

**RETURN BIDS TO:**  
**RETOURNER LES SOUMISSIONS À:**

**Bid Receiving  
PWGSC  
33 City Centre Drive  
Suite 480  
Mississauga  
Ontario  
L5B 2N5  
Bid Fax: (905) 615-2095**

## Request For a Standing Offer Demande d'offre à commandes

Regional Individual Standing Offer (RISO)  
Offre à commandes individuelle régionale (OCIR)

Canada, as represented by the Minister of Public Works and Government Services Canada, hereby requests a Standing Offer on behalf of the Identified Users herein.

Le Canada, représenté par le ministre des Travaux Publics et Services Gouvernementaux Canada, autorise par la présente, une offre à commandes au nom des utilisateurs identifiés énumérés ci-après.

## Comments - Commentaires

**Vendor/Firm Name and Address**  
**Raison sociale et adresse du**  
**fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**  
Public Works and Government Services Canada  
Ontario Region  
33 City Centre Drive  
Suite 480  
Mississauga  
Ontario  
L5B 2N5

<b>Title - Sujet</b> VALVE ASSEMBLIES	
<b>Solicitation No. - N° de l'invitation</b> K3D33-111043/A	<b>Date</b> 2012-07-19
<b>Client Reference No. - N° de référence du client</b> K3D33-111043	<b>GETS Ref. No. - N° de réf. de SEAG</b> PW-\$TOR-224-5974
<b>File No. - N° de dossier</b> TOR-2-35057 (224)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2012-08-29</b>	<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Daylight Saving Time EDT
<b>Delivery Required - Livraison exigée</b> 2012-06-01	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Juan, Peggy	<b>Buyer Id - Id de l'acheteur</b> tor224
<b>Telephone No. - N° de téléphone</b> (905)615-2467 ( )	<b>FAX No. - N° de FAX</b> (905)615-2060
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> DEPARTMENT OF THE ENVIRONMENT 4905 DUFFERIN STREET DOWNSVIEW Ontario M3H5T4 Canada	
<b>Security - Sécurité</b> This request for a Standing Offer does not include provisions for security. Cette Demande d'offre à commandes ne comprend pas des dispositions en matière de sécurité.	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

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## PART 1 - GENERAL INFORMATION

### 1. Introduction

The Request for Standing Offers (RFSO) is divided into seven parts plus attachments and annexes, as follows:

- |        |  |
|--------|--|
| Part 1 | General Information: provides a general description of the requirement;  |
| Part 2 | Offeror Instructions: provides the instructions applicable to the clauses and conditions of the RFSO;  |
| Part 3 | Offer Preparation Instructions: provides offerors with instructions on how to prepare their offer to address the evaluation criteria specified;  |
| Part 4 | Evaluation Procedures and Basis of Selection: indicates how the evaluation will be conducted, the evaluation criteria which must be addressed in the offer, if applicable, and the basis of selection; |
| Part 5 | Certifications: includes the certifications to be provided;  |
| Part 6 | Insurance Requirements: includes specific requirements that must be addressed by offerors; and   |
| Part 7 | 7A, Standing Offer, and 7B, Resulting Contract Clauses:  |
|        | 7A, includes the Standing Offer containing the offer from the Offeror and the applicable clauses and conditions;   |
|        | 7B, includes the clauses and conditions which will apply to any contract resulting from a call-up made pursuant to the Standing Offer.   |

The Annexes include the Requirement, the Basis of Payment and any other annexes.

### 2. Summary

To establish a Regional Individual Standing Offer (RISO) with a supplier on behalf of Environment Canada, Meteorological Services of Canada, located at Downsview, Ontario. This RISO is for the supply, manufacture and delivery of valve assemblies and associated parts based on the "build-to-print" drawing packages on an-as-and-when-requested basis. The estimated usage is approximately 5 lots of valve assemblies per year. The standing offer period will be 4 years.

The requirement is subject to the provisions of the World Trade Organization Agreement on Government Procurement (WTO-AGP), the North American Free Trade Agreement (NAFTA), and the Agreement on Internal Trade (AIT).

### 3. Debriefings

After issuance of a standing offer, offerors may request a debriefing on the results of the request for standing offers process. Offerors should make the request to the Standing Offer Authority within 15 working days of receipt of the results of the request for standing offers process. The debriefing may be in writing, by telephone or in person.

## **PART 2 - OFFEROR INSTRUCTIONS**

### **1. Standard Instructions, Clauses and Conditions**

All instructions, clauses and conditions identified in the Request for Standing Offers (RFSO) by number, date and title are set out in the Standard Acquisition Clauses and Conditions (<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>) Manual issued by Public Works and Government Services Canada.

Offerors who submit an offer agree to be bound by the instructions, clauses and conditions of the RFSO and accept the clauses and conditions of the Standing Offer and resulting contract(s).

The 2006 (2012-07-11) Standard Instructions - Request for Standing Offers - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the RFSO.

Subsection 5.4 of 2006, Standard Instructions - Request for Standing Offers - Goods or Services - Competitive Requirements, is amended as follows:

Delete: sixty (60) days  
Insert: ninety (90) days

#### **1.1 SACC Manual Clauses**

##### **1.1.1 Condition of Material**

SACC Manual Clauses M1004T (2011-05-16) Condition of Material

##### **1.1.2 No Substitute Products**

Offerors must provide products that are of the same description, brand name, model and/or part number as detailed in the item description of the bid solicitation. Offerors are advised that substitute products will not be considered.

### **2. Submission of Offers**

Offers must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the Request for Standing Offers.

Due to the nature of the Request for Standing Offers, transmission of offers by facsimile to PWGSC will not be accepted.

### **3. Enquiries - Request for Standing Offers**

All enquiries must be submitted in writing to the Standing Offer Authority no later than 10 calendar days before the Request for Standing Offers (RFSO) closing date. Enquiries received after that time may not be answered.

Offerors should reference as accurately as possible the numbered item of the RFSO to which the enquiry relates. Care should be taken by offerors to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that offerors do so, so that the proprietary nature of the question is eliminated,

and the enquiry can be answered with copies to all offerors. Enquiries not submitted in a form that can be distributed to all offerors may not be answered by Canada.

#### 4. Applicable Laws

The Standing Offer and any contract resulting from the Standing Offer must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

Offerors may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their offer, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the offerors.

#### 5. Ownership of Intellectual Property

The Department of Environment, the Meteorological Services of Canada (EC- MSC) has determined that any intellectual property rights arising from the performance of the Work under the resulting contract will belong to Canada, on the following grounds:

(6.5) where the material developed or produced consists of material subject to copyright, with the exception of computer software and all documentation pertaining to that software.

### PART 3 - OFFER PREPARATION INSTRUCTIONS

#### 1. Offer Preparation Instructions

Canada requests that offerors provide their offer in separately bound sections as follows:

Section I: Technical Offer (3 hard copies)  
 Section II: Financial Offer (1 hard copy)  
 Section III: Certifications (1 hard copy)

Prices must appear in the financial offer only. No prices must be indicated in any other section of the offer.

Canada requests that offerors follow the format instructions described below in the preparation of their offer.

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to that of the Request for Standing Offers.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process Policy on Green Procurement

(<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>).

To assist Canada in reaching its objectives, offerors are encouraged to:

- 1) use paper containing fibre certified as originating from a sustainably-managed forest and/or containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

**Section I: Technical Offer**

In their technical offer, offerors should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

**Section II: Financial Offer**

Offerors must submit their financial offer in accordance with the Annex B, Basis of Payment. The total amount of Goods and Services Tax or Harmonized Sales Tax must be shown separately, if applicable.

**Section III: Certifications**

Offerors must submit the certifications required under Part 5.

**PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION****1. Evaluation Procedures**

- (a) Offers will be assessed in accordance with the entire requirement of the Request for Standing Offers including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the offers.

**1.1. Technical Evaluation****1.1.1 Mandatory Technical Criteria**

The Offeror must demonstrate meeting each and every mandatory technical criteria listed below by providing substantiating document in its offer prior to bid closing date and time.

1. The Offeror must include a copy of their current valid Category H Certificate of Authorization with its offer submission.
2. The Offeror must demonstrate their proposed technician is a Certified Swagelok Technician by submitting the following in their offer submission:
  - a) Name of the proposed certified technician; and
  - b) A copy of the proposed technician's Swagelok training certification.
3. The Offeror must demonstrate compliance with the ASME B31.3 code by submitting the following in their offer submission:
  - a) A copy of the Offeror's current valid ASME B31.3 Certificate of Authorization, OR a copy of the Offeror's subcontractor's current valid ASME B31.3 Certificate of Authorization;
  - b) A copy of the Offeror's Quality Assurance plan and documentation for manufacturing procedures showing compliance with ASME B31.3;
  - c) Name of the documentation Reviewer/Approver for the Offeror's Quality Assurance Plan;
  - d) Professional credentials of the documentation Reviewer/Approver proposed in 3.c).

## 1.2 Financial Evaluation

### 1.2.1 Mandatory Financial Criteria

Offeror must complete and submit Annex B, Basis of Payment, in its offer package by bid closing date.

### 1.2.2 Evaluation of Price

The price of the offer will be evaluated in Canadian dollars, the Goods and Services Tax or the Harmonized Sales Tax excluded, FOB destination, Canadian customs duties and excise taxes included.

**1.2.3** The evaluated price will be the sum of the Offeror's proposed Firm Lot Price for the four standing offer years listed in Annex B, Basis of Payment.

**Copies of the Drawings available in DXF and ai format upon request to the Standing Offer Authority: Peggy Juan, [peggy.juan@pwgsc.gc.ca](mailto:peggy.juan@pwgsc.gc.ca), 905-615-2467.**

## 2. Basis of Selection - Mandatory Technical Criteria Only

**2.1** An offer must comply with the requirements of the Request for Standing Offers and meet all mandatory technical evaluation criteria to be declared responsive. The responsive offer with the lowest evaluated price will be recommended for issuance of a standing offer.

## PART 5 - CERTIFICATIONS

Offerors must provide the required certifications to be issued a standing offer. Canada will declare an offer non-responsive if the required certifications are not completed and submitted as requested.

Compliance with the certifications offerors provide to Canada is subject to verification by Canada during the offer evaluation period (before issuance of a standing offer) and after issuance of a standing offer. The Standing Offer Authority will have the right to ask for additional information to verify offerors' compliance with the certifications before issuance of a standing offer. The offer will be declared non-responsive if any certification made by the Offeror is untrue, whether made knowingly or unknowingly. Failure to comply with the certifications or to comply with the request of the Standing Offer Authority for additional information will also render the offer non-responsive.

### 1. Code of Conduct Certifications - Consent to a Criminal Record Verification

**1.1** Offerors must submit as part of their offer, by Request for Standing Offers closing date:

- (a) a complete list of names of all individuals who are currently directors of the Offeror;
- (b) a properly completed and signed form Consent to a Criminal Record Verification (PWGSC-TPSGC 229) (<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/229-eng.html>), for each individual named in the list.

### 2. Certifications Precedent to Issuance of a Standing Offer

The certifications listed below should be completed and submitted with the offer, but may be submitted afterwards. If any of these required certifications is not completed and submitted as requested, the



Standing Offer Authority will so inform the Offeror and provide the Offeror with a time frame within which to meet the requirement. Failure to comply with the request of the Standing Offer Authority and meet the requirement within that time period will render the offer non-responsive.

## 2.1 Federal Contractors Program - Certification

1.The Federal Contractors Program (FCP) requires that some suppliers, including a supplier who is a member of a joint venture, bidding for federal government contracts, valued at \$200,000 or more (including all applicable taxes), make a formal commitment to implement employment equity. This is a condition precedent to the issuance of a standing offer. If the Offeror, or, if the Offeror is a joint venture and if any member of the joint venture, is subject to the FCP, evidence of its commitment must be provided before the issuance of a standing offer.

Suppliers who have been declared ineligible contractors by Human Resources and Skills Development Canada (HRSDC) are no longer eligible to receive government contracts over the threshold for solicitation of bids as set out in the Government Contracts Regulations. Suppliers may be declared ineligible contractors either as a result of a finding of non-compliance by HRSDC, or following their voluntary withdrawal from the FCP for a reason other than the reduction of their workforce to less than 100 employees. Any offers from ineligible contractors, including an offer from a joint venture that has a member who is an ineligible contractor, will be declared non-responsive.

2.If the Offeror does not fall within the exceptions enumerated in 3.(a) or (b) below, or does not have a valid certificate number confirming its adherence to the FCP, the Offeror must fax (819-953-8768) a copy of the signed form LAB 1168, Certificate of Commitment to Implement Employment Equity, to the Labour Branch of HRSDC.

3.The Offeror, or, if the Offeror is a joint venture the member of the joint venture, certifies its status with the FCP, as follows:

The Offeror or the member of the joint venture

A.( ) is not subject to the FCP, having a workforce of less than 100 full-time or part-time permanent employees, and/or temporary employees having worked 12 weeks or more in Canada;

B.( ) is not subject to the FCP, being a regulated employer under the Employment Equity Act, S.C. 1995, c. 44;

C.( ) is subject to the requirements of the FCP, having a workforce of 100 or more full- time or part-time permanent employees, and/or temporary employees having worked 12 weeks or more in Canada, but has not previously obtained a certificate number from HRSDC (having not bid on requirements of \$200,000 or more), in which case a duly signed certificate of commitment is attached;

D.( ) is subject to FCP, and has a valid certificate number as follows: \_\_\_\_\_ (e.g. has not been declared an ineligible contractor by HRSDC).

Further information on the FCP is available on the HRSDC Web site.

## 2.2 Status and Availability of Resources

The Offeror certifies that, should it be issued a standing offer as a result of the Request for Standing Offer, every individual proposed in its offer will be available to perform the Work resulting from a call-up against the Standing Offer as required by Canada's representatives and at the time specified in a call-up or agreed to with Canada's representatives. If for reasons beyond its control, the Offeror is unable to provide

the services of an individual named in its offer, the Offeror may propose a substitute with similar qualifications and experience. The Offeror must advise the Standing Offer Authority of the reason for the substitution and provide the name, qualifications and experience of the proposed replacement. For the purposes of this clause, only the following reasons will be considered as beyond the control of the Offeror: death, sickness, maternity and parental leave, retirement, resignation, dismissal for cause or termination of an agreement for default.

If the Offeror has proposed any individual who is not an employee of the Offeror, the Offeror certifies that it has the permission from that individual to propose his/her services in relation to the Work to be performed and to submit his/her résumé to Canada. The Offeror must, upon request from the Standing Offer Authority, provide a written confirmation, signed by the individual, of the permission given to the Offeror and of his/her availability. Failure to comply with the request may result in the offer being declared non-responsive.

## **PART 6 - INSURANCE REQUIREMENTS**

### **1. Insurance Requirements**

The Offeror must provide a letter from an insurance broker or an insurance company licensed to operate in Canada stating that the Offeror, if issued a standing offer as a result of the request for standing offer, can be insured in accordance with the Insurance Requirements specified in Annex D.

If the information is not provided in the offer, the Standing Offer Authority will so inform the Offeror and provide the Offeror with a time frame within which to meet the requirement. Failure to comply with the request of the Standing Offer Authority and meet the requirement within that time period will render the offer non-responsive.

## **PART 7 - STANDING OFFER AND RESULTING CONTRACT CLAUSES**

### **A. STANDING OFFER**

#### **1. Offer**

**1.1** The Offeror offers to fulfill the requirement in accordance with the Requirement at Annex "A".

#### **2. Standard Clauses and Conditions**

All clauses and conditions identified in the Standing Offer and resulting contract(s) by number, date and title are set out in the *Standard Acquisition Clauses and Conditions* (<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>) Manual issued by Public Works and Government Services Canada.

#### **2.1 General Conditions**

2005 (2012-07-16) General Conditions - Standing Offers - Goods or Services, apply to and form part of the Standing Offer.

#### **2.2 Standing Offers Reporting**

The Offeror must compile and maintain records on its provision of goods, services or both to the federal government under contracts resulting from the Standing Offer. This data must include all purchases paid for by a Government of Canada Acquisition Card.

The Offeror must provide this data in accordance with the reporting requirements detailed in Annex "C". If some data is not available, the reason must be indicated. If no goods or services are provided during a given period, the Offeror must still provide a "NIL" report.

The data must be submitted on a quarterly basis to the Standing Offer Authority.

The quarterly reporting periods are defined as follows:

1st quarter: April 1 to June 30;

2nd quarter: July 1 to September 30;

3rd quarter: October 1 to December 31;

4th quarter: January 1 to March 31.

The data must be submitted to the Standing Offer Authority no later than 15 calendar days after the end of the reporting period.

### **3. Term of Standing Offer**

#### **3.1 Period of the Standing Offer**

The period for making call-ups against the Standing Offer is from Date of Standing Offer Issuance to Four years from the Date of Standing Offer Issuance.

### **4. Authorities**

#### **4.1 Standing Offer Authority**

The Standing Offer Authority is:

Peggy Juan  
Supply Specialist  
Public Works and Government Services Canada  
Acquisitions Branch  
Address: 33 City Centre Drive, Suite 480C  
Mississauga, Ontario L5B 2N5  
Telephone: (905) 615-2467  
Facsimile: (905) 615-2060  
E-mail address: peggy.juan@pwgsc.gc.ca

The Standing Offer Authority is responsible for the establishment of the Standing Offer, its administration and its revision, if applicable. Upon the making of a call-up, as Contracting Authority, he is responsible for any contractual issues relating to individual call-ups made against the Standing Offer by any Identified User.

#### **4.2 Technical Authority**

The Technical Authority for the Standing Offer is:

Name: \_\_ (To be included in the Standing Offer) \_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_  
 Telephone: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
 Facsimile: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
 E-mail address: \_\_\_\_\_

The Technical Authority is the representative of the department or agency for whom the Work will be carried out pursuant to a call-up under the Standing Offer and is responsible for all the technical content of the Work under the resulting Contract.

#### **4.3 Offeror's Representative**

Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Organization: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Telephone: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
 Facsimile: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
 E-mail address: \_\_\_\_\_

#### **5. Identified Users**

The Identified User authorized to make call-ups against the Standing Offer is: Environment Canada.

#### **6. Call-up Instrument**

The Work will be authorized or confirmed by the Identified User(s) using form Call-up Against a Standing Offer or electronic document.

#### **7. Limitation of Call-ups**

Individual call-ups against the Standing Offer must not exceed \$25,000 (Goods and Services Tax or Harmonized Sales Tax included).

#### **8. Financial Limitation**

The total cost to Canada resulting from call ups against the Standing Offer must not exceed the sum of \$\_\_\_\_\_ (Goods and Services Tax or Harmonized Sales Tax excluded) unless otherwise authorized in writing by the Standing Offer Authority. The Offeror must not perform any work or services or supply any articles in response to call ups which would cause the total cost to Canada to exceed the said sum, unless an increase is so authorized.

The Offeror must notify the Standing Offer Authority as to the adequacy of this sum when 75 percent of this amount has been committed, or 4 months before the expiry date of the Standing Offer, whichever comes first. However, if at any time, the Offeror considers that the said sum may be exceeded, the Offeror must promptly notify the Standing Offer Authority.

#### **9. Priority of Documents**

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- a) the call up against the Standing Offer, including any annexes;

- b) the articles of the Standing Offer;
- c) the general conditions 2005 (2012-07-16), General Conditions - Standing Offers - Goods or Services
- d) the general conditions 2010A (2012-07-16) General Conditions - Goods (Medium Complexity);
- e) Annex A, Requirement;
- f) Annex B, Basis of Payment;
- g) Annex C, Periodic Usage Report - Standing Offer;
- h) Annex D, Insurance Requirements;
- i) the Offeror's offer \_\_\_\_\_ (*insert date of offer*).

## **11. Certifications**

### **11.1 Compliance**

Compliance with the certifications provided by the Offeror is a condition of authorization of the Standing Offer and subject to verification by Canada during the term of the Standing Offer and of any resulting contract that would continue beyond the period of the Standing Offer. In the event that the Offeror does not comply with any certification or it is determined that any certification made by the Offeror in its offer is untrue, whether made knowingly or unknowingly, Canada has the right to terminate any resulting contract for default and set aside the Standing Offer.

### **11.2 SACC Manual Clauses**

M3020C (2010-01-11) Status and Availability of Resources

## **12. Applicable Laws**

The Standing Offer and any contract resulting from the Standing Offer must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

## **B. RESULTING CONTRACT CLAUSES**

The following clauses and conditions apply to and form part of any contract resulting from a call-up against the Standing Offer.

### **1. Requirement**

The Contractor must provide the items detailed in the call-up against the Standing Offer.

### **2. Standard Clauses and Conditions**

#### **2.1 General Conditions**

2010A (2012-07-16), General Conditions - Goods (Medium Complexity) apply to and form part of the Contract.

### **3. Term of Contract**

#### **3.1 Delivery Date**

Delivery must be made within 180 calendar days from receipt of a call-up against the Standing Offer.

#### **4. Payment**

##### **4.1 Basis of Payment - Firm Lot Price**

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm lot price, as specified in contract for a cost of \$\_\_\_\_\_ (insert the amount at contract award). Customs duties are included and Goods and Services Tax or Harmonized Sales Tax is extra, if applicable.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

##### **4.2 Limitation of Price**

C6000C (2011-05-16) Limitation of Price

##### **4.3 Multiple Payments**

H1001C (2008-05-12) Multiple Payments

#### **5. Invoicing Instructions**

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.
2. Invoices must be distributed as follows:
  - a. The original and one (1) copy must be forwarded to the address shown on page 1 of the Contract for certification and payment.
  - b. One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

#### **6. Insurance Requirements**

The Contractor must comply with the insurance requirements specified in Annex D . The Contractor must maintain the required insurance coverage for the duration of the Contract. Compliance with the insurance requirements does not release the Contractor from or reduce its liability under the Contract.

The Contractor is responsible for deciding if additional insurance coverage is necessary to fulfill its obligation under the Contract and to ensure compliance with any applicable law. Any additional insurance coverage is at the Contractor's expense, and for its own benefit and protection.

The Contractor must forward to the Contracting Authority within ten (10) days after the date of award of the Contract, a Certificate of Insurance evidencing the insurance coverage and confirming that the insurance policy complying with the requirements is in force. Coverage must be placed with an Insurer licensed to carry out business in Canada. The Contractor must, if requested by the Contracting Authority, forward to Canada a certified true copy of all applicable insurance policies.

## ANNEX "A" REQUIREMENT

### HOGEN Valve Assemblies

#### 1. SCOPE / OBJECTIVE

Environment Canada has developed 'build-to-print' drawing packages for three valve assemblies which will be used for distributing hydrogen gas in a meteorological balloon application. Environment Canada plans to purchase up to five units of each assembly on an as-and-when-requested basis per year, over four years.

#### 2. BACKGROUND

The Meteorological Service of Canada (MSC) is the weather service arm of Environment Canada, and maintains both monitoring and research and development departments in the weather service. These departments have a mandate to provide Canadians with timely, precise and accurate information on the weather that influences their daily lives. To that end, several improvements are being made to the monitoring networks. Many of the observations that MSC conducts involves the use of hydrogen filled weather balloons, each of which has an electronic package that transmits meteorological information to ground based sites. The delivery systems for the hydrogen gas are in need of improvement and this improvement includes new valve assemblies and associated parts for the delivery system.

#### 3. REQUIREMENTS

Environment Canada-MSC has a need for a single company to use the "build to print" drawing packages to build valve assemblies and associated parts on an as-and-when-requested basis at a rate of up to 5 sets of each Assembly per year for a period of 4 years with a turn around time of six months per order. The company will need to build and test all assemblies and parts, as per the specifications, prior to delivery to Environment Canada, 4905 Dufferin St, Toronto ON M3H 5T4.

The three assemblies and one accessory are as follows:

Assembly Name	Description	Drawing Number	Revision Level
VENT VALVE ASSEMBLY (VVA)	A two circuit hydrogen distribution module used to distribute product hydrogen to the hydrogen storage vessel, and by-product hydrogen to a outdoor vent. Major components in the assembly include two ball valves and a float drain trap.	OTAWA-30009-1	Rev.4
DISPENSING VALVE ASSEMBLY (DVA)	A dispensing module used to remotely control and monitor the flow of product hydrogen from the storage vessel to the meteorological balloon. Major components in the assembly include two explosion proof solenoid valves, an explosion proof flow switch, a metering valve, and a ball valve.	OTAWA-30009-2	Rev.3

WALL VENT ASSEMBLY (WVA)	A simple 'through wall' vent tube used to vent the pressure relief circuit of the hydrogen storage vessel.	OTAWA-30009-3	Rev.2
VVA CATCH BASIN	An accessory of the VENT VALVE ASSEMBLY. This component will be ordered when a VENT VALVE ASSEMBLY module is being purchased for a site that does not have a floor drain.	OTAWA-30009-4	Rev.1

#### 4. TECHNICAL REQUIREMENTS

Technical requirements for each assembly and the accessory VVA Catch Basin are as follows:

##### **VENT VALVE ASSEMBLY & DISPENSING VALVE ASSEMBLY – OTAWA-30009-1 R.4 & OTAWA-30009-2 R.3:**

- The Standing Offer Holder must have a valid Certificate of Authorization (CofA) to assemble and register category H fittings in accordance with CSA B51.
- A national category H CRN must be obtained for this assembly by the Standing Holder Offeror.
  - o The method by which the national CRN is obtained can be either by pressure test or engineering calculation as the regulations describe.
- PTFE tape must be applied to all NPT connections
- All tubing must be de-burred.
- The panel must be assembled by a certified Swagelok technician in accordance with Swagelok document MS-13-151.
- Each assembly manufacturers must be pneumatically pressure tested with helium in accordance with ASME B31.3 pressure test requirements. Each joint must be verified leak free by applying Swagelok Snoop bubble soap solution. No bubbles are permitted.
  - o EC reserves the right to witness the leak testing.
- Additional requirements are described on drawing OTAWA-30009-1 Rev.4 (for VVA) and OTAWA-30009-2 Rev.3 (for DVA). Component parts indicated on the bill of materials listed on sheets 2 and 3 must not be substituted.

##### **WALL VENT ASSEMBLY – OTAWA-30009-2 Rev.2:**

- Fittings to be assembled per manufacturer recommendations. Refer to Swagelok Document MS-13-151.
- Tube ends must be faced square prior to assembly.
- Back purge welds with shielding gas to prevent sugaring



- Additional requirements are described on drawing OTAWA-30009-3 Rev.2. Component parts indicated on the bill of materials must not be substituted.

#### **VVA CATCH BASIN – OTAWA-30009-4 Rev.1:**

- Total volume of catch basin to be 11L ±0.5L
- Fill basin with water and ensure welds are leak free
- Back purge welds with shielding gas to prevent sugaring
- Additional requirements are described on drawing OTAWA-30009-4 Rev.1. Component parts indicated on the bill of materials must not be substituted.

### **5. DELIVERABLES**

The standing offer deliverables are as follows:

- Upon receipt of a call-up, the Standing Offer Holder must manufacture and test the ordered assemblies according to the terms of the contract, and as described in the technical requirements and drawings.
- The completed and tested assemblies and/or accessory must have all open ports capped upon completion of assembly to prevent debris from entering and must be shipped with caps in good condition per the requirements below. The method of packaging for each shipment is subject to approval by the Technical Authority.
- Each completed and tested assembly must be shipped with copies of the following documents:
  - o Approved CRN registration (for at least one province, with evidence of submission to all other provinces and territories)
  - o A completed successful pressure test report, with date, time, technician name, medium (helium), and the associated drawing
- E-copies of each of the above documents must also be submitted to the Technical Authority at the time of shipment.
- All orders are to be shipped to Environment Canada in the above approved shipping package.

### **6. ATTACHED DOCUMENTS**

The following table lists the documents that are to accompany this Annex.

**All documents listed below in DXF and ai format are available upon request to the Standing Offer Authority: Peggy Juan, [peggy.juan@pwgsc.gc.ca](mailto:peggy.juan@pwgsc.gc.ca)**

Document	File Name
Vent Valve Assembly Drawing Package (6 sheets)	OTAWA-30009-1 Rev.4.pdf

Solicitation No. - N° de l'invitation

K3D33-111043/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

tor224

Client Ref. No. - N° de réf. du client

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

K3D33-111043

TOR-2-35057

Dispensing Valve Assembly Drawing Package (6 sheets)	OTAWA-30009-2 Rev.3.pdf
Wall Vent Assembly Drawing (1 sheet)	OTAWA-30009-3 Rev.2.pdf
VVA Catch Basin Drawing (1 sheet)	OTAWA-30009-4 Rev.1.pdf
VVA label, adobe illustrator (ai) file	OTAWA-30009-1-LABEL-R1.ai
VVA Cover Plate, DXF file	OTAWA-30009-1-COVERPLATE.DXF
VVA Base Plate, DXF file	OTAWA-30009-1-BASEPLATE-LASER.DXF
VVA Bracket, DXF file	OTAWA-30009-1-BRACKET.DXF
Manufacturer Name Plate, DXF file	MS-NAMEPLATE-3-LASER.DXF
DVA label, adobe illustrator (ai) file	OTAWA-30009-2-LABEL.ai
DVA Cover Plate, DXF file	OTAWA-30009-2-COVERPLATE.DXF
DVA Base Plate, DXF file	OTAWA-30009-2-BASEPLATE-LASER.DXF
Wall Vent Flange, DXF file	OTAWA-30009-3-CF.DXF
Catch Basin Sheet Metal, DXF file	OTAWA-30009-4-LASER.DXF
Flow Switch Assembly drawing (component of DVA)	OTAWA-30182-2 Rev.2.pdf
Swagelok Installer's Guide	MS-13-151.pdf

## ANNEX "B"

### BASIS OF PAYMENT

All-inclusive Firm Lot Price in Canadian currency for the supply, manufacture and delivery of the deliverables listed below, including FOB Destination delivery, including cost for packaging and all transportation charges as well as Custom Duties, if applicable. GST/HST extra.

While delivery must be made within 6-month after the call-up, the best delivery that could be offered is \_\_\_\_ days after the call-up.

Standing Offer Year	Deliverables	Unit of Issue	Firm Lot Price (GST/HST Extra)
Year 1	<ul style="list-style-type: none"> <li>•One (1) Vent Valve Assembly (VVA) with or without VVA Cath Basin;</li> <li>•One (1) Dispensing Valve Assembly (DVA); and</li> <li>•One (1) Wall Vent Assembly (WVA).</li> </ul>	One Lot	\$_____
Year 2	<ul style="list-style-type: none"> <li>•One (1) Vent Valve Assembly (VVA) with or without VVA Cath Basin;</li> <li>•One (1) Dispensing Valve Assembly (DVA); and</li> <li>•One (1) Wall Vent Assembly (WVA).</li> </ul>	One Lot	\$_____
Year 3	<ul style="list-style-type: none"> <li>•One (1) Vent Valve Assembly (VVA) with or without VVA Cath Basin;</li> <li>•One (1) Dispensing Valve Assembly (DVA); and</li> <li>•One (1) Wall Vent Assembly (WVA).</li> </ul>	One Lot	\$_____
Year 4	<ul style="list-style-type: none"> <li>•One (1) Vent Valve Assembly (VVA) with or without VVA Cath Basin;</li> <li>•One (1) Dispensing Valve Assembly (DVA); and</li> <li>•One (1) Wall Vent Assembly (WVA).</li> </ul>	One Lot	\$_____

Solicitation No. - N° de l'invitation

K3D33-111043/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

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File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

K3D33-111043

TOR-2-35057

**ANNEX "C"**  
**PERIODIC USAGE REPORTS - STANDING OFFER**

Standing Offer Number:			Start Date of SO (DD/MM/YYYY)		End Date of SO (DD/MM/YYYY)	
Total Call-Up Value to Date (\$)			Start Reporting Period (DD/MM/YYYY)		End Reporting Period (DD/MM/YYYY)	
Invoice Number	Date of Order	Date of Delivery	Call-up Number	Item Description (Name, Part #)	Item Quantity (In Lot)	Total Value of Call-Up
						\$
						\$
						\$
						\$
						\$
						\$
						\$
						\$
						\$
Reporting Period Total						\$

Reports must be submitted as per Part A, 2.2 Standing Offers Reporting.

