

USG BORAL TECHNICAL GYPSUM BOARD PORTFOLIO



USG BORAL
INNOVATION INSPIRED BY YOU.™



USGBoral.com

Gypsum Boards

Ceilings

Compounds

Metal Framing

Substrates

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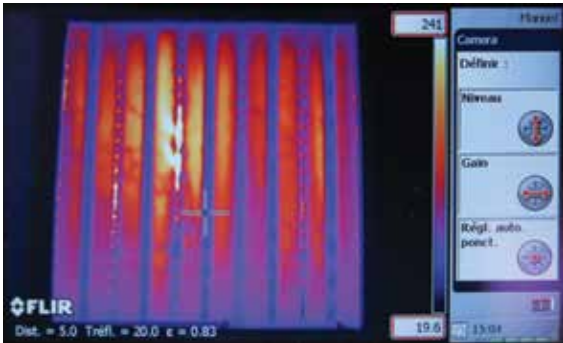
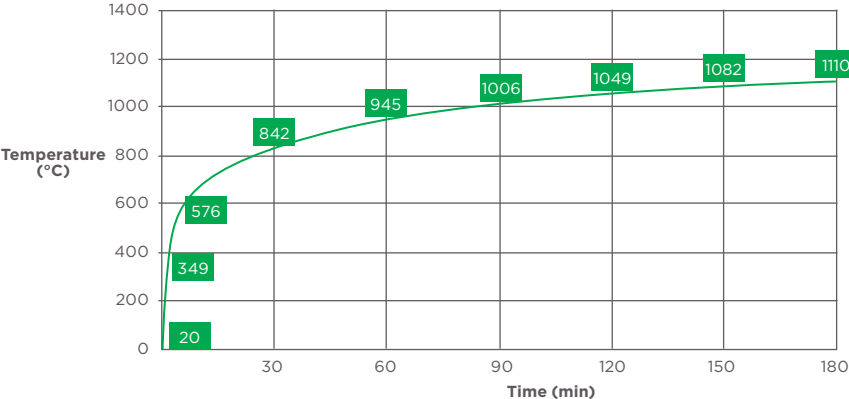


EXPERTISE IN DESIGN AND CONSTRUCTION

Our Commitment to Your Safety

USG Boral places safety in the highest regard. We strive to ensure safety for all our customers, from those who specify our products to those who build with our products, as well as those who live and work in environments where our products are assured. The design and installation of our fire-rated systems are all in accordance with our manufacturer’s instructions, and are strictly installed in accordance to relevant test standards.

The Standard ISO 834 Cellulosic Time-Temperature Curve



Our certified fire-rated partition are exposed to a fire curve that is modelled after a ventilated controlled fire, with the temperature increasing to 842°C after 30 minutes.

Fire Regulation

The major concern when it comes to safeguarding lives against a catastrophic fire is the level of fire protection and the effectiveness of these protective measures.

Traditionally, designers follow a set of prescriptive Fire Code requirements in applying the required fire protection for a building. However, in recent years, performance-based fire safety engineering has gained popularity among designers, especially for big and complex buildings where more a cost-centric approach is required.

The table below shows the objectives and means of performance-based fire safety engineering:

Objectives	Means
To keep people safe	Appropriate building design (compartments, smoke extraction, escape routes, ...)
To limit the risks of fire extension and consequences	Classification of construction products and systems

FIRE-RATED PARTITIONS

Fire Safety Engineering

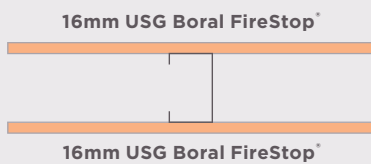
USG Boral's most commonly used fire-rated systems can be easily used in accordance with the performance-based principles of fire safety engineering. Our systems are tested and can be referenced across some of the most prestigious projects world-wide.

USG Boral's technical gypsum board portfolio can be utilized as shown for a one-stop solution.



