POTTORFF-QUICKTECH

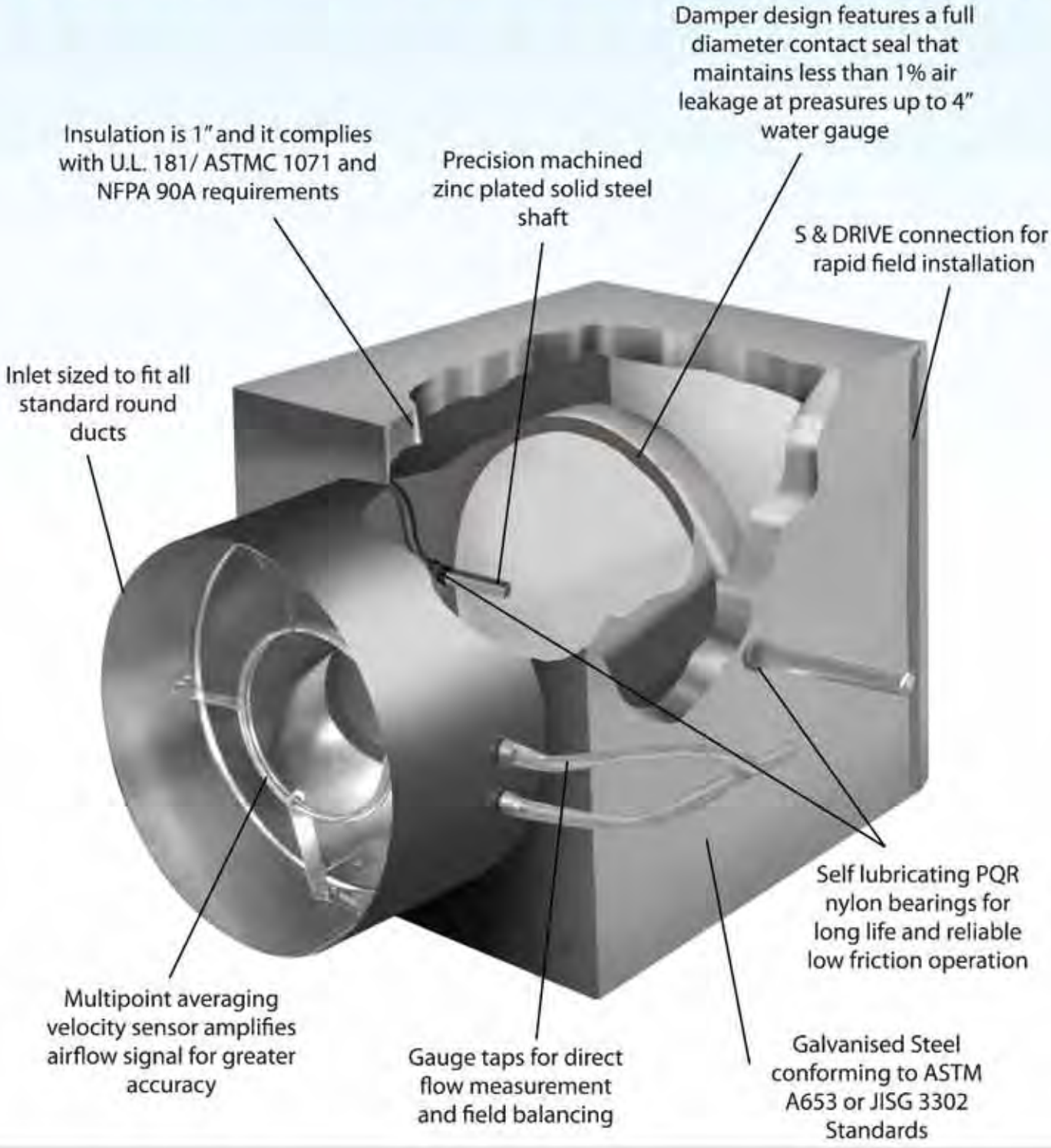
Excellence in Air Control

SINGLE DUCT **VAV** TERMINAL UNITS

POTTORFF-QUICKTECH V.A.V. TERMINAL UNITS

COMBINE

QUALITY CONSTRUCTION, SUPERIOR SERVICE, RAPID TURNAROUND TIME



TU-100 PRODUCT DESCRIPTION

CASING
- All TU-100 unit casing panels are constructed of 22 gage galvanized steel with a 20 gage option.

INLET COLLARS
- All round 22 gage inlet collars accommodate standard spiral and flex duct sizes.

- Left or right hand is determined by looking in the direction of airflow with the unit in the installed position.

OUTLET CONNECTION
- All standard outlet connections are rectangular and require a slip and drive duct connection.

- Round and multi-outlet discharge options are available.

DAMPER ASSEMBLY
- Unit size 6-16 utilize around control damper with blade control damper. All damper assemblies utilize a solid 1/2 shaft inch that rotates in self lubricating PQ Nylon® bearings.

- Damper blade incorporates a flexible gasket for tight airflow shutoff and operates over a full 90° rotation.

- The damper position is marked by an arrow embossment on the end of the damper shaft.

CASING LINERS
- Unit casing will be lined with 1 inch thick, 2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.

- (Optional) 2 inch Thick Insulation: Unit casing will be lined with 2 inch thick, 2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.

- (Optional) Cellular Insulation: Unit casing will be lined with glued and riveted 3/8 thick,1 1/2lb. density, smooth surface, polyolefin, closed-cell foam insulation for fiber free application. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth.

- (Optional) Steriliner Insulation: Unit casing will be lined with 13/16 thick, 4 lb. density, rigid board insulation with nylon reinforced foil covering insulation fibers that meets UL 181 and NFPA 90A. Liner shall be attached to unit casing by insulation adhesive and full-seam-length Z-strips to enclose and seal the insulation cut edges.

- (Optional) Sterilwall Insulation: Unit casing will be lined with 1/2 or 2 thick, 1 1/2lb. dual density fiberglass insulation, meeting UL 181 and NFPA 90A, enclosed between the unit casing and a non-perforated internal sheetmetal cover extending over the fiberglass insulation, as well as covering the liner cut edges.

TU-100 PRODUCT DESCRIPTION

- (Optional) Perforated Doublewall Insulation: Unit casing will be lined with 1/2, 11/2 lb. dual density fiberglass insulation meeting UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheetmetal cover extending over the fiberglass insulation, as well as covering the liner cut edges.

