

## DECLARATION

FlexiForce Group BV in Barneveld, the Netherlands, declares that:

**Tecsedo SA**  
Repr. Mr M. Tognelli  
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has joined the Initial Type Testing in accordance to the standard EN 13241-1 in combination with the below mentioned hardware and operators.

ITT number FlexiForce: 0402-CPD-407001 issued by SP-Institute, Sweden.

### Hardware Flexi-Force BV

FlexiForce® industrial hardware components

### Operators:

Marantec  
MFZ  
Liftmaster Professional/Chamberlain  
Faac Spa  
Nice Spa  
Dalmatic A/S  
Ovitor OY  
Becker GmbH  
Ditec  
Mtec  
BFT  
Ellard

*(all operators with the same construction but sold under different brand names are also a part of this type of test report.)*

### Obtained results:

Wind load	Class :	3
Air permeability	Class :	3
Resistance to water penetration	Class :	1
Thermal resistance without windows and pass door	U door:	0.8 W/(m <sup>2</sup> /K)
Thermal resistance with windows and pass door	U door:	1.0 W/(m <sup>2</sup> /K)

All tests are supervised and approved by Swedish National Testing and Research Institute in Sweden.

Barneveld, 18 June 2008  
Flexi-Force Group B.V.  
Frank Goedhart

Handled by, department  
Lars Andersson  
Building Technology and Mechanics  
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04 JULI 2006

## Testing of Industrial Doors

### 1 Test object

Panels for vertically moving Industrial doors tested together with FlexiForce hardware. The size of the doors was 4000 mm daylight width and 3500 mm daylight height for testing of wind load, air permeability and water penetration in an air chamber. The tests were performed in accordance with EN 13241-1 annex ZA.3 Initial type testing.

### 2 Date of testing

The testing was performed from 2005-02-29 to 2005-07-26. The panels were selected by the client without assistance from SP. The test result shown in this report refers only to the tested sample.

### 3 Testing

Following tests were performed: Resistance to wind load, determination of air permeability, determination of resistance to water penetration, dangerous substances and thermal resistance.

#### 3.1 Resistance to wind load

##### 3.1.1 Testing of fully assembled door

The door was fitted in the opening of an airtight chamber, with its exterior facing inwards towards the chamber and tested in accordance with *EN 12444 Resistance to wind load – testing and calculation*. Before the test steps were taken to eliminate air leakage in the door and its supporting construction. An inner air pressure was increased in steps in accordance with the different classes given in *EN 12424 Resistance to wind load – classification*. The air pressure was then increased until the door ruptured. The test was performed at ambient temperature.

##### 3.1.2 Testing of door panels

Door panels were subjected to four-point bending tests in accordance with *EN 12444 Resistance to wind load – testing and calculation*. The loading points were symmetrical positioned in the test set-up. The distance between the loading points was half of the distance between the points of support. The applied load was increased in steps in accordance with the different classes given in *prEN 12424 Resistance to wind load – classification*. After each step the deflection of the door panels was measured. The test was performed at ambient temperature.

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### 3.2 Determination of air permeability

The door was fitted in the opening of an airtight chamber, with its exterior facing inwards towards the chamber and tested in accordance with *EN 12427 Air permeability – test method*. The air leakage was measured at a positive air pressure of 50 Pa.

### 3.3 Resistance to water penetration

The door was fitted in the opening of an airtight chamber, with its exterior facing inwards towards the chamber and tested in accordance with *EN 12489 Resistance to water penetration – test method*. Water was supplied through three horizontal rows of nozzles with ten nozzles in each.

### 3.4 Dangerous substances

The different doors were examined in accordance with the requirements of the Construction Products Directive, CPD, (89/106/EEC). The interpretative Document Essential Requirements No 3 related to the CPD identifies aspects where hygiene, health and the environment may be concerned. Technical specifications are required to define release of pollutants to indoor air, outdoor air, soil and water, taking account of the concentration of pollutants in the products.

### 3.5 Thermal resistance

Calculation of the U-values of the door sections was performed using the FRAM 5.1 program. The tests were performed in heat-flow meter apparatus HFM2000 single specimen symmetrical configuration with double heat-flow meters.

## 4 Test result

### 4.1 Resistance to wind load

#### 4.1.1 Test of fully assembled door

The inner pressure in the air chamber was increased in steps.

**Table 1 Fully Assembled doors**

Door (panel) type	Width [m]	Height [m]	Wind load class	Maximum pressure [Pa]
Tecsedo covered t=40 mm	4.00	3.50	3	

#### 4.1.1.1 Measurement uncertainty wind load

The total calculated measurement uncertainty is for the wind load < 1.5% and for the deformations < 1.5%. Reported uncertainty corresponds to an approximate 95 % confidence interval around the measured value. The interval has been calculated in accordance with GUM (The ISO guide to the expression of uncertainty in measurements), which is normally accomplished by quadratic addition of the actual standard uncertainties and multiplication of the resulting combined standard uncertainty by the coverage factor  $k=2$ .

#### 4.1.2 Bending test of door panels

The door panels were subjected to four-point bending tests in accordance with *prEN 12444 Resistance to wind load – testing and calculation*. The panels were supported and the load was applied as shown in Figure 1. The loading points were symmetrical positioned in the test set-up.

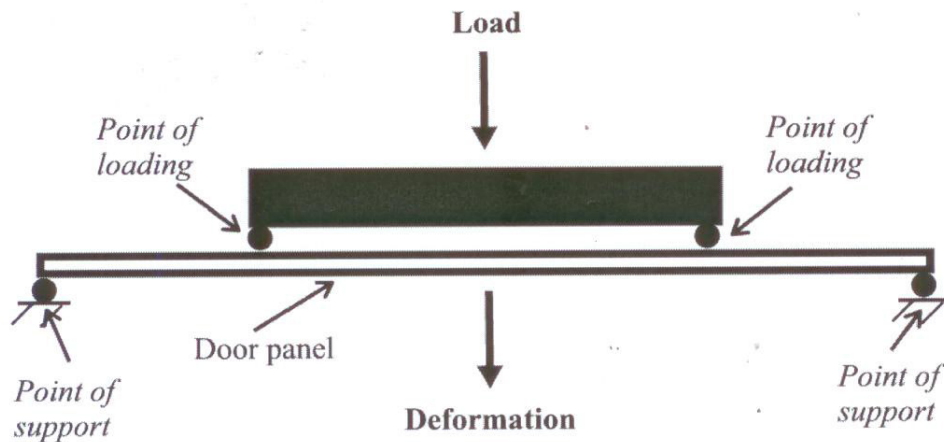


Figure 1 Schematic figure of test set-up

**4.1.3 Results from four point bending test**

**Table 2 Description of Tecsedo door panels**

Tecsedo a	4040*610*40
Tecsedo b	4000*610*40, 4 windows
Tecsedo c	6000*610*40
Tecsedo d	6000*610*40, 6 windows
Tecsedo e	7500*610*40, reinforcement profile 65S
Tecsedo f	8500*610*40, reinforcement profile 110S
Tecsedo g	7500*610*40, 7 windows, reinforcement profile 65S
Tecsedo h	8525*610*40, 8 windows, reinforcement profile 110S

**Table 3 Summary of Tecsedo test results of resistance to wind load**

Door panel	Wind load class		Maximum pressure [Pa]	Remarks/Fracture
		[Pa]		
Tecsedo a	5	1020	1403	BoP at loading point
Tecsedo b	2	-	819	BoP at windows 1 and 3
Tecsedo c	2	-	623	BoP at loading point
Tecsedo d	0	-	404	BoP at window 3
Tecsedo e	2	-	810	BoP at loading point
Tecsedo f	3	-	1018	BoP at loading points
Tecsedo g	1	-	560	BoP at both edges of window 3
Tecsedo h	2	-	829	BoP and delamination at inner edge of window 4

BoP = Buckling of the panel

#### 4.1.2.1 Measurement uncertainty bend test

The total calculated measurement uncertainty is for the wind load  $< 1.5\%$  and for the deformations  $< 1.5\%$ . Reported uncertainty corresponds to an approximate 95 % confidence interval around the measured value. The interval has been calculated in accordance with GUM (The ISO guide to the expression of uncertainty in measurements), which is normally accomplished by quadratic addition of the actual standard uncertainties and multiplication of the resulting combined standard uncertainty by the coverage factor  $k=2$ .

#### 4.2 Determination of air permeability

Table 4 Summary determination of air permeability

Door type	Width [m]	Height [m]	Air permeability class
Tecsedo covered t=40 mm	4.00	3.50	3

#### 4.3 Resistance to water penetration

Table 5 Summary resistance to water penetration

Door type	Width [m]	Height [m]	Water penetration class
Tecsedo covered t=40 mm	4.00	3,50	1

#### 4.6 Dangerous substances

Door components described in this report are made of material that complies with the Construction Products Directive (89/106/EEC).

#### 3.7 Thermal resistance

Calculations with an industrial door with width (W) = 8.50 m and height (H) 7.00 m;

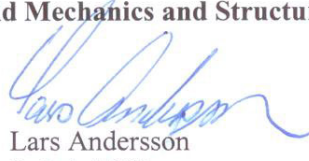
Table 6 Thermal resistance

Type of panels	Thermal transmittance, W/(m <sup>2</sup> K)					
	p	pw	pd	pwd	g	gd
Tecsedo	0.8	0.9	1.0	1.0	-	-

- p = Door with covered panels only  
 pw = covered panels with windows  
 pd = covered panels with a pass door  
 pwd = covered panels with windows and a pass door  
 g = fully glazed door  
 gd = glazed door with a pass door

SP Swedish National Testing and Research Institute  
 Building Technology and Mechanics - Solid Mechanics and Structures

  
 Erica Waller  
 Technical Manager

  
 Lars Andersson  
 Technical Officer

## DECLARATION

Flexi-Force BV in Barneveld, the Netherlands, hereby declares that

### **Tecsedo S.A.**

Attn. Dott. Ing. M. Tognelli  
Via Maderno, 10  
CH-6900 Lugano  
Switzerland

has succeeded the CE-tests in accordance to the standard EN13241-1 in combination with the below mentioned hardware and operators.

### **Hardware Flexi-Force BV:**

RES200  
RES70  
RES-X

### **Operators:**

Marantec  
RES-E-500  
MFZ  
Sommer  
Bernal  
Tormatic  
Liftmaster Professional/ Chamberlain  
FAAC SpA

*(All operators with the same construction but sold under different brand names are also a part of this type test report.)*

### **Obtained test results:**

Wind load	Class : 5
Air permeability	Class : 3
Resistance to water penetration,	Class : 3
Thermal resistance without windows	U door : 1.4 W/(m <sup>2</sup> K)
Thermal resistance with windows	U door : 1.6 W/(m <sup>2</sup> K)

All test are supervised and approved by Swedish National Testing and Research Institute in Sweden.

