

Ecophon Master™ Rigid

Sound comfort in classrooms



Ecophon®
SAINT-GOBAIN

A SOUND EFFECT ON PEOPLE

The natural environment

a model for learning spaces

Over thousands of years, the human sense of hearing evolved for an outdoor, natural environment. Today we spend almost 90% of our time indoors, and are exposed to many unnatural sounds. This has a significant impact on our ability to concentrate, communicate and learn. To improve the sound environment in classrooms we should strive to simulate the natural, outdoor environment.

Knowledge and wellbeing

An optimal sound environment is a basic necessity if all students are to be able to learn to their best. Requirements for the sound environment should be demanding and based on how people experience sound and the way it affects them, not just on formal standards. When the sound environment provides the best possible support for students and teachers, we have helped to increase comfort and the quality of learning.

This publication shows products from Ecophon's product range and those of other suppliers. The specifications are intended to provide a general guide to which products are most suitable for the preferences indicated. Technical data is based on results obtained under typical testing conditions or long experience in normal conditions. The specified functions and properties for products and systems are only valid on condition that instructions, installation diagrams, installation guides, maintenance instructions and other stated conditions and recommendations have been taken into consideration and followed. Deviation from this, such as changing specific components or products, will mean that Ecophon cannot be held responsible for the function, consequences and properties of the products. All descriptions, illustrations and dimensions contained in this brochure represent general information and shall not form part of any contract. Ecophon reserves the right to change products without prior notice. We disclaim any liability for misprints. For the latest information go to www.ecophon.com or contact your nearest Ecophon representative.

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Idea and layout: Navigator. Printer: Skånerick AB. Cover: Hans Georg Esch. Page 2-3: Marion/Nicklas Rudfäll. Technical photographs: Citat. Illustrations: Citat

A group of approximately ten children of various ages are seated at rows of wooden school desks in a lush green field. The desks are arranged in a classroom-like fashion, but the setting is outdoors with a dense line of green trees in the background. The children are dressed in casual clothing like t-shirts, hoodies, and sweaters. Some are looking towards the camera, while others are looking slightly away. The overall atmosphere is bright and natural.

The evolution of education imposes new demands

There is an ongoing move away from lecture-style teaching, towards a situation where the teacher is seen as a facilitator accommodating individual differences between pupils interests, achievements and learning styles. A modern learning environment is expected to motivate students to be more actively involved in their education, which leads to increased communication and potentially higher sound levels.

Supporting better

learning environments

A classroom usually has a ceiling, enclosed parallel walls and a hard floor, with little upholstered furniture and curtains. The sound bounces around in the room, and conditions are far from those in the natural outdoor environment. The challenge is to be able to control unwanted sounds and reflections to make listening and speaking more comfortable for students and teachers.

Meeting the standards – a minimum

Guidance when designing solutions for better acoustics is available from international standards. Most standards are based on the amount of sound absorbed, and the use of reverberation time as a measure. Compliance with standards must be seen as the absolute minimum.

Going beyond standards

– aiming for the optimum

Creating the best possible conditions for students and teachers requires an understanding of how people experience sound in classrooms. This involves how sound is reflected in a room, how speech consists of different sound frequencies and how it is understood, and the way people respond both physically and mentally to different sound situations. To be able to see the whole picture, we generally look at four acoustic qualities.



Sound strength

How strong the sound is in the room.



Speech clarity

How speech is perceived in the room.



Reverberation

How quickly sound energy dissipates by 60dB in the room.



Listening comfort

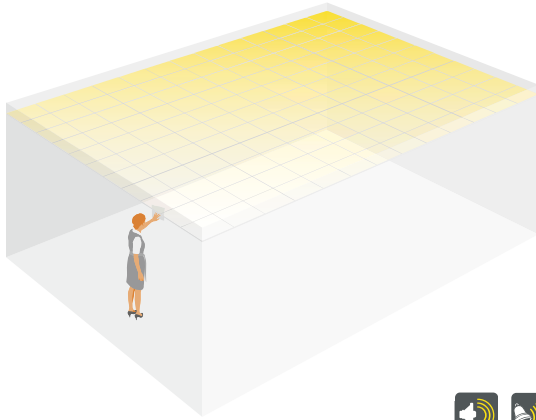
How low-frequency sound affects listening comfort.

Benefits for students and teachers

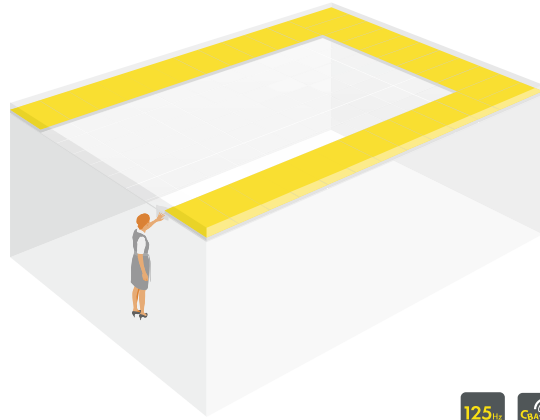
Addressing all four acoustic qualities gives numerous benefits for people experiencing the sound environment in the classroom. These are some examples:

- Lower sound pressure levels improve listening comfort and conditions for concentration and short-term memory, and reduce mental stress.
- Removing late horizontal reflections improves speech clarity, especially in teaching situations with one-way speech.
- Improved speech clarity gives a balanced quality of communication enabling information to be easily understood.
- Comfortable speaking reduces stress for the teacher and relieves the vocal cords.
- Increased low-frequency absorption makes both speaking and listening more comfortable in multi-communication classrooms.
- Good acoustics benefit students, interaction, attitudes and behaviour, which have a positive effect on teachers' working environments and the school's overall performance.

