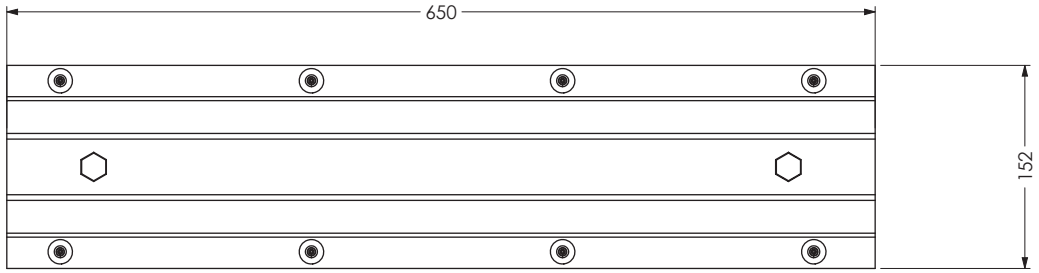
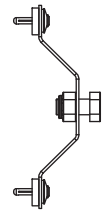
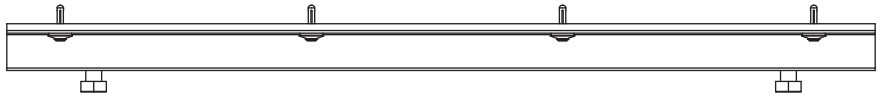
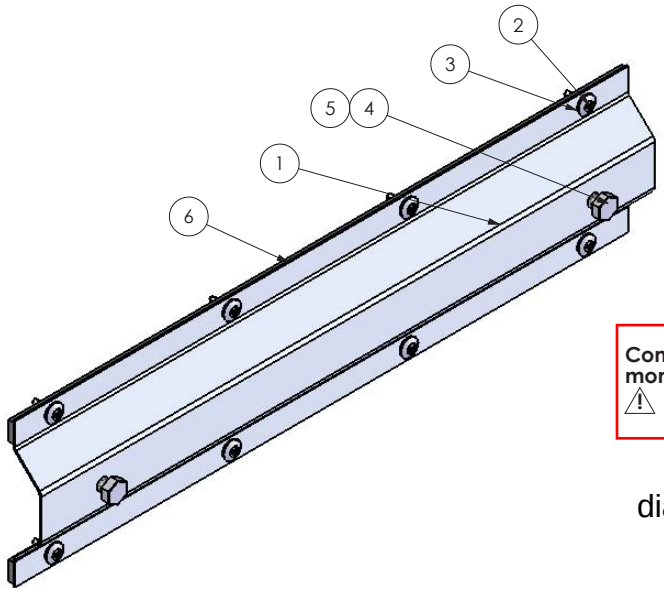
Rep	Titre	Qté	Matière	Réf. produit	Brut
1	Kit de fixation bardage	1	5754 H111	F600200115	A760080001
2	Rivet 5.2x25 alu/alu etoile etanche	8	Aluminium	A711010025	
3	Rondelle d'etancheité RN19 A2	8		A712200009	
4	Vis H Zn M12x25	2	Zingué	A710150025	
5	Ecrou frein Zn M12	2	Zingué	A710710012	
6	Bande EPDM 650x20x2mm 70shores A +/-5 adhésivée	2	Caoutchouc noir	A750150050	









To drill face the wall in order to pop with the rivets

Contrepercer les trous pour les 8 rivets lors du montage en fonction du type de bardage

diamètre de perçage pour les rivets : 6 mm

Poids:0.877kg

REV.	DESCRIPTION	DATE
1	Diffusion	08/11/2013

Titre

Kit de fixation bardage

Dessin prototype ☐	Dessin validé ☒		Date 08/11/2013	Dessiné par L.Schaeffer
Matière	Traitement	Tol. Gén. ±0,5	Echelle 1:4	Vérifié par P.Regnault
Code produit **F600200115**		Famille F60	Client	Fournisseur

ALULOCK

A3

Calculation note - Ladder fixing kit for cladding

Assumptions :

Rivet centre distance between top and bottom line = 14Omm
Distance between vertical axis of ladder and wall = 255mm Steel
cladding thickness = O.@3mm
Ladder secured by at least 3 pairs of brackets Load on upright :
Fv = 3 kN
In accordance with standard NFE 85-O1@, Fv is applied to the fixing lugs.
=> Fv1= 3KN/3 (minimum of 3 fixings per upright)= 1 kN

Each interface supports 2 mounting brackets:
Load on interface support: Fsi = Fv1 x 2 = 1 x 2 = 2 kN **Load**

reduction :

