110mm wall height is also available on request.

Complete range of Pultruded Trays for extended support span up to 3 metres in 50mm and 80mm wall heights are also available on request.

Please contact us on +44 (0)1424 856600 for a lead time.

Tray/trunking component chart

External bend		Flat angle (small radius)		Flat angle (large radius)		Flat angle 135° (large radius)		Offset	
Base	Cover	Base	Cover	Base	Cover	Base	Cover	Base set	Cover set
KKBA5050	KKBAD5050	KKW5050	KKWD50	–	–	–	–	–	–
KKBA10050	KKBAD10050	KKW10050	KKWD100	–	–	–	–	–	–
KKBA15050	KKBAD15050	KKW15050	KKWD150	KKB15050	KKBD150	–	–	–	–
KKBA20050	KKBAD20050	KKW20050	KKWD200	KKB20050	KKBD200	–	–	–	–
KKBA30050	KKBAD30050	KKW30050	KKWD300	KKB30050	KKBD300	–	–	–	–
KKBA10080	KKBAD10080	KKW10080	KKWD100	KKB10080	KKBD100	KKC10080	KKCD100	KKET10080	KKETD10080
KKBA15080	KKBAD15080	KKW15080	KKWD150	KKB15080	KKBD150	KKC15080	KKCD150	KKET15080	KKETD15080
KKBA20080	KKBAD20080	KKW20080	KKWD200	KKB20080	KKBD200	KKC20080	KKCD200	KKET20080	KKETD20080
KKBA30080	KKBAD30080	KKW30080	KKWD300	KKB30080	KKBD300	KKC30080	KKCD300	KKET30080	KKETD30080
KKBA40080	KKBAD40080	KKW40080	KKWD400	KKB40080	KKBD400	KKC40080	KKCD400	KKET40080	KKETD40080

Quick reference chart

Standard span pressed tray

Tray/trunking component chart

Length: 3 metres

Pack 1

	Flat tee (small radius)		Flat tee (large radius)		Reducer left hand		Reducer right hand		
	Base	Cover	Base	Cover	Base	Cover	Base	Cover	Pin rack
50 x 50mm tray	KKSS5050	KKSSD50	–	–	–	–	–	–	–
100 x 50mm tray	KKSS10050	KKSSD100	KKST10050	KKSTD100	–	–	–	–	KR100
150 x 50mm tray	KKSS15050	KKSSD150	KKST15050	KKSTD150	–	–	–	–	KR150
200 x 50mm tray	KKSS20050	KKSSD200	KKST20050	KKSTD200	–	–	–	–	KR200
300 x 50mm tray	KKSS30050	KKSSD300	KKST30050	KKSTD300	–	–	–	–	KR300
100 x 80mm tray	KKSS10080	KKSSD100	KKST10080	KKSTD100	–	–	–	–	KR100
150 x 80mm tray	KKSS15080	KKSSD150	KKST15080	KKSTD150	–	–	–	–	KR150
200 x 80mm tray	KKSS20080	KKSSD200	KKST20080	KKSTD200	KKRL20080 200 to 100mm	KKRLD200	KKRR20080 200 to 100mm	KKRRD200	KR200
300 x 80mm tray	KKSS30080	KKSSD300	KKST30080	KKSTD300	KKRL30080 300 to 200mm	KKRLD300	KKRR30080 300 to 200mm	KKRRD300	KR300
400 x 80mm tray	–	–	KKST40080	KKSTD400	KKRL40080 400 to 300mm	KKRLD400	KKRR40080 400 to 300mm	KKRRD400	KR400

Product Information

All products are supplied in pack quantities of one, except cover clips and fixing bolts.

A range of Pressed GRP Trays with 110mm wall height is also available on request.

Complete range of Pultruded Trays for extended support span up to 3 metres in 50mm and 80mm wall heights are also available on request.

Please contact us on +44 (0)1424 856600 for a lead time.

PULTRUDED LADDER

GRP pultruded ladders are manufactured by pultrusion, a process using layers of mats and rovings injected with resin and pulled through a die in a continuous operation. The system is ideal for installation into tunnels, bridges, railways, underground, offshore and marine environments.

Product information

- A variety of sizes from 200 x 53mm to 900 x 150mm
- 2.5 times lighter than steel
- Completely corrosion resistant against salt spray, H25, acid build up from exhaust gases and brake dust along roads and railways
- No need for painting or protective coating
- Classified LS0H material
- Self-extinguishing
- Low conductivity
- Earthing not required
- Antimagnetic and resistant to electromagnetic pulses
- Effective at temperatures between -80°C to +130°C
- Lower life cycle cost
- Fast installation with fewer fasteners
- Easy to cut and drill
- Load characteristics in accordance with IEC 61537
  (for load or other calculations and values, please refer to the technical section)

BIM BUILDING INFORMATION MODELLING

Basic components

Ladder

code	size	pack
UL20053	200 x 53mm	1x3m
UL20080	200 x 80mm	1x3m
UL150100	150 x 100mm	1x3m
UL300100	300 x 100mm	1x3m
UL400100	400 x 100mm	1x3m
UL600100	600 x 100mm	1x3m
UL900100	900 x 100mm	1x3m
UL150150	150 x 150mm	1x3m
UL300150	300 x 150mm	1x3m
UL400150	400 x 150mm	1x3m
UL600150	600 x 150mm	1x3m
UL900150	900 x 150mm	1x3m

Ladder cover

code	to fit	pack
KKD200	200 x 53mm	1x3m
KKD200	200 x 80mm	1x3m
KKD150	150 x 100mm	1x3m
KKD300	300 x 100mm	1x3m
KKD400	400 x 100mm	1x3m
KKD600	600 x 100mm	1x3m
KKD900	900 x 100mm	1x1.5m
KKD150	150 x 150mm	1x3m
KKD300	300 x 150mm	1x3m
KKD400	400 x 150mm	1x3m
KKD600	600 x 150mm	1x3m
KKD900	900 x 150mm	1x1.5m

See page 13 for quick reference chart

Fittings

Ladder cover clip

code	pack
DF50	50
DF80	50
DF100	50
DF150	50

Ladder horizontal coupler* (Set of 2 pieces)

code	pack
ULIH53	1
ULIH80	1
ULIH100	1
ULIH150	1

* Foldable splice plate requires 4 x M616/V4A (Nut, bolt and washer) Please note M616/V4A is sold in packs of 100

