

Between us, ideas become reality®

MAIN LINE BROCHURE 2010 / 2011

Ceiling information
Product information



Armstrong®

Leading with integrity for 150 years

At your service to create A VALUABLE PARTNERSHIP!



CUSTOMER HELP-DESKS

You've got questions; we've got answers! Armstrong's **Internal Technical Sales** (ITS) teams have the product knowledge and technical ability to handle your queries effectively. In addition, Armstrong's **Customer Order Service** (COS) teams offer an experienced, friendly, order processing service. Wherever in the world you're based, our experienced customer focused teams are just a phone call away.

SPECIALIST TEAMS

Whether you're a purchasing manager, contractor or distributor, Armstrong's dedicated teams are available to help you with technical requirements, offer advice on drawings and project layouts, and provide an efficient follow-up service. Our specialist teams are dedicated to providing customised, design and technical solutions to meet your project and supply chain needs.

PARTNERSHIP

Nurturing strategic partnerships is a valuable way to offer customers the best service levels of quality. Due to our distributor partnerships, we currently boast the largest distribution network in Europe. We team up with recognised installers through our OMEGA programme.

TOOLS

Keeping in touch with Armstrong is incredibly easy! In addition to providing you with brochures, data sheets and magazines, we also have a dedicated website with specific design and technical tools such as CAD, 3D modelling and acoustic calculators.

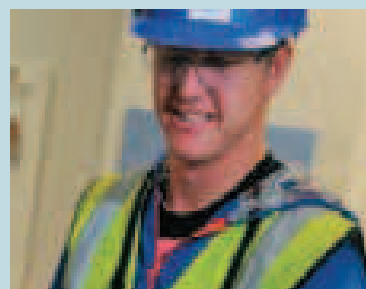
VISIT US ONLINE TODAY!

To further enrich your Armstrong experience, check out the Armstrong website, where you can benefit from up-to-date news and information, inspirational design ideas, a project gallery, an acoustic mini-site, product dedicated pages, downloadable documents and much more! www.armstrong-ceilings.co.uk
www.armstrong-ceilings.ie

THE OMEGA PROGRAMME



Through the OMEGA programme, Armstrong works closely with specialist ceiling contractors to reach the highest levels of performance, service and sustainability. OMEGA partners are carefully selected based on specific Omega criteria, and they must adhere to a comprehensive range of commitments. Among others, these include complying rigorously with strict industry standards, maintaining a thorough understanding of Armstrong's processes and product catalogues, and constantly submitting projects to Armstrong for assessment of workmanship.



PRODUCT SELECTOR

BY APPLICATION AREAS

Office

	MINERAL & WOOD	METAL	CANOPY	GRID
Reception areas	MADEIRA, VECTOR range	CLIP-IN, Floating Ceilings	CANOPY range, INFUSIONS Canopy	Designer grid
Open spaces	OP range, OPTIMA Vector	CLIP-IN, HOOK-ON	OPTIMA Canopy, ULTIMA Canopy	Designer grid
Meeting rooms	ULTIMA, PERLA	CLIP-IN, HOOK-ON	ULTIMA Canopy, ORCAL Canopy	
Individual offices	dB range	ORCAL PREMIUM, Floating Ceilings		
Corridors	PLANKS range	Corridor Ceilings	CANOPY (INFUSIONS ...)	
Cafeterias	OP range & COLORTONE	LAY-IN, HOOK-ON	CANOPY range	



ULTIMA Canopy



DUNE SUPREME

Healthcare

	MINERAL & WOOD	METAL	CANOPY	GRID
Receptions & Waiting areas	PERLA, BIOGUARD ACOUSTIC	CLIP-IN, Floating Ceilings	CANOPY range, INFUSIONS Canopy	GRID
Consulting rooms	dB & BIOGUARD ranges	CLIP-IN, HOOK-ON B15		
Corridors	Planks & BIOGUARD ranges	Corridor Ceilings		
Clean rooms	BIOGUARD range	ORCAL BIOGUARD, CLIP-IN		CLEAN ROOM GRID



MYLAR



BIOGUARD Range

Transport

Halls & Circulation areas		CLIP-IN, HOOK-ON Perforated	CANOPY range	
Waiting areas	ULTIMA, PERLA, Vector range	CLIP-IN, LAV-IN Perforated	CANOPY range	
Lounges	MADEIRA, ULTIMA, PERLA, Vector range	HOOK-ON, Floating Ceilings Perforated	CANOPY range	
Humid areas	CERAMAGUARD, NEWTONE	CLIP-IN, HOOK-ON (back coated)		



ORCAL Canopy



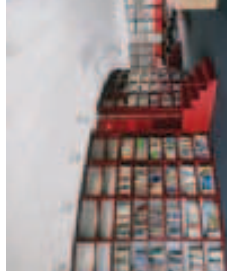
AXIAL Vector

Education

Classrooms	DUNE SUPREME / DUNE MAX	LAY-IN, HOOK-ON		
Libraries	OP range, OPTIMA	LAY-IN, HOOK-ON	CANOPY range	
Canteens	OP range, COLORTONE NEVADA	CLIP-IN, HOOK-ON	CANOPY range	
Corridors	Planks range	Corridor Ceilings		
Kitchens	BIOGUARD range, PARAFON HYGIEN	CLIP-IN, LAV-IN (Plain)		
Humid areas	CERAMAGUARD, NEWTONE	CLIP-IN, HOOK-ON (Plain)		



OPTIMA



DUNE SUPREME

Retail / Leisure

Swimming pools & Spa	CERAMAGUARD, NEWTONE, OP range			Trucks, Corrosive Resistant Grid
Shops & Department stores	GRAPHIS, COLORTONE, ULTIMA	LAY-IN, HOOK-ON	CANOPY range	
Cinemas / Theatres	OP range, COLORTONE NEVADA	LAY-IN, HOOK-ON		
Restaurants	OP range, COLORTONE	LAY-IN, Floating Ceilings	CANOPY range	



AXIOM C Canopy



CLIP-IN

PRODUCT SELECTOR

BY PERFORMANCE

Sustainability		Acoustics				Safe & Healthy			Compatible
ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance
Recycled content (%)	Light reflectance (%)	up to	up to	up to	up to	resistance	resistance	Anti-microbial	resistance

Mineral Laminated

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
ULTIMA	44	87	0.75(H)	C	0.75	40	18	A2-s1, d0	95	wipeable / nox.don	✓
ULTIMA OP	42	86	1.00	A	0.95	26	10	A2-s1, d0	95	wipeable / nox.don	✓
ULTIMA GB	63	87	0.65(H)	C	0.70	43	21	A2-s1, d0	95	wipeable / nox.don	✓
OPTIMA	52	87	1.00	A	1.00	7	A2-s1, d0	95	wipeable / nox.don	✓	
PERLA	45	86	0.65(H)	C	0.70	36	18	A2-s1, d0	95	wipeable / nox.don	✓
PERLA OP	42	86	0.95	A	0.90	27	10	A2-s1, d0	95	wipeable / nox.don	✓
PERLA GB	63	86	0.60(H)	C	0.65	43	21	A2-s1, d0	95	wipeable / nox.don	✓
SERRA OP	15	83	0.90	A	0.90	29	11	A2-s1, d0	95	wipeable / nox.don	✓
NEVADA	20	82	1.00	A	0.95	27	7	A1 (1)	95	wipeable / nox.don	✓

Mineral Non Laminated

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
DUNE SUPREME	42	up to 85	0.65	D	0.50	35	17	A2-s1, d0	99	whitely / don	✓
DUNE MAX	44	84	0.65	C	0.60	35	17	A2-s1, d0	99	whitely / don	✓
DUNE GB	59	84	0.60	C	0.55	39	20	A2-s1, d0	95	whitely / don	✓
CORRIS	33	83	0.55(H)	D	0.50	36		A2-s1, d0	95	whitely / don	
CORRIS MAX / CORRIS 75	65	83	0.70(H)	C	0.75	38		A2-s2, d0	95	whitely / don	
PLANI	36-44	87	0.15(L)	E	0.15	37		A2-s1, d0	95	whitely / don	
FINE FISSURED	39-51	85	0.60(H)	C	0.60	34		A2-s1, d0	95	whitely / don	

Metal

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
EXTRA MICRO PERFORATED (2)	up to 30	80	0.95(U)	D	0.65	30		A1	95	wipeable / nox.don	✓
MICRO PERFORATED (2)	up to 30	66	0.75	C	0.80	20	6	A1	95	wipeable / nox.don	✓
PERFORATED (2)	up to 30	70	0.70(L)	C	0.70	20	6	A1	95	wipeable / nox.don	✓
PLANI (IMPERFORATED)	up to 30	85	0.10(L)	Max Class (3)	0.10	44	19	A1	95	whitely / don	ISO 3 (4)
PREMIUM B15	up to 30	depends on perforation	0.65	C	0.60	47	21	A2-s1, d0	95	wipeable / nox.don	✓

Wood

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
MADERA VENEERS			0.50(L)	D	0.60			B-s2, d0	70	wipeable / nox.don	
MADERA LAMINATES			0.50(L)	D	0.60			B-s2, d0	70	wipeable / nox.don	

Sustainability		Acoustics				Safe & Healthy			Compatible
ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance
Recycled content (%)	Light reflectance (%)	up to	up to	up to	up to	resistance	resistance	Anti-microbial	resistance

Mineral Decorative

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to <th>Fire reactant (dB)</th> <th>Humidity resistance</th> <th>Chemicality</th> <th>Air quality</th> <th>Scratch resistance</th> <th>Compatible</th>	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
COLORTONE DUNE	48		0.55	D	0.55	35	17	A2-s1, d0	95	whitely / don	
COLORTONE NEVADA	20		1.00	A	0.95	24	7	A1 (5)	95	wipeable / nox.don	
COLORTONE FINE FISSURED BLACK	51		0.60(H)	C	0.60	34		A2-s2, d0	95	whitely / don	
CORRIS DESIGN*	33	83	0.55(H)	D	0.55	36		A2-s1, d0	up to 95	whitely / don	
GRAPHS	51	92	0.15(L)	E	0.15	36		A2-s2, d0	70	whitely / don	
VISUAL	71		0.95	A	0.90			A2-s1, d0	70	whitely / don	

* Stone Decoable Deco/Inglaz/Syn/nymes/Contrast

Specific Solutions

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
BIOGUARD ACOUSTIC	45	85	0.60(H)	C	0.60	36	18	A2-s1, d0	95	weatherable / scrubtable	ISO 5
BIOGUARD PLANI	52	87	0.15(L)	E	0.15	37	19	A2-s1, d0	95	weatherable / scrubtable	ISO 5
ORCAL BIOGUARD Extra Microperforated with fleece & PREMIUM B15	up to 30	70	0.65	C	0.60	40	18	A2-s2, d0	95	weatherable	ISO 5
ORCAL BIOGUARD PLANI	up to 30	85	0.10(L)		0.10	44	19	A2-s2, d0	95	high pressure cleaning (3)	ISO 3 (4)
PARAFON HYGEN	20	82	0.95	A	0.95			A2-s1, d0	95	high pressure cleaning / water cleaning	ISO 5
MILAR		78	0.10(L)		0.10	36		A2-s1, d0	95	weatherable	ISO 1
CERAMAGUARD	38	79	0.55(MH)	D	0.60	39		A1	100	scrubtable	
NEVITONE		84	0.10(L)		0.10	37		A2-s1, d0	100	weatherable	✓

Design / Discontinuous Solutions

Product	ISO 14021	Light reflectance (%)	Sound absorption class	NIC up to	Draught / Drive (dB) up to	Fire reactant (dB)	Humidity resistance	Chemicality	Air quality	Scratch resistance	Compatible
OPTIMA CANDOPY	82	87						B-s1, d0	90	whitely / don	
ULTIMA CANDOPY	44	87						A2-s1, d0	70	whitely / don	
ORCAL CANDOPY	30	80						B-s2,d0	90	whitely / don	
AXOMA C CANDOPY	25	up to 90							whitely / don		
AXOMA KE CANDOPY	25	up to 90							whitely / don		
IMPUSIONS CANDOPY									whitely / don		

see detailed data on product pages

Our tests have been conducted in an independent third party quality assured laboratory in accordance with current standard (EN ISO...), Armstrong conducts extensive and regular tests on its products. Inevitably slight variations occur over a range of results for the same product. The results above do not necessarily represent the highest achieved but indicate values that can be consistently and confidently offered.