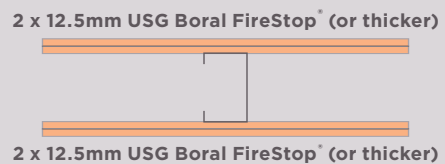
The conceptual fire safety engineering design of a typical floor in an apartment.

USG Boral 1-hour Fire-Rated Partition

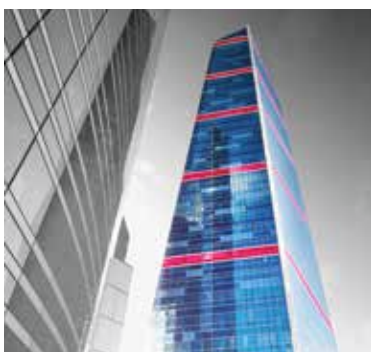


Lower fire rating (FRL -/60/60) in non-sleep rooms such as classrooms, offices and common areas.

USG Boral 2-hour Fire-Rated Partition



Higher fire rating (FRL -/120/120) in sleeping rooms such as hotels and hospitals.



Refuge floors shown in red in a high-rise building.

Refuge Areas/Floors

Fire engineers and designers often put in refuge areas to limit flame and smoke spread to protect lives or critical equipment. The area of refuge is set aside for situations when evacuation may not be possible or is otherwise unsafe.

For example, patients in a hospital may not be able to use a stairwell to exit the building when there is a fire. People can wait in the area of refuge safely until rescued by firefighters or emergency rescue teams. This area may also have the name “area of rescue assistance.”

The fire ratings in these floors are higher than usual and typically incorporate fire-rated ceilings or have fire corridor systems.

FIRE-RESISTANT GYPSUM BOARD

Protecting What's Most Valuable to You



Fire racing through a residential complex. Life-threatening events such as this and the catastrophic fire incident at the Grenfell Tower in London continue to challenge and change the way we approach fire safety engineering.



USG Boral FireStop® Gypsum Board

Features and Benefits: Fire-Resistant Gypsum Board

The gypsum that makes the core of USG Boral's FireStop® Gypsum Board portfolio is specially formulated to resist the dehydration by heat in the event of a fire.

The non-combustible gypsum board core is tested to various standards such as British, American or European standards for the products and systems that provide minimum periods of fire resistance.



Fire Safety



Functionality

Fire escape

Fire-rated partition for corridors as a mode of escape

Fire-rated ceiling in server rooms

 USG Boral Rated Drywall/Ceiling

 USG Boral Securock™ Fire-rated Exterior Wall



Fire compartmentation is a concept where the spread of fire within a building is restricted by partitioning walls or floors with fire resisting walls or ceilings. These partitions can also deter the spread of smoke which allows for a safe mode of escape during an emergency.

Application: Fire Resistance

The concept of fire resistance is the ability of a structure to maintain its structural capability and prevent the spread of flames or heat when exposed to fire conditions.

USG Boral's fire-rated gypsum board portfolio and systems are tested to:

Non-combustibility, surface-burning characteristics:

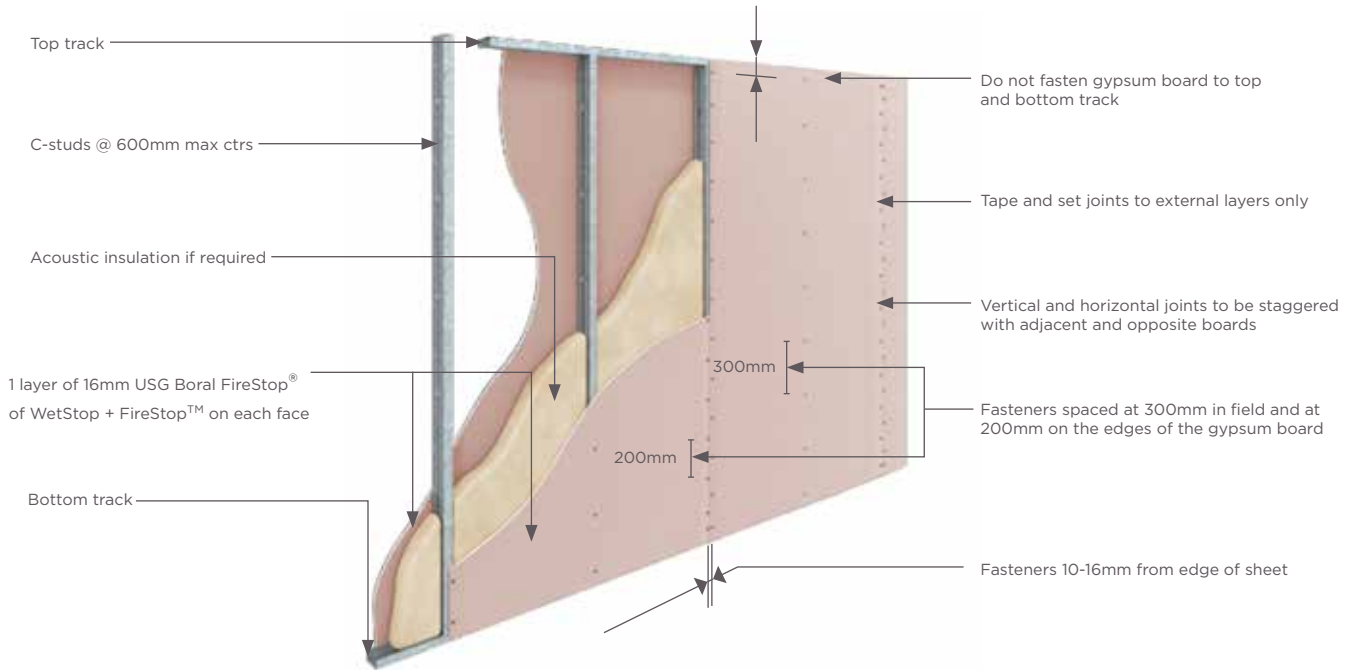
BS 476 : Part 4,6 and 7
EN 13501-1
ASTM C1396

System performance for 30 minutes and up to 4 hours:

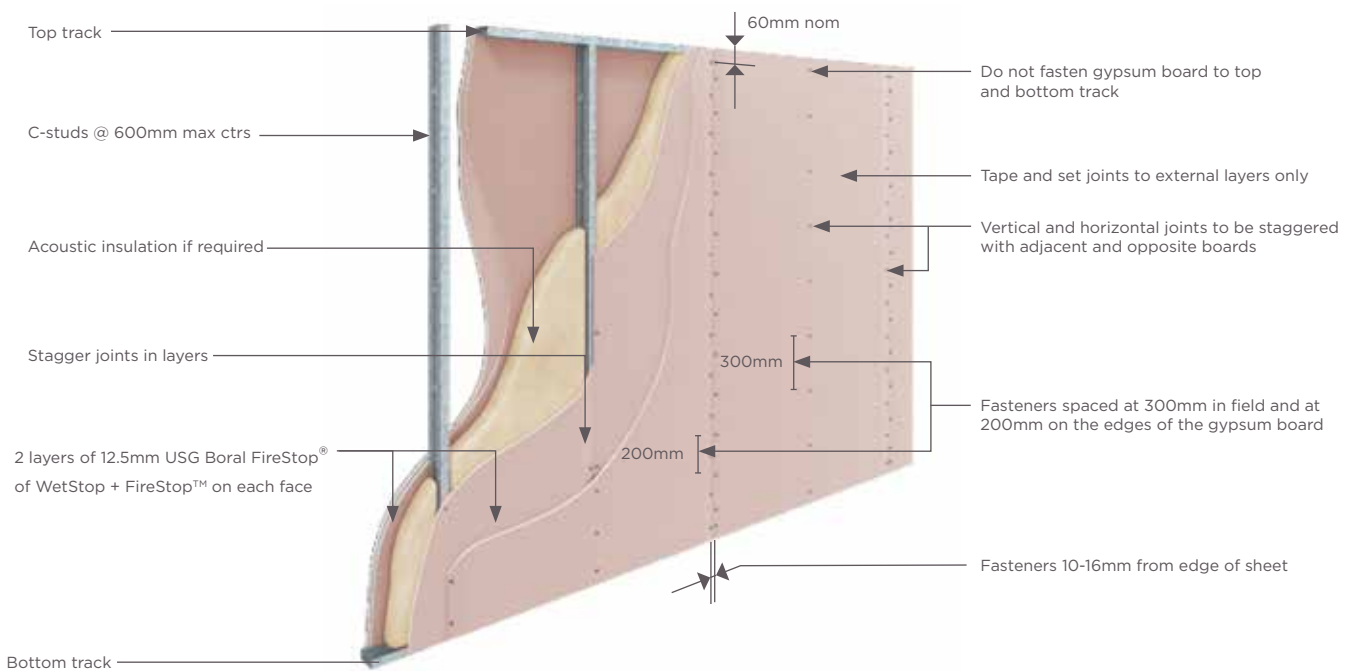
BS 476 : Part 22
EN 13501-2
ASTM E119

FIRE-RATED SYSTEMS

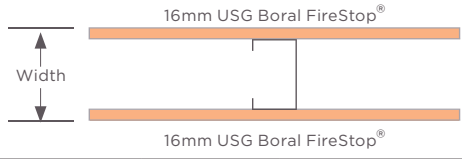
1-hour Fire-Rated Steel Stud - Vertical Fixing



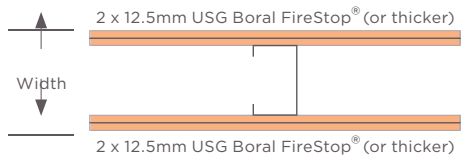
2-hour Fire-Rated Steel Stud - Vertical Fixing



