

Laboratory HVAC Engineering
Building 47.

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

Product submitted: **Studor Mini-Vent, Mini-KNITS and OsmaVent 40.**
DIN CERTCO KEYMARK licence number : 011-7B003

Product Designation: A I

Production facility: Dymotek, USA.


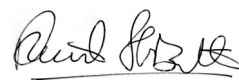
Test Standard: **EN 12380:2002.** Air admittance valves for drainage systems – Requirements, test methods and evaluation of conformity.

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.

Test report number: 292657

Test report date: 10th January 2014

Prepared by		Approved on behalf of BRE	
Name	M Swainson	Name	D Butler
Position	Principal Engineer	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 (inch)	Orientation			Comments
	1	2	3	
1 ½	Pass	Pass	Pass	

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

Valve connector size	Pressure recorded after 5 minutes greater than 90% of initial pressure	Comments
1 ½ inch	Pass	
32 mm	Pass	
40 mm	Pass	
56 mm	Pass	
63 mm	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 (inch)	Pressure recorded after 5 minutes greater than 90% of initial pressure	Comments
1 ½	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 (inch)	Pressure recorded after 5 minutes greater than 90% of initial pressure	Comments
1½ inch	Pass	

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

Valve connector size	Opening pressure 0 – 150 Pa	Airflow rate at Static pressure of -250^{+1}_{-10} Pa (l/s)	Measurable airflow rate at -150^{+0}_{-10} Pa
1½ inch	Pass	8.0	Yes
32 mm	Pass	7.8	Yes
40 mm	Pass	7.7	Yes
56 mm	Pass	8.4	Yes
63 mm	Pass	8.4	Yes

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

Valve connector size (inch)	Air flow rate greater than 90% of initial air flow rate	50mm water trap contained more than 25mm water
1½	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:

1½ inch threaded (DN 32, DN 40, DN 56 and DN 63 when fitted with Studor Global Connector)

The AAVs were delivered to BRE on 27th August 2013.

BS EN 12380:2002 requires six physical tests to be undertaken on a number of valves in a range. BRE undertook this work during November 2013.

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.

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.*

Studor provided six samples which were numbered 1059-A to 1059-F.

Product sample	Quantity supplied	BRE number
Studor Mini-Vent (International NPT)	2	1059-A and 1059-B
Studor Mini-KNITS (NPT)	2	1059-B and 1059-D
Studor Mini-Vent (AU/NZ BSP)	2	1059-E and 1059-F

Table 1 AAVs samples received for testing

Three valves were then randomly chosen by Mr C Manescu, Test Engineer, BRE, from those supplied to be tested.

The identification numbers of the AAVs chosen for test are presented in Table 2.

Valve connector size (inch)	Valves randomly selected for test		
1½	1059-B	1059-D	1059-E

Table 2 AAVs selected for testing

The test samples were supplied with the Studor Global Connector for connection to DN 32, DN 40, DN 56 and DN 63 pipes.

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

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	1

Table 3 Tests undertaken for valves designated A I.

For the endurance tests and the test for effectiveness at temperatures below 0°C, Mr C Manescu, Test 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	Brookes 5853E Chell Display CCD100	Chell (UKAS)

4 Test results

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

Test laboratory temperature maintained at 20.0°C.

Valve number	Valve connector size (inch)	Orientation			Comments
		1	2	3	
1059-B	1½	Pass	Pass	Pass	
1059-D	1½	Pass	Pass	Pass	
1059-E	1½	Pass	Pass	Pass	

Table 4 Drop test results (Clause 6.2)

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

Valve number	Valve connector size	Pressure applied (Pa)	Pressure after 5 mins. (Pa)	Laboratory temp (°C)	Comments
1059-B	1½ inch	37	37	20.0	
1059-B	1½ inch	506	502	20.0	
1059-B	1½ inch	9955	9848	20.0	
1059-D	32	33	33	20.1	
1059-D	32	502	501	20.1	
1059-D	32	9988	9980	20.1	
1059-D	40	32	32	20.1	
1059-D	40	509	509	20.1	
1059-D	40	9955	9952	20.1	
1059-E	56	34	34	20.4	
1059-E	56	505	504	20.4	
1059-E	56	9978	9952	20.4	
1059-E	63	32	32	20.4	
1059-E	63	507	507	20.4	
1059-E	63	9941	9928	20.4	

Table 5 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 (inch)	Number of cycles in 16 hours	Test rig temperature (°C)	Valve operational at end of test	Comments
1059-E	1½	16508	21.2	Yes	

Table 6 Endurance and temperature test results at 20°C (Clause 6.4)

Valve number	Valve connector size (inch)	Pressure applied (Pa)	Pressure after 5 mins. (Pa)	Laboratory temp (°C)	Comments
1059-E	1½	32	32	22.9	
1059-E	1½	508	508	22.9	
1059-E	1½	9996	9813	22.9	

Table 7 Air tightness test results for AAVs following endurance and temperature test at 20°C (Clause 6.3)

Valve number	Valve connector size (inch)	Number of cycles in 8 hours	Test rig temperature (°C)	Valve operational at end of test	Comments
1059-E	1½	8514	61.2	Yes	

Table 8 Endurance and temperature test results at 60°C (Clause 6.4)

Valve number	Valve connector size (inch)	Pressure applied (Pa)	Pressure after 5 mins. (Pa)	Laboratory temp (°C)	Comments
1059-E	1½	31	31	21.7	
1059-E	1½	505	505	21.7	
1059-E	1½	9976	9655	21.7	

Table 9 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 20.1°C.

