



*Bringing Quality
To Light*

WARNING

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Soft-Lite Training Session

Sound Abatement (STC)



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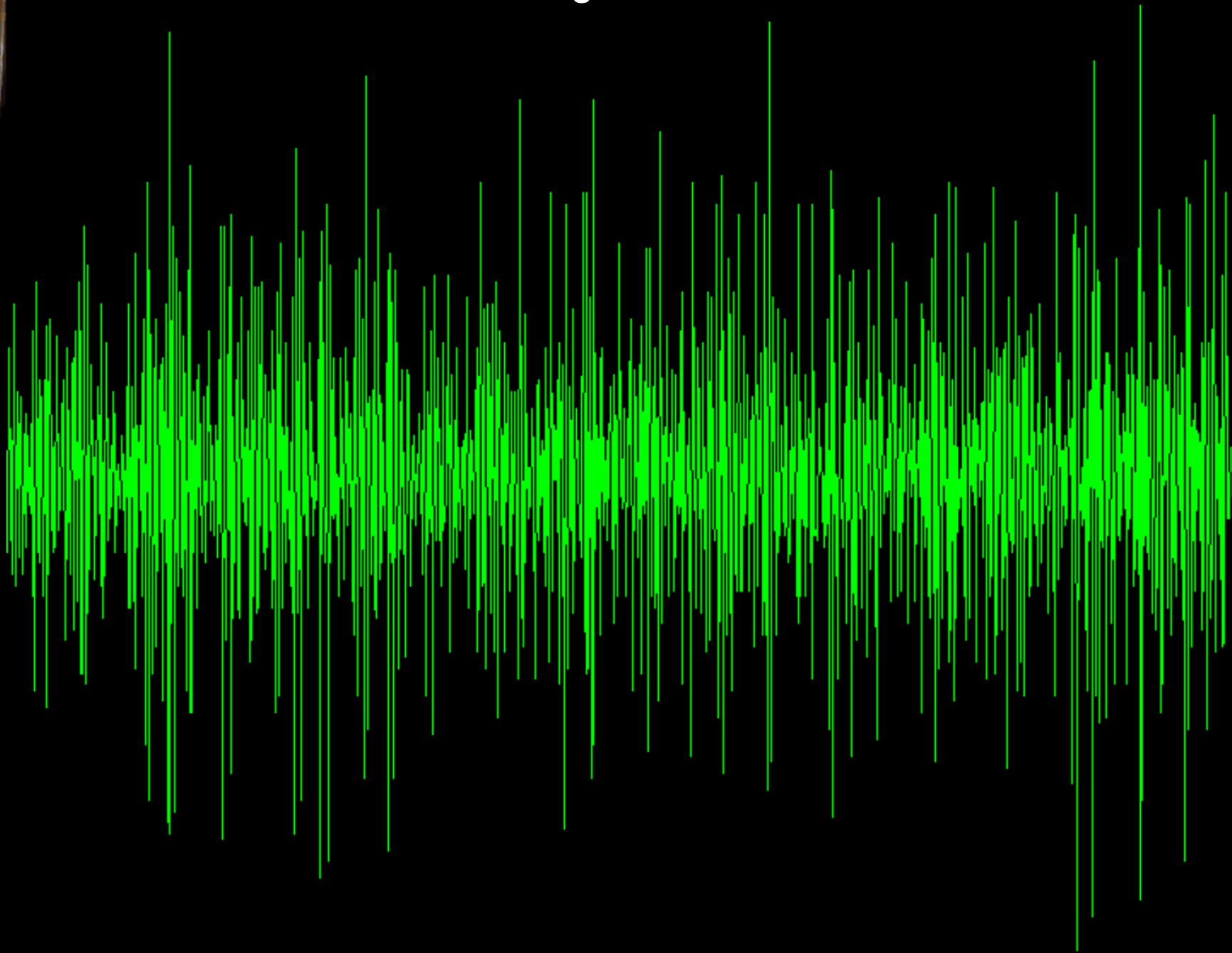
“Sound reduction is the next great differentiator in fenestration.”



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No Need to Oversell the “Quiet” Benefit



Top Sound MYTHS to Bust:

Sound-proof windows alone can make any house completely quiet.

Hermetically sealed Argon or Krypton improve sound resistance because they are heavier than dead air.

Triple pane deadens more sound than double pane.

Vinyl Windows are better than aluminum or wood windows when it comes to sound prevention.