---

## **ANNEX "D"**

### **INSURANCE REQUIREMENTS**

#### **1. Commercial General Liability Insurance**

1. The Contractor must obtain Commercial General Liability Insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature, but for not less than \$2,000,000 per accident or occurrence and in the annual aggregate.

2. The Commercial General Liability policy must include the following:

- a. Additional Insured: Canada is added as an additional insured, but only with respect to liability arising out of the Contractor's performance of the Contract. The interest of Canada should read as follows: Canada, as represented by Public Works and Government Services Canada.
- b. Bodily Injury and Property Damage to third parties arising out of the operations of the Contractor.
- c. Products and Completed Operations: Coverage for bodily injury or property damage arising out of goods or products manufactured, sold, handled, or distributed by the Contractor and/or arising out of operations that have been completed by the Contractor.
- d. Personal Injury: While not limited to, the coverage must include Violation of Privacy, Libel and Slander, False Arrest, Detention or Imprisonment and Defamation of Character.
- e. Cross Liability/Separation of Insureds: Without increasing the limit of liability, the policy must protect all insured parties to the full extent of coverage provided. Further, the policy must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.
- f. Blanket Contractual Liability: The policy must, on a blanket basis or by specific reference to the Contract, extend to assumed liabilities with respect to contractual provisions.
- g. Employees and, if applicable, Volunteers must be included as Additional Insured.
- h. Employers' Liability (or confirmation that all employees are covered by Worker's compensation (WSIB) or similar program)
- i. Broad Form Property Damage including Completed Operations: Expands the Property Damage coverage to include certain losses that would otherwise be excluded by the standard care, custody or control exclusion found in a standard policy.
- j. Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of policy cancellation.
- k. If the policy is written on a claims-made basis, coverage must be in place for a period of at least 12 months after the completion or termination of the Contract.
- l. Owners' or Contractors' Protective Liability: Covers the damages that the Contractor becomes legally obligated to pay arising out of the operations of a subcontractor.

- 
- m. Non-Owned Automobile Liability - Coverage for suits against the Contractor resulting from the use of hired or non-owned vehicles.
- n. Litigation Rights: Pursuant to subsection 5(d) of the Department of Justice Act, S.C. 1993, c. J-2, s.1, if a suit is instituted for or against Canada which the Insurer would, but for this clause, have the right to pursue or defend on behalf of Canada as an Additional Named Insured under the insurance policy, the Insurer must promptly contact the Attorney General of Canada to agree on the legal strategies by sending a letter, by registered mail or by courier, with an acknowledgement of receipt.

For the province of Quebec, send to:

Director Business Law Directorate,  
Quebec Regional Office (Ottawa),  
Department of Justice,  
284 Wellington Street, Room SAT-6042,  
Ottawa, Ontario, K1A 0H8

For other provinces and territories, send to:

Senior General Counsel,  
Civil Litigation Section,  
Department of Justice  
234 Wellington Street, East Tower  
Ottawa, Ontario K1A 0H8

A copy of the letter must be sent to the Contracting Authority. Canada reserves the right to co-defend any action brought against Canada. All expenses incurred by Canada to co-defend such actions will be at Canada's expense. If Canada decides to co-defend any action brought against it, and Canada does not agree to a proposed settlement agreed to by the Contractor's insurer and the plaintiff(s) that would result in the settlement or dismissal of the action against Canada, then Canada will be responsible to the Contractor's insurer for any difference between the proposed settlement amount and the amount finally awarded or paid to the plaintiffs (inclusive of costs and interest) on behalf of Canada.

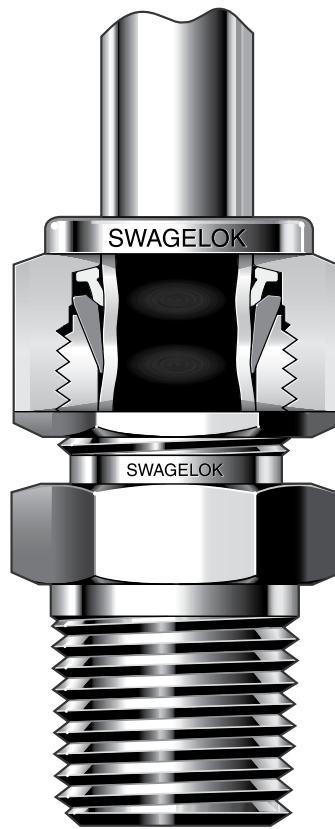
## **2. Errors and Omissions Liability Insurance**

1. The Contractor must obtain Errors and Omissions Liability (a.k.a. Professional Liability) insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature but for not less than \$1,000,000 per loss and in the annual aggregate, inclusive of defence costs.
2. If the policy is written on a claims-made basis, coverage must be in place for a period of at least 12 months after the completion or termination of the Contract.
3. The following endorsement must be included:

Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of cancellation.

An Installer's  
Pocket Guide  
for Swagelok®

# Tube Fittings



Swagelok®





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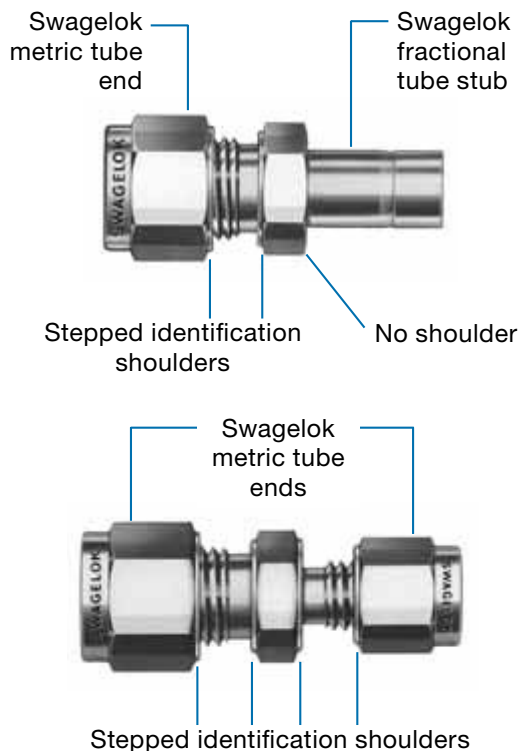
## Intermix/Interchange with Other Manufacturers' Components

This practice can be dangerous. Leak-tight seals that will withstand high pressure, vibration, vacuum, and temperature changes depend on close tolerances and consistent, exacting quality control in conjunction with good design principles. The critical interaction of precision parts is essential for reliability and safety.

Components of other manufacturers may look like Swagelok tube fitting components—but they cannot be manufactured in accordance with Swagelok engineering standards, nor do they benefit from innovations in design and manufacture defined by 36 active Swagelok tube fitting patents issued since 1989.

## Metric Swagelok Tube Fittings

Metric tube fittings have a stepped shoulder on the body hex.



Shaped fittings, such as elbows, crosses, and tees, are stamped MM for metric tubing and have no step on the forging.

## Installation Instructions

Swagelok tube fittings 1 in./25 mm and smaller can be installed quickly, easily, and reliably with simple hand tools.

Over 1 in./25 mm sizes require use of a hydraulic swaging unit to swage the ferrules onto the tubing.

## Safety Precautions

- Do not bleed system by loosening fitting nut or fitting plug.
- Do not assemble and tighten fittings when system is pressurized.
- Make sure that the tubing rests firmly on the shoulder of the tube fitting body before tightening the nut.
- Use the correct Swagelok gap inspection gauge to ensure sufficient pull-up upon initial installation.
- Always use proper thread sealants on tapered pipe threads.
- Do not mix materials or fitting components from various manufacturers—tubing, ferrules, nuts, and fitting bodies.
- Never turn fitting body. Instead, hold fitting body and turn nut.
- Avoid unnecessary disassembly of unused fittings.
- Use only long reducers in female Swagelok end connections.

See the instructions starting below for installation of Swagelok tube fittings, O-seal male connectors, caps and plugs, port connectors, tube adapters, positionable elbows and tees, weld fittings, depth marking tool, and preswaging tool.

## Swagelok Tube Fittings

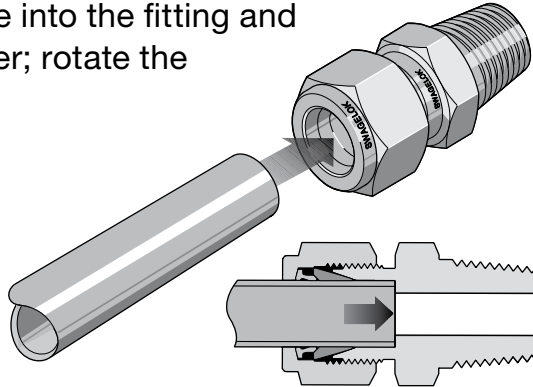
### Up to 1 in./25 mm

These instructions apply both to traditional fittings and to fittings with the advanced back-ferrule geometry.

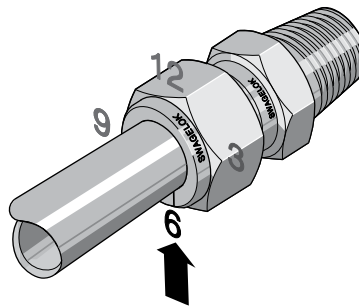
Fully insert the tube into the fitting and against the shoulder; rotate the nut finger-tight.

**High-pressure applications and high safety-factor systems:**

*Further tighten the nut until the tube will not turn by hand or move axially in the fitting.*

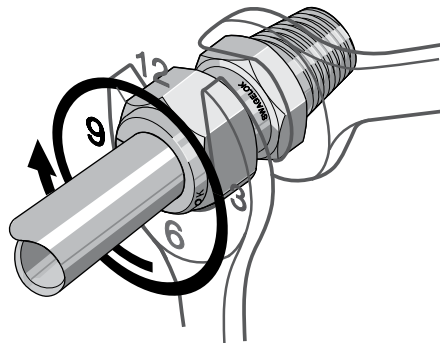


Mark the nut at the 6 o'clock position.



While holding the fitting body steady, tighten the nut one and one-quarter turns to the 9 o'clock position.

*For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut three-quarters turn to the 3 o'clock position.*





## Swagelok Tube Fittings

### Over 1 in./25 mm

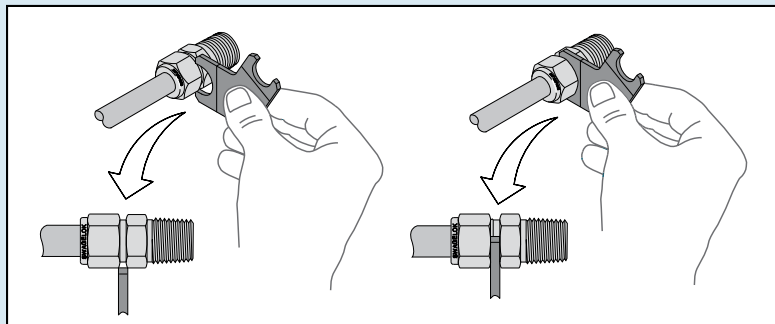
1. Preswage the ferrules onto the tube using a Swagelok multihead hydraulic swaging unit (MHSU).
2. Apply the lubricant packaged with the fitting lightly to the body threads and the rear surface of the back ferrule.
3. Insert the tube with preswaged ferrules into the fitting until the front ferrule seats against the fitting body; rotate the nut finger-tight.
4. Mark the nut at the 6 o'clock position.
5. While holding the fitting body steady, tighten the nut one-half turn to the 12 o'clock position.

*Use the Swagelok MHSU gap inspection gauge to ensure that the fitting has been tightened sufficiently.*

### Gaugeability

On initial installation, the Swagelok gap inspection gauge assures the installer or inspector that a fitting has been sufficiently tightened.

Position the Swagelok gap inspection gauge next to the gap between the nut and body.



If the gauge **will not** enter the gap, **the fitting is sufficiently tightened.**

If the gauge **will** enter the gap, **additional tightening is required.**



**Always depressurize a system before adjusting the tightness of a tube fitting connection.**

## Swagelok Tube Fittings

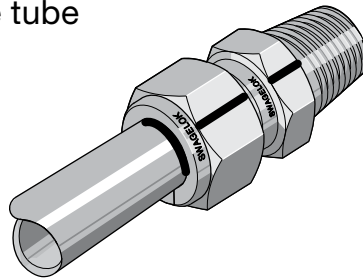
### Reassembly—All Sizes

You may disassemble and reassemble Swagelok tube fittings many times.

**⚠ Always depressurize the system before disassembling a Swagelok tube fitting.**

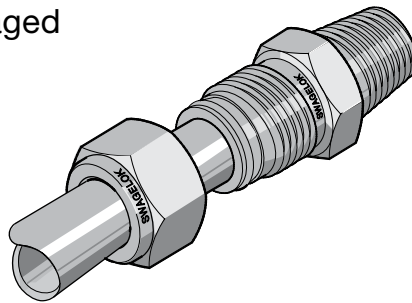
Prior to disassembly, mark the tube at the back of the nut; mark a line along the nut and fitting body flats.

*Use these marks to ensure that you return the nut to the previously pulled-up position.*

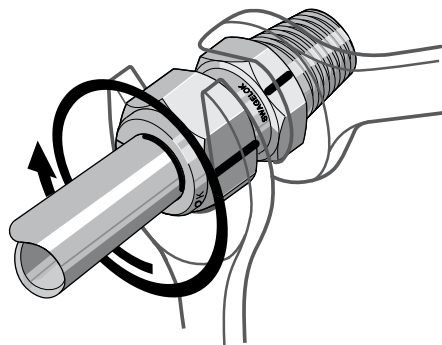


Insert the tube with preswaged ferrules into the fitting until the front ferrule seats against the fitting body.

**Over 1 in./25 mm sizes:** *If needed, reapply lubricant lightly to the body threads and the rear surface of the back ferrule.*



While holding the fitting body steady, rotate the nut with a wrench to the previously pulled-up position, as indicated by the marks on the tube and flats. At this point, you will feel a significant increase in resistance. Tighten the nut slightly.



**⚠ Do not use the Swagelok gap inspection gauge with reassembled fittings.**

## O-Seal Male Connectors

1. Turn the O-seal connector into the female end until it is finger-tight.
2. Tighten the O-seal connector until it makes metal-to-metal contact with the face of the female end.
3. Tighten slightly with a wrench.

*O-rings are coated with a thin film of silicone-based lubricant. Removal of factory-applied lubricants may alter performance.*

---

## Caps and Plugs



### Caps

See Swagelok tube fitting installation and reassembly, page 10 and 12.



### Plugs

While holding fitting body steady, tighten the plug one-quarter turn from the finger-tight position.

*For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the plug one-eighth turn.*

*For over 1 in. and over 25 mm tube fittings, tighten the plug one-quarter turn.*

### Reassembly

You may disassemble and reassemble Swagelok plugs many times. Make subsequent connections by slightly tightening with a wrench after snugging the nut by hand.

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## Pipe Thread Fittings

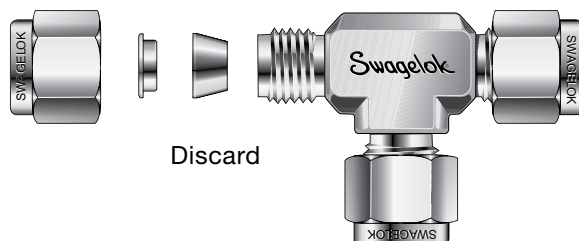
A thread sealant should always be used when assembling tapered threads. SWAK® anaerobic pipe thread sealant, PTFE-Free pipe thread sealant, and Swagelok PTFE Tape are available. For more information, see the Swagelok *Leak Detectors, Lubricants, and Sealants* catalog, MS-01-91.

## Port Connectors

Connect the machined ferrule end **before** connecting the tube adapter end.

### Machined Ferrule End

1. Remove the nut and ferrules from the Swagelok end connection. Discard the ferrules.

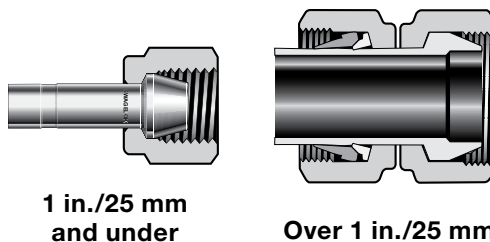


2. Slip the nut over the machined ferrule end of the port connector.

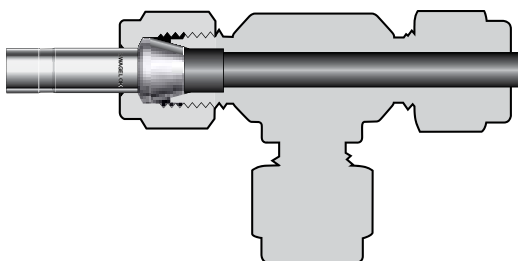
**Over 1 in./25**

**mm sizes:**

*The nut is preassembled on the port connector.*

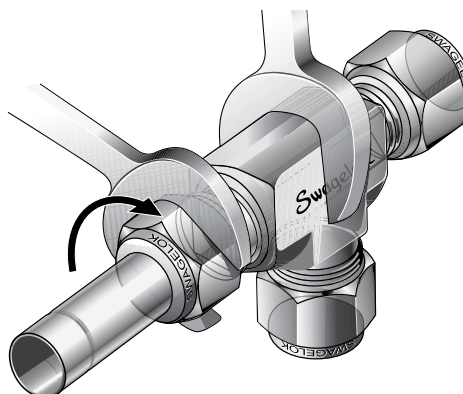


3. Insert the port connector into the end connection and finger-tighten the nut.



4. While holding fitting body steady, tighten the nut one-quarter turn.

*For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut one-eighth turn.*



**⚠ Do not use the Swagelok gap inspection gauge with machined ferrule ends.**

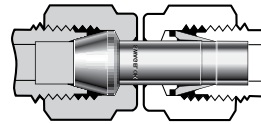
## Port Connectors

### Reassembly

You may disassemble and reassemble Swagelok port connectors many times. Make subsequent connections by slightly tightening with a wrench after snugging the nut by hand.

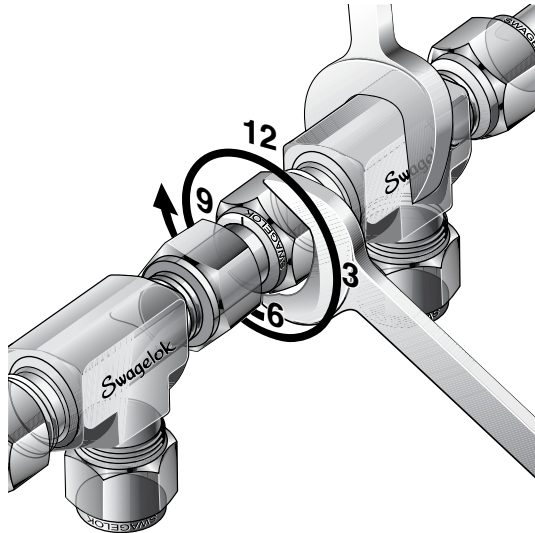
### Tube Adapter End

5. Insert the tube adapter until it rests firmly on the shoulder of the Swagelok tube fitting body. Finger-tighten the nut.



**Over 1 in./25 mm sizes:** Remove and discard the nut and ferrules from the end connection, then insert the tube adapter.

6. Mark the nut at the 6 o'clock position. While holding fitting body steady, tighten the nut one and one-quarter turns to the 9 o'clock position.



For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut three-quarters turn to the 3 o'clock position.

For preswaged over 1 in./25 mm and over tube fittings, tighten the nut one-half turn to the 12 o'clock position.

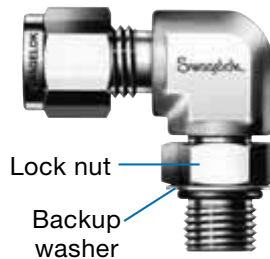
**⚠ Do not use the Swagelok gap inspection gauge with preswaged tube adapter connections over 1 in./25 mm.**

### Reassembly

See Swagelok tube fitting reassembly, page 12.

## Positionable Elbows and Tees

1. Turn the positionable end into the female fitting until the metal backup washer contacts the face of the fitting.
2. Turn the positionable end out of the female fitting (not more than one turn) until the Swagelok tube fitting end is positioned properly.
3. While holding fitting body steady, tighten the lock nut until the metal backup washer contacts the face of the fitting.



## Tube Adapters

### Up to 1 in./25 mm

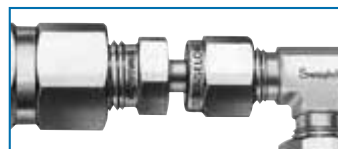
1. Install the end opposite the tube adapter end (Fig. 1).
2. Insert the tube adapter into the Swagelok tube fitting. Make sure that the tube adapter rests firmly on the shoulder of the tube fitting body and that the nut is finger-tight (Fig. 2).
3. Mark the nut at the 6 o'clock position.
4. While holding fitting body steady, tighten the nut one and one-quarter turns to the 9 o'clock position.

Fig. 1

Female pipe port on existing equipment



Fig. 2



*For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut three-quarters turn to the 3 o'clock position.*

### Over 1 in./25 mm

Swagelok tube adapters over 1 in./25 mm are furnished with nuts and preswaged ferrules.

To assemble, follow steps 2 through 5 of the Swagelok tube fittings over 1 in./25 mm assembly instructions, page 11.



**Do not use the Swagelok gap inspection gauge with preswaged tube adapter connections over 1 in./25 mm.**

## Tube Adapters

### Reassembly

See Swagelok tube fitting reassembly, page 12.

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## Weld Fittings

### ***Welding Precautions for Swagelok Tube Fittings with Weld End Connections***

1. Remove the nut and ferrules.
2. Turn a Swagelok tube fitting plug or another nut onto the fitting so that it is finger-tight. This protects the threads and sealing components.
3. Provide a suitable heat sink to dissipate the heat.
4. Tack weld at four positions 90° apart to hold the fitting in place and to ensure alignment and concentricity of the components.
5. Complete the weld.
6. Remove the plug or nut and replace the nut and ferrules.

**⚠ Caution: When welding carbon steel fittings, the heat often removes the protective oil from the threads. It is important to apply another lubricant, such as Goop™ thread lubricant.**

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## Depth Marking Tool

1. Insert cleanly cut, fully deburred tube into the depth marking tool (DMT) until the tube is against the shoulder of the tool. Using a pen or pencil, mark the tube at the top of the DMT (Fig. 1).
2. Remove the tube from the DMT and insert it into the Swagelok fitting until it is against the shoulder of the fitting body (Fig. 2). Rotate the nut finger-tight. If any portion of the mark on the tube can be seen above the fitting nut, the tube is not fully inserted into the fitting.
3. While holding the fitting body steady, follow Swagelok tube fitting installation instructions, page 10.

**Fig. 1**



**Fig. 2**



## Preswaging Tool

1. Install the Swagelok nut and ferrules onto the preswaging tool.
2. Insert the tube into the preswaging tool.
3. Make sure that the tube rests firmly on the shoulder of the preswaging tool body and that the nut is finger-tight.
4. Mark the nut at the 6 o'clock position.
5. While holding the preswaging tool steady, tighten the nut one and one-quarter turns to the 9 o'clock position.

*For 1/16, 1/8, and 3/16 in.; 2, 3, and 4 mm tube fittings, tighten the nut only three-quarters turn to the 3 o'clock position (Fig. 1).*

**Fig. 1**



6. Loosen the nut.
7. Remove the tube with preswaged ferrules from the preswaging tool. If the tube sticks in the preswaging tool, remove the tube by gently rocking it back and forth. Do not turn the tube (Fig. 2).
8. Insert the tube with preswaged ferrules into the fitting body until the front ferrule seats against the fitting body.
9. While holding the fitting body steady, rotate the nut with a wrench to the previously pulled-up position; at this point, you will feel a significant increase in resistance.

**Fig. 2**



10. Tighten the nut slightly (Fig. 3).

**Fig. 3**



**Do not use the Swagelok gap inspection gauge with fittings that were assembled using the preswaging tool.**



## Hydraulic Swaging Units

Swagelok hydraulic swaging units preswage Swagelok ferrules onto tubing prior to assembly and provide Swagelok tube fitting connections that are 100 % gaugeable upon initial installation. Multihead hydraulic and air-actuated hydraulic swaging units:

- Place no initial strain on nut or fitting body threads or on body seal surfaces
- Are available with interchangeable fractional and metric tooling
- Fit neatly in a rugged plastic carrying case
- Reduce assembly and installation time and operator error.

### ***Multihead (MHSU)***



- Is available in two unit sizes, with tooling for:
  - 1/2 to 1 in. and 12 to 25 mm tubing and tube adapters
  - 1 to 2 in. and 25 to 50 mm tubing and tube adapters
- **Must** be used to install 1 1/4, 1 1/2, and 2 in. and 28, 30, 32, 38, and 50 mm Swagelok tube fittings
- Is standard with a tube marking feature to indicate when tube is properly bottomed in the unit
- Is available with a support base (as shown).
- Is available with stainless steel connection tubing in place of hydraulic hose; support base is required.

**The MHSU cannot be used for SAF 2507™ tubing 1/2 in. and under or for medium-pressure tubing. For 5/8 and 3/4 in. SAF 2507 tubing, order the 1 in./25 mm and over unit and SAF 2507 tooling kit and gap inspection gauges.**

## Hydraulic Swaging Units

### *Air-Actuated (AHSU)*



- Requires only one unit with interchangeable tooling to swage 1/4 to 1/2 in. and 6 to 12 mm Swagelok tube fitting ferrule sizes
- Requires no threading of nut on or off the tooling

**The AHSU cannot be used for SAF 2507 tubing or for medium-pressure tubing.**

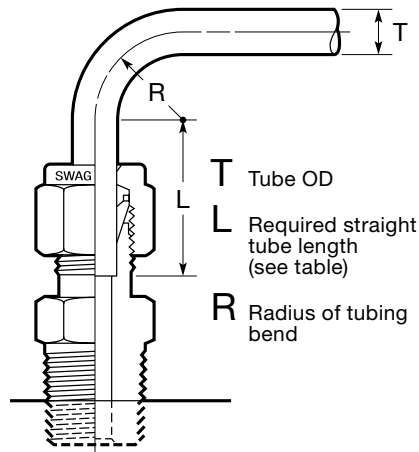
### ***Additional Information, MHSU and AHSU***

See the Swagelok *Gaugeable Tube Fittings and Adapters* catalog, MS-01-140. For instructions, see *Multihead Hydraulic Swaging Unit (MHSU) Setup and Operation Instructions*, MS-12-37, and *Air-Actuated Hydraulic Swaging Unit (AHSU) Setup and Operation Instructions*, MS-12-38.

## Tubing Installation

Tubing properly selected and handled, when combined with the quality of Swagelok fittings, will give you leak-tight systems. Properly installed on such tubing, Swagelok fittings provide reliable service under a wide variety of fluid applications.

When installing fittings near tube bends, there must be a sufficient straight length of tubing to allow the tube to be bottomed in the Swagelok fitting (see tables below).



Fractional, in.	
T Tube OD	L <sup>①</sup>
1/16	1/2
1/8	23/32
3/16	3/4
1/4	13/16
5/16	7/8
3/8	15/16
1/2	1 3/16
5/8	1 1/4
3/4	
7/8	1 5/16
1	1 1/2
1 1/4	2
1 1/2	2 13/32
2	3 1/4

① Required straight tube length.

Metric, mm	
T Tube OD	L <sup>①</sup>
3	19
6	21
8	23
10	25
12	31
14	32
15	
16	
18	34
20	
22	34
25	40
28	46
30	50
32	54
38	63
50	80

## Tubing Selection

- Metal tubing material should be softer than fitting material. For example, stainless steel tubing should not be used with brass fittings.
- When tubing and fittings are made of the same material, tubing must be fully annealed.
- Always use an insert with extremely soft or pliable plastic tubing.
- Extremes of wall thickness should always be checked against the suggested minimum and maximum wall thickness limitations.
- Surface finish is very important to proper sealing. Tubing with any kind of depression, scratch, raised portion, or other surface defect will be difficult to seal, particularly in gas service.
- Tubing that is oval and will not easily fit through fitting nuts, ferrules, and bodies should never be forced into the fitting.

## Gas Service

Gases (air, hydrogen, helium, nitrogen, etc.) have very small molecules that can escape through even the most minute leak path. Some surface defects on the tubing can provide such a leak path. As tube outside diameter (OD) increases, so does the likelihood of a scratch or other surface defect interfering with proper sealing.

The most successful connection for gas service will occur if all installation instructions are carefully followed and the heavier wall thicknesses of tubing on the following tables are selected.

A heavy-wall tube resists ferrule action more than a thin-wall tube, allowing the ferrules to coin out minor surface imperfections. A thin-wall tube offers less resistance to ferrule action during installation, reducing the chance of coining out surface defects, such as scratches. Within the applicable suggested allowable working pressure table, select a tube wall thickness whose working pressure is *outside* of the shaded areas.

## Fractional Carbon Steel Tubing

Allowable working pressures are calculated from an S value of 15 700 psi (108.2 MPa) for ASTM A179 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3. For working pressure in accordance with ASME B31.1, multiply by 0.85.

### ***Suggested Ordering Information***

High-quality, soft annealed seamless carbon steel hydraulic tubing, ASTM A179 or equivalent. Hardness not to exceed 72 HRB or 130 HV. Tubing to be free of scratches, suitable for bending and flaring.

Tube OD in.	Tube Wall Thickness, in.													Swagelok Fitting Series
	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	0.148	0.165	0.180	0.220	
	Working Pressure, psig Note: For gas service, select a tube wall thickness outside of the shaded area. (See <b>Gas Service</b> , page 22.)													
1/8	8000	10 200												200
3/16	5100	6 600	9600											300
1/4	3700	4 800	7000	9600										400
5/16		3 700	5500	7500										500
3/8		3 100	4500	6200										600
1/2		2 300	3200	4500	5900									810
5/8		1 800	2600	3500	4600	5300								1010
3/4			2100	2900	3700	4300	5100							1210
7/8			1800	2400	3200	3700	4300							1410
1			1500	2100	2700	3200	3700	4100						1610
1 1/4				1600	2100	2500	2900	3200	3600	4000	4600	5000		2000
1 1/2					1800	2000	2400	2600	2900	3300	3700	4100	5100	2400
2						1500	1700	1900	2100	2400	2700	3000	3700	3200

## Metric Carbon Steel Tubing

Allowable working pressures are based on equations from ASME B31.3 for DIN 2391 tubing, using a stress value of 113 MPa (16 300 psi) and tensile strength of 340 MPa (49 300 psi).

### ***Suggested Ordering Information***

High-quality, soft annealed carbon steel tubing, DIN 2391 or equivalent. Hardness not to exceed 72 HRB or 130 HV. Tubing to be free of scratches, suitable for bending or flaring.

Tube OD mm	Tube Wall Thickness, mm															Swagelok Fitting Series
	0.8	1.0	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5			
	Working Pressure, bar Note: For gas service, select a tube wall thickness outside of the shaded area. (See Gas Service, page 22.)															
3	630	790													3M0	
6	290	370	460	590											6M0	
8		270	330	430											8M0	
10		210	260	330											10M0	
12		170	210	270	330	380	420								12M0	
14		150	180	230	280	320	350								14M0	
15		140	170	210	260	290	330								15M0	
16		130	150	200	240	270	300	350							16M0	
18			140	170	210	240	270	310							18M0	
20			120	160	190	210	240	270	310						20M0	
22			110	140	170	190	210	240	280						22M0	
25			100	120	150	170	180	210	240	260					25M0	
28						150	160	190	210	230	270				28M0	
30						140	150	170	200	210	250				30M0	
32						130	140	160	180	200	230	270			32M0	
38							120	130	150	160	190	230	260		38M0	



## Fractional Stainless Steel Seamless Tubing

Allowable working pressures are calculated from an S value of 20 000 psi (137.8 MPa) for ASTM A269 tubing at –20 to 100°F (–28 to 37°C), as listed in ASME B31.3 and ASME B31.1, except as noted.

### ***For Welded Tubing***

For welded and drawn tubing, a derating factor must be applied for weld integrity:

- for double-welded tubing, multiply pressure rating by 0.85
- for single-welded tubing, multiply pressure rating by 0.80.

