Appendix

Agencies and Organizations

ACI	ACI International (American Concrete Institute) P.O. Box 9094 38800 Country Club Drive Farmington Hills, MI 48333	Phone: 248-848-3700 Fax: 248-848-3720 Website: http://www.aci-int.net/ E-mail: jtosca@aci-int.org
AGC	Associated General Contractors of America 333 John Carlyle Street Alexandria, VA 22314	Phone: 703-548-3118 Fax: 703-548-3119 Website: http://www.agc.org E-mail: info@agc.org
AFPA	American Forest & Paper Association 1111 19th Street NW, Suite 800 Washington, DC 20036	Phone: 202-463-2700 Fax: 202-463-2785 Website: http://www.afandpa.org E-mail: info@afandpa.org
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006	Phone: 202-626-7300 Fax: 202-626-7587 Website: http://www.aiaonline.com E-mail: aiaonline@aiamail.aia.org
A Ins. A	American Insurance Association 1130 Connecticut Ave., N.W. Washington, DC 20036	Phone: 202-828-7100 Fax: 202-293-1219 Website: http://www.aiadc.org E-mail: membership@aiadc.org
AIHA	American Industrial Hygiene Association 2700 Prosperity Avenue, Suite 250 Fairfax, VA 22031	Website: www.aiha.org
AISI	American Iron and Steel Institute 1101 17th Street, N.W. Washington, DC 20036	Phone: 202-452-7100 Fax: 202-463-6573 Website: http://www.steel.org E-mail: dwalson@steel.org
ANSI	American National Standards Institute 11 W. 42nd Street, 13th floor New York, NY 10036	Phone: 212-642-4900 Fax: 212-398-0023 Website: http://www.ansi.org E-mail: ansionline@ansi.org
APA	APA, The Engineered Wood Association (formerly: American Plywood Association) P.O. Box 11700 Tacoma, WA 98411	Phone: 253-565-6600 Fax: 253-565-7265 Website: http://www.apawood.org E-mail: help@apawood.org
ASA	Acoustical Society of America 2 Huntington Quadrangle Suite 1NO1 Melville, NY 11747-4502	Phone: 516-576-2360 Fax: 516-576-2377 Website: http://asa.aip.org E-mail: asa@aip.org
ASC	Adhesive and Sealant Council, Inc. 7979 Old Georgetown Road Suite 500 Bethesda, MD 20814	Phone: 301-986-9700 Fax: 301-986-9795 Website: http://www.ascouncil.org E-mail: malinda.armstrong@ ascouncil.org

ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. 1791 Tullie Circle, N.E. Atlanta, GA 30329	Phone: 800-527-4723 or 404-636-8500 Fax: 404-321-5478 Website: http://www.ashrae.org E-mail: ashrae@ashrae.org
ASSE	American Society of Safety Engineers 1800 E. Oakton Street Des Plaines, IL 60018	Phone: 800-380-7101 Website: www.asse.org
ASTM	American Society for Testing and Materials 100 Barr Harbor West Conshohocken, PA 19428-2959	Phone: 610-832-9585 Fax:: 610-832-9555 Website: http://www.astm.org E-mail: service@astm.org
AWCI	Association of the Wall & Ceiling Industries International 803 West Broad Street, Suite 600 Falls Church, VA 22046	Phone: 703-534-8300 Fax: 703-534-8307 Website: http://www.awci.org E-mail: info@awci.org
BIA	Brick Industry Association (formerly: Brick Institute of America) 11490 Commerce Park Drive Reston, VA 20191	Phone:703-620-0010 Fax: 703-620-3928 Website: http://www.brickinfo.org E-mail: cooney@bia.org
CAC	Cement Association of Canada 1500-60 Queen Street Ottawa, ON K1P 5Y7	Phone: 613-236-9471 Website: http://www.cement.ca
CCA	Canadian Construction Association 75 Albert Street, Suite 400 Ottawa, ON K1P 5E7	Phone: 613-236-6455 Fax: 613-236-9526 Website: http://www.cca-acc.com
CHBA	Canadian Home Builders Association 150 Laurier Avenue West Ottawa, ON K1P 5J4	Phone: 613-230-3060 Website: http://www.chba.ca
CISC	Canadian Institute of Steel Construction 201 Consumers Road, Suite 300 North York, ON M2J 4G8	Phone: 416-491-4552 Fax: 416-491-6461 Website: http://www.cisc-icca.ca
CISCA	Ceiling and Interior Systems Construction Association 1500 Lincoln Highway, Suite 202 St. Charles, IL 60174	Phone: 630-584-1919 Fax: 630-584-2003 Website: http://www.cisca.org E-mail: cisca@cisca.org
CMHC	Canada Mortgage and Housing Corporation 700 Montreal Road Ottawa, ON K1A 0P7	Phone: 613-748-2000 Fax: 613-748-2098 Website: http://www.cmhc-schl.gc.ca
CSA	Canadian Standards Association 178 Rexdale Boulevard Etobicoke, ON M9W 1R3	Phone: 416-747-4000 Website: http://www.csa.ca
CSC	Construction Specifications Canada 120 Carlton Street, Suite 312 Toronto, ON M5A 4K2	Phone: 416-777-2198 Fax: 416-777-2197 Website: http://www.csc-dcc.ca

CSI	Construction Specification Institute 99 Canal Center Plaza, Suite 300 Alexandria, VA 22314	Phone: 703-684-0300 or 800-689-2900 Fax: 703-684-0465
CSSBI	Canadian Sheet Steel Building Institute 852 Bishop Street, North Cambridge, ON N3H 4X6	Phone: 519-650-1285 Fax: 519-650-8081 Website: http://www.cssbi.ca
CWC	Canadian Wood Council 400-99 Bank Street Ottawa, ON K1P 6B9	Phone: 613-747-5544 Fax: 613-747-6264 Website: http://www.cwc.ca
DRCI	Drywall Finishing Council 345 West Meats Avenue Orange, CA 92865	Phone: 714-637-2770 Fax: 714-921-8974 E-mail: none
EIMA	EIFS Industry Members Association 3000 Corporate Center Drive Suite 270 Morrow, GA 30260	Phone: 770-968-7945 Fax: 770-968-5818
GA	Gypsum Association 810 First Street, NE, Suite 510 Washington, DC 20002	Phone: 202-289-5440 Western Office: 602-527-8466 Fax: 202-289-3707 Website: http://www.gypsum.org E-mail: info@gypsum.org
HUD	Department of Housing & Urban Development (U.S.) 451 Seventh Street, SW Washington, DC 20410	Phone: 202-708-0417 (General phone number) Fax: 202-619-8129 (Administration Office) Website: http://www.hud.gov E-mail: no general e-mail
ML/SFA	Metal Lath/Steel Framing Association; now a division of National Association of Architectural Metal Manufacturers (see NAAMM)	
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue Suite 1000 Chicago, IL 60603	Phone: 312-332-0405 Fax: 312-332-0706 Website: http://www.naamm.org E-mail: naamm@naamm.org
NAHB	National Association of Home Builders 1201 15th Street NW Washington, DC 20005-2800	Phone: 800-368-5242 or 202-822-0200 Fax: 202-822-0559 Website: http://www.nahb.com E-mail: info@nahb.com
NCMA	National Concrete Masonry Association 2302 Horse Pen Road Herndon, VA 20171-3499	Phone: 703-713-1900 Fax: 703-713-1910 Website: http://www.ncma.org E-mail: ncma@ncma.org
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1847 Rosslyn, VA 22209	Phone: 703-841-3200 Fax: 703-841-3300 Website: http://www.nema.org E-mail: mal_o'harpan@nema.org No general e-mail – above is for the President.

NFPA	National Fire Protection Association 1 Batterymarch Park P.O. Box 9101 Quincy, MA 02269	Phone: 800-344-3555 or 617-770-3000 Fax: 800-593-6372 Website: http://www.nfpa.org E-mail: custserv@nfpa.org
NFoPA	National Forest Products Association This organization is now American Forest & Paper Association (see AFPA)	
NIBS	National Institute of Building Sciences 1090 Vermont Avenue, NW Suite 700 Washington, DC 20005-4905	Phone: 202-289-7800 Fax: 202-289-1092 Website: http://www.nibs.org E-mail: nibs@nibs.org
NLS	National Lime Association 200 North Glebe Road, Suite 800 Arlington, VA 22203	Phone: 703-243-5463 Fax: 703-243-5489 Website: http://www.lime.org E-mail: natlime@aol.com
NRCC-IRC	National Research Council Canada-Institute For Research in Construction 1200 Montreal Road Ottawa, ON K1A 0R6	Phone: 613-993-2607 Website: http://www.irc-cnrc.gc.ca
NSC	National Safety Council 1121 Spring Drive Itasca, IL 60143-3201	Phone: 800-621-7619 Website: www.nsc.org
NTIS	National Technical Information Center U.S. Department of Commerce (Technology Admin.) 5295 Port Royal Road Springfield, VA 22161	Phone: 703-487-4650 Fax: 703-605-6900 Website: http://www.ntis.gov/ E-mail: info@ntis.fedworld.gov
NWPCA	National Wooden Pallet and Container Association 1800 North Kent Street, Suite 911 Arlington, VA 22209-2109	Phone: 703-527-7667 Fax: 703-527-7171 Website: http://www.nwpca.com
OSHA	U. S. Department of Labor Occupational Safety & Health Administration 200 Constitution Avenue Washington, DC 20210	Phone: 800-321-OSHA (6742) Website: www.osha.gov
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077	Phone: 847-966-6200 Fax: 847-966-6200 Website: http://www.portcement.org E-mail: bruce_mcintosh@port cement.org
PDCA	Painting and Decorating Contractors Of America 3913 Old Lee Highway, Suite 33B Fairfax, VA 22030	Phone: 800-332-7322 Fax: 703-359-2576 Website: http://pdca.org E-mail: gdomedion@pdca.org
RAIC	Royal Architectural Institute of Canada 330-55 Murray Street Ottawa, ON K1N 5M3	Phone: 613-241-3600 Fax: 613-241-5750 Website: http://www.raic.org

RAL	Riverbank Acoustical Laboratories 1512 S. Batavia Avenue Geneva, IL 60134	Phone: 630-232-0104 Fax: 630-232-0138 Website: http://riverbank.iitri.org E-mail: jstangel@iitri.org
SIPA	Structural Insulated Panel Association 3413 56th Street NW, Suite A Gig Harbor, WA 98335	Phone: 253-858-7472 Fax: 253-858-0272 Website: http://www.sips.org E-mail: jimt@sips.org
TCA	Tile Council of America, Inc. 100 Clemson Research Blvd. Anderson, SC 29625	Phone: 864-646-8453 Fax: 864-646-2821 Website: http://www.tileusa.com E-mail: literature@carol.net
TPI	Truss Plate Institute 583 D'Onofrio Drive, Suite 200 Madison, WI 53719	Phone: 608-833-5900 Fax: 608-833-4360 Website: none E-mail: flow@tpinst.org
TTMAC	Terrazzo Tile and Marble Association of Canada 163 Buttermill Avenue, Unit 8 Concord, ON L4K 3X8	Phone: 905-660-9640 Fax: 905-660-0513 Website: http://www.ttmac.com
UL	Underwriters Laboratories, Inc. 333 Pfingsten Road Northbrook, IL 60062-2096	Phone: 847-272-8800 Fax: 847-272-8129 Website: http://www.ul.com E-mail: northbrook@ul.com
ULC	Underwriters Laboratories of Canada 7 Crouse Road Scarborough, Ontario M1R 3A9 Canada	Phone: 416-757-3611 Fax: 416-757-1781 Website: http://www.ulc.ca E-mail: ulcinfo@ulc.ca
WHI	Warnock Hersey International Inc. Intertek Testing Services 530 Garcia Avenue Pittsburg, CA 94565	Phone: 925-432-7344 Fax: 925-432-3576 Website: http://www.warnock hersey.com E-mail: hstacy@itsqs.com

Rating Fire Endurance

CAN/ULC S101 (ASTM E119, UL 263 and NFPA 251)

This is the standard test for rating the fire resistance of columns, girders, beams, and wall-partition, floor-ceiling and roof-ceiling assemblies. It is published by four organizations, designated above, and is essentially the same for all four.

The test procedure consists of the fire endurance test for all assemblies (not individual products) and, in addition, a hose stream test for partition and wall assemblies. The test specimen assembly must meet the following requirements:

1. Structural elements subjected to the test must support the maximum design loads applied throughout the test period. Columns, beams, girders and structural decks must carry the load without failure.

   This test does not imply that the test specimen will be suitable for use after the exposure. Some specimens are so damaged after one hour of exposure that they would require replacement, even though they meet all of the requirements for a 4-hr. rating.

2. No openings may develop in an assembly that will permit flames or hot gases to penetrate and ignite combustibles on the other side.

3. An assembly must resist heat transmission so that temperatures on the side opposite the fire are maintained below designated values. The temperature of the unexposed surface is measured by thermocouples covered with dry refractory filter pads attached directly to the surface. In the case of walls and partitions, one thermocouple is located at the center of the assembly, one in center of each quarter-section, and the other four at the discretion of the testing authority.

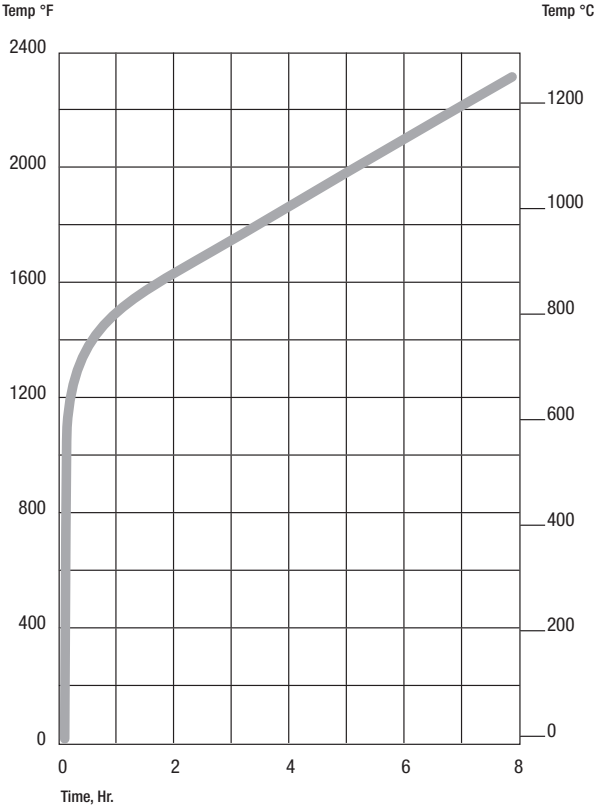
   The integrity of walls and partitions is evaluated in the hose stream test that examines the construction's ability to resist disintegration under adverse conditions. The hose stream test subjects a duplicate sample to one-half of the indicated fire exposure (but not more than one hour), then immediately to a stream of water from a fire nozzle at a prescribed pressure and distance. This test evaluates the impact, erosion and cooling effects of a hose stream directed at the exposed surface. If there is a breakthrough on the unexposed side, sufficient to pass a stream of water, the result is test failure.

   The time-temperature curve used for the fire endurance test is shown on page 424. The temperature of the furnace is obtained from the average readings of nine thermocouples, symmetrically located, and placed 150 mm (6″) from the exposed surface of walls and partitions, or 300 mm (12″) from the exposed surface of floors, ceilings and columns.

Conditions for Hose Stream Test

Resistance Period	Water Pressure At Base of Nozzle		Duration of Application, Min. per 10m² (100 ft.²) Exposed Area
	kPa	lbf/in.²	
8 hr. and over	310	45	6
4 hr. and over if less than 8 hrs.	310	45	5
2 hr. and over if less than 4 hrs.	207	30	2-1/2
1-1/2 hr. and over if less than 2 hr.	207	30	1-1/2
1 hr. and over if less than 1-1/2 hr.	207	30	1
Less than 1 hr., if desired	207	30	1

Time Temperature Curve for Fire-Endurance Testing (CAN/ULC S101)



Surface Burning Characteristics

CAN/ULC S102 (ASTM E84, ANSI 2.5, NFPA 225 and UL 723)

The characteristics of interior finish materials that are related to fire protection are:

– ability to spread fire, and

– quantity of smoke developed when burning

Materials that have high flame spread and produce large quantities of smoke are considered undesirable, especially when used in areas where people assemble or are confined.

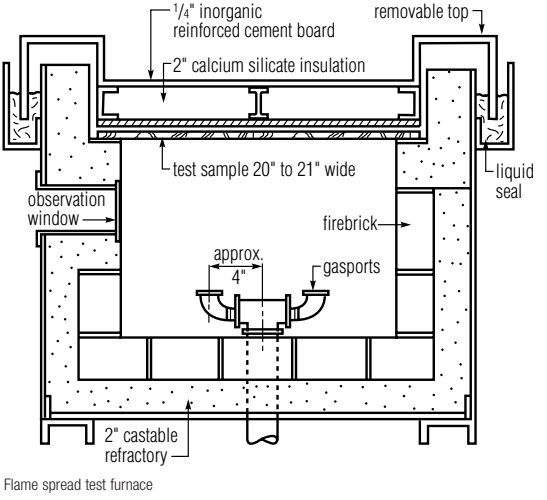
The flame spread test (Surface Burning Characteristics of Building Materials) is often referred to as the Steiner Tunnel Test, after its originator.

