ACOUSTIC PRIVACY,

SPEECH INTELLIGIBILITY,

&

AUDIO SECURITY

IN VARIOUS OFFICE, EDUCATION & RESIDENTIAL ENVIRONMENTS

Updated and Reprinted October 2010

SPECTRA TECH LTD
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FOUR FACTORS CONTROL PRIVACY / INTELLIGIBILITY

Audio privacy, inversely related to intelligibility, is a function controlled by four design factors:

1. The loudness of speech, music, or machine noise source.
2. The sound attenuation of the building, measured between the location where the speech, music, or machine noise occurs and all likely listening locations.
3. The loudness of the background sound level at the listening location, measured or adjusted to meet the privacy requirements of the facility.
4. Allowance for signal recovery techniques, based on the owner's security threat analysis.

DEGREES OF PRIVACY

When a person needs to concentrate on a task, the unwanted information, such as surrounding conversations, will be distracting unless the room was designed to exclude them. Persons need *SECRET* or *CONFIDENTIAL* Privacy to preclude the understanding of speech by persons not 'intended to hear the conversation. Persons need *NO PRIVACY* when the listener must be able to understand everything said. These two extremes define a range of degrees of privacy which is listed below:

SECRET PRIVACY, This degree of privacy is achieved when an outside listener will NOT be able to understand conversations within the room, even when-he makes DELIBERATE attempts to monitor the conversations with listening or signal recovery devices.

CONFIDENTIAL PRIVACY, This degree of privacy is achieved when an outside listener will NOT be able to understand conversations within the room when he does NOT make a deliberate attempts to listen. The talker may be HEARD, but is not UNDERSTOOD.

NORMAL PRIVACY. When two people have *Normal Privacy* from each other, their conversations do not distract each other, and the talkers have conversational privacy. The conversations are partially understood. This degree of privacy can be achieved in the open office with proper design.

TRANSITIONAL PRIVACY. When two people have *Transitional Privacy* from each other, their conversations will distract each other occasionally. This degree of privacy can be achieved easily in the open office.

POOR PRIVACY, When two people have *Poor Privacy* from each other their conversations are often distracting. This degree of privacy generally results when no acoustical planning is done.

NO PRIVACY, When two people have *No Privacy* from each other their conversations are well understood and completely distracting. This degree is the design goal for conference rooms and closed offices and must be achieved even in the presence of masking sound.

PRIVACY REQUIREMENTS BY TASK

Below is a listing of activities that require the various degrees of privacy, based on past experience within the design community. It should be considered representative of typical performance standards in use.

SECRET PRIVACY

- Classified Conversations / Material Handling
- Executive & Board Room Discussions
- Planning Room Discussions
- Residential Units

CONFIDENTIAL PRIVACY

- High Level Management Staff
- High Level Legal Staff
- High Level Financial Staff
- Labor Contract Negotiators
- Personnel Interviewers
- Medical Counselors
- Conflict Resolution Situations

NORMAL PRIVACY

- Middle Level Management Staff
- Computer Programmers
- Engineers and Researchers
- Persons doing mathematical or accounting tasks
- Persons writing or reading difficult materials
- Self-learning situations

TRANSITIONAL PRIVACY

- Sales / Purchasing Agents
- Administrative Assistants
- Executive Secretaries
- Draftsmen and Designers
- Customer Service Staff-Telephone

POOR PRIVACY

- Secretarial Staff
- Clerical Staff
- Order Processing Staff

NO PRIVACY (HIGH INTELLIGIBILITY WANTED)

- Reception Areas
- Customer Service Staff - Face-to~Face Contact
- Lecture, Seminar, or Meeting Rooms (within room)

Excerpts ***from:*** Defense Intelligence Agency DIAM 50-3: “Physical Security Standards for Construction of Sensitive Compartmented Information Facilities”

SOUND ATTENUATION CLASSIFICATIONS FOR SECURE WORK AREAS

1. This enclosure provides information to be used as acoustic isolation criteria (voice range only) for construction of sensitive compartmented information facilities (SCI). The spectrum of technical surveillance devices for voice transmittal and compromising emanations is treated in other directives and. therefore, is not addressed herein.

2. The term "Sound Transmission Class" (STC) is used in architectural acoustics to describe the transmission attenuation afforded by various wall materials and other building components. The following transmission attenuation groups have been set up to satisfy the normal security requirements of facilities used for SCI actlvities.

Sound Group 1	***STC of 30 or better*** Loud speech can be understood fairly well. Normal speech cannot be easily understood.
Sound Group 2	***STC of 40 or better*** Loud speech can he heard, but is hardly intelligible. Normal speech can be heard only faintly, if at all.
Sound Group 3	***STC of 46 or better*** Loud speech can be faintly heard but not understood. Normal speech is inaudible.
Sound Group 4	***STC of 60 or better*** Very loud sounds. such as loud singing, brass musical instruments or a radio at full volume, can be heard only faintly or not at all.

3. The above sound group designation* are used la the listing which follows to simplify the application of acoustic requirements of secure facilities for various functions.

Building Areas and Functions	**Sound Group**
Office Space	
Executive Suite	3
Private Offices	2
Open Workspace	3
"Lab"	2
Conference Rooms	
Briefing or Conference Rooms	3
Training / Plans Room	3
Conference Rooms with movable partitions	3
Auditoriums	
Auditorium with sound reinforcement (No speakers on common wall)	4
Auditorium without sound reinforcement	3
Projection Rooms (all)	3

4. Testing Procedures: Test procedures to be followed for measurement the attenuation levels of a completed structure are those prescribed in ASTM Standard #E-336, "Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings."

