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**Certified Ratings Program -
Product Rating Manual for
Acoustical Duct Silencers**



**AIR MOVEMENT AND CONTROL
ASSOCIATION INTERNATIONAL, INC.**

The International Authority on Air System Components

AMCA Publication 1011-03 (R2010)

Certified Ratings Program Product Rating Manual for Acoustical Duct Silencers



Air Movement and Control Association International, Inc.
30 W. University Drive
Arlington Heights, Illinois
60004

AMCA Publications

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- Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004-1893 U.S.A.
- AMCA International, Incorporated
c/o Federation of Environmental Trade Associations
2 Waltham Court, Milley Lane, Hare Hatch
Reading, Berkshire, United Kingdom
RG10 9TH
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Review Committee

Harve McFerron	AeroSonics, Inc.
Mike Beaver	Dynasonics
Jim Haller	JP Environmental
Chris Depies	Kinetics Noise Control, Inc. (Vibron Products Group)
Tom Paige	Kinetics Noise Control, Inc. (Vibron Products Group)
John Gierzak	McGill Airflow Corporation
Todd Talbott	McGill Airflow Corporation
Bob Bullock	Metal Form Manufacturing Co., Inc.
Jim Meats	Ruskin Company
Robert Van Becelaere	Ruskin Company
Roger Coday	Semco Incorporated
Charles Hoyle	Semco Incorporated
Joseph Brooks	AMCA International
Timothy Orris	AMCA International

The following individuals contributed to the revision of Publication 1011:

John Gierzak	McGill Airflow Corp.
Tom Paige	Kinetics Noise Control, Inc. (Vibron Products Group)
James Partain	P.C.I. Industries, Inc.
Robert Van Becelaere	Ruskin Company
Robert Spadafore	AMCA International

Related AMCA Documents

Related Standards	ASTM Standard E477-99	<i>Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers</i>
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Certified Ratings Program

Product Rating Manual for Acoustical Duct Silencers

1. Scope

1.1 Products

Products that can be licensed by AMCA International to bear the AMCA International Certified Ratings Seal are prefabricated acoustical duct silencers. Prefabricated acoustical duct silencers are defined as silencers that are constructed in advance, or manufactured in standard assemblies or sections ready for field installation.

The program applies to acoustical duct silencers within the scope of AMCA International for which performance rating catalogs are published and made available to the public. When performance ratings for both licensed and unlicensed products are contained in the same catalog, there must be a clear distinction made between licensed and unlicensed products, as required in Section 11 of AMCA International Publication 11, *Certified Ratings Program Operating Manual*.

When licensed products are used as component parts of a larger unit, the AMCA International Certified Ratings Seal shall not be applied to the complete unit. The seal can only be applied to the individual licensed components.

2. Definitions

AMCA International Certified Ratings Program for Acoustical Duct Silencers

A program for certifying a product's sound dynamic insertion loss, airflow generated noise and pressure drop performance ratings, as defined in this document, AMCA Publication 1011, *Certified Ratings Program – Acoustical Duct Silencers*, and ASTM Standard E-477, *Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers*.

Acoustical duct silencer

A device used to attenuate sound which is transmitted through airflow systems.

Acoustic media

The sound-absorbing material used inside a silencer (if any).

Acoustic media covering

The material that is used as a facing or bagging to protect the acoustic media from moisture absorption or air erosion.

Appurtenance

Any item in or on the inlet or discharge air-stream that affects the performance of the acoustical duct silencer. An appurtenance should be considered a part of the acoustical duct silencer if it is in place when the acoustical duct silencer is tested for performance rating, and the effect of the appurtenance is included in the cataloged performance rating. Examples of appurtenances may include bird-screens, airflow measurement stations, etc.

Attenuation method

The method by which a silencer reduces sound. The most common attenuation methods include dissipative or absorptive silencers, reactive silencers and active silencers.

Catalog

A printed document that contains data and performance ratings of a model, and that meets the other requirements of the Certified Ratings Program. It is also defined as an electronic media that provides performance data for a licensed product.

Catalog data

The performance rating of each length of the model in the specific format that is to be published (see Section 3.2.6).

Face area

The cross-sectional area of the inlet or outlet of the silencer.

Free area ratio

The ratio of the passage area divided by the face area of a silencer measured at the point along the silencer length where the ratio is the lowest.

Geometry

The basic geometric shape of a silencer. Common terms used to describe silencer geometry include rectangular, circular, round, tubular, elbow, transitional, diffuser and conical.

Length

The overall length of a silencer, as shown in Section 6, Figures 1 through 4.

License

A legal contract between AMCA International and a person, firm or corporation, which authorizes participation in the AMCA International Certified Rating Seal to products listed in the appendices of the license. A separate Appendix to the License will be issued for each licensed model.

Model

A silencer that has a specific attenuation method, geometry, free area ratio and acoustic media covering (if any).

Model line

A group of silencers of the same model having various lengths and sizes.

Passage area

The open or unobstructed cross-sectional area of a silencer.

Performance rating

A statement of the acoustical dynamic insertion loss, airflow generated noise, and pressure drop as a function of airflow obtained in accordance with ASTM E477-99, *Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers*.

