

COMPLETE APPLICATION
GUIDE INSIDE

REVIEW S2S
CASE STUDIES

S2S PRODUCT
TESTING RESULTS

S2S[®] PRODUCT GUIDE

S2S FLOAT COAT

THE ULTIMATE SOLUTION TO
TREATING CONFINED SPACES

S2S PLID WRAP

ELIMINATE CORROSION ON PIPES, FLANGES
AND CONNECTORS WITH ONE EASY STEP

DIELECTRIC
SUPER
STRENGTH

40020 VOLTS MAKES S2S
SAFE FOR ALL ELECTRICAL



SHIP 2 SHORE[®]
CORROSION PREVENTIVE COATINGS

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Company History

In 1985, Terry Lainge started Liquid Corrosion Control, a service applying inhibitors for the Marine industry in the Pacific Northwest. As an applicator, Terry became frustrated with the quality and longevity of the products available in the market.

During a chance meeting at a convention, Terry met the lead chemist for the company he was sourcing his products from. He teamed up with the chemist and subsequently developed his own superior inhibitors, which increased the success and longevity of his applications, including his float coat technique.



In December 2016, in his 80's, Terry could no longer handle the physical demands of the application business and decided it was time to retire.

Since acquiring the business in 2016, we have been focused on manufacturing and sales of the products and have found major distribution worldwide.

The products are all manufactured in an award winning ISO 9001 certified facility with rail access, allowing us to ship worldwide.



Terry continued to work as an applicator until his retirement in 2016. Throughout his career, his main goal was his customers' satisfaction. Terry never wanted to be in the chemical distribution business and continued to apply the products until he retired.

Over the years, through word of mouth, demand for Terry's products grew internationally. When he was free from his application business, Terry would make extra products and ship them out.



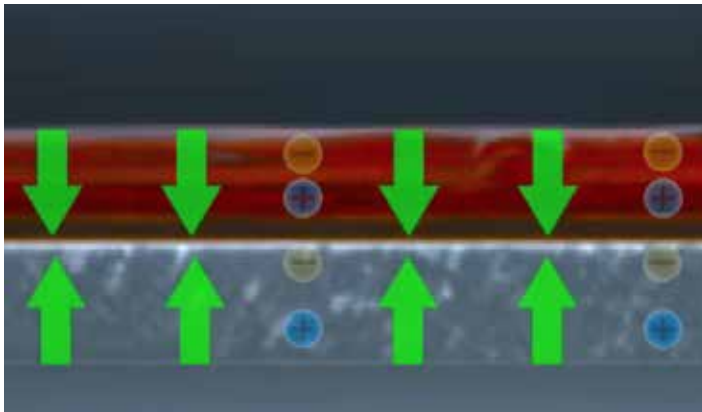
S2S How it works

S2S wet films are all from the same PLID family & work the same way. PLID is an acronym for...

Penetrant
Lubricant
Inhibit Rust
Dielectric

S2S products work by polar bonding to the metal, displacing oxygen and water, forming an even, dripless dielectric barrier over the metal.

The products are all self-healing and will remain wet on the metal. You cannot paint over the products, however you can apply over paint.

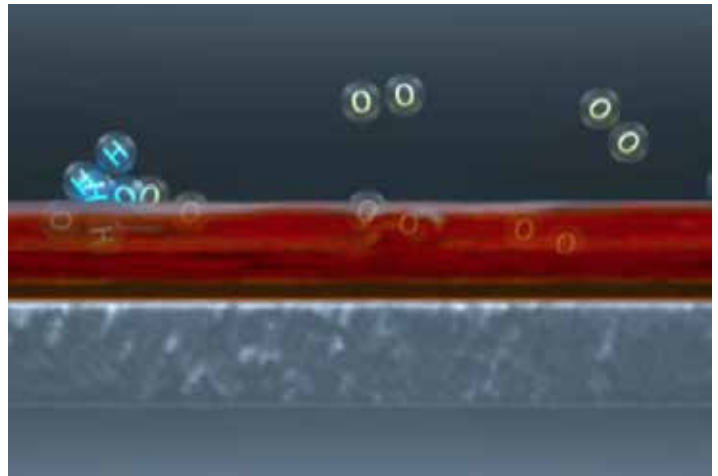


S2S products polar bond to metal, forming an even, dripless, self-healing layer.

The only way to remove the product, is to break the polar bond with a high PH soap.

Applying our products is simple. No surface preparation is required, also no training or certification is needed.

If the metal has a visible wet coating, the product is on and is working. It is either on and working or gone and no longer working.



S2S PLID products displace oxygen and water to form a dielectric barrier, protecting the metal from rust and corrosion.

The differences between the products is their thickness; the thicker the product, the longer it will last, the better lubricant it will be.

Thinner products have better dielectric and penetration capabilities.

Thicker versions also have less coverage and cost more for an initial application but are much more economical over the long term.

All products are non-toxic and non-hazardous. All products use kerosene as a solvent, which quickly flashes off after application. The warning symbols listed on the labels refer to the small percentage of kerosene contained in the products. Gloves are recommended during application.

S2S PLID THIN FILM



S2S PLID Thin Film is perfect for removing rusted bolts and freeing seized gears & valves.
It is great for electronics and penetrates the core of steel rope & wire.
1 gallon covers 280 square feet.

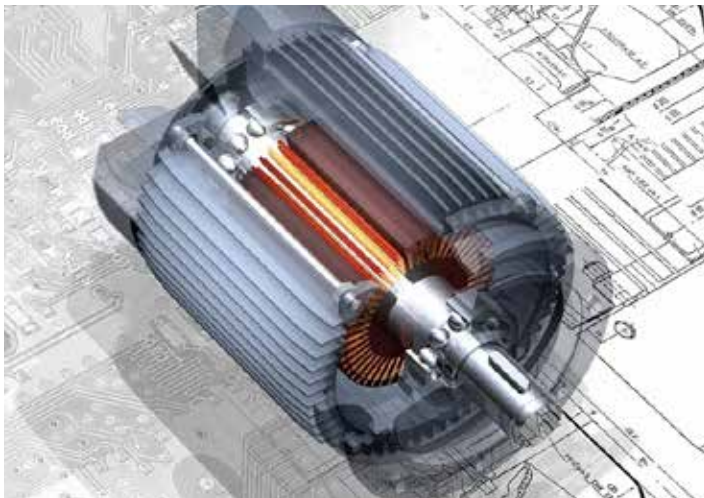


The Best Anti-Corrosion, Anti-Seize Lubricant & Penetrant

S2S PLID Thin Film provides high performance protection from water and corrosive contaminants.

Advanced Thin Film Technology

- Penetrates existing rust and corrosion.
- Shuts down rust cells and halts electrolysis.
- Displaces moisture.
- Provides protection from water and corrosive contaminants.
- Works as a liquid descaler.
- Strong electromagnetic attraction to metals, like a magnet to steel, ensures adhesion long after other products disappear. Dielectric to 40,000 volts.
- Safe and effective for electronics, radios, circuit boards, electric motors, etc.



Keep motors, switches and machinery lubricated and rust free.

Use on integrated and printed circuit boards, conductors, connectors, contacts, electric connections, electric motors, wires, fasteners, screws, nuts and bolts, etc.



Coated with S2S PLID Aerosol Thin Film.

Electronics - Avoid Replacement Parts & Service Costs

A significant cause of electric component failure is corrosion.

Corrosion in electronic components is insidious and cannot be readily detected. When corrosion failure occurs, it is often dismissed as just a failure and the part or component is replaced. The most common reasons for corrosion-related failure are atmospheric humidity and environmental contaminants.



Penetrates existing rust and corrosion. Keeps bolts lubricated and rust free.

PLID Thin Film TDS

Introduction

Made for Industry, S2S PLID Thin Film is the ultimate penetrant. It seeps beneath the surface of metal providing superior corrosion protection with high dielectric strength.

Applications

S2S PLID Thin Film can be used on steel, steel alloy, stainless steel, galvanized, aluminum, tin, iron and copper. It has excellent adhesion to metal surfaces and resists splash, spray and complete submersion. PLID Thin Film shuts down corrosion and electrolysis and has a dielectric strength of 40,000 volts. It can be applied to materials from -35°C to 150°C.

Performance Data

Physical State:	Liquid
Colour:	Dark Orange
Odour:	Fresh Scent
Specific Gravity @15.6°C:	0.908
Viscosity @40°C, cSt:	33
Flash Point (COC), °C:	159
Fire Point, °C:	171
Pour Point, °C:	-21
Vapor Pressure:	8mm Hg at 25°C
Evaporation Rate:	TBD
Water Solubility:	TBD

Available Package Sizes

- Aerosol 180 g; box of 12
- 20 litre pail (5 gal)
- 205 litre drum (55 gal)

S2S INDUSTRIAL THICK FILM



S2S PLID Industrial Thick Film is perfect for protecting metal in moderate environments. 1 gallon covers 150 square feet.



Long Lasting Moisture & Corrosion Protection

For 30 years, S2S Industrial Thick Film has prevented rust on vessels, equipment, wire rope and chain throughout the Pacific Northwest, earning a deserved reputation

- Forms a penetrating, dynamic and non-hardening, dripless, self-healing film.
- Unique electromagnetic adhesion, like a magnet to steel, resists splash, spray and complete submersion.
- Protection from moisture, humidity and submersion. Displaces moisture and can be applied to damp surfaces.
- Shuts down rust cells and stops electrolysis. Penetrates and lubricates.
- Unlimited shelf life.
- Dielectric to 8920 volts – low conductivity. Safe for electronics and electric connections.
- Not a sealant. No silicone, wax, tar or lanolin.
- Apply with sprayer, roller, brush or mop. Coverage: 20 litres covers 750 square feet at 2 ml thickness.
- Recommended coverage: 2 to 5 ml. More aggressive environments and where regular submersion occurs, 5 to 10 ml.
- Environment and User friendly: contains 4 to 5% solvent that “flashes off” when cured. Rated low health hazard, low fire hazard, not hazardous to fish in moderate to low concentrations (96-h LC50 Bioassay), cleans up with soap and water.



S2S Industrial Thick Film applied in 1991. Picture taken June 2014. New metal is 100% rust free; new welds are still shiny, old metal is rust stained but rust is stopped 100% for 25 years.

S2S Industrial Thick Film is ideal for protection in moderate conditions. It achieved 300 hours in a salt spray test however, we have many case studies showing the product still holds up after 2 decades in real world applications. With a dielectric rating of 8920 volts, Industrial Thick Film is an ideal choice for most electrical and electronics needing corrosion protection. Use on metal, anchor chains, or even in bearings exposed to corrosive environments. S2S Industrial is certified food safe for operations below the belt line.



S2S Industrial Thick Film is protecting the Space Shuttle at Kennedy Space Center

PLID Industrial Thick Film TDS

Introduction

Made for Industry, S2S Industrial Thick Film has been used in the Pacific Northwest with proven success for over 30 years as the ultimate in moisture and anti-corrosion protection.

Applications

S2S PLID Industrial Thick Film is a corrosion inhibitor, penetrant, marine lubricant for ferrous and non-ferrous metals. It has excellent adhesion to metal surfaces and resists splash, spray and complete submersion. S2S Industrial Thick Film shuts down corrosion and electrolysis and has a dielectric strength of 9800 volts. It will adhere to materials from -35°C to 55°C and shows no signs of product breakdown or separation up to 120°C.

Performance Data

Physical State:	Thixotropic
Colour:	Orange Red
Odour:	Fresh Scent
Specific Gravity @15.6°C:	0.901
Viscosity @25°C, cP:	18,000
Flash Point (COC), °C:	60
Fire Point, °C:	145
Pour Point, °C:	-9
Evaporation Rate:	TBD
Water Solubility:	TBD

Available Package Sizes

- Aerosol 180 g; box of 12
- 20 litre pail (5 gal)
- 205 litre drum (55 gal)

S2S PLID HD



S2S PLID Heavy Duty (HD) is perfect for protecting metal in harsh environments.
1 gallon covers 85 square feet.



The Ultimate Inhibitor & Lubricant for Extreme Environments

- Displaces moisture.
- Adheres like a magnet to steel.
- Penetrates existing rust and corrosion.
- Shuts down corrosion and electrolysis.
- Resists splash, spray and submersion.
- High pressure lubricant.
- Forms a dynamic, self-healing, non-hardening and dripless film.

S2S HD is the thickest, longest lasting formula in the PLID product line. After 1000 hours in the ASTM B117-18 salt spray test, S2S HD remained intact with fresh metal under the thick coating. HD is recommended in harsh environments or when you simply want to coat an area and have it protected for decades.



S2S HD on a barge in an extreme environment. The area with HD has no rust and could not even be removed with a 5000psi pressure washer. (A high pH soap would break the bond and remove the product).



After 1000 hours in a salt spray chamber. The metal under the HD coating is unaffected.



PLID HD TDS

Introduction

Made for Industry, the extra thick PLID HD was formulated for use in the most extreme environments for long lasting protection against moisture and corrosion.

Applications

S2S PLID HD is a corrosion inhibitor, penetrant, marine lubricant for ferrous and non-ferrous metals. It has excellent adhesion to metal surfaces and resists splash, spray and complete submersion. S2S HD will adhere to materials from -35°C to 55°C and shows no signs of product breakdown or separation up to 120°C.

Performance Data

Physical State:	Liquid
Colour:	Dark orange
Density:	0.90 kg/L
Viscosity at 25°C, cP:	Not available
Flash Point (COC):	78 °C
Fire Point:	Not available
Pour Point:	-9°C
Evaporation Rate:	← 1
Water Solubility:	Slightly emulsifiable

Available Package Sizes

- 20 litre pail (5 gal)
- 205 litre drum (55 gal)



S2S PLID FLOAT COAT



S2S Float Coat is designed for applications in confined spaces.
1 gallon covers 200 square feet.

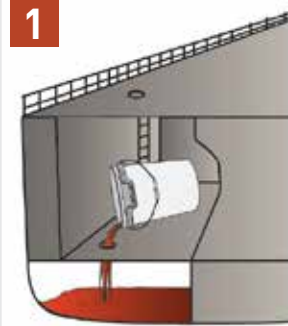


S2S Float Coat is a long lasting, cost effective solution for combating corrosion in tight & confined spaces

S2S Float Coat was specially designed to meet the following criteria:

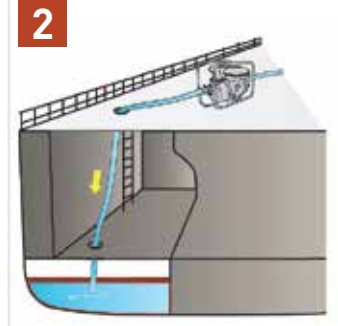
1. It floats on top of water (forming a continuous layer on the surface), polar bonds to metal it comes into contact with and displaces water and oxygen.
2. It surpassed the US Navy Mil Spec 16713 salt spray test requirements (323 hours) by lasting 500 hours in a salt spray chamber. This success can be attributed to S2S Float Coat's ideal viscosity; it is thin enough to float in a continuous layer on the water yet thick enough to protect metal from rust for a lengthy period of time.
3. Its water discharge meets the environmentally strict standards set by the state of California, which means that 90% of the discharge from an S2S float coat can be safely pumped into the ocean. The final 10% should be recovered and disposed of in accordance with local regulations.

How it works



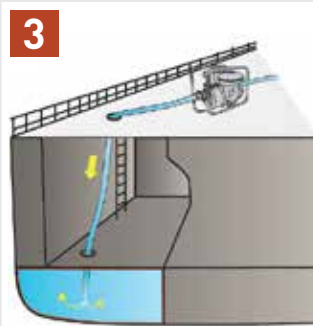
Measure & pour S2S float coat

Calculate product requirement: Each gallon will coat 200 sq feet. Add 20% to final calculation. A pail coats 1000 sq feet; a drum coats 10,000 sq feet.



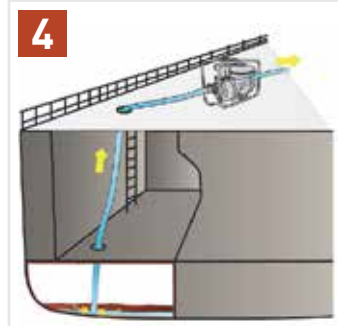
Gently & slowly pump in water

Place pump hose at floor of tank and slowly fill with water. Note: S2S Float Coat is lighter than water and will float on top and polar bond to the metal as it rises.



Fill void area to the top of space

When the water and Float Coat reach the top, turn off the pump and let the water settle for 24 hours. This will allow the Float Coat to clearly separate from the water.



Gently & slowly pump water out

Slowly pump the water out from the bottom. Use a screen to filter out rust flakes. The last portion of the water should be recaptured so the product is not pumped into ocean.

S2S PLID WRAP



S2S PLID Wrap is perfect for protecting pipes, flanges, valves & fittings in a simple, one step application. S2S PLID Wrap is infused with S2S HD, our strongest formula.



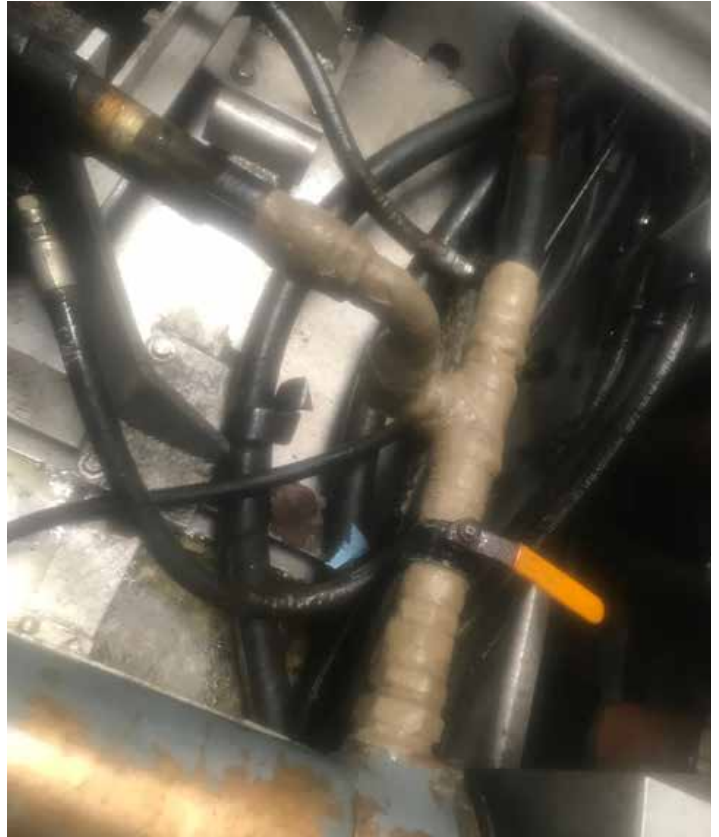
Introducing S2S PLID Wrap

S2S PLID Wrap is a wax based woven fabric infused with S2S HD. There are other petrol wraps on the market, but they do not have a rust inhibitor in the tape. As a result, they involve a 2-step application process that requires applying a grease with gloves followed by the tape.

S2S PLID Wrap is a one-step application as the inhibitor is infused into the wrap. Other wraps are saggy and difficult to use. S2S PLID Wrap bonds to the metal surface like a magnet to steel, eliminating sags and air gaps that can fill with moisture and, in the case of submersion, saltwater.

S2S PLID Wrap can be over wrapped in colored vinyl tape or a paintable tape for color coding pipes.

S2S PLID Wrap can be custom cut from 2 inches up to 36 inches in quantity.



S2S PLID Wrap on Hydraulic lines on a US Navy amphibious vehicle. Notice how the Wrap conforms (through polar bonding) to the metal with no sagging or gaps like all other wraps are prone to do.



S2S PLID Wrap after 1000 hours in a Salt Spray test chamber. No corrosion where the Wrap covered the pipe.

S2S PLID Wrap works on Hydraulic fittings, pipe, valves, flanges and is even used as patches over problem areas in vessels.

Application Guide

Personal Protection Equipment

Organic vapor respirator cartridge, Tyvek suit, non-slip oil resistant gloves, safety glasses or protective eyewear, work boots.



Application Equipment



Roller

- Use a good quality foam roller.
- For best results, apply when temperatures are between 37° - 15°C (100° - 60°F).
- Can be used with 5-gallon pail.
- A simple, inexpensive application option but time consuming over large areas.



Airless Sprayer

- Airless Sprayer must be able to flow at least 1 gallon per minute.
- Airless tips can range from a 315 - 521, based on temperature.
- For best results, apply when temperatures are between 37° - 15°C (100° - 60°F).
- When temperatures are below 15° - 4°C (60° - 40°F), a bigger pump will be needed. We recommend using a 30:1, with a hopper field, and a 3/8" hose no longer than 75m (225'), with a 1 m (3') whip line at 6 mm (1/4"). Tip size will need to be 317-521.
- In colder temperatures, band heaters must be used, with insulated lines.
- Pump pressure should never go over 60 or 3000 psi in the lines.



Pressure Pot

(Recommended for spraying S2S HD)

- Must have a working pressure of 20-40 psi.
- When temperatures are between 37° - 21°C

(100° - 70°F), use 20 psi in up flow or bottom feed pot, with a 15 m (50') hose. Spray guns with D or E setups or 64 66 with air caps that match with same air atomizing air pressure will result in a uniform spray pattern.

