

***DuraSite 500(1)  
Portable Sample Vessel  
User's Guide***

Version 11142003

(1) = 90 Duro Wetted O-Rings

# Table Of Contents

1. Introduction	3
2. About this Manual	3
3. Contacting YZ Systems	3
4. Vessel Components	4
5. Specifications	5
6. Application	6
7. Theory of Operation	7
8. DuraSite Installation & Use	8
9. Cylinder Maintenance	10
10. Diagrams	
DuraSite Portable Sample Vessel	12

## 1. Introduction:

Congratulations on your purchase of the DuraSite Portable Sample Vessel. You've made a wise measurement investment for your company.

Before you begin installation, insure that all of the necessary components are present. TFE tape, Stainless Steel Tubing, and Tubing Fittings may be required.

## 2. About This Manual:

This User's Guide provides a step-by-step description of the information you need to operate the DuraSite Portable Sample Vessel.

## 3. Contacting YZ Systems, Inc.:

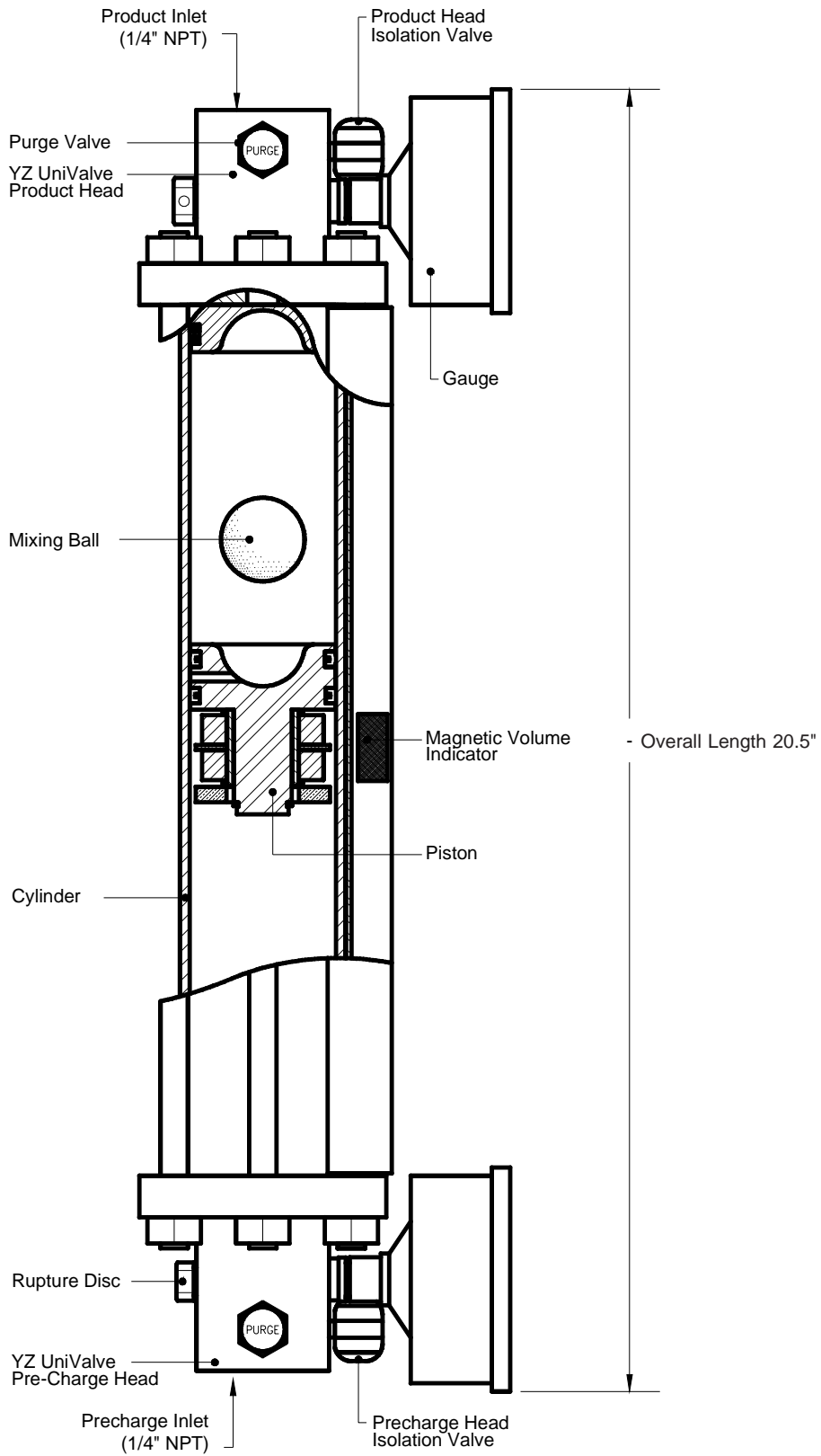
If the answer to your question can not be found within this manual please contact YZ Systems at 1.936.788.5593. When calling please have on hand this manual for potential review. Also be prepared to provide the following:

- The model and serial number of the DuraSite Portable Sample Vessel. The model and serial number are printed on the Pre-Charge head of the sample vessel.
- This manual and its version number, listed on the front cover.
- A description of the difficulty and the activity at the time of occurrence.



