EX-Series®

LadderEX®

Ladder Product Guide

World leaders in the design and supply of Fibreglass Reinforced Plastic (FRP) Access Systems for industry.

TREADWELL™
ACCESS SYSTEMS

Treadwell Group is very pleased to present the latest FRP Ladder Product Guide.

Treadwell's range of ladder systems has evolved and expanded progressively through the years. Covering all aspects and needs of a durable and flexible ladder system, LadderEX® now encompasses safety cages in both standard and side access, our proprietary retractable stile system, full FRP bolts and nuts from our EXsemble™ range, and more for the complete FRP solution.

Our EX-Series® FRP ladders are designed for use in a multitude of environments where the ladders are continually subjected to corrosion by the elements and chemicals, fumes, submersions or splashes, electrical dangers or radio frequency sensitive areas. In such demanding circumstances, FRP ladders will certainly outperform the standard traditional ladder options.

With warehouses and distribution centres strategically placed throughout Australia and New Zealand, Treadwell is your one stop shop for FRP solutions. We stock, customise and deliver to ensure that Treadwell is the name you can rely on.

A BRIEF HISTORY

At Treadwell Group, our core business divisions have been developed utilising the latest fibreglass reinforced plastic (FRP) technology. We are committed in providing true value to our customers through effective implementation of our comprehensive and diverse range of products and systems.

By continually innovating and a consistent dedication to evolving our offerings, we are competent in delivering unparalleled solutions to a diversified index of industries which are by no means limited to the manufacturing, marine, oil and gas, infrastructure, and food and beverage sectors.

The progression of our products has been focused on ensuring extended design life in varied applications, enabling us to support our continuing commitment to satisfy and add value to our client's endeavours.

Treadwell Group Pty Ltd

Australia
P 1800 246 800
sales@treadwellgroup.com.au
treadwellgroup.com.au

New Zealand
P 0800 244 600
sales@treadwellgroup.co.nz
treadwellgroup.co.nz

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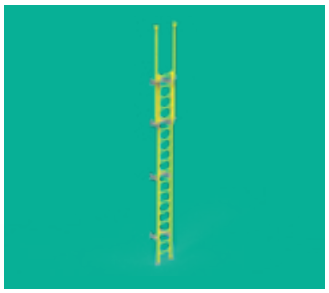
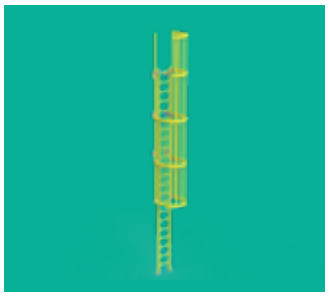




Quality Policy

Quality is at the forefront of Treadwell's working practices. With over 15 years of manufacturing to the highest quality standards, Treadwell prides itself on its implementation of strict quality control measures, and strives to supply products that surpass customers' expectations. The company works on a policy of continuous improvement.

Environmental Policy

Treadwell is conscious of the impact it has on the environment and its associated responsibilities. The company is committed to ensuring its operations satisfy both legal obligations and moral duties. Treadwell has been committed to sustainability for many years and is not just responding to current trends.

Materials of Construction

Benefits of FRP

Corrosion, Rust & Rot Proof

Treadwell's superior resin systems offer exceptional resistance to acids, salts and alkalis. At the same time, our FRP systems are rot and termite proof.

No Protective Coating Required

Treadwell's unique surface finishing system ensures UV stability in exposed applications, directly eliminating the need for costly surface treatment.

Long Term Cost Benefits

Long service life, minimal maintenance costs and low installation costs all combine to provide a very competitive solution over time.

Virtually Maintenance Free

Given the nature of FRP, any system utilising it is virtually maintenance free, thus keeping maintenance costs as low as possible.

Design Flexibility

The unique capabilities of conforming partial functionality to the use or application, ease to manufacture and to personalise shapes and aesthetics are just some of the key benefits that draw designers, engineers and architects to composite materials.

Light Weight, High Strength & Easy Installation

Treadwell 's FRP products and systems are lightweight and very manageable. FRP has specific gravity one quarter that of steel and two thirds of aluminium.

No Hot Work or Wielding Required

FRP is very simply modified or fabricated on site with easy to use hand tools. These can be done without the hassle of first needing to obtain hot work permits.

Non-Conductive & RF Transmission Transparent

FRP is transparent to radio frequency transmission and is non-conductive in nature. This makes the material ideal for applications that need to avoid electrical currents and radio frequency.

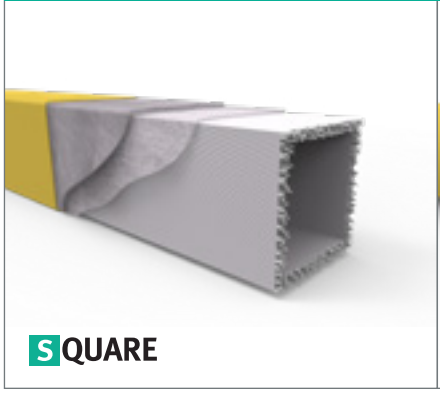
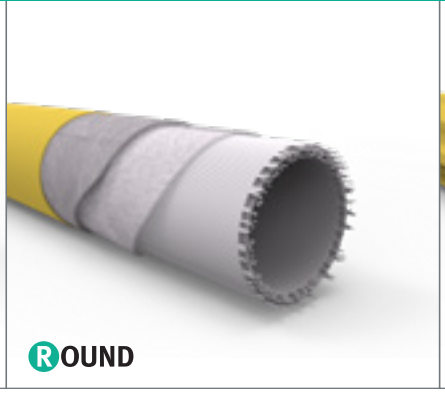
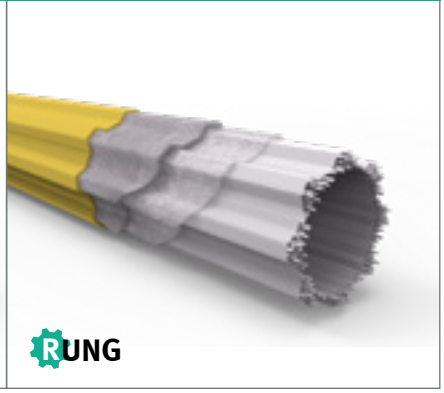
Competitive Vs Traditional Materials

FRP is manufactured from a more economically sound raw material base than metallic alternatives, and is far more structurally sound when compared to timber and plastic materials.

Environmentally Sound

Related to the lightweight, low need for maintenance and long design life of FRP, the reduced lifecycle cost and environmental footprint are highly sought after characteristics in the modern world. Continual resin formulation fine tuning and development can further raise this environmental profile of composites.

LadderEX® handrails are constructed from fibreglass rovings combined with a blend of thermosetting resins. All resins used in the production of EX-Series® products contain UV inhibitors and fire retardant additivies.

SQUARE STILE	ROUND STILE	SERRATED RUNG
		

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What is LadderEX®?

LadderEX® is the superior alternative to metallic ladders and cage systems, providing excellent corrosion resistance and electrical transparency. Even in complete immersion applications, Treadwell's fibreglass ladders have outlasted aluminium and steel, and required little or no maintenance.

Our products in this range are made from superior fibreglass which offers unparalleled advantages, leaving behind alternatives that are metal or steel based. Our ladders and ladder cage systems are produced using a premium grade polyester resin system with flame retardant and ultraviolet (UV) inhibitor additives. A vinylester resin system is available upon request for additional corrosion resistance. Standard side rails and cages are in safety yellow. The rungs are a pultruded fibreglass polyester tube with a fluted, non-skid surface.

LadderEX® fibreglass ladder systems are fabricated and designed with FRP according to AS 1657 - 2013. The pultruded parts are produced with a fire retardant polyester resin which meets the ASTM E-84 test for flame spread of 25 or less and contains a UV inhibitor. The colour is in standard OSHA safety yellow though colour matching can be provided.

Ladders are shop assembled and may be pre-drilled and prepared for field attachment with standoff clips and/ or base brackets systems.

The LadderEX® product range can easily be integrated into any existing platform or structure. It can come in a variety of configurations to suit any purpose as well.

Treadwell FRP Vs Alternative Materials

	FRP	Steel	Aluminum	Timber	Recycled Plastics	Composite Timber
Corrosion Resistance	●●●●●	●●	●●●●	●●	●●●●●	●●●●●
Strength	●●●●●	●●●●●	●●●●●	●●	●●	●●
Weight	●●	●●●●●	●●	●●●●	●●●●	●●●●
Electrical	●●	●●●●●	●●●●●	●●●	●●	●●
Conductivity	●	●●	●●●●●	●●	●●	●●
Thermal Expansion	●	●●●●●	●●●●●	●●	●●●●	●●
RF Transparency	●●	●●●●●	●●●●●	●●	●●	●●
Fabrication	●●	●●●	●●●	●●●●●	●●●●●	●●●●●
Life Cycle Cost	●●	●●●●●	●●●●●	●●	●●	●●
Slip Resistance	●●●●●[1]	●●	●●	●●	●●	●●
Fire Rating	●●●●●[2]	●●●●●	●●●●●	●●	●●●●	●●●●

1 Tested to comply with A5 4586, 2013
2 Tested to comply with ECA C10.1

LadderEX® Standard Colour

Treadwell's standard colour for our ladders is Safety Yellow

Contact Customer Service on 1800 246 800 or email us at sales@treadwellgroup.com.au for custom requirements - custom colours are available on request.

Did You Know?

Treadwell has the resource and expertise to fabricate ladders to your exact requirements and furthermore, we specialise in drafting to save you the bother.

LadderEX® Overview

FAQ's

Costs of Treadwell's FRP vs other materials?

