BELGIAN BUILDING RESEARCH INSTITUTE
INSTITUTION RECOGNISED BY APPLICATION OF THE DECREE-LAW OF 30 JANUARY 1947

All tests in this report are executed according to the ISO 9001 certified Quality management system of the BBRI

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TEST REPORT

Laboratory	CAR	**O/References**	DE 651 XG 815 CAR 8175_EN Page 1/7

Requested by	**DUCO** Handelstraat, 19 BE-8630 VEURNE Tel.: 058/33.00.33 - Fax: 058/33.00.44		
Date of the order	2008.09.04	**Samples registration**	2008/043/019
		Date of reception of samples	2008.09.18 and 2008.10.08
Date of the test	2008.09.24 and 2008.11.13		
Date of issue of the report	2014.02.12 (Translation)		
Test carried out	Burglar Resistance Test on a ventilation louvre (**DGS Versterkt Kaderprofiel G30Z (P1)**)		
References	prEN 1627 to 1630 (September 2007)		

This test report contains 7 pages and 3 appendixes. This test report may only be reproduced in its entirety. Each page of the original report has been stamped (in red) by the laboratory and initialled by the head of laboratory. The results and findings are only valid for the tested samples.

- ☐ *No sample*
- ☑ *Sample(s) subjected to destructive test*
- ☐ *Sample(s) to be removed from our laboratories 30 calendar days after sending of the report, save in the case of a further written request*

Ir. V. Detremmerie
Head of Laboratory

C.S.T.C. W.T.C.B. CAR

Ir. B. Michaux
Assistant Head of Division

1 INTRODUCTION

At request of Reynaers Aluminium NV, represented by Mr Stefan Verbrugge, the BBRI carried out tests in order to determine the burglar resistance of a wall louvre in accordance with prEN 1627 to 1630 (September 2007). The results of these tests are given in the report with reference "CAR 8175_EN".

2 NORMATIVE REFERENCES

[1] prEN 1627 « Burglar resistance construction products (not for precast concrete parts) – Requirements and classification »
Draft version, September 2007

[2] prEN 1628 « Burglar resistance construction products (not for precast concrete parts) – Test method for the determination of resistance under static loading »
Draft version, September 2007

[3] prEN 1629 « Burglar resistance construction products (not for precast concrete parts) – Test method for the determination of resistance under dynamic loading »
Draft version, September 2007

[4] prEN 1630 « Burglar resistance construction products (not for precast concrete parts) – Test method for the determination of resistance to manual burglary attempts »
Draft version, September 2007

3 DESCRIPTION OF THE TEST PIECES

The test pieces were received at the research centre of the BBRI in Limelette and were registered in the receipts register of test pieces under the number N-2008-043-019 by the laboratory "Roof and Façade elements". It concerns a wall louvre (Type DucoGrille Solid G 30Z with 30Z3 P1 blades) mounted in a timber frame and from which the composition and the dimensions are given hereunder.

3.1 SCHEMATIC REPRESENTATION OF THE TEST PIECE

The schematic representation of the test pieces is shown on *Figure 1*.

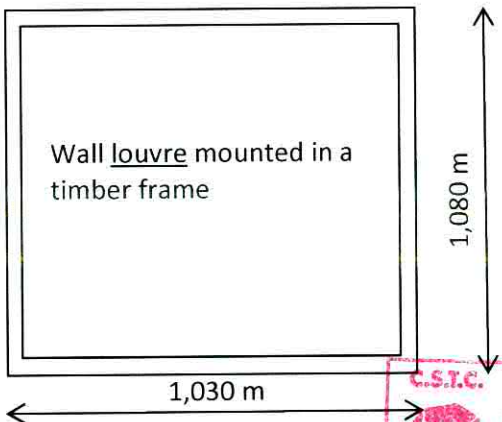

Figure 1: Schematic representation of the test piece

3.2 DIMENSIONS OF THE TEST PIECE

Total dimensions: - Height : 1.080 m
- Width : 1.030 m

3.3 DESCRIPTION OF THE TEST PIECE

The characteristics of the elements constituting the test pieces are given by the applicant and described in Appendix 2.

- **Mounting instruction:** Mounting of the element in a 100/58 mm timber frame performed by the requester. Use of 4 x 3 anchors (fixed with 2 rivets on the reinforced frame).

3.4 INTENDED RESISTANCE CLASS

The intended burglar resistance class for this element is class 2. The various tests were thus carried out in accordance with the prescription applicable to this class.

4 RESULTS OF THE TESTS

4.1 INTRODUCTION

All tests were carried out in accordance with the sequence described in the norm project prEN 1627 (September 2007). The norm projects prEN 1628, EN 1629 and EN 1630 (September 2007) are respectively applicable to static, dynamic and manual tests. The description of the various tests is given in Appendix 1.

Test date:	2008.09.24 and 2008.11.13	
Circumstances of the test:	Temperature:	20,1°C and 19,8°C
	Relative humidity:	59,5% and 54,2%

Comment
- Verification of the conformity of the specimen with the drawings.

4.2 STATIC TESTS

The various load points are shown on *Figure 2*. The results of the static tests are given in Table 1.

