



## Test Report

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.

para-test.com



paragliding by air turquoise

## Standards

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

<b>Manufacturer:</b>	Ozone Gliders
<b>Harness model:</b>	Exoceat
<b>Size:</b>	Medium
<b>Harness Weight:</b>	7.8 kg
<b>Maximum certified pilot</b>	125 kg
<b>Impact protection type:</b>	Mousse bag
<b>Harness type:</b>	ABS
<b>Test responsible:</b>	Alain Zoller
<b>Test place:</b>	Villeneuve
<b>Test date:</b>	November 02, 2012
<b>Test room temp &amp; humidity:</b>	22° C; 40%rel, 1005.8 hPa
<b>Certification number EN:</b>	PH 048.2013
<b>Certification number LTF:</b>	GZ 048.2013

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ISO 9001  
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**Air Turquoise S.A. - Certification of paraglider equipment**  
 Tested in accordance with EN 1651:1999 and 2.DV LuftGerPV§1, Nr.7c

Prepared by RE  
 Rev.0, 25.01.2011  
 No. 71.9.3



## 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		Default flying position	2 main attachment points	Hip fixated	6g	6000	10	OK
2	✓		4.2.1.a				9g	9000		
3	✓	5.3.2.2		Default, landing position	2 main att. points	Hip fixated, landing conf.	6g	6000	10	OK
4	✓		4.2.1.b				15g	15000		
5	✓	5.3.2.7		Rescue	2 rescue att. Pnts.	Hip fixated	9g	9000	10	OK
6	✓		4.2.1.a rescue				15g	15000		
7	✓	5.3.2.4		Rescue, landing	2 rescue att. Pnts.	Hip fixated, landing conf.	6g	6000	10	OK
8	✓		4.2.1.b rescue				6g	6000		
9	✓	5.3.2.3		One riser	ONE main att.	1 central hip fixation	6g	6000	10	OK
10	✓		4.2.1.d				3g	3000		
11	✓	5.3.2.5		Towing	2 main att. + 2 tow att.	None	5g	5000	10	n/a
12	✓		4.2.1.e				5g	5000		
13	✓	5.3.2.6		Default, Negatif	One main att.	Head fix.	4.5g	4500	10	OK
14	✓		4.2.1.c				6g	6000		
15	✓		4.2.1.c rescue	Upside down rescue	2 rescue att. downw.	Head fix.	6g	6000	10	OK
16	✓		4.2.1.c rescue				6g	6000		

### 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 d 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	34.78	0	0.019	<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 d 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	Connection strap in tensile testing machine	700N	10	n/t	<b>n/a</b>

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

**Ozone Gliders  
Exocet  
Medium**

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, November 02, 2012

Place, Date



EN & LTF Testing center  
Alain Zoller  
www.para-test.com

Test responsible

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Annex: detailed test reports

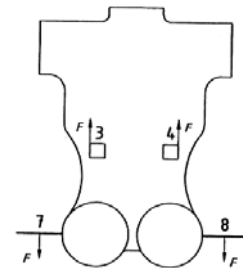
**Harness Test** **Test ID 1**

**Item:** Exoceat  
**Manufacturer:** Ozone Gliders  
**Test place & date:** Villeneuve November 02, 2012  
**Test responsible:** Alain Zoller  
**Temp. [°C] & Humidity:** 22° C; 40%rel, 1005.8 hPa  
**Maximum certified pilot weight [kg]:** 125 kg

**Standard:** EN 1651 & 2. DV LuftGerPV §1, Nr. 7 c  
**Test standard §:** 5.3.2.1 (EN) & 4.2.1 a (LTF DV)

**Test setup:** Default flying position  
**Anchoring: Attachment points:** Both main riser attachments (3, 4)  
**Dummy:** Default, hip fixed (7, 8)

**Required load in g :** 9g (EN: 6g)  
**Minimum load [N]:** 9000 N (EN: 6000 N)  
**Required test load in kg:** **1125 kg**  
**Min. duration [s]:** 10 s



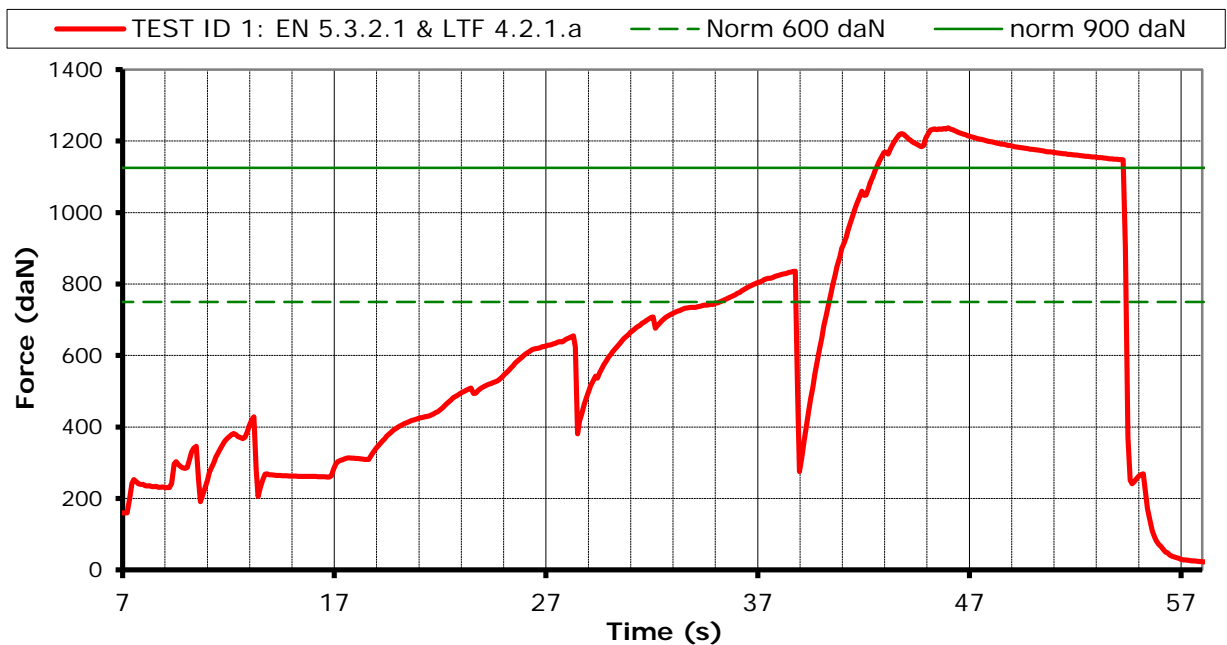
**Results**

**Duration of maintained min. load [s]:** **11.2 s**

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

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

**Graph:**



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Annex TEST ID 1  
 Prepared by RE  
 Rev.0, 25.01.2011  
 No. 71.9.3