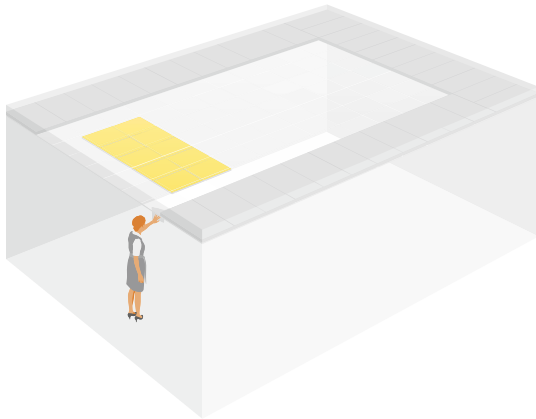
Four components to secure acoustic comfort in classrooms



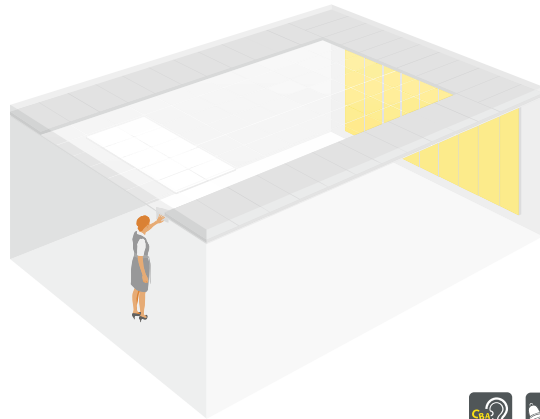
The fully covering acoustic ceiling **Ecophon Master™ Rigid** is a first and important step towards the best possible sound environment. Its main effect is to reduce reverberation and decrease sound levels.



The low-frequency absorber **Ecophon Extra Bass** is placed on top of Master Rigid and reduces unwanted sounds at 125 Hz. Extra Bass greatly improves listening comfort and speech clarity, and should be installed in a U-form covering approximately 45% of the ceiling.



To support speaker comfort, **Ecophon Master™ Rigid/gamma** can be installed as a reflector above the teacher. These panels are part of the acoustic ceiling. When teachers receive speaker feedback from the reflector they do not need to raise their voices to feel properly heard.



With **Ecophon Wall Panel™** positioned at the back wall, the horizontal sound reflections will be reduced, which will increase speech clarity and further reduce reverberation.

Measuring the three most important acoustic parameters in classrooms

Sound strength – G (dB) measures the extent to which a room amplifies the sound from a sound source, compared with measurements in a laboratory with no sound reflections.

Speech clarity (definition) – D_{50} (%) is the energy of all useful reflections of the direct sound, which enhance speech clarity, divided by the total energy including the direct sound. The higher the value, the better the speech clarity.

Reverberance – Reverberation time, T (sec), indicates how long it takes for the sound to drop by 60 dB after the source stops emitting sound.

According to ISO 3382-1 and ISO 3382-2.

The modern classroom

from a sound perspective

Today's verbal communication in classrooms is more complex than the old one-way lecture-style teaching. Speech is encouraged to be multi-dimensional, with a variety of learning styles. This means that there are potential contradictions in acoustic priorities – supporting the teacher speaking to the whole class and allowing students' interactive communication, while ensuring an overall beneficial sound environment for every person in the classroom. The acoustic solution must support all these activities in order to create the optimal learning conditions for students and teachers.

Looking at fundamentals

Understanding the users' approach is the key to providing the right acoustic environment. This includes things like different learning styles and the size and shape of the classroom. Knowledge of these is fundamental in creating conditions for good speech and listening comfort, and crucial for overcoming the acoustic obstacles to the learning process.



Photographer: Hans Georg Esch

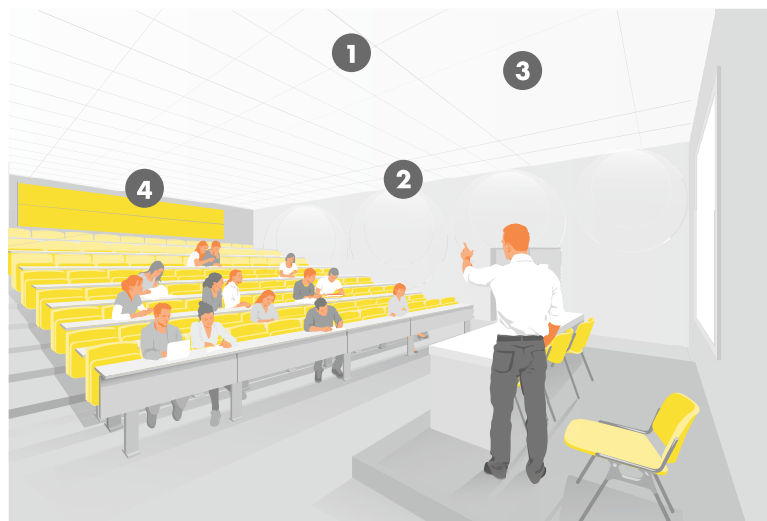


Standard classroom with traditional teaching

When the teacher speaks, the sound spreads in the room. The fully covering acoustic ceiling Master Rigid (1) absorbs the sound and prevents the creation of disturbing reflections. The Extra Bass (2) absorbs the low-frequency sound, which greatly improves speech clarity. The reflector (3) above the teacher's head gives good support for speech and makes speaking more comfortable. Wall Panel (4) installed on the back wall of the classroom will absorb the sound of the teacher's voice when it hits the back wall, preventing it from bouncing back into the room. This keeps the overall sound level down and improves speech clarity, giving everyone better sound comfort.

