Chapter 12
NBS 9A Coupler Type RA0075
12.1 Introduction

The G.R.A.S. Type RA0075 is a coupler for testing earphones. It uses a 1-inch condenser microphone with preamplifier.

The Type RA0075 complies with the requirements of:


It is also part of the Artificial Ear Type 43AF described in Chapter 6.

12.2 Components

The Type RA0075 comprises the following components:

- RA0075  NBS 9-A Coupler
- GR0572  Stop Collar (to maintain consistent coupler-volume)

The Type RA0075 is delivered as shown in Fig. 12.1. It uses a 1-inch pressure condenser microphone with preamplifier. An exploded view of its user-serviceable components together with a suitable preamplifier and adapter, and microphone is shown in Fig. 12.2.

12.2.1 Preamplifiers

It can use either a 1-inch preamplifier or ½-inch preamplifier with an adapter. The example in Fig. 12.2 shows:

- Type 26AK  G.R.A.S. ½-inch Preamplifier
- RA0073  G.R.A.S. ½ - to 1-inch Adapter

12.2.2 Microphones

It uses primarily a 1-inch pressure condenser microphone (of the type WS1P) with the normal protection grid replaced by a special coupler-adapter ring. The example in Fig. 12.2 shows the 64 AA configuration of:

- Type 40EN  G.R.A.S. 1-inch Pressure Condenser Microphone
  fitted with
- RA0074  Coupler-adapter ring

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Fig. 12.1  NBS 9A Coupler Type RA0075 as delivered
Use with ½-inch Microphone
The RA0075 can also be used with the G.R.A.S. ½-inch Microphone Type 40AG. In this case, the optional Adapter RA0077 should replace the protection grid of the Type 40AG. This combination will allow measurements to frequencies higher than those with a 1-inch microphone.

12.3 Characteristics

12.3.1 Main Purpose
ANSI specifies the NBS 9A Coupler for calibrating the earphones of audiometers. It has been chosen because of its simple construction and because the threshold transfer data\(^1\) of so many different earphones have already been determined.

12.3.2 Volume
It has a volume of about 5.6 cm\(^3\) which approximates the volume enclosed by a supra-aural earphone on a human ear.

12.3.3 Frequency
The output level of an earphone on a real ear measured below 500 Hz is lower because of leakage and flesh compliance. From 500 Hz to 1500 Hz, it is about the same for both ear and coupler.

Between 1500 Hz and 8000 Hz, the response of the coupler is a fair indication of the earphone’s performance. However this cannot necessarily be used as a precise indication of the relationship between coupler and ear because of complex interactions between the earphone and its acoustic load.

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\(^1\) Earphone coupler sound pressure level produced when earphone is excited by a voltage corresponding to hearing threshold. See also ANSI S3.6-1989 and ISO R 389-1985, Standard Reference Zero for the Calibration of Pure Tone Air Conduction Audiometers, and Addendum 1-1983 to ISO R389-1975.
**Fig. 12.2** Exploded view of user-servicable parts with a 1-inch microphone and a ½-inch preamplifier