

## **Appendix C**

# **IMPLEMENTATION MATERIALS**

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The materials in this appendix are for use in implementing the Noise Compatibility Program for Williams Gateway Airport and include the following:

- National Business Aviation Association (NBAA) Noise Abatement Procedures;
- “Noise Awareness Steps” published by the Aircraft Owners and Pilots Association (AOPA);
- Federal Aviation Administration Advisory Circular 91-53A Noise Abatement Departure Profiles;
- Sample Letter of Agreement for Helicopter Routes;
- Model Subdivision Regulations Amendment;
- Maricopa Association of Governments Sound Insulation Standards; and
- Aircraft Noise Disclosure Statement.

**AIRCRAFT OWNERS AND PILOTS ASSOCIATION  
(AOPA)  
NOISE AWARENESS STEPS**

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Following are some general guidelines and techniques to minimize the noise impact produced by aircraft operating near the ground:

1. If practical, avoid noise-sensitive areas such as residential areas; open-air assemblies (e.g., sporting events and concerts), and national park areas. Make every effort to fly at or above 2,000 feet over the surface of such areas when overflight cannot be avoided.
2. Consider using a reduced power setting if flight must be low because of cloud cover or overlying controlled airspace or when approaching the airport of destination. Propellers generate more noise than engines; flying with the lowest practical rpm setting will reduce the aircraft's noise level substantially.
3. Perform stalls, spins, and other practice maneuvers over uninhabited terrain.
4. Many airports have established specific noise abatement procedures. Familiarize yourself and comply with these procedures.
5. Work with airport managers and fixed-base operators to develop procedures to reduce the impact on noise-sensitive areas.
6. To contain aircraft noise within airport boundaries, avoid performing engine runups at the ends of runways near housing developments. Instead, select a location for engine runup closer to the center of the field.
7. On takeoff, gain altitude as quickly as possible without compromising safety. Begin takeoffs at the start of a runway, not at an intersection.
8. Retract the landing gear either as soon as a landing straight ahead on the runway can no longer be accomplished or as soon as the aircraft achieves a positive rate of climb. If practical, maintain best-angle-of-climb airspeed until reaching 50 feet or an altitude that provides clearance from terrain or obstacles. Then accelerate to best-rate-of-climb airspeed. If consistent with safety, make the first power reduction at 500 feet.
9. Fly a tight landing pattern to keep noise as close to the airport as possible. Practice descent to the runway at low power settings and with as few power changes as possible.
10. If a VASI or other visual approach guidance system is available, use it. These devices will indicate a safe glidepath and allow a smooth, quiet descent to the runway.

11. If possible, do not adjust the propeller control for flat pitch on the downwind leg; instead, wait until short final. This practice not only provides a quieter approach, but also reduces stress on the engine and propeller governor.
12. Avoid low-level, high-power approaches, which not only create high noise impacts, but also limit options in the event of engine failure.

*Note: These recommendations are general in nature; some may not be advisable for every aircraft in every situation. No noise reduction procedure should be allowed to compromise flight safety.*

Source: *AOPA's Aviation USA - 1994*

## SAMPLE LETTER OF AGREEMENT

### HELICOPTER DEPARTURE AND ARRIVAL PROCEDURES

1. PURPOSE. This letter of agreement specifies responsibilities, defines terms, and establishes procedures to be used between \_\_\_\_\_ Tower and signatory operators for control and operation of helicopters operating within the \_\_\_\_\_ Class \_\_\_\_ Airspace under VFR and Special VFR weather conditions.

2. CANCELLATION. This Letter of Agreement cancels the Letter of Agreement, \_\_\_\_\_.

3. SCOPE. Unless otherwise coordinated and approved, the procedures contained herein shall be used by helicopter pilots under the jurisdiction of the signatories of this agreement while conducting flights to or from locations on \_\_\_\_\_ Airport and within the \_\_\_\_\_ Class \_\_\_\_ Airspace. The provisions of this agreement are applicable only when \_\_\_\_\_ Tower is in operation.

