

## Test Report

**Test centre:** TÜV Saarland e. V.  
Am TÜV 1  
66280 Sulzbach

**Test object:** Shut-off damper, ID no. 220  
Diameter 400 mm

**Customer:** Aerotechnik Siegwart GmbH  
Untere Hofwiesen  
66299 Friedrichsthal

**Scope of 2nd commission:** Measurement of the leakage air flow in accordance with DIN EN 1751

**Test basis:** DIN EN 1751, issue 01.99

**Test date:** 31-03-2005

**Inspected by:** Mahren (Graduate Engineer – Dipl. Ing. (FH))

**Test report no.:** 60404A0216/C shut-off damper, circular

**No. of pages.:** 5

## **1. General information**

Aerotechnik Siegwart GmbH, Friedrichsthal commissioned us to inspect the sealing characteristics of a circular shut-off damper in accordance with DIN EN 1751, class 4. The purpose of the test was to establish whether DIN EN 1751 (class 4) requirements were met.

## **2. Description of the inspected system**

The description of the inspected damper in accordance with the manufacturer's specifications is included in enclosure 1. The documents presented to us do not contain production tolerances.

## **3. Test structure and realisation of measurements**

The test station structure is illustrated in the enclosure. A diaphragm gas meter was utilised to measure the air volume and a differential pressure measuring instrument (SI) to measure the pressure.

## **4. Measuring results**

Measuring results are listed in table 1 of the report.

The leakage air volumes measured are less than the values specified in DIN EN 1751 (as illustrated in table 1).

The inspection described here was not intended as a type or design acceptance test, endurance test, material test or production inspection, and no requirement for such existed. The measurement results are only valid for the inspected damper.

**Table 1**

Circular shut-off damper in accordance with DIN EN 1751, class 4

Dimensions $\varnothing$ [mm]	$\Delta p$ [Pa]	V [m <sup>3</sup> /h]	Free surface [m <sup>2</sup> ]	Permissible leakage air flow $\left[\frac{m^3}{h \cdot m^2}\right]$	Measured leakage air flow $\left[\frac{m^3}{h \cdot m^2}\right]$
400	250	0.1420	0.1257	9.2	1.13
	500	0.2387	0.1257	12.8	1.90
	1000	0.2978	0.1257	18.0	2.37

**Table 2**

List of measuring instruments employed:

Ser. no.	Measuring instrument designation	Measurement range	Measurement uncertainty	Calibrated yes/no	Comment
1	Diaphragm gas meter	0 ... 10 m <sup>3</sup> /h	$\pm 1.0$ % of measurement value	yes	
2	Micromanometer Manufacturer: SI	0 ... 200 Pa 0 ... 2000 Pa	$\pm 0.5$ % of measurement value	yes yes	

This report may not be published in any abridged version, nor may extracts of this report be published without our express permission.

Sulzbach, 02-05-05

Building Services and Conveying Engineering  
Assessor:

*Signature*

Mahren (Graduate Engineer – Dipl. Ing. (FH))

**Enclosure**

Manufacturer's description  
Test structure  
Calculation example

**TC**

**Date:**

**Distributor:**

File no.: 60404A0216

5 copies: Aerotechnik Siegwart; c/o H. Kuhn, Untere Hofwiesen,  
66299 Friedrichsthal

**Calculation example:**

Circular shut-off damper in accordance with DIN EN 1751, class 4

Diameter	400 mm
Test pressure	1000 Pa
Free surface A	0.1256 m <sup>2</sup>

Permissible leakage air flow  $q_{VLBA}$  in  $l \cdot s^{-1} \cdot m^{-2}$  from Fig. C 1 of DIN EN 1751 at a test pressure of 1000 Pa, class 4:

$$q_{VLBA} = 5 \text{ l} \cdot \text{s}^{-1} \cdot \text{m}^{-2}, \text{ equivalent to } 18 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2}$$

Measurement value:  $V = 0.2978 \text{ m}^3/\text{h}$

Leakage air flow:

$$q_{VLBA} = \frac{V[m^3/s]}{A[m^2]} = \frac{0.2978}{0.1256} \cdot \frac{m^3}{h \cdot m^2}$$

$$= 2.37 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2} < 18.0 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2}$$

**Description of the circular shut-off damper made from Sendzimir galvanised sheet steel**

Type:	AKH ID no. 220
Construction year:	2005
Diameter:	400 mm
Installation length:	250 mm
Adjustment:	Manual adjustment device by lever with conical adjustable screw and fixing disc
Male couplings:	Rolling rubber ring sealing system "Roll-Gu-Fix" Male couplings press-calibrated according to DIN 24147 T1

The airtight circular shut-off damper type AKH  $\varnothing$  400 mm consists of a laser-welded housing made from Sendzimir galvanised sheet steel manufactured according to EN 1506 with a centrally located sealing disc.

The fitting of the rubber seal against the tube wall is realized by a laser-welded housing with smooth surface, without any intruding fold. The male couplings are press-calibrated according to DIN 24147 part 1 and consequently they are dimensionally stable and fit accurately.

The sealing disc consists of two Sendzimir galvanised sheet steel discs with an intermediate silicone rubber-washer and is manufactured as a combination in a kind of "sandwich structure", including an angulated axle pick-up for the damper axles. The form-fit connection between axle and sealing disc is realized by tightening a hexagon bolt with screw nut. The angulated axle pick-ups serve at the same time as centring of the sealing disc against the tube wall.

The actual damper axle consists of two single axles  $\varnothing$  12 mm, each with an adapter for an o-ring and a retaining ring.

The axle bearing is realized by a special, maintenance-free bearing-bush whereby the retaining ring serves as axial block for the assembly of the axle into the bearing-bush and thus guarantees the exact positioning of the axle and the o-ring into the bearing-bush.

The o-ring guarantees an airtight shaft feedthrough towards the exterior.

The locking adjustment of the damper blade is realized by a lever with conical adjustable screw and a fixing disc with grid spacing which is mounted on the housing.

The seal of the a.m. shut-off damper is airtight up to a pressure of 1000 Pa according to Din EN 1751 class 4. It operates within a temperature range from  $-15^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ .

Friedrichsthal, 23-03-2005

Helm