



www.perfopan.com

83 YEARS EXPERIENCE IN THE SECTOR



Our Company's Founder Mehmet Ismet AKTAN, Year 1961

COMPANY PROFILE

AKTAN MOBILYA was established in 1932 and has been engaged in various furniture manufacture and decoration works for years both inside the country and abroad, and in 2005 the Company began to get involved in acoustic panel production. In our country, wooden acoustic panel production has been branded by the name PERFOPAN primarily. PERFOPAN; as an entire domestic production TURKISH brand name, has developed and designed sound emission and sound insulation materials for the sound industry, and is proud of introducing acoustic wall, ceiling boards and sound insulation doors into the sector. The Company increased its investments in 2010 and decided to gather all companies under a single roof, furthermore it incorporated Aktan Mobilya and Perfopan wooden acoustic board trade names and gathered them under ISUS 1932 Mobilya Ltd. Sti.

Perfopan has been improving itself continuously in the sound industry, and based on an innovative approach since 1932 the Company has associated its wooden production experience in acoustic board manufacture and has been continuing to act in international market with its experienced engineer and architect staff.

The Company developed Perfofire Fire Resistant Wooden Board model in 2013 and brought in something new in acoustic panel market. For avoidance of loss of life and property, the interior facing materials used in the buildings should be fire resistant in accordance with the applicable law. Our company has increased investments and strengthened its place in the market with the brand name Perfofire .

We have been maintaining our work experiences acquired in our country and in various countries worldwide with our structure which consists of firm and core craftsmen established within years, by staying loyal to our traditions which were transferred from father to son.

General Director Third Generation Ismet AKTAN



The History Of Our Company

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FIRE WOODEN ACOUSTIC



Fire

Fire is a disaster which is unknown to get started when and where. Serious loss of life and property is experienced worldwide due to disaster of fire. The main condition to avoid the loss of life and property in the fire is to use materials which prevent fire and to take necessary measures thereof.

Various developed countries have arranged Regulations for establishing acceptable minimum level for fire protection purpose. These Regulations provide guidance to the engineers and architects in terms of use of materials for interior design of the buildings for fire protection purpose.

As the amendments made in the Regulation on The Fire Protection of the Buildings entered into force on 9 September 2009 be being published in the Official gazette; in the places where people between 50–2000 live, use of at least B class wall and ceiling facing materials have become compulsory.

IMPORTANT ARTICLES ICNLUDED IN THE REGULATION ON THE FIRE PROTECTION OF THE BUILDINGS IN OUR COUNTRY ARE LISTED BELOW

- Outbreak of fire and spread of fire and smoke should be limited in the building.
- Flooring materials should be made of minimum fire inflammatory materials, whereas they should be made of minimum difficult inflammatory materials in higher buildings.
- In terms of fire security, easy flaming building materials are not permitted to be used in the constructions. Easy flaming construction materials may be only used provided to be converted into normal flaming material in a composite.

MINIMUM FIRE ENDURANCE CLASSES IN CROWDED PLACES

Construction Materials	For 50 People Capacity - Office And Meeting Rooms	For 100-200 People Capacity Movie Houses	For 200-800 People Capacity Conference Halls	For 1000-2000 People Capacity and Larger Halls
Wall Boards	C Class	B Class	B Class	B Class
Ceiling- Floor Coverings	B Class	B Class	B Class	A Class

Wooden

In the building sector, wooden and semi products made of wood are used in interior decoration for ages. The tree; with is visual beauty as well as its warmness and easy workability for its user, is an indispensible material for decoration and acoustic insulation.

Wooden derivative materials; when exposed to fire under specific conditions, contribute to cracking and fast inflammation and display the fire resistance of that building material.

In line with the technological advances, features of new generation wooden building materials were enabled to change according to the applicable fire regulations. In accordance with the general fire security regulation on the new generation buildings, the properties of the building materials used in crowded places are requested to be supplied from higher fire resistant items.

Perfofire; which is produced by Perfopan, has been developed upon the association of fiber plaster formula and aesthetic of wood and higher rate of fire resistance is provided accordingly.

Acoustic

To use the decorative acoustic panels in the buildings' inner coverings commonly and as these coverings are combustive art a higher rate; it is required that particular materials with fire resistance should be brought to the forefront and should be selected.

Perfofire series acoustic panels are developed as a result of such necessities and are manufactured in fabrication according to your project. All Perfofire products are accredited and certified for fire and acoustic.