- (1) NEVADA White
- (2) Typical values for product with fleece acoustic inlay. For other acoustic solutions, see metal technical ranges.
- (3) Only for the Clip-In systems with silicone sealed joints.
- (4) All Orcal Plan products achieve ISO 3.
- (5) Expect Cement & Metal

Latest information available on www.armstrong-ceiling.co.uk
www.armstrong-ceilings.ie

THIS BROCHURE IS DIVIDED INTO THREE SECTIONS:


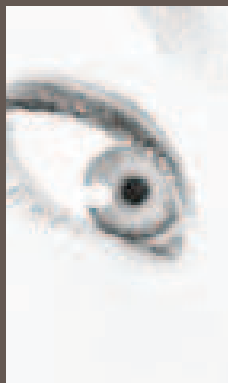
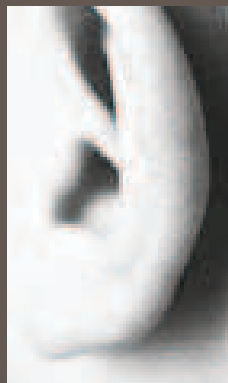
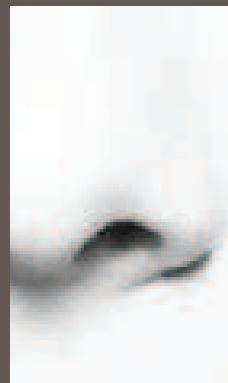
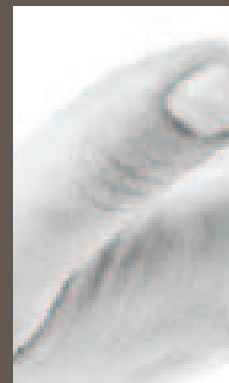
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The latest brochure is available to download from our website.

www.armstrong-ceilings.co.uk
www.armstrong-ceilings.ie

1 > Ceiling information

ENVIRONMENT	PROJECT GALLERY	ACOUSTICAL COMFORT	SAFE & HEALTHY	INSTALLATION & MAINTENANCE
				
6 Armstrong Policy & Initiatives	2 Project Gallery	10 From Performance to Acoustical Comfort	20 Health and Cleanliness	24 Technical Glossary
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PROJECT GALLERY

RETAIL - Concordia Hotel (IT), AXIOM C Canopy



TRANSPORT - Dubai Airport (UAE), METAL Ceilings



RETAIL - Wellness Park Laško (SL), MADERA Ceilings



HEALTHCARE - Refaja Ziekenhuis Hospital (NL),
ULTIMA Large module



OFFICE - Kirrnaprs (FR), ULTIMA Canopy



EDUCATION - Luiss University (IT),
ULTIMA Canopy



EDUCATION - Brede School Mikado-Aalsmeer (NL), OPTIMA



PROJECT GALLERY

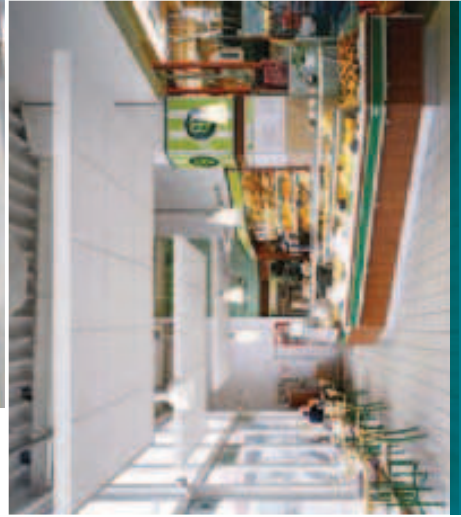
TRANSPORT - Nice Airport (FR), ORCAL Canopy



EDUCATION - Newfield BSF (UK),
Metal CLIP-IN



HEALTHCARE - Bos & Lommer Drugstore (NL), BIOGUARD ACOUSTIC



RETAIL - Bakery (D), AXIOM C Canopy



TRANSPORT - Gatwick Airport (UK), AXAL Vector



OFFICE - Online (PT), OPTIMA Canopy



OFFICE - Fortis Bank (NL), LAY-IN MicroLook



Discover our "Book Of Ideas"
and "Project Gallery"

ARMSTRONG POLICY & INITIATIVES

[DID YOU KNOW...]

Armstrong helped pioneer "green" practices from as early as 1860. Our commitment to environmentally preferable products and programmes began more than a hundred years ago when the company developed a process to recycle cork scrap. The end result was a product which was introduced then and is known today, as linoleum.



CONCEPTION

Armstrong continually seeks to make use of research and production technology to provide protection for the environment both in the workplace and the wider community, reducing risk to our surroundings and natural elements.

NEW PRODUCTS

Armstrong keep reinvesting in ongoing product innovation to reduce our environmental footprint.

ENERGY MANAGEMENT

Since 1998, Armstrong has been engaged in efforts such as our 'gas reduction project' to focus on the control of energy use during product manufacture. These programmes have, and continue to reduce energy use.

AIR QUALITY MANAGEMENT

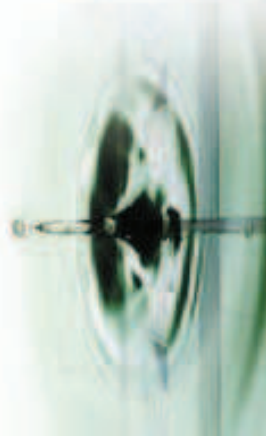
Armstrong is continually engaged in research and development efforts to minimise the impact on air quality of our products. In accordance with EN 13964, as part of the process for achieving the CE mark, all Armstrong ceiling products attained the lowest classification E1.

SAFETY PROGRAMMES

For Armstrong, safety is an ongoing key priority for our businesses, and as a result, we have made several step changes in our processes, procedures and measures to attain a world class safety performance.

LOGISTICS

As one of the worlds leading manufacturer's of suspended ceilings, Armstrong has multiple manufacturing facilities, reducing transportation, emissions and our environmental impact. Over the many years that Armstrong has led the industry, we have developed, in conjunction with our customers, packaging that utilises minimum material, but ensures durability of the product during transport and installation.



RECYCLING PROGRAMMES

In 1999, Armstrong Ceilings in the United States introduced the industry's first ceiling recycling programme. To date, worldwide, we have recycled over 8 million m² of old ceiling material. That's more than 40,000 tonnes of construction waste that's been diverted from landfills.

■ End-of-Life recycling programme: we offers a free collection programme for refurbishment / strip out projects of 2000m²+, of used tiles whenever it is environmentally and economically viable to do so. The ceiling tiles are 100% recycled into the mix and are processed into new ceiling tiles.

■ Off-Cut recycling programme: in UK and France, we offer an Off-Cut recycling programme that diverts waste during the installation process from going to landfill.

SUSTAINABLE SOLUTIONS

[DID YOU KNOW...]

Armstrong Ceilings can contain up to 82% recycled content. We have the broadest portfolio of ceilings with high recycled content. Armstrong suspension systems contain 25% recycled content – the highest percentage of post consumer content in the industry.

RAW MATERIAL

Raw materials for our ceilings are renewable and abundant in nature - **Biosoluble mineral wool** (the wools used in our products meet the classification "exempt" as defined by EC directive 97/69/EC 1997), perlite, natural starch, recycled paper, recycled tiles and clay. None of our ceiling products contain asbestos.

RECYCLED CONTENT

A significant proportion of our ceiling tiles are produced using recycled raw materials, including slag mineral wool, other recycled mineral wools, recycled paper and recycled ceiling tiles. These recycled contents are indicated on all Armstrong's published literature in accordance with EN ISO 14021 : 2001 .



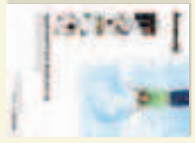
RECYCLED CONTENT CALCULATED ACCORDING TO ISO 14021

Product Range	Mineral	Product Range
BIOGUARD Acoustic	45%	PERLA dB
BIOGUARD Plain	52%	PERLA OP
CERAMAGUARD	38%	PLAIN
CIRRLUS	33%	DUNE MAX
CIRRLUS MAX / 75	65%	DUNE Vector
CIRRLUS Design	33%	DUNE dB
COLORSTONE DUNE	48%	DUNE SUPREME
FINE FISSURED + FF Black	51%	SIERRA OP
GRAPHIS	51%	ULTIMA
NEVADA	20%	ULTIMA dB
OPTIMA	82%	ULTIMA OP
PARAFON Hygien	20%	ULTIMA Vector
PERLA	45%	VSJAL
		Grid
		Metal
		30%

*Recycled Content Definition (from EN ISO 14021:2001): Proportion, by mass, of recycled material in a product or packaging. This is consistent with WRAP-rules of thumb- guidelines. Only pre-consumer and post-consumer materials shall be considered as recycled content, consistent with the following usage of the terms. Material diverted from the waste stream during a manufacturing process. Excluded is reutilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. Material generated by households or by commercial, industrial and institutional facilities in their role as end users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

PRODUCTS

- **Mineral ceilings**
 - High recycled content (up to 82%)
 - High light reflectance and acoustical performance
 - 15 year guarantee
 - Multiple manufacturing locations for reduced transportation costs & emissions.
- **Metal ceilings**
 - High recycled content (up to 30%)
 - Well established 3rd party recycling waste stream
 - 15 year guarantee
 - High light reflectance and acoustical performance
 - Cleanable and durable
 - Multiple manufacturing locations for reduced transportation costs & emissions
 - Design flexibility for waste minimisation and performance optimisation.
- **Suspension Systems**
 - All Armstrong suspension systems contain 25% recycled content.
 - Rotary stitched for additional strength and stability
 - Recyclable
 - Patented Peakform for extra strength & stability
 - Multiple manufacturing locations for reduced transportation costs & emissions



Discover our Environmental brochure

[DID YOU KNOW...]

A ceiling with a high light reflectance, up to 90%, can extend the daylight into a space which can help to reduce the lighting energy required. You can enhance the indoor environment by improving the acoustics of the space.

VISUAL COMFORT

The 'light reflectance' of a surface is its ability to reflect light. Daylight and electrical lighting represent the two primary sources of lighting available in the workplace.

The light reflectance of the ceiling, floor and wall surfaces play the second most important role for overall illumination of the room, thus also directly affecting working comfort and productivity.

- High light reflectance ceilings also enhance indirect lighting by improving overall lighting uniformity, returning up to 90% of the light back into the space, compared to 75% with standard ceilings.
- A light reflectance of 90% and more allows 20% of cost savings with indirect lighting, and can yield total building energy savings up to 11%.
- Canopies installed in the work place can improve the light reflection over a working space and provide better comfort for the end user.

ACOUSTICAL COMFORT

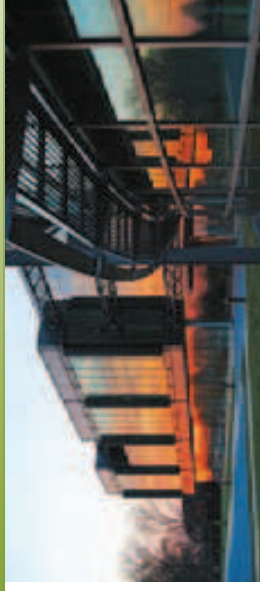
In all types of spaces, choosing the right acoustical solutions will enhance the end user' needs and overall comfort. With acoustics, you need to determine whether you need to determine whether intelligibility, concentration or confidentiality is required? Armstrong can help you find the right acoustic solution for your space.

You can choose from a wide portfolio of products such as Armstrong canopies, standard suspended ceilings and i-ceilings sound masking products.

