

Handrail Systems

MFC CONSTRUCTION &
WATER PRODUCTS



SAFRAIL™ INDUSTRIAL FIBERGLASS HANDRAIL



SAFRAIL™ system in a chemical plant.



Internal connections make circular handrail systems such as these possible around tanks.



SAFRAIL™ and DURAGRID® pultruded grating were fabricated to make access platforms over waste water recycling tanks. The previous steel structure corroded, and was unsafe.

SAFRAIL™ Industrial fiberglass handrails are commercial railing systems for stair rails, platforms and guardrails. SAFRAIL Systems are fabricated from pultruded fiberglass components and molded thermoplastics connectors. The railing systems are particularly well-suited to corrosive environments' like those found in industrial, chemical and wastewater treatment plants as well as commercial structures.

SAFRAIL™ fiberglass handrail systems are:

- Corrosion resistant
- Structurally strong
- Impact Resistant
- Lightweight
- Easy to field fabricate
- Low in thermal conductivity
- Low electrical conductivity

SAFRAIL™ systems are the result of more than 40 years of experience in the manufacture, design, and fabrication of fiberglass handrail systems. The systems offer the following advantages:

- **Ease of Assembly-** SAFRAIL™ systems are produced in lightweight standard sections that include both post and rail. Systems can be fabricated in large sections and shipped to the site or they can be fabricated and installed on site with simple carpenter tools.
- **Internal Connection Systems-** All connections fit flush resulting in a pleasing, streamlined appearance. The internal connections allow the construction of continuous handrail systems around circular tanks without special fittings.
- **Safety Features-** SAFRAIL™ systems come in a “safety yellow color”, feature low electrical conductivity for worker safety and exhibit high strength. Systems meet federal OSHA standards with a 2:1 factor of safety with a 6-foot (1830mm) maximum post spacing. SAFRAIL™ systems also comply with international standard AFNOR NF E 85-101.
- **Low Maintenance-** Corrosion resistant fiberglass with molded-in color will outlast aluminum or steel systems with virtually no maintenance.
- **Cost Effective-** Fiberglass components and ease-to-assemble design provide savings on labor and maintenance, resulting in long-term savings and elimination of the cost and inconvenience of “down-time for repairs” in plant operations.

Guardrail

SAFRAIL™ industrial systems can be used in guardrail applications where railing is needed to protect the open side of an elevated walkway. SAFRAIL™ systems meet OSHA requirements for a height of 42” (1067mm) from the top of walkway to the top of the guardrail.

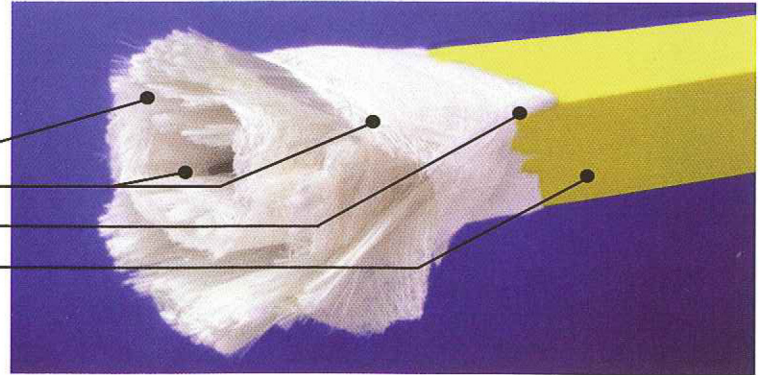
The OSHA loading requirement for both guardrail and handrail is a 200 pound (890N) concentrated load at any point or direction on the top rail. Other building codes may require different loading conditions.

Materials of Construction

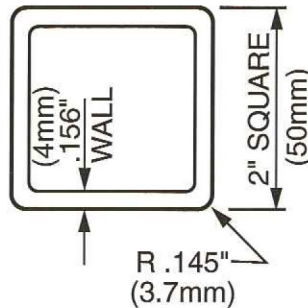
SAFRAIL™ is an engineered composite consisting of:

- Continuous glass fibers
- Two continuous strand glass mats
- A synthetic surfacing veil
- Fire-retardant polyester resin

This unique combination provides the ultimate in strength, stiffness and long-term corrosion and UV protection.