- (Optional) No Liner: Unit casing will be equipped with no internal insulation liner.

▼ AIRFLOW SENSOR

- All units are equipped with a factory installed airflow measuring sensor.

- The standard sensor is our multi-point, velocity averaging sensor FlowRing with an amplified-signal.

- Balancing taps are optionally provided to allow for easy airflow verification.

- An optional linear multi-point averaging sensor is also available.

▼ CONTROLS

- Electric, analog electronic or factory mounted direct digital electronic control types are available. A "no control" unit is also available for field mouting of direct digital electronic controls where a sheet metal enclosure will be provided by us.

▼ LABELS

- Label information is adhered to each unit and includes model, size, airflow (CFM), balancing chart and tagging data.

▼ PACKAGING

- Multiple units are palletized. Each pallet of units is banded and stretch wrapped with cellophane. Cartonizing is available with TU-100 base unit.

TU-100 TYPICAL APPLICATION

POTTORFF-QUICKTECH TU-100 single duct terminal units are designed to be easily incorporated in the overall building HVAC design. Control packages allow the TU-100 to be used in constant volume and variable volume applications. Although designed for compatibility with low pressure (<0.10 Ps), the TU-100 unit performs reliably in high pressure systems as well (up to 6.0 Ps).

In variable volume pressure independent applications, the TU-100 unit compensates for system pressure, while adjusting the airflow in response to room thermostat demand. When used in a constant volume application, the TU-100 can maintain a set flow requirement, compensating for fluctuations in system pressure.

Depending on the layout of the ductwork, it is sometimes more practical to specify the TU-100 with factory-installed MULTIPLE OUTLET PLENUMS (MOP).

▼ TU-100, DAMPER & CASING LEAKAGE DETAIL

	Damper Leakage					
Unit Size	1.5" WG		3.0" WG		6.0" WG	
	CFM	%	CFM	%	CFM	%
6	4	0.8	5	1.0	7	1.3
8	4	0.4	5	0.5	7	0.8
10	4	0.3	5	0.3	7	0.5
12	4	0.2	5	0.2	7	0.3
14	4	0.1	6	0.2	8	0.3
16	5	0.1	7	0.2	9	0.2

	Casing Leakage					
Unit Size	0.25" WG		0.5" WG		1.0" WG	
	CFM	%	CFM	%	CFM	%
6	2	0.4	3	0.6	5	1.0
8	3	0.3	4	0.4	6	0.6
10	4	0.3	5	0.3	7	0.5
12	5	0.2	7	0.3	9	0.5
14	6	0.2	9	0.3	12	0.4
16	7	0.2	10	0.3	14	0.4

► *Damper leakage is measured with the damper fully closed using an actuator. A precision low flow orifice is used upstream of the unit to measure the leakage rate as a function of the measured upstream static pressure. Casing leakage is determined with the damper fully open and the discharge of the unit sealed. A precision low flow orifice is used upstream of the unit to measure the leakage rate as a function of the supplied static pressure.*

TU-100 DISCHARGE SOUND PERFORMANCE DATA

▼ DISCHARGE SOUND DATA

Inlet Size	Flow Rate		Min ΔPs		0.5" ΔPs							1" ΔPs							2" ΔPs						
					Octave Band Sound Power, Lw						Lp	Octave Band Sound Power, Lw						Lp	Octave Band Sound Power, Lw						Lp
	CFM	(L/s)	"WG	(Pa)	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC
6	90	(42)	0.005	(1.26)	41	40	29	27	29	24	-	44	45	34	31	34	31	-	47	50	40	35	39	38	-
	233	(110)	0.034	(8.46)	52	51	44	40	37	32	-	55	57	49	44	42	39	-	59	62	54	48	48	46	21
	377	(178)	0.089	(22.08)	57	57	51	46	41	36	-	61	63	57	51	47	43	20	64	68	62	55	52	50	26
	520	(245)	0.169	(42.05)	61	61	56	51	44	39	-	65	67	62	55	49	45	25	68	72	67	59	55	52	31
8	160	(76)	0.005	(1.30)	47	44	39	32	34	29	-	50	50	45	36	39	36	-	53	55	51	41	45	43	-
	440	(208)	0.040	(9.83)	56	54	49	45	42	37	-	60	60	55	49	47	44	-	63	65	61	54	53	50	24
	675	(319)	0.093	(23.14)	60	58	53	50	45	40	-	63	64	59	55	51	47	22	67	70	65	59	56	53	29
	920	(434)	0.173	(42.98)	63	61	56	54	48	42	-	66	67	62	59	53	49	25	70	73	68	63	59	56	31
10	250	(118)	0.005	(1.29)	42	43	36	35	36	34	-	46	48	41	39	41	40	-	49	53	46	44	47	46	-
	675	(319)	0.038	(9.37)	54	53	48	46	44	41	-	58	58	53	51	49	47	-	61	63	58	55	55	53	21
	1075	(507)	0.096	(23.77)	60	58	54	51	48	44	-	63	63	59	56	53	50	-	66	68	64	60	59	56	25
	1430	(675)	0.169	(42.05)	64	61	58	55	50	46	-	67	66	63	59	55	52	23	70	70	68	64	61	58	28
12	360	(170)	0.005	(1.26)	43	42	34	36	37	37	-	47	47	38	40	42	43	-	50	52	42	45	47	49	-
	1000	(472)	0.039	(9.72)	57	53	49	47	46	44	-	60	58	54	51	51	50	-	64	63	58	56	56	56	20
	1550	(731)	0.094	(23.35)	63	58	56	52	50	47	-	66	63	60	56	55	53	20	70	68	65	61	60	59	26
	2060	(972)	0.166	(41.25)	67	61	60	55	53	48	-	70	67	64	59	57	54	24	74	72	69	64	62	60	30
14	480	(227)	0.005	(1.30)	39	38	31	35	34	36	-	42	43	34	39	39	41	-	46	47	37	42	43	47	-
	1375	(649)	0.043	(10.67)	56	53	50	48	46	44	-	59	57	54	52	51	50	-	63	61	57	56	55	55	-
	2125	(1003)	0.102	(25.48)	63	59	58	53	51	48	-	66	63	61	57	55	53	-	70	67	65	61	60	59	25
	2800	(1321)	0.178	(44.24)	58	62	63	57	54	50	-	71	67	66	61	59	55	24	74	71	70	65	63	61	29
16	630	(297)	0.005	(1.26)	33	27	18	27	28	26	-	36	31	21	31	32	31	-	40	35	25	35	37	37	-
	1775	(838)	0.040	(10.00)	54	48	44	45	44	41	-	57	52	48	49	48	46	-	61	57	51	53	53	52	-
	2725	(1286)	0.095	(23.57)	63	57	55	52	50	47	-	66	61	59	56	55	53	-	69	65	62	60	59	58	22
	3660	(1727)	0.171	(42.52)	69	63	63	57	55	52	-	72	67	66	61	59	57	24	75	71	70	65	64	62	30

