WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® TRANSPORTABLE CRUDE OIL CONTAINER

MODEL
TCC Optimum™

DRAWING NUMBERS
AD557DV.1
AD557DY

MANUAL NUMBER
IOM-186

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 and operation guide for the Welker® Transportable Crude Oil Container, TCC Optimum™. For comprehensive 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 TCC Optimum™ Transportable Crude Oil Container 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 TCC Optimum™ Transportable Crude Oil Container, 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® *TCC Optimum*™ Transportable Crude Oil Container is an atmospheric sample container designed for ease of use and sample accuracy when collecting and transporting stabilized liquid product. The TCC Optimum™ is designed to be weighed in order to determine sample volume.

The TCC Optimum™ uses a lighter-weight design to reduce the physical strain on the operator during installation and removal. The quick-connect stems allow the TCC Optimum™ to be quickly installed to and disconnected from a sampling system or mixing skid equipped with flexible hoses with quick-connects. The TCC Optimum™ can be installed to a laboratory mixing skid to mix the collected sample for laboratory analysis and to clean the TCC Optimum™ after use. The entire surface of the 2.5-gallon TCC Optimum™ is electropolished, which enables the operator to thoroughly clean the unit's interior between uses.

Welker® might custom design the TCC Optimum™ to suit the particular application and specifications of each customer.

1.3 Specifications

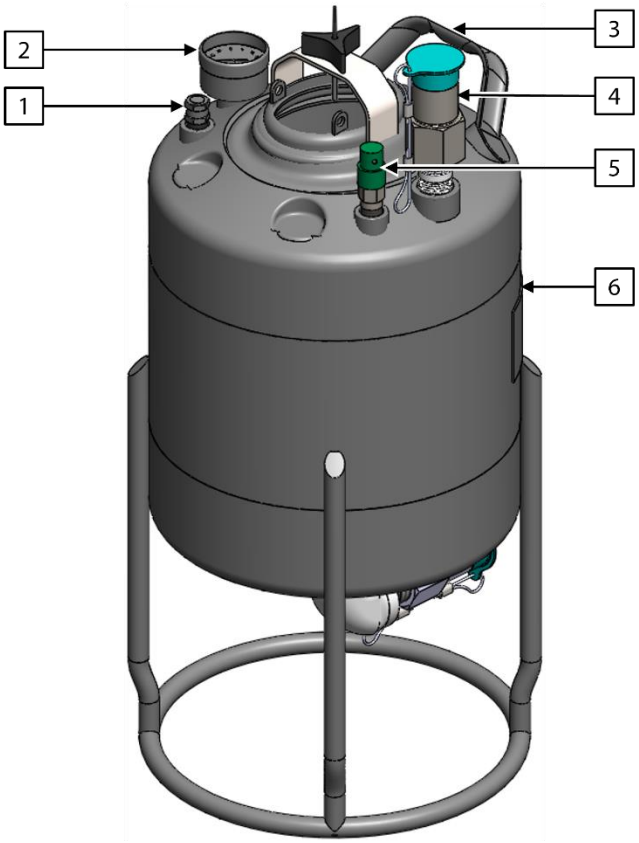
The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: Welker® TCC Optimum™ Specifications	
Applications	Collection of Product That Is Stable or Stratifies at Atmospheric Conditions Transport of Samples to Laboratory for Mixing and Analysis
Materials of Construction	316/316L Stainless Steel With Stainless Steel Fittings
Maximum Allowable Inlet Pressure	136 psig @ -20 °F to 100 °F (*9 barg @ -28 ℃ to 37 ℃*)
Volume	2.5 Gallons (*9.4 Liters*) at 100% 5 US Gallons (*18.9 Liters*) at 100%
Approximate Weight	**2.5-Gallon:** 15 lb [Dry – Includes All Standard Fittings (*Figure 1*) But Does Not Include Optional Items] **5-Gallon:** 23 lb [Dry – Includes All Standard Fittings (*Figure 2*) But Does Not Include Optional Items]
Approximate Dimensions	**2.5-Gallon:** 9½" x 9½" x 21" (Length x Width x Height) (Not Including Optional Items) **5-Gallon:** 10" x 9⅝" x 30½" (Length x Width x Height) (Not Including Optional Items)
Features	Compatible With Welker® MSTCC Laboratory Mixing Skids Internal Fill Marks at 7 (74% Full) and 7.2 Liters (76% Full) (2.5-Gallon Model Only) Portable [One (1) Handle] Precision Spray Bar With Nozzle Pressure Gauge Pressure Relief Valve Quick-Connect Stems Ring Chime Base Rounded Bottom Vacuum Breaker (i.e., Vacuum Relief Valve)
Industry Standards / Product Certifications	Follows API 8.2 Standard Practice for Automatic Sampling of Petroleum and Petroleum Products (ASTM Practice D4177 – 22) ASME Code Stamped (Stainless Steel Container) DOT Approval (2.5-Gallon Model Only) Transport Canada Approval (2.5-Gallon Model Only)
Options	Fittings Supplied by Non-Standard Manufacturers High-Level Switch Quick-Connect Bodies Screw-Tight Lid