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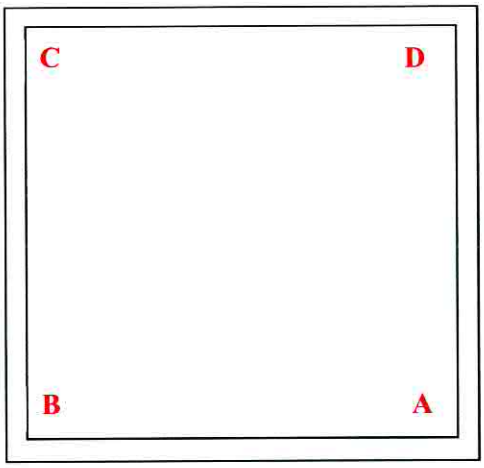

Figure 2: Location of the load points (seen from the outside)

Load (kN)		Gap gauge[1]	Application point	Special comments
F1	3	B	A	Small local deformation of the blades
F1	3	B	B	
F1	3	B	C	
F1	3	B	D	
F2	1.5	B	-	Not applicable (see Appendix 1)
F3/F3.a	3/1.5	A	-	

Table 1: results of the static tests

The gap gauges A and B cannot pass through any aperture in the test specimen when applying the loads F3 and F1. The test specimen thus succeeded the tests for the determination of the resistance under class 2 static load.

The element used for the static test (prEN 1628) can be used again for the dynamic test (prEN 1629) as the damage caused during the static test will not affect the result of the dynamic test.

4.3 DYNAMIC TESTS

Preliminary comment

- Inspection of the element before the dynamic test.

The results of the dynamic tests are shown in Table 2.

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[1] See Appendix 1

Shock	Impact point	Drop height (mm)	Observations
1	In the centre of the infilling	450	Deformation of the blades and of the central reinforcement
2	In the centre of the infilling		
3	In the centre of the infilling		
4	Lower right corner of the infilling		Small local deformations
5	Lower left corner of the infilling		
6	Upper left corner of the infilling		
7	Upper right corner of the infilling		

Table 2: Observations during the dynamic tests – Double wheel

The gap gauge D cannot pass through any aperture realized in the test specimen during the test. The test specimen thus succeeded the tests for the determination of the resistance under class 2 dynamic load.

4.4 MANUAL TESTS

4.4.1 PRELIMINARY MANUAL TEST

Comment

- The element used for the static and dynamic tests was reused for the preliminary manual tests.

The different potential attack points are shown in *Figure 3*.

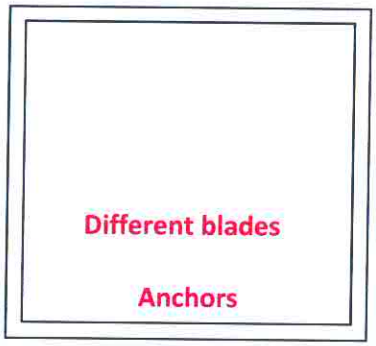

Figure 3: Points of application for the manual tests (seen from outside)

The results of the (preliminary) manual test are shown in Table 3 below.

Attack points	Tools	Observations
Blades	Wedges, gripping pliers, screwdrivers, rubber hammer	Impossible to force an opening via the blades. Preliminary test stopped after 10'50''
Anchors		Removing of the wall vent after 2'30'' (the anchors are removed from the grooves foreseen for this purpose)

Table 3: Results of the preliminary manual test

Total resistance time: > 3 minutes except for the attack of the anchors.

It was decided to perform the main manual test on a similar element to evaluate the resistance of the anchors against a manual attack. The evaluation of the anchors will be performed on another element for which their fixation on the vent will be reviewed (cfr documentation in Appendix 3). Indeed, without improvements, the element does not satisfy the requirements of the intended burglar resistance class 2.

After the preliminary manual test, the following attack sequence and tools were retained for the main manual test:

- Attack sequence: Attack of the blades (test performed on 2008/09/24) and of the anchors (test performed on 2008/11/13 on an improved element wrt the fixation of the anchors on the wall vent)
- Tools: wedges, screwdrivers, rubber hammer and gripping pliers

4.4.2 MAIN MANUAL TEST

For the main manual test, a new element was used (one for the blades and one for the anchors as mentioned here above). The attack sequence is as defined after the preliminary manual test and described in the here above paragraph 4.4.1).

The results of the main manual test are listed in *Table 4*.

Attack points	Tools	Observations
Blades	Wedges, gripping pliers, screwdrivers, rubber hammer	Impossible to force an opening in more than 5 minutes (test stopped after 5'17'')
Anchors		Impossible to force an opening in more than 9 minutes (trying to remove the anchors and to attack the rivets)

Table 4: results of the main manual test

Total resistance time: > 3 minutes

The resistance time is greater than the one recommended for the intended burglar resistance class 2 and no gap gauge (defined in Appendix 1) can pass through any aperture realized in the test specimen. The specimen thus complies with the requirements of the manual test for the intended burglar resistance class 2.

4.5 SUMMARY OF THE PERFORMANCE

The test part, for the specific configuration described in paragraph 3 (improved fixation of the anchors on the vent frame) successfully completes all the tests prescribed in the standard projects prEN 1627 to 1630 for the intended burglar resistance class 2.