All sound data is based on tests conducted in accordance with ARI 880. Δ Ps is the difference in static pressure from inlet to discharge. Sound power levels are in dB, re 10^{-12} watts. Discharge sound power is the sound emitted from the unit discharge. NC application data is from ARI standard 885 Appendix E, as a function of flow rate shown.

TU-100 RADIATED SOUND PERFORMANCE DATA

▼ RADIATED SOUND DATA

Inlet Size	Flow Rate		Min ΔPs		0.5" ΔPs							1" ΔPs							2" ΔPs						
					Octave Band Sound Power, Lw						Lp	Octave Band Sound Power, Lw						Lp	Octave Band Sound Power, Lw						Lp
	CFM	(L/s)	'WG	(Pa)	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC
6	90	(42)	0.005	(1.26)	40	31	20	19	15	8	-	43	35	24	22	18	14	-	46	40	28	25	22	20	-
	233	(110)	0.034	(8.46)	50	43	35	32	28	22	-	53	47	39	35	32	27	-	56	52	43	39	36	33	-
	377	(178)	0.089	(22.08)	55	49	43	39	35	28	-	58	53	47	42	39	34	22	61	58	51	45	43	40	27
	520	(245)	0.169	(42.05)	58	53	48	44	40	33	22	61	57	52	47	43	39	26	64	62	56	50	47	44	32
8	160	(76)	0.005	(1.30)	40	34	26	22	20	12	-	43	39	33	27	25	19	-	46	45	40	32	30	26	-
	440	(208)	0.040	(9.83)	50	43	37	33	30	22	-	53	49	44	38	35	29	-	56	54	51	43	40	36	25
	675	(319)	0.093	(23.14)	54	47	41	38	34	27	-	57	52	48	42	39	34	22	60	58	55	47	44	40	30
	920	(434)	0.173	(42.98)	57	49	44	41	37	30	-	60	55	51	46	42	37	26	63	61	58	51	47	32	33
10	250	(118)	0.005	(1.29)	29	29	16	14	8	-3	-	35	35	20	19	16	9	-	41	41	23	23	24	20	-
	675	(319)	0.038	(9.37)	42	38	36	29	21	9	-	48	44	39	34	29	21	-	54	50	43	38	37	32	-
	1075	(507)	0.096	(23.77)	48	42	45	36	27	15	-	54	48	48	41	35	26	22	60	54	52	45	43	38	26
	1430	(675)	0.169	(42.05)	52	44	51	40	30	18	25	58	44	54	45	39	30	29	64	57	58	50	47	41	32
12	360	(170)	0.005	(1.26)	36	41	26	21	19	12	-	40	45	30	25	23	18	-	45	50	35	29	28	24	-
	1000	(472)	0.039	(9.72)	47	46	39	35	32	24	-	51	50	43	39	36	30	-	56	55	48	43	41	35	23
	1550	(731)	0.094	(23.35)	52	48	44	40	37	29	-	56	52	49	44	42	35	23	60	57	54	48	47	40	28
	2060	(972)	0.166	(41.25)	55	49	48	44	41	32	22	59	54	53	48	46	38	27	63	59	57	52	50	44	32
14	480	(227)	0.005	(1.30)	31	31	19	23	22	20	-	36	37	23	26	25	25	-	41	42	26	30	29	29	-
	1375	(649)	0.043	(10.67)	45	41	37	35	34	30	-	49	47	40	38	37	35	-	54	52	43	42	41	39	20
	2125	(1003)	0.102	(25.48)	50	45	44	40	39	34	-	55	51	48	43	43	39	22	59	56	51	47	46	43	25
	2800	(1321)	0.178	(44.24)	53	48	49	43	42	37	23	58	53	52	47	46	41	27	63	59	55	50	49	46	30
16	630	(297)	0.005	(1.26)	35	33	26	26	23	17	-	39	38	31	31	30	25	-	44	44	36	36	37	33	-
	1775	(838)	0.040	(10.00)	48	43	40	37	32	25	-	52	49	45	42	39	33	-	57	54	50	47	46	41	24
	2725	(1286)	0.095	(23.57)	53	47	45	41	36	29	-	58	53	50	47	43	37	25	63	59	55	52	50	45	30
	3660	(1727)	0.171	(42.52)	57	50	49	45	38	31	23	62	56	54	50	46	39	29	66	62	59	55	53	47	34

All sound data is based on tests conducted in accordance with ARI 880. Δ Ps is the difference in static pressure from inlet to discharge. Sound power levels are in dB, re 10^{-12} watts. Radiated sound power is the sound transmitted through the casing walls. NC application data is from ARI standard 885 Appendix E, as a function of flow rate shown.

PROCEDURE FOR ESTIMATING OCCUPIED SPACE SOUND LEVELS IN THE APPLICATION OF AIR TERMINALS AND AIR OUTLETS BASED ON THE ARI STANDARD 885

Purpose and Scope

The purpose of this Standard is to provide a consistent industry-accepted method for estimating sound pressure levels in a conditioned, occupied space.

The sound levels include a contribution from most, but not all, components in the air distribution system. Air terminals, air outlets and the low pressure ductwork which connects them are considered as sound sources and are the subject of this Standard.

This Standard does not make provision to estimate space sound level contributions from the central system fan, ductwork upstream of the air terminal, equipment room machinery or exterior ambient sound. Often significant, these sound sources should be considered in the designer's work to achieve a complete estimate of the room sound level.

Definitions, calculation procedures, recommended default values and tabulated data are in accordance with the best information available at the time of publication. As new or better information from the ASHRAE Handbook or other recognized procedures and information in this Standard may be revised or amended.