4. RESPONSIBILITIES.

a. Helicopter company signatories to this letter of agreement shall be responsible to ensure each pilot, operating a helicopter under their jurisdiction, is thoroughly briefed, is familiar with, and can demonstrate a working knowledge of the procedures contained herein.

b. Helicopter company signatories to this letter of agreement shall be responsible to secure, from the appropriate party, approval to depart, maneuver, and arrive within non-movement areas.

c. \_\_\_\_\_ Tower shall provide air traffic and advisory services in response to operational requests and as required by immediate circumstances.

5. DEFINITION OF APPLICABLE TERMS.

a. **Movement Area.** The runways and taxiways utilized for taxiing/hover taxiing, air taxiing, takeoff and landing of aircraft, exclusive of loading ramps and parking areas. Specific approval from the tower is required for entry onto the movement area.

b. **Non-movement Area.** Ramp, Heliport, Auto-Rotation Pad, and loading area, not controlled by the tower.

- c. Auto-rotation pad. *Enter Location Description.*
- d. Heliport. Designated helicopter arrival and departure pad located immediately *Enter Location Description.*
- e. Reference Points:
  - (1) North Point – *Enter Location Description*, used in all procedures described in this agreement.
  - (2) South Point – *Enter Location Description*, used only by the east and south procedures described in this agreement.
- f. Transition – airport ingress/egress routes are referred to as north transition (Alpha) and south transition (Bravo).
- g. Standard departure/arrival procedures – procedures for operations to/from the north and south reference points.
- h. “departure/arrival will be at your own risk” – a phrase used by the tower approving a takeoff or landing from the heliport and any other non-movement area not clearly visible from the tower.

6. PROCEDURES. All departure and arrival profiles are a combination of two phases of flight, a transition phase to egress or ingress the airport and the departure and arrival phase.

- a. Helicopters shall:
  - (1) Use frequency \_\_\_\_\_, unless otherwise specified by Tower.
  - (2) State the following on initial contact:
    - (a) Departures – position, transition and standard departure procedure.
    - (b) Arrivals – position.
    - (c) Operations not covered by this agreement – position and specific service request.
  - (3) Operations, which will cross the runway, shall not be made until specifically authorized by the control tower, see paragraph 6b(4).

(4) Apply internally developed noise abatement procedures, particularly while conducting operations to the north, south, and west.

b. \_\_\_\_\_ Tower shall:

(1) Issue ATC clearances to aircraft operating to/from movement area.

(2) Approve a pilot's request to operate within the \_\_\_\_\_ Class \_\_\_\_\_ Airspace. Approve takeoff and/or landing from a non-movement area by stating, "... at your own risk", followed by applicable traffic and/or instructions, as necessary, or

(3) Issue traffic advisories to resolve conflicts within the Class \_\_\_\_\_ airspace, when appropriate, and as time permits.

(4) Issue a specific ATC clearance, to cross the runways when a departure or arrival profile crosses the airport.

7. DEPARTURE TRANSITIONS.

(a) Alpha – *Enter Location Description.*

(b) Bravo – *Enter Location Description.*

8. ARRIVAL TRANSITIONS. Arriving helicopters will announce transition route prior to reaching North Point.

(a) Alpha – *Enter Location Description.*

(b) Bravo – *Enter Location Description.*

9. STANDARD DEPARTURE PROCEDURES AND ALTITUDE. All standard departure routes originate at *Enter Location Description.*

(a) North – *Enter Location Description.*

(b) East – *Enter Location Description.*

(c) South – *Enter Location Description.*

(d) West – *Enter Location Description.*

10. STANDARD ARRIVAL PROCEDURES AND ALTITUDES. All standard arrival procedures terminate at *Enter Location Description*.

(a) North Arrival – *Enter Location Description*.

(b) East Arrival – *Enter Location Description*.

(c) South Arrival – *Enter Location Description*.

(d) West Arrival – *Enter Location Description*.

