Rödelbronn GmbH
Technik und Entwicklung

Determination of the wind resistance class

Load Test

according to EN 13561 / DIN EN 1932 / DIN EN 13527

No. 55.00

G250 Half Cassette Awning

6 m wide x 4 m front

Test report dated 11/14/2005

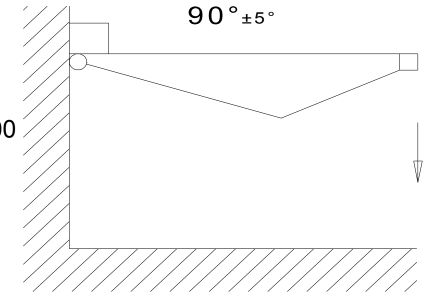
1. Objective:

Wind resistance determiation according to EN 13561 / DIN EN 1932 / DIN EN 13527.

2. Test arrangement:

See DIN EN 1932 (5.2 Test Methods)

3. Test description



The G250 half cassette awning is fixed to the test device firmly and virtually non-flexibly with two load-bearing wall brackets (100 mm with 3 slots).The awning is adjusted such that the ballast roller tube (front profile) extends as far as possible horizontally (tolerance ±5°) and parallel

4. Basic data

Awning type: G250

Parts name: Half cassette awning

Awning design: 6.0 m wide 4 m drop

Bracket design: 100 mm with 3 slots

Number of parts/ awning: 2

Max. awning width ***L*** [m]: 6

Possible drops ***H*** [m]:	1.5	2.0	2.5	3.0	3.5	4.0
Arm weight ***GG*** [kg]:	3.23	3.89	4.97	6.55	7.99	8.63

Table 1

Fabric weight [kg/m^2]: 0.3

Clearance fabric width ***TA*** [mm]: 150

Ballast roller tube weight ***GA*** [kg/m]: 2.127

Distance mounting surface - center fabric shaft ***TM*** [mm]: 84

Wind resistance classes:	Class 0	Class 1	Class 2	Class 3
nominal test pressure ***q*** [N/m^2]:	<40	40	70	110
Test pressure ***p*** [N/m^2]:	<24	24	40	70
Safety test pressure ***p x 1,2*** [N/m^2]:	<29	29	48	84
Corresponds to wind force:	<4	4	5	6

Values refer to En 13561 issue approx. 2007

Table 2

Crank radius [mm]: 180

Classes of operating force:	$F_c = \{ F_{cP} , F_{cN} \}$			
	Class 1	Class 2	Class 3	Class 4
Maximum values of the operating for	{ 90 , 30 }	{ 60 , 15 }	{ 30 , 30 }	{ 15 , 15 }

Values refer to En 13561 issued 2004

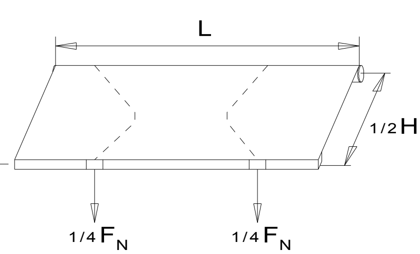
Table 3

F cP = Highest value of the max. operating force that is necessary for releasing the arms with the first revolution of the winding tube

F cN = Highest value of operating force that is necessary during the remaining retraction operation or during the remaining extension operation.

5. Test methods

Sequence 1



A torque is calculated according to the awning size, clearance measuremetns and weights of the individual components and at certain points simulated by a weight that is hung on the ballast roller tube.

Subsequently the operating force of the turn gear is measured by means of a spring balance.

Measurement of the operating force before load.

$$V = 100 \times (P_e / P_i - 1)$$

V = Change in % of the operating force

P_e = Operating force after the test

P_i = Operating force before the test

Sequence 2

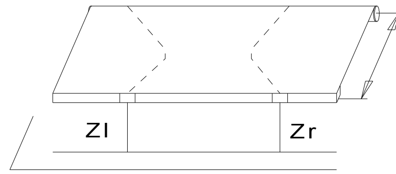
On the right and left of ballast tube holder the measurements to thereference plane are measured by means of a meter rule.

