

IAPMO IGC 397-2024



PUBLIC REVIEW DRAFT

Industry Standard for

Two-stage Toilet Coupler



IAPMO Standard

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Preface

This is the first edition of IAPMO IGC 397, Two-stage Toilet Coupler.

This Standard was developed by the IAPMO Standards Review Committee (SRC) in accordance with the policies and procedures regulating IAPMO industry standards development, Policy S-001, Standards Development Process. This Standard was approved as an IAPMO Industry Standard on Month DD, YYYY.

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 - (a) *standard designation (number);*
 - (b) *relevant section, table, or figure number, as applicable;*
 - (c) *wording of the proposed change, tracking the changes between the original and the proposed wording; and*
 - (d) *rationale for the change.*
- (8) *Requests for interpretation should be clear and unambiguous. To submit a request for interpretation of this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org, alternatively, at 4755 East Philadelphia Street, Ontario, California, 91761, and include “Request for interpretation” in the subject line:*
 - (a) *the edition of the standard for which the interpretation is being requested;*
 - (b) *the definition of the problem, making reference to the specific section and, when appropriate, an illustrative sketch explaining the question;*
 - (c) *an explanation of circumstances surrounding the actual field conditions; and*
 - (d) *the request for interpretation phrased in such a way that a “yes” or “no” answer will address the issue.*
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- (11) Participation by federal or state agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this Standard.*
- (12) Proposals for amendments to this Standard will be processed in accordance with the standards-writing procedures of IAPMO industry standards development, Policy S-001, Standards Development Process.*

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IAPMO IGC 397-2024

Two-stage Toilet Coupler

1 Scope

1.1 General

This Standard covers two-stage toilet couplers intended for sanitary and waste applications and specifies requirements for materials, physical characteristics, performance testing, and markings.

1.2 Terminology

In this standard,

- (a) "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy to comply with the standard;
- (b) "should" is used to express a recommendation, but not a requirement;
- (c) "may" is used to express an option or something permissible within the scope of the Standard; and
- (d) "can" is used to express a possibility or a capability.

Notes accompanying sections of the Standard do not specify requirements or alternative requirements; their purpose is to separate explanatory or informative material from the text. Notes to tables and figures considered part of the table or figure and can be written as requirements.

1.3 Units of Measurement

SI units are the primary units of record in global commerce. In this Standard, the inch/pound units are shown in parentheses. The values stated in each measurement system are equivalent in application, but each unit system is to be used independently. All references to gallons are to U.S. Gallons.

1.4 Amendments

Proposals for amendments to this Standard will be processed with the Standards writing procedures of IAPMO.

2 Reference Publications

This Standard refers to the following publications and, where such reference is made, it shall be to the current edition of those publications, including all amendments published thereto.

ASME (American Society of Mechanical Engineers)

ASME B1.1

Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)

ASME B18.21.1

Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

ASME B18.2.2

Nuts for General Applications: Machine Screw Nuts; and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

ASTM International (American Society for Testing and Materials)

ASTM A240/A240M

Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

ASTM A307

Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM A576

Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

ASTM B633

Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

ASTM B689

Standard Specification for Electroplated Engineering Nickel Coatings

ASTM C920

Standard Specification for Elastomeric Joint Sealants

ASTM D1784

Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

ASTM D2665

Standard Specification for Poly (Vinyl Chloride) (PVC) Schedule 40 Plastic Drain, Waste, Vent Pipe, and Fittings

ASTM D2661

Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, Vent Pipe and Fittings

ASTM D3965

Standard Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings

ASTM D4586/D4586M

Standard Specification for Asphalt Roof Cement, Asbestos-Free

ASTM E84

Standard Test Method for Surface Burning Characteristics of Building Materials

3 Definitions and Abbreviations

3.1 Definitions

The following definitions shall apply in this standard.

