

Laboratory HVAC Engineering
Building 47. BRE, Garston, Watford, WD25 9XX, UK.

Products submitted by: Studor Ltd, Studor House, 13 Sheridan Terrace, Hove, BN3 5AE, UK.

Product submitted: **STUDOR MAXI-VENT, STUDOR KNITS II, OsmaVent 110.**
DIN CERTCO KEYMARK licence number : 011-7B008

Product Designation: A I

Production facility: Dymotek, USA.

Test Standard: **EN 12380:2002.** Air admittance valves for drainage systems – Requirements, test methods and evaluation of conformity.
The European standard generally incorporates the requirements of AS/NZS 4936: 2002 (Australia / New Zealand standard)

Tests undertaken: Drop test, Air tightness test, Endurance and temperature test, Opening characteristics and airflow capacity test and Test for effectiveness at temperatures below zero, -20°C and -40°C (*exceeding the requirements of the Test Standard*).

Test report number: PR1059-1002

Test report date: 13th August 2015

Prepared by		Approved on behalf of BRE	
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Name	M Swainson
Position	Principal Engineer

Name	D Butler
Position	Group Manager

Signature 

Signature 



BRE's Quality Management System is approved to BS EN ISO9001:2008, certificate number LRQ 4001063.

BRE's Environmental Management System is approved to BS EN ISO14001:2004, certificate number LRQ 4001064.

1 Test result summary

The tests carried out were in accordance with BS EN 12380:2002. Air admittance valves for drainage systems – Requirements, test methods and evaluation of conformity.

BS EN 12380:2002. Clause 6.2. Drop test results

Valve connector size (mm)	Orientation			Comments
	1	2	3	
110	Pass	Pass	Pass	

BS EN 12380:2002. Clause 6.3. Air tightness test results

Valve connector size (mm)	Pressure recorded after 5 minutes greater than 90% of initial pressure	Comments
50	Pass	
75	Pass	
90	Pass	
110	Pass	

BS EN 12380:2002. Clause 6.4. Endurance and temperature test results (air tightness test, Clause 6.3). Results after 16 hours at 20°C

Valve connector size (mm)	Pressure recorded after 5 minutes greater than 90% of initial pressure	Comments
110	Pass	

BS EN 12380:2002. Clause 6.4. Endurance and temperature test results (air tightness test, Clause 6.3). Results after 8 hours at 60°C

Valve connector size (mm)	Pressure recorded after 5 minutes greater than 90% of initial pressure	Comments
110	Pass	

BS EN 12380:2002. Clause 6.5. Opening characteristics and air flow capacity test results

Valve connector size (mm)	Opening pressure 0 – 150 Pa	Airflow rate at Static pressure of $-250^{+/-}10\text{Pa}$ (l/s)	Measurable airflow rate at -150^{+0}_{-10}Pa
50	Pass	23.6	Yes
75	Pass	34.9	Yes
90	Pass	35.0	Yes
110	Pass	34.8	Yes

BS EN 12380:2002. Clause 6.6. Test for effectiveness at temperatures below 0°C test results (-20°C)

Valve connector size (mm)	Air flow rate greater than 90% of initial air flow rate	50mm water trap contained more than 25mm water
110	Pass	Yes

BS EN 12380:2002. Clause 6.6. Test for effectiveness at temperatures below 0°C test results (-40°C)

Valve connector size (mm)	Air flow rate greater than 90% of initial air flow rate	50mm water trap contained more than 25mm water
110	Pass	Yes

2 Introduction

Studor approached BRE to undertake the testing of a range of Air Admittance Valves (AAVs) to the current standard BS EN 12380:2002 Air admittance valves for drainage systems – Requirements, test methods and evaluation of conformity. A proposal was prepared and submitted and accepted by Studor.

The AAVs, manufactured by Studor, to be tested were stated as being:

DN90 (DN 50, DN 75, and DN 110 when fitted with rubber connector)

The AAVs were delivered to BRE on 6th February 2015.

BS EN 12380:2002 requires six physical tests to be undertaken on a number of valves in a range. BRE undertook this work during April 2015.

Studor advised BRE that all AAVs were to be tested for designation A I. Designation A I allows the valves to be located below flood level of connected appliances and operate at temperatures ranging from -20°C to +60°C.

In addition to the standard low temperature test at -20°C, BS EN 12380:2002.Clause 6.6, Studor requested testing undertaken be witnessed at a lower air temperature of -40°C. This testing was undertaken at the Studor test laboratory.