# MODEL SUBDIVISION REGULATIONS AMENDMENT

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	<b>Section 1.0</b>	<b>Purpose</b>
<b>Section 2.0</b>		<b>Definitions</b>
<b>Section 3.0</b>		<b>Area of Applicability</b>
<b>Section 4.0</b>		<b>Plat Notice</b>
<b>Section 5.0</b>		<b>Avigation Easement</b>
<b>Section 6.0</b>		<b>Fair Disclosure Agreement</b>

**SECTION 1.0 PURPOSE.** This chapter is intended to protect the public health, safety and welfare by regulating development and land use within noise sensitive areas and airport hazard areas; to ensure compatibility between Williams Gateway Airport and surrounding land uses; and to protect the Airport from incompatible encroachment.

## **SECTION 2.0 DEFINITIONS.**

**2.1 Airport Planning Area:** The area currently exposed to aircraft noise and low aircraft overflights and at risk of being exposed to aircraft noise and low overflights over the long-term future. It is presented in the Noise Compatibility Plan. See the F.A.R. Part 150 Noise Compatibility Study for Williams Gateway Airport for more information.

**2.2 Day-Night Sound Level (DNL):** The 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 a.m. and between 10 p.m. and midnight, local time, as averaged over one year. It is the Federal Aviation Administration's standard metric for determining the cumulative exposure of individuals to noise.

**2.3 DNL Contour:** A line linking together a series of points of equal cumulative noise exposure based on the DNL metric. Such contours are developed based on aircraft flight patterns, number of daily aircraft operations by type of aircraft and time of day, noise characteristics of each aircraft, and typical runway usage patterns.

**2.4 Decibel (dB):** A unit of measure of a sound expressed from a calibrated sound level meter using an A-level weighting scale.

**2.5 Structure:** Any object, whether permanent or temporary, including, but not limited to, a building, tower, crane, smokestack, earth formation, transmission line, flagpole, or ship mast, and includes a mobile object.

**SECTION 3.0 AREA OF APPLICABILITY.** For purposes of this chapter, the standards and requirements provided herein shall apply within the Airport Planning Area.

**SECTION 4.0 PLAT NOTICE.** A notice of potentially high aircraft noise levels shall be affixed to and recorded with the final plat (or for a minor subdivision, the deed) for properties in the Airport Planning Area. The notice shall be worded as follows:

"**NOISE WARNING** - All or part of this property is in an area potentially subject to aircraft noise levels high enough to annoy users of the property and interfere with its unrestricted use. Contact Williams Gateway Airport Director for information regarding the most recently calculated levels of current and forecast aircraft noise levels on the property."

**SECTION 5.0 AVIGATIONAL EASEMENT.** An avigational easement shall be granted to the Williams Gateway Airport Authority before approval of the final plat or deed for all subdivisions where required by the \_\_\_\_\_ Zoning Ordinance.

**SECTION 6.0 FAIR DISCLOSURE AGREEMENT.** For all subdivisions, a fair disclosure agreement shall be filed whereby the owner and his or her agents agree fully to disclose to prospective buyers of the property the potential airport noise impacts to which the property may be subject. This agreement shall be written and recorded as a covenant running with the land, binding all succeeding owners of the property within the subdivision.

**MARICOPA ASSOCIATE OF GOVERNMENT**  
**SOUND INSULATION STANDARDS**

**SECTION 1215. DEFINITIONS**

In this ordinance, unless the context otherwise requires:

“ASTM (American Society for Testing and Materials)” means an organization which develops and publishes recommended practices and standards for a broad range of testing and material properties issues.

“A-WEIGHTED SOUND LEVEL” means a quantity, in decibels, read from a standard sound level meter which discriminates against the lower frequencies to which the ear is less sensitive. The A-weighted scale attempts to approximate the auditory sensitivity of the human ear.

“DAY-NIGHT AVERAGE SOUND LEVEL (DNL)” means the A-weighted equivalent continuous sound exposure for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10 p.m. to 7 a.m.)

“INTERIOR NOISE LEVEL” means the sound level of noise in any habitable room with windows and doors closed.

“NOISE CONTOURS” mean lines which connect points subject to equal noise levels expressed in terms of average daily noise over a 24-hour period.

“R-VALUE” means insulation properties of an assembly. Insulation properties are further defined as the ability to reduce the factor of heat transmission or loss.