Q: How does Treadwell's FRP compare to stainless steel in price?

A: Treadwell's FRP typically cost less than stainless steel.

Q: How does Treadwell's FRP compare to carbon steel in price?

A: Treadwell's FRP materials are generally more expensive than carbon steel when comparing material costs. However, when factoring in installation, handling, transportation and other associated expenses, the total installed cost of FRP is therefore more competitive.

Q: How does Treadwell's FRP compare to aluminium in price?

A: Treadwell's FRP is usually priced competitively with aluminium and the total installed cost generally makes FRP a more price competitive choice than aluminium.

Q: How does Treadwell's FRP compare to wood in price?

A: Treadwell's FRP cannot compete with wood on price alone. Customers should also evaluate the strength, resistance and overall performance requirements for the application and as well as maintenance moving forwards.

Unsure about the strength of FRP ladders?

Q: Are LadderEX®® ladders the strongest type of non-metallic ladders available?

A: Treadwell's FRP ladders boasts higher strength and stiffness. LadderEX® incorporates glass reinforcing which no other plastic handrail features. Our ladders consists of 15-20% more reinforcing content compared to alternative FRP ladder systems on the market.

Ease of Installation

Q: How simply can I install LadderEX® onsite?

A: Very simply. Our ladders are prefabricated according to requirements and packed in segments for easy installation onsite. Further, FRP is lightweight, making it easy to handle with very little need for future maintenance.

Corrosion issues?

Q: Is there a point in using FRP handrails in a corrosive environment? Would the other framework surrounding it affect FRP?

A: For challenging applications where exposure to chemicals and the elements would typically corrode traditional materials, FRP is the obvious choice. With strong resistance to chemicals and the ability to work alongside other materials easily, there is hardly any better option.

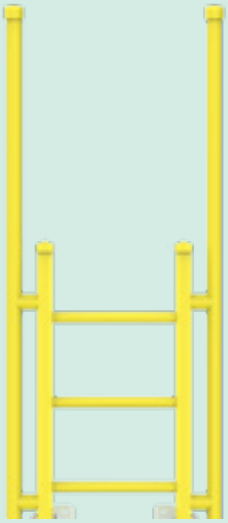
Outdoors as well?

Q: Does LadderEX® offer better UV protection than alternative materials?

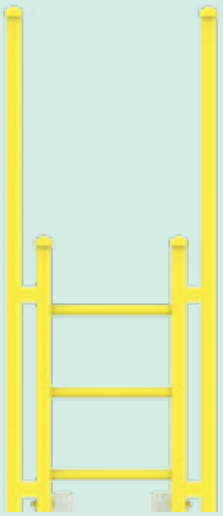
A: Yes it does. With an optimum amount of UV inhibitors and stabilisers within the material, our EX-Series® Resin Systems will offer premium UV protection.

LadderEX®

LadderEX® Standard Grab Stiles

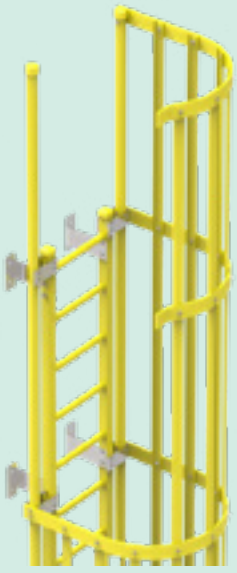


ROUND Grab Stiles



SQUARE Grab Stiles

LadderEX® Safety Cages



LadderEX® Side Access Cage

LadderEX® Standard Safety Cage

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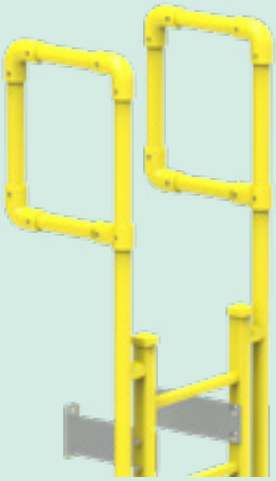
Overview

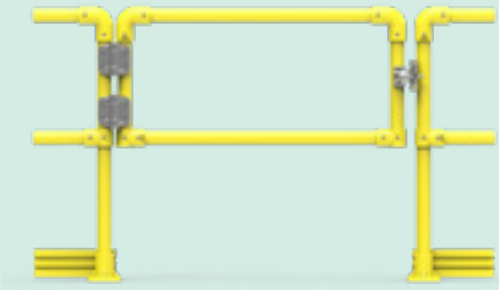
LadderEX® Returns

SQUARE Return

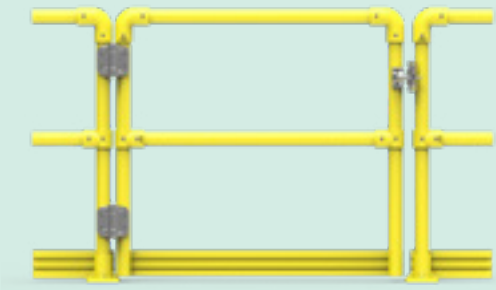


ROUND Return

LadderEX® Self Closing Gates



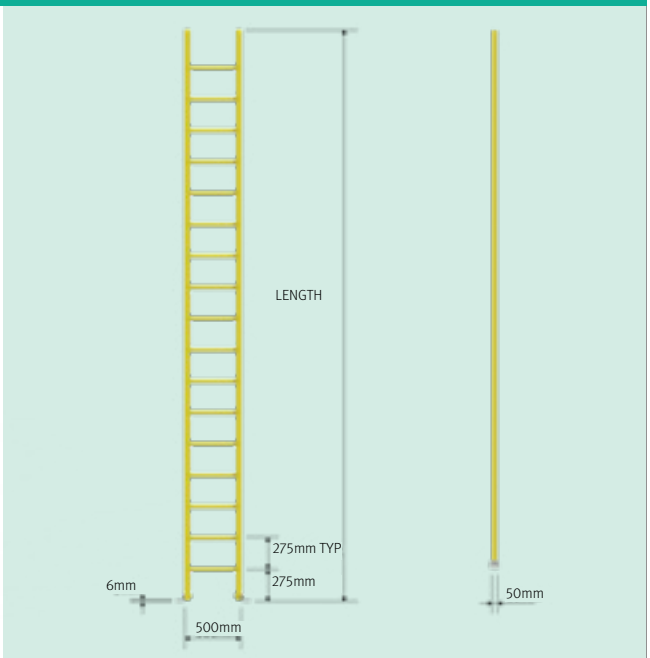
RailEX® Economy Self Closing Gate



RailEX® Premium Self Closing Gate

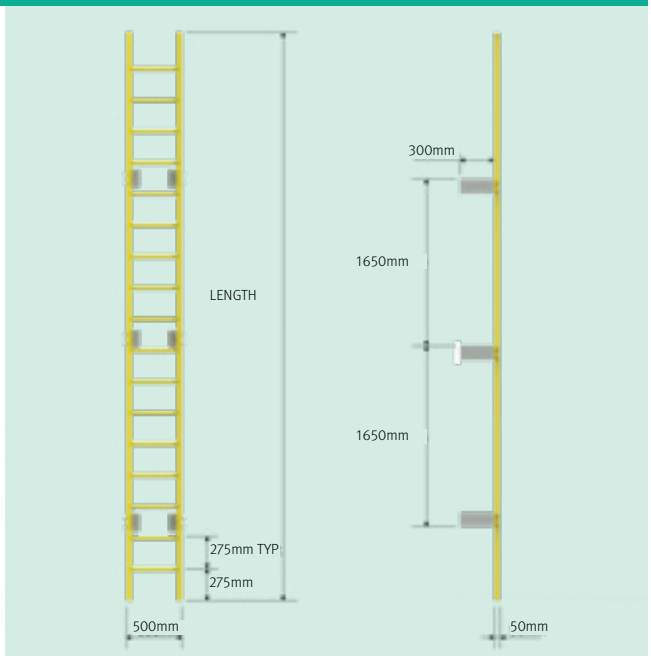
LadderEX® Standard Access Ladders

LadderEX® Standard Floor Mounted Ladder



Brief:
Treadwell's floor mounted ladders are an important addition to sections where there is a requirement to provide safe, designated access to elevated areas. These ladders are securely fastened to the floor with a standard floor mount bracket to ensure safe and sturdy passage.