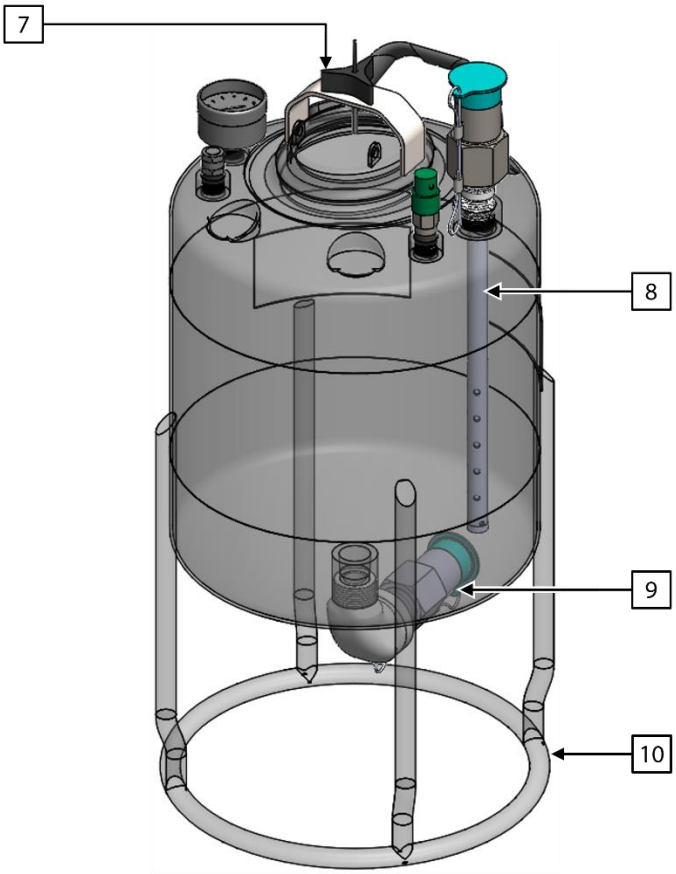
1.4 Equipment Diagrams

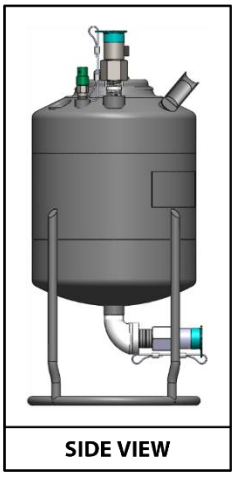
Figure 1: Welker® 2.5-Gallon TCC Optimum™ (With Optional Screw-Tight Lid) Diagram