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Sell The Truth

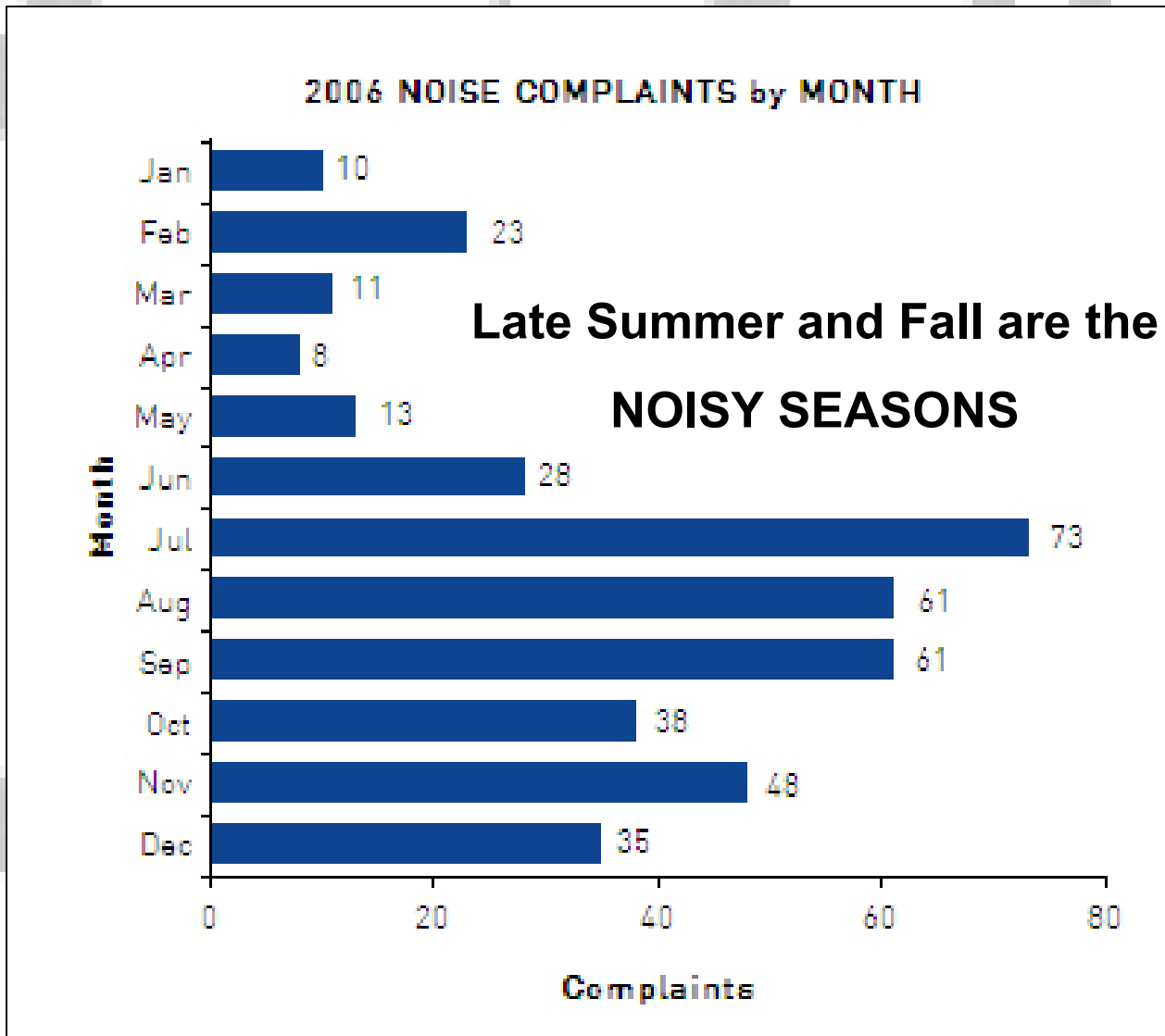


Top Sound TRUTHS:

1. “Sound-deadening” windows will divert sounds to points of less resistance in the structure at a higher rate (walls, roofs, doors). Therefore, it is “incomplete” to purchase STC-40 windows unless walls, doors, and roofs are at least that same performance level.
2. *Airspace density* is irrelevant. Gas has no discernable effect on sound transmission. *Airspace distance* matters. Storm panels with laminated glass fixed 2” to 4” from the primary window are proven to increase sound transmission resistance significantly, well beyond the STC40 threshold.
3. Vinyl windows are no better than aluminum or wood windows when it comes to sound prevention. Reverberation is a systemic issue that can be made to affect any substrate material.
4. Replacing a single-pane window with a double-pane or triple-pane window will increase STC audibly, by about 7 points up to 26%. Adding a laminated storm window to any other IG window will increase STC about 18 points or 60%.

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There is a Noise Complaint Pattern



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Points of Least Resistance

“Sound travels around obstacles, through openings in those obstacles, and is transmitted through the obstacle at points where the assembly has a lower STC rating.

Minimizing sound transmission, therefore, becomes the same effort that we use to minimize heat loss.

The same qualities that provide better thermal value (i.e., air infiltration) also perform better acoustically.”

The Specification

DO NOT MAKE PROMISES YOU CANNOT KEEP. DO NOT OVERSELL!

Legitimate sound-deadening windows must meet written specifications. Here is one simplified example:

Windows shall be double-glazed with panes at least three-sixteenths inch (3/16") thick. Panes of glass shall be separated by a minimum one-half inch (1/2") airspace, and **shall not be equal in thickness.**

Double glazed windows shall employ fixed sash or efficiently weather-stripped, 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 air infiltration test not to exceed one-half (1/2) cubic foot per minute per foot of crack length in accordance with ASTM E-283-65-T.

Glass shall be sealed in an air-tight manner with a non-hardening sealant or a soft elastomer gasket or gasket tape.

The perimeter of the window frames shall be sealed air-tight 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, or other materials approved by the Building Official, (listed).



