



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
FOR WELKER® SINGLE CAVITY SAMPLE CYLINDER

MODEL

SC

DRAWING NUMBERS

AD410BA.9

AD410BI

AD410BX.CE

MANUAL NUMBER

IOM-146

REVISION

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SAFETY

IMPORTANT SAFETY INFORMATION READ ALL INSTRUCTIONS



NOTES emphasize information and/or provide additional information to assist the user.



CAUTION messages appear before procedures that could result in damage to equipment if not observed.



WARNING messages appear before procedures that could result in personal injury if not observed.

This manual is intended to be used as a basic installation of operation guide for the Welker® Single Cavity Sample Cylinder, Model SC. For further information and instructions, please refer to the Installation, Operation, and Maintenance (IOM) Manuals for each individual component. A list of relevant component IOM Manuals is provided in the Appendix to this manual.

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide for the installation, operation, and maintenance of the Welker® equipment described in this manual. Correct installation and operation, however, are the responsibility of the end user. Welker® reserves the right to make changes to this manual and all products in order to improve performance and reliability.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

IMPORTANT – Save these instructions for local inspectors' use.

IMPORTANT – Observe all governing codes and ordinances.

Note to Installer – Leave these instructions with the end user.

Note to End User – Keep these instructions for future reference.

Installation of this Single Cavity Sample Cylinder is of a mechanical nature.

Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the warranty.

If you received a damaged Single Cavity Sample Cylinder, please contact a Welker® representative immediately.

Phone: 281.491.2331

Address: 13839 West Bellfort Street
Sugar Land, TX 77498

SECTION 1: PRODUCT INFORMATION

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this equipment becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance (IOM) Manuals* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call Welker® at 1.281.491.2331.

**The following procedures have been written for use with standard Welker® parts and equipment. Assemblies that have been modified might have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® SC Single Cavity Sample Cylinder is designed to be used in any of a variety of sampling applications, including liquid sampling. However, its primary usage is for gas sampling. The Single Cavity Sample Cylinder is a high-pressure, stainless steel, double-ended sample collection cylinder. If used for liquid sampling, customers should select the option of an outage/ullage tube to provide expansion volume remains to prevent the cylinder from reaching its full capacity. Please refer to *Section 1.3* for further information on expansion volume.

Welker® recommends using a floating piston cylinder for liquid sampling. Please refer to the *Appendix* to this manual for a list of possible cylinder alternatives and their associated *Installation, Operation, and Maintenance (IOM) Manuals*.

Welker® might custom design the Single Cavity Sample Cylinder to suit the particular application and specifications of each customer.

1.3 Safety Warning and Important Information



Please read the following information in its entirety before using the Welker® equipment described in this manual. Failure to adhere to these warnings and recommendations could result in equipment damage and/or personal injury and/or environmental contamination.

- NEVER fill a sample cylinder completely full of a liquid or of a refrigerated gas. ALWAYS allow for AT LEAST 20% expansion. Certain types of liquids might require a different ratio (e.g., 70/30 or 60/40). If the Single Cavity Sample Cylinder is used for liquid sampling, customers MUST use the cylinder designed with an appropriate outage/ullage tube to provide expansion volume remains to prevent the cylinder from reaching its full capacity. Welker® recommends using a floating piston cylinder for liquid sampling. Please refer to the *Appendix* to this manual for a list of possible cylinder alternatives and their associated *Installation, Operation, and Maintenance (IOM) Manuals*.
- NEVER transport a cylinder with pressure exceeding D.O.T. regulations (see U.S. Government CFR 49 for D.O.T. regulations). **In cases where the cylinders are exposed to varying temperatures, do not allow the cylinder to exceed the maximum allowable operating pressure indicated in Table 1.**
- Protect the cylinder at all times and handle with care. It is a precision instrument and might contain a flammable or caustic product as well as a valuable representation of your company's product.
- Welker® recommends cleaning and leak testing of the cylinders after each use.
- Welker® recommends that the cylinder valves be capped or plugged during transportation and when not in use.
- When analysis of product is complete, the cylinder should be emptied according to safe, responsible environmental protocol.