1-hour Fire-Rated Partition

System No.	Fire-Rating FRL (Test Ref.)	Description and physical data	Acoustic Performance																																																				
SS5	1 Hour-/60/60* BS 476 EN 13501-2 ASTM E119	 <p style="text-align: center;">16mm USG Boral FireStop®</p> <p style="text-align: center;">16mm USG Boral FireStop®</p>	STC 43 with insulation (92 CS 55) Ref. Acoustic System ASS3																																																				
		<p>Steel Stud Partition - 1 layer 16mm USG Boral FireStop® or WetStop + FireStop™ on each side of 51, 64, 76, 92 and 150mm CS Studs @ 610mm centers max.</p> <p>Caulk all perimeter gaps with USG Boral Fire Sealant.</p> <p style="text-align: center;">Mass 26/kg/m²</p>																																																					
		<table border="1"> <thead> <tr> <th>Limiting Height mm (max) 0.25kPa</th> <th>Width (mm)</th> <th>Studs (mm)</th> <th>Studs BMT (mm)</th> </tr> </thead> <tbody> <tr><td>3390 d</td><td>83</td><td>51</td><td>.50</td></tr> <tr><td>3920 d</td><td>96</td><td>64</td><td>.50</td></tr> <tr><td>4350 d</td><td>96</td><td>64</td><td>.75</td></tr> <tr><td>4530 d</td><td>96</td><td>64</td><td>1.15</td></tr> <tr><td>4320 d</td><td>108</td><td>76</td><td>.55</td></tr> <tr><td>5260 d</td><td>108</td><td>76</td><td>.75</td></tr> <tr><td>5430 d</td><td>108</td><td>76</td><td>1.15</td></tr> <tr><td>5210 d</td><td>124</td><td>92</td><td>.55</td></tr> <tr><td>5730 d</td><td>124</td><td>92</td><td>.75</td></tr> <tr><td>5940 d</td><td>124</td><td>92</td><td>1.15</td></tr> <tr><td>7200 d</td><td>182</td><td>150</td><td>.75</td></tr> <tr><td>7800 d</td><td>182</td><td>150</td><td>1.15</td></tr> </tbody> </table>		Limiting Height mm (max) 0.25kPa	Width (mm)	Studs (mm)	Studs BMT (mm)	3390 d	83	51	.50	3920 d	96	64	.50	4350 d	96	64	.75	4530 d	96	64	1.15	4320 d	108	76	.55	5260 d	108	76	.75	5430 d	108	76	1.15	5210 d	124	92	.55	5730 d	124	92	.75	5940 d	124	92	1.15	7200 d	182	150	.75	7800 d	182	150	1.15
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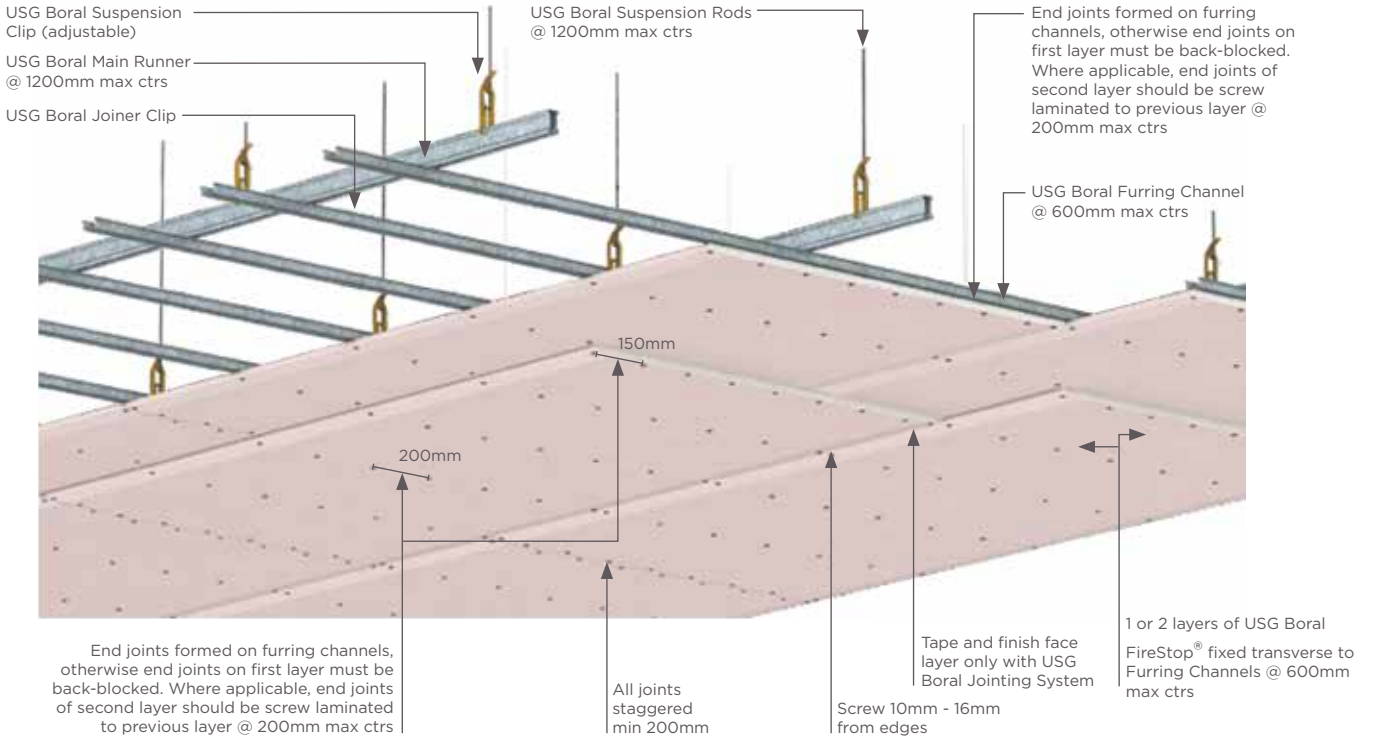
2-hour Fire-Rated Partition

