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## Test Report

### EN 352-1 : 2002

**Report no:** 05.05.02

**Client:** INSPEC Certification Services  
Upper Wingbury Courtyard  
Wingrave  
Aylesbury  
Buckinghamshire  
HP22 4LW

**Client order:** TS05/2672 Wingrave

**Order received:** 2 and 15 February 2005

**Manufacturer:** Vicsa Steelpro

**Model:** EM-20

**Date(s) tested:** 7 February to 4 May 2005

#### Conditions:

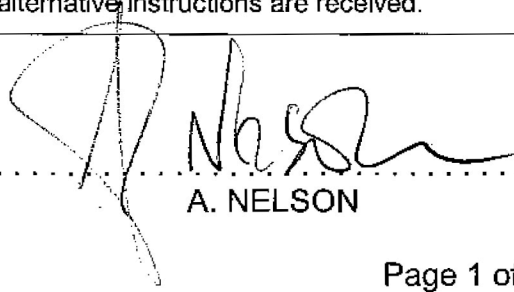
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Opinions, comments and interpretations expressed herein are outside the scope of UKAS accreditation are shown in italics in this report.

Tests marked ☒ are not included in the UKAS accreditation schedule for INSPEC.

Samples will be disposed of within one month of this report unless alternative instructions are received.

Checked:   
S. J. WRIGHT

Approved:   
A. NELSON

Issued: 16 May 2005

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**Testing requested**

Type of test: Mandatory

Stated product characteristics :		
Universal ear-muff		No
Wearing mode(s)		Over-the-head (O-T-H)
Size range		Large
Adjustable force		No
Replaceable cushions and liners		Yes
Fluid filled cushions		No

**Sample details**

Product		Submitter	Quantity	Received	INSPEC no. (Q100+)
EM-20 ear-muff		Manufacturer	10 pairs	19 Jan. 05	01 to 10
Replacement cushions					
User information			1	8 Feb. 05	
Revised user information			1		
Proposed packaging information			1	4 May 05	

Samples were selected by INSPEC from the submission detailed above.

**Procedures**

Testing was performed in accordance with EN 352-1 : 2002 (BS EN 352-1 : 2002), unless stated otherwise below.

- 4.3.9 The acoustic test fixture and test site used for the measurement of insertion loss were as described in ISO/TR 4869-3. A plane progressive wave was used.
- 4.3.12 Sound attenuation testing was performed at the University of Salford's School of Computing, Science and Engineering and was conducted by INSPEC Testing Services' personnel.

**Summary of assessment\***

Clause		Samples	Result
4.2.1	Materials	05 and 06	See "Result detail"
4.2.2	Construction		Pass
4.3.2	Sizing and adjustability	01 to 06	Pass
4.3.3	Cup rotation		Pass
4.3.4	Headband force		Pass
4.3.5	Cushion pressure		Pass
4.3.6	Resistance to damage when dropped		Pass
4.3.7	Resistance to damage when dropped at low temperature (optional)		
4.3.8	Change in headband force	01 to 06	Pass
4.3.9	Insertion loss	01 to 10	Pass
4.3.10	Resistance to leakage	05 and 06	NAs
4.3.11	Ignitability		Pass
4.3.12	Minimum attenuation ☒	01 to 04	Pass
5	Marking	05 and 06	Fail
6.1	Information supplied by the manufacturer: General		Pass
6.2	Information supplied by the manufacturer: Wearer information		Fail
6.3	Information supplied by the manufacturer: Additional information	-	NAs

**Key**

	Highlighting shows the clauses requested for each model. Any other clauses were not requested.
Pass	Requirement satisfied.
Ltd	Testing requested was insufficient to completely verify compliance with clause. See "Result detail".
Fail	Requirement not satisfied. See "Result detail".
NAs	Assessment requested but not carried out.
NAs	Requirement not applicable.
NT	Requested but not tested due to early termination following failure.
☒	These tests were not included in the UKAS accreditation schedule for INSPEC.

\* Assessment relates only to those items tested in this report.

**Result detail****4.2.1 Materials****4.2.1.1** Those parts of the ear-muff that come into contact with the skin were non-staining, soft and pliable.

