

## Test Report

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This test report describes the test results of the below mentioned paragliding harness.

All the tests were carried out by:

Air Turquoise SA, official test laboratory of Switzerland.

### Standards

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Tests were carried out in conformity with the following standards:

- 2. DV LuftGerPV §1, Nr. 7 c (\*note: in what follows this will be abbreviated by "LTF")
- European Standard EN1651 September 1999 (\*note in what follows this will be abbreviated by "EN")
- European Standard EN12491 September 2001 (\*note in what follows this will be abbreviated by "EN12491")

### Harness details

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<b>Manufacturer:</b>	Sup'Air
<b>Harness model:</b>	Evo XC 3
<b>Size tested:</b>	Large
<b>Harness Weight tested:</b>	4.2 kg
<b>Maximum certified pilot</b>	120 kg
<b>Impact protection type:</b>	Mousse bag
<b>Impact pad number :</b>	MISC_053.2017
<b>Harness type:</b>	ABS
<b>Test responsible:</b>	Alain Zoller
<b>Test place:</b>	Villeneuve
<b>Test date:</b>	December 27, 2013
<b>Test room temp &amp; humidity:</b>	22,6° C; 31 %rel
<b>Certification number EN:</b>	PH 084.2013
<b>Certification number LTF:</b>	GZ 084.2013

Test summary

**A. STRUCTURAL STRENGTH TESTS**

A test plan was set up in order to execute the different tests in an efficient order. The table below summarizes this test plan together with the applicable standards and results.

Test ID	TESTED ?	Standard Ref.		TEST setup	Anchoring		Forces		Min. Test duration [sec]	Result
		EN	LTF		Attach - ment points	Dummy	Req. Load in g	Min. force [N]		
1	✓	5.3.2.1	4.2.1.a	Default flying position	2 main attachment points	Hip fixated	6g	6000	10	OK
2	✓	5.3.2.2					15g	15000	5	OK
3	✓		4.2.1.b	Default, landing position	2 main att. points	Hip fixated, landing conf.	6g	6000	10	OK
4	✓	5.3.2.7					15g	15000	5	OK
5	✓		4.2.1.a rescue	Rescue	2 rescue att. Pnts.	Hip fixated	9g	9000	10	OK
6	✓	5.3.2.4					15g	15000	5	OK
7	✓		4.2.1.b rescue	Rescue, landing		Hip fixated, landing conf.	6g	6000	10	OK
8	✓	5.3.2.3		One riser	ONE main att.	1 central hip fixation	6g	6000	10	OK
9		5.3.2.5	4.2.1.d	Towing	2 main att. + 2 tow att.	None	3g 5g	3000 5000	10	n/a
10	✓	5.3.2.6		Default, Negatif	One main att.	Head fix.	4.5g	4500	10	OK
11	✓		4.2.1.c	Upside down	2 main att. downw.	Head fix.	6g	6000	10	OK
12	✓		4.2.1.c rescue	Upside down rescue	2 rescue att. downw.		6g	6000	10	OK

**B. HARNESS PROTECTION SHOCK TEST**

Most paraglider harnesses are equipped with a protection device that damps the shock on the pilot's spine during a hard landing.

Shock impact tests have to be executed on these harnesses in order to prove the damping characteristics of it.

Test ID	TESTED ?	Standar rd Ref.:	TEST setup	Anchoring		Impact				Result	
		LTF		Attach- ment points	Dummy	Max. tolerated peak impact in g	Max Peak impact measured	Impact duration of +38 g (if any) recorded:	Impact duration of +20 g (if any) recorded:		
<b>PRO TECT 1</b>	✓	5.1.1	<b>Default flying position</b>	Test dummy is attached to the harness like a pilot in flight.			+50g	23.688	0	16.02 msec	<b>OK</b>

### C. RESCUE DEPLOYMENT RESISTANCE TEST

The deployment of the rescue system has to be ensured in all circumstances of flight. This test is to verify whether the force needed to deploy is in between reasonable limits.

Test ID	TESTED ?	Standar rd Ref.	TEST setup	Anchoring		Force for single hand deployment			Result	
		LTF		Attach- ment points	Dummy	Min. force [N]	Max. force [N]	Resistance measured [daN]		
<b>Resc depl</b>	✓	6.1.5	<b>Default flying position</b>	Test responsible is attached to the harness like a pilot in flight. (no dummy required)			20 N	70 N	n/t	<b>OK</b>

### D. RESCUE DEPLOYMENT STRAP STRENGTH TEST

The connection between handgrip and inner container has to have sufficient load capacity/structural strength in any situation that may arise during normal use. During this test is verified, whether this connection fulfill the requirements.

