

Marvin Architectural

Your Guide To
Sound Resistant Windows

Why Has Soundproofing Become Such a Hot Topic?



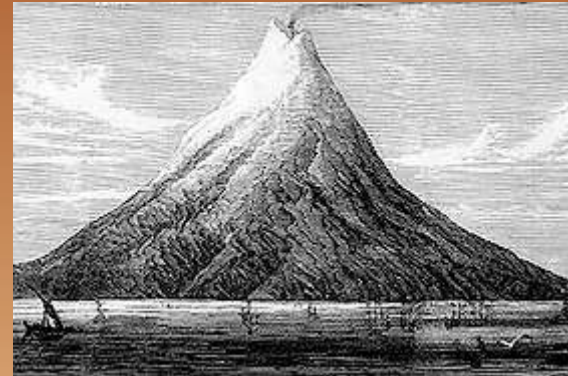
- Recent health research
- Protection of property values

Overview

- Need and Desire for Sound Resistant Windows and Doors
- Definition of Sound
- Testing Protocol Created to Measure Sound Transmission
- Window Ratings and Correct Usage
- Achieving Higher STC Ratings
- Importance of Correct Installation



Need and Desire for Sound-Resistant Windows and Doors



Krakatoa, a volcanic island made of lava in Indonesia, exploded in 1883, killing approximately 40,000 people. The explosion is considered to be the loudest sound ever heard in modern history, with reports of it being heard nearly 3,000 miles (4,800 km) from its point of origin.