Manufacturer to certify regarding likelihood of skin irritation, allergic reaction or any other adverse effect on health. **NAs**

**4.2.1.2** The assessed materials of the ear-muff were visibly unimpaired after cleaning and disinfection by the methods specified by the manufacturer.**4.3.4 Headband force**

Mode	Size	Force (N)						Mean
		01	02	03	04	05	06	
O-T-H	L	11.7	11.5	11.7	11.9	11.9	11.7	11.7

**4.3.5 Cushion pressure**

Mode	Size	Pressure (Pa)					
		01	02	03	04	05	06
O-T-H	L	3689	4194	3631	4261	3648	3967

**4.3.8 Change in headband force**

Headband force (following conditioning) and Change in headband force – Large size

Sample	01	02	03	04	05	06	Mean
Force (N)	11.1	11.5	11.4	11.6	11.4	11.4	11.4
Change (%)	-5.1	0	-2.6	-2.5	-4.2	-2.6	-

**4.3.9 Insertion loss**

Samples 01 to 10 were tested.

A summary of the insertion loss data for the individual samples, and the mean insertion loss with standard deviations at each frequency, are given in the Annex to this report.

**4.3.12 Minimum attenuation ☒**

Refer to the University of Salford's Test Report, No: HP/05/19, which is contained in the Annex to this report.

**Attenuation**

Frequency (Hz)	125	250	500	1000	2000	4000	8000
Measured attenuation ( $M_f - s_f$ ) (dB)	12.6	13.5	20.2	31.0	28.7	32.9	25.0
Limit (dB)	5	8	10	12	12	12	12

**5 Marking**

The samples were not marked.

**Fail**

The client submitted user information that referenced the intended product marking as follows -

- a) *Manufacturer identification* - "Unique Safety".
- b) *Model designation* - "EM-20".
- c) *Standard number* - "EN 352-1:2002".

- d) An indication of the required orientation of the cup was not provided.

**Fail**

**Note** -- the cups incorporated a headstrap retainer which, for universal ear-muffs, would indicate the correct orientation of the cups.

Durability of marking could not be assessed.

**NAs****6 Information supplied by the manufacturer**

The instructions to users have been assessed as detailed below, with reference only to the relevant requirements of the Standard.

INSPEC Testing Services has not assessed these instructions with respect to claims made by the manufacturer outside of these requirements, and therefore accepts no responsibility for the legitimacy of any such claims.

**6.1 General**

Information was provided in the English language.

**6.2 Wearer information**

Appropriate information was not provided with the samples.

**Fail**

One copy of proposed user information was provided for assessment.

- a) Standard number included.
- b) Manufacturer identification included.
- c) Model designation included.
- d) Not required.
- e) Headband and cushion material included.
- f) Fitting/adjustment instructions included.
- g) Size range included together with warning statements on both the user instructions and packaging.
- h) Attenuation values were included.
- i) Recommendations were included.
- j) Adhering to the recommendations warning was included.
- k) Cleaning and disinfection included.
- l) Manufacturer to certify that the specified agents are not known to be harmful to the wearer.
- m) Chemical substances statement included.
- n) Deterioration statement included.
- o) Fitting of hygiene covers statement was included.
- p) Storage conditions included.
- q) Replacement cushion information was included.
- r) Cushion replacement instructions included.
- s) Mass included.
- t) Address included.

**NAs****6.3 Additional information**

Manufacturer to certify.

**NAs****(4.1.3.6) Mass**

The mean mass of the ten samples was 189 grams.

## ANNEX

This Annex comprises five sections:-

1. University of Salford, School of Computing, Science and Engineering  
Report No: HP/05/19 - 4 pages.
2. H-M-L and SNR values calculated from the results detailed  
in the University's Report - 1 page.
3. Insertion loss results summary - 1 page.
4. Product photographs - 1 page.
5. Estimates of the uncertainty of measurement - 1 page.