1.4 Specifications



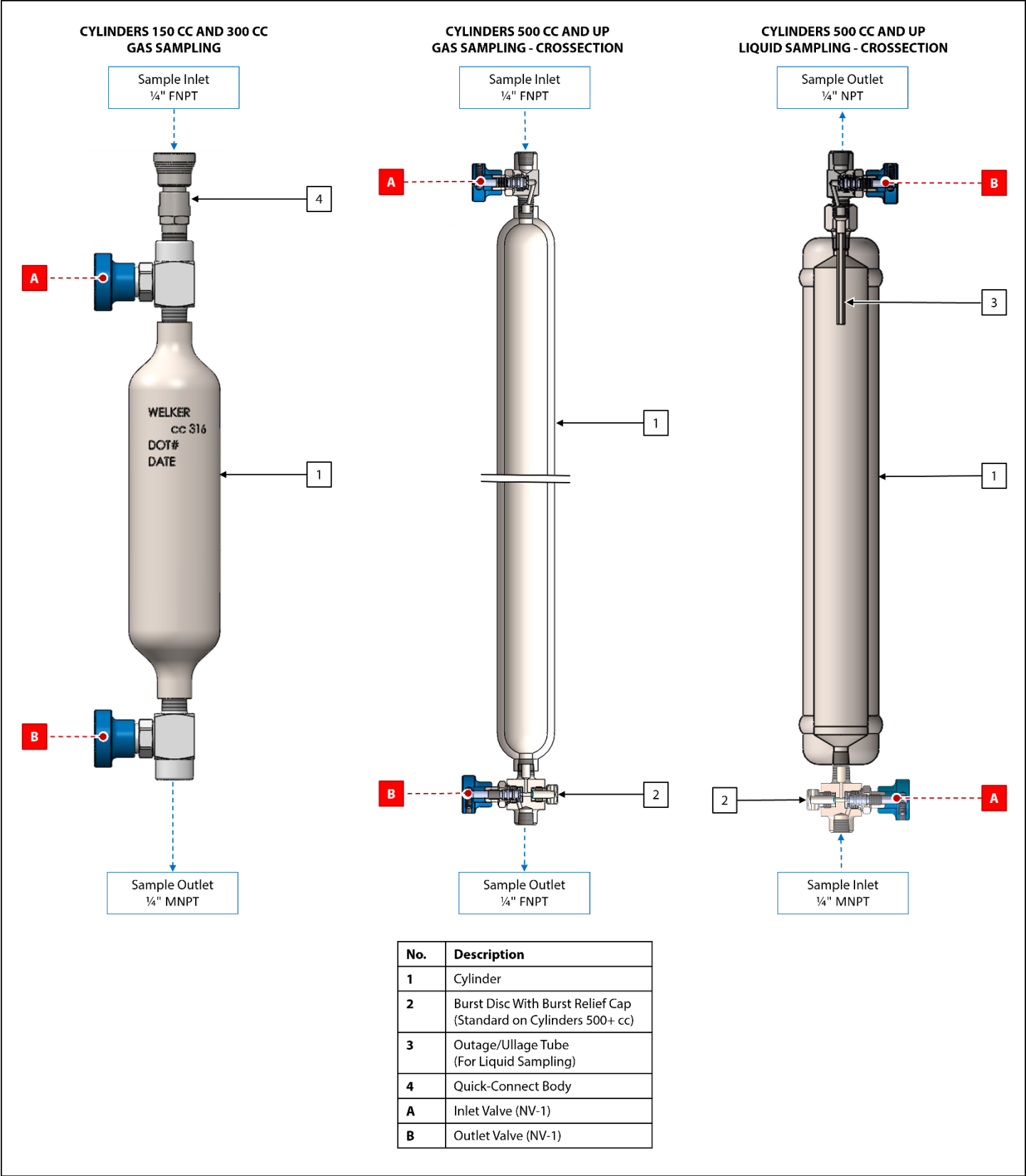
The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: Welker® SC Single Cavity Sample Cylinder Specifications