Tensile force Rh1 :
The point of rotation being commonly accepted on the lower rivet line, the resultant tensile force applied on the upper rivet line is equal:
255 x Fsi / 14O = 3.@4 kN
Number of rivets installed=
3
Resulting force in each rivet: 3.@4/3=> **Rh1= 1.21 kN**

Shear force Rv1 :
In this case, the force Fsi of 2 kN will be absorbed by all the fixing rivets installed, both on the lower and upper parts:
Number of rivets installed= @
Resulting force in each rivet: 2 / @=> **Rv1= O.33** kN

Summary of forces on rivets :

The rivets on the top line are :

- *A tensile load Rh1= 1.21 kN ;*
- *A shear load Rv1= O.33 kN ;*

The rivets on the bottom line only resume:

- *A shear load Rv1= O.33 kN ;*

Rivet strength requirements: *(see Page 5@ of European technical approval)*

The values to be taken into consideration for the "cladding+ rivets" assembly are equal to (for an assembly of part 1, thickness> 1.5mm and part 2 (cladding)) ep. @3/1000ths):

Maximum tensile strength of a rivet	Rt =1.48 kN
Maximum rivet shear strength	Rc= 1.78 kN

Checking the safety coefficient :

The rivets on the top line are :

- *Tensile strength :*
  - *Rt / Rh1= 1.48 kN / 1.21= safety coefficient= 1.22*
- *Shear strength*
  - *Rc / Rv1= 1.78 kN / O.33 = safety = 5.39*

The dimensioning of rivets subjected to combination of forces *(tension + shear)* must comply with the following formula according to Eurocode 3 :

(Rv1/Rc) + (Rh1/(1.4xRt)) <= 1

AN :

(O.33/1.78)+ (1.21/(1.4x1.48)= O.77

Satisfactory condition because less than 1

The rivets on the bottom line include :

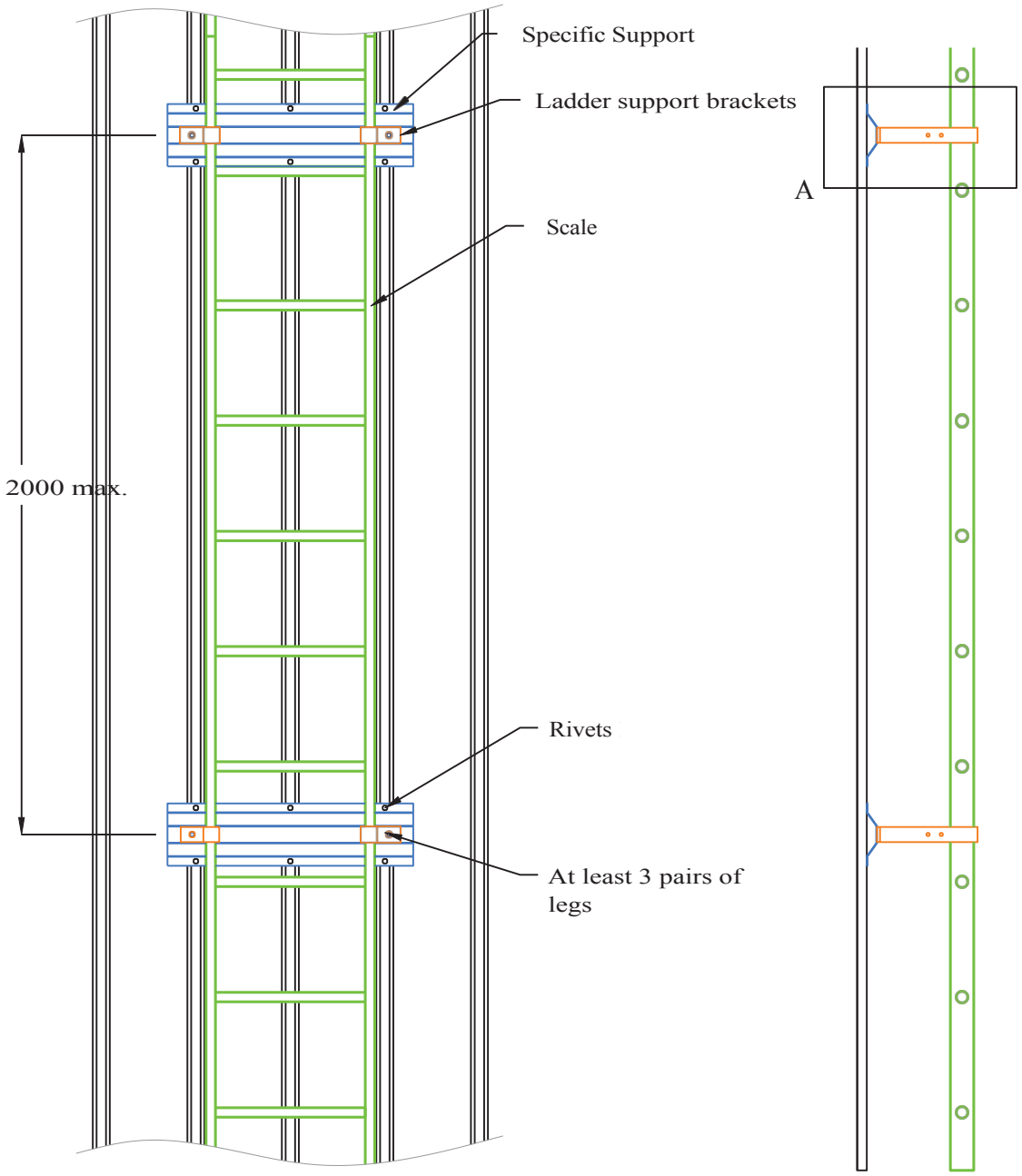
- *Shear strength*
  - *Rc / Rv1= 1.78 kN / O.33 = safety = 5.39*