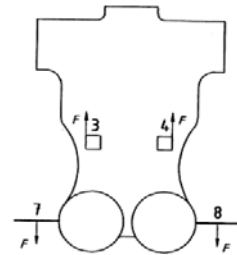


## Harness Test

## Test ID 2

<b>Item:</b>	Exoceat
<b>Manufacturer</b>	Ozone Gliders
<b>Test place &amp; date:</b>	Villeneuve November 02, 2012
<b>Test responsible:</b>	Alain Zoller
<b>Temp. [°C] &amp; Humidity:</b>	22° C; 40%rel, 1005.8 hPa
<b>Maximum certified pilot weight [kg]:</b>	125 kg

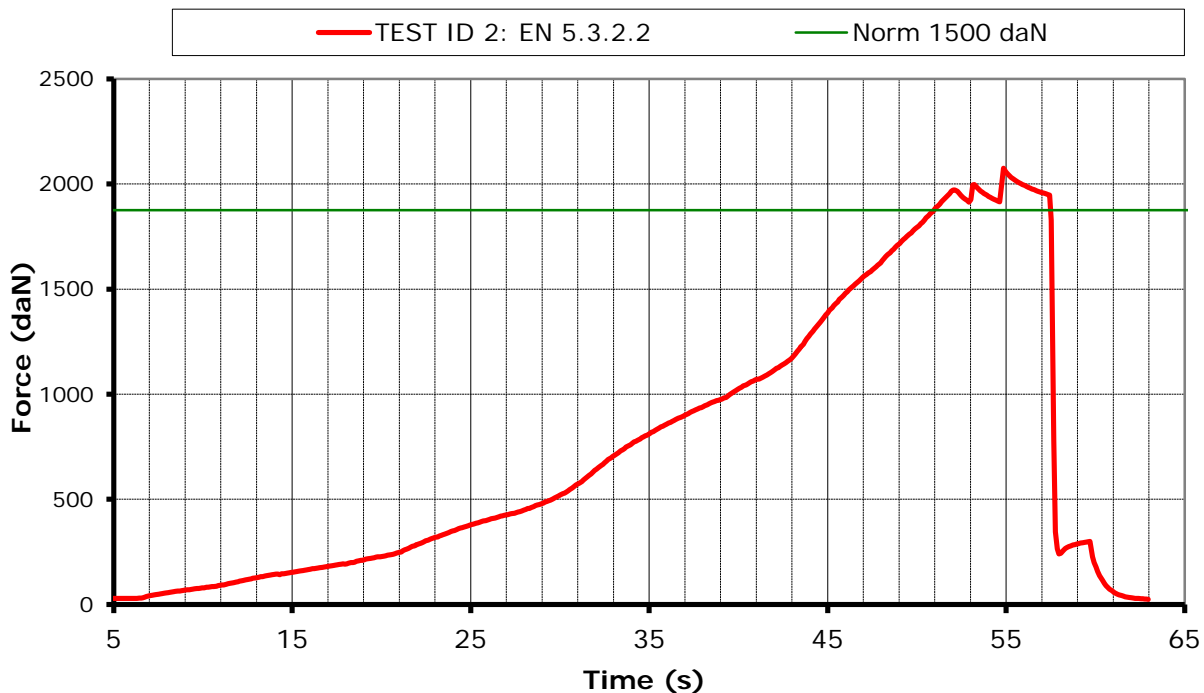
<b>Standard</b>	EN 1651
<b>Test standard §:</b>	5.3.2.2
<b>Test setup:</b>	Default flying position
<b>Anchoring: Attachment points:</b>	Both main riser attachments (3, 4)
<b>Dummy:</b>	Default, hip fixed (7, 8)
<b>Required load in g:</b>	15 g
<b>Min load [N]:</b>	15 000 N
<b>Required test load in kg:</b>	<b>1875 kg</b>
<b>Min. duration [s]:</b>	5s



### Results

<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>

### Graph:



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## Harness Test

## Test ID 3

Item: Exoceat  
 Manufacturer: Ozone Gliders  
 Test place & date: Villeneuve November 02, 2012  
 Test responsible: Alain Zoller  
 Temp. [°C] & Humidity: 22° C; 40%rel, 1005.8 hPa  
 Maximum certified pilot weight [kg]: 125 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);

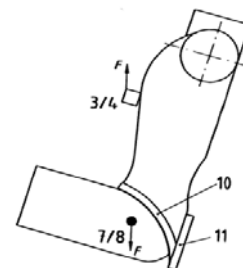
Dummy: Default, hip fixed (7, 8)