Users of the Standard undoubtedly will ask about the accuracy of the predictions. Until a significant body of experience is accumulated with ARI Standard 885, no explicit tolerance of prediction can be given.

The methods described in this Standard can be used to identify acoustically critical paths in the system design. The effects of inserting alternative components and changes in the system can be evaluated. The accuracy of evaluating the difference in sound pressure between two alternatives is greater than individual predictions.

The Relationships of ARI Standard 880 and 885

2.1 ARI Standard 880 "Air Terminals" provides industry agreed-upon methods for determining sound power ratings of air terminal and air distribution devices. These sound power ratings are published in manufacturers' data sheets.

2.2 ARI Standard 885 provides industry agreed-upon methods to use ARI Standard 880 sound ratings to estimate the sound levels which will occur in the conditioned, occupied space.

ARI Standard 885 provides calculation methods to examine and compare sound sources and attenuation in the application of air terminals and air distribution devices.

Design Guidelines for HVAC System Noise in Unoccupied Spaces	
Space	**RC (N) or NC Level**
Private residences	25-35
Hotel/motels	
Individual rooms or suites	25-35
Meeting/banquet rooms	25-35
Halls, corridors, lobbies	35-45
Service/support areas	35-45
Office Buildings	
Executive and private offices	25-35
Conference rooms	25-35
Teleconference rooms	25(max)
Open plan offices	30-40
Circulation and public lobbies	40-45
Hospitals and clinics	
Private rooms	25-35
Wards	30-40
Operating rooms	25-35
Corridors	30-40
Public area	30-40
Performing Arts Spaces	
Drama theaters	25(max)
Concert and recital halls	[b]
Music teaching studios	25(max)
Music practice rooms	35(max)
Laboratories (with fume hoods)	
Testing/research, minimal speech communication	45-55
Research, extensive telephone use, speech communication	40-50
Group teaching	35-45
Churches, mosques, synagogues	25-35
With critical music programs	[b]
Schools	
Classrooms up to 750 ft² [75 m²]	40(max)
Classrooms over 750 ft² [75 m²]	35(max)
Lecture rooms for more than 50 (unamplified speech)	35(max)
Libraries	30-40
Courtrooms	
Unamplified speech	25-35
Amplified speech	30-40
Indoor stadiums and gymnasiums	
School and college gymnasiums and natatoriums	40-50[c]
Large seating capacity spaces (with amplified speech)	45-55[c]

A) An experienced acoustical consultant should be retained for guidance on acoustically critical spaces (below RC 30) and for all performing arts spaces.

B) The values and ranges are based on judgement and experience, not on quantitative evaluations of human reactions. They represent general limits of acceptability for typical building occupancies. Higher or lower values may be appropriate and should be based on a careful analysis of economics, space usage, and user needs. They are not intended to serve by themselves as a basis for a contractual requirement.

C) Spectrum levels and sound quality are of lesser importance in these spaces than overall sound levels.