Standard classroom with group work

When students work in groups, it is crucial that group members can hear each other clearly, without disturbing other groups. When the overall sound level is raised, people tend to raise their own voices to compete with others. This is called the Lombard effect, and has to be carefully balanced. With the fully covering acoustic ceiling Master Rigid (1), much of the disturbing sound is absorbed, so people do not feel they need to raise their voices. The Extra Bass (2) absorbs the low-frequency sound, which greatly improves speech clarity. Wall Panel (4) also helps to absorb the sound from the groups sitting closest to it.



Large classroom with traditional teaching

A classroom more than nine metres deep imposes additional demands on the acoustic solution. Speech levels decrease over distance which makes the situation difficult for students sitting furthest from the teacher. The fully covering Master Rigid (1) will absorb much of the unwanted sound, but can be supplemented with a longer reflector area (3). This will help the teacher's voice and improves the speech clarity for students at the back. The Extra Bass (2) absorbs the low-frequency sound, which greatly improves speech clarity. Wall Panel (4) will absorb the sound when it hits the back wall, preventing it bouncing back into the room.

Designed to serve

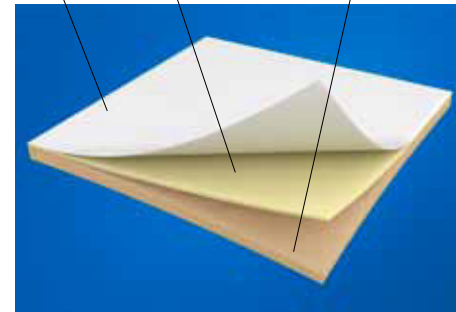
both schools and the environment

Ten times stronger surface

Master Rigid has a unique reinforced Akutex FT surface, which is a layered construction. The surface has been developed with schools demands in mind, such as impact resistance and aesthetics. The reinforced Akutex FT has proved to be ten times stronger than the standard Akutex FT surface. The Master Rigid system is a safe and economical choice, when strength and an aesthetically pleasing appearance are required.

*The pictures to the right are the results from identical impact tests using an Elcometer.

Akutex FT Reinforcement layer Glass wool core



Ecophon Master™ Rigid is a sandwich construction



Photographer: Ole Jørg



Photographer: Patrick Klemm

Impact tested*: Reinforced Akutex FT surface



Photographer: Patrick Klemm

Impact tested*: Akutex FT surface



Master Rigid Dp

System design

In learning environments it is important that the tiles in a suspended ceiling are secured in the grid system. The Master Rigid system is available in three different edges, A, E and Dp, that can all be secured in the Connect grid system. In Master Rigid A and E, clips are used (Connect Hold down clips A and E are patent pending), and Master Rigid Dp is secured through its edge design (Edge Dp is patent pending). This means the system can withstand impacts from below. Despite being secured to the grid system, they are all fully demountable from below. The Master Rigid Dp edge design gives the ceiling a linear look, due to an 8 mm gap between the tiles in one direction and 2 mm in the other. It can also be locked to the grid system, which can be a requirement in some applications.



Edge A with clip



Edge E with clip



Edge Dp



Photographer: Patrick Klemm

Easy installation

The light weight Master Rigid panels together with the Connect profile system make installation quick and easy. Since the absorption of low-frequency sound is crucial for acoustic performance in classrooms, Extra Bass is an important part of the system. This product is totally encapsulated in a film which greatly simplifies handling and installation. Extra Bass does not need to be cut, and is easy to place above the acoustic ceiling. It can also be folded around any installations in the ceiling space without compromising performance.

Good light efficiency

Lighting is a key factor in a learning environment. Ecophon acoustic ceilings provide high and uniform light reflection, thus contributing to comfortable light diffusion and cost-effective lighting. Ecophon acoustic ceiling panels with Akutex FT coating have a light reflection of 85% and a light diffusion of 99%. The retroreflection coefficient is 63 mcd/m² lx and gloss < 1.



Photographer: Patrick Klemm

With deep concern

for the environment



More than 70% recycled household glass is used in the products.

Master Rigid and Extra Bass panels are manufactured using the latest technology for glass wool production, 3RD Technology, which is a combination of a high proportion of recycled glass with a renewable plant-based binder. The petroleum-based binder has now been replaced, contributing to better environmental performance. These products have been granted the Nordic Swan Ecolabel.

Developed for the future

Products from Ecophon produced with traditional glass wool technology already meet the stringent demands imposed on building material emissions. With 3RD Technology we are taking a step further in preparation for future demands for even lower emissions.

Lower transportation volume

By moving from maximised to optimised absorption, Ecophon has succeeded in reducing the thickness of the panels by 50%. This reduces transportation volume and weight, which also contributes to lowering the impact on the environment.