Barneveld, 8 March 2005

Frank Goedhart (CMO)  
Flexi-Force BV

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## Testing of Garage Door Panels

### 1. Test object

Panels for residential sectional overhead doors. The tested panels are shown in the test results. The tests were performed in accordance with EN 13241-1.

Garage Door Type:	Tecsedo panels
Daylight width:	2500 mm
Daylight height:	2610 mm
Hardware:	FlexiForce Type RES 70 RES 200 RES X
Balancing system for 160 kg:	2 torsion springs 1 = 670 mm Di = 67 mm D = 6.5 mm

#### *Date of testing*

The testing was performed from 2004-11-01 to 2005-02-10. The doors were selected by the client without assistance from SP. The test result shown in this report refers only to the tested sample.

### 2. Testing

Following tests were performed: Resistance to wind load, determination of air permeability, determination of resistance to water penetration, dangerous substances, thermal resistance.

#### 2.1 Resistance to wind load

##### 2.1.1 Testing of fully assembled door

The size of the door was 2500 mm daylight width and 2610 mm daylight height. The door was fitted in the opening of an airtight chamber, with its exterior facing inwards towards the chamber and tested in accordance with *EN 12444 Resistance to wind load – testing and calculation*. Before the test steps were taken to eliminate air leakage in the door and its supporting construction. An inner air pressure was increased in steps in accordance with the different classes given in *EN 12424 Resistance to wind load – classification*. The air pressure was then increased until the door ruptured. The test was performed at ambient temperature.

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### 2.1.2 Testing of door panels

Door panels were subjected to four-point bending tests in accordance with *EN 12444 Resistance to wind load – testing and calculation*. The loading points were symmetrical positioned in the test set-up. The distance between the loading points was half of the distance between the points of support. The applied load was increased in steps in accordance with the different classes given in *prEN 12424 Resistance to wind load – classification*. After each step the deflection of the door panels was measured. The test was performed at ambient temperature.

### 2.2 Determination of air permeability

The door was fitted in the opening of an airtight chamber, with its exterior facing inwards towards the chamber and tested in accordance with *EN 12427 Air permeability – test method*.

### 2.3 Resistance to water penetration

The door was fitted in the opening of an airtight chamber, with its exterior facing inwards towards the chamber and tested in accordance with *EN 12489 Resistance to water penetration – test method*.

### 2.4 Dangerous substances

The different doors were examined in accordance with the requirements of the Construction Products Directive, CPD, (89/106/EEC). The interpretative Document Essential Requirements No 3 related to the CPD identifies aspects where hygiene, health and the environment may be concerned. Technical specifications are required to define release of pollutants to indoor air, outdoor air, soil and water, taking account of the concentration of pollutants in the products.

### 2.5 Thermal resistance

Calculation of the U-values of the door sections was performed using the FRAM 5.1 program. The tests were performed in heat-flow meter apparatus HFM2000 single specimen symmetrical configuration with double heat-flow meters.

## 3 Test result

### 3.1 Resistance to wind load

#### 3.1.1 Test of fully assembled door

The inner pressure in the air chamber was increased in steps.

Door (panel) type	Width [m]	Height [m]	Wind load class	Maximum pressure [Pa]
Tecsedo	2.50	2.61	5	1300

#### 3.1.1.1 Measurement uncertainty wind load

The total calculated measurement uncertainty is for the wind load < 1.5% and for the deformations < 1.5%. Reported uncertainty corresponds to an approximate 95 % confidence interval around the measured value. The interval has been calculated in accordance with GUM (The ISO guide to the expression of uncertainty in measurements), which is normally accomplished by quadratic addition of the actual standard uncertainties and multiplication of the resulting combined standard uncertainty by the coverage factor  $k=2$ .



3.1.2 Bending test of door panels

The door panels were subjected to four-point bending tests in accordance with *prEN 12444 Resistance to wind load – testing and calculation*. The panels were supported and the load was applied as shown in Figure 1. The loading points were symmetrical positioned in the test set-up. The distance between the loading points was half of the distance between the points of support. The applied load was increased in steps in accordance with the different classes given in *prEN 12424 Resistance to wind load – classification*, 300, 450, 700 and 1000 Pa. After each step the deflection of the door panels was measured. The test was performed at ambient temperature.

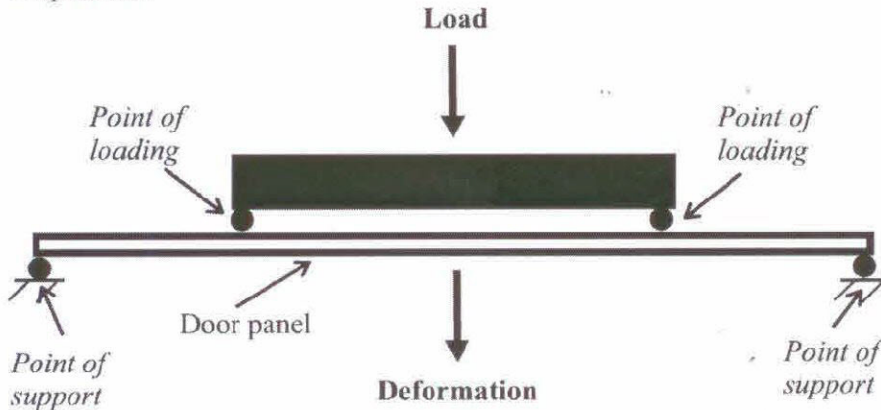


Figure 1 Schematic figure of test set-up

The panel test results are shown below and in figures 2 to 5 as wind load vs. displacement curves.

Door panel	Length [m]	Width [m]	Wind load class		Maximum pressure [Pa]	Remarks/Fracture
				[Pa]		
Tecsedo,	2.50	0.49	5	2 649	3 642	BoP at the point of loading
Tecsedo,, Three windows	2.54	0.49	5	1 137	1 563	BoP at the centre window
Tecsedo,	5.00	0.49	2		918	BoP at the point of loading
Tecsedo Five windows	5.00	0.49	1		530	BoP at both sides of the second window

BoP = Buckling of the panel

DoP = Delaminating of the panel

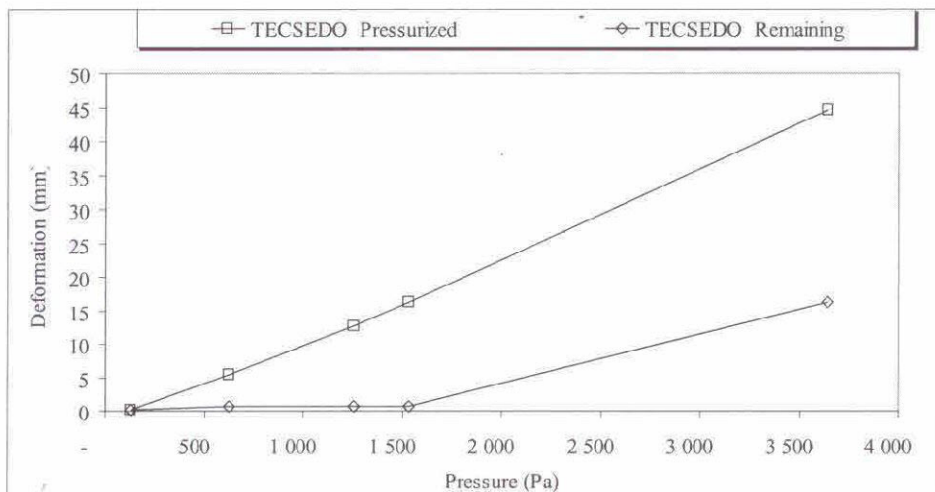


Figure 2 Wind load vs. displacement TECSEDO 2500x490 [mm]

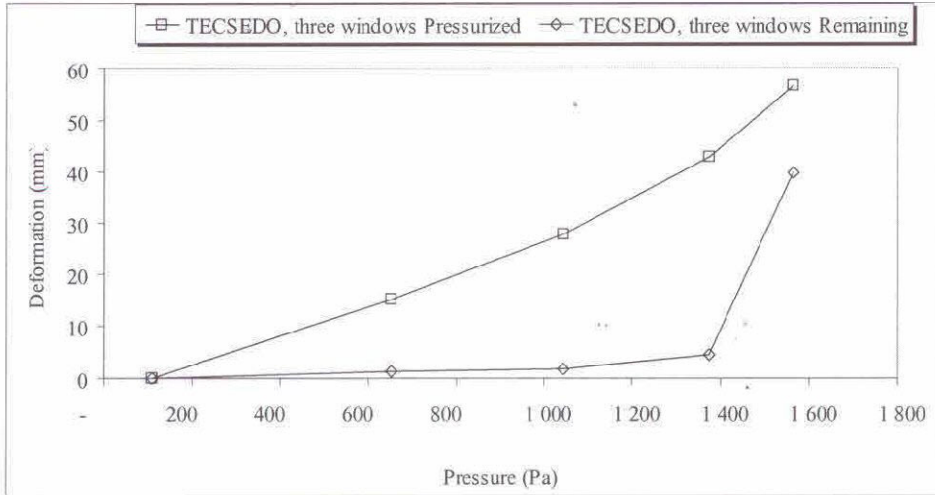


Figure 3 Wind load vs. displacement TECSEDO 2540x490 [mm]

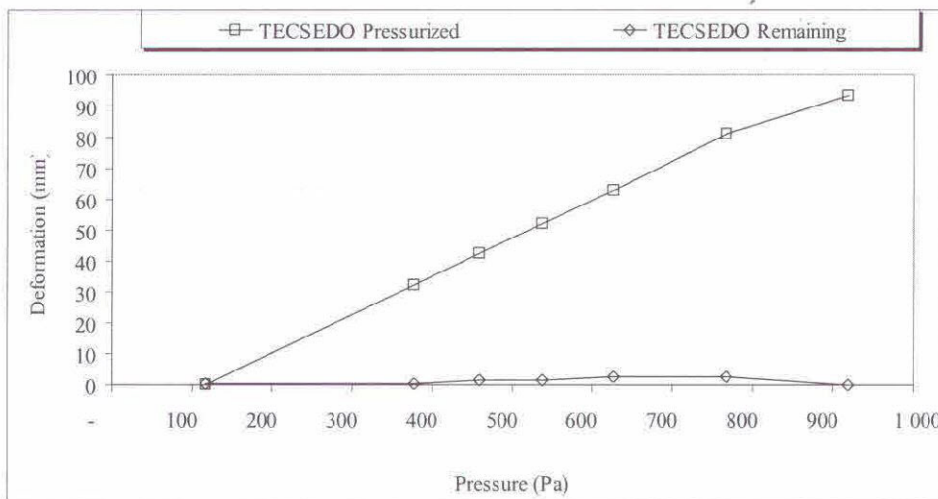


Figure 4 Wind load vs. displacement TECSEDO 5000x490 [mm]