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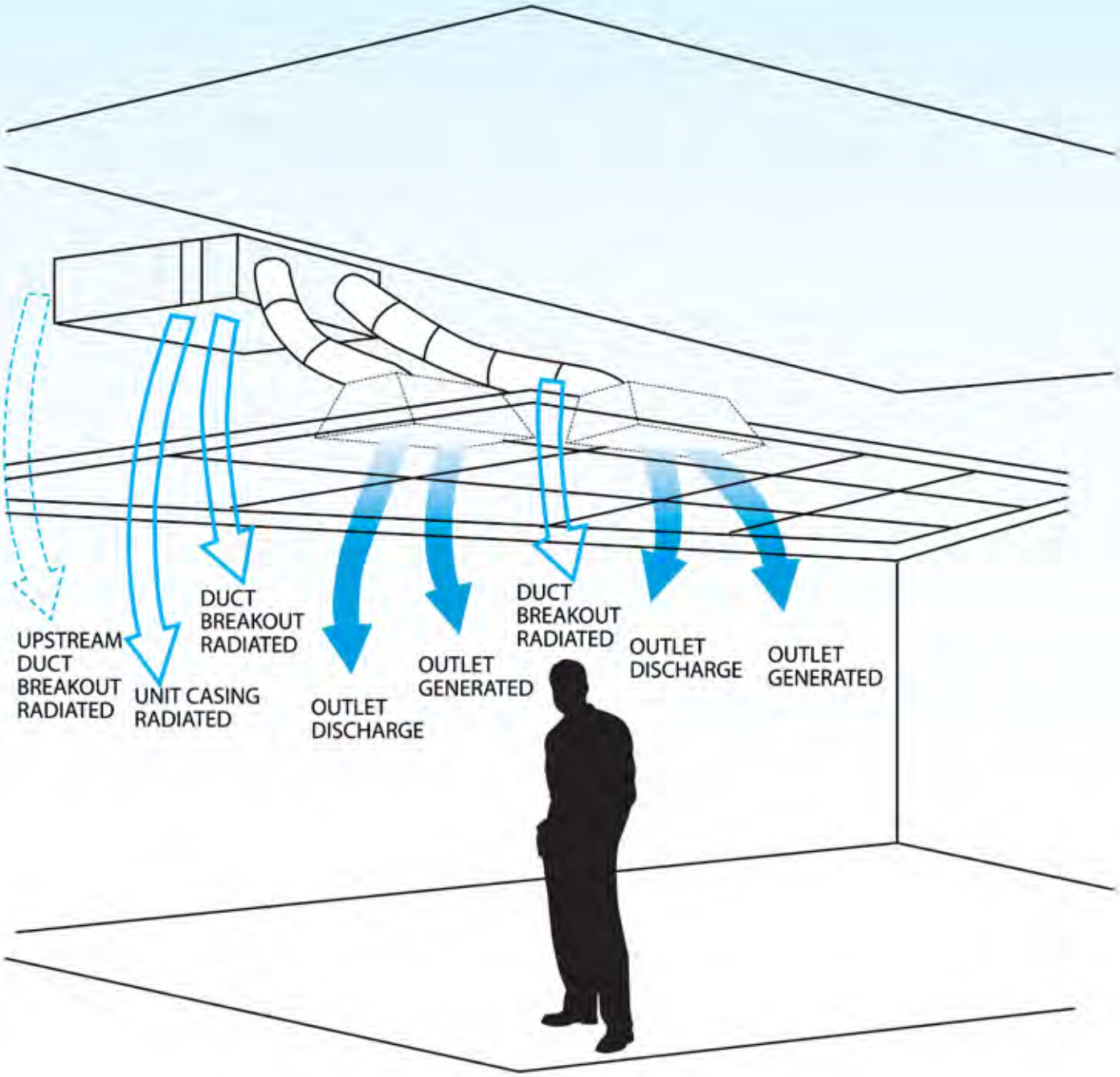
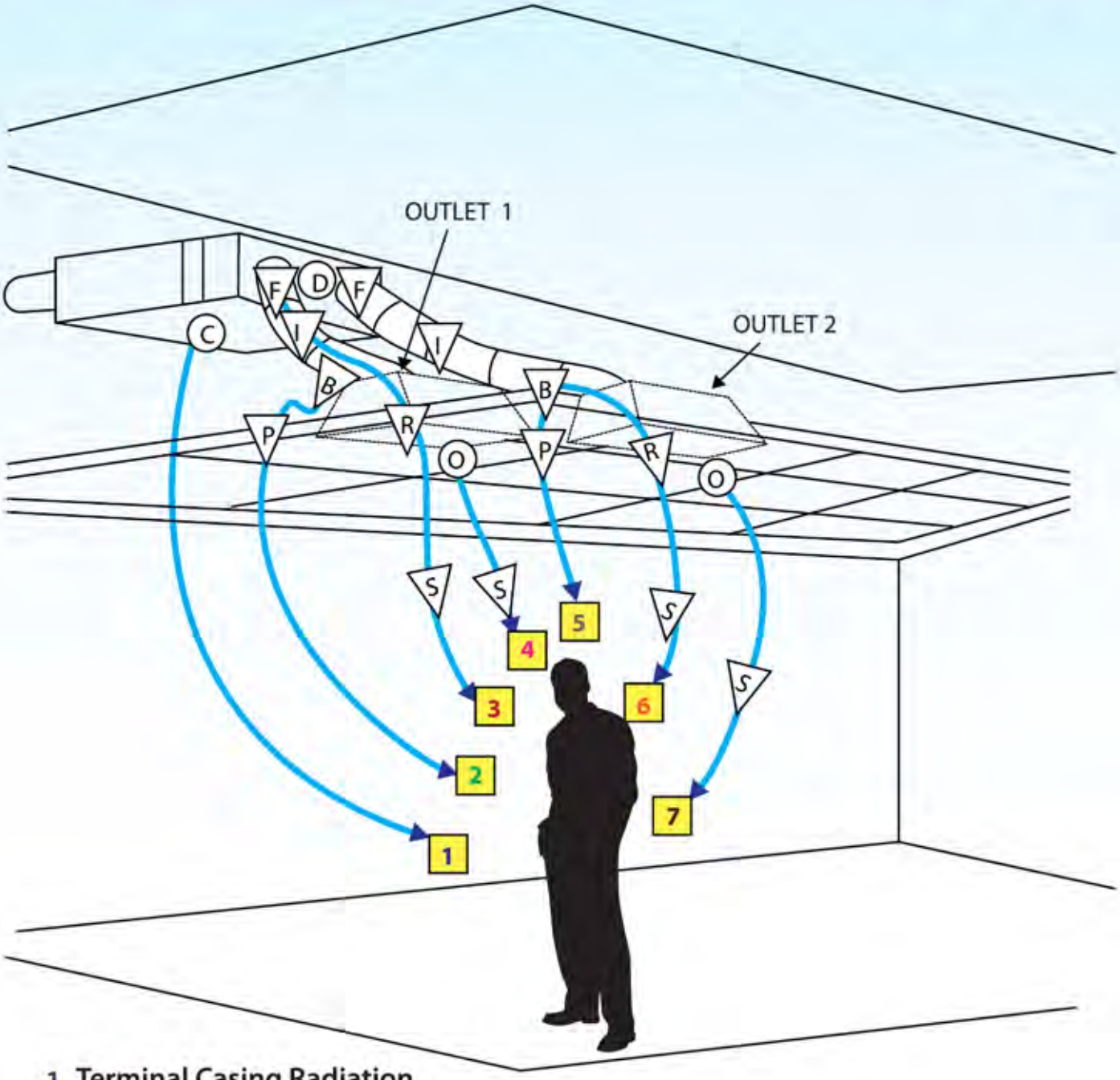