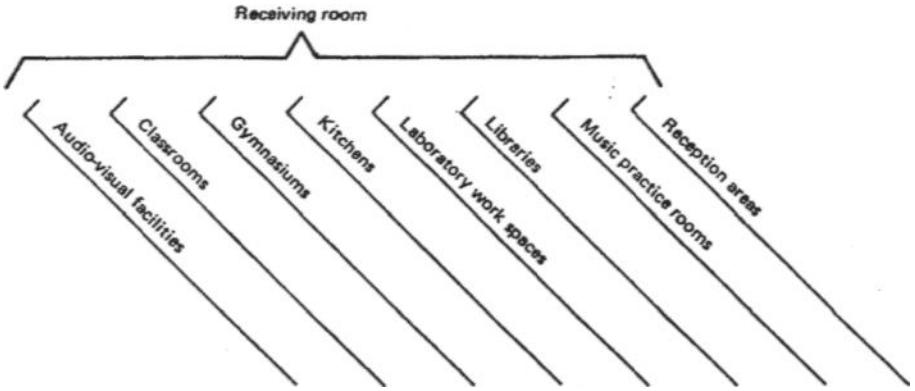
Also see Director of Central Intelligence Directive 6/9: Manual for Physical Security Standards for Sensitive Compartmented Information Facilities (SCIF)

TYPICAL SOUND ATTENUATION BY DISTANCE, WALLS, FLOOR/CEILINGS, DOORS, WINDOWS

Sound attenuation refers to the ability of a particular facility to isolate itself from adjoining facilities or outdoor areas. Walls, floors, ceilings, windows and doors comprise the barriers through which sound can be transmitted. Distance between the source and receiving location is also a factor. Each material and element of the perimeter construction has a sound transmission loss rating usually specified as an STC rating. The composite or overall sound transmission rating of a facility is only as good as the weakest element. All potential sound paths, inc1uding air gaps, must be considered. The chart below shows the optimum sound isolation ratings for various types of facilities.

The appropriate sound isolation rating should be specified for each facility so that the ambient noise level within the facility, including sound received from adjacent areas, will not cause undesirable interference with speech and program reception.

Suggested Sound Transmission Class (STC) Ratings for Partitions



Audio-visual facilities	**50**	**50**	**15**	**IS**	**50**	**50**	**50**	**50**
Classrooms	**20**	**35**	–	–	**35**	**35**	–	**35**
Gymnasiums	**35**	50	–	–	**20**	**50**	**20**	**20**
Kitchens	50 :	**65**	**15**	**-**	**50**	**65**	**35**	**50**
Laboratory work spaces	**I5**	**35**	–	–	–	**35**	**15**	**15**
Libraries	–	–	–	-	-	-	-	-
Music practice rooms	**50**	**50**	–	–	**15**	**50**	**65**	**15**
Reception areas	**15**	**35**	–	–	**35**	**35**	–	–

Excerpts from:

A GUIDE TO

Airborne, Impact, and Structure Borne Noise-

Control in Multifamily Dwellings

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Washington D.C. 20410

Prepared for the
FEDERAL HOUSING ADMINISTRATION

Regarding recommended STC + IIC sound / impact isolation design criteria

F. RECOMMENDED CRITERIA

Descriptive definitions of three grades of acoustic environment are given in order to ascribe criteria suitable to the wide range of urban developments, geographic locations, economic conditions and other factors involved in the areas of concern of the FHA. Constructions which meet the criteria will provide good sound insulation and satisfy most of the occupants in the buildings which fit the conditions of each grade. Emphasis should be placed upon Grade II, as described below, for this category will be applicable to the largest percentage of multifamily dwelling construction and thus should be considered as the fundamental guide.

Grade I is applicable primarily in suburban and peripheral suburban residential areas, which might be considered as the "quiet" locations and as such the nighttime exterior noise levels might be about 35-40 dB(A) or lower, as measured using the "A" weighting network of a sound level meter which meets the current standards. The recommended permissible interior noise environment is characterized by noise criteria of NC20-25*. In addition, the insulation criteria of this grade are applicable in certain special cases such as dwelling units above the eighth floor in high-rise buildings and the better class or "luxury" buildings, regardless of location.

Grade II is the most important category and is applicable primarily in residential urban and suburban areas considered to have the "average" noise environment. The nighttime exterior noise levels might be about 40-45 dB (A); and the permissible interior noise environment should not exceed NC25-30 characteristics.

Grade III criteria should be considered as minimal recommendations and are applicable in some urban areas which generally are considered as "noisy" locations. The nighttime exterior noise levels might be about 55 dB(A) or higher. It is recommended that the interior noise environment should not exceed the NC-35 characteristic.

In all cases, the partition structures should have STC and IIC ratings equal to or greater than the given criterion figures. For floor-ceiling assemblies, the criteria for both airborne and impact sound insulation must be met. A floor-ceiling structure which may provide adequate impact sound insulation but insufficient airborne sound insulation, or vice versa, will not assure freedom from occupant complaints.

The fundamental or key criteria of airborne and impact sound insulation of wall and floor assemblies which separate dwelling units of equivalent function are given in Table 10-1. These criteria are based upon STC and IIC ratings derived from laboratory measurements, since standard methods of test for field measurements have not as yet been formally adopted. Figures 10.5 and 10.6 illustrate the relationship of the fundamental FHA recommended criteria with the range of airborne and impact sound insulation requirements or recommendations of other countries.

TABLE 10-1. Key Criteria of Airborne and Impact Sound Insulation Between Dwelling Units

	GRADE I	GRADE II	GRADE III
Wall Partitions	STC ≥ 55	STC ≥ 52	STC ≥ 48
Floor-Ceiling Assemblies	STC ≥ 55 IIC ≥ 55	STC ≥ 52 IIC ≥ 52	STC ≥ 48 IIC ≥ 48

The following comprehensive tables show the criterion values related to partition function as applied in the separation of dwelling units. Indeed, these tables include most of the typical separation combinations found in multifamily buildings, as well as some which are clearly undesirable for several reasons. The purpose of this detail is to illustrate the importance of the acoustical separation between sensitive and non-sensitive areas. Where the partition between dwelling units is common to several functional spaces, the partition must meet the highest criterion value.

