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**Title: Instruction for Installation, Operation, & Maintenance of
ANSI Class 150-600 Sure Shot® Single Chamber Orifice Fittings**



**Title: Instructions for Installation, Operation, & Maintenance of ANSI
Class 150 – 600 Sure Shot® Single Chamber Orifice Fittings**

TMCo, Inc. (The Measurement Company) has manufactured and tested the Sure Shot® Orifice Fitting to be operated for specific design and flow conditions. The Sure Shot® Orifice Fitting will perform its intended function when it is installed, operated, and maintained in strict accordance with these instructions. Nameplate design conditions must never be exceeded. To maintain a safe environment for the equipment and plant personnel, all warnings and safety precautions identified in this document must be strictly followed.



**SERIOUS PERSONAL INJURY OR
DEATH OCCURRENCE WARNING**

TMCo, Inc. requests the user to read all nameplate information to determine the MAOP (maximum allowable operating pressure) or CWP (Cold Working Pressure) before placing the product in service. Operating this product above the MAOP / CWP may lead to serious injury or death. Do not install the product if the nameplate is missing or has been altered in any form; instead, contact your local TMCo, Inc. office immediately for instructions.

Read all instructions prior to installing, operating, or servicing this product. This manual is specific to certain forms and types of the Sure Shot® Orifice Fitting. Do not use this manual if it is not specific to the equipment you are using. To obtain the correct manual, please contact TMCo, Inc. @ 713-465-3255. Follow all warnings, cautions, and instructions marked on and supplied with the Sure Shot® Orifice Fitting, including this manual.

Prior to using the Sure Shot® Orifice Fitting, all associated personnel should be informed and educated in its proper installation, operation, and maintenance. If you do not understand any of these instructions, contact TMCo, Inc. @ 713-465-3255 immediately for assistance and clarification. To ensure proper performance, only use qualified personnel to install, operate, and maintain the Sure Shot® Orifice Fitting.

Install the Sure Shot® Orifice Fitting as specified in the installation instructions herein and per local applicable codes and national standards. Connect all features to the proper pressure sources.

When replacement parts are required, ensure the use of replacement parts specified by TMCo, Inc. Unauthorized parts and procedures can affect the performance and risk the safe operation of the Sure Shot® Single Chamber Orifice Fitting. Non OEM part substitutions may result in fire, improper operation or other hazards.

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Ensure that all equipment openings, access plugs, and protective covers are in place to prevent personal injury.

**READ AND FOLLOW THE TMC Co, INC. SURE SHOT® ORIFICE FITTING
OWNER'S MANUAL. PLEASE OBSERVE AND NOTE ALL PRODUCT WARNINGS AND
INSTRUCTIONS.**

NOTICE

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A. LIMITED WARRANTY- Subject to any limitations described in Paragraph B herein, and except as otherwise expressly provided herein, TMC Co, Inc. (The Measurement Company) warrants that the Goods manufactured or Services provided by TMC Co, Inc. will be free from defects in materials and workmanship under normal use and care until the expiration of the applicable warranty period. Goods are warranted for a period of twelve (12) months from the date of initial installation or twenty four (24) months from the date of shipment, whichever date comes first. Consumables and services are warranted for a period of ninety (90) days from the date of shipment or completion of services. Products purchased by TMC Co, Inc. from a third party for resale to Buyer shall carry only the warranty extended by the original manufacturer. Buyer agrees that TMC Co, Inc. has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of those products. If Buyer discovers any warranty defects and notifies TMC Co, Inc. thereof in writing during the applicable warranty period, TMC Co, Inc. shall, at its option, promptly correct any errors that are found by TMC Co, Inc. in the services, or repair or replace F.O.B point of manufacture that portion of the Goods found by TMC Co, Inc. to be defective, or refund the purchase price of the defective portion of the Goods/Services. All repairs or replacements necessitated by inadequate maintenance, normal wear and usage, unsuitable utility sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of TMC Co, Inc. are not covered by this limited warranty, and shall be at the Buyer's expense. TMC Co, Inc. shall not be obligated to pay any costs or charges incurred by the Buyer or any other party except as may be agreed upon in writing by an authorized TMC Co, Inc. representative. All costs of dismantling, reinstallation and freight and the time and expenses of TMC Co, Inc. service personnel for site travel and diagnosis under this warranty clause shall be born by the Buyer unless accepted in writing by TMC Co, Inc. Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the originals warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by TMC Co, Inc. and can be amended only in writing signed by an authorized representative of TMC Co, Inc.

EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS AGREEMENT, THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES PROVIDED.

**CORROSION OR EROSION OF MATERIALS IS NOT COVERED IN THIS
GUARANTEE.**

B. LIMITATION OF REMEDY AND LIABILITY – TMC Co, Inc. shall not be liable for damages caused by delay in performance. The sole and exclusive remedy for breach of warranty hereunder shall be limited to repair, correction, replacement, or refund of purchase price under the limited warranty clause in Section A herein. In no event, regardless of the form of the claim or cause of action, whether based in contract, negligence, infringement, strict liability, other tort or otherwise, shall TMC Co, Inc.'s liability to Buyer and/or its customers exceed the price to Buyer of the specific Goods manufactured or Services rendered by TMC Co, Inc. giving rise to the claim or cause of action. Buyer agrees that in no event shall TMC Co, Inc.'s liability to Buyer and/or its customers extend to include consequential, incidental, or punitive damages. The term consequential damages shall include but not be limited to, loss of anticipated profits, loss of use, loss of revenue and cost of capital.

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1.0 INTRODUCTION

1.1 GENERAL

This manual provides installation, operation, and maintenance instructions for use with the TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting. It is important to read this manual in its entirety before beginning any of the listed operations, and to observe all warnings, cautions, and notices described herein which are intended to highlight potential safety concerns and may endanger personnel and equipment if ignored.

1.2 DESCRIPTION

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting is a Simple, Safe, Accurate, Economical, Grease Free Orifice measurement device, using the principal of differential pressure to measure flow. Features of the TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting includes:

1.2.1 COMPONENTS

TOP CLAMPING BAR SEAL

Seals easily by tightening square head clamping bar screws. HNBR D70 O-Ring. (HNBR) or Hydrogenated Nitrile Butadiene Rubber offers improved wear and extrusion resistance over standard sealing materials. It has excellent chemical compatibility and can be used with oils which have aggressive additives, fluids containing Hydrogen Sulfide, Amines, and Oilfield corrosion inhibitors. The compound also has an extended temperature range (-40° .F. to 300° .F.)

ORIFICE PLATE SEAL (PATENTED)

The orifice plate seal is (HNBR) Hydrogenated Nitrile Butadiene Rubber material bonded to a stainless steel metal insert. This insert retains seal shape, ensuring no protrusion into the bore. This special shape provides a positive seal between the orifice plate and the upstream fitting seat. This conforms to latest AGA 3/API 14.3 and ISO 5167 design specification requirements.

PRESSURE TAPS AND DRAIN PLUGS

Standard NPT pipe taps conform to AGA 3/API 14.3 and ANSI requirements.

STANDARD NACE TRIM

Special parts and their associated costs are not needed for applications where H₂S is present. The standard internal materials are fully compliant with the NACE MR-01-75-2000 requirements.

1.2.2 FUNCTIONALITY

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting utilizes a single chamber design to precisely position an orifice plate in the center of a flow stream. Fluid flow through the orifice plate generates a differential pressure across the orifice plate. By measuring the resultant pressure drop through pressure taps located in the chamber body, and with known or measured fluid process parameters, the flow can be calculated using standard, industry accepted equations.

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting allows for inspection of and replacement of the orifice plate without removing the Sure Shot® from the flow line. Use of the

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Sure Shot® eliminates the effort required to remove and inspect an orifice plate housed in conventional orifice flange installations.

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting is a greaseless fitting with no moving parts.

Note: These procedures must be performed when the fitting is depressurized.

TMC Co, Inc. Sure Shot® Single Chamber Orifice Fittings “fully conform” to the AGA 3 / API 14.3 requirements, ISO 5167, ANSI Flange Standards, ASTM Material Specifications and NACE MR-01-75-2000 Edition (for internal wetted parts).

TMC Co, Inc. Sure Shot® Single Chamber Orifice Fittings offer telemetry taps on both sides of the orifice fitting as an option in sizes 4” & 6” and a drain plug located at the bottom of all fittings.

