f. Meeting space, public space and corridor carpet must be glued down as high traffic and equipment may adversely affect normal wear. The following requirements must be met in this instance:

1.) A double glue-down policy must be followed. The pad is to be glued to the floor and the carpet glued to the pad. Installation must be according to manufacturer's instructions.

2.) Use of the double-stick Carpet Installation System with factory approved adhesive on a sponge rubber pad (23-26 lb. density) is the preferred method. A synthetic fiber pad that is specially treated for this type of installation can be used with prior approval.

g. Installation must meet all local, state, and safety codes.

2514.04 CEILINGS

A. In no case may any ceiling be less than 7'-6"/2.3m. Local codes may require higher ceilings than those included.

B. Paint

1. All paints must be low VOC (less than 50 VOC grams per liter) and low odor.
2. Paint in high humidity areas such as guest bathrooms must be washable and have a mildew resistant finish.
3. Painted ceilings in public areas must have a smooth or light sand finish.
4. Guestroom ceilings must have a smooth painted finish.
5. Guest bathroom ceilings must receive a latex enamel, semi-gloss paint.

C. Acoustic Ceiling Tile (ACT)

1. Tile in public areas must be 2'-0"/600mm x 2'-0"/600mm, with tegular (reveal) edges.
2. 12" x 12"/300mm x 300mm and 24" x 48"/600mm x 1.2m grid is not allowed in any public spaces.
3. All exposed ceiling grid systems must be narrow spline, 9/16"/15mm maximum width, and must match the color of the ceiling tile.
4. Maximum of 30% of the ceiling area is permitted to be ACT in public areas.
5. Concealed spine acoustical tile ceilings are not allowed in public areas.
6. ACT is not allowed in guestroom corridors.
7. ACT is not allowed in guestrooms.
8. Kitchen ceilings must be 2' x 4'/600mm x 1.2m washable plastic or fiberglass tile ceiling with aluminum suspension system.

D. Acoustic Panels

1. Acoustical panels in ballrooms must be a minimum 48" x 96"/1.2m x 2.4m with tight butt joints.
2. Maximum of 50% of the ceiling area is permitted to be acoustical panels in ballrooms.
3. Acoustical panels in restaurants and front desk area must be a minimum 48" x 48"/1.2m x 1.2m with spineless, tight grid.

4. Maximum of 30% of the ceiling area is permitted to be acoustical panels in restaurants and front desk areas.

2514.05 ACOUSTICAL PERFORMANCE

A. Pre-development Noise Surveys

1. Prior to commencement of the project, a minimum of 24 hours' continuous monitoring must be undertaken at a number of locations around the development site.

2. Data must be collected to enable:

   a. significant existing noise and vibration sources to be identified

   b. noise levels incident on each façade of the hotel development throughout the day to be determined

   c. resultant vibration levels within the development to be estimated

   d. (where required by local codes) pre-existing background noise levels to be established

B. External Noise Intrusion

1. External building fabric, including any ventilators, must be designed and built to ensure that the following internal noise levels are not exceeded due to any regularly-occurring external noise source.

2. Measurements of noise within the hotel must be taken during the noisiest two-hour period of the day, as identified in the noise survey.

Room	External Intrusion Noise Level Full Service Grade
Guestroom Daytime (07:00 – 23:00): Night-time (23:00 – 07:00):	 35dB $L_{Aeq,16h}$ 30dB $L_{Aeq,8h}$ / 40dB $L_{Amax(fast)}$*
Meeting/function rooms	32dB $L_{Aeq,5min}$
Bar/restaurant/breakout	38dB $L_{Aeq,5min}$
Executive lounge	35dB $L_{Aeq,5min}$
Lobby/reception/guest corridors	42dB $L_{Aeq,5min}$
Toilets/staff changing	40dB $L_{Aeq,5min}$
Fitness center	40dB $L_{Aeq,5min}$
Spa	38dB $L_{Aeq,5min}$
Offices	38dB $L_{Aeq,5min}$
* For hotels on or close to major international airports, maximum noise levels due to aircraft may be relaxed to 50dB $L_{Amax(fast)}$ subject to permission from Hilton Worldwide.	