3 Details of tests carried out

The tests carried out were in accordance with BS EN 12380:2002. *Air admittance valves for drainage systems – Requirements, test methods and evaluation of conformity*. An additional test at a lower air temperature of -40°C was also undertaken

Studor provided six samples which were numbered BRE01 to BRE06. Three valves were then randomly chosen by Mr M Swainson, Principal Engineer, BRE, from those supplied to be tested.

The identification numbers of the AAVs chosen for test are presented in Table 1

Valve size (mm)	Valves randomly selected for test		
DN 90	A-1128	C-1128	D-1128

Table 1 AAVs selected for testing

Studor also provided 8 connectors.

- Four rubber connectors with cones inside for connection to on 50 mm diameter pipe.
- Four standard rubber connectors for connection to 110 mm and 75 mm diameter pipe.

Studor also advised BRE that the valves can be installed solvent welded directly to 90 mm diameter pipe.

All air flow rates are corrected to Standard Temperature and Pressure (STP) 101325 Pa and 20°C.

For designation A I valves, the tests undertaken are detailed in Table 2.

BS EN 12380:2002 Clause reference	Test description	Number of valves tested
6.2	Drop test	3
6.3	Air tightness test	3
6.4	Endurance test	1
6.3	Retest air tightness following endurance test	1
6.5	Opening characteristic and airflow capacity test	3
6.6	Test for effectiveness at temperatures below zero (-20°C)	1
6.6	Test for effectiveness at temperatures below zero (-40°C)	1

Table 2 Tests undertaken for valves designated A I.

For the endurance tests and the test for effectiveness at temperatures below 0°C, Mr M Swainson, Principal Engineer, BRE, randomly selected one valve from the three selected to be tested.

Test instruments used during testing of AAVs

Measurement	Test instrument	Calibration
Air and water temperature readings	PT100 1/10th DIN probes	In-situ 5 point temperature calibration with Hewlett Packard Digital Quartz Thermometer type 2804A BRE Calibration Services (UKAS)
Static pressure readings		
0 - 500Pa	Furness Controls FCO332	BRE calibration (UKAS)
0 - 10,000Pa	Furness Controls Ltd FCO510 Micromanometer	Furness Controls Ltd (UKAS)
Airflow rate readings	Hastings LFE LS-8S Chell Display CCD100	Chell (UKAS)

4 Test results

BS EN 12380:2002. Clause 6.2. Drop test results

Test laboratory temperature maintained at 19.8°C.

Valve number	Valve connector size (mm)	Orientation			Comments
		1	2	3	
A-1128	110	Pass	Pass	Pass	
C-1128	50	Pass	Pass	Pass	
D-1128	75	Pass	Pass	Pass	

Table 3 Drop test results (Clause 6.2)

BS EN 12380:2002. Clause 6.3. Air tightness test results

Valve number	Valve connector size (mm)	Pressure applied (Pa)	Pressure after 5 mins. (Pa)	Laboratory temp (°C)	Comments
A-1128	110	30	30	21.2	Pass
A-1128	110	502	502	21.2	Pass
A-1128	110	9967	9961	21.2	Pass
C-1128	50	30	30	21.2	Pass
C-1128	50	503	503	21.2	Pass
C-1128	50	9992	9914	21.2	Pass
D-1128	75	30	30	21.2	Pass
D-1128	75	505	505	21.2	Pass
D-1128	75	9974	9937	21.2	Pass

Table 4 Air tightness test results for AAVs (Clause 6.3)

BS EN 12380:2002. Clause 6.4. Endurance and temperature test results

Valve number	Valve connector size (mm)	Number of cycles in 16 hours	Test rig temperature (°C)	Valve operational at end of test	Comments
D-1128	110	15731	20.3	Yes	Pass

Table 5 Endurance and temperature test results at 20°C (Clause 6.4)

Valve number	Valve connector size (mm)	Pressure applied (Pa)	Pressure after 5 mins. (Pa)	Laboratory temp (°C)	Comments
D-1128	110	31	31	20.3	Pass
D-1128	110	500	500	20.3	Pass
D-1128	110	9974	9961	20.3	Pass

Table 6 Air tightness test results for AAVs following endurance and temperature test at 20°C (Clause 6.3)

Valve number	Valve connector size (mm)	Number of cycles in 8 hours	Test rig temperature (°C)	Valve operational at end of test	Comments
D-1128	110	7923	61.4	Yes	Pass

Table 7 Endurance and temperature test results at 60°C (Clause 6.4)

Valve number	Valve connector size (mm)	Pressure applied (Pa)	Pressure after 5 mins. (Pa)	Laboratory temp (°C)	Comments
D-1128	110	33	33	20.9	Pass
D-1128	110	502	501	20.9	Pass
D-1128	110	9946	9913	20.9	Pass

Table 8 Air tightness test results for AAVs following endurance and temperature test at 60°C (Clause 6.3)

BS EN 12380:2002. Clause 6.5. Opening characteristics and air flow capacity test results

Test laboratory during test, Temperature 19.9°C.