In the test, a 500 x 7620 mm (20″ x 25′) sample, forming the roof of a rectangular furnace, is subjected to a fire of controlled severity, placed 300 mm (12″) from one end of the sample. Where the flame contacts the sample is considered to be 1370 mm (4-1/2′) from the fire, so the test is actually conducted over 5940 mm (19-1/2′) of the sample.

The time required for the flame to travel the 5790 mm (19′) to the end of the sample, along with the smoke and heat produced, is compared with similar figures for red oak which is arbitrarily given the value of 100 for these three characteristics, and inorganic reinforced cement board which is given the value of 0.

Smoke developed is measured by means of a photoelectric cell connected to an ammeter which indicates changes in smoke density.

Obviously, the indices developed in the tunnel test are relative, but enough is known about the burning characteristics of materials to make these indices reliable for building code specifications.



Flame spread test furnace

In Canada, the building code prescribes maximum limits of flame spread and smoke developed of materials based on the materials actual results.

U.S. building codes divide materials into four classes, based on the Flame Spread Indices. The numbering and range of each class varies with the different codes, but they generally follow this pattern:

Class I (Class A)—0-25

Class II (Class B)—26-75

Class III (Class C)—76-200

Class IV (Class D)—over 200

Surface Burning Characteristics (per CAN/ULC S102)

Product	Flame Spread	Smoke Developed
SHEETROCK Brand Gypsum Panels	15	0
SHEETROCK Brand Interior Gypsum Ceiling Board	15	0
SHEETROCK Brand Lay-In Ceiling Tile	20	0
SHEETROCK Brand Exterior Gypsum Ceiling Board	20	0
SHEETROCK Brand Gypsum Panels, Water-Resistant	20	0
SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels		
Pumice	≤ 25	≤ 50
Moonstone	≤ 25	≤ 50
Burlap	≤ 25	≤ 50
Tweed	≤ 25	≤ 50
Granite	≤ 25	≤ 50
Academy	≤ 25	≤ 50
Trafalgar	≤ 25	≤ 50
Striae	≤ 25	≤ 50
Sonoma	≤ 25	≤ 50
Brushwork	≤ 25	≤ 50
THERMAFIBER Sound Attenuation Fire Blankets	15	0
DUROCK Cement Board, Underlayment and Exterior Cement Board	5	0
USG Brand Ceiling Panels	0.25	0.50

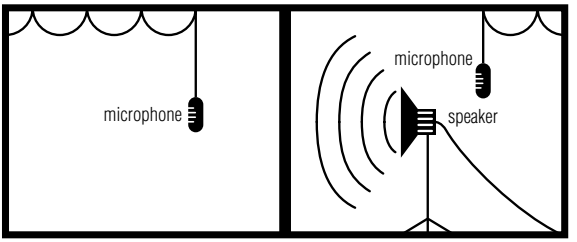
Determination of Sound Transmission Class (STC)

Testing for airborne sound transmission is performed under rigidly established procedures set up by the American Society for Testing and Materials (ASTM procedure E90-90). Several independent acoustical laboratories across the nation are qualified to perform the tests. Although all are presumably reliable and follow the ASTM procedure, the results tend to vary slightly. For this reason, test results from more than one laboratory should never be compared on an exact basis.

Tests are conducted on a sample assembly, at least 2.4 m x 2.4 m in size. The assembly is installed between two rooms constructed in such a way that sound transmitted between the rooms by paths other than through the assembly is insignificant. Background noise in the rooms is monitored to ensure it does not affect test results.

The sound source consists of an electronic device and loudspeaker which produce a continuous random noise covering a minimum frequency range of 125 to 4,000 Hz (Hertz—cycles per second). Note for comparison that human speech is approximately 125 to 8,000 Hz. Panel diffusers and/or rotating vanes are set up so noise is diffused and the sound level is measured at several microphone positions in each room. Readings are taken at sixteen 1/3-octave frequency-band intervals. Average sound levels in the receiving room are subtracted from the corresponding sound levels in the source room. The differences (sound levels of the actual transmission) are recorded as transmission-loss values (adjustments are made for test room absorption and test assembly size).

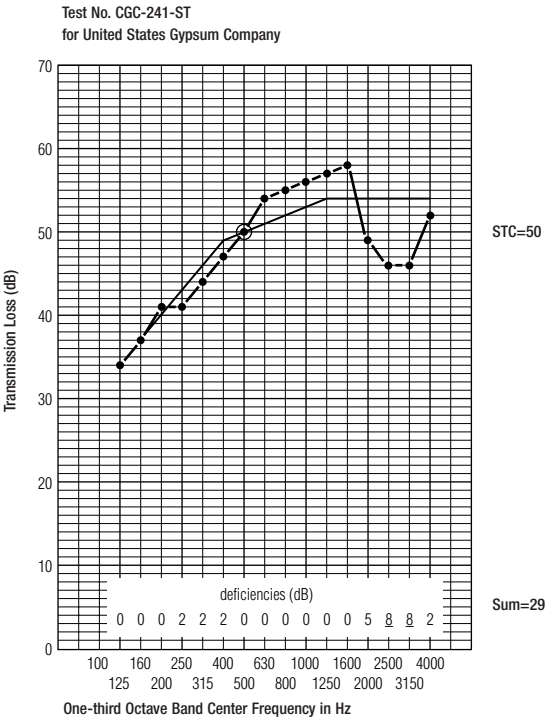
Sound Test Sample Assembly



These transmission-loss values are then plotted on a frequency band-sound pressure level graph and the resulting curve is compared to a standard reference contour. The Sound Transmission Class (STC), as defined by the rating procedure set forth in ASTM E413-87, is determined by adjusting the reference contour vertically until the decibel (dB) total of all frequency bands on the test curve that are below the reference contour does not exceed 32, and no point on the test curve is more than 8 dB below the reference contour. Then, with the reference contour adjusted to meet these standards, its transmission loss at 500 Hz (500 cycles per second) is taken as the STC (dropping dB unit).

An alternative procedure, frequently used for the measurement of sound transmission loss under field conditions, is given in ASTM Standard Test Method E336-90. This may be used to obtain a Field Sound Transmission Class (FSTC).

Determination of Sound Transmission Class



Reproduced above is the graph of an actual sound transmission-loss test of a drywall partition, Test No. USG-241-ST. The partition is rated at STC 50 with the reference contour adjusted to meet the standards outlined above. The deficiencies at 2,500 Hz and 3,150 Hz are 8, the allowable maximum.

The total of all points below the criterion curve is 29, three points less than the 32 allowed.

The reference contour itself is plotted to allow for subjective human response to sound pressure at the 16 frequency bands measured. Because the human ear is less sensitive to low-frequency sound pressure than to high frequencies, the reference contour has been adjusted to allow some additional noise at low frequencies. This avoids down-rating test results because of noise levels that are least objectionable to people. The ASTM test procedure explains the use of STC in the following excerpt from E413.

"These single-number ratings correlate in a general way with subjective impressions of sound transmission for speech, radio, television and similar sources of noise in offices and buildings. This classification method is not appropriate for sound sources with spectra significantly different from those sources listed above. Such sources include machinery, industrial processes, bowling alleys, power transformers, musical instruments, many music systems and transportation noises such as motor vehicles, aircraft and trains. For these sources, accurate assessment of sound transmission requires a detailed analysis in frequency bands."

Noise Reduction Coefficient (NRC)

Noise Reduction Coefficient (NRC) is a measure of the sound absorption characteristics of an acoustical product. In accordance with the reverberation room test method, ASTM C423, panels are tested for sound absorption in the frequency range of 100 to 5000 hz. The actual NRC value is determined by averaging the sound absorption values in the four main frequency bands of 250, 500, 1000, and 2000 hz. These values represent the majority of the range of the human voice. The greater the NRC, the better the overall sound absorption of the acoustical material, providing a room that will have less reverberation and echo.

Ceiling Attenuation Class (CAC)

Ceiling Attenuation Class (CAC) is a numerical rating used to characterize sound traveling between two horizontally adjacent spaces sharing a common ceiling plenum. CAC is measured using test standard ASTM E1414. Sound is introduced into a room and measured in that room. Then the same sound is measured in the adjacent room (other side of the partition from where sound was introduced). The CAC value is calculated using sound measurements in both rooms. Any sound that could pass directly through the partition is already calculated and factored out. Higher CAC values indicate greater attenuation of sound into and through the plenum.

Articulation Class (AC)

Articulation Class (AC) is a single numerical rating used to identify the degree of transmitted speech intelligibility between office spaces. This rating is particularly useful for open plan offices. AC provides an indication of the degree to which occupants will be able to understand and/or be disturbed by conversation occurring elsewhere in the office space. AC is determined by following the test procedure outlined in standard ASTM E1111, which measures sound levels in a source

space and then at varying distances beyond a barrier screen. The derived value is a combination of the sound reflection characteristics and sound absorption characteristics of the acoustical product being tested in a prescribed assembly.

Determination of Impact Insulation Class (IIC)

Impact sound originates when one body strikes another, such as in the case of footsteps, hammering and objects falling. Even though some of the sound energy is eventually conducted to the air, the sound is still classified as impact.

Impact sound travels through the structure with little loss of energy if the structure is continuous and rigid. Thus, tenants without enough heat can pound on a radiator and notify the superintendent (and all other tenants as well) of the situation.

Transmission of impact sound can be controlled by isolation, absorption and elimination of flanking paths, and offset by the introduction of masking sound. Limpness in the construction affects transmission of impact sound, but is difficult to introduce because of the structural requirements of the assembly.

Mass plays a secondary role in the isolation of impact sound. The benefit of mass in a sound-control construction is its resistance to being set into vibration. In retarding airborne sound, this is very effective because the sound energy is small. With impact sound, the energy is greater and is applied directly to the construction by the sound source with little energy loss. Thus, the mass of that surface is immediately set into motion. For this reason, concrete slab construction at 490 kg/m^2 (100 lb/$ft.^2$) is only slightly more effective in retarding impact sound than simple wood frame construction at 49 kg/m^2 (10 lb/$ft.^2$).

Although leaks in a floor-ceiling assembly must be sealed to stop transmission of the airborne sound associated with impact, they play little part in retarding the transmission of structure-borne sound.

Absorbing Impact Sound

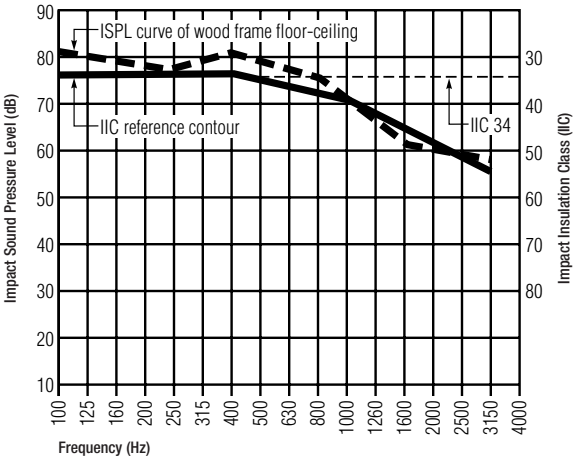
The use of sound attenuation blankets is as effective in controlling impact sound as for airborne sound. Of course, unless the opposite surfaces of the assembly (floor and ceiling) are isolated or decoupled, sound travels through the connecting structure.

Structural Flanking Paths

One of the most frequent causes of sound performance failure in a floor-ceiling assembly is flanking paths. Impact sound produces high energy at the source. This energy follows any rigid connection between construction elements with little loss. For example, in a child's tin-can telephone, sound travels better through the tight string stretched between the cans than through the surrounding air.

Some of the most common flanking paths are supplied by plumbing pipes, air ducts and electrical conduit rigidly connected between floor and ceiling. Continuous walls between floors, columns or any other continuous structural elements will act as flanking paths for impact sound. In fact, any rigid connection between the two diaphragms transmits impact sound.

Determination of Impact Insulation Class



Methods of Impact Rating

Assemblies designed to retard transmission of impact sound are tested for performance as prescribed by ASTM Standard Method E492-90. The floor-ceiling assembly is constructed between two isolated rooms, and microphones are positioned in the receiving room to record the pressure of transmitted sound.

The impact sound source is a standard tapping machine. It rests on the floor of the test assembly and drops hammers at a uniform rate and impact energy. The sound produced depends to a large extent on the floor surface material. Carpet and pad, for example, greatly improve IIC ratings. The transmitted sound is measured and recorded at several microphone locations and four locations of the tapping machine. Results are corrected to a standard absorption so that results from different laboratories may be compared.

These results, recorded at sixteen 1/3-octave bands, are plotted and compared with a standard reference contour in much the same manner as Sound Transmission Class determinations, except that deficiencies lie above the contour.

Impact sound rating methods were established by the U.S. Federal Housing Administration (now HUD). The earliest was a single-number rating system called Impact Noise Rating (INR) and published in FHA 750.

The current rating system is described in E989-89. To determine this Impact Insulation Class (IIC), the ISPL curve is plotted on a graph as shown above. The reference contour is then shifted to the lowest point where no point on the ISPL (Impact Sound Pressure Level) curve is more than 8 dB above it, and the sum of all ISPL deviations above it is no more than 32 dB. The location of the reference contour at 500 Hz is projected to the IIC scale, right of graph, to read IIC rating.

The IIC relates to STC ratings with respect to acceptability, and is a positive number. IIC values will usually be 51 points above the corresponding former INR values, but some deviations can occur. Tests must be analyzed individually against IIC criteria.

Abuse-Resistant Systems

Abuse resistance has grown in importance as designers have realized that it is often less expensive from a life-cycle cost perspective to address abuse resistance in critical areas in the initial project stage than to pay the high on-going costs of maintaining and repairing regular drywall partitions.

Defining Abuse Resistance Abuse resistance may be defined as the ability of a system to resist three levels of damage: (1) Surface damage (from abrasion and/or indentation); (2) Penetration (through to the wall cavity from sharp or blunt impact); (3) Security breach (through the entire assembly from ballistics or forced entry). For more detailed information on abuse resistance, please see publication SA929, *United States Gypsum Company Abuse Resistant Systems.*

Categories of Abuse Resistance

Assemblies designed to have appropriate strength will lessen maintenance and repair costs. Five usage categories have been created by CGC to help you determine the appropriate level of abuse resistance needed. Each category is described below with *minimum* performance values that apply. All categories represent an improvement over standard interior partition construction.

CGC-Defined

		Performance Types			
Level	**Description**	**Abrasion**	**Indentation**	**Hard-Body Impact**	**Soft-Body Impact**
Category 1 Light duty	A basic upgrade to standard drywall. Provides improved resistance to incidental surface and impact damage.	15 cycles	3.8 mm (0.15 in.)	41 N•m (30 ft.-lbs.)	163 N•m (120 ft.-lbs.)
Category 2 Moderate duty	Provides moderate resistance to incidental surface and impact damage from people and objects.	30 cycles	3.3 mm (0.13 in.)	54 N•m (40 ft.-lbs.)	244 N•m (180 ft.-lbs.)
Category 3 Heavy duty	Provides resistance to intentional surface and impact abuse from people and objects.	100 cycles	2.5 mm (0.10 in.)	108 N•m (80 ft.-lbs.)	285 N•m (210 ft.-lbs.)
Category 4 Extreme duty	Provides resistance to high levels of intentional surface and impact damage from hard objects.	500 cycles	2 mm (0.08 in.)	149 N•m (110 ft.-lbs.)	408 N•m (300 ft.-lbs.)
Category 5 Security	For areas requiring forced entry and ballistic resistance.	1000 cycles	N/A	N/A	N/A

Abuse-Resistant Systems By Category

The following table illustrates abuse-resistant systems for all categories or levels of abuse-resistance that apply to walls. Systems based on drywall, veneer plaster, conventional plaster, gypsum fiber and concrete masonry units (CMU) are described.