System No.	Fire-Rating FRL (Test Ref.)	Description and physical data	Acoustic Performance																																				
SS2	2 Hours-/120/120 BS 476 EN 13501-2 ASTM E119	 <p style="text-align: center;">2 x 12.5mm USG Boral FireStop® (or thicker)</p> <p style="text-align: center;">2 x 12.5mm USG Boral FireStop® (or thicker)</p>	STC 53 with insulation (92 CS 55) STC 52 with insulation (64 CS 55) Ref. Acoustic System ASS9																																				
		<p>Steel Stud Partition - 2 layers 12.5mm USG Boral FireStop® or WetStop + FireStop™ on each side of 76, 92 and 150mm CS Studs @ 610mm centers max.</p> <p>Caulk all perimeter gaps with USG Boral Fire Sealant.</p> <p style="text-align: center;">Mass 52/kg/m²</p>																																					
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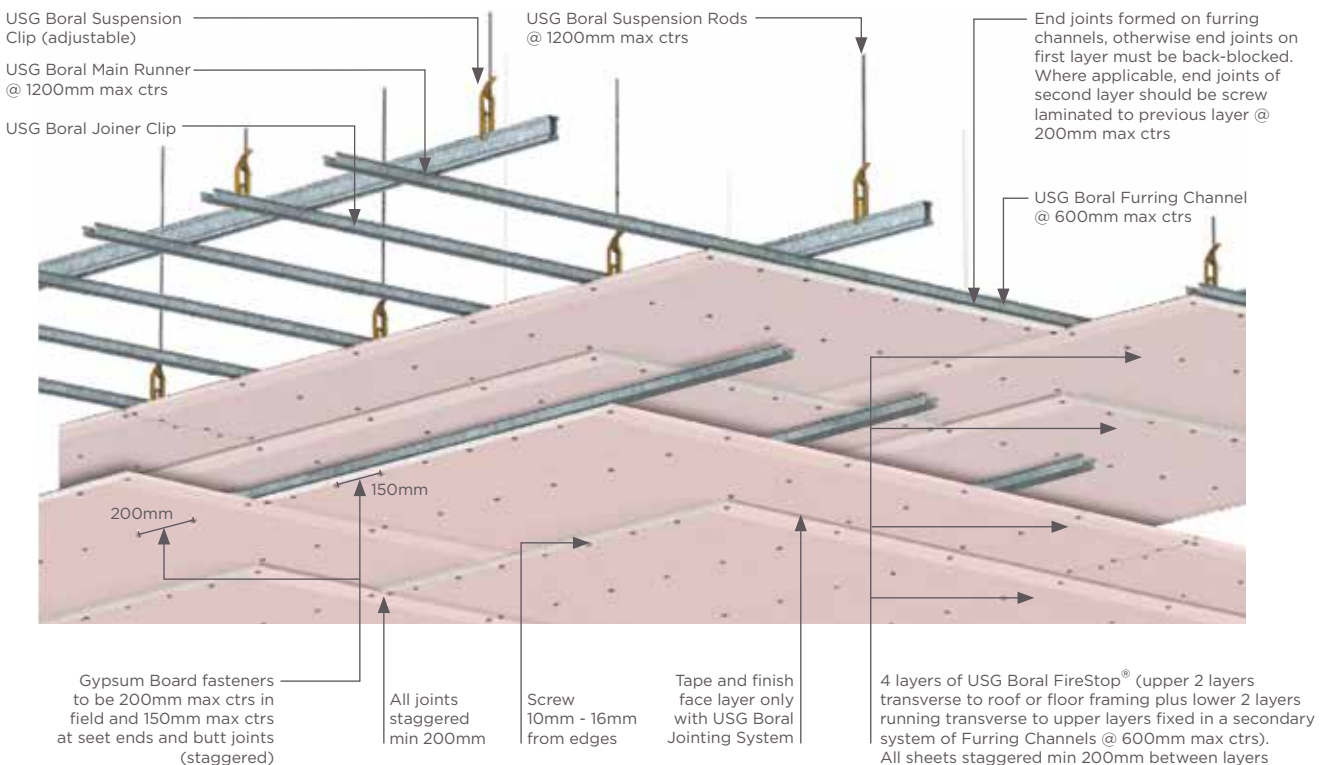
- Limiting Heights shown are the lesser of Fire Height (f) without pressure, and Structural Limiting Height (in a non fire environment) at 0.25kPa governed by Deflection l/240 (d), Strength (s) or End Reaction (r). End reaction refers to the manner in which the stud is retained in the top and bottom track i.e. friction fit or rigidly fixed.
- Mid-span noggling is recommended for erection purposes in walls higher than 3600mm.
- Use of rock wool is optional for fire-rated partitions shown

