

 **DANAK** Reg. no. 91

Report

FORCE-Dantest CERT



**Measurement of Sound Pressure Level
From Whistles for Lifejackets
According to EN 394
(Lifejackets and personal buoyancy aids
– Additional items)**

**National Molding Europe srl.
Cambiano, Italy**

3. March 2005

FORCE Technology

**DANAK no.: 91-152
Project no.: m1445-235450
Project leader: Peter Just**



FORCE Technology Norway AS
Claude Monets allé 5
1338 Sandvika, Norway
Tel. +47 64 00 35 00
Fax +47 64 00 35 01
e-mail info@forcetechnology.no
www.forcetechnology.no

FORCE Technology Sweden AB
Tallmätargatan 7
721 34 Västerås, Sweden
Tel. +46 (0)21 490 3000
Fax +46 (0)21 490 3001
e-mail info@forcetechnology.se
www.forcetechnology.se

FORCE Technology, Main office
Park Allé 345
2605 Brøndby, Denmark
Tel. +45 43 26 70 00
Fax +45 43 26 70 11
e-mail force@force.dk
www.force.dk



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1. Summary

FORCE Technology was requested by Mr. Attilio Lovato, "National Molding Europe" - Italy to measure and estimate the sound pressure levels for whistles for lifejackets produced by "Uraflex".

The measurements are carried out according to European Standard EN 394: "Lifejackets and personal buoyancy aids – Buoyancy items, part 4.3 – Whistles".

- The average A-weighted sound pressure level of $L_{pA,max}$ at the required distance of 5 m in all tested blows (wet or dry) reaches a 101 dB, (re 20 μ Pa) which is higher than the required minimum level.
- The average A-weighted sound pressure level of $L_{pA,max,PEAK}$ is 109 dB, (re 20 μ Pa).
- The frequency analysis shows that the lower dominating tone of 1963 Hz is within the required range of 1900 – 2100 Hz.

Thus, all tested whistles comply with the standard EN 394.

FORCE Technology

3. March 2005

Dimitar Ianev
M.Sc.Eng. - Acoustics

Peter Just
B.Sc.Eng. – Acoustics
Authorized to sign



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2. Introduction

FORCE Technology was requested by Mr. Attilio Lovato, "National Molding Europe" - Italy to measure and estimate the A-weighted sound pressure levels for whistles for lifejackets produced by "Uraflex" see fig.1.

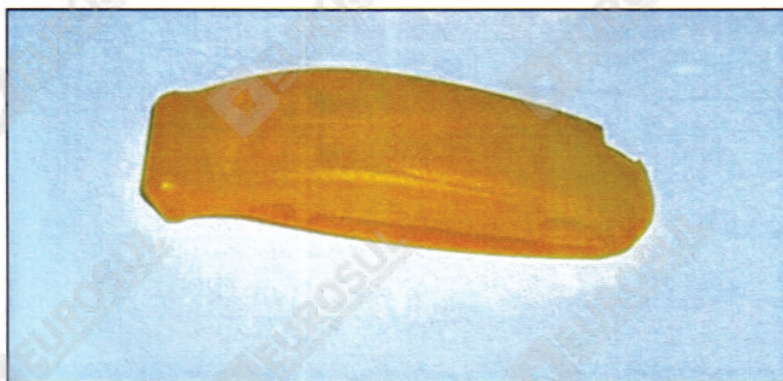


Fig. 1: The test object - whistle for lifejackets by "Uraflex"

3. Measurements

The measurements were carried out on 21st of February 2005 by FORCE Technology – Peter Just and Dimitar Ianev. The set up is an open site (parking lot) covered with asphalt (reflection surface) with no other sound reflecting surfaces in the close vicinity – see fig. 2.

During the measurements the weather was calm and dry. The wind was light and without measurable influence on the results. The air temperature was about 2°C.

The person blowing the whistle was a 28 years old man, 175 cm high and non-smoker, without any known pulmonary diseases. The whistle was held by one hand when blown – see fig. 2.



Fig. 2: The test subject and the set-up.

There were used 3 whistles and each one was tested 6 times in "dry" and "wet" condition. The distance to the measuring microphone was 5 m, as prescribed in the standard. The height of the microphone was 1,5 m over the surface (asphalt).

The measurement was done as A-weighted maximum values of $L_{pA,max}$ and $L_{pA,max,PEAK}$, (dB re 20 μ Pa) respectively. The integration time of the used equipment when $L_{pA,max}$ was measured, was set to "FAST".

4. Standards and equipment

The measurements and the set-up were done according to European Standard EN 394: "Lifejackets and personal buoyancy aids – Buoyancy items, part 4.3 – Whistles" – se appendix 1. A calibration signal was recorded on the tape before and after the measurements.

