UNIT COVER SHEET

5979
Serial Number
.75” 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.
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. 5979
SERIAL NO.
TAG .75 MAX FLOW RATE

ORIFICE DATA
ORIFICE STYLE A
NOMINAL SIZE .75
THROAT DIA (IN.) .589
BETA RATIO .715
TAP SIZE 1/2
TAP LOCATION CORNER

BODY MATERIAL S304
THROAT MATERIAL S304
FLANGE MATERIAL CARBON STEEL

DIFFERENTIAL PRESSURE IS 100 INCHES OF WATER AT 14 GPM.
PERMANENT PRESSURE LOSS IS 50.18% OF DIFFERENTIAL.
PERMANENT PRESSURE LOSS IS 50.18 INCHES OF WATER AT 14 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) 14
NORM.FLOW (GPM) 14

PIPE REYNOLDS NO. 60165
PIPE MATERIAL METAL
PIPE I.D. (IN.) .824
FLANGE RATING 150

CUSTOMER PIPELINE & FLANGE DATA
NOM.PIPE SIZE .75
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
ORIFICE DATA

ORIFICE STYLE A
NOMINAL SIZE .75

WORKING EQUATION FOR LIQUID FLOW
GAL/HR AT BASE TEMPERATURE

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

\[ Q_{GH} = 840 \quad FHM = 10 \]
\[ S = .36332 \quad FGB = 1.00193 \]
\[ FA = 1.00017 \quad FGF = .99904 \]
\[ D^2 = .67898 \]

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

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

\[ Q_{GHA} = 840 \quad D = .824 \]
\[ GB = .99807 \quad U = .89043 \]

DISCHARGE COEFFICIENT = .60988
**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.** 5979
**TAG** .75 NORMAL FLOW RATE

**ORIFICE DATA**

<table>
<thead>
<tr>
<th>ORIFICE STYLE</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOMINAL SIZE</td>
<td>.75</td>
</tr>
<tr>
<td>THROAT DIA (IN.)</td>
<td>.5890</td>
</tr>
<tr>
<td>BETA RATIO</td>
<td>.715</td>
</tr>
<tr>
<td>TAP SIZE</td>
<td>1/2</td>
</tr>
<tr>
<td>TAP LOCATION</td>
<td>CORNER</td>
</tr>
</tbody>
</table>

**DIFFERENTIAL PRESSURE IS** 17.99 INCHES OF WATER AT 6 GPM.
**PERMANENT PRESSURE LOSS IS** 50.26% OF DIFFERENTIAL.
**PERMANENT PRESSURE LOSS IS** 9.04 INCHES OF WATER AT 6 GPM.

**FLUID DATA**

<table>
<thead>
<tr>
<th>FLUID</th>
<th>OPER.PRES.(PSIA)</th>
<th>OPER.SP.GR.</th>
<th>BASE SP.GR.</th>
<th>OPER.VISC.(CP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>28.700</td>
<td>.99807</td>
<td>.99807</td>
<td>.8904</td>
</tr>
<tr>
<td>OPER.TEMP.(F)</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BASE TEMP.(F)</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FLOW DATA**

| MAX.FLOW (GPM) | 6 |
| NORM.FLOW (GPM) | 6 |

**CUSTOMER PIPELINE & FLANGE DATA**

| NOM.PIPE SIZE | .75 |
| PIPE SCHED/CLASS | STD |
| FLANGE TYPE  | ANSI |

**PIPE MATERIAL** METAL
**PIPE I.D. (IN.)** .824
**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: .75 Normal Flow Rate

Orifice Data
Orifice Style: A
Nominal Size: .75

Working Equation for Liquid Flow
GAL/HR AT BASE TEMPERATURE

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

\[
\begin{align*}
Q_{GH} & = 360 \\
S & = .36715 \\
FA & = 1.00017 \\
D^2 & = .67898 \\
FHM & = 4.24129 \\
FGB & = 1.00193 \\
FGF & = .99904
\end{align*}
\]

Reynolds No. Equation for Liquid Flow
GAL/HR AT BASE TEMPERATURE

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

\[
\begin{align*}
Q_{GHA} & = 360 \\
GB & = .99807 \\
D & = .824 \\
U & = .89043
\end{align*}
\]

Discharge Coefficient = .61768
<table>
<thead>
<tr>
<th>Pipe:</th>
<th>N/A</th>
<th>Design Pressure:</th>
<th>150 PSIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orifice Plate:</td>
<td>304 Stainless Steel</td>
<td>Design Temperature:</td>
<td>150 °F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessories:</td>
<td>Complete with Gaskets, Bolts (or Studs), and Jackscrews</td>
</tr>
<tr>
<td>Pipe Flanges:</td>
<td>150-lb Carbon Steel, SA 105</td>
<td>Serial Nos.:</td>
<td>5979</td>
</tr>
<tr>
<td></td>
<td>per ANSI B16.5-1996 Corner Tap</td>
<td>Tag Nos.:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Notes:</td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Materials:**

- Pipe: N/A
- Orifice Plate: 304 Stainless Steel
- Pipe Flanges: 150-lb Carbon Steel, SA 105 per ANSI B16.5-1996 Corner Tap

**Revision Date:**

<table>
<thead>
<tr>
<th>A</th>
<th>N</th>
<th>R</th>
</tr>
</thead>
</table>

**Governing Code:**

A. ANSI 816.5-1996

**Notes:**

- Compressed Gasket Thickness
- Located 180° Apart

**Dimensions:**

<table>
<thead>
<tr>
<th>D</th>
<th>0.824</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>0.5890</td>
</tr>
</tbody>
</table>

**FLANGE**

- NPS: 0.75
- Rating: 150

**PLATE**

- Thk.: 0.120