

# PERFORMANCE DESCRIPTION HELICOPTER HELMET LH 350 TYPE

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## TEST RESULTS

**NOTICE:** All tests have been carried out on LH 350 type helmet.

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### STANDARDS and REFERENCES

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- **USAARL recommendations:** U.S. Army Aeromedical Research Laboratory – Fort Rucker, Alabama 36362-0577
- **MIL-DTL-87174/A (USAF):** (USA) Military Specification - Helmet, Flyer's HGU-55/P.
- **EN-1836:** (Europe-1997) Individual eye protection – Sun glasses and protection filters against solar radiations for general practice.
- **GAM-EG13 B :** French Military environmental standard.
- **EN-966:** (Europe-1996) Aerial sport helmet.
- **EN 136 :** (NF March 1998) Protection respirator device

<b>SHOCK ABSORPTION TESTS</b>
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▪ These tests were carried out following the protocol proposed by **MIL-DTL-87174/A (USAF)** which requires a blow of 47,5 J without redoubling. The maximum acceptable acceleration is 400G with acceleration greater than 200G not exceeding 3 ms and acceleration greater than 150G not exceeding 6 ms.

**The LH 350 helmet meets the requirements.**

▪ These tests were carried out following the protocol recommended by the U.S. Army Aeromedical Research Laboratory (**USAARL**) which requires a 7 point impacts from a high and with a velocity described in the table in paragraph *Shock absorption / section TEST PROTOCOL*.

The maximum acceptable acceleration is, depending on the impact point, 150G or 175G.

**The LH 350 helmet is at the level of the USAARL recommendations.**

## PERFORATION RESISTANCE TESTS

- These tests were carried out in accordance with the **MIL-DTL-87174/A** (USAF) standard with a requirement of 13,5 J and a validation condition which does not permit the point to come into contact with the head form.

**The LH 350 helmet meets the requirements.**

## TEAR TEST

- These tests were carried out according to the recommendations of U.S. Army Aeromedical Research Laboratory (**USAARL**).  
The shell alone is impacted with a 5kg guillotine (blade) at a velocity between 5,4 and 5,6m/s (73J to 78,4J).  
The length of the tearing should not exceed 5cm long.

**The LH 350 helmet is at the level of the USAARL recommendations.**

## VISORS QUALITIES

- The injected visors - validated with small outer clear and yellow screens and big inner green screen - meet or exceed the **EN 1836: 1997** standard for :
  - Optical powers: spherical power (optical class 1), astigmatic power (optical class 1), and prismatic power difference (optical class 1),
  - Transmittance: filter category 0 for the clear and yellow, filter category 3 for the green,
  - UV 400 protection: Transmittance (100 - 400nm) < 1 % for all the colours, and IR protection:  $T_{SIR} < 45$  % for the green and grey,
  - Requirements for road use and driving,
  - Scattered light,
  - Enhanced robustness,
  - Resistance to radiation,
  - Ignition,

- The injected visors – validated with worst configuration – meet or exceed the MIL-V-43511C standard for optical qualities:
  - Vertical and horizontal prismatic deviation,
  - Refractive power,
  - Luminous transmittance,
  - Optical distortion of critical areas,
  - Hase,
  - Ultraviolet transmittance,
  - Neutrality of the green and grey,
  - Chromaticity of the grey.

<b>ACOUSTIC INSULATION MEASUREMENT</b>
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- Evaluation of the Insertion Loss (IL) by the ISL (Institute of Saint Louis) of the hearing protection part of the LH 350 flight helmet for the helicopter pilots and crews:

<b>Frequency (Hz)</b>	63	125	250	500	1000	2000	4000	8000	16000
<b>IL (dB)</b>	4,3	8,3	11,1	24,7	27,8	28,3	53	52,1	36,5

<b>RESISTANCE TO PULLING OFF</b>
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- The tests were carried out in accordance with the **EN-966** standard.  
The helmet is subject to a traction force applied to the back of the dome in the helmet's vertical median plane and directed at an inclination of 45° to the top and to the front. The conditions for validation are that the helmet should not separate from the head form and that after the test the angle formed by the reference line at the top of the helmet and by the reference plane of the head form should not exceed 30°.

**The LH 350 helmet meets the requirements.**

## RETENTION SYSTEM RESISTANCE

- The tests were carried out in accordance with the **EN-966** standard. The conditions for validation are as follows. The dynamic stretching should not exceed 35 mm and the residual stretching should not be greater than 25 mm. After the test, the retention system should still enable the helmet to be removed from the dummy head by using opening device in the normal way.