Favourable indoor environments

The indoor environment impacts strongly on people's health and satisfaction in learning spaces. Ecophon acoustic products meet the strictest requirements in the *Danish Indeklima (Indoor Climate)* and *Finnish M1* standards, and are recommended by the *Swedish Asthma and Allergy Association*.



Recommended
by the
Swedish Asthma
and Allergy Association

Ecophon Wall Panel™

for acoustic and visual effects

Sound-absorbing wall panels are a central part of optimised acoustic comfort in classrooms. You can enhance the visual impact of the classroom with Ecophon Wall Panel™. This is available in a variety of colours, patterns and profiles, giving scope for creating eye-catching design solutions.

Flexibility to meet your needs

The Wall Panel range offers different surfaces and several types of profile systems, which give many design options. You can place them vertically, diagonally or horizontally, and combine colours and patterns. The Connect product range also provides a special profile suitable for the installation of bookshelf systems.

There is more information in the Ecophon Wall Panel product brochure and on the Ecophon website. www.ecophon.com.



Photographer: Hans Geert Eick



Photographer: Saint-Gobain Ecophon, Muralis: Fontana Susanna Swenen

Printed patterns

Muralis is a series of printed patterns developed to add something extra to the room.



Photographer: Patrick Klemm

Versatile colours

Texona offers a smooth surface with 16 vibrant colours to play with.



Photographer: Saint-Gobain Ecophon

Super G surface

Super G has an impact-resistant surface and is available in three colours.



Photographer: Patrick Klemm

Practical bookshelves creating diffusion

The Connect Recessed profile enables practical bookshelves to be installed in front of the wall absorbers adding diffusion.

Note: The bookshelf system is not provided by Ecophon.

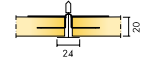


ECOPHON MASTER™ RIGID A

Suitable for classrooms or other premises where strict demands are made on good acoustics and speech intelligibility, and where demountability is vital. Ecophon Master Rigid A has an exposed grid system. Each tile is secured in the grid by clips, but fully demountable.

The system consists of Ecophon Master Rigid A tiles, Ecophon Extra Bass and Ecophon Connect grid system, with an approximate weight of 3,5 kg/m². The tiles are manufactured from high density glass wool utilizing the 3RD Technology. The surface is a reinforced sandwich construction. The visible surface has an Akutex™ FT coating. The product is also available with a sound reflecting surface (gamma) with the same visual appearance. The back of the tile is covered with glass tissue. The edges are primed.

Ecophon Extra Bass is used to improve sound absorption in the low frequency range, and is installed on top of the suspended ceiling. For best performance and system quality, use Ecophon Connect grid and accessories. The grid is manufactured from galvanized steel.



Master Rigid A tile



Section of Master Rigid A system with Connect T24



Master Rigid A system with Connect T24

SYSTEM RANGE

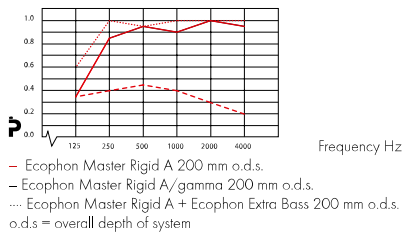
Size, mm	600	1200	1200
	x 600	x 600	x 1200
T24	•	•	•
Thickness	20	20	20
Inst. Diag.	M316	M316	M316

TECHNICAL PROPERTIES



ACOUSTIC Sound Absorption Test results according to EN ISO 354. Classification according to EN ISO 11654.

α_p Practical sound absorption coefficient



Product	Master Rigid A
o.d.s mm	200
absorption class	A

Sound Insulation Not applicable.

Sound Privacy Not applicable



ACCESSIBILITY The tiles are secured in the grid, but demountable. Minimum demounting depth according to installation diagrams.



CLEANABILITY Daily dusting and vacuum cleaning. Weekly wet wiping.



VISUAL APPEARANCE White Frost, nearest NCS colour sample S 0500-N, 85% light reflectance (of which more than 99% is diffuse reflection). Retro reflection coefficient 63 mcd*m⁻²lx⁻¹. Gloss < 1.



INFLUENCE OF CLIMATE The tiles withstand a permanent ambient RH up to 95% at 30°C without sagging, warping or delaminating (ISO 4611).



INDOOR CLIMATE Certified by the Indoor Climate Labelling, emission class M1 for building materials and recommended by the Swedish Asthma and Allergy Association.



ENVIRONMENTAL INFLUENCE Granted the Nordic Swan eco-label. Fully recyclable.



FIRE SAFETY The glass wool core of the tiles is tested and classified as non-combustible according to EN ISO 1182. The systems are classified as fire protective covering according to NT FIRE 003. See Functional demands, Fire safety.