“SOUND TRANSMISSION CLASS (STC)” means a single-number rating for describing sound transmission loss of a wall, roof, floor, window, door, partition, or other individual building components or assemblies.

**SECTION 1217. APPLICATION TO NEW BUILDINGS**

The criteria of this ordinance establish the minimum requirements for acoustic design of the exterior envelope of buildings and for through-the-wall ventilation (HVAC) units and their parts. These requirements shall apply to all new buildings and alterations for first occupancy after October 1, 1996 that are located on property on which the average sound level is sixty-five decibels or greater. This noise level is defined by the noise contours for Luke Air Force Base prepared as a part of the 1988 Maricopa Association of Governments Westside Joint Land Use Study. The criteria of this ordinance do not apply to ancillary buildings used in agricultural land use.

## **SECTION 1219. APPLICATION TO EXISTING BUILDINGS**

- Additions may be made to existing buildings without making the entire building comply with all the requirements of this ordinance for new construction.
- If the gross floor area of a building is expanded by less than fifty percent, the requirements of this section apply only to the area of expansion. If the gross floor area of a non-residential building is expanded by fifty percent or more, the requirements of this section apply to the entire building.
- Any change in occupancy or use of a building shall not be permitted unless the building or portion of the building complies with this ordinance.

## **SECTION 1221. PLANS AND SPECIFICATIONS**

The plans and specifications shall show in sufficient detail all pertinent data and features of the building and the equipment and systems, as herein governed, including, but not limited to: exterior envelope component materials; STC ratings of applicable component assemblies; R-values of applicable insulation materials; size and type of apparatus and equipment; equipment and system controls and other pertinent data to indicate conformance with the requirements herein.

## **SECTION 1223. ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION**

- The provisions of this ordinance are not intended to prevent the use of any material or method of construction not specifically prescribed by this ordinance, provided any alternative has been approved and its use authorized by the building official.
- The building official may approve any such alternate, provided the building official finds that the proposed design is satisfactory and complies with the provisions of this ordinance and that the material or method of construction is, for the purpose intended, at least the equivalent of that prescribed in this ordinance in noise level reduction.
- The building official shall require that sufficient evidence or proof be submitted by a licensed architect or engineer to substantiate any claims that may be made regarding the use of alternative materials and methods. The details of any action granting approval of an alternate shall be recorded and entered in the files of the county, city, or town.

**SECTION 1225. BUILDING REQUIREMENTS FOR A NOISE LEVEL REDUCTION OF 25 dB**

Compliance with Section 1231 through Section 1239 in Appendix A shall be deemed to meet requirements for a minimum noise level reduction (NLR) of 25 decibels.

**SECTION 1227. BUILDING REQUIREMENTS FOR A NOISE LEVEL REDUCTION OF 30 dB**

Compliance with Section 1241 through Section 1249 in Appendix A shall be deemed to meet requirements for a minimum noise level reduction (NLR) of 30 decibels.

**SECTION 1229. BUILDING REQUIREMENTS FOR A NOISE LEVEL REDUCTION OF 35 dB**

Compliance with Section 1251 through Section 1259 in Appendix A shall be deemed to meet requirements for a minimum noise level reduction (NLR) of 35 decibels.

## SOUND ATTENUATION STANDARDS

April 9, 1996

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
General	Section 1231 a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.	Section 1241 a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.	Section 1251 a. Brick veneer, masonry blocks, or stucco exterior walls shall be constructed airtight. All joints shall be grouted or caulked airtight.
	b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.	b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.	b. At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar.
	c. Window and/or through-the-wall ventilation units (HVAC) shall not be used.	c. Window and/or through-the-wall ventilation (HVAC) units shall not be used.	c. Window and/or through-the-wall ventilation units shall not be used.
	d. Through-the-wall/door mail boxes shall not be used.	d. Through-the-wall/door mail boxes shall not be used.	d. Through-the-wall/door mail boxes shall not be used.
	e. All sleeping spaces shall be provided with a sound-absorbing ceiling system and carpeted floors.	e. All sleeping spaces shall be provided with a sound-absorbing ceiling system and a carpeted floor.	e. All sleeping spaces shall be provided with a sound-absorbing ceiling system and a carpeted floor.
		f. Operational vented fireplaces shall not be used.	f. Operational vented fireplaces shall not be used.