- When temperatures are between 21° - 10°C (70° - 50°F), use 40 psi.
- When temperatures are below 10°C (50°F) bottom feed pot will need to be used. For best results, never use more than 60 psi or air bubbles will result.
- In temperatures below 5°C (42°F), heaters will need to be used in order to obtain adequate flow.

Preparation

- Before spraying, remove all debris, dirt, moisture, soap and degreaser.

Spraying

- In order to minimize overspray, always have the nozzle of the gun at a 90° angle.
- To reach desired thickness, make 2 - 3 passes.
- Ideal coat is 250 - 400 microns (10 - 16mm) thick.

Clean up

- Pour all remaining HD back into container and cover.
- Use warm water and soap to thoroughly clean spray equipment.
- If spray equipment will be used for another application of S2S products, a thorough cleaning of the lines is not necessary. However, if spray equipment will be going into storage, clean thoroughly and allow soapy water to remain in lines in order to avoid clogging.

Removal of S2S Wet Films

- Use high PH soap to break the polar bond.
- Pressure washer without use of High PH soap will not remove the products.

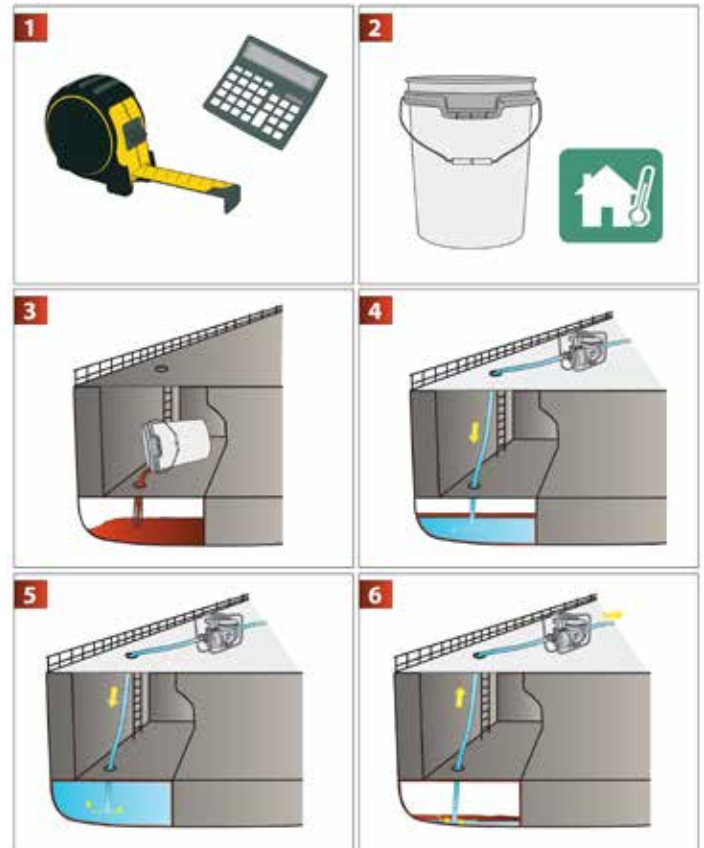
General Application Procedure

- Use PLID Thin film on all cracks, welds and bolts before general application, for deep penetration.
- Choose S2S PLID HD or S2S PLID Industrial for overall application, depending on the environment.
- If there is heavy scaling, apply S2S PLID Thin liberally over the scales and after 2 weeks they should fall off, then re-apply over the area with S2S PLID HD.
- Apply thicker coat over known problem areas and bottom quarter of interior hull walls.
- When coating extremely old, porous metal, double up on the coating thickness. S2S has a tendency to penetrate right into the pores of the metal leaving nothing on the surface.



S2S PLID Float Coat Procedure

- S2S PLID Float Coat (PLID FC) procedure will yield 100% coverage of all contacted surfaces in one operation.
- The unit being coated can be damp on the inside before installation of PLID FC.



- PLID FC will attach to the surface at approximately 1 mil.
- Calculate the volume of material required for a 1 mil coat on all surfaces. Coverage per gal of PLID FC at 1 mil. = 280 square feet.
- To this volume, add additional 20% PLID FC so several inches remain on the surface of the water after it has been drained down.
- Gently add water (preventing excess turbulence) until the unit is completely filled so PLID FC contacts the top of the unit. Drain out the water, leaving the extra PLID FC in the unit.

Procedure for units with heavy rust scale

- Proceed as above but allow more time and volume of PLID FC to soak into the rust scale. A second up & down cycle may be prudent.
- **Note: Be aware**, after a few months the rust scale will delaminate and begin falling off, which may **cause clogging of pump screens** etc.
 - A second application may be required after a year or so as most rust scale will have fallen off, leaving unprotected metal.
- **Note:** The PLID FC that is left sitting in the bottom of the unit will seep and cover bare spots that may be caused as minor rust scales detach and fall off. In this manner, self-healing will continuously occur.
- PLID FC may be used as a liquid descaler. Apply as above and check in a year's time.

Bolts, Flanges, Pipes and Pipe Lines

- S2S PLID INDUSTRIAL
- **Flange painting spec.** If the flanges are to be painted, a porous paint should be used so S2S can penetrate through to the surface of the metal.
- A cheap primer works well.
- The procedure below is the same for painted or unpainted flanges.
- Apply a heavy coat of S2S on the face of the flanges to be mated.
- Apply in the flange bolt holes and on the flange around the holes where the bolt head and washers will seat.
- Coat all bolts (under the heads as well) and washers (if any) and install through holes in flanges.
- Coat any washers, going under the nuts and install nuts.
- Once completed as above, it is good practice to coat the entire exterior of the flange assembly with S2S PLID Industrial.
- **NOTE:** Torque specifications will need to be adjusted for lubricated bolts.
- S2S works well as an assembly lube on O-rings and others requiring an assembly lube.
- **NOTE:** If the piping has a CP system installed, a check to be sure the current is passing

through the joint is necessary; if it is not passing through, a jumper may need to be installed.

- If the entire pipeline is coated with S2S, there is no need for cathodic protection for the exterior of the piping.

Steel Cable

- To ensure long term protection and a thorough coating of the inner fibers, an initial application of S2S PLID Thin is recommended.
- S2S PLID Industrial can be used as a top coating for harsher environments.
- Can be treated by spraying during cable retraction.
- Can be dunked in a tank or drum of S2S.
- Some customers leave cable soaking in a tank when cable not in use, during off season.
- S2S will keep cable lubricated and fully flexible and does not need to be removed like traditional cable grease.

Anchor Chain

- S2S may be sprayed or brushed on chains.
- S2S will creep into the difficult to reach areas between links.
- One application method is to use a crane to hoist chain above a tank and slowly lower the chain as the links are coated.
- Another method is to lay chain out on a plastic sheet and apply on the ground with brush or sprayer, then flip the chain to coat opposite side.
- Do not over coat the chain or excess product will become airborne during deployment.
- S2S PLID Industrial may be applied over existing paint and rust.



Electrical & Electronics

- Apply S2S directly to circuit boards.
- Apply S2S to wires and breakers with power off.
- S2S should eliminate electrical and electric failure due to corrosion.
- If untreated electronics are accidentally submerged in water, keep in water until able to treat with S2S PLID Thin film, then remove electronics from water and spray with S2S PLID Thin film until coated. This will displace moisture and salt, keeping the item rust free.

S2S PLID WRAP (for Pipes and Flanges)

- S2S PLID WRAP is infused with S2S PLID HD.
- PLID WRAP can be used alone, or for harsher environments, with any of the S2S PLID wet films.
- No major surface preparation required. Simply remove grease or dirt. No need to sandblast. PLID WRAP can be applied over existing rust and paint.
- In severe conditions, apply a coat of S2S PLID wet film, before applying the PLID WRAP.
- Wrap S2S PLID WRAP over pipe, ensuring it is in constant contact with surface.
- Use a 30% overlap.
- If pipe will be buried underground apply the extra outer protective layer (sold separately).
- Before wrapping flanges, see application procedures for bolts and flanges, then treat and wrap.

Case Studies

US Tower

US Tower is a manufacturer of portable towers with world wide sales. US Tower customers were frustrated with the corrosion on the supporting cables and they had to provide a solution.



S2S PLID Thin Film penetrates to the core of the cable

They turned to S2S and now they submerge all their steel cables in S2S Thin film for deep penetration into the cable core and have now solved their cable issues.



US Tower Rig with S2S PLID Thin protecting the cable from the factory

S2S was Spec into build of the New Canadian Navy Ships.

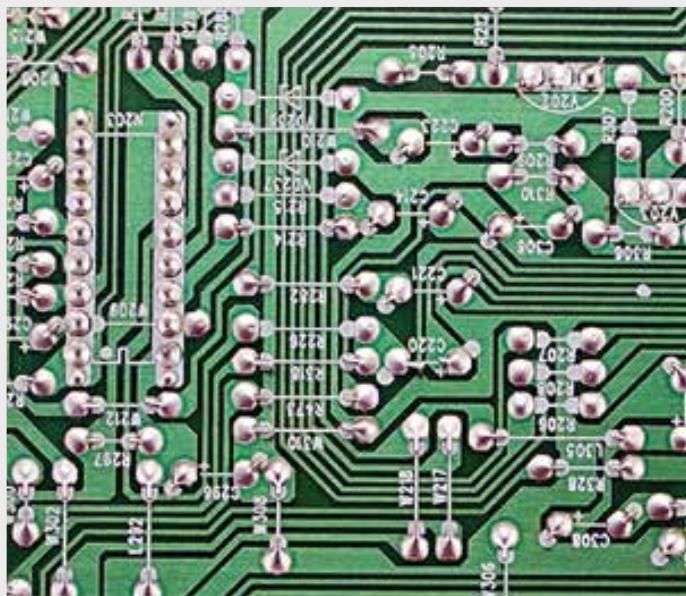


S2S has been specified into the build of the new Surface Combatant Ships for the Canadian Navy. The ships are being coated with S2S in the rudder and various internal voids.

The first two shipments were already delivered and we are proud to be a supplier to the Canadian Navy and their new vessels.

Hi all,

I spent a number of years working as a communications tech. One day I got a call from one of the logging companies we dealt with. One of their tugboats had sunk at the point where the tide changed. It had been below the surface when the tide was high and was now partially out of the water at low tide. They had the marine VHF and 2-meter radio removed and sitting on the dock. I told him to put both in a bucket of fresh water and bring them to me.



When the foreman walked in with the bucket of water there were a couple of customers in the store who looked inside and laughed. Telling me I was crazy and to throw the radios in the bin. I made a bet with one of them for 20 bucks that I could get one, if not both radios back up and running perfectly.

The 2-meter was a Motorola worth 1200 bucks, so it was certainly worth a try for the logging company.

I took both radios apart, removing every piece I could and laying them out on a workbench. Then I took a can of PLID and completely covered each part.

Then I left them alone for three days. In the afternoon of the third day I wiped all the excess off, making sure any pins and connections were clean as its a dielectric. Then proceeded to reassemble both radios.

Both radios powered up and worked perfectly when connected to my monitor. The Motorola had 49 watts on transmit. Not bad for a radio rated at 50 watts that had been in salt water for 12 hours. The VHF was around 20 watts on transmit, it was rated at 25 watts, but they are always a little high on quoted ratings in my experience.

Both were taken and reinstalled on the tugboat and used for years afterwards. I collected my 20 bucks and the logging company were very happy customers.

One thing to remember when using this is that it is a dielectric and any connections you put it on will stop being connections. We had a guy who put it on a bunch of electrical connections on his backhoe. It stopped working until he cleaned it off.

I have no connection to the company that makes it, just wanted to share this because it really does work and might save someone a bunch of money or even their lives. Here is the link to their site.

Remote Steel I-Beam Highway Bridge

Steep Creek Bridge September 2004 - 2014 photos
(10 years later) have been added. (July 2014)

The I-beams on this remote bridge were so badly rusted conventional preparation and coatings were out of the question.



Ship-2-Shore was chosen as the only alternate coating that could be used successfully in this situation. Liquid Corrosion Control Systems was contracted to do the work.

We first tried needle guns but most of the scale was so tightly adhere needle guns were ineffective. 10 pound smithy hammers banged off some of the looser scale but a lot of tight scale remaining. We applied **Ship-2-Shore** "Industrial" to all the steel work right over the tightly adhered rust scale we had been unable to remove.



The brown spots above are extra **Ship-2-Shore**.

Six weeks later the Ministry of Transportation and Highways bridge inspector reported back and said "**Ship-2-Shore** application looks fine but we will have to put more on." I asked if we had missed some area, he said "No, the rust scale is starting to fall off!"... of course this takes the **Ship-2-Shore** off as well!



Above, the rusting has stopped.
The green hue is a reflection.

The bridge crew reapplied **Ship-2-Shore** as necessary. This is Liquid Descaling in Action! For more information contact us.

Ten years later. All scale gone.
A couple of minor **Ship-2-Shore** touch-ups since 2004. Scale gone, Rusting STOPPED!
100% Simple, Easy, Effective Rust Control.



2014 Update



November 2003

This is a rare original oil well pump at a museum in the U.S. It got rather damp and needed some extra protection to preserve it.



Cleaned up by hand using a wire brush, **Ship-2-Shore** was the coating of choice to preserve it for future generations. **Ship-2-Shore** was

applied using a brush straight out of the container.



Note how the rain water beads up and has no detrimental effect on **Ship-2-Shore**.

If **Ship-2-Shore** ever needs a re-application just brush a little more on.

No preparation is required.

1943 German 88mm PAK 43/41 Anti-Tank Gun

Another successful restoration project is of a 1943 German 88mm PAK 43/41 Anti-Tank Gun For the U.S. Army Heritage Museum and Education Center in Carlisle Pennsylvania that was done in 2003 by Thomas Podnar, Robert Lodge, Curtis McCartney, and Mark Erdmann of McKay Lodge Conservation Laboratory, Inc. of Oberlin Ohio.

“...to protect the metal from further corrosion, a corrosion inhibiting clear coating was applied. The product used was **Ship-2-Shore** Industrial,

a very effective and long lasting gel that dries to waxy clear film. A Canadian product, it has an extensive and very successful performance history in the maritime industry protecting ship steel from salt water. **Ship-2-Shore** Industrial and the lower viscosity **Ship-2-Shore** PLID were used extensively in this restoration. The PLID product was used to penetrate all openings at moving parts and all points of wear to prevent corrosion from water entry when the gun is exhibited outdoors.”

Computer Boards

July 2002

The Mushroom Composting Facility job is now in operation. **Ship-2-Shore** PLID is working well to prevent corrosion on computer boards in the loaders. In this high “ammonia” environment, computer boards in the loaders were lasting about 6 months before corroding out at a cost of \$3,000 each. This was getting

expensive. Since they started spraying the boards with PLID before putting them in service the problem has been virtually eliminated.

One dollar invested returns \$3,000 on saved computer boards

The Problem of Valves

October 2002

We applied INDUSTRIAL to a couple of 966 loaders (including all the electrical connections) used on salt barges, and an excavator used to load potash.

Another use has surfaced: **Ship-2-Shore** for valves and piping in manholes that get flooded with water which contains salt and other corrosive substances, running off of city streets.

Here is an inexpensive and permanent cure to the problem of valves and hydraulic hose

ends rusting when exposed to severe marine environments.

Apply **Ship-2-Shore** INDUSTRIAL to the valves. Wrap them with a clear plastic wrap and secure with nylon ties. You can see the valves, so monitoring is easy and the **Ship-2-Shore** is enclosed, so it is permanent. You will experience no corrosion and you can still wash the area as often as necessary with no detrimental effect. It costs about \$3.00 per valve and maybe 15 minutes of your time. This would also work for flange connections on large pipes on off-shore oil rigs.

Waste Water Barge

The Job

She's a beauty! This old lube oil barge above is now used to remove waste water (sewage) from aircraft carriers.
Below is the hatch. (April 2000)



Looking up, the bulk head above shows a large sheet of original hard coating disbonded and hanging.



Disbondment examples are below.



Waste Water Barge

Preparation and Application

Getting started above, we soon found that needle guns work much better than prospectors picks.



The **Ship-2-Shore** appears white while applying as the photo below shows, but it soon goes clear.



Below the surface looks good after application.



Below we have removed some of the rust.



Below, the surface feels good, clean and clear; not at all dirty and there is no fire or explosion hazard. We cleaned up with soap and water.



Waste Water Barge

After Use



This area had been submerged in waste water for approximately four months, from August to the end of December 2002, when they finally got pumped out and hosed down. But now there is no rusting here, the **Ship-2-Shore** coating is 100% intact.

With the barge back in service, there was a layer of slime remaining after pumping and hosing out and as far as could be determined the Ship-2-Shore coating was totally intact as there was no sign of rusting. The photo above shows the layer of slime coating most of the interior. I ran my finger through it in January 2003.



When this application was done the metal was damp, there were oxides on the surface of the metal. These rust marks are the result of

Ship-2-Shore displacing this moisture, containing oxides, away from the metal. The moisture has evaporated off leaving the oxides behind. This is a good thing and a clearly demonstrates **Ship-2-Shore**'s ability to displace moisture.

The photo below shows that waste water sat in this compartment for over four months; things are really slimy but no rusting any where.

Ship-2-Shore has formed a very protective barrier under the slime.



SeaSpan Tug Boat Lazarette

1994 - 2009

The lazarette, or steering compartment, under the hatch (indicated by the blue arrow) in the back of this SeaSpan tug is subjected to stressed metal (dents), heat and humidity, wet and cold. This is quite an aggressive environment.



The lazarette had been painted in 1990. When I entered in 1994 there was already a very active rust stain coming from behind this angle iron. Without preparation, although the metal was wet, I painted **Ship-2-Shore INDUSTRIAL** into the weld. I rubbed the rust stain off in two spots. Two years later in 1996 I took the first picture of this series.



Nothing crossed the top rub off, a slight stain is visible crossing the lower rub off proving this was very active at the time of INDUSTRIAL application.



1998 nothing has crossed the top rub off, the stain on the lower rub off has almost faded away, proving it is no longer being fed (the tear of a dying rust cell).



In October of 1999, five and a half years after application, there are no new rust stains. Behind the angle iron there seems to be as much **Ship-2-Shore INDUSTRIAL** remaining as when it was applied in 1994. This is performance! This is cheap maintenance so simple it's hard to believe.



This photo was taken in February 2004. Still nothing has crossed. This is proof that the rusting has been stopped 100%

In 10 Years no rust appeared... not bad for one application of **Ship-2-Shore**. The application took 5 minutes, and no preparation or skill was required.

The photo below was taken August 2009.



This is why repair yards don't want you using **Ship-2-Shore**.

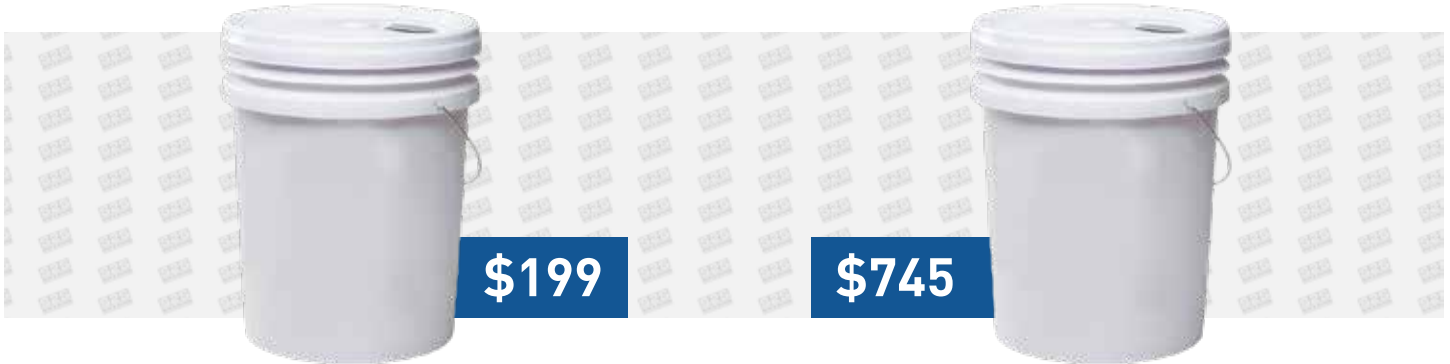
No rusting after 15 years!



Cost Guide

Q. Which pail of inhibitor is most cost effective?

A. You can't answer the question without knowing the following variables: coverage area, the product life expectancy, the time involved to prepare the surface and to apply the product.



Product Cost Table

	PLID Thin Film	PLID Industrial	PLID HD	PLID Float Coat
Coverage square feet per Gallon	280	150	85	200
Thickness in mils	1-2 mils	8-10 mils	18-20 mils	1-2 mils
Product cost of application per square foot	25 cents	46 cents	88 cents	66 cents
Salt Spray test hours/years lasting	100/1	300/3	1000/10 (see note)	500/5
Square foot cost per year	25 cents	15 cents	9 cents	13 cents

*Note: Costs do not include the application labor. All S2S products require minimum surface preparation and are able to be applied quickly compared to other options.

1. Application cost per square foot is cost per gallon divided by coverage per gallon.
2. Salt spray results for every 100 hours equals 1 year life of product. S2S HD did not reach failure at 1000 hours, test ended. These are very conservative estimates as we have case studies of 15 to 20 years with S2S Industrial. We used salt spray results, real life examples and conservative estimate were used.
3. Life expectancy ÷ cost of application = yearly cost per square foot.



