Document No. Loading Arm IOM, Rev. 0
Issue Date: September 1, 2014
Supersedes: September 1, 2013

OPW
ENGINEERED SYSTEMS
A DOVER COMPANY

Loading Arm

Installation, Maintenance & Safety Manual

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Thank you for selecting OPW Engineered Systems, Inc. ("OPW"), and giving us the opportunity to supply you with this Loading Arm. At OPW, we appreciate your business, as well as your confidence in our organization to supply you with equipment that makes your site safer, cleaner, and more productive. The Customer > Distributor > Manufacturer value chain gets stronger as we work to communicate our requirements across the links between us.

Please read this Installation, Maintenance, and Safety Manual (the "Manual") and identify any questions or concerns you may have. Our distributor and factory personnel have a vested interest in your success and are available to answer your questions. All installers and users of the Loading Arm must read this Manual before installing or using the Loading Arm. Please make a copy of this Manual to provide to each person who works on or near the Loading Arm.

Disclaimer

Each installer and user of the **OPW Loading Arm** must read and understand this Manual. Each installer and user must be a skilled worker and must be able to read English.

All installers and users of the Loading Arm must read and understand this entire Manual before installing or using the Loading Arm. All installers and users of the Loading Arm must follow all instructions and warnings in this Manual before installing or using the Loading Arm. This Manual is a part of the **Loading Arm** and must at all times accompany the **Loading Arm** if it is relocated or sold to a third party.

Although **OPW** has taken the utmost care with this publication, **OPW** cannot entirely exclude errors and omissions. **OPW** accepts no liability for any direct or indirect damage caused by or related to this or any other publication.

Do not use the **Loading Arm** unless you agree that **OPW** cannot be held responsible for incorrect use of the **Loading Arm.**

OPW will decline all guarantees and warranties if the Loading Arm:

(1) is used in another location than originally designed or specified in the initial quotation,

(2) is abused, or

(3) is used with a different medium or pressure.

If you intend to relocate the Loading Arm due to restructuring or renovating the supporting infrastructure, you should contact **OPW** for consultation. **OPW** is the exclusive owner of any designs, drawings, documentation or developments relating to the Loading Arm or this Manual, and submits them to you on the condition that they are kept confidential.

The designs, drawings and documentation in this Manual are subject to return on demand.

This Manual and your receipt of the Loading Arm are subject to the OPW Engineered Systems Terms and Conditions that accompanied an invoice for the Loading Arm or the delivery of the Loading Arm and this Manual.

Section 1 Introduction

This Loading Arm is designed to load media from a distributing system into a loading container such as a truck trailer or a railroad car that is designed and suitable for holding and transporting the specific media.

Before selling this Loading Arm, OPW has treated its surface, tested its performance and executed a hydrostatic test as follows:

1.1 Surface Treatments

OPW has finished standard, carbon-steel Loading Arms with a two-part paint process that includes the following:

- 1.5-2.0 mils DFT of high-solids, corrosion-resistant, alkyd primer
- 2.0-2.7 mils DFT of high-gloss, quick-dry enamel paint
- A total minimum DFT target coverage of 4.0 mils

Specifications and performance data are available upon request.

OPW has not painted any stainless steel or aluminum components.

1.2 Performance Test

- OPW has mounted all Assembled-Tested & Boxed (ATB) Loading Arms on a test stand post and conducted a performance test.
- OPW has connected the torsion spring and/or pneumatic counterbalance to achieve smooth movements.
- OPW has checked all planes of rotation for proper functioning.

1.3 Hydrostatic test

- OPW has executed a hydrostatic test according to test pressure.
- OPW used a test medium of a mixture of water and a corrosion-resistant additive.

Section 2 Safety Precautions

IMPORTANT: Take special notice of the Dangers, Warnings and Cautions in this Manual. Like any other piece of equipment, if the Loading Arm is used unsafely or incorrectly, serious consequences may result. Our goal is Zero Harm – Safeguarding People and the Environment.

This concept drives all our actions. The brands and people of OPW Engineered Systems strive to be your preferred partner in providing expert solutions for the safe and efficient handling of hazardous bulk products. Please call on us for processing, loading, transporting and unloading applications worldwide.