Armstrong acoustical ceilings reduce noise levels in interior spaces, allowing for an optimum balance of high performance sound absorption and room to room sound attenuation to maximise / minimise speech intelligibility as appropriate.

THERMAL MASS

To control the thermal environment in an office, we can use the thermal mass of the concrete to control the temperature in the room instead of relying on air-conditioning and heating. Without the need to power these, the amount of electricity being used is reduced significantly, lowering the building's energy requirements. To enable the thermal slab to work efficiently, it is important to maximise the open area. Solutions like canopies make it possible, still improving acoustical and visual comfort.



Armstrong Headquarters, US
LEED-EB Platinum building

MANUFACTURING ACCREDITATIONS

Armstrong's corporate policy includes an ongoing commitment to improving its environmental responsibilities by starting with a comprehensive safety policy and continuing through into the environment. Not only are we continuing to make our products environmentally friendly but we are also using effective recycling methods to prevent pollution and reduce waste.

Our certifications:

- ISO 14001: 2004**
- ISO 9001: 2008**
- OHSAS 18001: 2007**

PRODUCT CERTIFICATION, ACCREDITATION - BRE (UK)

As the world's foremost producer of suspended ceiling systems, we know how important it is to be transparent in regard to the impact our operations have on the environment. Claims are easy to make but difficult to substantiate without an independent, universal measuring system.

BRE initiated a scheme compliant with ISO 14041 which provides Environmental Profiling, allowing end users and manufacturers to assess the environmental performance of selected products. Starting in 2004 we commissioned BRE to profile our UK ceiling and grid manufacturing facilities and products. BRE assess this impact using an 'Ecopoint' score based on a product's raw materials and manufacturing processes. These are then measured against key criteria, including climate change, mineral extraction, ozone depletion and waste generation. Our rating was 0.16 Ecopoints giving a

lower environmental impact compared with BRE's generic norm of 0.22 (based upon 1m² of 600 x 600 ceiling panel and Trulok grid). At that time the "Green Guide to Specification" included suspended ceilings and this resulted in an 'A' rating - the best available.

BRE's system of profiling has since progressed to reflect the needs of developing European and international standards. It now complies with ISO 21930, the forthcoming standard for analysing the impacts of construction products. Therefore, during 2007 we updated our Environmental Profile using BRE's new methodology and are delighted that our Ecopoints rating of 0.16 has reduced to 0.10 Ecopoints.

PRODUCT CERTIFICATION, ACCREDITATION - FDES (FR)

Until a standardised method for profiling products is agreed within the European Union, there will be many approaches to better understand the environmental impact of products. An approach used in France, that is currently expected to mirror a European approach is through the development of FDES (Fiche Déclaration Environnementale et Sanitaire). The information generated through this procedure is utilised in the HQE (Haute Qualité Environnementale) project accreditation approach. Armstrong has developed product profiles for Mineral & Metal tile facilities in line with the FDES methodology.

OTHER CERTIFICATIONS

- **IBU:** WETEC (which Armstrong is a member of) is a certified partner for sustainable building and member of www.bau-umwelt.com
 - **IBU Institut:** Bauen und Umwelte. V. (German Institute Construction and Environment e. V.). An EPD Environmental Product Declaration for WETEC products is on its way.
 - **LEED:** US Green Building Council is an organisation with the goal of making sustainable buildings universally available within a generation. The USGBC's Leadership in Energy and Environmental Design (LEED) building certification system provides a framework by which the environmental footprint of all aspects of building design, construction and operation can be measurably improved.
- Today, **Armstrong is proud to have joined the UK Green Building Council.** Armstrong is a founding member of the United States and the Indian Green Building Councils and is also a member in Canada, China and Australia.
- Armstrong's corporate headquarters building in Lancaster, PA, was certified in 2007 as LEED-EB (Existing Building) Platinum, the highest and most difficult rating to achieve.

15 YEAR GUARANTEE

Most of our products are cleanable and our hygiene tiles have an antifungicide treatment. The durability of our products means less damage and fewer replacements required, resulting in a lower impact on the environment. All our 95% and 99% RH products are guaranteed for 15 years.

Discover our Book of "Green" ideas on our website : www.armstrong-ceiling.co.uk/boi www.armstrong-ceiling.ie



ACOUSTICAL COMFORT:

From performance to acoustical comfort

[DID YOU KNOW...]

Acoustical treatment is not always sound absorption.

The right acoustical environment is essential and the way to achieve this is to focus on:

- **Intelligibility** (I want to be understood),
- **Confidentiality** (I do not want to be overheard),
- **Concentration** (I do not want to be disturbed).

INTELLIGIBILITY, CONFIDENTIALITY AND CONCENTRATION

To meet acoustical regulations, it is generally sufficient to provide the performance measures in unoccupied spaces, without office equipment switched on. Acoustical regulations usually recommend values to be achieved for reverberation times (within a space) and sound insulation (between spaces or from outside the building).

This approach isn't satisfactory any more to **meet the expectations of occupants**, in particular with the development of open spaces in offices and the increasing hearing problems of students in the education sector.

On a day-to-day basis, any activity disturbs the initial acoustical balance, as for example group discussions, ringing phones, copier machines, music, open windows or road traffic noise. Occupants of an office, a classroom, a shop, a hospital or any other space, need a **comfortable and healthy environment to carry out their activity under the best conditions**.

The acoustic quality of a room in a building is governed by major design criteria which require close monitoring:

- **Intelligibility** (I want to be understood),
- **Confidentiality** (I do not want to be overheard),
- **Concentration** (I do not want to be disturbed).

WHAT INFLUENCES PERFORMANCE?

The acoustical properties of a mineral ceiling tile vary depending on the combination of porosity, thickness and density. The following table shows the impact on acoustical performance when increasing each of these parameters.

	Sound absorption	Sound attenuation and reduction
Density	↗	↗
Porosity	↗	↗
Thickness	↗	↗




Armstrong offers a wide range of densities and materials combining the necessary acoustical performances with an extensive range of visuals. The impact of acoustical control on occupants of spaces with passive ceilings can be summarised as follows:

	Sound absorption	Sound attenuation and reduction
Controls	Reflections within rooms	Transmission between rooms
Effect upon	Intelligibility	Confidentiality & Concentration
Benefits	Room occupants	Room neighbours



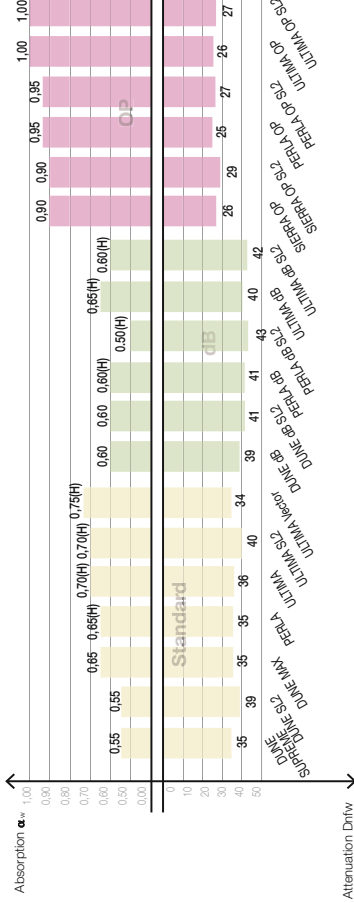
For a more detailed explanation, and to download the 'Armstrong Acoustic Guide' brochure, visit our dedicated website www.armstrong-ceiling.co.uk

EXAMPLES OF MOST APPROPRIATE ACOUSTICAL SOLUTIONS:

Situation	Product performance & attributes	best	Product recommendation better	good	Examples of room types
 Intelligibility I want to be understood	Mix of absorption & attenuation	ULTIMA	PERLA	DUNE SUPREME / DUNE MAX	- Meeting room - Classroom - Conference room
 Confidentiality I do not want to be overheard	Attenuation	PERLA dB	ULTIMA dB	DUNE dB	- Closed Office - Hospital bedroom
 Concentration I do not want to be disturbed	Absorption	OPTIMA, ULTIMA OP	PERLA OP	DUNE MAX	- Open spaces - Call centre - Library

A WIDE RANGE OF SOLUTIONS

Acoustical solutions to answer all performance requirements. Ceiling tile edge details have an important influence in helping to prevent noise transfer from one space to another.



ACTIVE OR PASSIVE ACOUSTICS?

For a balanced acoustic environment, Armstrong recommends a two step approach:

- 1 = Use passive acoustics**
 - to absorb sound within a space and block sound between spaces or coming from outside the building.
- 2 = Use active acoustics**
 - to cover remaining un-wanted noise
 - to raise the level of speech and overcome intelligibility issues
 - to play music
 - to provide intelligible public announcement.

ACOUSTICAL COMFORT:

The role of ceiling in passive acoustics

[DID YOU KNOW...]

Suspended ceiling systems play a key role in the control of the acoustical environment. Passive acoustics is concerned with the absorption and blocking of sound within and between spaces.



- **Sound attenuation** is the control of sound transmission between adjacent spaces with a common void above them.
- **Sound reduction** is the control of sound generated in the plenum or coming from the floor above.

SOUND ATTENUATION FOR BETTER CONFIDENTIALITY

Many areas, such as senior management offices and medical consulting rooms, require high levels of room-to-room insulation for optimal aural privacy. Armstrong's dB range of higher-density ceilings minimises noise transfer between rooms by as much as 43 dB, keeping conversations private and occupants happy.



- **Sound absorption** is the part of incident sound that is not reflected by the tile.

SOUND ABSORPTION FOR BETTER CONCENTRATION

Sometimes the goal is simply to reduce noise transfer as much as possible, for example in large open offices and call centres, where voices, telephones and office equipment can cause major distractions. Armstrong's OP range of lower-density ceilings controls excessive sound reflections, offering customers optimal levels of sound absorption.



- Balance of **sound attenuation** and **absorption**.

SOUND ATTENUATION & ABSORPTION FOR BETTER INTELLIGIBILITY

Controlling sound absorption and sound reduction is vital for improving speech clarity. Armstrong's standard range of medium-density ceilings strikes an outstanding balance between both, blocking unwanted noise from outside while enhancing sound quality inside. These ceilings are ideal for classrooms and conference rooms.

CASE STUDY: CONFIDENTIALITY

How to ensure noises from adjacent spaces are not heard in the corridor ?

- De Koning Office (NL)



- Solution: ULTIMA dB Planks

How to create a quiet space despite noisy services in the plenum?

- International Book Club (E)



- Solution: METAL Premium B15

CASE STUDY: CONCENTRATION

How to provide concentration, visual comfort and easy access to the plenum in an open space?

- Recicliador Office Building (E)



- Solution: ULTIMA Vector

How to improve the acoustic, visual and ergonomic comfort of an open plan television studio?

- I Online Office (PT)



- Solution: OPTIMA Canopy

CASE STUDY: INTELLIGIBILITY

How to provide the best acoustic design solutions to a class room?

- School (D)



- Solution : ULTIMA Board

How to provide optimal intelligibility to all participants in a meeting room?

- Armstrong Building Product Office (FR)



- Solution: ORCAL Canopy

ACOUSTICAL COMFORT:

The role of ceiling in active acoustics

[DID YOU KNOW...]

Armstrong's i-ceilings provide the active acoustics to complement the passive treatment whenever necessary.

DEFINITION

i-ceilings sound panels are a range of state-of-the-art flat panel loudspeakers designed to aesthetically match Armstrong ceiling tiles and lay directly into the ceiling grid. Sound panels deliver voice, music and active acoustics, an electroacoustical room treatment that enhances intelligibility, confidentiality and concentration levels in occupied spaces.