Ladder int/ext angle base

code	to fit	pack
ULBA20053	200 x 53mm	1
ULBA20080	200 x 80mm	1
ULBA150100	150 x 100mm	1
ULBA300100	300 x 100mm	1
ULBA400100	400 x 100mm	1
ULBA600100	600 x 100mm	1
ULBA900100	900 x 100mm	1
ULBA150150	150 x 150mm	1
ULBA300150	300 x 150mm	1
ULBA400150	400 x 150mm	1
ULBA600150	600 x 150mm	1
ULBA900150	900 x 150mm	1

Ladder int/ext angle cover

code	to fit	pack
ULBAD20053	200 x 53mm	1
ULBAD20080	200 x 80mm	1
ULBAD150100	150 x 100mm	1
ULBAD300100	300 x 100mm	1
ULBAD400100	400 x 100mm	1
ULBAD600100	600 x 100mm	1
ULBAD900100	900 x 100mm	1
ULBAD150150	150 x 150mm	1
ULBAD300150	300 x 150mm	1
ULBAD400150	400 x 150mm	1
ULBAD600150	600 x 150mm	1
ULBAD900150	900 x 150mm	1

Fittings

Ladder flat angle 90° base

code	to fit	pack
ULB20053	200 x 53mm	1
ULB20080	200 x 80mm	1
ULB150100	150 x 100mm	1
ULB300100	300 x 100mm	1
ULB400100	400 x 100mm	1
ULB600100	600 x 100mm	1
ULB900100	900 x 100mm	1
ULB150150	150 x 150mm	1
ULB300150	300 x 150mm	1
ULB400150	400 x 150mm	1
ULB600150	600 x 150mm	1
ULB900150	900 x 150mm	1

Ladder flat angle 90° cover

code	to fit	pack
ULBD200	200 x 53/80mm	1
ULBD150	150 x 100/150mm	1
ULBD300	300 x 100/150mm	1
ULBD400	400 x 100/150mm	1
ULBD600	600 x 100/150mm	1
ULBD900	900 x 100/150mm	1

Ladder flat tee base

code	to fit	pack
ULTE20053	200 x 53mm	1
ULTE20080	200 x 80mm	1
ULTE150100	150 x 100mm	1
ULTE300100	300 x 100mm	1
ULTE400100	400 x 100mm	1
ULTE600100	600 x 100mm	1
ULTE900100	900 x 100mm	1
ULTE150150	150 x 150mm	1
ULTE300150	300 x 150mm	1
ULTE400150	400 x 150mm	1
ULTE600150	600 x 150mm	1
ULTE900150	900 x 150mm	1

Ladder flat tee cover

code	to fit	pack
ULTED200	200 x 53/80mm	1
ULTED150	150 x 100/150mm	1
ULTED300	300 x 100/150mm	1
ULTED400	400 x 100/150mm	1
ULTED600	600 x 100/150mm	1
ULTED900	900 x 100/150mm	1

Ladder flat crossover base

code	to fit	pack
ULX20053	200 x 53mm	1
ULX20080	200 x 80mm	1
ULX150100	150 x 100mm	1
ULX300100	300 x 100mm	1
ULX400100	400 x 100mm	1
ULX600100	600 x 100mm	1
ULX900100	900 x 100mm	1
ULX150150	150 x 150mm	1
ULX300150	300 x 150mm	1
ULX400150	400 x 150mm	1
ULX600150	600 x 150mm	1
ULX900150	900 x 150mm	1

Ladder flat crossover cover

code	to fit	pack
ULXD200	200 x 53/80mm	1
ULXD150	150 x 100/150mm	1
ULXD300	300 x 100/150mm	1
ULXD400	400 x 100/150mm	1
ULXD600	600 x 100/150mm	1
ULXD900	900 x 100/150mm	1

Ladder reducer

code	to fit ladder depth	Reduction achieved	pack
ULR15053	53mm	150mm	1
ULR15080	80mm	150mm	1
ULR100100	100mm	100mm	1
ULR200100	100mm	200mm	1
ULR300100	100mm	300mm	1
ULR200150	150mm	200mm	1
ULR300150	150mm	300mm	1
ULR500150	150mm	500mm	1

Vertical variable angle plate (Set of 2 pieces)

code	size	pack
ULIV53	53mm	1
ULIV80	80mm	1
ULIV100	100mm	1
ULIV150	150mm	1

Components

Ladder hold down clamp+

code	pack
ULKGHA	1

+ ULKGHA requires 1 x M1040V4AHEX

Quick reference chart
Pultruded ladder

Length: 3 metres
Pack 1

(width x height)

Ladder component chart







Ladder	Cover	Cover clip	Flat 90° angle Base	Flat 90° angle Cover	Int/Ext angle Base	Int/Ext 90° angle Cover
200 x 53mm						
UL20053	KKD200	DF50	ULB20053	ULBD200	ULBA20053	ULBAD20053
200 x 80mm						
UL20080	KKD200	DF80	ULB20080	ULBD200	ULBA20080	ULBAD20080
150 x 100mm						
UL150100	KKD150	DF100	ULB150100	ULBD150	ULBA150100	ULBAD150100
300 x 100mm						
UL300100	KKD300	DF100	ULB300100	ULBD300	ULBA300100	ULBAD300100
400 x 100mm						
UL400100	KKD400	DF100	ULB400100	ULBD400	ULBA400100	ULBAD400100
600 x 100mm						
UL600100	KKD600	DF100	ULB600100	ULBD600	ULBA600100	ULBAD600100
900 x 100mm						
UL900100	KKD900	DF100	ULB900100	ULBD900	ULBA900100	ULBAD900100
150 x 150mm						
UL150150	KKD150	DF150	ULB150150	ULBD150	ULBA150150	ULBAD150150
300 x 150mm						
UL300150	KKD300	DF150	ULB300150	ULBD300	ULBA300150	ULBAD300150
400 x 150mm						
UL400150	KKD400	DF150	ULB400150	ULBD400	ULBA400150	ULBAD400150
600 x 150mm						
UL600150	KKD600	DF150	ULB600150	ULBD600	ULBA600150	ULBAD600150
900 x 150mm						
UL900150	KKD900	DF150	ULB900150	ULBD900	ULBA900150	ULBAD900150

Product Information

All products are supplied in pack quantities of one, except cover clips and fixing bolts.

Additional ladder widths in wall heights 53mm, 80mm, 100mm and 150mm are available on request.

6 metre lengths are available on request.

Please contact us on +44 (0)1424 856600 for a lead time.