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SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name: PLID Thin Film

Product use: Corrosion inhibitor / penetrant / lubricant for marine environments – for non-ferrous or ferrous as well as dissimilar metals / wherever there is excessive moisture

Supplier: Not available.

Manufacturers Name: Ship-2-Shore

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Canada

Telephone: 800-430-1533

Emergency Telephone: 866-836-8855

SECTION 2 — HAZARD IDENTIFICATION

WHMIS Classification Poisonous and Infectious Material: Class D2B

OSHA Hazards Carcinogenicity: Category 1B

GHS Label elements, including precautionary statement

Signal Word Danger

Hazard statement(s) H229: Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s) P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
P280: Use personal protective equipment as required.
P264: Wash thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.

Label element



HMIS Classification

Health hazard	1
Flammability	1
Physical hazard	0

Potential health effects

Inhalation Can cause irritation to nose, throat and upper respiratory tract during prolonged exposure. Exercise caution if vapors are hot. If over exposure occurs - may cause dizziness, headaches or nausea. *Based on toxicity of components.

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Skin	Prolonged or repeated contact with skin has been a cause of defatting or dermatitis in normal day to day handling of material.
Eyes	Essentially non-irritating, however, vapors and/or mists can cause mild to moderate irritation.
Ingestion	Maybe harmful or fatal if swallowed. Can cause severe irritation of the mouth, throat and esophagus. Can cause nausea, vomiting or gastrointestinal upset. May cause diarrhea. Based on toxicity of petroleum distillate only.

SECTION 3 — COMPOSITION/INFORMATION ON INGREDIENTS

Material	CAS-No.	Concentration (%wt)
Refined petroleum streams	72623-85-9 72623-83-7	70-80
Kerosene	8008-20-6	3-7
Mineral Spirits	8052-41-3	10-30

Proprietary Additive Mixture

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SECTION 4 — FIRST AID MEASURES

General advice

If negative symptoms developed while handling the product move out of the area to prevent further exposure. Consult a physician as a precautionary measure. If symptoms developed after being exposed to the material without proper protection. Show this safety data sheet to the doctor in attendance.

If inhaled

In emergency situations, use proper respiratory protection and immediately remove the affected person from exposure. Keep at rest. Administer artificial respiration if breathing has stopped. Seek medical attention.

In case of skin contact

Wash exposed skin thoroughly with soap and water. Cold water washing is suggested if irritation is caused by exposure. If irritation develops and is prolonged and/or sore, consult a physician.

In case of eye contact

Flush eyes with plenty of water for at least 15 minutes. Avoid rubbing the eye. If experiencing prolonged irritation or soreness, seek medical attention.

If swallowed

Do not induce vomiting. Rinse mouth well with water. Never give anything by mouth to an unconscious person. Seek medical attention.

General information

If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

SECTION 5 — FIRE FIGHTING MEASURES

Conditions of flammability

Non-flammable under standard use conditions.

Suitable extinguishing media

Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Special protective equipment for fire-fighters

Cool closed containers exposed to fire with water spray.

Hazardous combustion products

Oxides of carbon, dense smoke and possibly toxic fumes.

Explosion data – sensitivity to mechanical

Not available.

Explosion data – sensitivity to static discharge

Not available.

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SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not breathe gas. Emergency personnel need self-contained breathing equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see Section 8 of the SDS.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

Method and materials for containment and cleaning up

Land spill: Ventilate the area with fresh air. If in confined space or limited air circulation area, clean-up workers should wear appropriate respiratory protection. Stop leak if without risk. Move containers from spill area. Shovel into suitable properly marked container for disposal or reclamation in accordance with local regulations.

SECTION 7— HANDLING AND STORAGE

Precautions for safe handling

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where the material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Avoid contact with skin, eyes and clothing. Keep container away from heat, sparks, and open flame. Keep container closed when not in use.

Conditions for safe storage, including any incompatibilities

Store in a cool, dry area away from heat, sparks and open flames. Containers should be tightly closed while not in use. Store away from acids and oxidizing materials.

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SECTION 8 — EXPOSURE CONTROL / PERSONAL PROTECTION

Component	CAS-No.	Type	Value	Basis
Refined petroleum streams	72623-85-9 72623-83-7	TWA STEL	5mg/m ³ 10 mg/m ³	US. ACGIH Threshold Limit Values
Kerosene	8008-20-6	TWA	200 mg/m ³	US. ACGIH Threshold Limit Values Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)
Mineral spirits	8052-41-3	TWA TWA STEL TWA TWA TWA	100 ppm 572 ppm 580 mg/m ³ 290 mg/m ³ 100 ppm 100 ppm 525 mg/m ³	US. ACGIH Threshold Limit Values Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Biological limit values: No biological exposure limits noted for the ingredient(s).

Exposure guidelines:

Canada - Alberta OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - British Columbia OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Manitoba OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Ontario OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Saskatchewan OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

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Personal Protection Equipment

Respiratory protection

In case of insufficient ventilation, use suitable respiratory equipment.

Skin/hand protection

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Long sleeved clothing and full length pants should be worn if repeated or prolonged direct contact is likely to occur.

Eye protection

If contact is likely, safety glasses with side shields or goggles should be worn. When using eye protection, equipment should be tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Hygiene measures

When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Specific engineering control

Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state

Clear liquid

Color

Dark orange

Safety data

Odour

Fresh Scent/Petroleum-like.

Odour threshold

Not available.

pH

Not available.

Melting point/Freezing point

Not available.

Initial boiling point/boiling range

>250°C

Flash Point (ASTM D93)

84°C

Evaporation rate

< 1

Flammability (solid; gas)

Not available.

Lower flammable/explosive limit

Not available.

Upper flammable/explosive limit

Not available.

Vapour pressure (ambient temp)

8 mm Hg

Vapour density

> 1

Relative density (ASTM D1217-15)

0.87 kg/L

Solubility (water)

Insoluble.

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Partition coefficient - n-octanol/water	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
VOC Content	0.1%
Dielectric strength	41 kv
Sulfurous acid spray	>90 hr

SECTION 10 — STABILITY AND REACTIVITY

Chemical stability

The product is stable and non-reactive under normal conditions of use, storage, and transport.

Possibility of hazardous reactions

Hazardous polymerization does not occur.

Materials to avoid

Strong oxidizing agents. Nitrates. Fluorine. Chlorine.

Conditions to avoid

Heat and open flames. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

Hazardous decomposition products

No hazardous decomposition products are known.

Reactivity

Material is stable under normal conditions.

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SECTION 11 — TOXICOLOGICAL INFORMATION

Symptoms related to the physical, chemical and toxicological characteristics

Direct contact with eyes may cause temporary irritation.

Component	Species	Test results
Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7) Acute Dermal LD50	Rabbit	>2000 mg/kg
Oral LD50	Rat	>5000 mg/kg
Inhalation LC50	Rat	>2500 mg/m ³ , 4hr
Kerosene (CAS#: 8008-20-6) Acute Dermal LD50	Rabbit	>2000 mg/kg >2000 mg/kg, 24 hr
Inhalation LC50	Cat Rat	>6.4 mg/l, 6 hr >7.5 mg/l, 6 hr >4.3 mg/l, 4 hr >0.1 mg/l, 8 hr
Oral LD50	Rat	>5000mg/kg
Mineral Spirits (CAS#: 8052-41-3) Acute Dermal LD50	Rabbit	>2000 mg/kg
Oral LD50	Rat	>7500 mg/kg

* Toxicity data is presented for the individual components, in their pure form, and not as a mixture in their reported concentrations as in the product

Skin corrosion/irritation

Prolonged skin contact may cause temporary irritation. Direct contact with eyes may cause temporary irritation.

Serious eye damage/eye irritation

Direct contact with eyes may cause temporary irritation.

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Respiratory sensitization

Not a respiratory sensitizer.

Skin sensitization

This product is not expected to cause skin sensitization.

Germ cell mutagenicity

May cause genetic defects. No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity

May cause cancer.

ACGIH Carcinogens

Kerosene (CAS 8008-20-6): A3 Confirmed animal carcinogen with unknown relevance to humans.

Canada - Manitoba OELs: carcinogenicity

Kerosene (non-aerosol), as total hydrocarbon vapor (CAS 8008-20-6): Confirmed animal carcinogen with unknown relevance to humans.

Reproductive toxicity

This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure

Not classified.

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

Not likely, due to the form of the product.

Chronic effects

Causes damage to organs through prolonged or repeated exposure. Prolonged exposure may cause chronic effects.

Potential health effect

Not available.

Signs and symptoms of exposure

Not available.

Synergistic effect

Not available.

Additional information

Symptoms may be delayed.

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SECTION 12 — ECOLOGICAL INFORMATION**Ecotoxicity**

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Ecotoxicity data

Kerosene (CAS#: 8008-20-6)

Fish	LC50	Pimephales Promelas Lepomis Macrochirus	45 mg/l, 96 hr 1740 mg/l, 96 hr
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Mineral Spirits (CAS#: 8052-41-3)

Algae	IC50	Pseudokrichneriella Subcapitata	3000 mg/l, 72 hr
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Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7)

Not available.

Precedence and degradability

No data is available on the degradability of this product.

Bioaccumulation potential

No data available.

Partition coefficient n-octanol / water (log Kow)

Mineral Spirits (CAS#: 8052-41-3)	3.16 - 7.15
Kerosene (CAS#: 8008-20-6)	3.3 - >6.0
Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7)	Not available.

Mobility in soil

Not available.

PBT and vPvB

Not available.

Other adverse effects

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

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SECTION 13 — DISPOSAL CONSIDERATIONS

Local disposal regulations

Dispose in accordance with all applicable regulations.

Waste from residues / unused products

Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging

Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

SECTION 14 — TRANSPORT INFORMATION

Special shipping information

TDG: Not Regulated as dangerous good

DOT: Not Regulated as dangerous good

IATA-DGR: Not Regulated as dangerous good

IMDG-CODE: Not Regulated as dangerous good

SECTION 15 — REGULATORY INFORMATION

Canadian regulations:

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

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International Inventories:		
Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16 — OTHER INFORMATION

Prepared October 11th, 2019. The information, recommendations, and suggestions in the safety data sheet, have been compiled from tests and data believed to be reliable. The above information is believed to be correct, but is not under guarantee or warranty to be all inclusive and shall be used only as a guide. The information contained herein is based on the present state of our knowledge and is only applicable to the product or material set forth in Section 1. The information provided may not be applicable or complete if such product material is used in combination with any other product or material, or in any process. The information provided on the product or material is with regard to appropriate safety precautions and does not represent any guarantee of the properties of the product. It is the user's obligation to determine the safety, toxicity and suitability for their own use of the product described herein and to comply with all applicable laws and regulations. Ship-2-Shore and its affiliates not be held liable for any damage resulting from handling or from contact with the above product.

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SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name: Industrial Fluid Thick Film

Product use: Corrosion inhibitor / penetrant / lubricant for marine environments — for non-ferrous or ferrous as well as dissimilar metals / wherever there is excessive moisture

Supplier: Not available.

Manufacturers Name: Ship-2-Shore

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Burnaby, BC V5J 0G7
Canada

Telephone: 800-430-1533

Emergency Telephone: 866-836-8855

SECTION 2 — HAZARD IDENTIFICATION

WHMIS Classification Poisonous and Infectious Material: Class D2B

OSHA Hazards Carcinogenicity: Category 1B

GHS Label elements, including precautionary statement

Signal Word Danger

Hazard statement(s) H229: Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s) P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
P280: Use personal protective equipment as required.
P264: Wash thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.

Label element



HMIS Classification

Health hazard	1
Flammability	1
Physical hazard	0

Potential health effects

Inhalation Can cause irritation to nose, throat and upper respiratory tract during prolonged exposure. Exercise caution if vapors are hot. If over exposure occurs - may cause dizziness, headaches or nausea. *Based on toxicity of components.

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PLID Industrial Thick

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Skin	Prolonged or repeated contact with skin has been a cause of defatting or dermatitis in normal day to day handling of material.
Eyes	Essentially non-irritating, however, vapors and/or mists can cause mild to moderate irritation.
Ingestion	Maybe harmful or fatal if swallowed. Can cause severe irritation of the mouth, throat and esophagus. Can cause nausea, vomiting or gastrointestinal upset. May cause diarrhea. Based on toxicity of petroleum distillate only.

SECTION 3 — COMPOSITION/INFORMATION ON INGREDIENTS

Material	CAS-No.	Concentration (%wt)
Refined petroleum streams	72623-85-9 72623-83-7	70-80
Kerosene	8008-20-6	3-7
Mineral Spirits	8052-41-3	10-30

Proprietary Additive Mixture

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SECTION 4 — FIRST AID MEASURES

General advice

If negative symptoms developed while handling the product move out of the area to prevent further exposure. Consult a physician as a precautionary measure. If symptoms developed after being exposed to the material without proper protection. Show this safety data sheet to the doctor in attendance.

If inhaled

In emergency situations, use proper respiratory protection and immediately remove the affected person from exposure. Keep at rest. Administer artificial respiration if breathing has stopped. Seek medical attention.

In case of skin contact

Wash exposed skin thoroughly with soap and water. Cold water washing is suggested if irritation is caused by exposure. If irritation develops and is prolonged and/or sore, consult a physician.

In case of eye contact

Flush eyes with plenty of water for at least 15 minutes. Avoid rubbing the eye. If experiencing prolonged irritation or soreness, seek medical attention.

If swallowed

Do not induce vomiting. Rinse mouth well with water. Never give anything by mouth to an unconscious person. Seek medical attention.

General information

If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

SECTION 5 — FIRE FIGHTING MEASURES

Conditions of flammability

Non-flammable under standard use conditions.

Suitable extinguishing media

Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Special protective equipment for fire-fighters

Cool closed containers exposed to fire with water spray.

Hazardous combustion products

Oxides of carbon, dense smoke and possibly toxic fumes.

Explosion data – sensitivity to mechanical

Not available.

Explosion data – sensitivity to static discharge

Not available.

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SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not breathe gas. Emergency personnel need self-contained breathing equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see Section 8 of the SDS.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

Method and materials for containment and cleaning up

Land spill: Ventilate the area with fresh air. If in confined space or limited air circulation area, clean-up workers should wear appropriate respiratory protection. Stop leak if without risk. Move containers from spill area. Shovel into suitable properly marked container for disposal or reclamation in accordance with local regulations.

SECTION 7— HANDLING AND STORAGE

Precautions for safe handling

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where the material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Avoid contact with skin, eyes and clothing. Keep container away from heat, sparks, and open flame. Keep container closed when not in use.

Conditions for safe storage, including any incompatibilities

Store in a cool, dry area away from heat, sparks and open flames. Containers should be tightly closed while not in use. Store away from acids and oxidizing materials.

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CORROSION PREVENTIVE COATINGS

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SECTION 8 — EXPOSURE CONTROL / PERSONAL PROTECTION

Component	CAS-No.	Type	Value	Basis
Refined petroleum streams	72623-85-9 72623-83-7	TWA STEL	5mg/m ³ 10 mg/m ³	US. ACGIH Threshold Limit Values
Kerosene	8008-20-6	TWA	200 mg/m ³	US. ACGIH Threshold Limit Values Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)
Mineral spirits	8052-41-3	TWA TWA STEL TWA TWA TWA	100 ppm 572 ppm 580 mg/m ³ 290 mg/m ³ 100 ppm 100 ppm 525 mg/m ³	US. ACGIH Threshold Limit Values Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Biological limit values: No biological exposure limits noted for the ingredient(s).

Exposure guidelines:

Canada - Alberta OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - British Columbia OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Manitoba OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Ontario OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Saskatchewan OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

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Personal Protection Equipment

Respiratory protection

In case of insufficient ventilation, use suitable respiratory equipment.

Skin/hand protection

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Long sleeved clothing and full length pants should be worn if repeated or prolonged direct contact is likely to occur.

Eye protection

If contact is likely, safety glasses with side shields or goggles should be worn. When using eye protection, equipment should be tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Hygiene measures

When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Specific engineering control

Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state

Opaque liquid

Color

Orange-red

Safety data

Odour

Fresh Scent/Petroleum-like.

Odour threshold

Not available.

pH

Not available.

Melting point/Freezing point

Not available.

Initial boiling point/boiling range

>100°C

Flash Point (ASTM D93)

85 °C

Evaporation rate

< 1

Flammability (solid; gas)

Not available.

Lower flammable/explosive limit

Not available.

Upper flammable/explosive limit

Not available.

Vapour pressure (ambient temp)

8 mm Hg

Vapour density

> 1

Relative density (ASTM D1217-15)

0.98 kg/L

Solubility (water)

Completely miscible.

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Partition coefficient - n-octanol/water	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity at 25°C	1000 cP.
Non-volatile by weight (%)	> 50%
Dielectric strength	8.9 kv
Sulfurous acid spray	>1000 hr

SECTION 10 — STABILITY AND REACTIVITY

Chemical stability

The product is stable and non-reactive under normal conditions of use, storage, and transport.

Possibility of hazardous reactions

Hazardous polymerization does not occur.

Materials to avoid

Strong oxidizing agents. Nitrates. Fluorine. Chlorine.

Conditions to avoid

Heat and open flames. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

Hazardous decomposition products

No hazardous decomposition products are known.

Reactivity

Material is stable under normal conditions.

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SECTION 11 — TOXICOLOGICAL INFORMATION

Symptoms related to the physical, chemical and toxicological characteristics

Direct contact with eyes may cause temporary irritation.

Component	Species	Test results
Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7) Acute Dermal LD50	Rabbit	>2000 mg/kg
Oral LD50	Rat	>5000 mg/kg
Inhalation LC50	Rat	>2500 mg/m ³ , 4hr
Kerosene (CAS#: 8008-20-6) Acute Dermal LD50	Rabbit	>2000 mg/kg >2000 mg/kg, 24 hr
Inhalation LC50	Cat Rat	>6.4 mg/l, 6 hr >7.5 mg/l, 6 hr >4.3 mg/l, 4 hr >0.1 mg/l, 8 hr
Oral LD50	Rat	>5000mg/kg
Mineral Spirits (CAS#: 8052-41-3) Acute Dermal LD50	Rabbit	>2000 mg/kg
Oral LD50	Rat	>7500 mg/kg

* Toxicity data is presented for the individual components, in their pure form, and not as a mixture in their reported concentrations as in the product

Skin corrosion/irritation

Prolonged skin contact may cause temporary irritation. Direct contact with eyes may cause temporary irritation.

Serious eye damage/eye irritation

Direct contact with eyes may cause temporary irritation.

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Respiratory sensitization

Not a respiratory sensitizer.

Skin sensitization

This product is not expected to cause skin sensitization.

Germ cell mutagenicity

May cause genetic defects. No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity

May cause cancer.

ACGIH Carcinogens

Kerosene (CAS 8008-20-6): A3 Confirmed animal carcinogen with unknown relevance to humans.

Canada - Manitoba OELs: carcinogenicity

Kerosene (non-aerosol), as total hydrocarbon vapor (CAS 8008-20-6): Confirmed animal carcinogen with unknown relevance to humans.

Reproductive toxicity

This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure

Not classified.

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

Not likely, due to the form of the product.

Chronic effects

Causes damage to organs through prolonged or repeated exposure. Prolonged exposure may cause chronic effects.

Potential health effect

Not available.

Signs and symptoms of exposure

Not available.

Synergistic effect

Not available.

Additional information

Symptoms may be delayed.

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SECTION 12 — ECOLOGICAL INFORMATION

Ecotoxicity

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Ecotoxicity data

Kerosene (CAS#: 8008-20-6)

Fish	LC50	Pimephales Promelas Lepomis Macrochirus	45 mg/l, 96 hr 1740 mg/l, 96 hr
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Mineral Spirits (CAS#: 8052-41-3)

Algae	IC50	Pseudokrichneriella Subcapitata	3000 mg/l, 72 hr
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Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7)

Not available.

Precedence and degradability

No data is available on the degradability of this product.

Bioaccumulation potential

No data available.

Partition coefficient n-octanol / water (log Kow)

Mineral Spirits (CAS#: 8052-41-3)	3.16 - 7.15
Kerosene (CAS#: 8008-20-6)	3.3 - >6.0
Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7)	Not available.

Mobility in soil

Not available.

PBT and vPvB

Not available.

Other adverse effects

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

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SECTION 13 — DISPOSAL CONSIDERATIONS

Local disposal regulations

Dispose in accordance with all applicable regulations.

Waste from residues / unused products

Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging

Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

SECTION 14 — TRANSPORT INFORMATION

Special shipping information

TDG: Not Regulated as dangerous good

DOT: Not Regulated as dangerous good

IATA-DGR: Not Regulated as dangerous good

IMDG-CODE: Not Regulated as dangerous good

SECTION 15 — REGULATORY INFORMATION

Canadian regulations:

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

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International Inventories:		
Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16 — OTHER INFORMATION

Prepared October 11th, 2019. The information, recommendations, and suggestions in the safety data sheet, have been compiled from tests and data believed to be reliable. The above information is believed to be correct, but is not under guarantee or warranty to be all inclusive and shall be used only as a guide. The information contained herein is based on the present state of our knowledge and is only applicable to the product or material set forth in Section 1. The information provided may not be applicable or complete if such product material is used in combination with any other product or material, or in any process. The information provided on the product or material is with regard to appropriate safety precautions and does not represent any guarantee of the properties of the product. It is the user's obligation to determine the safety, toxicity and suitability for their own use of the product described herein and to comply with all applicable laws and regulations. Ship-2-Shore and its affiliates not be held liable for any damage resulting from handling or from contact with the above product.