FRONT VIEW, ANGLED



FRONT VIEW, TRANSPARENT



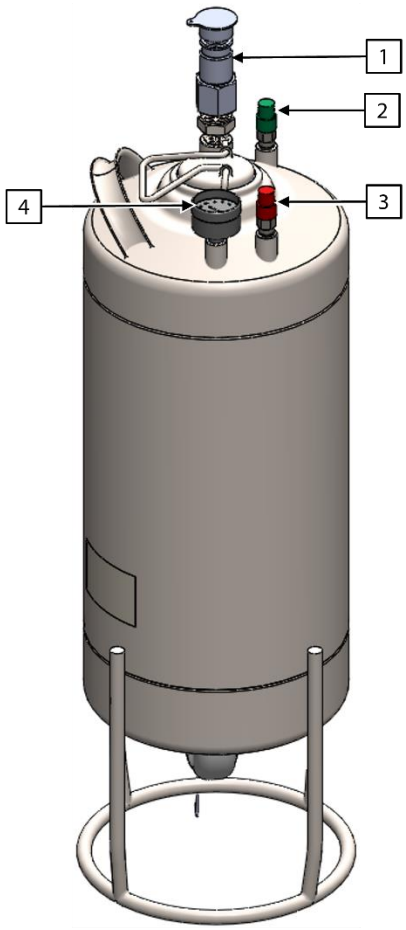


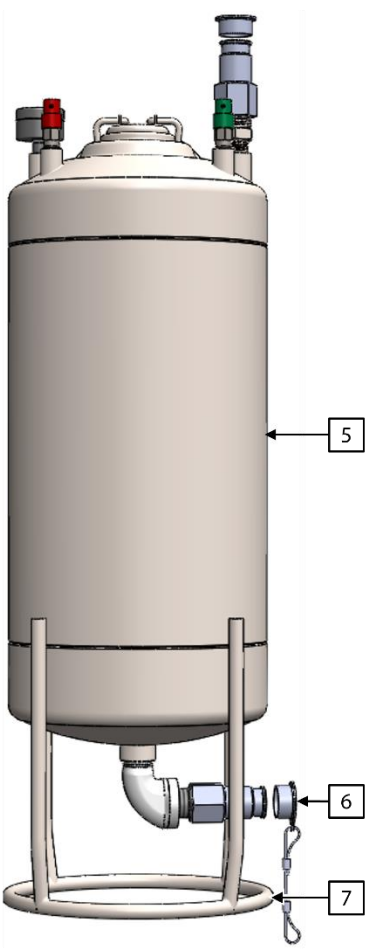
SIDE VIEW

No.	Description
1	Pressure Relief Valve
2	Pressure Gauge
3	Handle (Qty = 1)
4	Product Inlet With Quick-Connect Stem and Cover
5	Vacuum Relief Valve (Green Cap)

No.	Description
6	TCC 2.5-Gallon Tank
7	Adjustment Knob of Optional Screw-Tight Lid
8	Spray Bar
9	Product Outlet With Quick-Connect Stem and Cover
10	Ring Chime Base

Figure 2: Welker® 5-Gallon TCC Optimum™ Design

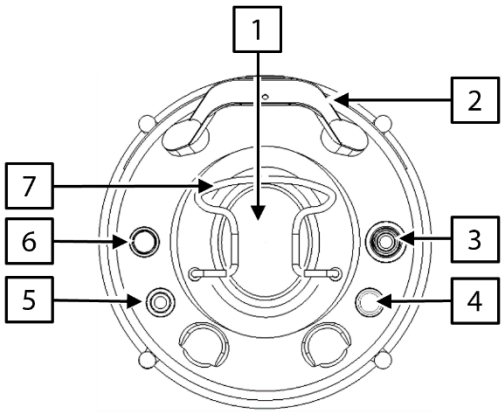




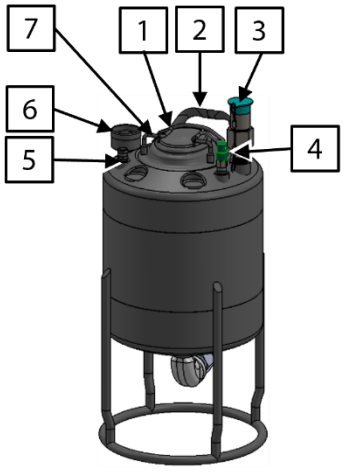
Sample Outlet Shown With Side Placement for Diagram Visibility – See *Figure 1* for Correct Placement

No.	Description
1	Sample Inlet (Shown With Quick-Connect Stem and Cover)
2	Vacuum Relief (Green Cap)
3	Pressure Relief Valve (Red Cap)
4	Pressure Gauge
5	5-Gallon Tank
6	Sample Outlet (Shown With Quick-Connect Stem and Cover)
7	Ring Chime Base