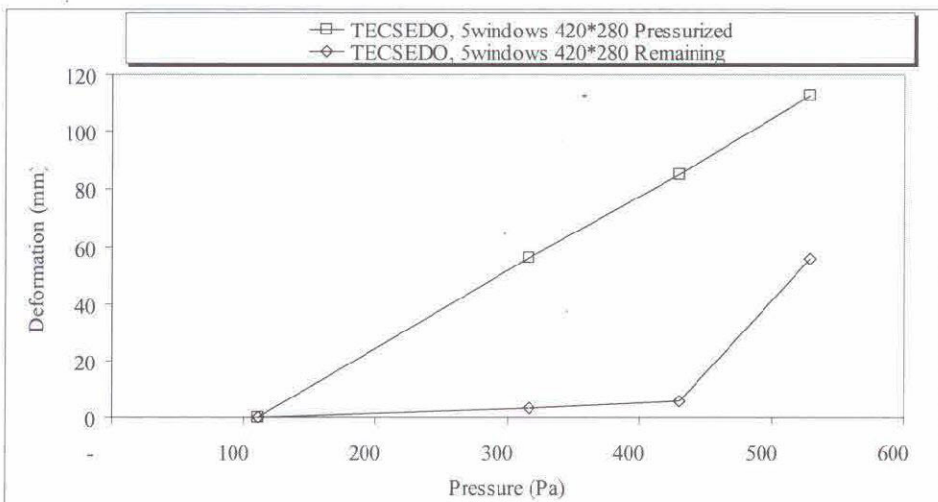


Figure 5 Wind load vs. displacement TECSEDO 5000x490 [mm]

### 3.1.2.1 Measurement uncertainty bend test

The total calculated measurement uncertainty is for the wind load < 1.5% and for the deformations < 1.5%. Reported uncertainty corresponds to an approximate 95 % confidence interval around the measured value. The interval has been calculated in accordance with GUM (The ISO guide to the expression of uncertainty in measurements), which is normally accomplished by quadratic addition of the actual standard uncertainties and multiplication of the resulting combined standard uncertainty by the coverage factor  $k=2$ .

### 3.2 Determination of air permeability

Door type	Width [m]	Height [m]	Air permeability class
Tecsedo	2.50	2.61	3

### 3.3 Resistance to water penetration

Door type	Width [m]	Height [m]	Water penetration class
Tecsedo	2.50	2.61	3 (110 Pa)

### 3.4 Dangerous substances

Door components described in this report are made of material that complies with the Construction Products Directive (89/106/EEC).

### 3.5 Thermal resistance

Calculations with a garage door with width (W) = 2.50 m and height (H) 2.61 m;

Supplier	Thermal transmittance, W/(m <sup>2</sup> K)	
	without windows $U_{door} =$	with four windows $U_{door} =$
Tecsedo	1.4	1.6

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## Determination of air permeability, resistance to water penetration and resistance to wind load according to EN 13241-1

(1 appendix)

### Test object

Client: Doco International B.V.  
Tested door: DOCO Industrial door with Tecsedo panels  
Type of door: Industrial, overhead, sectional door  
Daylight size: Width 4000 mm, Height 3300 mm

The door was supplied and installed by the client in the opening of an airtight chamber, with its exterior facing inwards towards the chamber, see description and pictures in appendix 1.

### Summary of classification

Air permeability according to EN 12426:	Class 4
Resistance to water penetration according to EN 12425:	Class 2
Resistance to wind load according to EN 12424:	Class 3

### Test procedure

#### Air permeability

A positive air pressure was established in the chamber and the air leakage was measured at 50 Pa.

The tests were carried out in accordance with EN 12427.

#### Resistance to water penetration

Water was applied through three horizontal rows of nozzles with ten nozzles on each row. The upper row supplied  $2\pm 0.2$  l/min of water per nozzle. The two lower rows supplied  $1\pm 0.1$  l/min of water per nozzle.

The test was carried out in accordance with EN 12489.

#### Resistance to wind load

The door was tested in accordance with EN 12444 in an air pressure chamber. Before the test measures were taken to minimize air leakage in the door and its supporting construction. The air pressure in the test chamber was increased in steps in accordance with the different classes given in EN 12424.

The test was carried out in accordance with EN 12444.

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**Test results**

**Air permeability**

Leakage at 50 Pa positive pressure: 2.7 m<sup>3</sup>/h,m<sup>2</sup>  
 Classification according to EN 12426: Class 4

**Resistance to water penetration**

The test was interrupted after 70 Pa and 30 minutes.

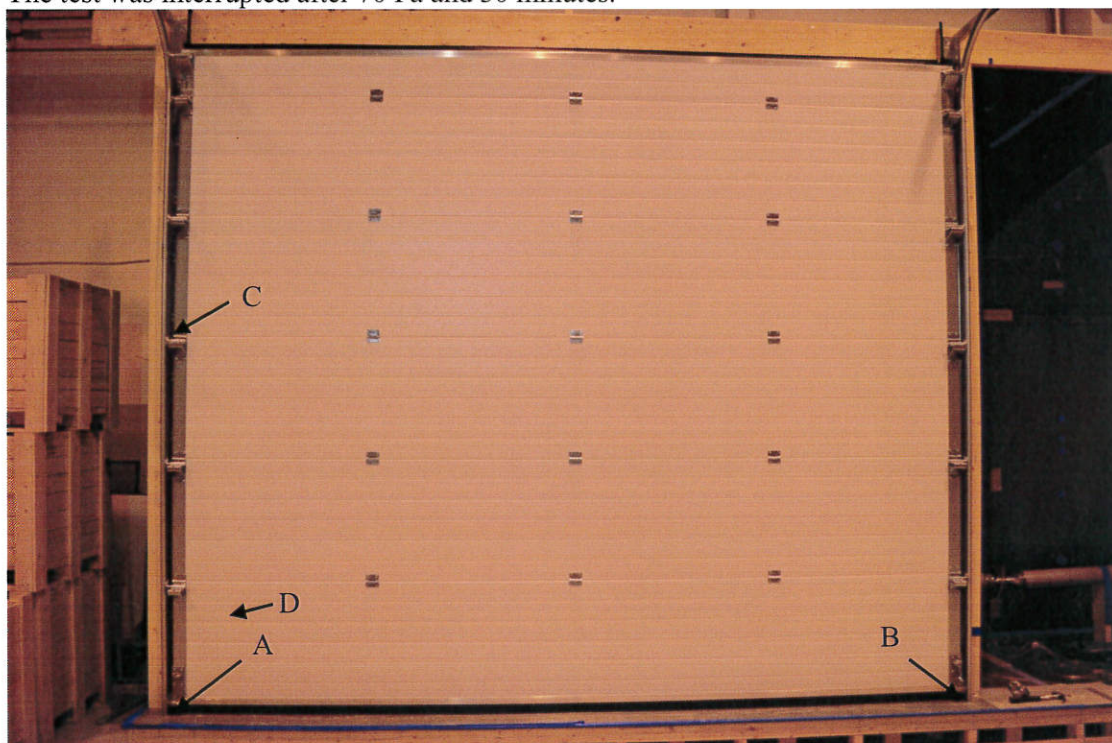


Figure 1. The door as seen from inside.

Air pressure (Pa)	Time (min)	Degree of water leakage at location			
		A	B	C	D
0	0-10	3	0	0	0
10	11-15	3	3	0	0
30	16-20	3	3	0	0
50	21-25	3	3	0	0
70	26-30	3	3	3	3

**Location of leakage:**

- A: Leakage at the edge of the bottom sealing
- B: Leakage at the edge of the bottom sealing
- C: Leakage between the panels at the edge
- D: Water runnel on the panel from leakage C

**Degree of water leakage:**

- 0: No leak
- 1: One clinging drop
- 2: Two or more falling or chain drops
- 3: Runs
- 4: Considerable flow

Failure according to leakage D.

Classification according to EN 12425: Class 2

### Resistance to wind load

The door collapsed at an inner pressure of about 1200 Pa. The panels folded at the middle.

No visible deformations were noted at pressure step, 1100 Pa.

Classification according to EN 12424: Class 3

### Conditions of test

The test results refer only to the tested object.

Date of test: 2013-01-15  
Place of test: SP, Energy Technology, Borås, Sweden  
Equipment used: Measuring equipment no. 202429, 202733, 202214  
Estimated error margin: Air pressure difference  $\pm 2\%$ , air flow  $\pm 5\%$ , water flow  $\pm 5\%$   
Ambient climate: Air temperature 18 °C, RH 31 %, atmospheric pressure 988 hPa

### SP Technical Research Institute of Sweden Energy Technology - Building Physics and Indoor Environment

Performed by

Examined by



Roger Davidsson



Börje Gustavsson

Appendix 1: Description and pictures of the door.

Appendix 1

**Description of the door**

<b>Tested door</b>	DOCO Industrial door with Tecsedo panels
<b>Daylight size</b>	4000 x 3300 mm
<b>Type and producer of panels</b>	Tecsedo
<b>Thickness of panel</b>	40 mm
<b>Type of tracks</b>	DOCO IND
<b>Type of side hinges</b>	DOCO 25334
<b>Type of slides</b>	DOCO 25238
<b>Type of rollers</b>	DOCO 25010-E
<b>Type of intermediate hinges</b>	DOCO 25333
<b>Type of bottom bracket</b>	DOCO 25032
<b>Type of top sealing</b>	DOCO 825101
<b>Type of bottom sealing</b>	DOCO 825103
<b>Type of side sealing</b>	DOCO 225030 series