Quick reference chart
Pultruded ladder

Ladder component chart







Length: 3 metres
Pack 1

	Flat tee		Flat crossover				
	Base	Cover	Base	Cover	Horizontal coupler (Set of 2 pieces)	Vertical variable angle plate (Set of 2 pieces)	Ladder clamp to support
200 x 53mm	ULTE20053	ULTED200	ULX20053	ULXD200	*ULIH53	ULIV53	+ULKGHA
200 x 80mm	ULTE20080	ULTED200	ULX20080	ULXD200	*ULIH80	ULIV80	+ULKGHA
150 x 100mm	ULTE150100	ULTED150	ULX150100	ULXD150	*ULIH100	ULIV100	+ULKGHA
300 x 100mm	ULTE300100	ULTED300	ULX300100	ULXD300	*ULIH100	ULIV100	+ULKGHA
400 x 100mm	ULTE400100	ULTED400	ULX400100	ULXD400	*ULIH100	ULIV100	+ULKGHA
600 x 100mm	ULTE600100	ULTED600	ULX600100	ULXD600	*ULIH100	ULIV100	+ULKGHA
900 x 100mm	ULTE900100	ULTED900	ULX900100	ULXD900	*ULIH100	ULIV100	+ULKGHA
150 x 150mm	ULTE150150	ULTED150	ULX150150	ULXD150	*ULIH150	ULIV150	+ULKGHA
300 x 150mm	ULTE300150	ULTED300	ULX300150	ULXD300	*ULIH150	ULIV150	+ULKGHA
400 x 150mm	ULTE400150	ULTED400	ULX400150	ULXD400	*ULIH150	ULIV150	+ULKGHA
600 x 150mm	ULTE600150	ULTED600	ULX600150	ULXD600	*ULIH150	ULIV150	+ULKGHA
900 x 150mm	ULTE900150	ULTED900	ULX900150	ULXD900	*ULIH150	ULIV150	+ULKGHA

Product Information

* Foldable splice plate requires 4 x M616/V4A

\+ ULKGHA requires 1 x M1040V4AHEX

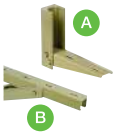
SUPPORT SYSTEMS

Quick reference chart

Support systems for tray and ladder

Support system component chart

GRP Systems



Stainless steel 316

Pack 1	FPAM Bracket	Bracket	Adj. rail (GRP) 45 x 45 x 2000mm	Clamp bolt assembly S/S M10 x 30mm	H/D Bracket Type 'A' S/S	Adj. rail (S/S) 40 x 40 x 2000mm	Clamp bolt assembly S/S M10 x 30mm
100mm	FPAM100	FPAP100AC (A)	FPAR2000AC	FPBGV10/V4A	–	ASSV2000	BGSV
150mm	–	FPAP150AC (A)	FPAR2000AC	FPBGV10/V4A	–	ASSV2000	BGSV
200mm	FPAM200	FPAP200AC (A)	FPAR2000AC	FPBGV10/V4A	AV200S	ASSV2000	BGSV
250mm	FPAM250	FPAP250AC (A)	FPAR2000AC	FPBGV10/V4A	AV250S	ASSV2000	BGSV
300mm	FPAM300	FPAP300AC (A)	FPAR2000AC	FPBGV10/V4A	AV300S	ASSV2000	BGSV
400mm	–	FPAP400AC (B)	FPAR2000AC	FPBGV10/V4A	AV400S	ASSV2000	BGSV
500mm	–	FPAP500AC (B)	FPAR2000AC	FPBGV10/V4A	AV500S	ASSV2000	BGSV
600mm	–	FPAP600AC (B)	FPAR2000AC	FPBGV10/V4A	AV600S	ASSV2000	BGSV

Product Information

All products are supplied in pack quantities of one.
Other brackets and supports available on request.
Please contact us on +44 (0)1424 856600 for a lead time.

GROUND DUCTS AND PROFILES

GRP ground ducts and profiles are ideal for railway applications wherever below ground installations are required.

Product information

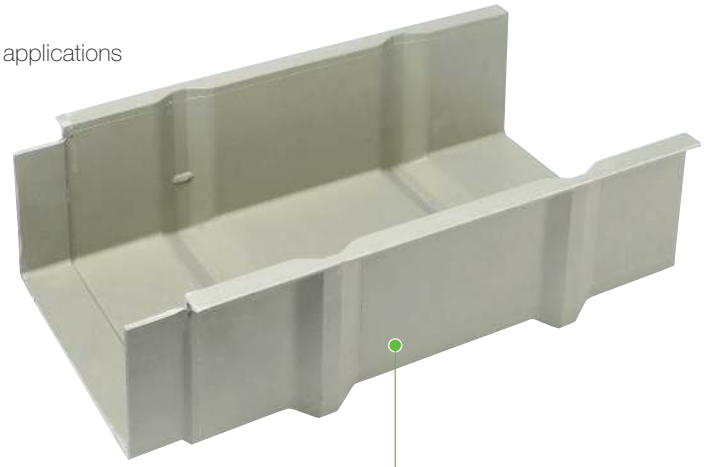
Ducts

- 250 x 140mm to 450 x 176mm
- Rigid and self-supporting
- 3 times lighter than GRC (Glass fibre Reinforced Concrete)
- 10 times lighter than concrete
- 2.5 times lighter than steel
- Impact and frost resistant
- Easy to handle and load

Profile

- 36 x 35mm to 143 x 53mm
- Avoids ballast falling into ducts
- Ensures perfect positioning of ground duct covers
- Increases capacity of existing concrete ground ducts
- High mechanical and corrosion performance

For information on other available dimensions, please call our Technical Team on +44 (0)1424 856688



GRP is a non-conductive material with excellent fire performance and high corrosion resistance.

Ground ducts and profiles

Duct base 2500mm

code	size	pack
BK200140	250 x 140mm	1
BK300176	350 x 176mm	1
BK400176	450 x 176mm	1

Cover 1250mm

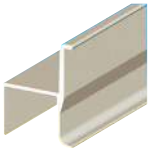
code	to fit	pack
BKDR200	250 x 140mm	1
BKDR300	350 x 176mm	1
BKDR400	450 x 176mm	1

Clip for cover mounting

code	to fit	pack
DF94/4	250 x 140mm	1
DF94/4	350 x 176mm	1
DF94/4	450 x 176mm	1

Set of clips and hinge for articulate cover mounting

code	to fit	pack
DF94/C	250 x 140mm	1
DF94/C	350 x 176mm	1
DF94/C	450 x 176mm	1



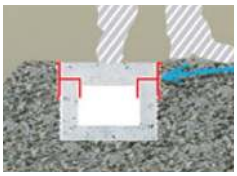
Ground duct profile

code	to fit	pack
PR3635	36 x 35mm	1
PR5045	50 x 45mm	1
PR5555	55 x 55mm	1

Ground duct A profile

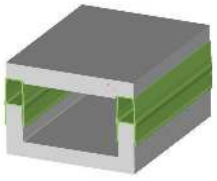
code	to fit	pack
PR5080	143 x 53mm	1

Ground duct profile



Ground duct A profile

- Increases cable capacity of existing concrete ground ducts
- High mechanical and corrosion performance
- Highly effective at minimum cost



CABLE TROUGHING

GRP cable troughing is ideally suited to railway applications where cable ducts cannot be buried.