Spare Parts may be ordered on line via the following website link: www.tmcousa.com or you may contact us directly by phone @ 713-465-3255. When ordering spare parts, please specify meter serial number, size and item no. referenced below.

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1.3 GENERAL PARTS LIST – NACE TRIM STANDARD

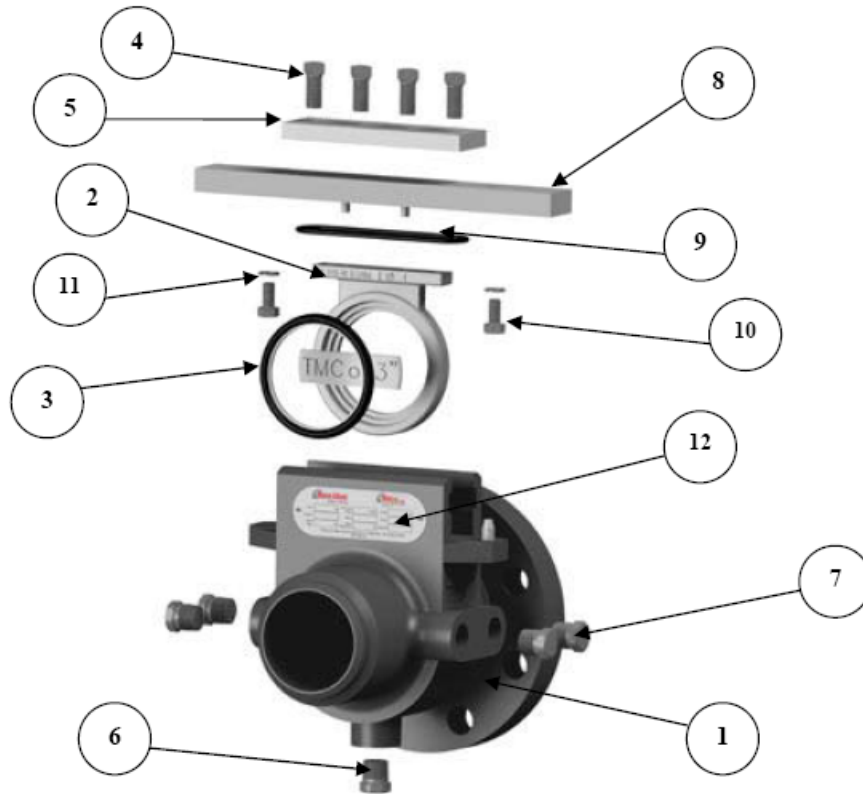
PARTS IDENTIFICATION & MATERIALS LIST QUANTITY BY SIZE

ITEM	DESCRIPTION	STANDARD MATERIAL*	2"	3"	4"	6"
1	Body	A-216 WCB/WCC	1	1	1	1
2	Orifice Plate Carrier, Patented	ASTM A351 Gr. CF8M	1	1	1	1
3 ¹	Orifice Plate Seal Ring, Patented	StnlsStl/HNBR Bonded	1	1	1	1
4	Clamping Bar Screws, Coated	Carbon Steel Gr. 8	4	4	5	6
5	Clamping Bar, Coated	Carbon Steel	1	1	1	1
6	Drain Plug NPT	Carbon Steel-6000 psi Rated	1	1	1	1
7	Plugs for Flange Taps 1/2" NPT	Carbon Steel-6000 psi Rated	4	4	4/8 ²	4/8 ²
8	Sealing Bar, Coated	Carbon Steel	1	1	1	1
9	Sealing Bar O-Ring	HNBR D70	1	1	1	1
10	Plate Carrier Cap Screws	Stainless Steel	2	2	2	2
11	Plate Carrier Cap Screws Lock Washers	Stainless Steel	2	2	2	2
12	Name Tag	Stainless Steel	1	1	1	1

* Materials subject to change. Please consult sales.

¹ To be ordered separately

² (8) For TT taps



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2.0 INSTALLATION

2.1 METER TUBE INSTALLATION

The orifice fitting (meter) is typically installed in a meter run to complete a metering unit. If the TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting is not already connected to a meter tube, a meter tube which meets the applicable code requirements, such as AGA 3 / API 14.3, should be fabricated and attached to the orifice fitting, inspected, and tested prior to installation in the process line.