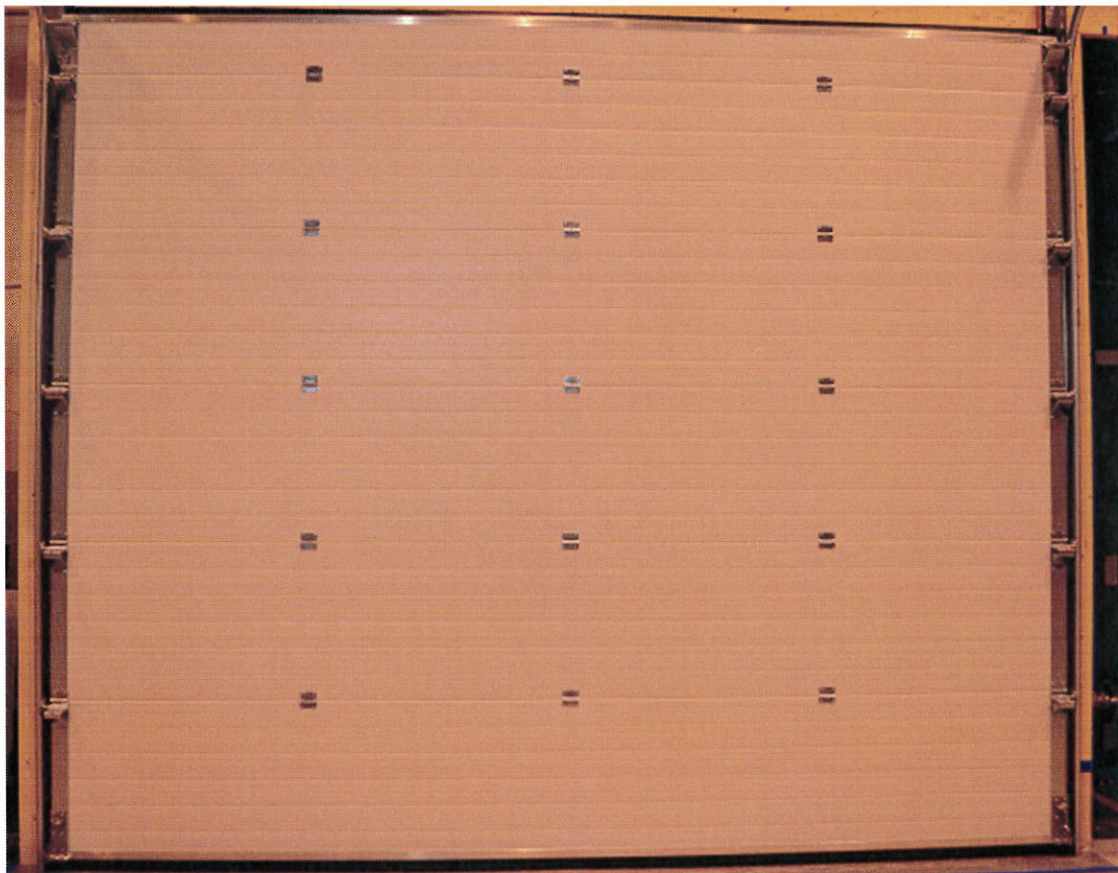


Figure 2. Tested door, DOCO Industrial door with Tecsedo panels, mounted in the test rig, as seen from inside.

Appendix 1



Figure 3. Side hinge, slide and roller.

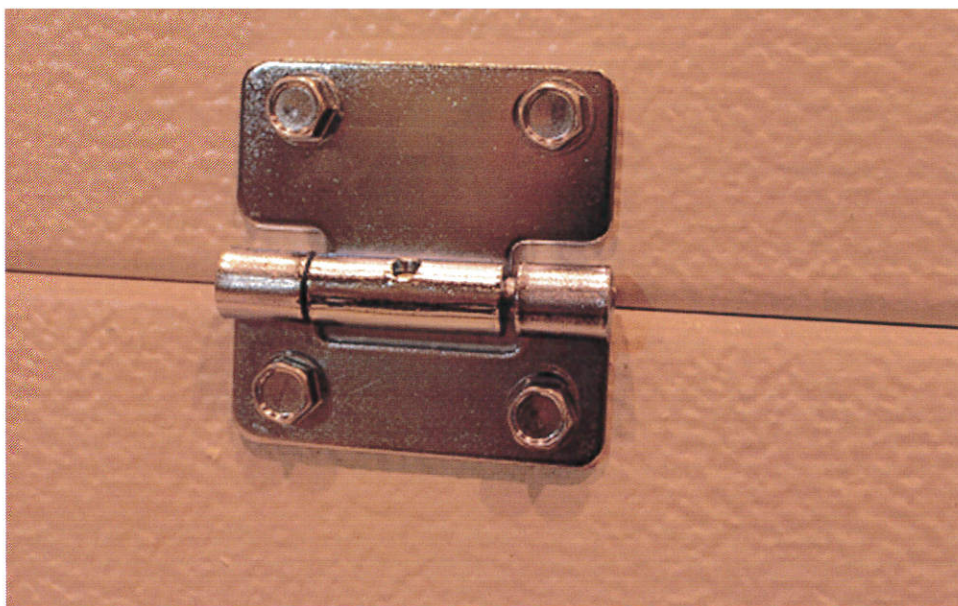


Figure 4. Intermediate hinge.



Appendix 1



Figure 5. Bottom bracket.

Doco International B.V.  
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Nederländerna

## Measuring of resistance to wind load, by four point bending test

**Table 1** Summary of test results of resistance to wind load of Doco International B.V. door panels.

Door Panels	Wind load		Maximum press. [Pa]	Remarks/Fracture
	class	[Pa]		
Tecsedo strut 120 length 8.5 m	2	615	831	BoP center
Tecsedo strut 67 length 6.0 m	3	760	1 025	BoP point of loading

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Door Panels	Wind load		Maximum press. [Pa]	Remarks/Fracture
	class	[Pa]		
Tecsedo length 5.0 m	2	625	844	BoP close to point of loading

## 1 Introduction

SP has been commissioned by Doco International B.V. to perform wind load tests on door panels.

Place of testing                      Laboratory of SP Building and Mechanics

Test date                                2013-02-11--2013-02-15

## 2 Tested objects

The tested objects consist of door panels according to Table 2. The client selected the test specimens without assistance from SP.

**Table 2      Description of the tested door panels.**

Door Panels	Width mm	Height mm
Tecsedo strut 120 length 8.5 m	8500	610

Tecsedo strut 67 length 6.0 m	6000	610
Tecsedo strut 81 length 7.5 m	7500	610
Tecsedo length 5.0 m	5000	610

### 3 Test performance

The door panels were subjected to four point bending and tested in accordance with *EN 12444 Resistance to wind load – testing and calculation*. The load was applied as shown in Figure 1. The loading points were symmetrical positioned in the test set-up. The distance between the loading points was half of the distance between the points of support.

The applied load was increased in steps in accordance with the different classes given in *EN 12424 Resistance to wind load – classification*. After each step the deflection of the door panels was measured. The test was performed at ambient temperature.

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Nederl nderna

## Determination of air permeability, resistance to water penetration and resistance to wind load according to EN 13241-1

(1 appendix)

### Test object

Client: Doco International B.V.  
Tested door: DOCO REN/EXS, Garage door with Tecsedo panels  
Type of door: Residential, overhead, sectional door  
Daylight size: Width 2500 mm, Height 2460 mm

The door was supplied and installed by the client in the opening of an airtight chamber, with its exterior facing inwards towards the chamber, see description and pictures in appendix 1.

### Summary of classification

Air permeability according to EN 12426:	Class 3
Resistance to water penetration according to EN 12425:	Class 3, 70 Pa
Resistance to wind load according to EN 12424:	Class 5, 1100 Pa

### Test procedure

#### Air permeability

A positive air pressure was established in the chamber and the air leakage was measured at 50 Pa.

The tests were carried out in accordance with EN 12427.

#### Resistance to water penetration

Water was applied through two horizontal rows of nozzles with seven nozzles on each row. The upper row supplied 2±0.2 l/min of water per nozzle. The lower row supplied 1±0.1 l/min of water per nozzle.

The test was carried out in accordance with EN 12489.

#### Resistance to wind load

The door was tested in accordance with EN 12444 in an air pressure chamber. Before the test measures were taken to minimize air leakage in the door and its supporting construction. The air pressure in the test chamber was increased in steps in accordance with the different classes given in EN 12424.

The test was carried out in accordance with EN 12444.

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**Test results**

**Air permeability**

Leakage at 50 Pa positive pressure: 4.4 m<sup>3</sup>/h,m<sup>2</sup>  
 Classification according to EN 12426: Class 3

**Resistance to water penetration**

The test was interrupted after 90 Pa and 35 minutes.

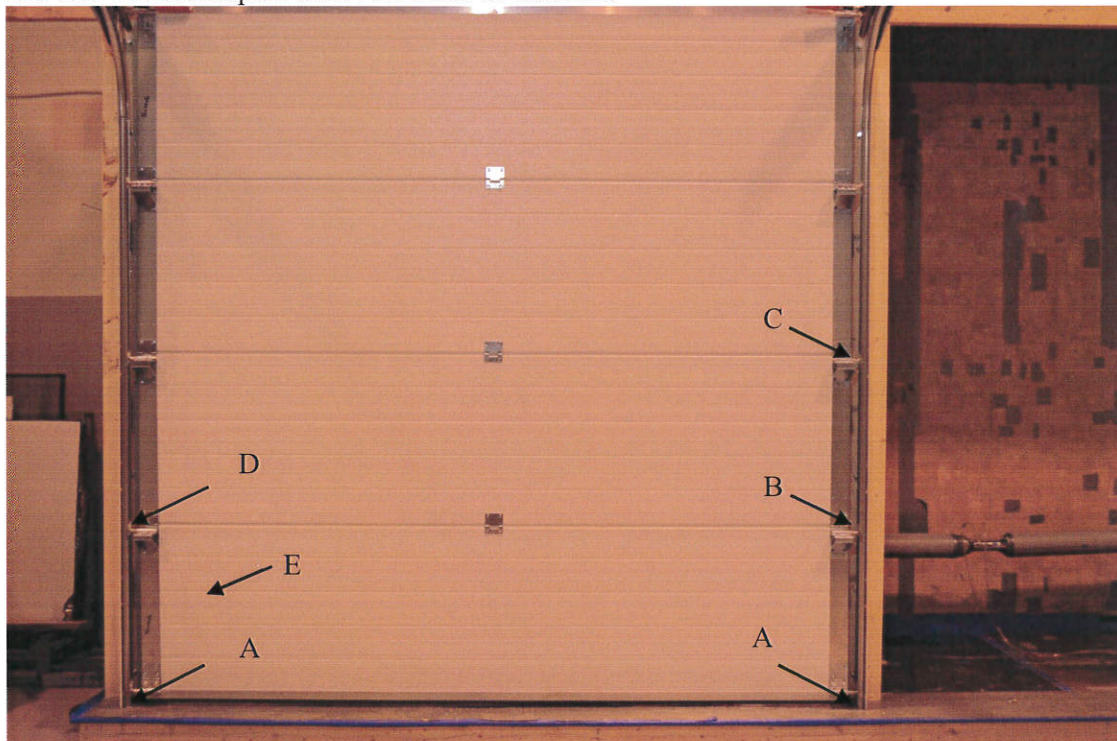


Figure 1. The door as seen from inside.