Product information

- 150 and 250 x 150mm
- Self-supporting base
- High mechanical loading capacity
- One post every 6m
- Lightweight product
- Only one person required for installation

For further information please call our Technical Team on +44 (0)1424 856688

GRP is a non-conductive material with excellent fire performance and high corrosion resistance

Basic components

Base and pre–mounted connector 6M

code	size	pack
SP150150	150 x 150mm	1
SP250150	250 x 150mm	1

U–Shaped connector

code	to fit	pack
SPIH150150	150 x 150mm	1
SPIH250150	250 x 150mm	1

Splice plate

code	to fit	pack
KKIH50	150 x 150mm	1

Cable trough covers

code	to fit	pack
KKDL150	150 x 150mm	1
KKDL250	250 x 150mm	1

Fittings

Internal vertical elbow 15˚

code	size	pack
SPBI150	150 x 150mm	1
SPBI250	250 x 150mm	1

Cover for internal vertical elbow 15˚

code	to fit	pack
SPBID150	150 x 150mm	1
SPBID250	250 x 150mm	1

External vertical elbow 15˚

code	size	pack
SPBA150	150 x 150mm	1
SPBA250	250 x 150mm	1

Cover for external vertical elbow 15˚

code	to fit	pack
SPBAD150	150 x 150mm	1
SPBAD250	250 x 150mm	1

Horizontal elbow 15˚

code	size	pack
SPB150	150 x 150mm	1
SPB250	250 x 150mm	1

Cover for horizontal elbow 15˚

code	to fit	pack
SPBD150	150 x 150mm	1
SPBD250	250 x 150mm	1

Fittings

Steel post 1500mm

code	to fit	pack
SPP100150	150/250 x 150mm	1

Steel post 2000mm

code	to fit	pack
SPP100200	150/250 x 150mm	1

Steel post 2500mm

code	to fit	pack
SPP100250	150/250 x 150mm	1

Steel mounting plate

code	to fit	pack
SPC100150	150 x 150mm	1
SPC100250	250 x 150mm	1

HDG steel cable out fitting with bolts

code	to fit	pack
SPKA	150/250 x 150mm	1

316 SS bolts and nuts for SPIH/KKIH

code	to fit	pack
SPM1025	for 150/250 x 150mm	1

HDG steel bolts, nuts and U–shaped washers

code	to fit	pack
SPM1025/HDG	150/250 x 150mm	1

Case Study

GRP cable management proves perfect solution for Jersey's historic rail tunnels

High humidity levels and potential fire risks posed a cable management specification challenge during work at Jersey's famous St Aubin's wartime tunnels.

Corroded casing needed replacing within the tunnels because it was considered a fire risk and required frequent repair due to high humidity levels. GRP cable management proved the perfect solution thanks to its corrosion resistance and excellent fire safety credentials.

For this project GRP tray was suspended from ceilings to carry a wide range of cables, including PVC/SWA sub main, lighting SY sub-circuit, fire alarm and low voltage signal cables. Light fittings have also been fixed to the trunking's underside.

Specifier, Dave Atkinson from States of Jersey, explained why GRP was ideal for this challenging environment: "The humidity level in the tunnels at certain times of the year is very high due to water permeating through the hillside and concrete structure. Because of this moisture, the existing electrical installation had corroded.

"We chose GRP tray for the upgrade as it's resistant to humidity and fire. Apart from putting an end to the corrosion issues, St Aubin's needed a solution that would improve safety for tunnel users while also allowing maintenance teams to reduce testing regimes – something that was taking up a lot of time. Thanks its fire resistant credentials, the use of GRP has meant that periodic testing is now sufficient, in-line with BS 5839," concluded Mr Atkinson.

GRP ladder and tray

Overview

GRP (Glass Reinforced Polyester) has, good stability to UV, great mechanical strength and is 40% lighter than steel. GRP is a non-conductive insulating material, resistant to temperatures from -80ºC to +130ºC and has excellent resistance to fire and corrosion being self-extinguishing and zero halogen.

Standards and Approvals

- IET Wiring Regulations BS 7671
- (LVD) 2014/35/EU
- Low Voltage Directive

Mechanical Behaviour

- Breaking point to NEMA FG1
- IEC 61537
- Tensile strength at break point to ISO 527-5
- Modulus of elasticity to ISO 527-5
- Accelerated aging to ISO 4892-2 & ISO 9227

Electrical Behaviour

- Surface resistivity to IEC 6079-0
- IEC 60093
- Breakage voltage to IEC 60243-1
- Comparative tracking index IEC 60112

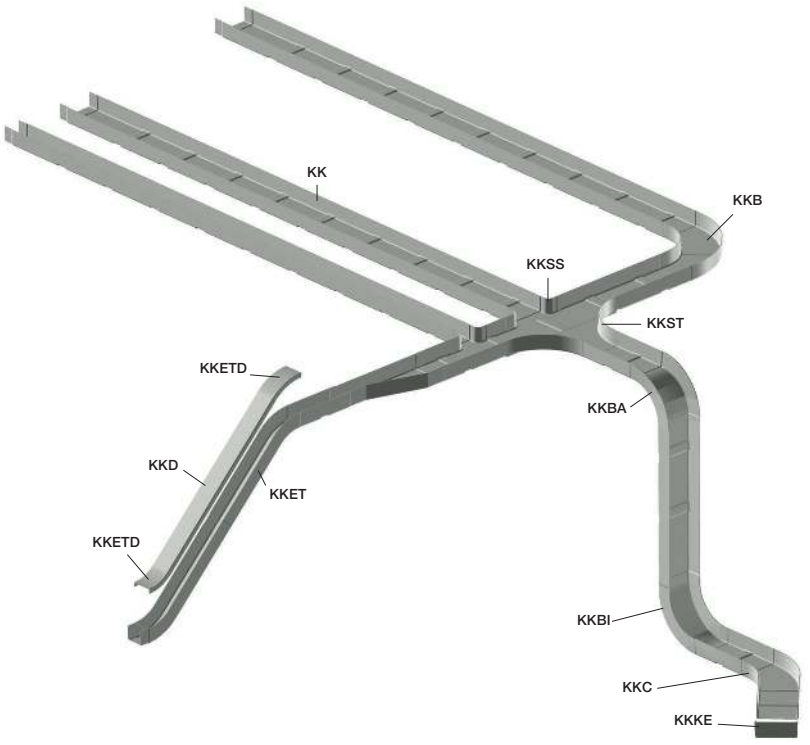
Density to DIN 53479

- Linear Thermal Dilatation to DIN 53752
- Water Absorption to ISO 62

Fire Behaviour

- Inflammability to IEC 60695-2-12/ UL94
- UL 723
- DIN 5510-2
- NF-F-16101
- Spread of flame to BS 476 part 7 class 2/ ASTM E84 (Up to Class 1 on request)
- Fire propagation to BS 476 Part 6
- Smoke emissions to BS 6853 App B53
- Fire standard to DIN 4102 part 12
- Reaction to fire classification: M1

GRP tray



KKB

During installation care must be taken to position a support at each end of the cable tray fitting. It is also recommended that the large radius fitting is fixed laterally to each end of adjoining cable tray.