3. Equipment installations must be designed and installed to ensure that atmospheric noise does not result in the above internal values being exceeded.

C. Internal Sound Insulation

1. Sound insulation between vertically and horizontally adjacent spaces, including crosstalk via ductwork and service risers, must achieve the minimum levels of performance set out in section 2514.05.J.

2. Performance targets are set as in-situ values for airborne and impact sound insulation. Sound insulation performance must be demonstrated to Hilton Worldwide by means of an agreed program of pre-completion testing.

3. Numerically, the sound insulation performance descriptors of weighted sound reduction (R_w R'_w)[1] and sound transmission class (STC, ASTC)[2] are generally equivalent. Within this document, therefore, the parameters are considered directly interchangeable.

4. The airborne sound insulation targets are achieved by constructions achieving laboratory-tested sound reduction values, i.e. R_w or STC, of around 5dB greater (masonry constructions) and around 10dB greater (lightweight constructions) than the in-situ requirement.

5. All due account must be taken of flanking elements, e.g. external walls and ceiling voids, and junction detailing which might otherwise compromise the overall sound insulation.

6. Sound insulation between a guestroom and its ensuite is controlled by the door. Notwithstanding, the partition construction must be capable of achieving sound reduction R_w/STC 45dB.

7. Where rooms require enhanced acoustic privacy from entrance lobbies or corridors, doors and frames must be of a design that has been proven by laboratory testing (with full supporting documentation being made available to Hilton Worldwide) to achieve the following minimum performance standards.

Room	**Weighted Sound Reduction Index of Doors, R_w or STC** **Full Service Grade**
Guestroom entrance (within 5m of elevator/lift lobby)	32dB (35dB)
Meeting/function room entrance	35dB
Executive lounge	30dB
Offices	30dB

8. Doors connecting guestrooms must be designed and installed to achieve sound reduction values listed in section 2514.05.J.

9. Other than where occurring between guestrooms, partitions containing a door are unlikely to achieve sound reduction performances specified in section 2514.05.J. In this case, the partition construction must be selected so as to be capable of achieving in-situ performance, i.e. R'_w or ASTC, at least 10dB greater than the door performance above. For example, the partition containing a guestroom access door must be designed to achieve minimum R'_w/ASTC 42dB. Owing to the relative internal dimensions of corridors and stairwells, in-situ testing of guestroom doors will not be undertaken.

10. Toilets serving lobbies, lounges, restaurants and bars must be accessed via an acoustically lined lobby, preferably with doors at either end. Electric hand-driers must not be mounted on walls shared with noise sensitive areas.

1 BS EN ISO 140-4: 1998 'Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms' and weighted according to BS EN ISO 717-1: 1997 'Acoustics – Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation'
2 Apparent sound transmission class measured in accordance with ASTM E90: 2009 'Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements' and weighted as described in ASTM E413: 2004 'Classification for Rating Sound Insulation

11. Sound insulation performance of sliding glass doors must reflect the sensitivity of the adjoining rooms and must, therefore, be clarified on a project basis. Unless otherwise stated, sliding glass doors must be capable of achieving sound reduction R_w/STC 30dB and must be installed in accordance with the supplier's instructions in order to maximize the in-situ sound insulation.

D. Internal Noise Sources

1. Airborne and structure-borne noise from building services (including equipment rooms) must not exceed the following values within occupied spaces.

Room	External Intrusion Noise Level, L_{eq} Full Service Grade
Guestroom	NR25
Guestroom bathroom	NR35
Meeting/function rooms	NR30
Bar/restaurant/breakout	NR35
Executive lounge	NR35
Lobby/reception/guest corridors	NR40
Public Toilets	NR40
Staff toilets/changing	NR45
Fitness Center	NR40
Spa	NR35
Offices	NR35
BOH/service areas	NR40 – 45

2. Building services noise must not contain any feature, such as knocking, rattling or whistling, that is likely to attract attention.

