

Dynarail® Guardrail, Handrail & Ladder

Products Brochure
SI Units

Fibergrate Composite Structures

Building the World to Last®

HIGH PERFORMANCE COMPOSITE SOLUTIONS



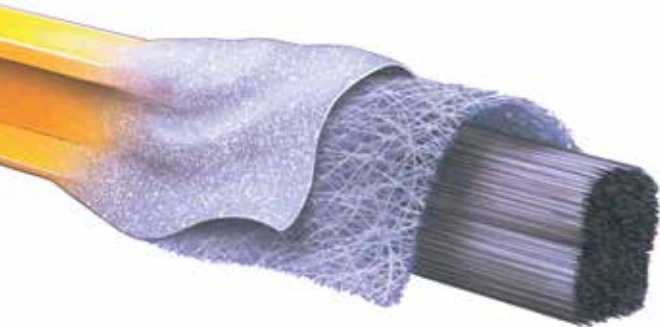
Dynarail® FRP Products



Combining corrosion resistance, long life and a low maintenance design, Dynarail® guardrail, handrail and ladder systems are superior to conventional metallic systems. These advanced systems are designed and manufactured to be easily installed with no guesswork involved. Components are lightweight and easy to fabricate. Savings on labor and equipment often make the total installed cost of Dynarail comparable to that of steel. Combining its low cost of installation with low maintenance and long life, Dynarail offers a life cycle cost that is significantly lower than that of its counterparts.

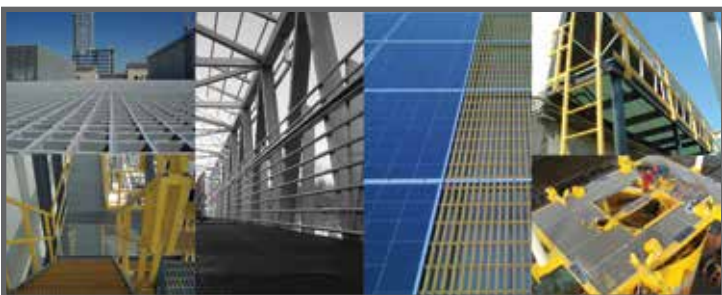


The Dynarail guardrail line includes everything needed to install OSHA- and IBC-compliant horizontal and inclined railing systems with either two or three rails. Fibergrate can also provide specialty picketed guardrail systems. The Dynarail handrail system can be added to a guardrail or wall to meet code requirements. The Dynarail ladder line includes ladders, standard walk-thrus and safety cages. Fibergrate's complete line of Dynarail products offer a variety of solutions for most applications.



Dynarail components, including the railing, kickplate and ladder rungs, are manufactured using the proven Fibergrate pultrusion process. In this process, continuous fiber rovings and mat as well as a synthetic veil are mechanically drawn through a resin bath and shaped through a series of forming guides, then pulled through a heated die.

Fibergrate Markets



- Architectural
- Bridge & Highway
- Chemical
- Commercial
- Food & Beverage
- Manufacturing
- Metals & Mining
- Microelectronics
- Oil & Gas
- Pharmaceutical
- Power
- Pulp & Paper
- Recreation
- Telecommunications
- Transportation
- Water & Wastewater

Dynarail® Benefits



Corrosion Resistant: Dynarail® fiberglass guardrail, handrail and ladder products are known for their ability to provide corrosion resistance in the harshest environments and chemical exposures.



Slip Resistant: Ladder rungs include heavily serrated flutes for positive, slip resistant footholds; also ungritted rungs are easy on the hands, while still ensuring safety.



Low Maintenance: The corrosion resistant properties of Fibergrate's FRP products reduce or eliminate the need for sandblasting, scraping and painting. Products are also easily cleaned with a high pressure washer.



Fire Retardant: Flame spread rating of 25 or less, as tested in accordance with ASTM E-84, and meets the self-extinguishing requirements of ASTM D-635.



Electrically & Thermally Non Conductive: Fiberglass is electrically non conductive for safety and has low thermal conductivity which results in a more comfortable product when physical contact occurs.



Long Service Life: Fiberglass products provide outstanding durability and corrosion resistance in demanding applications, therefore providing improved product life over traditional materials.



Low Install Cost: Due to ease of fabrication and lightweight, FRP guardrail, handrail and ladders eliminate the need for heavy lifting equipment. Components are also labeled with tags that correspond to engineering drawings to ensure time-efficient and accurate installation.



UV Protection: UV inhibitors in the resin matrix, along with a synthetic surfacing veil, provide optimum protection from the effects of UV weathering. *(An optional UV coating is required for installations with intense UV exposure.)*



NSF® Standard 61-Certified:

Fibergrate is now able to offer NSF Standard 61-Certified Dynarail® FRP guardrail, handrail and ladder systems. These products complement the complete line of NSF Standard

61-Certified Fibergrate® molded gratings, Dynaform® fiberglass structural shapes, and Safe-T-Span® pultruded gratings assembled from NSF Standard 61-Certified components. Molded gratings are available in all Fibergrate® molded grating mesh patterns and thicknesses, except 1219mm x 3658mm Micro-Mesh® panels.



Heavy Metal Safe:

The EPA, OSHA and other regulatory agencies created to

protect our lives and our natural resources have increased legislation to control heavy metals such as lead, chrome, cadmium and other metals in all products where exposure is a health threat. Fibergrate Composite Structures Inc. supports this strengthened legislation and has, for more than 20 years, voluntarily tested for heavy metals in our products and minimized or eliminated heavy metals from our products.

Dynarail Resin Systems

- **ISOFR (Guardrail, Handrail & Ladders):** Isophthalic polyester resin formulation with a low flame spread rating of 25 or less designed for applications where there is moderate exposure to corrosive elements.
- **VEFR (Ladders, Guardrail & Handrail):** Vinyl ester resin system with a flame spread of 25 or less for dependable resistance to both acidic and alkaline environments.

Dynarail® FRP Guardrail and Handrail

Dynarail Modular Guardrail and Handrail

Dynarail modular guardrail and handrail provide the look and performance of a custom rail system in an easily assembled, cost-effective package. Available in easy-to-use kits, the modular kits include step-by-step installation instructions. Dynarail is expertly engineered to use the fewest number of railing components of any system available in order to facilitate an easier, faster installation with less chance of error. Kits include everything needed for a quality installation requiring only minimal assembly skills, less labor and common hand tools. Posts are pre-routed to accept continuous rails, eliminating the need for extra pieces to connect rails to posts. Utilizing modular kits eliminates time-consuming fabrication and field modification associated with using stock lengths.