KK

Each length of tray comes complete with built in, self adjusting coupler. An expansion gap of 8mm must be considered for thermal movement.

KKSS

During installation care must be taken to position a support at each end of the cable tray fitting.

KKST

During installation care must be taken to position a support at each end of the cable tray entry.

KKRR

During installation every reducer must be supported at each end. It is also recommended that the reducer fitting is fixed laterally to each end of adjoining cable tray.

KKBA

During installation care must be taken to position a support at each end of the cable tray entry. It is also recommended that the outside elbow fitting is fixed laterally to each end of adjoining cable tray.

KKETD

Covers are attached using either DF50/DF80 stainless steel cover clips. In strong winds the quantity of clips should be increased.

KKD

For a stronger assembly, covers with a width greater than 400mm are strengthened. Strengthening ribs are visible on the outside of the cover. Covers are attached using either DF50/DF80 stainless steel cover clips. Under normal conditions use 3 clips alternatively on each side per 3 metres of ladders/trays. Under extreme conditions (strong winds >60km/h) use 7 clips per 3 metres of ladder/tray.

KKET

During installation all fittings must be supported at every cable entry, and central support for all fittings with a radius greater than 250mm, and/or with width greater than 400mm. It is also recommended that the change in elevation fitting is fixed laterally to each end of adjoining cable tray.

KKBI

During installation care must be taken to position a support at each end of the cable tray entry. It is also recommended that the inside elbow fitting is fixed laterally to each end of adjoining cable tray.

KKC

To ensure correct installation, the horizontal elbow must be fixed laterally to each end of the adjoining cable tray.

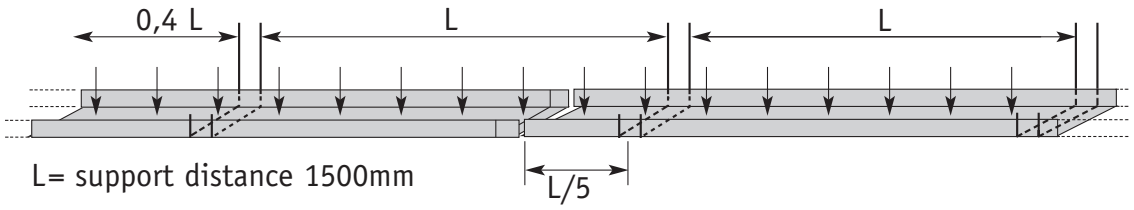
KKKE

Mounting accessories required for this fitting – 2 x M6x16 Bolts (to be ordered separately).

Standard span pressed tray

Load characteristics

Coefficient of safety > 1.7 (in accordance with IEC 61537) this data is given for ladders coupled with splice plates and bolts.



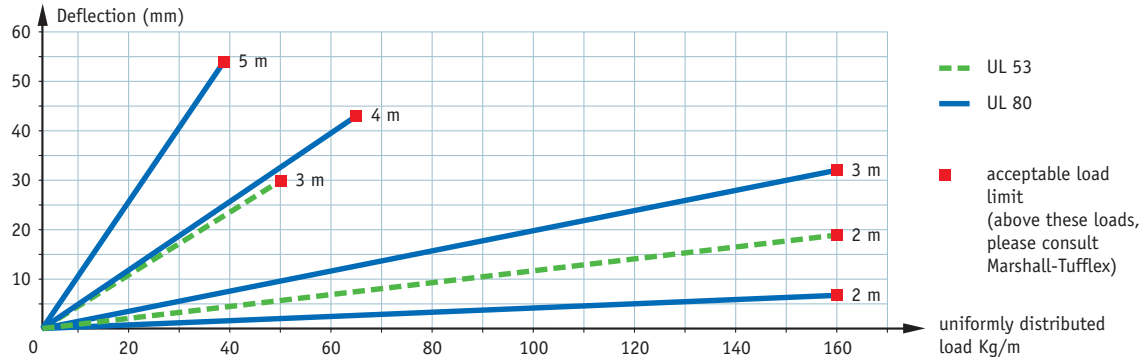
The deflection values are measured with the position of the junction between 2 ladders at a distance L/5 from a support. If this distance is not respected, it is necessary to raise the deflection values by about 30% when fully loaded.

		Useful area (mm^2)	Weight of cables kg/m	Maximum admissable load kg/m according to the distance between supports				
				2m	3m	4m	5m	6m
UL...53	150 – 300	4420 – 9520	= 250	160	50			
	400 – 600	12920 – 19720	= 550		50			
UL...80	150 – 300	7690 – 16840	= 450	160	160	60	30	
	400 – 600	22940 – 35140	= 1000			60	30	

Optimal conditions, for cost reduction on your installation.

Series UL load diagram: supporting distances from 2 to 5m.

For 100mm and 150mm wall height refer to Marshall-Tufflex.



