

 **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  
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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  $\mu$ 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  $\mu$ Pa).
- The frequency analysis shows that the lower dominating tone of 1963 Hz is within the required range of 1900 – 2100 Hz.

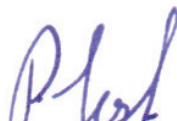
**Thus, all tested whistles comply with the standard EN 394.**

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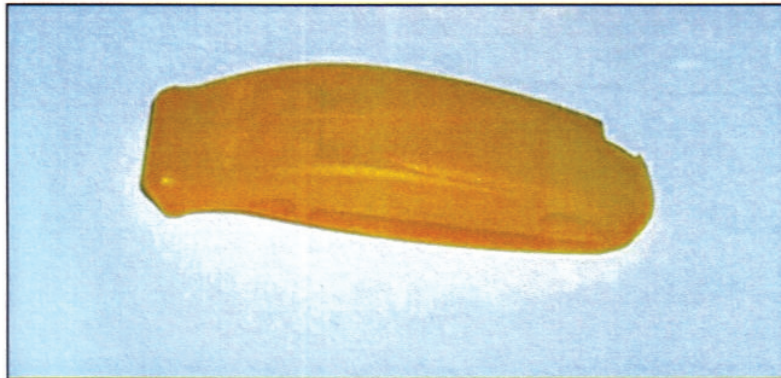
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M.Sc.Eng. - Acoustics



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

## 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 21<sup>st</sup> 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  $\mu$ 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  $\mu$ Pa) respectively were registered – see table 2 and 3.

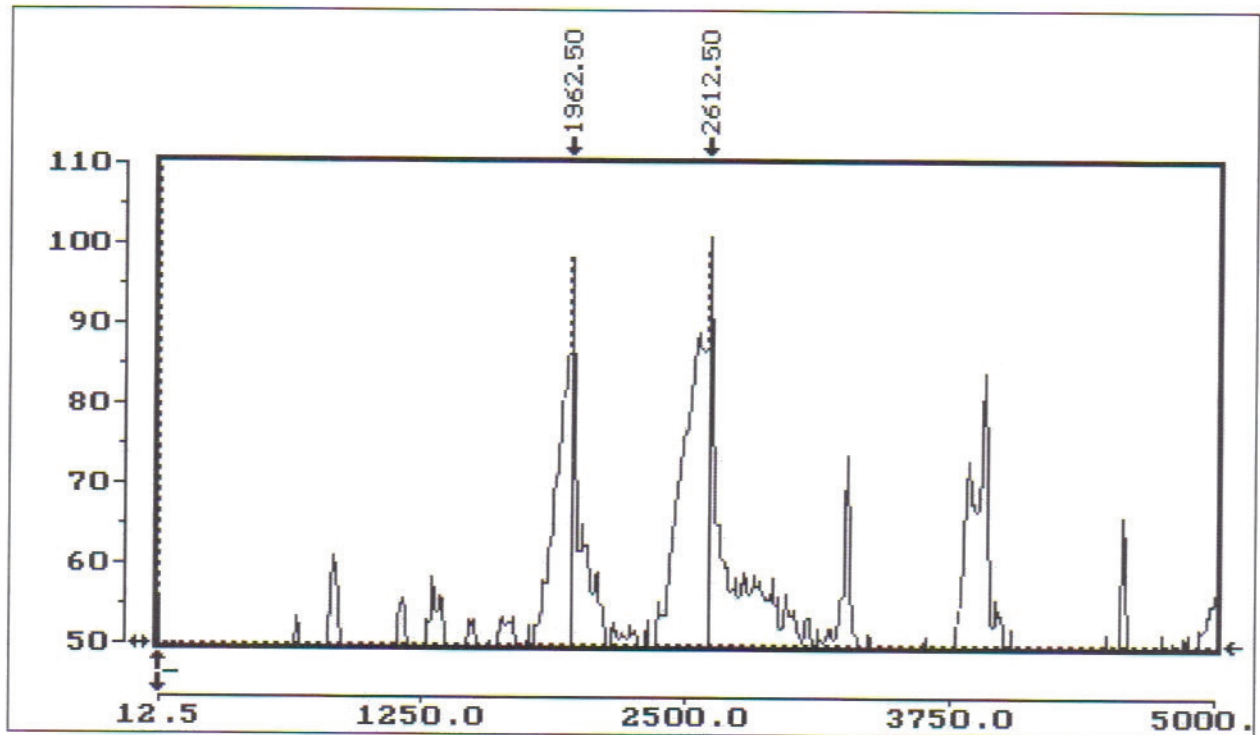
| Whistle no.    |            |            |            |            |            |            |  |
|----------------|------------|------------|------------|------------|------------|------------|--|
|                |            | 1          |            | 2          |            | 3          |  |
| 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         |  |
| <b>Average</b> | <b>101</b> | <b>101</b> | <b>102</b> | <b>101</b> | <b>101</b> | <b>100</b> |  |

**Table 2.** A-weighted values of  $L_{pA,max}$  (dB re 20  $\mu$ 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        |  |
| <b>Average</b> | <b>109</b> | <b>109</b> | <b>109</b> | <b>110</b> | <b>110</b> | <b>109</b> |  |

**Table 3.** A-weighted values of  $L_{pA,max,PEAK}$  (dB re 20  $\mu$ 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.