

# **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.



## **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

Manufacturer: AIR MKG Kortel Design

Harness model: Kuik2 Unit 4

Size: Medium

Harness Weight: 2.250 kg

Maximum certified pilot 120 kg 130 LTF

Impact protection type: Foam + Air Bag

Harness type: ABS

Test responsible:

Test place:

Villeneuve

Test date:

January 04, 2013

Test room temp & humidity: 21.5° C; 31 %rel

Certification number EN: PH 052.2013
Certification number LTF: GZ 052.2013

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## Test summary

## A. STRUCTURAL STRENGHT 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.

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

## **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.

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est ID	ESTED?	Standa rd Ref.: LTF	TEST setup	Ancl Attach- ment points	horing X W W N	Max. tolerated peak impact in g	Max Peak impact 3	mpact duration of +38 g (if any) ecorded:	mpact duration of -20 g (if any) ecorded:	Result
PRO			Default		is attached to					_
TECT 1	✓	5.1.1	flying position	the harness	s like a pilot in ight.		35.824	0	0.02	OK

## 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.

Fest ID	rested?	Standa rd Ref. LTF		Anchoring  Attach- ment points		Force for sir Min. force [N]	Result		
Resc					ponisble is the harness	I	l I	 I	
Resc	✓	6.1.5	Default flying		ot in flight.	20 N	70 N	n/t	ОК
depl			position	(no dumn	ny required)	I -	l		I

## D. RESCUE DEPLOYMENT STRAP STRENGHT 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?	Standa LTF	ard Ref. EN 12491	TEST setup	Minimum force [N]	Min. Test durati on [s]	Breaking resistance measured	Result
Resc strap	<b>✓</b>	6.1.8	5.3.2	Connection strap in tensile testing machine	700N	10	n/t	ок

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

AIR MKG Kortel Design Kuik2 Unit 4 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,	January 04, 2013
Place, Date	e

Alain Zoller www.para-test.com
Test responsible

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Annex: detailed test reports

Harness Test Test ID 1

Item: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

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: 1080 kg

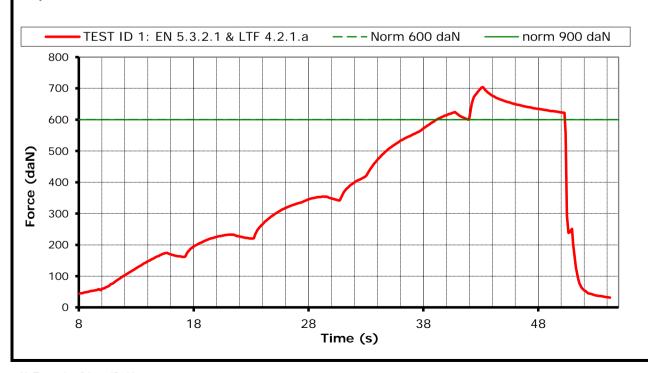
Min. duration [s]: 10 s

Results

Duration of maintained min. load [s]: 11.5+A1 s

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

Test result: Passed







Item: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

Standard EN 1651
Test standard §: 5.3.2.2

Test setup: Default flying position

Anchoring: Attachment points: Both main riser attachments (3, 4)

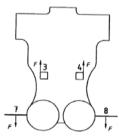
**Dummy:** Default, hip fixed (7, 8)