5 LIST WITH APPENDIXES

Appendix 1: Description of the tests
Appendix 2: Sections and detail drawings of the sample
Appendix 3: Mounting instructions

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Appendix 1: Description of the tests

1. INTRODUCTION

In order to carry out the tests to determine the burglar resistance, the test piece is placed in a 100 x 100 mm wooden barring any other contrary indication.

All the tests are listed in Table 1 and are carried out in accordance with the sequence described in the standard project prEN 1627 (September 2007). The applicable standard projects for the static, dynamic and manual tests are respectively prEN 1628, prEN 1629 and prEN 1630 (September 2007).
During the various tests the test piece was closed and locked. The tests are carried out on the outside (area of action) of the test piece.
The classification of the test pieces, after the tests for the determination of the burglar resistance, is realised in accordance with the requirements of prEN 1627 (September 2007). This classification can be extrapolated to any element of an identical composition and with dimensions varying between -20% and +10%.

Testing sequence	Type of test	Classification	Description of the test
1	Static test	prEN 1627	prEN 1628
2	Dynamic test	prEN 1627	prEN 1629
3	Preliminary manual test	prEN 1627	prEN 1630
4	Main manual test	prEN 1627	prEN 1630

Table 1: Test sequence and standards

2. STATIC TESTS

The tests to determine the burglar resistance under static load are carried out in accordance with the standard project prEN 1628 (September 2007).

These tests are carried out by using a servo-hydraulic jack with a capacity of 25 kN (F1, F2 and F3) that applies a specific pressure on the test piece via an ad hoc pressure pad. The loads F3.a (only for elements from group 1 of resistance classes 1 and 2 and of group 2) are applied with a strap.

The different loads to be applied per resistance class are defined in *Table 2* hereafter, where

- F1 is applied on each corner of the infilling, perpendicular to the surface of the element in order to loosen the infilling.
- F2 is applied on each leaf and casement corner (if the distance between the 2 nearest locking – or hanging points is > 350 mm) and perpendicular to the surface of the element in order to open the leaf.
- F3 is applied on each locking point[2]. If the distance between 2 adjacent locking points is less than 200 mm, then a single loading point shall be used located at the midpoint between the 2 locking points.

[2] This term includes all the connecting points between the opening and the fixed elements (locking points, hinges, etc.).

– F3.a is applied on each locking point[23]. Application of the load to the leaf and, where necessary, to the frame, in a direction to disengage the associated locking point. Load only applied in association with F3.

	Resistance class (RC)											
	1, 2			3			4			5, 6		
	Test Load	Gap gauge	Pressure Pad	Test Load	Gap gauge	Pressure Pad	Test Load	Gap gauge	Pressure Pad	Test Load	Gap gauge	Pressure Pad
Loading points	kN		Type	kN		Type	kN		Type	kN		Type
F1 Corner of infilling	3	B	1	6	B	1	10	B	1	15	B	1
F2 Leaf and casement corners	1,5	B	1/2	3	B	1/2	6	B	1/2	10	B	1/2
F3 Locking points	3	A	1/2	6	A	1/2	10	A	1/2	15	A	1/2
F3.a Group 1[4] products[a] Locking points (additional loading)	1,5	A	-	-	-	-	-	-	-	-	-	-
F3.a Group 2[5] products Locking points (additional loading)	1,5	A	1/2	6	A	1/2	10	A	1/2	15	A	1/2

Table 2: Static loading of group 1 and group 2 products

A visual inspection of the element is carried out before and after the test.

The evaluation of the deformation of the leaf is done with gap gauges. For a given burglar resistance class, the ad hoc gap gauge (see *Table 2*) cannot pass through any aperture realized in the test specimen during or not the application of the loads:

– For F1 and F2: gap gauge type B (Figure 2).
– For F3: gap gauge type A (Figure 1).

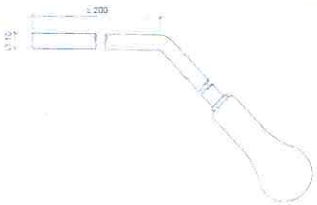


Figure 1: Gap Gauge type A

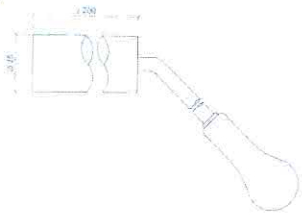


Figure 2: Gap Gauge type B

[3] This term includes all the connecting points between the opening and the fixed elements (locking points, hinges, etc.).
[4] Group 1 product : product that has a solid and rigid leaf or opening element and the principal movement to open is turning the element
[5] Group 2 product : product that has a solid and rigid leaf or opening element and the principal movement to open is sliding

3. DYNAMIC TESTS

The tests for the determination of the burglar resistance under dynamic load are carried out in accordance with the standard project prEN 1629 (September 2007). These tests are only carried out for elements of classes 1 to 3.

The pendulum impactor is described in the NBN EN 12600. It consists of 2 pneumatic tyres inflated to a pressure of 0.35 MPa ± 0.02 MPa. The tyres shall be fitted to the rims of wheels that carry 2 steel weights of equal mass. The weights shall be dimensioned so that the total mass of the impactor is 50 kg ± 0.1 kg and the weights do not have any contact with the test specimen during the impact.