Safety Precautions

WARNING: Failure to follow these warnings could result in personal injury, property damage or product failure.

DANGER: Explosion hazard! Always properly ground the Loading Arm and the receiving loading container. Product flow causes static electricity. Failure to ground both the Loading Arm and the receiving loading container may cause an explosion, property damage, serious personal injury, and death.

DANGER: Always keep all body parts away from the rotating and moving parts of the Loading Arm. The rotating and moving parts of the Loading Arm creates pinch point hazards which may cause serious personal injury and death. Always keep body parts clear of pinch points between the Loading Arm and the loading container which may cause serious injury or death.

WARNING: While installing and using the Loading Arm, always wear adequate personal protection, including hard hats, gloves, and steel-toed work boots. Failure to wear adequate personal protection may cause serious personal injury and death.

WARNING: Always follow the procedures prescribed in this Manual. Failing to follow the procedures prescribed in this Manual may damage the Loading Arm and cause serious personal injury and death.

CAUTION: Always use the Loading Arm for its designated purpose only. Using the Loading Arm for other than its designated purpose is unsafe and may damage the Loading Arm and cause personal injury.

Only one person – the responsible operator – is allowed in the working area of the Loading Arm.

Disconnect the Loading Arm from its adapter and park it in a safe position when you have completed loading or unloading.

Provide an instruction or a sign on the work floor to warn users of the Loading Arm above them and to stay away from the area during installation, use, maintenance or disassembly.

Section 2 Installation, Operation & Maintenance

Only trained and skilled personnel who have read and understand this Manual can install the Loading Arm.

Installation

Preparing for the Installation

- For safe and efficient transportation, Loading Arms may be partly disassembled and packed in crates.
- Each crate may contain one or more boxes with fastening materials for assembly of the Loading Arms.
- These crates may also contain optional accessories.
- After installing the Loading Arm, save these crates for future use in storing or dismantling the Loading Arm.
- OPW does not include any gaskets, bolts, nuts or washers for mounting the stand post or the inlet flange of the Loading Arm.
- You must purchase the bolts, nuts and washers to mount to stand post and the inlet flange or the Loading Arm with these specifications:
  - Bolt diameter must be less than the bolt-hole diameter.
  - Bolt material must be at a minimum steel class 8.8.
  - The bolt-torque setting must follow the bolt class.

WARNING: Always verify that the Loading Arm's supporting piping is level and plumb and capable of handling the weight and forces of the Loading Arm. Failure to level the supporting piping may damage the Loading Arm and may cause serious personal injury and death.

CAUTION: The Loading Arm has no provision to relieve pressure caused by temperature fluctuations and thermal expansion of transferring media. A pressure relief valve in front of the inlet of the Loading Arm may be required to relieve this pressure. This pressure must never exceed 10% of the working pressure. Failure to install a pressure relief valve may damage the Loading Arm and may cause personal injury.

Assembling the Loading Arm

1.) Review assembly drawing and confirm that all components are available and in good condition.

2.) Contact OPW immediately if you notice any missing or damaged components.

3.) Clean all dirt from threads and all other parts of the Loading Arm.

4.) Begin assembly starting from the inlet end of the Loading Arm.

5.) When making a threaded connection, apply a liberal coating of suitable and compatible thread sealant on the first three or four male threads.

6.) Use strap wrenches wherever possible, and always use strap wrenches with aluminum parts.

7.) You may damage aluminum parts if you use a pipe wrench on them.