### ***Suggested Ordering Information***

High-quality, fully annealed (Type 304, 304/304L, 316, 316/316L, 317, 317/317L) (seamless or welded and drawn) stainless steel hydraulic tubing, ASTM A269 or A213, or equivalent. Hardness not to exceed 90 HRB or 200 HV. Tubing to be free of scratches, suitable for bending and flaring. OD tolerances not to exceed  $\pm 0.003$  in. for 1/16 in. OD tubing.

*Certain austenitic stainless tubing has an allowable ovality tolerance double the OD tolerance and may not fit into Swagelok precision tube fittings. Dual-certified grades such as 304/304L, 316/316L, and 317/317L meet the minimum chemistry and the mechanical properties of both alloy grades.*

Tube OD in.	Tube Wall Thickness, in.																Swagelok Fitting Series
	0.010	0.012	0.014	0.016	0.020	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	0.156	0.188	
	Working Pressure, psig Note: For gas service, select a tube wall thickness outside of the shaded area. (See Gas Service, page 22.)																
1/16	5600	6800	8100	9400	12 000												100
1/8						8500	10 900										200
3/16						5400	7 000	10 200									300
1/4						4000	5 100	7 500	10 200 <sup>①</sup>								400
5/16							4 000	5 800	8 000								500
3/8							3 300	4 800	6 500	7500 <sup>①②</sup>							600
1/2							2 600	3 700	5 100	6700							810
5/8								2 900	4 000	5200	6000						1010
3/4								2 400	3 300	4200	4900	5800					1210
7/8								2 000	2 800	3600	4200	4800					1410
1									2 400	3100	3600	4200	4700				1610
1 1/4										2400	2800	3300	3600	4100	4900		2000
1 1/2											2300	2700	3000	3400	4000	4900	2400
2												2000	2200	2500	2900	3600	3200

① For higher pressures, see the Swagelok *Medium-Pressure Fittings* catalog, MS-02-335, or the Swagelok *High-Pressure Fittings* catalog, MS-01-34.

② Rating based on repeated pressure testing of the Swagelok tube fitting with a 4:1 design factor based upon hydraulic fluid leakage.

## Metric Stainless Steel Seamless Tubing

Allowable working pressures are based on equations from ASME B31.3 and ASME B31.1 for EN ISO 1127 tubing (D4, T4 tolerance for 3 to 12 mm; D4, T3 tolerance 14 to 50 mm), using a stress value of 137.8 MPa (20 000 psi) and tensile strength of 516.4 MPa (74 900 psi), except as noted.

### ***For Welded Tubing***

For welded and drawn tubing, a derating factor must be applied for weld integrity:

- for double-welded tubing, multiply pressure rating by 0.85
- for single-welded tubing, multiply pressure rating by 0.80.

### ***Suggested Ordering Information***

High-quality, fully annealed (Type 304, 304/304L, 316, 316/316L, 317, 317/317L) stainless steel tubing, EN ISO 1127 or equivalent. Hardness not to exceed 90 HRB or 200 HV. Tubing to be free of scratches, suitable for bending or flaring. OD tolerances not to exceed  $\pm 0.076$  mm for 3 mm OD tubing.

*Dual-certified grades such as 304/304L, 316/316L, and 317/317L meet the minimum chemistry and the mechanical properties of both alloy grades.*

Tube OD mm	Tube Wall Thickness, mm															Swagelok Fitting Series
	0.8	1.0	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5	5.0		
	Working Pressure, bar Note: For gas service, select a tube wall thickness outside of the shaded area. (See Gas Service, page 22.)															
3	670														3M0	
6	310	420	540	710											6M0	
8		310	390	520											8M0	
10		240	300	400	510	580									10M0	
12		200	250	330	410	470									12M0	
14		160	200	270	340	380	430								14M0	
15		150	190	250	310	360	400								15M0	
16			170	230	290	330	370	400 <sup>①</sup>							16M0	
18			150	200	260	290	320	370							18M0	
20			140	180	230	260	290	330	380						20M0	
22			140	160	200	230	260	300	340						22M0	
25					180	200	230	260	290	320					25M0	
28						180	200	230	260	280	330				28M0	
30						170	180	210	240	260	310				30M0	
32						160	170	200	220	240	290	330			32M0	
38							140	160	190	200	240	270	310		38M0	
50										150	180	210	240	270	50M0	

① Rating based on repeated pressure testing of the Swagelok tube fitting with a 4:1 design factor based upon hydraulic fluid leakage.

## Fractional Copper Tubing

Allowable working pressures are calculated from an S value of 6000 psi (41.3 MPa) for ASTM B75 and ASTM B88 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3 and ASME B31.1.

### Suggested Ordering Information

High-quality, soft annealed seamless copper tubing, ASTM B75 or equivalent. Also soft annealed (Temper O) copper water tube, type K or type L to ASTM B88.

Tube OD in.	Tube Wall Thickness, in.										Swagelok Fitting Series
	0.028	0.030	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134	
	Working Pressure, psig Note: For gas service, select a tube wall thickness outside of the shaded area. (See <b>Gas Service</b> , page 22.)										
1/8	2700	3000	3600								200
3/16	1800	1900	2300	3400							300
1/4	1300	1400	1600	2500	3500						400
5/16			1300	1900	2700						500
3/8			1000	1600	2200						600
1/2			800	1100	1600	2100					810
5/8				900	1200	1600	1900				1010
3/4				700	1000	1300	1500	1800			1210
7/8				600	800	1100	1300	1500			1410
1				500	700	900	1100	1300	1500		1610
1 1/8					600	800	1000	1100	1300	1400	1810

## Ordering Numbers

Select a basic ordering number.

Example: **-100-6**

Add a material designator.

Example: **SS**-100-6

Minimum order quantities may apply to certain materials and configurations.

Material	Designator
316 SS	SS
Aluminum	A
Alloy 20	C20
Alloy 400	M
Alloy 600	INC
Alloy 625	625
Alloy 825	825
Alloy C-276	HC
Brass	B
Carbon steel	S
Nylon	NY
PTFE	T
Titanium	TI

## Additional Products

- For SAF 2507 super duplex tube fittings, see the *Swagelok Gaugeable SAF 2507 Super Duplex Tube Fittings* catalog, MS-01-174.
- For alloy 400 tube fittings, see the *Swagelok Gaugeable Alloy 400/R-405 Mechanically Attached Pipe and Tube Fittings* catalog, MS-02-332.
- For PFA tube fittings, see the *Swagelok PFA Tube Fittings* catalog, MS-01-05.
- For heavy-wall tube fittings, see the *Swagelok High-Pressure Fittings* catalog, MS-01-34.
- For medium-pressure tube fittings, see the *Swagelok Medium-Pressure Fittings* catalog, MS-02-335.

Contact your authorized Swagelok sales and service representative about additional sizes and special alloys.

## Unions



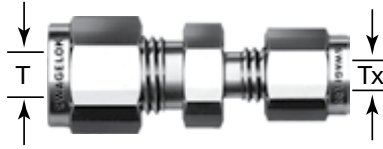
### Union

Tube OD in.	Basic Ordering Number
1/16	-100-6
1/8	-200-6
3/16	-300-6
1/4	-400-6
5/16	-500-6
3/8	-600-6
1/2	-810-6
1/2	-810-6-0030 <sup>①</sup>
5/8	-1010-6
3/4	-1210-6
7/8	-1410-6
1	-1610-6
1 1/8	-1810-6
1 1/4	-2000-6
1 1/2	-2400-6
2	-3200-6

<sup>①</sup> Bored through.

Tube OD mm	Basic Ordering Number
2	-2M0-6
3	-3M0-6
4	-4M0-6
6	-6M0-6
8	-8M0-6
10	-10M0-6
12	-12M0-6
14	-14M0-6
15	-15M0-6
16	-16M0-6
18	-18M0-6
20	-20M0-6
22	-22M0-6
25	-25M0-6
28	-28M0-6
30	-30M0-6
32	-32M0-6
38	-38M0-6
50	-50M0-6

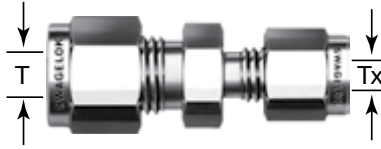
## Unions



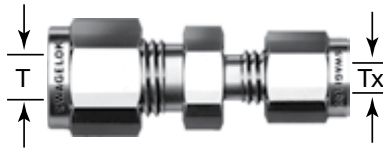
**Union**  
**(Metric to**  
**Fractional)**

Tube OD		Basic Ordering Number
T, mm	Tx, in.	
2	1/8	-2M0-6-2
	1/4	-2M0-6-4
3	1/8	-3M0-6-2
4	1/8	-4M0-6-2
	1/4	-4M0-6-4
6	1/16	-6M0-6-1
	1/8	-6M0-6-2
	1/4	-6M0-6-4
	5/16	-6M0-6-5
	3/8	-6M0-6-6
8	1/4	-8M0-6-4
	3/8	-8M0-6-6
10	1/8	-10M0-6-2
	1/4	-10M0-6-4
	5/16	-10M0-6-5
	3/8	-10M0-6-6
12	1/4	-12M0-6-4
	5/16	-12M0-6-5
	3/8	-12M0-6-6
	1/2	-12M0-6-8
15	1/2	-15M0-6-8
16	5/8	-16M0-6-10
18	3/4	-18M0-6-12
20	1/2	-20M0-6-8
	1	-20M0-6-16
25	1	-25M0-6-16



**Unions*****Reducing Union***

Tube OD, in.		Basic Ordering Number
T	Tx	
1/8	1/16	-200-6-1
3/16	1/16	-300-6-1
	1/8	-300-6-2
1/4	1/16	-400-6-1
	1/8	-400-6-2
	3/16	-400-6-3
5/16	1/8	-500-6-2
	1/4	-500-6-4
3/8	1/16	-600-6-1
	1/8	-600-6-2
	1/4	-600-6-4
	5/16	-600-6-5
1/2	1/8	-810-6-2
	1/4	-810-6-4
	3/8	-810-6-6
5/8	3/8	-1010-6-6
	1/2	-1010-6-8
3/4	1/4	-1210-6-4
	3/8	-1210-6-6
	1/2	-1210-6-8
	5/8	-1210-6-10
1	1/2	-1610-6-8
	3/4	-1610-6-12

**Unions*****Reducing Union***

Tube OD, mm		Basic Ordering Number
T	Tx	
3	2	-3M0-6-2M
6	2	-6M0-6-2M
	3	-6M0-6-3M
	4	-6M0-6-4M
8	6	-8M0-6-6M
10	6	-10M0-6-6M
	8	-10M0-6-8M
12	6	-12M0-6-6M
	8	-12M0-6-8M
	10	-12M0-6-10M
16	10	-16M0-6-10M
	12	-16M0-6-12M
18	12	-18M0-6-12M
25	18	-25M0-6-18M
	20	-25M0-6-20M
30	18	-30M0-6-18M
	20	-30M0-6-20M
	25	-30M0-6-25M
32	18	-32M0-6-18M
	20	-32M0-6-20M
	25	-32M0-6-25M
38	20	-38M0-6-20M
	25	-38M0-6-25M
	30	-38M0-6-30M

## Unions



### *Bulkhead Union*

Tube OD in.	Basic Ordering Number
1/16	-100-61
1/8	-200-61
3/16	-300-61
1/4	-400-61
5/16	-500-61
3/8	-600-61
1/2	-810-61
5/8	-1010-61
3/4	-1210-61
1	-1610-61
1 1/4	-2000-61
1 1/2	-2400-61
2	-3200-61

Tube OD mm	Basic Ordering Number
3	-3M0-61
4	-4M0-61
6	-6M0-61
8	-8M0-61
10	-10M0-61
12	-12M0-61
14	-14M0-61
15	-15M0-61
16	-16M0-61
18	-18M0-61
20	-20M0-61
25	-25M0-61
30	-30M0-61
32	-32M0-61
38	-38M0-61



### *Bulkhead Reducing Union*

Tube OD, in.		Basic Ordering Number
T	Tx	
1/8	1/16	-200-61-1
1/4	1/8	-400-61-2
3/8	1/4	-600-61-4
1/2	1/4	-810-61-4

### *Bulkhead Reducing Union (Metric to Fractional)*

Tube OD		Basic Ordering Number
T, mm	Tx, in.	
6	1/8	-6M0-61-2

## Male Connectors



### NPT

Tube OD in.	NPT Size in.	Basic Ordering Number
1/16	1/16	-100-1-1
	1/8	-100-1-2
	1/4	-100-1-4
1/8	1/16	-200-1-1
	1/8	-200-1-2
	1/4	-200-1-4
	3/8	-200-1-6
	1/2	-200-1-8
3/16	1/8	-300-1-2
	1/4	-300-1-4
1/4	1/16	-400-1-1
	1/8	-400-1-2
	1/4	-400-1-4
	3/8	-400-1-6
	1/2	-400-1-8
	3/4	-400-1-12
5/16	1/8	-500-1-2
	1/4	-500-1-4
	3/8	-500-1-6
3/8	1/8	-600-1-2
	1/4	-600-1-4
	3/8	-600-1-6
	1/2	-600-1-8
	3/4	-600-1-12
	1	-600-1-16
1/2	1/8	-810-1-2
	1/4	-810-1-4
	3/8	-810-1-6
	1/2	-810-1-8
	3/4	-810-1-12
	1	-810-1-16

Tube OD in.	NPT Size in.	Basic Ordering Number
5/8	1/4	-1010-1-4
	3/8	-1010-1-6
	1/2	-1010-1-8
	3/4	-1010-1-12
3/4	3/8	-1210-1-6
	1/2	-1210-1-8
	3/4	-1210-1-12
	1	-1210-1-16
7/8	1/2	-1410-1-8
	3/4	-1410-1-12
	1	-1410-1-16
1	1/2	-1610-1-8
	3/4	-1610-1-12
	1	-1610-1-16
1 1/8	1	-1810-1-16
1 1/4	1	-2000-1-16
	1 1/4	-2000-1-20
1 1/2	1 1/2	-2400-1-24
2	2	-3200-1-32

## Male Connectors

**NPT**



Tube OD mm	NPT Size in.	Basic Ordering Number
2	1/8	-2M0-1-2
3	1/8 1/4	-3M0-1-2 -3M0-1-4
4	1/8 1/4	-4M0-1-2 -4M0-1-4
6	1/8 1/4 3/8 1/2	-6M0-1-2 -6M0-1-4 -6M0-1-6 -6M0-1-8
8	1/8 1/4 3/8 1/2	-8M0-1-2 -8M0-1-4 -8M0-1-6 -8M0-1-8
10	1/8 1/4 3/8 1/2 3/4	-10M0-1-2 -10M0-1-4 -10M0-1-6 -10M0-1-8 -10M0-1-12
12	1/8 1/4 3/8 1/2 3/4	-12M0-1-2 -12M0-1-4 -12M0-1-6 -12M0-1-8 -12M0-1-12
14	1/4 3/8 1/2	-14M0-1-4 -14M0-1-6 -14M0-1-8
15	1/2	-15M0-1-8
16	3/8 1/2 3/4	-16M0-1-6 -16M0-1-8 -16M0-1-12
18	1/2 3/4	-18M0-1-8 -18M0-1-12
20	1/2 3/4	-20M0-1-8 -20M0-1-12
22	3/4 1	-22M0-1-12 -22M0-1-16
25	1/2 3/4 1	-25M0-1-8 -25M0-1-12 -25M0-1-16
28	1 1 1/4	-28M0-1-16 -28M0-1-20
30	1 1/4	-30M0-1-20
32	1 1/4	-32M0-1-20
38	1 1/2	-38M0-1-24

## Male Connectors

**ISO/BSP  
Tapered  
Thread (RT)**



Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8 1/4	-200-1-2RT -200-1-4RT
1/4	1/8 1/4 3/8 1/2	-400-1-2RT -400-1-4RT -400-1-6RT -400-1-8RT
5/16	1/8 1/4	-500-1-2RT -500-1-4RT
3/8	1/8 1/4 3/8 1/2 3/4	-600-1-2RT -600-1-4RT -600-1-6RT -600-1-8RT -600-1-12RT
1/2	1/4 3/8 1/2 3/4	-810-1-4RT -810-1-6RT -810-1-8RT -810-1-12RT
5/8	1/2	-1010-1-8RT
3/4	3/4 1	-1210-1-12RT -1210-1-16RT
1	3/4 1	-1610-1-12RT -1610-1-16RT
1 1/4	1 1/4	-2000-1-20RT

## Male Connectors

**ISO/BSP  
Tapered  
Thread (RT)**



Tube OD mm	ISO Thread Size in.	Basic Ordering Number
2	1/8	-2M0-1-2RT
3	1/8 1/4	-3M0-1-2RT -3M0-1-4RT
4	1/8 1/4	-4M0-1-2RT -4M0-1-4RT
6	1/8 1/4 3/8 1/2	-6M0-1-2RT -6M0-1-4RT -6M0-1-6RT -6M0-1-8RT
8	1/8 1/4 3/8 1/2	-8M0-1-2RT -8M0-1-4RT -8M0-1-6RT -8M0-1-8RT
10	1/8 1/4 3/8 1/2 3/4	-10M0-1-2RT -10M0-1-4RT -10M0-1-6RT -10M0-1-8RT -10M0-1-12RT
12	1/4 3/8 1/2 3/4	-12M0-1-4RT -12M0-1-6RT -12M0-1-8RT -12M0-1-12RT
14	1/4 3/8	-14M0-1-4RT -14M0-1-6RT
15	1/2	-15M0-1-8RT
16	1/4 3/8 1/2 3/4	-16M0-1-4RT -16M0-1-6RT -16M0-1-8RT -16M0-1-12RT
18	1/2 3/4	-18M0-1-8RT -18M0-1-12RT
20	1/2 3/4	-20M0-1-8RT -20M0-1-12RT
22	3/4 1	-22M0-1-12RT -22M0-1-16RT
25	1/2 3/4 1	-25M0-1-8RT -25M0-1-12RT -25M0-1-16RT
28	1 1 1/4	-28M0-1-16RT -28M0-1-20RT
30	1 1/4	-30M0-1-20RT
32	1 1/4	-32M0-1-20RT
38	1 1/2	-38M0-1-24RT

## Male Connectors



### *ISO/BSP Parallel Thread (RS)*

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8	-200-1-2RS
	1/4	-200-1-4RS
	3/8	-200-1-6RS
1/4	1/8	-400-1-2RS
	1/4	-400-1-4RS
	3/8	-400-1-6RS
	1/2	-400-1-8RS
3/8	1/8	-600-1-2RS
	1/4	-600-1-4RS
	3/8	-600-1-6RS
	1/2	-600-1-8RS
1/2	1/4	-810-1-4RS
	3/8	-810-1-6RS
	1/2	-810-1-8RS
3/4	1/2	-1210-1-8RS
	3/4	-1210-1-12RS
1	1/2	-1610-1-8RS
	3/4	-1610-1-12RS
	1	-1610-1-16RS



## Male Connectors

**ISO/BSP  
Parallel  
Thread (RS)**



Tube OD mm	ISO Thread Size in.	Basic Ordering Number
2	1/8	-2M0-1-2RS
3	1/8 1/4	-3M0-1-2RS -3M0-1-4RS
4	1/8	-4M0-1-2RS
6	1/8 1/4 3/8 1/2	-6M0-1-2RS -6M0-1-4RS -6M0-1-6RS -6M0-1-8RS
8	1/8 1/4 3/8 1/2	-8M0-1-2RS -8M0-1-4RS -8M0-1-6RS -8M0-1-8RS
10	1/4 3/8 1/2	-10M0-1-4RS -10M0-1-6RS -10M0-1-8RS
12	1/4 3/8 1/2 3/4	-12M0-1-4RS -12M0-1-6RS -12M0-1-8RS -12M0-1-12RS
14	3/8 1/2	-14M0-1-6RS -14M0-1-8RS
15	3/8 1/2 3/4	-15M0-1-6RS -15M0-1-8RS -15M0-1-12RS
16	3/8 1/2 3/4	-16M0-1-6RS -16M0-1-8RS -16M0-1-12RS
18	1/2 3/4	-18M0-1-8RS -18M0-1-12RS
20	1/2 3/4	-20M0-1-8RS -20M0-1-12RS
22	3/4 1	-22M0-1-12RS -22M0-1-16RS
25	3/4 1	-25M0-1-12RS -25M0-1-16RS
28	1 1 1/4	-28M0-1-16RS -28M0-1-20RS
30	1 1/4	-30M0-1-20RS
32	1 1/4	-32M0-1-20RS
38	1 1/2	-38M0-1-24RS

## Male Connectors



### *ISO/BSP Parallel Thread (RP)*

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8 1/4	-200-1-2RP -200-1-4RP
1/4	1/8 1/4	-400-1-2RP -400-1-4RP
1/2	3/8 1/2	-810-1-6RP -810-1-8RP
3/4	1/2 3/4	-1210-1-8RP -1210-1-12RP
1	1	-1610-1-16RP

## Male Connectors



### *ISO/BSP Parallel Thread (RP)*

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
3	1/8	-3M0-1-2RP
	1/4	-3M0-1-4RP
4	1/8	-4M0-1-2RP
6	1/8	-6M0-1-2RP
	1/4	-6M0-1-4RP
	3/8	-6M0-1-6RP
	1/2	-6M0-1-8RP
8	1/8	-8M0-1-2RP
	1/4	-8M0-1-4RP
	3/8	-8M0-1-6RP
	1/2	-8M0-1-8RP
10	1/4	-10M0-1-4RP
	3/8	-10M0-1-6RP
	1/2	-10M0-1-8RP
12	1/4	-12M0-1-4RP
	3/8	-12M0-1-6RP
	1/2	-12M0-1-8RP
	3/4	-12M0-1-12RP
15	1/2	-15M0-1-8RP
16	3/8	-16M0-1-6RP
	1/2	-16M0-1-8RP
18	1/2	-18M0-1-8RP
	3/4	-18M0-1-12RP
20	1/2	-20M0-1-8RP
	3/4	-20M0-1-12RP
22	3/4	-22M0-1-12RP
	1	-22M0-1-16RP
25	3/4	-25M0-1-12RP
	1	-25M0-1-16RP
28	1	-28M0-1-16RP
	1 1/4	-28M0-1-20RP
30	1 1/4	-30M0-1-20RP
32	1 1/4	-32M0-1-20RP
38	1 1/2	-38M0-1-24RP

## Male Connectors



### *Bulkhead NPT*

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-11-2
1/4	1/8 1/4	-400-11-2 -400-11-4
3/8	1/4 3/8 1/2	-600-11-4 -600-11-6 -600-11-8
1/2	3/8 1/2	-810-11-6 -810-11-8
3/4	3/4	-1210-11-12
1	1	-1610-11-16

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-11-2 -6M0-11-4
12	1/2	-12M0-11-8

## Male Connectors

### SAE/MS Straight Thread (ST)



Tube OD in.	SAE/MS Thread Size	Basic Ordering Number
1/8	5/16-24	-200-1-2ST
	7/16-20	-200-1-4ST
	9/16-18	-200-1-6ST
1/4	5/16-24	-400-1-2ST
	7/16-20	-400-1-4ST
	9/16-18	-400-1-6ST
	3/4-16	-400-1-8ST
	7/8-14	-400-1-10ST
5/16	1/2-20	-500-1-5ST
3/8	7/16-20	-600-1-4ST
	9/16-18	-600-1-6ST
	3/4-16	-600-1-8ST
	7/8-14	-600-1-10ST
1/2	9/16-18	-810-1-6ST
	3/4-16	-810-1-8ST
	7/8-14	-810-1-10ST
	1 1/16-12	-810-1-12ST
5/8	3/4-16	-1010-1-8ST
	7/8-14	-1010-1-10ST
3/4	3/4-16	-1210-1-8ST
	1 1/16-12	-1210-1-12ST
	1 5/16-12	-1210-1-16ST
7/8	1 3/16-12	-1410-1-14ST
1	1 1/16-12	-1610-1-12ST
	1 5/16-12	-1610-1-16ST
1 1/4	1 5/8-12	-2000-1-20ST
1 1/2	1 7/8-12	-2400-1-24ST
2	2 1/2-12	-3200-1-32ST

Tube OD mm	SAE/MS Thread Size	Basic Ordering Number
6	9/16-18	-6M0-1-6ST
10	9/16-18	-10M0-1-6ST
	3/4-16	-10M0-1-8ST
12	7/16-20	-12M0-1-4ST
	9/16-18	-12M0-1-6ST
	3/4-16	-12M0-1-8ST

### Long SAE/MS Straight Thread (ST)

Tube OD in.	SAE/MS Thread Size	Basic Ordering Number
1/4	7/16-20	-400-1L-4ST
1/2	3/4-16	-810-1L-8ST

## Male Connectors



### *O-Seal (SAE/MS Straight Thread)*

Tube OD in.	SAE/MS Thread Size	Basic Ordering Number
1/16	5/16-24	-100-1-OR
1/8	5/16-24	-200-1-OR
3/16	3/8-24	-300-1-OR
1/4	7/16-20	-400-1-OR
5/16	1/2-20	-500-1-OR
3/8	9/16-18	-600-1-OR
1/2	3/4-16	-810-1-OR
3/4	1 1/16-12	-1210-1-OR
1	1 5/16-12	-1610-1-OR



### *O-Seal (NPT)*

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-1-2-OR
1/4	1/8	-400-1-2-OR
	1/4	-400-1-4-OR
3/8	1/4	-600-1-4-OR
	3/8	-600-1-6-OR
	1/2	-600-1-8-OR
1/2	1/2	-810-1-8-OR

## Male Connectors



### *AN Fitting*

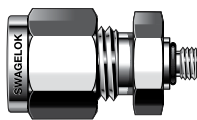
Tube OD in.	AN Tube Flare Size in.	Basic Ordering Number
1/16	1/8	-100-6-2AN
1/8	1/8 1/4	-200-6-2AN -200-6-4AN
1/4	1/4	-400-6-4AN
5/16	5/16	-500-6-5AN
3/8	1/4 3/8	-600-6-4AN -600-6-6AN
1/2	1/2	-810-6-8AN
3/4	3/4	-1210-6-12AN
1	1	-1610-6-16AN



### *AN Bulkhead Fitting*

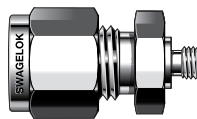
Tube OD in.	AN Tube Flare Size in.	Basic Ordering Number
1/4	1/4	-400-61-4AN
3/8	3/8	-600-61-6AN
1/2	1/2	-810-61-8AN
3/4	3/4	-1210-61-12AN
1	1	-1610-61-16AN

## Male Connectors



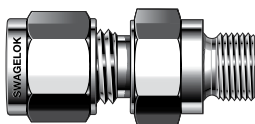
### 10-32 Thread

Tube OD in.	Basic Ordering Number
1/8	-200-1-0157
1/4	-400-1-0256



### M5 × 0.8 Thread

Tube OD mm	Basic Ordering Number
6	-6M0-1-0046



### Metric Thread (RS)

Tube OD mm	Basic Ordering Number
6	-6M0-1-M10X1.0RS
	-6M0-1-M12X1.0RS
12	-12M0-1-M16X1.5RS



## Weld Connectors



### Tube Socket Weld

Tube OD in.	Socket Weld Size in.	Basic Ordering Number
1/8	1/8	-200-6-2W
1/4	1/4	-400-6-4W
3/8	3/8	-600-6-6W
1/2	1/2	-810-6-8W
3/4	3/4	-1210-6-12W
1	1	-1610-6-16W



### Male Pipe Weld (Fractional)

Tube OD in.	Pipe Weld Size in.	Basic Ordering Number
1/8	1/8	-200-1-2W
3/16	1/8	-300-1-2W
1/4	1/8 1/4	-400-1-2W -400-1-4W
5/16	1/8 1/4	-500-1-2W -500-1-4W
3/8	1/4 3/8 1/2 3/4	-600-1-4W -600-1-6W -600-1-8W -600-1-12W
1/2	3/8 1/2 3/4 1	-810-1-6W -810-1-8W -810-1-12W -810-1-16W
5/8	1/2	-1010-1-8W
3/4	1/2 3/4	-1210-1-8W -1210-1-12W
1	1	-1610-1-16W
1 1/4	1 1/4	-2000-1-20W
1 1/2	1 1/2	-2400-1-24W
2	2	-3200-1-32W

## Weld Connectors



### *Male Pipe Weld (Metric to Fractional)*

Tube OD mm	Pipe Weld Size in.	Basic Ordering Number
3	1/8	-3M0-1-2W
4	1/8	-4M0-1-2W
6	1/8	-6M0-1-2W
	1/4	-6M0-1-4W
8	1/8	-8M0-1-2W
	1/4	-8M0-1-4W
	1/2	-8M0-1-8W
10	1/4	-10M0-1-4W
	3/8	-10M0-1-6W
	1/2	-10M0-1-8W
12	1/4	-12M0-1-4W
	3/8	-12M0-1-6W
	1/2	-12M0-1-8W
	3/4	-12M0-1-12W
14	3/8	-14M0-1-6W
15	1/2	-15M0-1-8W
16	1/2	-16M0-1-8W
18	1/2	-18M0-1-8W
30	1 1/4	-30M0-1-20W
32	1 1/4	-32M0-1-20W
38	1 1/2	-38M0-1-24W

## Female Connectors



### NPT

Tube OD in.	NPT Size in.	Basic Ordering Number
1/16	1/16 1/8	-100-7-1 -100-7-2
1/8	1/8 1/4	-200-7-2 -200-7-4
3/16	1/8	-300-7-2
1/4	1/8 1/4 3/8 1/2	-400-7-2 -400-7-4 -400-7-6 -400-7-8
5/16	1/8 1/4	-500-7-2 -500-7-4
3/8	1/8 1/4 3/8 1/2 3/4	-600-7-2 -600-7-4 -600-7-6 -600-7-8 -600-7-12
1/2	1/4 3/8 1/2 3/4	-810-7-4 -810-7-6 -810-7-8 -810-7-12
5/8	3/8 1/2 3/4	-1010-7-6 -1010-7-8 -1010-7-12
3/4	1/2 3/4	-1210-7-8 -1210-7-12
7/8	3/4	-1410-7-12
1	3/4 1	-1610-7-12 -1610-7-16
1 1/4	1 1/4	-2000-7-20
1 1/2	1 1/2	-2400-7-24
2	2	-3200-7-32

## Female Connectors



### NPT

Tube OD mm	NPT Size in.	Basic Ordering Number
3	1/8	-3M0-7-2
	1/4	-3M0-7-4
4	1/8	-4M0-7-2
6	1/8	-6M0-7-2
	1/4	-6M0-7-4
	3/8	-6M0-7-6
	1/2	-6M0-7-8
8	1/8	-8M0-7-2
	1/4	-8M0-7-4
	3/8	-8M0-7-6
	1/2	-8M0-7-8
10	1/4	-10M0-7-4
	3/8	-10M0-7-6
	1/2	-10M0-7-8
12	1/4	-12M0-7-4
	3/8	-12M0-7-6
	1/2	-12M0-7-8
15	1/2	-15M0-7-8
16	1/2	-16M0-7-8
20	1/2	-20M0-7-8
	3/4	-20M0-7-12
22	3/4	-22M0-7-12
	1	-22M0-7-16
25	3/4	-25M0-7-12
	1	-25M0-7-16

## Female Connectors

**ISO/BSP  
Tapered  
Thread (RT)**



Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8	-200-7-2RT
1/4	1/8	-400-7-2RT
	1/4	-400-7-4RT
	3/8	-400-7-6RT
	1/2	-400-7-8RT
3/8	1/4	-600-7-4RT
	3/8	-600-7-6RT
	1/2	-600-7-8RT
1/2	1/4	-810-7-4RT
	3/8	-810-7-6RT
	1/2	-810-7-8RT

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
3	1/8	-3M0-7-2RT
6	1/8	-6M0-7-2RT
	1/4	-6M0-7-4RT
	3/8	-6M0-7-6RT
	1/2	-6M0-7-8RT
8	1/8	-8M0-7-2RT
	1/4	-8M0-7-4RT
	3/8	-8M0-7-6RT
	1/2	-8M0-7-8RT
10	1/8	-10M0-7-2RT
	1/4	-10M0-7-4RT
	3/8	-10M0-7-6RT
	1/2	-10M0-7-8RT
12	1/8	-12M0-7-2RT
	1/4	-12M0-7-4RT
	3/8	-12M0-7-6RT
	1/2	-12M0-7-8RT
	3/4	-12M0-7-12RT
15	3/8	-15M0-7-6RT
	1/2	-15M0-7-8RT
20	1/2	-20M0-7-8RT
	3/4	-20M0-7-12RT
22	3/4	-22M0-7-12RT
	1	-22M0-7-16RT
25	3/4	-25M0-7-12RT
	1	-25M0-7-16RT

## Female Connectors



### ISO/BSP Parallel Thread (RJ)

ISO/BSP parallel thread (RJ) fittings are available in stainless steel only.