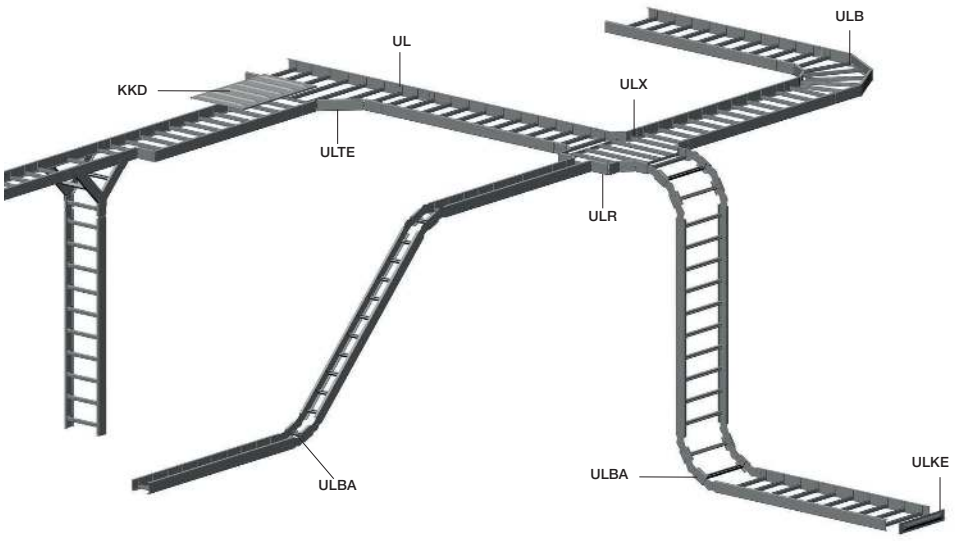
Localised loads

To be able to compare this to a uniformly distributed load it is necessary to double the value of the localised load. Example: A 60kg local load at the centre of a ladder with 3m of support distance. Equivalent load: 60 x 2 = 120kg uniformly distributed along 3m (ie 40kg/m).

Loading characteristics

- Defection <5mm (1/300).
- Coefficient of safety >1.7 (in accordance with IEC 61537) using the interlocking and self-adjustable coupling without fasteners.
- Loading diagram details (below) in accordance with IEC 61537, at an ambient temperature of 25°C.

GRP pultruded ladder



ULB
During installation you must take care to position a support under each elbow at each cable ladder end. If the bending radius is greater than 250mm and/or the width greater than 400mm, an additional intermediary support is necessary.

UL
Cable ladders are supplied with non-perforated rungs. Should you require perforated ladder rungs please contact a member of the technical team who will be happy to assist in your enquiry.

ULX
During installation all fittings must be supported at every cable entry. A central support is required for all fittings with a bend radius greater that 250mm and/or the width greater than 400mm

ULR
During installation the stainless steel splice plates must be fixed on each cable ladder end using 8 x M6 x 16 bolts. (to be ordered separately)

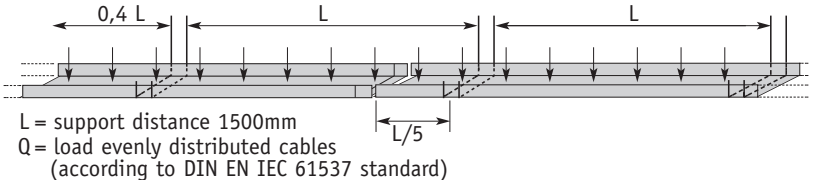
KKD
For a stronger assembly, covers with a width greater than 400mm are strengthened. Strengthening ribs are visible on the outside of the cover. Covers are attached using either DF50/DF80 stainless steel cover clips. In strong winds the quantity of clips should be increased.

ULTE
During installation all fittings must be supported at every cable entry. A central support is required for all fittings with a bend radius greater that 250mm and/or the width greater than 400mm

ULBA
During installation the metallic splice plates must be fixed at each cable ladder end using 4 x M6 x 16 bolts. (to be ordered separately). If the bending radius is greater than 250mm and/or the width greater than 400mm, an additional intermediary support is necessary.

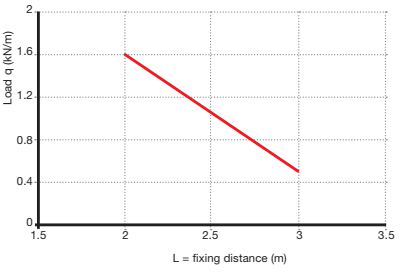
ULKE
Mounting this accessory requires 2 x M6 x 16 bolts. (to be ordered separately)

Load characteristics

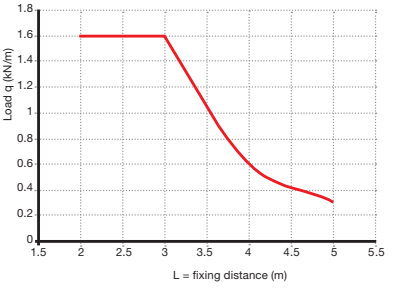


L = support distance 1500mm
Q = load evenly distributed cables
(according to DIN EN IEC 61537 standard)

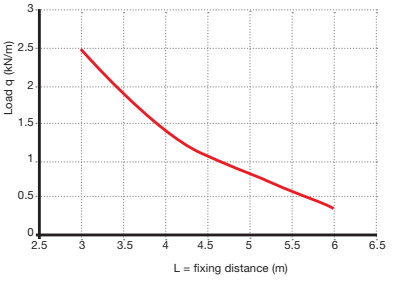
53mm High Cable Ladder



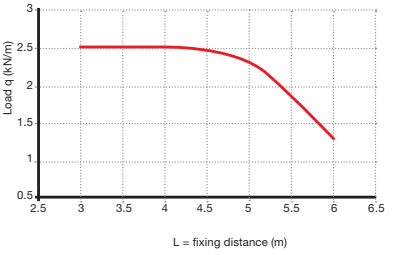
80mm High Cable Ladder



100mm High Cable Ladder



150mm High Cable Ladder



Warning: the deflection is measured with a junction position between 2 cable trays at a distance of L/5 from the support. If this distance is not respected, it is necessary to raise the deflection values by approx 30%.

