

# Improve Workspace Effectiveness With UL Classified High Performance Acoustical Ceilings

## Look For This Icon

identifying Armstrong High Performance Acoustical ceilings throughout this catalog.



## Look For This Logo

identifying Armstrong UL Classified Acoustical ceilings throughout this catalog – the assurance of precise performance in every ceiling tile.



## Armstrong UL Classified High Performance Acoustical Ceilings:

- Help prevent noise – the #1 distraction in open plan offices
- Carry UL Classification for precise acoustical compliance

Sound absorption is a primary design criterion – and key to more effective spaces for working, learning and healing. Research proves that 70% of workers identify conversational noise as the number one problem affecting their productivity in open plan offices where “standard” acoustical ceilings are installed.

## Three Factors Contribute to Noise Distractions in the Workplace:

- 1 General office noise (measured by NRC)
- 2 Reflected conversational noise that angles off ceilings into adjacent cubicles (measured by AC)
- 3 Sound transmission through cubicles, partitions, walls and ceilings (measured by CAC)

Three standards of acoustical classification measure the level of control provided by an acoustical material:



### 1. Noise Reduction Coefficient (NRC)

A measure of the average percentage of noise that a material absorbs in the mid-frequency range (average of four frequency bands - 250, 500, 1000, 2000 Hz). This key measure of sound absorption for general office noise is expressed as a single value number from 0.0 to 1.0. (Reference: ASTM C 423)

### 2. Speech Range Absorption (SRA)

A measure of the average percentage of sound that a material absorbs in the speech frequency range (average of four frequency bands 500-4000 Hz). Similar to NRC but shifted higher in frequency to better represent speech effects.



### 3. Articulation Class (AC)

Rates a ceiling's suitability for achieving normal speech privacy in open office spaces by absorbing noise reflected at an angle off the ceiling into adjacent cubicles. This is a measure of the noise reflected over office partitions (60" high) in the frequencies critical to speech intelligibility and conversational privacy. The generally accepted AC rating for normal privacy in open plan is minimum 170, with 190 to 210 preferred. AC is the primary measure of acoustic performance in the open plan. (Reference: ASTM E 1110 and 1111)



### 4. Ceiling Attenuation Class (CAC)

Rates a ceiling structure's efficiency as a barrier to airborne sound intrusion between two closed rooms, over the speech frequency range. It is an especially significant measure in providing acoustic privacy between adjacent work areas, where sound can penetrate plenum spaces and carry to other spaces. CAC is stated as a minimum value; CAC minimum 25 is acceptable in open plan offices, while a rating of minimum 35 or 40 is preferred for closed offices. (Reference: ASTM E 1414)

**UL Classified Acoustical Performance:**

Only ceilings that are UL Classified for Acoustical Performance ensure performance that meets or exceeds published values for NRC (Noise Reduction Coefficient), AC (Articulation Class) and CAC (Ceiling Attenuation Class). As the industry leaders, Armstrong and UL teamed to create this new classification to ensure more precision and reliability in the reporting and specifying of sound absorption. Every tile in every Armstrong carton meets these standards.

Under semimonthly plant audits by UL inspectors, acoustical performance for all Armstrong commercial ceilings is validated by applying the most current published editions of ASTM standard test methods:

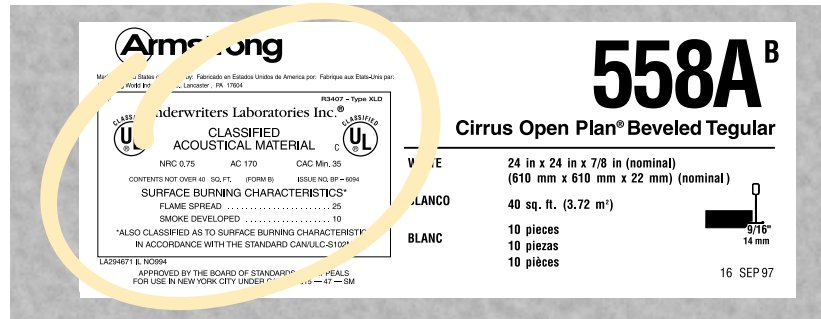
- Sound Absorption: ASTM C 423 for Noise Reduction Coefficient (NRC)
- Transmission Loss: ASTM E 1414 for Ceiling Attenuation Class (CAC)
- Sound Absorption in Open Plan Design: ASTM E 1111 for Articulation Class (AC)

Meeting ASTM E 1264 Guidelines: Armstrong Single-Number Values Reduce Margin of Error  
Armstrong follows ASTM E 1264-98 "Standard Classification for Acoustical Ceiling Products" guidelines by specifying a single number (for example, 0.55 NRC or 35 CAC) rather than a range (0.50-0.60 NRC or 35-39 CAC) to categorize acoustical values.