Figure 3: Welker® TCC Optimum™ Standard Lid Design



No.	Description
1	Lid
2	Handle
3	Sample Inlet With Quick-Connect Stem
4	Vacuum Relief Valve
5	Pressure Relief Valve
6	Pressure Gauge
7	Lid Holder



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

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

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

These instructions are written with the assumption that a Welker® MSTCC Laboratory Mixing Skid will be used to mix the contents of the TCC Optimum™. While it is possible to use the MSTCC and the TCC Optimum™ with equivalent third-party equipment, the MSTCC has been designed to take full advantage of the TCC Optimum™'s features to provide a quality sample for basic sediment and water (BS&W) monitoring.

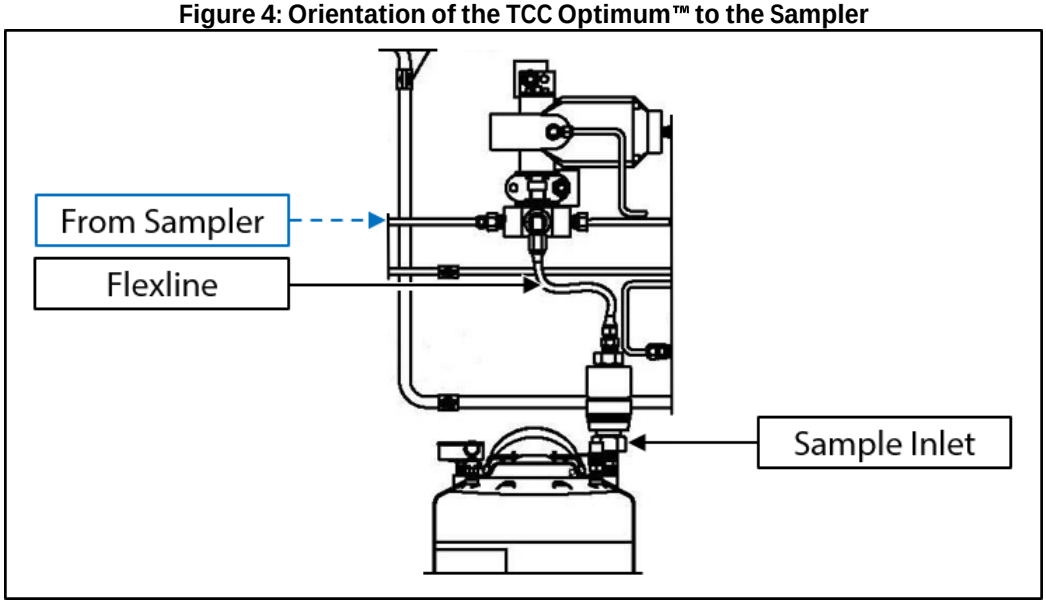
Ensure that the TCC Optimum™ is clean and free of contaminants that might affect the sample. See *Section 3.2, Cleaning the TCC Optimum™ Without Using an MSTCC* or refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the Welker® MSTCC Laboratory Mixing Skid (listed in the *Appendix* to this manual) for instructions on properly cleaning the TCC Optimum™.

2.2 Installing the TCC Optimum™ to the Sampling System

All fittings have been aligned for optimal performance and user convenience. Do not change the fitting alignment.

1. Remove the sample inlet cover from the sample inlet port on the TCC Optimum™ (*Figure 1* or *Figure 2*).
2. Using ¼" flexline with a maximum allowable operating pressure (MAOP) of 136 psig (*9 barg*) or greater, connect from the sampler outlet port to the sample inlet port on the TCC Optimum™. The sampler should be positioned above or level with the product inlet on the TCC Optimum™ (*Figure 4*). Customer-supplied tubing must slope downward from the sampler to the TCC-Optimum™ to ensure that all of the product sampled (BS&W) flows to the TCC Optimum™.

Figure 4: Orientation of the TCC Optimum™ to the Sampler



2.3 Opening the Lid of the TCC Optimum™

If excessive force is used to open the lid of the TCC Optimum™, the lid could pop and cause severe personal injury.