Tube OD in.	ISO Thread Size in.	Ordering Number
1/4	1/4	SS-400-7-4RJ
	3/8	SS-400-7-6RJ
	1/2	SS-400-7-8RJ
5/16	1/4	SS-500-7-4RJ
	1/2	SS-500-7-8RJ
3/8	1/4	SS-600-7-4RJ
	3/8	SS-600-7-6RJ
	1/2	SS-600-7-8RJ
1/2	1/4	SS-810-7-4RJ
	3/8	SS-810-7-6RJ
	1/2	SS-810-7-8RJ

Tube OD mm.	ISO Thread Size in.	Ordering Number
6	1/4	SS-6M0-7-4RJ
	3/8	SS-6M0-7-6RJ
	1/2	SS-6M0-7-8RJ
8	1/4	SS-8M0-7-4RJ
	3/8	SS-8M0-7-6RJ
	1/2	SS-8M0-7-8RJ
10	1/4	SS-10M0-7-4RJ
	3/8	SS-10M0-7-6RJ
	1/2	SS-10M0-7-8RJ
12	1/4	SS-12M0-7-4RJ
	3/8	SS-12M0-7-6RJ
	1/2	SS-12M0-7-8RJ

### ISO/BSP Parallel Thread (RP)

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8	-6M0-7-2RP
	1/4	-6M0-7-4RP
22	3/4	-22M0-7-12RP
25	1	-25M0-7-16RP

## Female Connectors



### *ISO/BSP Parallel Thread (RG, Gauge)*

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/4	-200-7-4RG
1/4	1/8	-400-7-2RG
	1/4	-400-7-4RG
	3/8	-400-7-6RG
	1/2	-400-7-8RG
5/16	1/4	-500-7-4RG
	1/2	-500-7-8RG
3/8	1/4	-600-7-4RG
	3/8	-600-7-6RG
	1/2	-600-7-8RG
1/2	3/8	-810-7-6RG
	1/2	-810-7-8RG

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
3	1/4	-3M0-7-4RG
6	1/8	-6M0-7-2RG
	1/4	-6M0-7-4RG
	3/8	-6M0-7-6RG
	1/2	-6M0-7-8RG
8	1/4	-8M0-7-4RG
	3/8	-8M0-7-6RG
	1/2	-8M0-7-8RG
10	1/4	-10M0-7-4RG
	3/8	-10M0-7-6RG
	1/2	-10M0-7-8RG
12	1/4	-12M0-7-4RG
	3/8	-12M0-7-6RG
	1/2	-12M0-7-8RG
20	1/2	-20M0-7-8RG
22	1/2	-22M0-7-8RG

## Female Connectors



### ***Bulkhead NPT***

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-71-2
1/4	1/8 1/4	-400-71-2 -400-71-4
3/8	1/4	-600-71-4
1/2	3/8 1/2	-810-71-6 -810-71-8

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/4	-6M0-71-4
12	1/2	-12M0-71-8



## Reducers

### Reducer (Fractional)



Tube OD, in.		Basic Ordering Number
T	Tx	
1/16	1/8 1/4	-100-R-2 -100-R-4
1/8	1/16 1/8 3/16 1/4 3/8 1/2	-200-R-1 -200-R-2 -200-R-3 -200-R-4 -200-R-6 -200-R-8
3/16	1/8 1/4	-300-R-2 -300-R-4
1/4	1/8 3/16 1/4 5/16 3/8 1/2 5/8 3/4	-400-R-2 -400-R-3 -400-R-4 -400-R-5 -400-R-6 -400-R-8 -400-R-10 -400-R-12
5/16	3/8 1/2	-500-R-6 -500-R-8
3/8	1/4 3/8 1/2 5/8 3/4	-600-R-4 -600-R-6 -600-R-8 -600-R-10 -600-R-12
1/2	1/4 3/8 1/2 5/8 3/4 1	-810-R-4 -810-R-6 -810-R-8 -810-R-10 -810-R-12 -810-R-16
5/8	3/4 7/8 1	-1010-R-12 -1010-R-14 -1010-R-16
3/4	1/2 1	-1210-R-8 -1210-R-16
1	1 1/4 1 1/2 2	-1610-R-20 <sup>①</sup> -1610-R-24 <sup>①</sup> -1610-R-32 <sup>①</sup>
1 1/4	1 1/2 2	-2000-R-24 <sup>①</sup> -2000-R-32 <sup>①</sup>
1 1/2	2	-2400-R-32 <sup>①</sup>

① Furnished with nut and preswaged ferrules.

**Reducers*****Reducer  
(Metric)***

Tube OD, mm		Basic Ordering Number
T	Tx	
2	3	-2M0-R-3M
3	4	-3M0-R-4M
	6	-3M0-R-6M
	10	-3M0-R-10M
4	6	-4M0-R-6M
6	3	-6M0-R-3M
	8	-6M0-R-8M
	10	-6M0-R-10M
	12	-6M0-R-12M
	18	-6M0-R-18M
8	6	-8M0-R-6M
	10	-8M0-R-10M
	12	-8M0-R-12M
10	6	-10M0-R-6M
	8	-10M0-R-8M
	12	-10M0-R-12M
	15	-10M0-R-15M
	18	-10M0-R-18M
12	6	-12M0-R-6M
	8	-12M0-R-8M
	10	-12M0-R-10M
	16	-12M0-R-16M
	18	-12M0-R-18M
	20	-12M0-R-20M
	22	-12M0-R-22M
	25	-12M0-R-25M
16	12	-16M0-R-12M
18	12	-18M0-R-12M
	16	-18M0-R-16M
	20	-18M0-R-20M
	22	-18M0-R-22M
	25	-18M0-R-25M
20	16	-20M0-R-16M
	18	-20M0-R-18M
	22	-20M0-R-22M
	25	-20M0-R-25M
22	18	-22M0-R-18M
	20	-22M0-R-20M
	25	-22M0-R-25M
25	18	-25M0-R-18M
	20	-25M0-R-20M

**Reducers*****Reducer  
(Metric to  
Fractional)***

Tube OD		Basic Ordering Number
T, mm	Tx, in.	
2	1/8	-2M0-R-2
3	1/8	-3M0-R-2
	1/4	-3M0-R-4
4	1/4	-4M0-R-4
6	1/8	-6M0-R-2
	1/4	-6M0-R-4
	5/16	-6M0-R-5
	3/8	-6M0-R-6
	1/2	-6M0-R-8
8	1/4	-8M0-R-4
	3/8	-8M0-R-6
	1/2	-8M0-R-8
10	3/8	-10M0-R-6
	1/2	-10M0-R-8
12	1/2	-12M0-R-8
	3/4	-12M0-R-12
18	3/4	-18M0-R-12
	1	-18M0-R-16
25	1	-25M0-R-16

***Reducer  
(Fractional to  
Metric)***

Tube OD		Basic Ordering Number
T, in.	Tx, mm	
1/8	6	-200-R-6M

## Reducers



### *Long Reducer*

Use only long reducers in female Swagelok end connections.

Tube OD, in.		Basic Ordering Number
T	Tx	
3/8	1/2	-600-RF-8



### *Bulkhead Reducer*

Tube OD in,	Basic Ordering Number
1/8	-200-R1-2
1/4	-400-R1-4
3/8	-600-R1-6
1/2	-810-R1-8
5/8	-1010-R1-10
3/4	-1210-R1-12
1	-1610-R1-16

## Port Connectors

### Port Connector



1 in./25 mm and Under



Over 1 in./25 mm

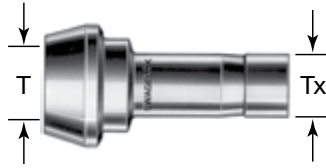
Tube OD in.	Basic Ordering Number
1/16	-101-PC
1/8	-201-PC
1/4	-401-PC
5/16	-501-PC
3/8	-601-PC
1/2	-811-PC
5/8	-1011-PC
3/4	-1211-PC
1	-1611-PC
1 1/4	-2000-PC <sup>①</sup>
1 1/2	-2400-PC <sup>①</sup>
2	-3200-PC <sup>①</sup>

① Furnished with nuts and preswaged ferrules.

Tube OD mm	Basic Ordering Number
3	-3M1-PC
6	-6M1-PC
8	-8M1-PC
10	-10M1-PC
12	-12M1-PC
15	-15M1-PC
16	-16M1-PC
18	-18M1-PC
20	-20M1-PC
25	-25M1-PC
28	-28M0-PC <sup>①</sup>
30	-30M0-PC <sup>①</sup>
32	-32M0-PC <sup>①</sup>
38	-38M0-PC <sup>①</sup>

① Furnished with nuts and preswaged ferrules.

## Port Connectors



### Reducing Port Connector

Tube OD, in.		Basic Ordering Number
T	Tx	
1/8	1/16	-201-PC-1
1/4	1/16	-401-PC-1
	1/8	-401-PC-2
3/8	1/8	-601-PC-2
	1/4	-601-PC-4
1/2	1/4	-811-PC-4
	3/8	-811-PC-6
3/4	1/2	-1211-PC-8
1	1/2	-1611-PC-8
	3/4	-1611-PC-12

Tube OD, mm		Basic Ordering Number
T	Tx	
6	3	-6M1-PC-3M
8	6	-8M1-PC-6M
10	6	-10M1-PC-6M
	8	-10M1-PC-8M
12	6	-12M1-PC-6M
	8	-12M1-PC-8M
	10	-12M1-PC-10M
16	12	-16M1-PC-12M
28	25	-28M1-PC-25M
32	25	-32M1-PC-25M
38	25	-38M1-PC-25M

## Caps and Plugs



### Cap

Tube OD in.	Basic Ordering Number
1/16	-100-C
1/8	-200-C
3/16	-300-C
1/4	-400-C
5/16	-500-C
3/8	-600-C
1/2	-810-C
5/8	-1010-C
3/4	-1210-C
7/8	-1410-C
1	-1610-C
1 1/8	-1810-C
1 1/4	-2000-C
1 1/2	-2400-C
2	-3200-C

Tube OD mm	Basic Ordering Number
2	-2M0-C
3	-3M0-C
4	-4M0-C
6	-6M0-C
8	-8M0-C
10	-10M0-C
12	-12M0-C
14	-14M0-C
15	-15M0-C
16	-16M0-C
18	-18M0-C
20	-20M0-C
22	-22M0-C
25	-25M0-C
28	-28M0-C
30	-30M0-C
32	-32M0-C
38	-38M0-C

## Caps and Plugs



### Plug

Tube OD in.	Basic Ordering Number
1/16	-100-P
1/8	-200-P
3/16	-300-P
1/4	-400-P
5/16	-500-P
3/8	-600-P
1/2	-810-P
5/8	-1010-P
3/4	-1210-P
7/8	-1410-P
1	-1610-P
1 1/4	-2000-P
1 1/2	-2400-P
2	-3200-P

Tube OD mm	Basic Ordering Number
2	-2M0-P
3	-3M0-P
4	-4M0-P
6	-6M0-P
8	-8M0-P
10	-10M0-P
12	-12M0-P
15	-15M0-P
16	-16M0-P
18	-18M0-P
20	-20M0-P
22	-22M0-P
25	-25M0-P
28	-28M0-P
30	-30M0-P
32	-32M0-P
38	-38M0-P



## Vent Protectors

### *Mud Dauber*

Swagelok vent protectors, more commonly known as **mud dauber fittings**, protect open ends of instruments, tubing, outlet vents, and bleed-off lines.

The mesh wire screen prevents foreign objects, such as mud dauber insects, from entering and clogging various systems and causing damage.

Vent protectors are available in stainless steel and brass. To order brass, replace **SS** in the ordering number with **B**.

Example: **B-MD-2**



NPT Size in.	Ordering Number
1/8	SS-MD-2
1/4	SS-MD-4
3/8	SS-MD-6
1/2	SS-MD-8
3/4	SS-MD-12

## Unions



Tube OD in.	Basic Ordering Number
1/16	-100-9
1/8	-200-9
3/16	-300-9
1/4	-400-9
5/16	-500-9
3/8	-600-9
1/2	-810-9
5/8	-1010-9
3/4	-1210-9
7/8	-1410-9
1	-1610-9
1 1/8	-1810-9
1 1/4	-2000-9
1 1/2	-2400-9
2	-3200-9

Tube OD mm	Basic Ordering Number
3	-3M0-9
4	-4M0-9
6	-6M0-9
8	-8M0-9
10	-10M0-9
12	-12M0-9
14	-14M0-9
15	-15M0-9
16	-16M0-9
18	-18M0-9
20	-20M0-9
22	-22M0-9
25	-25M0-9
28	-28M0-9
30	-30M0-9
32	-32M0-9
38	-38M0-9
50	-50M0-9

**Male****NPT**

Tube OD in.	NPT Size in.	Basic Ordering Number
1/16	1/16	-100-2-1
	1/8	-100-2-2
1/8	1/16	-200-2-1
	1/8	-200-2-2
	1/4	-200-2-4
3/16	1/8	-300-2-2
	1/4	-300-2-4
1/4	1/16	-400-2-1
	1/8	-400-2-2
	1/4	-400-2-4
	3/8	-400-2-6
	1/2	-400-2-8
5/16	1/8	-500-2-2
	1/4	-500-2-4
	3/8	-500-2-6
3/8	1/8	-600-2-2
	1/4	-600-2-4
	3/8	-600-2-6
	1/2	-600-2-8
	3/4	-600-2-12
1/2	1/4	-810-2-4
	3/8	-810-2-6
	1/2	-810-2-8
	3/4	-810-2-12
5/8	3/8	-1010-2-6
	1/2	-1010-2-8
	3/4	-1010-2-12
3/4	1/2	-1210-2-8
	3/4	-1210-2-12
7/8	3/4	-1410-2-12
1	3/4	-1610-2-12
	1	-1610-2-16
1 1/4	1 1/4	-2000-2-20
1 1/2	1 1/2	-2400-2-24
2	2	-3200-2-32

**Male****NPT**

Tube OD mm	NPT Size in.	Basic Ordering Number
3	1/8	-3M0-2-2
	1/4	-3M0-2-4
4	1/8	-4M0-2-2
	1/4	-4M0-2-4
6	1/8	-6M0-2-2
	1/4	-6M0-2-4
	3/8	-6M0-2-6
	1/2	-6M0-2-8
8	1/8	-8M0-2-2
	1/4	-8M0-2-4
	3/8	-8M0-2-6
	1/2	-8M0-2-8
10	1/8	-10M0-2-2
	1/4	-10M0-2-4
	3/8	-10M0-2-6
	1/2	-10M0-2-8
12	1/4	-12M0-2-4
	3/8	-12M0-2-6
	1/2	-12M0-2-8
	3/4	-12M0-2-12
15	1/2	-15M0-2-8
16	3/8	-16M0-2-6
	1/2	-16M0-2-8
	3/4	-16M0-2-12
18	1/2	-18M0-2-8
	3/4	-18M0-2-12
20	1/2	-20M0-2-8
	3/4	-20M0-2-12
22	3/4	-22M0-2-12
	1	-22M0-2-16
25	3/4	-25M0-2-12
	1	-25M0-2-16
30	1 1/4	-30M0-2-20
32	1 1/4	-32M0-2-20
38	1 1/2	-38M0-2-24

**Male**

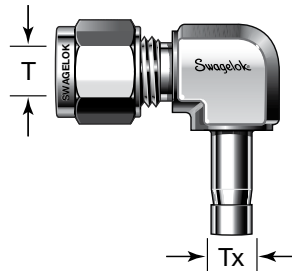
***ISO/BSP  
Tapered  
Thread (RT)***

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8 1/4	-200-2-2RT -200-2-4RT
1/4	1/8 1/4 3/8 1/2	-400-2-2RT -400-2-4RT -400-2-6RT -400-2-8RT
5/16	1/4	-500-2-4RT
3/8	1/8 1/4 3/8	-600-2-2RT -600-2-4RT -600-2-6RT
1/2	1/4 3/8 1/2	-810-2-4RT -810-2-6RT -810-2-8RT
3/4	1/2	-1210-2-8RT
1	1	-1610-2-16RT

**Male**
**ISO/BSP  
Tapered  
Thread (RT)**

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
3	1/8	-3M0-2-2RT
	1/4	-3M0-2-4RT
4	1/8	-4M0-2-2RT
	1/4	-4M0-2-4RT
6	1/8	-6M0-2-2RT
	1/4	-6M0-2-4RT
	3/8	-6M0-2-6RT
	1/2	-6M0-2-8RT
8	1/8	-8M0-2-2RT
	1/4	-8M0-2-4RT
	3/8	-8M0-2-6RT
	1/2	-8M0-2-8RT
10	1/4	-10M0-2-4RT
	3/8	-10M0-2-6RT
	1/2	-10M0-2-8RT
12	1/8	-12M0-2-2RT
	1/4	-12M0-2-4RT
	3/8	-12M0-2-6RT
	1/2	-12M0-2-8RT
	3/4	-12M0-2-12RT
14	1/2	-14M0-2-8RT
15	1/2	-15M0-2-8RT
16	3/8	-16M0-2-6RT
	1/2	-16M0-2-8RT
18	1/2	-18M0-2-8RT
	3/4	-18M0-2-12RT
20	1/2	-20M0-2-8RT
	3/4	-20M0-2-12RT
22	3/4	-22M0-2-12RT
	1	-22M0-2-16RT
25	3/4	-25M0-2-12RT
	1	-25M0-2-16RT
28	1	-28M0-2-16RT

**Male**



**Reducing**

Tube OD, mm		Basic Ordering Number
T	Tx	
6	6	-6M0-2R-6M
12	12	-12M0-2R-12M



**Positionable,  
SAE/MS  
Straight  
Thread (ST)**

Tube OD in.	SAE/MS Thread Size	Basic Ordering Number
1/4	7/16-20	-400-2-4ST
	9/16-18	-400-2-6ST
5/16	1/2-20	-500-2-5ST
3/8	7/16-20	-600-2-4ST
	9/16-18	-600-2-6ST
	3/4-16	-600-2-8ST
1/2	9/16-18	-810-2-6ST
	3/4-16	-810-2-8ST
5/8	7/8-14	-1010-2-10ST
3/4	1 1/16-12	-1210-2-12ST
7/8	1 3/16-12	-1410-2-14ST
1	1 5/16-12	-1610-2-16ST
1 1/4	1 5/8-12	-2000-2-20ST
1 1/2	1 7/8-12	-2400-2-24ST
2	2 1/2-12	-3200-2-32ST

**Male**

***Positionable,  
ISO/BSP  
Parallel  
Thread (PR)***

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/4	1/8 1/4	-400-2-2PR -400-2-4PR
3/8	1/4 3/8	-600-2-4PR -600-2-6PR
1/2	1/4 3/8 1/2	-810-2-4PR -810-2-6PR -810-2-8PR
5/8	1/2	-1010-2-8PR
3/4	1/2 3/4	-1210-2-8PR -1210-2-12PR
1	3/4 1	-1610-2-12PR -1610-2-16PR

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-2-2PR -6M0-2-4PR
8	1/8 1/4	-8M0-2-2PR -8M0-2-4PR
10	1/4 3/8	-10M0-2-4PR -10M0-2-6PR
12	1/4 3/8 1/2 3/4	-12M0-2-4PR -12M0-2-6PR -12M0-2-8PR -12M0-2-12PR



**Weld****Tube Socket Weld**

Tube OD in.	Socket Weld Size in.	Basic Ordering Number
1/4	1/4	-400-9-4W
3/8	3/8	-600-9-6W
1/2	1/2	-810-9-8W
3/4	3/4	-1210-9-12W
1	1	-1610-9-16W

**Male Pipe Weld**

Tube OD in.	Pipe Weld Size in.	Basic Ordering Number
1/4	1/8	-400-2-2W
	1/4	-400-2-4W
3/8	1/4	-600-2-4W
1/2	1/2	-810-2-8W
3/4	3/4	-1210-2-12W

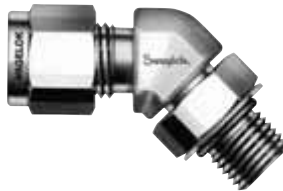
**Female****NPT**

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-8-2
	1/4	-200-8-4
3/16	1/8	-300-8-2
1/4	1/8	-400-8-2
	1/4	-400-8-4
	3/8	-400-8-6
	1/2	-400-8-8
5/16	1/8	-500-8-2
	1/4	-500-8-4
3/8	1/8	-600-8-2
	1/4	-600-8-4
	3/8	-600-8-6
	1/2	-600-8-8
1/2	1/4	-810-8-4
	3/8	-810-8-6
	1/2	-810-8-8
5/8	3/8	-1010-8-6
	1/2	-1010-8-8
3/4	1/2	-1210-8-8
	3/4	-1210-8-12
7/8	3/4	-1410-8-12
1	3/4	-1610-8-12
	1	-1610-8-16

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8	-6M0-8-2
	1/4	-6M0-8-4
	1/2	-6M0-8-8
8	1/4	-8M0-8-4
10	1/8	-10M0-8-2
	1/4	-10M0-8-4
12	1/4	-12M0-8-4
	1/2	-12M0-8-8
16	1/2	-16M0-8-8

**Male****NPT**

Tube OD in,	NPT Size in,	Basic Ordering Number
1/4	1/8	-400-5-2
	1/4	-400-5-4
3/8	1/8	-600-5-2
	1/4	-600-5-4
	3/8	-600-5-6
1/2	3/8	-810-5-6
	1/2	-810-5-8
3/4	3/4	-1210-5-12
1	1	-1610-5-16



**Positionable,  
SAE/MS  
Straight  
Thread (ST)**

Tube OD in,	SAE/MS Thread Size	Basic Ordering Number
1/4	7/16-20	-400-5-4ST
3/8	9/16-18	-600-5-6ST
1/2	3/4-16	-810-5-8ST
3/4	1 1/16-12	-1210-5-12ST
1	1 5/16-12	-1610-5-16ST

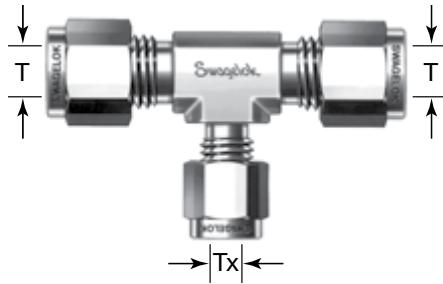
## Unions



Tube OD in.	Basic Ordering Number
1/16	-100-3
1/8	-200-3
3/16	-300-3
1/4	-400-3
5/16	-500-3
3/8	-600-3
1/2	-810-3
5/8	-1010-3
3/4	-1210-3
7/8	-1410-3
1	-1610-3
1 1/8	-1810-3
1 1/4	-2000-3
1 1/2	-2400-3
2	-3200-3

Tube OD mm	Basic Ordering Number
2	-2M0-3
3	-3M0-3
4	-4M0-3
6	-6M0-3
8	-8M0-3
10	-10M0-3
12	-12M0-3
14	-14M0-3
15	-15M0-3
16	-16M0-3
18	-18M0-3
20	-20M0-3
22	-22M0-3
25	-25M0-3
28	-28M0-3
30	-30M0-3
32	-32M0-3
38	-38M0-3
50	-50M0-3

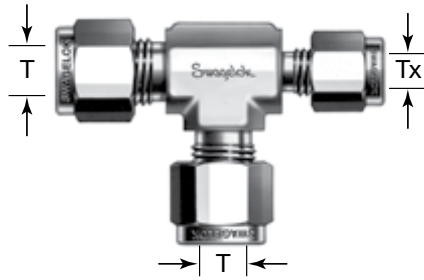
## Unions

*Reducing Union*

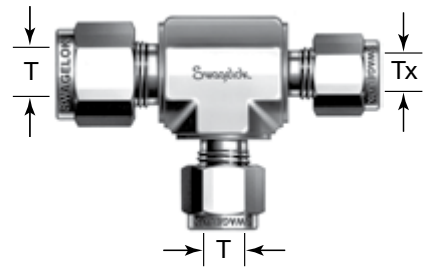
Tube OD, in.		Basic Ordering Number
T	Tx	
3/8	1/4	-600-3-6-4
1/2	1/4	-810-3-8-4
	3/8	-810-3-8-6
5/8	3/8	-1010-3-10-6
3/4	3/8	-1210-3-12-6
	1/2	-1210-3-12-8
1	3/8	-1610-3-16-6
	1/2	-1610-3-16-8
	3/4	-1610-3-16-12
1 1/4	1	-2000-3-20-16
1 1/2	1	-2400-3-24-16
2	1	-3200-3-32-16

Tube OD, mm		Basic Ordering Number
T	Tx	
3	6	-3M0-3-3M-6M
8		-8M0-3-8M-6M
10		-10M0-3-10M-6M
12		-12M0-3-12M-6M
15	12	-15M0-3-15M-12M
16		-16M0-3-16M-12M
18		-18M0-3-18M-12M
22		-22M0-3-22M-12M
25		-25M0-3-25M-12M

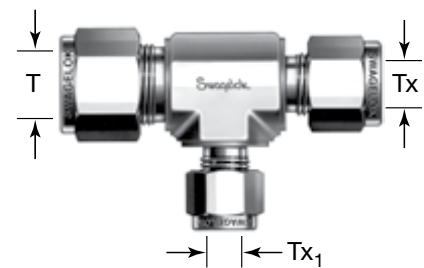
## Unions

*Reducing Union*

Tube OD, in.		Basic Ordering Number
T	Tx	
3/8	1/4	-600-3-4-6



Tube OD, in.		Basic Ordering Number
T	Tx	
1/2	3/8	-810-3-6-6
5/8		-1010-3-6-6
3/4		-1210-3-6-6



Tube OD, in.			Basic Ordering Number
T	Tx	Tx <sub>1</sub>	
5/8	1/2	3/8	-1010-3-8-6
3/4	1/2		-1210-3-8-6
1	3/4		-1610-3-12-6

**Male*****Branch,  
NPT (TTM)***

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-3TTM
	1/4	-200-3-4TTM
3/16	1/8	-300-3TTM
1/4	1/8	-400-3TTM
	1/4	-400-3-4TTM
5/16	1/8	-500-3TTM
3/8	1/4	-600-3TTM
	3/8	-600-3-6TTM
1/2	3/8	-810-3TTM
	1/2	-810-3-8TTM
5/8	1/2	-1010-3TTM
3/4	3/4	-1210-3TTM

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8	-6M0-3TTM
	1/4	-6M0-3-4TTM
8	1/8	-8M0-3TTM
	1/4	-8M0-3-4TTM
10	1/4	-10M0-3TTM
12	3/8	-12M0-3TTM
	1/4	-12M0-3-4TTM
	1/2	-12M0-3-8TTM
16	1/2	-16M0-3TTM

**Male*****Run,  
NPT (TMT)***

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8 1/4	-200-3TMT -200-3-4TMT
3/16	1/8	-300-3TMT
1/4	1/8 1/4	-400-3TMT -400-3-4TMT
5/16	1/8	-500-3TMT
3/8	1/4 3/8	-600-3TMT -600-3-6TMT
1/2	3/8 1/2	-810-3TMT -810-3-8TMT
5/8	1/2	-1010-3TMT
3/4	3/4	-1210-3TMT

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-3TMT -6M0-3-4TMT
8	1/4	-8M0-3-4TMT
12	1/4 1/2	-12M0-3-4TMT -12M0-3-8TMT
16	1/2	-16M0-3TMT



**Male**

***Positionable  
Branch,  
SAE/MS  
Straight  
Thread (TTS)***

Tube OD in,	SAE/MS Thread Size	Basic Ordering Number
1/4	7/16-20	-400-3TTS
3/8	9/16-18	-600-3TTS
1/2	3/4-16	-810-3TTS
3/4	1 1/16-12	-1210-3TTS
1	1 5/16-12	-1610-3TTS
1 1/4	1 5/8-12	-2000-3TTS
1 1/2	1 7/8-12	-2400-3TTS
2	2 1/2-12	-3200-3TTS



***Positionable  
Run,  
SAE/MS  
Straight  
Thread (TST)***

Tube OD in,	SAE/MS Thread Size	Basic Ordering Number
1/4	7/16-20	-400-3TST
3/8	9/16-18	-600-3TST
1/2	3/4-16	-810-3TST
3/4	1 1/16-12	-1210-3TST
1	1 5/16-12	-1610-3TST
1 1/4	1 5/8-12	-2000-3TST
1 1/2	1 7/8-12	-2400-3TST
2	2 1/2-12	-3200-3TST

**Male**

***Positionable  
Branch,  
ISO/BSP  
Parallel  
Thread (TTR)***

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/4	1/8 1/4	-400-3TTR -400-3-4TTR
3/8	1/4	-600-3TTR
1/2	3/8 1/2	-810-3TTR -810-3-8TTR
5/8	1/2	-1010-3TTR
3/4	3/4 1/2	-1210-3TTR -1210-3-8TTR
1	1	-1610-3TTR

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-3TTR -6M0-3-4TTR
8	1/8 1/4	-8M0-3TTR -8M0-3-4TTR
10	1/4	-10M0-3TTR
12	3/8 1/2	-12M0-3TTR -12M0-3-8TTR

**Male**

***Positionable  
Run,  
ISO/BSP  
Parallel  
Thread (TRT)***

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/4	1/8 1/4	-400-3TRT -400-3-4TRT
3/8	1/4	-600-3TRT
1/2	3/8 1/2	-810-3TRT -810-3-8TRT
5/8	1/2	-1010-3TRT
3/4	3/4 1/2	-1210-3TRT -1210-3-8TRT
1	1	-1610-3TRT

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-3TRT -6M0-3-4TRT
8	1/8 1/4	-8M0-3TRT -8M0-3-4TRT
10	1/4	-10M0-3TRT
12	3/8 1/2	-12M0-3TRT -12M0-3-8TRT

## Female



***Run,  
NPT (TFT)***

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-3TFT
1/4	1/8 1/4	-400-3TFT -400-3-4TFT
3/8	1/4	-600-3TFT
1/2	3/8 1/2	-810-3TFT -810-3-8TFT
3/4	3/4	-1210-3TFT
1	3/4 1	-1610-3-12TFT -1610-3TFT

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-3TFT -6M0-3-4TFT
8	1/8 1/4	-8M0-3TFT -8M0-3-4TFT
10	1/4	-10M0-3TFT
12	1/4 3/8 1/2	-12M0-3-4TFT -12M0-3TFT -12M0-3-8TFT
16	1/2	-16M0-3TFT

**Female*****Branch,  
NPT (TTF)***

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8	-200-3TTF
1/4	1/8 1/4	-400-3TTF -400-3-4TTF
3/8	1/4 3/8 1/2	-600-3TTF -600-3-6TTF -600-3-8TTF
1/2	1/4 3/8 1/2	-810-3-4TTF -810-3TTF -810-3-8TTF
5/8	1/2	-1010-3TTF
3/4	3/4	-1210-3TTF
1	3/4 1	-1610-3-12TTF -1610-3TTF

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8 1/4	-6M0-3TTF -6M0-3-4TTF
8	1/8 1/4	-8M0-3TTF -8M0-3-4TTF
10	1/4	-10M0-3TTF
12	1/4 3/8 1/2	-12M0-3-4TTF -12M0-3TTF -12M0-3-8TTF
16	1/2	-16M0-3TTF

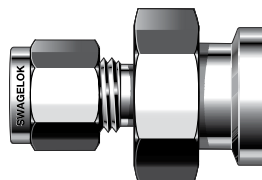
Union



Tube OD in.	Basic Ordering Number
1/8	-200-4
1/4	-400-4
5/16	-500-4
3/8	-600-4
1/2	-810-4
3/4	-1210-4
1	-1610-4

Tube OD mm	Basic Ordering Number
3	-3M0-4
6	-6M0-4
8	-8M0-4
10	-10M0-4
12	-12M0-4
16	-16M0-4
18	-18M0-4
20	-20M0-4
22	-22M0-4
25	-25M0-4

## Kwik-Clamp Flange To Swagelok Tube Fitting



Tube OD in.	Flange Size in.	Ordering Number
1/4	1/2	SS-400-SC-8
	3/4	SS-400-SC-12
	1	SS-400-SC-16
	1 1/2	SS-400-SC-24
3/8	1/2	SS-600-SC-8
	3/4	SS-600-SC-12
	1	SS-600-SC-16
	1 1/2	SS-600-SC-24
1/2	1/2	SS-810-SC-8
	3/4	SS-810-SC-12
	1	SS-810-SC-16
	1 1/2	SS-810-SC-24
1	1	SS-1610-SC-16
	2	SS-1610-SC-32

**Male****NPT**

1 in./25 mm and Under



Over 1 in./25 mm

Tube OD in,	NPT Size in.	Basic Ordering Number
1/8	1/8 1/4	-2-TA-1-2 -2-TA-1-4
3/16	1/8 1/4	-3-TA-1-2 -3-TA-1-4
1/4	1/8 1/4 3/8 1/2	-4-TA-1-2 -4-TA-1-4 -4-TA-1-6 -4-TA-1-8
5/16	1/8 1/4	-5-TA-1-2 -5-TA-1-4
3/8	1/8 1/4 3/8 1/2	-6-TA-1-2 -6-TA-1-4 -6-TA-1-6 -6-TA-1-8
1/2	1/4 3/8 1/2	-8-TA-1-4 -8-TA-1-6 -8-TA-1-8
5/8	1/2	-10-TA-1-8
3/4	1/2 3/4	-12-TA-1-8 -12-TA-1-12
1	3/4 1	-16-TA-1-12 -16-TA-1-16
1 1/4	1 1/4	-20-TA-1-20 <sup>①</sup>
1 1/2	1 1/2	-24-TA-1-24 <sup>①</sup>
2	2	-32-TA-1-32 <sup>①</sup>

**⚠ Swagelok tube adapters are to be used ONLY in Swagelok tube fittings. Use in fittings made by other manufacturers may result in leakage or slippage.**

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8 1/4	-6-MTA-1-2 -6-MTA-1-4
8	1/4 3/8	-8-MTA-1-4 -8-MTA-1-6
10	1/4 3/8 1/2	-10-MTA-1-4 -10-MTA-1-6 -10-MTA-1-8
12	1/4 1/2	-12-MTA-1-4 -12-MTA-1-8
28	1 1 1/4	-28-MTA-1-16 <sup>①</sup> -28-MTA-1-20 <sup>①</sup>
30	1 1 1/4	-30-MTA-1-16 <sup>①</sup> -30-MTA-1-20 <sup>①</sup>
32	1 1/4	-32-MTA-1-20 <sup>①</sup>
38	1 1/2	-38-MTA-1-24 <sup>①</sup>

<sup>①</sup> Furnished with nut and preswaged ferrules.