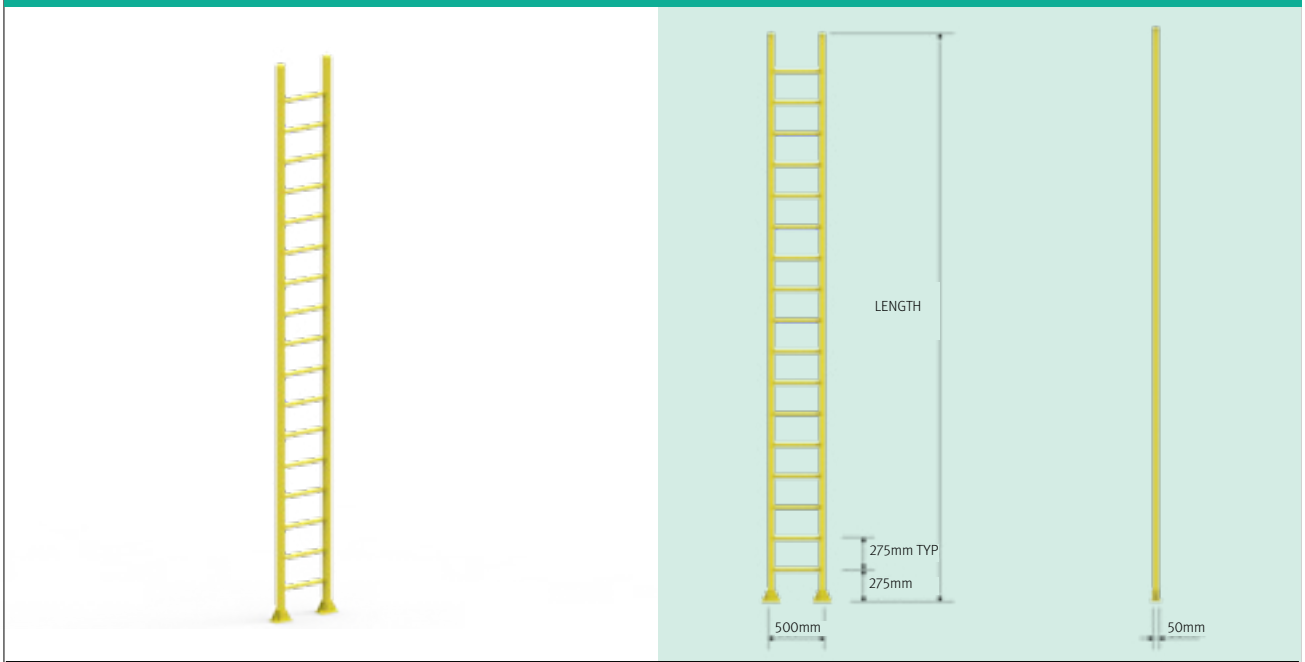
LadderEX® Standard Wall Mounted Ladder



Brief:
LadderEX® wall mounted ladders are an integral addition to any structure to help provide safe, designated access to elevated areas such as rooftops, ceiling spaces, and maintenance platforms. Wall brackets as well as floor mounts can be utilised in securing safe and stable access.

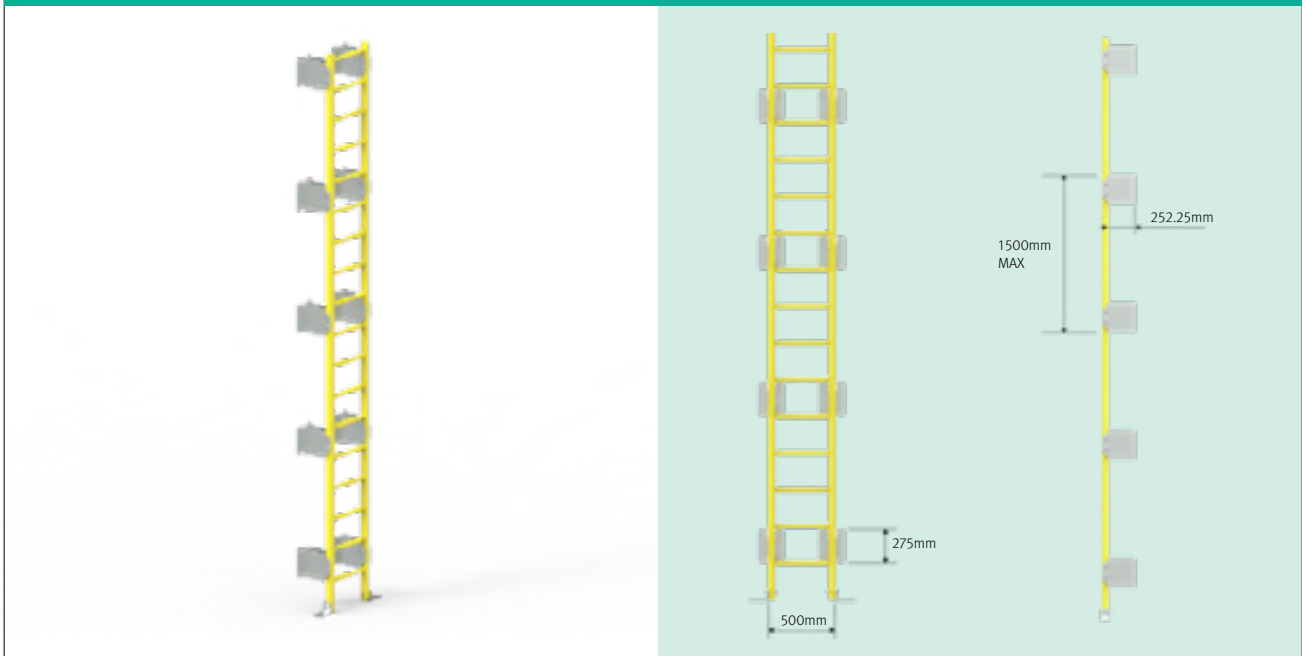
LadderEX® Heavy Duty Access Ladders

LadderEX® Heavy Duty Floor Mounted Ladder



Brief:
For industrial and other heavy duty purposes, Treadwell supplies a more durable and robust heavy duty floor mount to safeguard users and increase the safety factor.

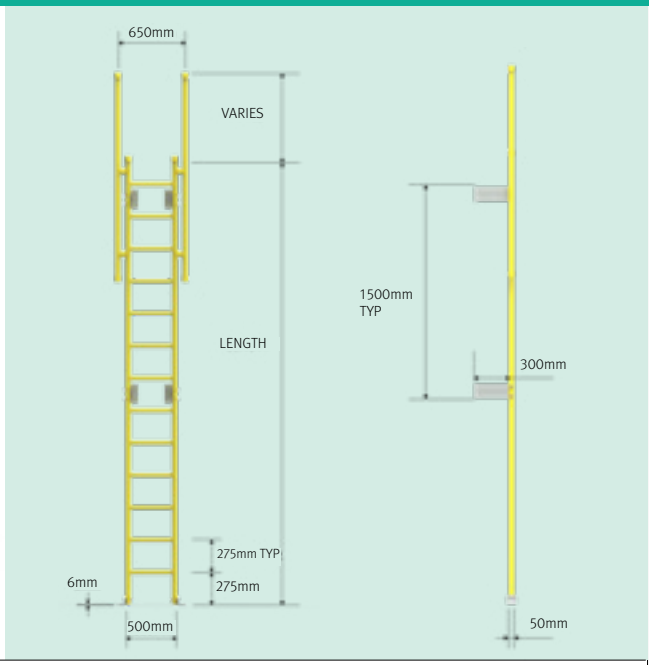
LadderEX® Heavy Duty Wall Mounted Ladder



Brief:
For industrial and other heavy duty purposes, Treadwell supplies a more durable and robust heavy duty wall mount and floor mounts (if required) for that added safety factor.

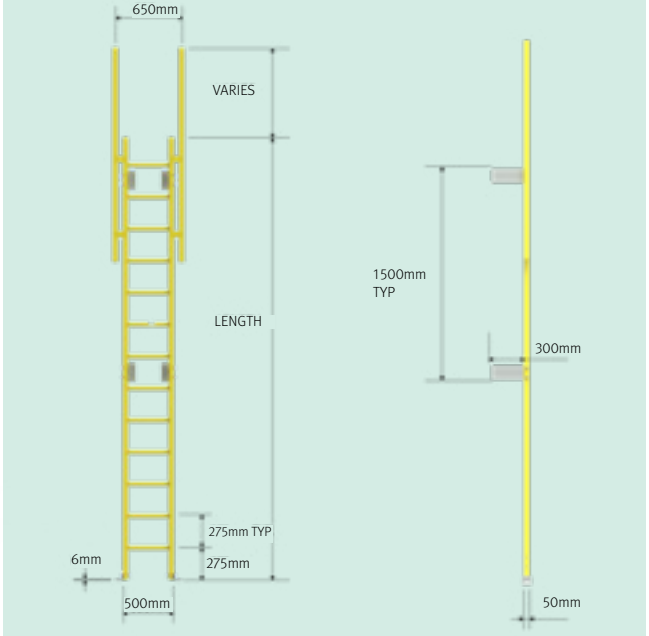
LadderEX® Standard Access Ladders with Grab Stiles

LadderEX® Standard Ladder with ROUND Grab Stiles



Brief:
In instances where there is a requirement for extra security above 1.5m, Treadwell can supply standard access ladders without returns with a round grab stile.

LadderEX® Standard Ladder with SQUARE Grab Stiles



Brief:
In instances where there is a requirement for extra security above 1.5m, Treadwell can supply standard access ladders without returns with a square grab stile.