System	Assembly Substrate	Finish	Surface Damage: Abrasion (Cycles)	Surface Damage: Indentation Depth mm (in.)	Penetration: Hard-Body[4] N•m (ft.-lbs.)	Penetration: Soft-Body[4] N•m (ft.-lbs.)	Fire Rating[1] (hours)	Sound[4] (STC Rating)	Partition Width[2] mm (in.)	System Weight[2] kg/m² (psf)	Cost Index[3]	Applications
Category 1	Basic Upgrade to standard drywall. Provides some resistance to surface abuse and impact.											
Light Duty	12.7 mm (1/2″) Fiberock VHI	Joint Treatment Only	30	3.6 (0.14)	94 (69.5)	325 (240)	N/A	40 (est.)	117 (4-5/8)	11 (2.3)	1.11	Stairways, family rooms, primary grade classrooms, public spaces in health-care facilities.
	15.9 mm (5/8″) Fiberock AR	Joint Treatment Only	30	3.6 (0.14)	47 (35)	203 (150)	1	41	124 (4-7/8)	14 (2.9)	1.18	
	12.7 mm (1/2″) Sheetrock AR	Joint Treatment Only	20	3.8 (0.15)	47 (35)	163 (120)	1	45 (est.)	117 (4-5/8)	11 (2.2)	1.05	
	12.7 mm (1/2″) Imperial Base	1-Coat Diamond Veneer	30	3 (0.12 (est.))	28 (21)	81 (60)	N/A	45	121 (4-3/4)	15 (3.1)	1.2	
	15.9 mm (5/8″) Imperial Base	1-Coat Diamond Veneer	30	3 (0.12)	41 (30)	163 (120)	1	47	127 (5)	16 (3.3)	1.35	
Category 2	Provides moderate resistance to incidental impact and abrasion from bodies and objects.											
Moderate Duty	15.9 mm (5/8″) Fiberock VHI	Joint Treatment Only	30	3.6 (0.14)	134 (99)	>408 (>300)	1	41	124 (4-7/8)	14 (2.9)	1.27	Multifamily stairways, entries and common areas, middle/high school classrooms, college lecture halls, mailrooms, retail corridors/public areas.
	15.9 mm (5/8″) Fiberock AR	2-Coat Veneer[6]	1000	2.3 (0.09)	85 (62.5)	244 (180)	1	42 (est.)	121 (4-3/4)	24 (4.9)	1.84	
	15.9 mm (5/8″) Imperial AR	1-Coat Diamond Veneer	30	2.3 (0.09)	74 (54.6)	244 (180)	1	45 (est.)	127 (5)	16 (3.3)	1.35	
	15.9 mm (5/8″) Sheetrock AR	Joint Treatment Only	20	3.3 (0.13)	61 (45)	203 (150)	1	45 (est.)	124 (4-7/8)	13 (2.7)	1.15	
	15.9 mm (5/8″) Sheetrock AR	2-Coat Diamond Veneer[5]	30	3 (0.12)	85 (62.5)	244 (180)	1	46 (est.)	124 (4-7/8)	18 (3.6)	1.78	
	19 mm (3/4″) Ultracode	2-Coat Veneer[6]	1000	2.3 (0.09)	68 (50)	244 (180)	1	48 (est.)	133 (5-1/4)	19 (3.9)	2.01	
Category 3	Provides resistance to intentional and heavy surface and impact abuse from people and objects.											
Heavy Duty	15.9 mm (5/8″) Fiberock VHI	2-Coat Veneer[6]	1000	2.3 (0.09)	156 (est.) (115 (est.))	>408 (>300)	1	42 (est.)	127 (5)	24 (4.9)	1.92	High-risk multifamily entries, stairways, common areas, school corridors and gyms, college dorms, healthcare corridors, payroll rooms and loading areas.
	15.9 mm (5/8″) Imperial AR (2 layers)	2-Coat Imperial Veneer[7]	1000	2.3 (0.09)	114 (84)	285 (210)	2	51	156 (6-1/8)	31 (6.3)	—	
	3.4# Lath	1-Coat Imperial Veneer	1000	2 (0.08)	122 (90)	N/A	1	45 (est.)	—	37 (7.5)	2.26	
	203 mm (8″) Hollow CMU	Joint Treatment Only	>700	0.5 (0.018 (est.))	95 (70)	N/A	1	44	203 (8)	186 (38.00)	—	

Note: “est.” indicates estimated value.

(1) See publication SA923 for specific fire rating information. (2) Weights and widths are based on completed systems (panels on both flanges of studs). (3) Cost index base of 1.00 corresponds to single-layer Type X paper-faced gypsum panel each side of 92 mm (3-5/8″), 0.8 mm (20-ga.) steel framing, 400 mm (16″) o.c., joint treatment only. (4) Minimum 92 mm (3-5/8″), 0.8 mm (20-ga.) steel framing at 400 mm (16″) o.c. is recommended for abuse-resistant assemblies, and was used for the hard-body, soft-body and acoustical testing shown in this publication. Framing spacing of 600 mm (24″) o.c. will likely reduce the impact resistance of an assembly, while framing of 300 mm (12″) o.c. will likely improve the impact resistance. (5) Two-coat system consists of Diamond Brand Veneer Basecoat Plaster and Diamond Brand Interior Finish Plaster. (6) Two-coat system consists of Diamond Brand Veneer Basecoat Plaster and Imperial Brand Finish Plaster. (7) Two-coat system consists of Imperial Brand Basecoat Plaster and Imperial Brand Finish Plaster.

System	Assembly: Substrate	Assembly: Finish	Surface Damage: Abrasion (Cycles)	Surface Damage: Indentation Depth mm (in.)	Penetration: Hard-Body[4] N•m (ft.-lbs.)	Penetration: Soft-Body[4] N•m (ft.-lbs.)	Fire Rating[1] (hours)	Sound[4] (STC Rating)	Partition Width[2] mm (in.)	System Weight[2] kg/m² (psf)	Cost Index[3]	Applications
Category 4	Provides resistance to intentional and heavy surface and impact abuse from people and objects.											
Extreme Duty	15.9 mm (5/8″) Fiberock VHI (2 layers)	2-Coat Veneer[6]	1000	2.3 (0.09)	325 (240)	>487 (>360) (6 impacts)	2	51 (est.)	156 (6-1/8)	38 (7.8)	2.38	Low-risk and youth detention, psychiatric wards, payroll rooms and loading areas
	Structo-Base #9 Lath	1-Coat Imperial Veneer	1000	2 (0.08)	339 (250)	N/A	2	45 (est.)	127 (5)	37 (7.5)	2.87	
	203 mm (8″) Core-Filled CMU	Parge or prime and paint	>700	0.5 (0.018 (est.))	>339 (>250) (23 impacts)	N/A	2	45 (est.)	203 (8)	465 (95.0)	5.60	
Category 5	For areas requiring forced-entry and ballistic resistance											
Secure	12-Gauge Structocore	1-Coat Imperial Veneer	1000	0.6 (0.023)	>339 (>250) (50 impacts)	N/A	2	45	89 (3-1/2)	171 (35.0)	15.00	Government, military, embassies and consulates, high-detention, bank vaults.
	18-Gauge Structocore	1-Coat Imperial Veneer	1000	0.6 (0.023)	>339 (>250) (38 impacts)	N/A	2	45	89 (3-1/2)	171 (35.0)	5.00	
	203 mm (8″) Core-Filled CMU	Parge or prime and paint	>700	0.5 (0.018 (est.))	>339 (>250) (23 impacts)	N/A	2	56	203 (8)	465 (95.0)	5.60	

Note: "est." indicates estimated value.

(1) See publication SA923 for specific fire rating information. (2) Weights and widths are based on completed systems (panels on both flanges of studs). (3) Cost index base of 1.00 corresponds to single-layer Type X paper-faced gypsum panel each side of 92 mm (3-5/8″), 0.8 mm (20-ga.) steel framing, 400 mm (16″) o.c., joint treatment only. (4) Minimum 92 mm (3-5/8″), 0.8 mm (20-ga.) steel framing at 400 mm (16″) o.c. is recommended for abuse-resistant assemblies, and was used for the hard-body, soft-body and acoustical testing shown in this publication. Framing spacing of 600 mm (24″) o.c. will likely reduce the impact resistance of an assembly, while framing of 300 mm (12″) o.c. will likely improve the impact resistance. (5) Two-coat system consists of Diamond Brand Veneer Basecoat Plaster and Diamond Brand Interior Finish Plaster. (6) Two-coat system consists of Diamond Brand Veneer Basecoat Plaster and Imperial Brand Finish Plaster. (7) Two-coat system consists of Imperial Brand Basecoat Plaster and Imperial Brand Finish Plaster.

Fixture Attachment-Drywall and Plaster Systems

Fixture Attachment Load Table

Fastener Type	Size mm	Size in.	Base Assembly	Allowable Withdrawal Resistance N[1]	Allowable Withdrawal Resistance lbf	Allowable Shear Resistance N[1]	Allowable Shear Resistance lbf
toggle bolt or hollow wall fastener	3.2	1/8	12.7 mm (1/2″) gypsum base or panels	89	20	178	40
	4.8	3/16		134	30	223	50
	6.4	1/4		178	40	267	60
	3.2	1/8	12.7 mm (1/2″) gypsum base or panels	312	70	445	100
	4.8	3/16	& 25 ga. steel studs	356	80	556	125
	6.4	1/4		690	155	779	175
No. 8 sheet metal screw	—	—	12.7 mm (1/2″) gypsum base or panels	223	50	356	80
Type S bugle head screw			& 25 ga. steel base	267	60	445	100
Type S-12 bugle head screw	—	—	12.7 mm (1/2″) gypsum base or panels	378	85	601	135
			& 20 ga. steel insert				
Type S pan head screw	—	—	25 ga. steel to 25 ga. steel	312	70	534	120
two bolts welded to steel insert	4.8	3/16	grab bar attachment	779	175	890	200
	6.4	1/4		890	200	1113	250
bolt welded to 38 mm (1-1/2″) channel	6.4	1/4	plumber's bracket	890	200	1113	250
	7.9	5/16	see drawing on page 132	890	200	1334	300
plug and screw	#6	—	metal or gypsum	45	10	178	40
	#8	—	lath and plaster[2]	89	20	222	50
	#12	—		133	30	267	60
Toggle bolt or hollow wall fastener	3.2	1/8	Metal or gypsum	334	75	222	50
	4.8	3/16	lath and plaster[2]	556	125	623	140
	6.4	1/4		778	175	667	150

(1) Newton. (2) Plaster having compressive strength of at least 6.2 MPa (900 psi) was used to develop this data.

Drywall, Plaster and Acoustical Ceiling Installation Tolerances

Standards of acceptability for installation of framing, drywall panels and joint treatment vary in different parts of North America. Nevertheless, several organizations, including the Metal Lath/Steel Framing Association, Gypsum Association and American Society for Testing and Materials (ASTM), have published recommendations, standards and/or tolerances that may be required for a specific project.

Similarly, references for tolerances and quality in plasterwork and acoustical ceilings are available. References for tolerances and quality in plasterwork have been published by ASTM and Diehl's "Manual of Lathing and Plastering." For acoustical ceilings construction, see the appropriate ASTM standards (page 442) or "Code of Practices for Acoustical Ceiling System Installation" in the Ceilings and Interior Systems Construction Association (CISCA) *Ceiling Systems Handbook*.

Contractors and their customers should reach agreement before starting the project regarding which tolerance standards will be used to judge acceptability of the work.

Gypsum Board Screw Usage

The number of fasteners used to install gypsum board varies with framing spacing, screw spacing, panel orientation and panel size. The charts below show estimated screw usage per 100 m^2 (thousand square feet) of gypsum board for both horizontal and vertical board attachment. Allowance should be made for loss.

Horizontal Board Attachment (Screws/100 m^2 (1000 $ft.^2$))

Framing Spacing				
	Screw Spacing mm (Inches)			
1220 x 2400 mm (4′ x 8′) Board	**200 (8)**	**300 (12)**	**400 (16)**	**600 (24)**
200 mm (8″)	3061 (2844)	2186 (2031)	1749 (1625)	1312 (1219)
300 mm (12″)	2119 (1969)	1513 (1406)	1211 (1125)	909 (844)
400 mm (16″)	1648 (1531)	1178 (1094)	942 (875)	706 (656)
600 mm (24″)	1178 (1094)	841 (781)	673 (625)	505 (469)
1220 x 3050 mm (4′ x 10′) Board				
200 mm (8″)	3014 (2800)	2153 (2000)	1722 (1600)	1292 (1200)
300 mm (12″)	2072 (1925)	1480 (1375)	1184 (1100)	888 (825)
400 mm (16″)	1602 (1488)	1142 (1063)	915 (850)	687 (638)
600 mm (24″)	1130 (1050)	807 (750)	646 (600)	484 (450)
1220 x 3660 mm (4′ x 12′) Board				
200 mm (8″)	2992 (2780)	2131 (1980)	1711 (1590)	1281 (1190)
300 mm (12″)	2045 (1900)	1464 (1360)	1173 (1090)	883 (820)
400 mm (16″)	1572 (1460)	1130 (1050)	904 (840)	678 (630)
600 mm (24″)	1109 (1030)	786 (730)	635 (590)	474 (440)

Vertical Board Attachment (Screws/100 m² (1000 ft.²))

Framing Spacing				
	Screw Spacing mm (Inches)			
1220 x 2400 mm (4′ x 8′) Board	**200 (8)**	**300 (12)**	**400 (16)**	**600 (24)**
200 mm (8″)	3061 (2844)	2120 (1969)	1648 (1531)	1178 (1094)
300 mm (12″)	2186 (2031)	1513 (1406)	1178 (1094)	841 (781)
400 mm (16″)	1749 (1625)	1211 (1125)	942 (875)	673 (625)
600 mm (24″)	1312 (1219)	908 (844)	706 (656)	505 (469)
1220 x 3050 mm (4′ x 10′) Board				
200 mm (8″)	3113 (2800)	2072 (1925)	1602 (1488)	1030 (1050)
300 mm (12″)	2153 (2000)	1480 (1375)	1144 (1063)	807 (750)
400 mm (16″)	1722 (1600)	1184 (1100)	915 (850)	646 (600)
600 mm (24″)	1292 (1200)	888 (825)	687 (638)	484 (450)
1220 x 3660 mm (4′ x 12′) Board				
200 mm (8″)	2983 (2771)	2040 (1896)	1569 (1458)	1099 (1021)
300 mm (12″)	2130 (1979)	1457 (1354)	1122 (1042)	785 (729)
400 mm (16″)	1703 (1583)	1166 (1083)	897 (833)	628 (583)
600 mm (24″)	1278 (1188)	875 (813)	673 (625)	461 (438)

Comparing Plaster Systems

The chart below compares conventional plaster and veneer plaster systems to help in selection for specific job applications.

Characteristics	Comments			
1. Conventional Plaster Best system to attain a uniform, monolithic, blemish-free, smooth surface with excellent wear resistance.				
2. IMPERIAL Brand Basecoat with selected finish shown below, "A" through "E"	**Finish Plaster Rating (No. 1 Best—No. 4 Acceptable)**			
	Productivity	**Hardness**	**Workability**	**Ease to Achieve Smooth Surface**
A. IMPERIAL Brand Finish Ultimate in surface hardness and abrasion resistance. Easily textured. Low productivity and hard to achieve a completely smooth finish.	4	1	4	4
B. DIAMOND Brand Interior Finish Plaster Single-bag, ready-to-use finish. Moderate high strength. Acceptable workability. Extremely adaptable to textured finishes. Satisfactory smooth finish.	2	2	2	3
C. Regular Gauging Lime Putty Highest productivity. Best workability. Joinable, easiest to achieve a monolithic finish. Only moderate surface hardness.	1	4	1	1
D. STRUCTO-GAUGE Gauging Lime Putty (1:1) Hardest dense putty finish. Moderate workability and ease of application. Excellent finish appearance.	2	3	2	2
E. RED TOP Keenes Cement, Lime Putty and Sand Unique, only truly retemperable material. Best choice for coloring or tinting large plaster wall areas. Ultimate choice for texturing. Can be floated for extended time period.	Due to its unique nature, Keenes is not rated with above finishes.			
3. IMPERIAL Brand Finish (one-coat) Monolithic, smooth or textured appearance Ultimate in surface hardness. Primarily intended for direct application to plaster base. Achieves high productivity due to compatibility with absorbent surface of plaster base. Ready for finishing in 48 hours with favorable drying conditions.	Fast completion shortens construction time, brings in paying tenants faster, thus reducing interest paid on project construction loan.			
4. DIAMOND Brand Interior Finish Plaster Monolithic appearing. Hard, wear-resistant surface. Provides texture desired. Ready for final finish in as little as 48 hours under favorable drying conditions. Greatest coverage for single coat application over special absorbent surface of plaster base. Lowest cost veneer system.	See comment on IMPERIAL Brand Finish.			

Metric Terms and Metric Equivalents

Basic Units

	Metric (SI)		Imperial
Quantity	**Unit**	**Symbol**	**equivalent (nom.)[1]**
Length	millimeter	mm	0.039 in.
	meter	m	3.281 ft.
			1.094 yd.
Area	square meter	m^2	10.764 $ft.^2$
			1.196 $yd.^2$
Volume	cubic meter	m^3	35.315 $ft.^3$
			1.308 $yd.^3$
Volume (Fluid)	liter	L	35.195 oz.
			0.220 gal.
Mass (Weight)	gram	g	0.035 oz.
	kilogram	kg	2.205 lb.
	tonne	t	2,204.600 lb.
			1.102 tons
Force	newton	N	0.225 lbf.
Temperature (Interval)	kelvin	K	1.8ºF
	degree celsius	ºC	1.8ºF
Temperature	celsius	ºC	(ºF-32)5/9
Thermal Resistance		$K \bullet m^2$ / W	$5.679\ ft.^2 \bullet hr \bullet ºF$ / Btu
Heat Transfer	watt	W	3.412 Btu/hr.
Pressure	kilopascal	kPa	0.145 $lbf/in.^2$ (psi)
	pascal	Pa	20.885 $lbf/ft.^2$ (psf)

(1) To convert imperial units to SI units, divide by imperial equivalent

Prefixes (Order of Magnitude)

Prefix	Symbol	Factor
mega	M	$1000000 = 10^6$
kilo	k	$1000 = 10^3$
centi[1]	c	$0.01 = 10^{-2}$
milli	m	$0.001 = 10^{-3}$
micro	µ(mu)	$0.000001 = 10^{-6}$

(1) Limited use only.

Metric Conversion

The table below provides metric equivalents for the dimensions of CGC products. "Soft" conversions merely apply a conversion factor that translates feet and inches (according to which the products were manufactured) into metric units; "hard"metric measurements are given for products actually manufactured in metric sizes.