# 4. Vessel Components:

The primary components of the DuraSite Portable Sample Vessel are illustrated here.



## 5. Specifications:

Working Pressure:	1800 psi*
Tested Pressure:	3000 psi*
Visual Level Indication:	Magnetic
Primary Materials:	316 Stainless Steel and Aluminum
Carrying Case:	Optional
Total Volume:	*500cc

\*Manufactured under DOT exemption #DOT-E 8757



## 6. Application:

Accurate sampling of natural gas and liquid hydrocarbons equates to revenue, and in many cases a large amount of revenue. One of the major links in the sampling process is the sample container or sample cylinder.

In recent years, the Constant Pressure Cylinder has become the storage cylinder of choice, principally due to its unique design. This type cylinder allows the sampled product to be stored at a constant pressure throughout the sample period and in final lab analysis.

The DuraSite Portable Sample Vessel permits the user to remove a liquid or gas hydrocarbon sample from a pipeline or a sampling device. This is accomplished without changing the pressure of the product or exposing it to a contaminant fluid. If properly used and maintained the DuraSite will provide many years of safe, accurate and clean sampling.

The DuraSite is a very safe device to use. As with any equipment dealing with flammable products, it is mandatory that a good, thorough operator training procedure be established prior to use.

## 7. Theory of Operation: The DuraSite Portable Sample Vessel

The DuraSite Portable Sample Vessel consists of a metal cylinder precisely machined and polished on the inside surface with removable end heads for easy access to the inside of the cylinder. The heads are drilled and tapped to incorporate isolation valves, gauges, and pressure rupture disc assemblies.

Contained inside of the cylinder is a moving piston fitted with seals to ensure a leak-free seal between the sample and pre-charge side of the cylinder. The piston is able to move freely within the cylinder while maintaining the segregation between the two ends of the cylinder. This piston also incorporates a set of magnets to interface with the magnetic sensor to determine the level of the sample fluid within the vessel. A visual level indication can be observed on the DuraSite vessel by the position of the magnetic level marker on the vessel.

In operation an inert gas pressure is applied to the pre-charge end of the sample cylinder. This inert gas pressure should exceed the anticipated equilibrium vapor pressure of the product. This will ensure the sample is maintained in a single phase.

Product should be introduced to the cylinder from the product end. The cylinder should never be filled over 80% full by volume, to allow a safe cushion for any expansion of the product due to changes in the temperature.



## 8. DuraSite Installation & Use:

Typical use of the vessel would be as follows:

### **Step 1: In The Lab**

Connect a regulated inert gas supply to the pre-charge valve. The product valve should be open. By carefully controlling the pre-charge valve and the regulator, the vessel can be slowly charged with pre-charge gas (NOTE: This should be done slowly to prevent slamming the piston down to the opposite end). The pressure on the pre-charge pressure gauge should be brought to a reading of 10-50 psi above the expected pressure of the product in the field. Close the pre-charge valve and disconnect the gas supply. Check the pre-charge valve, relief device, and the pre-charge pressure gauge for leaks. Any leaks should be stopped before continuing. The vessel should be placed in a padded carrying case and made ready for field use.

### **Step 2: In The Field**

Connect the pre-charged sample vessel to the product supply (NOTE: the pre-charge pressure gauge reading should be greater than the product supply pressure reading. If not, repeat Step 1 above).

### **Step 3:**

Once the vessel is connected to the product supply, it is necessary to vent a small amount of product prior to filling the vessel. This assures fresh product and removes any air or gas when dealing with liquids. This can be done by loosening the product purge valve a very small amount until the product is purged. After thorough purging, the product purge valve should be tightened.

### **Step 4:**

The product pressure gauge reading should be 10-50 psi below the pre-charge pressure gauge reading. By carefully opening the pre-charge valve, the pressure becomes equalized. The pre-charge valve should be carefully controlled so as to not vent the pre-charge gas too fast. The pre-charge port should then be connected to a pipeline connection or relief valve (*page 11*), which will allow movement of the piston while maintaining pre-charge on the vessel.



## 8. DuraSite Installation & Use:

### Step 5:

When the vessel becomes a maximum of 80% full (see volume indicator), all valves should be closed. The product connection is slowly broken in order to vent any trapped product. After vessel removal, all connections should be checked for leaks and the pre-charge and product valve ports capped to prevent leakage.