Single / Duct Terminal Acoustic Model



1 Terminal Casing Radiation

2 Flex Duct Breakout Radiation

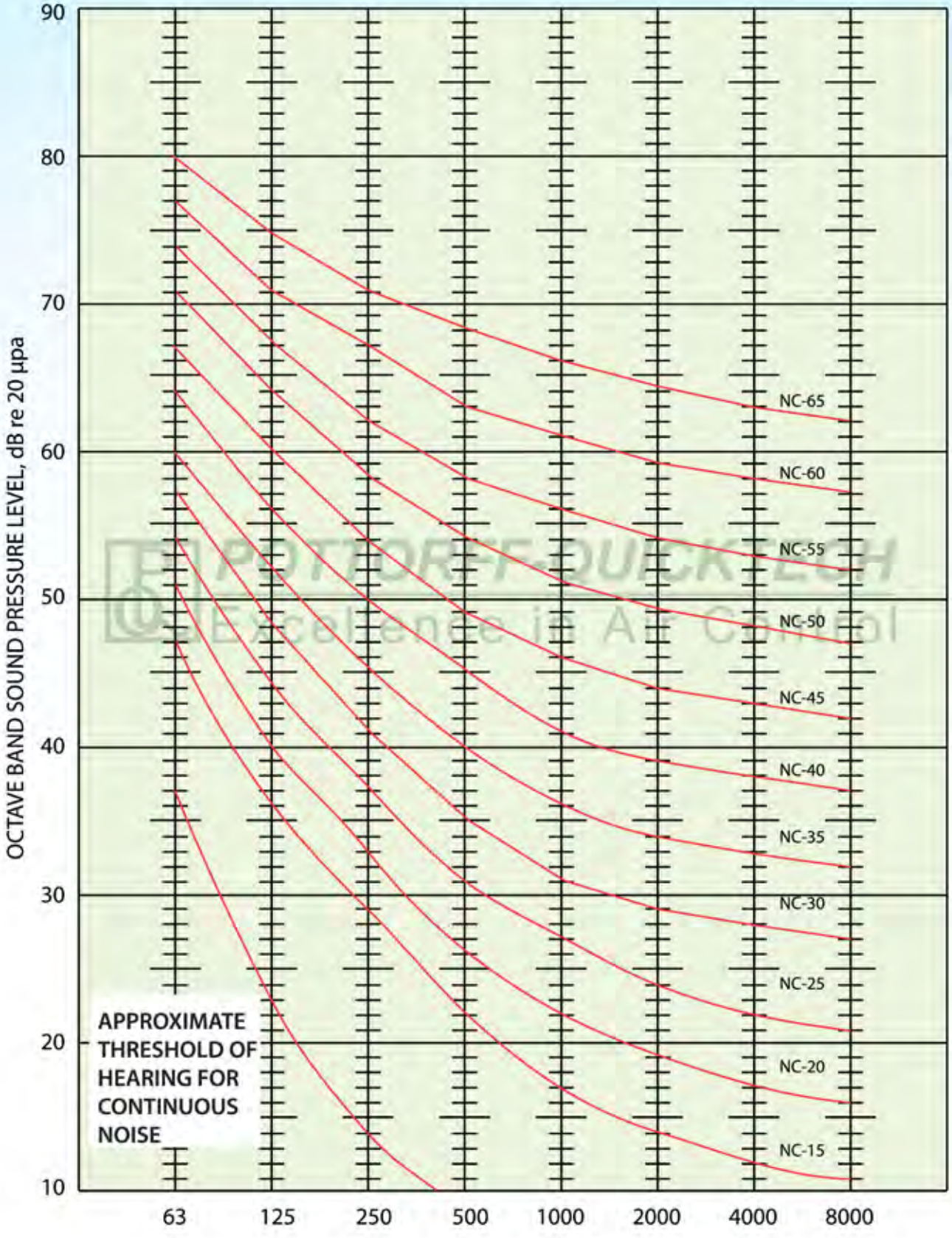
3 Duct Airborne Radiation

4 Out #1 Generated Sound

5 Flex Duct Breakout Radiation

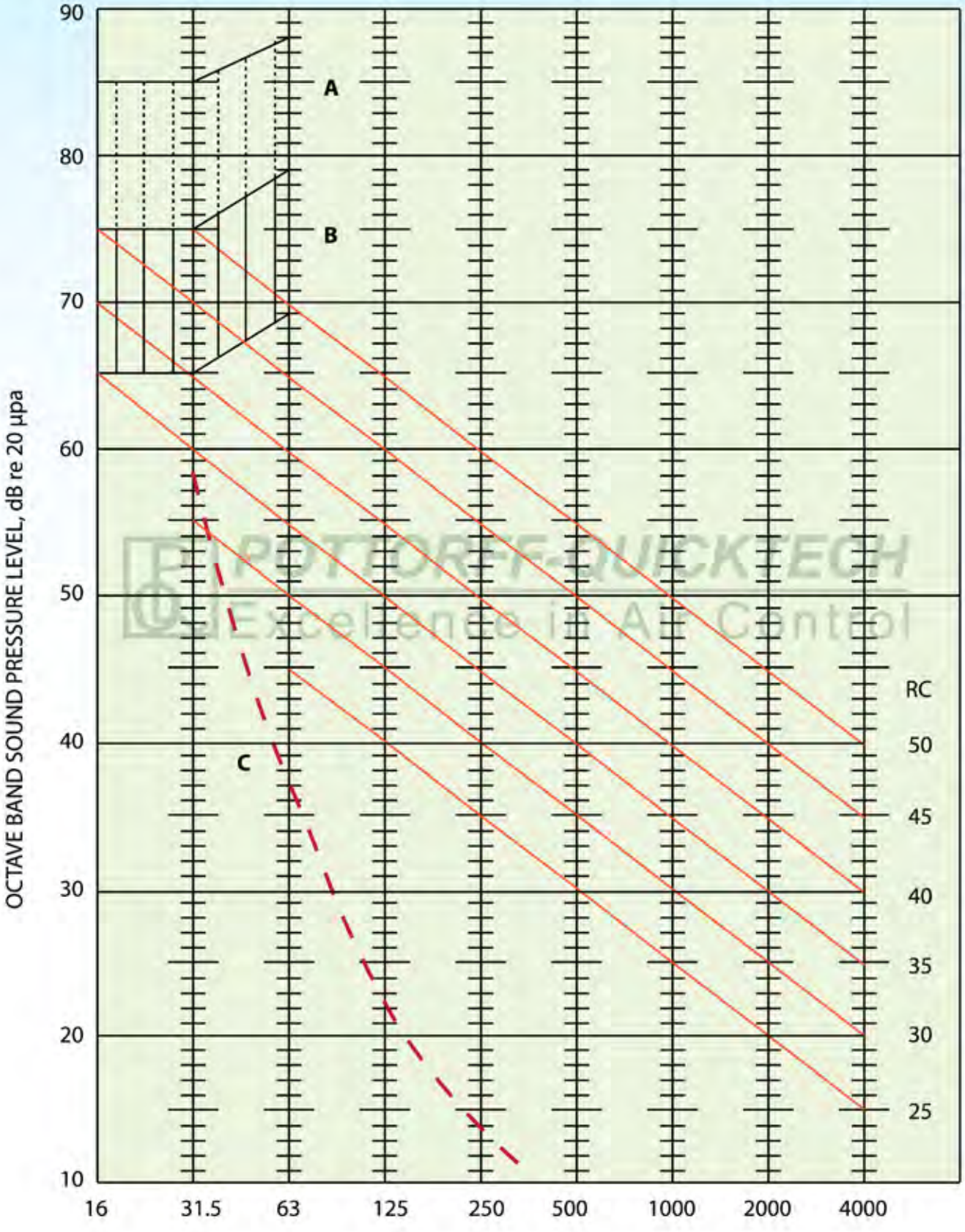