Good Sounds vs. Bad Sound



127 dB per vuvuzela

The perfect volume: 50 dB





Traffic

67–83 dB



Barking Dog

100 dB

Vuvuzela

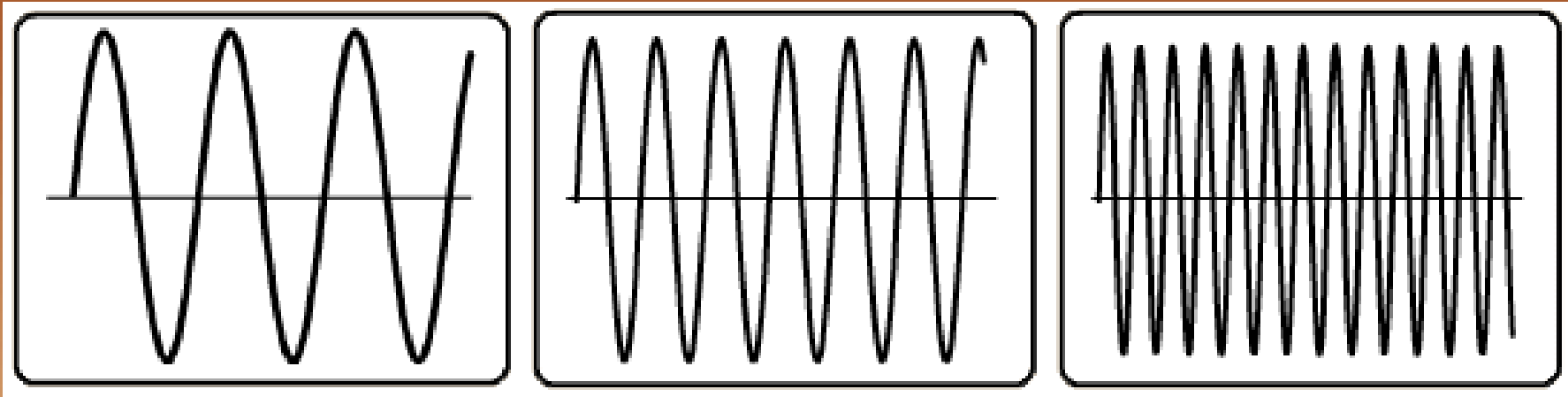
127 dB



Jet

150 dB

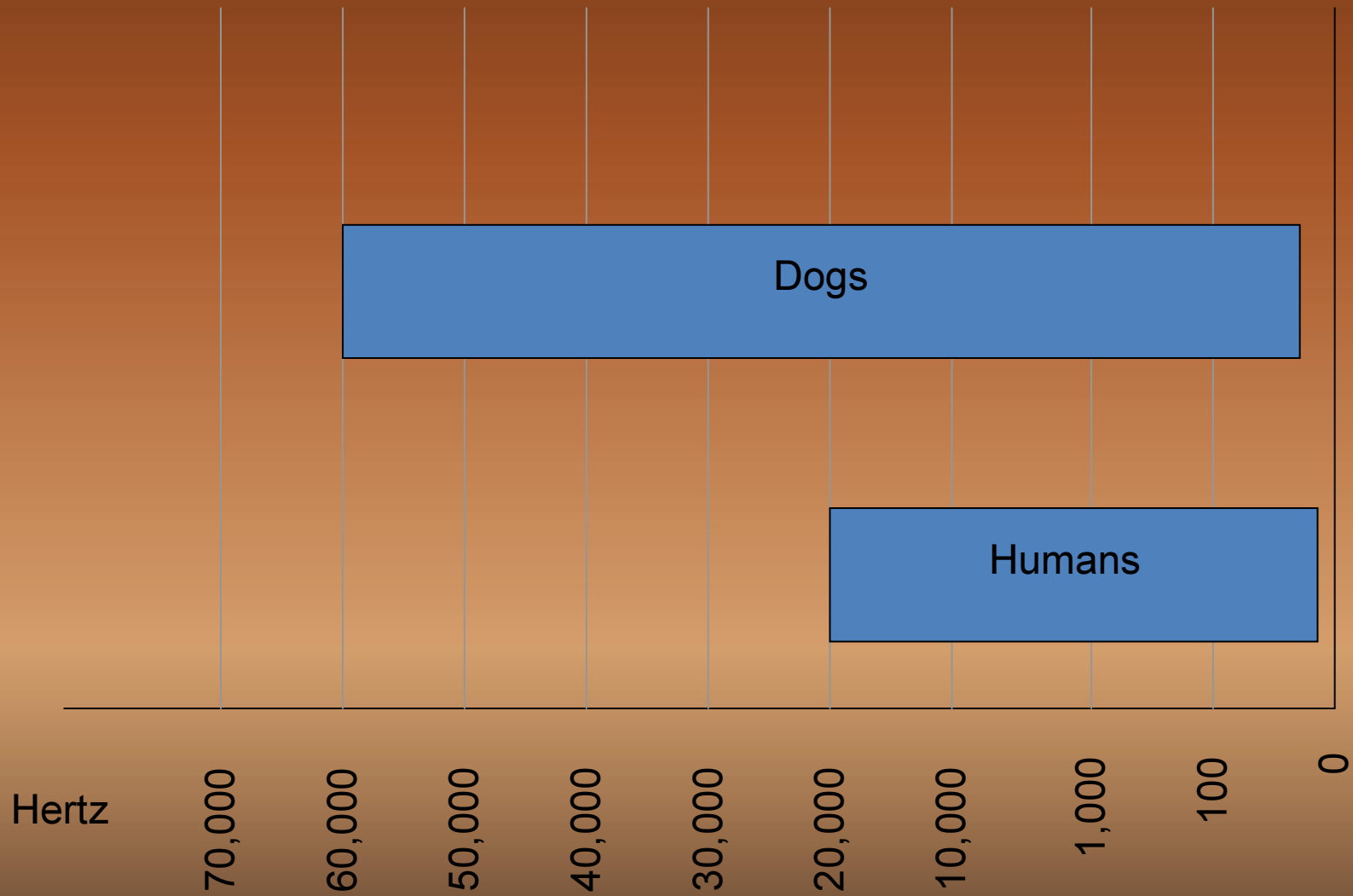
Welcome to the Science of Sound



Lower pitch

Higher pitch

Frequency = Pitch



The Decibel

Painful Acoustic Trauma	140	Shotgun blast
	130	Jet engine 100 feet away
	120	Rock concert
Extremely Loud	110	Car horn, snowblower
	100	Blow dryer, subway, helicopter, chainsaw
	90	Motorcycle, lawn mower, convertible ride on highway
Very Loud	80	Factory, noisy restaurant, vacuum, screaming child
Loud	70	Car, alarm clock, city traffic
	60	Conversation, dishwasher
Moderate	50	Moderate rainfall
Faint	40	Refrigerator
	30	Whisper, library
	20	Watch ticking
	dB levels	

Combined Sounds



Mass Law

The more mass (weight), the greater the reduction of noise energy.

Limp/Mass Law

The stiffer a material is, the more easily sound waves can transmit through the barrier.

Limp/Mass Law and Windows

Higher Density +
More Flexibility
= Higher Sound Transmission
Reduction

Absorption vs. Transmission

Sound absorption: The reduction of reflected sound within a room

Sound transmission: The passing of sound from room to room or between interior and exterior of a building

TL: Transmission Loss

A measurement of a material's ability to block sound at a given frequency.

STC: Sound Transmission Class

- An STC rating measures a material or partition's transmission loss. The higher the number, the better the noise isolation.
- STC can be increased by:
 - Adding mass
 - Increasing or adding air space
 - Absorptive material inside partition
- Rule of thumb: A 10-point change in an STC rating means that sound transmission is either twice (or half) as loud

STC: Sound Transmission Class

Used to compare insulating properties for partitions.