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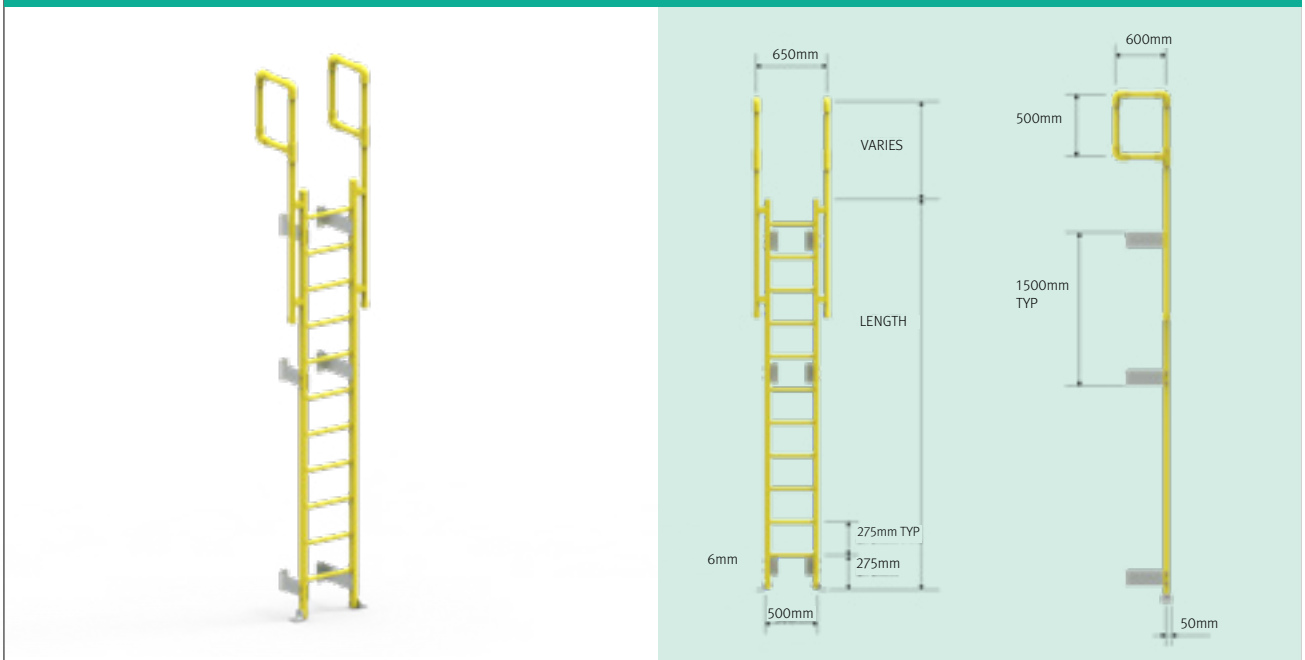
LadderEX® Standard Access Ladders with Returns

LadderEX® Standard Ladder with ROUND Returns

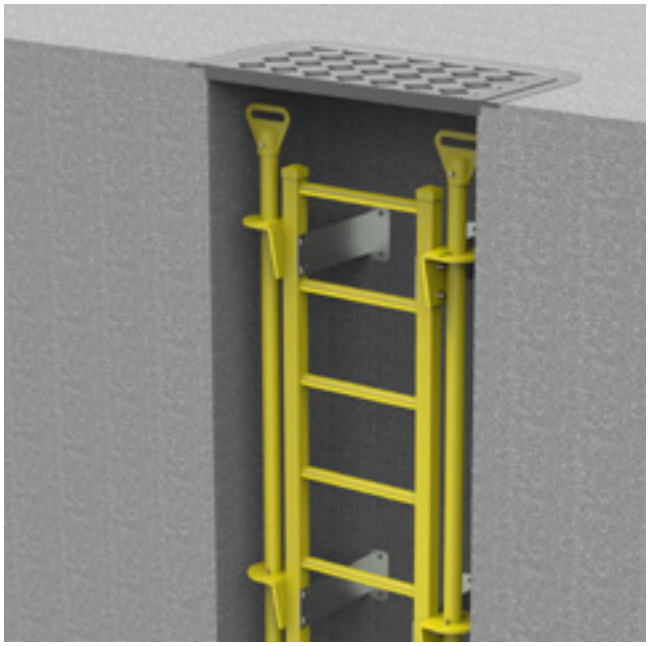


Brief:
This configuration is designed to provide access to platforms such as a roof area and features walk-through hand railing and a return ladder to assure safe entry and exit. Returns in this instance are round.

LadderEX® Standard Ladder with SQUARE Returns

Brief:
This configuration is designed to provide access to roof areas and other platforms. It also features walk-through hand railing and a return ladder to assure safe access. Returns in this instance are square.

RETRACT-A-STILES

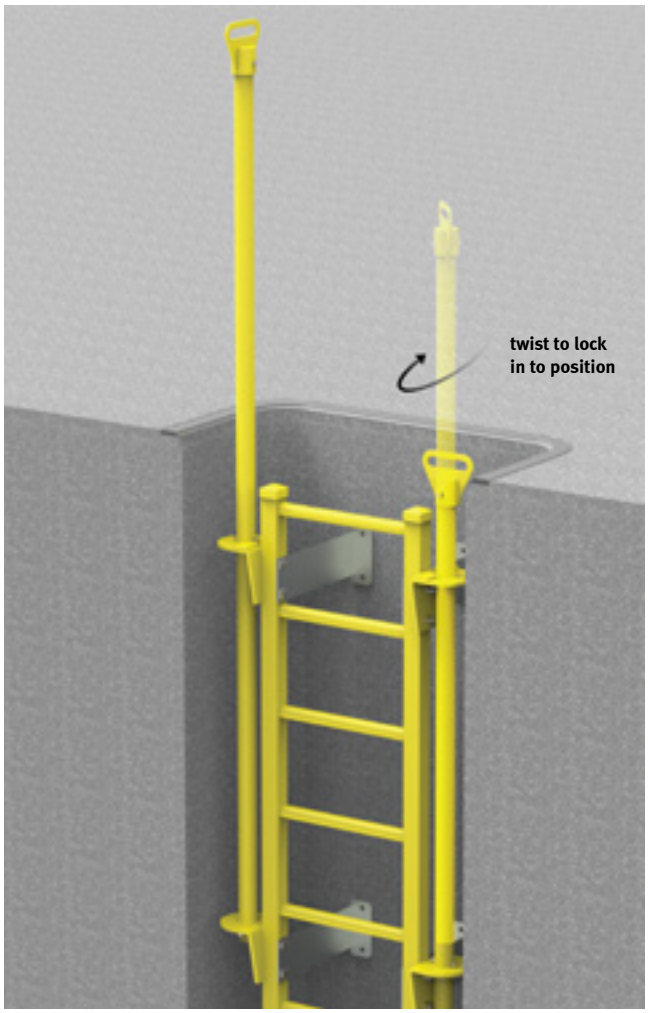


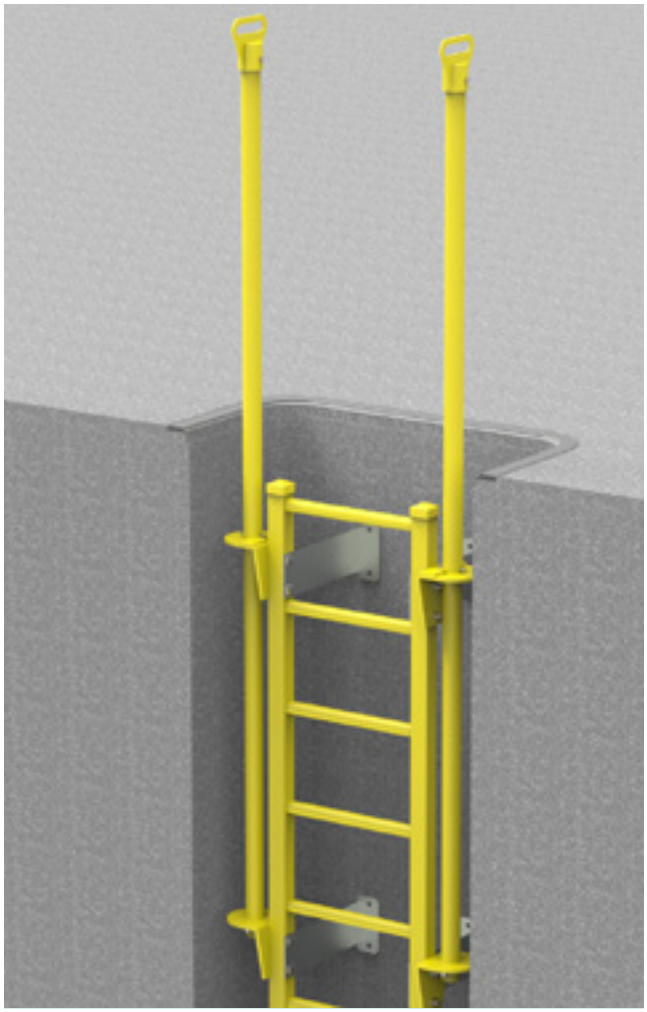
What are LadderEX® Retract-A-Stiles?

LadderEX® Retract-A-Stiles are the perfect solution for convenience and flexibility for added safety, especially in confined spaces. Made from FRP, they are corrosion resistant and require very little maintenance if any.

LadderEX® Retract-A-Stiles are also easy to install and maximise safety when working at heights. The handles are ergonomically designed for maximum grip and the fixing brackets are suited for utmost strength and versatility.

LadderEX® components are fabricated in modular sections which then allows for construction of endless ladder and access configurations to suit specific site requirements. We can easily accomodate your needs into any of our designs with our Retract-A-Stile.