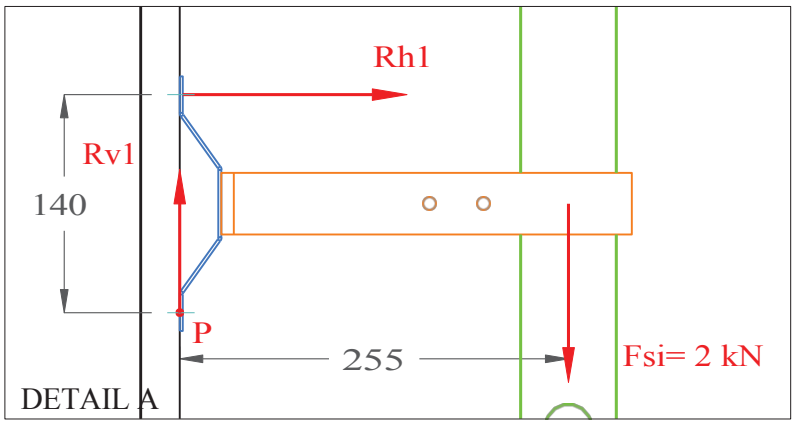
Conclusion:

The ladder itself *(including its crinoline and fixing brackets*) complies with standard NFE 85.O1@.
The ladder fixing interface on the cladding is well justified in terms of the 3kN load per upright specified in the standard *(paragraphs 4.3.2 and 7.3).*
This load does not constitute a normal load but **the minimum vertical tensile load that the ladder must withstand.**
There is no safety coefficient specified in the standard, this condition being considered sufficient.

Consequently, the ladder installed complies with the provisions specified in standard NFE85.O1@.

Mr TLALKA *(office technician)*


Specific Support
Ladder support brackets
Scale
2000 max.
Rivets
At least 3 pairs of legs
A


Rh1
Rv1
140
P
255
Fsi= 2 kN
DETAIL A

4.3 Materials and sizing

4.3.1 Materials

The materials must have sufficient strength and ductility characteristics to ensure that the failure load (breakage or flow) is 25% greater than the ultimate load (a necessary condition to avoid non-ductile failures).

Fasteners must be sized to ensure that the strength and ductility characteristics of the joint components are not degraded.

The materials used must, by their nature or through additional treatment, be able to resist corrosion induced by an ambient atmosphere.

Any part likely come into contact with personnel must be free sharp edges and designed in such a way not to cause a risk of injury due to the user's clothing being caught.

Fixed ladders with or without crinolines must be designed with two uprights. The finish

area must comply with NF E 85-014.

4.3.2 Sizing

The ladder components must comply with the requirements of NF EN 131-2. The maximum deformation, as indicated in 5.1 of the aforementioned standard, must not exceed 50 mm.

The permanent deformation of the connecting elements resulting from a horizontal load of 500 N must not exceed 10 mm. The fixing brackets and their fixings must be capable of 3000 N per upright (see check in 7.3).

The permanent deformation of the crinoline resulting from a vertical load of 1000 N must not 10 mm and that resulting from a horizontal load of 500 N must not exceed 10 mm (see 7.2 and Figure 10).