The drop height (vertical height difference between the horizontal axis of the shock body at the time of release and the vertical resting point measured at the gravity centre) varies in function of the intended resistance class. This is specified in *Table 3* below.

Resistance class (RC)	**Mass of the impactor** (kg)	**Drop height** (mm)
1	50	450
2	50	450
3	50	750

Table 3: Drop height for the dynamic test

Barring contrary indication, the test is carried out with the infilling and the glazing intended for the application. Consequently a replacement is not permitted. Due to the test requirements, the laminated glass is placed on the side of impact.
The test piece used for the static test (prEN 1628), may also be used for the dynamic test as any damage caused during the static test does not influence the result of the dynamic test.

Let the shock body drop on the following different points of the element:

- 3 impacts in the centre of the leaf and/or the infilling and one impact on each corner.
- Direction of the impact: always perpendicular to the side of impact.
- Special conditions:
  - The test cannot be carried out on an infilling that is less than 150 mm wide.
  - If the distance between 2 impact points is ≤ 300 mm, an impact is only carried out on the middle point between these 2 points.

A visual inspection of the element is carried out before and after the test.

The product shall be deemed to have succeeded if the gap gauge D (Figure 3) cannot pass through any aperture in the product (applying a force of 200 N at any point of the test specimen).

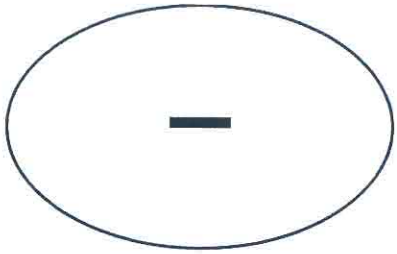


Figure 3: Gap gauge type D (250mm x 150mm)

4. MANUAL TESTS

The tests for the determination of the resistance against manual burglar attempts are carried out in accordance with the standard project prEN 1630 (September 2007). These tests are only carried out for the elements of classes 2 to 6.

Depending on the level of the intended class the element must be worked using tools for a specific duration (resistance time and total test time) as specified in prEN 1627 and in *Table 4* below.

The sequence of the manual attack must be carried out on at least 2 test pieces: one for the preliminary test and one for the main test. The test piece that was used for the static (prEN 1628) and dynamic (prEN 1629) tests, may also be used for the preliminary test if any damage caused during these 2 first tests will not influence the result of the preliminary manual test.

Resistance Class (RC) **EN 1627**	Type of attack		Stat. test **EN 1628**	Dynam. test **EN 1629**	Manual test **EN 1630**			
	Burglar	Means			Test	Tool set	Resistance time (min)	Maximum total test time (min)
1	Casual	Physical violence	X	X	-	A1	-	-
2	Casual	Simple tools (screwdrivers, plier, wedge, ...)	X	X	X	A2	3'	15'
3	Medium	Screwdrivers, crow bar	X	X	X	A3	5'	20'
4	Practised	Idem + saws, hammer, axe, chisels, bolt cutter, plate shears, electric drill	X	-	X	A4	10'	25'
5	Experienced	Idem + electric tools (drills, jig- and sabre saw)	X	-	X	A5	15'	30'
6	Experienced	Idem + poweful electric tools (electric drill, angle grinder)	X	-	X	A6	20'	40'

Table 4: Set of tools and resistance time per resistance class

If the glazing is in accordance with the recommendations of prEN 1627 (see *Table 5*), the attack must not be carried out on the glass but exclusively on the system holding the glass.

Resistance class	Resistance class of glazing according to EN 356
1	P4 A
2	P5 A
3	P6 B
4	P7 B
5	P8 B
6	P8 B

Table 5: Recommended resistance classes for glazing

The aim of the preliminary test is to identify the weakest and most vulnerable areas of the element. Each locking point is then submitted to attack for at least 25% of the resistance time of the intended class. The efficiency of all the tools specified for this class can be evaluated in this way for each attack point.

