



# Report

[www.bsria.co.uk](http://www.bsria.co.uk)

## Leakage Tests on 'Spiralite' ductwork

Report 50940/1 Edition 2  
January 2008

**Carried out for: Specialist Insulation Ltd**

Unit 3 The Capstan Centre  
Thurrock Park Way  
Tilbury  
Essex  
RM18 7HH

**Compiled by:** Tom Garrigan

**Quality Approved:** PHIL STONARD  
Laboratory Manager  
MicroClimate & Test

This report must not be reproduced except in full without the written approval of an executive director of BSRIA. It is only intended to be used within the context described in the text.

**BSRIA Limited**

Old Bracknell Lane West, Bracknell, Berkshire RG12 7AH UK

**T:** +44 (0)1344 465600 **F:** +44 (0)1344 465626

**E:** [bsria@bsria.co.uk](mailto:bsria@bsria.co.uk) **W:** [www.bsria.co.uk](http://www.bsria.co.uk)

## PREFACE

This report supersedes Report No. 50940/1 dated 4 January 2008. The following amendments have been made:

1. Company name changed on Client request to Specialist Insulation Ltd
2. Typing error, product trade name should have read Spiralite not Spirolite.

These changes do not affect the overall results or conclusions of the report as originally issued.

**CONTENTS**

1	INTRODUCTION.....	4
1.1	OBJECTIVES.....	4
1.2	ITEMS RECEIVED FOR TEST .....	4
2	TEST METHOD .....	6
3	INSTRUMENTATION.....	6
4	TEST FACILITY .....	6
5	RESULTS.....	7
5.1	Air Leakage Test 400Pa .....	7
5.2	Air leakage test 800Pa .....	7
5.3	Air leakage test 1000Pa .....	8
5.4	Air leakage test 1200Pa .....	8
5.5	Air leakge test 1500Pa.....	9
5.6	Air leakage test 2500Pa .....	9
5.7	Pressure Test comments .....	9
6	CONCLUSION .....	10

**APPENDICES**

APPENDIX: A	GRAPH OF LEAKAGE RATE AND CLASS C ALLOWANCE.....	11
-------------	--	----

# 1 INTRODUCTION

This report details the results of tests carried out on pre-insulated 'SPIRALITE' ductwork. The tests were conducted at BSRIA's test facility, located in Bracknell, Berkshire during December 2007.

The tests were commissioned by Specialist Insulation Ltd.

## 1.1 OBJECTIVES

The objectives of the test were to determine the following parameters of the ductwork in accordance with BS EN 13403:2003 'Ventilation for buildings- non-metallic ducts – ductwork made from insulation duct boards':

- Air leakage factor and air tightness classification
- Strength test

## 1.2 ITEMS RECEIVED FOR TEST

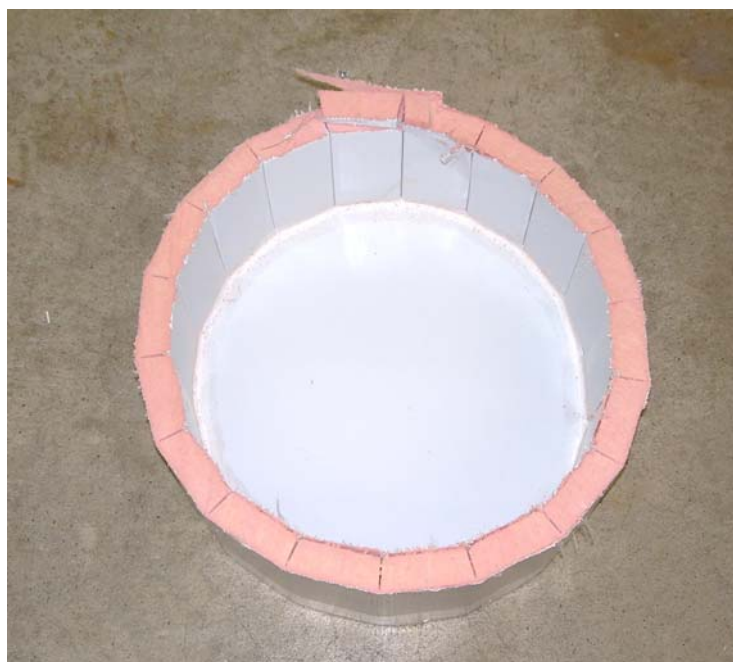
The test item consisted of two ductwork sections constructed from insulated duct boards of equivalent internal dimensions 300mm by 300mm by 2400mm. The duct work was of approximately circular (18 segments). A circular spigot 75mm diameter was fitted at one end of both sections along with a 6mm pressure tapping. The unit was manufactured and supplied by Specialist Insulation Ltd. The inside of the ductwork had an antibacterial and self-cleaning coating. The trade name was 'Spiralite'.