Prior to installation of the meter, the meter tube assembly must be cleaned of all dirt, scale, foreign matter, grease, oil, or other contaminants.

Personnel installing the meter tube shall ensure the connecting process lines are also cleaned adequately to prevent foreign material from entering the meter tube and or meter during the installation process.

The orifice plate is to be installed during meter tube installation. (Note: the orifice plate is not provided by TMC_o, Inc.)

2.2 SURE SHOT® INSTALLATION



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The TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting is a pressure containing device. Failure to operate the Sure Shot® Single Chamber Fitting as instructed per this manual could result in serious injury or death.

The meter must be installed with the flow arrow indicating the correct flowing direction. The flow directional arrow is cast or stamped into the chamber body casting (1) on all Sure Shot® Single Chamber Orifice Fittings.

The orifice meter may be installed in either the horizontal position with the Sealing Bar access at the top, or with the Sealing Bar access rotated to either the right hand or left hand side of the meter. For raised face ANSI Class 600 and above, the downstream companion flange to the meter is required to be a close tolerance female flange. For raised face ANSI Classes 150 and 300, the downstream companion flange to the meter requires dowel pin alignment.

Adequate maintenance and operating clearance around the meter should be verified prior to final installation. Clearance is required to access the Clamping Bar Square Head Bolts and adequate clearance for the removal of the Clamping bar should be provided. Also allow adequate clearance for all secondary process equipment connecting to the pressure taps, telemetering taps, and Chamber Body Drain Plug.

The TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting does not require a grease gun for lubrication of any parts.

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The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting requires no additional assembly for installation.

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting is factory shipped with the orifice plate carrier assembly installed. The carrier assembly should be removed prior to any field testing. To remove the plate carrier assembly, the following steps should be taken:

- Step 1. First check the fitting to make sure there is no pressure contained in the chamber of the fitting from test performed during fabrication. Verify line pressure using upstream and downstream valves. If the operator hears pressure being relieved, the operator should relieve all pressure before proceeding to remove the orifice plate carrier.
- Step 2. Loosen clamping bar screws. After the top seal is dislodged from the chamber top seat area, remove clamping bar, sealing bar/Carrier Assembly from the fitting.
- Step 3. Remove the carrier assembly from the sealing bar. Re-install the Sealing Bar, and Clamping Bar with Square Head Bolts and tighten the bolts to the recommended torque values of a recommended torque, see table 5.3 for torque values
- Step 4. Complete a post installation inspection before starting field testing procedures.

2.3 METER OR METER TUBE PRESSURE TEST



SERIOUS PERSONAL INJURY OR DEATH OCCURRENCE WARNING

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting is a pressure containing device. Failure to operate the Sure Shot® Single Chamber Fitting as instructed per this manual could result in serious injury or death.

Pressure testing of the Meter Tube with the installed meter should be conducted prior to placing the meter in service. Internal company field testing procedures should be followed. Please also reference Sure Shot Installation procedures, para 2.2 above

2.4 ORIFICE PLATE INSTALLATION



SERIOUS PERSONAL INJURY OR DEATH OCCURRENCE WARNING

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting is a pressure containing device. Failure to operate the Sure Shot® Single Chamber Fitting as instructed per this manual could result in serious injury or death.

Bring complete meter tube to operating pressure.

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To install the Orifice Plate Carrier and Orifice Plate, follow the procedures described in paragraph 4.2 below

The TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting is now ready for service operation as a measurement device.

3.0 OPERATING INSTRUCTIONS



SERIOUS PERSONAL INJURY OR DEATH OCCURRENCE WARNING

The TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting is a pressure containing device. Failure to operate the Sure Shot® Single Chamber Fitting as instructed per this manual could result in serious injury or death.

The TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting design allows the operator to install or remove the Plate Carrier Assembly with a minimum amount of metering system shut down time.

The Sure Shot® Carrier Plate is part of a sub-assembly. The sub-assembly is simply referred to as the Carrier Sub-Assembly.

The entire sub-assembly can be removed from the body. To change or inspect an orifice plate or orifice plate seal, simply push the downstream side of the orifice plate until it is dislodged from the sub-assembly.