Installation of the Assembled Loading Arm

DANGER

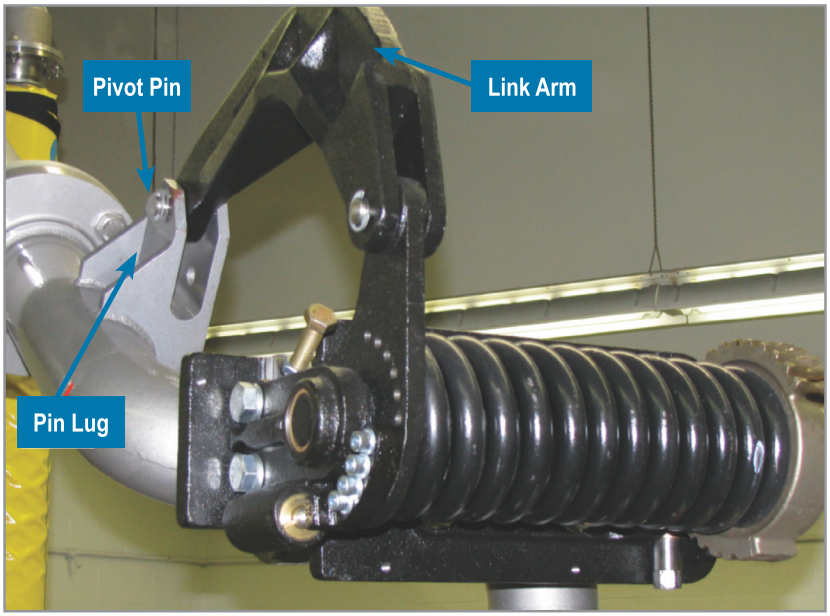
DANGER: Always use a crane or a lifting device to move and lift the Loading Arm. The Loading Arm is heavy. Failure to use a crane or lifting tool to move and lift the Loading Arm may damage the Loading Arm and cause serious personal injury and death.

The following items should be inspected on a regular basis:

1.) OPW has connected the torsion spring of the Loading Arm before shipment. The lever arm must be reconnected during rigging of the Loading Arm. Final spring adjustment may be necessary to achieve desired lifting action.

2.) Use two webbing straps for hoisting the primary Loading Arm out of the crate.

3.) For shipping purposes, the Loading Arm may be shipped in sections. Typically, you should assemble the Loading Arm at grade and lift the fully assembled Loading Arm into position.



4.) Review drawing thoroughly to insure that the Loading Arm is assembled correctly.

5.) When hoisting, make sure that the Loading Arm is balanced and cannot move during hoisting.

6.) Lift Loading Arm away from crate and place it on the steelwork in the desired position.

7.) Mount the inlet flange of the Loading Arm onto the corresponding outlet flange.

8.) Once the Loading Arm is mounted to inlet-supply piping, reconnect torsion-spring link arm via pivot pin.

9.) Secure pivot pin with E-clips.

10.) Raise outboard section of Loading Arm until Link Arm holes align with pin lugs on outboard piping.

11.) For a supported boom-style arm, Loading Arm must be supported until the pillow block or the flange bearing is attached.

12.) Spring adjustment may be required to achieve the desired balance position.

13.) To adjust the spring, follow the spring adjustment procedure provided with the Loading Arm shipment.

Operation

Operating the Loading Arm

DANGER: Explosion hazard! Always properly ground the Loading Arm and the receiving loading container. Product flow causes static electricity. Failure to ground both the Loading Arm and the receiving loading container may cause an explosion, property damage, serious personal injury and death.

1.) The following procedures are general in nature and require additional or different procedures for your application.

2.) Follow site-specific operational policies and guidelines at all times during the loading or unloading process.

3.) Before using the Loading Arm, always place the receiving loading container (tank truck, railcar, etc.) within the area of the Loading Arm and respective safety-access equipment.

Dismantling the Loading Arm

1.) Only trained and skilled personnel who have read and understand this Manual should dismantle the Loading Arm.

2.) The same risks and procedures of initial installation apply.

3.) When disassembling the Loading Arm, account for all risks it could pose.

4.) If you are unfamiliar with dismantling industrial structures, consult with your local distributor or OPW.

5.) Before dismantling the Loading Arm, take these necessary preparations.

DANGER: Always use a crane or a lifting device to move and lift the Loading Arm. The Loading Arm is heavy. Failure to use a crane or lifting tool to move and lift the Loading Arm may damage the Loading Arm and cause serious personal injury and death.