STANDARD EDGE DETAILS

Sound panel edge detail	Board	Regular	MicroLook
<p>Board visual for a ceiling where ceiling tiles and grids are at the same level</p>	Board 24 mm	<p>Regular visual for a ceiling with depth on a wide grid</p>	<p>MicroLook visual for a ceiling with depth on a narrow grid</p>
Sound panel edge detail (1)	24 mm	24 mm	15 mm

(1) Available in VECTOR, AXAL & CLIP-IN (microperforation and standard perforation)

APPLICATIONS

	Speech reinforcement	Sound masking	Public announcement	Music
Office		✓	✓	
Open space, call centre		✓		
Individual office		✓		
Conference room	✓	✓	✓	✓
Class room	✓		✓	
Library		✓	✓	
Waiting area		✓	✓	
Patient room		✓		✓
Shop / Showroom			✓	✓
Retail			✓	✓
Restaurant			✓	✓
Lounge			✓	✓
Transport			✓	✓
Waiting room			✓	✓

ACOUSTICAL COMFORT:

Solutions for "RETROFIT"

[DID YOU KNOW...]

An acoustical retrofit consists of fine tuning the acoustical performance of an existing space to meet the end users' desired levels of intelligibility, concentration and confidentiality. When relocating a business to new premises or reconfiguring an existing office plan to suit new organisational requirements, acoustics must be taken into account as early as possible in the design process. Integrating acoustics and space planning will allow you to achieve a good balance between space optimisation and occupants' comfort levels for more productive working environments. The acoustical performance of a space is set by its size, the room surface materials, furniture and background noise. An acoustical

retrofit will therefore consider:

- changing existing surface materials;
- complementing the existing room configuration with discontinuous ceiling solutions (Canopy range);
- complementing the passive acoustics with an active acoustics solution (i-ceilings)

Office space planning is a balance between optimising the area available and producing a comfortable and productive working environment. Armstrong recommends that acoustical fine tuning be considered as early as possible in the design scheme.

Armstrong retrofit solutions by Armstrong offer unique benefits:

- **Aesthetics:** create a striking design and more intimate spaces.

- **Flexibility:** solutions can be easily displaced to suit future reconfigurations.

- **Functionality:** act as light reflectors to minimise energy consumption.

- **Ease of installation:** special direct ceiling attachment (plasterboard and grid) with OPTIMA Canopy.

CANOPY : ARMSTRONG & SOLUTION

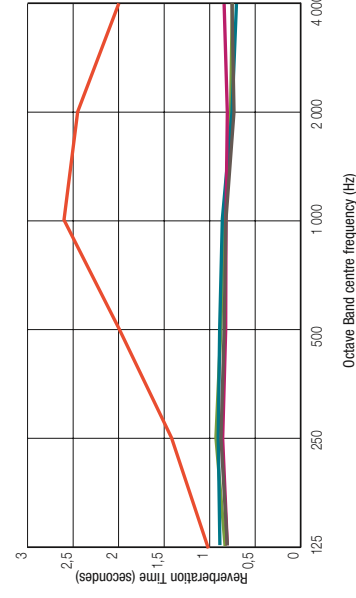
Plasterboard ceilings or exposed concrete soffits can create a very reverberant space which, in combination with today's office interior design trends with extensive use of glass partitions, impacts negatively on concentration levels. Existing suspended ceilings do not always meet the stringent acoustical requirements set by such applications as call centres. Treating sound directly above workstations, whilst also contributing to lowering the overall reverberation time, is then key to enhancing levels of concentration and confidentiality.

Under challenging architectural and acoustical configurations, retrofitting an existing ceiling with lightweight and design acoustical absorbers

or "canopies", can trigger a 180 degree shift in the perceived quality of the space, higher comfort levels and an increase in occupant productivity.

Canopy solutions may further be complemented by wall treatments and active acoustics by Armstrong.

Example of acoustical treatment in an empty space:



Acoustical performance objective: Speech intelligibility with a RT<0.8s

Room volume	250 m ³
Ceiling height	2.6 m
Area	96.2 m ²
Length	12.0 m
Width	8.0 m

- Empty room
- 13 ULTIMA Canopy
- 20 OPTIMA Canopy
- 14 ORCAL Canopy
- 5 AXIOM Canopy (with ULTIMA OP)

WEIGHTED SOUND ABSORPTION COEFFICIENT, α_w

A single-number rating for random incidence sound absorption coefficients calculated by reference to EN ISO 11654. With this method measured values obtained in accordance with EN ISO 354, are converted into octave bands at 250, 500, 1000, 2000 and 4000Hz and are plotted onto a graph. A standard reference curve is then shifted towards the measured values in steps of 0.05 until a 'best fit' is obtained. The derived value of α_w will vary between 0.00 and 1.00 but is only expressed in multiples of 0.05, eg $\alpha_w = 0.65$.

SHAPE INDICATOR

With reference to EN ISO 11654, the calculated value of α_w may be qualified by one or more letters (in brackets) to indicate if the product has excess sound absorption at low (L), medium (M) or high (H) frequencies.

SOUND ABSORPTION CLASS

With reference to EN ISO 11654, the calculated value of α_w may additionally be allocated into one of six descriptive classes in accordance with the following table:

Sound absorption Class	α_w
A	0.90; 0.95; 1.00
B	0.80; 0.85
C	0.60; 0.65; 0.70; 0.75
D	0.30; 0.35; 0.40; 0.45; 0.50; 0.55
E	0.15; 0.20; 0.25
Not Classified	0.00; 0.05; 0.10

WEIGHTED SUSPENDED CEILING NORMALISED LEVEL DIFFERENCE Dncw

A single-number rating of the laboratory measurement of room-to-room (horizontal) airborne sound insulation of a suspended ceiling above adjacent rooms sharing a common ceiling plenum. It is determined in accordance with EN ISO 717-1 from measurements made in accordance with EN 20140-9.
Note: EN 20149-9 has now been withdrawn and superseded by EN ISO 10848-2. (see Dntw), although Dncw test results still continue to be valid.

WEIGHTED SUSPENDED CEILING NORMALISED FLANKING LEVEL DIFFERENCE, Dntw

A single-number rating of the laboratory measurement of room-to-room (horizontal) airborne flanking sound transmission of a suspended ceiling above adjacent rooms sharing a common ceiling plenum. It is determined in accordance with EN ISO 717-1 from measurements made in accordance with EN ISO 10848-2. This has now superseded EN 20149-9. (see Dncw).

WEIGHTED SOUND REDUCTION INDEX, R_w

A single-number rating of the laboratory measurement of (vertical) airborne sound reduction of a suspended ceiling. It is determined by reference to EN ISO 717-1 from measurements of sound reduction index made in accordance with EN ISO 140-3.

RAIN NOISE SOUND INTENSITY LEVEL, LI

The laboratory measurement of the sound intensity in a room below a roof construction when subjected to rainfall. It is determined by reference to EN ISO 140-18:2006 – Laboratory measurement of sound generated by rainfall on building elements. The roof's performance can be tested with or without a suspended ceiling beneath. The intensity of the rainfall tested can be selected from the options given in the standard. A combined A-weighted single-number (LJA) can also be determined.

SOUND ATTENUATION

A term used in relation to the horizontal transmission of sound through a suspended ceiling above adjacent rooms sharing a common ceiling plenum.

SOUND REDUCTION

A term used in relation to the vertical transmission of sound through a suspended ceiling.

NOISE REDUCTION COEFFICIENT, NRC

A single-number descriptor of random incidence sound absorption coefficients. Defined in ASTM C423 as the arithmetical average, to the nearest multiple of 0.05, of the measured sound absorption coefficients for the four one-third octave band centre frequencies of 250, 500, 1,000 and 2,000 Hz.

SABINE

A Sabine is a measure of the total sound absorption provided by discrete (canopies, screens, furniture, etc) objects when installed in an architectural space. Because these type of absorbers have more than one surface and may be irregular in form, it is not meaningful to assign sound absorption coefficients to them. Hence Sabines per unit is preferred to characterise the absorption provider by an individual 'space absorber'.

Sound reduction

Product Name	Cert #	Weighted value R _w	One-Third Octave Band Centre Frequency Hz																
			Minimal range																
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	
NEMADA 15	5915	7	8.5	6.2	5.3	4.5	5.0	3.5	4.3	6.1	6.3	6.5	6.9	6.7	7.4	8.4	8.7	9.5	9.8
OPTIMA 15	5916	7	7.2	6.1	6.3	5.1	4.2	3.1	4.8	5.9	6.0	6.3	6.8	6.7	7.2	8.0	8.5	8.9	9.6
PERLA OP	5919	10	10.2	7.2	7.4	5.7	5.9	6.2	6.8	7.9	8.0	9.0	10.0	9.6	10.8	12.3	13.5	14.3	15.2
ULTIMA OP	5921	10	10.5	7.7	7.3	6.4	5.6	5.8	6.5	7.8	8.7	9.7	10.0	11.1	12.2	13.8	14.2	15.6	15.5
SERRA OP	5920	11	11.3	7.8	7.5	6.6	6.4	6.9	7.1	8.8	9.2	9.5	10.3	11.3	12.4	13.6	14.8	15.9	17.3
DUNE SUPREME	5923	17	12.1	9.0	7.4	7.9	8.4	9.6	9.9	12.5	14.8	17.1	18.5	19.9	21.3	23.0	23.4	23.6	24.5
PERLA SUPREME	5922	17	12.2	8.6	8.4	8.3	7.9	10.4	10.4	12.8	14.8	17.0	18.3	19.6	20.8	22.2	22.8	22.7	23.1
BOGARD ACOUSTIC	5927	18	11.4	9.3	8.8	8.9	9.7	10.6	11.2	13.5	15.9	17.5	19.1	20.5	21.9	23.2	23.5	24.2	24.2
ULTIMA	5926	18	11.6	9.8	9.1	9.3	9.2	11.0	11.4	13.4	16.5	17.7	18.6	19.8	21.0	22.3	22.5	23.1	21.1
BOGARD PLAIN	5925	19	12.3	9.3	8.0	8.5	9.7	11.5	11.0	13.9	16.1	17.9	19.2	20.4	21.7	23.1	23.6	23.6	22.4
DUNE 4B	5941	20	13.3	9.1	9.2	9.4	11.4	12.5	12.9	15.7	17.5	19.6	20.5	21.1	22.4	24.3	25.9	27.5	28.9
ULTIMA 4B	5935	21	13.6	10.4	11.1	11.4	11.6	13.3	13.9	16.1	18.2	20.3	21.8	22.2	23.5	26.0	27.4	26.1	25.7
PERLA 4B	5932	21	14.8	11.1	11.0	11.5	11.8	13.4	13.7	16.5	18.3	20.0	21.5	22.4	23.5	25.6	26.9	28.5	29.9

Product Name	Cert #	Weighted value R _w	Metal range																
			Metal range																
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	
Microperforation without fleece	5938	5	7.3	5.0	4.5	3.8	3.6	3.3	3.8	4.1	4.5	5.2	4.8	4.8	4.5	5.0	4.8	4.6	3.8
Standard perforation without fleece*	5939	6	9.0	6.9	5.6	5.2	5.3	4.0	4.6	5.9	6.1	6.4	6.3	6.0	5.8	6.4	6.7	7.0	6.7
Standard perforation with fleece*	5939	6	9.0	6.9	5.6	5.2	5.3	4.0	4.6	5.9	6.1	6.4	6.3	6.0	5.8	6.4	6.7	7.0	6.7
Microperforation with B15	5941	18	11.7	9.1	7.9	8.5	10.1	11.8	11.7	13.8	16.3	18.0	18.5	19.6	20.7	21.9	22.5	23.2	24.3
Standard perforation with B15*	5941	18	11.7	9.1	7.9	8.5	10.1	11.8	11.7	13.8	16.3	18.0	18.5	19.6	20.7	21.9	22.5	23.2	24.3
PLAIN (no infill)	5936	19	12.4	9.5	8.9	9.3	10.5	12.7	11.9	14.1	16.6	18.4	19.3	20.8	22.2	23.8	24.9	25.4	20.8
PLAIN with B15	5937	21	13.5	10.6	10.1	10.1	11.2	13.1	13.6	16.5	19.0	21.0	22.2	22.9	23.5	25.6	26.4	26.6	24.4

* Estimated
 1) A1 SRI tests have been conducted in an independent third party quality assured laboratory in accordance with EN ISO 140-3 with the ceiling suspended horizontally between two vertical transmission suites. Mineral tiles were 600x600 (Board square) edge in a Preclude T24 grid.
 2) Rw values are determined in accordance with EN ISO 717-1.
 3) Values for Standard Perf (16% open area) are estimated as being not less than Micro Perf (22% open area).
 4) Armstrong conducts extensive and regular acoustic tests on its ceiling tiles and planks. Inevitably slight variations occur over a range of results for the same product. The results above do not necessarily represent the highest achieved but indicate values that can be consistently and confidently offered.