Metric Equivalents

Dimension	Conversion Type(1)	Ft./In.	mm(2)
SHEETROCK Brand Gypsum Panels			
Thickness	Soft	1/4″	6
		3/8″	10
		1/2″	13
		5/8″	16
		3/4″	19
		1″	25
Width	Hard	24″	600
		48″	1200
Length	Hard	8′	2400
		10′	3000
		12′	3600
Steel Stud Framing			
Thickness (gauge)	Soft	0.0179 (25)	0.45
		0.0270 (22)	0.69
		0.0329 (20)	0.84
Depth	Soft	1-5/8″	41
		2-1/2″	64
		3-1/2″	89
		3-5/8″	92
		4″	102
Length	Hard	8′	2400
		10′	3000
		12′	3600
THERMAFIBER Insulation			
Thickness	Soft	1″	25
		1-1/2″	38
		2″	51
		3″	76
		4″	102
		6″	152
Width	Hard	16″	400
		24″	600
Length	Hard	48″	1200

(1) Conversion Type: "Soft" is metric relabeling with no physical change of dimension; "hard" is a physical change to the metric dimension shown. (2) Conversion factors: Inches X 25.4 = mm; Feet X 304.8 = mm.

Notes: Availability: Items above are not stocked in metric lengths or widths. Minimum quantity orders may be required. Lead time should be determined; upcharges may apply. Geographic availability may vary and should be verified for the project location.

Lengths: Shown on SHEETROCK Brand Gypsum Panels and steel stud framing for illustration purposes only.

Framing Spacing: 16″ o.c. converts to 400 mm o.c.; 24″ converts to 600 mm o.c.

Specification Standards

The listings following contain existing standard specifications that apply to CGC materials described in this handbook. Where ASTM, local codes, etc., require product variance, consult your CGC representative.

Specification Standards

Product	ASTM Designation	
Plaster		
RED TOP gypsum plaster	C28	
RED TOP two-purpose plaster	C28	
RED TOP wood fiber plaster	C28	
STRUCTO-LITE plaster	C28	
RED TOP gauging plaster	C28	
RED TOP keenes cement		
regular	C61	
quick trowel	C61	
STRUCTO-GAUGE plaster	C28	
STRUCTO-BASE plaster	C28	
IMPERIAL plaster	C587	
DIAMOND plaster	C587	
Gypsum Lathing		
GRAND PRIX plaster base 9.5 mm (3/8″), 12.7 mm (1/2″) and 15.9 mm (5/8″)	C37, C588, C1396	
Lime		
RED TOP single hydrated finish lime	C206 type N	
SNOWDRIFT double hydrated finish lime	C206 type S	
Gypsum Panels		
SHEETROCK Brand (plain) (foil-back)	C36	C1396
SHEETROCK Brand sq. edge	C36	C1396
SHEETROCK Brand tap. edge	C36	C1396
SHEETROCK Brand bev. edge	C36	C1396
5/8″ SHEETROCK Brand FIRECODE Core	C36	C1396
SHEETROCK Brand FIRECODE C core	C36	C1396
SHEETROCK vinyl-covered	C960	C1396
SHEETROCK Brand water-resistant	C630	C1396
SHEETROCK Brand gypsum coreboard panels	C442	C1396
SHEETROCK Brand shaft wall liner panels	C442	C1396
SHEETROCK Brand exterior gypsum ceiling board	C931	C1396
SHEETROCK Brand interior gypsum ceiling board	C1395	C1396
SHEETROCK Brand HUMITEK gypsum panels	C36	C1396
FIBEROCK Brand panels—abuse-resistant	C1278	
FIBEROCK Brand panels—VHI abuse-resistant	C1278	
Cement Panels		
DUROCK Brand cement board	C1325 (ANSI A 118.9)	
DUROCK Brand exterior cement board	C1186 (ANSI A 118.9)	
Sheathing		
GYPLAP Brand gypsum sheathing treated core	C79	C1396
FIBEROCK Brand sheathing—AQUA-TOUGH	C1278	
Joint Treatment		
CGC, F1, CLASSIC, LITELINE joint compounds	C475	

Specification Standards (continued)

Product	ASTM Designation
Accessories	
Structural steel joists, runners	C645, C955, A568, A653, A792 (alum.-zinc coating), A591 (galv. coating)
25, 22 ga. studs, 25, 22 ga. runners	C645, A568 (steel), A653, A463 (alum. coating), A792 (alum.-zinc coating) A591 (galv. coating)
20 ga. studs, 20 ga. runners	C645, A568 (steel), A653 (galv. coating), A792 (alum.-zinc coating) A591 (galv. coating)
RC-1 resilient channels	A568 (steel), A525 (galv. coating), A792 (alum.-zinc coating)
Zinc Control Joints	C841
DUR-A-BEAD corner bead	C1047
SHEETROCK Brand metal trims	C1047
Shaft wall/area separation wall studs	A653 A792 (alum.-zinc coating) A591 (galv. coating)
Drywall screws	C1002, C954
SHEETROCK Brand acoustical sealant	C834
Acoustical Units—Prefabricated	
Cast ceiling panels	C423, C523, C635, E1264,
Water-felted ceiling panels	C117, E1264
Ceiling Suspension System	
DONN Grid	C635, C363, C645, C841, E580
Mineral Fiber Insulation	
THERMAFIBER sound atten. fire blanket	C665

ASTM Application Standards

There are also standards for application of many of the products in this Handbook. See the specification standards listed below for more information.

Application Standards

Product	Application Standard
Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels	C636
Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products	C754
Specification for Application and Finishing of Gypsum Board	C840
Specification for Installation of Interior Lathing and Furring	C841
Specification for Application of Interior Gypsum Plaster	C842
Specification for Application of Gypsum Veneer Plaster	C843
Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster	C844
Specification for Installation of Load-Bearing Steel Studs and Related Accessories	C1007
Specification for Application of Gypsum Sheathing	C1280
Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Moderate Seismic Restraint	E580

ASTM Standards for Performance Specifications and Test Methods

Performance Specifications and Test Methods

CAN/ULC S102, Test for Surface Burning Characteristics of Building Materials and Accessories. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials, describes the method of establishing Flame Spread and Smoke Developed values.

CAN/ULC S101, Fire Endurance Tests of Building Construction and Materials. ASTM E-119, Standard Test Methods for Fire Tests of Building Construction and Materials, describes the method of establishing fire-resistant hourly ratings for floor/ceiling and/or roof/ceiling construction assemblies. Underwriters Laboratories, Inc. Fire Resistance Designs are established under this test method.

CAN/ULC S114, Test for Determination of Non-Combustibility in Building Materials. ASTM E-136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C, describes the method for determining the acceptability of a material for use in noncombustible construction.

U.S. Fed. Spec. 209, Clean Room and Work Station Requirements for Controlled Environments, describes the method of establishing Clean Room Classification values.

ASTM C-367, Standard Test Methods for Strength Properties of Prefabricated Architectural Acoustical Tile or Lay-in Ceiling Panels, describes the method of establishing strength properties of acoustical ceiling tiles and panels.

ASTM E-413, Standard Classification for Rating Sound Insulation, provides criteria to establish Ceiling Attenuation Class (CAC) of an acoustical ceiling, similar to STC ratings for walls.

ASTM C-423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method, describes the method of establishing Noise Reduction Coefficient (NRC) values.

ASTM C-635, Standard Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings, provides classification criteria by load capacity, along with manufacturing tolerance, coating, and inspection criteria for suspension systems.

ASTM E-1110, Standard Classification for Determination of Articulation Class, provides criteria to establish ceiling Articulation Class (AC) of an acoustical ceiling, generally applies to open plan ceilings in lieu of a NRC rating.

ASTM E-1111, Standard Test Method for Measuring the Interzone Attenuation of Ceiling Systems, describes the method of establishing Articulation Class (AC) values.

ASTM E-1264, Standard Classification for Acoustical Ceiling Products, (Correlates with Federal Spec. SS-S-118 "Sound Controlling Acoustical Tiles and Panel"), provides general classification by type and form, acoustical rating qualification, light reflectance coefficient qualification, and surface burning fire classification of acoustical ceiling tiles and panels.

ASTM E-1414, Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum (Adaptation of the AMA-I-II-1967 "Test Method for Ceiling Sound Transmission Test by Two-Room Method"), describes the method of establishing Ceiling Attenuation Class (CAC) values.

ASTM E-1433, Standard Guide for Selection of Standards on Environmental Acoustics, is intended to assist acoustical consultants, architects, specifiers and others in understanding ASTM standards in environmental acoustics, as referenced in E-413, E-1110, E-1264, etc.

ASTM E-1477, Standard Test Method for Luminous Reflection Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers, describes the method of establishing Light Reflectance (LR) values.

Products/UL Designations

The CGC products listed below are identified in the UL Fire Resistance Directory by the designations shown.

Products/UL Designations

UL Type Designation	Drywall, Cement Board and Plaster Board Products
R	SHEETROCK Brand Gypsum Panels
SCX	SHEETROCK Brand Gypsum Panels, FIRECODE Core (including HUMITEK and MH Panels)
C	SHEETROCK Brand Gypsum Panels, FIRECODE C Core
WRX	SHEETROCK Brand Gypsum Panels, FIRECODE Core, Water-Resistant
WRC	SHEETROCK Brand Gypsum Panels, FIRECODE C Core, Water-Resistant
AR	SHEETROCK Brand Abuse-Resistant Gypsum Panels
SLX	SHEETROCK Brand Gypsum Liner Panels
ULTRACODE	SHEETROCK Brand Gypsum Panels, ULTRACODE Core
SHX	SHEETROCK Brand Gypsum Sheathing, FIRECODE Core
FCV	SHEETROCK Brand Gypsum Panels, FIRECODE Core, Vinyl-Covered
FB	SHEETROCK Brand Formboard
FRX-G	FIBEROCK Brand Panels, all AQUA-TOUGH and abuse resistant
IPR	GRAND PRIX Brand Plaster Base
IP-X1	GRAND PRIX Brand Plaster Base (Type X)
IP-X2	GRAND PRIX Brand Plaster Base (Type C)
IP-X3	GRAND PRIX Brand Plaster Base, ULTRACODE Core
DUROCK	DUROCK Brand Cement Board
DUROCK Exterior	DUROCK Brand Exterior Cement Board
UL Type Designation	**Acoustical Tile and Panel Products**
FC-CB	Gypsum Lay-In Ceiling Tile
AP or AP-1	ACOUSTONE Ceiling Product (SANDRIFT, FROST, GLACIER, BRIO *CLIMAPLUS*, FRESCO *CLIMAPLUS*, "F" FISSURED Ceiling Panels)
GR	AURATONE FIRECODE Ceiling Product (Radar, Radar *CLIMAPLUS*, Fissured Ceiling Tile)
FR-83 or GR-1	AURATONE FIRECODE Ceiling Product (Illusion, Aspen, Radar, Fissured, Pebbled, Radar *CLIMAPLUS*, Ceiling Panels)
FR-81 or FR-83	AURATONE FIRECODE Ceiling Product (Rock Face *CLIMAPLUS*, Clean Room *CLIMAPLUS* Ceiling Panels)
FR-4	CERAMIC HERITAGE Ceiling Product (CERAMIC HERITAGE *CLIMAPLUS* Ceiling Panels)
FR-X1	X Technology FIRECODE Ceiling Product (ORION *CLIMAPLUS*, ECLIPSE *CLIMAPLUS*, MILLENIA *CLIMAPLUS* [clay back] Ceiling Panels)
DXL	DONN 1 1/2" Fire rated grid system components

Permeance–CGC Products

Permeance—CGC Products

Moisture Vapor Permeance		
Product[1]	**Finish**	**ng/Pa•s•m² (Perms)[2,3,4]**
Gypsum Panels		
9.5 mm (3/8″) SHEETROCK Brand Regular		2047 (35.3)
12.7 mm (1/2″) SHEETROCK Brand Regular		1983 (34.2)
12.7 mm (1/2″) SHEETROCK Brand Regular	1-coat flat latex paint	1641 (28.3)
12.7 mm (1/2″) SHEETROCK Brand Regular	2-coats flat latex paint	1647 (28.4)
12.7 mm (1/2″) SHEETROCK Brand Regular	2-coats gloss enamel (oil)	58 (1.0)
15.9 mm (5/8″) SHEETROCK Brand Regular		1542 (26.6)
15.9 mm (5/8″) SHEETROCK Brand FIRECODE Core		1658 (28.6)
12.7 mm (1/2″) SHEETROCK Brand FIRECODE C Core		1844 (31.8)
15.9 mm (5/8″) SHEETROCK Brand FIRECODE C Core		1502 (25.9)
12.7 mm (1/2″) SHEETROCK Brand Water-Resistant		1751 (30.2)
15.9 mm (5/8″) SHEETROCK Brand Water-Resistant FIRECODE C Core, FIRECODE Core		1751 (30.2)
12.7 mm (1/2″) SHEETROCK Brand HUMITEK gypsum panel		1751 (30.2)
15.9 mm (5/8″) SHEETROCK Brand HUMITEK FIRECODE gypsum panel		1751 (30.2)
12.7 mm (1/2″) FIBEROCK Brand Abuse Resistant Panels		N/A
15.9 mm (5/8″) FIBEROCK Brand Abuse Resistant Panels		N/A
12.7 mm (1/2″) SHEETROCK Vinyl-Faced		
Pumice		<58 (<1)
Moonstone		<58 (<1)
Burlap		<58 (<1)
Granite		<58 (<1)
Tweed		<58 (<1)
Academy		<58 (<1)
Trafalgar		<58 (<1)
Striae		<58 (<1)
Sonoma		<58 (<1)
Brushwork		<58 (<1)
25 mm (1″) SHEETROCK Brand Gypsum Liner Panel		1392 (24.0)
Gypsum Base		
12.7 mm (1/2″) GRAND PRIX Brand		1670 (28.8)
12.7 mm (1/2″) GRAND PRIX Brand	DIAMOND Brand Interior Finish Plaster	1415 (24.4)
12.7 mm (1/2″) GRAND PRIX Brand	1 coat IMPERIAL Finish Plaster	307 (5.3)
12.7 mm (1/2″) GRAND PRIX Brand	IMPERIAL Brand Basecoat/ IMPERIAL Brand Finish Plaster	464 (8.0)
15.9 mm (5/8″) GRAND PRIX Brand		1560 (26.9)
12.7 mm (1/2″) GRAND PRIX Brand FIRECODE C		1740 (30.0)
15.9 mm (5/8″) GRAND PRIX Brand FIRECODE C		1519 (26.2)
9.5 mm (3/8″) gypsum base and 12.7 mm (1/2″) gypsum plaster, metal lath and 19 mm (3/4″) gypsum plaster		1160 (20.0)
Gypsum Sheathing		
12.7 mm (1/2″) GYPLAP Brand Gypsum Sheathing Treated Core		1351 (23.3)
12.7 mm (1/2″) FIBEROCK Brand Sheathing AQUA-TOUGH		1624 (28)
15.9 mm (5/8″) FIBEROCK Brand Sheathing AQUA-TOUGH		1450 (25)

(1) All foil-back products, less than 0.06 perms.

(2) All tests comply with ASTM E96 (desiccant method).

(3) Grain per sq. ft. per in. of water vapor pressure difference (grain/ft²•h•in.-Hg) (grams/m²/24 hours).

(4) 57.4 ng/Pa•s•m² permeance is equivalent to the former one "Perm" (1 grain/ft²•h•Hg•in.)