Fading of the sound is proportional with the rigidity and weight of the sound. Our panels' fiber plaster internal structure are heavier by %50 compared to wooden panels with same weight. Heavy covering panels have better acoustic performance compared to light panels. For instance, sound permeability of a panel depends on the decreasing volume of the incoming sound.

Best Of Its Class

Perfofire series panels have been certified as the Euro class value B-s1,d0 after beeing covered by wooden over the A2 - s1,d0 fiber plaster which is unreachable for wooden panel production values.

- **B** Difficult flaming
- s1 Extremely limited smoke generation
- d0 No flame droplets and particles exist

Consumers Should Pay Attention To Scientific Results, Not The Speculations.

Euro Class Main Combustion Class Values

- A1 Non Blazing Substance, Never Burns
- A2 Non Blazing Substance, Extremely Limited Combustive
- B Difficult Flaming
- C Contributes Limitedly To Inflammation
- D Contributes For The Spread Of Flames
- E Contributes Mainly To Inflammation
- F Easy Flaming

Smoke Generation Sub - Class Values

- **S1** Extremely Limited Smoke Generation
- s2 Medium Degree Smoke Generation
- s3 Higher Degree Smoke Generation

Flame Droplets Sub - Class Values

- d0 No Flame Droplets And Particles Exist
- d1 Flame Droplets And Particles Die Less Than 10 Seconds
- d2 Flame Droplets And Particles Exist





Perfofire panels are tested according to EN 13501-1 standards. You may request international test certificates from our Company for your projects.

WHY PERFOFIRE

- Perfofire are the boards which have been developed for more healthier lives at your places, which are fireproof and produced from natural materials which you are looking for acoustic performance.
- They are multifunctional boards which comply with the aesthetic view of the wood, fire security and the requirements of the Acoustic Regulation applicable.
- It is a product which provides aesthetic and acoustic solutions for architectural claims and which combines the decorative natural wooden view and sound emission performance at a single form. There various manufacture models which may be produced with less or continuous perforated surfaces
 private designs.
- It is environmental- friendly. Its components are made of natural materials. Recycling is easy. It does not lead to environmental pollution. It does not involve hazardous substances against human health.
- It provides assistance for the protection of the structural integrity for a long time during fire exposure. It prevents the spread of flames to adjacent areas of the building. It protects your places from fire thus increases the life standard of the places where you live.
- Its fiber plaster internal structure are more resistant against moisture compared to other board cores. Board; when the raw material is stepped in the water for 24 hours, swells out at a rate of % 3 maximum.
- It provides humid transfer at the places and provides your places to breath naturally.
- It is applied in your inner places; for the construction of partition wall, curtain wall, suspended ceiling cover. They are assembled practically. It provides time and monetary saving.
- Inner filling material is made of plaster, therefore insects such as bugs and bed bugs are not permitted to live there in and to destroy the board.
- Due to its sound arrangement feature, it increases the concentration during work at noisy areas.
- It has voice and heat feature due to its intensity and perforated internal structure.
- It is resistant against impacts due to its durable hard inner filling material. Its nail and screw bearing capacity is higher.
- It may be used due to its sustainable feature for green building projects.
- It increases the quality of your building materials, provides the elimination of probable risks and provides you to obtain the material certification from insurance and technical construction consultancy companies, creates the minimum risk factor for appropriate leasing.
- It is resistant against indoor weather conditions and provides dimensional stability.

Boards' Interior Core Definitions	Fire Class EN Europe	Fire Class DIN German	Test Methods	Formaldehyde Emission
Perfofire	A2 - s1 , d0	A2	EN 13501-1	-
Standard Mdf	D - s2 , d1	D	EN 622-5	E1
Mdf Resistant Against Red Flame	B - s2 , d0	B1	EN 622-5	E1
Plywood	D - s2 , d1	D	EN 636	-
Standard Particle Board	D - s2 , d1	D	EN 312	E1
Particle Board Resistant Against Fire	B - s2 , d0	B2	EN 312	E1

Reaction To Fire Feature Of Various Wooden Boards

Above table; within basic requirements, indicate the Euroclass vamp feature when the Perfofire boards as a building material which are one of the fire security precautions within the scope of architecture discipline particularly are compared to other wooden boards.