Square Post or Rail Section Properties

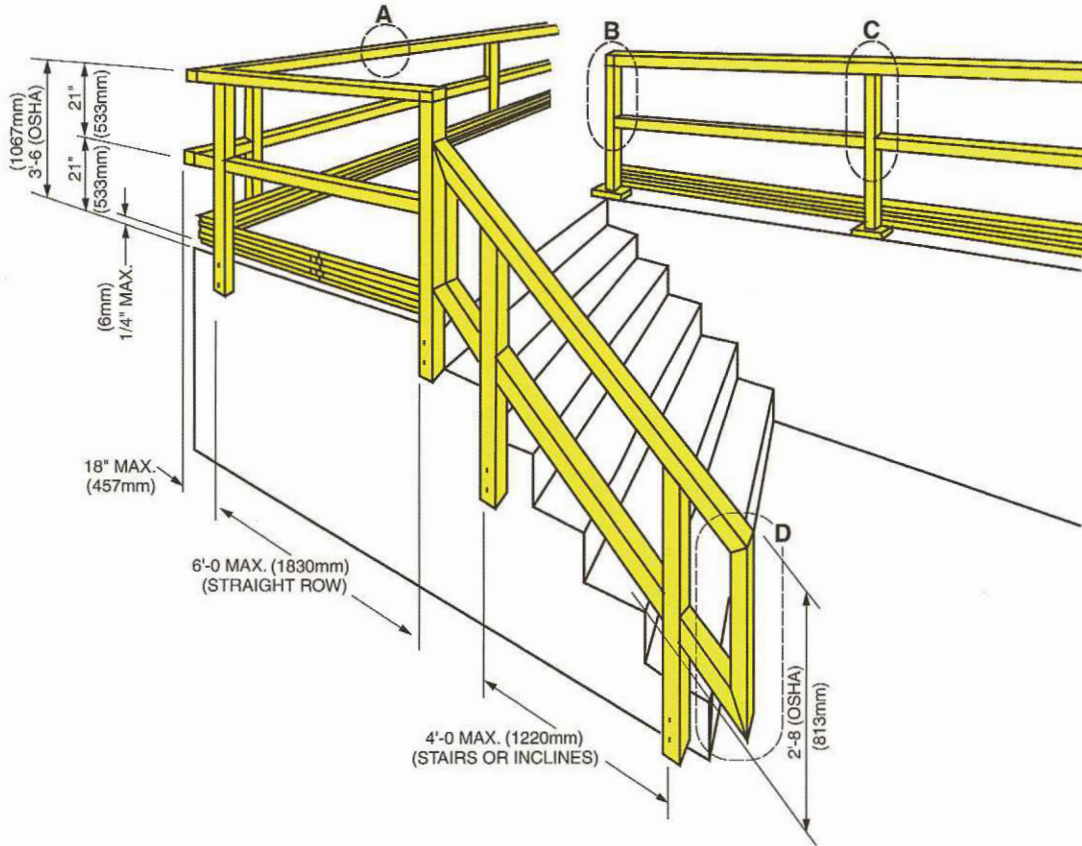


$A = 1.151 \text{ in.}^2 \text{ (742.5mm}^2\text{)}$
 $S = .657 \text{ in.}^3 \text{ (1.077} \times 10^4 \text{ mm}^3\text{)}$
 $I = .657 \text{ in.}^4 \text{ (2.735} \times 10^5 \text{ mm}^4\text{)}$
 $E = 3.7 \times 10^6 \text{ psi (2.55} \times 10^{10} \text{ N/m}^2\text{)}$
 $WT = .95 \text{ lbs./lin.ft. (431 Grams)}$
 where E = Flexural modulus full section