Instrument	Type	Serial no.	Last calibration date	Next calibration date
Microphone	B&K 4165	1594201	27.06.2004	27.06.2005
SPL meter	B&K 2231	1767963	11.08.2003	11.08.2005
Calibrator	B&K 4230	1410461	20.06.2004	20.06.2005
Tape recorder	HHB 1000	10679	17.11.2004	17.11.2006
Software	Multi	-	-	-

Table 1. Description of the used equipment

5. Results

During the test the A-weighted maximum values of $L_{pA,max}$ and $L_{pA,max,PEAK}$ (dB re 20 μ Pa) respectively were registered – see table 2 and 3.

Whistle no.						
	1		2		3	
Test	Dry	Wet	Dry	Wet	Dry	Wet
No.1	102	102	102	100	102	100
No.2	100	101	101	101	101	100
No.3	99	102	103	101	100	101
No.4	100	101	101	101	100	101
No.5	102	101	101	102	102	101
No.6	-	101	-	101	103	99
Average	101	101	102	101	101	100

Table 2. A-weighted values of $L_{pA,max}$ (dB re 20 μ Pa) and their average for all 3 whistles.

Whistle no.						
	1		2		3	
Test	Dry	Wet	Dry	Wet	Dry	Wet
No.1	109	108	109	108	110	108
No.2	108	109	109	110	110	109
No.3	109	111	110	110	109	110
No.4	108	109	110	110	109	109
No.5	109	109	109	111	111	109
No.6	-	109	-	109	111	109
Average	109	109	109	110	110	109

Table 3. A-weighted values of $L_{pA,max,PEAK}$ (dB re 20 μ Pa) and their average for all 3 whistles

The frequency analysis of a blow with any whistle (dry or wet) shows that there are 2 dominating frequencies (determinate by the volume of the 2 chambers), at approximately 1963 and 2613 Hz – se fig. 3. The lowest one is between the recommended limits of 1900 – 2100 Hz.

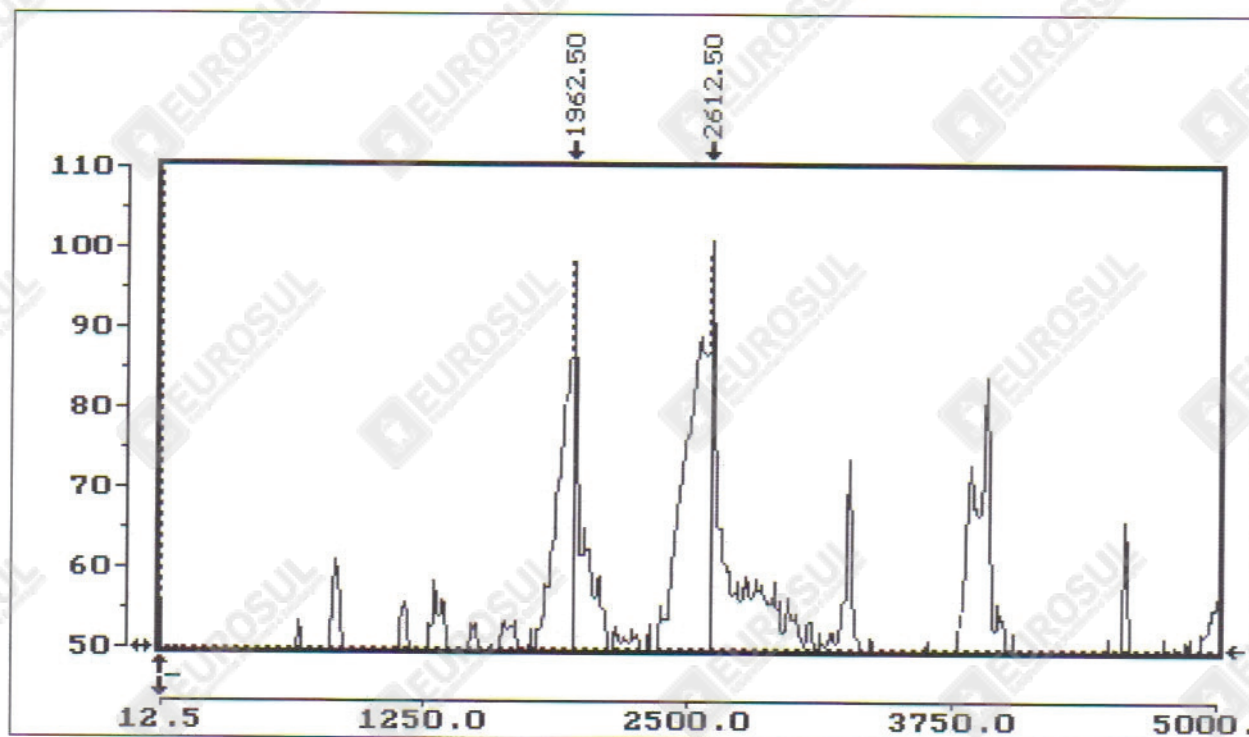


Fig. 3: FFT spectrum of a blow on whistle "Uraflex", below 5000 Hz with Hanning window and resolution of 18,75Hz. The lowest dominating fundamental frequency is at 1963 Hz.