ABS – thermoplastic polymer acrylonitrile butadiene styrene

PVC – synthetic polymer polyvinyl chloride

Two-stage Toilet Coupler – a toilet coupler consisting of an upper toroidal shaped unit with an outer O-ring gasket attached that is attached to the bottom of a toilet surrounding the outflow horn and configured for installation into a water closet flange receiving well on the lower stage unit. The lower stage unit consists of a flange with a receiving well that is attached to a floor opening and soil pipe and configured to receive the upper toroidal shaped unit.

4 General Requirements

4.1 Two-stage Toilet Coupler Materials

Two-stage toilet couplers covered by this Standard shall be made of ABS or PVC that complies with:

- 4.1.1 ASTM D2661 *Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, Vent Pipe and Fittings*, or
- 4.1.2 ASTM D3965 *Standard Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings, Injection Molding cell classification 32222*, or
- 4.1.3 ASTM D2665 *Standard Specification for Poly (Vinyl Chloride) (PVC) Schedule 40 Plastic Drain, Waste, Vent Pipe, and Fittings*, or

4.1.4 ASTM D1784 *Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds, Injection Molding Cell Classification 13464*

4.2 Rework / Regrind Materials

ABS/PVC molding material may include up to 10% of the manufacturer's own clean post-production scrap (flash, trim, sprues, runners, set up parts, etc).

4.3 Alternative Materials

The requirements of this standard are not intended to prevent the use of alternative materials or methods of construction provided such alternatives meet the intent and requirements of this Standard. Materials not specifically covered by this standard shall not sustain damage or permanent deformation with routine use or maintenance. The product must also meet the requirements of this Standard.

4.4 Two-stage Toilet Coupler Design

Two-stage toilet couplers shall be comprised of:

4.4.1 Upper stage unit:

The upper stage unit shall form a collar extending outwardly providing a flat mating surface for attachment to a toilet bottom surrounding the outflow horn. The upper stage unit body shall form an open piston with an outer O-ring gasket. The upper stage unit shall be attached with two embedded mounting plates that include integral hollow bolt fasteners that pass through the toilet mounting holes and secured by lock nuts. Application of sealant/adhesive to the collar mating surface before installation shall provide a gas and watertight seal between the upper stage unit and toilet. See Figure 1.

4.4.2 Lower stage unit:

The flange top of the lower stage unit shall form a collar extending outwardly for attachment to the top of the floor opening surrounding the soil pipe. When the toilet is installed, the upper stage unit shall be inserted into the lower stage unit creating an O-ring seal that is gas and watertight. Installation is completed with screw fasteners passing through holes in the collar and two embedded mounting plates that include integral standing lock pins that project into the hollow bolt receivers. After installation, fasteners are inserted down into the hollow bolt receivers and screwed into the ensconced interior threaded lock pins to secure the toilet to the floor. See Figure 3 and Figure 4.

4.5 Dimensions

4.5.1 Upper stage unit hollow bolt fasteners shall be centered on a 76.2 mm (3.0 in) radius from center point in anti-polar position configured to align with standard toilet mounting holes centered on a 76.2 mm (3.0 in) radius from toilet outflow horn center point in anti-polar position. See Figure 1.

4.5.2 Lower stage lock pins shall be centered on a 76.2 mm (3.0 in) radius from flange center point in anti-polar position configured to align with and fit into the hollow bolt receivers of the upper stage unit when the toilet is installed. See Figure 2.