PERFORMANCE

Physical Properties Of the Plaster and Wooden Panels

Flameproof Plaster - A2 Class

Material Thickness	12.5mm
Board Weight	15.75 kg/m²
Melting Temperature	1000℃
Fire Endurance	F30
Dry Wall And 4cm Stone Wool 30kg/m ³ Insulation	49 db
Intensity	1050kg/m³
Pressure Resistance	23 N/mm²
Brinell Hardness Value	ca. 28 N/mm ²
Drilling Hardness	ca. 700 N
Humid Ratio Of Expansion	0.2 mm
Heat Conductivity	λR = 0,24 W/mK
Thickness Tolerance	+/0.2-mm
Formaldehyde	0



Flameproof Mdf - B Class

Material Thickness	18 mm
Board Weight	15.55 kg/m²
Melting Temperature	750℃
Fire Endurance	FO
Dry Wall And 4cm Stone Wool 30kg/m ³ Insulation	40 db
Intensity	800 kg/m³
Pressure Resistance	25 N/mm²
Brinell Hardness Value	ca. 30 N/mm ²
Drilling Hardness	ca. 750 N
Humid Ratio Of Expansion	0.5 mm
Heat Conductivity	λR = 0,17 W/mK
Thickness Tolerance	+/0.3-mm
Formaldehyde	8mg/100g



Standard Mdf - D Class

Material Thickness	18 mm
Board Weight	15.20 kg/m²
Melting Temperature	600°C
Fire Endurance	FO
Dry Wall And 4cm Stone Wool 30kg/m ³ Insulation	39 db
Intensity	730 kg/m³
Pressure Resistance	25 N/mm²
Brinell Hardness Value	ca. 30 N/mm²
Drilling Hardness	ca. 750 N
Humid Ratio Of Expansion	0.6 mm
Heat Conductivity	λR = 0,17 W/mK
Thickness Tolerance	+/0.3-mm
Formaldehyde	8mg/100g



Perfofire fiber plaster inner board is the unique board as a material which fulfills the highest fire protection requirement level. Fire classes of the plaster and wooden boards become more flammble after being covered by wood. Above given tables indicate only the inner core raw materials 'physical properties.

PERFORMANCE Fire Security



Internal core of Perfofire products are plaster based. Plaster is a material which has been tested as no-combustible building material and having low melting and dropping feature compared to Mdf boards.



A2 class; due to its internal core, shows a long time resistance against fire compared to the various board types used. In inner spaces which the relevant application has been made, it has prolonged the duration of escape from fire.





13.5 mm

Perfofire - A2 Class

Inner core structure A2 - s1,d0 perfofire boards' flame resistance is considerable high. Due to higher resistant inner core structure, the spread of flame and smoke generation are prevented.

At the end of the 10th minute, inner board feature is not deteriorated, the flame is not permitted to go forward.





Mdf - B Class (Flame Resistant)

It is observed that boards with inner core structure Mdf B Class are blazed in 5 minutes.

At the end of the 10th minute, spread of flame has gone towards inner layer from the outer layer and initiated the smoke generation.





Mdf - D Class (Standard)

It is observed that boards with inner core structure Mdf D Class are blazed rapidly.

At the end of the 10th minute, along with intensive smoke generation, deteriorations and dropping have begun in the inner layers.



COLOR CHART

Dantela Veneer Samples

Lace coverings are produced upon the painting of wooden fibers with special techniques as the fibers are restructured. Rift cut are the copies of each other at each sheet. Thus, more homogeneous and regular wooden textures are created. Lace covers are applied to the boards upon natural wood siding technique. Following the siding, they are applied three layers of filing by the polishing machine, whereas the last layer is applied mate or brilliant polishing.





Crown Cut White Birch





Crown Cut Limy Oak



Rift Cut White Birch



Bamboo



Bird Eye



Crown Cut Oak



Teak



Crown Cut Walnut

Ebony

Wenge

Natural Veneer Samples

Natural coverings are obtained by being cut from the wooden ingots. The amount of covering to be received corresponds to the product obtained from the ingot, in relation with the size of the ingot. Due to its naturalness and as its own core pattern and color comes out from each ingot, there exists texture and tone differences at wooden surfaces. For this reason, our company which is specialized on wall and ceiling modulation works in the basis of project in order to prevent tone difference on the facades and classifies its products facade by facade thus it can minimize the tone and design differences.





White Birch Crown



Rift Cut Beech





European Ash

Rift Cut Oak



Crown Cut Oak



American Oak



Cherry





Walnut



Mahogany



Sapelle

Wenge



(HPL) Laminate Covering

It is preferred due to the hardness and durability of the surfaces. Easy maintenance is available as it can be easily deleted after application is completed. There are wooden pattern, smooth, colored or metal surfaced models available. Laminate coverings of the desired trademarks are used.