Two Third-Party Measurements

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STC

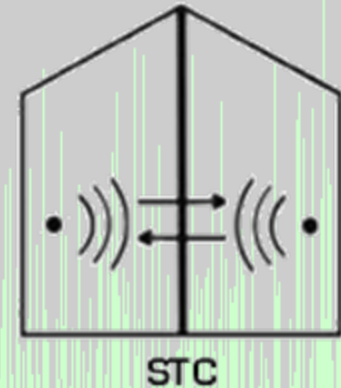
OITC



Sound Transmission Classification - STC

STC: Sound Transmission Class (ASTM E 413)

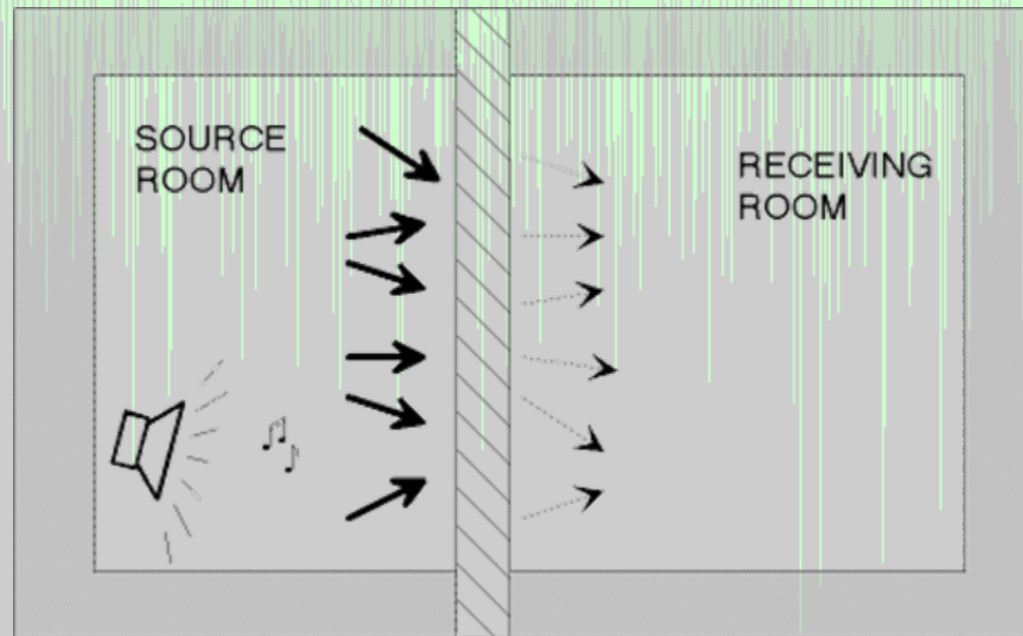
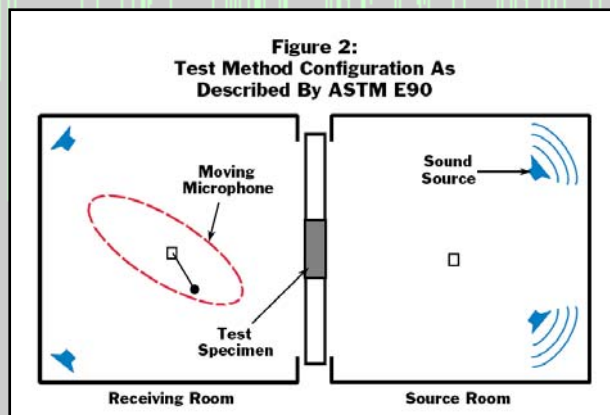
A higher STC rating blocks more noise from transmitting through a partition. If an 80dB sound on one side of a wall/floor/ceiling is reduced to 50dB on the other side, that partition is said to have an STC of 30.



If Source Room is 80dB

If Receiving Room is 50dB

Then **STC = 80-50 = 30**



Outdoor-Indoor Transmission Classification - OITC



FYI

**OITC is not yet
a factor!**

STC

**is the current
reality.**

**The higher the
Rating, the more it
resists sound.**

**OITC: Outdoor-Indoor Transmission Class
(ASTM E 1332)**

Newer standard includes frequencies lower than “standard household noise spectrum” of 125 to 4000 Hz including car traffic, airport noise, trains, and industrial processes.

- **Frequency**
- **Amplitude**
- **Mass Law**
- **Coincidence dip**

OITC is a new classification that better measures common, deeper frequencies including booming bass in car audios and vehicle traffic vibrations that STC does not measure.

Sound Transmission Classification - STC

STC	WHAT CAN BE HEARD
25	Normal speech can be understood quite easily and distinctly through wall
30	Loud speech can be understood fairly well, normal speech heard but not understood
35	Loud speech audible but not intelligible
40	Onset of "privacy" THRESHOLD OF PERFORMANCE
42	Loud speech audible as a murmur
45	Loud speech not audible; 90% of statistical population not annoyed
50	Very loud sounds such as musical instruments or a stereo can be faintly heard; 99% of population not annoyed.
60+	Superior soundproofing; most sounds inaudible (High-end studios)

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Sound Transmission Classification - STC

dB	TYPICAL SOUND
120	Thunder Clap
110	Nearby riveter
90	Loud Street Traffic Noise
80	Noisy Office
70	Average Street Noise
60	Average Office
50	Restaurant Chatter
40	Private office THRESHOLD OF PERFORMANCE
30	Quiet Private Room
20	Whisper
10	Normal Breathing
0	Audibility Threshold

Example: 90dB – 30STC = 60dB

dB=decibel

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STC – Human Perception

If you can not detect it, it's not “more quiet”!