Reaction-to-fire classification

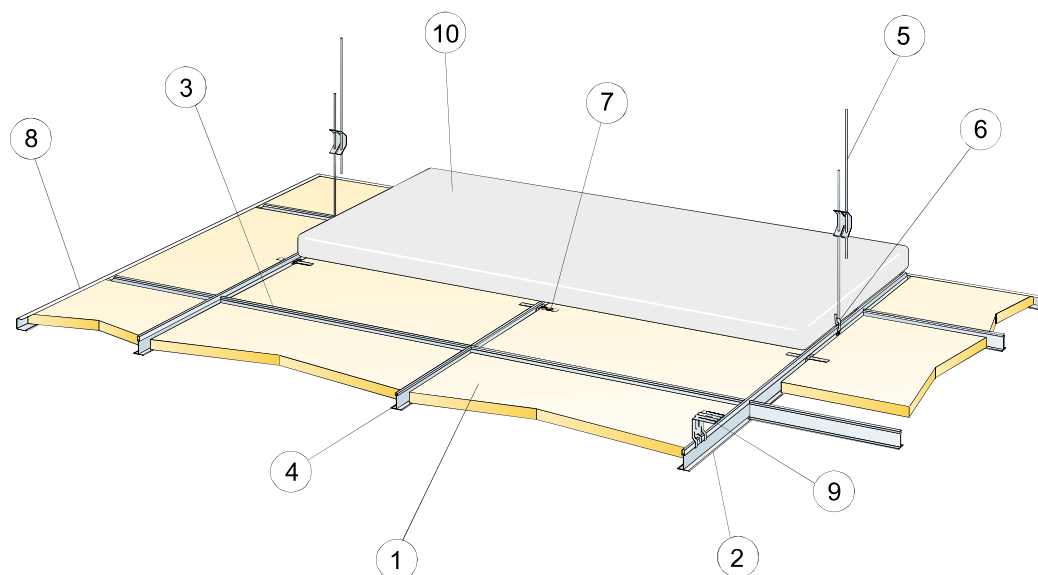
Country	Standard	Class
Europe	EN 13501-1	A2-s1,d0



MECHANICAL PROPERTIES For information regarding live load and requirements for load bearing capacity, see installation diagrams. Conditions: See Functional demands, Mechanical properties.



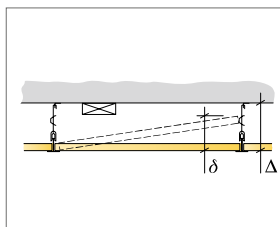
INSTALLATION Installed according to system range which includes information regarding minimum overall depth of system.



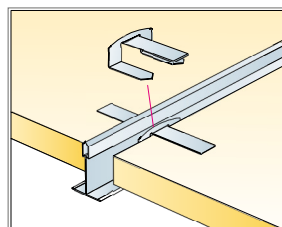
© Ecophon Group

QUANTITY SPECIFICATION (EXCL. WASTAGE)

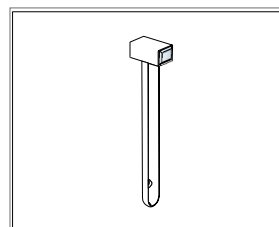
		Size, mm		
		600x600	1200x600	1200x1200
1	Ecophon Master Rigid A	2,8/m ²	1,4/m ²	0,7/m ²
2	Connect T24 Main runner, installed at 1200 mm centres	0,9m/m ²	0,9m/m ²	0,9m/m ²
3	Connect T24 Cross tee, L=1200 mm, installed at 600 mm centres	1,7m/m ²	1,7m/m ²	0,9m/m ²
4	Connect T24 or T15 Cross tee, L=600 mm	0,9m/m ²	-	-
5	Connect T24 Cross tee, L=1200 mm, installed at 600 mm centres	0,7/m ²	0,7/m ²	0,7/m ²
6	Connect Hanger clip	0,7/m ²	0,7/m ²	0,7/m ²
7	Connect Hold down clip A	2pcs/panel	2pcs/panel	2pcs/panel
8	Connect Channel trim, fixed at c300 mm (1200x1200, c200 mm)	as required	as required	as required
9	For direct installation: Connect Direct bracket, installed at 1200 mm centres	0,7/m ²	0,7/m ²	0,7/m ²
10	Ecophon Extra Bass (1200x600x50 mm)	0,6/m ²	0,6/m ²	0,6/m ²
Δ Min. overall depth of system: 100 mm		-	-	-
δ Min. demounting depth: 120 mm, [170 mm incl. Ecophon Extra Bass]		-	-	-



See Quantity specification



Connect Hold down clip A (patent pending)



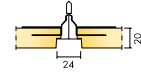
Connect Demounting tool

Size, mm	Max live load [N]	Min load bearing capacity [N]
600x600	50	160
1200x600	50	160
1200x1200	50	160

Live load/load bearing capacity



ECOPHON MASTER™ RIGID E



Suitable for classrooms or other premises where strict demands are made on good acoustics and speech intelligibility, and where demountability is vital. Ecophon Master Rigid E has a recessed visible grid and a tegular edge design, creating a ceiling with a shadow effect that accentuates each tile and partially conceals the grid system. The visible surface of each tile is 10 mm below the grid. Each tile is secured in the grid by clips, but fully demountable.

The system consists of Ecophon Master Rigid E tiles, Ecophon Extra Bass and Ecophon Connect grid system, with an approximate weight of 3,5 kg/m². The tiles are manufactured from high density glass wool utilizing the 3RD Technology. The surface is a reinforced sandwich construction. The visible surface has an Akutex™ FT coating. The product is also available with a sound reflecting surface (gamma) with the same visual appearance. The back of the tile is covered with glass tissue. The edges are painted.

Ecophon Extra Bass is used to improve sound absorption in the low frequency range, and is installed on top of the suspended ceiling. For best performance and system quality, use Ecophon Connect grid and accessories. The grid is manufactured from galvanized steel.