6 Duct Airborne Sound

7 Out #2 Generated Sound



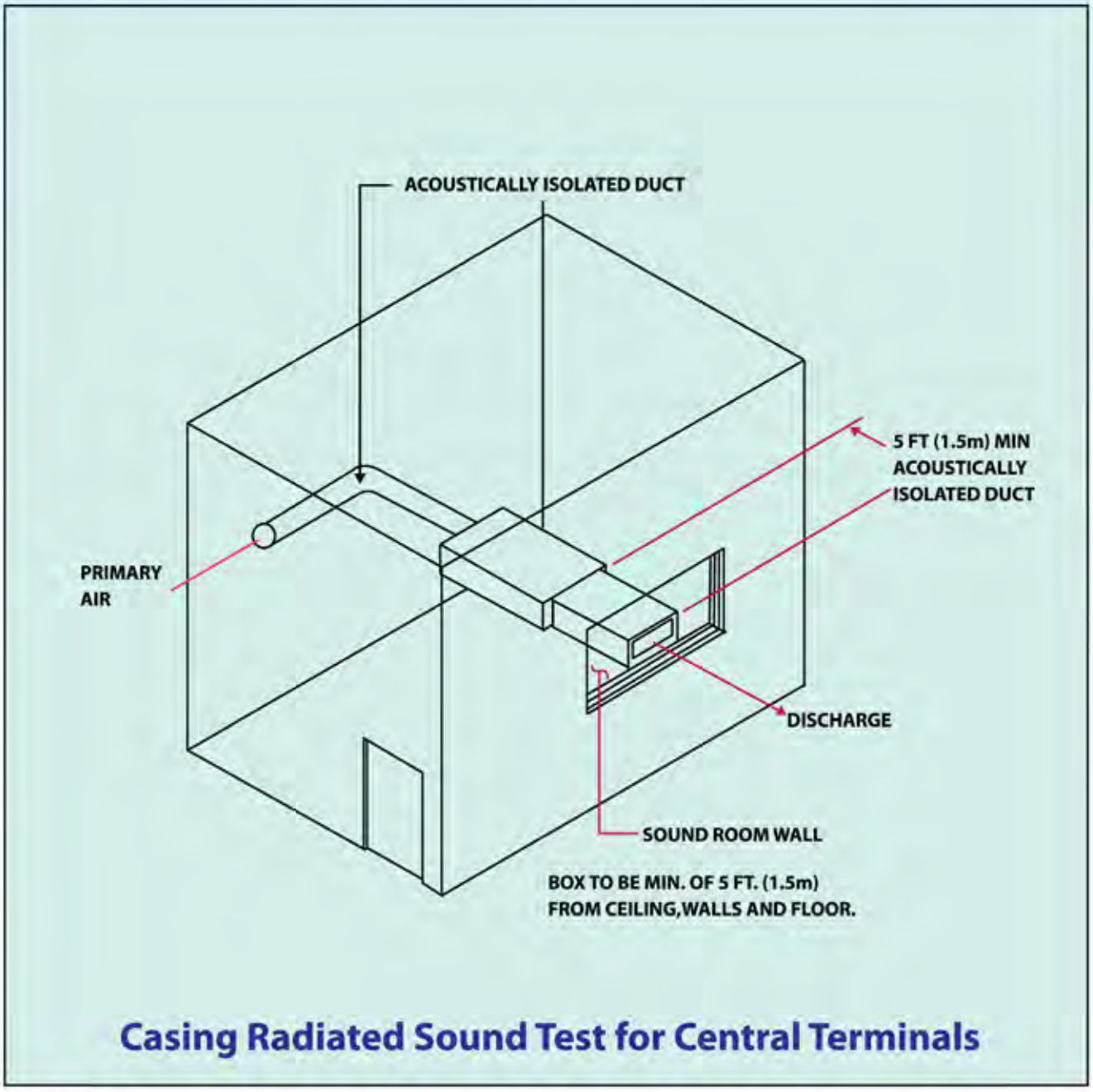
OCTAVE BAND CENTER FREQUENCIES, HZ

NC (noise Criteria) Curves for Specifying the Design Level in Terms of Maximum Permissible Sound Pressure Level for Each Frequency Band