Valve number	Valve connector size	Opening pressure (Pa)	Static pressure of -250 ⁺ /.10 Pa	Airflow rate (l/s)	Static pressure of -150 ⁺ ₋₁₀ Pa	Airflow rate (l/s)
1059-B	1½ inch	66	249	8.0	149	6.1
		61				
		59				
1059-D	32 mm	58	252	7.8	149	6.0
		55				
		52				
1059-D	40 mm	55	251	7.7	148	5.6
		52				
		55				
1059-E	56 mm	50	253	8.4	150	6.1
		49				
		50				
1059-E	63 mm	52	248	8.4	149	6.3
		51				
		53				

Table 10 Opening characteristics and air flow capacity test results for AAVs (Clause 6.5)

Valve number	Valve connector size	Opening pressure 0 – 150 Pa	Static pressure of -250 ⁺ /.10 Pa	Airflow rate (l/s)	Measurable airflow rate at -150 ⁺ ₋₁₀ Pa
1059-B	1½ inch	Pass	249	8.0	Pass
1059-D	32 mm	Pass	252	7.8	Pass
1059-D	40 mm	Pass	251	7.7	Pass
1059-E	56 mm	Pass	253	8.4	Pass
1059-E	63 mm	Pass	248	8.4	Pass

Table 11 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

Test laboratory during test, Temperature 19.8 °C,

Valve number	Valve connector size (mm)	Temperature of ambient air (°C)	Temperature of air inside pipe (°C)	Static pressure (Pa)	Airflow rate (l/s)
1059-E	1½ inch	19.7	19.7	247	8.1

Table 12 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 19.6 °C,

Valve number	Valve connector size (inch)	Temperature of ambient air (°C)	Temperature of air inside pipe (°C)	Water temperature (°C)	Static pressure (Pa)	Airflow rate (l/s)	Water in 50mm trap >25mm
1059-E	1½ inch	-20.7	-14.5	39.4	244	8.2	Yes

Table 13 Test for effectiveness at temperatures below 0°C results for all AAVs ambient air at -20°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, 2 and 3 for the Studor Mini-Vent and Studor Mini-KNITS.

6 Photographs



Figure 1 Studor Mini-Vent (International NPT)



Figure 2 Studor Mini-Vent (AU/NZ BSP)



Figure 3 Studor Mini-KNITS



Figure 4 Internal view of Studor Mini-Vent and Mini-KNITS



Figure 5 Studor Mini-Vent and Mini-KNITS and Studor Global Connector

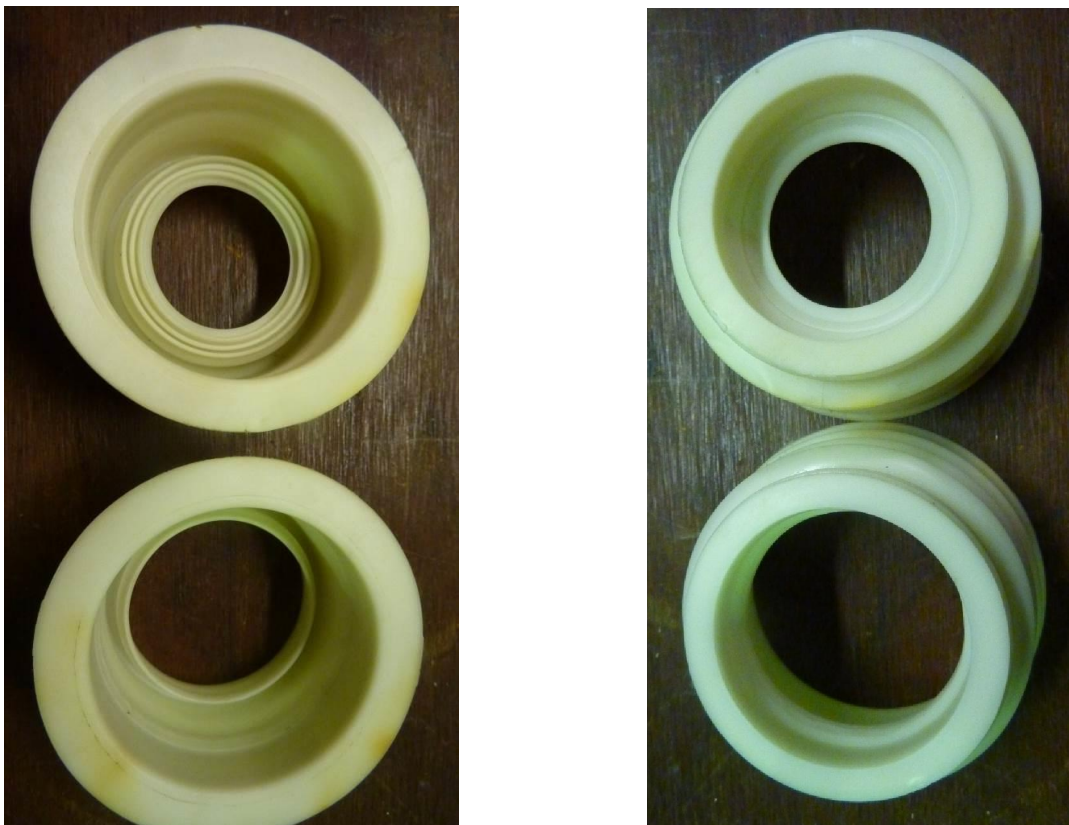


Figure 6 Studor Global Connector – top DN32, bottom, ring removed for DN40 fitting.

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