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
Exterior Walls	Section 1233 1. Exterior walls, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC 39;	Section 1243 1. Exterior walls, other than as described in this section, shall have a laboratory sound transmission class rating of at least STC 44;	Section 1253 1. Exterior walls, other than as described in this section shall have a laboratory sound transmission class rating of at least STC 49;
	2. Masonry walls having a weight of at least 25 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy "bridging" paint.	2. Masonry walls having a weight of at least 40 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy "bridging" paint.	2. Masonry walls having a weight of at least 75 pounds per square foot do not require a furred (stud) interior wall. At least one surface of concrete block walls shall be plastered or painted with heavy "bridging" paint.
	3. Stud walls shall be at least 4 inches in nominal depth and shall be finished on the outside with solid sheathing under an approved exterior wall finish; siding-on-sheathing, stucco or brick veneer.	3. Stud walls shall be at least 4 inches in nominal depth and shall be finished on the outside with solid sheathing under an approved exterior wall finish: siding on sheathing, stucco or brick veneer.	3. Stud walls shall be at least 4 inches in nominal depth and shall be finished on the outside with solid sheathing under an approved exterior wall finish: siding-on-sheathing, stucco, or brick veneer.
	1. Interior surface or the exterior walls shall be of gypsum board or plaster at least 1/2 inch thick, installed on the studs.	1. Interior surface of the exterior walls shall be of gypsum board or plaster at least 1/2 inch thick, installed on the studs. The gypsum board or plaster may be fastened rigidly to the studs if the exterior	1. Interior surface of the exterior walls shall be of gypsum board or plaster at least 5/8 inch thick installed on the studs. The gypsum board or plaster may be fastened rigidly to the

		is brick veneer or stucco. If the exterior is siding-on-sheathing, the interior gypsum board or plaster must be fastened resiliently to the studs.	studs if the exterior is brick veneer or stucco. If the exterior is siding-on-sheathing, the interior gypsum board or plaster must be fastened resiliently to the studs or double thickness must be used.
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	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
	2. Continuous composition board, plywood, or gypsum board sheathing at least 1/2 inch thick shall cover the exterior side of the wall studs behind wood or metal siding. Asphaltic or wood shake shingles are acceptable in lieu of siding.	2. Continuous composition board, plywood, or gypsum board sheathing at least 3/4 inch thick shall cover the exterior side of the wall studs behind wood or metal siding. The sheathing and facing shall weigh at least 4 pounds per square foot.	2. Continuous composition board, plywood, or gypsum board sheathing at least 1 inch thick shall cover the exterior side of the wall studs. The sheathing and facing shall weigh at least 4 pounds per square foot.
	3. Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.	3. Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.	3. Sheathing panels shall be butted tightly and covered on the exterior with overlapping building paper. The top and bottom edges of the sheathing shall be sealed.
	4. Insulation material at least R-11 shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.	4. Insulation material at least R-15 shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.	4. Insulation material at least R-19 shall be installed continuously throughout the cavity space behind the exterior sheathing and between wall studs. Insulation shall be glass fiber or mineral wool.
Exterior Windows	Section 1234 1. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-28;	Section 1244 1. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-	Section 1254 1. Windows other than as described in this section shall have a laboratory sound transmission class rating of at least STC-

	28;	33;	38;
	2. Glass shall be at least 3/16 inch thick, double glazed.	2. Windows shall be double glazed with panes at least 3/16 inch thick. Panes of glass shall be separated by a minimum 1/2 inch airspace.	2. Glass of double glazed windows shall be at least 3/16 inch thick. Panes of glass shall be separated by a minimum 1/2 inch airspace and shall not be equal in thickness.