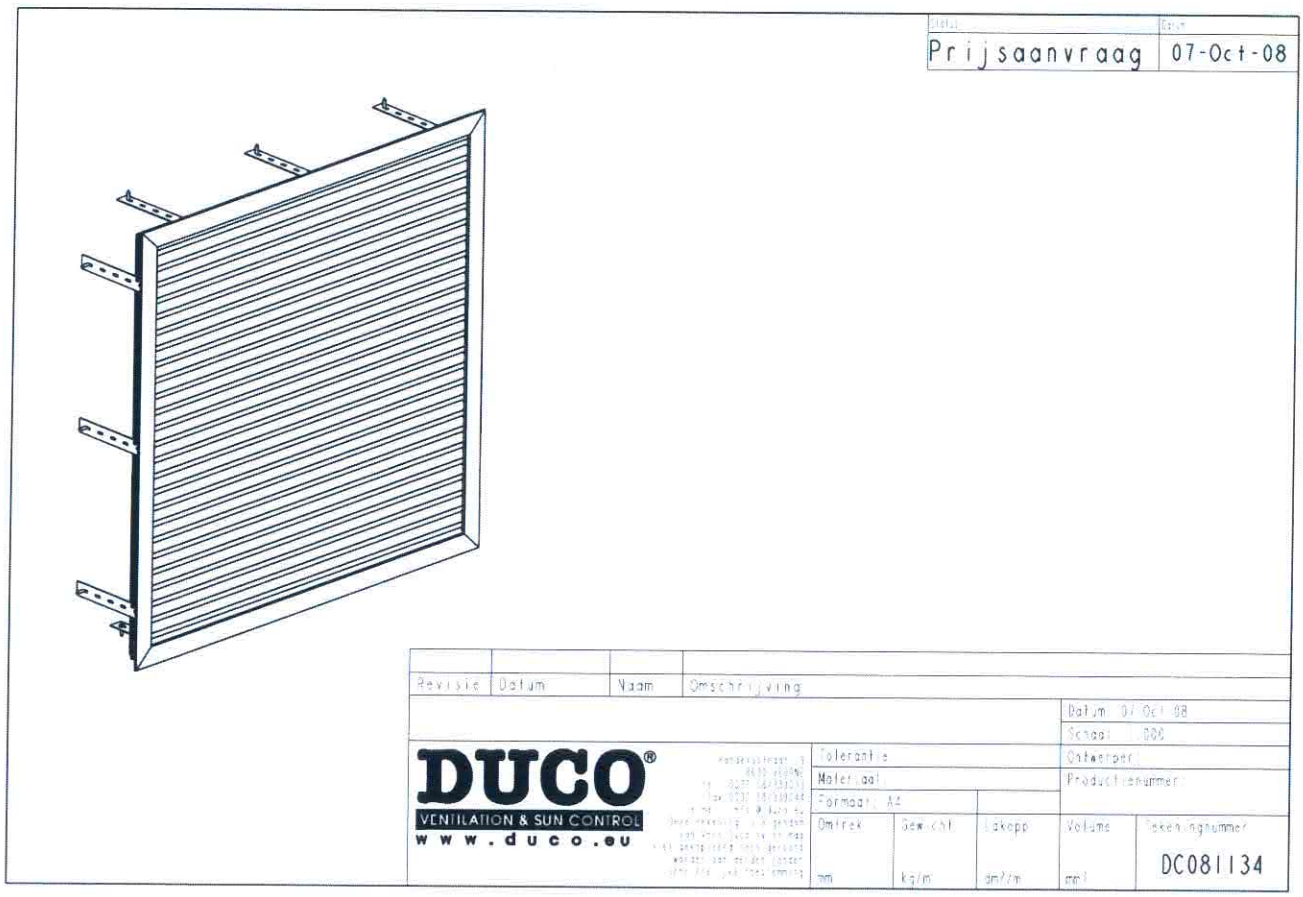
During the main test, the technician attempts to open the test piece or to make a sufficiently large opening using the defined set of tools during the resistance time and the total test time as recommended in prEN 1627 for the intended resistance class. The attacks are carried out on the weakest and most vulnerable areas identified during the previous test using the most efficient tools or a combination thereof.

The test for the determination of the resistance against manual burglar attempts shall be considered as successful for the intended class if none of the following gap gauges can go through any, sufficiently large opening in the test piece:

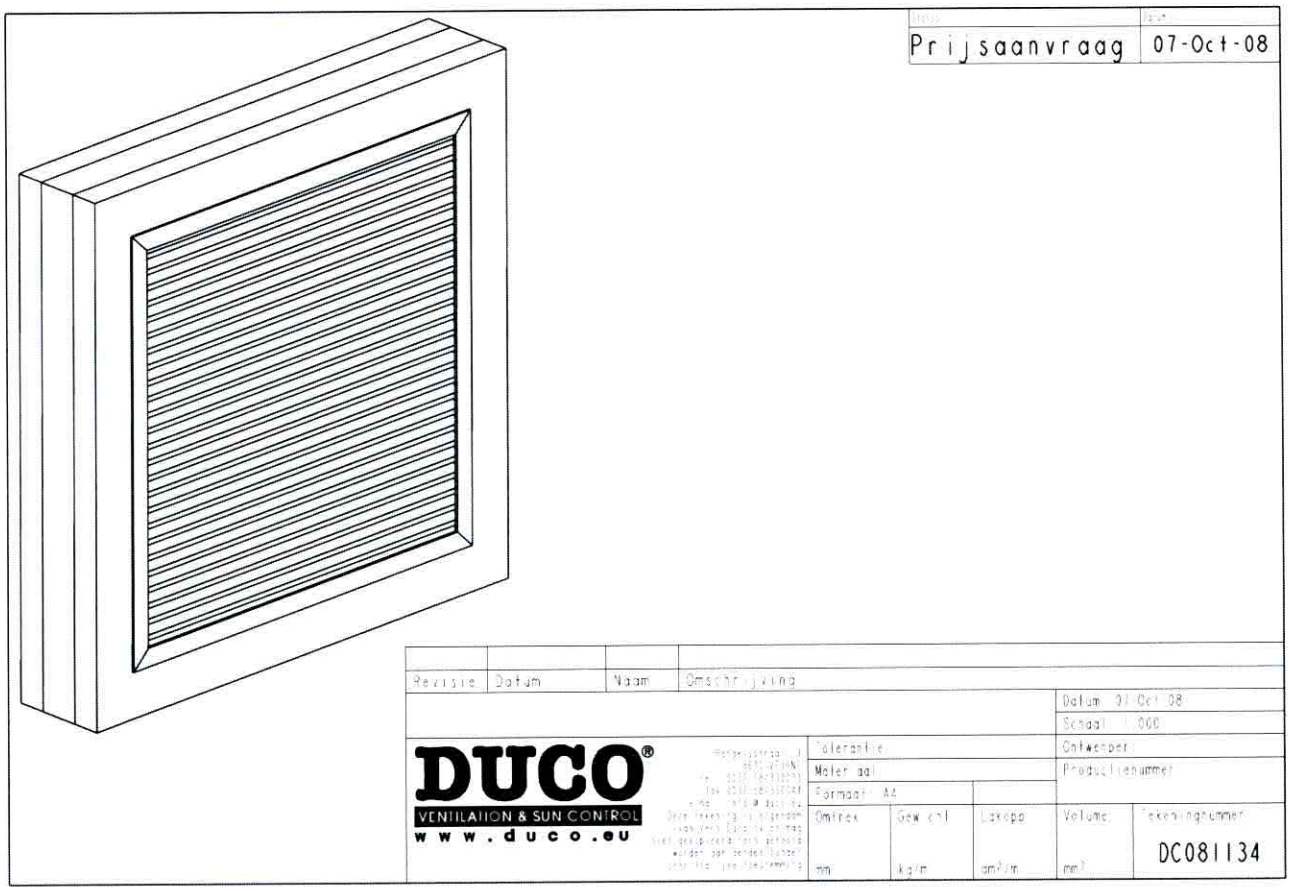
- A rectangle of 400 mm x 250 mm;
- An oval of 400 mm x 300 mm;
- A circle with a diameter of 350 mm.