Lacquer Paint

Board surfaces may be painted by lacquer processed paint. Based on NCS or RAL codes, the colors you choose may be applied.



PANEL TYPES

Perforated Surface Models



Flat Surface Model

Ceiling



- Acoustic Panel
 Acoustic Felt
 Mineral Wool
- 4. Air Space 200mm



Perforation ratio and hole numbers of the panels refers to value of 1 sqm area.



Kod No: PF 16 x 64 x 10 mm DS1000 A=64 mm B=44 mm C=24 mm D=16 mm Ø=10 mm PR %8



Kod No: PF 32 x 32 x 8 mm DS1000 A=32 mm B=28 mm C=24 mm D=32 mm Ø=8 mm PR %5



Kod No: PF 32 x 32 x 8 mm DS2000 A=16 mm B=28 mm C=24 mm D=16/32 mm Ø=8 mm PR %10



Kod No: PF 16 x 16 x 8 mm DS4000 A=16 mm B=28 mm C=24 mm D=16 mm Ø=8 mm PR %20

Kod No: PF 16 x 16 x 8 mm DS3000 A=16 mm B=36 mm C=48 mm D=16 mm Ø=8 mm PR %16



Kod No: PF 16 x 16 x 8 mm DS2000 A=16 mm B=36 mm C=48 mm D=16 mm Ø=8mm PR %10



Kod No: PF 16 x 16 x 8 mm DS700 A=16 mm B=36 mm C=48 mm D=16 mm Ø=8mm PR %4



Kod No: PF 16 x 16 x 3 mm DS8000 A=8mm/16 mm B=28 mm C=24 mm D=8 mm /16mm Ø=3mm PR %6



Kod No: PF 16 x 16 x 6 mm DS8000 A=8mm/16 mm B=28 mm C=24 mm D=8 mm /16mm Ø=6mm PR %23



Kod No: PF 8 x 8 x 2 mm DS16000 A=8mm B=20 mm C=20 mm D=8 mm Ø=2mm PR %5

ed as 300mm x 600mm.	PF 32x32x8 mm DS 1000	
Panel images have been mode		
		10

PANEL TYPES Slotted Grooved Panels



- 1. Acoustic Panel 2. Mineral Wool 3. Acoustic Felt
- 4. Air Space 200mm



Perforation ratio and hole numbers of the panels refers to value of 1 sqm area.



Kod No: 2S 6A DS 4000 A=16 mm B=20 mm C=24 mm D=16 mm Ø=10 mm Ø2=2 mm PR %8



Kod No: 2S 14 A DS 4000 A=16 mm B=20 mm C=24 mm D=16 mm Ø=10 mm Ø2=2 mm PR %6



Kod No: 2S 30A DS 2000 A=32 mm B=28 mm C=24 mm D=16 mm Ø=10 mm Ø2=2 mm PR % 4



Kod No: 3S 5A DS 4000 A=16 mm B=20 mm C=24 mm D=16 mm Ø=10 mm Ø2=3 mm PR %12



Kod No: 3S 13A DS 4000 A=16 mm B=20 mm C=24 mm D=16 mm Ø=10 mm Ø2=3 mm PR %12



Kod No: 4S 12A DS 4000 A=16 mm B=18 mm C=24 mm D=16 mm Ø=10 mm Ø2=4 mm PR %16



Kod No: 4S 28A DS 2000 A=32 mm B=28 mm C=24 mm D=16 mm Ø=8mm Ø2=4 mm PR %6



Kod No: 4S 60A DS 1000 A=64 mm B=44 mm C=24 mm D=16 mm Ø=10mm Ø2=4 mm PR %4



Kod No: SLT 7x7 SS 300 A=35 mm B=37 mm C=28 mm D=27 mm E=63 mm Ø=7mm PR %14

and the second

Kod No: SLT 7x7 SS 600 A=17.5 mm B=37 mm C=28 mm D=27 mm E=63 mm Ø=7mm PR %28



WALL COVERINGS

Perfofire Panel Inner Layer Structure



Side Details Of The Boards





Prafix Profile Models



Prafix Profiles allows making quick and easy installation. Saves %30 time when it is applied.