Thermal Coefficients of Linear Expansion of Common Building Materials

Unrestrained 4º—38ºC. (40º—100ºF)

	Coefficient	
Material	**x10^{-6}/mm/mm/ºC**	**(x10^{-6}/in/in/ºF)**
Gypsum Panels and Bases	16.2	9.0
Gypsum Plaster (sanded 100:2, 100:3)	12.6	7.0
Wood Fiber Plaster (sanded 100:1)	14.4	8.0
Structo-Lite Plaster	13.1	7.3
Aluminum, Wrought	23.0	12.8
Steel, Medium	12.1	6.7
Brick, Masonry	5.6	3.1
Cement, Portland	10.6	5.9
Concrete	14.2	7.9
Fir (parallel to fiber)	3.8	2.1
Fir (perpendicular to fiber)	5.8	3.2

Hygrometric Coefficients of Expansion (unrestrained)

	mm/mm/% R.H.	**Inches/Inch/% R.H. (5%—90% R.H.)**
Gypsum Panels and Bases	7.2 x 10^{-6}	7.2 x 10^{-6}
Gypsum Plaster (sanded 100:2, 100:3)	1.5 x 10^{-6}	1.5 x 10^{-6}
Wood Fiber Plaster (sanded 100:1)	2.8 x 10^{-6}	2.8 x 10^{-6}
Structo-Lite Plaster	4.8 x 10^{-6}	4.8 x 10^{-6}
Vermiculite Gypsum Plaster (sanded 100:2)	3.8 x 10^{-6}	3.8 x 10^{-6}

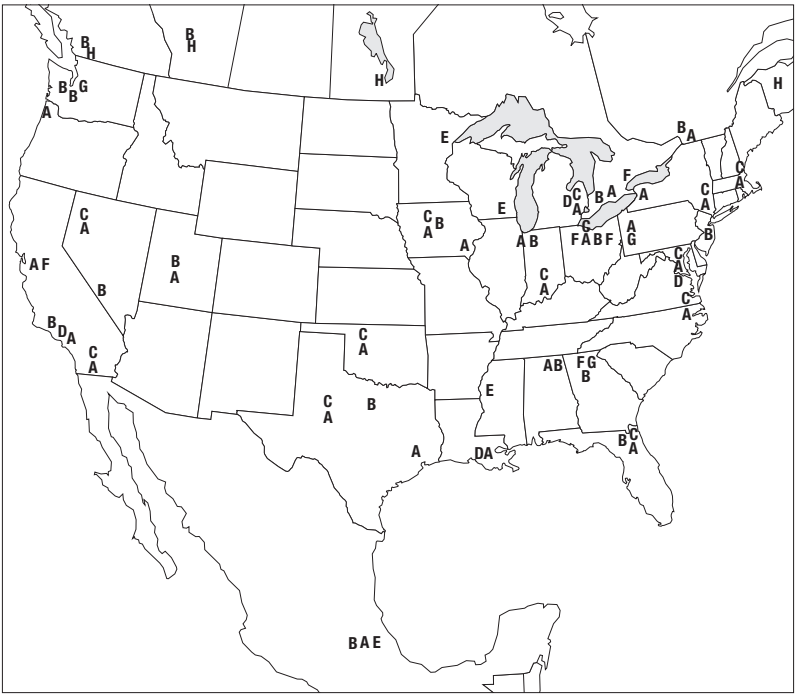
Thermal Resistance Coefficients of Building and Insulating Materials(1)

Thickness			Density		Resistance (R-Value)	
mm	in.	Product	kg/m³	lb/ft³	K.m²/W	hr.ft.²°F/Btu
50.8-63.5	2-2-1/2	THERMAFIBER Mineral Fiber Insulation (SAFB)	48.1	2.5	1.23	7.7-9.3
76.2-88.9	3-3-1/2	THERMAFIBER Mineral Fiber Insulation (SAFB)	48.1	2.5	1.94	11.1-13.0
133.4-152.4	5 1/4-6	THERMAFIBER Mineral Fiber Insulation (SAFB)	48.1	2.5	3.35	19.4-22.2
25.4	1	Extruded Polystyrene Insulation	35.2	2.2	0.88	5.00
12.7	1/2	SHEETROCK Brand Gypsum Panels	690.2	43	0.08	0.45
15.9	5/8	SHEETROCK Brand Gypsum Panels	690.2	43	0.10	0.56
12.7	1/2	SHEETROCK Brand Gypsum Panels, FIRECODE C Core	800.9	50	0.08	0.45
15.9	5/8	SHEETROCK Brand Gypsum Panels, FIRECODE and FIRECODE C Core	800.9	50	0.10	0.56
12.7	1/2	FIBEROCK Brand Panels	850	53	0.08	0.5
15.9	5/8	FIBEROCK Brand Panels	850	53	0.08	0.5
12.7	1/2	SHEETROCK Brand HUMITEK Gypsum Panels	690	43	0.08	0.45
15.9	5/8	SHEETROCK Brand HUMITEK Gypsum Panels	690	43	0.10	0.56
12.7	1/2	GRAND PRIX Brand Veneer Plaster Base	690.2	43	0.08	0.45
15.9	5/8	GRAND PRIX Brand Veneer Plaster Base	690.2	43	0.10	0.56
12.7	1/2	GRAND PRIX Brand Veneer Plaster Base, FIRECODE C Core	800.9	50	0.08	0.45
15.9	5/8	GRAND PRIX Brand Veneer Plaster Base, FIRECODE and FIRECODE C Core	800.9	50	0.10	0.56
9.5	3/8	GRAND PRIX Plaster Base	800.9	50	0.06	0.32
12.7	1/2	GYPLAP Brand Gypsum Sheathing Treated Core	800.9	50	0.08	0.45
12.7	1/2	Sanded Plaster	1681.9	105	0.02	0.09
12.7	1/2	Plaster with Lightweight Aggregate	720.8	45	0.06	0.32
101.6	4	Common Brick	1922.2	120	0.14	0.80
12.7	1/2	DUROCK Brand Cement Board	1153.3	72	0.05	0.26
12.7	1/2	DUROCK Brand Exterior Cement Board	1153.3	72	0.05	0.26
101.6	4	Face Brick	2082.4	130	0.08	0.44
25.4	1	Portland Cement Stucco with Sand Aggregate	1858.1	116	0.04	0.20
101.6	4	Concrete Block, 3-oval Core, Cinder Aggregate			0.20	1.11
203.2	8	Concrete Block, 3-oval Core, Cinder Aggregate			0.30	1.72
304.8	12	Concrete Block, 3-oval Core, Cinder Aggregate			0.33	1.89
—	—	Vapor-Permeable Felt			0.01	0.06
—	—	Vapor-Retarder Plastic Film		Negl.	—	
25.4	1	Stone			0.01	0.08
25.4-203.2	1 x 8	Wood Drop Siding			0.14	0.79
19.1-254.0	3/4 x 10	Beveled Wood Siding			0.18	1.05
19.1-88.9	3/4-3-1/2	Plain Air Space, non-reflective(2)			0.17	0.92

(1) All factors based on data from 1981 ASHRAE Handbook of Fundamentals, Factors at 24ºC (75ºF), mean temperature. (2) Conditions: heat, flow horizontal; mean temperature 10°C (50°F); temperature differential ⁻1°C (30°F); E (emissivity) 0 82.

USG/CGC Plant Locations

USG/CGC Plant Locations



Legend	
A	Gypsum Board
B	Joint Treatment and Textures
C	Gypsum Plasters
D	Cement Board Products
E	Acoustical Ceilings
F	Acoustical Suspension Systems and Specialty Products
G	Trim
H	Reload Distribution Centres

A	**Gypsum Board**	Aliquippa, PA Baltimore, MD Boston, MA Bridgeport, AL Detroit, MI East Chicago, IN Empire, NV Fort Dodge, IA Fremont, CA Galena Park, TX Gypsum, OH Hagersville, Ontario Jacksonville, FL Montreal, Quebec	New Orleans. LA Norfolk, VA Oakfield, NY Plaster City, CA Puebla, Mexico Ranier, OR Santa Fe Springs, CA Shoals, IN Sigurd, UT Southard, OK Sperry, IA Stony Point, NY Sweetwater, TX
B	**Joint Treatment and Textures**	Auburn, WA Bridgeport, AL Calgary, Alberta Chamblee, GA Dallas, TX East Chicago, IN Edmonton, Alberta Fort Dodge, IA Gypsum, OH	Hagersville, Ontario Jacksonville, FL Montreal, Quebec Port Reading, NJ Puebla, Mexico Sigurd, UT Surrey, British Columbia Tacoma, WA Torrance, CA
C	**Gypsum Plasters**	Baltimore, MD Boston, MA Detroit, MI Empire, NV Fort Dodge, IA Gypsum, OH Jacksonville, FL Montreal, Quebec	Norfolk, VA Phoenix, AZ Plaster City, CA Shoals, IN Southard, OK Stony Point, NY Sweetwater, TX
D	**Cement Board**	Baltimore, MD Detroit, MI	New Orleans, LA Santa Fe Springs, CA
E	**Acoustical Ceilings**	Cloquet, MN Greenville, MS	San Juan, Mexico Walworth, WI
F	**Acoustical Suspension Systems and Specialty Products**	Oakville, Ontario Stockton, CA Westlake, OH	Cartersville, GA Medina, OH
G	**Trim**	Auburn, WA Cartersville, GA	Wierton, WV
H	**Reload Distribution Centres**	Calgary, Alberta Moncton, New Brunswick	Port Kells, British Columbia Winnipeg, Manitoba

CGC Literature

Complete technical data on CGC products and systems can be found in the CGC Architectural Technical Literature series. Those folders applying to drywall, cement board, acoustical ceilings, insulation and plaster construction are listed below with their appropriate CSC numbers. Copies of literature are available through CGC sales offices.

Folder No. & Description		CSC No.
General		
SA100	Construction Selector	
Suspension Systems		
SC2000 C/FC/SC2014	Ceiling Systems	09120
Lath, Plaster		
SA920	Plaster Systems	09210
Gypsum Drywall		
SA923	Drywall/Steel-Framed Systems	09250
SA924	Drywall/Wood-Framed Systems	09250
SA925	CGC Area Separation Fire Wall/Party Wall Systems	09250
SA926	CGC Cavity Shaft Wall Systems	09250
SA927	Gypsum Panels & Accessories	09250
Prefinished Panels		
SA928	SHEETROCK TEXTONE Brand Vinyl-Faced Gypsum Panels	09720
Abuse-Resistant Systems		
SA929	Abuse-Resistant Systems	09250
Tile Accessories		
SA932	DUROCK Brand Cement Board Systems	09305
Finishing Materials		
SA933	SHEETROCK Brand Textures and Finish Products	09940
Ceiling Systems		
SC2000	Acoustical and Specialty Ceilings	09500

Glossary

Absorption The taking up and holding or dissipating of matter or energy, as a sponge takes up water. Absorption is the opposite of reflection. Porosity is a term that describes the absorption qualities of certain materials, such as wallboard paper.

Accelerator An additive that shortens the time for gypsum plasters or setting-type joint compounds to set.

Access Door A metal door that comes in various sizes and is framed into an acoustical ceiling to provide access to mechanical valves in the plenum. Some standard sizes are 300 x 300 mm (12″ x 12″), 300 x 600 mm (12″ x 24″), 300 x 450 mm (12″ x 18″), 450 x 450 mm (18″ x 18″), 600 x 600 mm (24″ x 24″), and 600 x 900 mm (24″ x 36″).

Access Tab A special spline with an exposed tab for making a (or any) particular tile in a concealed suspension system removable.

Acoustical Panels Normally a 600 x 600 mm (24″ x 24″) or larger piece of prefinished material with various surface finishes installed in a suspension system to provide improved sound absorption qualities.

Acoustic Privacy Sound-control design with assemblies provided between two spaces for the purpose of preventing passage of airborne sound and dampening impact sound.

Acoustical Ceiling Sound-absorbing and/or sound attenuating modules held in a suspended grid. A system having highly effective sound-absorbing and/or sound attenuating qualities.

Acoustical Ceiling Board (Lay-In Panel) Acoustical material used in conjunction with a lay-in grid system, usually in 600 x 600 mm (24″ x 24″) or larger panels.

Acoustical Consultant Trained professional in recommending solutions to sound problems and design facilities to meet specific sound criteria. Also acoustical engineer or acoustician.

Acoustical Sealant Special caulking material designed to seal gaps and cracks to reduce sound flanking in an assembly.

Acoustical Tile Normally a 300 x 300 mm (12″ x 12″) or 300 x 600 mm (12″ x 24″) piece of prefinished material with various surface finishes installed in a concealed suspension system or cemented to a ceiling or upper wall surface to provide sound absorption qualities.

Acoustics Science dealing with the production, control, transmission, reception and effects of sound, and the process of hearing. The acoustics of a room are those qualities that, together, determine its character with respect to distinct hearing.

Admixture Any substance added to a plaster component or plaster for the purpose of modifying its properties.

Aggregate Sand, gravel, crushed stone or other material that is a main constituent of portland cement concrete and aggregated gypsum plaster. Also, polystyrene, perlite and vermiculite particles used in texture finishes.

Airborne Sound Sound traveling through the medium of air.

All Purpose Joint Compound A compound formulated and manufactured to serve as a taping or finishing compound, or both.

Ambient Light The generally available, surrounding or pervading light in the area, coming from all sides, including outside light coming in through windows.

ANSI American National Standards Institute, a nonprofit, national technical association that publishes standards covering definitions, test methods, recommended practices and specifications of materials. Formerly American Standards Assn. (ASA) and United States of America Standards Institute (USASI).

Anchor Metal securing device embedded or driven into masonry, concrete, steel or wood.

Anchor Bolt Heavy, threaded bolt embedded in the foundation to secure sill to foundation wall or bottom plate of exterior wall to concrete floor slab.

Annular Ring Nail A deformed shank nail with improved holding qualities specially designed for use with gypsum board.

Anti-Breathing Spline Spline used to link tiles in a concealed tee installation and to prevent air infiltration.

Area Separation Wall Residential fire walls, usually with a 2- to 4-hour rating, designed to prevent spread of fire from an adjoining occupancy; extends from foundation to or through the roof. Identified by codes as either "fire wall," "party wall" or "townhouse separation wall."

ARIDO Association of Registered Interior Designers of Ontario.

Articulation Class A classification to rate the degree of speech recognition allowed to transmit through ceilings or partitions.

ASTM Formerly American Society for Testing and Materials, now ASTM International, a nonprofit, national technical society that publishes definitions, standards, test methods, recommended installation practices and specifications for materials.

Attenuate The act of resisting the passage of sound energy.

Attenuation In acoustics, the diluting or holding back of the energy of sound waves as they pass through a material. Materials are rated for their ability to prevent sounds from traveling through them (see Ceiling Attenuation Class, CAC).

Back Blocking A short piece of gypsum board adhesively laminated behind the joints between each framing member to reinforce the joint. Also, may be a method of attaching additional framing to support gypsum board where no framing is present.

Back Cut Cutting the border tile at a 45° angle to achieve the best possible fit, or that portion of a tile cut back above the kerf in a tile.

Backup Strips Pieces of wood nailed at the ceiling-sidewall corner to provide fastening for ends of plaster base or gypsum panels.

Baffle Usually called sound baffle and is a piece of acoustical material hung vertically from a structure for sound absorption. Baffles are normally used where it is not practical to install a complete acoustical ceiling.

Balloon Frame Method of framing outside walls in which studs extend the full length or height of the wall.

Bar Joist Open-web, flat truss structural member used to support floor or roof structure. Web section is made from bar or rod stock, and chords are usually fabricated from "T" or angle sections.

Basecoat The first layer or layers of plaster applied over a lath or other substrate. The first application is normally called a scratch coat and the second application is referred to as a brown coat.

Basecoat Floating The finishing act of spreading, compacting and smoothing of the basecoat plaster to a reasonably true plane.

Batten Narrow strip of wood, plastic, metal or gypsum board used to conceal an open joint.

Beam Loadbearing member spanning a distance between supports.

Beam Clip A clip that can be fastened to a steel beam to support a hanger wire or strap.

Bearing Support area upon which something rests, such as the point on bearing walls where the weight of the floor joist or roof rafter bears.

Bed To set firmly and permanently in place.

Bending Bowing of a member that results when a load or loads are applied laterally between supports.

BESK Refers to Ceiling tile that is bevel edged, with a standard kerf.

Board Foot (Bd. Ft.) Volume of a piece of wood, nominal 1″ x 12″ x 1′. All lumber is sold by the board-foot measure.

Bond The holding of acoustical tile in place, on a ceiling surface, with adhesive.

Bonding Agent A material applied to a surface to improve the quality of the bond between it and the succeeding plaster application. For instance, monolithic concrete and cement board require the addition of a bonding agent before applying plaster.

Border Cut Cut made on both ceiling panel and grid at the perimeter of the installation.

Borrowed Light Refers to light from one area that helps to illuminate another area by a glass wall. Especially in schools, glass walls are installed between corridors and classrooms.

Brick Veneer Non-loadbearing brick facing applied to a wall to give appearance of solid-brick construction; bricks are fastened to backup structure with metal ties embedded in mortar joints.

Bridging Members attached between floor joists to distribute concentrated loads over more than one joist and to prevent rotation of the joist. Solid bridging consists of joist-depth lumber installed perpendicular to and between the joists. Cross-bridging consists of pairs of braces set in an "X" form between joists.

Brown Coat The second coat in three-coat gypsum plaster application.

Building Construction Joint A designed division of a building that allows movement of all component parts of the building, in any plane, which may be caused by thermal, seismic, wind loading or any other force. The construction of the separation is accomplished by one of the following methods: (1) manufactured devices suitable for this application, or (2) by field fabrication of suitable materials.

CAC See Ceiling Attenuation Class.

Calcine The process of heating a mineral to produce a change in the chemical composition of the mineral, ranging from the removal of chemically combined water through the reduction of the mineral to its oxide state.

Calcined Gypsum A dry powder; primarily calcium sulfate hemihydrate, resulting from calcination of gypsum; cementitious base for production of most gypsum plasters: also called plaster of paris; sometimes called stucco.

Calcium Sulfate The chemical compound $CaSO_4$.

Camber Curvature built into a beam or truss to compensate for loads that will be encountered when in place and load is applied. The crown is placed upward. Insufficient camber results in unwanted deflection when the member is loaded.

Cant Beam Beam with edges chamfered or beveled.

Cant Strip Triangular section laid at the intersection of two surfaces to ease or eliminate effect of a sharp angle or projection.

Cap The rolled covering on the flange of a T-Bar suspension system part. Cap is available in steel or aluminum, and in many colours.

Carrying Channel Main supporting member of a suspended ceiling system to which furring members or channels attach.

Casement Glazed sash or frame hung to open like a door.

Casing The trim around windows, doors, columns or piers.

Ceiling Attenuation Class (CAC) A sound rating developed especially for acoustical ceilings. The sound ratings are determined by AMA1-II ceiling sound transmission tests. Results were previously called CSTC value.

Ceiling Break Any change in the elevation of a ceiling, such as occurs at the point where a soffit is installed.

Ceiling STC (CSTC) Obsolete. See Ceiling Attenuation Class.

Ceiling Track A channel used as a ceiling runner to set prefabricated steel studs for relocatable partitions or walls.

Cement Board A factory-manufactured panel, 8 to 15.9 mm (5/16″ to 5/8″) thick, 813 to 1220 mm (32″ to 48″) wide, and 914 to 3048 mm (3′ to 10′) long, made from aggregated and reinforced portland cement.

Center Line A line indicating the midpoint of a surface in either direction. Used as a guide in starting a ceiling.

Chalk Line Straight working line made by snapping a chalked cord stretched between two points, transferring chalk to work surface.

Channel (Molding) A U- or C-shaped metal member sometimes used for suspending or trimming a suspended ceiling.