Rain Noise - The acoustic performance of Armstrong ceilings with a lightweight roof construction

EN ISO 140-18:2006 is a test method for determining the sound intensity level of a radiating surface due to rainfall. Armstrong tested a lightweight roof construction, with 'heavy' intensity rain as defined in the standard, and then re-tested with a suspended ceiling below. Different ceiling tiles were tested and the results are shown in the table below. The performance values given below show the intensity of sound radiating into the room below the roof (and ceiling) constructions. Therefore, unlike Dntw and Rw data, where the higher the value the better insulation provided, the best performing ceiling tiles are those which have the lowest intensity levels, as less sound energy has penetrated into the room below. The results shown give the combined performance of the roof and ceiling constructions. Any change in the roof construction performance will affect the combined roof and ceiling performance. We have therefore shown the improvement in dB that each of the ceiling tiles provided compared to the roof construction on it's own.

Product Name	Cert #	Weighted value L _n	Improve -min/L _n	One-Third Octave Band Centre Frequency Hz															
				One-Third Octave Band Centre Frequency Hz															
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	
Roof Construction + PERLA 4B	C21102 / R01 - 2	41.8	11.8	42.7	42.2	43.6	41.2	39.5	37.2	36.9	35.6	34.7	33.6	29.5	27.4	24.9	20.8	20.1	18.8
Roof Construction + PERLA Plain with B15 infill	R01 - 4	42.4	11.2	43.7	41.9	43.0	40.7	39.4	37.6	38.0	36.4	35.4	33.9	30.2	27.6	26.0	23.8	24.3	23.3
Roof Construction + PERLA BRX	C21102 / R01 - 3	42.8	10.8	43.4	44.0	45.4	42.5	39.8	38.4	38.2	36.7	35.4	34.4	30.6	27.6	25.2	21.3	21.3	19.9
Roof Construction + PERLA OP	C21102 / R01 - 5	42.9	10.7	43.5	43.7	44.8	41.7	40.5	38.2	36.3	35.7	34.4	30.5	27.7	26.0	22.6	23.3	23.7	22.4
Roof Construction + METAL Microperforated with B15 infill	C21103 / R01 - 5	43.3	10.3	44.3	43.8	44.8	42.4	40.2	39.1	38.7	36.5	36.1	35.6	31.6	28.6	26.8	23.3	23.4	22.7
Roof Construction + PERLA OP	C21102 / R01 - 10	47.7	5.9	45.0	46.8	47.5	44.3	43.0	42.6	42.9	42.5	41.4	40.8	38.5	33.7	31.3	27.1	26.8	26.2
Roof Construction only	C21102 / R01 - 1	53.6	n/a	52.0	51.8	53.3	49.8	46.9	46.1	46.3	47.1	47.4	46.8	43.2	40.9	39.9	36.4	36.6	35.5

1) All tests have been conducted in an independent third party quality assured laboratory in accordance with EN ISO 140-18:2006.
 2) The one-third octave band intensity values given are unweighted measurements in dB.
 3) The roof construction used is a 10mm deep pointed steel profile with 20mm insulation and an aluminium standing seam valance roof membrane.
 4) The test depth below the ceiling is 1.0m. The test distance between the ceiling and the receiver is 1.0m. The test frequency is 1000Hz.
 5) Armstrong conducts extensive and regular acoustic tests on its ceiling tiles and planks. Inevitably slight variations occur over a range of results for the same product. The results above do not necessarily represent the highest achieved but indicate values that can be consistently and confidently offered.

ACOUSTICAL PERFORMANCE

Sound absorption

Product Name	Cert #	α _w	Absorption Class	NRC	Octave Band Centres Frequency / Hz						
					Mineral range - α _w						
					125	250	500	1000	2000	4000	
NYLAR	3352	0.10(L)	-	0.10	0.25	0.15	0.10	0.10	0.10	0.15	
NEUTRON Resilience	3349	0.10(L)	-	0.10	0.25	0.15	0.10	0.10	0.10	0.15	
DUNE SUPREME (Unfractured)	4058	0.15(L)	E	0.20	0.40	0.30	0.15	0.15	0.15	0.25	
BOGARD PLAIN	2945a	0.15(L)	E	0.15	0.30	0.20	0.10	0.10	0.20	0.25	
GRAHNS (all box patterns)	3233	0.15(L)	E	0.15	0.35	0.25	0.10	0.10	0.15	0.25	
PERLA OP Concealed Planks	3116	0.20(L)	E	0.20	0.35	0.20	0.10	0.15	0.15	0.25	
MADERA A2	5441	0.35(L)	D	0.45	0.40	0.60	0.55	0.40	0.30	0.20	
MADERA A10	5442	0.35(L)	D	0.45	0.40	0.60	0.55	0.40	0.30	0.25	
MADERA A12	5443	0.50(L)	D	0.60	0.45	0.70	0.70	0.55	0.45	0.40	
PERLA DB Planks	5968	0.50(H)	D	0.60	0.30	0.35	0.40	0.50	0.70	0.80	
GERMAGUARD	2821a	0.55(H)	D	0.60	0.25	0.30	0.50	0.80	0.85	0.75	
CERUS Decora, Dore & Slip	3262	0.55(H)	D	0.55	0.45	0.40	0.45	0.60	0.75	0.75	
CERUS Inlay	2923a	0.55(H)	D	0.55	0.35	0.40	0.45	0.60	0.75	0.85	
CERUS	3023	0.55(H)	D	0.55	0.40	0.40	0.45	0.55	0.60	0.70	
COLORTONE DUNE	3948	0.55	D	0.55	0.40	0.40	0.40	0.50	0.55	0.45	
CONTRAST Ceilings, Square & Linear	3255	0.55	D	0.50	0.35	0.40	0.45	0.55	0.60	0.65	
SYNONMES	4494a	0.60(H)	D	0.60	0.35	0.40	0.45	0.55	0.60	0.65	
BOGARD ACOUSTIC	4411	0.60(H)	C	0.60	0.40	0.40	0.55	0.75	0.75	0.75	
PERLA DB	5478a	0.60(H)	C	0.65	0.30	0.40	0.55	0.70	0.85	0.95	
DUNE SUPREME (Tiles & Planks 15mm)	4275	0.65	D	0.65	0.40	0.45	0.55	0.60	0.50	0.45	
DUNE Tiles & Planks	5008	0.65	D	0.65	0.35	0.40	0.45	0.55	0.65	0.65	
DUNE DB	5008	0.60(H)	C	0.65	0.30	0.35	0.40	0.55	0.65	0.65	
ULTIMA DB Concealed Planks	4169a	0.65(H)	C	0.70	0.35	0.40	0.60	0.80	0.95	1.00	
PERLA	4695	0.65(H)	C	0.70	0.40	0.40	0.60	0.80	0.95	1.00	
ULTIMA DB	5548a	0.65	C	0.60	0.40	0.40	0.60	0.80	0.95	1.00	
DUNE MAX	4478	0.65	C	0.60	0.40	0.40	0.60	0.80	0.95	1.00	
DUNE VECTOR	5763	0.65	C	0.65	0.50	0.55	0.55	0.70	0.60	0.60	
CERUS MAX / CERUS 75	3897	0.70(H)	C	0.75	0.40	0.40	0.70	0.90	1.00	1.00	
ULTIMA (Tiles & Mook Planks)	4697	0.70(H)	C	0.70	0.55	0.50	0.65	0.80	0.90	0.85	
ULTIMA Concealed Planks	4884a	0.70(H)	C	0.70	0.50	0.50	0.60	0.70	0.90	0.85	
ULTIMA VECTOR	5711	0.75(H)	C	0.70	0.50	0.55	0.70	0.85	0.95	0.95	
NEVADA 18 (Regular & Microlook)	3006	0.90	A	0.85	0.40	0.75	0.85	0.85	0.95	0.95	
OPTIMA 15	2912	0.90	A	0.85	0.50	0.75	1.00	0.80	0.90	1.00	
SERRA OP	5973	0.90	A	0.85	0.50	0.75	0.85	0.85	1.00	1.00	
OPTIMA 20	2913	0.95	A	0.95	0.40	0.80	1.00	0.85	1.00	1.00	
PARACONHYEN 18	2998	0.95	A	0.95	0.40	0.85	0.90	0.90	0.95	1.00	
PERLA OP (Tiles & Board Planks)	4763a	0.95	A	0.90	0.50	0.85	0.95	0.90	1.00	1.00	
PERLA OP Concealed Planks	5157	0.95	A	0.90	0.45	0.85	0.95	0.90	0.95	1.00	
VSUAL W9 + Placca + 25mm x 20kg/m ² glass fibre overlay	4300	0.95	A	0.90	0.35	0.80	0.95	0.90	1.00	1.00	
NEVADA 15	4527	1.00	A	0.95	0.40	0.90	1.00	0.90	1.00	1.00	
NEVADA 18 (Board)	3004	1.00	A	0.95	0.40	0.85	1.00	0.90	1.00	0.95	
OPTIMA 25	2914	1.00	A	1.00	0.50	0.80	1.00	0.95	1.00	1.00	
OPTIMA VECTOR 22	2923a	1.00	A	0.95	0.35	0.80	1.00	0.90	1.00	1.00	
OPTIMA OP	4763a	1.00	A	0.95	0.55	0.85	1.00	0.95	1.00	1.00	

Product Name	Cert #	α _w	Class	NRC	Metal range - α _w						
					Metal range - α _w						
					125	250	500	1000	2000	4000	
PLAIN (no inlay)	2208	0.10(L)	D	0.10	0.25	0.15	0.10	0.10	0.10	0.10	
Extra Microperforation with fleece	2533	0.55(L)	D	0.65	0.65	0.75	0.70	0.65	0.65	0.45	
Microperforation with B15	2537	0.60(H)	C	0.68	0.65	0.70	0.60	0.65	0.75	0.60	
Standard perforation with B15	2534	0.60(H)	C	0.60	0.40	0.45	0.50	0.65	0.75	0.60	
Extra Microperforation with B15	2534	0.68	C	0.60	0.40	0.45	0.50	0.65	0.75	0.60	
Standard perforation with B15	L2463	0.70(L)	C	0.70	0.40	0.75	0.65	0.65	0.75	0.75	
Microperforation with fleece	2175	0.75	C	0.60	0.30	0.75	0.60	0.65	0.75	0.60	

1) All tests have been conducted in an independent third party quality assured laboratory in accordance with EN ISO 354 and with the ceiling installed over a 200mm cavity.
 2) α_w & NRC values are determined in accordance with EN ISO 11654 & ASTM C423 respectively.
 3) Armstrong conducts extensive and regular acoustic tests on its ceiling tiles and planks. Inevitably slight variations occur over a range of results for the same product.
 The results above do not necessarily represent the highest achieved but indicate values that can be consistently and confidently offered.