Always, the first step in opening the lid of the TCC Optimum™ is to depressurize the TCC unit by pulling on the ring attached to the pressure relief valve (*Figure 1* or *Figure 2*). Forcing the lid open without depressurization could cause severe personal injury.

1. Depressurize the TCC Optimum™ by pulling on the ring attached to the pressure relief valve (*Figure 1* or *Figure 2*).
2. **If the TCC Optimum™ is equipped with the standard (i.e., flip-lever) lid** (*Figure 3*), pull up on the flip lever. This will release the lid. Then, while grasping the flip lever, carefully maneuver the oval lid, tilt the lid slightly sideways in the oval opening, and pull the lid off. Place the lid in a dry location that has been inspected for cleanliness.
3. **If the TCC Optimum™ is equipped with the optional screw-tight lid** (*Figure 1*), carefully turn the adjustment knob just enough to release the lid. Then carefully maneuver the oval lid, tilt the lid slightly sideways in the oval opening, and pull the lid off. Place the lid in a dry location that has been inspected for cleanliness.

2.4 Closing the Lid of the TCC Optimum™

If the lid of the TCC Optimum™ is not properly closed before operation, the sample might be compromised. An improperly closed lid might allow water to enter or vapors to escape, thus changing the composition of the sample.

If the TCC Optimum™ is equipped with the standard (i.e., flip-lever) lid, continue to instructions under the **Standard Lid** heading.
If the TCC Optimum™ is equipped with the screw-tight lid, proceed to instructions under the **Screw-Tight Lid** heading.

For liquid products, **never** fill the container above 80% of its capacity. Allow at least 20% for product expansion should the container be exposed to increased temperatures.

Note that there are 3,785 cc in 1 US gallon. The volume of each TCC Optimum™ is 5 gallons (18.92 liters) at 100% and 2.5 gallons (9.46 liters) at 100%.

Standard Lid

1. Lightly lubricate the O-ring that is on the lid. The O-ring might become brittle and crack if not covered with a thin layer of lubricant prior to use. Lubrication also helps ensure the seal seats properly and does not twist.

Welker® recommends a silicone-based lubricant, such as Molykote® 111, for use with this unit.

2. Gripping the lid holder (i.e., flip lever), orient the lid inside the opening of the TCC Optimum™, gently moving it until the oval lid is in line with the oval opening.
3. Gently pull up on the lid holder (i.e., flip lever) (*Figure 3*), then press the flip lever gently into place. The flip lever should fit snugly closed with a small amount of pressure. If you meet resistance requiring more than gentle pressure, check the alignment of the lid before proceeding, because the alignment might need to be corrected.

Do not pull up on the lid holder with excessive force or try to force the lid holder into place. Doing so might bend the lid or the lid opening. This will permanently ruin lid alignment, and the tank will leak until serviced or replaced.

Screw-Tight Lid (Optional)

1. Lightly lubricate the O-ring that is on the lid. The O-ring could become brittle and crack if not covered with a thin layer of lubricant prior to use. Lubrication also helps ensure the seal seats properly and does not twist.

Welker® recommends a silicone-based lubricant, such as Molykote® 111, for use with this unit.

2. Grasping the lid holder, situate the lid inside the opening of the TCC Optimum™.
3. Gently pull up on the lid while hand-tightening the adjustment knob (*Figure 1*). Stop tightening the adjustment knob once resistance is met.

2.5 Mixing Operations

1. Ensure that the lid of the TCC Optimum™ is properly closed. See *Section 2.4, Closing the Lid of the TCC Optimum™* for instructions on properly closing the lid of the TCC Optimum™.

STOP

If the lid of the TCC Optimum™ is not properly closed before operation, the sample might be compromised. An improperly closed lid might allow water to enter or vapors to escape, thus changing the composition of the sample.

2. Invert the TCC Optimum™ once to incorporate into the crude oil any condensate that might be on the inside of the lid.
3. Install the TCC Optimum™ to a Welker® MSTCC Laboratory Mixing Skid. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the MSTCC for instructions on installing the TCC Optimum™ to the skid.
4. To retrieve a homogeneous sample from the TCC Optimum™, refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the MSTCC for correct operating procedures.
5. Allow the contents of the TCC Optimum™ to mix in accordance with company policy.