- 4.5.3** Two-stage toilet coupler outside diameter shall be 177.8 mm (7.0 in). See Figure 3.
- 4.5.4** Lower stage unit pipe socket width and depth specifications shall comply with ASTM D2665 Standard for Schedule 40 PVC DWV fittings and ASTM D2661 Standard for Schedule 40 ABS DWV fittings. See Figure 2.
- 4.6 Operating Temperatures**
Two-stage toilet coupler operating temperature range shall be between 0°C to 60° C (32°F to 140°F) for PVC and ABS molded components.
- 4.7 Mounting Plates**
- 4.7.1** Upper stage unit mounting plates shall be fabricated from ASTM A240/A240M stainless-steel or ASTM A576 carbon steel. Carbon steel mounting plates shall have a corrosion resistant plating such as those specified in ASTM B689. Plates shall be embedded in the coupler collar and configured to connect the coupler to the toilet bottom surrounding the outflow horn using integral exterior threaded hollow bolts that pass through the two toilet mounting holes and secured by locknuts.
- 4.7.2** Lower stage unit mounting plates shall be fabricated from ASTM A240/A240M stainless-steel or ASTM A576 carbon steel. Carbon steel mounting plates shall have a corrosion resistant plating such as those specified in ASTM B689. Plates shall be embedded in the flange collar of the lower stage unit and be configured to connect the flange to the floor opening surrounding the soil pipe using screw fasteners that pass-through holes in the plates and collar and secured into floor. Plates include integral interior threaded standing lock pins that project into the hollow bolt receivers when the toilet is installed.
- 4.8 Fasteners**
- 4.8.1** Upper stage unit lock nuts shall be made of 300 series stainless-steel or carbon steel per ASTM A307 complying with ASME B18.2.2. Carbon steel lock nuts shall be zinc plated per ASTM B633, SC2 [minimum thickness 0.0076 mm (0.0003 in)].
- 4.8.2** Lower stage unit floor screws shall be made of 300 series stainless-steel or carbon steel per ASTM A307 complying with ASME B1.1. Carbon steel floor screws shall be zinc plated per ASTM B633, SC2 [minimum thickness 0.0076 mm (0.0003 in)].
- 4.8.3** Toilet hold down screws shall be made of 300 series stainless-steel or carbon steel per ASTM A307 complying with ASME B1.1. Carbon steel hold down screws shall be zinc plated per ASTM B633, SC2 [minimum thickness 0.0076 mm (0.0003 in)].
- 4.8.4** Toilet hold down screw washers shall be made 300 series stainless-steel or carbon steel per ASTM A307 complying with ASME B18.21. Carbon steel hold down screw washers shall be zinc plated per ASTM B633, SC2 [minimum thickness 0.0076 mm (0.0003 in)].

4.9 O-ring Gaskets

O-ring gaskets shall conform to the dimensions specified by the manufacturer and be made available for replacement purposes.

4.10 Sealant / Adhesive

Sealant/adhesive bonding coupler to toilet bottom shall comply with ASTM C920 or ASTM D4586/D4586M and ASTM E84. Sealant / adhesive shall provide a gas and watertight seal between the coupler and toilet bottom surrounding the outflow horn and be removable for repair purposes.

4.11 Servicing

Two-stage toilet couplers shall be configured to allow for removal and reinstallation of the toilet for drain service or O-ring gasket replacement without the need for additional parts or damage to either the upper or lower stage units.

4.12 Workmanship

The inside and outside surfaces of the upper and lower stage units shall be free of cracks, extraneous holes, blisters, voids, foreign inclusions, or other defects that are visible to the naked eye and that may affect the integrity of the components or restrict toilet outflow to the soil pipe.

5 Testing Requirements**5.1 Test Specimen and Conditioning****5.1.1 Test Specimen**

The test specimen shall consist of an upper and lower stage unit and all connectors, fasteners, gaskets, and sealant/adhesive required for installation.

5.1.2 Conditioning

The test specimen shall be acclimated to lab conditions for at least 24 hours prior to testing

5.2 Hydrostatic Pressure Test with Flat Toilet Bottom**5.2.1 Test Procedure**

- (a) Hydrostatic test shall be completed after lab acclimation.
- (b) Install two-stage toilet coupler to a simulated flat toilet bottom and soil pipe rig capable of being filled completely with water and pressurized to 68.9 kPa (10 psi).
- (c) Hold for 15 min.

5.2.2 Performance Requirement

There shall be no leakage of water from the test specimen.