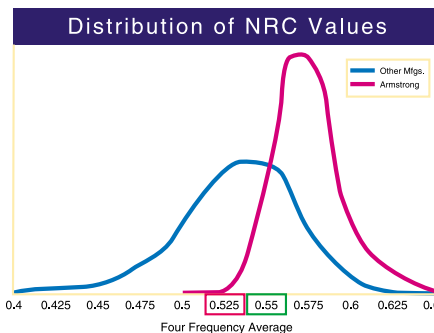
Nowhere does the ASTM classification suggest using ranges to categorize acoustical values.

Specifically, the ASTM classification states that "NRC values are to be expressed in increments of 0.05 as specified by Test Method C 423." The same single-number provisions apply to AC and CAC.

Precise single-number reporting as specified by ASTM requires consistent, in-control manufacturing processes. Examiners noted Armstrong's use of Statistical Process Control (SPC) when the organization became the only building products manufacturer to earn the Malcolm Baldrige National Quality Award.



▲ This label appears on cartons of Armstrong UL Classified acoustical ceilings. Armstrong certifies that the material in the carton meets published values, not merely that a similar batch of material met these values at some point in the past.



◀ Armstrong's focus on Statistical Process Control tightens the product performance range. In this example, Armstrong can provide the assurance of NRC 0.55 performance. There is no need to allow for variations by publishing a less exact range of performance.

Published NRC Value (in green box)  
Minimum NRC to meet published value (in red box)

**Ceiling Resources Available to You:**

- Summary listing, Armstrong High Performance Acoustical ceilings – Page 18
- Acoustical data for all Armstrong ceilings – "Acoustical Performance Summary", pages 186 and 187
  - "High Performance Acoustical Ceilings" – CS-3092
  - "The Sound of the Effective Workspace – Armstrong Case Studies On Open Plan Noise" – CS-3112
- Reprint, "Sound Advice" column by Jon W. Mooney, expert in Theoretical and Practical Acoustics, August, 1998 Walls & Ceilings magazine – 175024
- To actually hear the difference high performance acoustical ceilings can make: "Sounds of Silence High AC Acoustic DemoDisc" – 175016
  - TechLine assistance – 1-877-ARMSTRONG (Option 3)

[www.ceiling.com](http://www.ceiling.com)