Air pressure (Pa)	Time (min)	Degree of water leakage at location				
		A	B	C	D	E
0	0-10	0	0	0	0	0
10	11-15	3	0	0	0	0
30	16-20	3	0	0	0	0
50	21-25	3	3	0	0	0
70	26-30	3	3	3	0	0
90	31-35	3	3	3	3	3

**Location of leakage:**

- A: Leakage at the edge of the bottom sealing
- B: Leakage between the panels at the edge
- C: Leakage between the panels at the edge
- D: Leakage between the panel and the end cap
- E: Water runs on the panel from leakage D

**Degree of water leakage:**

- 0: No leak
- 1: One clinging drop
- 2: Two or more falling or chain drops
- 3: Runs
- 4: Considerable flow

Failure according to leakage E.

Classification according to EN 12425:

Class 3, 70 Pa

### Resistance to wind load

The test was interrupted after the inner pressure step at 1513 Pa.

No visible deformations were noted after the test.

Classification according to EN 12424:

Class 5, 1100 Pa

### Conditions of test

The test results refer only to the tested object.

Date of test: 2013-01-16

Place of test: SP, Energy Technology, Borås, Sweden

Equipment used: Measuring equipment no. 202429, 202733, 202214

Estimated error margin: Air pressure difference  $\pm 2$  %, air flow  $\pm 5$  %, water flow  $\pm 5$  %

Ambient climate: Air temperature 18 °C, RH 26 %, atmospheric pressure 991 hPa

### SP Technical Research Institute of Sweden

#### Energy Technology - Building Physics and Indoor Environment

Performed by

Examined by



Roger Davidsson



Börje Gustavsson

Appendix 1: Description and pictures of the door.

Appendix 1

**Description of the door**

<b>Tested door</b>	DOCO REN/EXS Garage door with Tecsedo panels
<b>Daylight size</b>	2500 x 2460 mm
<b>Type and producer of panels</b>	Tecsedo
<b>Thickness of panel</b>	40 mm
<b>Type of tracks</b>	DOCO REN/EXS
<b>Type of side hinges</b>	DOCO 25734
<b>Type of slides</b>	DOCO 25238
<b>Type of rollers</b>	DOCO 25010-E
<b>Type of intermediate hinges</b>	DOCO 25733
<b>Type of bottom bracket</b>	DOCO 25052 / 25057
<b>Type of top sealing</b>	DOCO 24750 series
<b>Type of bottom sealing</b>	DOCO 825100
<b>Type of side sealing</b>	DOCO 24750 series

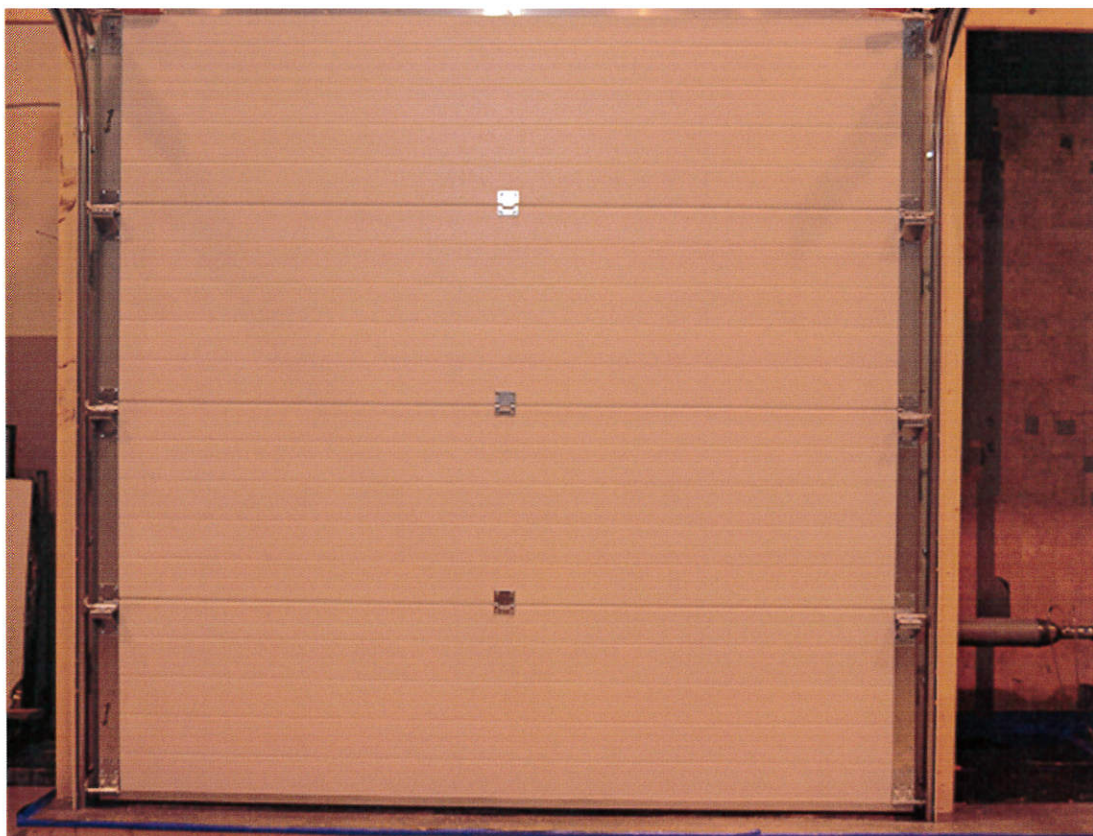


Figure 2. Tested door, DOCO REN/EXS garage door with Tecsedo panels, mounted in the test rig, as seen from inside.



Appendix 1

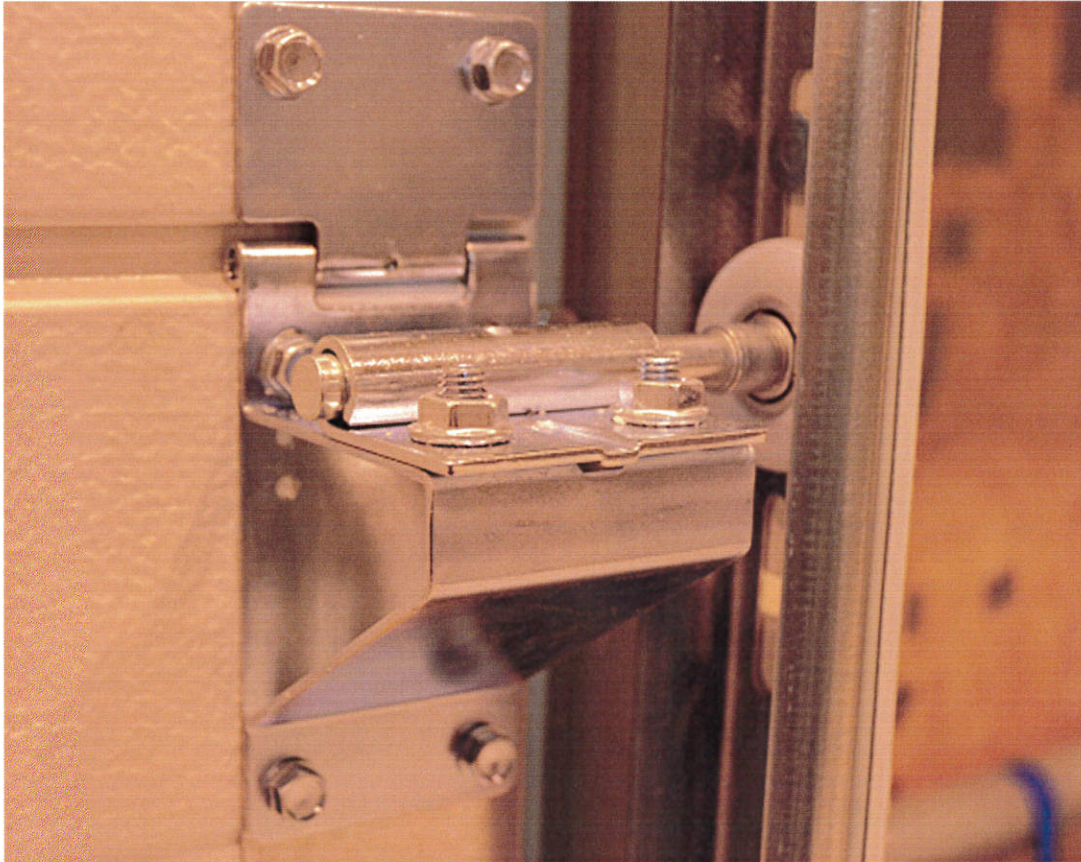


Figure 3. Side hinge, slide and roller.



Figure 4. Intermediate hinge.

Appendix 1



Figure 5. Bottom bracket.



Doco International B.V.  
Nusterweg 96  
NL-6136 KV SITTARD  
Nederl nderna

## Determination of air permeability, resistance to water penetration and resistance to wind load according to EN 13241-1

(1 appendix)

### Test object

Client: Doco International B.V.  
Tested door: DOCO SFR/SF/SRR, Garage door with Tecsedo panels  
Type of door: Residential, overhead, sectional door  
Daylight size: Width 2500 mm, Height 2460 mm

The door was supplied and installed by the client in the opening of an airtight chamber, with its exterior facing inwards towards the chamber, see description and pictures in appendix 1.

### Summary of classification

Air permeability according to EN 12426:	Class 3
Resistance to water penetration according to EN 12425:	Class 3, 150 Pa
Resistance to wind load according to EN 12424:	Class 5, 1200 Pa

### Test procedure

#### Air permeability

A positive air pressure was established in the chamber and the air leakage was measured at 50 Pa.

The tests were carried out in accordance with EN 12427.

#### Resistance to water penetration

Water was applied through two horizontal rows of nozzles with seven nozzles on each row. The upper row supplied 2±0.2 l/min of water per nozzle. The lower row supplied 1±0.1 l/min of water per nozzle.

The test was carried out in accordance with EN 12489.

#### Resistance to wind load

The door was tested in accordance with EN 12444 in an air pressure chamber. Before the test measures were taken to minimize air leakage in the door and its supporting construction. The air pressure in the test chamber was increased in steps in accordance with the different classes given in EN 12424.

The test was carried out in accordance with EN 12444.

---

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**Test results**

**Air permeability**

Leakage at 50 Pa positive pressure: 3.9 m<sup>3</sup>/h,m<sup>2</sup>  
 Classification according to EN 12426: Class 3

**Resistance to water penetration**

The test was interrupted after 170 Pa and 55 minutes.

