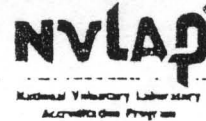




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April 29, 1999 Hearing Protective Device Test Report Number Q011A

3M OH & ESD
ATTN: Paul Martinson
3M Center Bldg. 260
St. Paul, MN 55144-1000

Attenuation measurements have been performed according to the American National Standards Institute (ANSI) Specifications, ANSI S3.19-1974, using the experimenter-fit protocol, on the combination of the 3M Model 1100 foam insert-type hearing protector formula modification 'A' (test ID Q011A). The specified threshold measurement data were obtained using ten normal-hearing listeners, six male and four female, with ages ranging from 19 to 45 years. These listeners were selected from a standby group of about 35 volunteers, mostly graduate students, who regularly serve as listeners for measurements of this kind.

The measurements were made in a room designed for this purpose. All acoustic characteristics of the room meet the requirements outlined in ANSI S3.19-1974. The ambient noise levels in this room are below the limits specified in ANSI S3.19-1974, and open ear thresholds are used on a continuing basis to monitor the background noise levels. An automatic recording attenuator was used to record both open and occluded ear thresholds.

The attached Tables show grand mean attenuation values in decibels (dB) for each test signal along with group attenuation values. Standard deviations (S.D.) for the 30 different attenuation determinations for each test signal are also given.

Michael & Associates is accredited by the National Institute of Standards and Technology (NIST) National Laboratory Accreditation Program (NVLAP) for tests performed according to ANSI S3.19-1974 and ANSI S12.6-1984. These accreditation criteria encompass the requirements of international standards ISO 9002:1994 (ANSI / ASQC Q92-1987), ISO / IEC Guide 25:1990, and ISO / IEC Guide 58:1993 as suppliers of test results. This report may only be reproduced or transmitted electronically in its entirety. This report shall not be used to claim product endorsement by NVLAP or by any agency of the U.S. Government.

Use these laboratory-derived attenuation data for comparison purposes only. The amount of protection afforded in field use is often significantly lower depending on how the protectors are fitted and worn.

Kevin Michael
Kevin Michael, Ph.D.
President

4/29/99
Date

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INDIVIDUAL AND SUMMARY ATTENUATION DATA FOR
HEARING PROTECTIVE DEVICES

TEST METHOD: ANSI S3.19-1974
MANUFACTURER: 3M
MODEL: 1100 PLUGS MOD. A

POSITION: INSERT
DATE: 4/27/99
TEST ID #: Q011A

FREQUENCY IN HERTZ

| SUBJECT | 125 | 250 | 500 | 1000 | 2000 | 3150 | 4000 | 6300 | 8000 |
|---------|-----|-----|-----|------|------|------|------|------|------|
| 1 | 28 | 35 | 35 | 36 | 39 | 40 | 34 | 39 | 45 |
| | 29 | 34 | 39 | 34 | 34 | 43 | 37 | 43 | 48 |
| | 31 | 36 | 40 | 32 | 36 | 42 | 38 | 44 | 49 |
| 2 | 26 | 33 | 35 | 39 | 34 | 44 | 43 | 43 | 44 |
| | 29 | 32 | 36 | 34 | 34 | 41 | 42 | 47 | 48 |
| | 33 | 33 | 33 | 35 | 36 | 45 | 47 | 50 | 49 |
| 3 | 41 | 41 | 46 | 45 | 41 | 37 | 45 | 41 | 41 |
| | 38 | 42 | 47 | 49 | 40 | 39 | 49 | 45 | 45 |
| | 37 | 42 | 47 | 45 | 41 | 44 | 44 | 41 | 42 |
| 4 | 29 | 29 | 32 | 31 | 33 | 42 | 45 | 48 | 39 |
| | 31 | 33 | 31 | 31 | 34 | 38 | 43 | 46 | 40 |
| | 28 | 33 | 31 | 31 | 34 | 37 | 43 | 46 | 38 |
| 5 | 37 | 44 | 45 | 40 | 44 | 49 | 48 | 56 | 52 |
| | 37 | 43 | 41 | 41 | 42 | 49 | 47 | 53 | 49 |
| | 34 | 42 | 40 | 42 | 42 | 48 | 44 | 52 | 47 |
| 6 | 33 | 37 | 37 | 32 | 37 | 45 | 46 | 47 | 42 |
| | 31 | 34 | 37 | 36 | 36 | 41 | 46 | 49 | 42 |
| | 35 | 32 | 34 | 38 | 36 | 39 | 40 | 46 | 39 |
| 7 | 44 | 47 | 49 | 44 | 36 | 45 | 44 | 48 | 48 |
| | 42 | 47 | 48 | 42 | 34 | 48 | 46 | 49 | 48 |
| | 41 | 46 | 47 | 43 | 36 | 43 | 42 | 48 | 47 |
| 8 | 39 | 41 | 42 | 42 | 42 | 45 | 44 | 42 | 45 |
| | 38 | 38 | 44 | 44 | 39 | 42 | 43 | 42 | 42 |
| | 37 | 36 | 44 | 40 | 37 | 38 | 41 | 42 | 44 |
| 9 | 28 | 38 | 43 | 39 | 38 | 37 | 40 | 41 | 43 |
| | 32 | 44 | 45 | 42 | 36 | 40 | 41 | 45 | 44 |
| | 35 | 45 | 42 | 37 | 36 | 37 | 42 | 47 | 45 |
| 10 | 31 | 31 | 35 | 36 | 36 | 44 | 42 | 44 | 45 |
| | 32 | 32 | 35 | 36 | 36 | 38 | 40 | 42 | 43 |
| | 32 | 32 | 34 | 38 | 31 | 36 | 37 | 41 | 45 |

MEANS
STD. DEV.

| | | | | | | | | |
|------|------|------|------|------|------|------|------|------|
| 33.9 | 37.7 | 39.8 | 38.5 | 37.0 | 41.9 | 42.7 | 45.5 | 44.6 |
| 4.7 | 5.5 | 5.6 | 4.8 | 3.1 | 3.8 | 3.4 | 4.0 | 3.4 |

NRR = 29 dB

Use these laboratory-derived data for comparison purposes only. The amount of protection afforded in field use is often significantly lower depending on how the protectors are fitted and worn.

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MANUFACTURER: 3M
 MODEL: 1100 PLUGS MOD. A
 POSITION: INSERT

DATE: 4/27/99
 TEST ID#: Q011A

Measurements were made according to American National Standards Institute Specifications ANSI S3.19-1974.

| Center Frequency in Hz | Mean Attenuation in dB | Group Attenuation in dB | Standard Deviation in dB |
|---------------------------|---------------------------|----------------------------|-----------------------------|
| 125 | 33.9 | 71.6 | 4.7 |
| 250 | 37.7 | | 5.5 |
| 500 | 39.8 | 199.9 | 5.6 |
| 1000 | 38.5 | | 4.8 |
| 2000 | 37.0 | | 3.1 |
| 3150 | 41.9 | | 3.8 |
| 4000 | 42.7 | 90.1 | 3.4 |
| 6300 | 45.5 | | 4.0 |
| 8000 | 44.6 | | 3.4 |

These data were obtained through measurements made at the laboratories of Michael & Associates, Inc., State College, PA, USA. Michael & Associates, Inc., is accredited to test to ANSI S3.19-1974 and ANSI S12.6-1984 by the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP).

Kevin L. Michael
 Kevin L. Michael, Ph.D.
 President

4/29/99
 Date