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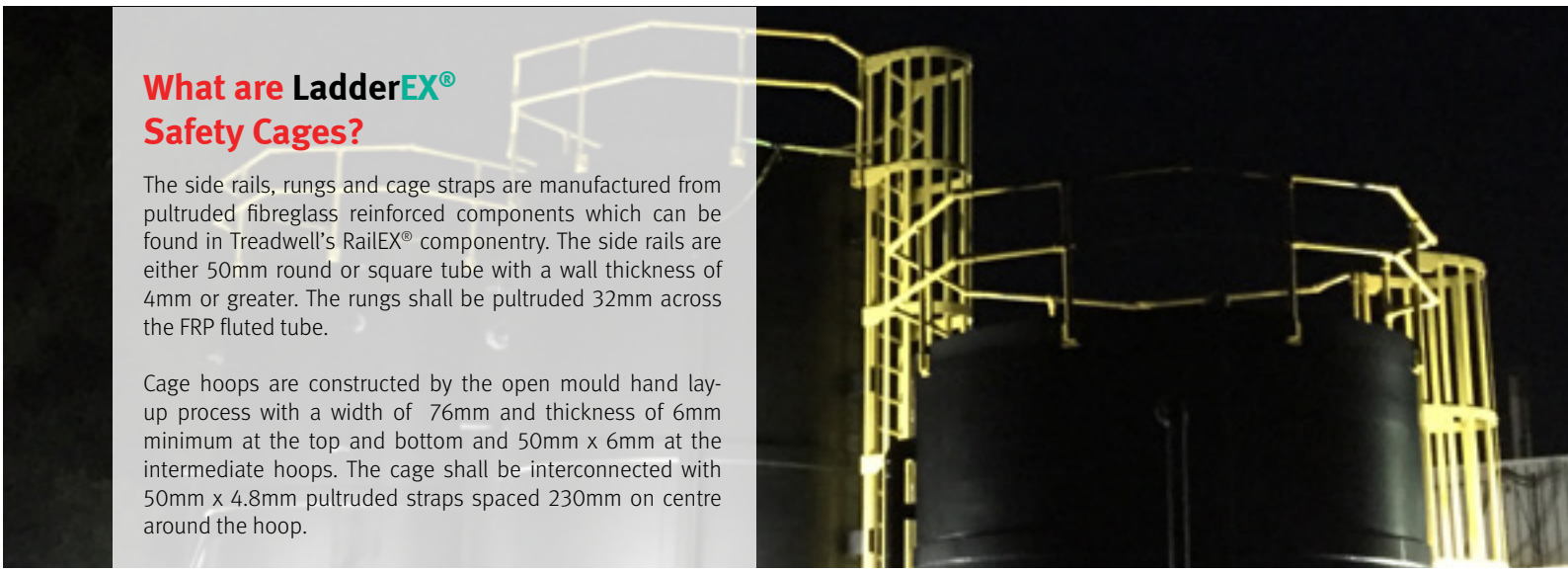
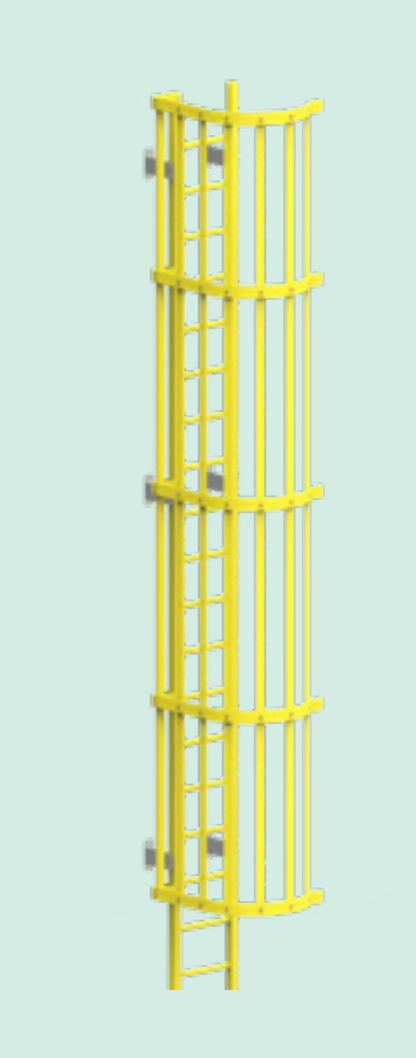


What are LadderEX® Safety Cages?

The side rails, rungs and cage straps are manufactured from pultruded fibreglass reinforced components which can be found in Treadwell's RailEX® componentry. The side rails are either 50mm round or square tube with a wall thickness of 4mm or greater. The rungs shall be pultruded 32mm across the FRP fluted tube.

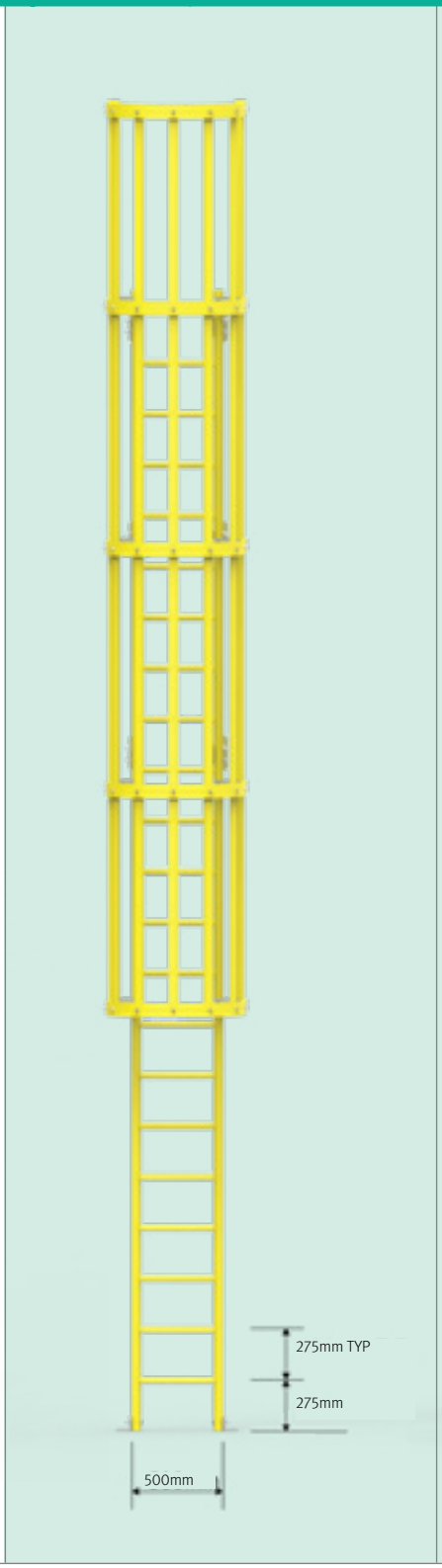
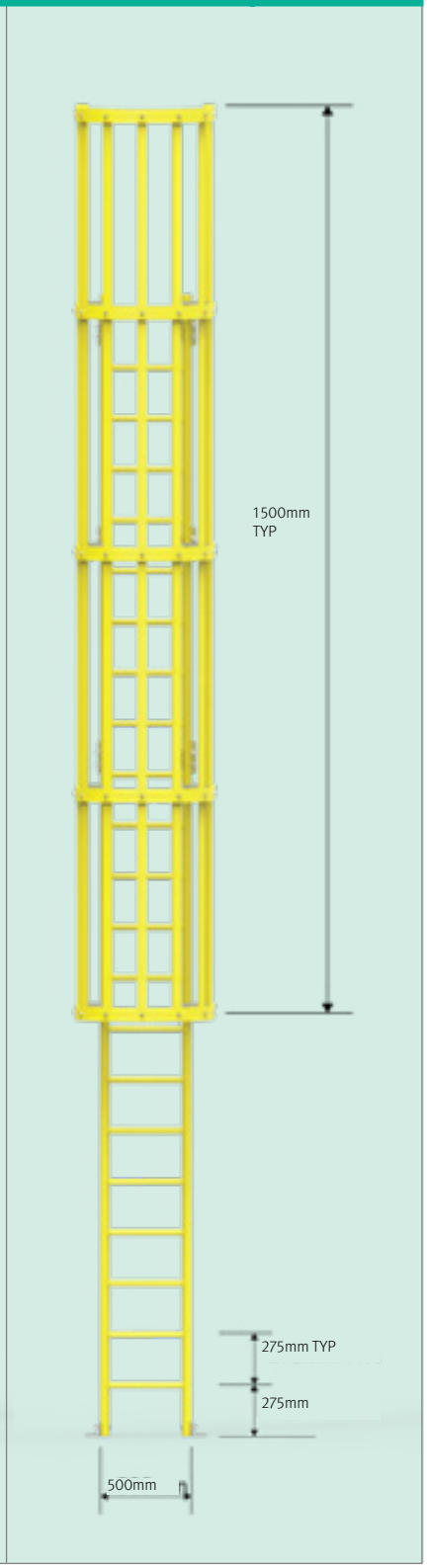
Cage hoops are constructed by the open mould hand lay-up process with a width of 76mm and thickness of 6mm minimum at the top and bottom and 50mm x 6mm at the intermediate hoops. The cage shall be interconnected with 50mm x 4.8mm pultruded straps spaced 230mm on centre around the hoop.

LadderEX® Safety Cage Options Overview

WALKTHROUGH	LEFT ACCESS	RIGHT ACCESS
		

Safety Cages

Treadwell's caged ladders add an extra dimension of permanent safe access for personnel access and are compliant with AS 1657 - 2013.