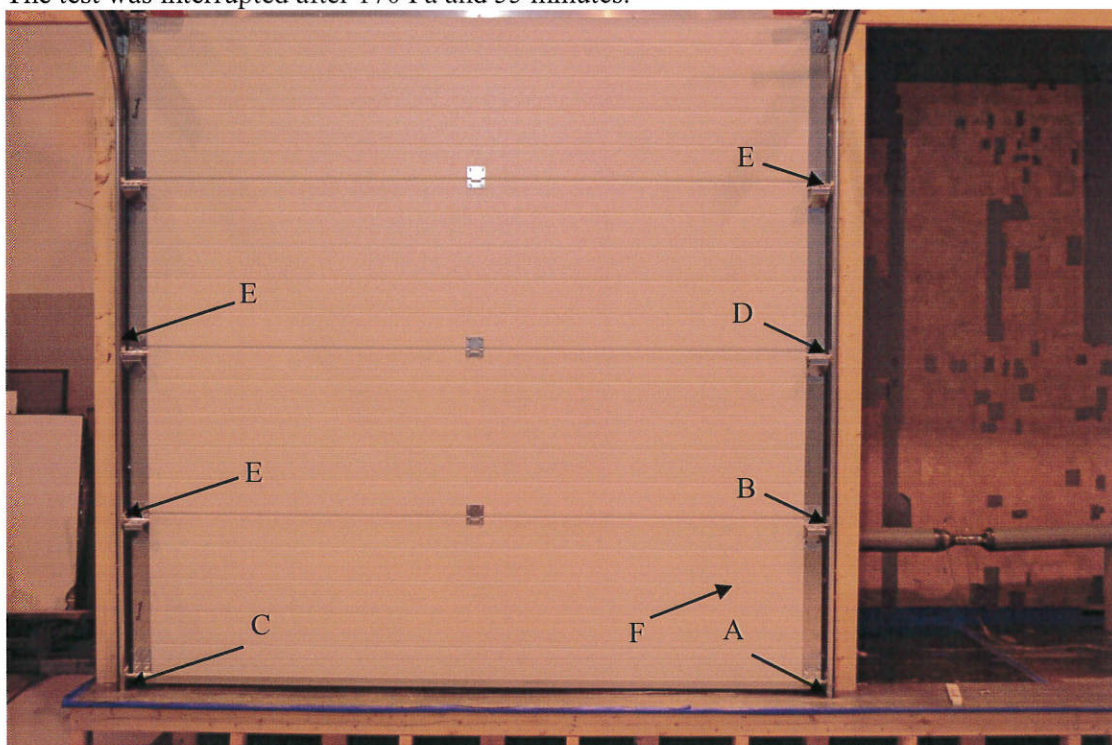


Figure 1. The door as seen from inside.

Air pressure (Pa)	Time (min)	Degree of water leakage at location					
		A	B	C	D	E	F
0	0-10	0	0	0	0	0	0
10	11-15	0	3	0	0	0	0
30	16-20	3	3	3	0	0	0
50	21-25	3	3	3	0	0	0
70	26-30	3	3	3	3	0	0
90	31-35	3	3	3	3	0	0
110	36-40	3	3	3	3	0	0
130	41-45	3	3	3	3	3	0
150	46-50	3	3	3	3	3	0
170	51-55	3	3	3	3	3	3

**Location of leakage:**

- A: Leakage at the edge of the bottom sealing
- B: Leakage between the panels at the edge
- C: Leakage at the edge of the bottom sealing
- D: Leakage between the panels at the edge
- E: Leakage between the panels at the edge
- F: Water runs on the panel from leakage D and E

**Degree of water leakage:**

- 0: No leak
- 1: One clinging drop
- 2: Two or more falling or chain drops
- 3: Runs
- 4: Considerable flow

Failure according to leakage F.

Classification according to EN 12425:

Class 3, 90 Pa

**Resistance to wind load**

The test was interrupted after the inner pressure step at 1650 Pa. After the test the screws to the side hinges had started to come loose from the panel.

No visible deformations were noted at pressure step, 1320 Pa.

Classification according to EN 12424:

Class 5, 1200 Pa

**Conditions of test**

The test results refer only to the tested object.

Date of test: 2013-01-17  
Place of test: SP, Energy Technology, Borås, Sweden  
Equipment used: Measuring equipment no. 202429, 202733, 202214  
Estimated error margin: Air pressure difference  $\pm 2\%$ , air flow  $\pm 5\%$ , water flow  $\pm 5\%$   
Ambient climate: Air temperature 18 °C, RH 26 %, atmospheric pressure 997 hPa


**SP Technical Research Institute of Sweden  
Energy Technology - Building Physics and Indoor Environment**

Performed by

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Börje Gustavsson

Appendix 1: Description and pictures of the door.

Appendix 1

**Description of the door**

<b>Tested door</b>	DOCO SFR/SF/SRR Garage door with Tecsedo panels
<b>Daylight size</b>	2500 x 2460 mm
<b>Type and producer of panels</b>	Tecsedo
<b>Thickness of panel</b>	40 mm
<b>Type of tracks</b>	DOCO SFR/SF/SRR
<b>Type of side hinges</b>	DOCO 25734
<b>Type of slides</b>	DOCO 25238
<b>Type of rollers</b>	DOCO 25010-E
<b>Type of intermediate hinges</b>	DOCO 25733
<b>Type of bottom bracket</b>	DOCO 25052 / 25057
<b>Type of top sealing</b>	DOCO 825101
<b>Type of bottom sealing</b>	DOCO 825100
<b>Type of side sealing</b>	DOCO 24740 series



Figure 2. Tested door, DOCO SFR/SF/SRR garage door with Tecsedo panels, mounted in the test rig, as seen from inside.

Appendix 1



Figure 3. Side hinge, slide and roller.



Figure 4. Intermediate hinge.

Appendix 1



Figure 5. Bottom bracket.





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Page  
1 (2)

EINGEGANGEN  
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Sommer Antriebs- und Funktechnik GmbH  
Hans-Böckler-Str. 21-27  
D-73230 Kirchheim/Teck  
Tyskland

## Determination of resistance to wind load according to EN 13241-1 (1 appendix)

### Test object

Client: SOMMER Antriebs- und Funktechnik GmbH  
Product name: DOCO SFR Tecsedo  
Type of door: Sectional, overhead door  
Daylight size: Width 6000 mm, Height 3000 mm

The door was supplied and installed by the client in the opening of an airtight chamber, with its exterior facing inwards towards the chamber, see description and pictures in appendix 1.

During the tests was a simulated door operator connected to the top panel.

### Test procedure

The door was tested in accordance with EN 12444 in an air pressure chamber. Before the test measures were taken to minimize air leakage in the door and its supporting construction. The air pressure in the test chamber was increased in steps in accordance with the different classes given in EN 12424.

The test was carried out in accordance with EN 12444.

### Test results

After the inner pressure step of 770 Pa was the reinforcements on the panels deformed and the screws to the reinforcement have started to come loose.

No visible deformations were noted at pressure step, 620 Pa.

Classification according to EN 12424: Class 2

### Conditions of test

The test results refer only to the tested object.

Date of test: 2014-09-15  
Place of test: SOMMER test site in Kirchheim/Teck, Germany  
Equipment used: Measuring equipment no. 202429  
Estimated error margin: Air pressure difference  $\pm 2$  %  
Ambient climate: Air temperature 20 °C

---

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**Appendix**

1: Description and figures of the test object.

Appendix 1

**Description and figures of the door**

<b>Manufacturer of the door</b>	DOCO
<b>Product name</b>	Garage door DOCO SFR
<b>Type of door</b>	Overhead, sectional door
<b>Daylight size (wxh)</b>	6000 mm x 3000 mm
<b>Producer and type of panel</b>	Tecsedo, fingersafe, residential
<b>Total thickness of panel</b>	40 mm
<b>Thickness of sheet in panel</b>	Outside 0,6 mm / inside 0,45 mm
<b>Type of tracks</b>	DOCO SFR
<b>Type of side hinges</b>	DOCO 25734
<b>Type of slide/roller</b>	DOCO 25011-E
<b>Type of intermediate hinges</b>	DOCO 25733
<b>Type of bottom bracket</b>	DOCO 25056/57
<b>Type of top sealing</b>	DOCO 24740 series
<b>Type of side sealing</b>	DOCO 24740 series
<b>Type of bottom sealing</b>	DOCO 825100
<b>Type of reinforcement on the panel</b>	DOCO 220900

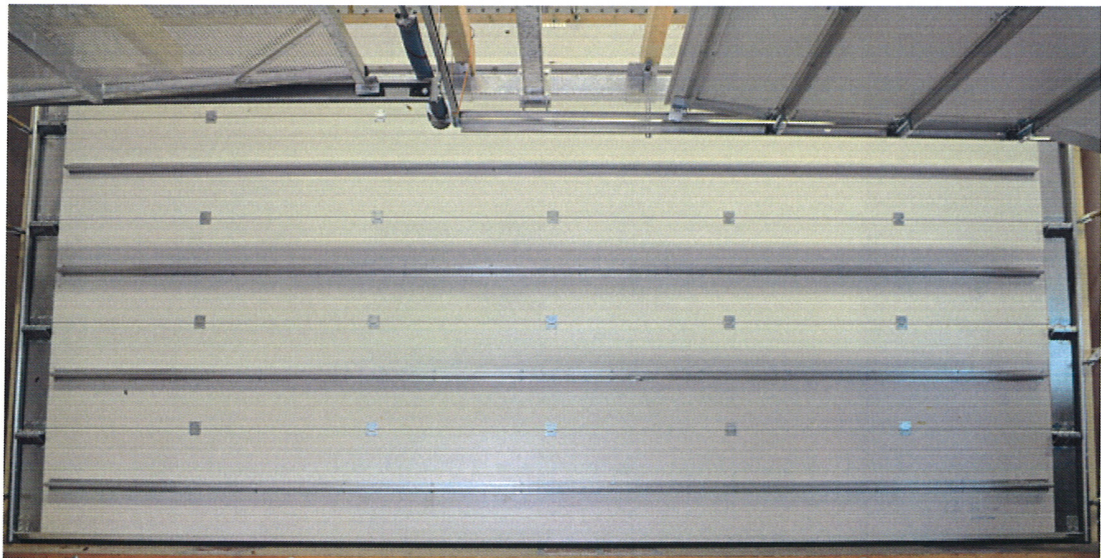


Figure 1. Door type DOCO SFR Tecsedo, mounted in the test rig, as seen from inside.