Dynarail Unique Guardrail and Handrail Solutions

Fibergrate has the capability to turnkey (design, manufacture, fabricate and install) a wide range of railing projects, from the smallest platform to massive, complex structures; from basic stairways to ADA compliant systems. To meet the requirements presented by such projects, Fibergrate employs a staff of engineers and technicians highly experienced in computerized design. This design group, well versed in all phases of FRP railing mounting conditions and special connections, provides the Fibergrate customer with accurate, concise drawings that meet the specifications of the project.

Fibergrate can also offer design, engineering, fabrication and installation of specialty solutions and picketed guardrail, segmented platform railings and other special systems.

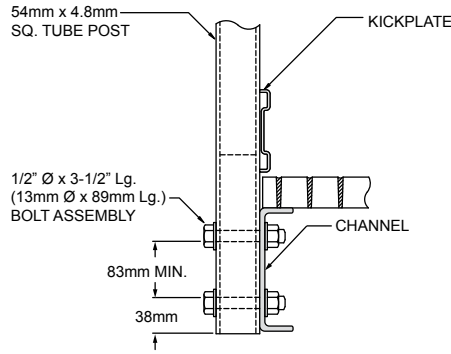


Dynarail® Post Installation Methods

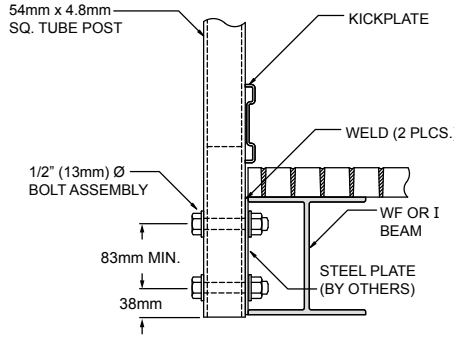
See page 7 for part numbers. For installation conditions not shown, contact Fibergrate.

All details are for posts spaced 1829mm max on centers to meet a F.O.S. of 2.0 under OSHA and IBC loads, unless noted otherwise.

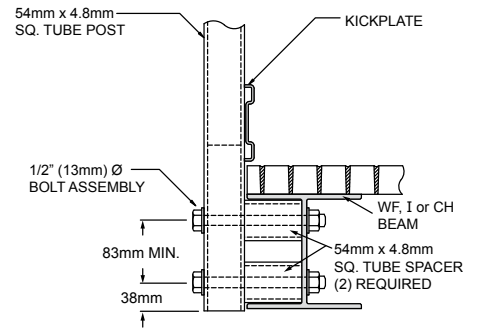
DRAWING A - POST TO FRP OR STEEL CHANNEL