Sound attenuation

One-Third Octave Band Centres Frequency / Hz

Product Name	Cert #	Weighted value	Mineral range																			
			100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000		
NEVADA Board 18	3038	24	Dnc	12.2	17.4	17.4	17.2	18.9	18.3	18.1	17.9	19.5	20.5	21.0	28.2	27.1	29.6	31.0	33.4	35.7	38.0	
PERLA OP (Tiles & Board Planks)	4763b	25	Dnc	15.3	20.9	20.7	20.1	20.7	18.9	19.0	19.1	21.4	22.4	23.6	28.0	28.0	32.6	34.0	37.1	39.6	42.3	
NEVADA Board 20	3033	25	Dnc	16.3	19.9	19.9	19.8	20.5	19.4	19.4	19.4	21.4	22.4	23.6	28.0	28.0	32.6	34.0	37.1	39.6	42.3	
NEVADA	4619	25	Dnc	16.4	17.5	20.3	19.9	19.5	19.8	19.7	20.7	21.7	22.7	23.7	28.1	31.2	32.6	35.0	37.6	40.1	42.6	
NEVADA Regular/Microlook 18	3034	27	Dnc	17.7	19.7	21.2	20.3	21.1	20.3	20.1	20.8	22.5	23.0	27.1	28.1	31.2	32.6	35.0	37.6	40.1	42.6	
PERLA OP Concealed Planks	5158b	27	Dnc	14.4	18.9	20.2	21.4	22.8	23.3	23.5	23.7	27.1	27.4	28.4	33.6	35.2	37.4	39.8	43.0	45.4	47.9	
SERRA OP Concealed Planks	5979	27	Dnc	14.8	18.5	21.9	22.7	22.8	23.3	23.5	23.7	27.1	27.4	28.4	33.6	35.2	37.4	39.8	43.0	45.4	47.9	
NEVADA Regular/Microlook 20	3031	28	Dnc	13.9	21.4	20.9	20.4	21.6	20.9	20.4	21.4	23.4	23.9	28.9	31.1	32.5	35.1	38.3	41.8	45.3	48.8	
NEVADA FISS/RED (no. Box)	3852	28	Dnc	13.9	21.4	20.9	20.4	21.6	20.9	20.4	21.4	23.4	23.9	28.9	31.1	32.5	35.1	38.3	41.8	45.3	48.8	
ULTIMA VECTOR	5715	34	Dnc	13.9	21.4	20.9	20.4	21.6	20.9	20.4	21.4	23.4	23.9	28.9	31.1	32.5	35.1	38.3	41.8	45.3	48.8	
DUNE SUPREME (Tiles & Planks)	4070	35	Dnc	13.2	22.0	23.1	24.2	24.2	26.1	26.3	28.3	32.3	32.2	37.3	38.6	40.7	45.1	44.8	45.3	45.2	44.4	42.3
DUNE SUPREME (Unfractured)	4070	35	Dnc	14.6	20.0	21.9	24.1	26.1	26.4	28.4	32.4	32.3	37.4	38.7	40.7	45.1	44.8	45.3	45.2	44.4	42.3	
COLORTONE DUNE	2888	35	Dnc	13.1	22.7	26.3	27.1	28.3	27.9	28.0	29.0	32.1	34.5	38.0	41.5	44.8	47.2	48.8	50.2	51.4	48.4	
DUNE VECTOR	5765	35	Dnc	11.4	19.8	23.2	27.8	29.0	28.1	27.4	31.4	34.5	36.5	40.0	41.9	44.4	45.4	46.1	47.3	46.6	46.2	
BOGARD ACOUSTIC	4955f	36	Dnc	17.3	21.1	23.3	26.5	27.8	28.5	27.6	29.0	32.5	35.2	37.3	38.6	41.0	41.9	42.4	41.8	41.2	42.4	
CERUS Decora, Dore & Slip	3277	36	Dnc	16.3	21.2	24.0	27.7	28.7	29.2	27.9	29.1	32.1	34.6	37.2	38.8	41.3	41.9	42.8	40.8	40.9	42.7	
CERUS Inlay	3278	36	Dnc	17.8	20.9	24.9	28.9	28.4	27.8	29.3	32.3	35.2	37.8	40.2	43.5	47.3	49.4	51.4	54.3	58.4	63.0	
CONTRAST Ceilings, Square & Linear	3279	36	Dnc	17.4	20.1	23.2	26.9	27.2	28.0	29.0	32.0	35.0	36.7	38.5	40.8	42.1	42.6	43.0	41.3	41.5	42.4	
GERMAGUARD (all box patterns)	3276	36	Dnc	15.4	20.5	25.1	28.8	29.9	30.3	29.8	30.9	34.0	35.8	37.6	38.4	39.8	39.9	40.1	39.2	38.0	40.4	
MILAR	3367	36	Dnc	13.6	24.4	26.4	28.2	29.9	28.7	29.3	31.3	34.4	36.1	37.3	38.3	40.2	40.1	39.5	37.4	35.8	36.7	
SYNONMES	4623f	36	Dnc	17.8	20.9	24.9	28.9	28.4	27.8	29.3	32.3	35.2	37.8	40.2	43.5	47.3	49.4	51.4	54.3	58.4	63.0	
ULTIMA (Tiles & Mook Planks)	5003f	36	Dnc	17.2	20.7	22.2	26.3	28.5	27.6	27.7	28.4	32.8	35.7	38.4	41.9	43.3	45.5	49.4	49.7	46.4	54.5	
BOGARD PLAIN	2955a	37	Dnc	13.3	23.2	25.8	28.2	29.4	29.4	28.4	30.6	34.2	37.9	39.1	41.2	42.8	44.0	44.2	42.6	46.3	43.9	
NEUTRON Resilience	3373	37	Dnc	17.3	26.4	27.9	28.7	31.0	29.5	29.2	32.2	35.0	36.4	37.0	40.3	41.9	42.6	42.8	42.4	42.5	41.5	
PLAIN	3133	37	Dnc	17.1	25.6	27.7	27.0	28.6	28.9	29.2	32.0	34.9	37.0	38.3	40.6	42.3	42.6	42.8	42.4	42.5	41.5	
CERUS MAX / CERUS 75	3604	38	Dnc	13.8	22.1	25.0	28.6	29.1	29.1	29.8	31.2	35.6	40.0	42.2	44.9	49.7	50.4	50.8	50.7	50.6	50.6	
GERMAGUARD	2954a	38	Dnc	16.1	24.6	27.2	29.5	30.4	29.9	30.4	32.5	36.8	43.2	44.8	48.9	48.6	48.1	48.3	44.0	46.1	46.1	
ULTIMA Concealed Planks	3418	39	Dnc	17.4	21.4	28.4	29.9	31.4	30.5	31.1	32.5	37.0	38.9	41.5	45.0	47.5	46.5	47.0	45.4	45.8	46.5	
DUNE DB	5639	39	Dnc	15.1	24.1	27.5	28.5	28.9	30.2	31.8	35.0	37.7	38.1	41.6	44.5	45.5	47.1	48.0	49.4	51.4	50.6	
ULTIMA Tiles - 25mm x 20kg/m ²	4176a	39	Dnc	15.0	24.9	28.7	29.2	29.6	30.4	29.2	3											

[DID YOU KNOW...]

IT'S ALL ABOUT AIR QUALITY CONTROL:

- The air penetrating the Clean Room can be filtered depending on the size of the undesired elements.
- Air can be recycled up to 60 times per hour for the total volume of the space.
- New air is also introduced to avoid a build up in the concentration of CO₂ and maintain enough oxygen for the people working there.
- Operators in a clean room have to wear equipment such as a clean room suit, hair cover, gloves, shoe-protection, or mask.
- There are 2 types of rooms:
 - rooms with over-pressure, to avoid pollutants from entering (dust, bacteria,...)
 - rooms with negative pressure, to avoid various contaminants from escaping to the outside (viruses, bacteria, spores,...).
- Building materials used in such spaces shall not have a negative impact on the pursuance of cleanliness and should preferably contribute actively to a better environment.

CLEAN ROOM

A clean room is a space or a series of spaces where the concentration of particles is controlled in order to minimise the introduction, generation, retention of particles inside, generally for a specific industrial or research objective, as well as in healthcare environments. Parameters such as temperature, humidity and relative pressure are also maintained at a precise level, as defined in ISO 14644-1.

- Clean rooms are classified ISO 1 (cleanest) to ISO 9 depending on the number of particles measured.
- The performance is tested to ISO 14644-1 which determines the particle cleanliness class. Although US Federal Standard 209E has been officially withdrawn, it is continuously used as a reference.

The following table shows the equivalence between the 2 standards.

ISO Class	Maximum Number of Particles in Air (particles in each cubic metre equal to or greater than the specified size)	Particle size	US Federal Standard 209E
		> 0.1µm > 0.2µm > 0.3µm > 0.5µm > 1µm > 5µm	
ISO Class 1	10	2	-
ISO Class 2	100	24	4
ISO Class 3	1,000	237	35
ISO Class 4	10,000	2,370	352
ISO Class 5	100,000	23,700	3,520
ISO Class 6	1,000,000	237,000	35,200
ISO Class 7	10,000,000	2,370,000	352,000
ISO Class 8	100,000,000	23,700,000	3,520,000
ISO Class 9	1,000,000,000	237,000,000	35,200,000

HEALTHCARE PREMISE

In Healthcare premises, it is of critical importance to avoid Hospital acquired infections.

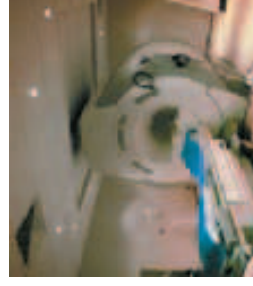
According to the level of risk, the necessary clean room performance will vary, generally between ISO 5 and ISO 8.

All products below:

- can be used in ISO 5 environments and are certified against ISO 14644-1;
- inhibit growth of bacteria, moulds and yeasts (tested against norms NF S 90-351 (France) and JIS Z2801);
- can be washed with diluted disinfectants.

Some examples of spaces and system solutions:

Type of space	Constraints	System solution	Level of performance
Operating Theatre	Fully air-tight Flush surface finish Anti-microbial	ORCAL BIOGUARD Plain CLIP-IN with appropriate silicone or mastic joint	ISO 3 High pressure water cleanable
MRI	Non-magnetic Anti-microbial	CLEAN ROOM grid with plastic hold-down clips & MYLAR CLEAN ROOM grid with plastic hold-down clips & BIOGUARD ACOUSTIC	ISO 4 Anti-static ISO 4 Bioguard treatment
Intensive Care Wake-up Room/Maternity Laboratory/ Pharmacy	Anti-microbial Good air-lightness Good acoustical environment.	CLEAN ROOM grid with plastic hold-down clips & BIOGUARD ACOUSTIC or ORCAL BIOGUARD EXTRA MICROPERFORATED Board with fleece and PREMIUM B15	ISO 4 Washable 0.65 α _w sound absorption



The BIOGUARD SOLUTION

BIOGUARD products have been especially designed for the Healthcare sector.



The BIOGUARD paint treatment has additional active components which reduce the colony size of virulent strains of bacteria, moulds and yeasts.



BIOGUARD products achieve ISO 5 to ISO 3 in accordance with ISO 14644-1.



BIOGUARD paint has enhanced resistance to disinfectants.

[DID YOU KNOW...]

System solutions for the Pharmaceutical, Food and Manufacturing Industry can be found in our brochure "Solutions for Clean Room Environments".

GRID AND TILES FOR CLEAN ROOM ENVIRONMENTS

Classification NF S 90-351	Particle cleanliness class	Material	Surface	MINERAL			METAL		
				CLEAN ROOM Grid	BIOGUARD Plain	BIOGUARD Acoustic		MYLAR	ORCAL BIOGUARD Extra Microperforated with fleece and Premium B15
Zone 1, 2 & 3	ISO 4	Aluminium	PVC	Zone 1, 2 & 3	ISO 5	Zone 1, 2 & 3	Zone 1, 2 & 3	Zone 1, 2 & 3	Zone 1, 2, 3 & 4
ISO 5	Aluminium	Mineral	Bioguard	ISO 5	Mineral	ISO 5	Steel with acoustic fleece and mineral infill	ISO 3	Steel
Zone 1, 2 & 3	ISO 4	Mineral	Paint Glass veil with Bioguard paint	Zone 1, 2 & 3	Mineral	Zone 1, 2 & 3	Extra Microperforated with Bioguard polyester powder paint	ISO 3	Unperforated with Bioguard polyester powder paint
Resistance to disinfectants			Quaternary Ammonium, Hydrogen Peroxide, Chlorine				Quaternary Ammonium, Hydrogen Peroxide, Chlorine		

* Not tested

REACTION TO FIRE

The harmonisation of technical standards within Europe, and the integration of EN13984 (Suspended ceilings – requirements and test methods) into national legislation, means that there is now one series of harmonised European test methods and classifications for the reaction to fire of suspended ceilings.