Test ID	TESTED ?	Standard Ref.		TEST setup	Minimum force [N]	Min. Test durati on [s]	Breaking resistance measured	Result
		LTF	EN 12491					
<b>Resc strap</b>	✓	6.1.8	5.3.2	<b>Connection strap in tensile testing machine</b>	700N	10	n/t	<b>OK</b>

After careful examination as explained in above mentioned test reports (from page 2 to page 18), the undersigned persons declare that the harness:

**Sup'Air  
Evo XC 3  
Large**

Complied with:

- **European Standard EN 1651 September 1999**

And / or (if tested)

- **European Standard EN 12491 March 2001**

And / or (if tested)

- **2. DV LuftGerPV §1, Nr. 7 c**

Villeneuve, December 27, 2013 | Revision 1 : 16.03.2018

Alain Zoller

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Test responsible**



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Annex: detailed test reports

Harness Test		Test ID 1
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	EN 1651 & 2. DV LuftGerPV §1, Nr. 7 c	
<b>Test standard §:</b>	5.3.2.1 (EN) & 4.2.1 a (LTF DV)	
<b>Test setup:</b>	Default flying position	
<b>Anchoring: Attachment points:</b>	Both main riser attachments (3, 4)	
<b>Dummy:</b>	Default, hip fixed (7, 8)	
<b>Required load in g :</b>	9g	(EN: 6g)
<b>Minimum load [N]:</b>	9000 N	(EN: 6000 N)
<b>Required test load in kg:</b>	<b>1080</b>	<b>kg</b>
<b>Min. duration [s]:</b>	10 s	

Results	
<b>Duration of maintained min. load [s]:</b>	<b>10.8 s</b>
<b>Any signs of structural failure after this test:</b>	<b>No visible failure</b>
<b>Test result:</b>	<b>Passed</b>

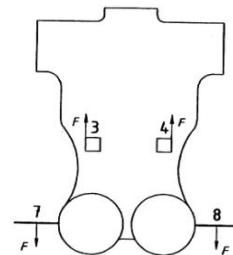
**Graph:**

— TEST ID 1: EN 5.3.2.1 & LTF 4.2.1.a   
 — Norm 600 daN   
 — norm 900 daN

Time (s)	Force (daN)
7	0
17	250
27	700
37	1050
45	1150
47	1100
48	250
57	100

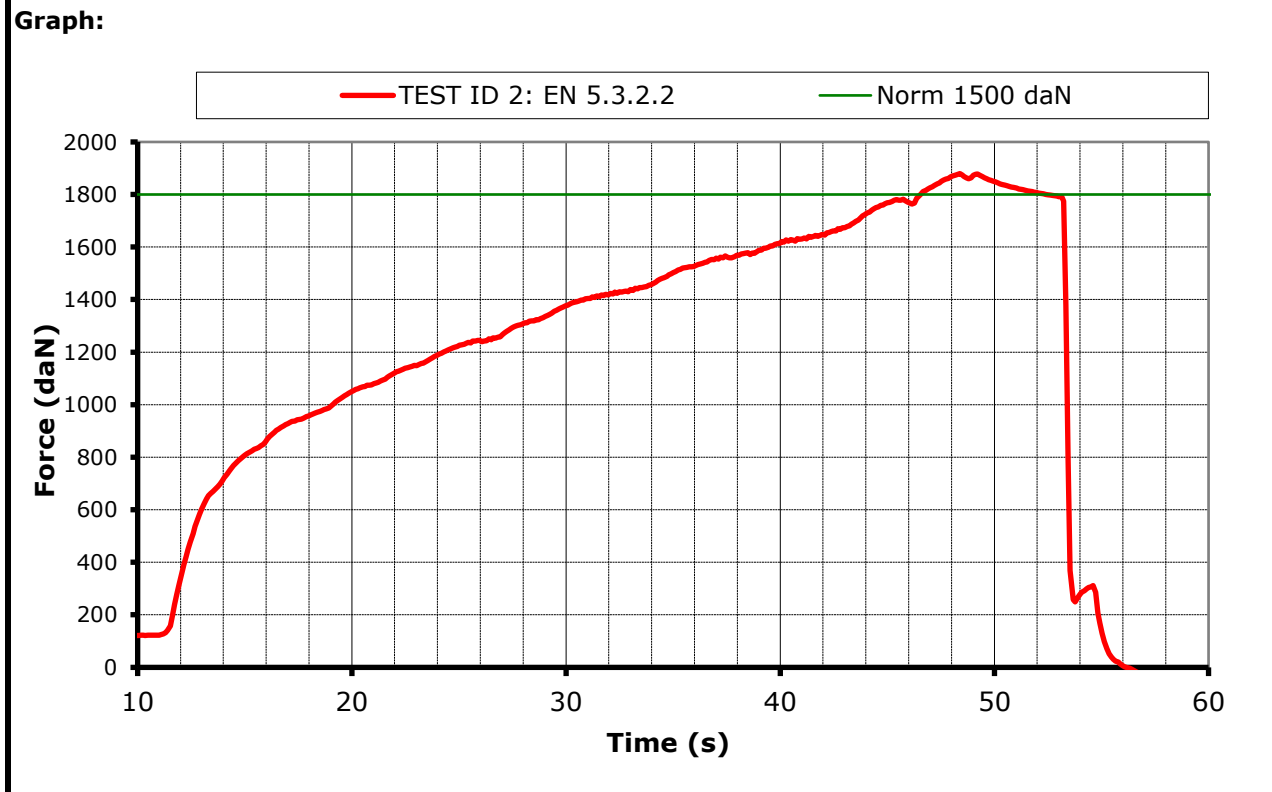
**Harness Test** **Test ID 2**

<b>Item:</b>	Evo XC 3
<b>Manufacturer</b>	Sup'Air
<b>Test place &amp; date:</b>	Villeneuve      December 27, 2013
<b>Test responsible:</b>	Alain Zoller
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel
<b>Maximum certified pilot weight [kg]:</b>	120      kg
<b>Standard</b>	EN 1651
<b>Test standard §:</b>	5.3.2.2
<b>Test setup:</b>	Default flying position
<b>Anchoring: Attachment points:</b>	Both main riser attachments (3, 4)
<b>Dummy:</b>	Default, hip fixed (7, 8)
<b>Required load in g:</b>	15      g
<b>Min load [N]:</b>	15 000 N
<b>Required test load in kg:</b>	<b>1800      kg</b>
<b>Min. duration [s]:</b>	5s