FIRE-RATED SYSTEMS

1-hour Fire-Rated Ceiling

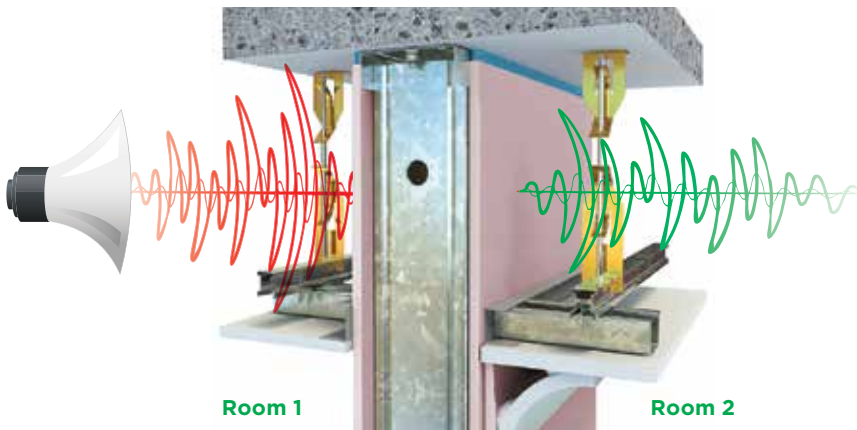


2-hour Fire-Rated Ceiling



ACOUSTIC GYPSUM BOARD

Acoustics that Enhance the Quality of Life



A Guide to Sound Transmission Class (STC) Values

25	Normal speech can be heard easily
30	Loud speech can be heard easily
35	Loud speech can be heard but comprehension might be compromised
42	Loud speech can be heard as murmur
45	Must strain to hear loud speech
48	Loud speech can be barely be heard
50	Loud speech cannot be heard
55	Loud speech and low frequency sound are further reduced

Acoustic privacy can be enhanced by incorporating special acoustically rated drywall partitions into the design of a layout. The table serves as a guide to sound insulation levels.



The Gyeongju Hwabaek International Convention Center in South Korea utilizes the USG Boral ArtSound™ to achieve the desired acoustic performance.

Features and Benefits: Acoustic Gypsum Board

Lightweight partition systems, made from acoustically enhanced gypsum boards have consistently proved to be excellent solutions to mask unwanted noise from an adjacent space.

The acoustically engineered systems exceed mass law predictions that demonstrate that adding mass is not the most economical answer to effective sound isolation.



Enhanced Acoustic Comfort



Functionality



Aesthetic



USG Boral EchoStop®/ArtSound™ Gypsum Board

Application: Acoustic Design

In recent years, multiple studies have proven that speech intelligibility is recognized as contributing factor in helping students achieve their full potential^{1,2}. Hospitals and health centers also benefit from an acoustically well-designed environment to enhance rest and recovery.