TABLE 10-2. Criteria for Airborne Sound Insulation of Wall Partitions Between Dwelling Units

Partition Function Between Dwellings			Grade I	Grade II	Grade III
Apt. A		Apt. B	STC	STC	STC
Bedroom	to	Bedroom	55	52	48
Living room	to	Bedroom[1, 2]	57	54	50
Kitchen[3]	to	Bedroom[1, 2]	58	55	52
Bathroom	to	Bedroom[1, 2]	59	55	52
Corridor	to	Bedroom[2, 4]	55	52	48
Living room	to	Living room	55	52	48
Kitchen[3]	to	Living room[1, 2]	55	52	48
Bathroom	to	Living room[1]	57	54	50
Corridor	to	Living room[2, 4, 5]	55	52	48
Kitchen	to	Kitchen[6, 7]	52	50	46
Bathroom	to	Kitchen[1, 7]	55	52	48
Corridor	to	Kitchen[3, 4, 5]	55	52	48
Bathroom	to	Bathroom[7]	52	50	46
Corridor	to	Bathroom[3, 4]	50	48	46

TABLE 10-3. Criteria for Airborne and Impact Sound Insulation of Floor-Ceiling Assemblies Between Dwelling Units

Partition Function Between Dwellings			Grade I		Grade II		Grade III	
Apt. A		Apt. B	STC	IIC	STC	IIC	STC	IIC
Bedroom	above	Bedroom	55	55	52	52	48	48
Living room	above	Bedroom[1, 2]	57	60	54	57	50	53
Kitchen[3]	above	Bedroom[1, 2, 4]	58	65	55	62	52	58
Family room	above	Bedroom[1, 2, 5]	60	65	56	62	52	58
Corridor	above	Bedroom[1, 2]	55	65	52	62	48	58
Bedroom	above	Living room[8]	57	55	54	52	50	48
Living room	above	Living room	55	55	52	52	48	48
Kitchen	above	Living room[1, 2, 4]	55	60	52	57	48	53
Family room	above	Living room[1, 2, 5]	58	62	54	60	52	56
Corridor	above	Living room[1, 2]	55	60	52	57	48	53
Bedroom	above	Kitchen[1, 4, 6]	58	52	55	50	52	46
Living room	above	Kitchen[1, 4, 6]	55	55	52	52	48	48
Kitchen	above	Kitchen[4]	52	55	50	52	46	48
Bathroom	above	Kitchen[1, 2, 4]	55	55	52	52	48	48
Family room	above	Kitchen[1, 2, 4, 5]	55	60	52	58	48	54
Corridor	above	Kitchen[1, 2, 4]	50	55	48	52	46	46
Bedroom	above	Family room[1, 6]	60	50	56	48	52	46
Living room	above	Family room[1, 6]	58	52	54	50	52	48
Kitchen	above	Family room[6, 8]	55	55	52	52	48	50
Bathroom	above	Bathroom[4]	52	52	50	50	48	48
Corridor	above	Corridor[7]	50	50	48	48	46	46

The sound insulation between living units and other spaces within the building requires special considerations. Placement of living units vertically or horizontally adjacent to mechanical equipment rooms should be avoided whenever possible. If such cases arise, the following is applicable. Generally the recommended airborne sound insulation criteria between mechanical equipment rooms and sensitive areas in dwellings are STC $\geq$ 65, STC $\geq$ 62 and STC $\geq$ 58 for grades I, II, and III, respectively. Mechanical equipment rooms include furnace-boiler rooms, elevator shafts, trash chutes, cooling towers, garages, and the like. Sensitive areas include bedrooms and living rooms. Similarly, the recommended criteria between mechanical equipment rooms and less sensitive areas in dwellings are STC $\geq$ 60, STC $\geq$ 58 and STC $\geq$ 54 for grades I, II, III, respectively, where less sensitive areas include kitchens and family or recreation rooms. Double-wall construction is usually necessary to achieve adequate acoustical privacy. Where living units are above noisy areas, the airborne sound insulation is important and impact insulation becomes a moot point as long as structure-borne vibration is minimal. However, where mechanical equipment rooms are above living areas, the airborne sound insulation must be maintained, but in addition the impact insulation becomes extremely important and elaborate steps must be taken to assure freedom from intruding viorations and impact noise. It is not advisable to ascribe impact insulation criteria values to this case, but rather as discussed in Chapter 7, such structures should be designed to assure quiet living spaces.

Placement of dwelling units vertically or horizontally adjacent to business areas such as restaurants, bars, community laundries and the like should be avoided whenever possible. If such situations arise, the recommended airborne sound insulation criteria between business areas and sensitive living areas are STC $\geq$ 60, STC $\geq$ 58 and STC $\geq$ 56 for grades I, II, III, respectively. If the living areas are situated above business areas, impact insulation criteria of IIC $\geq$ 60, IIC $\geq$ 58 and IIC $\geq$ 56 should be adequate; however, if the relative locations are reversed, i.e. business areas above living areas, the impact insulation criteria values should be increased at least by 5 points.