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SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name: Ultra Thick Heavy Duty

Product use: Corrosion inhibitor / penetrant / lubricant for marine environments — for non-ferrous or ferrous as well as dissimilar metals / wherever there is excessive moisture

Supplier: Not available.

Manufacturers Name: Ship-2-Shore

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SECTION 2 — HAZARD IDENTIFICATION

WHMIS Classification Poisonous and Infectious Material: Class D2B

OSHA Hazards Carcinogenicity: Category 1B

GHS Label elements, including precautionary statement

Signal Word None.

Hazard statement(s) H229: Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s) P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
P280: Use personal protective equipment as required.
P264: Wash thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.

Label element



HMIS Classification

Health hazard	1
Flammability	1
Physical hazard	0

Potential health effects

Inhalation Can cause irritation to nose, throat and upper respiratory tract during prolonged exposure. Exercise caution if vapors are hot. If over exposure occurs - may cause dizziness, headaches or nausea. *Based on toxicity of components.

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Skin	Prolonged or repeated contact with skin has been a cause of defatting or dermatitis in normal day to day handling of material.
Eyes	Essentially non-irritating, however, vapors and/or mists can cause mild to moderate irritation.
Ingestion	Maybe harmful or fatal if swallowed. Can cause severe irritation of the mouth, throat and esophagus. Can cause nausea, vomiting or gastrointestinal upset. May cause diarrhea. Based on toxicity of petroleum distillate only.

SECTION 3 — COMPOSITION/INFORMATION ON INGREDIENTS

Material	CAS-No.	Concentration (%wt)
Refined petroleum streams	72623-85-9 72623-83-7	70-80
Kerosene	8008-20-6	3-7
Mineral Spirits	8052-41-3	10-30

Proprietary Additive Mixture

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SECTION 4 — FIRST AID MEASURES

General advice

If negative symptoms developed while handling the product move out of the area to prevent further exposure. Consult a physician as a precautionary measure. If symptoms developed after being exposed to the material without proper protection. Show this safety data sheet to the doctor in attendance.

If inhaled

In emergency situations, use proper respiratory protection and immediately remove the affected person from exposure. Keep at rest. Administer artificial respiration if breathing has stopped. Seek medical attention.

In case of skin contact

Wash exposed skin thoroughly with soap and water. Cold water washing is suggested if irritation is caused by exposure. If irritation develops and is prolonged and/or sore, consult a physician.

In case of eye contact

Flush eyes with plenty of water for at least 15 minutes. Avoid rubbing the eye. If experiencing prolonged irritation or soreness, seek medical attention.

If swallowed

Do not induce vomiting. Rinse mouth well with water. Never give anything by mouth to an unconscious person. Seek medical attention.

General information

If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

SECTION 5 — FIRE FIGHTING MEASURES

Conditions of flammability

Non-flammable under standard use conditions.

Suitable extinguishing media

Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Special protective equipment for fire-fighters

Cool closed containers exposed to fire with water spray.

Hazardous combustion products

Oxides of carbon, dense smoke and possibly toxic fumes.

Explosion data – sensitivity to mechanical

Not available.

Explosion data – sensitivity to static discharge

Not available.

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SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not breathe gas. Emergency personnel need self-contained breathing equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see Section 8 of the SDS.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

Method and materials for containment and cleaning up

Land spill: Ventilate the area with fresh air. If in confined space or limited air circulation area, clean-up workers should wear appropriate respiratory protection. Stop leak if without risk. Move containers from spill area. Shovel into suitable properly marked container for disposal or reclamation in accordance with local regulations.

SECTION 7— HANDLING AND STORAGE

Precautions for safe handling

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where the material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Avoid contact with skin, eyes and clothing. Keep container away from heat, sparks, and open flame. Keep container closed when not in use.

Conditions for safe storage, including any incompatibilities

Store in a cool, dry area away from heat, sparks and open flames. Containers should be tightly closed while not in use. Store away from acids and oxidizing materials.

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SECTION 8 — EXPOSURE CONTROL / PERSONAL PROTECTION

Component	CAS-No.	Type	Value	Basis
Refined petroleum streams	72623-85-9 72623-83-7	TWA STEL	5mg/m ³ 10 mg/m ³	US. ACGIH Threshold Limit Values
Kerosene	8008-20-6	TWA	200 mg/m ³	US. ACGIH Threshold Limit Values Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)
Mineral spirits	8052-41-3	TWA TWA STEL TWA TWA TWA	100 ppm 572 ppm 580 mg/m ³ 290 mg/m ³ 100 ppm 100 ppm 525 mg/m ³	US. ACGIH Threshold Limit Values Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Biological limit values: No biological exposure limits noted for the ingredient(s).

Exposure guidelines:

Canada - Alberta OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - British Columbia OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Manitoba OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Ontario OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

Canada - Saskatchewan OELs: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Kerosene (CAS 8008-20-6): Can be absorbed through the skin.

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Personal Protection Equipment

Respiratory protection

In case of insufficient ventilation, use suitable respiratory equipment.

Skin/hand protection

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Long sleeved clothing and full length pants should be worn if repeated or prolonged direct contact is likely to occur.

Eye protection

If contact is likely, safety glasses with side shields or goggles should be worn. When using eye protection, equipment should be tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Hygiene measures

When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Specific engineering control

Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state

Liquid

Color

Dark orange

Safety data

Odour

Fresh Scent/Petroleum-like.

Odour threshold

Not available.

pH

Not available.

Melting point/Freezing point

Not available.

Initial boiling point/boiling range

Not available.

Flash Point (ASTM D93)

78 °C

Evaporation rate

< 1

Flammability (solid; gas)

Not available.

Lower flammable/explosive limit

Not available.

Upper flammable/explosive limit

Not available.

Vapour pressure (ambient temp)

8 mm Hg

Vapour density

Not available.

Relative density (ASTM D1217-15)

0.90 kg/L

Solubility (water)

Slightly emulsifiable.

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Partition coefficient - n-octanol/water	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Pour Point	-9 °C

SECTION 10 — STABILITY AND REACTIVITY

Chemical stability

The product is stable and non-reactive under normal conditions of use, storage, and transport.

Possibility of hazardous reactions

Hazardous polymerization does not occur.

Materials to avoid

Strong oxidizing agents. Nitrates. Fluorine. Chlorine.

Conditions to avoid

Heat and open flames. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

Hazardous decomposition products

No hazardous decomposition products are known.

Reactivity

Material is stable under normal conditions.

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Ultra Thick Heavy Duty

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SECTION 11 — TOXICOLOGICAL INFORMATION

Symptoms related to the physical, chemical and toxicological characteristics

Direct contact with eyes may cause temporary irritation.

Component	Species	Test results
Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7) Acute Dermal LD50	Rabbit	>2000 mg/kg
Oral LD50	Rat	>5000 mg/kg
Inhalation LC50	Rat	>2500 mg/m ³ , 4hr
Kerosene (CAS#: 8008-20-6) Acute Dermal LD50	Rabbit	>2000 mg/kg >2000 mg/kg, 24 hr
Inhalation LC50	Cat Rat	>6.4 mg/l, 6 hr >7.5 mg/l, 6 hr >4.3 mg/l, 4 hr >0.1 mg/l, 8 hr
Oral LD50	Rat	>5000mg/kg
Mineral Spirits (CAS#: 8052-41-3) Acute Dermal LD50	Rabbit	>2000 mg/kg
Oral LD50	Rat	>7500 mg/kg

* Toxicity data is presented for the individual components, in their pure form, and not as a mixture in their reported concentrations as in the product

Skin corrosion/irritation

Prolonged skin contact may cause temporary irritation. Direct contact with eyes may cause temporary irritation.

Serious eye damage/eye irritation

Direct contact with eyes may cause temporary irritation.

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Respiratory sensitization

Not a respiratory sensitizer.

Skin sensitization

This product is not expected to cause skin sensitization.

Germ cell mutagenicity

May cause genetic defects. No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity

May cause cancer.

ACGIH Carcinogens

Kerosene (CAS 8008-20-6): A3 Confirmed animal carcinogen with unknown relevance to humans.

Canada - Manitoba OELs: carcinogenicity

Kerosene (non-aerosol), as total hydrocarbon vapor (CAS 8008-20-6): Confirmed animal carcinogen with unknown relevance to humans.

Reproductive toxicity

This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure

Not classified.

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

Not likely, due to the form of the product.

Chronic effects

Causes damage to organs through prolonged or repeated exposure. Prolonged exposure may cause chronic effects.

Potential health effect

Not available.

Signs and symptoms of exposure

Not available.

Synergistic effect

Not available.

Additional information

Symptoms may be delayed.

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SECTION 12 — ECOLOGICAL INFORMATION

Ecotoxicity

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Ecotoxicity data

Kerosene (CAS#: 8008-20-6)

Fish	LC50	Pimephales Promelas Lepomis Macrochirus	45 mg/l, 96 hr 1740 mg/l, 96 hr
------	------	--	------------------------------------

Mineral Spirits (CAS#: 8052-41-3)

Algae	IC50	Pseudokrichneriella Subcapitata	3000 mg/l, 72 hr
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Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7)

Not available.

Precedence and degradability

No data is available on the degradability of this product.

Bioaccumulation potential

No data available.

Partition coefficient n-octanol / water (log Kow)

Mineral Spirits (CAS#: 8052-41-3)	3.16 - 7.15
Kerosene (CAS#: 8008-20-6)	3.3 - >6.0
Refined petroleum streams (CAS#: 72623-85-9, 72623-83-7)	Not available.

Mobility in soil

Not available.

PBT and vPvB

Not available.

Other adverse effects

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

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SECTION 13 — DISPOSAL CONSIDERATIONS

Local disposal regulations

Dispose in accordance with all applicable regulations.

Waste from residues / unused products

Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging

Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

SECTION 14 — TRANSPORT INFORMATION

Special shipping information

TDG: Not Regulated as dangerous good

DOT: Not Regulated as dangerous good

IATA-DGR: Not Regulated as dangerous good

IMDG-CODE: Not Regulated as dangerous good

SECTION 15 — REGULATORY INFORMATION

Canadian regulations:

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

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International Inventories:		
Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

SECTION 16 — OTHER INFORMATION

Prepared July 18th, 2019. The information, recommendations, and suggestions in the safety data sheet, have been compiled from tests and data believed to be reliable. The above information is believed to be correct, but is not under guarantee or warranty to be all inclusive and shall be used only as a guide. The information contained herein is based on the present state of our knowledge and is only applicable to the product or material set forth in Section 1. The information provided may not be applicable or complete if such product material is used in combination with any other product or material, or in any process. The information provided on the product or material is with regard to appropriate safety precautions and does not represent any guarantee of the properties of the product. It is the user's obligation to determine the safety, toxicity and suitability for their own use of the product described herein and to comply with all applicable laws and regulations. Ship-2-Shore and its affiliates not be held liable for any damage resulting from handling or from contact with the above product.

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SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: Ship 2 Shore PLID FLOAT COAT			
Product Use: <i>Corrosion Inhibitor / Penetrant / Lubricant for Marine Environments – for non-ferrous or ferrous as well as dissimilar metals / wherever there is excessive moisture</i>			
Manufacturer's Name: Ship 2 Shore			
Street Address: P.O. Box 48205			
City: Victoria	Province: BC	Postal Code: V8Z 7H6	Emergency Telephone: 1-800-430-1533

SECTION 2 – HAZARDS IDENTIFICATION

Hazard pictograms:



Signal word:

Warning

Hazard statement(s):

Causes skin irritation

Causes serious eye irritation

Precautionary Statements – Prevention

Wash thoroughly after handling.

Wear eye protection/face protection.

Wear protective gloves.

Precautionary Statements – Response

If on skin, wash with plenty of water.

If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If skin irritation occurs, get medical advice/attention.

If eye irritation persists, get medical advice/attention.

Take off contaminated clothing and wash it before reuse.

Precautionary Statements – Storage

Store in a well-ventilated place.

Keep container tightly closed.

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Precautionary Statements – Disposal

Dispose of contents/container in accordance with local, federal, and state regulations.

SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

Component	% by wt.	CAS Number
Distillates (petroleum), solvent-dewaxed heavy paraffinic	36-70	64742-65-0
Distillates (petroleum), hydrotreated heavy paraffinic	0-28	64742-54-7
Naphthalenesulfonic acid, dionyl-, calcium salt (2:1)	3-10	57855-77-3
Distillates, petroleum, hydrotreated light	4-9	64742-47-8
Stoddard solvent	1-6	8052-41-3
Carbonic acid calcium salt (1:1)	1-5	471-34-1
Other components below reportable levels	15-18	

SECTION 4 – FIRST AID MEASURES

EYE CONTACT:	Flush eyes with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention if irritation develops.
SKIN CONTACT:	Remove excess by wiping then wash with plenty of soap and water. Remove contaminated clothing and wash before reuse.
INHALATION:	Remove victim to fresh air. Apply CPR if required. If resuscitation is required, assessment by a physician if mandatory.
INGESTION:	Do NOT induce vomiting. If vomiting occurs, take care to prevent aspiration. Seek medical attention.

SECTION 5 – FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA:	Water fog, foam, dry chemical powder, carbon dioxide.
UNSUITABLE EXTINGUISHING MEDIA:	Do not use water stream as an extinguisher, as this will spread the fire.
SPECIFIC HAZARDS DURING FIREFIGHTING:	Cool closed containers exposed to fire with water spray.
COMBUSTION PRODUCTS:	Oxides of carbon, dense smoke, and possibly toxic fumes.
PROTECTIVE EQUIPMENT FOR FIRE-FIGHTERS:	Fire-fighters should always wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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SECTION 6 – ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:	For personal protective equipment, see Section 8.
ENVIRONMENTAL PRECAUTIONS:	Do not allow uncontrolled discharge of product into the environment.
METHOD FOR CONTAINMENT & CLEAN-UP:	Ventilate the area with fresh air. If in confined space or limited air circulation area, clean-up workers should wear appropriate respiratory protection. Stop leak if without risk. Move containers from spill area. Shovel into suitable properly marked container for disposal or reclamation in accordance with local regulations.

SECTION 7 – HANDLING & STORAGE

HANDLING PROCEDURES:	Put on appropriate personal protective equipment. Eating, drinking, and smoking should be prohibited in areas where material is handled, stored and processed. Workers should wash hands and face before eating, drinking, and smoking. Avoid contact with skin, eyes and clothing. Keep container away from heat, sparks, and open flame. Keep container closed when not in use.
STORAGE PROCEDURES:	Store in a cool, dry area out of direct sunlight. Containers should be tightly closed while in storage. Store separated from acids and oxidizing materials. Store away from sparks and open flames.

SECTION 8 – EXPOSURE CONTROL / PERSONAL PROTECTION

CONTROL PARAMETERS:	Chemical name	CAS No.	ACGIH TLV
	Distillates, petroleum, hydrotreated light	64742-47-8	TWA: 200 mg/m3 (as total hydrocarbon vapour)
	Stoddard solvent	8052-41-3	TWA: 100 ppm
ENGINEERING MEASURES:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.		
<u>PERSONAL PROTECTIVE EQUIPMENT</u>			
RESPIRATORY PROTECTION:	In case of insufficient ventilation, use suitable respiratory equipment.		
EYE PROTECTION:	Wear safety goggles.		
SKIN & BODY PROTECTION:	Wear safety shoes and protective gloves. Wash contaminated clothing before reuse.		
HYGIENE MEASURES:	Remove and wash contaminated clothing and gloves. Ensure the eyewash stations and safety showers are close to the workstation location.		

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SECTION 9 – PHYSICAL & CHEMICAL PROPERTIES

Physical state	Liquid
Colour	Brown
Odour	Mild hydrocarbon
Odour Threshold (ppm)	Not determined
pH	Not determined
Melting/freezing point (°C)	Not determined
Boiling point/boiling range (°C)	Not determined
Flash point (°C)	Not determined
Evaporation Rate	Not determined
Flammability Limit in Air	
Upper flammability limit	Not determined
Lower flammability limit	Not determined
Vapour pressure	Not determined
Vapour density	Not determined
Specific Gravity	0.8861
Partition coefficient: n-octanol/water	Not determined
Auto-ignition temperature (°C)	Not determined
Kinematic viscosity (cSt) at 40°C	80-100
VOC Content (%)	Not determined

SECTION 10 – STABILITY & REACTIVITY

REACTIVITY	Non-reactive under normal conditions
CHEMICAL STABILITY	Stable under normal conditions
POSSIBILITY OF HAZARDOUS REACTIONS	Hazardous polymerization does not occur.
CONDITIONS TO AVOID	Avoid contact with incompatible materials, avoid excessive heat, sparks, and open flame.
INCOMPATIBLE MATERIALS	Strong oxidizing agent
HAZARDOUS DECOMPOSITION PRODUCTS	May release carbon monoxide, carbon dioxide, smoke and irritating vapours when heated to decomposition.

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SECTION 11 – TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation – Prolonged exposure may be harmful

Skin Contact – Causes skin irritation

Eye Contact – Causes serious eye irritation

Ingestion – Expected to be a low ingestion hazard

ACUTE TOXICITY

Component name	Oral LD50	Dermal LD50	Inhalation LC50
Carbonic acid calcium salt (1:1)	6,450 mg/kg (mouse) 6,450 mg/kg (rat)	-	-
Naphthalenesulfonic acid, dinonyl-, calcium salt (2:1)	> 2,500 mg/kg (rat)	> 10,000 mg/kg	9,000 mg/L, 1 hr (rat)
Distillates, petroleum, hydrotreated light	> 5,000 mg/kg (rat)	> 2,000 mg/kg (rabbit)	> 6.03 mg/L, 4 hr (rat)
Distillates (petroleum), solvent-dewaxed heavy paraffinic	> 5,000 mg/kg (rat)	> 2,000 mg/kg (rabbit)	-
Distillates (petroleum), hydrotreated heavy paraffinic	> 5,000 mg/kg	> 2,000 mg/kg (rabbit)	-

SKIN CORROSION/IRRITATION Can cause irritation

MUTAGENICITY None

CARCINOGENICITY None

REPRODUCTIVE TOXICITY None

ASPIRATION TOXICITY None

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SECTION 12 – ECOLOGICAL INFORMATION

ECOTOXICITY	Toxicity to fish: <i>Carbonic acid calcium salt (1:1):</i> Western mosquitofish (<i>Gambusia affinis</i>) > 56,000 mg/L, 96 hr <i>Naphthalenesulfonic acid, dinonyl-, calcium salt (2:1):</i> Fish > 0.28 mg/L, 96 hr <i>Distillates, petroleum, hydrotreated light:</i> Fathead minnow 45 mg/L, 96 hr <i>Distillates, petroleum, solvent-dewaxed heavy paraffinic:</i> Fish > 100 mg/L, 96 hr Toxicity to daphnia and other aquatic invertebrates: <i>Naphthalenesulfonic acid, dinonyl-, calcium salt (2:1):</i> Daphnia > 0.27 mg/L, 48 hr <i>Distillates, petroleum, solvent-dewaxed heavy paraffinic:</i> Daphnia > 100 mg/L, 48 hr <i>Distillates, petroleum, hydrotreated heavy paraffinic:</i> Daphnia > 100 mg/L, 48 hr Toxicity to algae: <i>Naphthalenesulfonic acid, dinonyl-, calcium salt (2:1):</i> Algae > 0.27 mg/L, 72 hr <i>Distillates, petroleum, solvent-dewaxed heavy paraffinic:</i> Algae > 100 mg/L, 72 hr <i>Distillates, petroleum, hydrotreated heavy paraffinic:</i> Algae > 100 mg/L, 72 hr Toxicity to bacteria: No data available
PERSISTENCE & DEGRADABILITY	No data available
BIOACCUMULATION	No data available
OTHER ADVERSE EFFECTS	No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

DISPOSAL METHODS	All disposal activities must comply with local, federal, and state environmental control regulations. Do not dispose in to environment, in drains or in rivers, ponds, water reservoirs, and soil.
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SECTION 14 – TRANSPORT INFORMATION

<u>DOT</u>	Not regulated as dangerous goods
<u>TDG</u>	Not regulated as dangerous goods
<u>IATA</u>	Not regulated as dangerous goods
<u>IMDG/IMO</u>	Not regulated as dangerous goods

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SECTION 15 – REGULATORY INFORMATION

INTERNATIONAL INVENTORIES

TSCA	All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory.
DSL	On the inventory, or in compliance with the inventory.
IECSC	On the inventory, or in compliance with the inventory.

SECTION 16 – OTHER INFORMATION

The information and recommendations contained herein are, to the best of our knowledge and belief, accurate and reliable as of the date issued. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and Ship 2 Shore makes no warranty or guarantee, expressed or implied, of their accuracy or reliability, and Ship 2 Shore shall not be liable for any loss or damage based upon the criteria supplied by the developers of these rating systems, together with Ship 2 Shore's interpretation of the available data.