Side Elevation	Front Elevation	Basic Dimension Diagram
		

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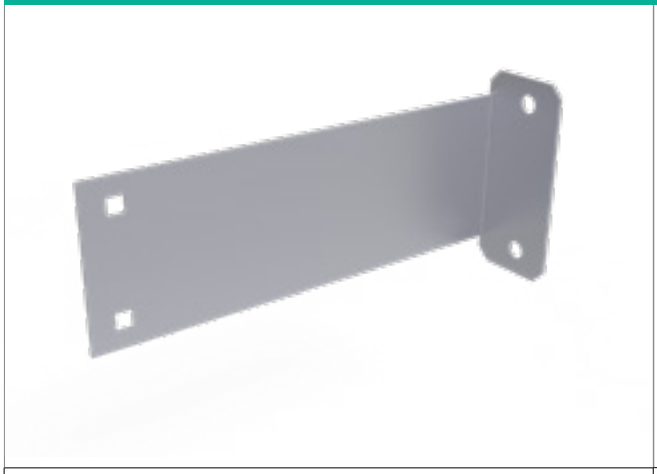
F-LXL-MB316



Description:
LadderEX® Standard Wall Mount Brackets

F-LXL-MB316HD

Description:
LadderEX® Heavy Duty Wall Mount Brackets

F-LXL-FMB

Description:
LadderEX® Floor Mount Bracket

F-LXL-FMBHD

Description:
LadderEX® Heavy Duty Floor Mount Base

F-LXL-SPL

Description:
LadderEX® Standard Splice Kit (ladder not included)

F-LXL-SC

Description:
LadderEX® SQUARE cap

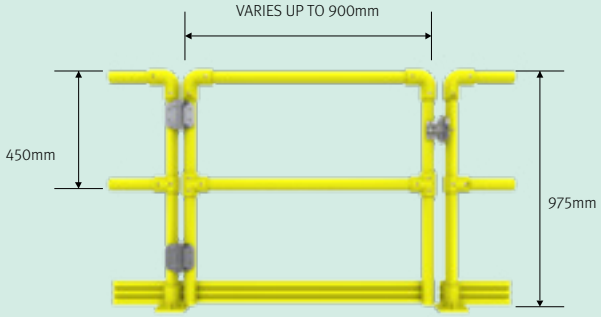
F-LXL-RC

Description:
LadderEX® ROUND cap

RailEX® Self Closing Gates

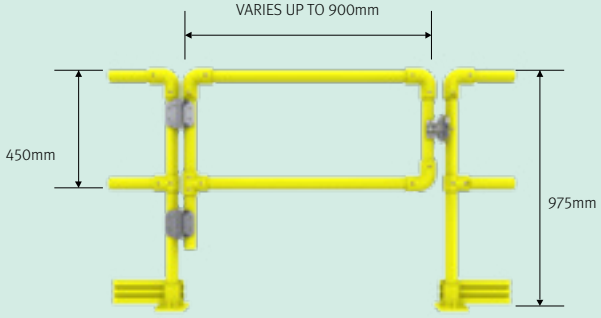
Treadwell's RailEX® gates are self-closing and are designed to attach to RailEX® stanchions. Both Economy and Premium gates can also be simply fitted to LadderEX® ROUND & SQUARE Grab Stiles. Single gates should not exceed 900mm.

RailEX® Premium Gate



Brief:
Premium RailEX® gates are supplied with kick plates for added safety and awareness around sites.

RailEX® Economy Gate



Brief:
A solid industrial safety gate, the economy RailEX® self-closing gate features a spring-loaded mechanism which increases safety in any environment by automatically closing behind after use.

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General

1.0 Scope

1.1 The ladders shall conform to the material and fabrication requirements as stipulated per this specification.

2.0 Standards/Related documents

2.1 AS 1657 – 2013 Fixed platforms, walkways, stairways and ladders – design, construction and installation.

2.2 ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

2.3 ASTM D 635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

2.4 AS 4020 – 2005 Testing of materials in contact with drinking water (potable).

3.0 Design Criteria

3.1 The design criteria of the fibreglass (FRP) products shall be in accordance with governing building codes and generally accepted standards in the FRP industry.

4.0 Submittals

4.1 Shop drawings of all fabricated items shall be submitted by Treadwell (unless provided by client) clearly displaying material sizes, types, styles, product codes and including types of fasteners as well as layout if required.

4.2 Submittal drawings shall display clearly all critical dimensional parameters i.e. overall height of ladders, location of mounting brackets etc.

4.3 No fabrication will commence prior to the client approving the submittal drawings.

5.0 Quality Assurance

5.1 Quality surrounds every aspect of Treadwell's commitment to our superior products and efficiency. Treadwell's quality assurance strictly adheres to the high quality control standards placed to conform to relevant specifications, codes, Australian Standards and contractual requirements in a timely manner.

6.0 Product Delivery and Storage

6.1 All ladders, components and ancillary items shall be fabricated per the design and piece marked accordingly.

6.2 Ladders shall be fully assembled, ready for installation OR ladders shall be trial assembled and flat packed for site assembly and installation.

6.3 The ladder cages shall be shipped assembled OR shipped unassembled for field assembly and installation.

Product System

7.0 Materials & Manufacturing Process

7.1 All fibreglass (FRP) items listed under this section shall be constructed from fibreglass reinforcement and resin of the quality necessary to meet the design requirements and dimensions as specified.

7.2 Fibreglass reinforcement shall be continuous roving and shall be in sufficient quantities as required for the application.

7.3 Resins shall be (refer to page 19) with chemical formulations as necessary to provide the corrosion resistance, strength and any other physical properties as required.

7.4 All finished surfaces are to be smooth, resin-rich free of voids and without dry spots, cracks reinforced areas and all fibreglass reinforced shall be well covered with resin to protect against exposure due to weather or wear.

7.5 All fibreglass (FRP) items shall be EITHER non-fire retardant OR have a tested flame spread rating of 25 or less when tested in accordance with the ASTM E-84 Tunnel Test.

7.6 All metallic accessories shall be manufactured from 316 Stainless Steel OR galvanized steel OR Monel. (OR refers to specific uncommon customer requests.)

7.7 The fibreglass reinforcement content shall be maintained at acceptable levels for a) pultruded items and b) SMC moulded items so as to ensure excellent resilience and performance over time.

7.8 All fibreglass material shall have an ultraviolet light inhibiting chemical additive to resist UV degradation.

7.9 Colour shall be any Treadwell standard colours (Safety Yellow, Light Grey or a custom color)

8.0 Fabrication & Workmanship

8.1 All cut or machined edges, holes and abrasions shall be sealed with a resin equivalent to the EX-Series® Resin System from which the ladder is constructed.

9.0 Installation

9.1 All FRP ladder sections shall be installed by others as shown on the approved shop drawings.

10.0 Acceptable Manufacturer

10.1 The fibreglass ladder system shall be manufactured by Treadwell Group Pty Ltd of Australia.

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EX-Series® Resin Systems

Options Overview

O-Series™ is an architectural grade Polyester Resin System with a moderate chemical resistance. O-Series is a good choice for commercial or light industrial applications, especially in areas where moisture is prevalent. O-Series is often utilized for public infrastructure applications were it has been proven to outperform tradition timber decking products.

I-Series™ is a premium Isopthalic Resin System. This system provides an intermediate level of chemical resistance and is the correct choice for areas subjected to splash and spill contact with harsh chemicals. This system is an excellent general-purpose resin and is a more favourably priced alternative to the vinyl ester system. This system has a flame spread of 25 or less.

V-Series™ Vinylester Resin System is a high quality and is the most chemical resistant system offered in the industry and has been developed for use in environments where fibreglass/FRP products are subject to frequent and direct contact with the harshest of chemicals: including a broad range of acids and caustics. This system has a flame spread of 25 or less.

P-Series™ Phenolic Resin System is a system designed specifically for use where fire resistance, low smoke and low toxic fumes are critical. P-Series is typically used in offshore applications and confines spaces where such criteria are an absolute necessity. This system is tested in accordance with ASTM E-84. Various products also conforming to US Coast Guard Approvals, Level 2 and 3, are also offered by Treadwell. This particular Resin System has a flame spread rating of 5 and a smoke density rating of 5.

Chemical Resistance Guide

Information contained in this guide is based on data collected from several years of actual industrial applications. Recommendations are based on conservative evaluations of the changes which occur in certain properties of replicate laminates after exposures of one year or longer, both in the laboratory and the field.

Temperatures are neither the minimum nor the maximum but represent standard test conditions (Room Temperature & 70˚C). The products may be suitable at higher temperatures but individual test data should be required to establish such suitability. Contact Treadwell for any special applications that you may have.

The recommendations (• : resistant: – :not resistant) contained in this specification sheet are made without guarantee or representation as to results. We suggest that you evaluate these recommendations and suggestions in your own laboratory oractual field trial prior to use. Our responsibility for claims arising from breach of warranty, negligence, or otherwise is limited to the purchase price of the material.

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Acetaldehyde	–	–	–	–
Acetic Acid 0-25%	•	•	•	•
Acetic Acid 25-50%	•	–	•	•
Acetic Anhydride	–	–	–	–
Acetone	–	–	–	–
Acrylonitrile	–	–	–	–
Alcohol, Butyl	–	–	•	–
Alcohol, Ethyl 10%	–	–	•	66
Alcohol, Ethyl 100%	–	–	•	–
Alcohol, Isopropyl 10%	–	–	•	66
Alcohol, Isopropyl 100%	–	–	•	–
Alcohol, Methyl 10%	–	–	•	66
Alcohol, Methyl 100%	–	–	–	–
Alcohol, Methyl Isobutyl	–	–	•	66
Alcohol, Secondary Butyl	–	–	•	66
Alum	•	•	•	•
Aluminium Chloride	•	•	•	•
Aluminium Hydroxide	•	–	•	49
Aluminium Nitrate				

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Aluminium Potassium Sulfate	•	•	•	•
Ammonia, Aqueous 0-10%	–	–	•	38
Ammonia, Gas	–	–	•	38
Ammonium Bicarbonate	•	–	•	49
Ammonium Bisulfite	–	–	•	49
Ammonium Carbonate	–	–	•	49
Ammonium Citrate	•	–	•	49
Ammonium Fluoride	–	–	•	49
Ammonium Hydroxide 5%	•	–	•	49
Ammonium Hydroxide 10%	•	–	•	49
Ammonium Hydroxide 20%	–	–	•	49
Ammonium Nitrate	•	•	•	49
Ammonium Persulfate	–	–	•	49
Ammonium Phosphate	–	–	•	49
Ammonium Sulfate	•	•	•	•
Arsenious Sulfate	•	–	•	•
O-Benzoyl Benzoic Acid	–	–	•	•
Barium Carbonate	•	–	•	•
Barium Chloride				