These new reaction to fire classifications, or 'Euroclasses', are made in accordance with EN13501-1:2007.

The 'Euroclasses' replace the old national fire reaction ratings for showing the performance of ceilings in order to meet the Construction Products Directive and national building regulation requirements for internal linings.

As reaction to fire is one of the essential safety requirements identified for suspended ceilings, the Euroclass classification is one of the mandatory elements on the CE mark for suspended ceiling tiles and grids.

The 'Euroclasses' rate from A1 through to F, as shown in the table opposite, with A1 being the best reaction to fire performance and F the worst.

Each member state then sets the performance level required for different areas and building types within their own building regulations.

Depending upon the reaction to fire tests) conducted, the rating may include an additional classification for smoke production and flaming droplets.

Smoke and flaming droplets are regulated in some European countries. Smoke production is rated from s1 (the least smoke produced) to s3 (no limit to amount of smoke produced).

Flaming droplets is rated from d0 (no flaming droplets) to d2 (no limit to flaming droplets).

This document is based on a large number of fire tests conducted on various Armstrong ceiling tile and grid types. It provides an assessment of the performances attainable when various Armstrong tile and grid systems are installed in accordance with the appropriate base fire test and the permitted installation variations from that base test.

The tables opposite give a summary of the performances achievable as stated in the assessment document and are correct at the time of going to print.

As products may be modified or retested it is essential that their validity is always checked prior to installation. Therefore, the current version of the assessment document 173816 and the relevant base test report should always be consulted prior to the installation of a floor construction to be protected by an Armstrong ceiling system.

A full document is always required and must be read and any limitations understood. Abbreviated versions must be regarded as undesirable as they will not show the full test details and construction.

All Armstrong test reports, certificates and assessments are freely available on request from our Internal Technical Sales Team on:

Freefone 0800 371 849 (UK) or 1800 409002 (RoI) or via email at sales-support@armstrong.com

STRUCTURAL FIRE PROTECTION

Throughout Europe, there is a requirement for a building's structure to be protected from fire. This is primarily for the structure to remain stable during a fire to allow the occupants to escape and also to enable fire fighters to work without threat of the building's collapse.

The duration of the required protection will usually depend upon the height of, and location within, the building (i.e. typical floor, basement, roof construction etc), whether there is any active methods of fire protection (sprinklers etc) and the type of construction to be protected (steel beams, timber or mezzanine floors etc).

A fire protecting suspended ceiling system is one of several important methods of providing the fire protection which fire degradable elements of the structure require. Ceilings can be used to enable a floor construction to meet the duration of protection required by the building regulations that it could not necessarily provide on its own.

There are many national test methods for establishing the structural fire protection performance of a suspended ceiling system, as well as several European norms which are acceptable in most European countries. The performance achieved during testing will be classified in terms of the duration of protection given, typically this is in accordance with EN13501-2:2007 for European tests.

However, there is not yet one single European test method which is acceptable to all member states. Untested products may be assessed by reference to the product attributes and comparison to similar tested products, provided this is supported by an assessment report from a recognised fire expert and should be provided with the

BUILDING REGULATION PERFORMANCE TABLE – INTERNAL LININGS

Building Regulations area (non-residential)	Euroclass	Old classification
Circulation areas	A1	Non-combustible
	A2-s3, d2	Limited Combustibility
	B-s3, d2	Class 0
Other Rooms (> 30 m ²)	C-s3, d2	Class 1
	D-s3, d2	Class 2
Small Rooms (< 30 m ²)	E-d2, F	Class 3
(Product cannot be used)		Class 4

Assessed Performance Under Structural Steel Beams - Base Test Report: 134086 (70995 for Clip-In)

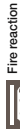
	Board	Regular	MicroLook	Flush/Regular	Clip-In 3mm	Comments
ULTIMA	60 minutes	60 minutes	60 minutes	60 minutes	n/a	Includes 500 x 500 and 1200 x 300 MicroLook ULTIMA
ULTIMA dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
ULTIMA OP	30 minutes	n/a	n/a	n/a	n/a	
PERLA	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
SERRA	30 minutes	n/a	n/a	n/a	n/a	
BOGUARD ACOUSTIC / BOGUARD PLAIN	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
DUNE dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
DUNE MAX / DUNE SUPREME / DUNE Planks	60 minutes	60 minutes	60 minutes	60 minutes	n/a	Includes all 500 x 500 and Cobotone DUNE Plus files
FINE FISSURED	60 minutes	60 minutes	60 minutes	60 minutes	n/a	Includes Cobotone Black, but NOT Sekor or Frequency
CRRUS	60 minutes	60 minutes	60 minutes	60 minutes	n/a	Does NOT include any CRRUS design files
TATRA / CORTEGA	60 minutes	60 minutes	60 minutes	60 minutes	n/a	Does NOT include any CRRUS design files
MEZZANINE DL 100	60 minutes	n/a	n/a	n/a	n/a	
METAL Plain + pad or B15	60 minutes	60 minutes	60 minutes	60 minutes	n/a	8mm and 16mm returns. 18mm 100kg/m ² ABEIF pad
METAL Std Pad + pad or B15	60 minutes	60 minutes	60 minutes	60 minutes	n/a	8mm and 16mm returns. 18mm 100kg/m ² ABEIF pad
METAL Microperg + pad or B15	60 minutes	60 minutes	60 minutes	60 minutes	n/a	8mm and 16mm returns. 18mm 100kg/m ² ABEIF pad
METAL Extra Microperg + pad or B15	60 minutes	60 minutes	60 minutes	60 minutes	n/a	8mm and 16mm returns. 18mm 100kg/m ² ABEIF pad
METAL Std Pad + pad	n/a	n/a	n/a	n/a	30 minutes	600 x 600 only. 40mm 45kg/m ² ABEIF pad
METAL Microperg + pad	n/a	n/a	n/a	n/a	30 minutes	600 x 600 only. 40mm 45kg/m ² ABEIF pad
METAL Extra Microperg + pad	n/a	n/a	n/a	n/a	30 minutes	600 x 600 only. 40mm 45kg/m ² ABEIF pad

Assessed Performance Under Timber Floors - Base Test Report: 167751

	Board	Regular	MicroLook	Flush/Regular	Clip-In 3mm	Comments
ULTIMA	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
ULTIMA dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
DUNE dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	Main runners at 600mm centres only
MEZZANINE DL 100	60 minutes	n/a	n/a	n/a	n/a	
FINE FISSURED	n/a	n/a	n/a	n/a	n/a	
DUNE dB	30 minutes	30 minutes	30 minutes	30 minutes	n/a	
ULTIMA / ULTIMA dB	30 minutes	30 minutes	30 minutes	30 minutes	n/a	
MEZZANINE DL 100	30 minutes	n/a	n/a	n/a	n/a	
SERRA	30 minutes	30 minutes	30 minutes	30 minutes	n/a	
BOGUARD ACOUSTIC / BOGUARD PLAIN	30 minutes	30 minutes	30 minutes	30 minutes	n/a	
DUNE MAX / DUNE SUPREME / DUNE Planks	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Includes Cobotone DUNE Plus files
FINE FISSURED	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Includes Cobotone Black, but NOT Sekor or Frequency
CRRUS	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Does NOT include GRAPHIS
TATRA / CORTEGA	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Does NOT include any CRRUS design files

Assessed Performance Under Mezzanine Floors - Base Test Report: 120559

	Board	Regular	MicroLook	Flush/Regular	Clip-In 3mm	Comments
ULTIMA / ULTIMA dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
ULTIMA dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
DUNE dB	60 minutes	60 minutes	60 minutes	60 minutes	n/a	
MEZZANINE DL 100	60 minutes	n/a	n/a	n/a	n/a	
SERRA	30 minutes	30 minutes	30 minutes	30 minutes	n/a	
BOGUARD ACOUSTIC / BOGUARD PLAIN	30 minutes	30 minutes	30 minutes	30 minutes	n/a	
DUNE MAX / DUNE SUPREME / DUNE Planks	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Includes Cobotone DUNE Plus files
FINE FISSURED	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Includes Cobotone Black, but NOT Sekor or Frequency
CRRUS	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Does NOT include GRAPHIS
TATRA / CORTEGA	30 minutes	30 minutes	30 minutes	30 minutes	n/a	Does NOT include any CRRUS design files



Fire reaction

National Building Regulations (where applicable) require that buildings meet the appropriate Euroclass **fire reaction** performance depending upon the area of application. Armstrong products have been tested to the harmonised European fire reaction standards and meet the minimum performance criteria. Many Armstrong products have also been tested for their **fire resistance** performance under various floor constructions. See page 22 for more information on how ceilings can create a safer environment.



Acoustic Performance

The occupant of a space, be it an office, a classroom, a shop, or any similar environmental needs:

- intelligibility – to hear and to be understood
- Confidentiality – to not be overheard
- Concentration – to not be disturbed

The optimum acoustic climate will be obtained with the right combination of sound absorption and sound attenuation, and can be supplemented by the use of active acoustics. See page 17 for more information on how acoustics can create a better environment.



Sound Attenuation

Is the control of horizontal sound transmission through a suspended ceiling and common void located above adjacent spaces.



Sound Absorption

Is the control of reflected sound, provided by the suspended ceiling, within a space.



Sound Reduction

Is the control of vertical sound transmission through a suspended ceiling located above a space.



Humidity Resistance

Ceiling installations are facing more and more demanding humidity conditions such as fast track programmes, buildings with intermittent heating and cooling, areas with a high concentration of people, structures which are open to the exterior environment, etc. To meet these requirements Armstrong offer a wide range of standard products suitable for installation in conditions of up to 95% and 99% relative humidity, as well as specialist products which excel in extreme conditions of up to 100% relative humidity.

The following table demonstrates the relative humidity resistance in relation to classes of exposure according to EN 13964.

Class	Conditions
A	Building components exposed to varying relative humidity up to 70% and varying temperature up to 25°C but without corrosive pollutants
B	Building components exposed to varying relative humidity up to 90% and varying temperature up to 30°C but without corrosive pollutants
C	Building components exposed to varying relative humidity up to 95% and varying temperature up to 30°C but without corrosive pollutants
D	More severe than the above



Light Reflectance

High levels of light reflectance from suspended ceilings can contribute significantly to maintaining the correct levels of illumination for all interior environments, as well as helping to reduce excessive electrical energy consumption. Armstrong conducts extensive tests of light reflectance on a wide range of its products, in accordance with EN ISO 7742-2 and 3 (as specified in EN 13964) and ASTM E4177, by third party accredited laboratories. The light reflectance values indicated on each product data page are as determined by these tests.



Anti-Microbial Performance

The control of bio-contamination is essential in the healthcare sector, especially in hospitals and clinics. Armstrong ceilings do not favour the development of fungi/mould or yeast and the products can be used in any general area. The Armstrong Bioguard paint reduces the colony size of virulent strains of bacteria, moulds and yeasts. This special paint finish can be cleaned and disinfected. See page 20 for more information on how ceilings can create a healthier environment.



Air Quality

Armstrong offer a number of specific tile and grid solutions to limit the number of airborne particles in a clean room environment. These products are tested against ISO 14644-1. See page 20 for more information on how ceilings can create a cleaner environment.



Thermal Conductivity

The ever increasing commitment to energy conservation, dictates that buildings should be as energy efficient as is compatible with their function, use and as specified in national building regulations. Interior building products which can form part of the external structure, such as suspended ceilings beneath a roof construction, can contribute to minimising the loss of heat to the exterior by reference to their thermal conductivity values. Armstrong conducts extensive tests of thermal conductivity on a wide range of its products, in accordance with EN 12667 (as specified in EN 13964) and ISO 8301, by third party accredited laboratories. The thermal conductivity values indicated on each product data page are as determined by these tests.