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Report No: HP/05/19

Date: 20 April 2005

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**TEST REPORT**  
**SOUND ATTENUATION**  
**OF HEARING PROTECTORS**

**BS EN 24869-1 : 1993**

**ISO 4869-1 : 1990**

**CLIENT:**

INSPEC International Limited  
56 Leslie Hough Way  
Salford  
Greater Manchester  
M6 6AJ

**YOUR ORDER NO:**

2/050310-3

**TYPE OF HEARING PROTECTOR:**

Ear-muff

**MODEL:**

EM-20

**MANUFACTURER:**

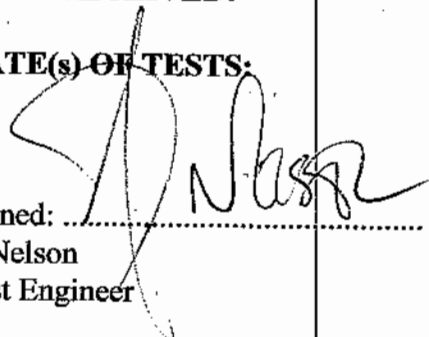
Unique Safety Equipment Co., Ltd.

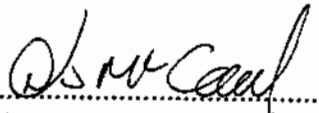
**DATE RECEIVED:**

15 March 2005

**DATE(s) OF TESTS:**

15, 18, 21 March & 1, 19 April 2005

Signed:   
A. Nelson  
Test Engineer

Approved:   
D.J. McCaul  
Laboratory Manager

## **INTRODUCTION:**

BS EN 24869-1 : ISO 4869-1 specifies a subjective method for measuring the attenuation of hearing protectors at the threshold of hearing. This method, including details of the test signals, site, equipment, subjects and procedure, was applied to the samples tested and the results are presented, as required by the Standard, on the following pages of this report.

For complete details of the method, please refer to BS EN 24869-1 : ISO 4869-1.

## **TEST SIGNALS, SITE AND EQUIPMENT:**

The facilities used for this test are located within the School of Computing, Science & Engineering at the University of Salford.

## **TEST SUBJECTS:**

The 16 test subjects comprised both males and females and covered a wide age range. All subjects were audiometrically screened in accordance with Clause 4.4.1 of BS EN 24869-1 prior to the test. They also satisfied the requirements of Clauses 4.4.2 and 4.4.3.

## **FITTING:**

Manufacturer's instructions were provided and were followed during the fitting of the hearing protectors. Guidance was also available from the test operator.

## **TEST PROCEDURE:**

Each of the four sample hearing protectors supplied by the client was tested on four test subjects. Each test subject's protected threshold was assessed once.

The procedures specified in Clause 4.5 were followed.

## **OBSERVATIONS :**

None.

## **RESULTS:**

See the attached sheet for the attenuation data for each individual subject.

The results here presented relate only to the items tested and described in this report.



Model EM-20

Mode tested O-T-H

Attenuation results (values in dB) See below

Test Reference No. HP/05/03/05

		Frequency (Hz)							
Subject	Sample	63	125	250	500	1000	2000	4000	8000
FW	01	9	12	14	26	42	34	36	30
RO	01	16	12	18	21	36	36	36	24
DW	01	14	15	19	26	36	39	38	28
JB	01	20	14	16	23	38	30	38	30
CW	02	16	17	15	23	36	32	40	24
ES	02	16	20	16	24	34	28	33	27
AO	02	19	15	15	26	40	30	30	26
DMM	02	22	18	20	24	36	32	36	31
AN	03	10	12	15	20	38	33	35	30
SVH	03	12	13	14	21	34	36	42	26
HK	03	22	19	20	23	38	28	39	27
JU	03	22	18	18	20	35	32	33	28
PK	04	20	16	10	18	30	30	32	24
CL	04	18	18	16	23	30	31	36	30
FB	04	18	16	18	24	32	27	39	32
MA	04	18	11	14	20	26	32	34	36
Mean									
Attenuation		17.0	15.4	16.1	22.6	35.1	31.9	36.1	28.3
Standard									
Deviation		4.1	2.8	2.6	2.4	4.1	3.2	3.2	3.3
Assumed									
Protection		12.9	12.6	13.5	20.2	31.0	28.7	32.9	25.0
SSV2									

Assumed Protection Value rounded to one decimal place.