Appendix 1

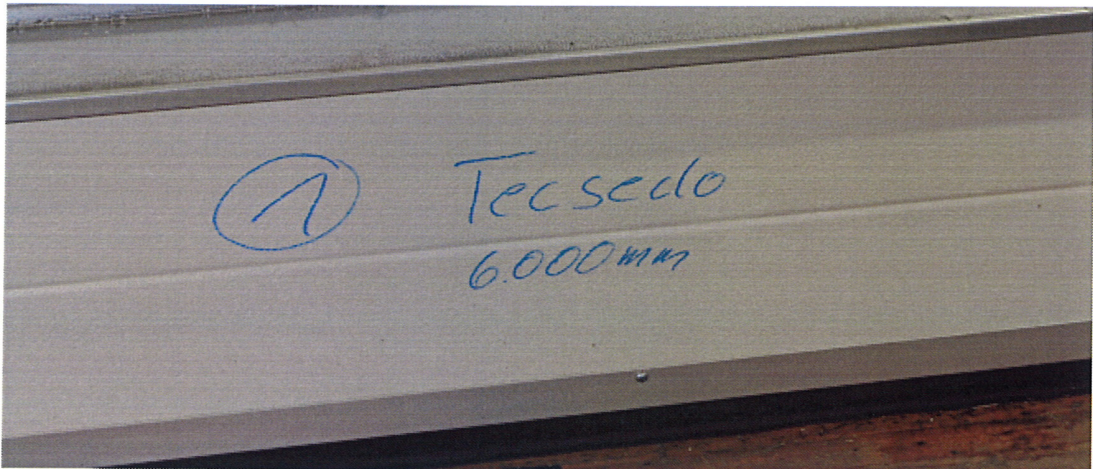


Figure 2. Marking on the test object.

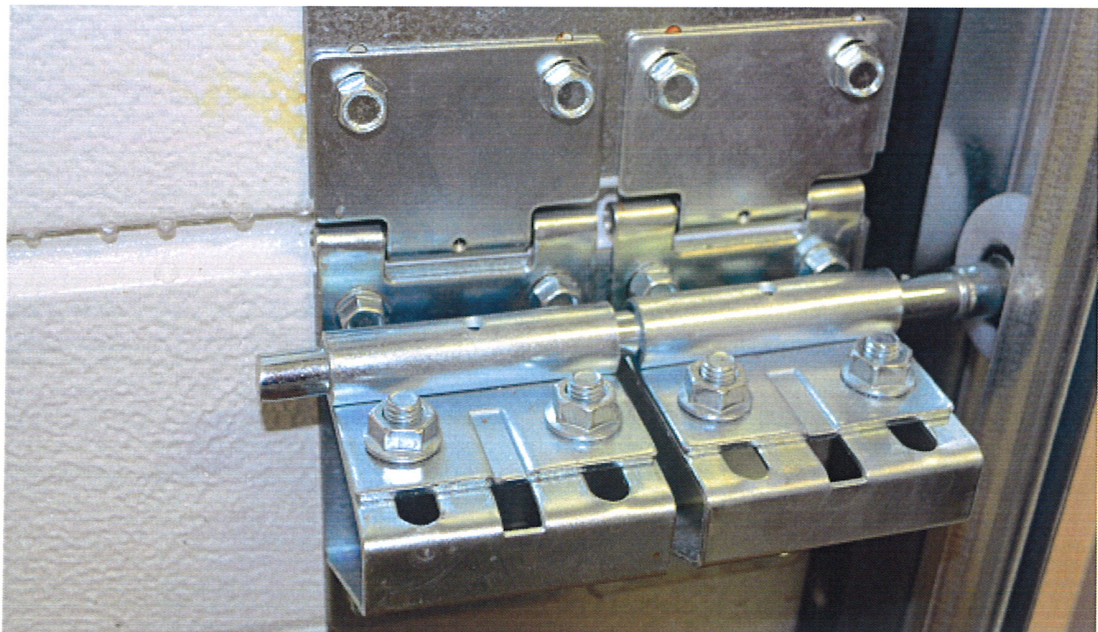


Figure 3. Hinges, slides and roller.

Appendix 1



Figure 4. The bottom bracket.

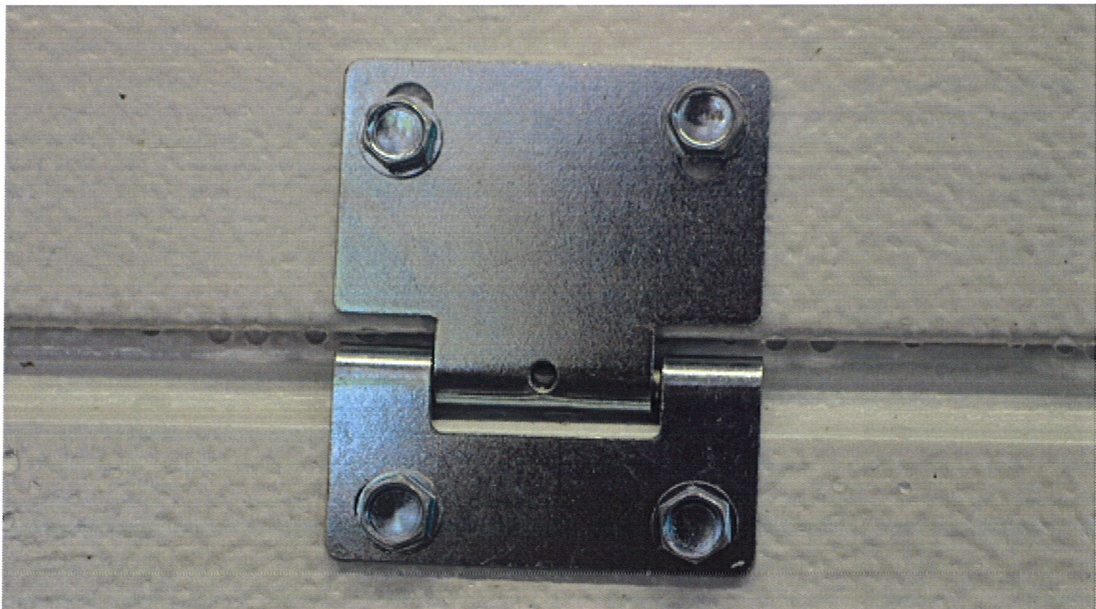


Figure 5. Intermediate hinge.

Appendix 1

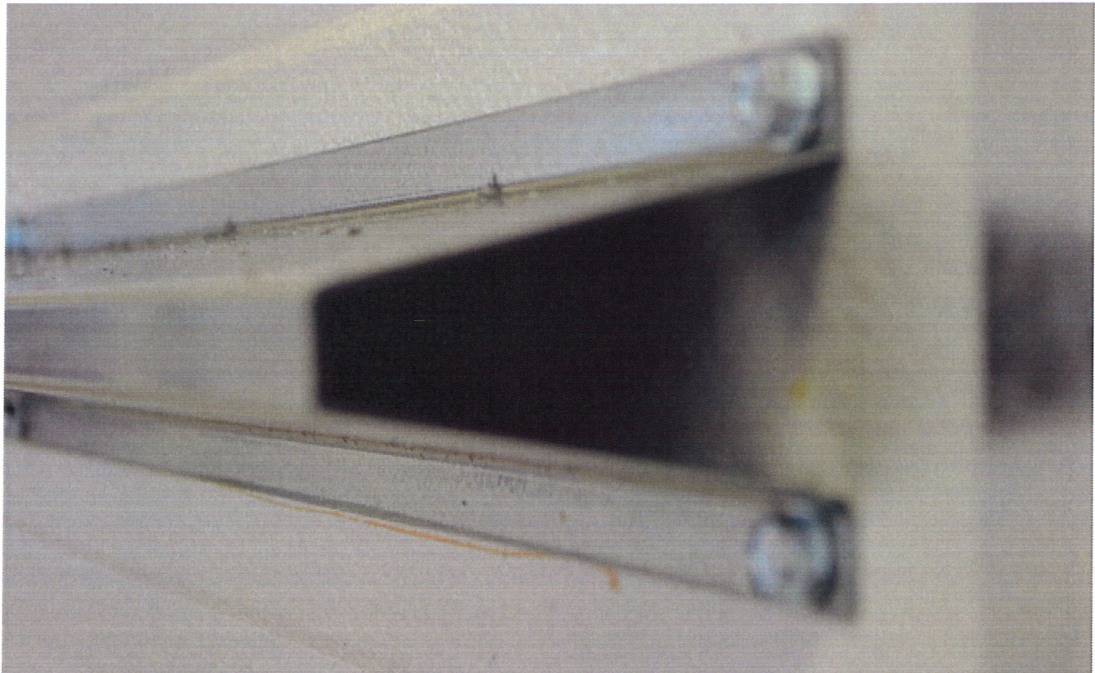


Figure 6. Reinforcement.

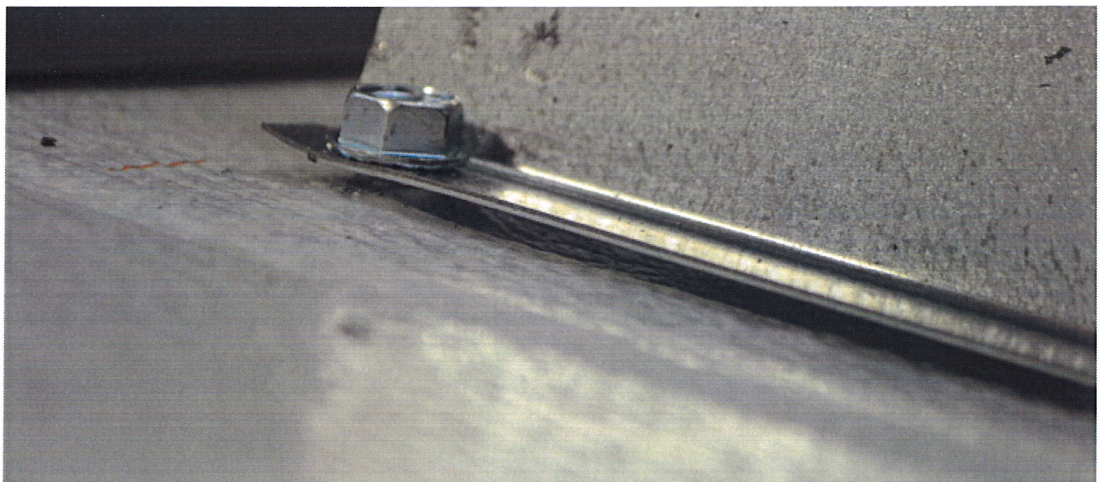


Figure 7. The screws to the reinforcement have started to come loose after pressure step at 770 Pa.

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Page  
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## Determination of resistance to wind load according to EN 13241-1

(1 appendix)

### Test object

Client: SOMMER Antriebs- und Funktechnik GmbH  
Product name: DOCO SFR Tecsedo  
Type of door: Sectional, overhead door  
Daylight size: Width 5000 mm, Height 3000 mm

The door was supplied and installed by the client in the opening of an airtight chamber, with its exterior facing inwards towards the chamber, see description and pictures in appendix 1.