**Male****ISO/BSP  
Tapered  
Thread (RT)****1 in./25 mm and Under****Over 1 in./25 mm**

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8 1/4	-2-TA-1-2RT -2-TA-1-4RT
1/4	1/8 1/4	-4-TA-1-2RT -4-TA-1-4RT
3/8	1/4 3/8 1/2	-6-TA-1-4RT -6-TA-1-6RT -6-TA-1-8RT
1/2	1/4 3/8 1/2	-8-TA-1-4RT -8-TA-1-6RT -8-TA-1-8RT
3/4	3/4	-12-TA-1-12RT
1	1	-16-TA-1-16RT

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8 1/4	-6-MTA-1-2RT -6-MTA-1-4RT
8	1/4	-8-MTA-1-4RT
10	1/4 3/8	-10-MTA-1-4RT -10-MTA-1-6RT
12	1/4 3/8 1/2	-12-MTA-1-4RT -12-MTA-1-6RT -12-MTA-1-8RT
28	1 1 1/4	-28-MTA-1-16RT <sup>①</sup> -28-MTA-1-20RT <sup>①</sup>
30	1 1/4	-30-MTA-1-20RT <sup>①</sup>
32	1 1/4	-32-MTA-1-20RT <sup>①</sup>
38	1 1/2	-38-MTA-1-24RT <sup>①</sup>

① Furnished with nut and preswaged ferrules.

**Male****ISO/BSP  
Parallel  
Thread (RS)****1 in./25 mm and Under****Over 1 in./25 mm**

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8 1/4	-2-TA-1-2RS -2-TA-1-4RS
1/4	1/8 1/4	-4-TA-1-2RS -4-TA-1-4RS
3/8	1/4 3/8	-6-TA-1-4RS -6-TA-1-6RS
1/2	1/4 3/8 1/2	-8-TA-1-4RS -8-TA-1-6RS -8-TA-1-8RS
3/4	3/4	-12-TA-1-12RS
1	1	-16-TA-1-16RS

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8 1/4	-6-MTA-1-2RS -6-MTA-1-4RS
8	1/4	-8-MTA-1-4RS
10	1/4 3/8 1/2	-10-MTA-1-4RS -10-MTA-1-6RS -10-MTA-1-8RS
12	1/4 3/8 1/2	-12-MTA-1-4RS -12-MTA-1-6RS -12-MTA-1-8RS
18	1/2 3/4	-18-MTA-1-8RS -18-MTA-1-12RS
28	1 1 1/4	-28-MTA-1-16RS <sup>①</sup> -28-MTA-1-20RS <sup>①</sup>
30	1 1/4	-30-MTA-1-20RS <sup>①</sup>
32	1 1/4	-32-MTA-1-20RS <sup>①</sup>
38	1 1/2	-38-MTA-1-24RS <sup>①</sup>

① Furnished with nut and preswaged ferrules.

**Male****ISO/BSP  
Parallel  
Thread (RP)**

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
28	1 1 1/4	-28-MTA-1-16RP <sup>①</sup> -28-MTA-1-20RP <sup>①</sup>
30	1 1/4	-30-MTA-1-20RP <sup>①</sup>
32	1 1/4	-32-MTA-1-20RP <sup>①</sup>
38	1 1/2	-38-MTA-1-24RP <sup>①</sup>

① Furnished with nut and preswaged ferrules.

**SAE/MS  
Straight  
Thread (ST)**

1 in./25 mm and Under



Over 1 in./25 mm

Tube OD in.	SAE/MS Thread Size	Basic Ordering Number
1/8	5/16-24	-2-TA-1-2ST
1/4	7/16-20	-4-TA-1-4ST
3/8	7/16-20 9/16-18 3/4-16	-6-TA-1-4ST -6-TA-1-6ST -6-TA-1-8ST
1/2	9/16-18 3/4-16	-8-TA-1-6ST -8-TA-1-8ST
5/8	7/8-14	-10-TA-1-10ST
3/4	1 1/16-12	-12-TA-1-12ST
1	1 5/16-12	-16-TA-1-16ST
1 1/4	1 5/8-12	-20-TA-1-20ST <sup>①</sup>
1 1/2	1 7/8-12	-24-TA-1-24ST <sup>①</sup>
2	2 1/2-12	-32-TA-1-32ST <sup>①</sup>

① Furnished with nut and preswaged ferrules.

**Male****O-Seal  
(SAE/MS  
Straight  
Thread)**

Tube OD in.	SAE/MS Thread Size	Basic Ordering Number
1/8	5/16-24	-2-TA-1-OR
3/16	3/8-24	-3-TA-1-OR
1/4	7/16-20	-4-TA-1-OR
5/16	1/2-20	-5-TA-1-OR
3/8	9/16-18	-6-TA-1-OR
1/2	3/4-16	-8-TA-1-OR

**AN Thread**

Tube OD in.	AN Tube Flare Size in.	Thread Size	Basic Ordering Number
1/4	1/4	7/16-20UNJF-3	-4-TA-1-4AN
3/8	1/4 3/8	7/16-20UNJF-3 9/16-18UNJF-3	-6-TA-1-4AN -6-TA-1-6AN
1/2	1/2	3/4-16UNJF-3	-8-TA-1-8AN
3/4	3/4	1 1/16-12UNJ-3	-12-TA-1-12AN
1	1	1 5/16-12UNJ-3	-16-TA-1-16AN

**Pipe Weld**

Tube OD in.	Pipe Weld Size in.	Basic Ordering Number
1/4	1/4	-4-TA-1-4W
3/8	1/2	-6-TA-1-8W
1/2	1/2 3/4	-8-TA-1-8W -8-TA-1-12W
3/4	3/4	-12-TA-1-12W

**Female****NPT****1 in./25 mm and Under****Over 1 in./25 mm**

Tube OD in.	NPT Size in.	Basic Ordering Number
1/8	1/8 1/4	-2-TA-7-2 -2-TA-7-4
3/16	1/4	-3-TA-7-4
1/4	1/8 1/4 3/8 1/2	-4-TA-7-2 -4-TA-7-4 -4-TA-7-6 -4-TA-7-8
5/16	1/4	-5-TA-7-4
3/8	1/8 1/4 3/8 1/2	-6-TA-7-2 -6-TA-7-4 -6-TA-7-6 -6-TA-7-8
1/2	1/4 3/8 1/2	-8-TA-7-4 -8-TA-7-6 -8-TA-7-8
5/8	1/2	-10-TA-7-8
3/4	1/2 3/4 1	-12-TA-7-8 -12-TA-7-12 -12-TA-7-16
1	3/4 1	-16-TA-7-12 -16-TA-7-16
1 1/4	1 1/4	-20-TA-7-20 <sup>①</sup>
1 1/2	1 1/2	-24-TA-7-24 <sup>①</sup>
2	2	-32-TA-7-32 <sup>①</sup>

① Furnished with nut and preswaged ferrules.

Tube OD mm	NPT Size in.	Basic Ordering Number
6	1/8 1/4	-6-MTA-7-2 -6-MTA-7-4
8	1/4	-8-MTA-7-4
10	1/4 3/8 1/2	-10-MTA-7-4 -10-MTA-7-6 -10-MTA-7-8
12	1/4 1/2	-12-MTA-7-4 -12-MTA-7-8

**Female****ISO/BSP  
Tapered  
Thread (RT)**

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/4	1/8 1/4	-4-TA-7-2RT -4-TA-7-4RT
3/8	1/4 3/8	-6-TA-7-4RT -6-TA-7-6RT
1/2	1/4 3/8 1/2	-8-TA-7-4RT -8-TA-7-6RT -8-TA-7-8RT

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8	-6-MTA-7-2RT
8	1/4	-8-MTA-7-4RT
10	1/4	-10-MTA-7-4RT

**ISO/BSP  
Parallel  
Thread (RP)**

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/8	1/8	-2-TA-7-2RP
1/4	1/8 1/4	-4-TA-7-2RP -4-TA-7-4RP
3/8	1/4 3/8	-6-TA-7-4RP -6-TA-7-6RP
1/2	3/8 1/2	-8-TA-7-6RP -8-TA-7-8RP

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/8 1/4	-6-MTA-7-2RP -6-MTA-7-4RP
12	1/2	-12-MTA-7-8RP

**Female**

**ISO/BSP  
Parallel  
Thread  
(RG, Gauge)**

Tube OD in.	ISO Thread Size in.	Basic Ordering Number
1/4	1/4	-4-TA-7-4RG
3/8	3/8	-6-TA-7-6RG
1/2	1/2	-8-TA-7-8RG

Tube OD mm	ISO Thread Size in.	Basic Ordering Number
6	1/4	-6-MTA-7-4RG
	3/8	-6-MTA-7-6RG
	1/2	-6-MTA-7-8RG
8	1/4	-8-MTA-7-4RG
	3/8	-8-MTA-7-6RG
	1/2	-8-MTA-7-8RG
10	1/4	-10-MTA-7-4RG
	3/8	-10-MTA-7-6RG
	1/2	-10-MTA-7-8RG
12	1/4	-12-MTA-7-4RG
	3/8	-12-MTA-7-6RG
	1/2	-12-MTA-7-8RG
16	1/2	-16-MTA-7-8RG
18	1/2	-18-MTA-7-8RG

**Female**
**ISO/BSP  
Parallel  
Thread (RJ)**

ISO/BSP parallel thread (RJ) fittings are available in stainless steel only.

Tube OD in.	ISO Thread Size in.	Ordering Number
1/4	1/4	SS-4-TA-7-4RJ
3/8	3/8	SS-6-TA-7-6RJ
1/2	1/2	SS-8-TA-7-8RJ

Tube OD mm	ISO Thread Size in.	Ordering Number
6	1/4	SS-6-MTA-7-4RJ
	3/8	SS-6-MTA-7-6RJ
	1/2	SS-6-MTA-7-8RJ
8	1/4	SS-8-MTA-7-4RJ
	3/8	SS-8-MTA-7-6RJ
	1/2	SS-8-MTA-7-8RJ
10	1/4	SS-10-MTA-7-4RJ
	3/8	SS-10-MTA-7-6RJ
	1/2	SS-10-MTA-7-8RJ
12	1/4	SS-12-MTA-7-4RJ
	3/8	SS-12-MTA-7-6RJ
	1/2	SS-12-MTA-7-8RJ

**AN Thread**

Tube OD in.	AN Tube Flare Size in.	Basic Ordering Number
1/8	1/8	-200-A-2ANF
	1/4	-200-A-4ANF
1/4	1/4	-400-A-4ANF
3/8	3/8	-600-A-6ANF
1/2	1/2	-810-A-8ANF
3/4	3/4	-1210-A-12ANF



## Tube Fitting Part Numbers

Swagelok tube fitting part numbers follow the sequence shown below.

**A** - **B** **C** **D** - **E** - **F** **G**  
**SS** - **2** **0** **0** - **1** - **2** **RT**

### **A** Material

**A** = Aluminum  
**B** = Brass  
**C20** = Alloy 20  
**HC** = Alloy C-276  
**INC** = Alloy 600  
**M** = Alloy 400  
**NY** = Nylon  
**S** = Carbon steel  
**SS** = 316 stainless steel  
**T** = PTFE  
**TI** = Titanium  
**625** = Alloy 625  
**825** = Alloy 825

### **B** Size (Tube OD)

Fractional, in.	Metric, mm
<b>1</b> = 1/16	<b>2</b> = 2
<b>2</b> = 1/8	<b>3</b> = 3
<b>3</b> = 3/16	<b>4</b> = 4
<b>4</b> = 1/4	<b>6</b> = 6
<b>5</b> = 5/16	<b>8</b> = 8
<b>6</b> = 3/8	<b>10</b> = 10
<b>8</b> = 1/2	<b>12</b> = 12
<b>10</b> = 5/8	<b>14</b> = 14
<b>12</b> = 3/4	<b>15</b> = 15
<b>14</b> = 7/8	<b>16</b> = 16
<b>16</b> = 1	<b>18</b> = 18
<b>18</b> = 1 1/8	<b>20</b> = 20
<b>20</b> = 1 1/4	<b>22</b> = 22
<b>24</b> = 1 1/2	<b>25</b> = 25
<b>32</b> = 2	<b>28</b> = 28
	<b>32</b> = 32
	<b>38</b> = 38
	<b>50</b> = 50

**A** - **B** **C** **D** - **E** - **F** **G**  
**SS** - **2** **0** **0** - **1** - **2** **RT**

**C Series**

**0** = Fractional 1/16 to 3/8 in.  
 and 1 1/4 to 2 in.

**1** = Fractional 1/2 to 1 1/8 in.

**M** = Millimeter tube size

To order a female Swagelok tube fitting, add **F**.

Example: SS-100**F**-1-1.

**D Component**

**0** = Fitting

**1** = Body

**E Fitting Type**

**1** = Male connector

**2** = 90° male elbow

**3** = Tee, union

**4** = Cross, union

**5** = 45° male elbow

**6** = Union

**7** = Female connector

**8** = Female elbow

**9** = Elbow, union

**11** = Bulkhead male connector

**61** = Bulkhead union

**71** = Bulkhead female connector

**A** = Adapter

**C** = Cap

**P** = Plug

**PC** = Port connector

**R** = Reducer

**R1** = Bulkhead reducer

**2R** = Reducing elbow

**TFT** = Tee, female run

**TMT** = Tee, male run

**TRT** = Tee, ISO/BSP parallel  
 male positionable run

**TST** = Tee, straight thread with O-ring  
 male positionable run

**TTF** = Tee, female branch

**TTM** = Tee, male branch

**TTR** = Tee, ISO/BSP parallel  
 male positionable branch

**TTS** = Tee, straight thread with O-ring  
 male positionable branch

**A** - **B** **C** **D** - **E** - **F** **G**  
**SS** - **2** **0** **0** - **1** - **2** **RT**

#### **F** Second End Connection Size

Add a size designator from the list on page 99 for the second end connection *or* if the fitting is a reducing union.

#### **G** Second End Connection Type

Add a second end connection type designator as needed.

**AN** = 37° male AN flare

**ANF** = 37° female AN flare

**BT** = Bored-through fitting

**F** = Female thread

**KN** = Knurled nut, nylon ferrules

**KT** = Knurled nut, PTFE ferrules

**M** = Metric tube end

**OR** = O-seal connection

**PR** = ISO/BSP positionable parallel pipe thread

**RG** = ISO/BSP parallel pipe thread (gauge)

**RJ** = ISO/BSP parallel pipe thread  
(Japanese gauge)

**RP** = ISO/BSP parallel pipe thread

**RS** = ISO/BSP parallel pipe thread

**RT** = ISO/BSP tapered pipe thread

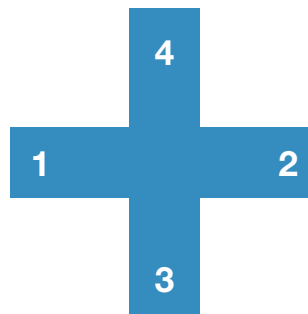
**ST** = Straight thread with O-ring (for SAE/MS)

**W** = Male pipe weld/tube socket weld

### ***Tees and Crosses***

Ordering numbers for tees and crosses indicate first the size of the run (**1** to **2**) and then the size of the branch (**3** for tees and **3** to **4** for crosses).

Example: SS-6M0-3-4TTF for a  
 316 SS female tee for  
 6 mm tube with 1/4 in.  
 female NPT branch



## Tube Adapter Part Numbers

Swagelok tube adapter part numbers follow the sequence shown below.

**A** - **B** - **C** - **D** - **E** **F**  
**SS** - **2** - **TA** - **1** - **4** **RT**

### **A** Material

**A** = Aluminum  
**B** = Brass  
**C20** = Alloy 20  
**HC** = Alloy C-276  
**INC** = Alloy 600  
**M** = Alloy 400  
**NY** = Nylon  
**S** = Steel  
**SS** = Stainless steel  
**T** = PTFE  
**TI** = Titanium  
**625** = Alloy 625  
**825** = Alloy 825

### **B** Size (Tube OD)

Fractional, in.	Metric, mm
<b>1</b> = 1/16	<b>2</b> = 2
<b>2</b> = 1/8	<b>3</b> = 3
<b>3</b> = 3/16	<b>4</b> = 4
<b>4</b> = 1/4	<b>6</b> = 6
<b>5</b> = 5/16	<b>8</b> = 8
<b>6</b> = 3/8	<b>10</b> = 10
<b>8</b> = 1/2	<b>12</b> = 12
<b>10</b> = 5/8	<b>14</b> = 14
<b>12</b> = 3/4	<b>15</b> = 15
<b>14</b> = 7/8	<b>16</b> = 16
<b>16</b> = 1	<b>18</b> = 18
<b>18</b> = 1 1/8	<b>20</b> = 20
<b>20</b> = 1 1/4	<b>22</b> = 22
<b>24</b> = 1 1/2	<b>25</b> = 25
<b>32</b> = 2	<b>28</b> = 28
	<b>32</b> = 32
	<b>38</b> = 38
	<b>50</b> = 50

**A** - **B** - **C** - **D** - **E** **F**  
**SS** - **2** - **TA** - **1** - **4** **RT**

**C Component**

**TA** = Fractional tube adapter

**MTA** = Metric tube adapter

**D Adapter Type**

**1** = Male adapter

**7** = Female adapter

**E Second End Connection Size**

Add a size designator from the list on page 102 for the second end connection.

**F Second End Connection Type**

Add a second end connection type designator as needed.

**AN** = 37° male AN flare

**ANF** = 37° female AN flare

**RG** = ISO/BSP parallel pipe thread (gauge)

**RJ** = ISO/BSP parallel pipe thread  
(Japanese gauge)

**RP** = ISO/BSP parallel pipe thread

**RS** = ISO/BSP parallel pipe thread

**RT** = ISO/BSP tapered pipe thread

**ST** = Straight thread with O-ring (for SAE/MS)

**W** = Male pipe weld/tube socket weld

## Nuts



### *Female*

Tube OD in.	Basic Ordering Number
1/16	-102-1
1/8	-202-1
3/16	-302-1
1/4	-402-1
5/16	-502-1
3/8	-602-1
1/2	-812-1
5/8	-1012-1
3/4	-1212-1
7/8	-1412-1
1	-1612-1
1 1/4	-2002-1
1 1/2	-2402-1
2	-3202-1

Tube OD mm	Basic Ordering Number
2	-2M2-1
3	-3M2-1
4	-4M2-1
6	-6M2-1
8	-8M2-1
10	-10M2-1
12	-12M2-1
14	-14M2-1
15	-15M2-1
16	-16M2-1
18	-18M2-1
20	-20M2-1
22	-22M2-1
25	-25M2-1
28	-28M2-1
30	-30M2-1
32	-32M2-1
38	-38M2-1
50	-50M2-1

## Nuts



### ***Knurled Female***

The Swagelok knurled nut tube fitting provides a leak-tight seal without the use of inserts on most wall thicknesses of polyethylene tubing. Inserts may be required for larger sizes.

To set the ferrules on the tubing, initial connections must be made with a wrench, tightening the nut one and one-quarter turns from finger-tight (three-quarters turn for 1/16, 1/8 and 3/16 in.; 2, 3, and 4 mm fittings). Leak-tight connections may be reassembled with finger-tight assembly.

To order a knurled nut, add **K** to the female nut basic ordering number.

Example: B-402-1**K**

To order a knurled nut on an assembled fitting with nylon ferrules, add **KN** to the fitting ordering number.

Example: SS-400-1-2**KN**

To order a knurled nut on an assembled fitting with PTFE ferrules, add **KT** to the fitting ordering number.

Example: SS-400-1-2**KT**

### ***Male***

For use in female Swagelok end connections.



Tube OD in,	Basic Ordering Number
1/16	-1F2-1GC
1/8	-2F2-1GC
1/4	-4F2-1
1/2	-8F2-1

Tube OD mm	Basic Ordering Number
10	-10MF2-1
12	-12MF2-1

## Ferrules



### Front

Tube OD in.	Basic Ordering Number
1/16	-103-1
1/8	-203-1
3/16	-303-1
1/4	-403-1
5/16	-503-1
3/8	-603-1
1/2	-813-1
5/8	-1013-1
3/4	-1213-1
7/8	-1413-1
1	-1613-1
1 1/4	-2003-1 <sup>①</sup>
1 1/2	-2403-1 <sup>①</sup>
2	-3203-1 <sup>①</sup>

① Over 1 in. and over 25 mm stainless steel front ferrules are PFA coated. To order silver-plated front ferrules, add **-BL** to the basic ordering number.

Example:

SS-2003-1-**BL**

Tube OD mm	Basic Ordering Number
2	-2M3-1
3	-3M3-1
4	-4M3-1
6	-6M3-1
8	-8M3-1
10	-10M3-1
12	-12M3-1
14	-14M3-1
15	-15M3-1
16	-16M3-1
18	-18M3-1
20	-20M3-1
22	-22M3-1
25	-25M3-1
28	-28M3-1 <sup>①</sup>
30	-30M3-1 <sup>①</sup>
32	-32M3-1 <sup>①</sup>
38	-38M3-1 <sup>①</sup>
50	-50M3-1 <sup>①</sup>



## Ferrules



### Back

Tube OD in.	Basic Ordering Number
1/16	-104-1
1/8	-204-1
3/16	-304-1
1/4	-404-1
5/16	-504-1
3/8	-604-1
1/2	-814-1
5/8	-1014-1
3/4	-1214-1
7/8	-1414-1
1	-1614-1
1 1/4	-2004-1 <sup>①</sup>
1 1/2	-2404-1 <sup>①</sup>
2	-3204-1 <sup>①</sup>

① Over 1 in. and over 25 mm stainless steel back ferrules are PFA coated. To order back ferrules without PFA coating, add **-WC** to the basic ordering number.

Example:  
SS-2004-1-**WC**

Tube OD mm	Basic Ordering Number
2	-2M4-1
3	-3M4-1
4	-4M4-1
6	-6M4-1
8	-8M4-1
10	-10M4-1
12	-12M4-1
14	-14M4-1
15	-15M4-1
16	-16M4-1
18	-18M4-1
20	-20M4-1
22	-22M4-1
25	-25M4-1
28	-28M4-1 <sup>①</sup>
30	-30M4-1 <sup>①</sup>
32	-32M4-1 <sup>①</sup>
38	-38M4-1 <sup>①</sup>
50	-50M4-1 <sup>①</sup>

## Nut-Ferrule Sets and Nut-Ferrule Packages

### *Nut-Ferrule Set*

The nut-ferrule set contains one nut, one back ferrule, and one front ferrule.

To order, add a material designator to the basic ordering number. Please order nut-ferrule sets in multiples of five.

Example: **SS-400-NFSET**

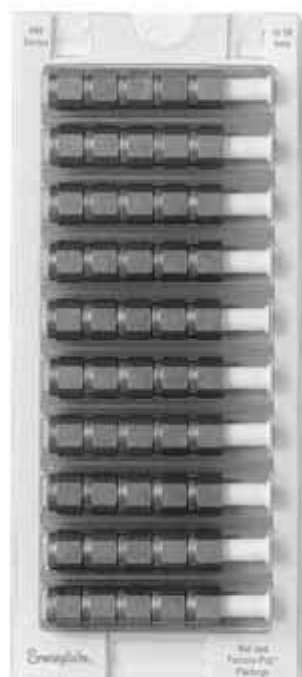
Material	Designator
Brass	B
Carbon steel	S
316 stainless steel	SS

Tube OD in.	Basic Ordering Number
1/4	-400-NFSET
3/8	-600-NFSET
1/2	-810-NFSET

Tube OD mm	Basic Ordering Number
6	-6M0-NFSET
8	-8M0-NFSET
10	-10M0-NFSET
12	-12M0-NFSET

### *Nut-Ferrule Package*

To order the nut-ferrule package (50 nut-ferrule sets), contact your authorized Swagelok representative.



## Ferrule Sets and Ferrule-Paks

### ***Ferrule Set***

The ferrule set contains one front ferrule and one back ferrule.

To order, add a material designator to the basic ordering number. Please order ferrule sets in multiples of ten.

Example: **SS-100-SET**

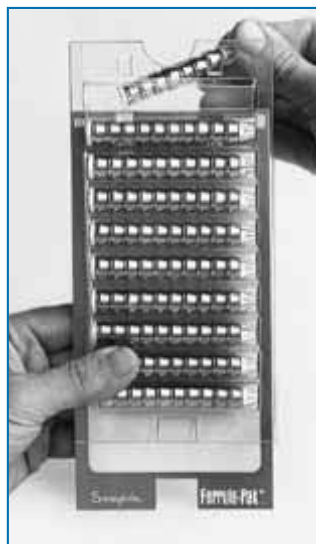
Material	Designator
Alloy 400	M
Aluminum	A
Brass	B
Carbon steel	S
Nylon	NY
PTFE	T
316 stainless steel	SS

Tube OD in.	Basic Ordering Number
1/16	-100-SET
1/8	-200-SET
3/16	-300-SET
1/4	-400-SET
5/16	-500-SET
3/8	-600-SET
1/2	-810-SET

Tube OD mm	Basic Ordering Number
6	-6M0-SET
8	-8M0-SET
10	-10M0-SET
12	-12M0-SET

### ***Ferrule-Pak***

To order the ferrule-pak package (100 front and back sets), contact your authorized Swagelok representative.



## ISO/BSP Parallel Gaskets



**RS/RSD  
Gasket**



**RSNB  
Gasket**

### ***Steel and Stainless Steel (RS Fitting)***

RS fitting steel gaskets provide a seal with male ISO/BSP parallel threads.

The RS gasket is of a fluorocarbon FKM inner ring bonded to a carbon steel outer ring.

The RSD (DIN-style) gasket is a fluorocarbon FKM inner ring bonded to a stainless steel or carbon steel outer ring as recommended in ISO 1179-1973. It can be used with end connections designed in accordance with DIN 3852 Part 2.

The RSNB gasket is an all-metal 304L stainless steel gasket similar to DIN 7603 form D.

ISO Thread Size, in.	Ordering Number		
	RS Gasket <sup>①</sup>	RSD Gasket <sup>②</sup>	RSNB Gasket
1/8	S-2-RS-2V	SS-2-RSD-2V	304L-2-RSNB-2
1/4	S-4-RS-2V <sup>③</sup>	SS-4-RSD-2V	304L-4-RSNB-2
3/8	S-6-RS-2V <sup>③</sup>	SS-6-RSD-2V	304L-6-RSNB-2
1/2	S-8-RS-2V <sup>③</sup>	SS-8-RSD-2V	304L-8-RSNB-2
3/4	S-12-RS-2V	SS-12-RSD-2V	304L-12-RSNB-2
1	S-16-RS-2V	SS-16-RSD-2V	304L-16-RSNB-2
1 1/4	S-20-RS-2V	SS-20-RSD-2V	304L-20-RSNB-2
1 1/2	S-24-RS-2V	SS-24-RSD-2V	304L-24-RSNB-2

① Also available with a Buna inner ring. To order, replace **V** with **B** in the ordering number.

Example: S-2-RS-2**B**

② Also available with a carbon steel outer ring. To order, replace **SS** with **S** in the ordering number.

Example: **S**-8-RSD-2V

③ Also available with a stainless steel outer ring. To order, replace **S** with **SS** in the ordering number.

Example: **SS**-8-RS-2V

## ISO/BSP Parallel Gaskets



### ***Copper (RP and RS Fitting)***

The RP and RS fitting copper gasket provides a seal with male ISO/BSP parallel threads.

ISO Thread Size, in.	Ordering Number
1/8	CU-2-RP-2
1/4	CU-4-RP-2
3/8	CU-6-RP-2
1/2	CU-8-RP-2
3/4	CU-12-RP-2
1	CU-16-RP-2
1 1/4	CU-20-RP-2
1 1/2	CU-24-RP-2



### ***Copper and Nickel (RG, Gauge Fitting)***

The RG fitting gasket provides a seal on pressure gauges equipped with ISO/BSP parallel male threads.

ISO Thread Size, in.	Ordering Number
<b>Copper Gaskets</b>	
1/4	CU-4-RG-2
3/8	CU-6-RG-2
1/2	CU-8-RG-2
<b>Nickel Gaskets</b>	
1/4	NI-4-RG-2
3/8	NI-6-RG-2
1/2	NI-8-RG-2



### ***PTFE (RJ Fitting)***

The RJ fitting PTFE gasket provides a seal with ISO/BSP parallel male threads.

ISO Thread Size, in.	Ordering Number
<b>Regular Gaskets</b>	
1/4	T-4-RJ-2
3/8	T-6-RJ-2
1/2	T-8-RJ-2
<b>Thick Gaskets</b>	
1/4	T-4-RJ-2-T
3/8	T-6-RJ-2-T
1/2	T-8-RJ-2-T

## O-Rings

### ***Buna N (O-Seal Straight Threads)***

O-ring  
hardness is 70  
durometer.

Thread Size in.	Uniform Size Number	Ordering Number
5/16-24	011	BN-70-OR-011
3/8-24	012	BN-70-OR-012
7/16-20	013	BN-70-OR-013
1/2-20	112	BN-70-OR-112
9/16-18	113	BN-70-OR-113
3/4-16	116	BN-70-OR-116
1 1/16-12	121	BN-70-OR-121
1 5/16-12	125	BN-70-OR-125

### ***Buna N (O-Seal Pipe Threads)***

O-ring  
hardness is 70  
durometer.