Changes in STC Rating	Changes in Apparent Loudness
+/- 1	Almost imperceptible
+/- 3	Just perceptible
+/- 5	Clearly noticeable
+/- 10	Twice (or half) as loud

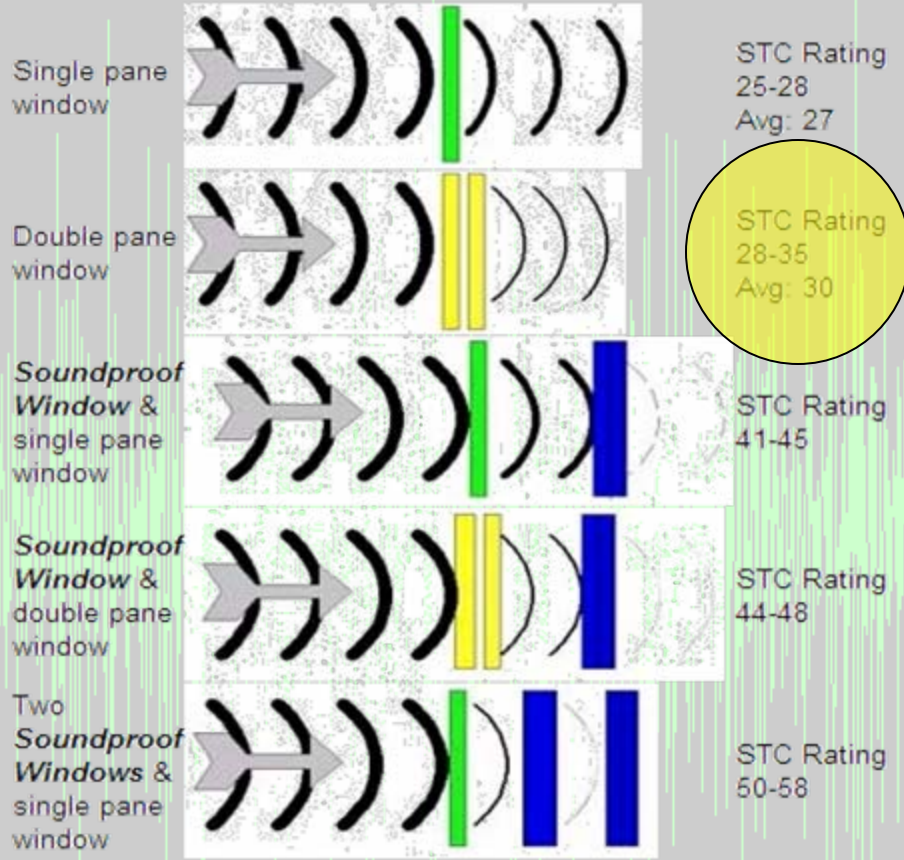
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The Ratings

STC FACT:

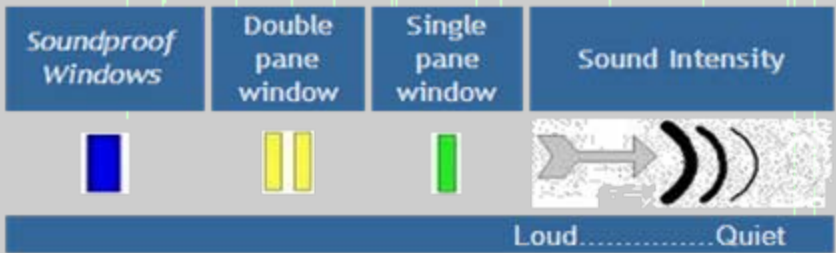
Triple Pane performs no better than Double Pane.

Threshold: 40



Document Summary

Copyright 2007 ASTM International. All rights reserved.
ACTIVE STANDARD: ASTM E413-04
Classification for Rating Sound Insulation
 Developed by Subcommittee: [E33.03](#)
 See [Related Work](#) by this Subcommittee
 Adoptions: DOD Adopted; Building Codes;
 Book of Standards Volume: 04.06



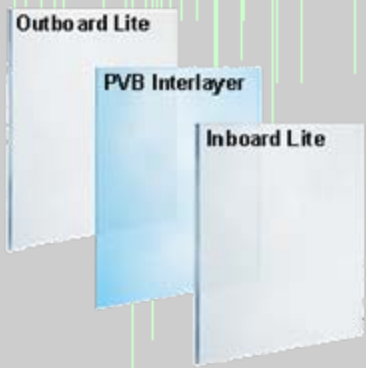
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STC – Glass Only