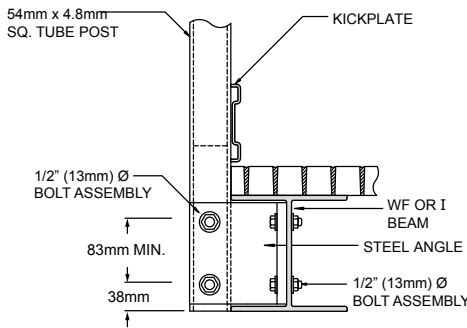
DRAWING B - POST TO STEEL PLATE ON STEEL BEAM



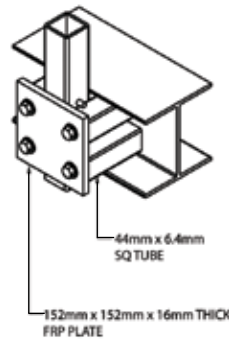
DRAWING C - POST TO FRP OR STEEL BEAM OR CHANNEL WITH FRP SPACERS



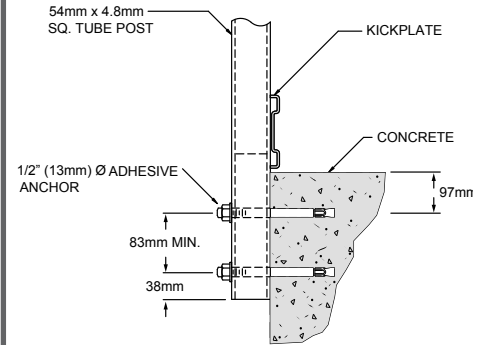
DRAWING D - POST TO STEEL ANGLE ON FRP OR STEEL BEAM



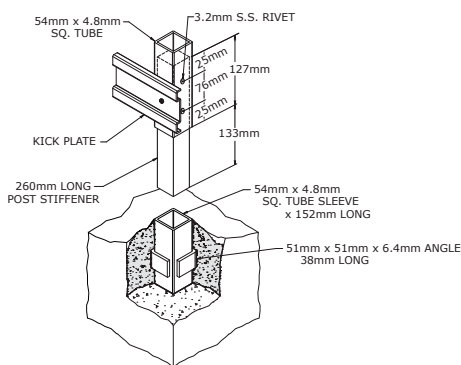
DRAWING E - REMOVABLE POST TO FRP OR STEEL BEAM



DRAWING F - SIDE-MOUNTED POST

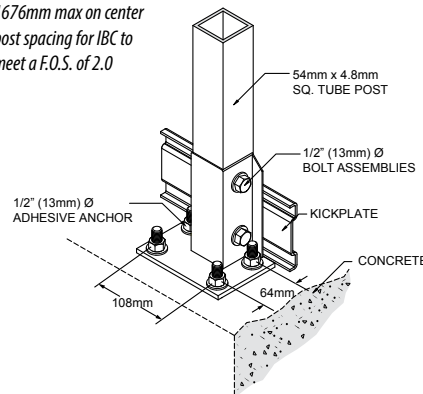


DRAWING G - EMBEDDED POST



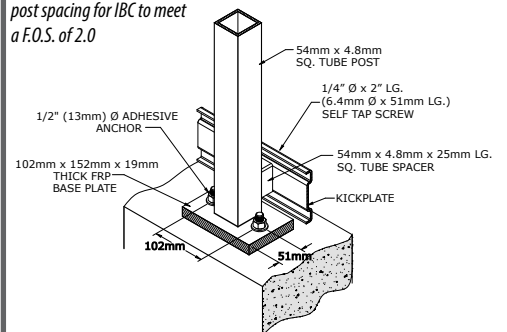
DRAWING H - TOP MOUNT STAIN-LESS STEEL STANCHION BASE

1676mm max on center post spacing for IBC to meet a F.O.S. of 2.0



DRAWING I - TOP MOUNT FRP STANCHION BASE

1219mm max on center post spacing for IBC to meet a F.O.S. of 2.0

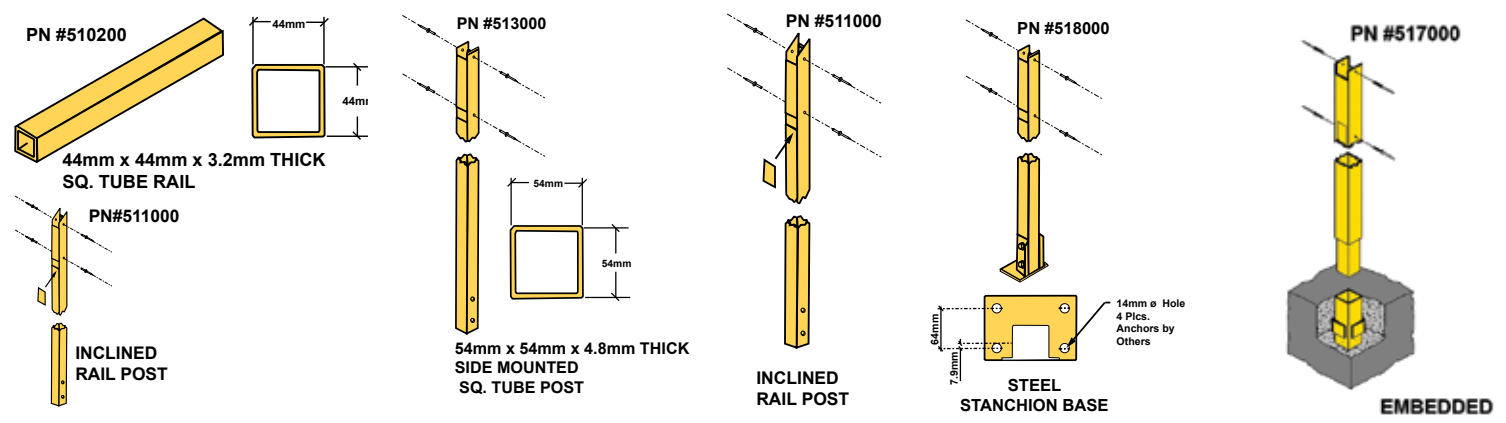
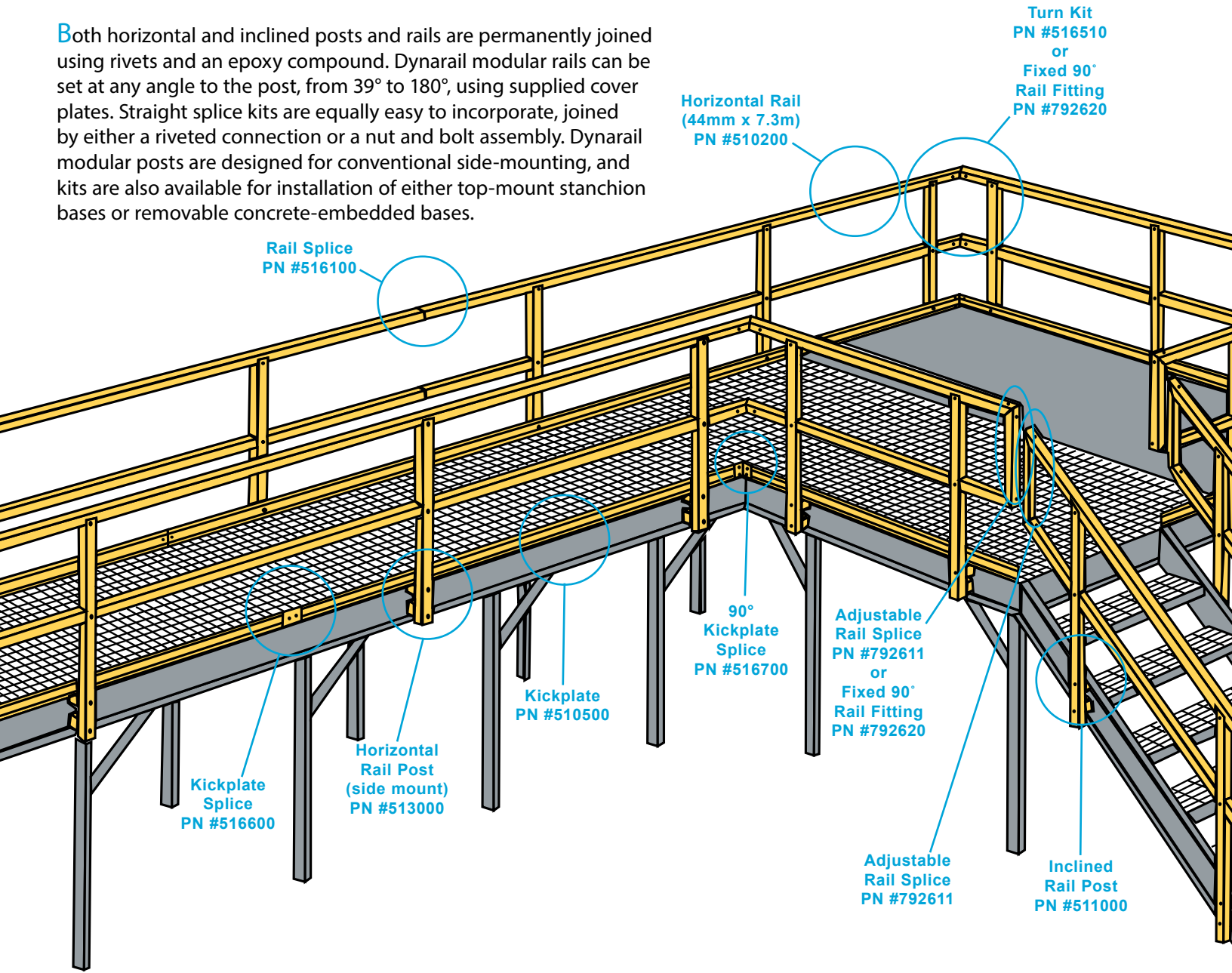