Chase Space Space provided between the surfaces within a partition for electrical, plumbing and other services.

CISCA Ceiling and Interior Systems Construction Association, 1500 Lincoln Highway, St. Charles, IL, U.S.A. 60174 (guide for basic installation of ceiling products).

Class A A fire classification for a product with a flame spread rating of no more than 25 and a smoke developed rating not exceeding 50, when tested in accordance with ASTM E84.

Cladding Gypsum panels, gypsum bases, gypsum sheathing, cement board, etc. applied to framing.

Clean Room An assembly room for precision products whose quality would be affected by dust, lint or airborne pathogens; usually has smooth room surfaces to prevent dust collection; air precipitators or filters keep dust, lint, etc. to a specified minimum level. Clean Room standards are set by Fed. Spec. 209E.

Coefficient of Thermal Conductance (C) Amount of heat (in Watts or Btu) that passes through a specific thickness of a material (either homogeneous or heterogeneous) $W/m^2 \bullet ºK$ (Btu per hr., per sq. ft., per ºF). Measured as temperature difference between surfaces.

The "C" value of a homogeneous material equals the "k" value divided by the material thickness:

$C = k/t$ where t = thickness of material in inches

It is impractical to determine a "k" value for some materials such as building paper or those only used or formed as a thin membrane, so only "C" values are given for them.

Coefficient of Thermal Conductivity (k) Convenient factor represents the amount of heat (in Watts or Btu) that passes by conduction through a 1″ thickness of homogeneous material, $W/m \bullet ºK$ (Btu per in., per sq. ft., per ºF). Measured as temperature difference between the two surfaces of the material.

Coefficient of Heat Transmission (U) Total amount of heat that passes through an assembly of materials, including air spaces and surface air films. Expressed in $W/m^2 \bullet K$ (Btu per hr., per sq. ft., per ºF) temperature difference between inside and outside air (beyond the surface air films). "U" values are often used to represent wall and ceiling assemblies, floors and windows.

Note: "k" and "C" values cannot simply be added to obtain "U" values. "U" can only be obtained by adding the thermal resistance (reciprocal of "C") of individual items and dividing the total into 1.

Coefficient of Hygrometric Expansion See Hygrometric Expansion.

Coefficient of Thermal Expansion See Thermal Expansion.

Column Vertical loadbearing member.

Compression Force that presses particles of a body closer together.

Compression Post A ceiling system member used to stabilize an acoustical suspension system under seismic conditions.

Compression Strength Measures maximum unit resistance of a material to crushing load. Expressed as force per unit cross-sectional area.

Concave Edges curved away from the observer; cupped. Curved like the inside of a hollow ball.

Concealed Cross T or T-Bar A tee-shaped intermediate member used to support the acoustical tile in a Z-Bar or H and T system perpendicular to the Z or H member, supporting the tile in a concealed manner.

Concrete Footing Generally, the wide, lower part of a foundation wall that spreads the weight of the building over a larger area. Its width and thickness vary according to weight of building and type of soil on which building is erected.

Conduction, Thermal Transfer of heat from one part of a body to another part of that body, or to another in contact, without any movement of bodies involved. The hot handle of a skillet is an example. The heat travels from the bottom of the skillet to the handle by conduction.

Construction Joint A designed division of a building that allows movement of all component parts of the building in any plane, which may be caused by thermal, seismic, wind loading or any other force. Construction joints are sometimes confused with control joints.

Convection Process of heat carried from one point to another by movement of a liquid or a gas (i.e. air). Natural convection is caused by expansion of the liquid or gas when heated. Expansion reduces the density of the medium, causing it to rise above the cooler, more dense portions of the medium.

Gravity heating systems are examples of the profitable use of natural convection. The air, heated by the furnace, becomes less dense (consequently lighter) and rises, distributing heat to the various areas of the house without any type of blower. When a blower is used, the heat transfer method is called "forced convection."

Convex Edges curved toward the observer; rounded. Curving outward like the surface of a sphere.

Core (of gypsum board) The hardened material filling the space between the face and back papers consisting substantially of rehydrated gypsum with additives.

Corner Brace Structural framing member used to resist diagonal loads that cause racking of walls and panels due to wind and seismic forces. May consist of a panel or diaphragm, or diagonal flat strap or rod. Bracing must function in both tension and compression. If brace only performs in tension, two diagonal tension members must be employed in opposing directions as "X" bracing.

Corner Cap Factory-formed cap that fits over the exterior of an outside corner.

Corner Post Timber or other member forming the corner of a frame. May be solid or built-up as a multi-piece member.

Creep Plastic flow or deformation of a material or a composite resulting from the sustained application of a force or load. Creep is typically greater at higher temperatures.

Creep Deflection Permanent deflection in a building system caused by deformation under a sustained force or load. An example of creep deflection is the sag in concrete floor slabs of a new building caused by sustained dead and live loads on the floor. This deformation or sag often causes partition cracking when the center of a partition span occurs near the area of greatest creep deflection. Creep deflection is a structural problem that decreases after a building stabilizes, one or two years after construction. Another cause of partition cracking, sometimes confused with that from creep deflection, is racking of structural

components. Partition cracking caused by racking as a result of thermal expansion and contraction or wind loads on the building must be treated in some way, such as by the use of control or expansion joints.

Cripple Short stud such as that used between a door or window header and the top plate.

Critical Light Strong, angular or harsh light that can show imperfections in reflecting surfaces. Most common sources are skylights, wall sconces and directed track lights such as those used in art galleries.

Cross T or T-Bar The intermediate exposed cross members that interlock with the main tee to complete a grid system.

CSC Construction Specifications Canada, Carlton Street, Toronto.

Curtain Wall Exterior wall of a building that is supported by the structure and carries no part of the vertical load except its own. Curtain walls must be designed to withstand wind loads and transfer them to the structure.

Cycle (Acoustic) One full repetition of a motion sequence during periodic vibration. Movement from zero to +1 back to zero to -1 back to zero. Frequency of vibration is expressed in Hertz (cycles per second see Frequency).

Dead Load Load on a building element contributed by the weight of the building materials.

Decibel (dB) Adopted for convenience in representing vastly different sound pressures. The sound pressure level (SPL) in decibels is 10 times the logarithm to the base 10 of the squared ratio of the sound pressure to a reference pressure of 20 micropascals. This reference pressure is considered the lowest value at 100 Hz that the ear can detect. For every 10 dB increase or decrease in SPL, a sound is generally judged to be about twice or half as loud as before the change.

Decoupling Separation of elements to reduce or eliminate the transfer of sound, heat or physical loads from one element to the other.

Deflection Displacement that occurs when a load is applied to a member or assembly. The dead load of the member or assembly itself causes some deflection as may occur in roofs or floors at mid-span. Under applied wind loads maximum deflection occurs at mid-height in partitions and walls.

Deflection Limitation Maximum allowable deflection is dictated by the bending limit of the finish material under the required design load (e.g.,usually 240 Pa (5 psf) for interior partitions). Often expressed as ratio of span (L) divided by criterion factor (120, 180, 240, 360). For example, in a 3048 mm (10′) or 3048 mm (120″) high wall, allowable deflection under L/240 criterion equals 3048 mm/240 (120″/240) or 12.7 mm (1/2″) maximum.

Selection of limiting heights and spans are frequently based on minimum code requirements and accepted industry practice as follows: (a) L/120 for gypsum panel surfaces and veneer plaster finish surfaces, (b) L/240 for conventional lath and plaster surfaces, (c) L/360 for mechanically attached marble or heavy stone to walls; however, support for its own weight should be from the floor or separate supports.

Although some building codes permit these deflections, more conservative criteria are frequently advised so that applied loads are not visible or esthetically unacceptable.

Deformation Change in shape of a body brought about by the application of a force internal or external. Internal forces may result from temperature, humidity or chemical changes. External forces from applied loads can also cause deformation.

Density The quantity per unit volume of a material; the mass of a substance per unit volume.

Design Load Combination of weight (dead load) and other applied forces (live loads) for which a building or part of a building is designed. Based on the worst possible combination of loads.

Desulfo Gypsum Calcium sulfate dihydrate (gypsum) produced as a byproduct of scrubbing industrial smoke stacks to meet environmental clean air standards. Also known as synthetic gypsum.

Detail Sections or parts of a structure drawn to a scale larger than the general plans to show shapes and dimensions.

Dew Point The temperature at which air becomes saturated with moisture and below which condensation occurs.

Diaphragm A thin body that separates two areas; in sound, the skin of a partition or ceiling which separates the room from the structural space in the center of the partition or ceiling assembly.

Diffraction The change in direction that occurs when a wave contacts a space, surface, or edge smaller than the wavelength.

Diffuse To spread out evenly and thus become less dense or concentrated.

Diffuser A circular or rectangular metal grille recessed in a ceiling for the passage of air from a ducted system. The flange of the diffuser covers the edge of the ceiling material. (See also Linear Air Diffuser.)

Direct Lighting Lighting aimed at objects or surfaces. Direct lighting mounted in ceilings de-emphasizes the ceiling surface and highlights horizontal surfaces, such as work surfaces and the floor. A combination of both direct and indirect illumination can produce a positive effect on the space and save money.

Door Buck Structural element of a door opening. May be the same element as the frame, if frame is structural, as in the case of heavy steel frames.

Dot A small lump of plaster placed on a surface (usually scarified basecoat) between grounds to assist the plasterer in obtaining the proper plaster thickness and aid in aligning the surface.

Double-Hung Window Window sash that slides vertically and is offset in a double track.

Double-Up Successive plaster coat application with no setting or drying time allowed between coats; usually associated with veneer plastering. The double-up coat is applied (from the same mix) to a scratch coat over gypsum base.

Drip Interruption or offset in an exterior horizontal surface, such as a soffit, immediately adjacent to the fascia. Designed to prevent the migration of water back along the surface.

Dry Line A string line drawn tight from two points and used as a guide in installing an acoustical ceiling to establish uniform length for hanger wires.

Drywall Generic term for interior surfacing material, such as gypsum panels, applied to framing using dry construction methods, e.g., mechanical fasteners or adhesive. See SHEETROCK Brand Gypsum Panels.

Echo A single reflection of sound that can be heard as a distinct repetition of the original sound.

Edge (of gypsum board) The paper-bound edge as manufactured.

Efflorescence A deposit of white, powdery, water-soluble salts on the surface of masonry or plaster. It is caused by the migration of the dissolved salts to the surface; also called "whiskering" or "saltpetering."

Egg-Crate Louver A polystyrene, acrylic, or metal open cell grid used to permit the circulation of air or the transmission of light from above the ceiling.

Elevation A drawing of any portion of a building (front, sides, or rear) to show how that portion will appear to the observer.

End (of gypsum board) The end perpendicular to the paper-bound edge as manufactured. The gypsum core is always exposed.

Energy The ability to perform work; in sound, the capacity to compress the conductor molecules.

Environmental Systems Grid systems that are made of materials that withstand a variety of corrosive conditions.

Excessive Reverberation Long persistence of sound in a highly reflective room.

Expanded Metal Sheet metal that has been slit and expanded to produce diamond or rib lath.

Expansion Joint See Building Construction Joint and Construction Joint.

Exposed T or T-Bar Grid system hung from the overhead structure with wire hangers used to support acoustical and/or decorative ceiling panels.

Exterior Insulation and Finish Systems (EIFS) Exterior cladding assembly consisting of a polymer finish over a reinforcement adhered to foam plastic insulation that is fastened to masonry, concrete, building sheathing or directly to the structural framing. The sheathing may be cement board, gypsum sheathing or other acceptable substrate.

Extrapolate To project tested values, assuming a continuity of an established pattern, to obtain values beyond the limit of the test results. Not necessarily reliable.

F & T Ratings Flame-resistance and temperature ratings usually associated with "Through-Penetration" Testing. "F rating" or flame-resistance rating is the time period a firestop system remains in place during a ULC S115 and ASTM E814 fire test, but "T rating" is the time period it takes for the temperature on the unexposed surface, the firestop and the penetrating item to rise 163ºC (325 ºF) above the initial temperature.

Factor of Safety Ratio of the ultimate unit stress to the working or allowable stress.

Fascia Board Board fastened to the ends of the rafters or joists forming part of a cornice.

Fast Track Method that telescopes or overlaps traditional design-construction process. Overlapping phases as opposed to sequential phases is keynote of the concept.

Fatigue Condition of material under stress that has lost, to some degree, its power of resistance as a result of repeated application of stress, particularly if stress reversals occur as with positive and negative cyclical loading.

Feather The gradual thinning of joint compound from the thickness over the joint to the outer edge of a coat.

Finish Coat The final layer of plaster applied over a basecoat or other substrate.

Finish Coat Floating The finishing act of spreading, compacting and smoothing the finish coat plaster or stucco to a specified surface texture.

Finishing Compound (See Topping Compound).

Fire Endurance Measure of elapsed time during which an assembly continues to exhibit fire resistance under specified conditions of test and performance. As applied to elements of buildings, it shall be measured by the methods and to the criteria defined in ULC and ASTM Methods CAN/ULC S101 and E119, Fire Tests of Building Construction and Materials; CAN/ULC S104 and ASTM Methods E152, Fire Tests of Door Assemblies.

Fireproof Use of this term in reference to buildings is discouraged because few, if any, building materials can withstand extreme heat for an extended time without some effect. The term "fire-resistive" or "resistant" is more descriptive.

Fire Resistance Relative term, used with a numerical rating or modifying adjective to indicate the extent to which a material or structure resists the effect of fire.

Fire-Resistive Refers to properties or designs to resist effects of any fire to which a material or structure may be expected to be subjected.

Fire-Retardant Denotes substantially lower degree of fire resistance than "fire-resistive." Often used to describe materials that are combustible but have been treated to retard ignition or spread of fire under conditions for which they were designed.

Firestop Obstruction in a cavity designed to resist the passage of flame, sometimes referred to as "fire blocking."

Firestop System A system for protecting against the spread of fire through a penetration in a wall or floor where a pipe or other penetrant passes through a fire-rated system. A firestop is the specific construction using materials designed to fill the annular space around the penetrant for the purpose of preventing the passage of fire through the fire-resistive partition or floor/ceiling assembly.

Fire Wall Fire-resistant partition extending to or through the roof of a building to retard spread of fire. See Area Separation Wall.

Flame Spread Index of the capacity of a material to spread fire under test conditions, as defined by CAN/ULC S102 and ASTM Standard E84. Materials are rated by comparison with the flame-spread index of red oak flooring assigned a value of 100 and inorganic reinforced cement board assigned a value of 0.

Flammable Capability of a combustible material to ignite easily, burn intensely or have rapid rate of flame spread.

Flanking Paths Paths by which sound travels around an element intended to impede it, usually some structural component that is continuous between rooms and rigid enough to transmit the sound. For example, a partition separating two rooms can be "flanked" by the floor, ceiling or walls surrounding the partition if they run uninterrupted from one room to the other. Ducts, conduits, openings, structural elements, rigid ties, etc., can be sound flanking paths. The acoustic effect of sound flanking paths is dependent on many factors.

Flashing Strips of metal or waterproof material used to make joints waterproof, as in the joining of curtain wall panels.

Flexural Strength The maximum load sustained by a standard specimen of a sheet material when subjected to a bending force.

Floor Plan An architectural drawing showing the length and breadth of a building and the location of rooms, partitions, windows, doors, ceilings, etc. Each floor has a separate plan.

Footcandle the measurement of light emitted over distance. One foot candle is the amount of direct light thrown by one international candle onto a surface one foot away and equal to one lumen per square foot. The metric version is lux. To convert footcandle (fc) to lux (lx) multiply by 10.76391.

Footing Lower extremity of a foundation or loadbearing member that transmits load to load-bearing substrate.

Force Amount of applied energy to cause motion, deformation or displacement and stress in a body.

Foundation Component that transfers weight of building and occupants to the earth.

Framing Member Stud, plate, track, joist, furring and other support to which a gypsum panel product, or metal plaster base is attached.

Frequency (Sound) Number of complete vibrations or cycles or periodic motion per unit of time.

Furring Member or means of supporting a finished surfacing material away from the structural wall or framing. Used to level uneven or damaged surfaces or to provide space between substrates. Also an element for mechanical or adhesive attachment of paneling.

Gable Uppermost portion of the end wall of a building that comes to a triangular point under a sloping roof.

Galvanized A generic term used to describe steel coated with zinc applied in a dipping or electroplating process.

Gasketed Grid Ceiling suspension system that has foam rubber gasketing attached to the topside of the flanges. Used in clean room ceilings to seal the panels to grid interface.

Gauge Thickness of steel. May be expressed by a number designation (24 Ga) or in thousandths of an inch (0.020).

Gauging Plaster Combine with lime putty to provide setting properties, to increase dimensional stability during drying, and to provide initial surface hardness in lime finish coats.

Girder Beam, especially a long, heavy one; the main beam supporting floor joists or other smaller beams.

Green A term to describe freshly applied plaster that has set, but has not dried.

Grid Ceiling An exposed grid ceiling is a direct hung suspension system. It uses main and cross tees with drop-in acoustical tile panels. Standard sizes are 2′ x 4′ and 2′ x 2′. It is also referred to as lay-in ceiling or tee-bar ceiling.

Grills A metal opening in ceiling for delivery of air into the room, or to return the air into the plenum.

Ground A piece of wood or metal attached to the framing or plaster base so that its exposed surface acts as a gauge to define the thickness of plaster to be applied. Also a term to denote plaster thickness. Also see Screed.