NPT/ISO Pipe Size in.	Uniform Size Number	Ordering Number
1/8	013	BN-70-OR-013
1/4	113	BN-70-OR-113
3/8	116	BN-70-OR-116
1/2	118	BN-70-OR-118

## O-Rings

**Fluorocarbon  
FKM  
(Positionable  
Fittings,  
ISO/BSP  
Parallel  
Threads)**

O-ring hardness  
is 90 durometer.

ISO Thread Size in.	Uniform Size Number	Ordering Number
1/8	502 <sup>①</sup>	FSP-90-OR-502
1/4	111	FCBR-90-OR-111
3/8	113	FCBR-90-OR-113
1/2	508 <sup>①</sup>	FCBR-90-OR-508
3/4	119	FCBR-90-OR-119
1	217	FCBR-90-OR-217

<sup>①</sup> Not a uniform O-ring size.

**Fluorocarbon  
FKM  
(SAE/MS  
Straight  
Threads)**

O-ring hardness  
is 90 durometer.

SAE/MS Thread Size	Uniform Size Number	Ordering Number
5/16-24	902	FCBR-90-OR-902
3/8-24	903	FCBR-90-OR-903
7/16-20	904	FCBR-90-OR-904
1/2-20	905	FCBR-90-OR-905
9/16-18	906	FCBR-90-OR-906
3/4-16	908	FCBR-90-OR-908
7/8-14	910	FCBR-90-OR-910
1 1/16-12	912	FCBR-90-OR-912
1 3/16-12	914	FCBR-90-OR-914
1 5/16-12	916	FCBR-90-OR-916
1 5/8-12	920	FCBR-90-OR-920
1 7/8-12	924	FCBR-90-OR-924
2 1/2-12	932	FCBR-90-OR-932

## Bulkhead Retainers

The bulkhead retainer acts as a backup wrench, enabling one person with one wrench to install a bulkhead fitting.



Fitting Size		Ordering Number
in.	mm	
1/16	—	SS-102-61F
1/8	—	SS-202-61F
3/16	3, 4	SS-302-61F
1/4	6	SS-402-61F
5/16	—	SS-502-61F
—	8	SS-8M2-61F
3/8	—	SS-602-61F
—	10	SS-10M2-61F
1/2	12	SS-812-61F
5/8	15, 16	SS-1012-61F
3/4	18	SS-1212-61F
7/8	—	SS-1412-61F
1	—	SS-1612-61F



## Gap Inspection Gauges



Swagelok gap inspection gauges assure the installer or inspector that the fitting has been sufficiently pulled up on initial installation, whether using a multihead hydraulic swaging unit (MHSU) or air-actuated hydraulic swaging unit (AHSU), or wrench tightening. All metal Swagelok tube fittings are gaugeable, with the exception of a few forged bodies in aluminum.

### *For Installation Using a Wrench*

Fitting Size		Ordering Number
in.	mm	
Female Nut		
1/16	—	MS-IG-100
1/8	2, 3	MS-IG-200
3/16	4	MS-IG-300
1/4	6	MS-IG-400
1/4, 3/8, 1/2	6, 12	MS-IG-468
1/4, 1/2	6, 8, 10, 12	MS-IG-612M
5/16	8	MS-IG-500
3/8	—	MS-IG-600
—	10	MS-IG-10M0
1/2	12	MS-IG-810
5/8	14, 15, 16	MS-IG-1010
5/8 (SAF 2507)	—	MS-IG-2507-1010
3/4	18	MS-IG-1210
3/4 (SAF 2507)	—	MS-IG-2507-1210
7/8	20, 22	MS-IG-1410
1	25	MS-IG-1610
Male Nut		
1/16	—	MS-IG-1F0
1/8	2, 3	MS-IG-2F0
1/4, 3/8, 1/2 (medium-pressure)	—	MS-IG-FK0

## Gap Inspection Gauges

### *For Installation Using the AHSU*

Fitting Size		Ordering Number
in.	mm	
Female Nut		
1/4, 3/8, 1/2	—	MS-AHSU-IG-468
—	6, 8, 10, 12	MS-AHSU-IG-612M

### *For Installation Using the MHSU*

Fitting Size		Ordering Number
in.	mm	
Female Nut		
1/2 <sup>①</sup>	12	MS-MHSU-IG-810
5/8 <sup>②</sup>	14, 15, 16	MS-MHSU-IG-1010
5/8 (SAF 2507)	—	MS-MHSU-IG-2507-1010
3/4 <sup>②</sup>	18	MS-MHSU-IG-1210
3/4 (SAF 2507)	—	MS-MHSU-IG-2507-1210
7/8	20, 22	MS-MHSU-IG-1410
1	25	MS-MHSU-IG-1610-1
—	28	MS-MHSU-IG-28M0-1
	30	MS-MHSU-IG-30M0-1
1 1/4	—	MS-MHSU-IG-2000-2
—	32	MS-MHSU-IG-32M0-1
—	38	MS-MHSU-IG-38M0-1
1 1/2	—	MS-MHSU-IG-2400-1
—	50	MS-MHSU-IG-50M0-1
2	—	MS-MHSU-IG-3200-1

① The MHSU cannot be used for SAF 2507 tubing 1/2 in. and under or for medium-pressure tubing.

② For 5/8 and 3/4 in. SAF 2507 tubing, order the 1 in. (25 mm) and over unit and SAF 2507 tooling and gauge.

## Depth Marking Tools



Swagelok depth marking tools help ensure that tubing is bottomed on the shoulder inside the Swagelok tube fitting body.

Tube OD in.	Ordering Number
1/4	MS-DMT-400
3/8	MS-DMT-600
1/2	MS-DMT-810
5/8	MS-DMT-1010
3/4	MS-DMT-1210
7/8	MS-DMT-1410
1	MS-DMT-1610

Tube OD mm	Ordering Number
6	MS-DMT-6M0
8	MS-DMT-8M0
10	MS-DMT-10M0
12	MS-DMT-12M0
16	MS-DMT-16M0
18	MS-DMT-18M0

## Preswaging Tools

For Swagelok tube fitting installations in close quarters, the Swagelok preswaging tool is a convenient accessory.



Tube OD in.	Ordering Number
<b>Female Nut</b>	
1/16	MS-ST-100
1/8	MS-ST-200
3/16	MS-ST-300
1/4	MS-ST-400
5/16	MS-ST-500
3/8	MS-ST-600
1/2	MS-ST-810
5/8	MS-ST-1010
5/8 (SAF 2507)	MS-ST-2507-1010
3/4	MS-ST-1210
3/4 (SAF 2507)	MS-ST-2507-1210
7/8	MS-ST-1410
1	MS-ST-1610
<b>Male Nut</b>	
1/16	MS-ST-1F0
1/4 (medium-pressure)	MS-ST-4FK0
3/8 (medium-pressure)	MS-ST-6FK0
1/2	MS-ST-8F0
1/2 (medium-pressure)	MS-ST-8FK0

Tube OD mm	Ordering Number
<b>Female Nut</b>	
3	MS-ST-3M0
4	MS-ST-4M0
6	MS-ST-6M0
8	MS-ST-8M0
10	MS-ST-10M0
12	MS-ST-12M0
14	MS-ST-14M0
15	MS-ST-15M0
16	MS-ST-16M0
18	MS-ST-18M0
20	MS-ST-20M0
22	MS-ST-22M0
25	MS-ST-25M0

## Inserts for Soft Plastic Tubing

Swagelok inserts help secure soft plastic tubing being used with standard Swagelok tube fittings. To determine the correct size of the Swagelok insert to be used, check both outside diameter and inside diameter of the plastic tubing.



Add the insert material designator to the basic ordering number.

Example:  
**B-305-2**

Material	Designator
Alloy 400	M
Aluminum	A
Brass	B
Carbon steel	S
Nylon	NY
Stainless steel	SS

Tube OD in.	Tube ID in.	Bore ID in.	Basic Ordering Number
3/16	1/8	0.09	-305-2
1/4	1/8	0.09	-405-2
	0.17	0.11	-405-170
	3/16	0.14	-405-3
5/16	1/8	0.09	-505-2
	3/16	0.12	-505-3
	1/4	0.19	-505-4
3/8	3/16	0.12	-605-3
	1/4	0.19	-605-4
1/2	1/4	0.19	-815-4
	3/8	0.31	-815-6
5/8	3/8	0.31	-1015-6
	1/2	0.44	-1015-8
3/4	1/2	0.44	-1215-8
	5/8	0.56	-1215-10
1	3/4	0.69	-1615-12

Tube OD mm	Tube ID mm	Bore ID mm	Basic Ordering Number
6	4	2.8	-6M5-4M
8	6	4.4	-8M5-6M
10	8	6.4	-10M5-8M
12	8	6.4	-12M5-8M
	10	8.3	-12M5-10M

For product technical data, see the Swagelok *Gaugeable Tube Fittings and Adapters* catalog, MS-01-140.

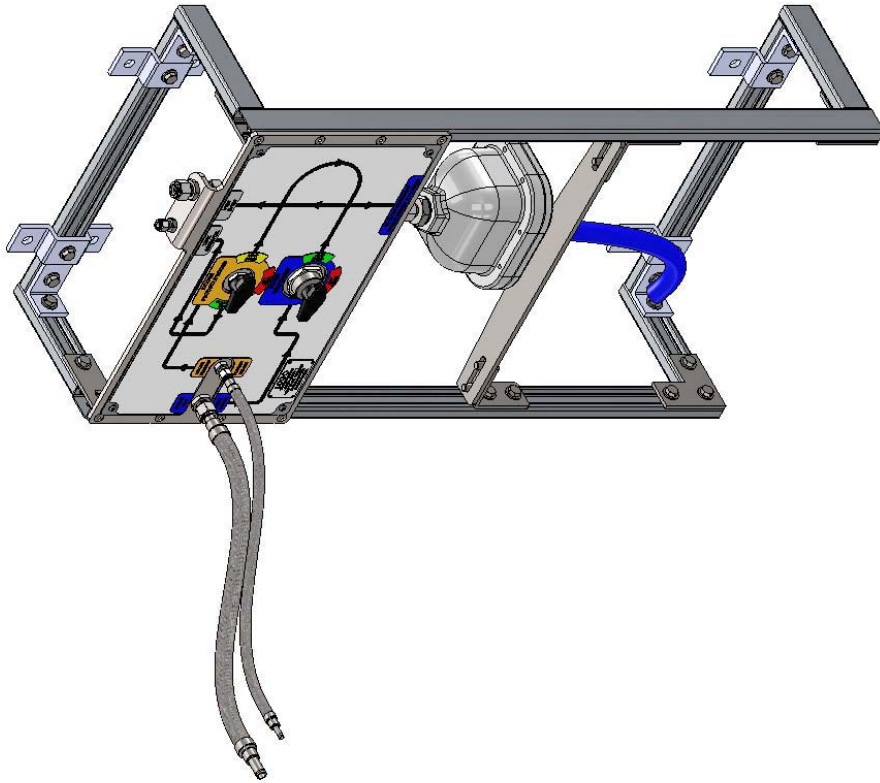
#### **Safe Product Selection**

**When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user. The complete catalog contents must be reviewed to ensure that the system designer and user make a safe product selection.**

**Caution: Do not mix or interchange components with those of other manufacturers.**


## **Warranty Information**

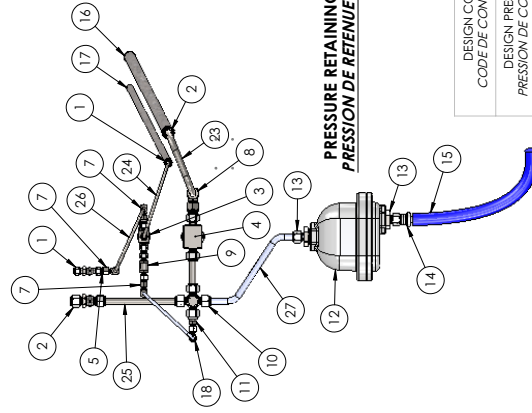
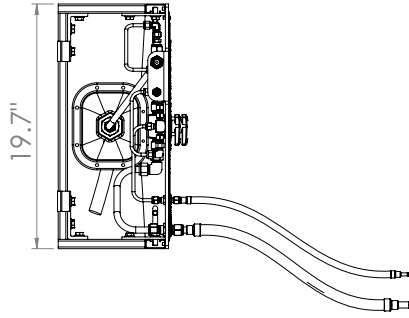
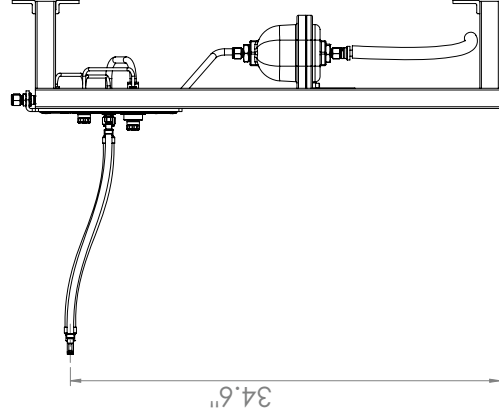
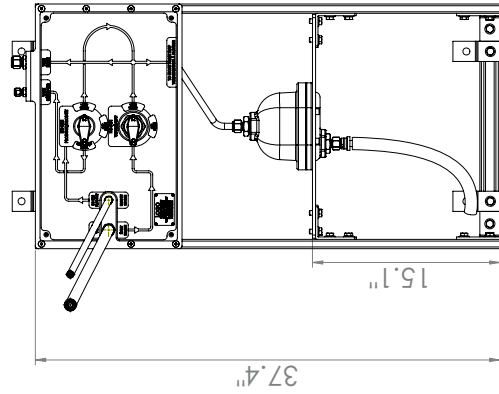
Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.



NOTES / REMARQUES :

1. The manufacturer shall have a valid certificate of authorization (C of A) to assemble and register category H fittings in accordance with CSA B51. *Le fabricant doit posséder un certificat d'autorisation valide pour assembler et enregistrer des raccords de catégorie H, conformément à la norme CSA B51.*
2. A national category H CRN shall be obtained for this assembly by the awarded manufacturer. *Le fabricant adjudicataire doit obtenir un NEC national de catégorie H pour cet ensemble.*
3. PTFE tape shall be applied to all NPT connections. *Il faut poser du ruban PTFE sur tous les raccords NPT.*
4. All tubing shall be deburred. *Tous les tubes doivent être ébarbés.*
5. Panel shall be assembled by a certified Swagelok technician in accordance with Swagelok Document MS-13-151. *Le panneau doit être assemblé par un technicien agréé Swagelok, conformément au document MS-13-151 de Swagelok.*
6. Each assembly manufactured shall be pneumatically pressure tested with helium in accordance with ASME B31.3 pressure test requirements. Each joint shall be verified leak free by applying Swagelok Snoop bubble soap solution. No bubbles are permitted. *La pression pneumatique de chaque ensemble fabrique doit être éprouvée avec de l'hélium, conformément aux exigences d'essai de pression de la norme B31.3 de l'ASME. L'étanchéité de chaque joint doit être éprouvée en utilisant une solution savonneuse Snoop de Swagelok. Aucune bulle n'est permise.*
7. When a catch basin (P/N OTAWA-30009-4) is not required, a 10 foot PB hose is required in lieu of the short PB hose (item 15). *Lorsqu'un puisard (pièce OTAWA n° 3009-4) n'est pas exigé, un tuyau PB de 10 pieds est nécessaire, au lieu du tuyau PB court (article 15).*

DESIGN CODE CODE DE CONCEPTION	ASME B31.3	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF EC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF EC IS PROHIBITED.  EXCLUSIFS ET CONFIDENTIELS LES INFORMATIONS CONTENUES DANS CE Dessin EST LA PROPRIÉTÉ EXCLUSIVE DE ENVIRONNEMENT CANADA. TOUTE REPRODUCTION EN PARTIE OU EN ENSEMBLE SANS L'ACCORD ÉCRIT LA PERMISSION DE EC EST INTERDITE.	DRAWN ÉTABLI REVIEWED BY VÉRIFIÉ PAR ENG. APPR. ING. APPROUVÉ	NAME/NOM AW PL	DATE 19/01/12 16/03/12	 Environment Canada Environnement Canada Meteorological Service of Canada Service Météorologique du Canada	
DESIGN PRESSURE PRESSION DE CONCEPTION	300 psig						
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	200 psig						
DESIGN TEMPERATURE TEMPÉRATURE	-40°C to 50°C						
REGISTRATION INSCRIPTION	Category H CATÉGORIE H	UNLESS OTHERWISE SPECIFIED: SAUF INDICATION CONTRAIRE DIMENSIONS ARE IN INCHES DIMENSIONS SONT EN POUCES TOLERANCES/TOLERANCES: FRACTIONAL/FRACTIONNELLE ± 0.1 inch	TITLE/TITRE: VENT VALVE ASSEMBLY		DWG. NO. REV OTAWA-30009-1 4	SCALE/ÉCHELLE N/A SHEET/FICHE 1 OF 6	
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI	1.1 x Design Pressure Pression de Conception						



**PRESSURE RETAINING & VENT COMPONENTS**  
**PRESSION DE RETENUE & VENT DES COMPOSANTS**

NOTES / REMARQUES :

8. Refer to sheet 3 for frame bill of materials.  
*Consulter la feuille n° 3 pour la nomenclature.*

DESIGN CODE CODE DE CONCEPTION	ASME B3.1.3
DESIGN PRESSURE PRESSION DE CONCEPTION	300 psig
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	200 psig
DESIGN TEMPERATURE TEMPERATURE REGISTRATION INSCRIPTION	-40°C to 50°C Category H CATÉGORIE H
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI PNEUMATIQUE	1.1 - 1.33 x Design Pressure Presson de Conception

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	NAME/NOM	DATE
DRAWN ETABL	AW	19/01/11
REVIEWED BY REVU PAR ENG APPR.	PL	16/03/11

UNLESS OTHERWISE SPECIFIED:  
SAUF INDICATION CONTRAIRE

DIMENSIONS ARE IN INCHES  
DIMENSIONS SONT EN POUCES

TOLERANCES/TOLÉRANCES:  
FRACTIONAL/FRACTIONNE ± 0.1inch

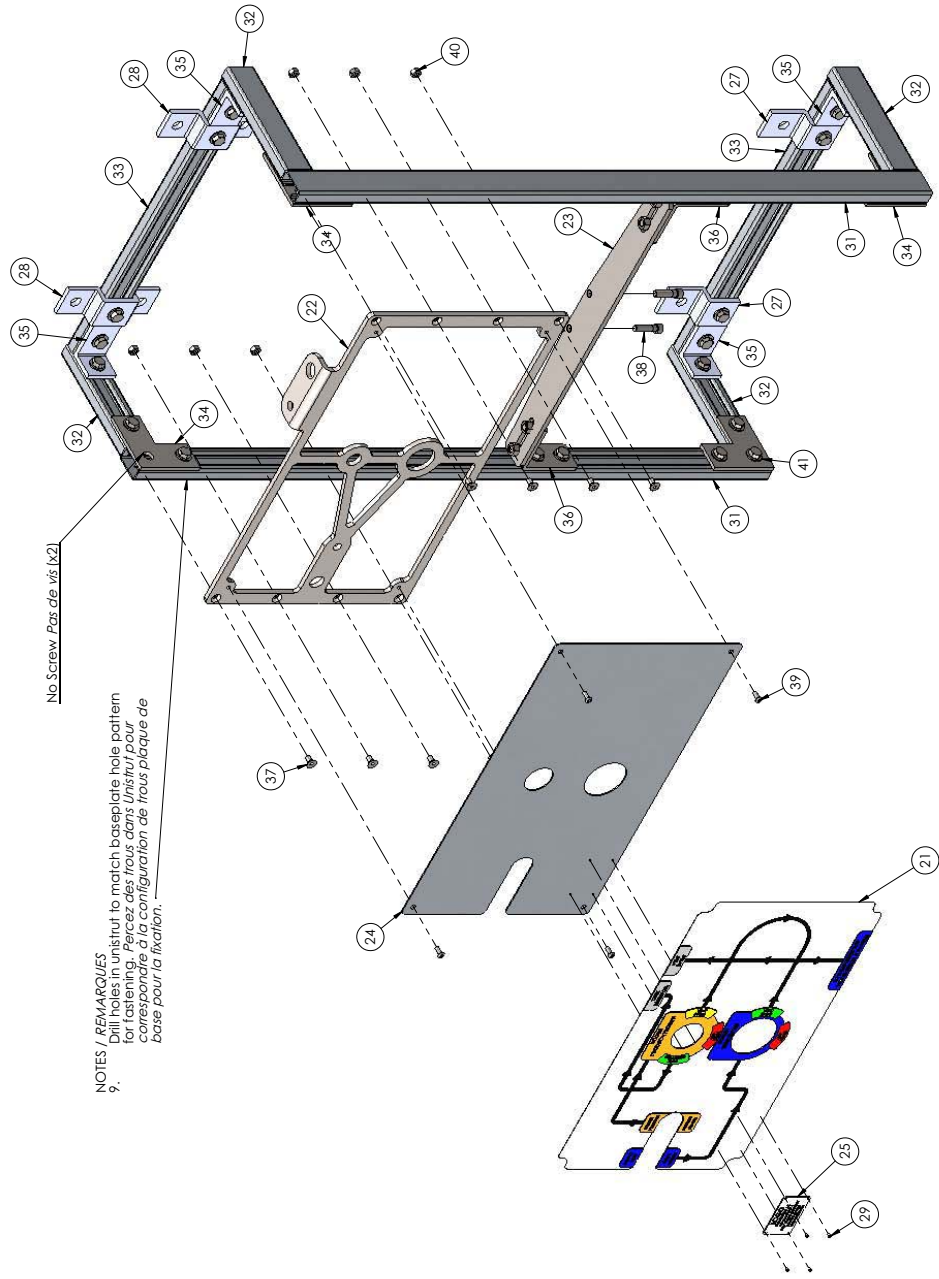
  **Environnement  
Canada**  
Meteorological Service of Canada  
*Service Météorologique du Canada*

VENT VALVE ASSEMBLY	REV
<b>OTAWA-30009-1</b>	<b>4</b>
SCALE/ÉCHELLE N/A SHEET/FICHE 2 OF 2	

ITEM N°	QTY	PART NUMBER / N° DE PIECE	MATERIAL	CRN / NEC	DESCRIPTION
1	2	SS-400-61	316SS	0A12577.5	316SS, SWAGELOK, 1/4" BULKHEAD UNION, 316SS, RACCORD DE CLOISON UNION 1/2 PO DE SWAGELOK
2	2	SS-810-61	316SS	0A12577.5	316SS, SWAGELOK, 1/2" BULKHEAD UNION, 316SS, RACCORD CLOISON UNION 1/2 PO DE SWAGELOK
3	1	SS-43GX54	316SS	0C12577.5 ADD3	316SS, SWAGELOK, 1/4" 40 SERIES, 3-WAY VALVE, 316SS, SOUPAPE 3 VOIES DE 1/2 PO SERIE 40, SWAGELOK
4	1	SS-4558	316SS	0C12577.5 ADD3	316SS, SWAGELOK, 1/2" 40 SERIES 2-WAY VALVE, 316SS, SOUPAPE 3 VOIES DE 1/2 PO SERIE 40, SWAGELOK
5	4	SS-401-PC	316SS	0A12577.5	316SS, SWAGELOK, 1/4" PORT CONNECTOR, 316SS, CONNECTEUR DE PORT DE 1/4 PO, SWAGELOK
6	1	SS-811-PC	316SS	0A12577.5	316SS, SWAGELOK, 1/2" PORT CONNECTOR, 316SS, CONNECTEUR DE PORT DE 1/2 PO, SWAGELOK
7	3	SS-400-9	316SS	0A12577.5	316SS, SWAGELOK, 1/4" UNION ELBOW, 316SS, COUDE UNION DE 1/4 PO, SWAGELOK
8	1	SS-810-9	316SS	0A12577.5	316SS, SWAGELOK, 1/2" UNION ELBOW, 316SS, COUDE UNION DE 1/2 PO, SWAGELOK
9	1	SS-4C-EP-5	316SS	0C12577.5 ADD2	316SS, SWAGELOK, 1/4" CHECK VALVE, 5PSIG, 316SS, CLAPET ANTIRETOUR DE 1/2 PO, 5LB/PO2 M, SWAGELOK
10	1	SS-810-4	316SS	0A12577.5	316SS, SWAGELOK, 1/2" UNION CROSS, 316SS, RACCORD EN CROIX DE 1/2 PO, SWAGELOK
11	1	SS-400-R-8	316SS	0A12577.5	316SS, SWAGELOK, 1/4" 112" REDUCER, 316SS, RÉDUCTEUR DE 1/4" O A 1/2 PO, SWAGELOK
12	1	95-AC	316SS	N/A	HAYWARD-EATON 95-AC FLOAT DRAIN TRAP, SIPHON FLOTTANT HAYWARD-EATON 95-AC
13	2	SS-810-1-16	316SS	0A12577.5	316SS, SWAGELOK, 1" NPT TO 1/2" TUBING, 1" PO MINET 1/2" PO
14	1	SS-P88-TA8	316SS	0A12577.5	316SS, SWAGELOK, 1/2" TA X HOSE CONNECTOR, 316SS, RACCORD DE TUYAU DE 1/2 PO TA X SWAGELOK
15	1	PB-8	PB HOSE TUYAU PB	0D12577.5	10 FT 1/2 PO TA X SWAGELOK, RUBBER HOSE, TUYAU EN CAOUTCHOUC, 10 PI, SERIE PB, SWAGELOK
16	1	SS-FJ8TA8SL-18	316SS	0D12415.5	SWAGELOK FLEX METAL HOSE 18" TUYAU MÉTALLIQUE FLEX METAL HOSE 18" TUYAU
17	1	SS-FJ4TA4SL-19	316SS	0D12415.5	SWAGELOK FLEX METAL HOSE 19" TUYAU MÉTALLIQUE FLEX METAL HOSE 19" TUYAU
18	1	SS-400-2R-4	316SS	0A12577.5	316SS, SWAGELOK, REDUCING ELBOW, 316SS, RÉDUCTEUR SWAGELOK
19	1	SS-T4-S-035-20	TP316/316L	N/A	ASME S2429, 1/4" X 3/16" 1/4" PO X 3/16" WALL TUBE DIA. EXT. 1/4" PO X 3/16" 0.035 PO, ASME S2429
20	1	SS-T8-S-035-20	TP316/316L	N/A	ASME S2429, 1/2" X 3/16" 1/2" PO X 3/16" WALL TUBE DIA. EXT. 1/2" PO X 3/16" 0.035 PO, ASME S2429



ITEM N° ART. N°	QTY QTE	PART NUMBER / N° DE PIÈCE	DESCRIPTION
21	1	OTAWA-30009-1-LABEL-R1	SHEET 4 / FEUILLE 4
22	1	OTAWA-30009-1-BASEPLATE	SHEET 6 / FEUILLE 6
23	1	OTAWA-30009-1-BRACKET-R1	SHEET 6 / FEUILLE 6
24	1	OTAWA-30009-1-COVERPLATE	SHEET 6 / FEUILLE 6
25	1	MS-NAMEPLATE-3	SHEET 6 / FEUILLE 6
26	26	P4008-EG	3/8" Unistrut Nut, Ecou Unistrut 3/8 po.
27	2	P3345-EG	Unistrut Z shape Bracket, Support en Z Unistrut
28	2	P4047-EG	Unistrut U shape bracket, Support en U Unistrut
29	4	RIVET	1/8" Aluminum Pop Rivet, Rive de sûreté en aluminium de 1/8 po.
30	30	HHCS037075EG	Unistrut Hex Head Cap Screw 3/8" X 3/4", Vis capuchon à tête hexagonale Unistrut de 3/8 po x 3/4 po.
31	2	P3300-EG	Aluminum Unistrut, Length = 37.4 inches, Unistrut en aluminium, longueur de 37.4 po
32	4	P3300-EG	Aluminum Unistrut, Length = 7 inches, Unistrut en aluminium, longueur de 7 po.
33	2	P3300-EG	Aluminum Unistrut, Length = 18.19 inches, Unistrut en aluminium, longueur de 18.19 po.
34	4	P1036-EG	Unistrut, 90° Deg Bracket, Support Unistrut à 90 degrés.
35	4	P1026-EG	Unistrut L One Hole Bracket, Support Unistrut en L à un trou.
36	2	P1325-EG	Unistrut L Two Hole Bracket, Support Unistrut en L à deux trous.
37	8	SCHSCREW 0.25-20X0.5X0.5-HX-N	Hardware / Quincaillerie
38	2	SOCKET CAP SCREW, 3/8-16X 1 3/4, Vis capuchon à douille, 3/8-16X 1 3/4	Hardware / Quincaillerie
39	4	SBHCSREW 0.19-24X0.5-HX-N	Hardware / Quincaillerie
40	8	HNUT 0.2500-20-D-N, Ecou hexagonal 0.2500-20-D-N	Hardware / Quincaillerie
41	30	HLFW037EG	Unistrut Washer, 3/8", Rondelle Unistrut, 3/8 po



**NOTES / REMARQUES**  
 Drill holes in unistrut to match baseplate hole pattern for fastening. Percevez des trous dans unistrut pour correspondre à la configuration de trous plaque de base pour la fixation.

**Environment Canada**  
**Meteorological Service of Canada**  
**Service Météorologique du Canada**

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NAME/NO	DATE
A W	19/01/12
PL	16/03/12
REVIEWED BY	
ENG APPR	
APPR. D'INGÉ	

UNLESS OTHERWISE SPECIFIED:  
 SAUF INDICATION CONTRAIRE

DIMENSIONS ARE IN INCHES  
 DIMENSIONS SONT EN POUCES

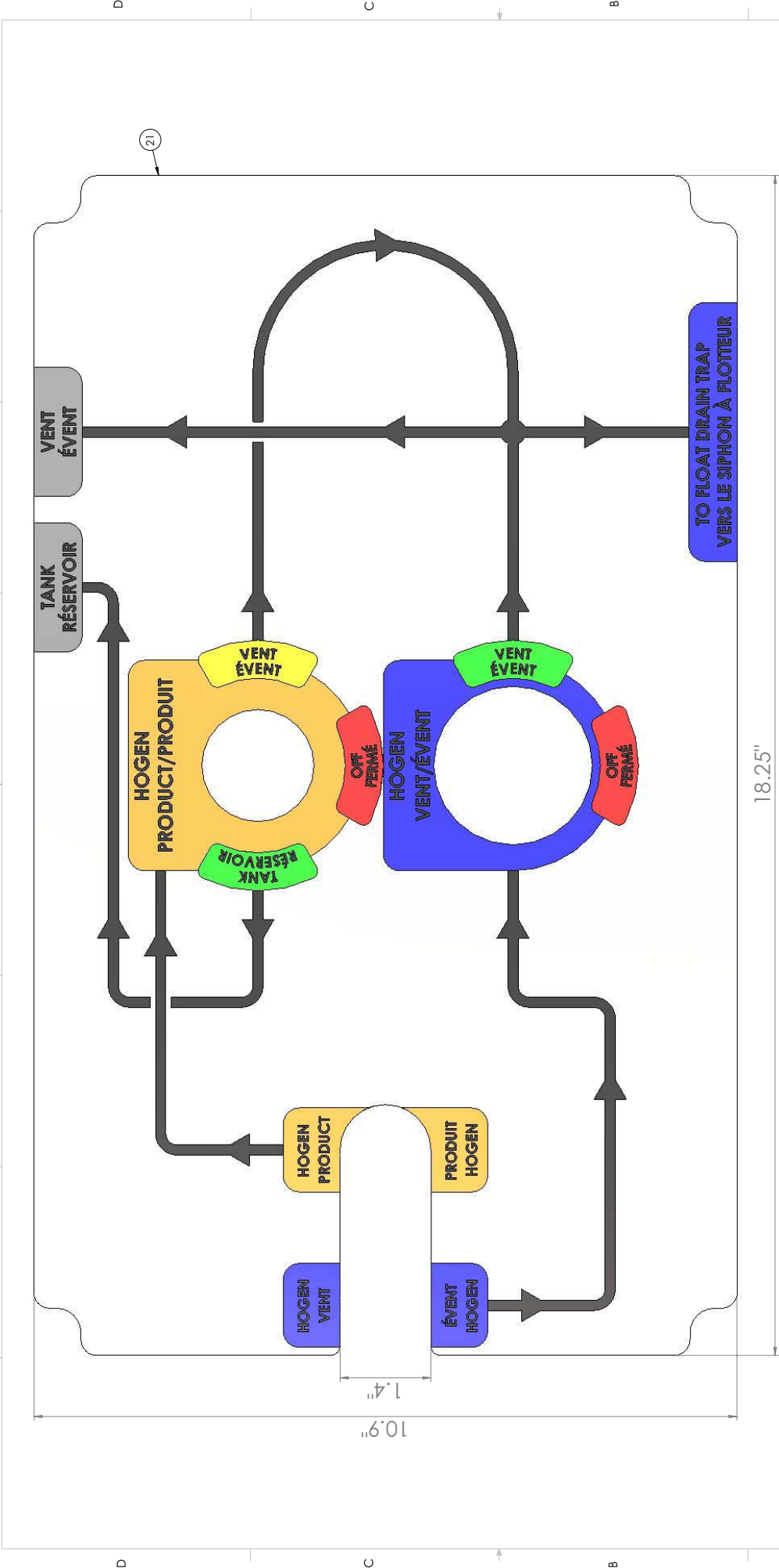
TOLERANCES/TOLÉRANCES:  
 FRACTIONNAI/FRACTIONNELLE ± 0.1 inch

**VENT VALVE ASSEMBLY**

DWG. NO. **OTAWA-30009-1**

REV **4**

SCALE/ÉCHELLE N/A. SHEET/FICHES OF 6



<b>ITEM N° QTY</b> <b>ART. N° QTE</b>		<b>PART NUMBER / N° DE PIÈCE</b>	<b>DESCRIPTION</b>
21	1	OTAWA-30009-1-LABEL-R1	Vinyl label, adhesive back, with clear matte laminate top coat. Refer to (OTAWA-30009-1-LABEL-R1.AI) FILE FOR PRINTING. Étiquette en vinyle, verso adhésif, avec surface laminée mate transparente. Consulter le fichier (.AI) pour l'impression.