Reference measurement:

Zl_0	Zr_0

Zl_0 = Reference measurement left before load [mm]

Zr_0 = Reference measurement right before load [mm]



Sequence 3

The nominal load is now measured at six different points with different weights . (See Fig.)

Direct nominal load:

$F_N = \beta \times p \times L \times H$

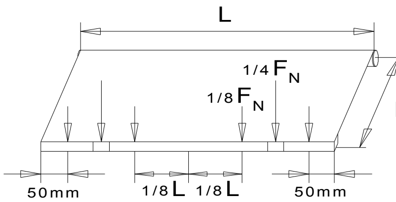
F_N = nominal wind load [KN]

β = Conversion coefficient [0,5] (in the case of articulated-arm awnings)

p = Test pressure [N/m^2]

L = max. width of the fabric [m]

H = max. height of the awning [m] (center fabric shaft - end ballast roller t



Displacement value left:

$(Zl_1 - Zl_0) / H \times 100$ ≤ 10% of H

Zl_1 = Reference measurement left after load [mm]

Displacement value right:

$Zr_1 - Zr_0 / H \times 100$ ≤ 10% of H

Zr_1 = Reference measurement right after load [mm]

Parallelism deviation

$(Zl_1 - Zl_{0)} - (Zr_1 - Zr_0) / L \times 100$ ≤ 1% of L

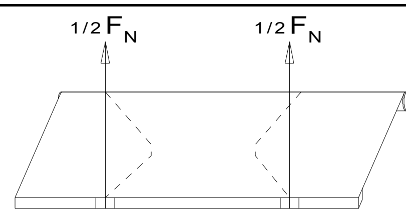
Sequence 4

The reverse nominal load is now measured at two different points. (See Fig.)

reverse nominal load:

$-F_N = \beta \times p \times L \times H$

$-F_N$ = reverse nominal wind load [KN]



Measurement of the operating force after load.

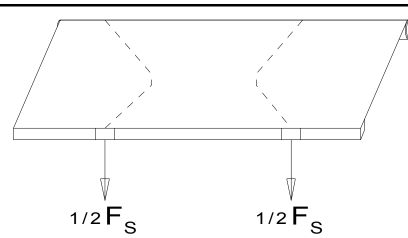
Sequence 5

The safety load is now measured at two different points. (See Fig)

Direct safety load:

$F_S = \beta \times 1{,}2p \times L \times H$

Measurement of the operating force after load.



Operating force

The highest value is measured of the max. operating force [F_{cP}] that is necessary for releasing the arms with the first revolution of the winding tube in the retraction direction when the awning is fully extended and the highest value of the operating force [F_{cP}] that is necessary during the remaining retraction operation or during the remaining extension operation.

Operating force:

$F_c = M / R$

F_c = max. operating force [N]

M = Highest torque [Nm]

R = Hand crank radius [mm]

The test methods are simulated in wind resistance classes I, II and III. If the awning withstands this without any major consequences, the torque is increased in 30 Nm - stages. Lowering the awning is measured during and after removal of the load and entered in a table of values. Anything conspicuous is noted. The load is increased until a clear, permanent deformation or a tear of a part occurs.