Master Rigid E tile



Section of Master Rigid E system with Connect T24



Master Rigid E system with Connect T24

SYSTEM RANGE

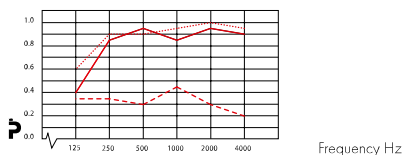
Size, mm	600	1200	1200
	x 600	x 600	x 1200
T24	•	•	•
Thickness	20	20	20
Inst. Diagr.	M317	M317	M317

TECHNICAL PROPERTIES



ACOUSTIC Sound Absorption Test results according to EN ISO 354. Classification according to EN ISO 11654.

α_p Practical sound absorption coefficient



— Ecophon Master Rigid E 200 mm o.d.s.
 - - Ecophon Master Rigid E/gamma 200 mm o.d.s.
 Ecophon Master Rigid E + Ecophon Extra Bass 200 mm o.d.s.
 o.d.s = overall depth of system

Product	Master Rigid E
o.d.s mm	200
absorption class	A

Sound Insulation Not applicable.

Sound Privacy Not applicable



ACCESSIBILITY The tiles are secured in the grid, but demountable. Minimum demounting depth according to installation diagrams.



CLEANABILITY Daily dusting and vacuum cleaning. Weekly wet wiping.



VISUAL APPEARANCE White Frost, nearest NCS colour sample S 0500-N, 85% light reflectance (of which more than 99% is diffuse reflection). Retro reflection coefficient 63 mcd*m⁻²lx⁻¹. Gloss < 1.



INFLUENCE OF CLIMATE The tiles withstand a permanent ambient RH up to 95% at 30°C without sagging, warping or delaminating (ISO 4611).



INDOOR CLIMATE Certified by the Indoor Climate Labelling, emission class M1 for building materials and recommended by the Swedish Asthma and Allergy Association.



ENVIRONMENTAL INFLUENCE Granted the Nordic Swan eco-label. Fully recyclable.



FIRE SAFETY The glass wool core of the tiles is tested and classified as non-combustible according to EN ISO 1182. The systems are classified as fire protective covering according to NT FIRE 003. See Functional demands, Fire safety.

Reaction-to-fire classification

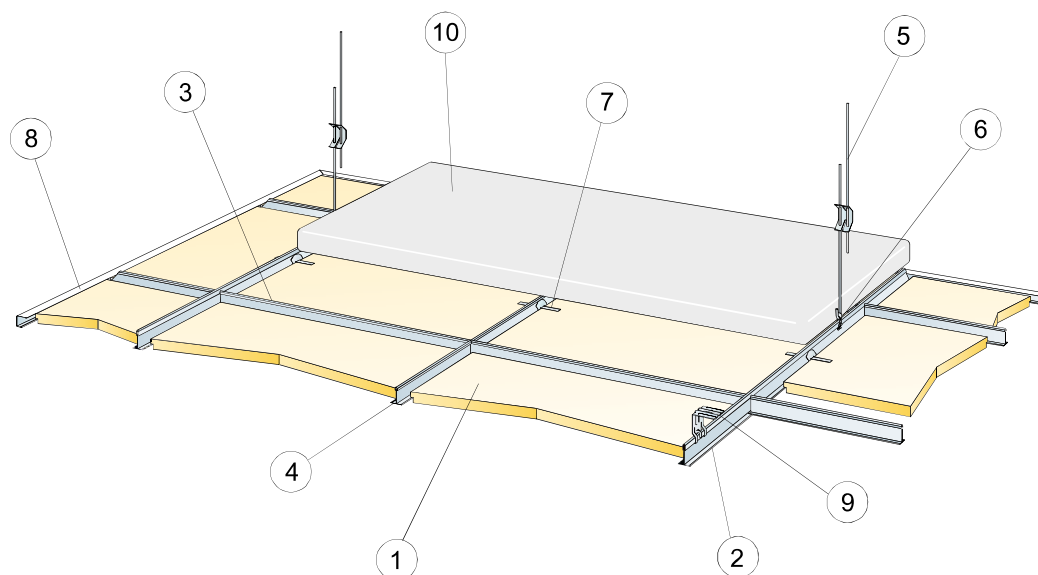
Country	Standard	Class
Europe	EN 13501-1	A2-s1,d0



MECHANICAL PROPERTIES For information regarding live load and requirements for load bearing capacity, see installation diagrams. Conditions: See Functional demands, Mechanical properties.



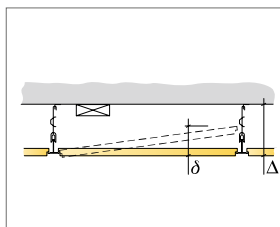
INSTALLATION Installed according to system range which includes information regarding minimum overall depth of system.