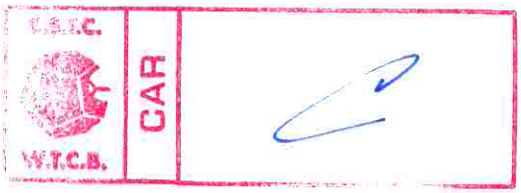
Appendix 2: Sections and detail drawings of the sample

Front view (external side)

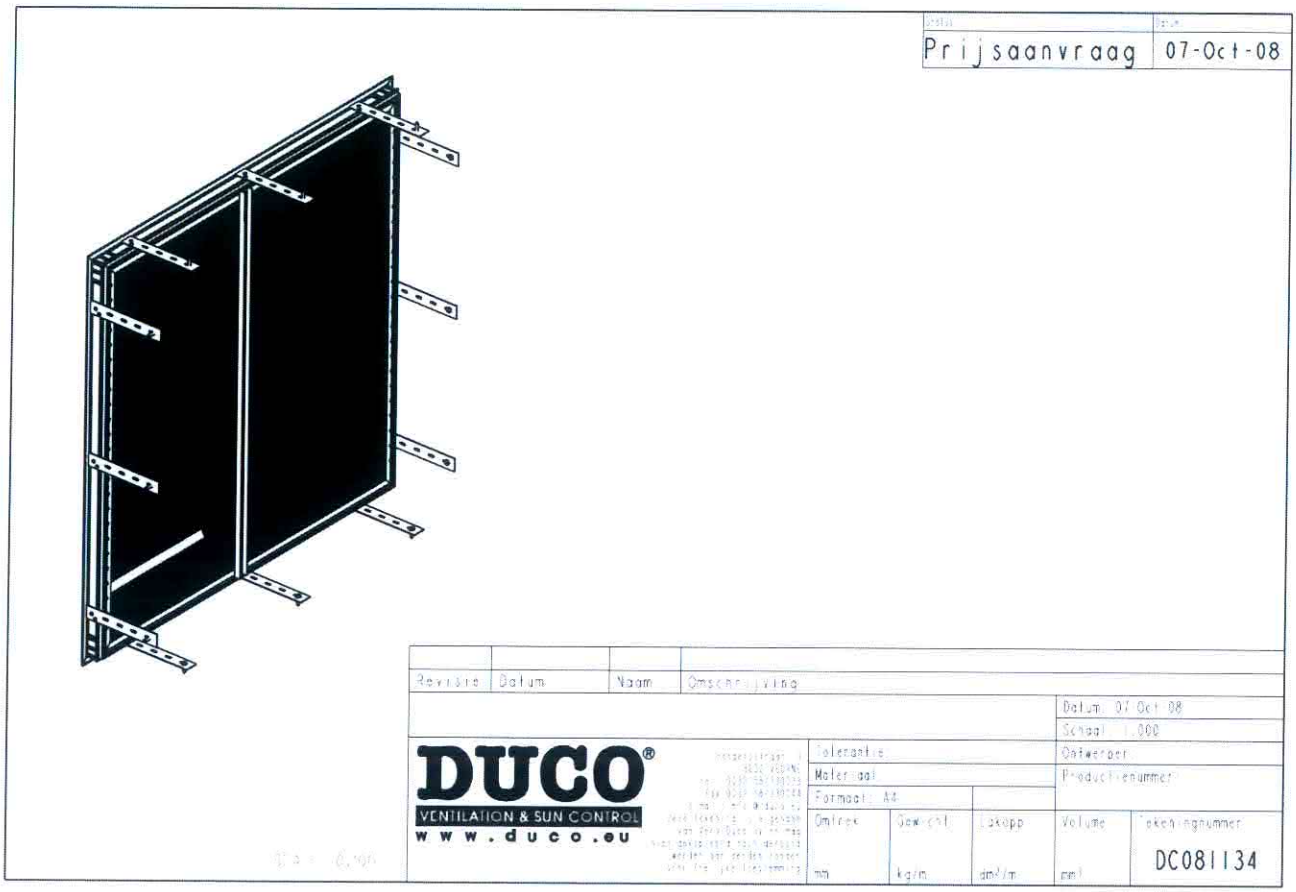


Wall vent mounted in its timber frame





Rear side (Inside)