WARNING: When transferring or working with fluid that is hazardous or toxic, always follow necessary precautions, including those specified in MSDS sheets. Always clean parts before doing any work. Always use appropriate specialized equipment, personnel and, if necessary, third parties with specialized knowledge and equipment. Failure to use appropriate precautions with hazardous or toxic fluids may cause serious injury or death.

WARNING: While installing and using the Loading Arm, always wear adequate personal protection, including hard hats, gloves and steel-toed work boots. Failure to wear adequate personal protection may cause serious personal injury and death.

6.) Prepare the crate which came with the initial purchase to hold the Loading Arm.

Dismantling the Loading Arm (continued)

7.) If the original crate is not available, make or buy a suitable crate or container in which the Loading Arm and parts can be transported or stored.

8.) Clear the surrounding area of obstacles and hazards.

9.) Shut off all working devices.

10.) Barricade the surrounding area so that no unauthorized people may access the work area.

11.) Arrange all necessary permits and paperwork with the facility owner, and any applicable local, state and federal authorities before taking any action.

12.) Clean and dry the Loading Arm.

13.) Begin disassembling the Loading Arm from its position.

14.) Secure the Loading Arm properly so that it will fit into its crate and will remain in its position when all tension is removed from the counterbalance torsion spring.

15.) Remove all tension from the counterbalance torsion spring. When spring tension has been removed, you can easily move the Torsion Spring Lever Arm.

DANGER: Before performing any maintenance, always secure the Loading Arm and remove all tension from the counterbalance – a torsion spring. The Loading Arm counterbalance spring contains a substantial amount of stored energy. You must relieve this energy before any disassembly. Failure to remove all tension from the counterbalance spring of the Loading Arm before maintenance may cause serious personal injury or death.

16.) Secure the Loading Arm with belts to a crane or lifting device.

17.) Insure that when the Loading Arm comes loose from the support piping, it will not fall onto the ground.

18.) Disconnect the bolts from the connecting flanges or threads between the Loading Arm and the plant support pipes.

19.) Lower the Loading Arm into its crate or onto the floor by crane or lifting device.

20.) If necessary, fold the Loading Arm into a position in which it can be transported safely.

21.) Secure the Loading Arm from moving by securing it with bolts, belts or other suitable means, or take apart the Loading Arm by disconnecting and removing all connecting parts.

Maintenance

Maintaining the Loading Arm

You must perform the following service functions to maintain your Loading Arm:

1.) Only trained and skilled personnel who have read and understand this Manual should perform maintenance.

2.) Before performing any maintenance, the entire installation must be shut down and turned off before proceeding.

3.) Remove all media from Loading Arm before performing any maintenance.

4.) During maintenance, unauthorized people must be prohibited from standing under or near the Loading Arm.

5.) During and after any maintenance, the Loading Arm inlet supply piping, suspension and spring tension must be checked and verified before re-starting the system.

6.) Inspect bolts and suspension points of the Loading Arm at least every three months.

7.) Inspect the Loading Arm for leaks at least every three months, and more often it you are transferring toxic or hazardous media.

8.) See OPW Loading Arm Start-Up & Annual PM Checklist for more details on maintaining your OPW Loading Arm.

9.) When partial or complete dismantling is necessary for maintenance, observe the same procedures and guard against the same risks as during installation.

10.) After performing any maintenance, the Loading Arm must be tested per facility or local guidelines before the next use.

DANGER: Before performing any maintenance, always secure the Loading Arm and remove all tension from the counterbalance – a torsion spring. The Loading Arm counterbalance spring contains a substantial amount of stored energy. You must relieve this energy before any disassembly. Failure to remove all tension from the counterbalance spring of the Loading Arm before maintenance may cause serious personal injury or death.

Testing After Service

1.) After servicing or replacing parts, you must test the Loading Arm for a safe and secure use.

2.) You must perform a leak test before returning the Loading Arm into service.

3.) After performing a leak test, visually inspect the Loading Arm.

4.) Verify that all parts are correctly bolted together, including accessories such as valves, quick disconnects, dry disconnects, safety breakaways, etc.

5.) After confirming that all parts are properly bolted and secured, switch on the fluid-transfer pump.

