UNIT COVER SHEET

5978
Serial Number
.5" Orifice Plate with Threaded Flange Union
Unit

ISO 9001: 2000 Certified
PED 97/23/EC Certified

Wyatt Engineering is the sole provider of the Badger differential producers worldwide.

Wyatt Engineering
Intelligent Flow Measurement
**DATE** 11-03-2005  
**BADGER S.O.NO.** 5978  
**CUSTOMER** UNIV OF FLORIDA  
**CUSTOMER P.O.NO.** 1903-437  
**USER** UNIV OF FLORIDA  
**CONSULTING ENGR.**  
**SERIAL NO.** 5978  
**TAG** .5 MAX FLOW RATE  
  
**ORIFICE DATA**  
- **ORIFICE STYLE** A  
- **NOMINAL SIZE** .5  
- **THROAT DIA (IN.)** .422  
- **BETA RATIO** .679  
- **TAP SIZE** 1/2  
- **TAP LOCATION** CORNER  
  
**DIFFERENTIAL PRESSURE IS** 100 INCHES OF WATER AT 7 GPM.  
**PERMANENT PRESSURE LOSS IS** 54.67% OF DIFFERENTIAL.  
**PERMANENT PRESSURE LOSS IS** 54.67 INCHES OF WATER AT 7 GPM.  
  
**FLUID DATA**  
- **FLUID** WATER  
- **OPER.PRES.(PSIA)** 28.700  
- **OPER.TEMP.(F)** 77  
- **BASE TEMP.(F)** 77  
  
**OPER.SP.GR.** .99807  
**BASE SP.GR.** .99807  
**OPER.VISC.(CP)** .8904  
  
**FLOW DATA**  
- **MAX.FLOW (GPM)** 7  
- **NORM.FLOW (GPM)** 7  
  
**PIPE REYNOLDS NO.** 39852  
**PIPE MATERIAL** METAL  
**PIPE I.D. (IN.)** .622  
**FLANGE Type** ANSI  
**FLANGE RATING** 150  
  
**CUSTOMER PIPELINE & FLANGE DATA**  
- **NOM.PIPE SIZE** .5  
- **PIPE SCHED/CLASS** STD  
- **FLANGE TYPE** ANSI  
  
**APPLICABLE DOCUMENTS**  
**INSTALLATION/APPROVAL**  
**PRODUCTION**  
  
**REFERENCE** FLOW METER ENGINEERING HANDBOOK, C.F.CUSICK, 3RD ED., 1961  
**CERTIFIED CORRECT BY** , DATE  
**PREPARED BY SAW**
DIFFERENTIAL ELEMENT
SUPPLEMENTARY DATA SHEET
WATER CALCULATION - VOLUMETRIC FLOW
(VERSION 1.02)

DATE 11-03-2005
BADGER S.O.NO. 5978
CUSTOMER UNIV OF FLORIDA
CUSTOMER P.O.NO. 1903-437
USER UNIV OF FLORIDA
CONSULTING ENGR. 
SERIAL NO. 5978
TAG .5 MAX FLOW RATE

ORIFICE DATA
ORIFICE STYLE A
NOMINAL SIZE .5

WORKING EQUATION FOR LIQUID FLOW
GAL/HR AT BASE TEMPERATURE

\[ Q_{GH} = 340.11(S)(FA)(D^2)(FHM)(FGB)(FGF), \]  \hspace{1cm} (EQ 15, PG 95)

\[ Q_{GH} = 420 \quad FHM = 10 \]
\[ S = .31881 \quad FGB = 1.00193 \]
\[ FA = 1.00017 \quad FGF = .99904 \]
\[ D^2 = .38688 \]

REYNOLDS NO. EQUATION FOR LIQUID FLOW
GAL/HR AT BASE TEMPERATURE

\[ RD = 52.654(Q_{GHA})(GB)/(D)(U), \]  \hspace{1cm} (EQ 20, PG 97)

\[ Q_{GHA} = 420 \quad D = .622 \]
\[ GB = .99807 \quad U = .89043 \]

DISCHARGE COEFFICIENT = .61404
DIFFERENTIAL ELEMENT
PRIMARY DATA/CALCULATION SHEET
WATER CALCULATION - VOLUMETRIC FLOW
(VERSION 1.02)

DATE 11-03-2005
BADGER S.O.NO. 5978
CUSTOMER UNIV OF FLORIDA
CUSTOMER P.O.NO. 1903-437
USER UNIV OF FLORIDA
CONSULTING ENGR.
SERIAL NO.
TAG .5 NORMAL FLOW RATE

ORIFICE DATA
ORIFICE STYLE A
NOMINAL SIZE .5
THROAT DIA (IN.) .4220
BETA RATIO .678
TAP SIZE 1/2
TAP LOCATION CORNER

BODY MATERIAL S304
THROAT MATERIAL S304
FLANGE MATERIAL CARBON STEEL

DIFFERENTIAL PRESSURE IS 17.95 INCHES OF WATER AT 3 GPM.
PERMANENT PRESSURE LOSS IS 54.71% OF DIFFERENTIAL.
PERMANENT PRESSURE LOSS IS 9.82 INCHES OF WATER AT 3 GPM.