Size

The cross-sectional dimensions for a silencer. For rectangular silencers, size refers to width and height. For circular silencers, size refers to the inner diameter.

3. Model Licensing Procedure

3.1 General procedure

In general, the steps shown in Table 1 will need to be completed in order for a model to become licensed to bear the AMCA International Certified Ratings Seal.

3.2 Detailed procedure

The requirements for each of these steps is covered in detail below.

3.2.1 Product testing

For each silencer model to be licensed, at least one size of each cataloged length shall be tested. The first size to be tested shall be 610 mm x 610 mm (24 in. x 24 in.) for rectangular silencers, and 610 mm (24 in.) inlet diameter for circular or round silencers. Other sizes may be tested based on the capabilities of the testing laboratory. On each catalog sheet containing data for a licensed model, it shall be clearly stated which size(s) were tested.

3.2.2 Application for a model license

Application for obtaining a license for a model is made by completing form CRP-10 (Application for Certified Ratings Seal). The application is to be completed and sent to AMCA International along with the data required in Section 3.2.3. Each model will require a separate application. The application will be reviewed by the AMCA International staff and the applicant notified, if necessary, of any change or further information required to comply with the Certified Ratings Program.

Table 1

Summary of Licensing Procedure

Section	Description	Responsibility
3.2.1	Test the product(s) to be licensed	Applicant
3.2.2	Apply for a model license	Applicant
3.2.3	Submit the required data	Applicant
3.2.4	Staff review of submitted data	AMCA International
3.2.5	Conduct the pre-certification check test	AMCA International
3.2.6	Submit proposed catalog data	Applicant
3.2.7	Staff review of proposed catalog data	AMCA International
3.2.8	Issue of notice of acceptability for license	AMCA International
3.2.9	Submit proof copy of catalog	Applicant
3.2.10	Staff review of catalog proof copy	AMCA International
3.2.11	Submit finished catalog	Applicant
3.2.12	Staff review of published catalog and issuance of license	AMCA International

3.2.3 Data submittal requirements

AMCA International staff shall accept for review only test data obtained in an AMCA International Accredited Laboratory or the AMCA International Laboratory in accordance with one or more of the test standards recognized in AMCA International Publication 111, *Laboratory Accreditation Program*.

The following data shall be submitted with the CRP-10 application form:

1. Results of the test(s) as required per ASTM E 477-99.
2. Dimensional drawings of each tested length of the model, giving the dimensions specified in Section 6, Figures 1 through 4, for the model being submitted.

3.2.4 AMCA International staff review of test data

3.2.4.1

The data submitted in compliance with Section 3.2.3 will be reviewed by the AMCA International staff. They will notify the applicant if any changes or further information is necessary to comply with the requirements of the Certified Ratings Program.

3.2.4.2

When the data submitted in accordance with Section 3.2.3 have been found to comply with the requirements of the Certified Ratings Program, the AMCA International staff will so advise the applicant and request the submittal of one of the lengths of the model line for a precertification test in the AMCA International Laboratory. For each model line, one length out of every four shall be tested for all of the performance data to be certified. The choice of the unit submitted shall be made by AMCA International staff. The requirement for a precertification test will be waived if all of the tests on the model were made in the AMCA International Laboratory.

3.2.5 Precertification check test

3.2.5.1

The purpose of the precertification check test is to establish that the designated product will, in fact, perform as shown by the applicant's test results. It also may provide for verification of the applicant's laboratory capability, as required by AMCA International Publication 111, *Laboratory Accreditation Program*.

3.2.5.2

The selected silencer will be tested by AMCA International in accordance with ASTM E477-99, Section 6, and the instructions of the applicant. If the unit test results are within the check test performance tolerances specified in Section 6, the applicant's test data will be deemed to be acceptable.

If the unit test results are not within the check test performance tolerance specified in Section 6, the applicant's test data will be deemed unacceptable.

AMCA International staff shall advise the applicant in writing of the results of the precertification test. If the test unit fails the precertification check test, the applicant may correct the test unit, or use the AMCA International test results for rating the product. Where the manufacturer intends to catalog multiple lengths in a model line, AMCA International staff will request submittal of another of the applicant's test lengths for an additional precertification test. The procedure will be repeated if the second precertification test fails.

The applicant may use the appeal procedure defined in Section 16 of AMCA International Publication 11, *Certified Ratings Program Operating Manual*, if there is a disagreement with the administration of this section by the AMCA International staff.

3.2.6 Submittal of proposed catalog data

The applicant shall submit the proposed catalog data in the form intended for publication (tabular, curves, electronic media, etc.). The prepared catalog data may be submitted with the test data submitted in Section 3.2.3, or may be submitted after the precertification test has been completed. The proposed catalog data may be in the form of the proof copy of the proposed catalog.

3.2.7 AMCA International staff review of proposed catalog data

After the precertification test has been completed satisfactorily, AMCA International staff shall review the proposed catalog data to verify that it is in agreement with the test data and will advise the applicant of any areas in question, or disagreement with the test data, which then must be corrected by the applicant before a notice of acceptability can be issued.