Required load in g: 6 g

Min load [N]: 6000 N

Required test load in kg: **750 kg**

Min. duration [s]: 10 s



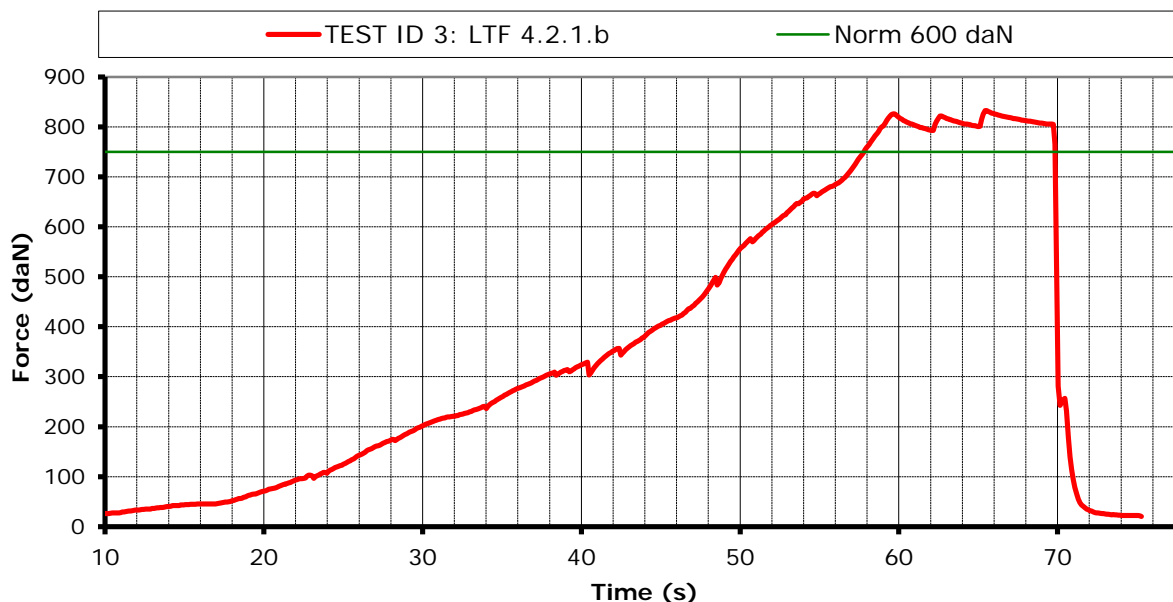
### Results

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

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

Test result: **Passed**

### Graph:



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## Harness Test

## Test ID 4

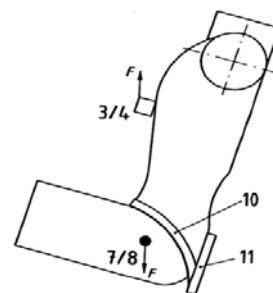
Item: Exocean  
 Manufacturer: Ozone Gliders  
 Test place & date: Villeneuve November 02, 2012  
 Test responsible: Alain Zoller  
 Temp. [°C] & Humidity: 22° C; 40%rel, 1005.8 hPa  
 Maximum certified pilot weight [kg]: 125 kg

Standard: EN 1651  
 Test standard §: EN 5.3.2.7

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: 15 g  
 Min load [N]: 15 000 N  
 Required test load in kg: **1875 kg**  
 Min. duration [s]: 5 s



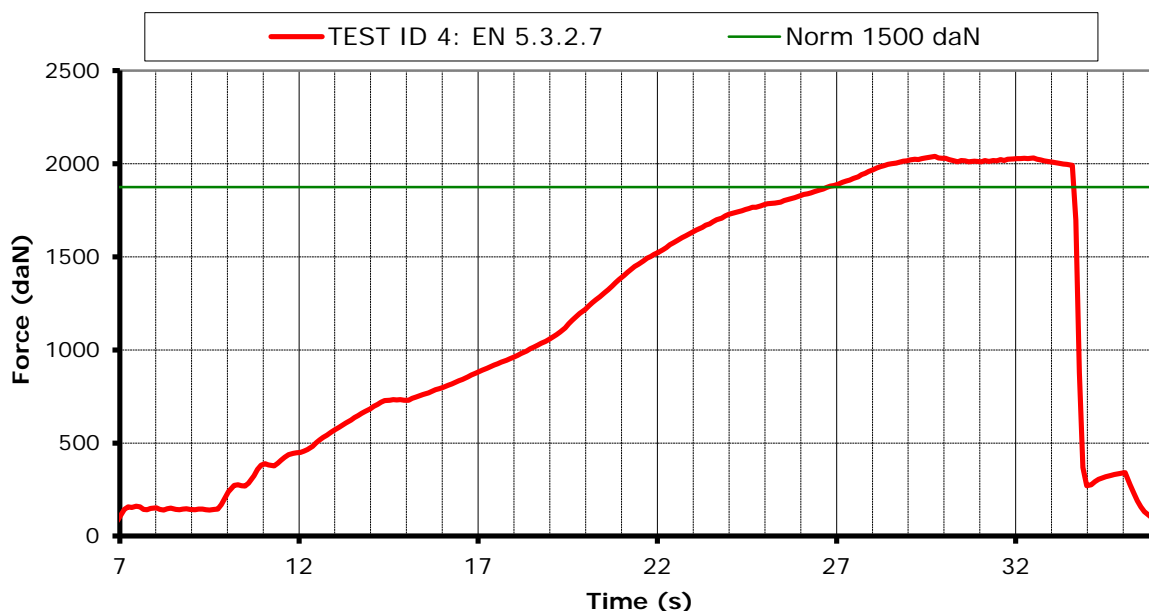
### Results

Duration of maintained min. load [s]: **6.7 s**

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

Test result: **Passed**

### Graph:



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## Harness Test

## Test ID 5

Item:	Exoceat	
Manufacturer	Ozone Gliders	
Test place & date:	Villeneuve	November 02, 2012
Test responsible:	Alain Zoller	
Temp. [°C] & Humidity:	22° C; 40%rel, 1005.8 hPa	
Maximum certified pilot weight [kg]:	125	kg

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

**Test standard §:** 4.2.1.a rescue

**Test setup:** Rescue attachments

**Anchoring: Attachment points:** Rescue riser attachments (1,2)

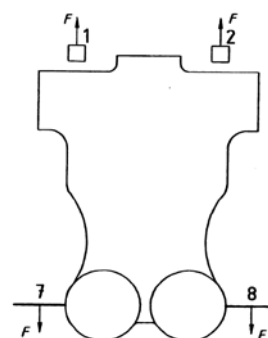
**Dummy:** Hip fixed (7, 8)