REVISION DATE: **DECEMBER 2019**



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Section 1 – Product And Company Identification

PRODUCT

PRODUCT NAME: S2S PETROWRAP
PRODUCT DESCRIPTION: Preparation/Mixture
PRODUCT USE: Corrosive Prevention

MANUFACTURER INFORMATION

Ship-2-Shore
 109-7337 North Fraser Way
 Burnaby, BC V5J 0G7 Canada
 (604) 522-2811

EMERGENCY INFORMATION

Telephone: 800-430-1533
Emergency Telephone: 866-836-8855

Section 2 – Hazards Identification

GHS Hazard Classification

Carcinogenicity Category 1B
Specific target organ toxicity (repeated exposure) Category 1 (Respiratory tract)



Signal word

Danger

Hazard Statement:

H350 May cause cancer .
 H372 Causes damage to organs through prolonged or repeated exposure.

Precautionary Statements: Prevention

P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P260 Do not breathe dust/fume/gas/mist/vapours/spray.
 P264 Wash hands thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P281 Use personal protective equipment as required.

Response

P308 + P313 IF exposed or concerned: Get medical advice/attention.
 P314 Get medical advice/attention if you feel unwell.

Storage

P405 Store locked up.

Disposal

P501 Dispose of contents/container: Follow the waste disposal requirements of your country, state, or local authorities.

Other hazards

0 % of mixture consists of ingredients of unknown acute toxicity

Section 3 – Composition/Information on Ingredients

COMPONENTS	CAS No.	% BY WEIGHT
Slack wax (Petroleum)	64742-61-6	17-34
Talc	14807-96-6	25-30
Refined petroleum streams	72623-85-9, 72623-83-7	15-18
Microcrystalline wax	63231-60-7	0-27
Mineral Spirits	8052-41-3	2-7
Polybutene	9003-88-4	0-9
Kerosene	8008-20-6	0.5-5

Section 4 – First Aid Measures

Description of First Aid Measures

Eye Contact	Remove contact lenses. Immediately flush eye(s) with plenty of water. If eye irritation persists, consult a specialist.
Skin Contact	Wash thoroughly with soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing before reuse. In the case of skin irritation or allergic reactions see a physician.
Inhalation	Move to fresh air in case of accidental inhalation of vapors. If continued difficulty with breathing is experienced, get immediate medical attention.
Ingestion	Not an expected route of exposure. If swallowed, do not induce vomiting. Get immediate medical attention.

Section 5 – Fire Fighting Measures

Fire/explosion	NFPA Class IIIB combustible liquid.
Suitable extinguishing media	Water fog, water spray, foam, dry powder, do not use a solid water stream as it may scatter and spread fire.
Unsuitable extinguishing media	No information available
Special hazards arising from the substance or mixture	Oxides of carbon, dense smoke and possible toxic fumes.
Protective actions fire-fighters	Wear self-contained breathing apparatus and protective suit.

Section 6 – Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures	Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. Do not breath gas. Emergency personnel need self-contained breathing equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.
Methods and materials for containment and cleaning up	Evacuate the area and eliminate all sources of ignition. Spilled material will solidify. Shovel into suitable container for disposal. Pick up and arrange disposal without creating dust. Prevent product from entering drains.
Spill Precautions	Material can create slippery conditions.

Section 7 – Handling and Storage

Precautions for safe handling	Handle in accordance with good industrial hygiene and safety practices. Keep away from heat and sources of ignition. Ensure all equipment is electrically grounded before beginning transfer operations.
Conditions for safe storage, including any incompatibilities	Do not store near heat, sparks or open flame. Store only in a well ventilated area.

Section 8 – Exposure Controls / Personal Protection

Control Parameters Exposure Guidelines

Components	ACGIH TLV	OSHA PEL	NIOSH
			REL
Refined petroleum streams 72623-85-9, 72623-83-7	TWA: 5mg/m ³ STEL: 10 mg/m ³		
Kerosene 8008-20-6	TWA: 200 mg/m ³		
Mineral spirits 8052-41-3	TWA: 100ppm		

Appropriate engineering control**Engineering Controls**

Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment**EYE PROTECTION:**

Safety Glasses with side shields. Wear ANSI approved eye protection

SKIN/BODY

Selection of specific items such as gloves, boots, apron or full-body suit will depend on

RESPIRATORY PROTECTION:

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations

Handle in accordance with good industrial hygiene and safety practice.

Section 9 – Physical and Chemical Properties

	PRODUCT CRITERIA
PHYSICAL STATE	Soft paste on cloth carrier
APPEARANCE - COLOR	Brown/Green
ODOR	Grease
ODOR THRESHOLD	No data available
PH	No data available
MELTING POINT/FREEZING POINT	80°C
INITIAL BOILING POINT AND BOILING RANGE	No data available
FLASH POINT	84°C
EVAPORATION RATE	Not applicable
FLAMMABILITY (solid, gas)	No data available
UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS	No data available
VAPOR PRESSURE	No data available
VAPOR DENSITY (AIR=1)	No data available
SPECIFIC GRAVITY(@25°C)	1.12
SOLUBILITY IN WATER	Insoluble
AUTO IGNITION TEMPERATURE	Not applicable
DECOMPOSITION TEMPERATURE	No data available
VISCOSITY	Not applicable
VOC CONTENT	50 g/L

Section 10 – Stability and Reactivity**Reactivity:**

Stable at normal ambient temperature and pressure.

Chemical Stability:

No decomposition if stored and applied as directed.

Possibility of Hazardous Reactions:

None under normal processing.

Conditions to Avoid:

Keep away from heat and sources of ignition

Incompatibility (Materials to Avoid):

Strong oxidizing agents. Nitrates. Fluorine. Chlorine.

Hazardous Decomposition Products:

Flue gas, carbon monoxide, aldehydes in the case of incomplete combustion.

Section 11 – Toxicological Information

GHS Required Criteria	Toxicity Criteria	Toxicity Information	Comments	Chemical Constituent
Acute Toxicity	LD50 (Oral/Rat)	>5000 mg/kg		Slack wax
	LC50 (Inhalation/Rat male)	-		
	LD50 (Dermal/Rabbit)	>5000 mg/kg		
	LD50 (Oral/Rat)	>5000 mg/kg		Microcrystalline waxes
	LC50 (Inhalation/Rat male)	-		
	LD50 (Dermal/Rabbit)	>3600 mg/kg		
	LD50 (Oral/Rat)	>34,600 mg/kg		Butene, homopolymer
	LC50 (Inhalation/Rat male)	4820 mg/m³		
	LD50 (Dermal/Rabbit)	>10,250 mg/kg		
	LD50 (Oral/Rat)	>5000 mg/kg		Refined petroleum Streams (72623-85-9, 72623-83-7)
	LC50 (Inhalation/Rat male)	>2500 mg/kg		
	LD50 (Dermal/Rabbit)	>2000 mg/kg		

	LD50 (Oral/Rat)	>5000 mg/kg		
	LC50 (Inhalation/Rat male)	>7.5 mg/L, 6 hrs		Kerosene (8008-20-6)
	LD50 (Dermal/Rabbit)	>2000 mg/kg		
	LD50 (Oral/Rat)	>2000 mg/kg		
	LC50 (Inhalation/Rat male)	-		Mineral spirits (8052-41-3)
	LD50 (Dermal/Rabbit)	>2000 mg/kg		
Skin Corrosion/Irritation	Slightly irritating to skin			
Serious Eye Damage / Eye Irritation	Slightly irritating to eyes			
Respiratory or Skin Sensitization	Guinea pig: not sensitizing			
Germ Cell Mutagenicity	No evidence of mutagenic effects			
Carcinogenicity	May cause cancer		1B	Based on information of the components
Reproductive Toxicity	Based on available data, the classification criteria are not met.			
STOT - Single Exposure	Based on available data, not expected			
STOT - Repeated Exposure	Cause damage to organs through prolonged or repeated exposure.		Cat 1	
Aspiration Hazard	Not classified, no data available			
Ames Test	No data available			

Section 12 – Ecological Information

Ecotoxicity This material may be toxic to aquatic organisms and should be kept out of sewage and drainage systems and all bodies of water. The environmental impact of this product has not been fully investigated.

Toxicity	LL50 (Pimephales promelas (fathead minnow)) 96 hours: >100 mg/l. LL50 (Gammarus pulex) 48 hours: > 10,000 mg/l. NOEL (Pseudokirchneriella subcapitata (green algae)) 72 hours: >=100 mg/l.	Slack wax
	LL50 (Pimephales promelas (fathead minnow)) 96 hours: >100 mg/l. LL50 (Gammarus pulex) 48 hours: > 10,000 mg/l. NOEL (Pseudokirchneriella subcapitata (green algae)) 72 hours: >=100 mg/l.	Microcrystalline waxes
	LC50 (Trout) 96 hours: >1000 mg/l. EC50 (Daphnia) 48 hours: > 1,000 mg/l.	Butene homopolymer
	LC50 (Pimephales promelas (fathead minnow)) 96 hours: >45 mg/l. LC50 (Lepomis Macrochirus) 96 hours: > 1740 mg/l.	Kerosene
	NOEL (Pseudokirchneriella subcapitata (green algae)) 72 hours: >=3000 mg/l.	Mineral spirits
Persistence and degradability	Slack Waxes: inherently biodegradable	
Bioaccumulative potential	Partition coefficient n-octanol / water (log Kow) Mineral spirits: 3.16-7.15 Kerosene: 3.3-6.0	
Mobility in soil	No data available	
PBT and vPvB assessment	No data available	
Other adverse effects	No data available	

Section 13 – Disposal Considerations

Waste Disposal Dispose of waste according to local, state/provincial, and federal requirements. Land disposal of this product is restricted. Do not contaminate any lakes, streams, ponds, groundwater or soil.

Contaminated Materials Treat as product waste.

Container Disposal Handling of empty containers and liners should be in a manner to minimize dust generation. Safe handling procedures as outline in the SDS should be followed at all times. Consult the appropriate official for information regarding disposal requirements.

Section 14 – Transportation Information

DOT Not Regulated as a hazardous material for transport

TDG Not Regulated as a hazardous material for transport

IATA Not Regulated as a hazardous material for transport

IMDG Not Regulated as a hazardous material for transport

Section 15 – Regulatory Information**U.S. FEDERAL REGULATIONS****OSHA Hazards (HCS 1994)**

Non-hazardous substance

SARA 302 Status

SARA 302: No chemicals in this product are subjected to the reporting requirements of SARA Title III, Section 302.

SARA 311/312 Classification

Non-hazardous substance

SARA 313 Chemical

SARA 313: This product does not contain any chemical components with known CAS number that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section

US. EPA CERCLA Hazardous Substances (40 CFR 302)

None

INTERNATIONAL REGULATIONS**WHMIS Classification**

WHMIS-2015: This SDS is in compliance with WHMIS 2015 (HPR / new HPA).

AICS

Listed

ENCS

Not listed

DSL

Listed

EINECS

Not listed

PICCS

Listed

KECI

Listed

IECSC

Listed

INSQ

Not listed

NZIoC

Listed

CHINV

Not listed

NECI

Listed

Section 16 – Other Information**HMIS Rating:**

Health	1
Flammability	1
Physical Hazard	0
Personal Protection	x

NFPA Rating:

Health	1
Flammability	1
Instability	0
Special	-

Issue Date:

October 11, 2019

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA BELIEVED TO BE RELIABLE BY SHIP-2-SHORE. IT IS TRUE AND ACCURATE TO THE BEST OF OUR KNOWLEDGE, BUT IS NOT INTENDED TO BE ALL-INCLUSIVE. USERS SHOULD CONSIDER THIS INFORMATION AS A SUPPLEMENT TO OTHER INFORMATION GATHERED BY THEM AND MUST MAKE THEIR OWN DETERMINATION OF SUITABILITY AND COMPLETENESS TO ASSURE PROPER SAFE USE AND DISPOSAL OF THESE MATERIALS.

Salt Spray (Fog) Testing to ASTM B117-18

Report No.: TR02785.01-03R0
Prepared for: Ship-2-Shore
John Bower
Address: 109 – 7337 North Fraser Way
Burnaby, BC V5J 0G7
Coating
Manufacturer: Ship-2-Shore
Date Received: 12 August 2019
Date Tested: 16 August 2019 to 28 September 2019
Part Data: Coated and uncoated (control) specimens of the steel plates.
Equipment Used: Q-Fog Cyclic Corrosion Tester CCT-1100, Powertech asset 30853
Mettler Toledo pH meter F20, Powertech asset 34062
VWR Hydrometer, Powertech asset 33700

TEST CONDUCTED:

Salt spray testing was conducted using the Q-Fog CCT in accordance with the following standard:

- ASTM standard B117-18, "Standard Practice for Operating Salt Spray (Fog) Apparatus"

SAMPLE DESCRIPTION & PREPARATION:

The client provided a specimen consisting of the substrate and coating listed in the table, below.

Sample ID	Substrate	Coating
PLID HD	Steel plate	Ship-2-Shore PLID HD

The specimen substrate material and coating were supplied by the client and substrates were not cleaned prior to coating. The coating was applied to the substrate sample by brush by Ship-2-Shore representatives, Zoran Culin and Erik Bergvinson, who then witnessed the samples' placement inside the Q-fog chamber before commencing the salt fog test.

Salt Spray (Fog) Testing to ASTM B117-18

TEST SOLUTION PREPARATION:

The test solution was prepared using 5 ± 1 parts by mass of sodium chloride (NaCl) and 95 parts of water. Impurity content in the sodium chloride was confirmed to be below the limits given in ASTM B117, Section 8. Adjustment to solution pH was made using analytical grade sodium hydroxide and/or analytical grade hydrochloric acid.

TEST PROCEDURE:

The test specimen was loaded into the test chamber in the orientations shown in Figure 1. The specimen was supported on inert racks in the salt spray chamber; the flat panel specimens were oriented at an angle of $20^\circ \pm 5^\circ$ inclined from vertical.

The test parameters are shown below, in Table 1.

Table 1: Test parameters

Parameter	Value
Duration	1000 hours
Start Date	16 August 2019
End Date	28 September 2019
Chamber Temperature	$35^\circ\text{C} \pm 2^\circ\text{C}$
Collected Solution pH	pH 6.5 to 7.2 (at $23^\circ\text{C} \pm 3^\circ\text{C}$)
Collected Solution Concentration	5 ± 1 part by mass NaCl to 95 ± 1 part distilled water

Chamber temperature, collected solution specific gravity, collection rate, and collected solution pH were measured every 24 hours, or up to a maximum of 96 hours when the time period spanned a weekend or holiday.

The condition of specimen was documented by photograph at the following approximate intervals: 100, 336, 500, and 1000 hours.

Salt Spray (Fog) Testing to ASTM B117-18

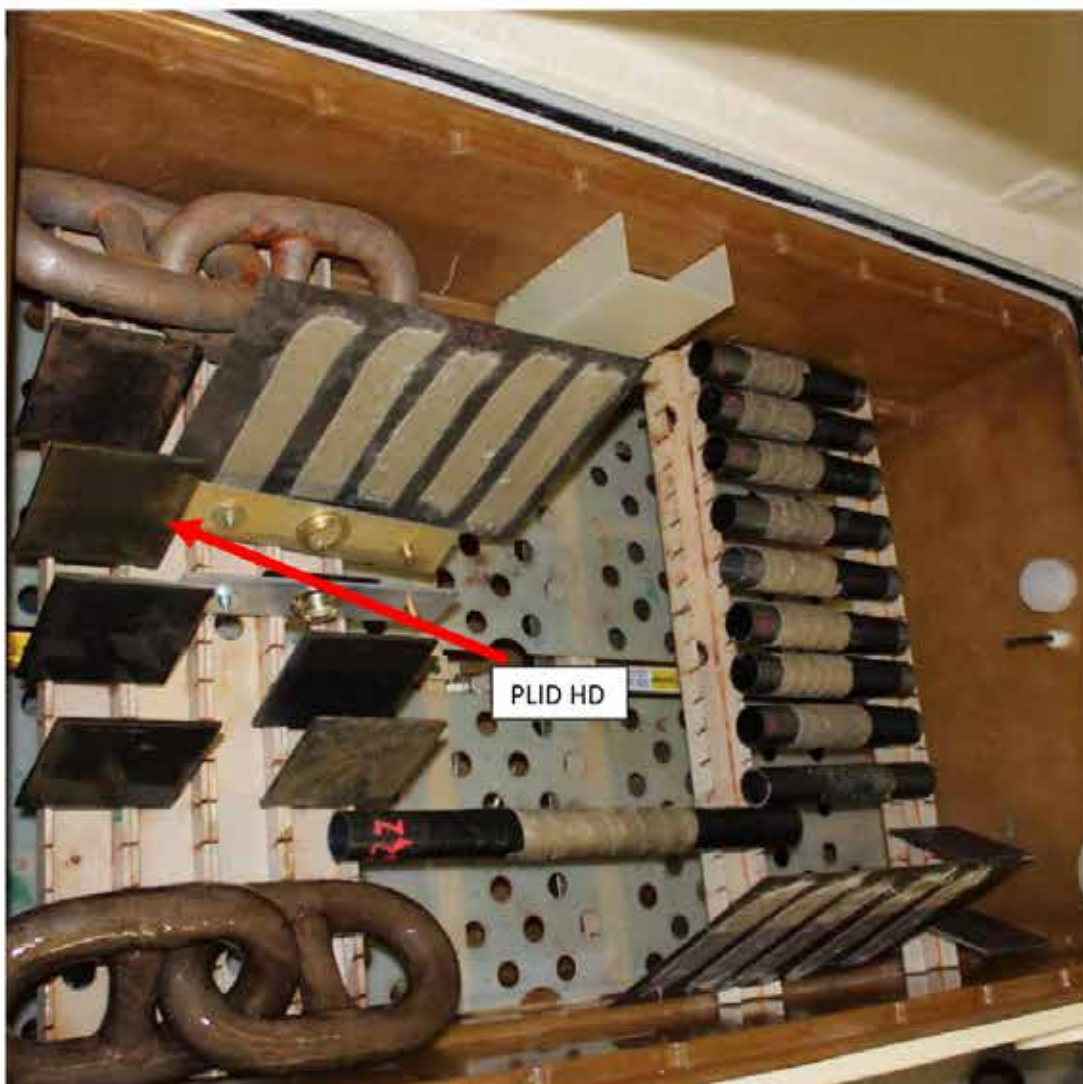


Figure 1: Inside the Q-fog chamber before starting the test

Salt Spray (Fog) Testing to ASTM B117-18

TEST DATA:

See Appendix A for the test record.

All parameters except for collected solution pH were within the standard specification for the duration of the test. Collected solution pH remained near-neutral, but particular daily measurements were marginally below the specified pH range (minimum values of 6.0-6.3 versus 6.5-7.2). As per ASTM B117, reservoir pH adjustments were made to compensate when the collected solution pH was found to be out of specified range.

TEST RESULTS:

Test results relate only to the items tested. No acceptance criteria were provided by the client. Photographs of the specimens before, during, and after testing are provided below in Figures 2 through 18.

No evidence of corrosion was observed on PLID HD with the exception of isolated locations of corrosion product bleeding from the edges of the plate (Figure 2). After 1000 hours of exposure, the coating at one test location was removed and the substrate was examined. No evidence of corrosion was observed on the substrate on the substrate of the PLID HD specimen (Figure 3).

Salt Spray (Fog) Testing to ASTM B117-18



Figure 2: PLID HD plate specimen, after exposure to salt spray testing for 100, 336, 500, and 1000 hours.

Salt Spray (Fog) Testing to ASTM B117-18

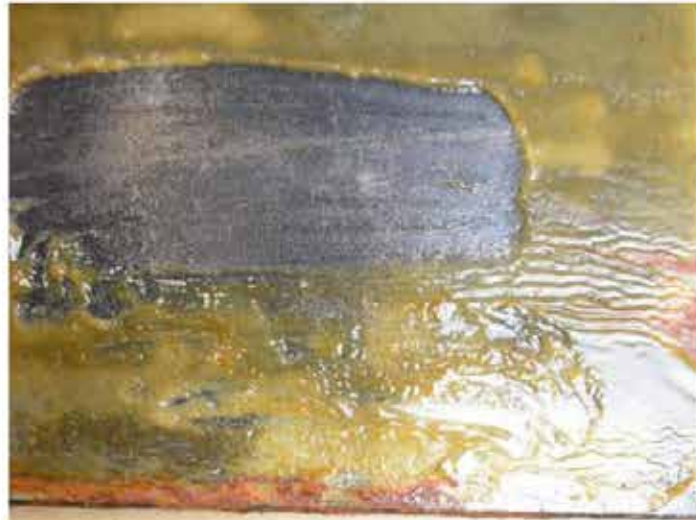


Figure 3: No evidence of corrosion observed on substrate under coating of PLID HD specimen.