3.2.8 Issuance of notice of acceptability for license

3.2.8.1

When the prepared catalog data has been verified as correct by AMCA International staff, AMCA International staff will issue a "Notice of Acceptability for License".

3.2.8.2

The "Notice of Acceptability for License" shall be revoked if the requirements of Sections 3.2.9 through 3.2.12 are not completed within one year of issuance of the "Notice."

Acceptability for licensing can be reinstated by resubmitting an application for license per Section 3.2.2.

3.2.9 Submittal of proof copy of the catalog

A proof copy of the catalog and/or electronic media shall be submitted to AMCA International staff for both verification of the performance to the requirements and use of the AMCA International Certified Ratings Seal in catalogs, in accordance with Sections 10 and 11 of AMCA International Publication 11, *Certified Ratings Program Operating Manual*.

3.2.10 AMCA International staff review of proof copy of the catalog

The AMCA International staff shall review the proof copy of the catalog and verify that the catalog data is correct and that the catalog conforms to the use of the AMCA International Certified Ratings Seal in accordance with Sections 10 and 11 of AMCA International Publication 11, *Certified Ratings Program Operating Manual*. AMCA International staff shall advise the applicant if there are any changes or corrections required to meet the requirements of this program. When all requirements have been met, AMCA International staff shall notify the applicant that the proof copy of the catalog satisfies the requirements of this program. AMCA International staff shall retain a duplicate of the proof copy of the catalog as part of the license file on the product.

3.2.11 Submit finished catalog

The applicant shall submit to AMCA International staff two copies of the catalog and/or electronic media immediately prior to being released to the public in the form to be made available to the public.

3.2.12 AMCA International staff review of published catalog and issuance of the license appendix

3.2.12.1

AMCA International staff shall review the finished catalog and, if it is unchanged from the proof copy in any way relative to the requirements of this program, AMCA International staff shall immediately issue an Appendix to the License Agreement for the model.

3.2.12.2

If the catalog does not meet the requirements of the program, the applicant shall be notified immediately of the discrepancy, advised not to distribute the catalog to the public, and no Appendix to the License Agreement shall be issued. The applicant shall correct the discrepancy and resubmit the catalog to AMCA International staff.

3.2.12.3

Model numbers and related catalog identification shall be included in the Appendix to the License Agreement and in subsequent editions of the AMCA International Directory of Licensed Products, located on AMCA's website (<http://www.amca.org/certified/search/company.aspx>).

4. Design Changes

A product will be considered to be a new model if a change is made to any of the following design details which results in a change in acoustical or aerodynamic performance greater than the specified check test tolerances:

- Shape of baffle head or tail
- Physical properties of sound absorbing material (type, density, compression)
- Physical properties of perforated liner material (open area, hole diameter, hole spacing)
- Gauge of materials used for manufacturing
- Type of materials used for manufacturing

5. Check Tests

5.1 General

Licensed products are subject to periodic check tests as defined in Sections 9.3 to 9.9 of AMCA International Publication 11, *Certified Ratings Program Operating Manual*. When products are check tested, the check test performance shall be within the tolerances as defined below, when compared to the catalog data published by the manufacturer.

5.2 Check test tolerances

5.2.1 Dynamic insertion loss tolerance

The dynamic insertion loss rating of the check test unit shall not be less than the published ratings by more than 6 dB in the 63 Hz octave band or 3 dB in any other band for which data is reported.

5.2.2 Airflow generated noise tolerance

The airflow generated noise rating of the check test unit shall not exceed the published ratings by more than 12 dB in the 63 Hz octave band or 6 dB in any other band for which data is reported.

5.2.3 Pressure drop tolerance

The pressure drop rating of the check test unit at any rated airflow shall not be more than 120 percent of the published ratings.

6. Guidelines for Developing Acoustical Duct Silencer Ratings

6.1 Published ratings

6.1.1 Performance ratings

Published data of an AMCA International licensed product under this Certified Ratings Program shall include dynamic insertion loss and airflow generated noise by octave bands with eight octave bands having center frequencies of 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz, and 8000 Hz reported.

The published data shall also include a record of the pressure drop for those flows which the dynamic insertion loss and airflow generated noise is published.

6.1.2 Statement required adjacent to the seal

In catalogs containing ratings of licensed products, the following statement shall be printed prominently and immediately adjacent to the reproduction of the AMCA Certified Ratings seal:

“(Licensee’s name) certifies that the silencer (s) shown herein is (or are) licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 1011 and comply with the requirements of the AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to dynamic insertion loss, airflow generated noise, and pressure drop.”

6.1.3 Size of unit tested statement

The actual size and length of the model tested shall be listed adjacent to the performance data.

6.2 Dimensional requirements

The manufacturer shall submit with the test data dimensional information for the test unit(s).

The dimensional data shall be in sufficient detail to allow AMCA International staff to verify that the precertification test unit and the check test unit are physically in accordance with the dimensional data submitted.