4.0 ORIFICE PLATE REMOVAL INSTRUCTIONS

With the TMC_o, Inc. Sure Shot® Single Chamber Orifice Fitting operating at line pressure with an Orifice Plate located in the flow stream, the following steps should be followed to safely remove the Carrier Sub-Assembly.

Step 1. Isolate the orifice metering system supporting the Sure Shot® and release the working pressure until the entire system reaches atmospheric (ambient) pressure.

SERIOUS PERSONAL INJURY OR DEATH OCCURRENCE WARNING

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Failure to direct the released pressurized fluids during the discharge may result in the release of fluid causing contamination and/or the accumulation of volatile gas mixtures. Volatile gas mixtures are explosive and/or toxic and may lead to serious injury or death.

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- Step 2. When the system reaches atmospheric (ambient) pressure, loosen each clamping bar screw two turns. Do not remove the clamping bar.
- Step 3. Lightly tap the sealing bar to break the seal between the sealing bar o-ring and the body.
- Step 4. Once the seal is broken, slide the clamping bar out from the body.
- Step 5. Lift the carrier sub-assembly out of the body.
- Step 6. Remove the o-ring from the sealing bar.
- Step 7. Remove the orifice plate and orifice plate seal from the carrier assembly.



DANGER

**SERIOUS PERSONAL INJURY OR
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4.1 ORIFICE PLATE REPLACEMENT

Verify that the TMC Co., Inc. Sure Shot® Single Chamber Orifice Fitting is still at atmospheric (ambient) pressure.

- Step 1. Inspect o-ring for damage and replace if necessary.

Note: Follow your internal company procedures for inspection of orifice plate

- Step 2. Inspect the seal for cuts or damage and replace if necessary.
- Step 3. Clean the orifice plate seating gland on the plate carrier.
- Step 4. Place the orifice plate with the downstream face into the plate carrier seating gland.
- Step 5. Insert the orifice plate seal ring into carrier with the molded markings, facing the orifice plate. Press evenly on the seal ring until it snaps into the orifice plate carrier.

4.2 ORIFICE PLATE INSERTION

NOTICE

**FAILURE TO INSTALL THE ORIFICE PLATE AND ORIFICE PLATE SEAL IN
A POSITION PROPERLY ORIENTED WITH THE DIRECTION OF FLOW WILL
RESULT IN MEASUREMENT ERROR AND A POSSIBLE LOSS OF REVENUE**

- Step 1. Lower the carrier sub-assembly into the body aligning the sealing bar with the dowel pin located in the body.
- Step 2. Continue to lower the carrier sub-assembly using the sealing bar/body dowel pin as a guide until it contacts the body.

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- Step 3. Install the clamping bar.
- Step 4. Tighten each clamping bar screw to the torque recommended in Section 5.3 of this manual.



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The correct positioning and installation of the sealing bar o-ring, sealing bar and clamping bar are essential to provide a pressure barrier between the line pressure and atmospheric pressure.

5.0 ADDITIONAL INFORMATION

5.1 RECOMMENDED SPARE PARTS – ONE YEAR OPERATION

Quantity	Item No.	Description	Material
2	3	Orifice Plate Seal Ring, Patented	SS/HNBR Bonded
1	9	Sealing Bar O-Ring	HNBR

5.2 LUBRICANTS

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting requires no grease or other recommended lubricants for in-service operations. There are no grease fittings on the unit.

The TMC Co, Inc. Sure Shot® Single Chamber Orifice Fitting does contain one static O-Ring. As a general rule, all static seals should be coated with a small amount of inert / process compatible grease before insertion to prevent damage during the seal installation processes. The user is responsible for the proper selection and use of any lubricants. TMC Co Inc. uses a silicone base lubricant on all static o-rings in the initial assembly of the Sure Shot® Single Chamber Orifice Fitting. Manufacturers’ instructions for the use of any lubricants must be strictly followed. The user must consider all possible ranges of operating and ambient temperatures, process fluid constituents including any chemical additives.

5.3 CLAMPING BAR SCREW TORQUE TABLE

Size	Press Class	No. Screws	Screw Size	Torque-Ft Lbs
2”	150-600	4	½-13 UNC	30-35
3”	150-600	4	½-13 UNC	30-35
4”	150-600	5	½-13 UNC	30-35
6”	150-600	6	½-13 UNC	30-35