Valve number	Valve connector size (mm)	Opening pressure (Pa)	Static pressure of $-250^{+/-}10$ Pa	Airflow rate (l/s)	Static pressure of -150^{+0}_{-10} Pa	Airflow rate (l/s)
A-1128	110	43	253	34.8	148	26.8
		44				
		46				
C-1128	50	45	252	23.6	148	17.9
		46				
		45				
D-1128	75	51	249	34.9	148	26.4
		50				
		51				
A-1128	90	44	249	35.0	149	26.6
		46				
		47				

Table 9 Opening characteristics and air flow capacity test results for AAVs (Clause 6.5)

Valve number	Valve connector size (mm)	Opening pressure 0 – 150 (Pa)	Static pressure of $-250^{+/-}10$ (Pa)	Airflow rate (l/s)	Measurable airflow rate at -150^{+0}_{-10} (Pa)
A-1128	110	Pass	253	34.8	Pass
C-1128	50	Pass	252	23.6	Pass
D-1128	75	Pass	249	34.9	Pass
A-1128	90	Pass	249	35.0	Pass

Table 10 Summary of test results of opening characteristics and air flow capacity test results for AAVs (Clause 6.5)

BS EN 12380:2002. Clause 6.6. Test for effectiveness at temperatures below 0°C test results (-20°C)

Test laboratory during test, Temperature 21.0 °C,

Valve number	Valve connector size (mm)	Temperature of ambient air (°C)	Temperature of air inside pipe (°C)	Static pressure of -250 ⁺ /.10 (Pa)	Airflow rate (l/s)
A-1128	110	21.0	20.8	251	34.9

Table 11 Test for effectiveness at temperatures below 0°C results for all AAVs ambient air at 20°C (Clause 6.6)

Test laboratory during test, Temperature 20.7 °C,

Valve number	Valve connector size (mm)	Temperature of ambient air (°C)	Temperature of air inside pipe (°C)	Water temperature (°C)	Static pressure of -250 ⁺ /.10 (Pa)	Airflow rate (l/s)	Water in 50mm trap >25mm
A-1128	110	-20.5	-8.7	40.4	251	34.6	Yes

Table 12 Test for effectiveness at temperatures below 0°C results for all AAVs ambient air at -20°C (Clause 6.6)

BS EN 12380:2002. Clause 6.6. Test for effectiveness at temperatures below 0°C test results (-40°C)

Laboratory

Studor Ltd, Studor House, 13 Sheridan Terrace, Hove, BN3 5AE, UK.

Test laboratory during test, Temperature 19.9°C,

Valve number	Valve connector size (mm)	Temperature of ambient air (°C)	Temperature of air inside pipe (°C)	Static pressure of -250 ⁺ /.10 (Pa)	Airflow rate (l/s)
Sample A	110	19.9	19.1	250	35.7

Table 13 Test for effectiveness at temperatures below 0°C results for all AAVs ambient air at 20°C (Clause 6.6)

Test laboratory during test, Temperature 19.9°C,

Valve number	Valve connector size (mm)	Temperature of ambient air (°C)	Temperature of air inside pipe (°C)	Water temperature (°C)	Static pressure of -250 ⁺ /.10 (Pa)	Airflow rate (l/s)	Water in 50mm trap >25mm
Sample A	110	-40.0	-33.5	39.5	250	34.5	Yes

Table 14 Test for effectiveness at temperatures below 0°C results for all AAVs ambient air at -40°C (Clause 6.6)

5 BS EN 12380:2002 Marking, labelling and packaging

All the valves tested by BRE were supplied loose with no installation instructions.

The markings on top of the valves are visible in Figure 1 for the Studor Maxi-Vent, Figure 2 for the Studor KNITS II and Figure 3 for the OsmaVent 110.

6 Photographs



Figure 1 STUDOR MAXI-VENT



Figure 2 STUDOR KNITS II



Figure 3 OsmaVent 110



Figure 4 Internal view of STUDOR MAXI-VENT, KNITS II and OsmaVent 110



Figure 5 STUDOR MAXI-VENT, KNITS II and OsmaVent 110 with rubber connector



Figure 6 Standard rubber connector



Figure 7 Rubber connector with cone inside



Figure 8 STUDOR MAXI-VENT, KNITS II and OsmaVent 110 with rubber connector with cone inside

=====REPORT ENDS=====