MAX PULLOUT FORCE ON EACH CONCRETE ANCHOR BOLT

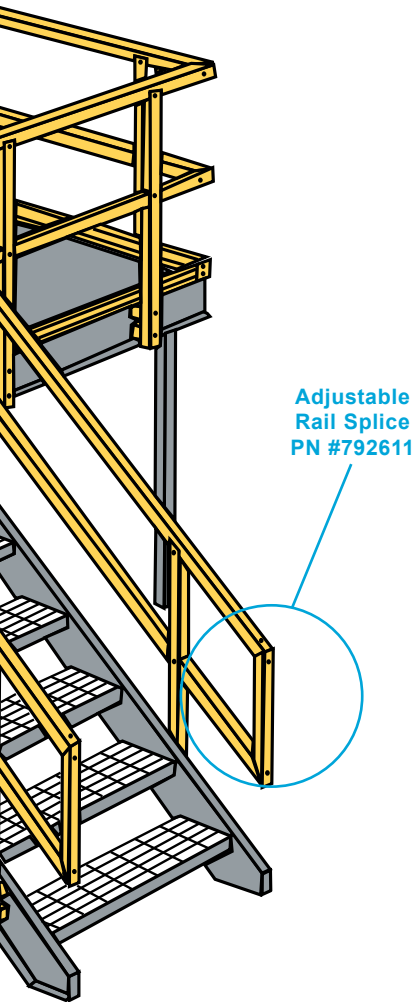
| | Drawing F | Drawing H | Drawing I |
|----------------|-----------|-----------|-----------|
| OSHA (0.9 kN) | 9.5 kN | 5.7 kN | 9.3 kN |
| IBC (0.7 kN/m) | 14.2 kN | 7.9 kN | 9.3 kN |

Modular Dynarail® Guardrail & Handrail Systems

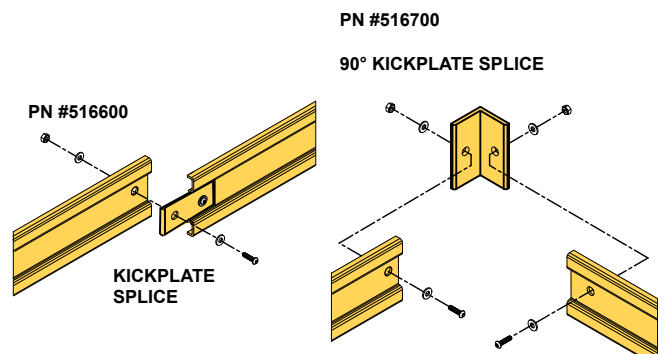
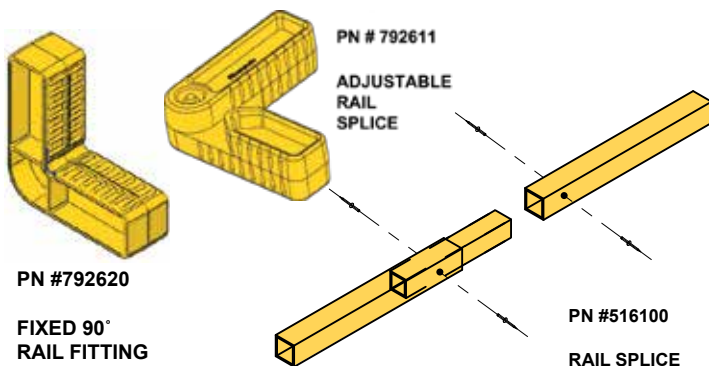
Both horizontal and inclined posts and rails are permanently joined using rivets and an epoxy compound. Dynarail modular rails can be set at any angle to the post, from 39° to 180°, using supplied cover plates. Straight splice kits are equally easy to incorporate, joined by either a riveted connection or a nut and bolt assembly. Dynarail modular posts are designed for conventional side-mounting, and kits are also available for installation of either top-mount stanchion bases or removable concrete-embedded bases.