Product(s) (Sampled)	Gases Compatible With the Materials of Construction *If Used for Liquid Sampling, Please See the <i>Safety Warning & Important Information, Section 1.3</i> and <i>Safety Issue Warning for Liquid Sample Cylinders, Section 3.5</i>
Materials of Construction	316/316L Stainless Steel
Maximum Allowable Operating Pressure	1800 psig @ -20 °F to 120 °F (124 barg @ -28.8 °C to 48.8 °C) Others Available
Volume	150 cc 300 cc 500 cc 1000 cc Others Available
Connections	Inlet — $\frac{1}{4}$ " FNPT Outlet — $\frac{1}{4}$ " MNPT
Mounting	Bracket (Optional)
Approximate Weight (Without Options)	150 cc —3 lb 300 cc —3 lb 500 cc —4 lb 1000 cc —5 lb Others Available
Approximate Dimensions	150 cc —12" x 3 $\frac{1}{4}$ " x 2" (Length x Height x Width) 300 cc —13" x 3 $\frac{1}{4}$ " x 2" (Length x Height x Width) 500 cc —17.5" x 3 $\frac{1}{4}$ " x 2" (Length x Height x Width) 1000 cc —13.25" x 4" x 4" (Length x Height x Width) Others Available
Features	Burst Disc With Burst Disc Cap (Standard on 500+ cc Models) Needle Valves (Welker® NV-1 Needle Valves) Note: 500+ cc Models Must Have a Relief Valve
Options	Outage/Ullage Tube (If Used for Liquid Sampling) Quick-Connect Bodies and Stems

1.5 Equipment Diagrams

Figure 1: Welker® Single Cavity Sample Cylinder Diagrams



SECTION 2: INSTALLATION AND OPERATION

2.1 Before You Begin



After unpacking the Welker® Single Cavity Sample Cylinder, check it for compliance and any damage that might have occurred during shipment. Immediately contact a Welker® representative if you received a damaged unit.



When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.

The procedures described in this manual regarding installation and operation should be performed on a clean surface.

2.2 Installation and Operation

1. This product can be installed and operated according to customer design and specifications.
2. Welker® recommends that installation and operation of the Single Cavity Sample Cylinder comply with industry regulations and standards. For gas sampling, the standard reference is GPA-2166. For liquid sampling, Welker® recommends using a floating piston cylinder. However, if the Single Cavity Sample Cylinder is used for liquid sampling, customers should select the option for an outage/ullage tube, located at the inside top of the cylinder, and must comply with standard reference ASTM D 1265 and/or ISO 4257.
3. Operators should refer to the following warnings before installing or operating the Single Cavity Sample Cylinder.



Welker® recommends that a relief valve be installed at the bottom end of the cylinder—closer to the cylinder body than any other valves connected to the cylinder.



A Single Cavity Sample Cylinder used to collect gas samples should ALWAYS be filled from the top down (see *Figure 1*). A Single Cavity Sample Cylinder used to collect liquid samples should ALWAYS be filled from the bottom up (see *Figure 1*). The top end of the cylinder—where the outage/ullage tube is located—should be labeled or otherwise clearly identified.



NEVER fill the cylinder with liquid to more than 80% capacity. Certain types of liquids require a 60% or 70% capacity limit. Please read *Safety Warning and Important Information, Section 1.3*. On cylinders designated for liquid sampling, an outage/ullage tube MUST be part of the cylinder and MUST be located at the top end of the cylinder (see *Figure 1*). The outage/ullage tube is designed to allow adequate room for product expansion should the cylinder be exposed to increased temperatures.



After isolating the cylinder following sample acquisition, do not move or transport until temperature and pressure have stabilized.



Welker® recommends the use of the floating piston cylinder for liquid sampling. Please refer to the *Appendix* to this manual for a list of possible cylinder alternatives and their associated *Installation, Operation, and Maintenance (IOM) Manuals*.