4.4 Rung spacing

4.4.1 Spacing between rungs

The spacing between two successive rungs must be constant and must be between 225 mm and 300 mm.

4.4.2 Spacing between rungs and start/finish area

The vertical distance between the starting platform and the first rung must not exceed the distance between two consecutive rungs.

The top step must be a landing step and must be positioned at the same level as the arrival platform.

4.5 Geometric characteristics of rungs

4.5.1 Length of rungs on fixed ladders with two uprights

The length of the rungs, clearance between the two uprights, must be between 400 and 600 mm.

4.5.2 Step section

The diameter of rungs with a circular cross-section must be at least 20 mm; the width of the bearing surface of rungs with a polygonal and U-shaped cross-section must be at least 20 mm.

The diameter of the circular rung or the largest diameter of a rung with a polygonal cross-section and a U-shaped profile must not be greater than 35 mm, allowing it to be easily grasped by the hand.

7.2.3 For the uprights, a simulated load (F_H) of 500 N must be applied horizontally at the worst point. The simulated load (F_H) can be distributed over three studs (see Figure 12). The permissible permanent deformation measured at the point of application of the load is equal to a maximum of 10 mm. Test crinolines that show permanent deformation must not be put into service.

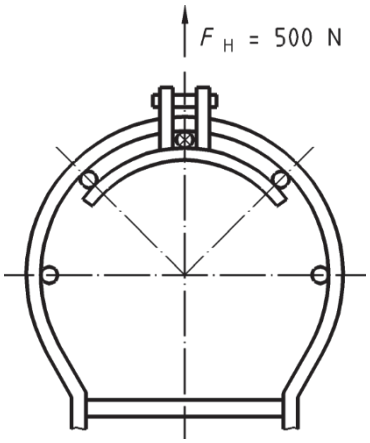
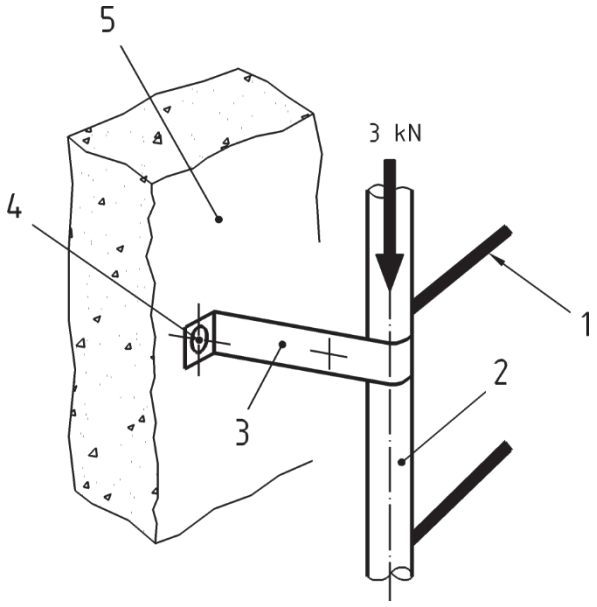


Figure 12 - Testing a crinoline (horizontal)

7.3 Test of anchorage points for fixed ladders with two uprights

On each upright, a maximum of four anchor points must be taken into account, through which the forces are transmitted to the fixed parts of the environment (e.g. wall, machine enclosure, etc.).

The strength of the anchor points for fixed ladders must be calculated taking into account a force of 3 kN for each upright, directed along the centre distance of each upright (see Figure 13).



Legend

1 Level
2 Amount
3 Fixing bracket
4 Anchoring point
5 Fixed part (e.g. wall)

Figure 13 - Installation for assessing anchor points and fixings for fixed two-post ladders

EXPERTISE0UIDEDIFFERENCE

GINGER CEBTP

TEST REPORT NO. BMA6-D-0178

TESTING AND MATERIALS
DEPARTMENT LEEMS
Materials and Structures Research
and Testing Laboratory

ESSAIS D'ARRACHEMENT SUR SYSTEME D'ANCRAGE

STRONG

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avenue Gay Lussac 78990
ELANCOURT
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Fax 01.30.85.23.40

At FORTAL's request, the BMA6 unit of GINGER CEBTP Ile de France carried out pull-out on the anchoring .

The samples supplied to the laboratory are as follows:

- 3 Omega-shaped profiles + 6 mounting brackets

The component drawings were not supplied to us.