1. Duct with test spigot and pressure tapping.



2. Central joint



3. Duct construction

## 2 TEST METHOD

The test method used was generally in accordance with BS EN13403:2003.

This used a duct sample of 300x300 cross sectional area (or equivalent), with section length being determined by the production board size.

Test pressure was initially set at a rated value of 1000Pa, at which point the leakage was determined. A strength pressure tests was then carried out at 2.5 times the rated pressure and the ductwork observed for structural integrity. As this remained good, leakage values were taken and the pressure slowly increased to the maximum that the test equipment could produce.

The test standard for ducts constructed from insulation board uses 1500Pa as a maximum leak test pressure. Allowable leakage rates above this were calculated using the same equations that would be used for high pressure (Class C) tests on steel ductwork.

## 3 INSTRUMENTATION

The following table details the instrumentation used in the testing of the ductwork

**Table 1 Calibration details for instruments.**

Instrument	Manufacturer	Range	Units	Serial No.	Calibration Due
Hand held micro manometer	TSI	0-3000	Pa	Ident 681	01-08-08
Hand held micro manometer	TSI	0-3000	Pa	Ident 682	01-08-08
8mm Venturi tube	BSRIA	0-4.33	L/s	Ident 140	02-01-09

## 4 TEST FACILITY

Air leakage and pressure tests were carried out in the general laboratory area.

During the air leakage tests a 8mm venturi tube was used along with a manometer in order to measure differential pressure and subsequently calculate flow rate.

Data was recorded when stable conditions were met and stayed within the allowed tolerances.

## 5 RESULTS

### 5.1 AIR LEAKAGE TEST 400PA

Air Leakage Rates				
400Pa Downstream positive				
	Duct Pressure	Venturi Flow Reading & Flow Rate		Maximum leakage
	Pa	Pa	l/s	l/s/m <sup>2</sup>
	408.30	5.5	0.14	0.047
	406.60	5.3	0.13	0.046
404.60	4.5	0.12	0.043	
<b>Average</b>	<b>406.50</b>	<b>Average</b>	<b>0.13</b>	<b>0.045</b>
				<b>Class</b>
				<b>C</b>

Air tightness classification and air leakage factor ( $f_{max}$ )		
Class A	Class B	Class C
1.340	0.447	<b>0.149</b>

### 5.2 AIR LEAKAGE TEST 800PA

Air Leakage Rates				
800Pa Downstream positive				
	Duct Pressure	Venturi Flow Reading & Flow Rate		Maximum leakage
	Pa	Pa	l/s	l/s/m <sup>2</sup>
	820.50	11.6	0.20	0.069
	795.30	11.1	0.19	0.068
778.80	10.7	0.19	0.066	
<b>Average</b>	<b>798.20</b>	<b>Average</b>	<b>0.20</b>	<b>0.068</b>
				<b>Class</b>
				<b>C</b>

Air tightness classification and air leakage factor ( $f_{max}$ )		
Class A	Class B	Class C
2.078	0.693	<b>0.231</b>