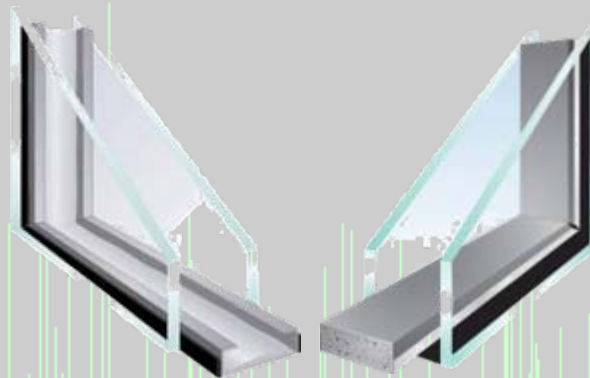
FLAT ANNEALED FLOAT GLASS	
Glass Thickness	STC Rating
SSB (3/32")	26
DSB (1/8")	28
3/16"	29
1/4"	31
3/8"	33
1/2"	36

LAMINATED GLASS		
OAT, Inches <small>Overall Laminate Thickness</small>	Configuration	STC Rating
1/4"	1/8 x .030 x 1/8	35
3/8"	3/16x.030x3/16	36
1/2"	1/4 x .030 x 1/4	38
1/2"	1/4 x .060 x 1/4	39
3/4"	1/2 x .060 x 1/4	41



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STC Results



INSULATING GLASS CONFIGURATIONS

OAT	Inner Pane	Airspace	Outer Pane	STC
5/8	SSB	7/16	SSB	27
5/8	SSB	3/8	DSB	28
5/8	DSB	3/8	DSB	29
5/8	3/16	1/4	3/16	31
3/4	SSB	9/16	SSB	27
3/4	DSB	1/2	DSB	30
3/4	DSB	7/16	3/16	32
7/8	SSB	11/16	SSB	28
7/8	DSB	5/8	DSB	30
7/8	3/16	9/16	DSB	33
7/8	3/16	1/2	3/16	33
7/8	1/4 Lam	1/2	DSB	35
1	DSB	3/4	DSB	32
1	3/16	5/8	3/16	32
1	1/4	1/2	1/4	33
1	1/4 Lam	9/16	3/16	35

MONOLITHIC STORM CONFIGURATION

Inner Pane	Airspace	Outer Pane	STC
1/4	1 7/8	1/4	39
1/4	2 1/2	1/4	40
1/4	3	1/4	42
1/4 Laminated	3 1/2	1/2 Laminated	43
3/8 Laminated	3 1/2	1/2 Laminated	44



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STC Results

STORM SASH TOP PERFORMERS

Primary Window Glazing	Storm/Prime Airspace	Storm Sash Pane	STC
1/2 IG: DSB – 1/4 - DSB	1 1/2	1/4 Laminated	35
7/8 IG: DSB – 11/16 – SSB	2 1/2	DSB	41*
7/8 IG: DSB – 1/2 - 1/4 Lam	3 1/2	DSB	44
1/2 IG: DSB – 1/4 - DSB	3	1/4 Laminated	45
7/8 IG: DSB – 1/2 - 1/4 Lam	3 1/2	5/32 Laminated	45

* Laminated glass is an unnecessary expense if the goal is to beat the STC40 threshold. Even better STC performance can be achieved with thicker glass and/or wider airspace distances between the panes.

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STC Results

RANGE OF PERFORMANCE WITHOUT AND WITH STORMS			
Primary Window IG	Prime/Storm Airspace	Storm Glazing	STC
1/8 – 1/2 air – 1/8	None	None	27-28
1/4 - 1/2 air – 1/4	None	None	31-32
1/4 - 1/2 air – 1/4 Laminated	None	None	34-35
1/4 Lam – 1/2 air – 1/4 Laminated	None	None	37-38
1/8 – 1/2 air – 1/8	2"	1/8	39-41
1/4 inner- 1/2 air – 1/8	2"	1/4	42-44
1/4 Laminated inner – 1/2 air – 1/8	2"	1/4	43-45
1/4 Laminated inner – 1/2 air – 1/8	2"	1/4 Laminated	44-46

Low
STC

40

HIGH
STC



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The Ratings

Typical Ratings for Common Double-Hung Vinyl Windows		
Configuration	Sound Transmission Class STC (ASTM E-413)	Outdoor-Indoor Transmission Class OITC (ASTM E-1332)
Single Glazed Window	24-26	16-20
Double Glazed Window	31-33	21-27
Laminated Double Glazed	35-38	25-30
Dual Window	39-50	26-40

+7 points 28%
+5 points 15%
+12 points 32%

The added cost of the laminated glass upgrade from un-laminated double-pane is not justifiable from a strict STC perspective. The jump from single glazed or double glazed to a dual window configuration is remarkably valuable from a strict STC perspective.

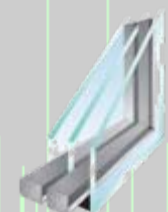
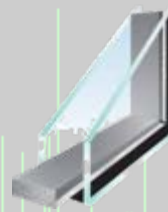
American Society for Testing and Materials E-1425-1991 (1999)

American Architectural Manufacturers Association 1801-07

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STC Results

Annealed DSB Glass



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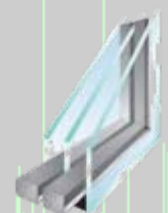
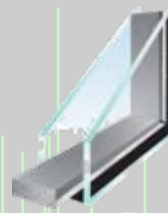
Soft-Lite[®] Windows

<i>Elements</i> Windows	32	32	31	33
<i>Imperial</i> LS	32	33	30	31
<i>Imperial</i> DH10, DH11	29	29	29	30
Bainbridge [™] VINYL WINDOWS	28	28	29	29
Barrington [™] VINYL WINDOWS	28	28	29	29

DH10 validated. Test results available. Other STC test results are computer-estimated.