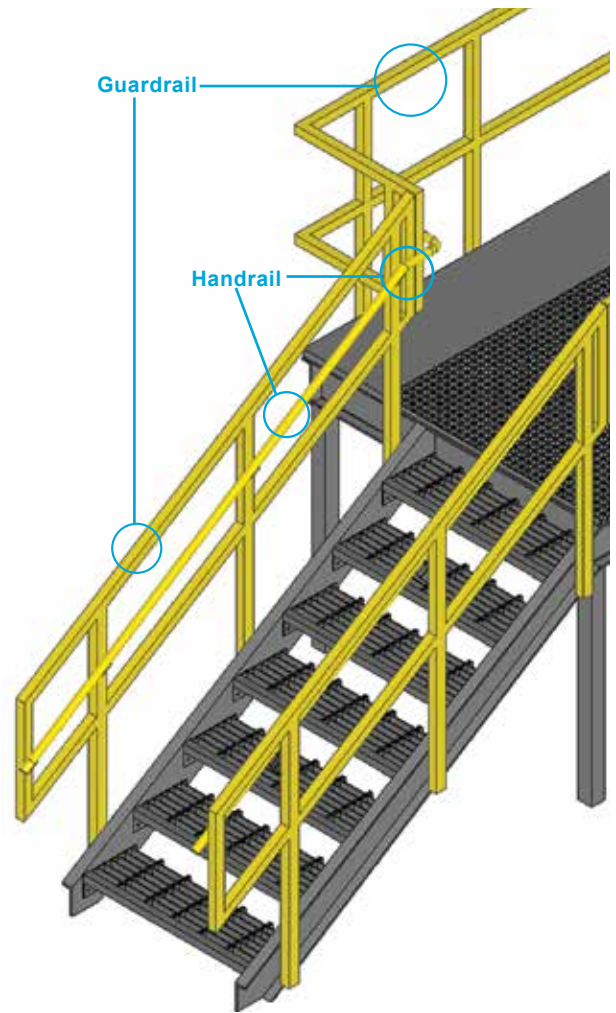
Modular Guardrail & Handrail Systems



| ASSEMBLY PART # | DESCRIPTION | |
|---|--|--|
| 510500 | Kickplate | 14mm Deep x 102mm High x 3.2mm Thick x 7.3m Long |
| 516600 | Kickplate Splice Kit | 1 ea. Splice 44mm x 102mm x 4.8mm |
| | | 2 ea. 6.4mm x 25mm x Socket Round Head Bolts, Nuts and Washers |
| 516700 | Kickplate Splice Kit 90° | 1 ea. Splice 54mm x 29mm x 4.8mm |
| | | 2 ea. 1/4" x 1" (6.4mm x 25mm) x Socket Round Head Bolts, Nuts and Washers |
| 511000 | Post Kit (Inclined Rail) | 1 ea. Post 54mm x 4.8mm x 1143mm High Sq. Tube |
| | | 4 ea. Cover Plates 54mm x 83mm |
| | | 4 ea. Rivets 18-8 SS |
| 513000 | Post Kit (Horizontal Rail) Side Mount | 1 ea. Post 54mm x 4.8mm x 1276mm High Sq. Tube (Undrilled) |
| | | 4 ea. Rivets 3.2mm x 4.8mm 18-8 SS |
| | | 1 ea. #10 x 1" (4.6mm x 25mm) Hex Washer Head Self Tap Screw |
| 517000 | Post Kit (Horizontal Rail) Removable Concrete Embedded | 1 ea. Post 54mm x 4.8mm x 1054mm High |
| | | 1 ea. 44mm Sq. Bar Extension 127mm Long |
| | | 1 ea. Sleeve 54mm x 4.8 x 152mm Sq. Tube (Ships Loose) |
| | | 4 ea. Rivets 18-8 SS |
| | | 1 ea. #10 x 1" (4.6mm x 25mm) Hex Washer Head Self Tap Screw |
| 518000 | Post Kit (Horizontal Rail) Top Mount (SS Base) | 1 ea. Post 54mm x 4.8mm x 1048mm High |
| | | 1 ea. Stanchion Base 316 SS |
| | | 2 ea. Bolts 1/2" x 3" (13mm x 76mm) and Nuts 316 SS |
| | | 4 ea. Rivets 18-8 SS |
| | | 1 ea. #10 x 1" (4.6mm x 25mm) Hex Washer Head Self Tap Screw |
| 518200 | Post Kit (Horizontal Rail) Top Mount (FRP Base) | 1 ea. Post 54mm x 4.8mm x 1035mm High |
| | | 1 ea. Stanchion Base FRP |
| | | 1 ea 54mm x 4.8mm Sq. Tube Kickplate Spacer |
| | | 1 ea. 1/4" (6.4mm) Hex Bolt Assembly |
| | | 4 ea. Rivets 18-8 SS |
| 510200 | Rail | 44mm x 3.2mm x 7.3m Long Yellow Square Tube |
| 792611 | Adjustable Rail Splice | 1 ea. Adjustable from 39° to 180° |
| 516100 | Rail Splice Kit | 1 ea. Splice 38mm Sq. Tube |
| | | 4 ea. Rivets 18-8 SS |
| 516510 | Turn Kit | 2 ea. Adjustable Rail Splices |
| | | 8 ea. Rivets 18-8 SS |
| 510100 | Spacer Material | 6.4m of 54mm x 4.8mm Yellow Square Tube |
| Bonding material should be ordered with each shipment of railing material. Order 1 kit (# 549100) for every 15 posts | | |
| SI Conversions: inch = 25.4 mm 1 foot = .305 m 1 mm = .0394 inches 1 meter = 3.28 feet | | |



Modular Dynarail® Guardrail & Handrail Systems



| ASSEMBLY PART # | DESCRIPTION |
|---|---|
| 162728 | Rail used as Handrail 38mm x 6.4mm x 6.1m Long Yellow Round Tube |
| 792650 | Fixed 90° Handrail Connector |
| 792640 | Adjustable Handrail Connector 1 ea. Adjustable from 39° to 180° |
| 522090 | Handrail Splice - 25mm ø FRP Round Rod |
| 792660 | Handrail End Cap |
| 794510 | SS Handrail Bracket |
| 794515 | SS Backer Plate |
| 756670 | 1 ea. #10 x 1" (4.6mm x 25mm) Hex Washer Head Self Tap Screw |
| Bonding material (1 Kit - PN#549100) should be ordered with each shipment of handrail material. | |
| SI Conversions: inch = 25.4 mm 1 foot = .305 m 1 mm = .0394 inches 1 meter = 3.28 feet | |

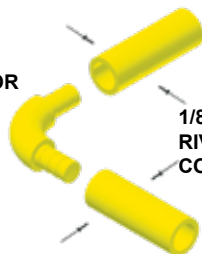
FIXED 90° HANDRAIL CONNECTOR
PN#792650



ADJUSTABLE HANDRAIL CONNECTOR
PN#792640



FIXED HANDRAIL CONNECTOR
PN#792650

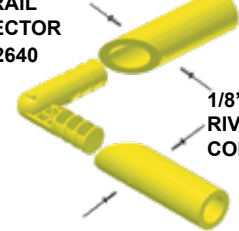


1/8" (3.2mm)
RIVETS (2) TYP ALL CONNECTIONS

ROUND TUBE USED AS HANDRAIL

ADJUSTABLE HANDRAIL CONNECTOR
PN#792640

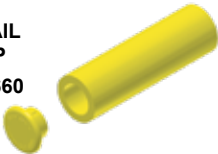
SAND & APPLY EPOXY



1/8" (3.2mm)
RIVETS (2) TYP ALL CONNECTIONS

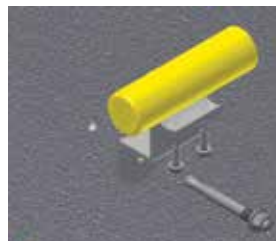
ROUND TUBE USED AS HANDRAIL

HANDRAIL END CAP
PN#792660



SS HANDRAIL BRACKET
PN#794510

SELF TAPPING SCREWS (PN#756670) ARE REQUIRED TO ATTACH SS BRACKET TO ROUND HANDRAIL TUBE



FOR ATTACHMENT TO A CONCRETE WALL:
PN#794510 REQUIRES 3/8" (9.5mm) DIA. CONCRETE ANCHOR



FOR ATTACHMENT TO AN FRP POST:
PN#794510 REQUIRES 3/8" (9.5mm) DIA. HEX HEAD BOLT & SS BACKER PLATE (PN#794515) ON OPPOSITE SIDE OF POST TO PREVENT POST FROM BEING CRUSHED BY BOLT

Dynarail® FRP Safety Ladders

The innovative Dynarail® fiberglass reinforced plastic (FRP) safety ladder and cage system meets or exceeds OSHA requirements. Dynarail cage components are shipped in compact kit form - not large, bulky units prone to damage. The safety cage is ready for field assembly with predrilled hoops for fast and easy attachment to the ladder and vertical safety bars.