2. PURPOSE OF **THE TESTS**

The aim of the tests is determine the pull-out load of the OMEGA-shaped parts.

3. MATERIAL USED

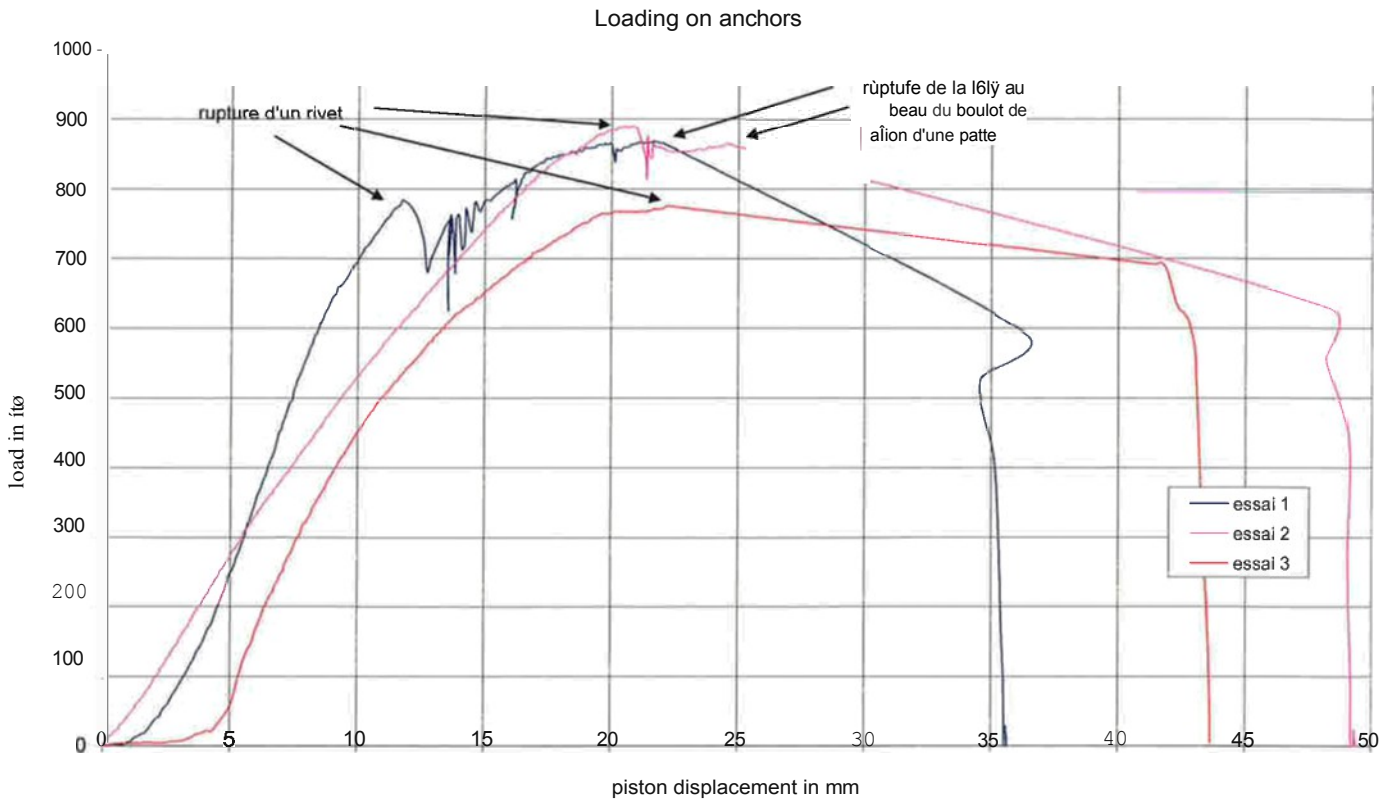
The loading tests were carried out on our AMSLER machine with a capacity of 400 kN (verification report no. 1210199-2 dated 17 December 2012).

Displacement was measured using a 200mm capacity rotary potentiometer connected to the press piston by a non-deformable INVAR wire (accuracy+ 0.1%).

4. TEST RESULTS

The significant results are as follows:

	Ruin load	Ruin mode
Trial 1	784 kg	Rivet breakage (I re load drop)
Trial 2	888 kg	
Trial 3	775 kg	



Test 1 under load

Pulling the bolt out of the bracket and breaking the rivet

5. COMMENTS

mechanical characteristics of the elements tested were investigated. The results do not give rise to any further comments.

Business Manager Arnau8 BARDN

Department Manager Maud FEUILLARD