STC Results

Laminated .090 Exterior DSB Glass



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Soft-Lite[®] Windows

<i>Elements</i> Windows	36	36	37	38
<i>Imperial</i> LS	36	37	36	37
<i>Imperial</i> DHT0, DHT1	35	38	37	36
Bainbridge [™] VINYL WINDOWS	37	35	35	36
Barrington [™] VINYL WINDOWS	35	38	36	36

STC test results are pending. Results shown are computer-estimated.

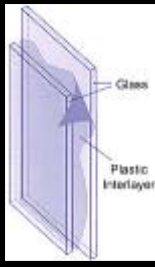


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Soft-Lite®
Windows



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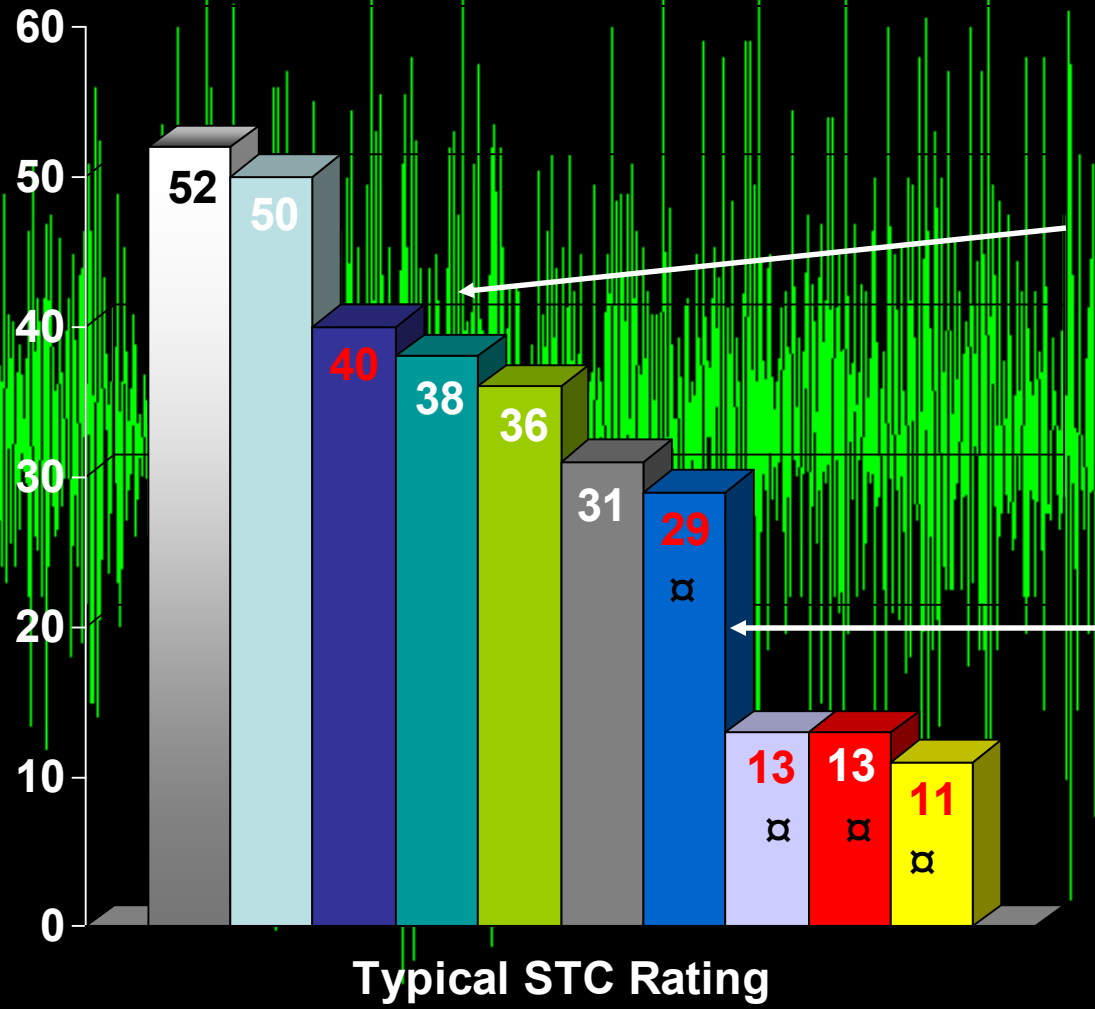
Laminated Glass