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Chemical Resistance Guide

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Barium Hydroxide	–	–	•	49
Barium Sulfate	•	•	•	•
Barium Sulfide	–	–	•	•
Beer	•	–	•	49
Benzene	–	–	–	–
5% Benzene in Kerosene	•	–	•	•
Benzene Sulfonic Acid	•	•	•	•
Benzoic Acid	•	–	•	•
Benzyl Alcohol	–	–	•	–
Benzyl Chloride	–	–	–	–
Brass Plating Solution:				
– 3% Copper Cyanide	–	–	•	•
– 6% Sodium Cyanide	–	–	•	•
– 1% Zinc Cyanide	–	–	•	•
– 3% Sodium Carbonate	–	–	•	•
Butyl Acetate	–	–	–	–
Butyric Acid 0-50%	•	–	•	•
Butylene Glycol	•	•	•	•
Cadmium Chloride	•	–	•	•
Cadmium Cyanide Plating Soln:				
– 3% Cadmium Oxide	–	–	•	49
– 6% Sodium Cyanide	–	–	•	49
– 1% Caustic Soda	–	–	•	49
Calcium Bisulfate	•	•	•	•
Calcium Carbonate	•	–	•	•
Calcium Chlorate	•	•	•	•
Calcium Chloride	•	•	•	•
Calcium Hydroxide	•	–	•	49
Calcium Hypochlorite	•	–	•	49
Calcium Nitrate	•	•	•	•
Calcium Sulfate	•	•	•	•
Calcium Sulfite	•	•	•	•
Caprylic Acid	•	–	•	•
Carbon Dioxide	•	•	•	•
Carbon Disulfide	–	–	–	–
Carbon Monoxide	•	•	•	•
Carbon Tetrachloride	–	–	•	38
Carbon Acid	•	–	•	•
Castor Oil	•	•	•	•
Carbon Methyl Cellulose	–	–	•	49
Chlorinated Wax	–	–	•	•
Chlorine Doixide/Air	•	–	•	•
Chlorine Dioxide, Wet Gas	–	–	•	•
Chlorine, Dry Gas	–	–	•	•
Chlorine, Wet Gas	–	–	•	•
Chlorine, Liquid	–	–	–	–

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Chlorine, Water	–	–	•	•
Chloroacetic Acid 0-50%	–	–	•	38
Chlorobenzene	–	–	–	–
Chloroform	–	–	–	–
Chlorosulfonic Acid	–	–	–	–
Chromic Acid 20%	–	–	•	49
Chromic Acid 30%	–	–	–	–
Chromium Sulfate	•	•	•	•
Citric Acid	•	•	•	•
Coconut Oil	•	–	•	•
Copper Chloride	•	•	•	•
Copper Cyanide	–	–	•	•
Copper Fluoride	–	–	•	•
Copper Nitrate	•	•	•	•
Copper Plating Solution:				
– Copper Cyanide	–	–	•	•
– 10.5% Copper	–	–	•	•
– 4% Copper Cyanide	–	–	•	•
– 6% Rochelle Salts	–	–	•	•
Copper Brite Plating:				
– Caustic Cyanide	–	–	•	38
Copper Plating Solution:				
– 45% Copper Fluorobrate	–	–	•	•
– 19% Copper Sulfate	–	–	•	•
– 8% Sulfuric Acid	–	–	•	•
Copper Matte Dipping Bath:				
– 30% Ferric Chloride	–	–	•	•
– 19% Hydrochloric	–	–	•	•
Copper Pickling Bath:				
– 10% Ferric Sulfate	–	–	•	•
– 10% Sulfuric Acid	–	–	•	•
Copper Sulfate	•	•	•	•
Corn Oil	•	–	•	•
Corn Starch-Slurry	•	–	•	•
Corn Sugar	•	–	•	•
Cottonseed Oil	•	–	•	•
Crude Oil, Sour	•	–	•	•
Crude Oil, Sweet	•	–	•	•
Cyclohexane	•	–	•	49
Detergents, Sulfonated	•	–	•	•
Di-Ammonium Phosphate	•	–	•	•
Dibromophenol	–	–	–	–
Dibutyl Ether	–	–	•	49
Dichloro Benzene	–	–	–	–
Dichloroethylene	–	–	–	–
Diesel Fuel	•	–	•	•

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Chemical Resistance Guide

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Diethylene Glycol	•	–	•	•
Dimenthyl Phthalate	–	–	•	•
Dioctyl Phthalate	–	–	•	•
Diprophylene Gylcol	•	–	•	•
Dodecyl Alcohol	–	–	•	•
Esters, Fatty Acids	•	•	•	•
Ethyl Acetate	–	–	–	–
Ethyl Benzene	–	–	–	–
Ethyl Ether	–	–	–	–
Ethylene Gylcol	•	•	•	•
Ethylene Dichloride	–	–	–	–
Fatty Acids	•	•	•	•
Ferric Chloride	•	•	•	•
Ferric Nitrate	•	•	•	•
Ferric Sulfate	•	•	•	•
Ferrous Chloride	•	•	•	•
Ferrous Nitrate	•	•	•	•
Ferrous Sulfate	•	•	•	•
8-8-8 Fertiliser	•	–	•	49
Fertiliser:				
– Urea Ammoium Nitrate	–	–	•	49
Fuel Gas	–	–	•	•
Fluoboric Acid	–	–	•	49
Fluosilicic Acid 0-20%	–	–	•	•
Formaldehyde	•	–	•	•
Formic Acid	•	–	•	•
Fuel Oil	•	–	•	•
Gas Natural	•	–	•	•
Gasoline, Auto	•	–	•	•
Gasoline, Aviation	•	–	•	•
Gasoline, Ethyl	•	–	•	•
Gluconic Acid	•	–	•	•
Gasoline, Sour	•	–	•	•
Glucose	•	•	•	•
Glycerine	•	•	•	•
Glycol, Ethylene	•	•	•	•
Glycol, Propylene	•	•	•	•
Glycolic Acid	•	–	•	•
Gold Plating Solution:				
– 63% Potassium Ferrocyanide	–	–	•	•
– 2% Potassium Gold Cyanide	–	–	•	•
– 8% Sodium Cyanide	–	–	•	•
Heptane	•	–	•	•
Hexane	•	–	•	•
Hexylene Glycol	•	•	•	•
Hydraulic Fluid	•	–	•	•

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Hydrobromic Acid 0-25%	•	–	•	•
Hydrochloric Acid 0-37%	•	–	•	•
Hydrocyanic Acid	•	–	•	•
Hydrofluoric Acid 10%	–	–	•	–
Hydrofluosilicic Acid, 10%	–	–	•	•
Hydrogen Bromide, Wet Gas	–	–	•	•
Hydrogen Chloride, Dry Gas	–	–	•	•
Hydrogen Chloride, Wet Gas	–	–	•	•
Hydrogen Peroxide	–	–	•	49
Hydrogen Sulfide, Dry	•	–	•	•
Hydrogen Sulfide, Aqueous	•	–	–	•
Hydrogen Fluoride, Vapour	–	–	•	•
Hydrosulfite Bleach	–	–	•	49
Hydrochlorus Acid 0-10%	–	–	–	–
Iron Plating Solution:				
– 45% Fecl: 15% Cacl	–	–	•	•
– 20% Fecl: 11% (Nh4)2 So4	–	–	•	•
Iron And Steel Claeaning Bath:				
–9% Hydrochloric: 23% Sulfuric	–	–	•	•
Isopropyl Amine	–	–	•	38
Isopropyl Palmitate	•	•	•	•
Jet Fuel	•	–	•	•
Kerosene	•	–	•	•
Lactic Acid	•	–	•	•
Lauroryl Chloride	–	–	•	•
Lauric Acid	•	–	•	•
Lead Acetate	•	–	•	•
Lead Chloride	•	–	•	•
Lead Nitrate	•	–	•	•
Lead Plating Solution:				
–.8% Fluoboric, 0.4% Boric Acid	–	–	•	•
Levulinic Acid	•	–	•	•
Linseed Oil	•	•	•	•
Lithium Bromide	•	•	•	•
Lithium Sulfate	•	•	•	•
Magnesium Bisulfite	•	–	•	•
Magnesium Carbonate	•	–	•	•
Magnesium Chloride	•	•	•	•
Magnesium Hydroxide	–	–	•	60
Magnesium Nitrate	•	–	•	•
Magnesium Sulfate	•	•	•	•
Maleic Acid	•	•	•	•
Mercuric Chloride	•	–	•	•
Mercurous Chloride	•	–	•	•
Methylene Chloride	–	–	–	–
Methyl Ethyl Ketone	–	–	–	–

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Chemical Resistance Guide

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Methyl Isobutyl Carbitol	–	–	–	–
Methanol (See Alcohol)	•	–	•	•
Methyl Isobutyl Ketone	–	–	–	–
Methyl Styrene	–	–	–	–
Mineral Oils	•	•	•	•
Molybdenum Disulfide	•	–	•	•
Monochloro Acetic Acid	–	–	–	–
Monoethyanolamine	–	–	–	–
Motor Oil	•	•	•	•
Myristic Acid	–	–	•	•
Naptha	•	•	•	•
Napthalene	•	–	•	•
Nickel Chloride	•	•	•	•
Nickel Nitrate	•	•	•	•
Nickel Plating:				
– 8% Lead, 0.8% Flouboric Acid	–	–	•	•
– 0.4% Boric Acid	–	–	•	•
Nickel Plating:				
– 11% Nickel Sulfate	•	–	•	•
– 2% Nickel Chloride	•	–	•	•
– 1% Boric Acid	•	–	•	•
Nickel Plating:				
– 44% Nickel Sulfate	•	–	•	•
– 4% Ammonium Chloride	•	–	•	•
– 4% Boric Acid	•	–	•	•
Nickel Sulfate	•	•	•	•
Nitric Acid 0-5%	•	•	•	•
Nitric Acid 20%	–	–	•	49
Nitric Acid Fumes	–	–	–	–
Nibrobenzene	–	–	–	–
Octanoci Acid	•	–	•	•
Oil, Sour Crude	•	•	•	•
Oil, Sweet Crude	•	•	•	•
Oleic Acid	•	•	•	•
Oleum (Fuming Sulfuric)	–	–	–	–
Olive Oil	•	•	•	•
Oxalic Acid	•	•	•	•
Peroxide Bleach:				
– 25% Peroxide 95%	•	•	•	•
– 0.025% Epsom Salts	•	•	•	•
– 5% Sodium Silicate 42.Be	•	•	•	•
– 1.4% Sulfuric Acid 66.Be	•	•	•	•
Phenol	–	–	–	–
Phenol Sulfonic Acid	–	–	–	–
Phosphoric Acid	•	•	•	•
Phosphoric Acid Fumes	•	•	•	•