Ladders are stocked in standard heights of 2.4m, 3.1m, 3.7m, 4.3m, 4.9m, 5.5m, 6.1m and 7.3m and are available in taller heights using splice kits. Ladders may be ordered with or without safety cage kits.

Safety features are built-in from the ground up. Special clip angles have been developed to securely anchor the ladder. Intermediate stand-off brackets laterally stabilize the ladder to the supporting structure on 1.8m centers. Ladder rungs include heavily serrated flutes for slip resistant footholds.



Technical Data (Except where noted, all materials are yellow vinyl ester, fire retardant - VEFR)

LADDER:

| | | | |
|--|-------|----------------------------------|--------|
| Maximum length without splice | 7.3m | Outside Diameter of rung | 32mm |
| Maximum ladder length with cage <i>(9.1m to step off plus 1.1m extension)</i> | 10.2m | Inside Diameter of rung | 22mm |
| Clear inside width (inside rail to rail) | 457mm | Rail - outside width | 44mm" |
| Outside width (outside rail to rail) | 546mm | Rail - wall thickness | 6.4mm |
| Rung Spacing (center to center) | 305mm | Weight per meter (approximately) | 4.0 kg |

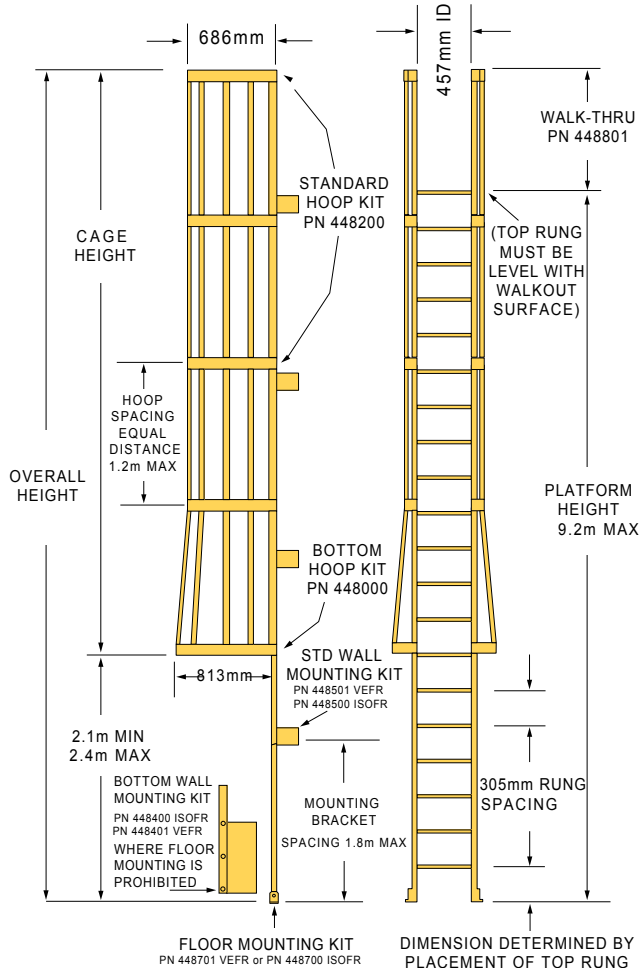
CAGE:

| Product | Description |
|---|---|
| Standard Hoop Kit (PN 448200) | 686mm from center line of ladder rung to inside of hoop 76mm wide x 6.4mm thick hand layup Predrilled holes <i>(with necessary bolt assemblies)</i> |
| Bottom Hoop Kit (PN 448000) | 787mm from center line of ladder rung to inside of hoop 76mm wide x 6.4mm thick hand layup Predrilled holes <i>(with necessary bolt assemblies)</i> |
| Hoop Brackets (Included with hoop kits) | 6.4mm thick, "U" shaped hand layup Predrilled holes <i>(with necessary bolt assemblies)</i> |
| Vertical I-Bars (PN 446211 - 3.0m; PN 446210 - 6.1m) | I-Bar, 38mm deep x 16mm flange x 3.2mm thick |
| Bottom Wall Mount Bracket Kit* (PN 448400 ISOFR Dk Gray, PN 448401 VEFR Beige) <i>Required when ladder cannot be floor mounted</i> | 56mm x 203mm x 9.5mm angle, 457mm long Two per set <i>(with necessary bolt assemblies)</i> |
| Wall Mount Bracket Kit* (PN 448500 ISOFR Dk Gray, PN 448501 VEFR Beige) | 56mm x 203mm x 9.5mm angle, 152mm long 178mm from wall to center of rung Two per set <i>(with necessary bolt assemblies)</i> |
| Floor Mount Clip Kit* (PN 448700 ISOFR Dk Gray, PN 448701 VEFR Beige) | 102mm x 102mm x 9.5mm angle, 70mm long Two per set <i>(with necessary bolt assemblies)</i> |

***NOTE:** Wall mount brackets and floor mount clips are predrilled with 14mm diameter holes for 13mm diameter anchor bolts only. **Anchor bolts not included.**