STOP

Never remove the lid during MSTCC mixing operations, because this will cause sample to spray out of the TCC Optimum™.

6. Once the contents of the TCC Optimum™ have been thoroughly mixed, extract the appropriate amount of sample. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the MSTCC for instructions.

Consult company policy for the volume of sample required for testing.

7. After extracting the required amount of sample, the TCC Optimum™ can be cleaned using the MSTCC. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the MSTCC for instructions on cleaning the TCC Optimum™ while the skid is still in operation. To clean the TCC Optimum™ without using the MSTCC, see *Section 3.2, Cleaning the TCC Optimum™ Without Using an MSTCC*.

STOP

Although the TCC Optimum™ incorporates lighter-weight design elements, the unit might be heavy when it reaches the 80% limit. It might be necessary to have a partner assist in removing the TCC Optimum™. Use appropriate personal protective equipment (PPE) and follow appropriate company policies for heavy lifting.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker® recommends that the TCC Optimum™ be cleaned after each use**. If the TCC Optimum™ is stored for some time prior to use, the TCC Optimum™ might need to be cleaned prior to being installed to a sampling system.
2. Prior to maintenance or disassembly of the unit, it is advisable to have an appropriate seal available to replace the lid seal in case of normal or unexpected lid seal wear. Be sure to lightly lubricate the O-ring on the lid. The O-ring might become brittle and crack if not covered with a thin layer of lubricant prior to use. Lubrication also helps ensure the seal seats properly and does not twist.

New seals supplied in spare parts kits should be lightly lubricated before being installed to ease the installation of the seals and reduce the risk of damage when positioning them on parts. Wipe excess lubricant from the seals, as it might adversely affect analytical instrument results. Be sure to lightly lubricate the O-ring for the lid. The O-ring might become brittle and crack if not covered with a thin layer of lubricant prior to use.

Welker® recommends a silicone-based lubricant, such as Molykote® 111, for use with this unit.

3. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
4. Welker® recommends having the following tools available for maintenance. Please note that the exact tools required might vary by model.
    - Clean Rags
    - Cleaning Solvent
    - Lubricant
    - Seal Pick

3.2 Cleaning the TCC Optimum™ Without Using an MSTCC

The TCC Optimum™ can be drained and cleaned while still connected to the Welker® MSTCC Laboratory Mixing Skid. Refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the MSTCC for instructions.

STOP

The TCC Optimum™ **must be depressurized** before opening the lid of the TCC Optimum™. Removing the lid of the TCC Optimum™ under pressure could cause severe injury.

1. Relieve pressure within the TCC Optimum™ by pulling the ring attached to the pressure relief valve (*Figure 1* or *Figure 2*).
2. Open the lid of the TCC Optimum™ by following the directions in *Section 2.3, Opening the Lid of the TCC Optimum™*.

If the TCC Optimum™ is equipped with the optional screw-tight lid, the adjustment knob needs to be loosened before the lid of the TCC Optimum™ can be removed.

STOP

Although the TCC Optimum™ incorporates lighter-weight design elements, the unit might be heavy. It might be necessary to have a partner assist in moving and shaking the TCC Optimum™. Use appropriate personal protective equipment (PPE) and follow appropriate company policies for heavy lifting.

3. Drain the contents of the TCC Optimum™. Follow company policy in safely disposing of the contents of the TCC Optimum™.
4. Flush and wipe down the TCC Optimum™ with a cleaning solvent according to the following steps:
    a. Add approximately one (1) cup of solvent to the TCC Optimum™.
    b. Replace the lid by following the instructions in *Section 2.4, Closing the Lid of the TCC Optimum™*.
    c. Although the TCC Optimum™ incorporates lighter-weight design elements, the unit might be heavy. It might be necessary to have a partner assist. Use appropriate personal protective equipment (PPE) and follow appropriate company policies for heavy lifting. Shake the TCC Optimum™ thoroughly while the unit is upright.
    d. Invert the TCC Optimum™, then shake the unit thoroughly while the unit is inverted.
    e. Open the lid according to instructions in *Section 2.3, Opening the Lid of the TCC Optimum™*, and drain the solvent, safely disposing of the solvent according to company policy.