FLUID DATA
FLUID WATER
OPER.PRES.(PSIA) 28.700
OPER.TEMP.(F) 77
BASE TEMP.(F) 77

OPER.SP.GR. .99807
BASE SP.GR. .99807
OPER.VISC.(CP) .8904

FLOW DATA
MAX.FLOW (GPM) 3
NORM.FLOW (GPM) 3

PIPE REYNOLDS NO. 17079
PIPE REYNOLDS NO. 17079

CUSTOMER PIPELINE & FLANGE DATA
NOM.PIPE SIZE .5
PIPE SCHED/CLASS STD
FLANGE TYPE ANSI

PIPE MATERIAL METAL
PIPE I.D. (IN.) .622
FLANGE RATING 150

APPLICABLE DOCUMENTS
INSTALLATION/APPROVAL

PRODUCTION

REFERENCE FLOW METER ENGINEERING HANDBOOK, C.F.CUSICK, 3RD ED., 1961

CERTIFIED CORRECT BY , DATE

PREPARED BY SAW
Differential Element
Supplementary Data Sheet
Water Calculation - Volumetric Flow
(Version 1.02)

Date: 11-03-2005
Badger S.O.No.: 5978
Customer: Univ of Florida
Customer P.O.No.: 1903-437
User: Univ of Florida
Consulting Engr.
Serial No.
Tag: .5 Normal Flow Rate

Orifice Data
Orifice Style: A
Nominal Size: .5

Working Equation for Liquid Flow
GAL/HR at Base Temperature

\[ Q_{GH} = 340.11(S)(FA)(D2)(FHM)(FGB)(FGF), \quad \text{(Eq 15, Pg 95)} \]

\[ Q_{GH} = 180 \]
\[ S = .32254 \]
\[ FA = 1.00017 \]
\[ D2 = .38688 \]
\[ FH = 4.23645 \]
\[ FGB = 1.00193 \]
\[ FGF = .99904 \]

Reynolds No. Equation for Liquid Flow
GAL/HR at Base Temperature

\[ RD = 52.654(Q_{GHA})(GB)/(D)(U), \quad \text{(Eq 20, Pg 97)} \]

\[ Q_{GHA} = 180 \]
\[ GB = .99807 \]
\[ D = .622 \]
\[ U = .89043 \]

Discharge Coefficient = .62206
<table>
<thead>
<tr>
<th>Pipe:</th>
<th>Design Pressure: 150 PSIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Design Temperature: 150 °F</td>
</tr>
<tr>
<td>Orifice Plate:</td>
<td>Complete with Gaskets, Bolts, and Jackscrews</td>
</tr>
<tr>
<td>304 Stainless Steel</td>
<td></td>
</tr>
<tr>
<td>Pipe Flanges:</td>
<td>Serial Nos.: 5978</td>
</tr>
<tr>
<td>150-lb Carbon Steel, SA 105</td>
<td>Tag Nos.:</td>
</tr>
<tr>
<td>per ANSI B16.5-1996 Corner Tap</td>
<td></td>
</tr>
<tr>
<td>Governing Code:</td>
<td>Notes:</td>
</tr>
</tbody>
</table>

Pipe: N/A  Plate: 304 Stainless Steel  Flanges: 150-lb Carbon Steel, SA 105  ANSI 816.5-1996 Corner T

Governing Code: N/A

(2) High Pressure Taps, 1/2" NPT, Located 180° Apart

(2) Low Pressure Taps, 1/2" NPT, Located 180° Apart

Flow Measurement & Flow Control

Title: 0.622" x 0.5890" Threaded Orifice Flange Set w/ OFP-CS

Drawing Number: OFP-FS-0.622 x 0.4220 5978

Scale: INCHES

Dimensions: 14-Dec-05

Note: Recipient agrees to hold the information in confidence and shall not reproduce it or use it in any way contrary to the business of Wyatt Engineering and its customers and clients.

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