### Step 6:

The vessel should be labeled and placed back into the padded case and made ready for shipment.

### Step 7: In The Lab

Prior to analysis, the product should be mixed. This is accomplished simply and efficiently by inverting the vessel end-over-end, causing the mixing ball to fall through the product. Approximately 10-12 trips of the mixing ball through the product assures a homogenous solution.

### Step 8:

The regulated pre-charge gas should be reconnected to the pre-charge side of the vessel. The pre-charge gas supply should remain open during analysis.

### Step 9:

Purging a small amount of product from the vessel removes unmixed product from the tee, relief device, gauge, etc. The unit can now be connected to a chromatograph and the product analyzed.

### Step 10:

After analyzing, the remainder of the product should be dumped and the vessel properly cleaned. Normal cleaning can be accomplished by rinsing the product end with a petroleum solvent and flushing with acetone. If a more thorough cleaning is required, the vessel should be disassembled.

***WARNING: A portable sample vessel should never be filled to more than 80%. This allows a 20% pre-charge cushion to absorb thermal expansion of the product.***

Shipping: Extreme care should be taken when preparing a vessel for shipment. Both valves should be capped to prevent possible leakage. The vessel should be placed in a snug-fitting, well-padded and durable case. All applicable DOT regulations should be adhered to.



## 9. Cylinder Maintenance:

### Maintenance:

*Time, Temperature, Pressures, Sample Quality, and the number of Sample Cycles will all have an affect on the need for maintenance.*

- **Preventative Maintenance**

In general, a preventative maintenance program is for the purpose of trying to anticipate possible maintenance that will be required and to choose when to perform that maintenance prior to the actual need for the maintenance, thus eliminating most emergency responses for the maintenance, or possible ending up with out a sample.

- **Reactive Maintenance**

This is when maintenance is only performed as a reaction to the cylinder not being capable of containing a sample properly due to some type of component fatigue.

***DOT-E 8757 requires that each cylinder must be visibly reinspected at least once a year for deterioration of seals, scratches, dents, and gouges. Components that are deteriorated or damaged must be replaced by factory specified parts as shown on YZ drawings. Components may be replaced by the factory or user, observing Tie Rod Nut tightening torque values. Additionally at least once a year, the end caps, tie rods, and cylinder must be thoroughly cleaned with appropriate solvent recommended by the manufacturer. Replace rupture disc every year under normal conditions. A more frequent change out of the rupture disc may be necessary due to corrosion, fatigue, temperature, or adverse conditions. These factors must be evaluated by the user through actual service experience. However; if the disc is not changed periodically when exposed to these conditions, premature failure (due to elapsed time or pressure) of the rupture disc may occur, thereby discharging the process media.***

### Recommended spare parts:

<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>
D3-0051-90D	90 Duro DuraSite Seal Repair Kit	1
A3-0156	3000 psi Rupture Disc	2

## 9. Cylinder Maintenance:

### Rupture Disc Design:

A rupture disc is a thin wafer of metal placed in a specially designed port for the purpose of protecting the device and anyone near it from danger due to over pressure of the device. If the device is over pressured this device **SHOULD** burst.

This overpressure may be a result of many factors, a couple of the most common causes are overfilling of the vessel, or a rise in temperature of a vessel that is full of liquids with no gas expansion area. Rupture disc typically used on our DOT sample vessels are rated at a pressure, but has a typical tolerance of +/- 10% @ 72° F. All fluctuations of pressure and/or temperature begin the weakening process of the rupture disc. that leads to required maintenance.

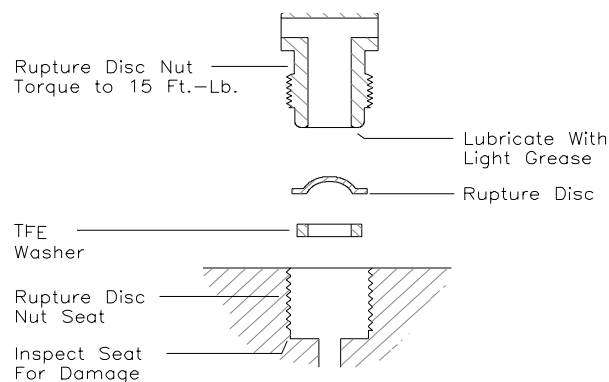
### • Safety Precautions Before Installation

1. The special standard flat seat rupture disc is a precision instrument and must be handled with extreme care. Rupture discs should be installed only by qualified personnel familiar with rupture discs and proper piping practices.
2. Do not install rupture disc if there is any damage in the dome area. A damaged rupture disc is any rupture disc with visible nicks or dents.
3. Do not install a rupture disc that has been previously installed and removed from the disc holder, as reinstalling may adversely affect the joint sealing capabilities and/or performance of the rupture disc