**APPLICATION FORCE:**

The application force of each sample ear muff was measured as specified in Clause 4.6, at 145mm head width and 129mm head height. The measurements were recorded after a period of 2 minutes. The results are presented below:

Sample	Force (N)
01	10.1
02	10.6
03	10.7
04	10.7

**REPLACEABLE PARTS:**

1. Cushions

ATTENUATION VALUES CALCULATED FROM  
UNIVERSITY OF SALFORD,  
SCHOOL OF COMPUTING, SCIENCE AND ENGINEERING  
REPORT NO: HP/05/19

H	=	29
M	=	23
L	=	17
SNR	=	26

Sample Numbers: 01 to 10

Mode tested: Over-the-head

Insertion loss (IL)

Summary of results (dB)

Freq (Hz)	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000
01 Cup R	16.7	21.3	26.1	31.4	37.0	44.3	50.3	43.0	34.9	42.0	38.3	26.7	37.8	36.2	27.2	32.0
01 Cup L	17.1	21.4	26.3	30.6	37.0	45.2	48.2	40.4	38.4	41.4	38.1	33.7	39.5	35.4	27.2	32.8
02 Cup R	18.0	24.7	27.2	32.5	37.8	47.6	47.1	39.8	37.4	40.0	35.8	29.8	39.5	33.7	29.1	32.9
02 Cup L	16.5	20.5	26.6	30.3	37.7	47.7	47.5	43.3	35.0	40.3	35.6	26.3	38.9	36.7	28.7	32.6
03 Cup R	16.5	21.0	27.3	31.0	38.9	45.1	42.3	37.9	35.4	40.9	40.1	29.2	36.6	35.1	32.7	37.6
03 Cup L	16.7	20.1	26.3	31.4	37.2	45.1	42.3	40.2	35.4	39.6	39.3	32.1	38.2	35.7	29.2	34.2
04 Cup R	17.2	21.3	27.0	31.2	38.0	47.0	44.3	41.5	34.0	37.6	34.6	29.1	39.8	36.3	28.9	36.1
04 Cup L	14.8	19.0	24.2	28.0	31.1	33.0	28.3	33.5	33.7	36.0	32.8	31.9	35.0	33.2	30.7	32.7
05 Cup R	17.1	20.5	26.4	31.7	36.8	44.7	47.7	37.9	35.1	41.5	39.0	29.0	38.8	33.8	28.9	37.0
05 Cup L	18.0	21.9	26.9	31.0	36.6	45.0	47.9	43.8	34.1	42.3	35.5	31.0	38.8	34.0	29.8	33.7
06 Cup R	17.6	21.3	27.5	33.5	38.7	47.8	46.7	40.8	39.4	37.8	35.5	31.5	39.9	34.7	30.1	33.3
06 Cup L	14.4	20.5	26.2	31.8	37.0	45.3	51.2	39.2	39.9	42.2	40.0	25.0	38.4	37.0	30.7	35.4
07 Cup R	16.9	21.3	27.1	30.3	37.7	46.6	49.0	41.8	38.0	41.5	36.3	27.4	41.4	35.8	31.5	36.3
07 Cup L	18.7	22.1	27.3	30.1	36.5	44.4	51.8	48.4	29.7	40.0	35.3	29.7	39.0	37.5	27.0	35.2
08 Cup R	15.7	20.5	25.8	30.3	37.1	47.6	43.9	38.2	34.7	39.7	36.6	28.9	43.3	35.9	29.6	36.1
08 Cup L	16.8	20.8	26.5	30.8	36.5	43.8	51.5	44.2	33.3	39.0	36.5	27.0	39.2	35.7	27.7	36.1
09 Cup R	17.1	21.9	28.1	32.5	38.4	47.6	47.9	42.3	32.8	38.8	36.2	29.5	41.4	34.2	27.7	34.3
09 Cup L	17.3	21.1	26.8	31.5	37.2	47.4	48.3	41.0	39.9	38.8	42.6	29.6	41.1	37.7	29.9	33.8
10 Cup R	17.2	21.6	26.9	32.7	38.3	48.4	46.9	42.4	35.0	38.8	38.0	29.6	40.8	38.6	30.3	33.9
10 Cup L	18.2	22.3	28.2	29.4	37.8	48.6	47.3	45.2	30.9	37.9	37.1	29.4	41.3	37.2	29.4	36.9
Mean	16.9	21.1	26.7	31.1	37.2	45.6	46.5	41.2	35.4	39.8	37.2	29.3	39.4	35.7	29.3	34.6
Std. Dev.	1.0	0.8	0.9	1.2	1.6	3.3	5.1	3.2	2.8	1.7	2.3	2.1	1.9	1.5	1.5	1.7