**The LH 350 helmet meets the requirements.**

- The tests were carried out in accordance with recommendations of the U.S. Army Aeromedical Research Laboratory (**USAARL**). The conditions for validation are as follows. The chinstrap has to resist to a load of 1956N for minimum 30s and the residual stretching should not be greater than 25mm. The helmet should not turn out of the head form.

**The LH 350 helmet is at the level of the USAARL recommendations.**

## CLIMATIC TESTS

- Temperature variation test between the cold temperature (-40°C) and the hot temperature (+70°C) validates the proper operation of the helmet and its aspect after tests.

**The LH 350 helmet meets the requirements.**

## FIRE RESISTANCE

- This test was carried out based on the **EN136** standard by the MSA laboratory: exposure to the flames of 6 burners with a temperature between 800 and 900°C but during 9s statically (specific requirement).

**The LH 350 helmet meets the requirements.**

## TEST PROTOCOLS

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### SHOCK ABSORPTION

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Following protocols of:

- **MIL-DTL-87174/A** (USAF) standard.
- **USAARL recommendations:** U.S. Army Aeromedical Research Laboratory.

<i>Maximum acceleration at impact in G</i>				
<i>Impact point</i>	<i>Velocity at impact in m/s</i>		<i>High in m</i>	<i>maximum G</i>
	<i>minimum</i>	<i>maximum</i>		
<i>Crown</i>	<i>4,88</i>	<i>4,95</i>	<i>1,22</i>	<i>150</i>
<i>Front</i>	<i>5,98</i>	<i>6,05</i>	<i>1,83</i>	<i>175</i>
<i>Rear</i>	<i>5,98</i>	<i>6,05</i>	<i>1,83</i>	<i>175</i>
<i>Left side</i>	<i>5,98</i>	<i>6,05</i>	<i>1,83</i>	<i>175</i>
<i>Right side</i>	<i>5,98</i>	<i>6,05</i>	<i>1,83</i>	<i>175</i>
<i>Left acoustic cavity</i>	<i>5,98</i>	<i>6,05</i>	<i>1,83</i>	<i>150</i>
<i>Right acoustic cavity</i>	<i>5,98</i>	<i>6,05</i>	<i>1,83</i>	<i>150</i>

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### PERFORATION RESISTANCE

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Following protocol of **MIL-DTL-87174/A** (USAF) standard.

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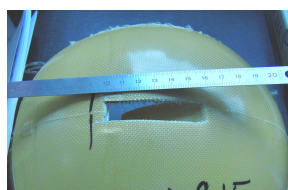
### TEAR TEST

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The protocol follows the recommendation of U.S. Army Aeromedical Research Laboratory (USAARL) : test done on the shell only (not on complete helmet).

A 5kg guillotine (blade) impacts the shell at 45° angle with a velocity between 5,4 and 5,6m/s.

The length of the tearing does not exceed 5cm long.



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## VISORS QUALITY

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Following protocol of **EN-1836: 1997** standard.

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## ACCOUSTIC INSULATION

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The **Insertion Loss (IL)** is defined as the difference between the levels measured of each third octave band when the ear is unprotected and the levels of each third octave band when the hearing protection is in place. The measurement of the IL has been done in a reverberant sound field, generated with pink noise from an analog generator. It has been presented with a global sound pressure level of 104 dB RMS.

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## RESISTANCE TO PULLING OFF

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Following protocol of **EN-966** standard.

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## RETENTION SYSTEM RESISTANCE

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Following protocols of:

- **EN-966** standard
- **USAARL recommendations**  
The chinstrap is pre-loaded to 111N. The load is then increased to 1956N and sustained at this level for 30s.  
No break is allowed and the residual stretching should not be greater than 25mm.

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## CLIMATIC TESTS

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Following protocol of **GAM-EG 13 B** fascicle 6 :

3 cycles:     \_ 3 hours at – 40°C  
                  \_ Variation of 3°C/ minute  
                  \_ 3 hours at + 70°C

The material should not be damaged: aspect, functions.

## **FIRE RESISTANCE**

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The protocol used the same material as the **EN136** standard.

The helmet is mounted on a head form fixed on a rotation axis. This head form turns above the 6 benzene burners with a velocity of  $(60\pm 5)$ mm. The head form with the helmet is submitted during 9s statically into the flame (specific requirement), 250mm higher than the mouth of the burners.

The helmet is tested on the front, on the rear and on the crown areas (MSA requirement).

Self-extinguishing should not happen after 5s after flame exposure.