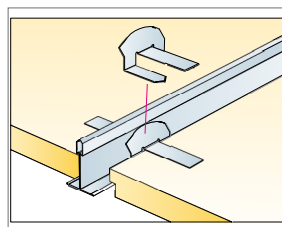
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QUANTITY SPECIFICATION (EXCL. WASTAGE)

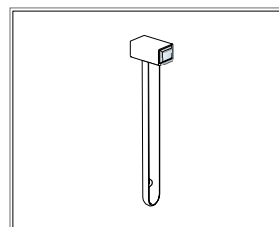
		Size, mm		
		600x600	1200x600	1200x1200
1	Ecophon Master Rigid E	2,8/m ²	1,4/m ²	0,7/m ²
2	Connect T24 Main runner, installed at 1200 mm centres	0,9m/m ²	0,9m/m ²	0,9m/m ²
3	Connect T24 Cross tee, L=1200 mm, installed at 600 mm centres	1,7m/m ²	1,7m/m ²	0,9m/m ²
4	Connect T24 or T15 Cross tee, L=600 mm	0,9m/m ²	-	-
5	Connect T24 Cross tee, L=1200 mm, installed at 600 mm centres	0,7/m ²	0,7/m ²	0,7/m ²
6	Connect Hanger clip	0,7/m ²	0,7/m ²	0,7/m ²
7	Connect Hold down clip E	2pcs/panel	2pcs/panel	2pcs/panel
8	Connect Channel trim, fixed at c300 mm (1200x1200, c200 mm)	as required	as required	as required
9	For direct installation: Connect Direct bracket, installed at 1200 mm centres	0,7/m ²	0,7/m ²	0,7/m ²
10	Ecophon Extra Bass (1200x600x50 mm)	0,6/m ²	0,6/m ²	0,6/m ²
Δ Min. overall depth of system: 110 mm		-	-	-
δ Min. demounting depth: 120 mm, [170 mm incl. Ecophon Extra Bass]		-	-	-



See Quantity specification



Connect Hold down clip E (patent pending)



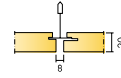
Connect Demounting tool

Size, mm	Max live load [N]	Min load bearing capacity [N]
600x600	50	160
1200x600	50	160
1200x1200	50	160

Live load/load bearing capacity



ECOPHON MASTER™ RIGID DP



Suitable for classrooms or other premises where strict demands are made on good acoustics and speech intelligibility, and where demountability is required. Ecophon Master Rigid Dp (patent pending) has a semi-concealed grid system, and is used when an impact resistant and lockable system is required. There is a 8 mm gap between the tiles in the emphasized direction and narrow gap in the other. The edges are sharp and well defined. Each tile can be locked but still fully demountable.

The system consists of Ecophon Master Rigid Dp tiles, Ecophon Extra Bass and Ecophon Connect grid system, with an approximate weight of 4 kg/m². The tiles are manufactured from high density glass wool utilizing the 3RD Technology. The surface is a reinforced sandwich construction. The visible surface has an Akutex™ FT coating. The product is also available with a sound reflecting surface (gamma) with the same visual appearance. The back of the tile is covered with glass tissue. The edges are painted.

Ecophon Extra Bass is used to improve sound absorption in the low frequency range, and is installed on top of the suspended ceiling. For best performance and system quality, use Ecophon Connect grid and accessories. The grid is manufactured from



Master Rigid Dp tile



Section of Master Rigid Dp system with Connect T24



Master Rigid Dp system with Connect T24

SYSTEM RANGE

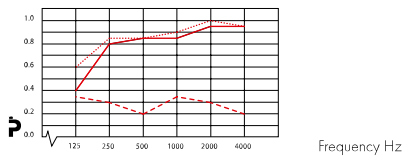
Size, mm	600	1200
	x	x
	600	600
T24	•	•
Thickness	20	20
Inst. Diagr.	M318	M318

TECHNICAL PROPERTIES



ACOUSTIC Sound Absorption Test results according to EN ISO 354. Classification according to EN ISO 11654.

α_p Practical sound absorption coefficient



— Ecophon Master Rigid Dp 200 mm o.d.s.
 - Ecophon Master Rigid Dp/gamma 200mm o.d.s.
 Ecophon Master Rigid Dp + Ecophon Extra Bass 200 mm o.d.s.
 o.d.s = overall depth of system

Product

o.d.s mm	200
absorption class	A

Sound Insulation Not applicable.

Sound Privacy Not applicable



ACCESSIBILITY The tiles are secured in the grid, but demountable. Minimum demounting depth according to installation diagrams.



CLEANABILITY Daily dusting and vacuum cleaning. Weekly wet wiping.



VISUAL APPEARANCE White Frost, nearest NCS colour sample S 0500-N, 85% light reflectance (of which more than 99% is diffuse reflection). Retro reflection coefficient 63 mcd*m-2lx-1. Gloss < 1.



INFLUENCE OF CLIMATE The tiles withstand a permanent ambient RH up to 95% at 30°C without sagging, warping or delaminating (ISO 4611).



INDOOR CLIMATE Certified by the Indoor Climate Labelling, emission class M1 for building materials and recommended by the Swedish Asthma and Allergy Association.



ENVIRONMENTAL INFLUENCE Granted the Nordic Swan eco-label. Fully recyclable.



FIRE SAFETY The glass wool core of the tiles is tested and classified as non-combustible according to EN ISO 1182. The systems are classified as fire protective covering according to NT FIRE 003. See Functional demands, Fire safety.