**Results**

<b>Duration of maintained min. load [s]:</b>	<b>5.6 s</b>
<b>Any signs of structural failure after this test:</b>	<b>No visible failure</b>
<b>Test result:</b>	<b>Passed</b>



## Harness Test

## Test ID 3

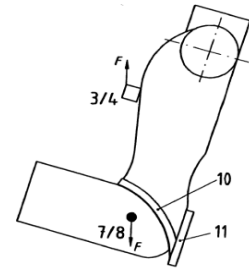
**Item:** Evo XC 3  
**Manufacturer:** Sup'Air  
**Test place & date:** Villeneuve December 27, 2013  
**Test responsible:** Alain Zoller  
**Temp. [°C] & Humidity:** 22,6° C; 31 %rel  
**Maximum certified pilot weight [kg]:** 120 kg

**Standard:** 2. DV LuftGerPV §1, Nr. 7 c  
**Test standard §:** 4.2.1.b

**Test setup:** Flying position before landing: seat board (11) in landing position, leg straps (10) closed.

**Anchoring: Attachment points:** Both of the main riser attachments attached (3 and 4);  
**Dummy:** Default, hip fixed (7, 8)

**Required load in g:** 6 g  
**Min load [N]:** 6000 N  
**Required test load in kg:** **720 kg**  
**Min. duration [s]:** 10 s



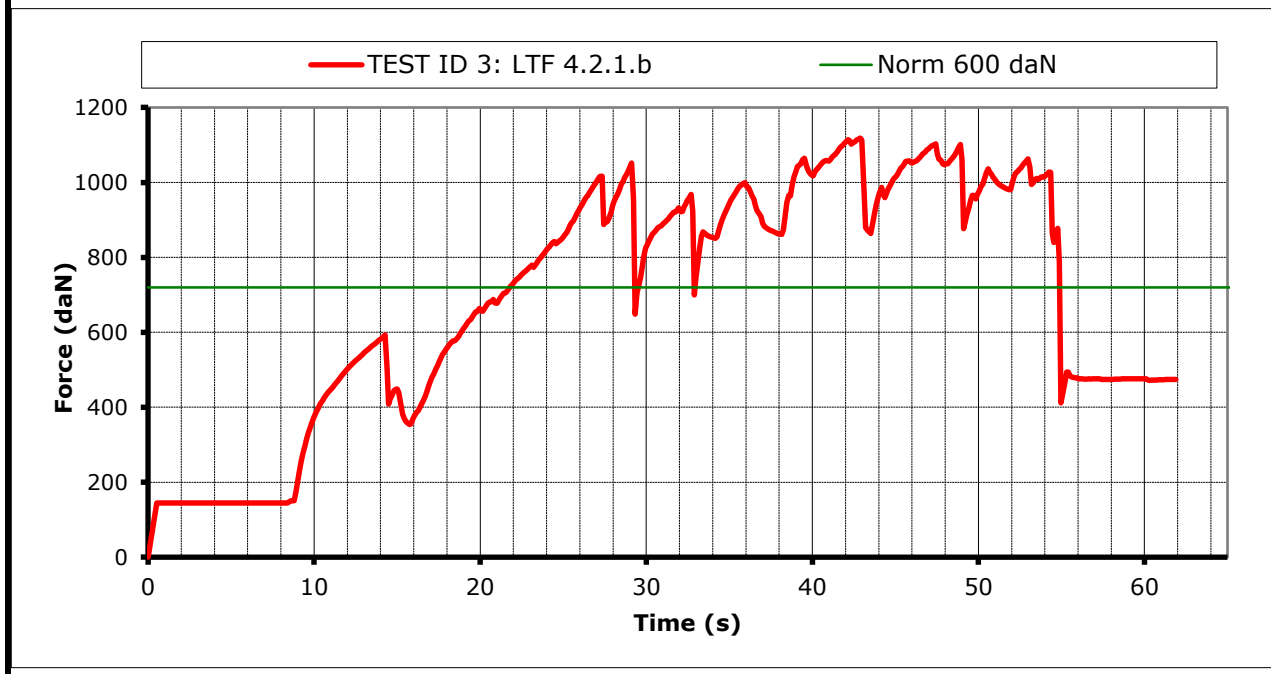
### Results

**Duration of maintained min. load [s]:** **11.3 s.**

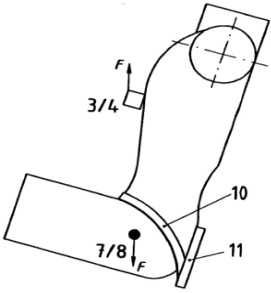
**Any signs of structural failure after this test:** **No visible failure**