Figures 1 through 4 are intended to provide guidelines for the minimum dimensional information that is required. The illustrations are not intended to represent all possible types and configurations of acoustical duct silencers.

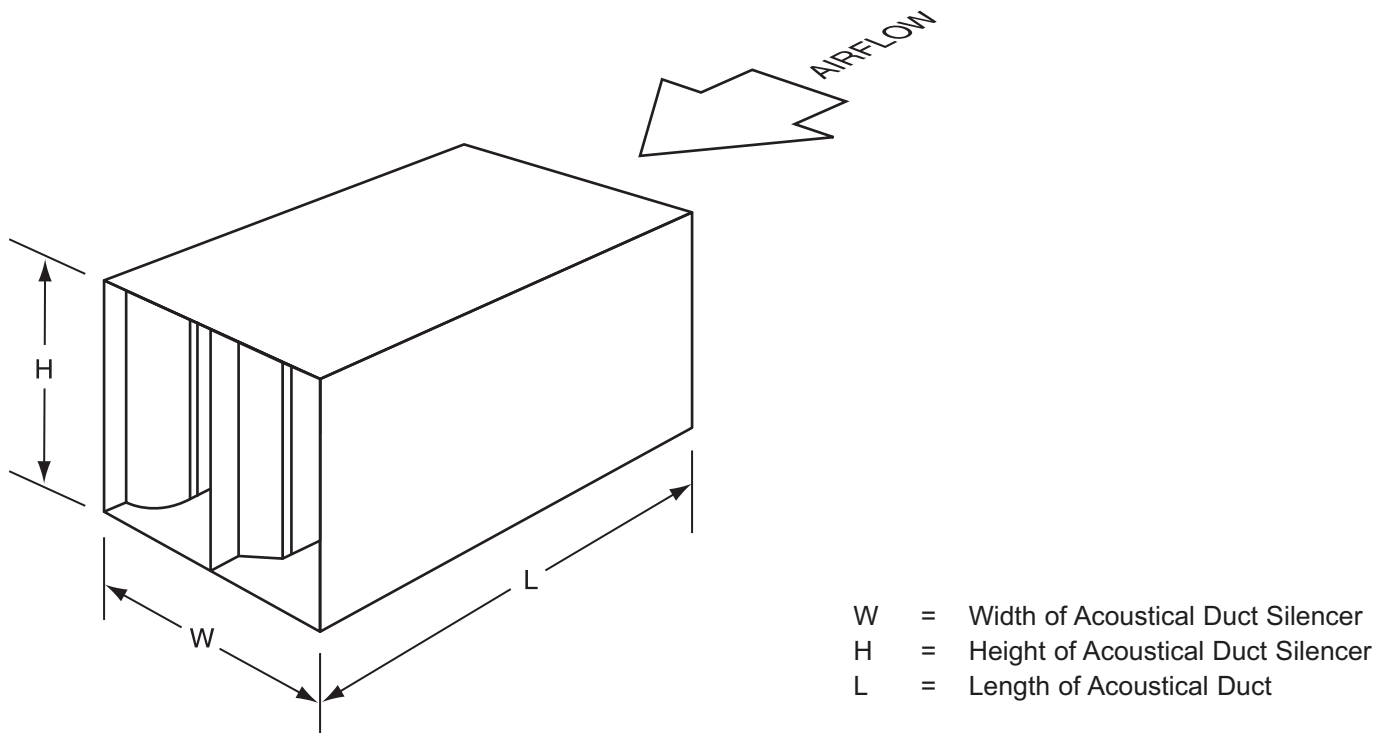
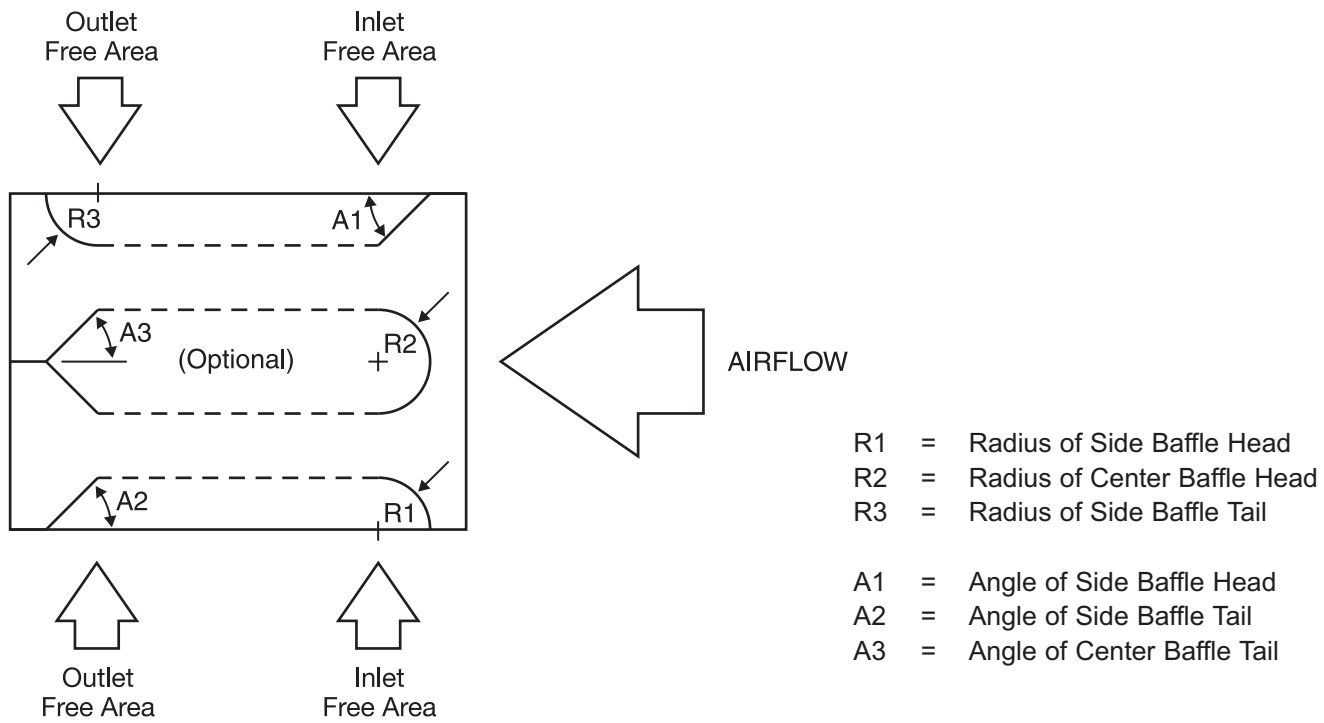