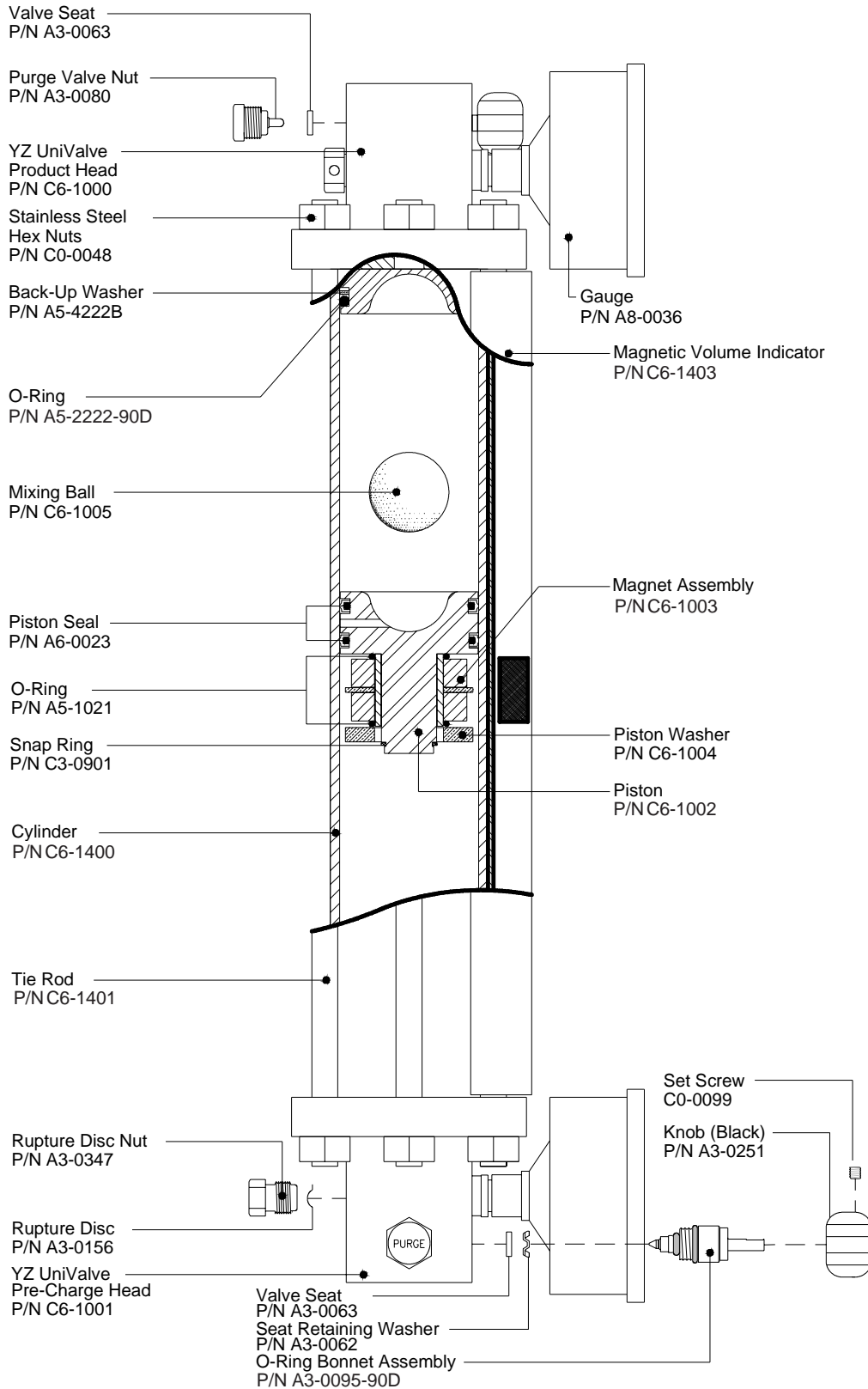
### • Replacement Procedure

1. Assure that the vessel has no pressure left in it.
2. Remove the rupture disc. retaining nut.
3. Remove the old Rupture Disc, and discard it.
4. Remove the old Kel-F/TFE washer, and discard it.
5. Inspect the retaining nut surface where it contacts the rupture disc, for any nicks, or deformities. Replace it if any are found.
6. Inspect the seat area in the disc pocket for any nicks, or deformities. Replace it if any are found.
7. Install the new TFE washer in the disc pocket.
8. Lubricate the face of the retaining nut that contacts the rupture disc, with a thin coat of light weight grease.
9. Install the new rupture disc wafer in the pocket on top of the TFE washer with the dome side of the disc facing up.
10. Install the retaining nut & tighten finger tight.
11. Final tightening of the retaining nut should be done with a **Torque Wrench ONLY.**

**Torque to PRECISELY 15 Ft. Lbs.**



# Diagram #1: DuraSite Portable Sample Vessel







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