

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ADDENDUM 1 TO ISO RECOMMENDATION R 389-1964

STANDARD REFERENCE ZERO
FOR THE CALIBRATION OF PURE-TONE AUDIOMETERS

ADDITIONAL DATA
IN CONJUNCTION WITH THE 9-A COUPLER

1st EDITION

October 1970

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BRIEF HISTORY

The Addendum 1, *Additional data in conjunction with the 9-A coupler*, to ISO Recommendation R389-1964 *Standard reference zero for the calibration of pure-tone audiometers*, was established by Technical Committee ISO/TC 43, *Acoustics*, the Secretariat of which is held by the British Standards Institution (BSI).

This Addendum was the subject of Draft ISO Recommendation No. 1712, which was submitted to all ISO Member Bodies for enquiry in October 1968. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	India	South Africa, Rep. of
Austria	Iran	Spain
Belgium	Israel	Sweden
Brazil	Italy	Switzerland
Canada	Japan	Thailand
Czechoslovakia	Korea, Rep. of	Turkey
Finland	Netherlands	U.A.R.
France	New Zealand	United Kingdom
Germany	Norway	U.S.S.R.
Greece	Poland	

The following Member Bodies opposed the approval of the Draft :

Denmark
U.S.A.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as ADDENDUM 1 to ISO Recommendation R 389-1964.

FOREWORD

ISO Recommendation R 389-1964, *Standard reference zero for the calibration of pure-tone audiometers* expresses this reference zero in terms of earphone-coupler combinations that are national standards in various countries. In the case of audiometers fitted with earphones of other patterns it is suggested in Appendix A-2.2 that the corresponding reference levels be obtained by an "equal loudness" balance with one of the patterns considered in the ISO Recommendation. In certain cases the results of such comparisons are already available.

This Addendum to ISO Recommendation R 389-1964 is based on an assessment of the information available from the various standardizing laboratories responsible for audiometric standards and from scientific publications up to the end of June 1966. Some notes on the derivation of the reference levels are given in Appendix A (Addendum).

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STANDARD REFERENCE ZERO
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ADDITIONAL DATA
IN CONJUNCTION WITH THE 9-A COUPLER

1. SCOPE

This Addendum to ISO Recommendation R 389-1964 gives the corresponding reference equivalent threshold sound pressure levels for eleven audiometric earphones referred to a single type of coupler, namely, the National Bureau of Standards, Washington, USA, Type 9-A Coupler. Of these eleven earphones, five are those currently used as reference standards in a number of standardizing laboratories, and the remaining six are other types which have been used on commercial equipment and in audiometric laboratories.

2. EXPLANATION OF TERMS

See section 1 of ISO Recommendation R 389-1964, *Standard reference zero for the calibration of pure-tone audiometers*.

3. SPECIFICATION

The reference equivalent threshold sound pressure level for constant auditory threshold, is dependent on the pattern of earphone and on the pattern of artificial ear employed for its calibration. The recommended standard values for earphones on the 9-A coupler consistent with the ISO recommended standard reference zero for the calibration of pure-tone audiometers are given in the Table below.

The earphone should be applied to the 9-A coupler without acoustic leakage with a force of between 4 and 5 N, not including the weight of the earphone itself.

TABLE - Recommended reference equivalent threshold sound pressure levels in the 9-A coupler

Reference equivalent threshold sound pressure levels relative to $2 \times 10^{-5} \text{ N/m}^2$ ($2 \times 10^{-4} \text{ dyn/cm}^2$)	
Frequency	dB
Hz (c/s)	
125	48.5
250	28.0
500	12.0
1000	6.5
1500	-
2000	6.0
3000	8.0
4000	3.5
6000	14.5
8000	12.0
Pattern of earphone*	Audio 15
	47.5
	28.5
	14.5
	8.0
	7.5
	8.0
	6.0
	5.5
	8.0
	10.5
	13.5
	8.0
	14.5
	20.5
	51.0
	30.5
	13.5
	6.5
	7.0
	7.5
	8.0
	10.5
	13.5
	17.5
	20.5
	45.5
	24.5
	11.0
	8.0
	6.5
	8.0
	7.5
	9.0
	9.0
	8.0
	9.0
	17.0
	9.5
	705-A
	W.E.
	T.D.6
	Permoflux PDR 8 MX41/AR cushion
	Permoflux PDR 1 Maico "Dough-nut" cushion
	Permoflux PDR 1 ADC case
	Permoflux PDR 1 MX41/AR cushion
	Permoflux PDR 10 MX41/AR cushion
	Permoflux PDR 1 MX41/AR cushion
	Permoflux PDR 10 MX41/AR cushion
	Permoflux PDR 10 MX41/AR cushion**
	Telephonics TDH 39 MX41/AR cushion**

* For these data to be valid the earphone should be placed both on the ear and on the coupler with its earcushion, with one exception, when calibrating the Beyer DT 48 earphone on the 9-A coupler, the cushion should be removed and an adapter used, as described by H. Mraas and H.G. Diestel, in Acustica, 9, 61-64 (1959).

** See Appendix B.