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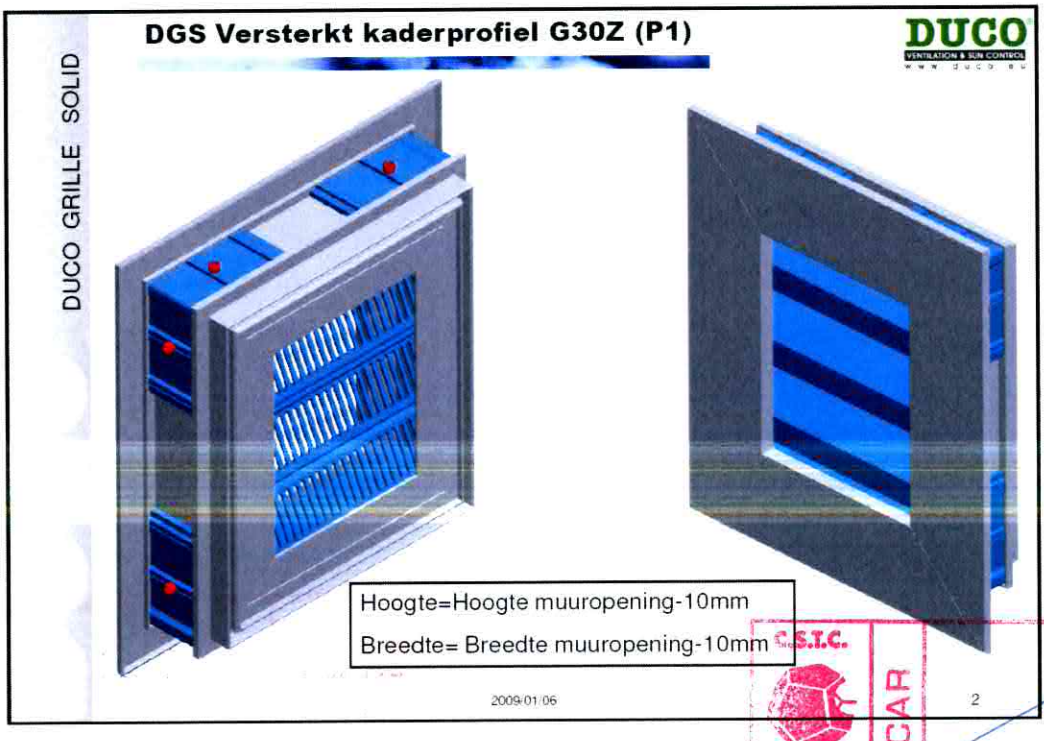
Appendix 3: Mounting instructions



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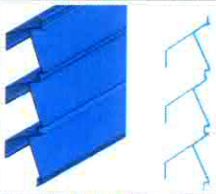
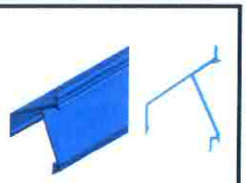
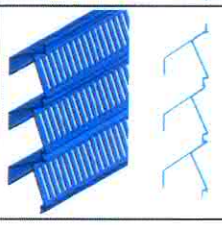
DGS3-voudige Lamel 30Z NP Nummer: P11847-10		DGS Lamel 30Z NP Nummer: P11856-10	
DGS3-voudige Lamel 30Z P1 Nummer: T11847-10		DGS Lamel 30Z P1 Nummer: T11856-10	
DGS Versterkt Kaderprofiel G30Z Nummer: P11897-10		Plat versterkingsprofiel 20x3mm P11210-10	

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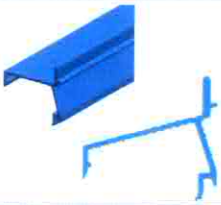
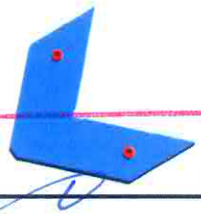
DGS ¼ StartLamel 30Z Nummer: P11864-10		DGS Klameerhoek 30Z Machinaal Nummer: PT070216-10 G0009688	
DGS ½ StartLamel 30Z Nummer: P11863-10		DGS Klameerhoek 30Z Nummer: DC071105-10 G0009689	
Profiel Klameerhoek klein Nieuw Nummer: P11884-10		Klameerhoek plat Nummer:PT010010 G0009685	