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
	3. All operable windows shall be weatherstripped and airtight when closed so as to conform to an air infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.	3. Double-glazed windows shall employ fixed sash or efficiently weather-stripped, operable sash. The sash shall be rigid and weatherstripped with material that is compressed airtight when the window is closed so as to conform to an infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.	3. Double-glazed windows shall employ fixed sash or efficiently weatherstripped, operable sash. The sash shall be rigid and weather-stripped with material that is compressed airtight when the window is closed so as to conform to an infiltration test not to exceed 0.5 cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.
	4. Glass of fixed sash windows shall be sealed in an airtight manner with a nonhardening sealant or a soft elastomer gasket or glazing tape.	4. Glass of fixed sash windows shall be sealed in an airtight manner with a nonhardening sealant or a soft elastomer gasket or gasket tape.	4. Glass of windows shall be sealed in an airtight manner with nonhardening sealant or a soft elastomer or glazing tape.
	5. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-00227, TT-S-00230, or TT-S-00153.	5. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-0027, TT-S-00230, or TT-S-00153.	5. The perimeter of window frames shall be sealed airtight to the exterior wall construction with a sealant conforming to one of the following Federal specifications: TT-S-00227, TT-S-00230, or TT-S-00153.
	6. The total area of glass in both windows and	6. The total area of glass of both windows and	6. The total area of glass of both windows and

	doors in sleeping spaces shall not exceed 20% of the floor area.	exterior doors in sleeping spaces shall not exceed 20% of the floor area.	exterior doors in sleeping spaces shall not exceed 20% of the floor area.
Exterior Doors	<p>Section 1235</p> <p>1. Doors other than as described in this section shall have a laboratory sound transmission class rating of at least STC-28.</p>	<p>Section 1245</p> <p>1. Doors other than as described in this section shall have a laboratory sound transmission class rating of at least STC-33.</p>	<p>Section 1255</p> <p>1. Doors other than as described in this section shall have a laboratory sound transmission class rating of at least STC 38.</p>

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
	2. All exterior side-hinged doors shall be solid core wood or insulated hollow metal at least 1-3/4 inches thick and shall be fully weatherstripped.	2. Double door construction is required for all door openings to the exterior. Openings fitted with side-hinged doors shall have one solid core wood or insulated hollow metal door at least 1-3/4 inches thick separated by an airspace of at least 4 inches from another door, which can be a storm door. Both doors shall be tightly fitted and weatherstripped.	2. Double door construction is required for all door openings to the exterior. The doors shall be side-hinged and shall be solid core wood or insulated hollow metal door at least 1-3/4 inches thick, separated by a vestibule or enclosed porch at least 3 feet in length. Both doors shall be tightly fitted and weather-stripped.
	3. Exterior sliding doors shall be weather-stripped with an efficient airtight gasket system with performance as specified in Section 1234 (c). The glass in the sliding doors shall be at least 3/16 inch thick.	3. The glass of double glazed sliding doors shall be separated by a minimum 1/2 inch airspace. Each sliding frame shall be provided with an efficiently airtight weatherstripping material as specified in Section 1244 (c).	3. The glass of double glazed sliding doors shall be separated by a minimum 1/2 inch airspace. Each sliding frame shall be provided with an efficiently airtight weather-stripping material as specified in Section 1254 (c).
	4. Glass in doors shall be sealed in an airtight nonhardening sealant or in a soft elastomer gasket or glazing tape.	4. Glass in all doors shall be at least 3/16 inch thick. Glass in double sliding doors shall not be equal in thickness.	4. Glass of all doors shall be at least 3/16 inch thick. Glass in double sliding doors shall not be equal in thickness.
	5. The perimeter of door frames shall be sealed airtight to the exterior wall construction	5. The perimeter of door frames shall be sealed airtight to the exterior wall construction	5. The perimeter of door frames shall be sealed airtight to the exterior wall construction

	(framing) as described in Section 1234 (e).	(framing) as indicated in Section 1244 (e).	(framing) as indicated in Section 1254 (e).
		6. Glass in doors shall be sealed in an airtight nonhardening sealant or in a soft elastomer gasket or glazing tape.	6. Glass in doors shall be sealed in an airtight nonhardening sealant or in a soft elastomer gasket or glazing tape.