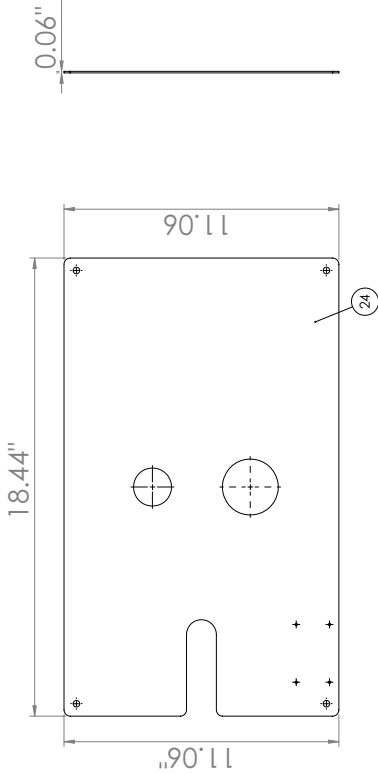
<b>PROPRIETARY AND CONFIDENTIAL</b> THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF EC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF EC IS PROHIBITED.		<b>ENVIRONMENT CANADA</b> MÉTÉOROLOGICAL SERVICE OF CANADA SERVICE MÉTÉOROLOGIQUE DU CANADA	<b>DATE</b> 19/01/12 16/03/12
<b>DRAWN</b> ETAB	<b>NAME/NOM</b> A W	<b>REVIEWED BY</b> REVU PAR	<b>DATE</b> 19/01/12 16/03/12
<b>ENG APPR</b> APPR. D'INGÉ			

<b>EXCLUSIFS ET CONFIDENTIELS</b> LES INFORMATIONS CONTENUES DANS CE Dessin EST LA PROPRIÉTÉ EXCLUSIVE DE L'ENVIRONNEMENT CANADA. TOUTE REPRODUCTION EN PARTIE OU EN ENSEMBLE SANS L'ACCORD ÉCRIT LA PERMISSION DE EC EST INTERDITE.		<b>TITLE/TITRE:</b> VENT VALVE ASSEMBLY	
		<b>DWG. NO.</b> OTAWA-30009-1	<b>REV</b> 4

<b>SCALE/ÉCHELLE</b> N/A		<b>SHEET/FICHE</b> 4 OF 6	
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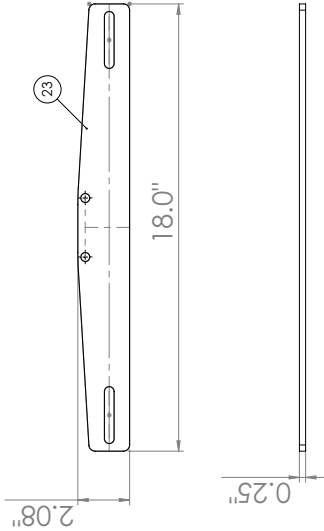
ITEM N° ART. N°	QTY QTÉ	PART NUMBER / N° DE PIÈCE	DESCRIPTION
24	1	OTAWA-30009-1-COVERPLATE	304SS, 16 Gauge, #4 Finish, 304SS, calibre 16, finition n° 4

10. Refer to OTAWA-30009-2-COVERPLATE.DXF file in 1:1 ratio for laser cut.  
Consulter le fichier OTAWA-30009-2-COVERPLATE.DXF à l'échelle 1:1 pour la découpe au laser.



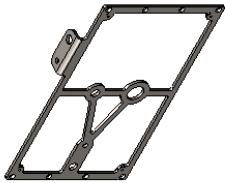
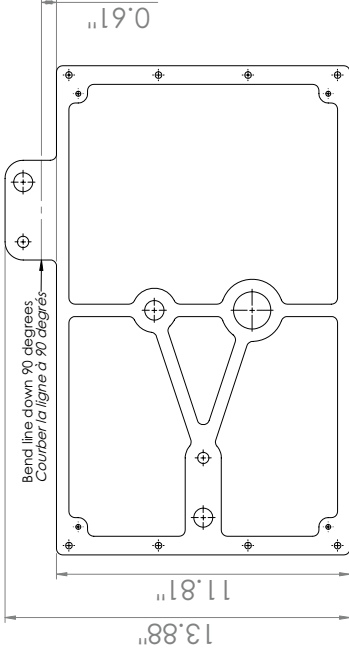
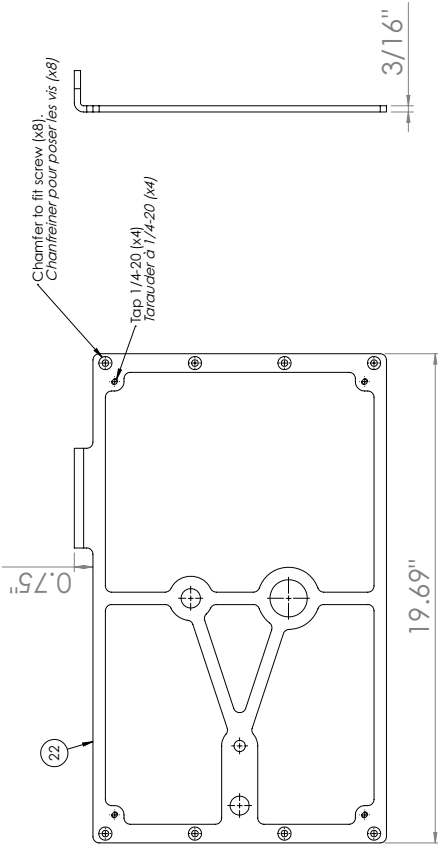
ITEM N° ART. N°	QTY QTÉ	PART NUMBER / N° DE PIÈCE	DESCRIPTION
23	1	OTAWA-30009-1-BRACKET-R1	304SS, 1/4inch thick, mill finish, 304SS, épaisseur 1/4 PO, aspect mat 1.


11. Refer to OTAWA-30009-2-BRACKET.DXF file in 1:1 ratio for laser cut.  
Consulter le fichier OTAWA-30009-2-BRACKET.DXF à l'échelle 1:1 pour la découpe au laser.

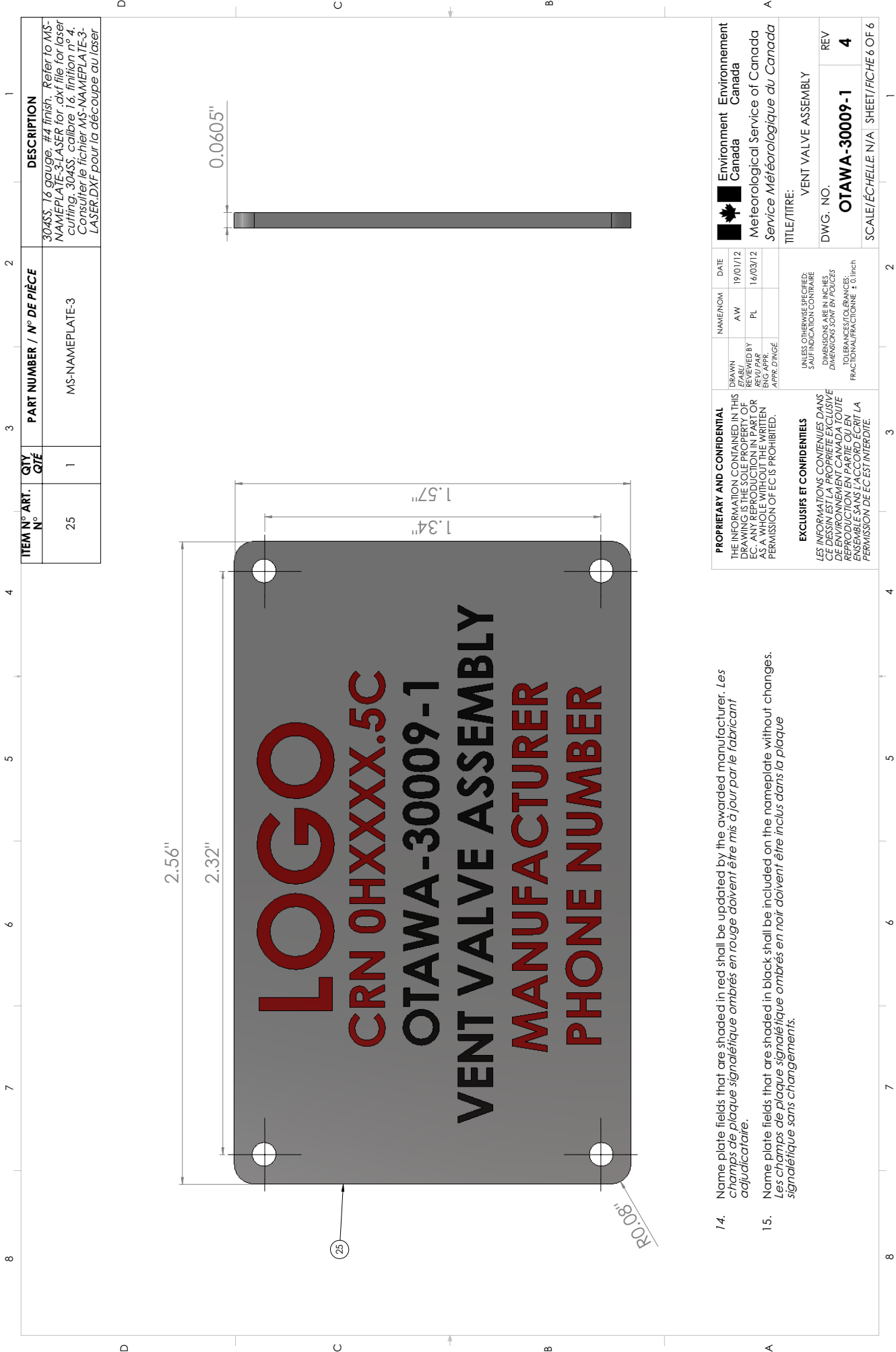


ITEM N° ART. N°	QTY QTÉ	PART NUMBER / N° DE PIÈCE	DESCRIPTION
22	1	OTAWA-30009-1-BASEPLATE	304SS, 3/16" Thick, #4 Finish, 304SS, épaisseur de 3/16 po, finition.

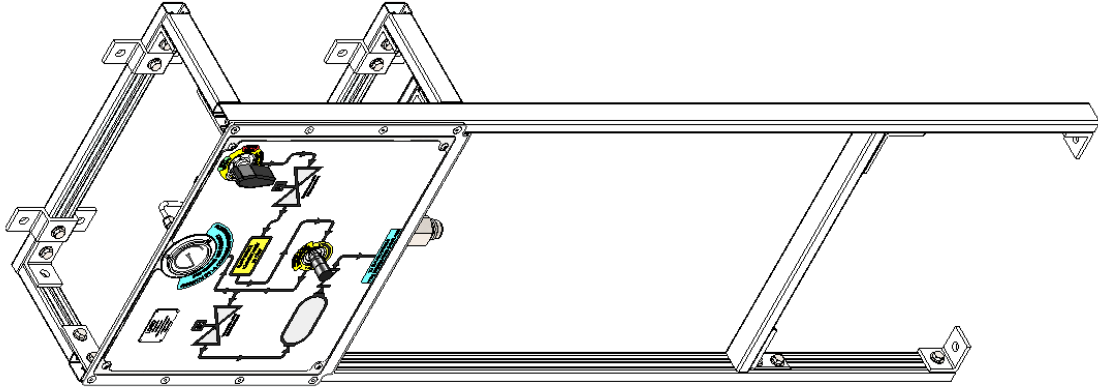
12. Refer to OTAWA-30009-2-BASEPLATE-LASER.DXF file in 1:1 ratio for laser cut. Consulter le fichier OTAWA-30009-2-BASEPLATE-LASER.DXF à l'échelle 1:1 pour la découpe au laser.  
13. Tap and chamfer screw holes after laser cutting. Tarauder et chanfreiner les trous de vis après la découpe au laser.



<div> Environment Canada</div> <div>Meteorological Service of Canada Service Météorologique du Canada</div>			
TITLE/TITRE:		VENT VALVE ASSEMBLY	
DWG. NO.		REV	
OTAWA-30009-1		4	
UNLESS OTHERWISE SPECIFIED: SAUF INDICATION CONTRAIRE		DIMENSIONS ARE IN INCHES DIMENSIONS SONT EN POUCES	
TOLERANCES/TOLÉRANCES: FRACTIONNAU/FRACTIONNE ± 0.1 inch			
SCALE/ÉCHELLE N/A SHEET/FICHES OF 6			



14. Name plate fields that are shaded in red shall be updated by the awarded manufacturer. Les champs de plaque signalétique ombrés en rouge doivent être mis à jour par le fabricant adjudicataire.
15. Name plate fields that are shaded in black shall be included on the nameplate without changes. Les champs de plaque signalétique ombrés en noir doivent être inclus dans la plaque signalétique sans changements.



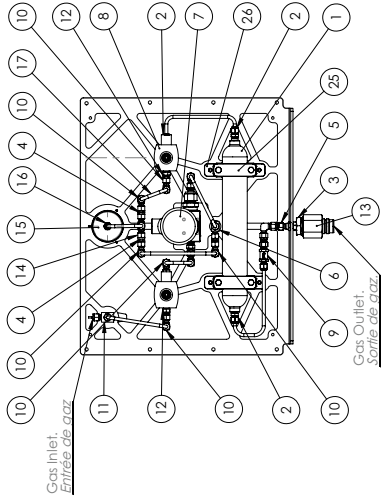
NOTES / REMARQUES:

1. The manufacturer shall have a valid certificate of authorization (C of A) to assemble and register category H fittings in accordance with CSA B51. Le fabricant doit posséder un certificat d'autorisation pour assembler et enregistrer des raccords de catégorie H, conformément à la norme CSA B51.
2. A national category H CRN shall be obtained for this assembly by the awarded manufacturer. Le fabricant adjudicataire doit obtenir un NEC national de catégorie H pour cet ensemble
3. PTFE tape shall be applied to all NPT connections. Il faut poser du ruban PTFE sur tous les raccords NPT.
4. All tubing shall be deburred. Tous les tubes doivent être ébarbés.
5. Panel shall be assembled by a certified Swagelok technician in accordance with Swagelok Document MS-13-151. Le panneau doit être assemblé par un technicien agréé Swagelok, conformément au document MS-13-151 de Swagelok.
6. Each assembly manufactured shall be pneumatically pressure tested with helium in accordance with ASME B31.3 pressure test requirements. Each joint shall be verified leak free by applying Swagelok Snoop bubble soap solution. No bubbles are permitted. La pression pneumatique de chaque ensemble fabriqué doit être éprouvée avec de l'hélium, conformément aux exigences d'essai de pression de la norme B31.3 de l'ASME. L'étanchéité de chaque joint doit être éprouvée en utilisant une solution savonneuse Snoop de Swagelok. Aucune bulle n'est permise.

DESIGN CODE CODE DE CONCEPTION	ASME B31.3	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DESIGN IS THE PROPERTY OF THE COMPANY AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF ORSTNC. IS PROHIBITED.		DRAWN ÉTABLI	NAME/NOM	DATE	Environment Canada
DESIGN PRESSURE PRESSION DE CONCEPTION	300 psig	EXCLUSIFS ET CONFIDENTIELS LES INFORMATIONS CONTENUES DANS CE Dessin EST LA PROPRIÉTÉ EXCLUSIVE DE L'ENVIRONNEMENT CANADA. TOUTE REPRODUCTION EN PARTIE OU EN ENSEMBLE SANS L'ACCORD ÉCRIT DE L'ENVIRONNEMENT CANADA EST INTERDITE.		REVIEWED BY REVU PAR	A W	04/02/12	Canada
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	200 psig			ENG APPR APPR. D'INGÉ	PL	16/03/12	Meteorological Service of Canada Service Météorologique du Canada
DESIGN TEMPERATURE TEMPÉRATURE	-40°C to 30°C	UNLESS OTHERWISE SPECIFIED: SAUF INDICATION CONTRAIRE DIMENSIONS ARE IN INCHES DIMENSIONS SONT EN POUCES TOLERANCES/TOLERANCES: FRACTION/AUFRACTIONNE ± 0.1 inch		TITLE/TITRE: DISPENSING VALVE ASSEMBLY			
REGISTRATION INSCRIPTION	Category H CATÉGORIE H			DWG. NO. REV			
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI	1.1-1.33 x Design Pressure Pression de Conception			OTAWA-30009-2 3			
				SCALE/ÉCHELLE N/A SHEET/FICHE 1 OF 6			



ITEM N° ART N°	QTY	PART NUMBER / N° DE PIÈCE	MATERIAL MATÉRIAU	CRN / NEC	DESCRIPTION
1	1	316L-HDF4-500	316SS	DOT Cert	Swagelok, Sample Cylinder, 1/4inch FNPT, 500 ml, Bouteille à échantillons Swagelok, ¼ po FNPT, 500 ml, Swagelok, 316SS, 1/4" Male Connector, Connecteur mâle Swagelok, ¼ po, 316SS.
2	3	SS-400-1-4	316SS	OA12577.5	Swagelok, 316SS Reducing Bushing, 1inch Male NPT x 1/4inch Female NPT, OA 12577.5ADD4 Bague réductrice Swagelok, 1 po NPT mâle x ¼ po NPT femelle.
3	1	SS-1-6-RB-4	316SS	OA12577.5ADD4	Swagelok, 316SS, 1/4inch Port Connector, Connecteur de port Swagelok, 316SS, ¼ po.
4	5	SS-401-PC	316SS	OA12577.5	Swagelok, 316SS, 1/4inch Port Connector, Connecteur de port Swagelok, 316SS, ¼ po.
5	1	SS-400-11-4	316SS	OA12577.5	Swagelok, 316SS, 1/4inch to 1/4inch NPT Bulkhead Union, Raccord de traversée Swagelok, 316SS, ¼ po à ¼ po NPT.
6	1	SS-4MA-EPMH	316SS	OA12577.5ADD4	Swagelok, 316SS, Melting Valve, 1/4" Swagelok Tube Fitting, Vernier Handle, Ethylene Propylene Stem O-Ring, Angle Valve, Valve doseuse Swagelok, 316SS, raccord de tube Swagelok ¼ po, poignée vernier, Joint torique à arbre éthylène-propylène, robinet à équerre.
7	1	OTAWA-30182-2	316SS	OH15085.5	Ottawa Fluid System Technologies Inc., Aneitrol Flow Switch Assembly, Design Pressure 300 psig, National Registration Pending, Ottawa Fluid System Technologies Inc., ensemble interrupteur de débit Aneitrol Flow, pression nominale de 300 lb/po2 de pression manométrique, numéro d'enregistrement national en attente.
8	2	8262H182/826H185	316SS	OC14182.5	ASCO General Service Solenoid Valve, Stainless Steel, 1/4in MNPT, 24VDC, 2-way, Electrovanne de service général, acier inoxydable, ¼ po MNPT, 24 V C.C., 2 voies.
9	1	SS-4C-EP-5	316SS	OC12577.5ADD1	Swagelok, 316SS, Check Valve, 5 psig, 1/4inch, Ethylene Propylene, Clapet anti-retour Swagelok, 316SS, 5 lb/po2 de pression manométrique, ¼ po, éthylène-propylène.
10	7	SS-400-9	316SS	OA12577.5	Swagelok, 316SS, 1/4inch Union Elbow, Coude union Swagelok, 316SS, ¼ po.
11	1	SS-4GES4-A-LL	316SS	OA12577.5ADD3	Swagelok, 316SS, 1-Piece 40G Series Vail Valve, 1.4 Cv, 1/4inch Swagelok Tube Fitting, UHMWPE Packing, Angle Pattern, Black Latch Lock Swagelok, soupape, Valinonopie série 40G, 316SS, 1.4 Cv, raccord Angle Pattern, Black Latch Lock Swagelok, ¼ po, garnissage UHMWPE, coude bec-de-cane noir.
12	3	SS-4-TA-1-4	316SS	OA12577.5	Swagelok, 316SS, Tube Adapter, 1/4" to 1/4" MNPT, Swagelok, 316SS, adaptateur de tube, ¼ po à ¼ po MNPT.
13	1	SS-QF16-S-16PF	316SS	OA12577.5ADD2	Swagelok, SS, Full Flow Quick Connect Stem w/o Valve, 39.0 Cv, 1inch Female NPT, Swagelok, SS, arbre à raccordement rapide à débit maximal sans soupape, 39.0 Cv, 1 po femelle NPT.
14	1	SS-400-3	316SS	OA12577.5	Swagelok, 316SS, 1/4inch Union Tee, Swagelok, 316SS, Union, ¼ po.
15	1	PGI-638-PG-300-CAQX-GJ	316SS	OF02026.25	Swagelok, SS, 2 inch dial o-300 psi, 1/4inch Tube Adapter, Centerback mount, Adjustable Pointer, w/Front Flange, Swagelok, acier inoxydable, cadran de 2.5 po, o-300 lb/po2, tube adaptateur à montage centre-arrière de ¼ po, aiguille réglable, avec brique avant.
16	1	SS-400-6	316SS	OA12577.5	SS Swagelok Tube Fitting, 1/4 in. tube OD, Raccord de tube en acier inoxydable Swagelok, Union, dia. ext. De tube de ¼ po.
17	1	SS-T4-S-035-0.49	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.49 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.49 pi.
18	1	SS-T4-S-035-0.57	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.57 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.57 pi.
19	1	SS-T4-S-035-0.59	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.59 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.59 pi.
20	1	SS-T4-S-035-0.61	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.61 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.61 pi.
21	1	SS-T4-S-035-0.75	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.75 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.75 pi.
22	1	SS-T4-S-035-0.76	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.76 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.76 pi.
23	1	SS-T4-S-035-0.79	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.79 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.79 pi.
24	1	SS-T4-S-035-0.82	TP316/316LSS	N/A, S/O	ASME SA249, TP 316/316L SS, Tubing, 1/4in OD x 0.035inch wall, ~ 0.82 ft, ASME SA249, TP 316/316L SS, tube dia. ext. de ¼ po x paroi de 0.035 po, ~ 0.82 pi.
25	2	304-S6-PP-32I	N/A, S/O	N/A, S/O	Swagelok Tube Support System, 2inch OD, Système de support de tubes Swagelok, dia. ext. de 2 po.
26	2	304-S6-WPE	N/A, S/O	N/A, S/O	Elongated Tube Support Plate, Plaque de support de tubes allongée

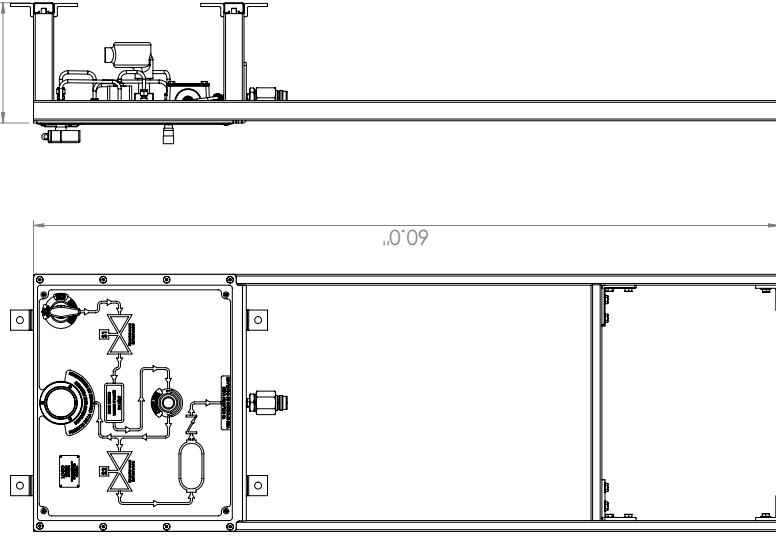
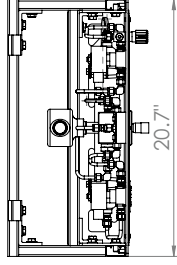


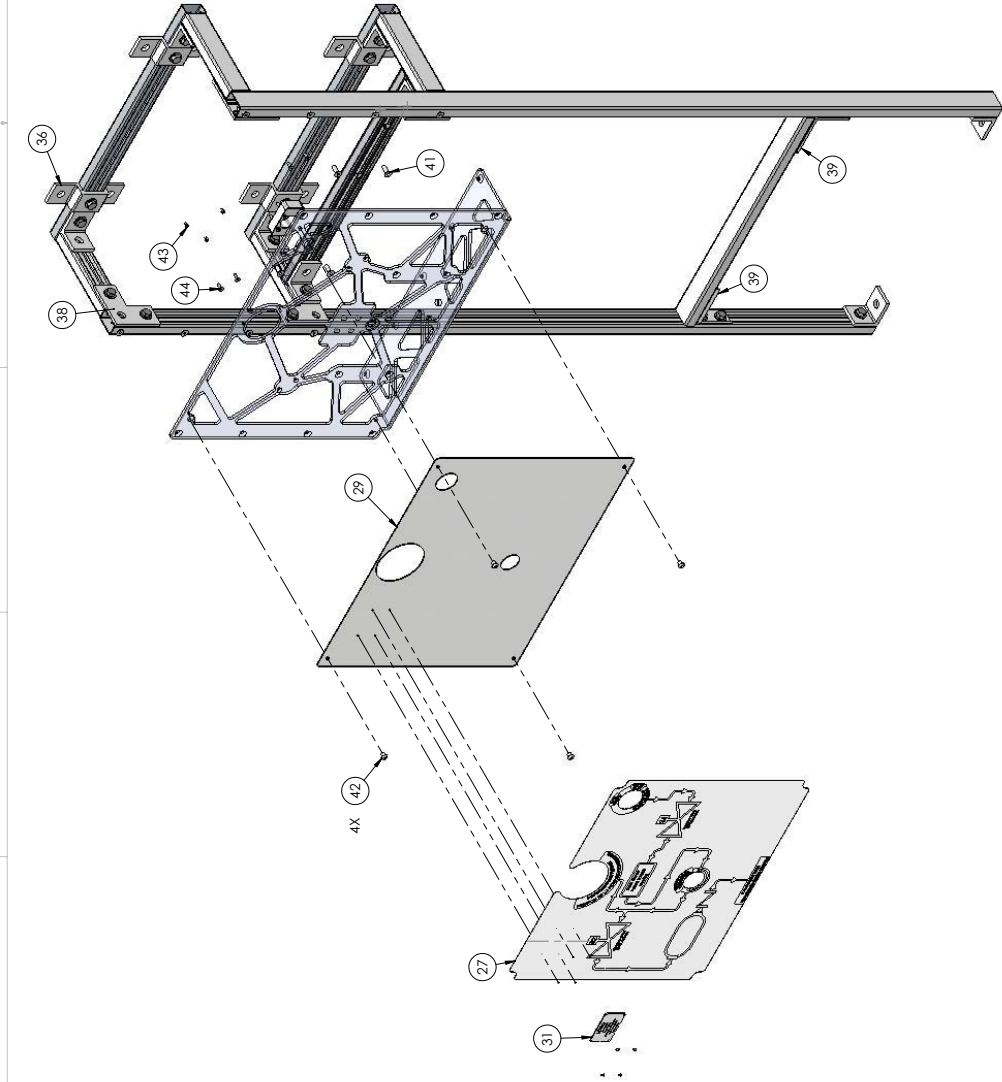
7. Refer to sheet 3 for frame bill of materials.  
Consulter la feuille 3 pour la nomenclature du cadre.