During the tests was a simulated door operator connected to the top panel.

### Test procedure

The door was tested in accordance with EN 12444 in an air pressure chamber. Before the test measures were taken to minimize air leakage in the door and its supporting construction. The air pressure in the test chamber was increased in steps in accordance with the different classes given in EN 12424.

The test was carried out in accordance with EN 12444.

### Test results

The screws of the outer hinges started to come loose after the inner pressure step of 770 Pa. At an inner pressure of about 900 Pa the screws come loose completely on four of the side hinges and the hinges were permanently deformed.

No visible deformations were noted at pressure step at 620 Pa.

Classification according to EN 12424: Class 2

### Conditions of test

The test results refer only to the tested object.

Date of test: 2014-09-17  
Place of test: SOMMER test site in Kirchheim/Teck, Germany  
Equipment used: Measuring equipment no. 202429  
Estimated error margin: Air pressure difference  $\pm 2$  %  
Ambient climate: Air temperature 19 °C

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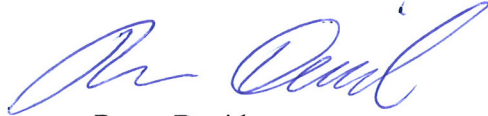
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Examined by



Börje Gustavsson

**Appendix**

1: Description and figures of the test object.



Appendix 1

**Description and figures of the door**

<b>Manufacturer of the door</b>	DOCO
<b>Product name</b>	Garage door DOCO SFR
<b>Type of door</b>	Overhead, sectional door
<b>Daylight size (wxh)</b>	5000 mm x 3000 mm
<b>Producer and type of panel</b>	Tecsedo, fingersafe, residential
<b>Total thickness of panel</b>	40 mm
<b>Thickness of sheet in panel</b>	Outside 0,60 mm / inside 0,45 mm
<b>Type of tracks</b>	DOCO SFR
<b>Type of side hinges</b>	DOCO 25734
<b>Type of slide/roller</b>	DOCO 25010-E
<b>Type of intermediate hinges</b>	DOCO 25733
<b>Type of bottom bracket</b>	DOCO 25056/57
<b>Type of top sealing</b>	DOCO 24740 series
<b>Type of side sealing</b>	DOCO 24740 series
<b>Type of bottom sealing</b>	DOCO 825100



Figure 1. Door type DOCO SFR Tecsedo, mounted in the test rig, as seen from inside.

Appendix 1

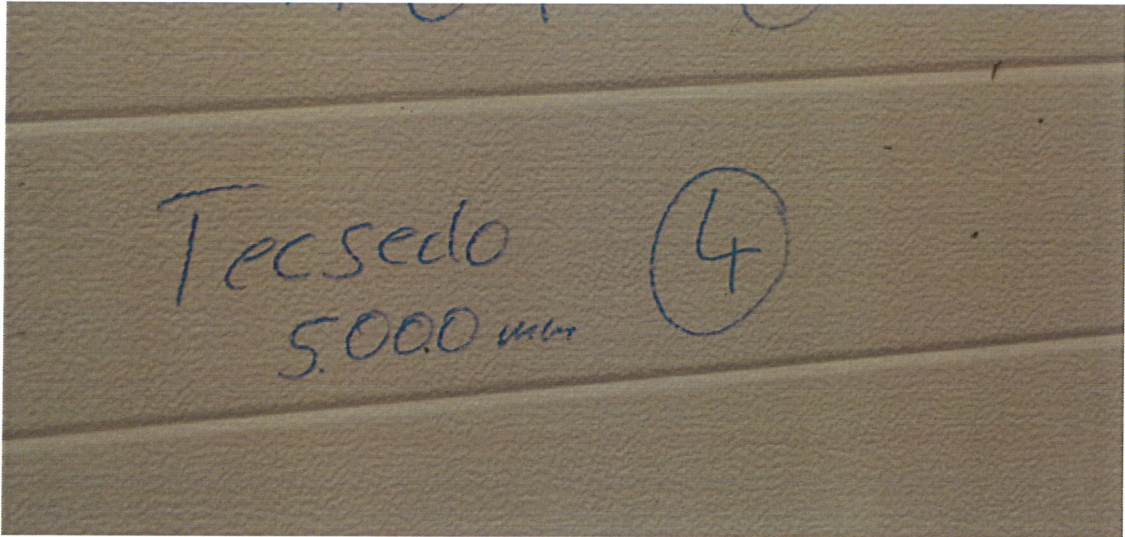


Figure 2. Marking on the test object.



Figure 3. Hinges, slides and roller.

Appendix 1



Figure 4. The bottom bracket.

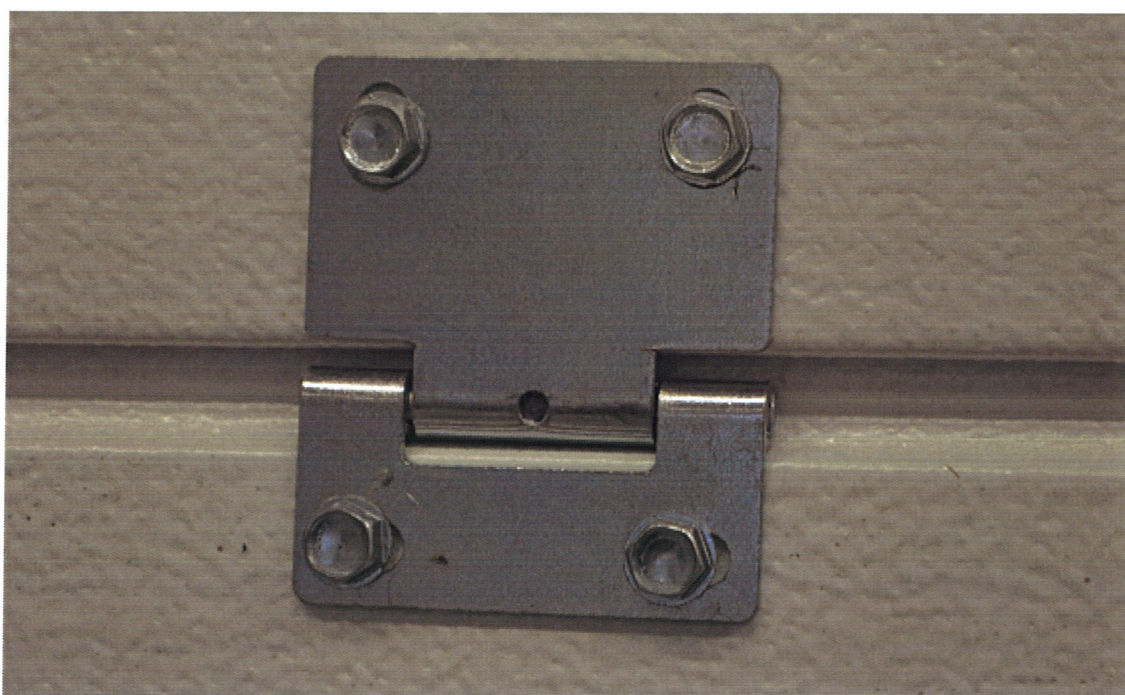


Figure 5. Intermediate hinge.

Appendix 1



Figure 6. Deformation on the hinges after an inner pressure of about 900 Pa.

## TECSEDO<sup>®</sup> SAFE & BASE panels, thickness 40 mm LOAD TABLES according to EN 13241-1

WINDLOAD RESISTANCE	
Type	Value
Class 1	300 Pa
Class 2	450 Pa
Class 3	700 Pa
Class 4	1000 Pa
Class 5	> 1000 Pa

		SPAN (m)							
		Up to 3	3.5	4	4.5	5	5.5	6	6.5
POSITIVE	CLASS	5	5	3	3	2	1	1	1
NEGATIVE		5	4	2	2	1	1	-	-

N.B. Positive/Negative classes are with positive wind pressure applied to the outside/inside of the door.  
 Values concern panels with internal reinforcements.  
 In order to increase the class corresponding to its referring span,  
 Bracing bars have to be fastened to all the panels.

NOTE: When panels are simply leaned on transversal bearings, for a load of 100kg/m<sup>2</sup> and deflection  $\leq 1/200$  of the span, the corresponding span is 3m.

## DECLARATION

### TO WHOM IT MAY CONCERN

#### SUBJECT: SOUND-PROOFING PROPERTIES OF TECSEDO® SANDWICH PANELS:

We hereby declare that panels Types

#### TECSEDO®BASE - TECSEDO®SAFE

produced at San Vittore (Switzerland) plant by TECSEDO S.A.,

insulated with polyurethane foam 40 mm thick injected between two prepainted galvanized steel sheets thick have a soundproof evaluation index (ISO 717 norm)

$I_a = 25 \text{ dB}$

and

that values for **R (dB)** are the following:

<b>F (Hz) =</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>4000</b>
<b>R (dB) =</b>	<b>14</b>	<b>18</b>	<b>22</b>	<b>24</b>	<b>24</b>	<b>35</b>

SPP/E 01/15  
San Vittore, 13.01.2015

## DECLARATION

### TO WHOM IT MAY CONCERN

#### SUBJECT: EN 13241-1 COMPOSITION OF TECSEDO<sup>®</sup>SANDWICH PANELS:

We hereby declare that panels

#### **TECSEDO<sup>®</sup>BASE - TECSEDO<sup>®</sup>SAFE**

produced at San Vittore (Swiss) plant by TECSEDO S.A.,

are composed of the following raw materials:

- galvanized, polyester prepainted, steel or aluminium sheets
- internal longitudinal steel plates for hinge fixing
- polyurethane CFC& HCFC-free foam
- lateral scotch tape and rubber gasket
- adhesive polythene films (to be removed)

Present declaration is required for the evaluation on dangerous substances according to EN 13241-1.

TPC/E 01/05  
San Vittore, 13.01.2015

## DECLARATION

### TO WHOM IT MAY CONCERN

#### SUBJECT: THERMAL TRANSMITTANCE OF TECSEDO<sup>®</sup>SANDWICH PANELS:

We hereby declare that panels

#### TECSEDO<sup>®</sup>BASE - TECSEDO<sup>®</sup>SAFE

produced at San Vittore (Switzerland) plant by TECSEDO S.A., 40 mm thickness with a high density polyurethane core have a the following thermal transmittance:

U Value- Panel thermal transmittance = 0, 50 W/m<sup>2</sup>°C

- $\lambda = 21 \text{ mw/m}^{\circ}\text{C}$
- Thickness: 40mm
- Width: 500mm and 610mm

TT/E 01/15  
San Vittore, 13.01.2015