# UL Classified Acoustical Performance Summary

## Ceilings

PRODUCT/DESIGN* — BY CEILING CATEGORY	PAGES	UNIT SIZE TESTED	SOUND ABSORPTION COEFFICIENTS <sup>C</sup> — E-400 MOUNTING						SOUND ABSORPTION <sup>F</sup>		SOUND TRANSMISSION <sup>G</sup>	
			125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC <sup>E</sup>	AC <sup>H</sup>	CAC MINIMUM <sup>E</sup>	
<b>GENERAL APPLICATION CEILING</b>												
CIRRUS Beveled Tile	30-31	12" x 12" x 3/4"	0.38	0.38	0.51	0.77	0.89	0.95	0.85	–	35 <sup>A</sup>	
CIRRUS Beveled Tile Fire Guard	30-31	12" x 12" x 3/4"	0.28	0.36	0.49	0.68	0.81	0.89	0.60	–	35 <sup>A</sup>	
CIRRUS Grid Accent Panels System J, K	42-43	24" x 24" x 3/4"	0.44	0.35	0.54	0.83	0.96	1.00	0.85	–	33	
CORTEGA Angled Tegular	56-57	24" x 48" x 5/8"	0.30	0.31	0.48	0.75	0.75	0.70	0.55	–	33	
CORTEGA Beveled Tile	56-57	12" x 12" x 5/8"	0.39	0.33	0.49	0.65	0.78	0.84	0.50	–	35 <sup>A</sup>	
CORTEGA Fire Guard	56-57	24" x 24" x 5/8"	0.35	0.28	0.49	0.86	0.84	0.86	0.55	–	35 <sup>A</sup>	
CORTEGA Second Look Fire Guard Squares	58-59	24" x 48" x 3/4"	0.36	0.35	0.53	0.72	0.74	0.76	0.55	–	40	
CORTEGA Second Look Planks	58-59	24" x 48" x 3/4"	0.29	0.28	0.41	0.57	0.66	0.69	0.50	–	35	
CORTEGA Second Look Squares	58-59	24" x 48" x 3/4"	0.31	0.33	0.51	0.67	0.70	0.78	0.55	–	30 <sup>B</sup>	
CORTEGA Square Lay-in	54-55	24" x 48" x 5/8"	0.30	0.31	0.48	0.75	0.75	0.70	0.55	–	35-40	
DESIGNER Angled Tegular (5/8")	62-63	24" x 24" x 5/8"	0.36	0.28	0.48	0.70	0.72	0.70	0.55	–	35	
DESIGNER Second Look Squares	62-63	24" x 48" x 3/4"	0.30	0.32	0.50	0.63	0.70	0.81	0.55	–	35	
DESIGNER Square Lay-in	62-63	24" x 48" x 5/8"	0.35	0.29	0.51	0.70	0.71	0.73	0.55	–	30 <sup>B</sup>	
DUNE Square Lay-in	64-65	24" x 48" x 5/8"	0.39	0.34	0.58	0.54	0.44	0.41	0.50	–	30	
FINE FISSURED Beveled Tile	70-71	12" x 12" x 3/4"	0.38	0.39	0.54	0.75	0.87	0.93	0.65	–	35 <sup>A</sup>	
FINE FISSURED Fire Guard	68-69	24" x 24" x 5/8"	0.37	0.31	0.54	0.76	0.77	0.84	0.55	–	35	
FINE FISSURED High NRC	68-69	24" x 48" x 3/4"	0.36	0.41	0.65	0.84	0.90	0.88	0.70	–	40	
FINE FISSURED Second Look Squares	78-79	24" x 48" x 3/4"	0.35	0.35	0.57	0.64	0.70	0.65	0.50-0.55	–	30 <sup>B</sup>	
FINE FISSURED Square Lay-in	68-69	24" x 48" x 5/8"	0.35	0.34	0.55	0.72	0.65	0.62	0.55	–	35	
FISSURED Beveled Tile	80-81	12" x 12" x 5/8"	0.34	0.30	0.49	0.66	0.79	0.84	0.50	–	35 <sup>A</sup>	
FISSURED Square Lay-in	80-81	24" x 48" x 5/8"	0.35	0.34	0.55	0.72	0.65	0.62	0.55	–	30 <sup>A</sup>	
FISSURED Square Lay-in Fire Guard	68-69	24" x 48" x 5/8"	0.26	0.26	0.43	0.77	0.87	0.93	0.55	–	35 <sup>A</sup>	
GEORGIAN Beveled Tegular	82-83	24" x 24" x 5/8"	0.24	0.34	0.58	0.64	0.51	0.42	0.55	–	35 <sup>A</sup>	
GEORGIAN Square Lay-in	82-83	24" x 48" x 5/8"	0.26	0.32	0.55	0.72	0.58	0.49	0.55	–	33	
GEORGIAN Square Lay-in Fire Guard	82-83	24" x 48" x 5/8"	0.31	0.32	0.54	0.81	0.72	0.53	0.55	–	35	
HIGHSPIRE	86-87	12" x 12" x 3/4"	0.39	0.37	0.53	0.78	0.89	0.99	0.65	–	35 <sup>A</sup>	
NATURAL FISSURED Angled Tegular	98-99	24" x 24" x 3/4"	0.38	0.38	0.54	0.79	0.96	1.01	0.65	–	35	
RANDOM FISSURED (Nonperforated)	126-127	24" x 48" x 5/8"	0.65	0.38	0.30	0.78	0.77	0.71	0.55	–	–	
RANDOM FISSURED (Perforated)	126-127	24" x 48" x 5/8"	0.67	0.65	0.65	0.71	0.81	0.71	0.70	–	–	
SANSERRA Angled Tegular	114-115	24" x 24" x 3/4"	0.35	0.32	0.54	0.81	0.91	1.02	0.65	–	35	
SANSERRA Square Tile	114-115	12" x 12" x 3/4"	0.42	0.36	0.52	0.83	0.94	1.02	0.65	–	35 <sup>A</sup>	