**Required load in g:** 9 g

**Min load [N]:** 9 000 N

**Required test load in kg:** **1125** kg

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



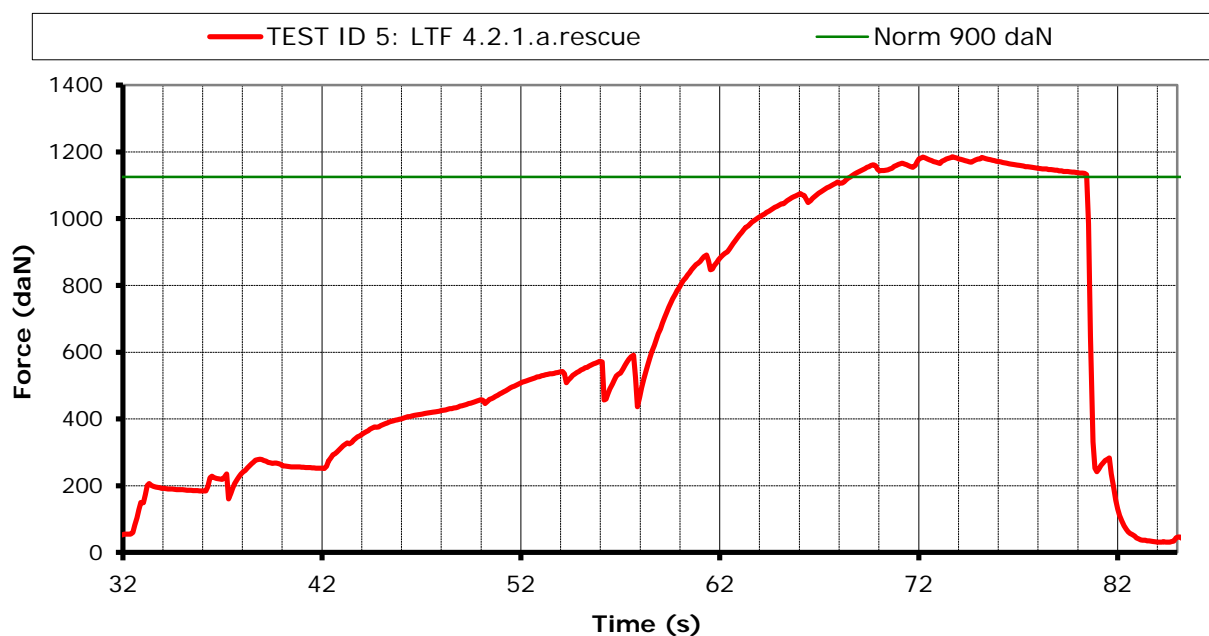
### Results

**Duration of maintained min. load [s]:** **11 s**

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

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

### Graph:



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## Harness Test

## Test ID 6

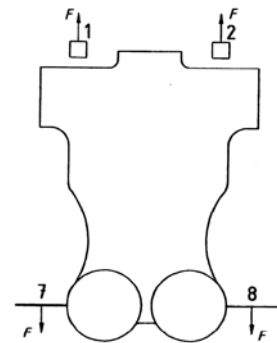
Item:	Exoceat	
Manufacturer	Ozone Gliders	
Test place & date:	Villeneuve	November 02, 2012
Test responsible:	Alain Zoller	
Temp. [°C] & Humidity:	22° C; 40%rel, 1005.8 hPa	
Maximum certified pilot weight [kg]:	125	kg

Standard	EN 1651
Test standard §:	5.3.2.4
Test setup:	Rescue attachments

Anchoring: Attachment points: Rescue riser attachments (1,2)

Dummy: Hip fixed (7, 8)

Required load in g:	15	g
Min load [N]:	15 000	N
Required test load in kg:	1875	kg
Min. duration [s]:	5	s



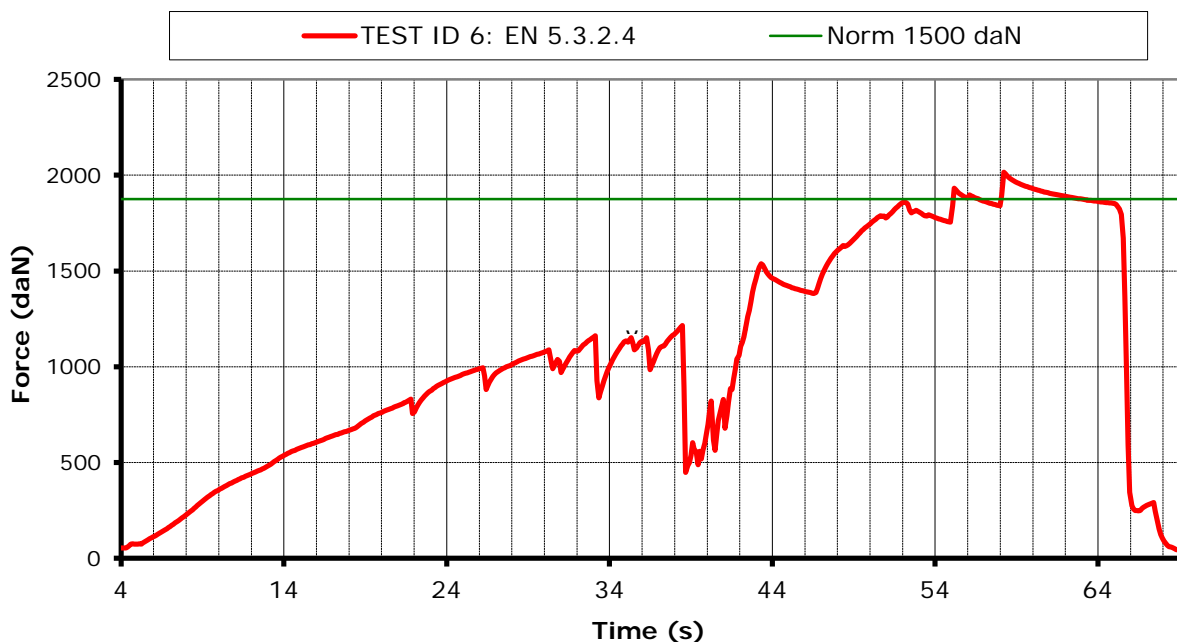
### Results

Duration of maintained min. load [s]: **5.1 s**

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

Test result: **Passed**

### Graph:



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## Harness Test

## Test ID 7

Item:	Exocet	
Manufacturer	Ozone Gliders	
Test place & date:	Villeneuve	November 02, 2012
Test responsible:	Alain Zoller	
Temp. [°C] & Humidity:	22° C; 40%rel, 1005.8 hPa	
Maximum certified pilot weight [kg]:	125	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);