GRP ground ducts

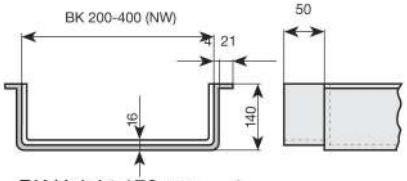
Load characteristics of ground duct

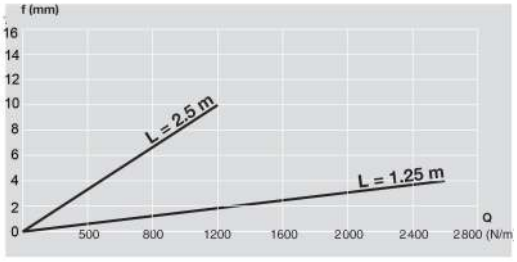
BK Height 140 mm

F = Deflection

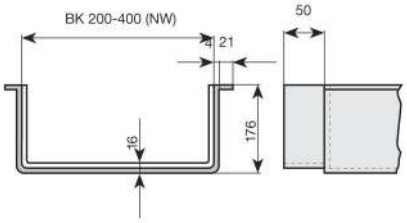
L = Support Distance

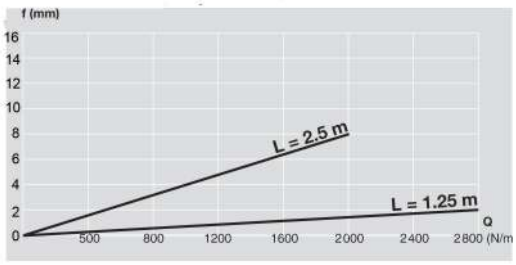
Q = Distributed Load



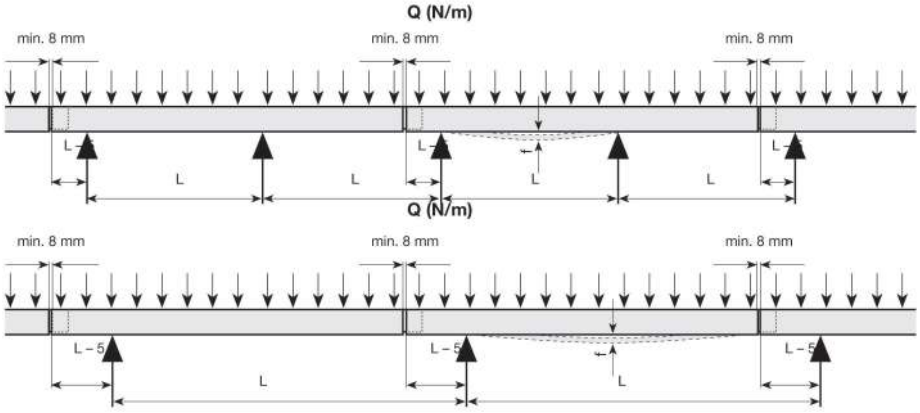


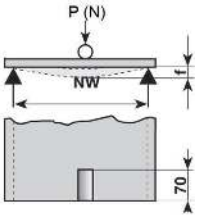
BK Height 176 mm





Tested in normal conditions of use





Load at edge of piece

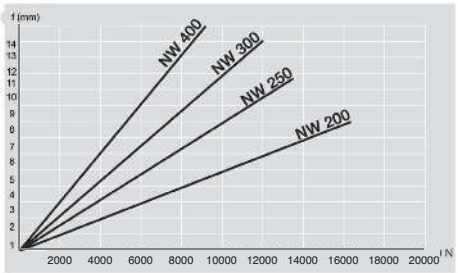
Load diagrams of plate covers

P = Load in N

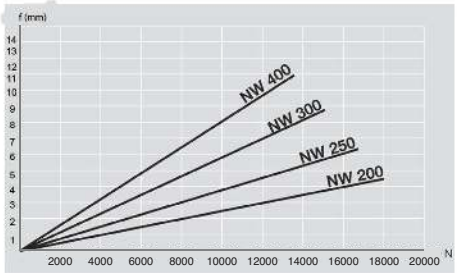
f = Deflection

NW = Nominal width BK

BKDR 5mm



BKDR 8mm



GRP ladder and tray material data

Fire behaviour

Properties	Standard references	Press Moulded Fittings	Pultruded Extrusions	Units
Flammability	**ASTM D 6194 / IEC 60695-2-12** Glow-wire flammability index (GWFI) test method for materials.	960	960	ºC
Flammability	**UL 94** Test for flammability of plastic materials.	V0	V0	–
Fire propagation	**NF P 92-501** Fire behaviour of building materials.	Not tested	Not tested	–
Flame spread & smoke developed index	**ASTM E84 / UL 723**	FSI = 25	FSI = 35	Index
	Surface burning characteristics of building materials.	SDI = 350	SDI = 450	Index
	Class following the Uniform Building Code.	Class I	Class II	–
Flammability & smoke index	**NF F 16-101**	I2	I2	Index
	Fire behaviour of materials for rolling stock.	F0	F1	Index
Limiting oxygen index	**ASTM D 2863 / ISO 4589-2** Plastics – Determination of burning behaviour by oxygen index. Part 2 : Ambient – temperature test.	> 32%	> 32%	%
Flammability & smoke index	**VKF** Materials and building parts. Part B : Test methods.	5.3	5.3	Index
Fire behaviour	**DIN 4102-1** Fire behaviour of building materials and elements. Part 1: Classification of building materials.	B2	B2	–
Fire behaviour	**DIN 5510-2** Preventive fire protection in railway vehicles.	S4 / SR2 / ST2	S4 / SR2 / ST2	Index
	Part 2 : Fire behaviour and fire side effects of materials and parts.	FED(30 min.) = 0,09	FED(30 min.) = 0,04	Index
	Appendix C : FED (30 min.) < 1			
Fire behaviour	**EN 45545-2** Railway applications – Fire protection on railway vehicles. Part 2 : Requirements for fire behaviour of materials and components. Applicable requirement : R6	None	None	HL
Fire behaviour	**ISO 5660-1** Parameter MARHE	103,7	101,3	kW/m²
	EN ISO 5659-2 (50 kW/m²) Parameter DS(4)	376,2	331,2	–
	EN ISO 5659-2 (50 kW/m²) Parameter VOF4	454,6	488,5	–
	EN 45545-2 Appendix C (50kW/m²) Parameter CITG at 4 min.	0,016	0,015	–
	EN 45545-2 Appendix C (50kW/m²) Parameter CITG at 8 min.	0,068	0,064	–

GRP ladder and tray material data – continued

Mechanical behaviour

Properties	Standard references	Press Moulded Fittings	Pultruded Extrusions	Units
Tensile strength at break point	**ISO 527-5** Plastics – Determination of tensile properties. Part 5 : Unidirectional fibre-reinforced plastic composites.	~ 55	~ 187	MPa
Tensile modulus	**ISO 527-5** Plastics – Determination of tensile properties. Part 5 : Unidirectional fibre-reinforced plastic composites.	~ 7200	~ 11900	MPa
Accelerated ageing test by UV exposure	**ISO 4892-2 / ISO 527-5** Methods of exposure to laboratory light sources – Part 2 : Xenon-arc sources.	Good mechanical and chromatic behaviour	Good mechanical and chromatic behaviour	–
Accelerated ageing test by salt spray exposure	**ISO 9227 / ISO 527-5** Corrosion tests in artificial atmospheres – Salt spray tests.	Good mechanical and chromatic behaviour	Good mechanical and chromatic behaviour	–
Accelerated ageing test by UV and salt spray exposure	**ISO 4892-2 / ISO 9227 / ISO 527-5** UV and salt spray exposure.	Good mechanical and chromatic behaviour	Good mechanical and chromatic behaviour	–