Figure 1
Rectangular Duct Silencer Dimensions

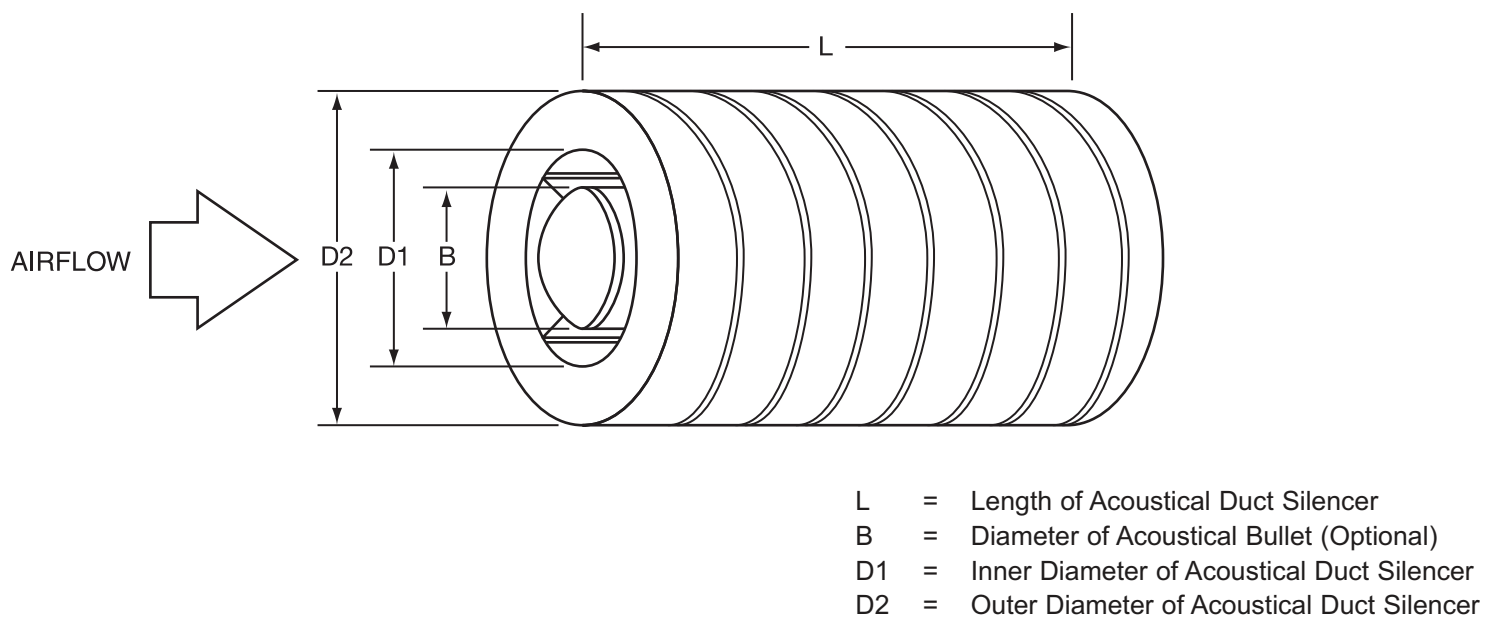
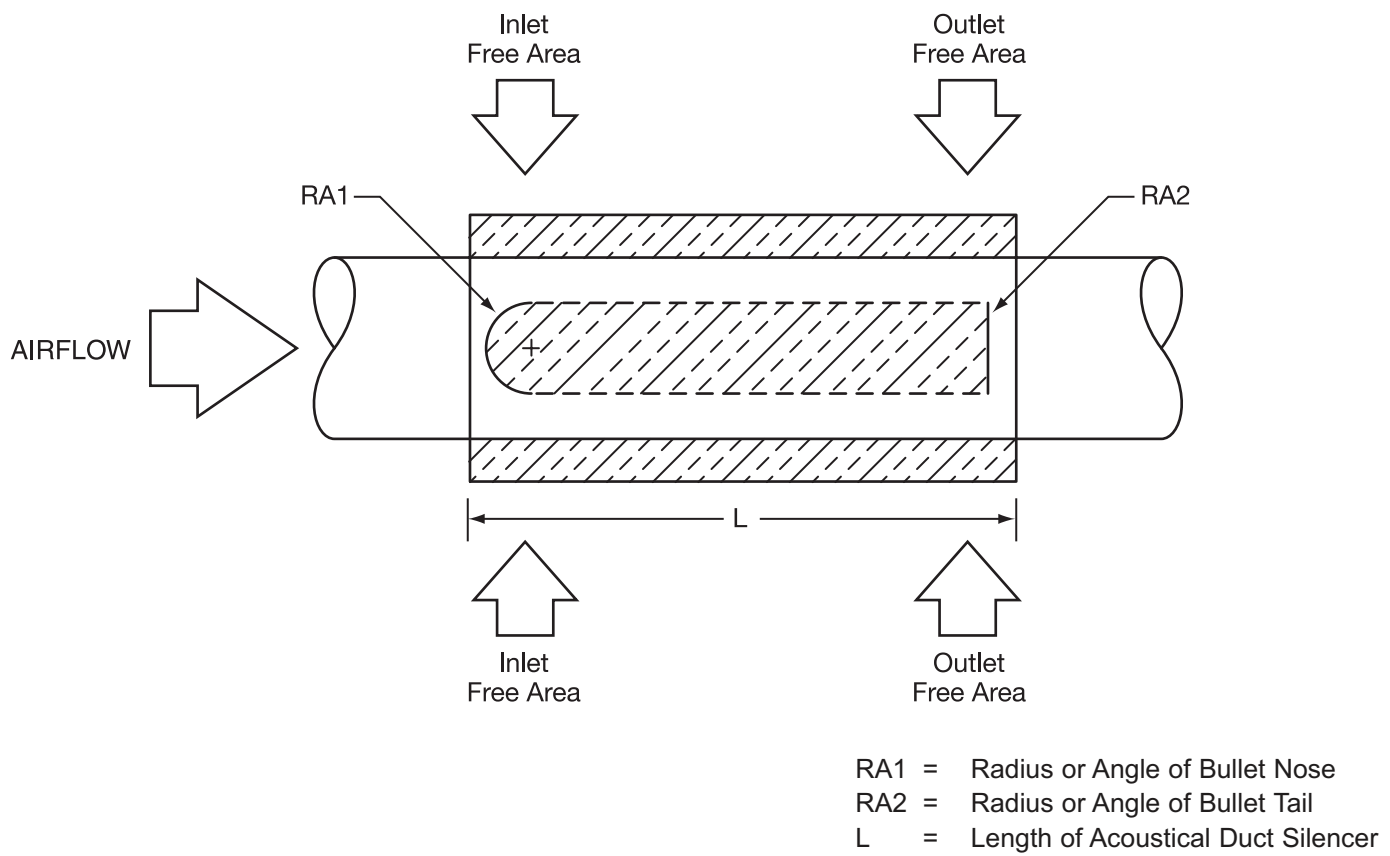