6. Results

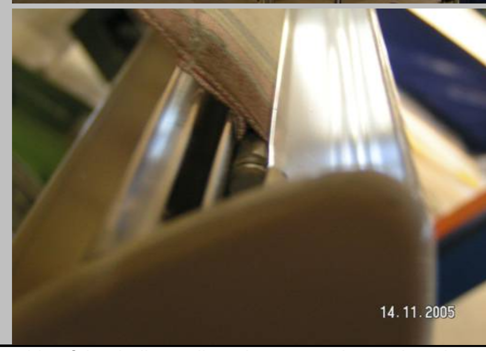
max. displacement value 392 mm

max. parallelism deviation 59 mm

Table 4

Sequence	Class		nominal wind load F_N [KN]	Total connection load *F* [kg]	Reference measurements Z_l / Z_r [mm]	Displacement value [%] ≤ 10% of H	Parallelism deviation [%] ≤ 1% of L	max. operating force - first revolution F_P [Kg]	max. operating force reatraction and extension F_N	Note
1 and 2		Zl_0	137	13.7	0			5.6	2.2	
		Zr_0			0					
3	I	left	275	27.5	38	0.97	0.09			
		right			33	0.84				
4	I	left	275	27.5	0	0.00	-0.09	5.6	2.2	
		right			5	0.13				
5	I	left	332	33.2	Break: yes / no ?		nein			Nothing conspicuous.
		right								
				Change in operating force V [%]				0.0	0.0	

Tabelle 5

3	II	left	458	45.8	161	4.11	0.39			Fabric fixing (torpedo) pushed outwards. Torpedo pushed into front profile (ballast roller tube).  
		right			138	3.52				
4		left	458	45.8	93	2.37	0.22	5.5	2.3	Right side of the ballast roller tube moves deeper into the roof.
		right			80	2.04				
5		left	550	55.0	Break: yes / no ?			nein		Awning still closes. Parallelism deviation of the ballast roller tube 55mm. (Photo under load) 
		right								
			Change in operating force V [%]					-1.8	7.0	

In addition a sequence 3 load was carried out with a total weight of 68 Kg. (theoretically corresponds to class ll 1/2)
After the test, the ballast roller tube moved under the roof, that is, it no longer closed.
Moreover, we measured a displacement value of 419mm (right) and 450mm (left) [max. 392mm]. The test was therefore discontinued here.

7. Photos (nothing remarkable)

8. Load achieved

The G250 half cassette awning reached a suspension load of approx. 55 KG 55 KG.