Dynarail® FRP Safety Ladders

Dynarail® Ladder System Data



Component Selection Guide

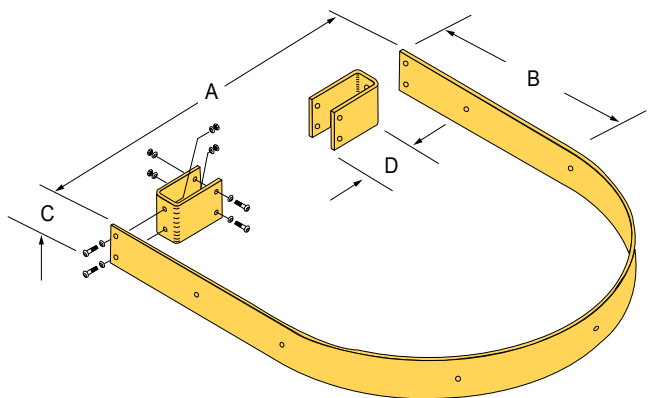
Cage Assembly Components

| Cage Height | Hoops Required | | Vertical I-Bars Required | |
|--------------|--------------------------------|------------------------------|----------------------------------|----------------------------------|
| | Standard Hoop Kit PN 448200 | Bottom Hoop Kit PN 448000 | 3.1m Vertical I-Bar PN 446211 | 6.1m Vertical I-Bar PN 446210 |
| 0.9m | 1 | 1 | 3 | 0 |
| 1.1m to 1.2m | 1 | 1 | 1 | 1 |
| 1.4m | 1 | 1 | 4 | 0 |
| 1.4m to 1.6m | 2 | 1 | 4 | 0 |
| 1.7m | 2 | 1 | 4 | 0 |
| 1.8m to 2.0m | 2 | 1 | 0 | 2 |
| 2.1m | 2 | 1 | 2 | 2 |
| 2.3m | 2 | 1 | 0 | 3 |
| 2.4m to 2.7m | 2 | 1 | 7 | 0 |
| 2.7m to 3.1m | 3 | 1 | 7 | 0 |
| 3.2m to 4.0m | 3 | 1 | 0 | 5 |
| 4.0m | 4 | 1 | 0 | 5 |
| 4.1m to 4.3m | 4 | 1 | 3 | 4 |
| 4.4m to 5.3m | 4 | 1 | 0 | 7 |
| 5.3m to 6.1m | 5 | 1 | 0 | 7 |
| 6.1m | 5 | 1 | 0 | 7 |
| 6.3m to 6.6m | 5 | 1 | 1 | 8 |
| 6.6m to 6.9m | 6 | 1 | 1 | 8 |
| 7.0m to 7.3m | 6 | 1 | 4 | 7 |
| 7.5m to 7.9m | 6 | 1 | 1 | 10 |
| 7.9m to 8.1m | 7 | 1 | 1 | 10 |

Ladder Mounting Accessories

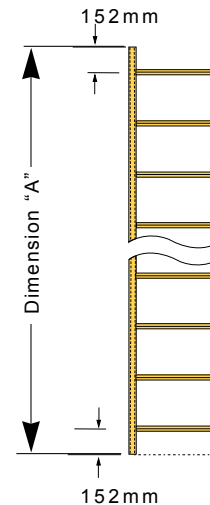
| Ladder Height | Floor Mount Kits Required ISOFR - DK GRAY VEFR - BEIGE | Bottom Wall Mount Kits PN 448400 ISOFR PN 448401 VEFR | Wall Mount Kits Required PN 448500 ISOFR PN 448501 VEFR |
|---------------|--|---|---|
| 0mm to 152mm | 1 | 1 | 1 |
| 2.0m to 3.7m | 1 | 1 | 2 |
| 3.8m to 5.5m | 1 | 1 | 3 |
| 5.6m to 7.3m | 1 | 1 | 4 |
| 7.5m to 9.2m | 1 | 1 | 5 |
| 9.3m to 11m" | 1 | 1 | 6 |

Dynarail® Hoop Data



| Hoop Kit | PART NUMBER | A | B | C | D |
|----------|-------------|-------|-------|------|-------|
| Bottom | 448000 | 889mm | 406mm | 76mm | 216mm |
| Standard | 448200 | 686mm | 406mm | 76mm | 114mm |

Ladder and Accessories



| Ladders ("A" dimension = stock length) | |
|--|-------------|
| Length* | Part Number |
| 2.4m | 444508 |
| 3.0m | 444510 |
| 3.7m | 444512 |
| 4.3m | 444514 |
| 4.9m | 444516 |
| 5.5m | 444518 |
| 6.1m | 444520 |
| 7.3m | 444524 |
| Accessories | |
| Description | Part Number |
| Ladder Rail Splice Kit | 448600 |
| 457mm Wide Walk-thru Kit | 448801 |
| 610mm Wide Walk-thru Kit | 448901 |