Scratch Resistance

Superior level of surface scratch resistance, evaluated with the Hess rake test.



Product Handling & Durability

Frequent ceiling tile removal, typically in areas where building service equipment is located, means that a higher level of impact resistance can be desired. In this category, the level of durability and impact resistance has been improved by Armstrong.



Recycled Content

Armstrong products are produced using a variety of recycled raw materials. The recycled content of individual products is indicated in our literature in accordance with ISO 14021:2004. See page 7 for more information on how ceilings can create a more sustainable environment.



15 Year Guarantee

Armstrong World Industries guarantees the Armstrong 95% and 99% relative humidity products shall be free from defects in materials or workmanship for 15 years from the date of installation of the material subject to the terms detailed opposite.

Cleaning and disinfection

The frequency and method of cleaning of a ceiling varies from one application to another. All products can at least be cleaned with a dry cloth or vacuum cleaner.



Wipeable with a dry cloth.



Wipeable with a moist cloth.



Washable with a sponge dampened in water containing mild soap or diluted detergent.



Scrubable with water containing mild soap or diluted detergent.



Can be cleaned using a high pressure water spray.



Can be cleaned with disinfectants commonly used in healthcare premises.

CE MARKING

■ What is it ?

CE stands for Conformité Européenne, which translated literally, means "European Conformity". The CE mark is a products "passport" for entry into the EEA (European Economic Area) and indicates that the product complies with the requirements of the applicable European Directive.

For construction products the European Directive is the Construction Products Directive (89/106/EEC).

The CPD identifies the essential requirements for products (and total projects) such that they are fit for intended use as:

- mechanical resistance and stability;
- safety in case of fire;
- hygiene, health and environment;
- safety in use;
- protection against noise;
- energy economy and heat retention.

For suspended ceilings, the way in which we must test and communicate performance for these essential requirements has been defined in a new standard published in the "Official Journal" EN 13964 Suspended Ceilings – Requirements and Test Methods.

■ What does this mean?

This standard identifies how the ceiling components must be tested against the essential requirements to identify a performance classification. It also indicates how the manufacturer must ensure that their products maintain these levels of performance on an ongoing basis.

On 1st July 2007, it became mandatory for all suspended ceilings and accompanying suspension systems (in the scope of EN 13964) to carry the CE mark and the accompanying essential requirement test information.

From 1st July 2007, onwards, non-CE marked materials are no longer saleable into the EEA.

Air Leakage

The cavity above a suspended ceiling may be used, as part of the mechanical air distribution system, when it is used as a supply or extract plenum, and the air pressure in the plenum will be either positive or negative in comparison to the pressure in the room below. Similarly for "Clean Room" applications, where it is most important to prevent the ingress of airborne dust contaminants, the room will be at positive pressure to the surrounding areas. Alternatively, to escape the egress of pathogens the room may be kept at a lower pressure relative to the surrounding areas. In these situations, it is necessary to know how much air leakage occurs through the ceiling system as a result of the pressure differential. Armstrong conducts extensive tests of air leakage on a wide range of its products, in accordance with EN 12114, and EN ISO 13829, by third party accredited laboratories. Please contact your local ITS/MSC centre for further details of these results.

Air Flow

When using Ocal perforated metal suspended ceilings, the cavity above may be used as part of the mechanical air distribution system when it is used as a supply plenum. With this arrangement the air pressure in the plenum is always positive in comparison to the pressure in the room below. Specific tiles can be selected as open (active), and these will become air diffusers, while the remaining tiles will have their perforations blocked (inactive). In this way the air flow supply volume to the room can be controlled and balanced dependent upon the pressure differential and the air change requirements. Armstrong conducts extensive tests of air flow on a range of its more common Ocal products, in accordance with EN 12114, and EN ISO 13829, by third party accredited laboratories. Please contact your local ITS/MSC centre for further details of these results.

Visible grid		Semi-concealed & concealed		Visible grid		Semi-concealed & concealed	
PreLubs XL/TL 15 mm Shoguno XL ¹ 15 mm Intrube XL ² 15 mm	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	System Z
Board & Tiles				Planks			
MicroLock/ MacroLock BE	Regular	Board	Vector	Board	SL2	SL2	SL2

Mineral Laminated

ULTIMA	✓	✓	✓	✓	✓	✓	✓
ULTIMA-OP	✓	✓	✓	✓	✓	✓	✓
ULTIMA-GB	✓	✓	✓	✓	✓	✓	✓
OPTIMA	✓	✓	✓	✓	✓	✓	✓
PEELA	✓	✓	✓	✓	✓	✓	✓
PEELA-OP	✓	✓	✓	✓	✓	✓	✓
PEELA-GB	✓	✓	✓	✓	✓	✓	✓
SERRA-OP	✓	✓	✓	✓	✓	✓	✓
NEVADA	✓	✓	✓	✓	✓	✓	✓ ¹

(1) NEVADA Planks are also available with MicroLock & Regular edge detail. Please see page 35.

Mineral Non Laminated

DUNE SUPREME	✓	✓	✓	✓	✓	✓	✓
DUNE (Vectra & Planks)	✓	✓	✓	✓	✓	✓	✓
DUNE MAX	✓	✓	✓	✓	✓	✓	✓
DUNE-GB	✓	✓	✓	✓	✓	✓	✓
CORRUS	✓	✓	✓	✓	✓	✓	✓
CORRUS MAX / CORRUS 75	✓	✓	✓	✓	✓	✓	✓
PLAIN	✓	✓	✓	✓	✓	✓	✓
FINE FISSURED	✓	✓	✓	✓	✓	✓	✓

Wood

MADERA VENEERIS	✓	✓	✓	✓	✓	✓	✓
MADERA LAMINATES	✓	✓	✓	✓	✓	✓	✓

Visible grid		Semi-concealed		Visible grid		Concealed	
PreLubs XL/TL 15 mm Shoguno XL ¹ 15 mm Intrube XL ² 15 mm	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	PreLubs XL/TLX 24 mm PreLubs Sxly ³	C-CHANNEL Spring 1	SYSTEM 3000/ C-CHANNEL with Spring A Bar
Mineral & Metal: Board & Tiles				Metal: Tiles & Planks			
MicroLock	Regular / Flush Regular	Board	Vector	SE / TE 8 / TE 16	Fasttrak / TE 30	Cip-in 5mm	Cip-in 3mm
							HOOK-ON

Mineral Decorative

COLORTONE DUNE	✓	✓	✓	✓	✓	✓	✓
COLORTONE NEVADA	✓	✓	✓	✓	✓	✓	✓
COLORTONE FINE FISSURED BLACK	✓	✓	✓	✓	✓	✓	✓
CORRUS DESIGN ¹	✓	✓	✓	✓	✓	✓	✓
GRAPHIS	✓	✓	✓	✓	✓	✓	✓
VISUAL	✓	✓	✓	✓	✓	✓	✓

(2) Step/Double/Down/Up/In/Sync/In/In/Contrast

Specific Solutions¹

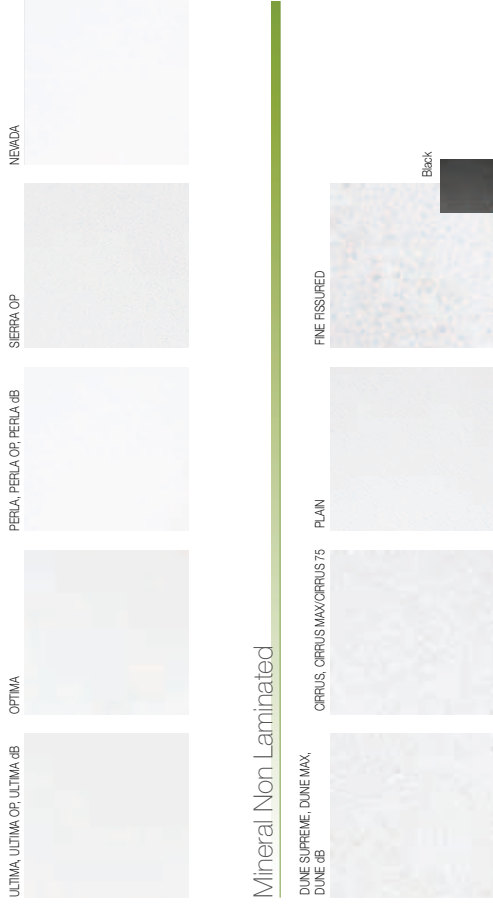
BIOGUARD ACOUSTIC	✓	✓	✓	✓	✓	✓	✓
BIOGUARD PLAIN	✓	✓	✓	✓	✓	✓	✓
PARAFON HYGEN	✓	✓	✓	✓	✓	✓	✓
GERMAGUARD	✓	✓	✓	✓	✓	✓	✓
NEUTONE	✓	✓	✓	✓	✓	✓	✓

(3) Clean Room Grid or PreLubs 24 Corrosive Resistant Grid are recommended for Clean Room environments and Healthcare premises.

Metal

EXTRA MICROPERFORATED	✓	✓	✓	✓	✓	✓	✓
MICROPERFORATED	✓	✓	✓	✓	✓	✓	✓
PERFORATED	✓	✓	✓	✓	✓	✓	✓
PLAIN	✓	✓	✓	✓	✓	✓	✓
PREMIUM B15	✓	✓	✓	✓	✓	✓	✓
BIOGUARD	✓	✓	✓	✓	✓	✓	✓

Mineral Laminated

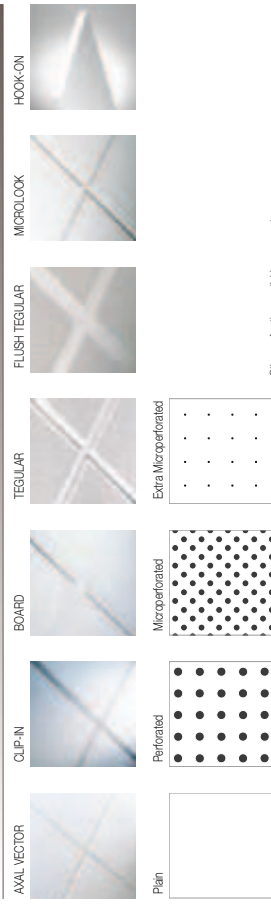


Mineral Non Laminated

Mineral Decorative

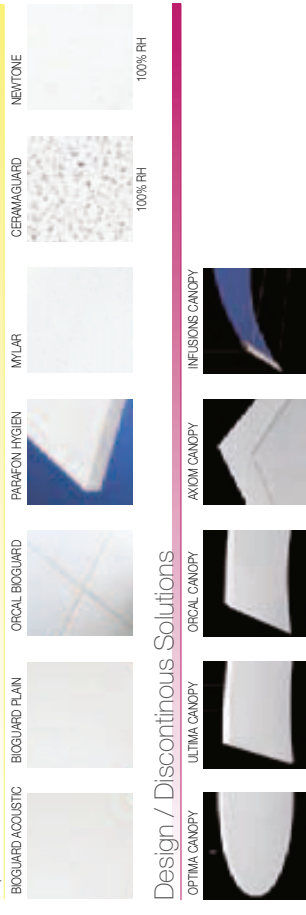


Metal



Other perforations available on request.

Specific Solutions



Design / Discontinuous Solutions

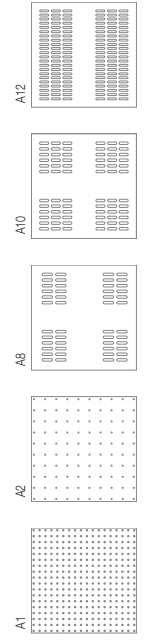


Wood

MADERA LAMINATES

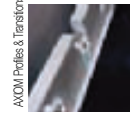


PERFORATIONS



Grid

DESIGNER GRID



EXPOSED SYSTEM



CONCEALED GRID SYSTEM Z



PRODUCT NAMES

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MINERAL

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