**Test result:** **Passed**

### Graph:



Harness Test		Test ID 4
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	EN 1651	
<b>Test standard §:</b>	EN 5.3.2.7	
<b>Test setup:</b>	Flying position before landing: seat board (11) in landing position, leg straps (10) closed.	
<b>Anchoring: Attachment points:</b>	Both of the main riser attachments attached (3 and 4);	
<b>Dummy:</b>	Default, hip fixed (7, 8)	
<b>Required load in g:</b>	15	g
<b>Min load [N]:</b>	15 000 N	
<b>Required test load in kg:</b>	<b>1800</b>	<b>kg</b>
<b>Min. duration [s]:</b>	5 s	
<b>Results</b>		
<b>Duration of maintained min. load [s]:</b>	<b>6.1 s</b>	
<b>Any signs of structural failure after this test:</b>	<b>No visible failure</b>	
<b>Test result:</b>	<b>Passed</b>	
<b>Graph:</b>		





Harness Test		Test ID 5
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	2. DV LuftGerPV §1, Nr. 7 c	
<b>Test standard §:</b>	4.2.1.a rescue	
<b>Test setup:</b>	Rescue attachments	
<b>Anchoring: Attachment points:</b>	Rescue riser attachments (1,2)	
<b>Dummy:</b>	Hip fixed (7, 8)	
<b>Required load in g:</b>	9	g
<b>Min load [N]:</b>	9 000 N	
<b>Required test load in kg:</b>	<b>1080</b>	<b>kg</b>
<b>Min. duration [s]:</b>	10 s	
<b>Results</b>		
<b>Duration of maintained min. load [s]:</b>	<b>10.9 s.</b>	
<b>Any signs of structural failure after this test:</b>	<b>No visible failure</b>	
<b>Test result:</b>	<b>Passed</b>	
<b>Graph:</b>		

<b>Harness Test</b>		<b>Test ID 6</b>
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>		
EN 1651		
<b>Test standard §:</b>	5.3.2.4	
<b>Test setup:</b>	Rescue attachments	
<b>Anchoring: Attachment points:</b>	Rescue riser attachments (1,2)	
<b>Dummy:</b>	Hip fixed (7, 8)	
<b>Required load in g:</b>	15	g
<b>Min load [N]:</b>	15 000 N	
<b>Required test load in kg:</b>	<b>1800</b>	<b>kg</b>
<b>Min. duration [s]:</b>	5 s	

**Results**

<b>Duration of maintained min. load [s]:</b>	<b>5.2 s.</b>
<b>Any signs of structural failure after this test:</b>	<b>Structural failure !</b>
<b>Test result:</b>	<b>Passed</b>

**Graph:**

Time (s)	Force (daN) - TEST ID 6: EN 5.3.2.4	Force (daN) - Norm 1500 daN
0	0	1500
10	300	1500
20	1000	1500
30	1300	1500
40	1500	1500
50	1750	1500
58	1850	1500
60	250	1500
62	100	1500

## Harness Test

## Test ID 7

**Item:** Evo XC 3  
**Manufacturer:** Sup'Air  
**Test place & date:** Villeneuve December 27, 2013  
**Test responsible:** Alain Zoller  
**Temp. [°C] & Humidity:** 22,6° C; 31 %rel  
**Maximum certified pilot weight [kg]:** 120 kg

**Standard:** 2. DV LuftGerPV §1, Nr. 7 c  
**Test standard §:** 4.2.1.b rescue

**Test setup:** Flying position before landing: seat board (11) in landing position, leg straps (10) closed.

**Anchoring: Attachment points:** Both of the rescue riser attachments attached (1 and 2);

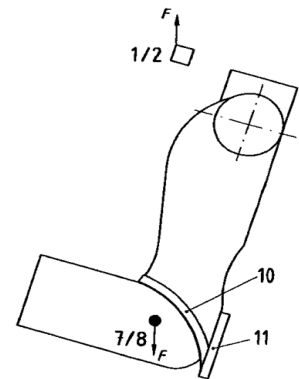
**Dummy:** Default, hip fixed (7, 8)