Welker® recommends cleaning the TCC Optimum™ with a quick-evaporating solvent. 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 Material Safety Data Sheet (MSDS).

5. Carefully dry the inside of the TCC Optimum™ with a clean, dry cloth.
6. If the cloth becomes dirty or if product is visible on the cloth when drying the TCC Optimum™, repeat steps 4 and 5 until the cloth is clean upon removal.
7. Close the lid of the TCC Optimum™. See *Section 2.4, Closing the Lid of the TCC Optimum™*, for instructions on properly closing the lid of the TCC Optimum™.
8. The cleaned TCC Optimum™ may now be installed to a sampling system. See *Section 2.2, Installing the TCC Optimum™ to the Sampling System*, for instructions. If the TCC Optimum™ will be stored prior to next use, tape, cap, or plug the ports on the TCC Optimum™ to prevent moisture and/or insects from entering.

3.3 Troubleshooting Guidelines

Table 2: Welker® TCC Optimum™ Troubleshooting Guidelines		
Issues	**Possible Causes**	**Solutions**
The standard lid will not close properly.	The lid and opening are not aligned properly because excessive force was used to try to close the lid.	Call Welker® for service options.
The solvent used to clean the TCC Optimum™ is toxic.	Adverse effects could be encountered by the operator should the operator fail to follow company policy and use proper personal protective equipment (PPE).	Use all chemical solvents safely, following all personal protective equipment (PPE) and usage directions listed on the solvent label and Material Safety Data Sheet (MSDS).
The O-ring on the lid has become brittle and cracked.	The O-ring on the lid was not lubricated prior to each use.	Replace the O-ring. Be sure to lightly lubricate the O-ring prior to each use of the TCC Optimum™. Welker® recommends a silicone-based lubricant, such as Molykote® III, for use with this unit.
The sample obtained from the TCC Optimum™ is contaminated.	The TCC Optimum™ lid was improperly closed, allowing water to enter or vapors to escape the sample. The TCC Optimum™ was not inverted once before mixing operations, and thus any condensate was not incorporated into the crude oil. The TCC Optimum™ was not cleaned after each use or the TCC Optimum™ was stored for some time prior to use without being cleaned prior to being installed.	Carefully and completely follow the instructions listed in *Section 2.4, Closing the Lid of the TCC Optimum™*. Follow the instructions listed in *Section 2.5, Mixing Operations*, being sure to invert the TCC Optimum™ once where noted, in order to incorporate any condensate into the crude oil. Welker® recommends that the TCC Optimum™ be cleaned after each use. Welker® also recommends cleaning the TCC Optimum™ prior to being installed after the TCC Optimum® has been stored for some time.
The TCC Optimum™ lid will not open.	The TCC Optimum™ has not been depressurized.	Do not try to force the lid open because severe personal injury could result. Depressurize the TCC Optimum™ unit by pulling on the ring attached to the pressure relief valve (*Figure 1* or *Figure 2*). Carefully and completely follow the instructions listed in *Section 2.3, Opening the Lid of the TCC Optimum™*.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-036: Welker® MSTCC Laboratory Mixing Skid
- IOM-136: Welker® MSTCCA Laboratory Mixing Skid
- IOM-205: Welker® MSTCCJ Laboratory Mixing Skid

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

- Generant Vent Relief Valve Series VRV (Welker® IOM-V175)
- Parker Hannifin Corporation Snap-tite 71 Series High Pressure, Push-to-Connect Non-Spill Quick Couplings (Welker® IOM-V333)
- PIC Gauges 302DNF All Stainless Center Back Mount Gauges (Welker® IOM-V335)
- Swagelok® Check Valves C, CA, CH, CP, and CPA Series (Welker® IOM-V076)
- Swagelok® Quick-Connects QC, QF, QM, and QTM Series (Welker® IOM-V088)

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

- Assembly Drawing: AD557DV.1 (Welker® 2.5-Gallon TCC Optimum™)
- Assembly Drawing: AD557DY (Welker® 5-Gallon TCC Optimum™)

NOTES

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