TYPICAL DESIGN CRITERIA FOR EDUCATION FACILITIES

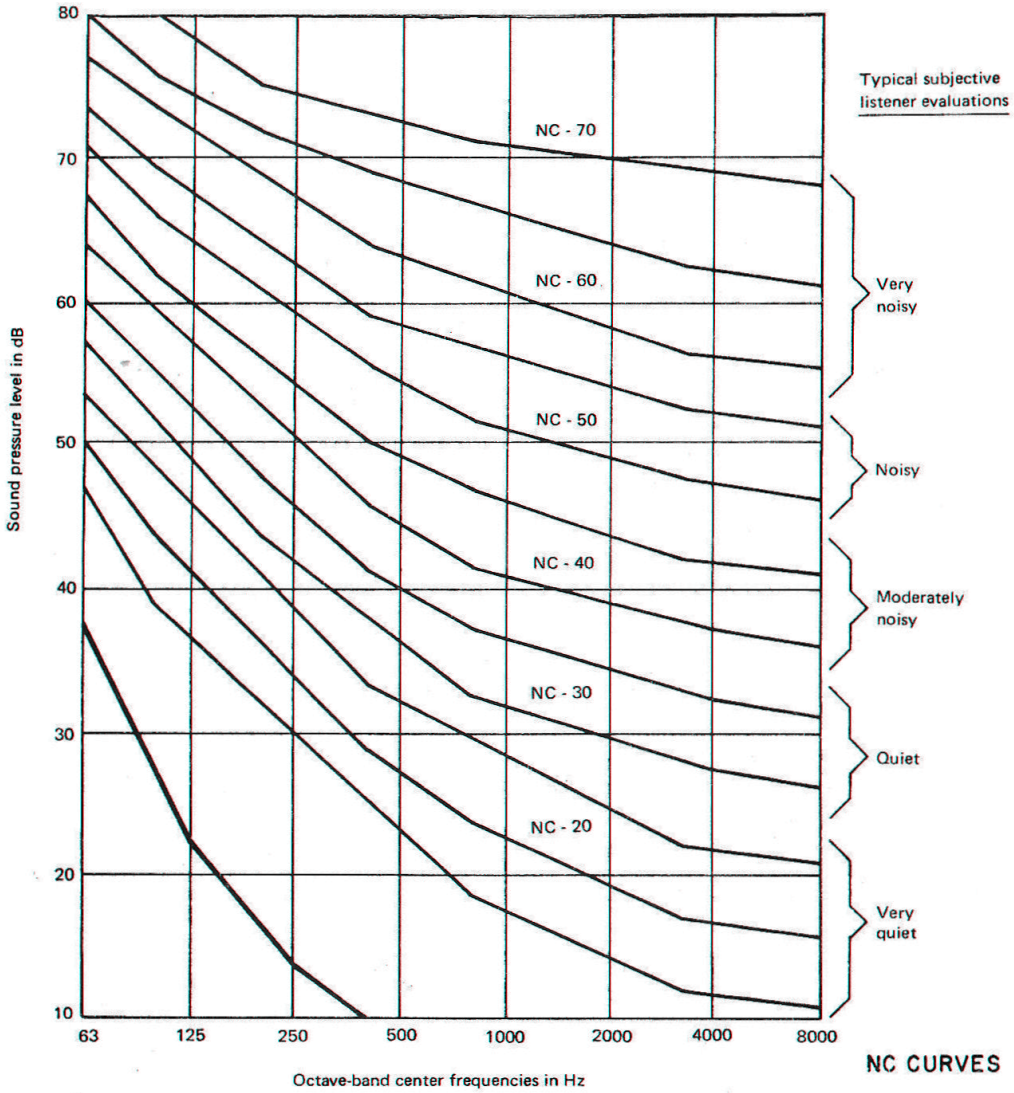
Multi-Purpose Room:
Reverberation Time (RT60): **0.83 seconds @500 Hz** ***NOTE 1***
Noise Criteria Curve: **NC-35**
Sound Transmission Class Rating – Walls: **STC-50**
Sound Transmission Class Rating – Doors: **STC-35**
Sound Transmission Class Rating – Windows: **STC-45**
Sound Transmission Class Rating – Gypsum Ceiling: **STC-50**
Sound Transmission Class Rating – Operable Partition: **STC-50**
Ceiling Attenuation Class Rating – Acoustical Ceiling Tile: **CAC-39**

Classrooms (typical):
Reverberation Time (RT60): **0.59 seconds @500 Hz** ***NOTE 1***
Noise Criteria Curve: **NC-35**
Sound Transmission Class Rating – Walls: **STC-50**
Sound Transmission Class Rating – Doors: **STC-35**
Sound Transmission Class Rating – Windows: **STC-45**
Sound Transmission Class Rating – Gypsum Ceiling: **STC-50**
Sound Transmission Class Rating – Operable Partition: **STC-50**
Ceiling Attenuation Class Rating – Acoustical Ceiling Tile: **CAC-39**

Distance Learning Lab:
Reverberation Time (RT60): **0.61 seconds @500 Hz** ***NOTE 1***
Noise Criteria Curve: **NC-35**
Sound Transmission Class Rating – Walls: **STC-50**
Sound Transmission Class Rating – Doors: **STC-35**
Sound Transmission Class Rating – Windows: **STC-45**
Sound Transmission Class Rating – Gypsum Ceiling: **STC-50**
Sound Transmission Class Rating – Operable Partition: **STC-50**
Ceiling Attenuation Class Rating – Acoustical Ceiling Tile: **CAC-39**

Recommended Noise Criteria Curves

Type of Space	Curve
Broadcast studios	15–20
Concert halls	15–20
Legitimate theaters (500 seats, no amplification)	20–25
Music rooms	25
Schoolrooms (no amplification)	25
Television studios	25
Apartments and hotels	25–30
Assembly halls (amplification)	25–35
Homes (sleeping areas)	25–35
Motion-picture theaters	30
Hospitals	30
Churches (no amplification)	25
Courtrooms (no amplification)	25
Libraries	30
Restaurants	45
Coliseums for sports only (amplification)	50



THE RATING OF ACOUSTICAL PRIVACY & INTELLIGIBILITY

An in-field determination of audio privacy between two points takes into account all relevant coustical factors. These factors include (1) the loudness of speech, music, or machines; (2) the sound attenuation of intervening distance, walls, ceilings, floors, doors, ducts, windows, piping, etc.; (3) the level of background sound at each listening location; and (4) the listeners' ability to electronically filter and recover speech signals buried in background noise.