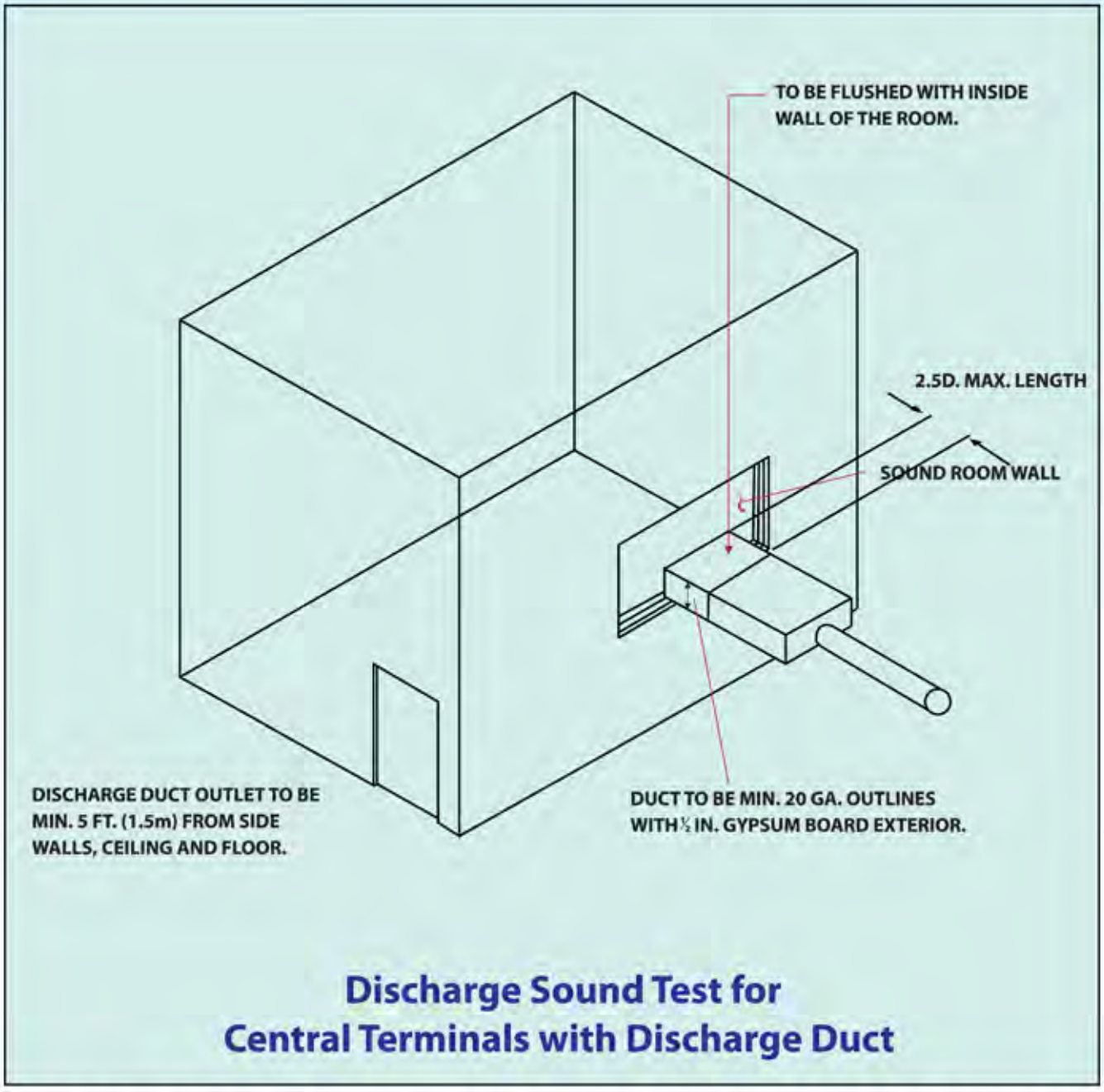
OCTAVE BAND CENTER FREQUENCIES, HZ

RC (Room Criterion) Curves for Specifying the Design Level in Terms of a Balanced Spectrum Shape



Casing Radiated Sound Test for Central Terminals

Casing Radiated Sound Power Level - *To determine the sound radiated from the casing (induction port plus casing radiated sound for fan powered units), the assembly shall be mounted in the reverberation room with suitable connecting duct or ducts - ARI STANDARD 880*



Discharge Sound Test for Central Terminals with Discharge Duct

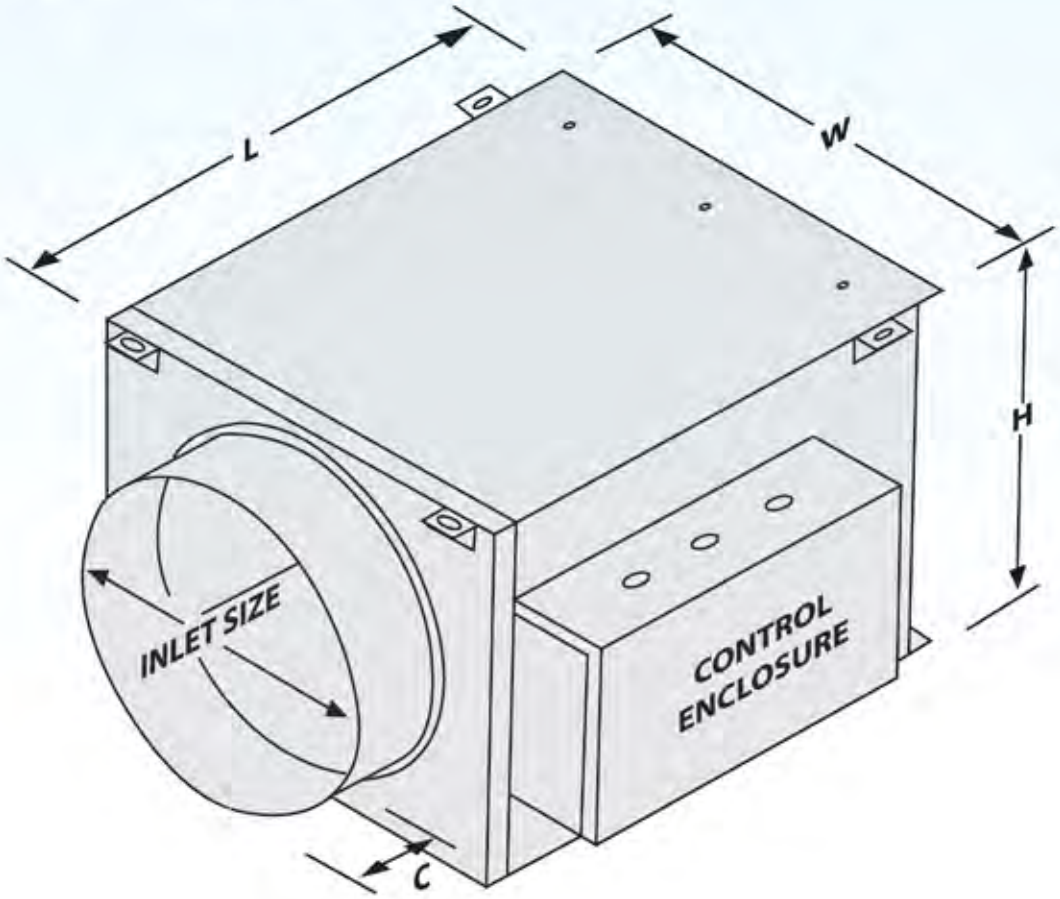
Discharge Sound Power Level - *Discharge sound power level determination required that only the discharge air flow be exposed to the sound test room. The casing must be acoustically isolated from the room - ARI STANDARD 880*

POTTORFF-QUICKTECH V.A.V. TERMINAL UNITS

COMBINE

QUALITY CONSTRUCTION, SUPERIOR SERVICE, RAPID TURNAROUND TIME

TERMINAL UNIT DIMENSIONS - MODEL TU-100



UNIT DESIGN		INLET SIZE		INLET DEPTH		OVERALL DIMENSION					
				C		W		H		L	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
6	152.4	5 7/8	149.2	4	101.6	10	254.0	10	254.0	16	406.4
8	203.2	7 7/8	200.0	4	101.6	10	254.0	10	254.0	16	406.4
10	254.0	9 7/8	250.8	4	101.6	13	330.2	12	304.8	16	406.4
12	304.8	11 7/8	301.6	4	101.6	15	281.0	14	355.6	16	406.4
14	355.6	13 7/8	352.4	4	101.6	17	431.8	16	406.4	16	406.4
16	406.4	15 7/8	403.2	4	101.6	19	482.6	18	457.2	16	406.4