Electrical behaviour

Properties	Standard references	Press Moulded Fittings	Pultruded Extrusions	Units
Measure of surface resistivity & discharge	**IEC 60079-0** Explosive atmospheres.	~ 4.10^9	> 10^{11}	Ω
	Part 0 : Equipment – General requirements.	IIA, IIB, IIC	IIA, IIB, IIC	–
Dielectric strength	**IEC 60243-1** Electric strength of insulating materials. Part 1 : Tests at power frequencies.	~ 6,5	Not tested	kV/mm
Proof tracking index	**IEC 60112** Method for the determination of the proof and the comparative tracking indices of solid insulating materials.	575	600	V

Marine approval

Properties	Standard references	Press Moulded Fittings	Pultruded Extrusions	Units
Approval for vessels and drilling platforms	**ABS** (American Bureau of Shipping)	KK Approved	UL Approved	

Others

Properties	Standard references	Press Moulded Fittings	Pultruded Extrusions	Units
Density		1,8	1,8	g/cm^3
Thermal conductivity		0,3	0,3	W/m.K
Coefficient of linear thermal expansion	**ISO 11359-2** Plastics – Thermo mechanical analysis (TMA). Part 2 : Determination of coefficient of linear thermal expansion.	~ 36 x 10-6	~ 10 x 10-6	cm/cm/K
Water absorption	**ISO 62** Plastics – Determination of water absorption.	0,16	0,3	%
Glass content		> 20%	> 45%	%
Linear shrinkage		0,1	0,1	%
Rockwell hardness		not tested	not tested	HRm
Barcol hardness		> 50	> 50	Barcol
Material temperature range*		-80°C to +130°C	-80°C to +130°C	°C
Continuous operating temperature range		-50°C to +80°C	-50°C to +80°C	°C
Material resistance to high temperatures		good, no flexion	good, no flexion	°C

* Reduced mechanical resistance when ambient temperature is increasing.

GRP Material Chemical Resistance Table

Chemical	Concentration	Performance
Water	–	Good Performance
Acids	10%	Medium Performance
Base	10%	Good Performance
Ethanol	–	Good Performance
Benzine	–	Good Performance
Benzol	–	Medium Performance
Mineral Oil	–	Good Performance
Vegetable and animal fat	–	Good Performance
Chemical products	–	Good Performance

Storage of GRP material

It is best to store GRP products prior to installation at temperatures higher than 0°C and less than 40°C. However the GRP products may be stored at temperatures between -60°C to over 130°C

Information on recycling and environmental impact for the GRP products

Thermoset composite material is made of glass and polyester resin. It can be recycled in waste treatment stations for a further waste processing. This material is inert and has no environmental impact as GRP waste can be re-used in outside applications as raw material for the road building or in cement production.

GRP cable ladders pultruded

Resin types (all zero halogen)

Polyester (standard)	good all round performance, mechanical strength, corrosion resistance, fire behaviour, temperature rating
Acrylic (on request)	excellent resistance to fire in a corrosive environment
Vymilester (on request)	highly resistant to a specific range of chemical agents (H2SO4HC1…)
Carbon loaded polyester (on request)	anitistatic properties for highly explosive atmospheres

TECHNICAL SUPPORT

Our Technical Team consists of qualified Electricians, Electrical and Mechanical Engineers with many years experience of cable management installations including an understanding of the regulations and compliancy to standards in both domestic and commercial sectors.

The team can advise on a wide range of solutions and technical issues, product standards, data cabling control and Part M compliancy.

We pride ourselves on providing and supplying our customers with specialist solutions to suit a variety of needs. We aim to complete all standard quotes within one working day, although more complex quotations such as 'take offs' can take longer.

Specialised solutions

With cable management installations becoming increasingly wide ranging, our specialised solutions service helps to find the perfect answer to a specific problem that a client is facing.

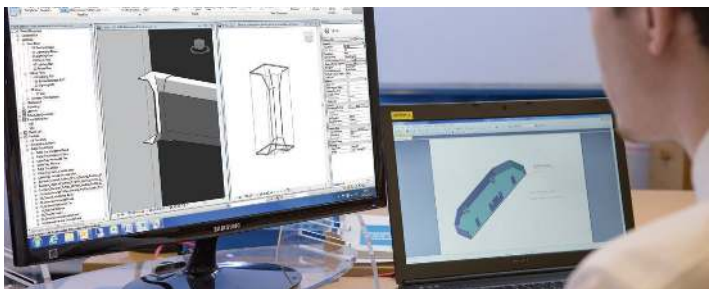
Our In-house Design Team continually push the boundaries of product design and work with architects, designers and contractors to create pre-fabricated solutions for their projects, designed to save time on site.

BIM (Building Information Modelling)

BIM (Building Information Modelling) brings together all of the digital information for every component of a building in one place allowing anyone to access that data. BIM data can be used and shared to illustrate the entire building life-cycle, from feasibility, design, during construction and throughout its working life.

3D Autodesk Revit models are now available to download for Marshall-Tufflex products, with the necessary technical product data for them to be easily specified and integrated into a construction project.

Visit www.marshall-tufflex.com/bim or www.bimstore.co.uk



Standards

BSI Standards
Marshall-Tufflex is committed to excellence and is recognised by the BSI as a firm of Assessed Capability for Quality Management Systems to BS EN ISO 9001:2015, Environmental Management Systems to BS EN ISO 14001:2015, Occupational Health and Safety Systems to BS OHSAS 18001:2007 and Energy Management Systems to BS EN ISO 50001:2011.

Q05393 EMS 539243 OHS 622466 ENMS 602935

BEAMA
BEAMA is the independent expert knowledge base and forum for the electrotechnical industry for the UK and across Europe. Representing over 300 manufacturing companies in the electrotechnical sector, the organisation has significant influence over UK and international political, standardisation and commercial policy. We are very proud to be an active member of BEAMA and work closely with them.

RoHS, REACH and WEEE
Marshall-Tufflex is committed to compliance with the RoHS, REACH and WEEE European Union Directives.

Marshall-Tufflex Ltd

Churchfields Industrial Estate
Hastings
East Sussex
TN38 9PU
United Kingdom

T +44 (0)1424 856600
F +44 (0)1424 856611
E sales@marshall-tufflex.com
www.marshall-tufflex.com

Technical Hotline:
+44 (0)1424 856688

Collect your order from our branches:

London (E17 6DJ)
Manchester (M26 1GG)
Hastings (TN38 9NU)

Republic of Ireland & Northern Ireland distributor

Core Electrical Ltd
17b Goldenbridge Industrial Estate
Tyrconnell Road, Inchicore
Dublin 8

T +353 (0)1453 7033
F +353 (0)1453 8911

UK OWNED
UK MANUFACTURER

Marshall Tufflex

EL256 /19015