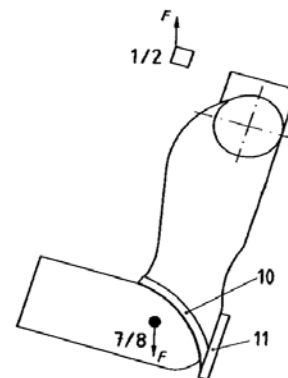
**Dummy:** Default, hip fixed (7, 8)

**Required load in g:** 6 g

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

**Required test load in kg:** 750 kg

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



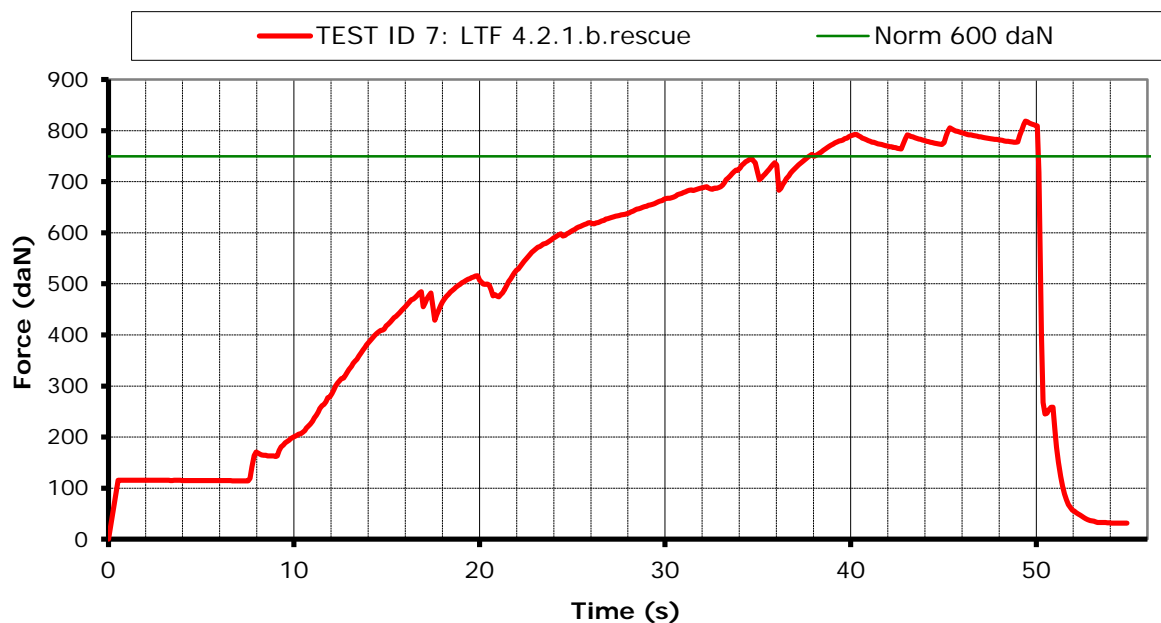
### Results

**Duration of maintained min. load [s]:** 11.9 s

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

**Test result:** Passed

### Graph:



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**Harness Test**

**Test ID 8**

Item: Exoceat  
 Manufacturer: Ozone Gliders  
 Test place & date: Villeneuve November 02, 2012  
 Test responsible: Alain Zoller  
 Temp. [°C] & Humidity: 22° C; 40%rel, 1005.8 hPa  
 Maximum certified pilot weight [kg]: 125 kg

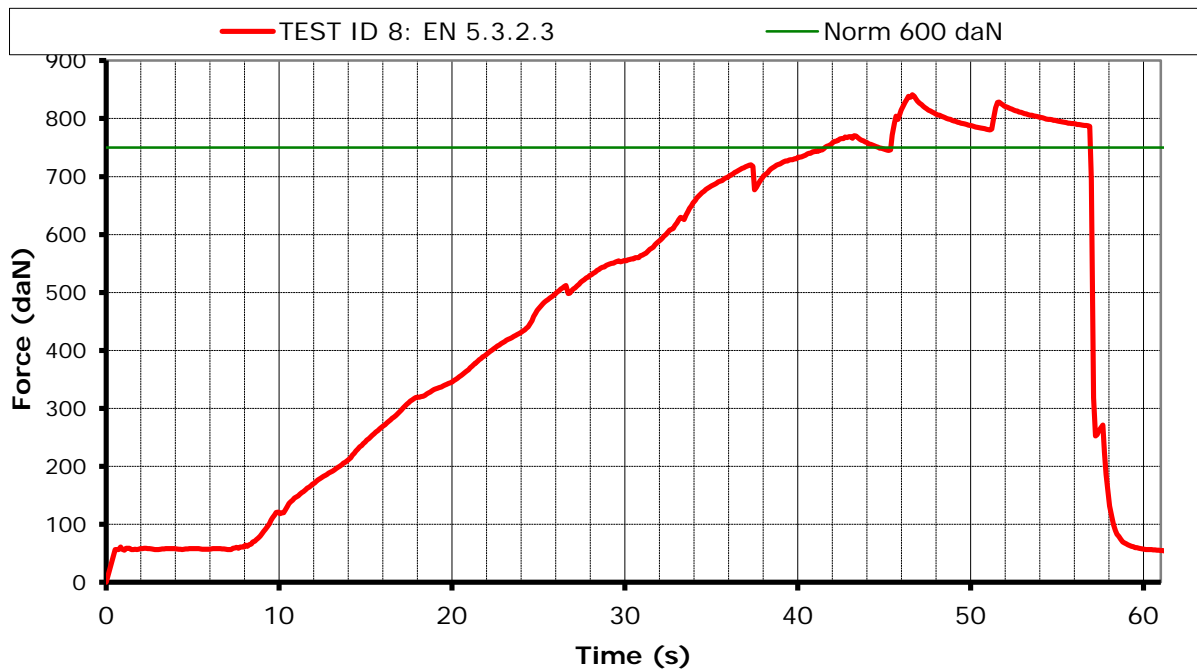
Standard: EN 1651  
 Test standard §: 5.3.2.3  
 Test setup: Only one riser attached  
 Anchoring: Attachment points: One main riser attachments (3)  
 Dummy: Hip fixed (7, 8 -> 12)  
 Required load in g: 6 g  
 Min load [N]: 6 000 N  
 Required test load in kg: **750 kg**  
 Min. duration [s]: 10 s