Selecting the Proper Sampling Procedure

Refer to the Gas Processors Association (GPA) Standard 2166, *Obtaining Natural Gas Samples for Analysis by Gas Chromatography*, for guidelines on selecting the proper sampling procedure for the operator's purpose. Or follow company policy.

GPA Standard 2166 identifies several sampling procedure methods:

- Purging—Fill and Empty Method
- Purging—Controlled Rate Method
- Evacuated Container Method
- Reduced Pressure Method
- Helium “Pop” Method
- Glycol or Water Displacement Method
- Floating Piston Cylinder Method (to be used only with floating piston cylinders—*not* the cylinders detailed in this manual) Welker® recommends using a floating piston cylinder for use with sampling liquid products. Please see the *Appendix* to this manual for a listing of Welker® Constant Pressure Cylinders and their respective *Installation, Operation, and Maintenance (IOM) Manuals*.
- Portable and Online Gas Chromatograph Method

After the Sampling Procedure

Following sample acquisition, containment, and isolation, the cylinder might be transported to a laboratory for sample analysis. Never transport a cylinder with pressure exceeding D.O.T. regulations (see U.S. Government CFR 49 for D.O.T. regulations). In cases where the cylinders are exposed to varying temperatures, do not allow the cylinder to exceed the maximum allowable operating pressure indicated in Table 1.

When analysis of product is complete, the cylinder should be emptied according to safe, responsible environmental protocol.

Following the emptying procedure, the cylinder should be purged, tested, and leak-tested prior to its next use. This is to prevent any residual product from contaminating the next sampling batch. Please refer to *Section 3.2, Cleaning*, and *Section 3.3, Testing With Helium*, for instructions.



PLEASE NOTE: Using one of the sampling procedures noted above (GPA Standard 2166) will most of the time include a method of purging the cylinder.

Purging With New Product

1. Purge the cylinder using the product that will be sampled. This can be accomplished each time the cylinder is put into service.



This method is acceptable ONLY if the cylinder will be used in only one location with only one type of product.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker® recommends that the unit have standard yearly maintenance under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that might lead to excess wear on the unit, a more frequent maintenance schedule might be appropriate.
2. **Welker® recommends purging, testing, and leak testing the cylinder after each use and cleaning with solvent as part of regularly scheduled maintenance or according to company policy. As an alternative to solvent cleaning, Welker® recommends the Welker® CSVC Steam and Vacuum System** (see the *Appendix* to this manual for a listing of the *Installation, Operation, and Maintenance (IOM) Manual* used with the CSVC system).
3. Prior to maintenance or disassembly of the unit, it is advisable to have repair items—such as replacement needle valves—available for repairs to the system in case of unexpected wear or leaking valves.
4. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.

3.2 Cleaning

Regular cleaning of cylinders is essential for the proper functioning of the device. For cylinders used for sample containment, any debris or residue left in the cylinders can contaminate the results of later samples extracted into the cylinder. Welker® recommends purging and leak testing the cylinder after each use (see *Installation & Operation, Section 2.2*). Also, routinely inspect the cylinder for dents, damage, and signs of misuse.

Cleaning With Solvent



Welker® recommends cleaning the Single Cavity Sample Cylinder with a quick-evaporating solvent, such as acetone. Refer to the appropriate company policy for the approved quick-evaporating solvent. Use chemical solvents safely, following all personal protective equipment (PPE) and usage directions listed on the solvent label and the Material Safety Data Sheet (MSDS).

1. Repeatedly fill and empty the cylinder with solvent.
2. Use an inert gas (i.e., helium) to dry and purge the cylinder to remove any traces of the solvent.

Alternative Cleaning Option

Welker® recommends the Welker® CSVC Steam and Vacuum System for cylinder steam cleaning. See the *Appendix* to this manual for a listing of the *Installation, Operation, and Maintenance (IOM) Manual* used with the CSVC system. When no hydrocarbons are found during analysis, cleaning is complete.