PRIVACY & INTELLIGIBILITY INDEXES. These ratings incorporate all acoustical factors into a highly precise measurement of site conditions. The indexes rate privacy and intelligibility using methods described in various standards. Because of the mathematical complexity, they are determined with the aid of a computer program.

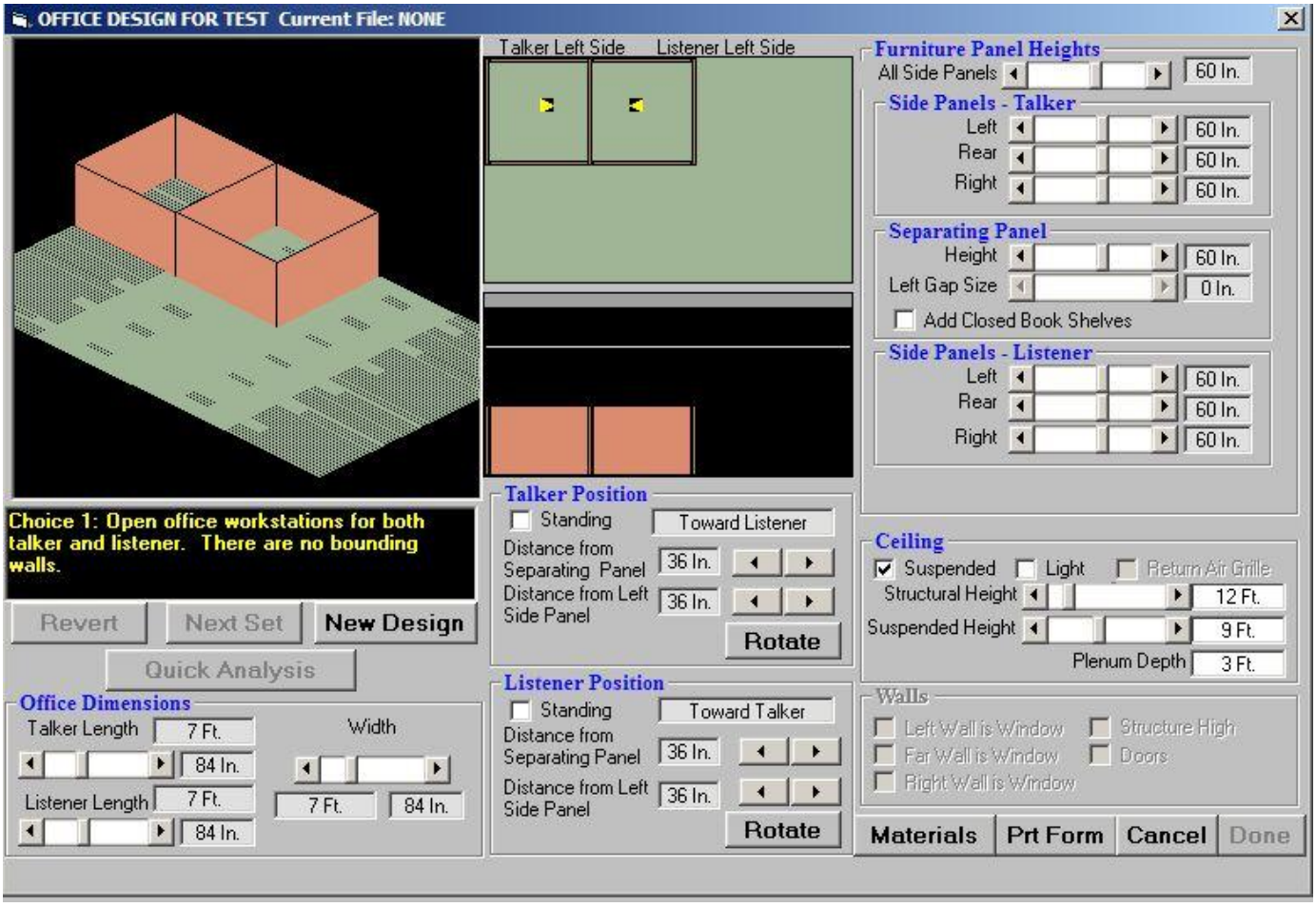
Chanaud Privacy Index (PI) - Developed by Dr. Robert Chanaud
Articulation Index (AI) per ANSI S3.5
Speech Intelligibility of Sentences Known to Listeners (SISK) per ANSI S3.5
Speech Intelligibility of Sentences First Heard by Listeners (SISF) per ANSI S3.5

DEGREE OF PRIVACY	*** PI ***	***** AI *****	** SISK **	** SISF **
SECRET	100%	0.00	0%	0%
CONFIDENTIAL	100 to 95%	0.00 to 0.05	0 to 10%	0 to 6%
NORMAL	94 to 85%	0.06 to 0.15	10 to 72%	6 to 33%
TRANSITIONAL	84 to 80%	0.16 to 0.20	72 to 78%	34 to 49%
POOR	79 to 70%	0. 21 to 0.30	78 to 92%.	50 to 79%
NO PRIVACY	< 70%	> 0.30	> 92%.	> 79%.

Standard loudness values for speech are used, or voice, music or machine sound levels are measured where necessary. The standard voice level categories are:

VOICE LEVELS	DESCRIPTION	VOICE LEVEL CORRECTION
WHISPER	Only upper nasal passages used	-6 dB
NORMAL	Conference table levels	0 dB
RAISED	Amplified A/V or Conflict situations	+10 dB
SHOUT	Loss of vocal control	+20 dB
SPEAKER PHONE	Desk speaker phone conversation	+5 dB

EXAMPLE
FROM
SPECTRA TECH'S OPEN PLAN OFFICE DESIGN ANALYSIS PROGRAM



ON-SITE PRIVACY / INTELLIGIBILITY TESTING & RATING PROCEDURES

On-site field tests do not rely on any estimates, since they measure EXACTLY what is happening in the real situation to rate acoustical privacy / intelligibility.