PRODUCT/DESIGN* —	PAGES	UNIT SIZE TESTED	SOUND ABSORPTION COEFFICIENTS <sup>C</sup> —E-400 MOUNTING						SOUND ABSORPTION <sup>F</sup>		SOUND TRANSMISSION <sup>G</sup>	
			125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC <sup>E</sup>	AC <sup>H</sup>	CAC MINIMUM <sup>E</sup>	
<b>GENERAL APPLICATION CEILING (CONTINUED)</b>												
SHASTA (Nonperforated)	126-127	24" x 48" x 5/8"	0.62	0.36	0.29	0.76	0.66	0.77	0.50	–	–	
SHASTA (Perforated)	126-127	24" x 48" x 5/8"	0.72	0.65	0.66	0.73	0.73	0.68	0.70	–	–	
STRATUS	118-119	24" x 24" x 3/4"	0.52	0.54	0.58	0.80	0.95	0.97	0.70	–	25	
TUNDRA	122-123	24" x 24" x 5/8"	0.31	0.32	0.63	0.70	0.48	0.33	0.50	–	35	
ULTIMA	124-125	24" x 48" x 3/4"	0.32	0.34	0.76	0.87	0.86	0.84	0.70	–	35	
<b>GENERAL APPLICATION CEILING (CONTINUED)</b>												
ARMATUFF	26-27	24" x 24" x 5/8"	0.31	0.26	0.39	0.61	0.75	0.81	0.50	–	35	
CIRRUS Open Plan	38-39	24" x 24" x 7/8"	0.32	0.37	0.70	0.93	1.00	1.05	0.75	170	35	
Clean Room MYLAR (Field Units)	52-53	24" x 48" x 3/4"	0.27	0.29	0.52	0.78	0.70	0.56	0.55	–	35 <sup>A</sup>	
FINE FISSURED Ceramaguard (Perforated)	72-73	24" x 48" x 5/8"	0.30	0.27	0.44	0.66	0.85	0.82	0.55	–	40	
FINE FISSURED Open Plan	76-77	24" x 48" x 3/4"	0.30	0.33	0.66	0.94	0.90	0.87	0.70	170	35 <sup>A</sup>	
OPTIMA Open Plan	100-103	24" x 24" x 1"	0.78	0.98	0.76	0.98	1.01	1.03	0.95	190	–	
OPTIMA Open Plan CAC Backing	100-103	24" x 48" x 1"	0.40	0.50	0.95	1.03	1.10	1.04	0.85	200	27	
OPTIMA Open Plan CAC Backing	100-103	24" x 48" x 1-1/2"	0.47	0.80	0.85	1.11	1.06	0.94	0.95	210	27	
PAINTED NUBBY Open Plan	108-111	24" x 48" x 3/4"	0.47	0.30	0.66	0.92	1.01	1.00	0.85	180	–	
PAINTED NUBBY Open Plan	108-111	24" x 48" x 1"	0.78	0.97	0.79	0.98	1.03	1.01	0.95	190	–	
PAINTED NUBBY Open Plan CAC Backing	108-111	24" x 24" x 1"	0.40	0.42	0.94	0.97	1.07	1.00	0.90	200	24	
PEBBLE	112-113	24" x 48" x 5/8"	0.77	0.69	0.61	0.76	0.80	0.79	0.70	–	–	
PEBBLE High NRC	112-113	24" x 48" x 1"	0.80	0.80	0.70	0.82	0.78	0.71	0.80	–	–	
STONEBROOKE	126-127	24" x 48" x 1"	0.62	0.77	0.66	0.82	0.79	0.64	0.65	–	–	
VL (Perforated)	52-53	24" x 48" x 5/8"	0.26	0.30	0.47	0.68	0.67	0.50	0.55	–	35 <sup>A</sup>	
<b>ACCENT AND ALTERNATIVE MATERIALS CEILING</b>												
GRAPHIS	84-85	24" x 24" x 3/4"	0.26	0.16	0.09	0.11	0.13	0.11	0.10	–	30	
SOFT LOOK	116-117	24" x 24" x 7/8"	0.32	0.35	0.60	0.79	0.74	0.75	0.60	–	33	
<b>ACOUSTICAL WALLS</b>												

For acoustical performance data on Armstrong wall products, see product pages 166-177.

- A** = CAC of minimum 40 is available on special order for selected items.
- B** = CAC of minimum 35 is available on selected items.
- C** = Sound absorption test data for specific item tested. Data for most products available upon request.
- D** = Weight of other patterns in this family varies.
- E** = NRC and CAC single number ratings comply with new ASTM E 1264 classification requirements. ASTM E 1264 supersedes Federal Specification SS-S-118B obsoleted by the General Service Administration 11/7/89.
- F** = Sound Absorption Data and NRC rating obtained by ASTM procedure C 423, "Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." Sample mountings follow procedures outlined in ASTM E 795, "Practices for Mounting Test Specimens During Sound Absorption Tests."
- G** = Sound Transmission loss data obtained by procedures outlined in AMA-1-II, "Test Method for Ceiling Sound Transmission Test by the Two-Room Method" or by the ASTM Procedure E 1414, "Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum." CAC rating determined by following procedure outlined in ASTM Procedure E 413, "Classification for Determination of Sound Transmission Class."
- H** = AC rating obtained by ASTM procedure ASTM E 1111 "Measuring into Zone Attenuation and Ceiling Systems" and ASTM E 1110 "Determination of Articulation Class"

\*These data represent averages for the product family.