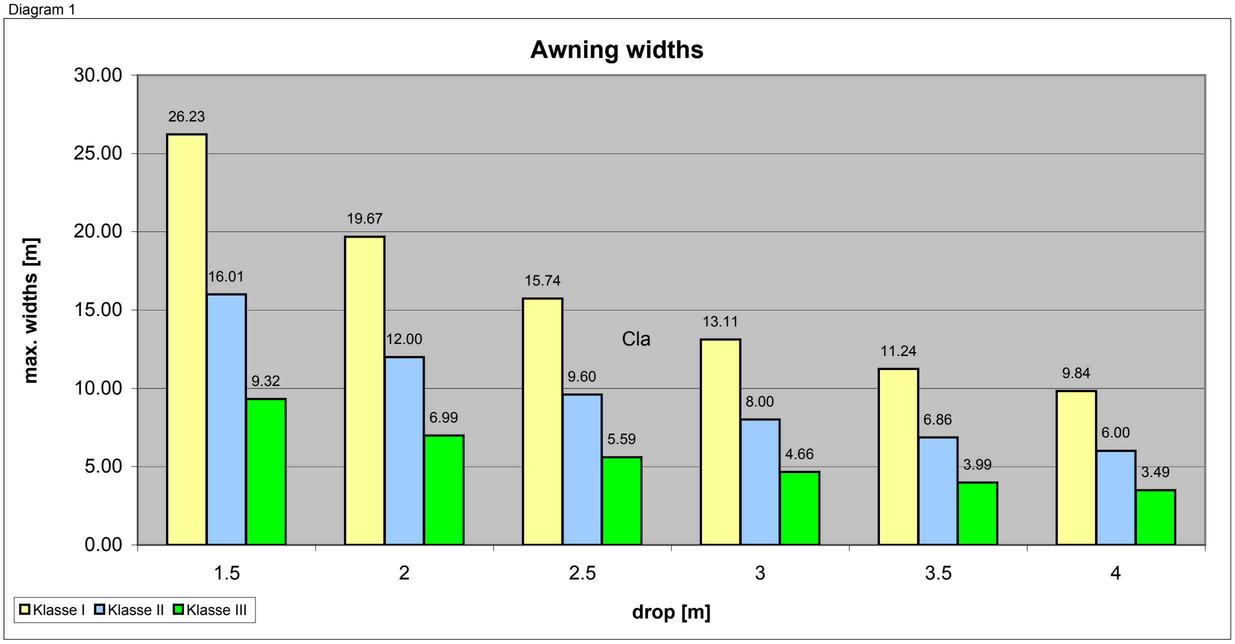
9. Results

Maximum awning widths with 2 arms

Table 7

		1.5	2.0	2.5	3.0	3.5	4.0
Class	I	26.23	19.67	15.74	13.11	11.24	9.84
	II	16.01	12.00	9.60	8.00	6.86	6.00
	III	9.32	6.99	5.59	4.66	3.99	3.49

Diagram 1



10. Wind resistance classes according to DIN EN 13561

The tested G250 half cassette awning (6m x 4 m) can reach the following wind resistance classes:

Table 8

drop [H] / Width [L]	1.5	2.0	2.5	3.0	3.5	4.0
3.0	3	3	3	3	3	3
3.5	3	3	3	3	3	2
4.0	3	3	3	3	2	2
4.5	3	3	3	3	2	2
5.0	3	3	3	2	2	2
5.5	3	3	3	2	2	2
6.0	3	3	2	2	2	2
6.5	3	3	2	2	2	1

Class 0	Class 1	Class 2	Class 3

11. Classes of operating force according to DIN EN 13561

Table 9

with wind class	Operating force [N] F_{cP}	Operating force [N] F_{cN}
I	56	22
II	55	23
II		

Table 10

Operating force $F_c = \{ F_{cP} , F_{cN} \}$	
Class 1	Class 2
{ 90 , 30 }	{ 60 , 15 }

12. Conclusion

With the 6 x 4m awning, the awning reached class II. It did not reach an additional theoretical class II $^1/_2$ because the ballast roller tube no longer retracted into the roof.

The awning thereby had a displacement value of 11.5% (max. ≤ 10% from front permitted)

In terms of the operating force, the awning reached only class I, since the force with the first revolution was too high.

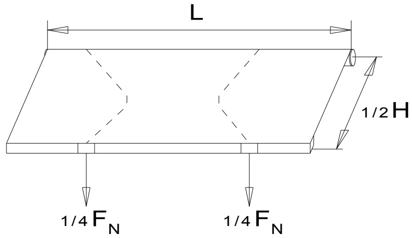
13. Authentication:

	Name	Date	Signature
Tester	Robert Schneider	11/14/2005	
Report compiled	Georg Truyen	11/14/2005	
Technical management	Joachim Göbels		

Class I

Sequence 1 (preload)

L= 5.85 m

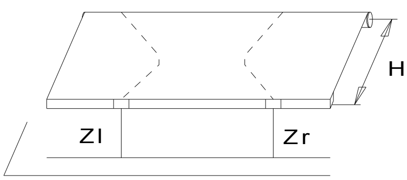


H= 1.96 m

F= 6.87 Kg 6.87 Kg

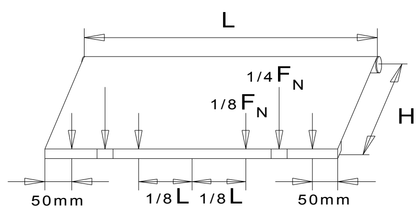
Operating force of the turn gear

Sequence 2 (0- position)