3. Waste systems, rainwater pipes and general plumbing must be treated to ensure that maximum breakout noise levels are controlled to levels at least 5dB below the corresponding building services noise level for the room through which it passes.

4. Elevators/lifts must be designed and shafts constructed to ensure that noise associated with any part of the elevator/lift cycle (including door operation) does not exceed the values listed below.

Room	Noise from elevator/lift, $L_{Amax,FAST}$
Guestroom	25dB
Meeting/function rooms	30dB
Bar/restaurant	35dB
Executive lounge	30dB
Offices	40dB
Elevator/lift lobbies	50dB

E. Control of Reverberant Noise

1. Acoustically absorbent finishes must be installed within common areas from which direct access is gained to guestrooms, with suitable conditions being provided by fitting standard carpet and pad. Where corridors have no carpet, acoustically absorbing ceiling and/or wall linings must be provided.

2. In other areas, finishes must be designed and installed to ensure that the following reverberation times are not exceeded at positions normally occupied by guests or at staff workstations. Values of reverberation time must be determined as the arithmetic average of octave band values from 500Hz to 2 kHz, inclusive.

Room	Maximum reverberation times, seconds
Meeting/function room	0.8
Lobby/reception	1.5
Bar/restaurant	1.0
Executive lounge	0.8
Spa	1.0

F. Adjoining Demises

1. Building fabric must be designed and built to ensure that noise transfer from any adjoining demise is controlled to the levels shown below, or lower.

Room	Adjacent Demise Intrusion Noise Level
Guestroom	25dB $L_{Aeq,5min}$ and 35dB $L_{Amax(fast)}$
Meeting/function rooms	NR25 $L_{eq,5min}$
Bar/lounge/restaurant	NR30 $L_{eq,5min}$
Lobby/reception/guest corridors	NR30 $L_{eq,5min}$
Offices	NR30 $L_{eq,5min}$

G. External Noise Emissions

1. Noise levels at the nearest affected receiver must comply with the requirements of the local authority or attain a noise level not exceeding 50dB L_{Aeq} at the site boundary or 45dB L_{Aeq} in public areas, whichever is the more stringent. Local codes may involve comparison with pre-development ambient noise conditions. Refer to section 2514.05.A.

2. Refer to section 2514.05.C to ensure suitable control of self noise impact on the building.

H. Vibration/Structure-BORNE Noise

1. All equipment (whether located in equipment rooms or occupied spaces), elevator/lifts, elevator/lift motors and ductwork/pipework systems must be isolated from the building structure in order to ensure that vibration within the floor of any occupied room is controlled to a level not exceeding $0.05ms^{-2}$ in any direction (vertical or horizontal), when measured and evaluated in accordance with ISO 2631-2:2003 '*Mechanical vibration and shock -- Evaluation of human exposure to whole-body vibration -- Part 2: Vibration in buildings (1 Hz to 80 Hz)*'.

2. More specific guidance is provided within BS6472:1992 *'Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)',* or ANSI S2.71-1983 (R2006) *'Mechanical vibration and shock -- Evaluation of human exposure to whole-body vibration -- Part 2: Vibration in buildings (1 Hz to 80 Hz)'*

3. Refer to section 2514.05.D.

I. Special Conditions

1. Rainfall Noise

a. Noise from rainfall on lightweight or glass roofs must be designed so to not exceed the following levels under a rainfall rate of 40mm/h. Calculations demonstrating compliance must be submitted to Hilton Worldwide upon request.

Room	Rainfall Noise Level, L_{eq}
Guestroom, including bathroom	NR40
Meeting/conference rooms	NR45
Bar/lounge/restaurant	NR50
Lobby/reception/guest corridors	NR50
Offices	NR45

b. In regions where such rainfall, or heavier, occurs frequently, more stringent criteria may be applicable.

c. Refer to section 2514.05.D for requirements for rainwater pipes.