DESIGN CODE CODE DE CONCEPTION	ASMEB31.3
DESIGN PRESSURE PRESSION DE CONCEPTION	300 psig
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	200 psig
DESIGN TEMPERATURE TEMPÉRATURE	-40°C to 50°C
REGISTRATION INSCRIPTION	Category H
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI	1.1-1.33 x Design Pressure Pression de Conception

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**EXCLUSIFS ET CONFIDENTIELS**  
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ITEM N° ART N°	QTY QTE	PART NUMBER / N° DE PIÈCE	DESCRIPTION
27	1	OTAWA-30009-2-LABEL	Vinyl label, adhesive backing, clear matte laminate top coat. <i>Étiquette en vinyle, verso adhésif, couche de finition laminée mate transparente</i>
28	1	OTAWA-30009-2-SWITCHBRACKET	Refer to Sheet 5. <i>Consulter la feuille 5</i>
29	1	OTAWA-30009-2-COVERPLATE-Rev 1	Refer to Sheet 5. <i>Consulter la feuille 5</i>
30	1	OTAWA-30009-2-BASEPLATE-R2	304SS, 16 gauge, #4 finish. Refer to MS-NAMEPLATE-3-LASER for .dxf file for laser cutting. 304SS, calibre 16, finition n° 4, consulter 3-NAMEPLATE-3-LASER pour le fichier DXF pour la découpe au laser.
31	1	MS-NAMEPLATE-3	Aluminum Unistrut, Length = 5 ft. Aluminum Unistrut, longueur de 5 pi.
32	2	P3300-PG-5	Aluminum Unistrut, Length = 1.72 ft. Aluminum Unistrut, longueur de 1.72.
33	2	P3300-PG-1.72	Aluminum Unistrut, Length = 1.58 ft. Aluminum Unistrut, longueur de 1.58 pi.
34	2	P3300-PG-1.58	Aluminum Unistrut, Length = 7 inch. Aluminum Unistrut, longueur de 7 po.
35	4	P33000-PG-0.58	Unistrut, Electrogalvanized, Wall Mount Fitting, 3/8inch Hole, Unistrut, support de montage mural électrogalvanisé, trou de 3/8 po.
36	4	P4047-EG	Unistrut, Electrogalvanized 90 Degree Fitting, 3/8inch hole, Unistrut, support électrogalvanisé coudé à 90 degrés, trou de 3/8 po.
37	8	P1026-EG	Unistrut, Electrogalvanized Fitting, Flat L-Bracket, 3x 3/8inch hole, Unistrut, support électrogalvanisé plat en L, 3 trous de 3/8 po.
38	4	P1036-EG	Unistrut, Electrogalvanized Fitting, 90 degree, 4 x 3/8inch hole, Unistrut, support électrogalvanisé, coudé à 90 degrés, 4 trous de 3/8 po.
39	2	P1325-EG	Solenoid Support Screws. <i>Vis de support de solénoïde</i>
40	4	Flat Head 10-32 x 1/2". Vis à tête plate 10-32 x 1/2 po.	Baseplate and cylinder support screws. <i>Plaque de base et vis de support de bouteille.</i>
41	17	Flat Phillips MIS 188 1/4-20 x 3/4". Vis à tête plate Phillips MIS 188 1/4-20 x 3/4 po.	Cover Plate Screws. <i>Vis de couverture.</i>
42	4	Socket Head 1/4-20. Vis à pans creux 1/4-20.	Gauge screws. <i>Vis de jauge.</i>
43	3	Socket Head 8-32. Vis à pans creux 8-32.	Flow Switch Screws. <i>Vis d'interrupteur de débit.</i>
44	4	Flat Head Phillips 1/4-20, 1-1/8". Vis à tête plate Phillips 1/4-20, 1-1/8 po.	Unistrut Washer, 3/8inch. <i>Rondelle Unistrut, 3/8 po.</i>
45	32	HFLW037EG	Unistrut, Short Spring Nut, 3/8inch. Unistrut, écrou à ressort court, 3/8 po.
46	32	P4008-EG	Unistrut, 3/8" x 7/8" Hex Head Cap Screw, Unistrut, vis à tête hexagonale 3/8 po x 7/8 po.
47	2	HHCS037087E6	1/8" Aluminum Pop Rivet. <i>Rivet de sûreté en aluminium.</i>
48	4	Rivet. Rivet 1/8 po	Unistrut, 3/8" Washer. <i>Rondelle Unistrut, 3/8 po.</i>
49	27	HHCS037075EG	

DESIGN CODE CODE DE CONCEPTION	ASME B31.3
DESIGN PRESSURE PRESSION DE CONCEPTION	300 psig
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	200 psig
DESIGN TEMPERATURE TEMPÉRATURE	-40°C to 30°C
REGISTRATION INSCRIPTION	Category H Catégorie H
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI	1.1-1.33 x Design Pressure Pression de Conception

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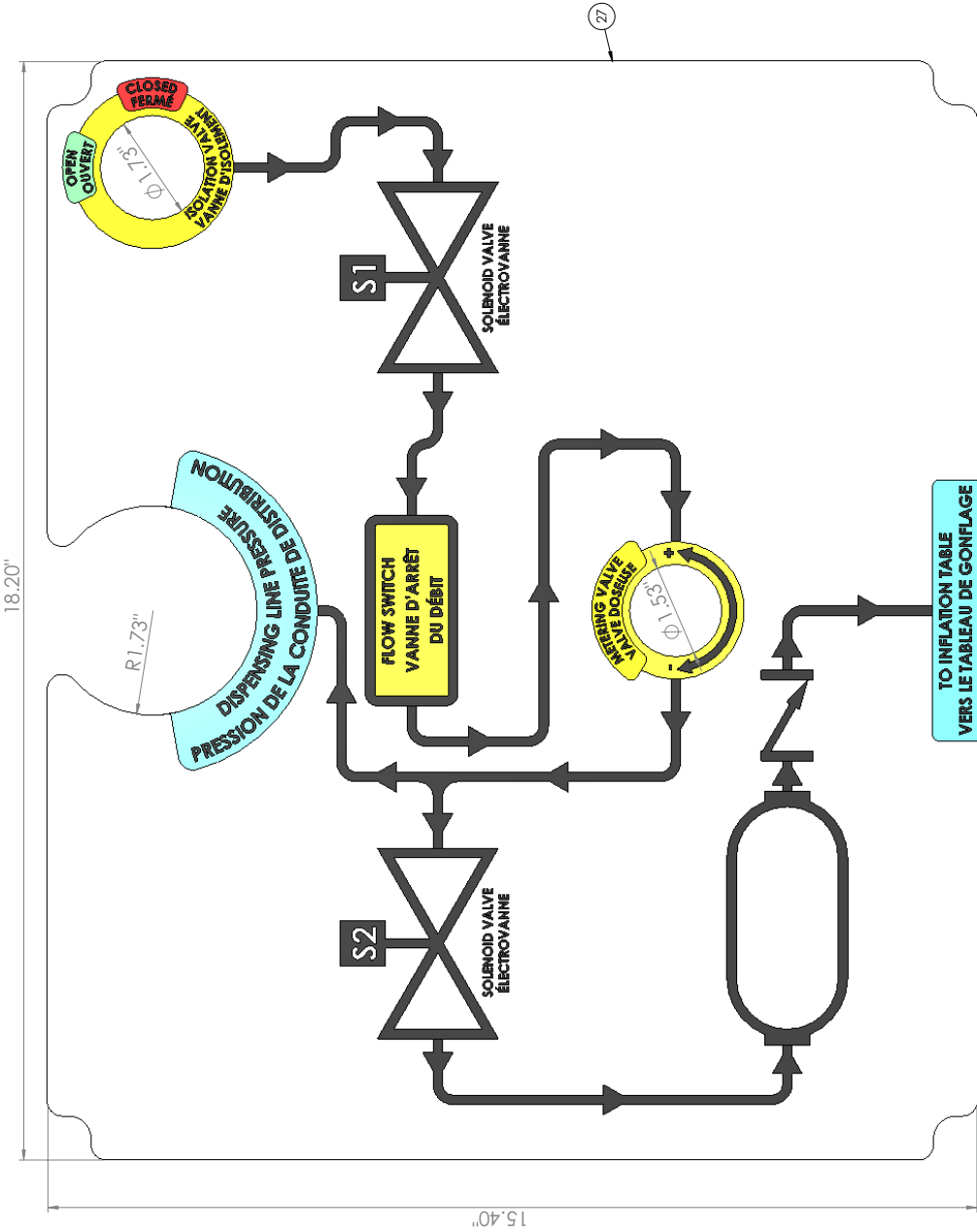
DRAWN ÉTABLI	NAME/NOM	DATE
REVIEWED BY REVU PAR	A W	04/02/12
ENG APPR. APPR. D'INGÉ	PL	16/03/12

UNLESS OTHERWISE SPECIFIED:  
SAUF INDICATION CONTRAIRE  
DIMENSIONS ARE IN INCHES  
DIMENSIONS SONT EN POUCES  
TOLERANCES/TOLERANCES:  
FRACTIONNAIR/FRACTIONNE ± 0.1 inch

 **Environment Canada**  
Meteorological Service of Canada  
Service Météorologique du Canada

TITLE/TITRE:  
DISPENSING VALVE ASSEMBLY  
DWG. NO.  
**OTAWA-30009-2**  
SCALE/ÉCHELLE N/A. SHEET/FICHES OF 6

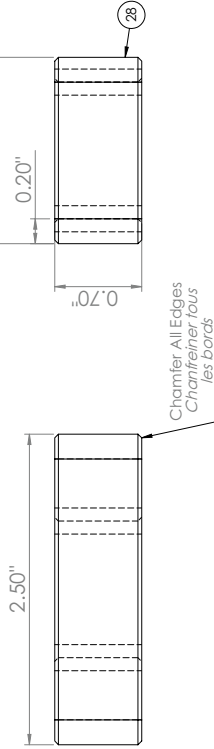
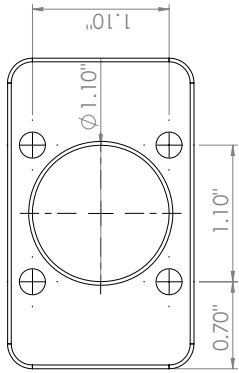
ITEM N° ART N°	QTY QTE PART NUMBER / N° DE PIÈCE	DESCRIPTION
27	1	OTAWA-30009-2-LABEL
		Vinyl label, adhesive backing, clear matte laminate top coat. Refer to OTAWA-30009-2-LABEL at file for printing. <i>Étiquette en vinyle, verso adhésif, couche de finition laminée mate transparente, consulter le fichier OTAWA-30009-2-LABEL at pour l'impression.</i>



DESIGNED ETABLI	NAME/NOM A W	DATE 04/02/12	 Environment Canada Meteorological Service of Canada Service Météorologique du Canada
REVIEWED BY REVU PAR	PL	16/03/12	
ENG APPR APPR. D'INGE			
UNLESS OTHERWISE SPECIFIED: SAUF INDICATION CONTRAIRE DIMENSIONS ARE IN INCHES DIMENSIONS SONT EN POUCES TOLERANCES/TOLERANCES: FRACTIONAL/FRACTIONNE ± 0.1inch			TITLE/TITRE: DISPENSING VALVE ASSEMBLY DWG. NO. <b>OTAWA-30009-2</b> REV <b>3</b>
SCALE/ÉCHELLE N/A			SHEET/FICHE 4 OF 6

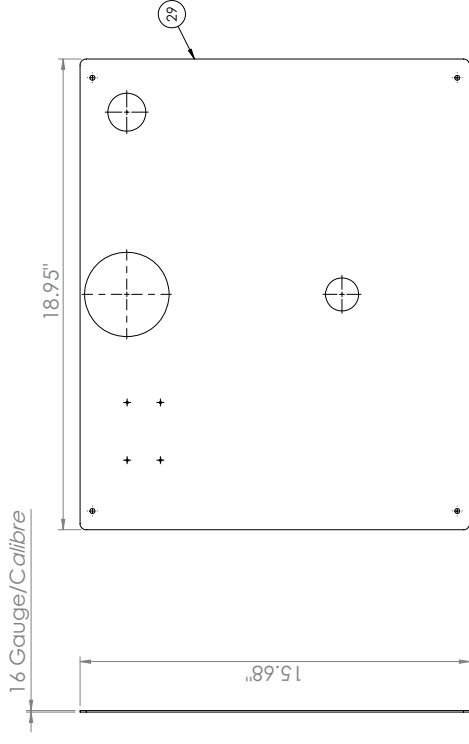


ITEM N° ART N°	QTY QTE	PART NUMBER / N° DE PIÈCE	DESCRIPTION
28	1	OTAWA-30009-2-SWITCHBRACKET	Flow switch mounting bracket. Aluminum Type 6061 raw stock. Support de montage d'interrupteur de débit, aluminium type 6061, ordinaire.



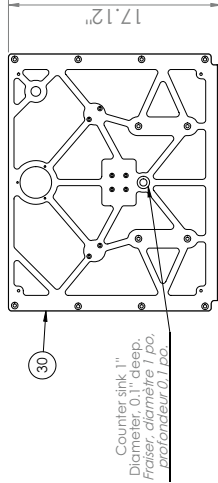
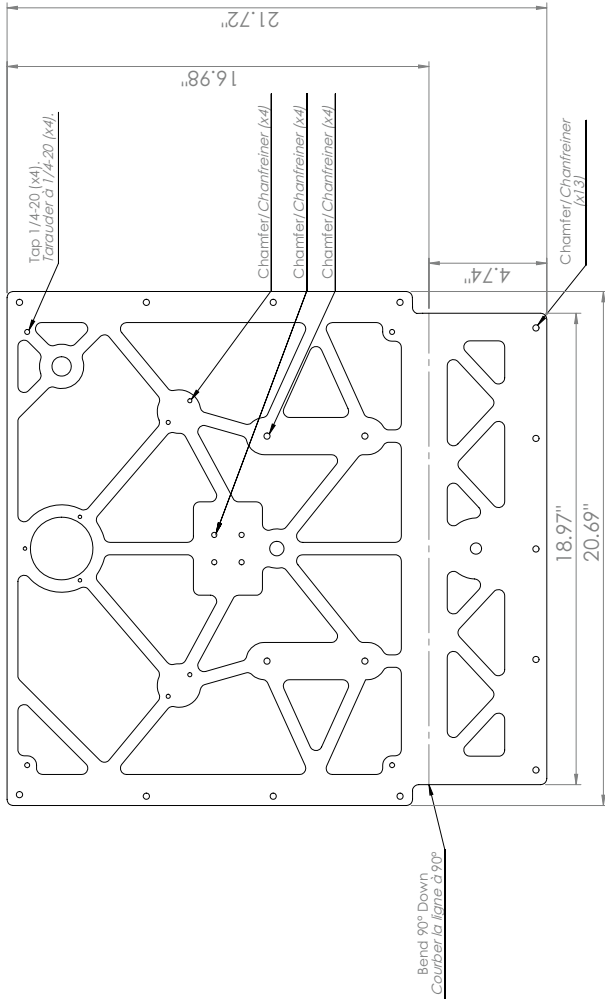
ITEM N° ART N°	QTY QTE	PART NUMBER / N° DE PIÈCE	DESCRIPTION
29	1	OTAWA-30009-2-COVERPLATE-Rev 1	304SS, 16 gauge, # 4 Finish, 304SS, calibre 16 po, finition n° 4.

8. Refer to OTAWA-30009-2-COVERPLATE.DXF file in 1:1 ratio for laser cut. Consulter le fichier OTAWA-30009-2-COVERPLATE.DXF à l'échelle 1:1 pour la découpe au laser.



ITEM N° ART N°	QTY QTE	PART NUMBER / N° DE PIÈCE	DESCRIPTION
30	1	OTAWA-30009-2-BASEPLATE-R2	304SS, 3/16", #4 Finish, 304SS, 3/16 po, finition n° 4.

9. Refer to OTAWA-30009-2-BASEPLATE-LASER.DXF file in 1:1 ratio for laser cut. Consulter le fichier OTAWA-30009-BASEPLATE-LASER.DXF à l'échelle 1:1 pour la découpe au laser.  
10. Tap and chamfer screw holes after laser cutting. Tarauder et chanfreiner les trous des vis après la découpe au laser.

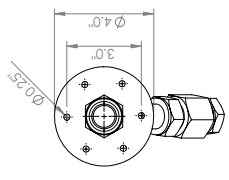
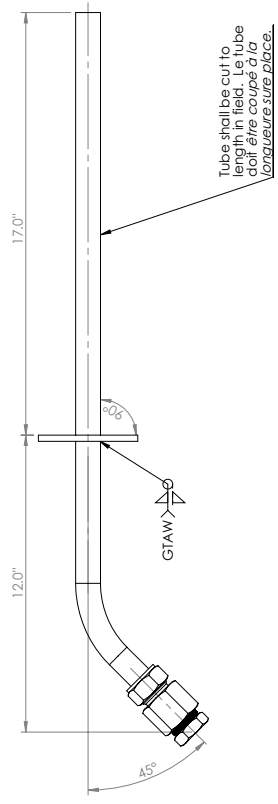
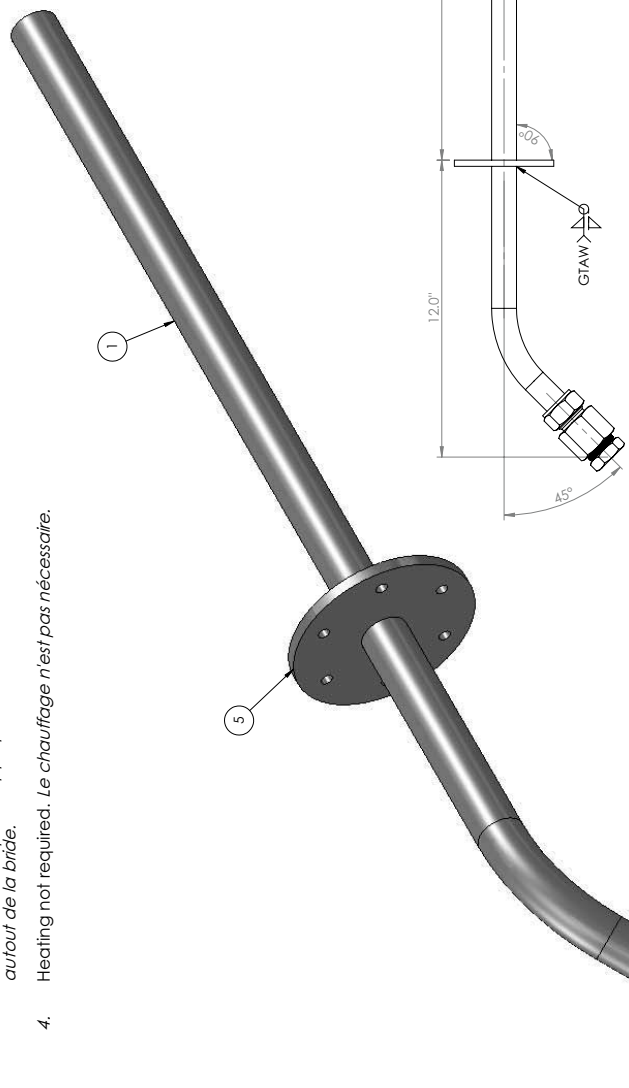
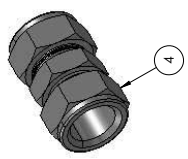


PROPRIETARY AND CONFIDENTIAL		NAME/NOM	DATE
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EXCLUSIFS ET CONFIDENTIELS		PL	16/03/12
LES INFORMATIONS CONTENUES DANS CE Dessin EST LA PROPRIÉTÉ EXCLUSIVE DE ENVIRONNEMENT CANADA. TOUTE REPRODUCTION EN PARTIE OU EN ENSEMBLE SANS L'ACCORD ÉCRIT DE ORST INC EST INTERDITE.		APPR. D'INGÉ	
UNLESS OTHERWISE SPECIFIED: SAUF INDICATION CONTRAIRE		TITLE/TITRE:	
DIMENSIONS ARE IN INCHES		DISPENSING VALVE ASSEMBLY	
TOLERANCES/TOLÉRANCES:		DWG. NO.	
FRACTIONNAIRIE ± 0.1 inch		REV	
		OTAWA-30009-2	
		3	
		SCALE/ÉCHELLE N/A SHEET/FICHES OF 6	

Environment Canada		Environment Canada	
Meteorological Service of Canada		Service Météorologique du Canada	



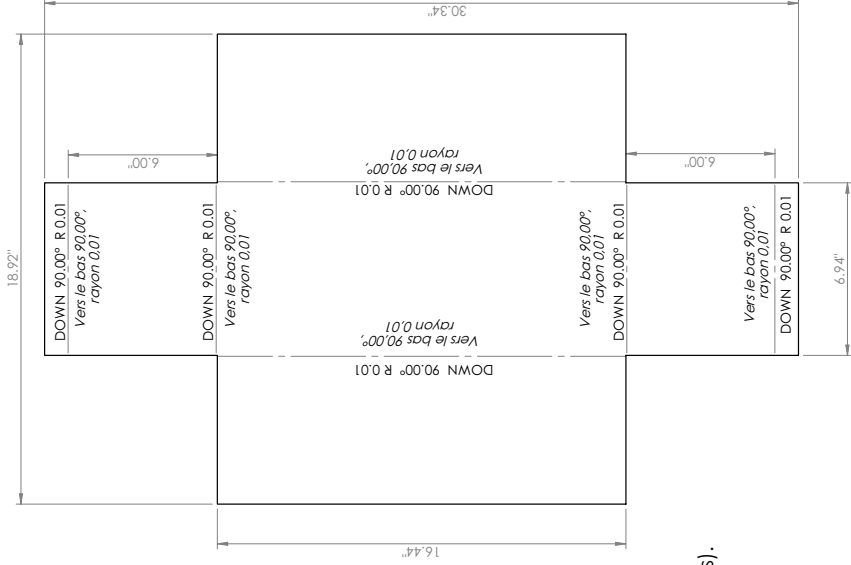
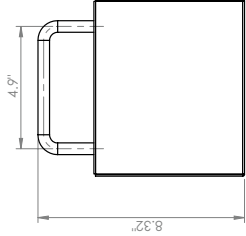
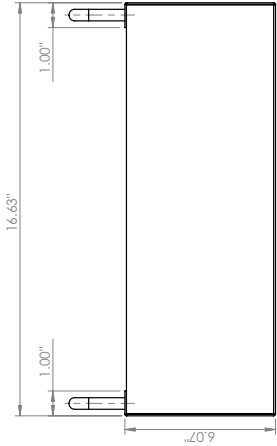
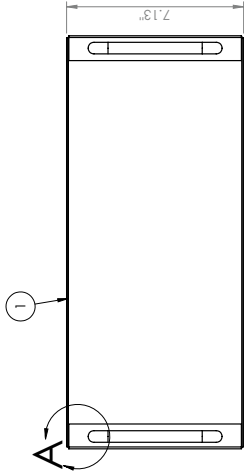
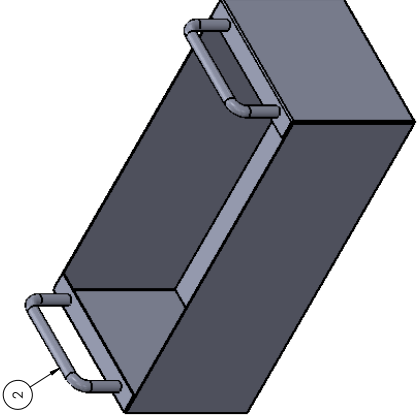
- Notes:
1. Fittings to be assembled per manufacturer recommendations. Refer to Swagelok Document MS-13-151. Les raccords doivent être assemblés conformément aux recommandations du fabricant. Consulter le document MS-13-151 de Swagelok.
  2. Tube ends shall be faced and square prior to assembly. Les extrémités des tubes doivent être usinées et d'équerre avant l'assemblage.
  3. Flange to be mounted to exterior surface of wall, sealant to be applied below and around flange. La bride doit être montée sur la surface extérieure de la paroi, appliquer du matériau d'étanchéité au-dessous et autour de la bride.
  4. Heating not required. Le chauffage n'est pas nécessaire.



ITEM N° ART N°	QTY QTÉ	PART NUMBER/DE PIÈCE	DESCRIPTION
1	1	SS-T1 6-S-083-10	316/316L Stainless Steel, 1 inch Tube OD x 0.083 inch wall, Acier inoxydable 316/316L, tube de dia. ext. de 1 po x paroi de 0.083 po.
2	1	SS-1610-7-16	SS Swagelok Tube Fitting, Female Connector, 1 in. Tube OD x 1 in. Female NPT, Support de tube Swagelok en acier inoxydable connecteur femelle de 1 po, tube de dia. ext. de 1 po x 1 po femelle NPT.
3	1	B-MD-16	Brass, 1" MNPT, Swagelok Mud Dauber, Contre-écrou Swagelok en laiton, 1 po MNPT.
4	1	SS-1610-6	316SS Swagelok, 1" Union, 316SS Swagelok, 1 po Union.
5	1	OTAWA-30009-3-CF	316L SS, Custom Flange, 1/4" thick, Mill Finish, 316L SS, BRIDE spéciale, épaisseur 1/4 po, finition usinée.

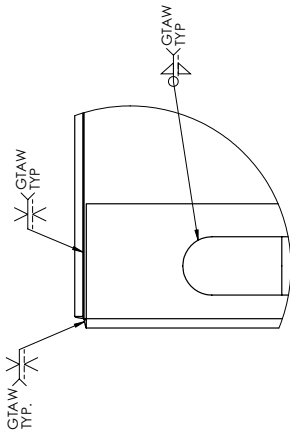
<b>PROPRIETARY AND CONFIDENTIAL</b> THE INFORMATION CONTAINED IN THIS DESIGN IS THE PROPERTY OF THE ENVIRONMENT CANADA. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF EC IS PROHIBITED.		DESIGN CODE CODE DE CONCEPTION	ASME B31.3	<b>EXCLUSIFS ET CONFIDENTIELS</b> LES INFORMATIONS CONTENUES DANS CE Dessin EST LA PROPRIÉTÉ EXCLUSIVE DE L'ENVIRONNEMENT CANADA. TOUTE REPRODUCTION EN PARTIE OU EN ENSEMBLE SANS L'ACCORD ÉCRIT LA PERMISSION DE EC EST INTERDITE.		<b>Environment Canada</b> Meteorological Service of Canada Service Météorologique du Canada	
DESIGN PRESSURE PRESSION DE CONCEPTION	15 psig	DESIGN TEMPERATURE TEMPÉRATURE	-40°C to 30°C	DATE	3/20/12	NAME/NOM	A W
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	15 psig	REGISTRATION INSCRIPTION	Not Required	REVIEWED BY REVU PAR		ENGINEER INGÉNIEUR	
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI	Not Required			UNLESS OTHERWISE SPECIFIED, SAUF INDICATION CONTRAIRE		INTERPRET GEOMETRIC TOLERANCING PER:	
				DIMENSIONS ARE IN INCHES DIMENSIONS SONT EN POUCES		DWG. NO.	
						WALL VENT ASSEMBLY	
						REV	
						OTAWA-30009-3	
						SCALE/ÉCHELLE N/A SHEET/FICHE 1 OF 1	

ITEM N° ART N°	QTY QTE	PART NUMBER DE PIÈCE	DESCRIPTION
1	1	Custom Water Bin, Bassin d'eau sur mesure	304 SS, 16 gauge, #4 Finish, Acier inoxydable 304 SS, calibre 16, finition N°4.
2	2	7088A1	McMaster Carr, Weld-On round handle, 4.57/64" long, 300 series stainless steel, Poignée arrondie soudée McMaster Carr, longueur 4.57/64 po, série 300, acier inoxydable



Notes / Remarques :

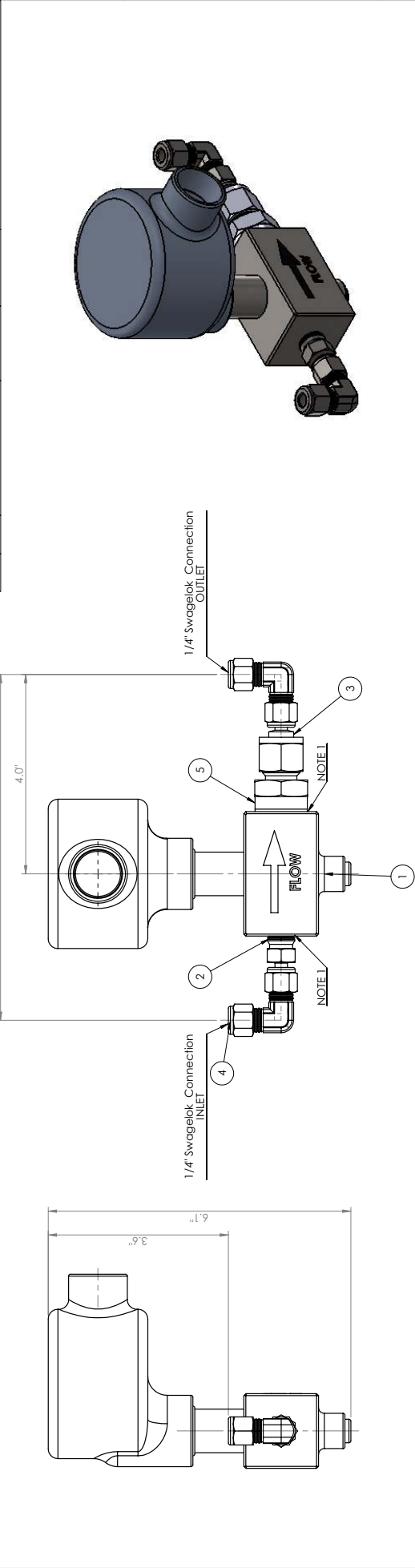
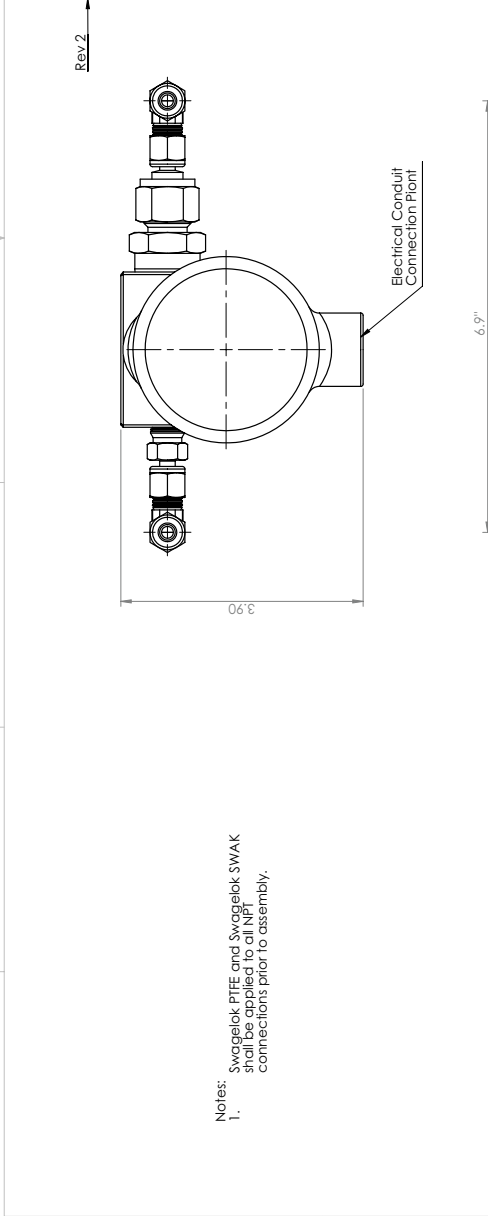
1. Total Volume approximately 681 cubic inches (11 litres).  
Volume total d'environ 681 pouces cube (11 litres)
2. Fill basin with water and ensure welds are leak free.  
Remplir le bassin d'eau et s'assurer que les soudures  
soient étanches.



DETAIL A  
DÉTAIL A

DESIGN CODE CODE DE CONCEPTION	N/A	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF ENVIRONMENT CANADA AND IS NOT TO BE REPRODUCED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF EC IS PROHIBITED.	DRAWN ETABLI	NAME/NO A W	DATE 3/20/12	Environment Canada Canada Meteorological Service of Canada Service Météorologique du Canada
DESIGN PRESSURE PRESSION DE CONCEPTION	N/A		REVIEWED BY REVU PAR			
OPERATING PRESSURE PRESSION DE FONCTIONNEMENT	N/A		ENG APPR ING APPR			
DESIGN TEMPERATURE TEMPÉRATURE	N/A	EXCLUSIFS ET CONFIDENTIELS LES INFORMATIONS CONTENUES DANS CE Dessin EST LA PROPRIÉTÉ EXCLUSIVE DE L'ENVIRONNEMENT CANADA TOU REPRODUCTION EN PARTIE OU EN ENSEMBLE SANS L'ACCORD ÉCRIT LA PERMISSION DE EC EST INTERDITE.	INTERPRET INTERPRÉTATION	SAUF INDICATION CONTRAIRE		TITLE/TITRE: VVA CATCH BASIN
REGISTRATION INSCRIPTION	N/A		TOLERANCES PER: DIMENSIONS ARE IN INCHES DIMENSIONS SONT EN POUCES			DWG. NO. REV
PNEUMATIC TEST PRESSURE PRESSION D'ESSAI	N/A		FRACTIONAL/FRACTIONNELLE : N/A TWO PLACE DECIMAL/DEUX DIGITALE : 0.02			<b>OTAWA-30009-4</b> 1
						SCALE/ÉCHELLE N/A SHEET/FICHE 1 OF 1

ITEM NO.	QTY.	PART NUMBER	MATERIAL	CRN	DESCRIPTION
1	1	IX-2575-D (AMERITROL)	316L SS Wetted Surfaces	N/A	Ameritrol Flow switch, 1/4" FNPT in, 3/4" FNPT out, 3.25" body length, 24 VDC or VAC input, SPDT relay output with 3 amp contact rating, 350 deg F max, NEMA 4X, Class I, Div I and II, Groups B, C, D and E, F, G, range number 2, Rotated 90 degrees
2	1	SS-4-TA-1-4	316L SS	0A12577.5	SS, Swagelok, Tube Adapter, 1/4" to 1/4" MNPT
3	1	SS-811-PC-4	316L SS	0A12577.5	SS Swagelok Tube Fitting, Reducing Port Connector, 1/2 in. x 1/4 in. Tube OD
4	2	SS-400-9	316L SS	0A12577.5	SS, Swagelok, 90 degree elbow
5	1	SS-810-1-12	316L SS	0A12577.5	SS, Swagelok Tube Fitting, Male Connector, 1/2 in. Tube OD x 3/4 in. Male NPT



<b>Swagelok</b> CENTRAL ONTARIO		NAME	AW	DATE	1/3/12
TITLE:		DRAWN	CHECKED	ENG. APPR.	MFG. APPR.
FLOW SWITCH ASSEMBLY		Q. A.	COMMENTS:		
SIZE	DWG. NO.	REV			
B	OTAWA-30182-2	2			
SCALE: 1:5		WEIGHT:	SHEET 1 OF 1		