Prepared and Tested By: <i>Shima Karimi</i> <small>Type text here</small>	Reviewed By: <i>Kristen Porter</i>
Shima Karimi EIT, Materials Solutions	Kristen Porter, P.Eng. Materials Engineer, Materials Solutions

Revision History

Revision 0
2019-10-21 New Document

Salt Spray (Fog) Testing to ASTM B117-18

**APPENDIX A.
SALT FOG (SPRAY) TEST RECORD**

Salt Spray (Fog) Testing to ASTM B117-18

Powertech AMTP05 Salt Fog Test Record DOC ID: AMPT03-03						Test Standard: <input type="checkbox"/> ISO 9227:2017 <input checked="" type="checkbox"/> ASTM B117-16					
Client/PLN: <u>Ship-2-Shore PL-02785</u>						Equipment: <u>Q-Fog CCT-1100</u>					
Duration: <u>1000 hrs</u>						Asset #: <u>30853</u>					
Start Date/Time: <u>Aug 16 / 12:30 PM</u>						Cal. Due Date:					
End Date/Time: <u>Sep 27, 28</u>											
Pre- & Post-test Checks: <input checked="" type="checkbox"/> Sample condition and placement photodocumented? <input type="checkbox"/> Acceptance criteria confirmed? <u>No</u> <input checked="" type="checkbox"/> Pre-/post-test cleaning requirements confirmed/completed? <input checked="" type="checkbox"/> Pre-test collection rate test complete (req. for ISO 9227)? <u>N/A</u>						Start of Test Checks: Atomizing air check: <u>14.5 (100)</u> Pressure, kPa (psi) <u>25°C</u> Temperature, °C <input type="checkbox"/> Pass <input type="checkbox"/> Fail					
Solution Type ¹	Date	Time	Solution Temp (°C)	Specific Gravity ²	pH	Collected Vol (mL)	Mass Check ³ (g/hr)	Elapsed Test Time (hr)	Collection Rate (mL/hr)	Chamber Temp (°C)	Initial
<u>Pre-test</u>											
<u>(L)</u>	<u>Aug 9</u>	<u>3:00</u>	<u>24.9</u>	<u>1.038</u>	<u>6.31</u>	<u>17</u>		<u>11 hrs</u>	<u>1.545</u>	<u>35</u>	<u>SK</u>
<u>(R)</u>	<u>Aug 9, 2019</u>	<u>3:05</u>	<u>24.8</u>	<u>1.037</u>	<u>6.36</u>	<u>17.6</u>		<u>11 hrs</u>	<u>1.6</u>	<u>35</u>	<u>SK</u>
<u>Res</u>	<u>Aug 16, 2019</u>	<u>12:30</u>	<u>23.8</u>	<u>1.030</u>	<u>6.67</u>						<u>SK</u>
<u>(R)</u>	<u>Aug 19, 2019</u>	<u>2:30</u>	<u>26.00</u>	<u>1.032^{24.8}</u>	<u>6.55</u>	<u>102</u>		<u>76⁵⁵⁸⁴⁵</u>	<u>1.34</u>	<u>35</u>	<u>SK</u>
<u>(L)</u>	<u>Aug 19, 2019</u>	<u>2:30</u>	<u>23.9</u>	<u>1.032^{24.8}</u>	<u>6.51</u>	<u>80</u>		<u>76⁵⁵⁸⁴⁵</u>	<u>1.052</u>	<u>35</u>	<u>SK</u>
<u>R</u>	<u>"</u>	<u>3:00</u>	<u>25.7</u>	<u>1.029^{24.8}</u>	<u>6.97</u>						
<u>(R)</u>	<u>Aug 20, 2019</u>	<u>3:45</u>	<u>24.6</u>	<u>1.033^{24.8}</u>	<u>6.45</u>	<u>42</u>		<u>55870</u>		<u>35</u>	<u>SK</u>
<u>(L)</u>	<u>Aug 20, 2019</u>	<u>3:45</u>	<u>24.4</u>	<u>1.033^{24.8}</u>	<u>6.16</u>	<u>28</u>		<u>55870</u>		<u>35</u>	<u>SK</u>
<u>R</u>	<u>"</u>	<u>3:50</u>	<u>26.1</u>	<u>1.030^{24.8}</u>	<u>7.01</u>						
<u>(R)</u>	<u>Aug 21, 2019</u>	<u>3:00</u>	<u>24.7</u>	<u>1.032</u>	<u>6.60</u>	<u>27</u>		<u>55893</u>	<u>1.174</u>	<u>35</u>	
<u>(L)</u>	<u>Aug 21, 2019</u>	<u>3:00</u>	<u>24.0</u>	<u>1.033</u>	<u>6.50</u>	<u>39</u>		<u>55893</u>	<u>1.695</u>	<u>35</u>	
<u>(R)</u>	<u>Aug 22, 2019</u>	<u>3:00</u>	<u>24.6</u>	<u>1.034^{24.8}</u>	<u>6.45</u>	<u>38</u>		<u>55917</u>	<u>1.583</u>		
<u>(L)</u>	<u>Aug 22, 2019</u>	<u>3:00</u>	<u>25.2</u>	<u>1.034^{24.8}</u>	<u>6.42</u>	<u>24</u>		<u>55917</u>	<u>1.00</u>		
<u>Res</u>		<u>3:30</u>	<u>22.7</u>	<u>1.029</u>	<u>6.54</u>						
			<u>23.8</u>		<u>6.59</u>						
<u>(R)</u>	<u>Aug 23</u>	<u>1:00</u>	<u>25.0</u>	<u>1.034</u>	<u>6.48</u>	<u>32</u>		<u>55939</u>	<u>1.454</u>	<u>35</u>	<u>SK</u>
<u>(L)</u>	<u>Aug 23</u>	<u>1:00</u>	<u>24.6</u>	<u>1.034</u>	<u>6.41</u>	<u>21</u>		<u>55939</u>	<u>0.954</u>	<u>35</u>	<u>SK</u>

Notes:
 1 Solution Type: P = Prepared, R = Reservoir, C = Collected
 2 Column typically contains SG values not corrected for hydrometer offset. If SG value is outside the accepted range of 1.027 - 1.033, also report the corrected value using the notation convention: SG_{uncorrected} (SG_{corrected})
 3 Report the mass/hour value for the collected solution volume. If within the range of 1.02-2.06 g/hr, the collected volume measurement is confirmed.

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Salt Spray (Fog) Testing to ASTM B117-18

Powertech AMTP05 Salt Fog Test Record DOC. ID: AMP103-83						Test Standard: <input type="checkbox"/> ISO 9227:2012 <input checked="" type="checkbox"/> ASTM B117-16					
Client/PL#:						Equipment:					
Duration:						Asset #:					
Start Date/Time:						Cal. Due Date:					
End Date/Time:											

Solution Type ¹	Date	Time	Solution Temp (°C)	Specific Gravity ²	pH	Collected Vol (mL)	Mass Check ³ (g/hr)	Elapsed Test Time (hr)	Collection Rate (mL/hr)	Chamber Temp (°C)	Initial
Res.	Aug 23	1:30	25.0	1.032 ²⁵	6.48	←					→
⊙ R	Aug 26	12:50 ²⁴	23.7	1.031 ²⁵	6.64	118		56010	1.662	35	SK
⊙ L	Aug 26	12:50 ²⁴	23.2		6.75	73		56010	1.028	35	SK
Res.	Aug 26		24.1		6.75						
⊙ R	Aug 27	2:10	25.3	1.030	6.27	37.5		56035	1.5	35	SK
⊙ L	Aug 27	2:10	24.7	1.030	6.33	21		56035	0.84	35	SK
Res.	Aug 27	2:20	24.8	1.027	6.35	←					→
⊙ R	Aug 28	2:00	23.3	1.034	6.46	38		56059	1.58	35	SK
⊙ L	Aug 28	2:00	23.1	1.034	6.44	23		56059	0.958	35	SK
Res.	Aug 28	2:30	23.6	1.027	7.77	←					→
⊙ R	Aug 29	2:13	26.2	1.031	6.45	38	0.003	56083		35	SK
⊙ L	Aug 29	2:13	24.2	1.031 ²⁴	6.37	29	0.619	56083		35	SK
Res.	Aug 29	2:35 ²⁴	25.8	1.026 ²⁵	7.62	←					→
L	Aug 30	2:50	24.6	1.032	6.38	25		56106	1.04	35	RY
R	Aug 30	2:50	24.6	1.030	6.40	28		56106	1.58	35	RY
Res.	Aug 30	2:50	24.4	1.027	8.60	←					→
L	Sep 03	2:50		1.032	6.87	130.5		56202	1.35	35	SK
R	Sep 03	2:50	28.4	1.032	6.79	104.5	58.22	56202	1.08	35	SK
RES	Sep 03	2:50	25.6	1.030	8.36	←					→
L	Sep 04	2:50	23.4	1.032	6.97	26		56226	1.08	35	SK
R	Sep 04	2:50	23.8	1.032	6.78	42.5		56226	1.77	35	SK
Res.	Sep 04	2:50	25.6	1.030	8.27	←		56226	←	35	SK

Notes:

- 1 Solution Type: P = Prepared, R = Reservoir, C = Collected
- 2 Column typically contains SG values not corrected for hydrometer offset. If SG value is outside the accepted range of 1.027 - 1.033, also report the corrected value using the notation convention: SG_{measured} (SG_{corrected})
- 3 Report the mass/hour value for the collected solution volume. If within the range of 1.02 - 2.08 g/hr, the collected volume measurement is confirmed.

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Salt Spray (Fog) Testing to ASTM B117-18

Powertech AMTP05 Salt Fog Test Record <small>DOC. ID: AMFT03-R3</small>						Test Standard: <input type="checkbox"/> ISO 9227:2012 <input type="checkbox"/> ASTM B117-16					
Client/PL#: _____						Equipment: _____					
Duration: _____						Asset #: _____					
Start Date/Time: _____						Cal. Due Date: 8/0/00					
End Date/Time: _____											

Solution Type ¹	Date	Time	Solution Temp (°C)	Specific Gravity ²	pH	Collected Vol (mL)	Mass Check ³ (g/hr)	Elapsed Test Time (hr)	Collection Rate (mL/hr)	Chamber Temp (°C)	Initial
R	Sep 05	3:00	26.5	1.032 ^{21.2}	6.44	39		56250		35	SK
L	Sep 05	3:00	26.6	1.032 ^{21.2}	6.63	25		56250		35	SK
Res	Sep 05	3:00		1.028 ^{20.8}	8.08	←					→
R	Sep 06	3:15	22.1	1.031	6.49	28		56273	1.217	35	SK
L	Sep 06	3:15	22.1	1.031	6.48	24		56273	1.043	35	SK
Res	Sep 06	3:15	26.0	1.028	7.99	←					→
R	Sep 09	2:10	27.8	1.030	6.51	127.5	-	56343	1.821	35	SK
L	Sep 09	2:10	27.7	1.031	6.75	75	-	56343	1.071	35	SK
Res	Sep 09	2:10	25.6	1.028	7.72						
R	Sep 10	2:48	25.2	1.032	6.45	2843		56368	1.72	35	RY
L	Sep 10	2:48	25.1	1.032	6.48	28		56368	1.12	35	RY
Res	Sep 10	2:48	26.4	1.028	6.95	←					→ RY
R	Sep 11	12:06	22.1	1.032	6.53	32		56387	1.684	35	SK
L	Sep 11	12:06	21.6	1.032	6.69	19		56387	1.00	35	SK
RES	Sep 11	12:06	24.0	1.029	7.58	←					→ SK
R	Sep 13	2:40	25.4	1.033	6.68	54		56417	1.542	35	SK
L	Sep 13	2:40	23.9	1.033	6.67	35		56417	1.166	35	SK
RES	Sep 13	2:40	26.0	1.030	8.42	←					→ SK

Notes:

¹ Solution Type: P = Prepared, R = Reservoir, C = Collected

² Column typically contains SG values not corrected for hydrometer offset. If SG value is outside the accepted range of 1.027 - 1.033, also report the corrected value using the notation convention: SG_{uncorrected} (SG_{corrected})

³ Report the mass/hour value for the collected solution volume. If within the range of 1.02-2.06 g/hr, the collected volume measurement is confirmed.

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Document Owner: K.Porter

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Salt Spray (Fog) Testing to ASTM B117-18

Powertech AMTP05 Salt Fog Test Record <small>DOC ID: AMFT03-R3</small>						Test Standard: <input type="checkbox"/> ISO 9227:2012 <input type="checkbox"/> ASTM B117-16					
Client/PL#:						Equipment:					
Duration:						Asset #:					
Start Date/Time:						Cal. Due Date:					
End Date/Time:											

Solution Type ¹	Date	Time	Solution Temp (°C)	Specific Gravity ²	pH	Collected Vol (mL)	Mass Check ³ (g/hr)	Elapsed Test Time (hr)	Collection Rate (mL/hr)	Chamber Temp (°C)	Initial
R	Sep 16	12:45	26.8	1.032	6.60	137.5		56487	1.964	35	SK
L	"	"	27.2	1.031	7.02	97		56487	1.386	35	SK
RES	"	"	24.1	1.030	8.36	←					→
R	Sep 17	2:25	22.3	1.030	6.50	46		56513	1.769	35	SK
L	"	2:25	24.7	1.030	6.54	30		56513	1.154	35	SK
RES	"	2:25	26.5	1.027	8.20	←					→
R	Sep 18	12:30	28.0	1.031	6.94	37		56534	1.76	35	SK
L	Sep 18	12:30	26.8	1.031	6.82	25		56534	1.19	35	SK
RES	"	12:30	25.2	1.029	7.95	←		56534	←		→
R	Sep 19	2:45	25.8	1.033	6.39	53		56561	1.96	35	SK
L	Sep 19	2:45	24.7	1.033	6.48	31		56561	1.15	35	SK
RES	Sep 19	2:45		1.030	7.63	←					→
R	Sep 20	1:10	22.7	1.033	6.69	45		56583	2.04	35	SK
L	Sep 20	1:10	22.5	1.033	6.71	25		56583	1.136	35	SK
RES	Sep 20	1:10	24.1	1.030	7.82	←					→
R	Sep 23	1:45	26.7	1.032	6.44	158		56655	2.19	35	SK
L	Sep 23	1:45	25.5	1.030	6.71	83		56655	1.15	35	SK
RES	Sep 23	1:45	24.4	1.030	8.59	←					→
R	Sep 24	11:44	24.0	1.033	6.61	35.5		56677	1.61	35	SK
L	Sep 24	11:44	23.4	1.033	6.57	25		56677	1.14	35	SK
RES	Sep 24	11:44	24.9	1.030	8.30	←					→

Notes:

1 Solution Type: P = Prepared, R = Reservoir, C = Collected

2 Columns typically contains SG values not corrected for hydrometer offset. If SG value is outside the accepted range of 1.027 - 1.033, also report the corrected value using the notation convention: SG_{uncorrected} (SG_{corrected})

3 Report the mass/hour value for the collected solution volume. If within the range of 1.02-2.06 g/hr, the collected volume measurement is confirmed.

Date Issued: 2018-08-24
Document Owner: K.Porter

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Salt Spray (Fog) Testing to ASTM B117-18

Report No.: TR02785.01-05R0
Prepared for: Ship-2-Shore
John Bower
Address: 109 – 7337 North Fraser Way
Burnaby, BC V5J 0G7
Coating
Manufacturer: Ship-2-Shore
Date Received: 12 August 2019
Date Tested: 16 August 2019 to 28 September 2019
Part Data: Coated specimens of the steel substrate
Equipment Used: Q-Fog Cyclic Corrosion Tester CCT-1100, Powertech asset 30853
Mettler Toledo pH meter F20, Powertech asset 34062
VWR Hydrometer, Powertech asset 33700

TEST CONDUCTED:

Salt spray testing was conducted using the Q-Fog CCT in accordance with the following standard:

- ASTM standard B117-18, “Standard Practice for Operating Salt Spray (Fog) Apparatus”

SAMPLE DESCRIPTION & PREPARATION:

The client provided a specimen consisting of the substrate and coating listed in the table, below.

Sample ID	Substrate	Coating
Float Coat V.1	Steel plate	Ship-2-Shore Float Coat V.1

The specimen substrate materials and coatings were supplied by the client and substrates were not cleaned prior to coating. The coating was applied to the substrate sample by brush by Ship-2-Shore representatives, Zoran Culin and Erik Bergvinson, who then witnessed the samples’ placement inside the Q-fog chamber before commencing the salt fog test.

TEST SOLUTION PREPARATION:

The test solution was prepared using 5 ± 1 parts by mass of sodium chloride (NaCl) and 95 parts of water. Impurity content in the sodium chloride was confirmed to be below the limits given in ASTM B117, Section 8. Adjustment to solution pH was made using analytical grade sodium hydroxide and/or analytical grade hydrochloric acid.

Salt Spray (Fog) Testing to ASTM B117-18

TEST PROCEDURE:

The test specimen was loaded into the test chamber in the orientations shown in Figure 1. The specimens were supported on inert racks in the salt spray chamber; the flat panel specimens were oriented at an angle of $20^{\circ} \pm 5^{\circ}$ inclined from vertical.

The test parameters are shown below, in Table 1.

Table 1: Test parameters

Parameter	Value
Duration	1000 hours
Start Date	16 August 2019
End Date	28 September 2019
Chamber Temperature	$35^{\circ}\text{C} \pm 2^{\circ}\text{C}$
Collected Solution pH	pH 6.5 to 7.2 (at $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$)
Collected Solution Concentration	5 ± 1 part by mass NaCl to 95 ± 1 part distilled water

Chamber temperature, collected solution specific gravity, collection rate, and collected solution pH were measured every 24 hours, or up to a maximum of 96 hours when the time period spanned a weekend or holiday.

The condition of the specimen was documented by photograph at the following approximate intervals: 100, 336, and 500 hours.

Salt Spray (Fog) Testing to ASTM B117-18

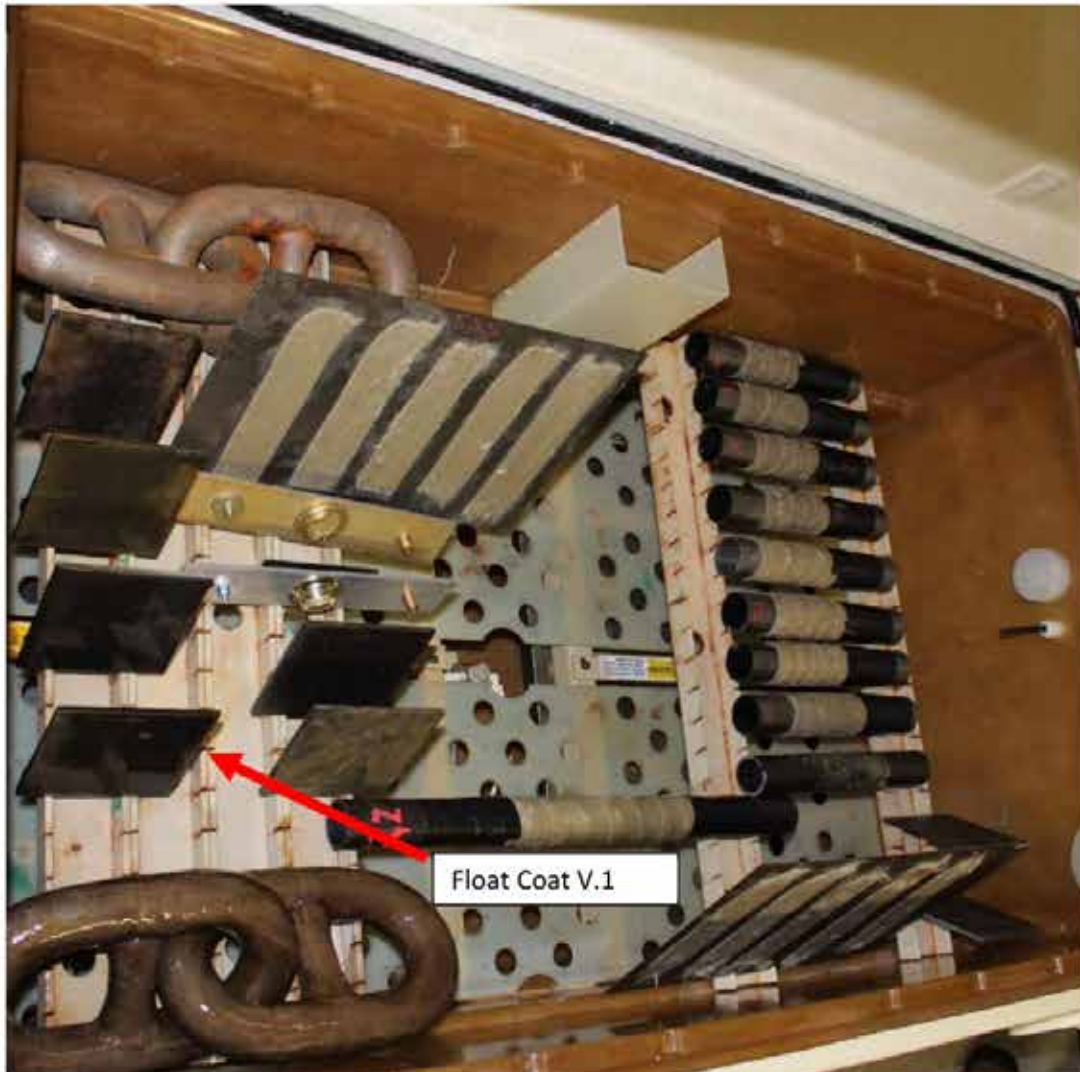


Figure 1: Float coat V.1 specimen inside the Q-fog chamber before starting the test

Salt Spray (Fog) Testing to ASTM B117-18

TEST DATA:

See Appendix A for the test record.

All parameters except for collected solution pH were within the standard specification for the duration of the test. Collected solution pH remained near-neutral, but particular daily measurements were marginally below the specified pH range (minimum values of 6.0-6.3 versus 6.5-7.2). As per ASTM B117, reservoir pH adjustments were made to compensate when the collected solution pH was found to be out of specified range.