**Required load in g:** 6 g

**Min load [N]:** 6 000 N

**Required test load in kg:** **720** kg

**Min. duration [s]:** 10 s



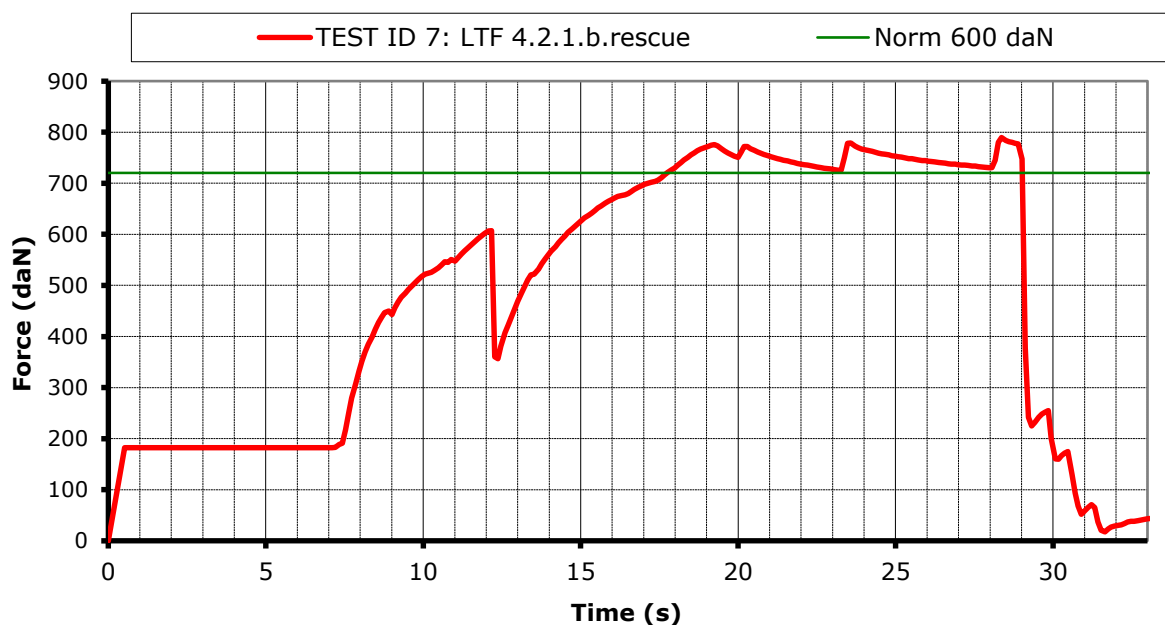
### Results

**Duration of maintained min. load [s]:** **12 s.**

**Any signs of structural failure after this test:** **No visible failure**

**Test result:** **Passed**

### Graph:



Harness Test		Test ID 8
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	EN 1651	
<b>Test standard §:</b>	5.3.2.3	
<b>Test setup:</b>	Only one riser attached	
<b>Anchoring: Attachment points:</b>	One main riser attachments (3)	
<b>Dummy:</b>	Hip fixed (7, 8 -> 12)	
<b>Required load in g:</b>	6	g
<b>Min load [N]:</b>	6 000 N	
<b>Required test load in kg:</b>	<b>720</b>	<b>kg</b>
<b>Min. duration [s]:</b>	10 s	

Results	
<b>Duration of maintained min. load [s]:</b>	<b>11.3 s.</b>
<b>Any signs of structural failure after this test:</b>	<b>No visible failure</b>
<b>Test result:</b>	<b>Passed</b>

**Graph:**

Time (s)	Force (daN) - TEST ID 8	Force (daN) - Norm 600 daN
9	0	600
14	100	600
19	400	600
24	600	600
29	750	600
34	750	600
38	750	600
39	0	600

Harness Test		Test ID 10
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	EN 1651	
<b>Test standard §:</b>	5.3.2.6	
<b>Test setup:</b>	Normal flying position in NEGATIF	
<b>Anchoring: Attachment points:</b>	ONE of the main riser attachments attached downwards(3 or 4);	
<b>Dummy:</b>	Dummy anchored at the head position (9)	
<b>Required load in g:</b>	4.5	g
<b>Min load [N]:</b>	4500 N	
<b>Required test load in kg:</b>	<b>540</b>	<b>kg</b>
<b>Min. duration [s]:</b>	10 s	

Results	
<b>Duration of maintained min. load [s]:</b>	<b>11.3 s.</b>
<b>Any signs of structural failure after this test:</b>	<b>No visible failure</b>
<b>Test result:</b>	<b>Passed</b>

**Graph:**

— TEST ID 10: EN 5.3.2.6      — Norm 450 daN

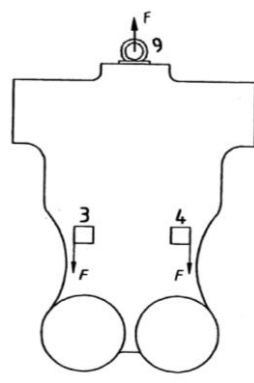
Time (s)	Force (daN) - TEST ID 10	Force (daN) - Norm
9	0	450
14	100	450
18	580	450
19	650	450
24	600	450
28	650	450
29	250	450
30	0	450

## Harness Test

## Test ID 11

**Item:** Evo XC 3  
**Manufacturer:** Sup'Air  
**Test place & date:** Villeneuve December 27, 2013  
**Test responsible:** Alain Zoller  
**Temp. [°C] & Humidity:** 22,6° C; 31 %rel  
**Maximum certified pilot weight [kg]:** 120 kg