**Results**

Duration of maintained min. load [s]: **10.8 s**  
 Any signs of structural failure after this test: **No visible failure**  
 Test result: **Passed**

**Graph:**



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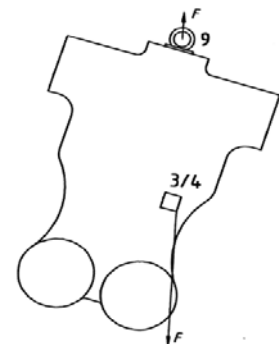


**Harness Test**

**Test ID 10**

Item: Exoceat  
 Manufacturer: Ozone Gliders  
 Test place & date: Villeneuve November 02, 2012  
 Test responsible: Alain Zoller  
 Temp. [°C] & Humidity: 22° C; 40%rel, 1005.8 hPa  
 Maximum certified pilot weight [kg]: 125 kg

Standard: EN 1651  
 Test standard §: 5.3.2.6  
 Test setup: Normal flying position in NEGATIF  
 Anchoring: Attachment points: ONE of the main riser attachments attached downwards(3 or 4);  
 Dummy: Dummy anchored at the head position (9)  
 Required load in g: 4.5 g  
 Min load [N]: 4500 N  
 Required test load in kg: **562.5 kg**  
 Min. duration [s]: 10 s



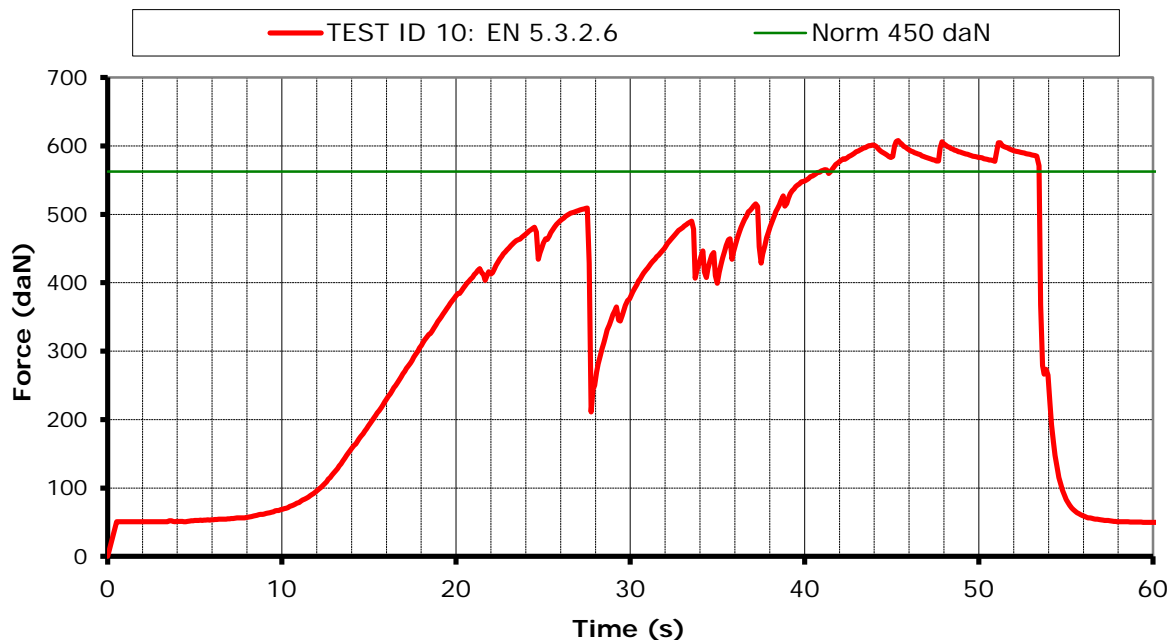
**Results**

Duration of maintained min. load [s]: **12.1 s**

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

Test result: **Passed**

**Graph:**



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## Harness Test

## Test ID 11

Item:	Exocean	
Manufacturer	Ozone Gliders	
Test place & date:	Villeneuve	November 02, 2012
Test responsible:	Alain Zoller	
Temp. [°C] & Humidity:	22° C; 40%rel, 1005.8 hPa	
Maximum certified pilot weight [kg]:	125	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);

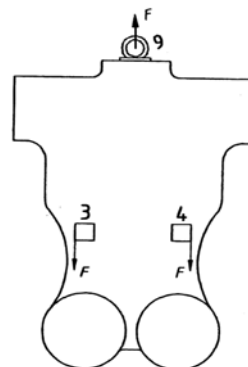
**Dummy:** Dummy anchored at the head position (9)