Required load in g: 15 g

Min load [N]: 15 000 N

Required test load in kg: 1800 kg

Min. duration [s]: 5s

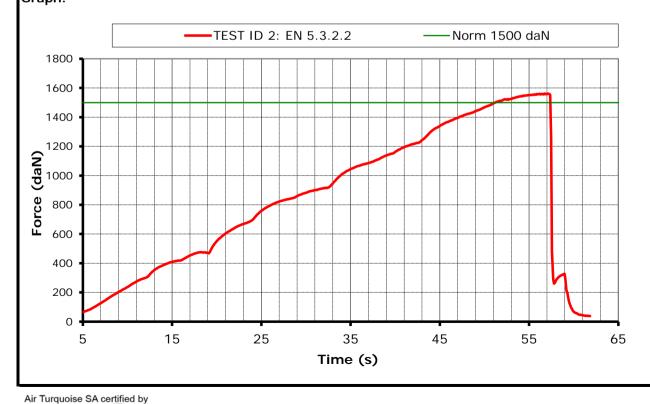


#### Results

Duration of maintained min. load [s]: 8.9 s

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

Test result: Passed







Item: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible: Alain Zoller
Temp. [°C] & Humidity: 21.5° 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

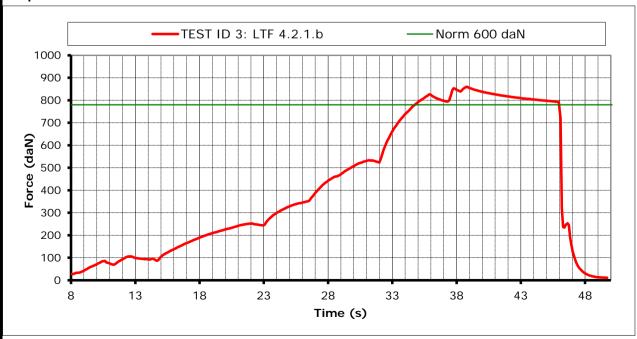
Min. duration [s]:



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

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

Test result: Passed







I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

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

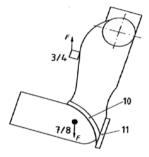
attached (3 and 4);

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

**Required load in g**: 15 g **Min load [N]**: 15 000 N

Required test load in kg: 1800 kg

Min. duration [s]: 5 s

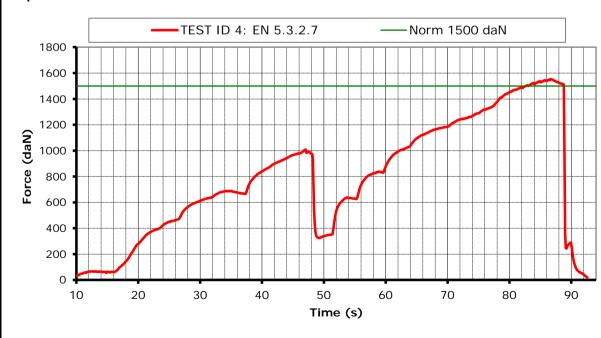


#### Results

Duration of maintained min. load [s]: 5.3 s

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

Test result: Passed







I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

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)

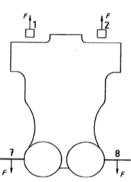
**Dummy:** Hip fixed (7, 8)

Required load in g: 9 g

Min load [N]: 9 000 N

Required test load in kg: 1080 kg

Min. duration [s]:

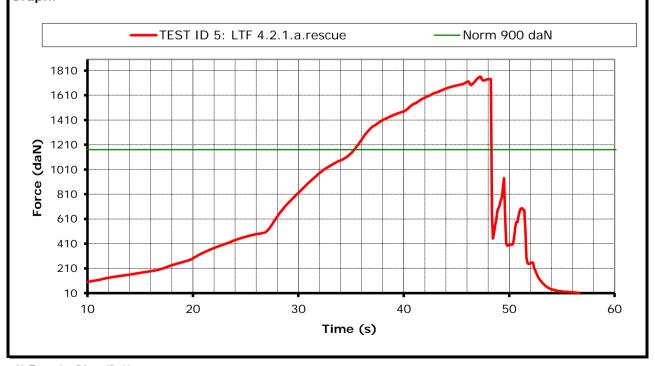


Results

Duration of maintained min. load [s]: 12.3

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

Test result: Passed







I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

Standard EN 1651

Test standard §: 5.3.2.4

Test setup: Rescue attachments

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

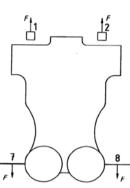
**Dummy:** Hip fixed (7, 8)