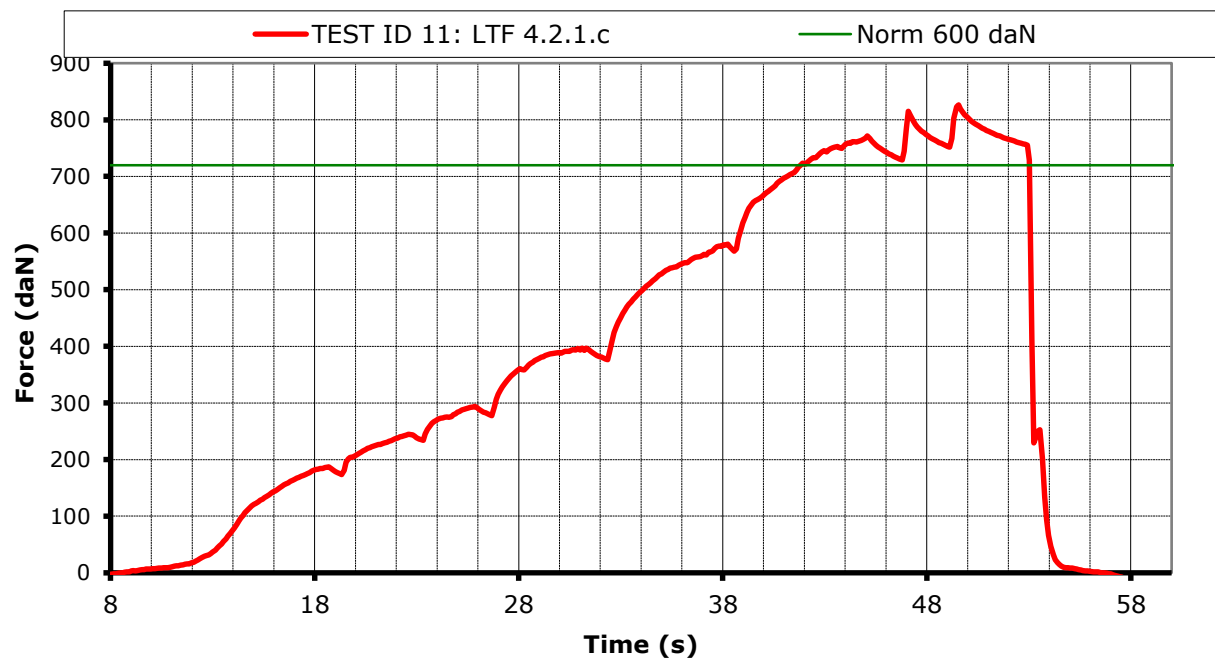
**Standard:** 2. DV LuftGerPV §1, Nr. 7 c  
**Test standard §:** 4.2.1.c  
**Test setup:** Pilot upside down flying position  
**Anchoring: Attachment points:** Both of the main riser attachments attached downwards (3 and 4);  
**Dummy:** Dummy anchored at the head position (9)  
**Required load in g:** 6 g  
**Min load [N]:** 6 000 N  
**Required test load in kg:** **720 kg**  
**Min. duration [s]:** 10 s



### Results

**Duration of maintained min. load [s]:** **11 s.**  
**Any signs of structural failure after this test:** **No visible failure**  
**Test result:** **Passed**

### Graph:



## Harness Test

## Test ID 12

**Item:** Evo XC 3  
**Manufacturer:** Sup'Air  
**Test place & date:** Villeneuve December 27, 2013  
**Test responsible:** Alain Zoller  
**Temp. [°C] & Humidity:** 22,6° C; 31 %rel  
**Maximum certified pilot weight [kg]:** 120 kg

**Standard** 2. DV LuftGerPV §1, Nr. 7 c

**Test standard §:** 4.2.1.c rescue

**Test setup:** Pilot upside down flying position

**Anchoring: Attachment points:** Both of the rescue riser attachments attached downwards (1 and 2);

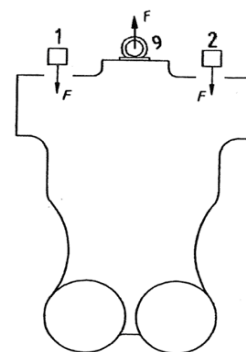
**Dummy:** Dummy anchored at the head position (9)