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
Roofs	<p>Section 1236</p> <p>1. Combined roof and ceiling construction other than described in this section and Section 1237 shall have a laboratory sound transmission class rating of at least STC-39.</p>	<p>Section 1246</p> <p>1. Combined roof and ceiling construction other than described in this section and Section 1247 shall have a laboratory sound transmission class rating of at least STC-44.</p>	<p>Section 1256</p> <p>1. Combined roof and ceiling construction other than described in this section and Section 1257 shall have a laboratory sound transmission class rating of at least STC-49.</p>
	<p>2. With an attic or rafter space at least 6 inches deep, and with a ceiling below, the roof shall consist of 1/2 inch composition board, plywood, or gypsum board sheathing topped by roofing as required.</p>	<p>2. With an attic or rafter space at least 6 inches deep, and with a ceiling below, the roof shall consist of 3/4 inch closely butted composition board, plywood, or gypsum board sheathing topped by roofing as required.</p>	<p>2. With an attic or rafter space at least 6 inches deep, and with a ceiling below, the roof shall consist of 1 inch composition board, plywood, or gypsum board sheathing topped by roofing as required.</p>
	<p>3. Open beam roof construction shall follow the energy insulation standard method for batt insulation.</p>	<p>3. Open beam roof construction shall follow the energy insulation standard method for batt insulation, except use 1 inch plywood decking with shakes or other suitable roofing material.</p>	<p>3. Open beam roof construction shall follow the energy insulation standard method for batt insulation, except use 1 inch plywood decking with concrete or clay tiles as roofing material.</p>
	<p>4. If the underside of the roof is exposed, or if the attic or rafter space is less than 6 inches, the roof construction shall have a surface weight of at least 6 pounds per</p>	<p>4. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6 inches, the roof construction shall have a surface weight of at</p>	<p>4. If the underside of the roof is exposed, or if the attic or rafter spacing is less than 6 inches, the roof construction shall have a surface weight of 9</p>

	square foot. Rafters, joists, or other framing may not be included in the surface weight calculation.	least 9 pounds per square foot. Rafters, joists, or other framing may not be included in the surface weight calculations.	pounds per square foot. Rafters, joists, or other framing may not be included in the surface weight calculation.
	5. Window or dome skylights shall have a laboratory sound transmission class rating of at least STC-28.	5. Window or dome skylights shall have a laboratory sound transmission class rating of at least STC-33.	

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
Ceiling	<p>Section 1237</p> <p>1. Gypsum board or plaster ceilings at least ½ inch thick shall be provided where required by Section 1236 (b). Ceilings shall be substantially airtight with a minimum of penetrations.</p>	<p>Section 1247</p> <p>1. Gypsum board or plaster ceilings at least 5/8 inch thick shall be provided where required by Section 1246 (b), above. Ceilings shall be substantially airtight with a minimum of penetrations.</p>	<p>Section 1257</p> <p>1. Gypsum board or plaster ceilings at least 5/8 inch thick shall be provided where required by Section 1256, above. Ceilings shall be substantially airtight with a minimum of penetrations. The ceiling panels shall be mounted on resilient clips or channels.</p>
	<p>2. Glass fiber or mineral wool insulation at least R-19 shall be provided above the ceiling between joists.</p>	<p>2. Glass fiber or mineral wool insulation at least R-25 shall be provided above the ceiling between joists.</p>	<p>2. Glass fiber or mineral wool insulation at least R-30 shall be provided above the ceiling between joists.</p>
Floors	<p>Section 1238</p> <p>Openings to any crawl spaces below the floor of the lowest occupied rooms shall not exceed 2% of the floor area of the occupied rooms.</p>	<p>Section 1248</p> <p>The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawl space. All door and window openings in the fully enclosed basement shall be tightly fitted. Crawl space ventilation shall comply with Section 1238.</p>	<p>Section 1258</p> <p>1. The floor of the lowest occupied rooms shall be slab on fill or below grade.</p>