**Required load in g:** 6 g

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

**Required test load in kg:** **750** kg

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



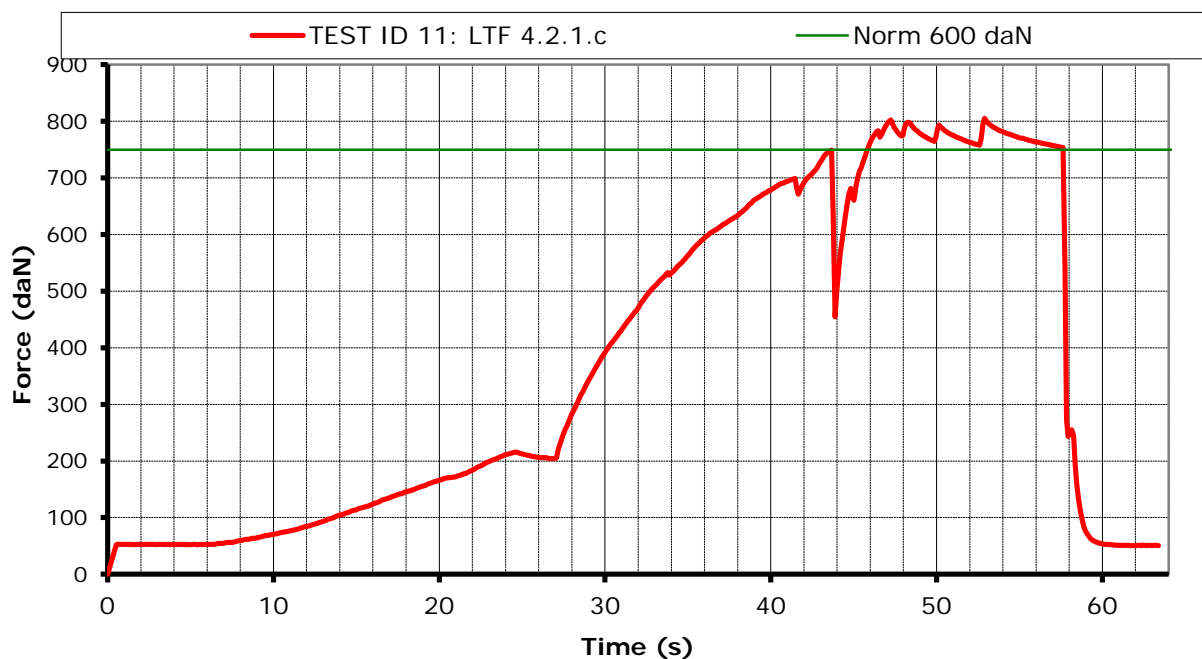
### Results

**Duration of maintained min. load [s]:** **11.7 s**

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

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

### Graph:



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No. 71.9.3



## Harness Test

## Test ID 12

**Item:** Exocet  
**Manufacturer:** Ozone Gliders  
**Test place & date:** Villeneuve November 02, 2012  
**Test responsible:** Alain Zoller  
**Temp. [°C] & Humidity:** 22° C; 40%rel, 1005.8 hPa  
**Maximum certified pilot weight [kg]:** 125 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);

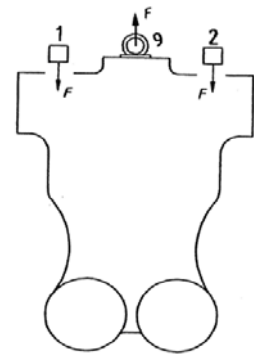
**Dummy:** Dummy anchored at the head position (9)