Grout Gypsum or portland cement plaster used to fill crevices or to fill hollow metal frames.

Gusset Wood or metal plate riveted, bolted, glued or pressed (wood trusses) over joints to transfer stresses between connected members.

Gypsum The mineral consisting primarily of fully hydrated calcium sulfate, $CaSO_4 \bullet 2H_2O$ or calcium sulfate dihydrate.

Gypsum Fiber Panels Gypsum panels with fiber reinforcement concentrated on each face of the panel. They are part of a new-technology series of panel products, called FIBEROCK® Brand Panels, which produce stronger, more abuse-resistant, water-resistant walls and ceilings than those produced with conventional drywall. There are variations for interior drywall applications in dry and wet areas, sheathing applications and flooring applications. Also, a very-high impact (VHI) product is further reinforced on the backside by a fiberglass mesh.

Gypsum Lath A gypsum board used as the base for application of gypsum plaster.

Gypsum Molding Plaster A calcined gypsum plaster used primarily for plaster casts or molds, sometimes used as a gauging plaster.

Gypsum Neat Plaster A calcined gypsum plaster without aggregate; common usage is for gypsum plaster used for basecoats.

Gypsum Plaster The generic name for a family of powdered cementitious products consisting primarily of calcined gypsum with additives to modify physical characteristics, and having the ability, when mixed with water, to produce a plastic mortar or slurry which can be formed to the desired shape by various methods and will subsequently set to a hard, rigid mass.

Gypsum Sheathing A gypsum board used as a backing for exterior surface materials, manufactured with water-repellent paper and may be manufactured with a water-resistant core.

HUD Housing and Urban Development, a U.S. federal agency.

HVAC Heating, ventilating and air conditioning. (American Society of Heating, Refrigerating & Air Conditioning Engineers, Inc. "ASHRAE" Guide is the technical reference source.)

Header Horizontal framing member across the ends of the joists. Also the member over a door or window opening in a wall.

Heat Form of energy thought to be characterized by the rate of vibration of the molecules of a substance. The hotter the substance, the faster the molecules vibrate. On the other hand, when there is no heat present it is thought the molecules will be at rest, which theoretically occurs at absolute zero, -273.2 ºC (-459.7 ºF or 0.0 K).

Heat Quantity (Btu) Common unit of measure of the quantity of heat is the British Thermal Unit (Btu). One Btu is the amount of heat required to raise 454 g (one pound) of water from 17.2 º to 17.8 ºC (63 º to 64 ºF) (1 Btu = 1055.06 J). This is about the amount of heat given off by one wooden match. A 454 g (pound) of coal can produce 13,000 Btu.

Heat Transfer Heat always flows toward a substance of lower temperature until the temperatures of the two substances equalize. It travels by one or more of three methods: conduction, convection or radiation.

Heel of Rafter Seat cut in a rafter that rests on the wall plate.

Hemihydrate The dry powder, calcium sulfate hemihydrate, resulting from calcination of $CaSO_4 \bullet 2H_2O$, calcium sulfate dihydrate. See calcined gypsum.

Hertz The units of measure of sound frequency, named for Heinrich H. Hertz. One Hertz equals one cycle per second.

High Density Tile Acoustical tile with good attenuation and low sound absorption.

High Hat Fixture A small circular recessed light from 6″ to 12″ deep. Sometimes called a can fixture because it resembles a tin can. Larger High Hats may cause additional field labour for the acoustical contractor.

Hold Down Clip Mechanical fastener that snaps over the bulb of a grid system to hold ceiling panels in place.

Honeycomb Any substance having cells suggesting a mass of cells such as those built by the honeybee. Some hollow-core doors use the honeycomb principle in their construction.

Hot Dipped Galvanized Process to coat steel to offer environmental resistance to corrosion. Cold rolled steel is submerged (dipped) into a molten zinc bath. A heavy coating of zinc is applied to the steel substrate. Zinc coating thickness varies and is designated by a "G" series, such as G-60 or G-90.

Hydrate To chemically combine with water as in the hydration of calcined gypsum or slaking of quicklime. Also the product resulting from this combination.

Hygrometric Expansion All materials, particularly those of organic origin, expand and contract in relation to their moisture content, which varies with environment. The Hygrometric Coefficient of Expansion is expressed in mm/mm/% R.H. ("Inches Per Inch Per Percent Of Relative Humidity.")

Example: gypsum board has a coefficient of 7.2 x 10^{-6} mm/mm/% R.H. (7.2 x 10^{-6} in. per in per % R.H). This means that with an increase in relative humidity of from 10% to 50%, a gypsum board wall 91 m (300 ft.) long will have an unrestrained linear expansion of 26.3 mm (1.0368″).

ISO International Standards Organization, an organization similar in nature to ASTM International, CSA, and ULC.

Impact Insulation Class (IIC) Single-number rating used to compare and evaluate the performance of floor-ceiling constructions in isolating impact noise. The advantages of this rating system are positive values and the correlation with Sound Transmission Class (STC) values-both providing approximately equal isolation at a particular value. The IIC rating is used by building agencies for specifying minimum sound-control performance of assemblies in residential construction.

Impact Noise Rating (INR) Obsolete rating system for floor-ceiling construction in isolating impact noise. INR ratings can be converted to approximate IIC ratings by adding 51 points; however, a variation of 1 or 2 points may occur.

Incombustible See Noncombustible.

Indirect lighting Reflected light. For ceilings, this is typically light from luminaires distributed upward. A combination of both direct and indirect illumination can produce a positive effect on the space and save money.

Industrial Construction Construction of residential or commercial structures in a factory environment. Includes HUD-Code manufactured homes as well as residential and commercial modular construction.

Insulation (Thermal) Any material that measurably retards heat transfer. There is wide variation in the insulating value of different materials. A material having a low density (weight/volume) will usually be a good thermal insulator.

Integral Splice Connects the mains or tees together and is formed from the base metal of the components.

Interpolate To estimate untested values that fall between tested values.

Isolation Separation of elements to reduce or eliminate the transfer of sound, heat, or physical loads from one element to the other. (See Decoupling.)

Jamb One of the finished upright sides of a door or window frame.

Jamb Stud Wood or metal stud adjacent to the door jamb.

Joint Tape A type of paper, fabric or glass mesh commonly used with joint compounds to reinforce the joints between adjacent gypsum boards.

Joist Small beam that supports part of the floor, ceiling or roof of a building.

Joist Hanger Metal shape formed for hanging on the main beam to provide support for the end of a joist.

Keene's Cement An anhydrous gypsum plaster characterized by a low mixing water requirement and special setting properties, primarily used with lime to produce hard, dense finish coats. Complete name is Red Top Keenes Cement.

Kerf A slit cut into the midpoint of the edge of tiles. This kerf permits the tile to be inserted onto the flange of various types of suspension runners. Splines are also inserted in tile kerfs when additional support is needed in lieu of a runner. Thickness and depth of kerfs are industry standards.

Key The grip or mechanical bond of one coat of plaster to another coat, or to a plaster base. It may be accomplished physically by the penetration of wet mortar or crystals into paper fibers, perforations, scoring irregularities, or by the embedment of the lath.

Kiln-Dried Lumber Lumber that has been dried and seasoned with carefully controlled heat in a kiln.

Label Service (ULC) Program allowing a manufacturer to place Underwriters Laboratories of Canada labels on its products that have met ULC requirements. A ULC representative visits the manufacturing location to obtain samples of the products for testing by ULC. In some cases, samples are also purchased on the open market for testing. The public is thereby assured that products bearing the ULC label continually meet ULC specifications.

Lamination Placing a layer of gypsum board over another gypsum board or over another substrate using an adhesive product for attachment.

Laser Level A mechanical device whose primary function is to establish level or plumb lines on a construction site with an extreme degree of precision. In acoustical ceiling installations it uses a high-intensity light beam that rotates in a level plane. See Tool Chapter for more information.

Lath A metal or gypsum (or wood in the past) material applied separately to a structure to serve as a base for plaster.

Lay-In Panel Any panel designed to be supported by an accessible suspension system.

Leaks (Sound) Small openings at electrical boxes and plumbing, cracks around doors, loose-fitting trim and closures all create leaks that allow sound to pass through, reducing the acoustical isolation of a wall, floor or ceiling system.

Ledger Strip Strip fastened to the bottom edge of a flush girder to help support the floor joists.

Life-Cycle Costing Selection of the most economical material and systems based on initial costs, maintenance costs and operating costs for the life of the building.

Light Reflectance (LR) Light reflectance of a surface is its property of reflecting light. The measure of light reflectance is that fraction of the specified incident light, which is reflected by the surface. (Defined in ASTM E 1477).

Limiting Height Maximum height for design and construction of a partition or wall without exceeding the structural capacity or allowable deflection under given design loads.

Linear Metal Ceiling Aluminum or steel panels usually 4″ wide and continuous in appearance. It is suspended on main runners that are notched to accept the snap-on panel.

Lintel Horizontal member spanning an opening such as a window or door. Also referred to as a Header.

Live Load Part of the total load on structural members that is not a permanent part of the structure. May be variable, as in the case of loads contributed by the occupancy, and wind and snow loads.

Load Force provided by weight, external or environmental sources such as wind, water and temperature, or other sources of energy.

Load-Bearing Partition A partition designed to support a portion of the building structure.

Loudness Subjective response to sound pressure, but not linearly related thereto. A sound with twice the pressure is not twice as loud. See Decibel.

Louver Opening with slanted fins (to keep out rain and snow) used to ventilate attics, crawl spaces and wall openings.

Lumen A standard unit of light emission measurement. Generally speaking, one lumen is the amount of light emitted by one candle. More strictly defined, a lumen is the unit of measure for the flow of light through a unit solid angle from a uniform point source of one international candle.

Luminaire A complete lighting unit, consisting of a lamp or lamps together with parts designed to distribute the light, to position and protect the lamps and to connect to the power source.

Main Runner The heaviest horizontal weight-carrying member, supported by hangers in a suspended ceiling, to which the cross tees are attached.

Main T or T-Bar The weight-supporting member of an exposed suspension system or grid.

Mass Property of a body that resists acceleration and produces the effect of inertia. The weight of a body is the result of the pull of gravity on the body's mass.

Mechanical Bonds The attachment created when plaster penetrates, into or through, the substrate, or envelops irregularities in the surface of the substrate.

Metal-Framing Metal-framed partitions commonly used for fire-rated construction around columns and at beams. Also a commonly used method of framing partitions in commercial construction.

Metal Furring A light gauge framework of strips fastened to 1-1/8″ channels or bar joint. There are various shapes, for example: H-shape, U-shape, Z-shape and T-shape.

Metal Pan Any steel or aluminum ceiling panel that either lays into or snaps into a grid system.

Metal Pan Hold-Down Spacer A light gauge channel that fits between a metal pan border cut and the molding to force the pan to lay flat on the molding.

Metal Stud Prefabricated horizontal metal member used as the supporting element in a partition system.

Metric Terms Metric units shown as equivalents in this handbook are from the International System of Units in use throughout the world, as

established by the General Conference of Weights and Measures in 1960. Their use here complies with the Metric Conversion Act of 1975, which committed the United States to a coordinated voluntary conversion to the metric system of measurement.

Refer to the pages 438-439 in Appendix for metric units and conversion factors applicable to subjects covered in this handbook. For additional information, refer to ASTM E380-76, Standard for Metric Practice.

Miter Joint formed by two pieces of material cut to meet at an angle.

Modular Building A structure intended for residential or commercial use that is at least partially completed in a factory complying with state or local code requirements.

Module (1) In architecture, a selected unit of measure used as a basis for building layout; (2) In industrialized housing, a three-dimensional section of a building, factory-built, shipped as a unit and interconnected with other modules to form the complete building. Single-family units factory-built in two halves are usually referred to as "sectionals."

Modulus of Elasticity (E) Ratio between stress and unit deformation, a measure of the stiffness of a material.

Moment of Inertia (I) Calculated numerical relationship (expressed in cm^4 ($in.^4$)) of the resistance to bending of a member, a function of the cross-sectional shape and size. A measure of the stiffness of a member based on its shape. Larger moments of inertia indicate greater resistance to bending for a given material.

Mortar A mixture of gypsum plaster or portland cement with aggregate or hydrate lime, or both, and water to produce a trowelable fluidity.

Moulding Narrow decorative strip applied to a surface.

Mud Slang term for joint compound.

Mud Pan Rectangular, angle-sided pan, shaped like bread pan, used by joint finisher to handle portions of joint compound. Straight-cut lip of pan assures that taping knife can be regularly cleaned.

Mullion Vertical bar or division in a window frame separating two or more panes.

Muntin Horizontal bar or division in a window frame separating multiple panes or lights.

Music/Machinery Transmission Class (MTC) Rating developed by U.S. Gypsum Company to isolate music and machinery/mechanical equipment noise or any sound with a substantial portion of low frequency energy. This rating system is not currently in common use.

NFPA National Fire Protection Association. An international technical society that disseminates fire prevention, fire fighting and fire protection information. NFPA technical standards include the National Electrical Code which is widely adopted.

NFoPA National Forest Products Association.

Nail Pop The protrusion of the nail usually attributed to the shrinkage of or use of improperly cured wood framing.

Neutral Axis The plane through a member (at the geometric center of the section in symmetrical members) where the fibers are neither under tensile nor compressive stress.

Noise Reduction Coefficient (NRC) Arithmetic average of sound absorption coefficients at 250, 500, 1000 and 2000 Hz.

Nominal Term indicating that the full measurement is not used; usually slightly less than the full net measurement, as with 2″ x 4″ studs that have an actual size when dry of 1-1/2″ x 3-1/2″.

Non-Bearing Partition A partition that is not designated to support the weight of a floor, wall, or roof.

Non-Breathing Spline A fiber or metal strip inserted into the kerf of a tile to eliminate the passage of air through the joint between two tiles in a concealed suspension system.

Noncombustible Those materials that pass CAN/ULC S114 Test for Determination of Non-Combustibility in Building Materials.

Non-Sag Ceiling Panel A ceiling panel that resists sagging and warping, such as our *ClimaPlus*™ panels.

Octave Interval between two sounds having a basic frequency ratio of two. The formula is 2n times the frequency, where n is the desired octave interval. The octave band frequency given in sound test results is usually the band center frequency, thus the 1000 Hz octave band encompasses frequencies from 707 Hz to 1414 Hz ($n=\pm 1/2$). The 1000 Hz one-third octave band encompasses frequencies from 891 Hz to 1122 Hz ($n = \pm 1/6$).

Parapet Wall Extension of an exterior wall above and/or through the roof surface.

Penny (d) Suffix designating the size of nails, such as 6d (penny) nail, originally indicating the price, in English pence, per 100 nails. Does not designate a constant length or size, and will vary by type (e.g., common and box nails).

Performance Specification States how a building element must perform as opposed to describing equipment, products or systems by name.

Perimeter Relief A gap left around the perimeter of a wall, floor or ceiling membrane, such that it will not be in direct contact with the membrane of adjoining assemblies. This gap is normally caulked with acoustical sealant.

Perm A unit of measurement of Water Vapor Permenance (ASTN E96). Also, see Permeance.

Permeance (water vapor) The ratio of the rate of water vapor transmission (WVT) through a material or assembly between its two parallel surfaces to the vapor pressure differential between the surfaces. Metric unit of measuring is the metric perm, ng/Pa•s•m^2; British unit, 1 grain/h x ft.^{2} x in. Hg.

Permeability The property of a porous material that permits a fluid (or gas) to pass through it; in construction, commonly refers to water vapor permeability of a sheet material or assembly and is defined as water vapor permeance per unit thickness. Metric unit of measurement, metric perms per centimeter of thickness. Also, see Permeance.

Photographing See Shadowing.

Pilaster Projecting, square column or stiffener forming part of a wall.

Pillar Column supporting a structure.

Pink Noise Random noise with a continuous frequency spectrum with equal power per constant percentage band width (see Noise, White Noise, Random Noise).

Pitch of Roof Slope of a surface, generally expressed in measured units of vertical rise per horizontal distance, such as "4-in-12 pitch."

Plaster Base Gypsum panel with specially treated face paper to serve as a stable backing for plaster applications. Two types of plaster base are available; one type is usually 9.5 mm (3/8-in.) thick, 406 mm (16 in.) wide and 1220 mm (4 feet) long and is used for conventional (thick) coat plastering. The other is typically 12.7 mm (1/2-in.) or 15.9 mm (5/8-in.) thick and 1220 mm (4 feet) wide (lengths vary) and is used for veneer plaster system applications.

Plaster Bonder See Bonding Agent.

Plate "Top" plate is the horizontal member fastened to the top of the studs or wall on which the rafters, joists or trusses rest; "sole" plate is positioned at bottom of studs or wall.

Platform Floor surface raised above the ground or floor level.

Platform Framing Technique of framing where walls can be built and tilted-up on a platform floor, and in multi-story construction are erected sequentially from one platform to another. Also known as "Western" framing.

Plenum Chamber in which the pressure of the air is higher (as in a forced-air furnace system) than that of the surrounding air. Frequently a description of the space above a suspended ceiling.

Plenum Barrier Vertical surface framed from the structure above to the finished ceiling and sealed to prevent the passage of air.

Pop Rivet A small gauge metal fastener used to fasten T-Bars to molding or to fasten any two light gauge metal pieces together. The rivets are installed with a hand-operated pliers-type tool called a pop rivet gun through a pre-drilled hole.

Porosity The propensity of certain materials, such as wallboard paper, to absorb water.