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
Ventilation	<p>Section 1239</p> <p>1. A ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior. The inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1 inch thick coated glass fiber, and shall be at least 5 feet long with one 90 degree bend.</p>	<p>Section 1249</p> <p>1. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior. The inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1 inch thick coated glass fiber, and shall be at least 5 feet long with one 90 degree bend.</p>	<p>Section 1259</p> <p>1. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior. The inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1 inch thick coated glass fiber, and shall be at least 10 feet long with one 90 degree bend.</p>
	<p>2. Gravity vent openings in attics shall not exceed code minimum in number and size, as practical.</p>	<p>2. Gravity vent openings in attics shall not exceed code minimum in number and size, as practical. The openings shall be fitted with transfer ducts at least 3 feet in length containing internal 1 inch thick coated fiberglass sound-absorbing duct lining. Each duct shall have a lined 90 degree bend</p>	<p>2. Gravity vent openings in attics shall be as close to code minimum in number and size, as practical. The openings shall be fitted with transfer ducts at least 6 feet in length containing internal 1 inch thick coated fiberglass sound-absorbing duct lining. Each duct shall have a lined 90 degree</p>

		in the duct such that there is no direct line-of-sight from the exterior through the duct into the attic.	bend in the duct such that there is no direct line-of-sight from the exterior through the duct into the attic.
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	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
	<p>3. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with coated glass fiber 1 inch thick, and shall be at least 5 ft. long with one 90 degree bend.</p>	<p>3. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with coated glass fiber 1 inch thick, and shall be at least 5 ft. long with one 90 degree bend.</p>	<p>3. If a fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel, which shall be lined with 1 inch thick coated glass fiber, and shall be at least 10 ft. long with one 90 degree bend.</p>
	<p>4. All other vent ducts connecting the interior space to the outdoors, shall contain at least a 5-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section.</p> <p>Duct lining shall be coated glass fiber duct liner at least 1 inch thick approved and suitable for the intended use.</p>	<p>4. All other vent ducts connecting the interior space to the outdoors, shall contain at least a 10-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a lined 90 degree bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room opening cross-section. Duct lining shall be coated glass fiber duct liner at least 1 inch thick approved and suitable for intended use.</p>	<p>4. All other vent ducts connecting the interior space to the outdoors, shall contain at least a 10-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a lined 90 degree bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Duct lining shall be coated glass fiber duct liner at least 1 inch thick approved and suitable for intended use.</p>

	25 dB Reduction (Required Within 65-70 DNL Noise Contours)	30 dB Reduction (Required within 70-75 DNL Noise Contours)	35 dB Reduction (Required within 75-80 DNL Noise Contours)
	<p>5. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a baffle plate across the exterior termination which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line-of-sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material.</p>	<p>5. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a self-closing baffle plate across the exterior termination which allows proper ventilation. Each duct shall be provided with a bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. The dimensions of the baffle plate should extend at least one diameter beyond the line-of-sight into the vent duct. The baffle plate shall be made of the same material and thickness as the vent duct material.</p>	<p>5. Domestic range exhaust ducts connecting the interior space to the outdoors shall contain a self-closing baffle plate across the exterior termination which allows proper ventilation. The dimensions of the baffle plate should extend at least one diameter beyond the line-of-sight into the vent duct. The baffle plate shall be of the same material and thickness as the vent duct material. The duct shall be offset such that there is no direct line-of-sight through the duct.</p>
	<p>6. Fireplaces shall be provided with well fitted dampers as required for the type of fuel being used and tightly fitted glass doors.</p>	<p>6. Building heating units with flues or combustion air vents shall be located in a closet or room closed off from the occupied space by doors.</p>	<p>6. Building heating units with flues or combination air vents shall be located in a closet or room closed off from the occupied space by doors.</p>
		<p>7. Doors between occupied space and mechanical equipment</p>	<p>7. Doors between occupied space and mechanical equipment</p>

		areas shall be solid core wood or 20 gauge insulated steel hollow metal at least 1-3/4 inch thick and shall be fully weatherstripped.	areas shall be solid core wood or 20 gauge insulated hollow metal at least 1-3/4 inch thick and shall be fully weatherstripped.
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