Painted Block



Typical Wall - Batt Insulated



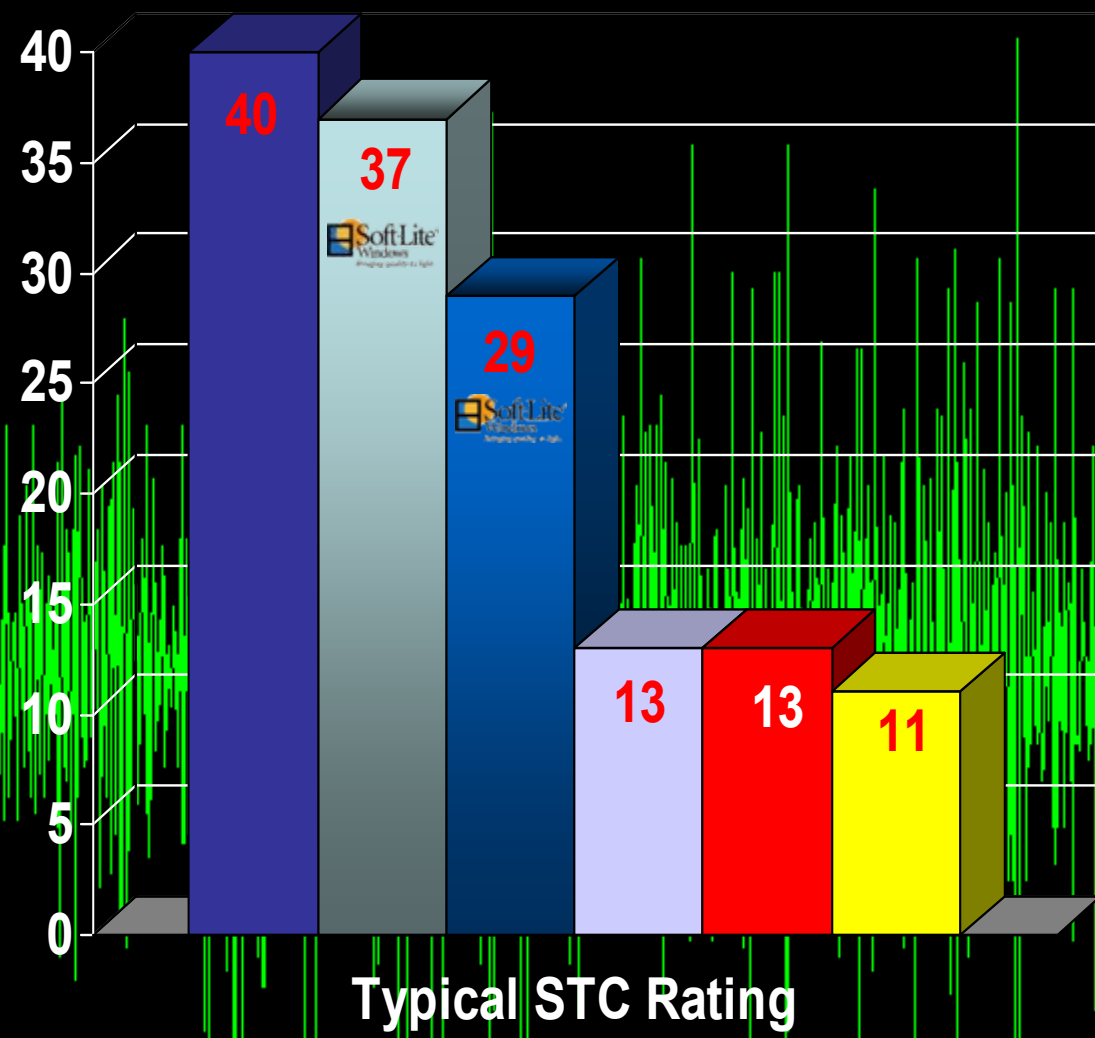
- Block Wall*
- Apartment Code
- STC Threshold
- Typical Wall*
- 1/2" Laminated Window
- 1/4" Laminated Window
- Imperial 2-pane not laminated
- 1-Pane Wood Window
- 1-Pane Steel Casement
- 1-Pane Aluminum Window

⌘ 123% Better; STC 16 Audible Improvement



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Soft-Lite®
Windows



- STC Threshold
- Imperial 2-pane not laminated
- 1-Pane Steel Casement
- Imperial 2-Pane Lam
- 1-Pane Wood Window
- 1-Pane Aluminum Window

Pop Quiz! Win a Prize!



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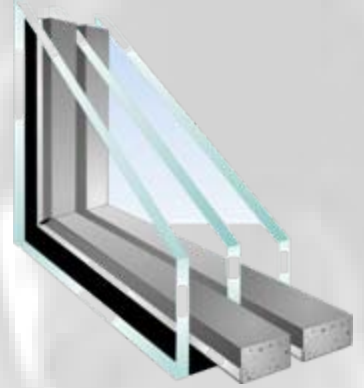
STC



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Presents

Educational Achievement

SOUND TRANSMISSION - STC

To

Your Name Here

December 17, 2009

Sell The Truth™

Tom Italiano, Soft-Lite® Certified Technical Training Manager



Ten STC Questions



1. Name the two third-party tests that measure sound performance of windows.

STC Sound Transmission Classification; OITC Outdoor-Indoor Transmission Class

2. Name the two “Third Parties” responsible for sound performance testing.

ASTM – American Society of Testing and Materials; AAMA – American Architectural Manufacturer’s Association

3. What is the threshold performance for a legitimate “Sound Deadening Window”?

STC 40

4. If one test chamber has 80 decibels and the other has 50 decibels, what is the STC of the barrier between them?

80 – 50 = 30; STC = 30

5. Which matters more to sound, the airspace density (gas) or the airspace distance?

Airspace density is irrelevant. Airspace distance matters.