Reaction-to-fire classification

Country	Standard	Class
Europe	EN 13501-1	A2-s1,d0

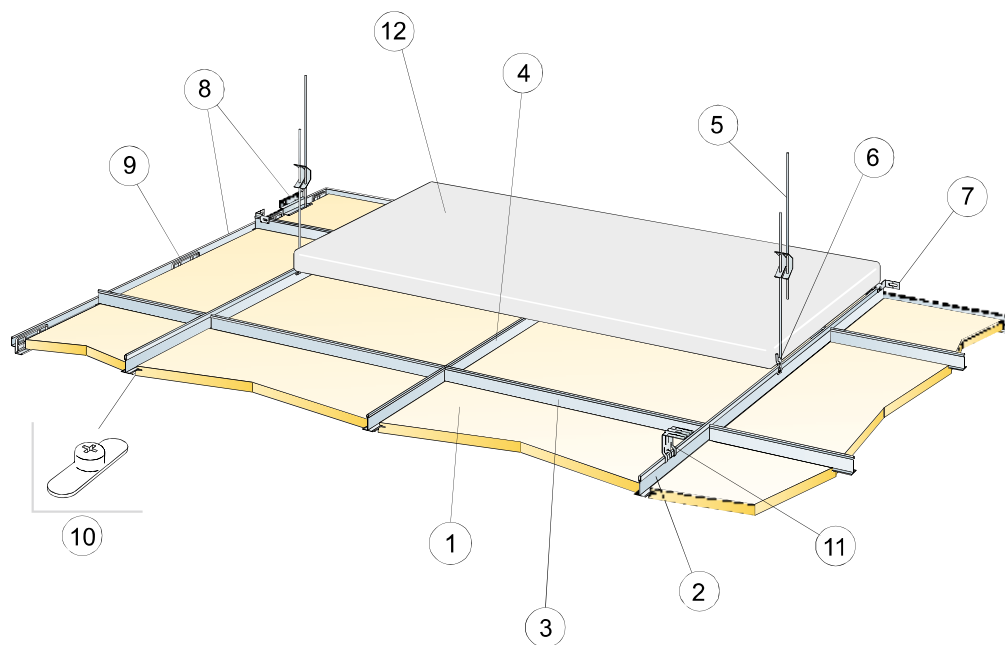


MECHANICAL PROPERTIES The system has been tested according EN 13964 annex D and is classified as 3A. For information regarding live load and requirements for load bearing capacity, see table. Conditions: See Functional demands, Mechanical properties.



INSTALLATION Installed according to system range which includes information regarding minimum overall depth of system.

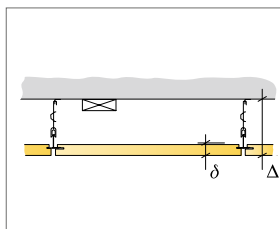
INSTALLATION DIAGRAM (M318) FOR MASTER RIGID DP



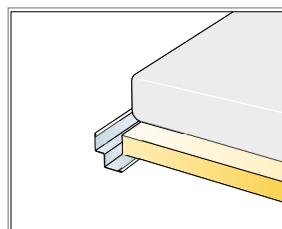
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QUANTITY SPECIFICATION (EXCL. WASTAGE)

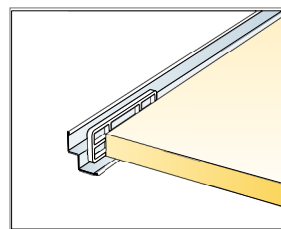
		Size, mm	
		600x600	1200x600
1	Ecophon Master Rigid Dp	2,8/m ²	1,4/m ²
2	Connect T24 Main runner, installed at 1200 mm centres	0,9m/m ²	0,9m/m ²
3	Connect T24 Cross tee, L=1200 mm, installed at 600 mm centres	1,7m/m ²	1,7m/m ²
4	Connect T24 or T15 Cross tee, L=600 mm	0,9m/m ²	-
5	Connect T24 Cross tee, L=1200 mm, installed at 600 mm centres	0,7/m ²	0,7/m ²
6	Connect Hanger clip	0,7/m ²	0,7/m ²
7	Connect Wall bracket for T-profiles (For every suspended row of main runner and every second row of cross tee)	as required	as required
8	Connect Shadow-line trim, fixed at 300 mm centres	as required	as required
9	Connect Wall spacer 5	1/cut tile with one bearing edge	2/cut tile with one bearing edge
10	Connect Panel lock Dp	1/panel	2/panel
11	For direct installation: Connect Direct bracket, installed at 1200 mm centres	0,7/m ²	0,7/m ²
12	Ecophon Extra Bass (1200x600x50 mm)	0,6/m ²	0,6/m ²
Δ Min. overall depth of system: 135 mm		-	-
δ Min. demounting depth: 30 mm		-	-



See Quantity specification



Wall connection with Connect Shadow-line trim



Connect Wall spacer 5 for locking of the perimeter tile

Size, mm	Max live load [N]	Min load bearing capacity [N]
600x600	50	160
1200x600	50	160

Live load/load bearing capacity



A SOUND EFFECT ON PEOPLE

Ecophon dates back to 1958, when the first sound absorbers from glass wool were produced in Sweden to improve the acoustic working environment. Today the company is a global supplier of acoustic systems that contribute to good room acoustics and a healthy indoor environment with the focus on offices, education, health care and industrial manufacturing premises. Ecophon is part of the Saint-Gobain Group and has sales units and distributors in many countries.

Ecophon's efforts are guided by a vision of earning global leadership in acoustic ceiling and wall absorber systems by providing superior end user value. Ecophon maintains an ongoing dialogue with government agencies, working environment organisations and research institutes, and is involved in formulating national standards in the field of room acoustics where Ecophon contributes to a better working environment wherever people work and communicate.

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