Figure 2
Circular Duct Silencer with Circular Casing Dimensions

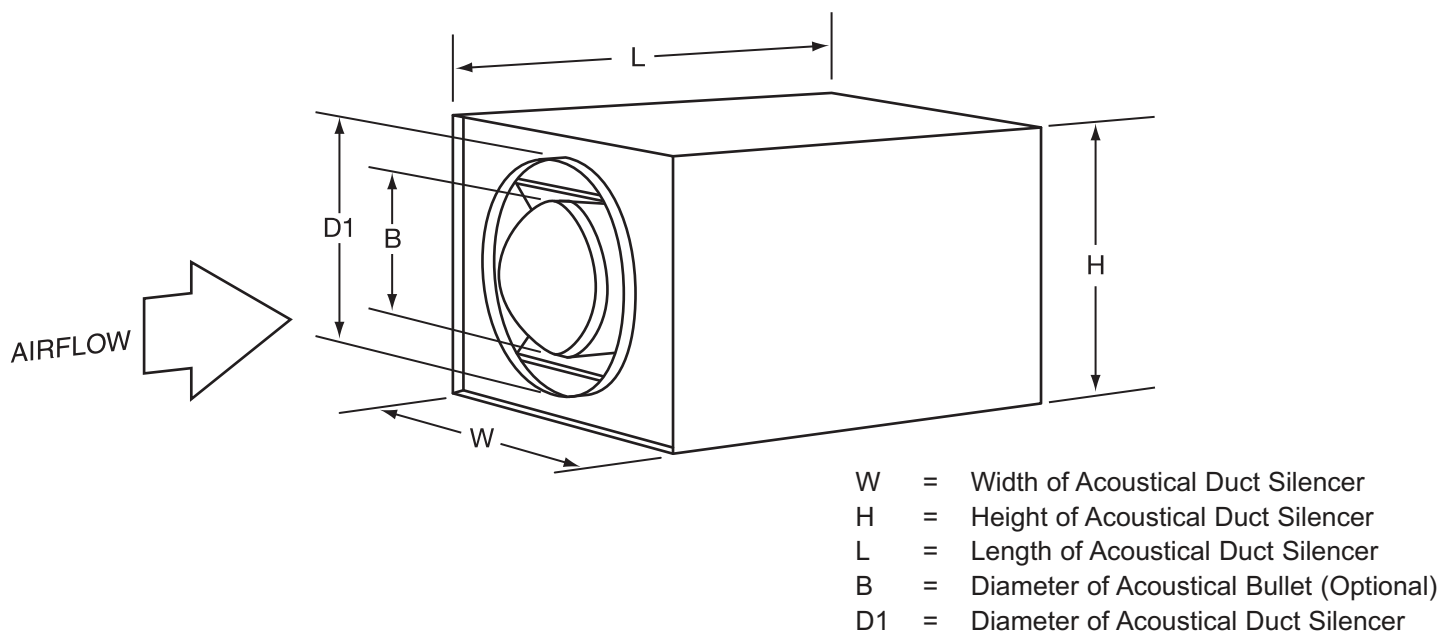
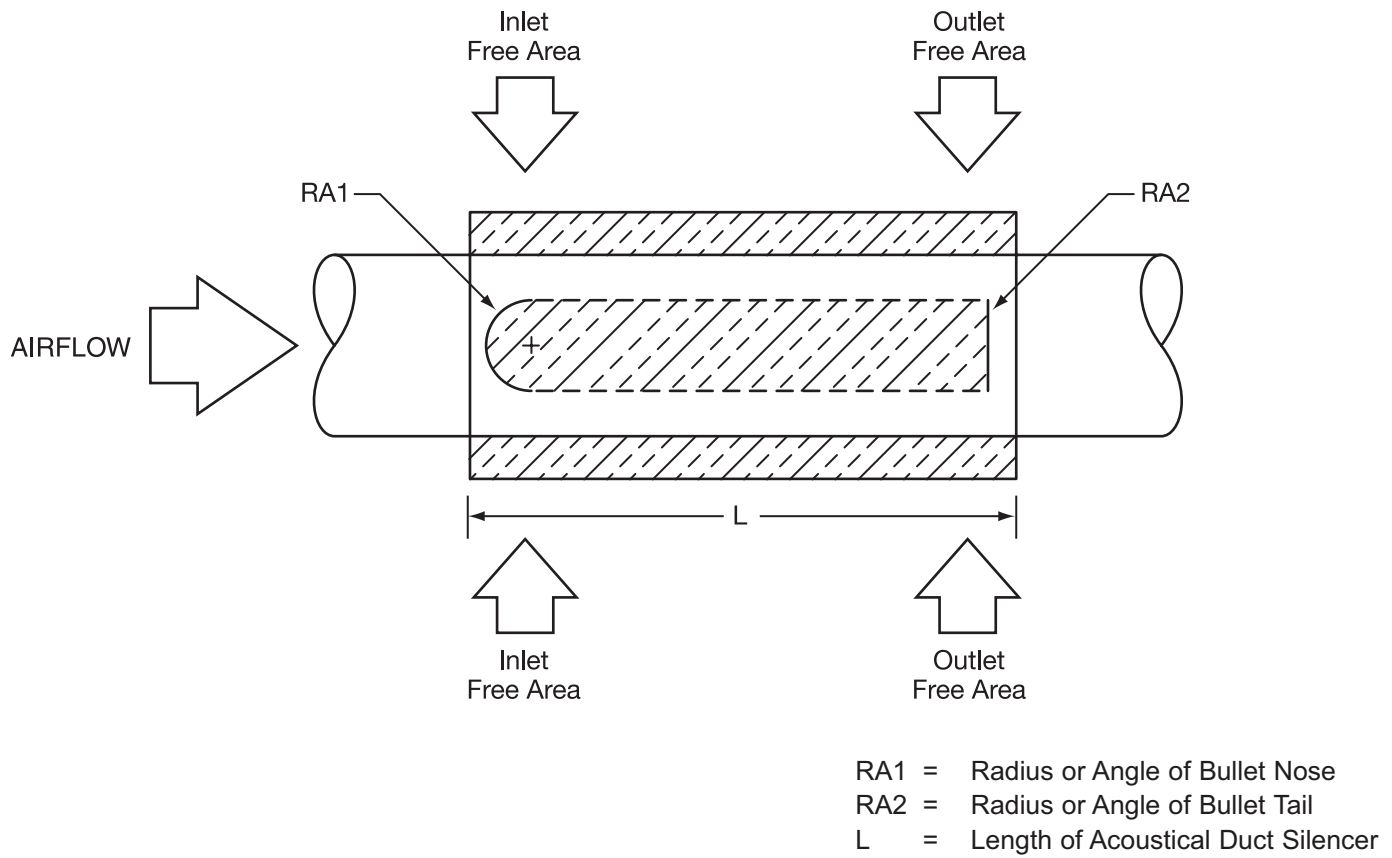
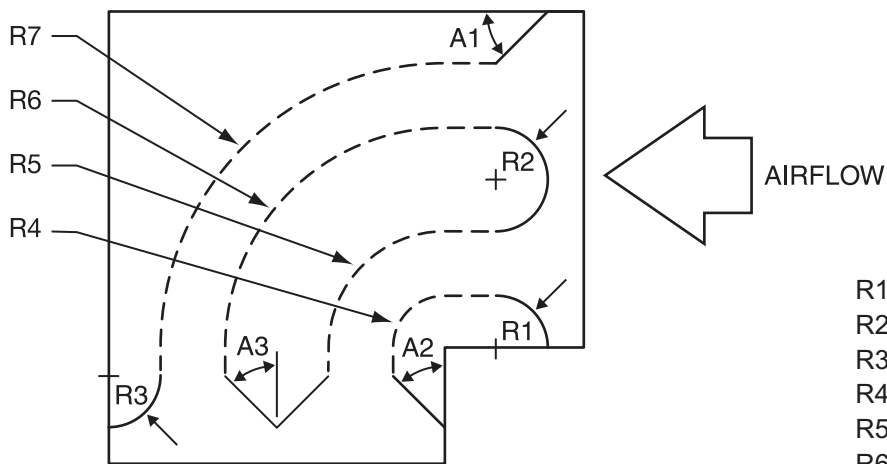
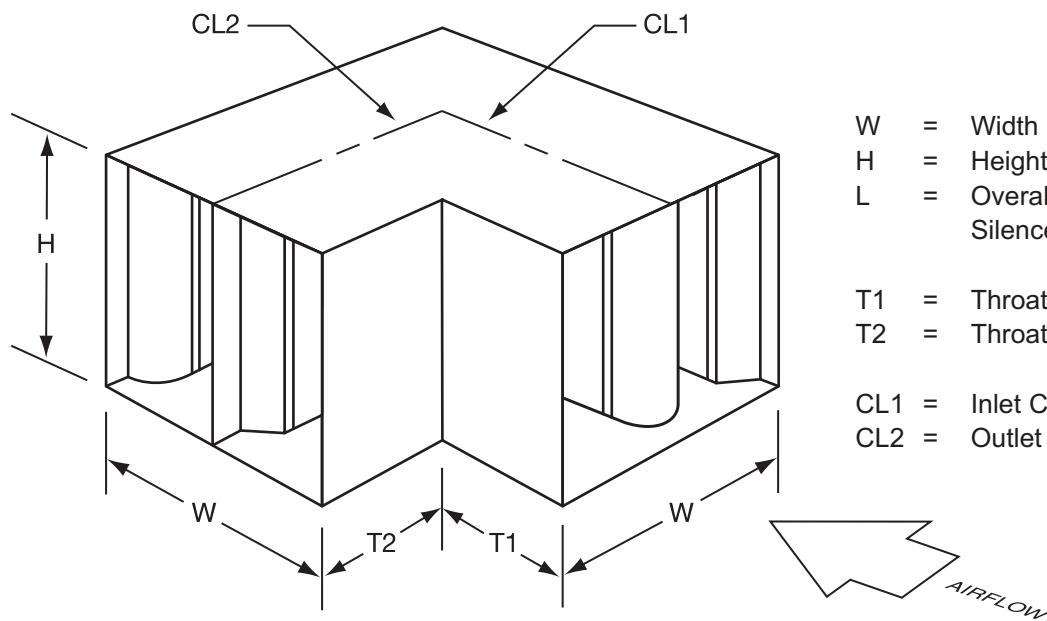


Figure 3
Circular Duct Silencer with Rectangular Casing Dimensions



- R1 = Radius of Side Baffle Head
 R2 = Radius of Center Baffle Head
 R3 = Radius of Side Baffle Tail
 R4 = If Required
 R5 = If Required
 R6 = If Required
 R7 = If Required

- A1 = Angle of Side Baffle Head
 A2 = Angle of Side Baffle Tail
 A3 = Angle of Center Baffle Tail



- W = Width of Acoustical Duct Silencer
 H = Height of Acoustical Duct Silencer
 L = Overall Centerline Length of Acoustical Duct Silencer (CL1 + CL2)

- T1 = Throat Inlet Leg Length
 T2 = Throat Outlet Leg Length

- CL1 = Inlet Centerline Leg Length
 CL2 = Outlet Centerline Leg length

Figure 4
Elbow Duct Silencer Dimensions

Annex A

Reference Material (Normative)

ASTM E477-99

Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers



AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

30 West University Drive
Arlington Heights, IL 60004-1893 U.S.A.

Tel: (847) 394-0150 • Fax: (847) 253-0088
E-Mail : info@amca.org • Web: www.amca.org

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