NOISE CRITERIA (NC) CURVE RATING: The ambient background sound level at the "listening" position is also measured since this ambient background sound has a direct bearing on a listener's ability to hear and / or understand the speech, music, or machine noise. The term "ambient background noise level" identifies all noise within or entering into the space from all sources other than occupant activity. This would include noise originating noise from sources inside and outside of the listening location, (e.g., street noise, HVAC system noise, elevator noise, etc.)

RT60 REVERBERATION TIME: A loud impulse noise is created at the "listening" location. Sound levels at all 1/3 octave band frequencies of interest are simultaneously sampled, recorded, and analyzed to determine the time required for the impulse sound to decay 60 dB. This rating is called the RT60 reverberation time of the space. The values are taken into account in subsequent calculations to allow comparison and adjustment of the results (if necessary) to a "standard" room having "typical" reverberation characteristics.

SOUND ATTENUATION BETWEEN SOURCE AND LISTENING LOCATIONS: An amplified "pink noise" sound source is positioned at the "source" location and set to produce a test signal of sufficient level (typically 90 to 100 dB) at all audio frequencies of interest (63 Hz to 8000 Hz). Sound levels at all 1/3 octave band frequencies of interest are simultaneously sampled, recorded, and averaged for ten seconds at a rate of four times per second, first at the "source" and then "listening" positions. In order to develop a statistical sample that satisfies the ASTM standard, the testing microphone is moved to ten random locations within the boundaries of each position.

FIELD SOUND TRANSMISSION CLASS (FSTC) RATING: The rating is computed based on the sound attenuation test and reverberation time at the receiving location.

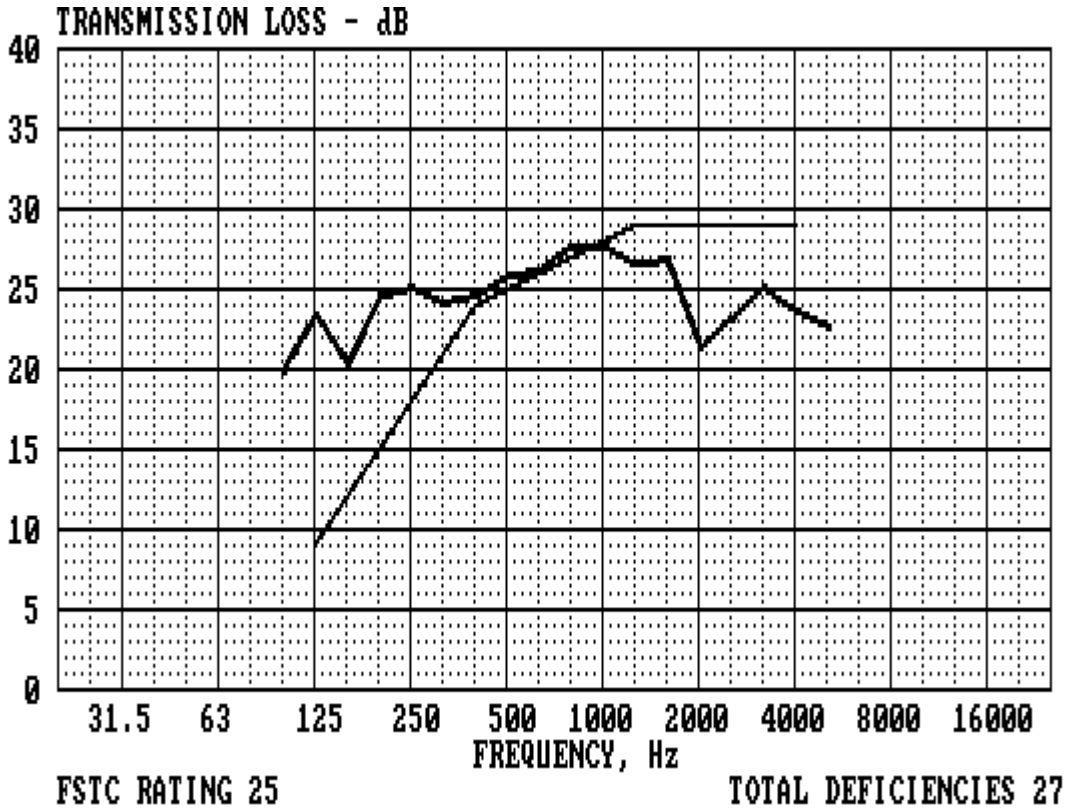
SOURCE SOUND LEVEL: A field test can be used to document the actual sound level of the speech, music, or machine noise source. Alternatively, reference test files for various sources can be used when onsite tests of the source are not possible at the site.

PRIVACY / INTELLIGIBILITY RATINGS: The privacy / intelligibility goal of the listeners is determined, based on the intended use of the space and classification of occupants needs. Mathematical test data for all of the variables described above are assembled into Spectra Tech's proprietary computer program, which then calculates the various privacy index values.

SOUND MASKING SYSTEM LEVEL ADJUSTMENT: If the listening location requires an increase in the ambient background sound level to achieve the desired level of privacy, the output level of a masking sound system is calculated at each of 21 frequency bands in the range of speech communication. The masking system is then tuned and adjusted to produce this spectrum at each masking speaker.