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Rubber O-ring 3.5mm (KS050061) G0004060		Poprivet ø3.9mmx20mm Inox/inox Vastzetten RVS dook aan kader (Versterkte muurroosters) G0000077	
Insektenwerend gaas 2.3 x 2.3 RVS (PT050132) G0000800		RVS Dook Type 200x33x1.5 (Versterkte muurroosters) (PT081140) G0009679	
Ongediertewerend gaas 6 x 6 RVS (PT050133) G0000810			

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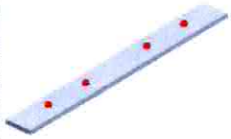
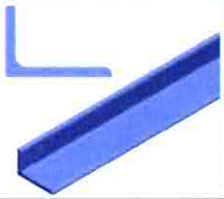
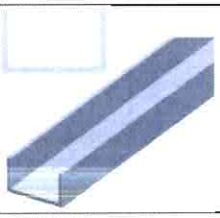
Koppelstuk 160/28/3-M5 S5990005 (DC081025)		Versterkingsprofiel: L 30/20/3 RVS (Versterkte muurroosters) P13020-10	
Versterkingsprofiel: U 15/25/15/2 RVS (Versterkte muurroosters) P13010-10		Poprivet ø3.9mmx12mm Inox/inox (Versterkte muurroosters vastzetten lamellen in kader) G0000076	
Logo-Duco www wit zwart 12x30mm Royal plast Bolkap E0000640			

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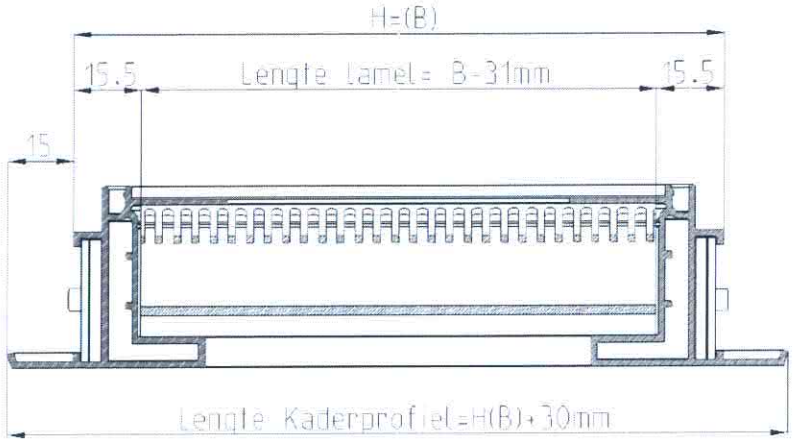
Zaagmaten Profielen van Versterkt Kaderprofiel G30Z



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Zaagmaten alle profielen Ducogrille type SOLID

Maximum standaard afmetingen:

Ieder muurrooster wordt normaal volledig afgewerkt in brute profielen en achteraf gelakt.

Max hoogte bedraagt 1600mm bij een Breedte van 4000mm.of

Hoogte 4000mm bij een breedte van 1600mm.

Voor muurroosters van dit type met grotere afmetingen:

De profielen worden eerst gelakt en daarna op maat gezaagd.

Maximum standaard afmetingen: Hoogte 2800mm bij een Breedte 6000mm.

of Hoogte 6000mm en breedte 2800mm(Transport)

Voor andere afmetingen moet men productie contacteren.

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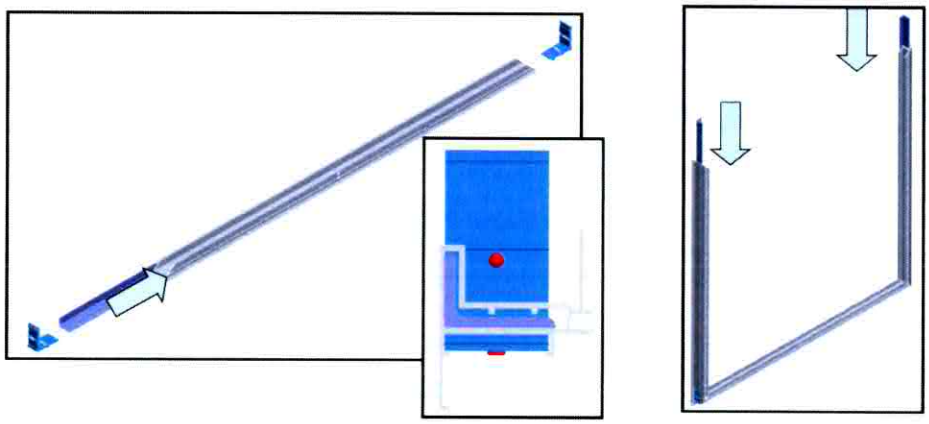
Monteren van het versterkt kader:

Bij montage van een versterkt kaderprofiel moeten we eerst de versterking monteren in het onderste kaderprofiel. Vervolgens na montage van de zijkanten met klameerhoek G9689 worden de versterkingsprofielen in de zijkant gemonteerd(schuiven).



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Monteren van het versterkt kader:

OPGELET:

Zorg dat het verstek goed aansluit en dat er geen spleten te zien zijn.

Een winkelhaak is op een plank gemonteerd als hulpmiddel.

Kleine braamvorming op de hoeken met schuurpapier gladmaken voor gelakte uitvoering.

De inbusschroeven mogen niet te hard aangedraaid worden:Profielvervorming!!

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