**Required load in g:** 6 g

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

**Required test load in kg:** **750 kg**

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



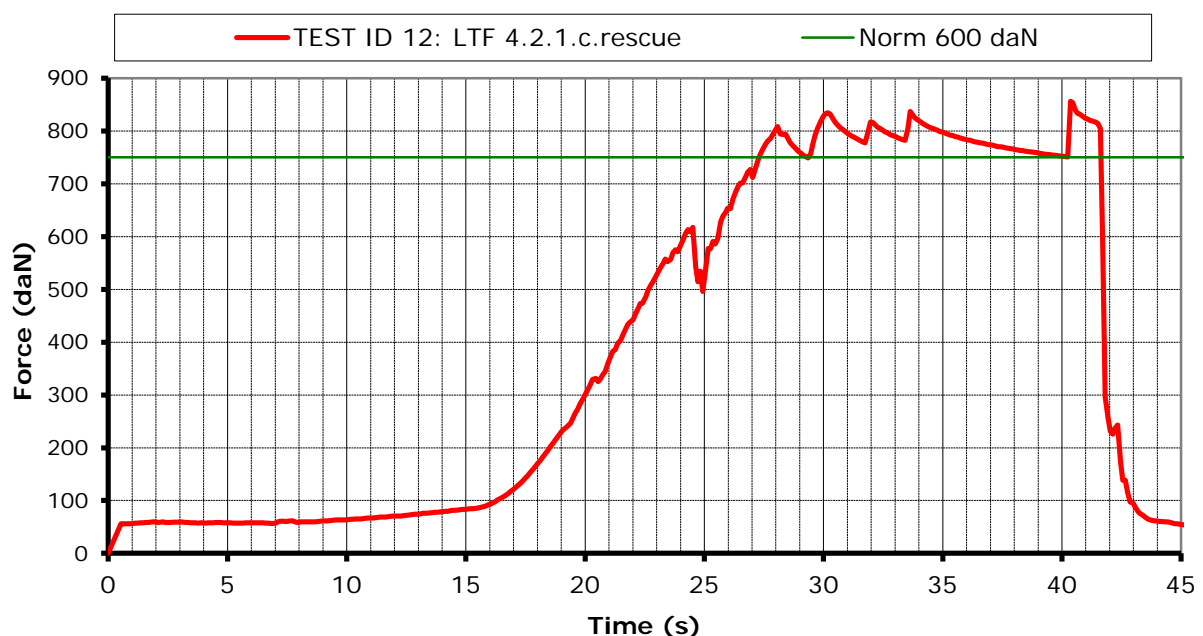
### Results

**Duration of maintained min. load [s]:** **10.2 s**

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

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

### Graph:



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 Prepared by RE  
 Rev.0, 25.01.2011  
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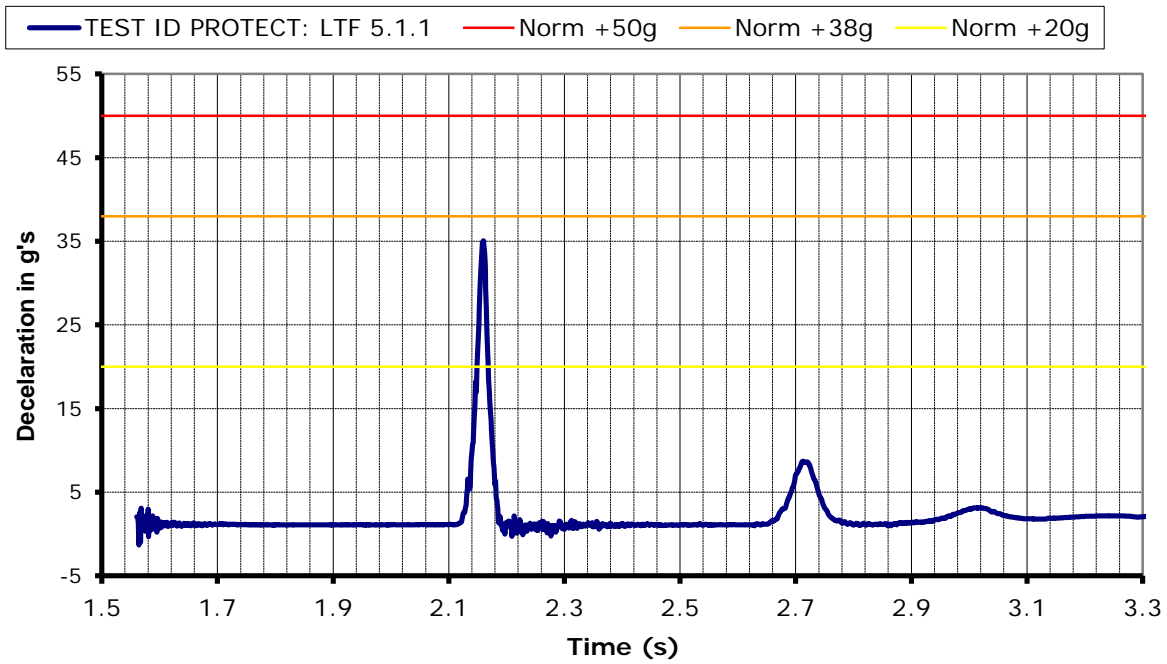


Protector shock test		Test ID Protect
<b>Item:</b>	Exoceat	
<b>Manufacturer</b>	Ozone Gliders	
<b>Test place &amp; date:</b>	Villeneuve	November 02, 2012
<b>Test responsible:</b>	Alain Zoller	
<b>Temp. [°C] &amp; Humidity:</b>	22° C; 40%rel, 1005.8 hPa	
<b>Maximum certified pilot weight [kg]:</b>	125	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>Shock test 1:</b>		
Impact at a height of 1.65m:	34.78	
Impact duration of + 38 g (if any):	0	
Impact duration of +20 g (if any):	0.019	
<b>Shock test 2:</b>		
Impact at a height of 1.65m:	36.952	
Impact duration of + 38 g (if any):	0	
Impact duration of +20 g (if any):	0.02	
<b>Test Result:</b>	<b>Passed</b>	

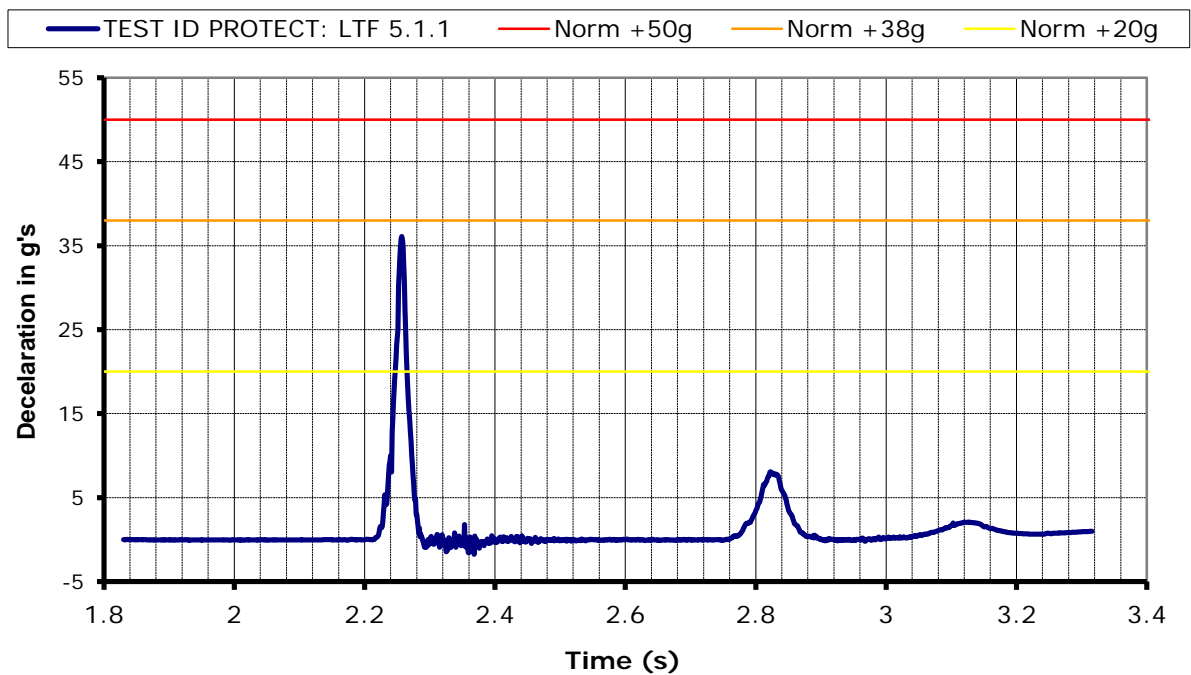




Graph 1:



Graph 2:





Rescue deployment resistance test		Test ID resc
Item:	Exoceat	
Manufacturer	Ozone Gliders	
Test place & date:	Villeneuve	November 02, 2012
Test responsible:	Alain Zoller	
Temp. [°C] & Humidity:	22° C; 40%rel, 1005.8 hPa	
Maximum certified pilot weight [kg]:	125	kg
Standard	2. DV LuftGerPV §1, Nr. 7 c	
Test standard §:	6.1.5	
Test setup:	<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>	
Requirements:	<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>		
Measured peak to peak required force for deployment [daN]:		6.2
Comment:	Passed	
Graph:		

Air Turquoise SA certified by



**Air Turquoise S.A. - Certification of paraglider equipment**  
Tested in accordance with EN 1651:1999 and 2.DV LuftGerPV§1, Nr.7c

Annex TEST ID resc depl  
Prepared by RE  
Rev.0, 25.01.2011  
No. 71.9.3