FIELD TEST REPORT – FIELD SOUND TRANSMISSION CLASS

PROJECT: Government Office Building
TEST DATE: February 28, 2012 **FOR:** A. Client & Associates
TEST SITE: 10th Floor **TEST POINT: 14**
SOURCE ROOM: Hancock Office **RECEIVING ROOM: East Office @ door**
TEST: Field Sound Transmission Class (FSTC) **TEST STANDARD:** ASTM E336
DESCRIPTION: Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
SITE CONDITIONS: Normal activity, unoccupied
RATING: FSTC-25 (27 deficiencies)



TEST EQUIPMENT: Spectra Tech Acoustical Measurement System, Ivie #IE-30 Spectrum Analyzer
CALIBRATION: Factory 07/12/11 – verified immediately prior to test
TIMING & FREQUENCY WEIGHTING SETUP: Fast response / unweighted / 1/3 octave
PROCEDURE: Ten 10 second samples of noise at typical source and receiving locations, RT60 at receiving location, background noise / signal-to-noise check, averaging and rating per ASTM standard
NOISE SOURCE FOR TEST: Spectra Tech tuned noise source, 150 watt full range amplifier / speaker
PRESENT: Richard Lemker
FILES: Hancock>East@d

REPORT PREPARED BY:

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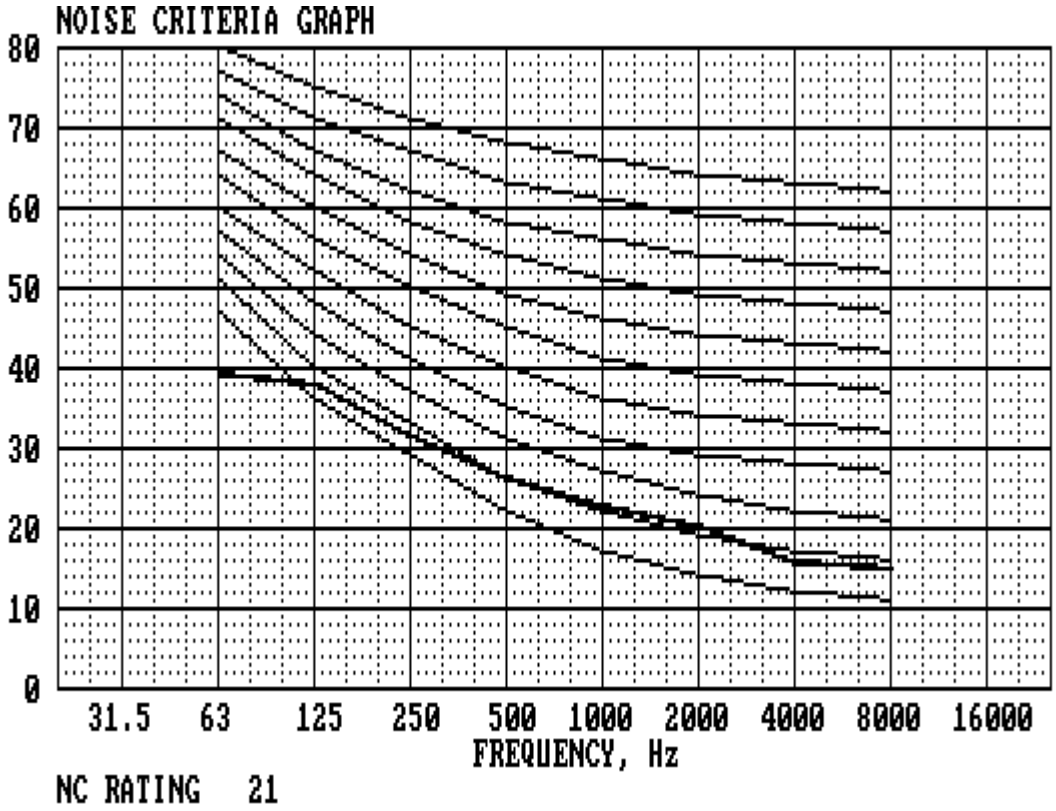
Cincinnati, OH 513.419.9169 service@SpectraTechLtd.com
PO Box 14082, Cincinnati, OH 45250

DATE: March 1, 2012 Certified: *Richard J. Lemker, Lead Consultant*

FIELD TEST REPORT – NOISE CRITERIA CURVE

PROJECT: Government Office Building
TEST DATE: February 28, 2012 **FOR:** A. Client & Associates
TEST SITE: 4th Floor **TEST POINT: 4**
PRIMARY NOISE SOURCE: HVAC System **TEST LOCATION: Office 4108A**
TEST: Ambient Noise – Noise Criteria (NC) Curve **TEST STANDARD:** ANSI/ASA S12.2
REFERENCE: Criteria for Evaluating Room Noise (HVAC Noise) – per ASHRAE
SITE CONDITIONS: Normal activity, unoccupied
RATING: NC-21 Noise Criteria Curve



TEST EQUIPMENT: Spectra Tech Acoustical Measurement System, Ivie #IE-30 Spectrum Analyzer
CALIBRATION: Factory 07/12/11 – verified immediately prior to test
TIMING & FREQUENCY WEIGHTING SETUP: Fast response / unweighted / 1/3 octave
PROCEDURE: Ten 10 second samples of noise at typical location, background noise / signal-to-noise check, averaging and rating per ASTM standard
PRESENT: Richard Lemker
FILES: 4108NC

REPORT PREPARED BY:

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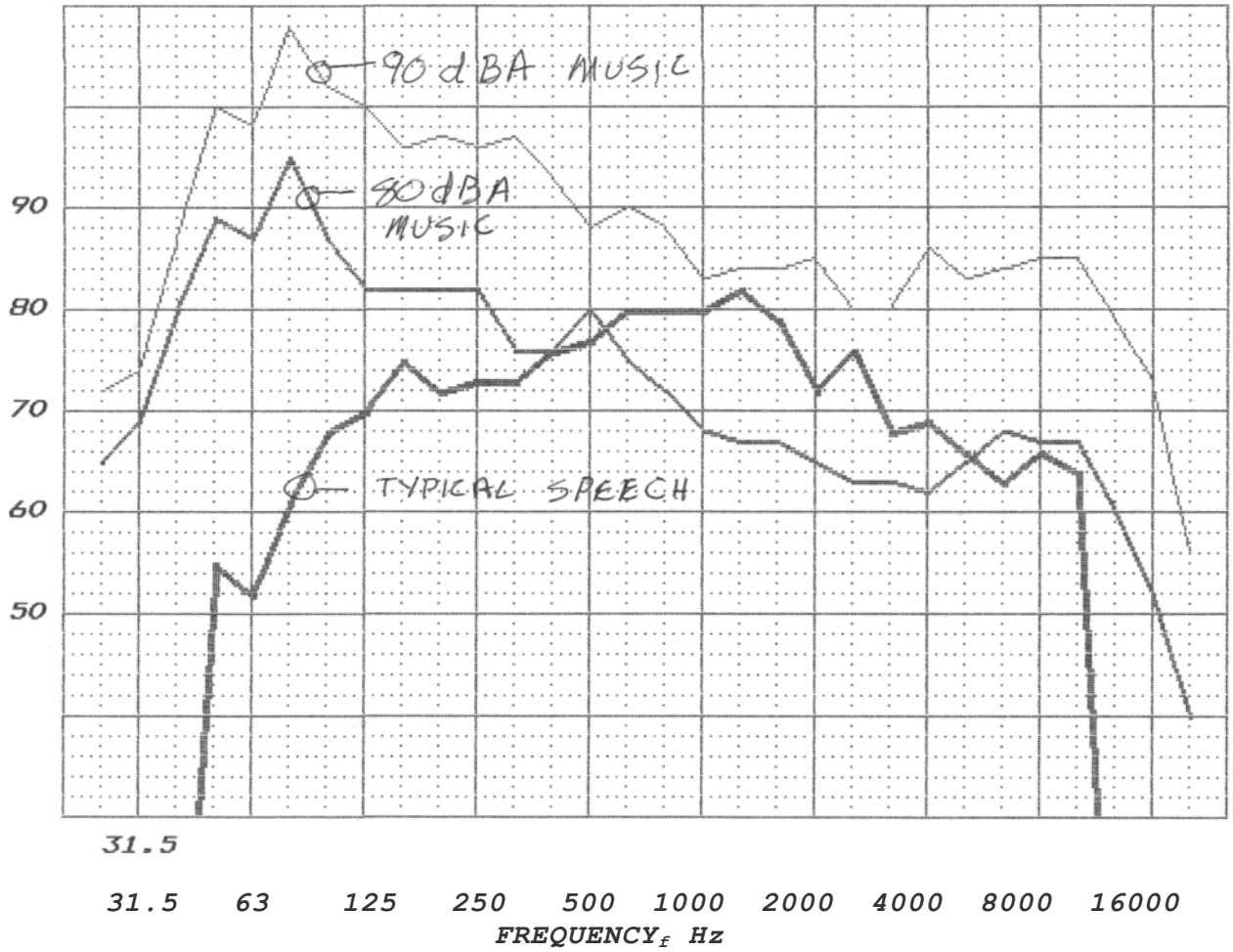
PO Box 14082, Cincinnati, OH 45250

DATE: _____March 1, 2012_____Certified: _____*Richard J. Lemker, Lead Consultant*

FIELD TEST REPORT

PROJECT: *SAMPLE*
ROOM: **TEST:** *TYPICAL SPEECH & MUSIC SOUND LEVELS*
DATE: **PREPARED FOR:** *A. CLIENT*

Lp_t dB re:20uPa



DESCRIPTION: *Typical sound spectra of speech & music sources*

NOTES: *Measured* **at** *source location*
TEST EQUIPMENT: *Ivie #IE-30$_f$ AMS computer program*
PROCEDURE: *All* **test data** *recorded and analyzed by computer*
SITE CONDITIONS: *normal environment*
PRESENT: *R, Lemker*
DATA FILES: *LOUDROCK, MEDIUMROCK, SPEECH-TYP*

KEY TO SPECTRA TECH PRIVACY REPORT PRINTOUTS

In order to assist you in reading the enclosed privacy test reports, please note the location of the following data on each report:

TOP LINE: ***Project name, data file name, and location of test***
(example:143 > 145 is a file name/location describing a privacy test originating in the Office #143, with privacy measured at the Office #145)

2ND LINE: ***Test source file name, background noise file name***

3RD LINE: ***SRC:*** signal recovery correction (0 typically used for all tests), type of privacy (NORMAL SPEECH is typically used for all tests)

GRAPHICS: Top graph shows plot of actual privacy vs. 100%privacy (all plots below 100% line are deficiencies)

PRIVACY INDEX: single number descriptor of the rated privacy, per Chanaud Privacy Index scale, in %

PRIVACY RATING: classification of privacy rating
(example: NO PRIVACY, TRANSITIONAL PRIVACY, etc.)

Bottom graph shows plot of ambient noise spectrum used in privacy evaluation computations

BACKGROUND SPECTRUM LEVEL: dBA of ambient noise level

FIELD TEST RESULTS / PREDICTION WITH MASKING: indicates whether the privacy rating is based on an actual field test, or is a prediction that takes into account the presence of a future sound masking system

RIGHT COLUMN: ***SISK:*** Speech Intelligibility of Sentences Known to Listeners (familiar subject matters), in %

SISP: Speech Intelligibility of Sentences First Heard by Listeners (unfamiliar subject matters), in %

AI: Articulation Index rating, per ANSI S3.5

FSTC: Field Sound Transmission Class rating of tested partition or other elements of construction

DBF: FSTC test, deficiency total

Please consult the attached documents for a further explanation of privacy evaluation criteria and test standards.

PRIVACY: FIELD TEST REPORTS – RATING EXAMPLES