Portland Cement Hydraulic cement produced by pulverizing clinker consisting essentially of hydraulic calcium silicates, usually containing one or more forms of calcium sulfate as an interground addition.

Prescriptive Specification Traditional procedure used on building projects to describe by name products, equipment or systems to be used.

Primer A thin paint or glue size material sprayed or rolled onto concrete to ensure that the cemented acoustical tile will properly hold or bond to the concrete.

Punching The space of the holes on the main tee to receive a cross tee in a grid system.

Purlin Horizontal member in a roof supporting common rafters, such as at the break in a gambrel roof. Also, horizontal structural member perpendicular to main beams in a flat roof.

Racking Forcing out of plumb of structural components, usually by wind, seismic stress or thermal expansion or contraction.

Radiation Transfer of heat energy through space by wave motion. Although the radiant energy of heat is transmitted through space, no heat is present until this energy strikes and is absorbed by an object. Not all of the radiant heat energy is absorbed; some is reflected to travel in a new direction until it strikes another object. The amount reflected depends on the nature of the surface that the energy strikes. This fact explains the principle of insulating foil and other similar products that depend on reflection of radiant heat for their insulating value.

Radiant heat travels in straight lines in all directions at about the speed of light. In radiant heating systems, heat is often radiated down from the ceiling. As it strikes objects in the room, some is absorbed and some reflected to other objects. The heat that is absorbed warms the object, which, in turn, warms the surrounding air by conduction. This warmed air sets up gentle convection currents that circulate throughout the room.

Rafter That member forming the slanting frame of a roof or top chord of a truss. Also known as hip, jack or valley rafter depending on its location and use.

Rafter Tail That part of a rafter that extends beyond the wall plate—the overhang.

Random Noise A noise whose magnitude and/or frequency cannot be predicted precisely at any given time. A rough approximation of random noise is the noise from a jet engine or the static heard on a radio between stations (see Noise, White Noise, Pink Noise).

Ready-Mixed Plaster A calcined gypsum plaster with aggregate added during manufacture. Ready-mixed plaster is a powder product that requires the addition of water.

Recessed Light Any lighting fixture located above the ceiling line.

Recessed Troffer Light A light fixture recessed into the ceiling displacing acoustical tile.

Reflected Heat See Radiation.

Reflected Plan A plan of an upper surface, such as a ceiling projected downward.

Reflected Sound Sound that has struck a surface and "bounced off." Sound reflects at the same angle as light reflects in a mirror; the angle of incidence equals the angle of reflection.

Large curved surfaces tend to focus (concave) or diffuse (convex) the sound when reflected. However, when the radius of the reflecting surface is less than the wavelength of the sound, this does not hold true. Thus, a rough textured surface has little effect on diffusion of sound.

Reflective Insulation Material that reflects and thus retards the flow of radiant heat. The most common type of reflective insulation is aluminum foil. The effectiveness of reflective barriers is diminished by the accumulation of dirt and by surface oxidation.

Relative Humidity The ratio of actual water vapor pressure to the saturation water vapor pressure at the same temperature, expressed as a percentage.

Resilient Hanger A type of hanger with rubber or fiberglass insulator ensuring no metal-to-metal contact. It affords maximum protection against sound transmission. This is also called a sound isolation hanger.

Retarder An admixture used to delay the setting action of plasters or other cementitious materials.

Reverberation Persistence of sound after the source stops. When one hears the 10th, 20th, 50th, 100th, etc., reflection of a sound, one hears reverberation.

Reverberation Time Essentially the number of seconds it takes a loud sound to decay to inaudibility after the source stops. Strictly, the time required for a sound to decay 60 dB in level.

Ridge Peak of a roof where the roof surfaces meet at an angle. Also may refer to the framing member that runs along the ridge and supports the rafters.

Rise Measurement in height of an object; the amount it rises. The converse is "fall."

Riser Vertical face of a step supporting the tread in a staircase.

Room Finish Schedule The section of a set of blueprints showing what type of ceiling is to be installed, the height of the ceiling, etc.

Rough Framing Structural elements of a building or the process of assembling elements to form a supporting structure where finish appearance is not critical.

Sabin Measure of sound absorption of a surface, equivalent to 0.093 m^2 (1 sq. ft.) of a perfectly absorptive surface.

Safing Firestop material in the space between floor slab and curtain wall in multi-story construction.

Safing Off Installation of fire safety insulation around floor perimeters, between floor slab and spandrel panels. Insulation helps retain integrity of fire resistance ratings.

Scab Small piece or block of wood that bridges several members or provides a connection or fastening between them.

Screed To level or straighten a plaster coat application with a rod, darby or other similar tool. Also, as a noun, see Ground. Screeds are made from basecoat plaster; they are created between plaster dots or grounds.

Scribe To cut and fit acoustical tile neatly to a wall or vertical surface.

Scrubbable Able to be scrubbed without compromising finish integrity. Measured by Gardner Scrubbability Test ASTM D 2486.

Section A drawing of a portion of a building cut lengthwise to show it from another dimension. Sections are indicated by means of cutting plane lines.

Section Modulus (S) Numerical relationship, expressed in cm^3 ($in.^3$), of the resistance to stress of a member. It is equal to the moment of inertia divided by the perpendicular distance from the neutral axis to the extremity of the member.

Seismic Load The force produced on a structural mass owing to its acceleration, induced by an earthquake.

Semi-Concealed Installation System Installation system in which tile is kerfed in one direction, exposing the grid on the other two sides.

Set The hardening and hydration of a gypsum plaster or setting-type joint compound. See Setting Time.

Setting Time The elapsed time required for a gypsum plaster or setting-type joint compound to attain a specified hardness and strength after mixing with water.

Shadow Molding A W-shaped molding that produces a reveal or space between the ceiling and the wall when fastened to the wall.

Shaft Wall Fire-resistant wall that isolates the elevator, stairwell and vertical mechanical chase in high-rise construction. This wall must withstand the fluctuating (positive and negative) air-pressure loads created by elevators or air distribution systems.

Shadowing An undesirable condition where the joint finish shows through the surface decoration.

Shear Force that tends to slide or rupture one part of a body from another part of the body or from attached objects.

Sheathing Plywood, gypsum, wood fiber, expanded plastic or composition boards encasing walls, ceilings, floors and roofs of framed buildings. May be structural or non-structural, thermal-insulating or non-insulating, fire-resistant or combustible.

SHEETROCK Leading brand of gypsum panel for interior wall and ceiling surfaces, developed and improved by United States Gypsum Company. There is only one SHEETROCK Brand Gypsum Panel.

Shoring Temporary member placed to support part of a building during construction, repair or alteration; also may support the walls of an excavation.

Sill Horizontal member at the bottom of door or window frames to provide support and closure.

Sill Plate Horizontal member laid directly on a foundation on which the framework of a building is erected.

Slab Flat (although sometimes ribbed on the underside) reinforced concrete element of a building that provides the base for the floor or roofing materials.

Slip Molding A light gauge channel used to cover the exposed edge of cemented acoustical tile panels.

Smoke Developed The ratio of the smoke emitted by a burning material to the smoke emitted by a red oak standard material as determined by CAN/ULC S102M.

Soffit Undersurface of a projection or opening; bottom of a cornice between the fascia board and the outside of the building; underside of a stair, floor or lintel.

Sole Plate See Plate.

Sound Absorption Conversion of acoustic or sound energy to another form of energy, usually heat.

Sound Attenuation The reduction of sound energy as it passes through a conductor, resulting from the conductor's resistance to the transmission.

Sound Barrier A material installed in a plenum or partition to prevent the passage of sound from one area to another. Sound-deadening board and lead sheet or special insulations make good sound barriers.

Sound Insulation, Isolation Use of building materials or constructions that will reduce or resist the transmission of sound.

Sound Intensity Amount of sound power per unit area.

Sound Isolation Hanger See Resilient Hanger.

Sound Pressure Level (SPL) Expressed in decibels, the SPL is 20 times the logarithm to the base 10 of the ratio of the sound pressure to a reference pressure of 20 micropascals. See Decibel.

Sound Transmission The transfer of sound energy from one place to another, through air, structure or other conductor. Unwanted sound in a room may be the result of sound transmission from sources outside the room. The degree to which this sound transmission is acceptable depends on the quantity and source of the sound and the use of the adjacent space. Sound transmitted at a level below the receiving room ambient level would be acceptable.

Sound Transmission Class (STC) Single-number rating for evaluating the effectiveness of a construction in isolating audible airborne sound transmission across 16 frequencies. Higher numbers indicate more effectiveness. Tested per ASTM E90.

Spacer Bar/Channel A bar with notches at each end that hook over two main T's in a concealed support system to space and stabilize them.

Span Distance between supports, usually a beam or joist.

Spandrel Beam Horizontal member, spanning between exterior columns, that supports the floor or roof.

Spandrel Wall Exterior wall panel, usually between columns, that extends from the window opening on one floor to one on the next floor.

Speed of Sound Speed of sound in air varies with atmospheric pressure and temperature, but is the same at all frequencies. For most architectural work, the speed of sound should be taken as 344 m/second (1,130 ft./second).

Splayed Hangers Hangers installed at an angle rather than perpendicular to the support grid or channel.

Splicers Small metal pieces used to fasten two ceiling components together.

Split Line The elevation of the bottom of the 1-1/8″ channel in a suspended acoustical ceiling.

Square Edge An acoustical tile is considered square-edge material when the edge of the tile is not beveled; it creates a hairline joint when installed. Drywall panels also may have square edges; however, drywall edges are typically tapered.

Stile Vertical outside member in a piece of mill work, as a door or sash.

Stirrup Hanger to support the end of the joist at the beam.

Stop Strip of wood fastened to the jambs and head of a door or window frame against which the door or window closes.

Strain Unit deformation in a body that results from stress.

Stress Unit resistance of a body to an outside force that tends to deform the body by tension, compression or shear.

Stringer Heavy horizontal timber supporting other members of the frame in a wood or brick structure; a support also for steps.

Structure-Borne Sound Sound energy imparted directly to and transmitted by solid materials; such as building structures.

Strut Slender structural element that resists compressive forces acting lengthwise.

Stucco

1. A mixture of portland cement and aggregate designed for use on exterior surfaces or interior surfaces exposed to high levels of moisture. May also contain hydrated lime to improve working characteristics.
2. A gypsum plaster mix including aggregate for use on interior surfaces.
3. Calcined gypsum used to produce plaster, gypsum wallboard and related products. This terminology is specific to the gypsum processing industry.

Stud Vertical load-bearing or non-load bearing framing member.

Subfloor Rough or structural floor placed directly on the floor joists or beams to which the finished floor is applied. As with resilient flooring, an underlayment may be required between subfloor and finished floor.

Substrate Underlying material to which a finish is applied or by which it is supported.

Surface Burning Characteristic Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to CAN/ULC S102M.

Suspended Ceiling A ceiling that is hung from the structure with wire hangers.

Synthetic Gypsum A chemical product, consisting primarily of calcium sulfate dehydrate ($CaSO_4 \bullet 2H_2O$) resulting primarily from an industrial process. Also, see Desulfo Gypsum.

Take-Up The loss of water of a plaster into the absorptive substrate during application, as evidenced by a moderate stiffening of the plaster coat.

Tapered Edge An edge formation of gypsum board which provides a shallow depression at the paper-bound edge to receive joint reinforcement. Typical edge on drywall panels; edges may also be square.

Taping Compound (Sometimes called embedding compound.) A compound specifically formulated and manufactured for use in embedding of joint reinforcing tape at gypsum board joints.

Task Lighting Lighting directed to a specific work surface or area to provide illumination for tasks.

Temperature Measurement of the intensity (not quantity) of heat. The Fahrenheit (ºF) scale places the freezing point of water at 32º and the

boiling point at 212º. The Centigrade or Celsius (ºC) scale, used by most countries and in scientific work, places the freezing point of water at 0º and the boiling point at 100º. On the Kelvin (K) scale, the unit of measurement equals the Celsius degree and measurement begins at absolute zero 0º (-273ºC).

Tensile Strength Maximum tensile stress that can be developed in a given material under axial tensile loading. Also the measure of a material's ability to withstand stretching.

Tension Force that tends to pull the particles of a body apart.

Thermal Expansion All materials expand and contract to some extent with changes in temperature. The Thermal Coefficient of Linear Expansion is expressed mm/mm/ºC [Inches Per Inch Per Degree Fahrenheit]. Example: gypsum board has a coefficient of 16.2 x 10^{-6} mm/mm/ºC (9.0 x 10^{-6} in. per in. per ºF). This means that with an increase in temperature of 50 Fº, a gypsum board wall 30 m (100 ft.) in length will have an unrestrained linear expansion of 13.7 mm (0.54″). The expansion characteristics of some other building materials are more pronounced; a 50 Fº temperature increase would produce expansion in a 30 m (100′) length of approx. 19 mm (3/4″) in aluminum, 9.5 mm (3/8″) in steel and 12.7 mm (1/2″) in concrete.

Thermal Resistance (R) Resistance of a material or assembly to the flow of heat. It is the reciprocal of the heat transfer coefficient: (1/C, or 1/U)

For insulating purposes, low "C" and "U" values and high "R" values are the most desirable.

Threshold Raised member at the floor within the door jamb. Its purpose is to provide a divider between dissimilar flooring materials or serve as a thermal, sound or water barrier.

Through Penetrations An opening through a fire-resistive partition or floor/ceiling assembly caused by the need to have a penetrating item pass through it. Through penetrations usually require the use of a firestop system to protect against the spread of fire through the opening.

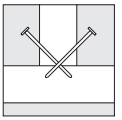
Through Penetration Firestop A system for sealing through-penetrations in fire-resistant floors, walls and ceilings.

Tie Wire 16 to 18-gauge galvanized wire used to fasten two pieces of metal furring together.

Tile Ceiling product of exact, not nominal size, usually 12″ x 12″.

Time-Temperature Curve Rate of rise of temperature in a fire-testing furnace.

Toenail Method of fastening two boards or studs together as in a "T" by driving nails into the board that forms the stem of the "T" at an angle so they enter the other board and cross each other.



Tongue-and-Groove Joint Joint where the projection or "tongue" of one member engages the mating groove of the adjacent member to minimize relative deflection and air infiltration; widely used in sheathing, flooring and paneling. Tongues may be in "V," round or square shapes.

Topping Compound A compound specifically formulated and manufactured for use over taping or all purpose compounds to provide a

smooth and level surface for the application of decoration.

Translucent Ceiling A ceiling with polystyrene, acrylic, or plastic lay-in panels that allow the light to pass through from fixtures above the ceiling, but obstruct ordinary vision to the plenum above.

Transmission Loss (TL) Essentially the amount, in decibels, by which sound power is attenuated (decreased) by passing from one side of a structure to the other. TL is independent of the rooms on each side of the structure and theoretically independent of the area and edge conditions of the structure.

Tread Horizontal plane or surface of a stair step.

Trimmer Double joists or rafters framing the opening of a stairway well, dormer opening, etc.

Truss Open, lightweight framework of members, usually designed to replace a large beam where spans are great.

"U" Factor Coefficient of heat transfer, "U" equals 1 divided by (hence, the reciprocal of) the total of the resistances of the various materials, air spaces and surface air films in an assembly. See Thermal Resistance.

ULC Underwriters Laboratories of Canada—not-for-profit laboratory operated for the purpose of testing devices, systems and materials as to their relation to life, fire and casualty hazards in the interest of public safety.

Vapor Retarder Material used to retard the flow of water vapor through walls and other spaces where this vapor may condense at a lower temperature.

Veneer Plaster Calcined gypsum plaster specially formulated to provide specific workability, strength, hardness and abrasion resistance characteristics when applied in thin coats (1.6 to 2.4 mm (1/16″ to 3/32″) nom.) over veneer gypsum base or other approved base. The term thin-coat plaster is sometimes used in reference to veneer plaster.

Washable Able to be cleaned with a damp sponge or cloth. See Scrubbable.

Water-Absorption The amount of water absorbed by a material under specified test conditions commonly expressed as weight percent of the test specimen.

Water Level A hose with a glass pipe inserted in both ends used in leveling ceilings. A transparent hose without glass ends may be used.

Water-Repellent Paper Gypsum board paper surfacing which has been formulated or treated to resist water penetration.

Water Vapor Transmission The rate of water vapor flow, under steady specified conditions, through a unit area of a material, between its two parallel surfaces and normal to the surfaces. Metric unit of measurement is ng/Pa•s•m^2. Also, see Permeance.

Wavelength (Sound) Wave is one complete cycle of sound vibration passing through a medium (such as air) from compression through rarefaction and back to compression again. The physical length of this cycle is termed the wavelength. Wavelengths in air vary from about 17.5 mm (11/16″) for

a 20,000-cycle per sec. (See Frequency) sound, to approximately 17.2 m (56-1/2′) for a 20-cycle per sec. sound (the two approximate extremes of human hearing sensitivity). There are waves outside of this range, but generally, they cannot be heard by humans.

Weep Hole Small aperture at the base of an exterior wall cavity intended to drain out trapped moisture.

Wet Sand To smooth a finished joint with a small-celled wet sponge. A preferred method to reduce dust created in the dry sanding method.

White Noise Random noise with a continuous frequency spectrum and with equal power per unit band width (see Noise, Pink Noise, Random Noise).

WHI Warnock Hersey International, an independent fire-testing laboratory.

Wood-Fibered Plaster A calcined gypsum plaster containing shredded or ground wood fiber added during manufacture.

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