5.3 Hydrostatic Pressure Test with Perpendicularly Misaligned Toilet Bottom

5.3.1 Test Procedure

- (a) Install two-stage toilet coupler to a simulated perpendicularly misaligned toilet bottom and soil pipe rig capable of being filled completely with water and pressurized to 68.9 kPa (10 psi). One side of the toilet bottom shall be 3.2 mm (.13 in) deeper than the opposite side.
- (b) Hold for 15 min.

5.3.2 Performance Requirement

There shall be no leakage of water from the test specimen.

6 Markings and Accompanying Literature

6.1 Markings

Markings shall be permanent, legible, and visible after installation.

Two-stage toilet couplers complying with this standard shall be marked with the:

- (a) manufacturers name or trademark;
- (b) model number;
- (c) IAPMO standard designation;
- (d) country of origin; and
- (e) maximum and minimum operating temperature.

6.2 Installation Instructions

Two-stage toilet couplers shall be accompanied by instructions for their installation specifying at minimum requirements for installation including the following:

- (a) concrete slab installation
- (b) framed floor installation
- (c) retrofit of existing water closet flanges

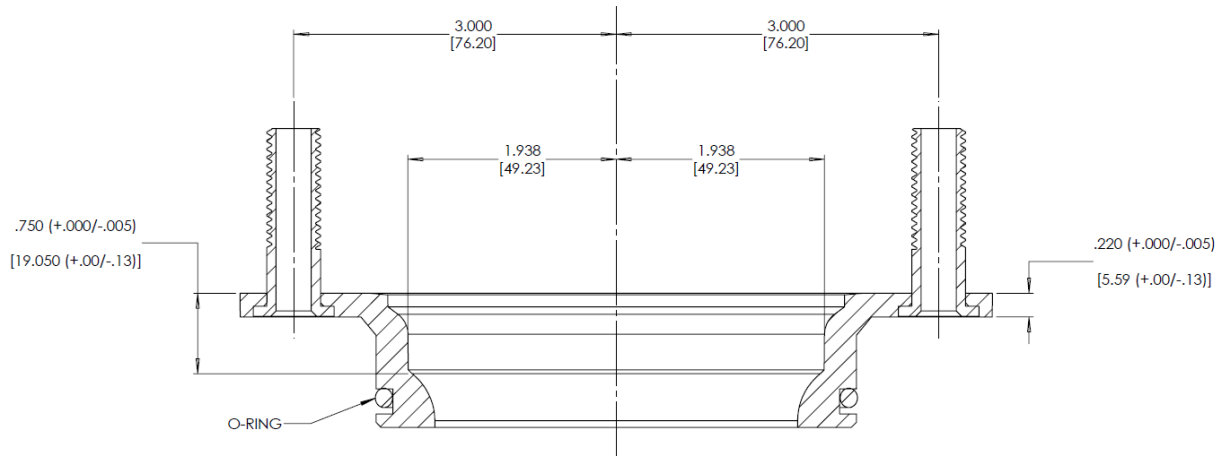


Figure 1
Cross Section View – Upper Stage Unit with Hardware
(Sections 4.4.1 and 4.5.1)