H= 3.92 m

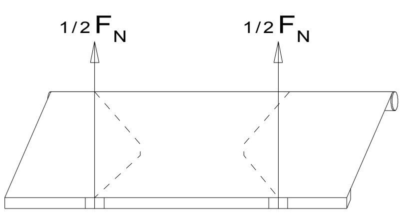
Sequence 3 (displacement values)



H= 3.92 m

F=	3.44	6.87	3.44	3.44	6.87	3.44	Kg
L=			731.3	731.3			mm

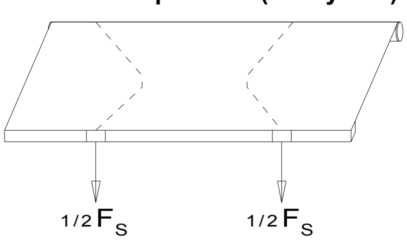
Sequence 4 (converse displacement values)



F= 13.75 13.75 Kg

Operating force of the turn gear

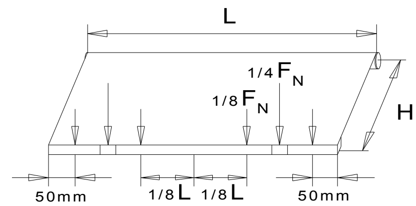
Sequence 5 (safety test)



F= 16.61 16.61 Kg

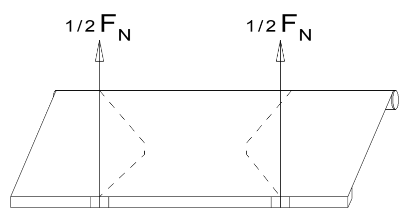
Class II

Sequence 3 (displacement values)



F=	5.73	11.45	5.73	5.73	11.45	5.73	Kg

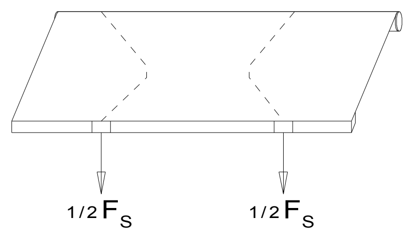
Sequence 4 (converse displacement values)



F= 22.91 22.91 Kg

Operating force of the turn gear

Sequence 5 (safety test)

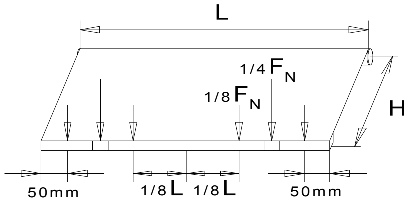


F= 27.49 27.49 Kg

Class III	Class II1/2

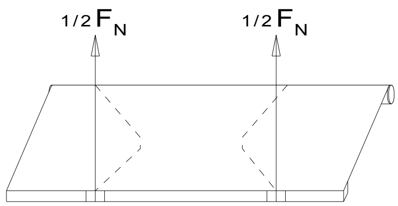
Class III

Sequence 3 (displacement values)



F=							
F=	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	Kg

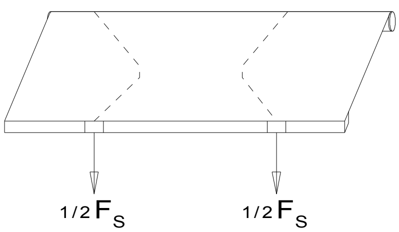
Sequence 4 (converse displacement values)



F=			
F=	#REF!	#REF!	Kg

Operating force of the turn gear

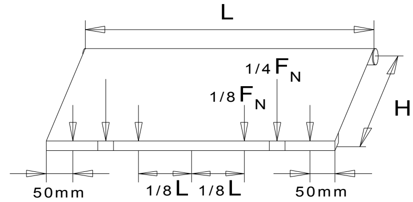
Sequence 5 (safety test)



F=			
F=	#REF!	#REF!	Kg

Class II1/2

Sequence 3 (displacement values)



F=							
F=	8.43	16.86	8.43	8.43	16.86	8.43	Kg

80
54.9
67.5

3.24
1.67