The background image shows an industrial facility with a high ceiling, metal trusses, and several large, cylindrical vessels. A walkway with a railing is visible in the middle ground. The floor in the foreground is a light-colored, polished concrete with a long, narrow metal grate or drainage channel running across it. The overall scene is brightly lit by overhead industrial lights.

Equipment Expertise eBook

# Inspecting Vessels - Part 1

## Glass-Lined Vessels

**EQUIPNET**

An EquipNet Certified eBook  
See more today: [EquipNet.com/News/](https://www.equipnet.com/news/)



## Introduction

Vessels come in all shapes and sizes; jacketed and nonjacketed, stainless steel, carbon steel, glass-lined, hastelloy and much more. These seemingly simple instruments can be tricky to inspect, and just one hairline crack, invisible to the naked eye, could indicate years of repairs, delays, and headaches to come.

In order to provide our customers with the most accurate information, EquipNet's in-house engineers and equipment specialists have gathered details on how to perform a successful inspection of a vessel, before committing to a purchase.

We'll start off focusing on pressurized and non-pressurized, jacketed and non-jacketed, glass-lined vessels.

---

## Who We Are

EquipNet is a global leader of surplus asset management solutions. We're recognized for our proprietary asset management platform, our revolutionary industrial equipment marketplace, and our results-driven project management services. Our diverse roster of clients include Fortune 500 multi-national corporations, leading regional manufacturers, financial institutions, and corporate renewal professionals.

EquipNet solutions deliver maximized financial return while improving our client's corporate image, adhering to their safety standards, and contributing to their sustainability initiatives.

---

**EQUIPNET**

An EquipNet Certified eBook | See more today: [EquipNet.com](https://www.equipnet.com)

## Gather Relevant Information

The first thing you will want to do when conducting an inspection of a used vessel is to gather all of the relevant information associated with that particular vessel.

Specifically, you will want to request that the seller provide:

- Access to the original nameplate. For the most part, this nameplate can be found on the vessel, however sometimes they may have been removed, or are too faded to read, in which case you will want to ask if the seller documented the nameplate information. This nameplate should display the following critical information: serial number, model number, date of construction, confirmed operating pressures, as well as A.S.M.E and National Board Code numbers.
- Original maintenance and service documents. It's important to review these documents to ensure all preventative maintenance and repairs were performed by a licensed professional so that the vessel's National Board certification is not put in jeopardy
- Ask the seller to confirm, and provide documentation as proof, of the vessel's material of construction.

# Visual Inspection of Glass-Lined Vessels

After gathering the facts, you will want to perform a visual inspection of the vessel's interior, exterior, manway, outlets, and inlets. The following information details how to successfully conduct your visual inspection of glass-lined vessels.

## External Inspection

- This type of vessel generally features a stainless steel or carbon steel exterior with a glass-lined interior; they can also be fitted with an exterior jacket for heating or cooling purposes. When conducting a visual inspection on these types of vessels, you will want to start with the most exterior part of the vessel—if it's a jacketed vessel, start there. If not, start with the exterior wall.
- With regard to the vessel's jacket, you will want to conduct an in-depth visual scan of the jacket's surface, checking for signs of corrosion, rust formation, or indication of previous repairs to resolve a leak. It is important to keep in mind that if the jacket's internal pressure is compromised by hairline cracks or corrosion, it will not be capable of performing as it was designed to; funds will have to be allocated to return the vessel to its fully functional condition.

## External Inspection

- Next, you will want to inspect the jacket's inlets for signs of any obstruction, which is an indication that the vessel itself was not regularly maintained and cleaned. If you find any type of material inside the inlet, clogging the passage of the jacket's heating or cooling solution, you will want to confirm what exactly is clogging the inlet. If it appears to be metallic flakes, this is a sign that the vessel is deteriorating from the inside out. This is especially an issue with carbon steel vessels, as they tend to be less durable and less resilient than their stainless steel and hastelloy counterparts.
- If the vessel does not have a jacket, you will want to visually scan the exterior wall for signs of rust formation, or corrosive staining. It is also crucial to check for a consistent degree of thickness throughout the vessel's exterior wall. Any thin spots in a vessel's walls will lead to leaks and necessary repairs down the road. Also in some cases, you will be able to find spots in the vessel's exterior wall where you are able to see the glass-lined interior. This should be considered a major concern since this is an indication that the exterior wall has undergone a significant amount of deterioration, which essentially eliminates any constant pressure that the vessel needs to maintain to function properly.