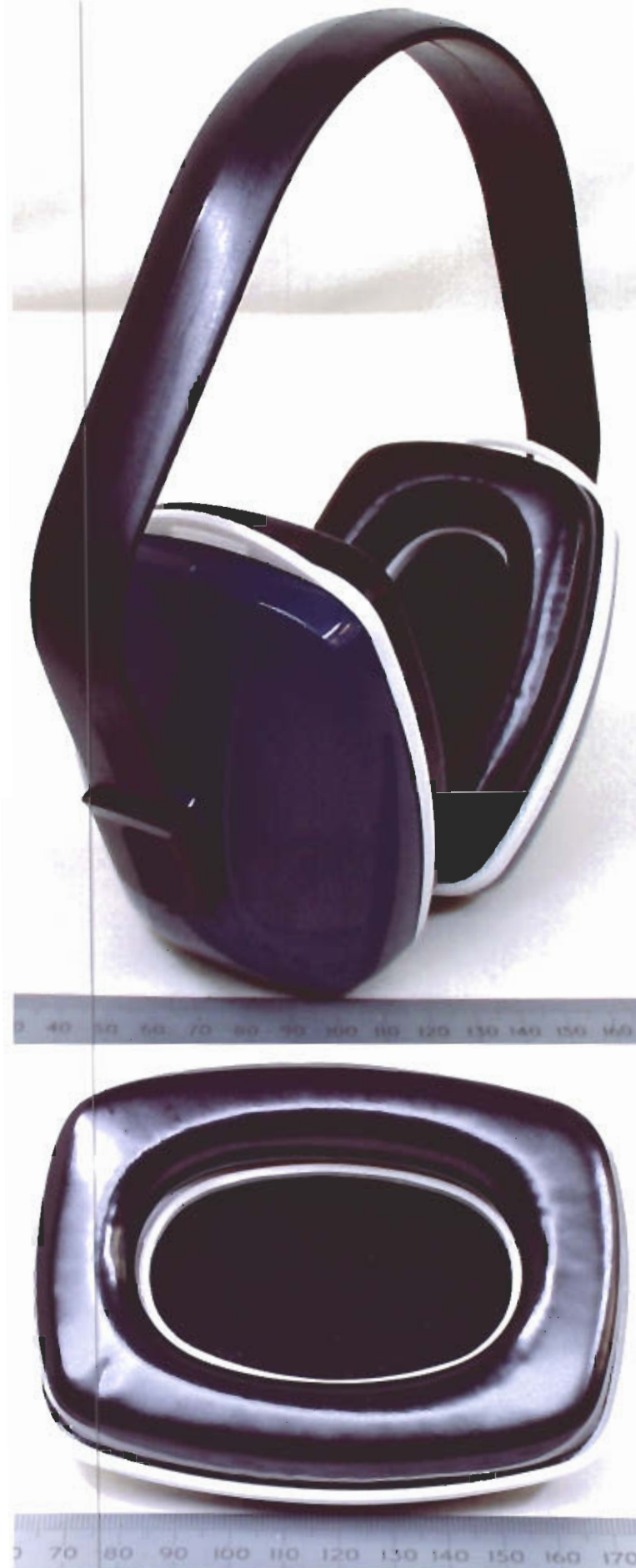
**EN 352-1 : 2002****Estimates of the uncertainty of measurement**

Clause	Test	Uncertainty
	Weighing	1.2%
4.3.4	Headband Force	0.8%
4.3.5	Cushion Pressure	1.3%
4.3.8	Change in headband force	1.1%
4.3.9	Insertion loss	4.1% (max: 250Hz)

Values expressed as a percentage (%) are relative.

It should be noted that the above values have not been taken into account when making assessment to the pass/fail criteria.

**Unique Safety Equipment Co., Ltd.'s models EM-20 ear muff**



**INSPEC Testing Services' sample number Q10010**

**7 February 2005**