Minimum Mechanical Properties for Pultruded Rail and Post

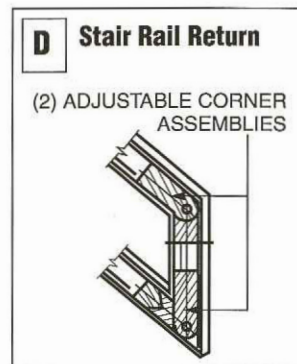
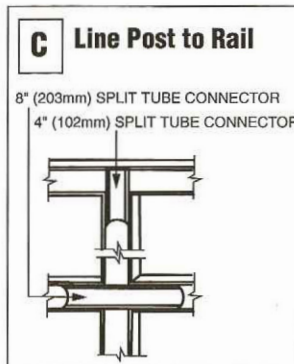
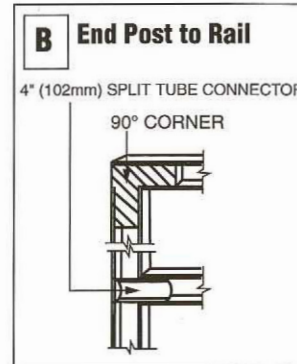
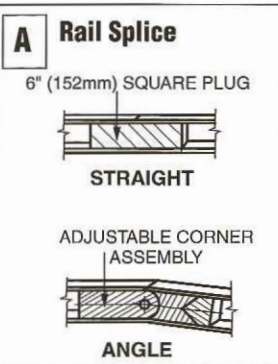
Properties	Test Method	Square Rail Values
Tensile Stress	ASTM D638	30,000 psi (207N/mm ²)
Tensile Modulus	ASTM D638	2.5x10 ⁶ psi (17.2x10 ³ N/mm ²)
Compressive Stress	ASTM D695	30,000 psi (207N/mm ²)
Compressive Modulus	ASTM D695	2.5x10 ⁶ psi (17.2x10 ³ N/mm ²)
Flexural Stress	ASTM D790	30,000 psi (207N/mm ²)
Flexural Modulus	ASTM D790	1.6x10 ⁶ psi (11.0x10 ³ N/mm ²)
Shear Stress	ASTM D2344	4,500 psi (31N/mm ²)
Density	ASTM D792	.060-.070 lbs/in ³ (1.72-1.94x10 ⁻³ g/mm ³)
24 Hr. Water Absorption	ASTM D570	0.6% max (.60)
Coef. Thermal Expansion	ASTM D696	4.4x10 ⁻⁶ in/in/°F (min.) (14.5x10 ⁻⁶ mm/mm/C°)
Flexural Stress	Full Section	36,000 psi (typical) (248N/mm ²)
Flexural Modulus	Full Section	3.7x10 ⁶ psi (typical) (25.5x10 ³ x10 ³ N/mm ²)

Typical Square Handrail Construction

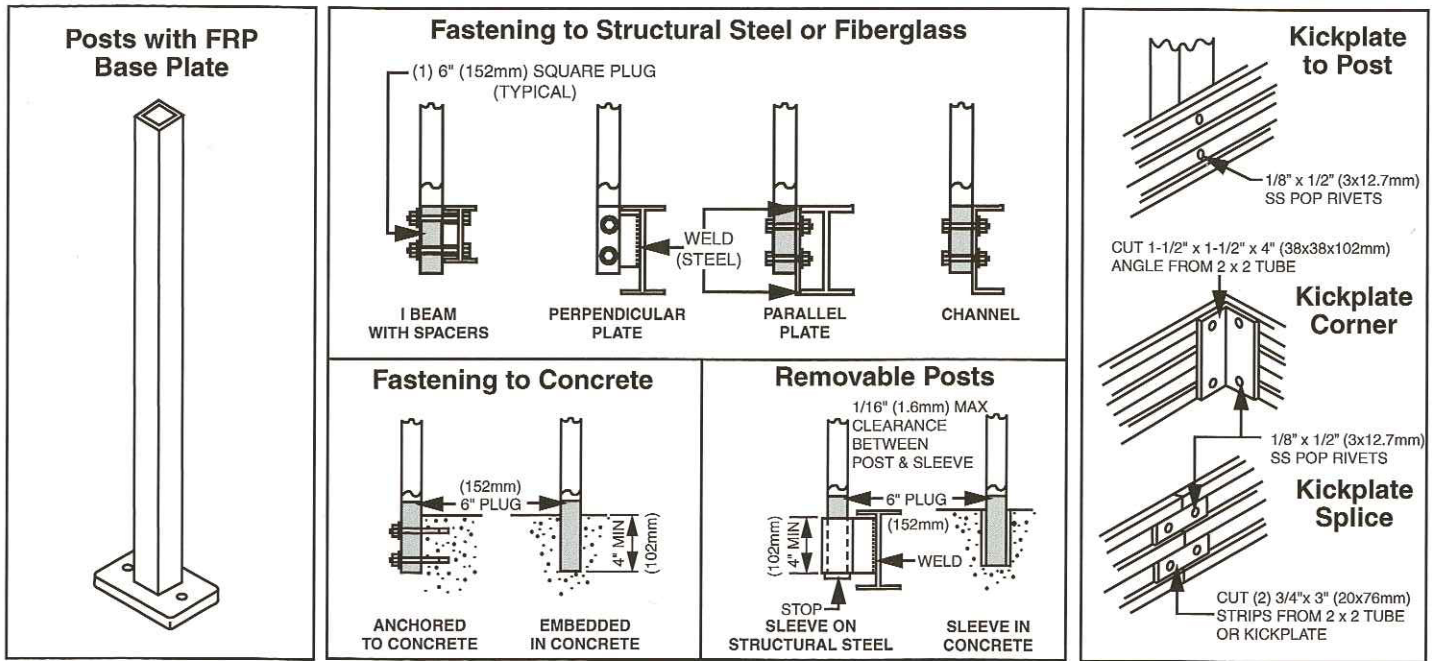


Connection Details

All components secured with epoxy.



Suggested Square Post and Kick Plate Installation



Square Handrail Components