6.) With the Loading Arm filled with fluid, visually inspect the Loading Arm, and confirm that there are no leaks.

7.) **OPW** recommends that you check the Loading Arm every three months for proper functioning, all connections for proper fastening and all joints for leak-free operation.

8.) If you find any leaks, replace the seals immediately to obtain the safe and correct use of the Loading Arm.

9.) If leaks continue after maintenance, contact your **OPW** distributor or **OPW** for further assistance.

10.) For maintenance and adjustment of the individual components, see relevant instruction sheets or consult the Download section of our website at **www.opw-es.com**.

Extended Storage of Loading Arm

1.) Before installing or storing the Loading Arm, inspect it to make sure it is not damaged.

2.) When you store a Loading Arm for future use, place and keep the Loading Arm in its shipping crate, and seal the crate.

3.) Store the Loading Arm in a dry warehouse.

4.) During storage, exercise swivel joints every 60 days by lubricating and rotating swivels.

5.) If you intend to relocate the Loading Arm to another location than as originally designed or specified in the initial quotation, you should contact OPW for consultation.

Loading Arm Start-up and PM Checklist

Loading Rack Location: _____ Products: _____

Assembly Drawing (Drawing #) _____

	Start-up (date and initial)	Annually (date and initial)
Confirm compatibility of loading arm seals with		
• Product(s)	_____	_____
• Operating and ambient temperatures	_____	_____
• Review loading arm assembly/approval drawing. Representative of installation? **Note:** Anything NOT captured on drawing that could ADD/DEDUCT significant weight?	_____	_____

Support Piping

• Inspect Loading Arm Support Piping Level and Plumb? **Note:** Inlet piping must be capable of supporting weight and loads of entire Loading Arm assembly AND any related accessories (i.e., vapor hoses, etc.)	_____	_____

Loading Arm

• Inspect all flange connections	_____	_____
• All 150/300 Class Flanges gasketed and properly torqued		
• ALL loading-arm swivel joint sealing flanges properly torqued **Note:** 2" and 3" DSF Sealing Flanges torqued to 28 ft/lbs, 4" to 75 ft/lbs.		
• Inspect all pivot pins. Verify that all E-clips are in place.		
• Inspect and lubricate loading-arm pillow block/flange bearing (supported boom style)		
• Inspect all swivel joint planes for evidence of leakage.		
• Lubricate all swivel-joints with manual grease gun using ONLY OPW-approved lubricants.		

NOTE: Swivel Joints DO NOT require field lubrication at start-up

Hose and Fittings

• Inspect all hoses and fittings for damage/leaks. Replace as needed.	_____	_____
• Verify hoses are properly attached to the arm and that hose does not limit range of motion of loading arm.		

Loading Arm Counterbalance

Torsion Spring

• Verify torsion-spring tension is adequate to easily move loading arm up and down **Note:** Most adjustments are made with the arm in the fully raised position via worm gear hex drive on underside of spring.	_____	_____

Upward/Downward Travel Adjustments

Note: OPW Counterbalance units have integral upward/downward travel stops. These should be set to avoid any obstructions at loading racks such as handrails, safety cages, overhead piping, lighting, etc.	_____	_____
• Verify upward travel stop position-adjust as necessary Downward Travel Stop		
• Verify downward travel stop position-adjust as necessary		

Pneumatic Counterbalance

• Verify that air supply is 80 psi (5.4 bar) minimum. **Note:** Inlet air gauge is located in Pneumatic Control Panel.	_____	_____
• Check operation of Up/Down Travel **Note:** If pendant controls are reversed, simply switch air-line connections at cylinder.		
• Inspect and lubricate pivot pins. E-clips in place?		
• Adjust cylinder-mounted speed-control valves as required		

Consult Loading Arm IOM for details on above listed procedures. These documents are available via download on www.opw-es.com