3.3 Testing With Helium

1. After purging with the inert gas following cleaning, take a sample of the helium to test for trace amounts of hydrocarbons.
2. If hydrocarbons are present in the analysis, the cylinder has not been adequately cleaned and further helium purging will be necessary (i.e., repeat *Cleaning With Solvent*, step 2).
3. If hydrocarbons or contaminants remain present, another solvent cleaning might be required (see *Section 3.2, Cleaning*). As an alternative to solvent cleaning, Welker® recommends the use of the Welker® CSVC Steam and Vacuum System (see the *Appendix* to this manual for a listing of the *Installation, Operation, and Maintenance (IOM) Manual* used with the CSVC system).
4. When no hydrocarbons are found during analysis, cleaning is complete.

3.4 Troubleshooting Guidelines

Table 2: Welker® Single Cavity Sample Cylinder Troubleshooting Guidelines

Issue	Possible Cause	Solution
High nitrogen content is detected in laboratory analysis.	The previous sample purge was not sufficient enough and air, which consists largely of nitrogen, remained in the cylinder (see <i>Section 2.2, Installation and Operation</i>) and contaminated the sample.	Follow the correct steps for the sampling method chosen. Refer to the Gas Processors Association (GSA) Standard 2166, <i>Obtaining Natural Gas Samples for Analysis by Gas Chromatography</i>, or to the operator's company policy. Complete <i>Section 3.2, Cleaning</i>, and <i>Section 3.3, Testing With Helium</i>, following each usage.
There is product leakage from the cylinders.	One or more of the cylinder's valves are leaking.	Check valves and replace if leaking. Leak test the cylinder following each usage. Replace leaking valves.
Product laboratory analysis results are faulty.	Hydrocarbons from a previous sample might have remained in the cylinder.	Follow the correct steps for the sampling method chosen. Refer to the Gas Processors Association (GSA) Standard 2166, <i>Obtaining Natural Gas Samples for Analysis by Gas Chromatography</i>, or to the operator's company policy. Complete <i>Section 3.2, Cleaning</i>, and <i>Section 3.3, Testing With Helium</i>, following each usage. Do not purge the cylinder with product unless the cylinder will only be used in only one location. Welker® recommends the Welker® CSVC Steam and Vacuum System for cylinder steam cleaning. See the <i>Appendix</i> to this manual for a listing of the <i>Installation, Operation, and Maintenance (IOM) Manual</i> used with the CSVC system.

3.5 Safety Issue Warning for Liquid Sample Cylinders



Please read the following information in its entirety before using the Welker® equipment described in this manual. Failure to adhere to these warnings and recommendations could result in equipment damage and/or personal injury and/or environmental contamination.

After drawing the sample into the cylinder, the inlet and outlet valves should be closed. The sample line is then disconnected from the cylinder and the cylinder is completely isolated from the process. Paperwork is processed and the cylinder is prepared for transport. Prior to transporting the cylinder, it is a common and recommended practice to plug or cap the valves on the cylinder. These valves may terminate with a female NPT or a male NPT. The female valves are typically plugged, while the male valves are typically capped.

In the case of liquid sampling and due to the potential extremes of thermal expansion of many LPG products, caution should be taken to ensure that any residual liquid is drained, blown, or absorbed from the accessible exterior dead volume of the valve body (downstream of the seat) prior to plugging or capping the valve.

It is common to see temperature differentials of as much as 100 °F (38 °C) or more. Liquid samples drawn at -40 °F to -50 °F (-40 °C to -46 °C) can be transported in shipping cases that may see ambient temperatures as high as 100 °F to 160 °F (38 °C to 71 °C), and at times may exceed 160 °F (71 °C).

Operators should be familiar with the basic and general physical properties of the product they are sampling. When sampling liquid, operators should be able to adequately estimate the expansion potential of the sampled product within the cylinder and therefore allow ample outage/ullage for expansion to occur. In a majority of cases, 80% fill and 20% pre-charge is acceptable, but certain liquid products may require a larger inert gas pre-charge ratio (i.e., 70%/30% or 60%/40%).