**Required load in g:** 6 g

**Min load [N]:** 6 000 N

**Required test load in kg:** **720 kg**

**Min. duration [s]:** 10 s



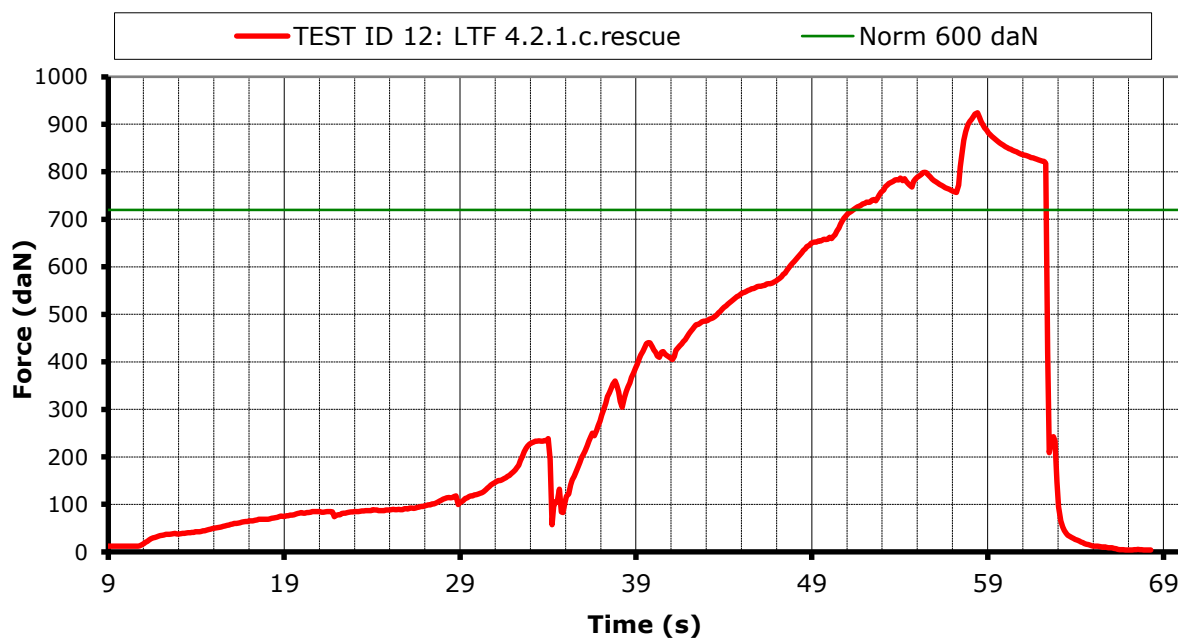
### Results

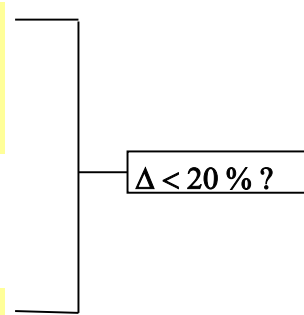
**Duration of maintained min. load [s]:** **10.9 s.**

**Any signs of structural failure after this test:** **No visible failure**

**Test result:** **Passed**

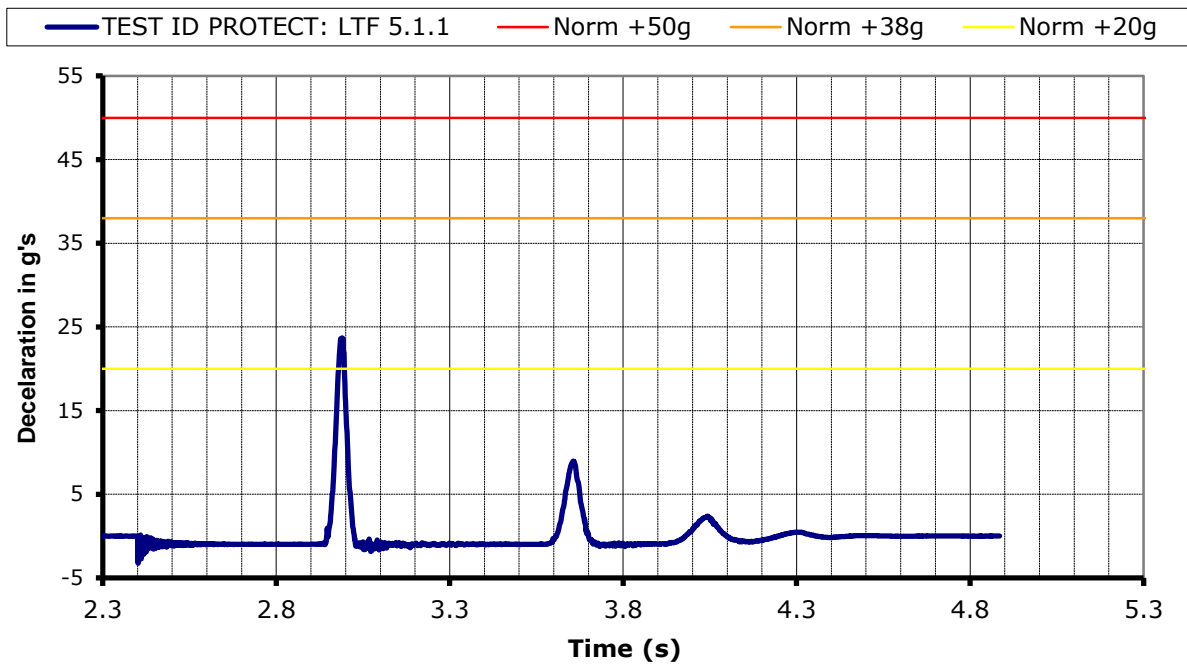
### Graph:



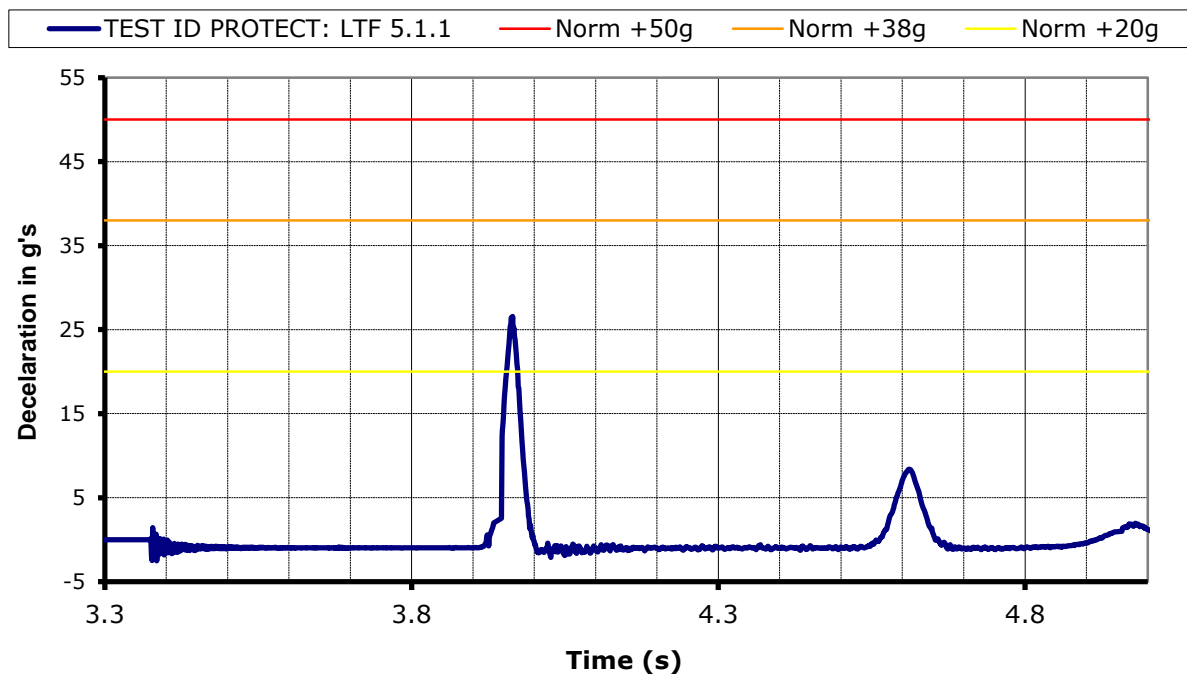
Protector shock test		Test ID Protect
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	2. DV LuftGerPV §1, Nr. 7 c	
<b>Test standard §:</b>	5.1.1	
<b>Test setup:</b>	Harness attached to protector test dummy, in a similar way like a real pilot in flight. Impact will be simulated by dropping the dummy from a certain height (with and without reserve). To simulate the "in-flight" conditions, the airbag is inflated with pressurized air equalling an airspeed of 7m/s. Inflation has to be stopped at least 5 sec before impact. Impact will be measured by an accelerometer mounted on the dummy. (Impact measured in g's)	
<b>Requirements:</b>	<b>Minimum height:</b>	1.65 m (between lowest point test dummy and impact surface)
	<b>Impact requirements:</b>	+50g as absolute maximum; +38g during less than 7 msec; +20g during less than 25 msec.
	<b>Repetitions:</b>	The test will be performed 2 times, minimum 1 hour and maximum 2 hours after the first impact (with airbag protectors this pause is not necessary). The 2 Max-values should not differ more than 20%
<b>Results</b>		
<b><u>Shock test 1:</u></b>		
<b>Impact at a height of 1.65m:</b>	23.688	
<b>Impact duration of+ 38 g (if any):</b>	0	
<b>Impact duration of +20 g (if any):</b>	16.02 msec	
<b><u>Shock test 2:</u></b>		
<b>Impact at a height of 1.65m:</b>	26.56	
<b>Impact duration of+ 38 g (if any):</b>	0	
<b>Impact duration of +20 g (if any):</b>	18 msec	
<b>Test Result:</b>	<b>Passed</b>	



**Graph 1:**



**Graph 2:**



Rescue deployment resistance test		Test ID resc
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	2. DV LuftGerPV §1, Nr. 7 c	
<b>Test standard §:</b>	6.1.5	
<b>Test setup:</b>	<p>The deployment of the rescue system has to be ensured in all circumstances, especially with a damaged glider.</p> <p>The pilot has to be able to deploy the rescue chute with a single pull out of the outer container, single handed and in an anatomical favorable direction.</p> <p>In order to simulate this, the test responsible deploys the rescue seated in the harness. In a similar way as in real flight. The deployment resistance is approximately measured by the load cell, which is placed between the hand of the test responsible and the rescue hand grip.</p> <p>On the other hand inadvertent deployment has to be fairly remote. Therefore a shear link has to withstand a minimum load.</p>	
<b>Requirements:</b>	<p><b>Max force for single hand deployment:</b></p> <p><b>Min force to prevent unwanted opening:</b></p>	<p>approx. 70 N</p> <p>approx. 20 N</p>
<b>Results</b>		
<b>Measured peak to peak required force for deployment [daN]:</b>	4.2 daN	
<b>Comment:</b>	Passed	
<b>Graph:</b>		



Rescue deployment strap strength test		Test ID resc strap
<b>Item:</b>	Evo XC 3	
<b>Manufacturer</b>	Sup'Air	
<b>Test place &amp; date:</b>	Villeneuve	December 27, 2013
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22,6° C; 31 %rel	
<b>Maximum certified pilot weight [kg]:</b>	120	kg
<b>Standard</b>	EN 12491 & 2. DV LuftGerPV §1, Nr. 7 c	
<b>Test standard §:</b>	5.3.2 (EN 12491) & 6.1.8 (LTF)	
<b>Test setup:</b>	<p>The handgrip of the outer container has to be connected to the inner container with a removable loop in a way that it is possible to use the inner container with different types of outer containers.</p> <p>The connection between handgrip and inner container has to have sufficient load capacity/structural strength in any situation that may arise during normal operation.</p> <p>In order to verify this, the connection is tested on its tensile strength by a default tensile testing setup.</p> <p>In addition to this the breaking resistance will also be measured.</p>	
<b>Requirements:</b>	<b>Min. tensile strenght for 10 s:</b>	700 N (= 70daN)
<b>Results</b>		
<b>Duration of maintained load [s]:</b>		<b>&lt; 10 sec</b>
<b>Breaking resistance [daN]:</b>		<b>365</b>
<b>Comment:</b>		<b>Passed</b>
<b>Graph:</b>		