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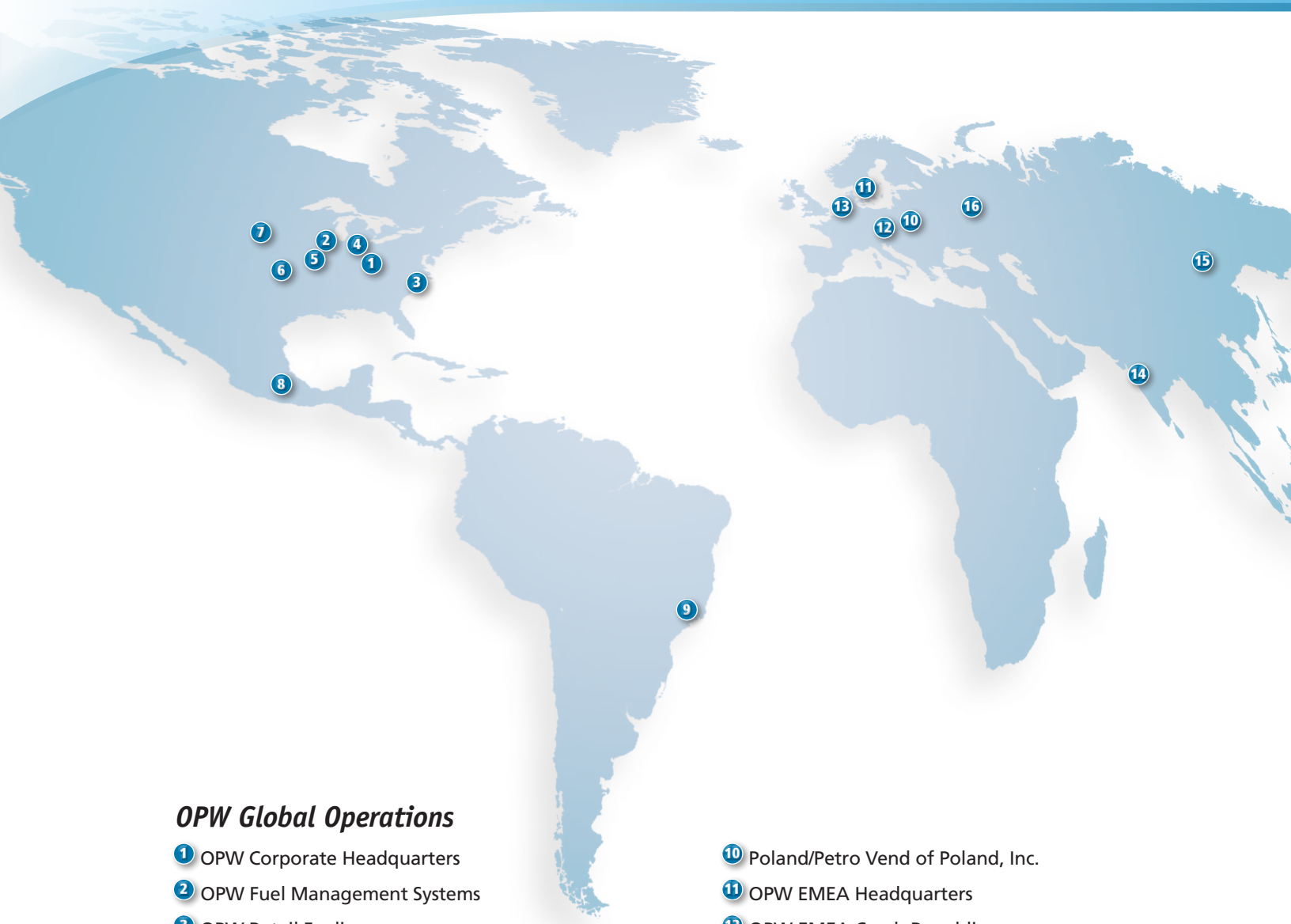
Leading The Way *in Fluid Handling Solutions Worldwide*



OPW Global Operations

1. OPW Corporate Headquarters
2. OPW Fuel Management Systems
3. OPW Retail Fueling
4. OPW Engineered Systems
5. Midland Manufacturing
6. Civacon
7. PDQ Manufacturing Inc.
8. OPW Mexico
9. OPW Latin America
10. Poland/Petro Vend of Poland, Inc.
11. OPW EMEA Headquarters
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