In order to provide the best acoustic performances, USG Boral's ArtSound™ Gypsum Board is specially designed to have sound absorption of up to NRC 0.7 as tested according to ASTM 423.

¹ Bradley, J.S., Oct 1986. Speech Intelligibility Studies in Classrooms

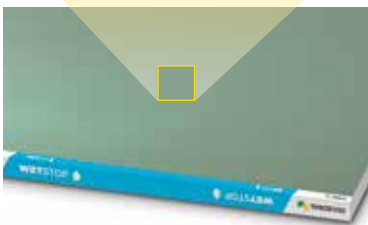
² Masson, F.N., et al, Sept 2016, Intelligibility in a Classroom : Coupling effects between outdoor noise and room acoustic response

MOISTURE-RESISTANT GYPSUM BOARD

Keeping You Dry and Comfortable



Application of the made-for-purpose moisture-resistant gypsum board in a bathroom ensures peace of mind when it comes to performance and comfort.



USG Boral WetStop™ Gypsum Board

Features and Benefits: Moisture-Resistant Gypsum Board

USG Boral's Moisture-Resistant Gypsum Board are manufactured to stringent requirements that repel moisture. The water-resistant core is formulated with water repellent additives and encased in specified moisture-resistant face and back liner papers.

These boards are also produced in fire-rated wet area formulations and form robust wet area systems when installed according to USG Boral Installation Manual. Ceramic tiles and natural marble, weighing up to 32 kg/sqm, may be directly adhered onto the USG Boral WetStop™ Gypsum Board.

Wet area gypsum boards are also available in fire-rated formulation known as USG Boral WetStop + FireStop™.



Moisture-Resistant



Functionality

Application: Wet Area Design

Most building codes³ dictate that areas within a building, which are exposed to moisture such as laundries, pantries, kitchens, showers and sanitary compartments, should be constructed with building elements that are waterproof or water-resistant. USG Boral's range of Moisture-Resistant Gypsum Board is designed to perform to these building codes and ensure appropriate protection against dampness.

³ AS 3740 : Waterproofing of Wet Areas within Residential Building

ABUSE-RESISTANT GYPSUM BOARD

Robustness and Extraordinary Lifespan



Some partitions have to be stronger and more durable than others, like this hospital corridor lined with USG Boral's abuse-resistant gypsum board.



USG Boral ImpactStop® Gypsum Board

Features and Benefits: Abuse-Resistant Gypsum Board

Impact resistance on walls typically takes into account collisions in the form of soft body, abrasive and hard body under the BS 5234 and ASTM C1629 tests. USG Boral's MultiStop™ and ImpactStop® Gypsum Board range from heavy duty systems that not only achieve heavy to severe duty performance, but can also be engineered to resist damage from door slamming and heavyweight anchorages of wash basins.



Abuse-resistant



Functionality

Application: Resisting Crowd Pressure

USG Boral Abuse-Resistant Gypsum Board can be used in areas such as corridors where a solid partition is desired as shown in the table below:

Drywall Performance	Typical Occurrence	Description
Light	<ul style="list-style-type: none"> Residential spaces 	<ul style="list-style-type: none"> Small chance of accident Persons tend to exercise care
Medium	<ul style="list-style-type: none"> Business offices 	<ul style="list-style-type: none"> Some chance of accident and misuse Spaces are moderately used Persons exercise some care
Heavy	<ul style="list-style-type: none"> Industrial areas Light to medium crowd traffic 	<ul style="list-style-type: none"> Some chance of accident and misuse Chance of accident or misuse occurring Area is highly used Persons exercise minimal care
Severe	<ul style="list-style-type: none"> Heavy industrial areas High traffic public areas 	<ul style="list-style-type: none"> Susceptible to vandalism with high chance of accident and misuse High traffic with space being used extensively by public

Australia
China
India
Indonesia
Malaysia
Middle East
New Zealand
Thailand
Philippines
Singapore
South Korea
Vietnam

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