### 5.3 AIR LEAKAGE TEST 1000PA

Air Leakage Rates				
1000Pa Downstream positive				
	Duct Pressure	Venturi Flow Reading & Flow Rate		Maximum leakage
	Pa	Pa	l/s	l/s/m <sup>2</sup>
	1004.00	15.3	0.23	0.080
	985.30	14.6	0.22	0.078
1020.00	15.4	0.23	0.080	<b>Class</b>
<b>Average</b>	<b>1003.10</b>	<b>Average</b>	<b>0.23</b>	

Air tightness classification and air leakage factor ( $f_{max}$ )		
Class A	Class B	Class C
2.411	0.804	<b>0.268</b>

### 5.4 AIR LEAKAGE TEST 1200PA

Air Leakage Rates				
1200Pa Downstream positive				
	Duct Pressure	Venturi Flow Reading & Flow Rate		Maximum leakage
	Pa	Pa	l/s	l/s/m <sup>2</sup>
	1200.00	16.1	0.24	0.082
	1177.00	15.9	0.23	0.081
1236.00	17.2	0.24	0.085	<b>Class</b>
<b>Average</b>	<b>1204.33</b>	<b>Average</b>	<b>0.24</b>	

Air tightness classification and air leakage factor ( $f_{max}$ )		
Class A	Class B	Class C
2.715	0.905	<b>0.302</b>

### 5.5 AIR LEAKGE TEST 1500PA

Air Leakage Rates					
1500Pa Downstream positive					
	Duct Pressure	Venturi Flow Reading & Flow Rate		Maximum leakage	
	Pa	Pa	l/s	l/s/m <sup>2</sup>	
	1495.00	22.1	0.28	0.096	
	1500.00	22.7	0.28	0.098	
	1564.00	23.9	0.29	0.100	
<b>Average</b>	<b>1519.67</b>	<b>Average</b>	<b>0.28</b>	<b>0.098</b>	<b>Class</b>
					<b>C</b>

Air tightness classification and air leakage factor ( $f_{max}$ )		
Class A	Class B	<b>Class C</b>
3.159	1.053	<b>0.351</b>

### 5.6 AIR LEAKAGE TEST 2500PA

Air Leakage Rates					
2500Pa Downstream positive					
	Duct Pressure	Venturi Flow Reading & Flow Rate		Maximum leakage	
	Pa	Pa	l/s	l/s/m <sup>2</sup>	
	2508.00	76.4	0.52	0.182	
	2514.00	74.9	0.52	0.180	
	2513.00	75.3	0.52	0.181	
<b>Average</b>	<b>2511.67</b>	<b>Average</b>	<b>0.52</b>	<b>0.181</b>	<b>Class</b>
					<b>C</b>

Air tightness classification and air leakage factor ( $f_{max}$ )		
Class A	Class B	<b>Class C</b>
4.379	1.460	<b>0.487</b>

The formula used to calculate the air leakage factor ( $f_{max}$ ) was:

$$0.003 \times P_s^{0.65} \text{ where } P_s = \text{static pressure}$$

### 5.7 PRESSURE TEST COMMENTS

The air leakage rate of the ductwork was tested up to a pressure of 2500Pa, which was then multiplied 2.5 times to give a pressure of 6250Pa, which was used during the strength pressure test. The ductwork was tested up to 7667Pa and remained structurally intact, although leaks did appear on the edges of the end pieces of the ductwork. The voltage was adjusted to increase the pressure in small increments up to the limit that the high-pressure fan could achieve.

## 6 CONCLUSION

The ductwork attained a C class rating during the air leakage test at 400Pa, 800Pa, 1000Pa, 1200Pa, 1500Pa and 2500Pa.

The ductwork remained structurally intact during the pressure test at a positive downstream pressure of 7667Pa.

Leakage appeared at the end cap attachments and penetrations through the duct (test spigots).

Appendix: A Graph of leakage rate and Class C allowance