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Phosphorous Pentoxide	•	•	•	•
Phosphorous Trichloride	–	–	–	–
Phthalic Acid	•	•	•	•
Pickling Acids (Sulfuric & Hydrochloric)	•	•	•	•
Picric Acid, Alcoholic	–	–	–	–
Polyvinyl Acetate Latex	•	–	•	•
Polyvinyl Alcohol	•	–	•	38
Polyvinyl Chloride Latex W/35 (Parts Dop)	–	–	•	49
Potassium Aluminium Sulfate	•	•	•	•
Potassium Bicarbonate	•	–	•	60
Potassium Bromide	•	–	•	38
Potassium Carbonate	•	–	•	60
Potassium Chloride	•	•	•	•
Potassium Dichromate	•	–	•	60
Potassium Ferricyanide	•	•	•	•
Potassium Ferrocyanide	•	•	•	•
Potassium Hydroxide	–	–	•	66
Potassium Nitrate	•	•	•	•
Potassium Permanganate	•	–	•	60
Potassium Persulfate	•	–	•	•
Potassium Sulfate	•	•	•	•
Propionic Acid 1-50%	–	–	•	49
Propionic Acid 50-100%	–	–	–	–
Propylene Glycol	•	•	•	•
Pulp Paper Mill Effluent	•	–	•	•
Pyridine	–	–	–	–
Salicylic Acid	–	–	•	60
Sebacic Acid	–	–	•	•
Selenious Acid	–	–	•	•
Silver Nitrate	•	•	•	•
Silver Plating Solution:				
– 44% Silver Cyanide	–	–	•	•
– 7% Potassium Cyanide	–	–	•	•
– 5% Sodium Cyanide	–	–	•	•
– 2% Potassium Carbonate	–	–	•	•
Soaps	•	–	•	•
Sodium Acetate	•	–	•	•
Sodium Benzoate	•	–	•	•
Sodium Bicarbonate	•	•	•	•
Sodium Bifluoride	•	–	•	49
Sodium Bisulfate	•	•	•	•
Sodium Bisulfite	•	•	•	•
Sodium Bromate	•	•	•	60
Sodium Bromide	•	•	•	•
Sodium Carbonate 0-25%	•	–	•	•

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Chemical Resistance Guide

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Sodium Chlorate	•	–	•	•
Sodium Chloride	•	•	•	•
Sodium Chlorite	•	–	•	•
Sodium Chromite	•	•	•	•
Sodium Cyanide	•	–	•	•
Sodium Dichromate	•	•	•	•
Sodium Di-Phosphate	•	•	•	•
Sodium Ferricyanide	•	•	•	•
Sodium Fluoride	•	–	•	49
Sodium Fluoro Silicate	–	–	•	49
Sodium Hexametaphosphates	–	–	•	38
Sodium Hydroxide 0-5%	–	–	•	66
Sodium Hydroxide 5-25%	–	–	•	66
Sodium Hydroxide 50%	–	–	•	66
Sodium Hydrosulfide	•	–	•	•
Sodium Hypochlorite	•	–	•	66
Sodium Lauryl Sulfate	•	•	•	•
Sodium Mono-Phosphate	•	•	•	•
Sodium Nitrate	•	•	•	•
Sodium Silicate	•	–	•	•
Sodium Sulfate	•	•	•	•
Sodium Sulfide	•	–	•	•
Sodium Sulfite	•	–	•	•
Sodium Tetra Borate	•	•	•	•
Sodium Thiocyanate	–	–	•	•
Sodium Thiosulfate	•	–	•	•
Sodium Tripolyphosphate	•	–	•	•
Sodium Xylene Sulfonate	•	–	•	•
Sodium Solutions	•	–	•	•
Sodium Crude Oil	•	•	•	•
Soya Oil	•	•	•	•
Stannic Chloride	•	•	•	•
Stannous Chloride	•	•	•	•
Stearic Acid	•	•	•	•
Styrene	–	–	–	–
Sugar, Beet And Cane Liquor	•	–	•	•
Sugar, Sucrose	•	•	•	•
Sulfamic Acid	•	–	•	•
Sulfanilic Acid	•	–	•	•
Sulfated Detergents	•	–	•	•
Sulfur Dioxide, Dry Or Wet	–	–	•	•
Sulfur Trioxide/Air	–	–	•	•
Sulfuric Acid 0-30%	•	•	•	•
Sulfuric Acid 30-50%	–	–	•	•
Sulfuric Acid 50-70%	–	–	•	49
Sulfurous Acid	–	–	•	38

Chemical	I-Series		V-Series	
	Room Temp	70°C	Room Temp	70°C
Superphosphoric Acid (76% P2 05)	•	–	•	•
Tall Oil	•	–	•	60
Tannic Acid	•	–	•	66
Tartaric Acid	•	•	•	•
Thionyl Chloride	–	–	–	–
Tin Plating:				
– 18% Stannous Fluorborate	–	–	•	•
– 7% Tin	–	–	•	•
– 9% Fluoroboric Acid	–	–	•	•
– 2% Boric Acid	–	–	•	•
Toluene	–	–	–	–
Toluene Sulfonic Acid	–	–	•	•
Transformer Oils:				
– Mineral Oil Types	•	•	•	•
– Chloro-Phenyl Types)	•	•	•	•
Trichlor Acetic Acid	•	–	•	•
Trichlorethylene	–	–	–	–
Trichloropenol	–	–	–	–
Tricresyl Phosphate	–	–	•	49
Tridecylbenzene Sulfonate	•	–	•	•
Trisodium Phosphate	•	–	•	•
Turpentine	–	–	•	38
Urea	–	–	•	38
Vegetable Oils	•	•	•	•
Vinegar	•	•	•	•
Vinyl Acetate	–	–	–	–
Water:				
– Deionised	–	–	–	–
– Demineralised	•	•	•	•
– Distilled	•	•	•	•
– Fresh	•	•	•	•
– Salt	•	•	•	•
– Sea	•	•	•	•
White Liquor (Pulp Mill)	•	–	•	•
Xylene	–	–	–	–
Zinc Chlorate	•	•	•	•
Zinc Nitrate	•	•	•	•
Zinc Plating Solution:				
– 9% Zinc Cyanide	–	–	•	49
– 4% Sodium Cyanide	–	–	•	49
–9% Sodium Hydroxide	–	–	•	49
Zinc Plating Solution:				
– (49% Zinc Fluoroborate	•	–	•	•
– 5% Ammonium Chloride	•	–	•	•
– 6% Ammonium Fluoroborate	•	–	•	•
Zinc Sulfate	•	•	•	•

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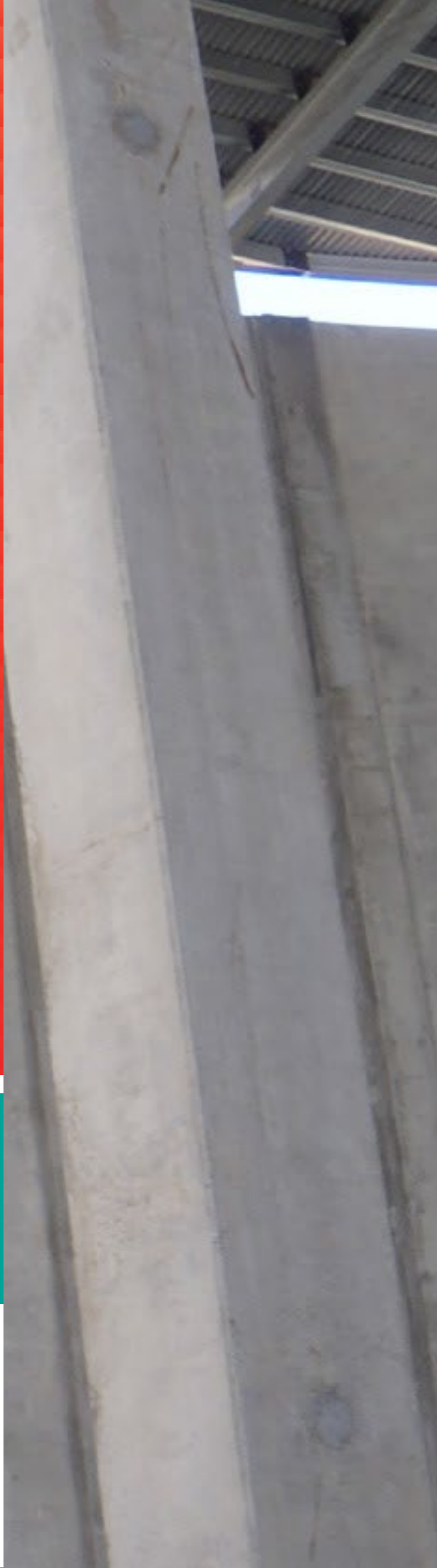

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