Required load in g: 15 g

Min load [N]: 15 000 N

Required test load in kg: 1800 kg

Min. duration [s]: 5 s



Results

Duration of maintained min. load [s]: 7.2 s

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

Test result: Passed





I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible: Alain Zoller
Temp. [°C] & Humidity: 21.5°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);

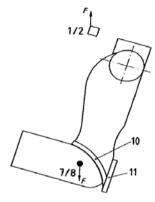
**Dummy:** Default, hip fixed (7, 8)

Required load in g: 6

Min load [N]: 6 000 N

Required test load in kg: 720 kg

Min. duration [s]:

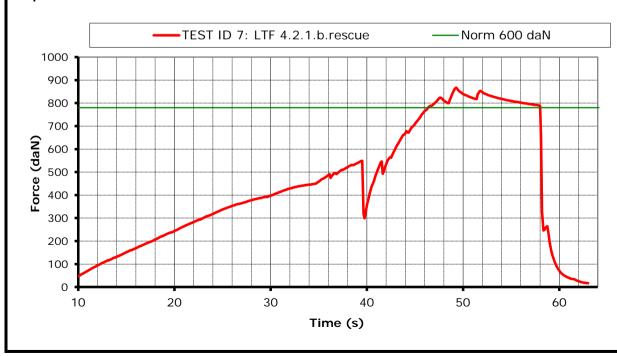


### Results

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

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

Test result: Passed







I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

Standard EN 1651
Test standard §: 5.3.2.3

**Test setup:** Only one riser attached

Anchoring: Attachment points: One main riser attachments (3)

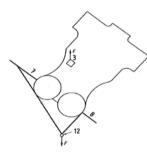
**Dummy:** Hip fixed (7, 8 -> 12)

Required load in g: 6 g

Min load [N]: 6 000 N

Required test load in kg: 720 kg

Min. duration [s]:



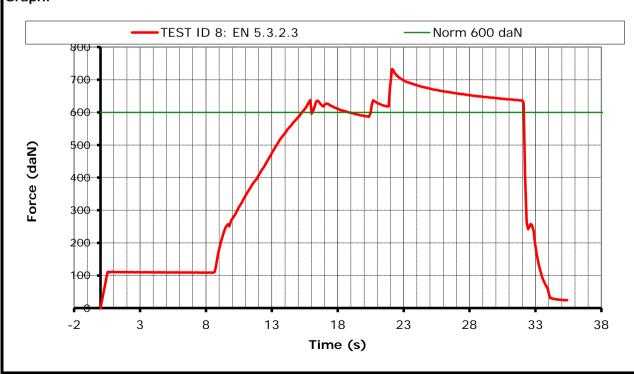
#### Results

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

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

Test result: Passed

Graph:



Air Turquoise SA certified by





I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

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 anchored at the head position

(9)

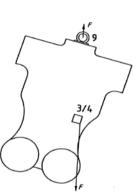
Required load in g: 4.5

Min load [N]: 4500 N

Required test load in kg: 540 kg

Min. duration [s]:

Dummy:



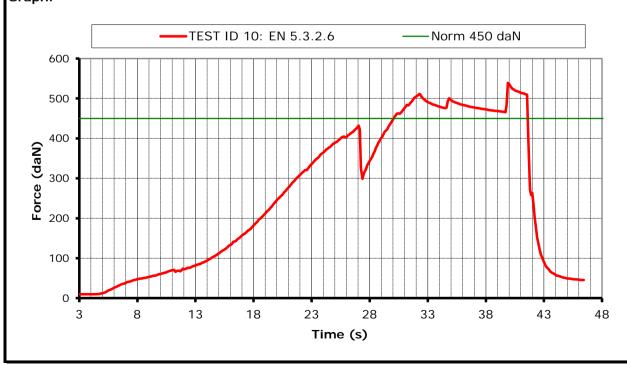
Results

Duration of maintained min. load [s]: 11.1 s

Any signs of structural failure after this test:

No visible failure

Test result: Passed





I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

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

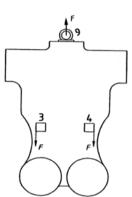
(9)

Required load in g: 6

Min load [N]: 6 000 N

Required test load in kg: 720 kg

Min. duration [s]:

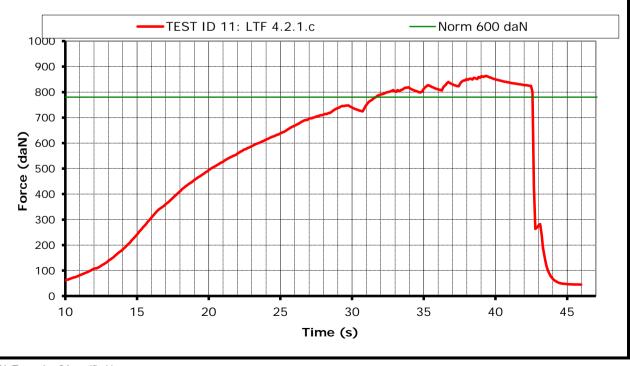


#### Results

Duration of maintained min. load [s]: 10.6 s

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

Test result: Passed







Item: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:
Alain Zoller
Temp. [°C] & Humidity:
21.5°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

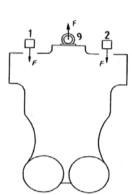
(9)

Required load in g: 6

Min load [N]: 6 000 N

Required test load in kg: 720 kg

Min. duration [s]:

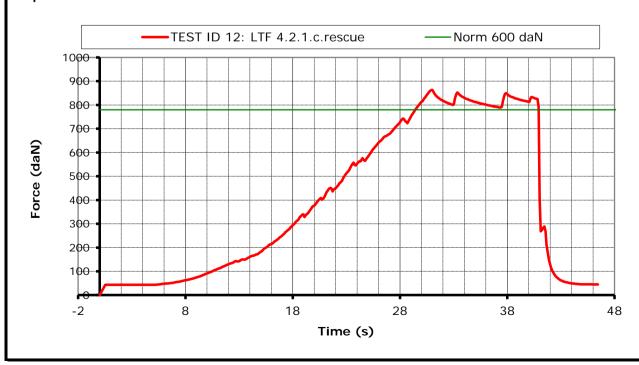


Results

Duration of maintained min. load [s]: 10.7 s

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

Test result: Passed





Protector shock test Test ID Protect

Item: Kuika Unit 4

Item: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible: Alain Zoller
Temp. [°C] & Humidity: 21.5°C; 31 %rel
Maximum certified pilot weight [kg]: 120 kg

Standard 2. DV LuftGerPV §1, Nr. 7 c

Test standard §: 5.1.1

Test setup: 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  $% \left( 1\right) =\left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left($ 

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)

Requirements: Minimun height: 1.65 m (between lowest point test dummy and impact surface)

Impact

requirements:

+50g as absolute maximum;

+38g during less than 7 msec;

+20g during less than 25 msec.

**Repetitions:** 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

 $\Delta < 20 \%$ ?

more than 20%

#### Results

## Shock test 1:

Impact at a height of 1.65m:

Impact duration of+ 38 g (if any):

Impact duration of +20 g (if any):

35.824

0

0.02

#### Shock test 2:

Impact at a height of 1.65m:

36.984

Impact duration of + 38 g (if any):

0

Impact duration of +20 g (if any):

0.018

Test Result:

**Passed** 

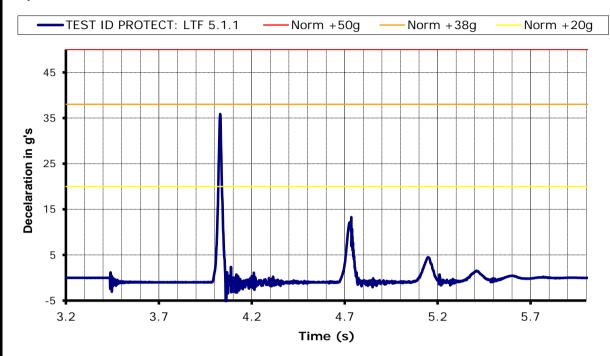


Tested in accordance with EN 1651:1999 and 2.DV LuftGerPV§1, Nr.7c

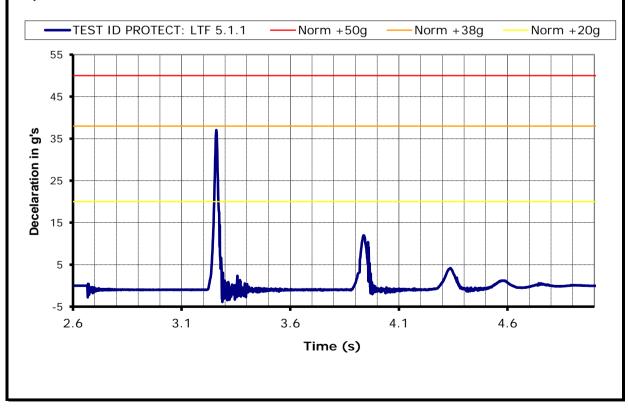








## Graph 2:





## Rescue deployment resistance test

**Test ID resc** 

I tem: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible: Alain Zoller
Temp. [°C] & Humidity: 21.5°C; 31 %rel
Maximum certified pilot weight [kg]: 120 kg

Standard 2. DV LuftGerPV §1, Nr. 7 c

Test standard §: 6.1.5

Test setup: The deployment of the rescue system has to be ensured in all

circumstances, especially with a damaged glider.

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.

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.

On the other hand inadvertent deployment has to be fairly remote. Therefore a shear link has to withstand a minimum load.

Requirements: Max force for single

hand deployment:

Min force to prevent unwanted opening:

approx. 70 N

approx. 20 N

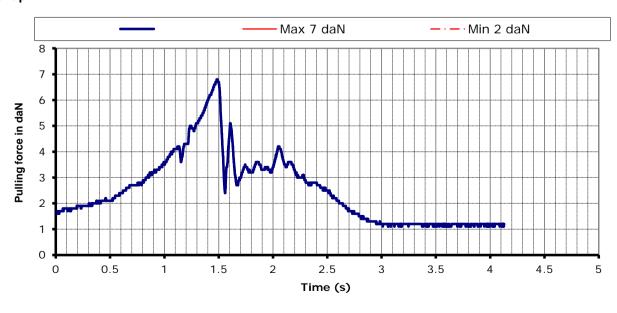
#### Results

Measured peak to peak required force for deployment [daN]:

6.8 daN

Comment:

**Passed** 





## Rescue deployment strap strength test

Test ID resc strap

Item: Kuik2 Unit 4

Manufacturer AIR MKG Kortel Design

Test place & date: Villeneuve January 04, 2013

Test responsible:

Temp. [°C] & Humidity:

Maximum certified pilot weight [kg]:

Alain Zoller

21.5° C; 31 %rel

120 kg

Standard EN 12491 & 2. DV LuftGerPV §1, Nr. 7 c

Test standard §: 5.3.2 (EN 12491) & 6.1.8 (LTF)

Test setup: 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.

The connection between handgrip and inner container has to have sufficient load capacity/structural strength in any situation

that may arise during normal operation.

In order to verify this, the connection is tested on its tensile

strength by a default tensile testing setup.

In addition to this the breaking resistance will also be

measured.

Requirements: Min. tensile strenght for

10 s:

700 N (= 70daN)

Results

Duration of maintained load [s]: 13 s

Breaking resistance [daN]: 272 daN

Comment: Passed