TEST RESULTS:

Test results relate only to the item tested. No acceptance criteria were provided by the client. Photographs of the specimens before and during testing are provided below in Figures 2.

The specimens did not sustain corrosion, pitting, or metal loss after exposures of up to 336 hours. Evidence of corrosion was observed on the Float Coat V.1 specimen (Figure 2-D) after exposures of approximately 500 hours and longer.

Salt Spray (Fog) Testing to ASTM B117-18

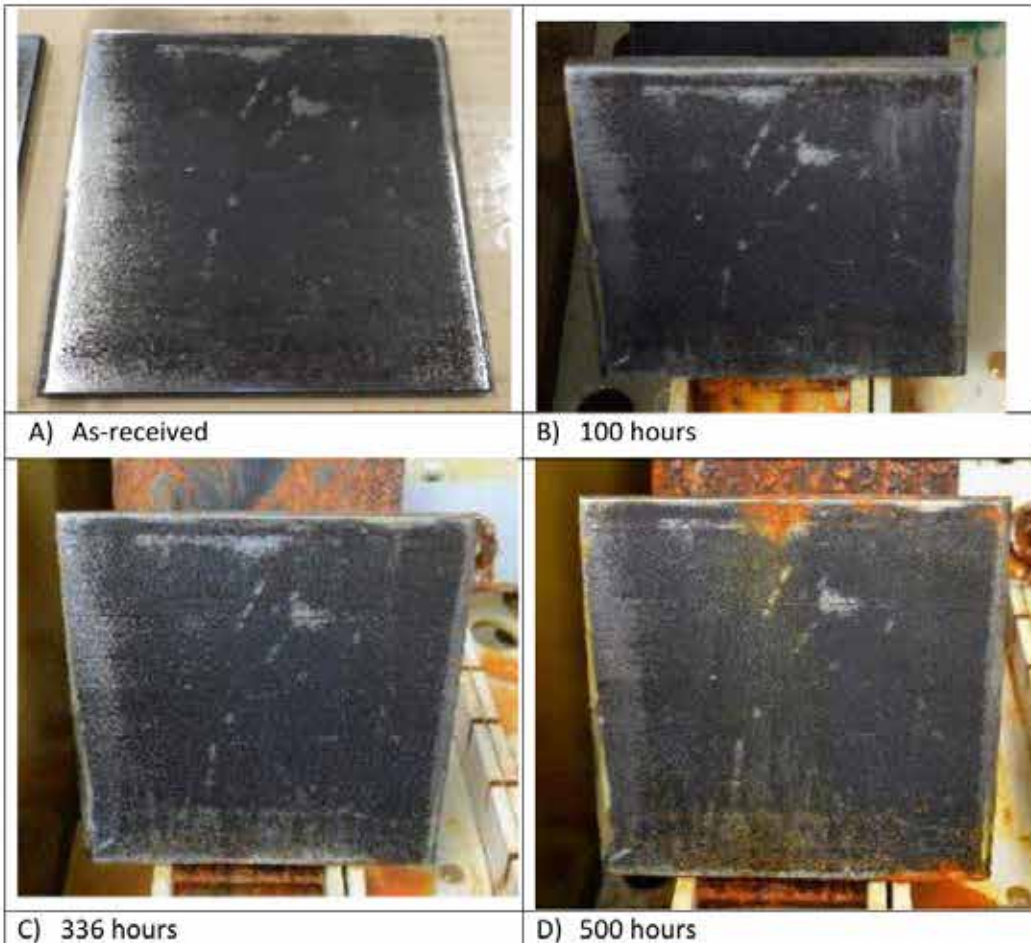


Figure 2: Float Coat V.1 specimen, in the as-received condition and after exposure to salt spray testing for 100, 336, and 500 hours.

Salt Spray (Fog) Testing to ASTM B117-18

Prepared and Tested By:

Shima Karimi

Shima Karimi
EIT, Materials Solutions

Reviewed By:

Kristen Porter

Kristen Porter, P.Eng.
Materials Engineer, Materials Solutions

Revision History

Revision 0

2019-10-21 New Document

Salt Spray (Fog) Testing to ASTM B117-18

Report No.: TR02785.06-01R0
Prepared for: Ship-2-Shore
John Bower
Address: 109 – 7337 North Fraser Way
Burnaby, BC V5J 0G7
Coating
Manufacturer: Ship-2-Shore
Date Received: 12 August 2019
Date Tested: 16 August 2019 to 28 September 2019
Part Data: Coated specimens of 5 steel pipes
Equipment Used: Q-Fog Cyclic Corrosion Tester CCT-1100, Powertech asset 30853
Mettler Toledo pH meter F20, Powertech asset 34062
VWR Hydrometer, Powertech asset 33700

TEST CONDUCTED:

Salt spray testing was conducted using the Q-Fog CCT in accordance with the following standard:

- ASTM standard B117-18, "Standard Practice for Operating Salt Spray (Fog) Apparatus"

SAMPLE DESCRIPTION & PREPARATION:

The client provided specimens consisting of the substrates and coatings listed in the table, below.

Sample ID	Substrate	Coating
S2S-100 Pipe	Steel pipe	Unidentified Ship-2-Shore coating
S2S-336 Pipe	Steel pipe	Unidentified Ship-2-Shore coating
S2S-500 Pipe	Steel pipe	Unidentified Ship-2-Shore coating
S2S-1000 Pipe	Steel pipe	Unidentified Ship-2-Shore coating

The specimen substrate materials and coatings were supplied by the client and substrates were not cleaned prior to coating. The coatings were applied to the substrate samples by Ship-2-Shore representatives, Zoran Culin and Erik Bergvinson, who then witnessed the samples' placement inside the Q-fog chamber before commencing the salt fog test.

Salt Spray (Fog) Testing to ASTM B117-18

TEST SOLUTION PREPARATION:

The test solution was prepared using 5 ± 1 parts by mass of sodium chloride (NaCl) and 95 parts of water. Impurity content in the sodium chloride was confirmed to be below the limits given in ASTM B117, Section 8. Adjustment to solution pH was made using analytical grade sodium hydroxide and/or analytical grade hydrochloric acid.

TEST PROCEDURE:

The test specimen was loaded into the test chamber in the orientations shown in Figure 1. The specimens were supported on inert racks in the salt spray chamber; the flat panel specimens were oriented at an angle of $20^\circ \pm 5^\circ$ inclined from vertical.

The test parameters are shown below, in Table 1.

Table 1: Test parameters

Parameter	Value
Duration	1000 hours
Start Date	16 August 2019
End Date	28 September 2019
Chamber Temperature	$35^\circ\text{C} \pm 2^\circ\text{C}$
Collected Solution pH	pH 6.5 to 7.2 (at $23^\circ\text{C} \pm 3^\circ\text{C}$)
Collected Solution Concentration	5 ± 1 part by mass NaCl to 95 ± 1 part distilled water

Chamber temperature, collected solution specific gravity, collection rate, and collected solution pH were measured every 24 hours, or up to a maximum of 96 hours when the time period spanned a weekend or holiday.

The condition of specimen IDs S2S-Pipe, S2S-Sheet was documented by photograph at the following approximate intervals: 100, 336, 500, and 1000 hours. At these intervals, the tape coatings were removed and the substrates were visually inspected.

Salt Spray (Fog) Testing to ASTM B117-18

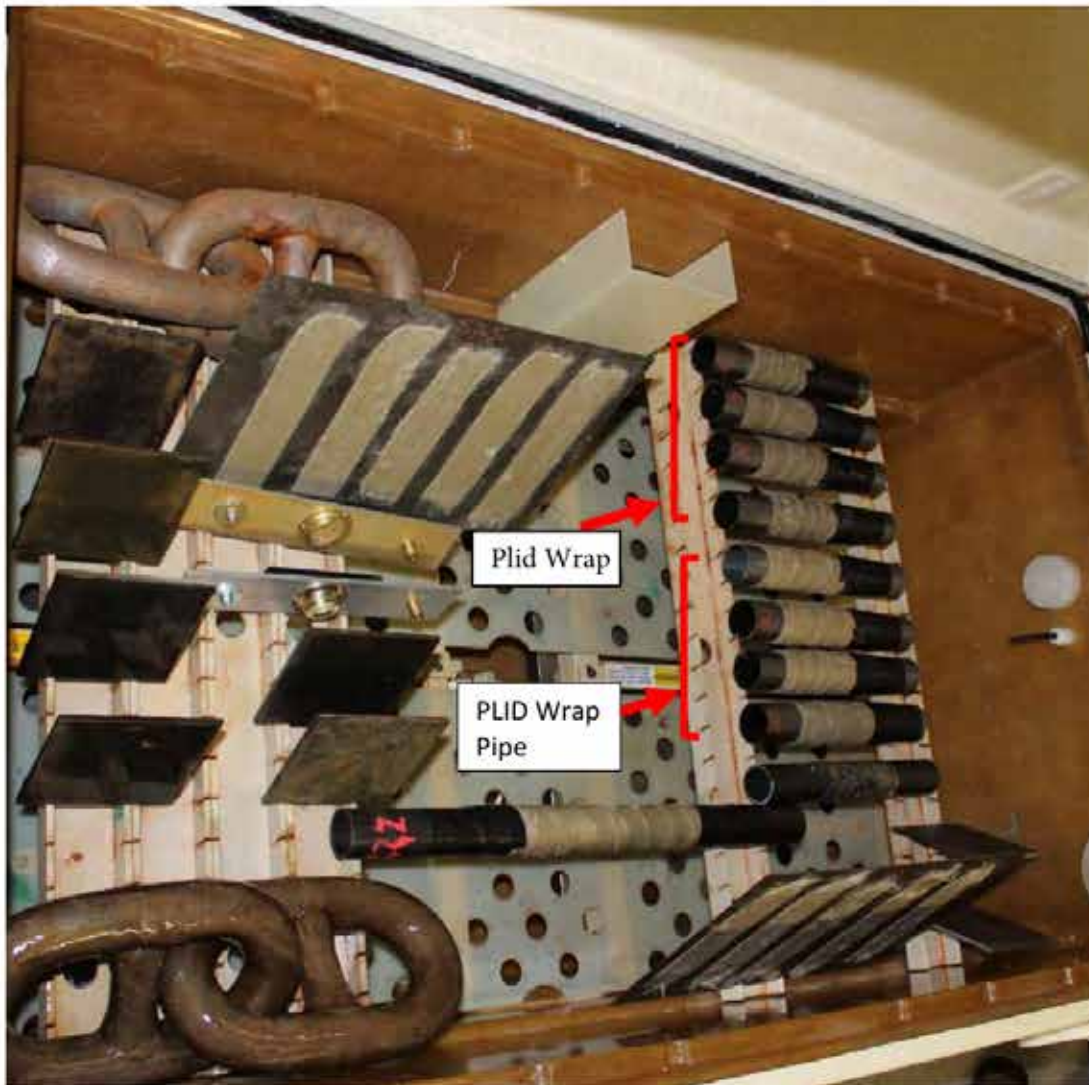


Figure 1: Inside the Q-fog chamber before starting the test

Salt Spray (Fog) Testing to ASTM B117-18

TEST DATA:

See Appendix A for the test record.

All parameters except for collected solution pH were within the standard specification for the duration of the test. Collected solution pH remained near-neutral, but particular daily measurements were marginally below the specified pH range (minimum values of 6.0-6.3 versus 6.5-7.2). As per ASTM B117, reservoir pH adjustments were made to compensate when the collected solution pH was found to be out of specified range.

TEST RESULTS:

Test results relate only to the items tested. No acceptance criteria were provided by the client.

The wrap coatings were removed and the substrates were visually inspected and documented by photograph at the following approximate intervals: 100, 336, 500, and 1000 hours. Photographs of PLID wrap specimens after 100, 336, 500, and 1000 hours exposure are provided in Figures 2 through 5. After removal of the wrap coatings, examination of the PLID wrap specimens' substrates under the coatings found the specimens did not sustain corrosion, pitting, or metal loss after exposures of up to 1000 hours (Figure 3B).

Figure 6 compares the condition of the S2S-Pipe specimens after 336 and 500 hours of exposure, respectively. No evidence of corrosion was detected on the PLID wrap pipe specimens.

Salt Spray (Fog) Testing to ASTM B117-18



A) 100 hours



B) 336 hours

Figure 2: PLID Wrap pipe specimens, after exposing to salt spray testing for approximately A) 100 and B) 336 hours.

Salt Spray (Fog) Testing to ASTM B117-18



A) 500 hours

B) 1000 hours

Figure 3: PLID Wrap pipe specimens, after exposing to salt spray testing for approximately A) 500 and B) 1000 hours.

Salt Spray (Fog) Testing to ASTM B117-18

Prepared and Tested By:

Shima Karimi

Shima Karimi
EIT, Materials Solutions

Reviewed By:

Kristen Porter

Kristen Porter, P.Eng.
Materials Engineer, Materials Solutions

Revision History

Revision 0

2019-10-25 New Document

Salt Spray (Fog) Testing to ASTM B117-18

**APPENDIX A.
SALT FOG (SPRAY) TEST RECORD**

Salt Spray (Fog) Testing to ASTM B117-18

Powertech AMTP05 Salt Fog Test Record DOC. ID: AMPT03-R3						Test Standard: <input type="checkbox"/> ISO 9227:2017 <input checked="" type="checkbox"/> ASTM B117-16					
Client/PL#: <u>Ship-2-Shore PL-02785</u>						Equipment: <u>Q-Fog CCT-1100</u>					
Duration: <u>1000 hrs</u>						Asset #: <u>30853</u>					
Start Date/Time: <u>Aug 16 / 12:30 PM</u>						Cal. Due Date:					
End Date/Time: <u>Sep 27, 28</u>											
Pre- & Post-test Checks: <input checked="" type="checkbox"/> Sample condition and placement photodocumented? <input type="checkbox"/> Acceptance criteria confirmed? <u>No</u> <input checked="" type="checkbox"/> Pre-/post-test cleaning requirements confirmed/completed? <input checked="" type="checkbox"/> Pre-test collection rate test complete (req. for ISO 9227)? <u>N/A</u>						Start of Test Checks: Atomizing air check: <u>14.5 (100)</u> Pressure, kPa (psi) <u>25°C</u> Temperature, °C <input type="checkbox"/> Pass <input type="checkbox"/> Fail					
Solution Type ¹	Date	Time	Solution Temp (°C)	Specific Gravity ²	pH	Collected Vol (mL)	Mass Check ³ (g/hr)	Elapsed Test Time (hr)	Collection Rate (mL/hr)	Chamber Temp (°C)	Initial
Pre-test											
(L)	Aug 9	3:00	24.9	1.038	6.31	17		11 hrs	1.545	35	SK
(R)	Aug 9, 2019	3:05	24.8	1.037	6.36	17.6		11 hrs	1.6	35	SK
Res	Aug 16, 2019	12:30	23.8	1.030	6.67	←					SK
(R)	Aug 19, 2019	2:30	26.00	1.032 ^{24.5}	6.55	102		76 ⁵⁵⁸⁴⁵	1.34	35	SK
(L)	Aug 19, 2019	2:30	23.9	1.032 ^{24.5}	6.57	80		76 ⁵⁵⁸⁴⁵	1.052	35	SK
R	"	3:00	25.7	1.029 ^{24.5}	6.97	←					→
(R)	Aug 20, 2019	3:45	24.6	1.033 ^{24.5}	6.45	42		55870		35	SK
(L)	Aug 20, 2019	3:45	24.4	1.033 ^{24.5}	6.16	28		55870		35	SK
R	"	3:50	25.1	1.030 ^{24.5}	7.01	←					→
(R)	Aug 21, 2019	3:00	24.7	1.033	6.60	27		55893	1.174	35	
(L)	Aug 21, 2019	3:00	24.0	1.033	6.50	39		55893	1.695	35	
(R)	Aug 22, 2019	3:00	24.6	1.034 ^{24.5}	6.45	38		55917	1.583		
(L)	Aug 22, 2019	3:00	25.2	1.034 ^{24.5}	6.42	24		55917	1.00		
Res		3:30	22.7	1.029	6.54						
			23.8		6.59						
(R)	Aug 23	1:00	25.0	1.034	6.48	32		55939	1.454	35	SK
(L)	Aug 23	1:00	24.6	1.034	6.41	21		55939	0.954	35	SK

Notes:
¹ Solution Type: P = Prepared, R = Reservoir, C = Collected
² Column typically contains SG values not corrected for hydrometer offset. If SG value is outside the accepted range of 1.027 - 1.033, also report the corrected value using the notation convention: SG_{uncorrected} (SG_{corrected})
³ Report the mass/hour value for the collected solution volume. If within the range of 1.02-2.06 g/hr, the collected volume measurement is confirmed.

Date Issued: 2018-08-24
Document Owner: K.Porter

Pg __ of __

Salt Spray (Fog) Testing to ASTM B117-18

Powertech AMTP05 Salt Fog Test Record <small>DOC ID: AMFT03-R3</small>					Test Standard: <input type="checkbox"/> ISO 9227:2012 <input type="checkbox"/> ASTM B117-16				
Client/PL#:					Equipment:				
Duration:					Asset #:				
Start Date/Time:					Cal. Due Date:				
End Date/Time:									

Solution Type ¹	Date	Time	Solution Temp (°C)	Specific Gravity ²	pH	Collected Vol (mL)	Mass Check ³ (g/hr)	Elapsed Test Time (hr)	Collection Rate (mL/hr)	Chamber Temp (°C)	Initial
Res.	Aug 23	1:30	25.8	1.0325	6.48	←					→
ⓄR	Aug 26	12:50 ^{PM}	23.7	1.031 ^{PM}	6.64	118		56010	1.662	35	SK
ⓄL	Aug 26	12:50 ^{PM}	23.2		6.75	73		56010	1.028	35	SK
Res.	Aug 26		24.1		6.35						
ⓄR	Aug 27	2:10	25.3	1.030	6.47	37.5		56035	1.5	35	SK
ⓄL	Aug 27	2:10	24.9	1.030	6.33	21		56035	0.84	35	SK
Res.	Aug 27	2:20	24.8	1.027	6.95	←					→
ⓄR	Aug 28	2:00	23.3	1.034	6.46	38		56059	1.58	35	SK
ⓄL	Aug 28	2:00	23.1	1.034	6.44	23		56059	0.952	35	SK
Res.	Aug 28	2:30	23.6	1.027	7.77	←					→
ⓄR	Aug 29	2:13	26.2	1.031	6.45	38	0.803	56083		35	SK
ⓄL	Aug 29	2:13	24.2	1.031 ^{PM}	6.37	29	0.619	56083		35	SK
Res.	Aug 29	2:35	24.8	1.026 ^{PM}	7.62	←					→
L	Aug 30	2:50	24.6	1.032	6.38	25		56106	1.04	35	SK
R	Aug 30	2:50	24.6	1.030	6.40	38		56106	1.58	35	SK
Res.	Aug 30	2:50	24.4	1.027	7.60	←					→
L	Sep 03	2:50		1.							
R	Sep 03	2:50	28.4	1.032	6.87	130.5		56202	1.35	35	SK
RES	Sep 03	2:50	28.4	1.032	6.79	104.5	58.22	56202	1.08	35	SK
RES	Sep 03	2:50	25.6	1.030	8.36	←					→
L	Sep 04	2:50	23.4	1.032	6.97	26		56226	1.08	35	SK
R	Sep 04	2:50	23.8	1.032	6.78	42.5		56226	1.77	35	SK
Res.	Sep 04	2:50	25.6	1.030	8.27	←		56226	←	35	SK

Notes:

- Solution Type: P = Prepared, R = Reservoir, C = Collected
- Column typically contains SG values not corrected for hydrometer offset. If SG value is outside the accepted range of 1.027 - 1.033, also report the corrected value using the notation convention: SG_{measured} (SG_{corrected})
- Report the mass/hour value for the collected solution volume. If within the range of 1.02-2.06 g/hr, the collected volume measurement is confirmed.

Date issued: 2018-08-24
Document Owner: K.Porter

Pg. of

Ship 2 Shore

7337 N Fraser Way #109, Burnaby, BC V5J 0G7

CATHODIC DISBONDMENT TEST

**OF 9170 PETROWRAP TAPE WITH PRIMER: PLID PRIMER, PLID WRAP
AS PER ASTM G8 METHOD B**

AUGUST 2019

0881-19-01-2 Rev0

PREPARED BY:

XU WANG, PH.D.
YUAN LI, PH.D.
IAN STEVENS, DIP. CHEM. ENG.
AHMED MAHMOUD

REVIEWED BY:

AMAL AL-BORNO, PH.D.
XIANYI CHEN, PH.D.

APPROVED BY:



AMAL AL-BORNO, PH.D.
PRESIDENT AND CEO

The results contained herein relate only to the items tested. This report should only be reproduced in full and with the permission of Charter Coating Service (2000) Ltd.

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SUMMARY OF RESULTS

Table 1. Cathodic Disbondment Test of 9170 PetroWrap Tape with Primer: PLID PRIMER, PLID WRAP
as per ASTM G8-96 (2010) Method B

Test Method	Test Conditions	Acceptance Criteria	Sample ID	Test Results
Cathodic Disbondment ASTM G8-96 (2010) Method B	<p>Intentional Holiday: 6.4 mm in diameter</p> <p>Temperature: 25±3°C</p> <p>Electrolyte: 1% NaCl, 1% Na₂SO₄, and 1% Na₂CO₃ solution</p> <p>Impressed Voltage: -1.39 V to a saturated Ag/AgCl electrode (-1.5 V with respect to Cu/CuSO₄ reference electrode)</p> <p>Duration: 30 days</p>	Report results	CD3	<ul style="list-style-type: none"> ➤ No coating disbondment but cohesive failure of the coating system was noted around the intentional and reference holidays. ➤ The equivalent circle diameter (ECD) was zero.

