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Handling and Installation Instructions for Fiberglass Reinforced Plastic Products

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I. Introduction

This document is intended as a useful guide for Industrial Linings, Inc. customers. Failure to comply with the provisions herein shall invalidate any warranty.

These handling and installation instructions are offered as general and typical guidelines only. All safety precautions and handling methods utilized are the responsibility of the customer and the “rigging” company employed by the customer.

The customer is fully responsible for the proper inspection, handling and installation of the fiberglass reinforced plastic (FRP) product. The customer accepts all liability for loss of or damage to the tank or contents resulting from improper handling and/or installation. Any unknown situation of condition not covered in this document must be the responsibility of the customer. The presence of an Industrial Linings, Inc. representative at the installation site does not relieve the customer of their responsibility for proper handling and installation procedures.

The customer is responsible for contracting and determining the capabilities of any and all “rigging” companies employed/contracted by them.

II. Inspection

All Industrial Linings, Inc. fiberglass reinforced plastic (FRP) products are inspected prior to shipment, but should be re-inspected by the customer immediately upon receipt and before any attempt is made to unload the product.

Checklist for external visual inspection:

- a. Check for loose banding, broken boxes, containers, shipping crates, chocks, and bulkheads, ect.
- b. Check the load for any sign of breakage or abrasion
- c. Check the ends, top, sides and any protruding parts (nozzles, lugs, ect.)
- d. Check the widest part of load
- e. Check the shipping cradles for any sign they may have moves
- f. Check the strapping for any sign the load may have shifted

Due to the flexibility of fiberglass reinforced plastic (FRP) products, there could be internal damage caused by impact without any apparent external damage. **It is essential that an internal inspection be performed.**

Checklist for internal visual inspection:

- a. Check for star-shaped cracks, fractures or breaks in the interior resin rich surface
- b. Check for damage around the nozzles and all internal components

III. Entrance Precautions for Fiberglass Reinforced Plastic (FRP) Products

When entering the interior of any fiberglass reinforced plastic (FRP) product for inspection, special care must be taken not to damage the interior surface.

Precautions for inspection entrance:

- a. Remove all foreign objects (dirt, pebbles, ect.) from the product so not to scratch the interior surface
- b. Wear soft-soled shoes
- c. If needed, use a ladder with padded feet, do not rest the ladder on any internal components
- d. Do not drop or bang objects against the product
- e. Make sure any area that may flex is not resting against any sharp object
- f. Do not use any component (internal or external) for climbing purposes, unless specially designed for that purpose

If there is damage to the interior surface, it is essential that the surface be repaired prior to placing the product into service.

Industrial Linings, Inc. must be promptly notified of any damage, prior to the delivery personnel departing from your facility.

IV. General Handling

Handling fiberglass reinforced plastic (FRP) products can be done relatively easy and without incurring any damage if a few simple precautions are observed. Industrial Linings, Inc. fiberglass reinforced plastic (FRP) products are designed and manufactured to withstand normal handling required to ship the product to its destination, moving the equipment into final site location, installation and placed into service. Minimal movement and/or storage times are preferred and recommended for all of our FRP products. Long-term storage (more than 30 days once delivered) could result in damage and/or distortion, which is the responsibility of others.

Normal handling procedures and practices:

- a. Proper rigging should be observed at all times. Hoisting equipment operators should attach a guide line to prevent the product from swinging without control and striking another object
- b. Do not drop the product
- c. Do not roll or slide the product on rough surfaces or gravel and never roll over a fitting
- d. Under no conditions should chains or cables be put around the product
- e. Do not lift by using any fittings

V. Handling Vertical Tanks

Small tanks are normally shipped upright and are crated or on skids to prevent the bottom of the tank from being damaged. These tanks can be moved or lifted with sufficient manpower because of their lightweight. Where a forklift is needed, care should be taken to prevent the points of the forks from damaging the tank.

Dished bottom or conical bottom tanks with integral legs are shipped upright whenever clearance dimensions permit. They may be slid on their legs only when a welded frame stand is provided. When using a forklift to move this type of tank, the forks should go under the tank and should be spread apart to lift out near the legs so the tank bottom and fittings are not damaged.

Where rigging equipment is needed to lift tanks into place, a spreader bar must be used with (2) eyebolts attached to the flange so the tank is not bent out-of-round.

VI. Handling Horizontal Tanks

Horizontal tanks are shipped either on tank support saddles or shipping cradles. When a tank is shipped inside a truck the shipping cradles or tank support saddles are fastened to runners and banded as a unit so it may be slid from the truck. If a forklift is used, make certain the forks are long enough so the points will not dig into the tank wall, and use padding where necessary.

Larger tanks are shipped either by rail or flat bed truck and strapped down. It is recommended to lift these type tanks with slings and a spreader bar. Place the slings to balance the load and use a guideline to keep the load under control. Use nylon slings or rope with a minimum diameter of 1". If the tank is over 30' in length, and depending upon its weight, it may be necessary to use (2) lifting cranes with single or double slings since a spreader bar may be impractical.

VII. Installing Flat Bottom Vertical Tanks

Flat bottom vertical tanks must be installed on a foundation that provides firm and continuous support over the entire bottom. The foundation must be able to support the weight of the tank under normal operating conditions without any deflection or sagging.

VIII. Installing Dished Bottom Vertical Tanks

Dished bottom or conical bottom tanks must be installed with the weight of the tank under normal operating conditions evenly supported on all of the legs or mounting lugs. These tanks **must** be positively vented to the atmosphere at all times, unless specific pressure limits have been agreed upon and stenciled on the tank.

IX. Installing Above Ground Horizontal Tanks

Horizontal tanks must be installed on a foundation that provides firm and continuous support over the entire bottom. The foundation must be able to support the weight of the tank under normal operating conditions without any deflection or sagging.

X. Precautions

Raised face flanges

Only full flat face metal flanges should be purchased when bolting to fiberglass reinforced plastic flanges. Where existing metal flanges have raised faces, spacers should be added to insure full-face contact and prevent overstressing the FRP flange.

Vibration

Vibration stresses can cause damage to piping if it is excessive and uncontrolled. In most cases, low amplitude vibrating motions caused by pumps will have little effect on FRP because it is absorbed by the relatively low modulus of the FRP pipe. Large amplitude vibration should be dampened before it

reaches the FRP pipe. Bellows type expansion joints can be used to stop vibrations from carrying over to FRP piping.

Abrasive fluids

Abrasion may occur in piping conveying liquids containing particulate matter. The amount of abrasion depends upon the fluid in the line and fluid velocity, but will generally be accelerated at changes in direction such as elbows, laterals, tees, etc. When necessary, pipe should have added interior thickness for abrasive service. Also, abrasion resistant additives may be incorporated into the resins. Special care must be taken in areas where high velocities are created by restrictions such as butterfly valves, etc., to prevent pipe erosion.

Exterior abrasion

Where FRP pipe moves on supports due to thermal strain or vibration, abrasion may result. Bonding a steel or FRP saddle to the pipe to insure that any abrasive damage does not weaken the pipe itself should reinforce these areas. A tie-down anchor is recommended where continuous vibration is encountered and rigid support is desired.

Steam

The occurrence of steam in FRP pipe should be avoided. High-pressure steam temperature can weaken the pipe interior reducing the pipe's strength and chemical resistance.