## Internal Inspection

- After performing a visual inspection of the vessel's exterior wall and/or jacket, divert your attention to the vessel's interior. Starting with the manway or port, keep your eyes alert for any signs of chipped glass around the edges of the interior. This is a strong indication of just how much wear and tear the glass-lined interior of the vessel has endured, and will allow you to estimate just how much longer the glass lining can be used before repairs or replacements are needed.
- Before moving further down into the interior, you must first figure out whether or not the vessel is pressurized, meaning is it designed to be used with and maintain a specific internal pressure. If the vessel is pressurized, you will want to inspect the mechanical seal located at the vessel's top most opening. Signs of any past problems will be represented by hydraulic fluid or oil stains around where the seal is supposed to clamp shut. If you spot any signs of leakage, you will want to make sure that the seller took some documented action to rectify the problem; otherwise, this could end up being a hidden repair cost if you decide to purchase the vessel. Lastly, there is one more component that you should inspect before diving into the interior of the vessel – that is the agitator, both the blade and the motor

## Internal Inspection

- An agitator is simply a long blade that comes in different shapes and sizes, attached to a motor of varying horsepower that is used to mix the vessel's contents. In order to really make a judgment on the condition of the agitator, you will need access to electricity. If you have access, turn the agitator on, and note if the blade maintains a tight radius as it turns. If it does not, this is a sign that the blade has endured large amounts of stress or long hours of usage. Again, this could end up being a hidden repair cost in the near future if you purchase the vessel. If you do not have access to power, you will need to base your assessment of the agitator on how well maintained the equipment appears. Bad signs to watch out for are rust, blade disfigurement, and signs of leaks coming from the agitator's motor.
- After peering around the edges and the entrance to the vessel, you are ready to inspect the interior. Inspect every square inch of the vessel's interior, taking note of the glass lining's luster and composition. Every glass lining is fire polished to a high gloss; if the glass lining in the vessel you are inspecting is dull, this is an indication that the glass is either worn thin due to exposure to highly corrosive contents over a long period of time, or that it has not been properly maintained by the seller



## Internal Inspection

- As for the composition of the lining, you are checking for chipping, and/or any obvious spots where the glass has worn away and is now revealing the vessel's exterior steel wall. This particular examination will require a keen eye, as some hairline cracks in the glass lining will be difficult to see with the naked eye. However, you will want to ensure that you closely investigate any questionable areas in the lining; these can turn into costly repairs should you overlook one and purchase the vessel.
- As a closing tip, EquipNet suggests that during your inspection you try to be as thorough as possible. One overlooked element could lead to months of headaches down the line. So take your time, and inspect the vessel with care—you won't regret it!

## Advanced Inspections

For the more serious buyer, a simple visual inspection at times is not enough to warrant the purchase. These more wary buyers may want to conduct what is commonly referred to as a Hydrostatic test or a spark test.

### Hydrostatic Test:

A hydrostatic test entails filling the vessel with water, usually a dyed water to achieve increased visibility. This type of test is performed on pressurized vessels only, as it is the pressure that essentially reveals and cracks in the vessel. When performing a hydrostatic test, the vessel is first filled with a nearly incompressible liquid, such as water or oil (most commonly, water), and then the pressure in the vessel is raised to 150% the manufacturer's suggested operating pressure. It is set this high so that the water or oil is forced out of any accessible cracks in the vessel. A hydrostatic test is very reliable, and is used by most organizations that utilize pressurized vessels in their day to day operations.





### Spark Test:

A spark test is very simple in regard to its application, but still manages to be highly effective in locating cracks or holes in a vessel's (pressurized or not) interior glass lining. By guiding a test electrode over the entire interior surface area of your vessel, you will be able to detect any structural inconsistencies in the glass lining. The telltale sign of a problem are sparks flying when your test electrode brushes over a spot where the highly electric-resistant glass lining is not present and the electricity being emitted by the test electrode manages to make contact with the steel exterior of the vessel.

## To learn more about inspecting and purchasing pre-owned vessels, contact EquipNet:

North America: +1 (781) 821 3482  
Europe: +1 (44) 118 901 6161  
Latin America: +57 (1) 508 7908

[sales@equipnet.com](mailto:sales@equipnet.com)  
[www.EquipNet.com](http://www.EquipNet.com)

-  @EquipNet
-  [linkedin.com/company/EquipNet](https://www.linkedin.com/company/EquipNet)
-  [facebook.com/EquipNet](https://www.facebook.com/EquipNet)
-  [youtube.com/equipnet](https://www.youtube.com/equipnet)
-  [blog.equipnet.com](http://blog.equipnet.com)