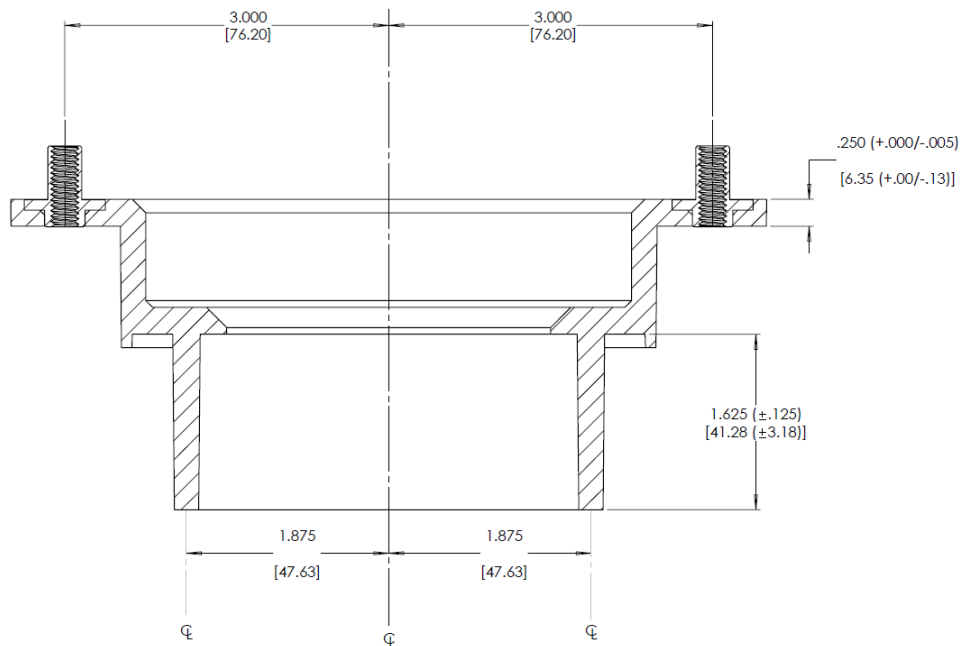


Figure 2
Cross Section View – Lower Stage Unit with Hardware
(Sections 4.5.2 and 4.5.4)