*Field Cut to size

Note: Top rung step-off must be even with upper walking surface

Dynarail® FRP Safety Ladders

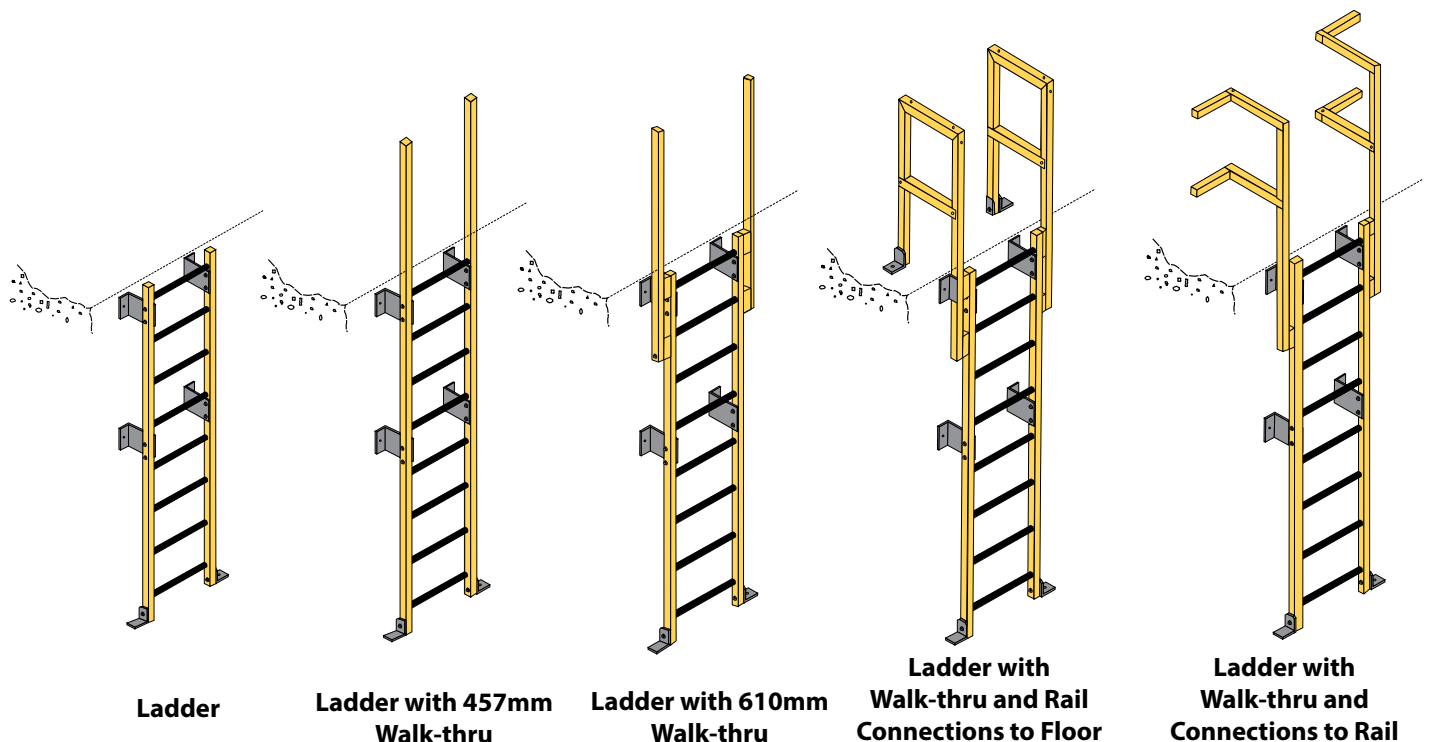
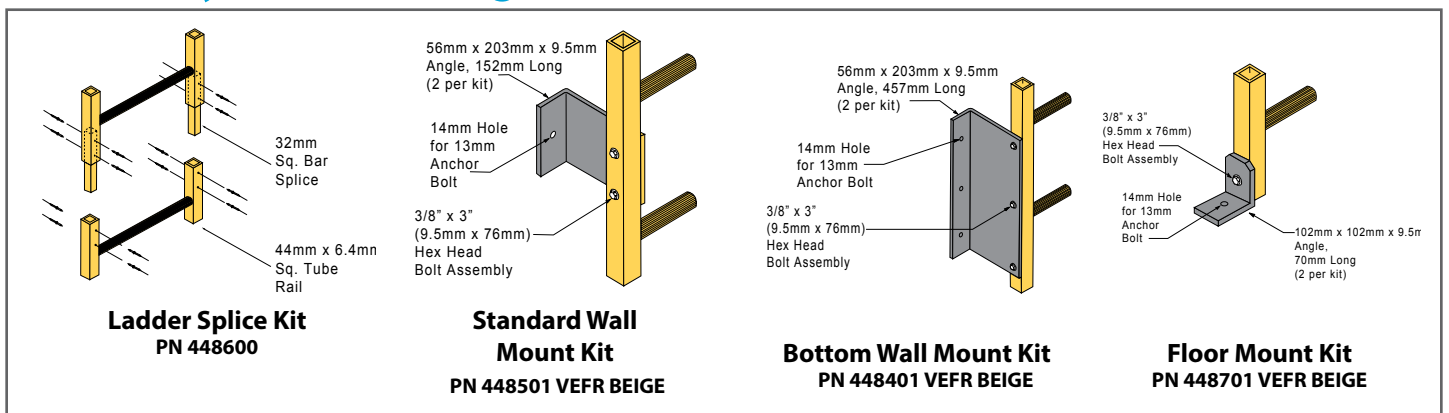
OSHA Requirements for Ladders & Ladder Systems

From the Code of Federal Regulations, Title 29, Labor, 1910.27

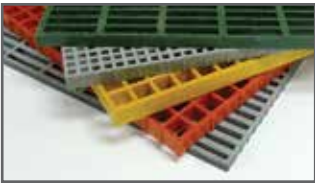
Installer is responsible for referring to most current OSHA Code for complete information.

1. (a)(1)(i) 0.9 kN concentrated load (minimum at center of rung)
2. (b)(1)(ii&iii) Distance between rungs maximum 305mm, minimum clear width between siderails of 406mm
3. (c)(4) Distance from the centerline of rungs to wall in back of ladder shall be not less than 178mm
4. (d)(1)(ii) Cage required on ladders of more than 6.1m to a maximum unbroken length of 9.1m
5. (d)(1)(iii) Cage to extend minimum of 1067mm above top of landing
6. (d)(1)(iv) Cage shall begin minimum 2.1m to maximum 2.4m above base of ladder (floor)
7. (d)(1)(v) Cage shall not be less than 686mm in width
8. (d)(1)(v) Cage hoop vertical bars shall be located at a maximum angle spacing of 40° around the circumference of the cage

Assembly & Mounting Details



Fibergrate Products & Services



Fibergrate® Molded Grating

Fibergrate® molded gratings are designed to provide the ultimate in reliable performance, even in the most demanding conditions. Fibergrate offers the widest selection in the market with multiple resins and more than twenty grating configurations available in many panel sizes and surfaces.



Safe-T-Span® Pultruded Industrial & Pedestrian Gratings

Combining corrosion resistance, long-life and low maintenance, Safe-T-Span® provides unidirectional strength for industrial and pedestrian pultruded grating applications.



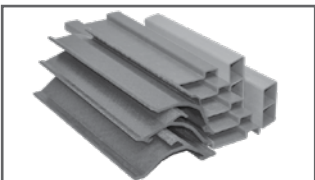
Dynaform® Structural Shapes

Fibergrate offers a wide range of standard Dynaform® pultruded structural profiles for industrial and commercial use, including I-beams, wide flange beams, round and square tubes, bars, rods, channels, leg angles and plate.



Dynarail® & DynaRound™ Guardrail, Handrail & Ladder

Easily assembled from durable components or engineered and prefabricated to your specifications, Dynarail square tube and DynaRound round tube railing systems and Dynarail safety ladder systems meet or exceed OSHA and strict building code requirements for safety and design.



Custom Composite Solutions

Combining Fibergrate's design, manufacturing and fabrication services allows Fibergrate to offer custom composite solutions to meet our client's specific requirements. Either through unique pultruded profiles or custom open molding, Fibergrate can help bring your vision to reality.



Design & Fabrication Services

Combining engineering expertise with an understanding of fiberglass applications, Fibergrate provides turnkey design and fabrication of fiberglass structures, including platforms, catwalks, stairways, railings and equipment support structures.



Worldwide Sales & Distribution Network

Whether a customer requires a platform in a mine in South Africa to grating on an oil rig in the North Sea, or walkways in a Wisconsin cheese plant to railings at a water treatment facility in Brazil; Fibergrate has sales and service locations throughout the world to meet the needs and exceed the expectations of any customer.

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