Wall at STC rating of 30 = audible loud speech

Wall at STC rating of 50 (standard) = loud speech awareness but not comprehensible

Wall at STC rating of 60 = loud speech completely blocked



OITC: Outdoor/Indoor Transmission Class

Used to measure transmission of transportation-related sounds.

- Provides a single-number rating for facades and fenestration
- The higher the number, the better the noise buffering



STC vs. OITC

STC: Sound Transmission Class

Indoor: Used to compare insulating properties for partitions.

OITC: Outdoor/Indoor Transmission Class

Outdoor to indoor: Used to measure transmission of transportation-related sounds.

NC: Noise Criteria Level

Recommended NC levels for various spaces:

Home: 20–30 (approx 30–38 dB)

Church: 30–35 (approx. 40–45 dB)

Private Office: 30–35 (approx. 40–45 dB)

Restaurant: 40–45 (approx. 50–55)

Factory: 40–65 (approx. 50–75 dB)

Sports Arena: 45–55 (approx. 55–65 dB)

Comparison: Sound Intensity and Sound Pressure Level

Sound	dB Level	Sound Intensity
Threshold of hearing	0 dB	1
Traffic	67-83 dB	10,000,000
Barking Dog	100 dB	10,000,000,000
Vuvuzela	127 dB	1,000,000,000,000
Jets	150 dB	1,000,000,000,000+