6. Is it true that sound will travel more easily through a window with poor AAMA air infiltration performance than it will through a window with better AAMA air performance?

Yes. Thermal and Sound characteristics follow the same performance principles.

7. Will a sound-proof window make a home sound-proof?

No! Sound will travel through the points of least resistance, so the structure’s walls, doors, roofs matter.

8. What is a typical 1-pane window STC? ***8A: Wood, metal or vinyl about STC 11 – STC 13***

9. What is the difference between a typical 2-pane window and a typical 3-pane window in STC?

Inaudible difference.

10. The STC increases with laminated glass. How big is the increase from 2-pane to laminated IG?

2-pane range: STC26-STC30; Laminated IG range: STC33-STC38. Not enough to reach STC Threshold of 40.

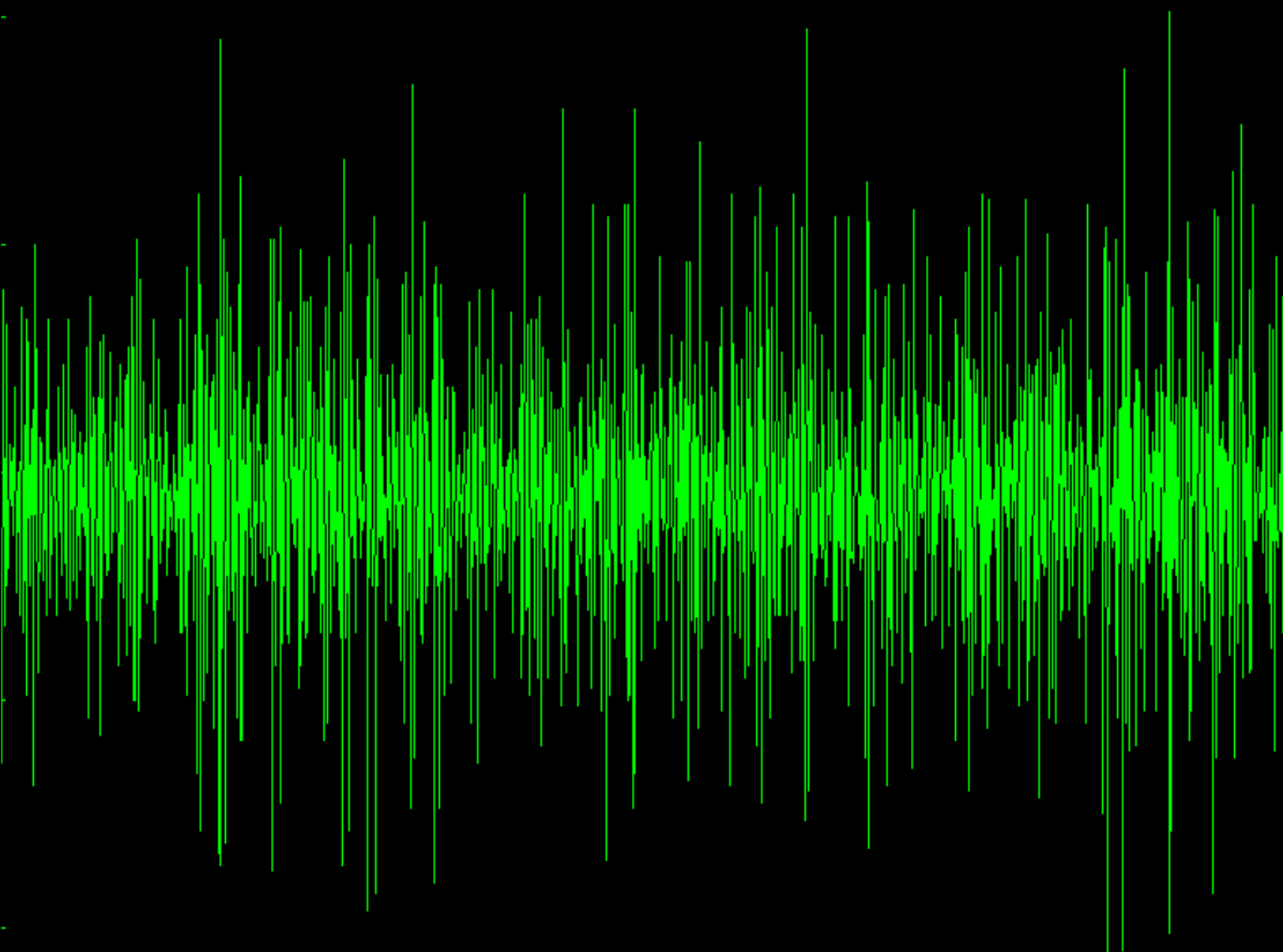
BONUS Q: Explain the ideal STC window configuration and what makes it work.

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Specific references and resources are behind graphic

Last slide – not for presentation: **END**