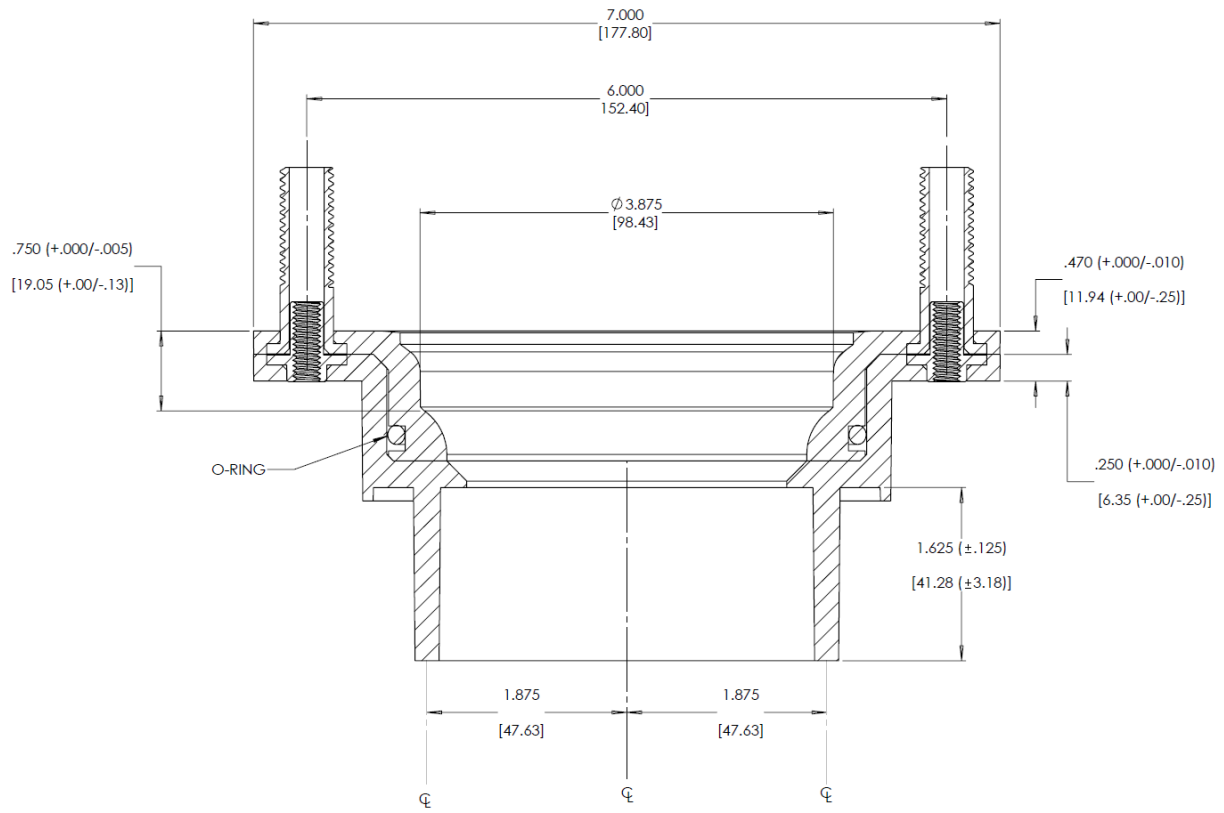


Figure 3
Cross Section View – Two-stage Toilet Coupler Assembly with Hardware
(Sections 4.4.2 and 4.5.3)

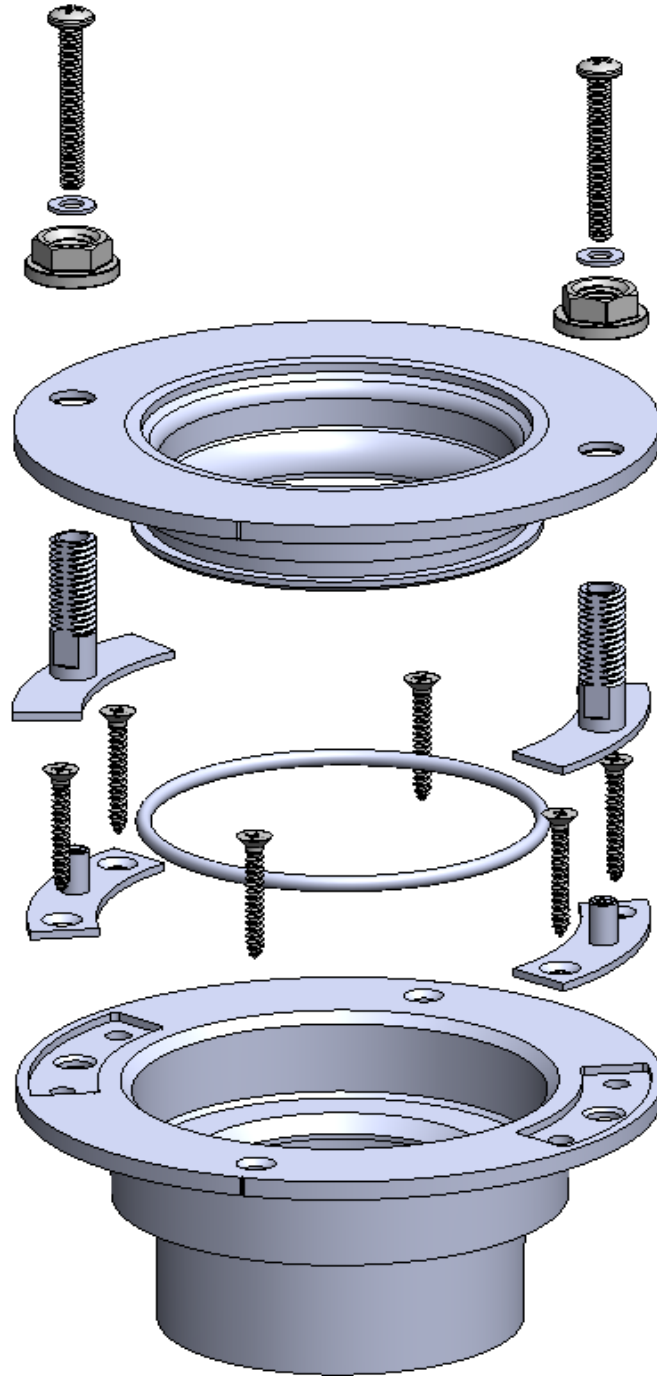


Figure 4
Exploded Perspective View – Two-stage Toilet Coupler Assembly with Hardware
(Section 4.4.2)



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