2. Groundborne Vibration

a. Development of sites located above or close to potential sources of groundborne vibration, e.g. roads carrying a high percentage of heavy goods traffic and surface/ underground railway lines, must ensure that resultant vibration and/or re-radiated noise levels within occupied rooms does not exceed the values listed below.

Room	Tactile Vibration in Floors, Vibration Dose Value $m/s^{1.75}$ x, y or z-axes	Re-radiated Noise, $L_{Amax,fast}$
		Full Service
Guestroom, including bathroom	0.2 to 0.4 (07.00h – 23.00h) 0.1 to 0.2 (23.00h – 07.00h)	35dB
Meeting/conference rooms	0.2 to 0.4 (07.00h – 23.00h)	35dB
Bar/lounge/restaurant	0.2 to 0.4 (07.00h – 23.00h)	40dB
Lobby/reception/guest corridors	0.2 to 0.4 (07.00h – 23.00h)	40dB
Offices	0.4 to 0.8 (07.00h – 23.00h)	50dB

Refer to BS6472:2008 '*Evaluation of human exposure to vibration in buildings* Part 1*: Vibration sources other than blasting*'.

J. Sound Insulation Matrices

1. The following matrix lists required in-situ airborne sound insulation between adjacencies (walls and floors), dB R'_w[3]/ASTC[4]. Performance must be tested upon completion.

[3] *Apparent weighted sound reduction index measured in accordance with BS EN ISO 140-4: 1998 'Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms' and weighted according to BS EN ISO 717-1: 1997 'Acoustics – Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation'*

[4] *Apparent sound transmission class measured in accordance with ASTM E90: 2009 'Standard Test Method for Laboratory*

	Guestroom	Equip. room/ riser or store	Corr-idor, no door	Rest-aurant, Bar, Game Room	Func-tion Room	Meet-ing, Board, Training Rooms	Exec Lounge, Bus. Center	Fitness Ctr, Spa	Office	WC/ Change Room	Kitchen, laundry
Guestroom	55dB	60dB	60dB	60dB	60dB	60dB	60dB	60dB	60dB	60dB	65dB
Equipment room/riser or store		-	45dB	45dB	45dB	50dB	50dB	45dB	50dB	45dB	40dB
Corridor - no door			-	45dB	45dB	45dB	45dB	45dB	45dB	45dB	50dB
Restaurant, Bar, Game Room				40dB	45dB	55dB	55dB	45dB	50dB	45dB	50dB** (no door)
Function Room					50dB*	55dB	55dB	45dB	55dB	45dB	50dB** (no door)
Meeting, Board, Training Rooms						50dB*	50dB	50dB	50dB	50dB	55dB
Executive Lounge/ Business Center							50dB	50dB	50dB	50dB	55dB
Fitness Center/Spa								-	50dB	45dB	55dB
Office									45dB	50dB	55dB
WC/ Changing Room Guestroom										40dB	45dB
Kitchen, laundry											-

* Applies to fixed partition. Moveable partitions must have minimum acoustic rating 3dB lower
** Doors to kitchens cannot be fitted with seals for reasons of accessibility and hygiene. Where there is a door, walls must be constructed to achieve R'_w 40dB minimum

2. The following matrix lists required impact sound insulation to rooms (floors), dB $L_{nT,w}$[5]. Performance must be tested upon completion.

Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements' and weighted as described in ASTM E413: 2004 'Classification for Rating Sound Insulation'

[5] *Weighted standardised impact sound pressure level measured in accordance with BS EN ISO 140-7: 1998 'Acoustics – Measurement*

Space Below	Space Above								
	Guest room	Restaurant, Bar, Game Room	Function Room	Meeting, Board, Training Rooms	Executive Lounge, Business Center	Office	WC/ Changing Room	Fitness Center, Spa*	Kitchen, laundry, bar store
Guestroom	50dB	45dB	45dB	50dB	50dB	50dB	50dB		
Restaurant, Bar, Game Room									
Function Room									
Meeting, Board, Training Rooms				55dB				*	**
Executive Lounge, Business Center									
Fitness Center, Spa				55dB					
Office				60dB					

* Hotel layouts must avoid arrangement of health clubs and spas (including swimming pools) above noise sensitive spaces unless all due measures are employed to control transfer of structure-borne sound to below.
** Impact sound levels within kitchens, laundries and stores are not of concern. Where these areas occur above sensitive areas, the corresponding impact sound level must be improved, i.e. lowered, by at least 10dB. Installation of floating concrete/screed floors is highly recommended.

3. The following matrix lists required impact sound insulation to rooms (floors), dB FIIC[6]. Performance to be tested upon completion.

Space Below	Space Above								
	Guestroom	Restaurant, Bar, Game Room	Function Room	Meeting, Board, Training Rooms	Executive Lounge, Business Center	Office	WC/ Changing Room	Fitness Center, Spa*	Kitchen, laundry, bar store
Guestroom	60dB	65dB	65dB	60dB	60dB	60dB	60dB	*	**
Restaurant,	55dB								

of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors' and weighted according to BS EN ISO 717-2: 1997 'Acoustics – Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation'

[6] Field impact insulation class determined in accordance with ASTM E1007 - 04e1 'Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures' and ASTM E989 - 06 'Standard Classification for Determination of Impact Insulation Class (IIC)'

Bar, Game Room			
Function Room			
Meeting, Board, Training Rooms			
Executive Lounge, Business Center			
Fitness Center, Spa	55dB		
Office	50dB		

* Hotel layouts must avoid arrangement of health clubs and spas (including swimming pools) above noise sensitive spaces unless all due measures are employed to control transfer of structure-borne sound to below
** Impact sound levels within kitchens, laundries and stores are not of concern. Where these areas occur above sensitive areas, the corresponding impact sound level must be improved, i.e. lowered, by at least 10dB. Installation of floating concrete/screed floors is highly recommended.

2514.06 MECHANICAL

A. The following Environmental Conditions Matrix must be followed for the design of the building.

Area	Location	Internal Conditions[1]				Pressure Relationships[2]		Ventilation Air Quantity[3]		Acoustical Rating	Filtration	
		Summer		Winter		Type	Differential	Fresh Air Supply	Exhaust Rate		Prefilter	Final Filter
		Tdb F(C)	RH% Max	Tdb F(C)	RH% Min	Pos/Neg/Neut	Inches w.g. (Pa)	CF/M-SF (L/S-SM)	CF/M-SF (L/S-SM	NR	MERV	MERV
Lobby	Vestibule	73 (23)	55	72 (22)	30	Pos	0.02 (5)	0.06 (0.3)	--	40	7	--
	Atrium	73 (23)	55	72 (22)	30	Pos	0.02 (5)	0.06 (0.3)	--	40	7	12
	Lobby	73 (23)	55	72 (22)	30	Pos	0.02 (5)	0.06 (0.3)	--	40	7	12
	Front Desk	73 (23)	55	72 (22)	30	Neut	--	0.06 (0.3)	--	40	7	12
	Concierge	73 (23)	55	72 (22)	30	Neut	--	0.06 (0.3)	--	40	7	12
	Luggage Room	73 (23)	55	72 (22)	--	Neut	--	0.06 (0.3)	--	40	7	12
	Bellman's Desk	73 (23)	55	72 (22)	--	Neut	--	0.06 (0.3)	--	40	7	12
	Valet Desk	73 (23)	55	72 (22)	--	Neut	--	0.06 (0.3)	--	40	7	12
Public	Public Restrooms	73 (23)	55	72 (22)	30	Neg	0.02 (5)	0.06 (0.3)	50 (12.5)[5]	40	7	12
Food & Beverage	Restaurant	73 (23)	55	72 (22)	30	Neg	0.02 (5)	0.18 (0.9)	--	35	7	12