3.6 Transportation of Single Cavity Sample Cylinders

Be certain when you transport a sample of hydrocarbon products in the oil and gas industry, that you do so in a Department of Transportation (D.O.T.) approved cylinder. If not, you and your company will face penalties and fines. In the United States, D.O.T. and Code of Federal Regulations, Title 49 (CFR-49) is the definitive and final authority on all issues regarding the handling and transportation of sample cylinders.

It is the sole responsibility of each company involved with sample cylinders, to have a copy of CFR-49 and to be responsible for clarification of any issues they have, by researching CFR-49 and consulting with D.O.T. representatives. D.O.T. representatives have the final word on any questions. D.O.T. is the enforcement agency regarding sample cylinder transportation.

There are additional local, county, and state regulations that might affect your operation. Remember, when you leave the confines of your company property and enter any public roadway, or present a sample cylinder for transport by common carrier or other shipping means, you immediately fall under legal jurisdiction for transportation of hazardous materials. Be informed! In January 1988, the D.O.T. informed local law enforcement agencies that anyone who had the authority to issue a citation for vehicular movement, or any person licensed in the law enforcement business, could issue a citation for improper transportation of sample containers. Prior to that time, the official had to be a D.O.T. officer. Now, any officer that is familiar with the rules and regulations of cylinder transport can issue a citation.

In the oil and gas industry, the most common sample cylinders are the spun-end "standard cylinder" (which is covered in this *Installation, Operation, and Maintenance (IOM) Manual*) and the constant pressure cylinder (refer to the *Appendix* to this *IOM* for a listing of Welker® constant pressure cylinders and their associated *IOMs*). The standard cylinder is manufactured according to CFR-49 requirements, and the most common ones (300 cc and 500 cc sizes) carry the stamping "DOT-3E-1800". Since these cylinders are manufactured in accordance with CFR-49, they do not require a document which describes the cylinder. The marking of "DOT-3E-1800" is sufficient.

If you have any questions, please contact Welker® at 1.281.491.2331.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

Welker® *Installation, Operation, and Maintenance (IOM) Manuals* suggested for reference or for use with this unit:

- IOM-011: Welker® Constant Pressure Cylinders With Tracker Tube (Non-Mixer)—Models CP-2G, CP-5G, CP-2G With Premium Purge
- IOM-012: Welker® Constant Pressure Cylinder—High Pressure
- IOM-013: Welker® Constant Pressure Cylinders With Tracker Tube and Gravity Mixer—Models CP2GM and CP5GM
- IOM-014: Welker® Constant Pressure Cylinder With Welker® Magnetic Indicator (With Gravity Mixer)—Model CP2GM-HP
- IOM-033: Welker® Relief Valve—Models RV-1, RV-2, RV-2CP, RV-3
- IOM-063: Welker® Constant Pressure Cylinders With Welker® Solid Indicator, Syringe T-Handle, or Vortex Mixer—Models CP2SI, CP5SI, CP52SY, CP5SY, CP35SY, CP2M, CP5M, CP35M
- IOM-105: Welker® NV-1 and NV-2 Instrument/Needle Valves
- IOM-115: Welker® Constant Pressure Cylinders—High Pressure With Welker® Solid Indicator, T-Handle, and Vortex Mixer—Model CP2M-HP
- IOM-128: Welker® CSVC Steam and Vacuum System
- IOM-234: Welker® RV-110A and RV-110V Relief Valves

Other *Installation, Operation, and Maintenance (IOM) Manuals* suggested for reference or for use with this unit:

- None

Welker® drawings and schematics suggested for reference or for use with this unit:

- Assembly Drawing: AD410BA.9 (Welker® Single Cavity Sample Cylinder, 150 cc and 300 cc, With Quick-Connect Bodies)
- Assembly Drawing: AD410BI (Welker® Single Cavity Sample Cylinder – Standard – High Pressure)
- Assembly Drawing: AD410BX.CE (Welker® Single Cavity Sample Cylinder – 500 cc - For Liquids – With Outage/Ullage Tube)

NOTES

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