INTRODUCTION

At the request of Ship 2 Shore Ltd. conducted cathodic disbondment tests for 9170 PetroWrap Tape with primer: PLID PRIMER, PLID WRAP as per ASTM G8-96 (2010) Method B. S2S provided one pipe ring for testing. According to the information provided by S2S, the coating system PLID PRIMER, PLID WRAP was provided by Ship-2-Shore in Burnaby, BC, Canada.

OBJECTIVE

The objective of this test was to evaluate the cathodic disbondment resistance of the 9170 PetroWrap Tape with primer: PLID PRIMER, PLID WRAP in accordance with ASTM G8-96 (2010) Method B.

SCOPE

The scope of this project was as follows:

1. S2S Inc supplied one pipe ring for the coating system PLID PRIMER, PLID WRAP.
2. IS2S Inc specified the test conditions.
3. Charter Coating Service (2000) Ltd. sealed one end of each pipe sample with cap and 9170 PetroWrap Tape PLID WRAP.
4. Charter Coating Service (2000) Ltd. conducted the test and evaluated the test results as per ASTM G8-96 (2010) Method B.

CATHODIC DISBONDMENT

Cathodic protection is a technique used to reduce the corrosion of a metal surface by providing it with enough cathodic current to make its anodic dissolution rate become negligible. This technique can be detrimental to the performance of the coating applied. The cathodic disbondment test, conducted in the laboratory, simulates the cathodic protection (CP) system used in the field while providing an indication of the durability of the coating material under the provided voltage conditions. An aggressive, caustic environment at the substrate/coating interface develops on the edge of the holiday (the cathode) as a result of the impressed electrical stress. Coating disbondment is initiated and propagates around the holiday due to the increase in pH in the immediate environment. The amount of coating disbondment is recorded and based on this disbondment; the coating material is then rated for its durability under the test conditions.

The objective of this study was to evaluate the cathodic disbondment resistance of the 9170 Petrowrap Tape with primer: PLID PRIMER, PLID WRAP under conditions of an impressed current simulating cathodic protection at $25\pm 3^{\circ}\text{C}$.

CONCLUSIONS

The 9170 PetroWrap Tape with primer: PLID PRIMER, PLID WRAP showed resistance to the cathodic disbondment testing conditions at $25^{\circ}\text{C}/77^{\circ}\text{F}$ for thirty (30) days and the equivalent circle diameter (ECD) was zero.

METHODOLOGY

The cathodic disbondment (CD) test was conducted according to ASTM G8-96 (2010) Method B. The test specimen consists of one (1) OD 4.5" × 11" pipe ring applied with primer and then wrapped with 9170 PetroWrap Tape. One end of each pipe was mounted with cap and sealed with 9170 PetroWrap Tape. Prior to making the artificial holiday, the continuity of the coating and the effectiveness of the end-cap seal were verified. One intentional holiday with a diameter of 6.4 mm was drilled in the center of the immersed test length. The test specimen was suspended vertically in the bath with the sealed end 6" away from the bottom of the test vessel, and more than 1.5" away from the anode and the wall of the bath. Electrolyte was added until about 8" of the sample lengths was submerged.

The test conditions were as follows:

Temperature:	25±3°C
Electrolyte:	1% NaCl, 1% NaSO ₄ and 1% Na ₂ CO ₃ solution
Test duration:	30 days
Impressed voltage:	-1.39 VDC with respect to saturated Ag/AgCl electrode (-1.5 V with respect to Cu/CuSO ₄ reference electrode)

At the completion of the test, the specimen was disconnected from the cathodic protection circuit and removed from the test solution. A new reference holiday was drilled where was not immersed. Radial 45° cuts were made through the coating to the substrate intersecting at the center of both intentional and reference holidays on the test specimen. The coating was lifted from the substrate by placing the tip of the blade of a utility knife in the cut lines at the holiday and using a levering action to pry the coating off the metal. Eight measurements of radius of disbondment were then taken for each holiday and the equivalent circle diameter (ECD) was calculated.

RESULTS

Results obtained are shown in Figure 1 below and given in the attached data sheet.

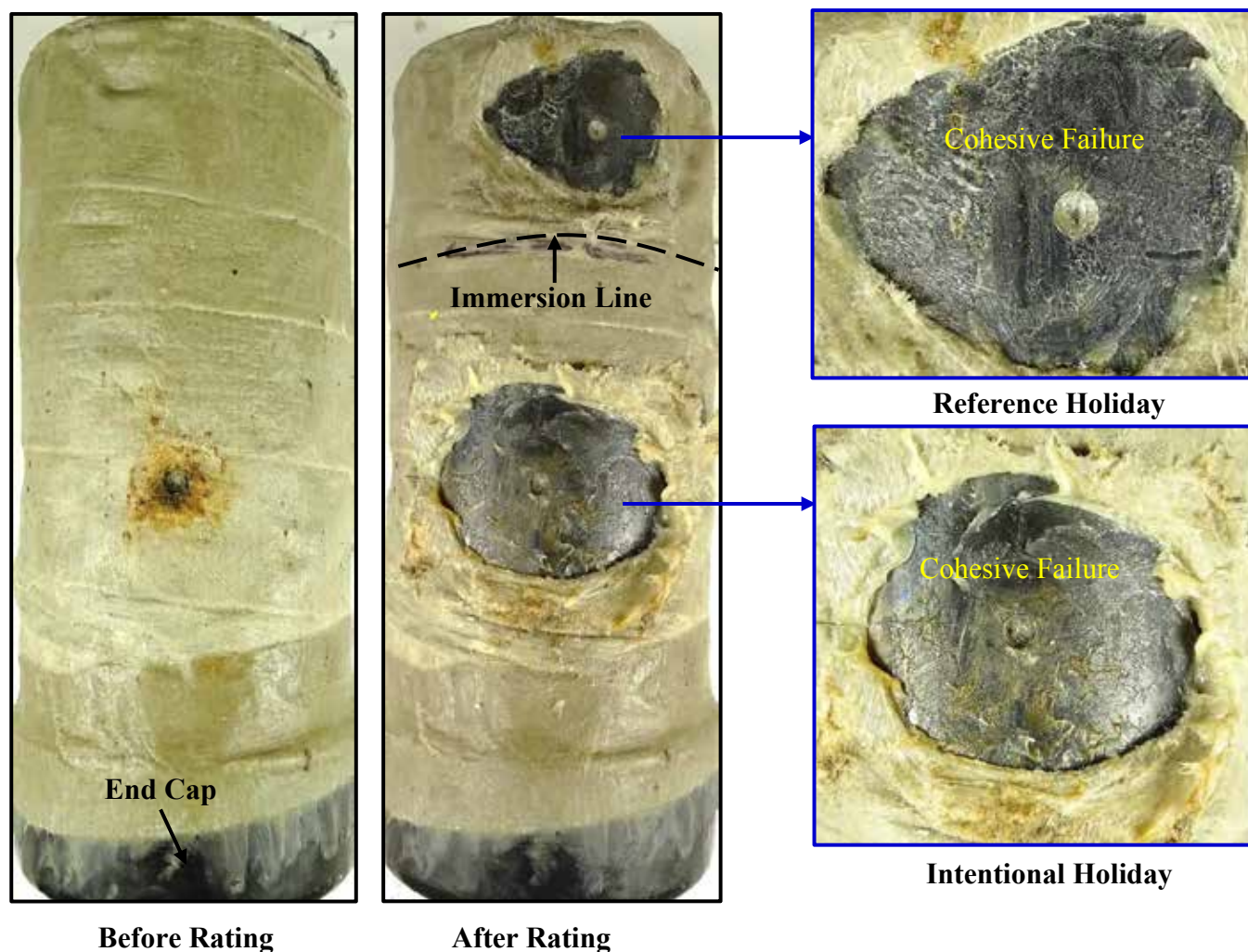


Figure 1. Cathodic Disbondment Post-test Overviews of 9170 PetroWrap Tape with Primer: PLID PRIMER, PLID WRAP as per ASTM G8-96 (2010) Method B: Thirty (30) Days at 25°C/77°F

Figure 1 shows the post-test overviews of 9170 PetroWrap Tape with Primer: PLID PRIMER, PLID WRAP after cathodic disbondment testing for thirty (30) days at 25°C/77°F. The coating system showed resistance to the test conditions, and no disbondment but the cohesive failure of coating system were noted around the reference and intentional holidays. Therefore, the equivalent circle diameter (ECD) was zero.

**CHARTER COATING SERVICE (2000) LTD.
CATHODIC DISBONDMENT TEST DATA SHEET
(ASTM G8 Method B Modified)**

Project Number:	0881-19-01-2	Date Started:	June 25, 2019
Coating Name:	9170 PetroWrap Tape with Primer: PLID PRIMER, PLID WRAP	Date Finished:	July 25, 2019
Duration:	30 Days	Voltage:	-1.39 V respect to Ag/AgCl
Temperature:	25°C/77°F	Holiday Diameter:	6.4 mm
Test Performed By:	I. Stevens and A. Mahmoud	Solution:	1% NaCl, 1%Na ₂ SO ₄ , 1%Na ₂ CO ₃

Sample ID	Film Thickness (mils)		Final Unsealed Area (mm ²) ¹	Equivalent Circle Diameter (mm) ²
	Pre-Test	Post-Test		
CD3	98 – 189 / 132	104 – 175 / 131	0	0

¹Excludes initial holiday measurement and the disbondment at the reference holiday.

²Equivalent Circle Diameter (ECD) is obtained from the formula:

$$ECD = (A/0.785)^{1/2} \text{ where: } A = \text{area of holiday (final unsealed area), mm}^2 \text{ (in.}^2\text{)}$$

Approval Authority: Dr. Amal Al-Borno

FM-505-00-13-02

Rev 05 (2019-06-21)

APPENDIX A

REVISION HISTORY

Revision Level	Revision Date	Revised by	Brief Description of Revision
Rev0	July 31, 2019	DR. XU WANG	Original report
Rev01	Aug 1, 2019	Dr. XIANYI CHEN	Revised to include the coating and the supplier names

-END OF FINAL REPORT-

June 26, 2019
PGL File: 5588-01.01

Via E-mail: jbower@lowrysales.com

Ship-2-Shore
109 - 7337 North Fraser Way
Burnaby, BC
V5J 0G7

Attention: John Bower

RE: SHIP-2-SHORE ANTI-CORROSION PRODUCT TESTING

PGL Environmental Consultants (PGL) has prepared this letter for Ship-2-Shore (S2S) for recent testing of their anti-corrosion products: Float-Coat and Chain-Coat/PLID Industrial Thick.

Based on the results of field scale testing and chemical analysis, the discharge water in contact with these products meets Canadian Federal and British Columbia Provincial Marine Water Quality Guidelines for petroleum hydrocarbons and metals. The discharge water quality also meets the California Environmental Protection Agency Ocean Marine Water Quality Objectives. Freshwater environments have lower guidelines than marine environments for some constituents of the discharge water. Discharge to a freshwater environment is not recommended without further review.

CONTEXT

S2S has two products used to prevent corrosion and fouling in marine vessel applications. Float-Coat is applied as a lining to void spaces, and Chain-Coat or PLID Industrial Thick (same product, different trade names) is applied to anchor chains. The products are applied using a flotation method where the product "floats" on a water surface as it drains a space or chamber and "coats" the surface. The water that drains out of the space is discharged to the ambient water where the process takes place.

ASSIGNMENT

A test procedure was set-up by S2S at their Burnaby location where a shipping container was filled with municipally supplied tap water. In separate tests, each product was added to the shipping container water in the specified application amount for each product. The water was allowed to drain from the container, simulating the coating process. A sample of the drainage water for each product was collected by PGL for analysis. Prior to the product tests, PGL collected a control sample of tap water drained from the container.

The tap water control, Float-Coat and Chain-Coat/PLID Industrial Thick discharge samples were collected and submitted to Caro Analytical Laboratory for analysis of:

- Light and heavy extractable petroleum hydrocarbons (LEPH/HEPH);
- Petroleum hydrocarbon fractions F1 to F4 (F1 – F4);
- Volatile hydrocarbons and volatile petroleum hydrocarbons (VH/VPH);
- Benzene, ethylbenzene, toluene, styrene, and xylenes (BTEX); and
- Total metals.

We compared the chemical analysis results to Canadian Federal and Provincial Surface Water Quality Guidelines for protection of marine aquatic life. Summary Tables 1 and 2 are attached to this letter.

All chemical analysis results meet the Canadian Federal and Provincial Surface Water Quality Guidelines for protection of marine aquatic life except for cadmium and copper in the tap water control sample and copper in the product discharge samples. We attribute the copper in the discharge samples to the tap water.

We also compared the analytical results to the California Environmental Protection Agency, State Water Control Board, 2012 California Ocean Plan, Table 1 Objectives for protection of marine aquatic life. The results also meet these standards. California State water regulations may vary depending on regional water control board authority. We recommend contacting a regulator in the region where the product is used for further clarification of applicable regulations.

LIMITATIONS

This report is accurate at a high level for reasonably foreseeable conditions. The limitations of the work are not always obvious, and the best way to understand them is discussion with the authors in the context of your intended use. This work is a snapshot in time, so any use must consider that conclusions may change materially because of changes in site condition or regulatory context.

Only the addressee, our client, and their agents may rely on this report for the stated purpose. We warrant only that the work was done as described and is similar to the work that would be done by other qualified consultants in this area. Our contract includes limitations on liability related to professional errors and omissions.

CLOSING

We trust that this meets your needs. If you have any questions or require clarification, please contact Dave Bell or Tom Berger at 604-895-7635 and 604-895-7605, respectively.

PGL ENVIRONMENTAL CONSULTANTS

Per:



Dave Bell, P.Ag., LEED AP®
Environmental Consultant



Tom Berger, B.Sc., P.Geo.
Senior Environmental Consultant

DWB/TEB/slr/mtl

\\pgl-van-file1\Project Files\5500-5599\5588 - Ship 2 Shore Corrosion\01-01_Client Docs\I-5588-01-01-Product Testing-v2.docx

Attachments: Tables 1 and 2
Laboratory Certificates



Ship-2-Shore Liquid Test

Prepared For: Ship-2-Shore

Halco Job # 1-180426-01

Date: May 2, 2018



**5773 Venice Blvd.,
Los Angeles, California 90019-5017
Office: 323-933-9431 • FAX: 323-933-2043**

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Ship-2-Shore
Attn. Erik Bergvinson
109-7337 North Fraser Way
Burnaby, BC, V5J 0G7

Re: Ship-2-Shore Liquid Test

I. INTRODUCTION

On April 27, 2018 Chris Lussier of Halco Testing Services performed testing of liquid identified as Ship-2-Shore Industrial Fluid Thick Film. The testing was performed at our facility on 5773 Venice Blvd, Los Angeles at ambient room temperature of 75F in accordance with ASTM Standard D-877 using a High Voltage Inc. Oil Dielectric Tester Model DTS-60D-TCD3 test instrument. ASTM D-877 standard is used to determine the dielectric breakdown of insulating liquids used in transformers.

II. LIST OF EQUIPMENT

Ship-2-Shore Dielectric, Anti Corrosion, and Lubricant Oil

III. RESULTS

The results of the tests concluded that the dielectric breakdown of the fluid was found to be 8.92kV.

IV. TEST DATA SHEETS

Attached



Halco Testing Services
5773 Venice Blvd.
Los Angeles, CA 90019
323-933-9431

Miscellaneous Test - Data Entry



Customer	Ship-2-Shore			Job #	1-180426-01			
Address	109-7337 North Fraser Way	Burnaby	BC	Date	4/30/2018			
Owner / User	Halco Shop			Ambient Temp.	75	°F	Humidity	%
Address	5773 Venice Blvd.	Los Angeles	CA	Reference #				
Equip Locations	Halco Warehouse			Device ID				

Test Type

Manufacturer

Type

Serial #

Catalog #

Other

Results	Breakdown Value
Test 1	8.9kV
Test 2	9.3kV
Test 3	9.0kV
Test 4	8.8kV
Test 5	8.6kV
Average	8.92kV

Comments			
Deficiencies			
Test Equip. IDs	High Voltage DTS60-D Hi POT	0	Tested By C.Lussier



Ship-2-Shore Liquid Test

Prepared For: Ship-2-Shore

Halco Job # 1-180620-01

Date: June 22, 2018



**5773 Venice Blvd.,
Los Angeles, California 90019-5017
Office: 323-933-9431 • FAX: 323-933-2043**

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Ship-2-Shore
Attn. Erik Bergvinson
109-7337 North Fraser Way
Burnaby, BC, V5J 0G7

Re: Ship-2-Shore Liquid Test

I. INTRODUCTION

On June 22, 2018 Chris Lussier of Halco Testing Services performed testing of liquid identified as Ship-2-Shore Industrial Fluid THIN PLID. The testing was performed at our facility on 5773 Venice Blvd, Los Angeles at ambient room temperature of 75F in accordance with ASTM Standard D-877 using a High Voltage Inc. Oil Dielectric Tester Model DTS-60D-TCD3 test instrument. ASTM D-877 standard is used to determine the dielectric breakdown of insulating liquids used in transformers.

II. LIST OF EQUIPMENT

Ship-2-Shore THIN PLID, Dielectric, Anti Corrosion, and Lubricant Oil

III. RESULTS

The results of the tests concluded that the dielectric breakdown of the fluid was found to be 40.64kV.

IV. TEST DATA SHEETS

Attached



Halco Testing Services
5773 Venice Blvd.
Los Angeles, CA 90019
323-933-9431

Miscellaneous Test - Data Entry



Customer	Ship-2-Shore			Job #	1-180620-01				
Address	109-7337 North Fraser Way	Burnaby	BC	Date	6/22/2018				
Owner / User	Halco Shop			Ambient Temp.	75	°F	Humidity	40	%
Address	5773 Venice Blvd.	Los Angeles	CA	Reference #					
Equip Locations	Halco Warehouse			Device ID					

Test Type

Manufacturer

Type

Serial #

Catalog #

Other

Results	Breakdown Value
Test 1	26.4kV
Test 2	43.6kV
Test 3	40.4kV
Test 4	37.2kV
Test 5	48.1kV
Test 6	33.2kV
Test 7	37.2kV
Test 8	50.7kV
Test 9	39.6kV
Test 10	49.8kV
Average	40.6kV

Comments			
Deficiencies			
Test Equip. IDs	High Voltage DTS60-D Hi POT	0	Tested By C.Lussier



CASSEN Testing Laboratories

51 International Blvd., Toronto, Ontario, M9W 6H3
tel: (416) 679-9663 fax: (416) 679-9668 web: www.cassen.ca

Forsythe Lubrication Associates
ATTN: William Ridley
120 Chatham Street
Hamilton, Ontario, L8P 2B5

Analytical Report

CASSEN Work Order #: 2509047B
Date Received: April 19, 2018
Client Project Name / Number: PD-030518-1

Reviewed By:

Queenie Yip, B.Sc., C.Chem, QA Manager

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CASSEN Testing Laboratories

51 International Blvd., Toronto, Ontario, M9W 6H3
tel: (416) 679-9663 fax: (416) 679-9668 web: www.cassen.ca

Analytical Results

Date: July 18, 2018

Organization: Forsythe Lubrication Associates
Address: 120 Chatham Street, Hamilton, Ontario, L8P 2B5
Contact: William Ridley
Project: PD-030518-1

Work Order No.: 2509047B
Date Received: April 19, 2018
Date Analyzed: April 26, 2018

Analysis Requested: TVOCs - Headspace
Instrument: Thermal Desorption with Gas Chromatography Mass Spectrometry
CASSEN Method: M2804.R2
Reference Method: CASSEN In-House Method
Sampling Media: Bulk Sample (Liquid)

No. of Samples: 1
No. of Blanks: 0

Total Volatile Organic Compounds (TVOCs)

#	Lab ID	Sample Identification	Date Sampled (dd/mm/yy)	Sample Mass (g)	GC/MS File #	Amount Total (ug)	Concentration Total (%)
1	59938	S2S PLID 2018-0316	18/03/18	7.8	D92051.D	9100	0.1

Notes:

- 1) N.A.: Information not available or not applicable.
- 2) TVOCs result is a semi-quantitative total amount/concentration based on the summation of the estimated masses of the VOC peaks. The result depends on the response of each VOC compared to the reference compounds.
- 3) Amount is the semi-quantitative estimate of the total mass of the VOC in micrograms (ug) emitted from the headspace sample.
- 4) Concentration (%) is the semi-quantitative estimate of the total concentration of the VOC detected in the sampled material via headspace sampling expressed in percentage.
- 5) This Certificate of Analysis shall not be reproduced except in full, without written approval of the laboratory. These analytical results pertain only to the samples as received in the laboratory. No responsibility or liability is assumed for the manner in which the results are used.
- 6) CTL has established an ISO17025 reporting policy that a maximum of 3 significant figures will be reported for test results.
- 7) The sample(s) were received in acceptable condition unless otherwise noted.

Analyst:

Gabriel Guazzoni, B.Sc., Analytical Chemist



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