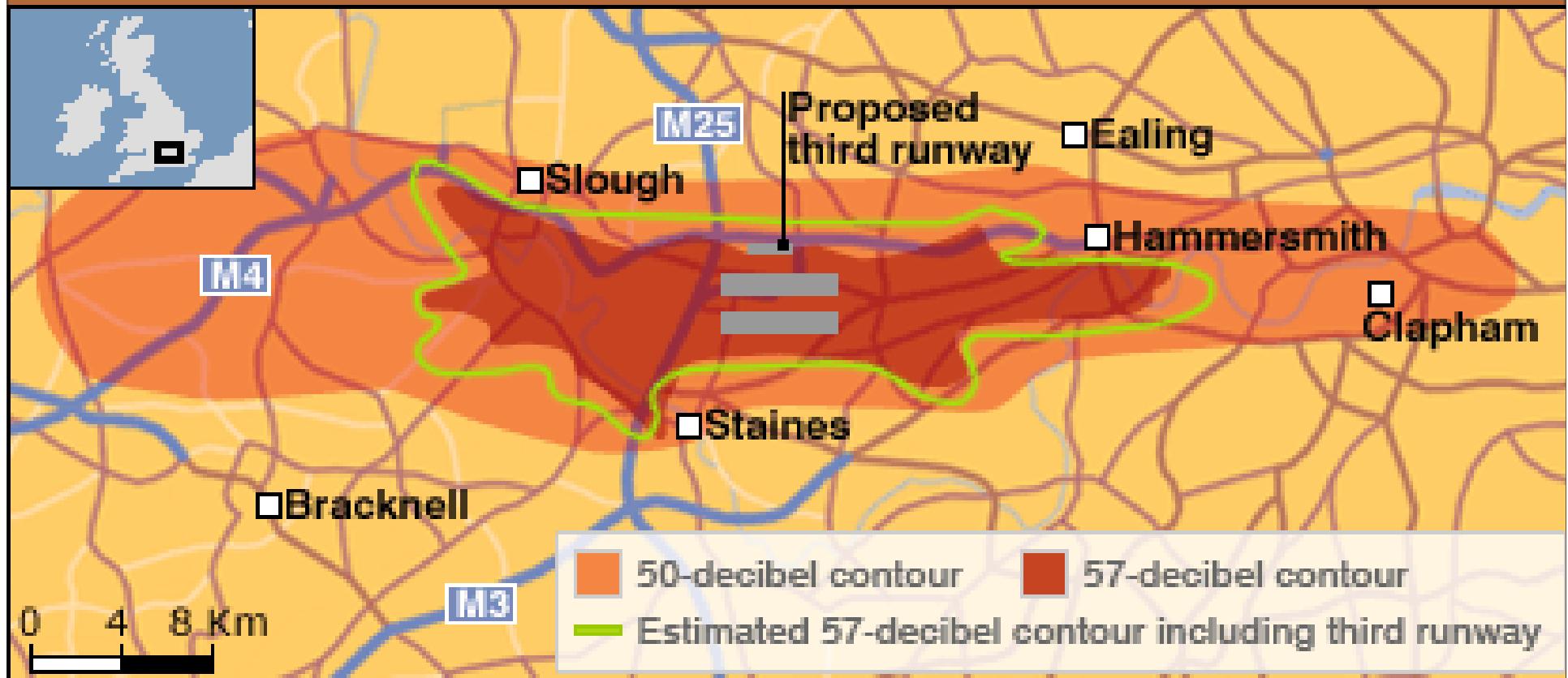
Acoustical Properties: Glass

Glass Type	Dimensions	STC
Single pane	3mm	27
	12mm	36
Insulated glass	3mm / 6mm AS / 3mm	29
	3mm / 12mm AS / 3mm	32
	6mm / 12mm AS / 6mm	35
Insulated glass w/storm panel		35+
Single laminated	3mm / .030 PVB / 5mm	36
	5mm / .090 PVB / 6mm	41
Laminated IG	3mm / 11mm AS/ 3mm 0.90/3mm	34
	3mm / 12mm AS / 3mm 030/3mm	35



One of the Biggest Annoyances: Airports

Heathrow 55dBALden Contour



Government-Led Noise Mitigation Projects

- One approach to appease residents: Noise mitigation programs.

- In 2006 the European Union issued a new law that required all large airports to produce a Noise Action Plan
- BAA believes their Action Plan will result in an improved noise climate around Heathrow, in particular it will mean:
 - A more equitable distribution of noise
 - The phase-out of the noisiest aircraft at Heathrow
 - Improved noise mitigation schemes
 - More transparent and improved communication about noise

What Have Window and Door Manufacturers Done?

Air Space

Glass Thickness

Varying Glass Thickness

Laminating Glass

Weatherstripping

Frame

Storm Panel



Air Space



- As air space increases, STC increases
- Higher energy-efficiency/STC rating relationship

Glass Thickness

2mm thick – Single Strength
2mm thick – Single Strength
3mm thick – Double Strength
3mm thick – Double Strength
3mm thick – Double Strength
5mm thick
3mm thick – Double Strength
6mm thick

Scale of 1-10

Sound Stoppage

2

Very poor; seldom found on larger windows

5

Okay; very typical

7

Good; recommended

8

Very Good; recommended

Varying Glass Thickness

3mm thick – Double Strength

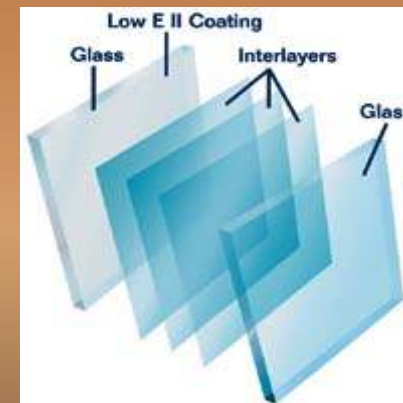
5mm thick

3mm thick – Double Strength

6mm thick

Laminating Glass

Glass Type	STC Rating
4mm clear	29
5mm clear	30
6.38mm laminate	30
7.52mm laminate	35
10.38mm laminate	36
IGU 3mm clear/8mm air/4m clear	28
Secondary window 6mm clear/ 100mm space/4mm clear	46



Don't forget to consider:

- Weatherstripping
- Frame
- Mullions
- Storm Panel



How to achieve the best STC rating

- Heavier Second Layers
- Laminated glass
- Storm Panel
- Provide a generous airspace



Installation



Why Soundproof?

Building owners and consumers are becoming more aware of the benefits of acoustically improved windows—and of the long-term dangers of noise.



Marvin Architectural

- Marvin Windows and Doors. Established over 100yrs
- Marvin Architectural – UK and Ireland distributors for Marvin products – 20yrs+
- Projects range from domestic replacements to newbuild and commercial

Marvin Architectural Services

- Full architectural support service
- Fully trained and experienced installation teams
- Customization and prototyping solutions
- Project management
- Consistent 10-12 week delivery schedule
- Product range exceeds all current building regulations







Marvin Architectural

Canal House
Catherine Wheel Road
Brentford
TW8 8BD

Tel: 0208 569 8222

Email: sales@marvinUK.com

www.marvin-architectural.com

Thanks To...

- Cardinal Glass
- The Construction Specifier (October 2004 Issue) - Specifying the Appropriate Glazing System: By Terry Zeimet, CSI, CCPR, AIA
- Canadian Building Digest: http://irc.nrc-cnrc.gc.ca/pubs/cbd/cbd236_e.html
- www.macavsat.org
- www.acousticalsurfaces.com
- www.hometheatermag.com
- www.encyclopedia.com
- www.101science.com/physics
- www.stcratings.com
- www.acoustics.com
- www.soundproofing101.com