WALL COVERINGS Main Carrier Profile Details



Internal - External Corner Details





Ground Start Profile Details



WALL COVERINGS Main Carrier Profile Details



Bearing Wall Cross Section Details







Bearing System Combination Details











Different Finish Details On Suspended Ceiling Wall Edges



SUSPENDED CEILINGS

Ceiling Panel Modulation Measurements



Types Of Panel Flooring



























FIRE SECURITY

Fire Standard Information For The Fire Resistant Boards

We have been serving for our customers' needs by producing various particular boards in the wooden board sector for years. The combination of the construction sector with new technologies in recent years brought along the importance attached to human life and environment. Intensive requests from our customers led our company to get focused on developing new products for fire security, thus our company has been directed to develop products with higher values in fire resistant polished products having no certificate after implementation and mdf products. Perfofire boards provided our company to take mea sures against fire as a result of intensive trials performed by our Research and Development Department.

According to construction materials legislation, the scientific results of the fire values of each material should be certified without requiring the customer's claim in this respect. Our Company has chosen Euro class test system for fire values.

European standards obliged that fire class values of each construction material should be known and led these evaluations to come forefront in each practice. Our company has been performing its board manufacture technology according to 13501-1 standard and provides CE norm standard.

Reaction to Fire Performance Specifications

- Smoke class value is defined
- S1, s2 and s3 classes are available.
- S1 represents the highest performance

B - s1, d0

S3 represents the lowest performance

Defines the main combustion class value. Defined by the letters; A1,A2,B,C,D,E,F. A1 represents the highest performance whereas F represents the lowest class.

Defines the flame droppings classes. d0, d1 and d2 classes are available.

d0 represents the highest performance whereas d2 represents the lowest performance.



Fire Classes In Various Countries

Euro Class 13501-1 Europe	DIN Class 4102-1 Germany	France Class NF P 92-507 France	Italy Class UNI 9174 Italy	UK Class BS 476 England
A1	A1	Non- combustible	Class 0	Non- combustible
A2	A2	M0-M1	Class 1-2	Limited combustive
В	B1	M1	Class 1-2	Class 0
С	B1	M2	Class 2-3	Class 1
D	B2	M3	Class 3	Class 3
E	B2	M4		
F	B3			

Buildings Having Higher Risks In Terms Of Human Life Against Fire In Accordance With Construction Laws

- 1. Health purpose buildings, hospitals
- 2. Education purpose buildings, schools, universities
- 3. Buildings, auditoriums, conference halls, theater and cinema halls for gathering purpose
- 4. Accommodation purpose buildings, hotels
- 5. Office and buildings.

Ceiling and wall coverings affect a real fire to a great extent. In crowded buildings, it should be paid attention whether the material is combustive or not, if happens; what should be its contribution to the fire in terms of energy. Generally, in indoor spaces, structural and integrated parts are full of combustive items. Furniture in the building and personal items may involve such materials probably. Designers; at the beginning stages of the projects, may pay attention to the behaviors of main inner coverings and may intervene to fire control. Perfo-fire panel systems generates extremely less poisonous gasses, thus gains time for the people in the building and the fire fighters due to its higher fire resistance feature.

Design of Fire Resistant Indoor Spaces

As the most of the materials used in conference halls and offices are combustive, the fire risk increases in such places. The important issue in crowded places is that to bring the structure resistant against flame and to provide the spectators, artists and officers to evacuate the building safely in case of a fire or emergency. Our researches show that; in case of a fire, if fire resistant materials have not been used which may provide the evacuation during the panic or deficiency of such items may lead to horrible results.

Today, fire protection and safety measures have become an important issue for the selection of building materials and created the design awareness thereof. Besides the use, function and aesthetic of the materials, fire performance is also brought to the forefront by the designers and engineers. The materials used should provide smoke control and at the same time should have limited features for smoke emission. The basic purpose of the fire insulation is to protect the human life. It is not correct to define any material as fully – non- combustive. The important point herein is to increase the duration of fire resistance of the buildings. It is important to prolong the intervention period and to assist the cooling and to provide the people there in the adequate time to escape from the building. Briefly, fire insulation is applied to minimize the damages of the fire which is a stoppable or decelerated disaster.

In the buildings, wall, ceiling and chairs and other elements should be protected during the period of evacuation or fire extinction. Under these conditions, at crowded places, materials with higher security level against fire (A2) (B) class or having adequate resistance time against combustion (F30 F60 F90 F120) should be used. If the bearing systems, columns and girders are covered by fire resistant materials, this shall provide contribution for the protection of core structure during the fire.



TECHNICAL INFORMATION



Echo Control and Frequency Design

Echo: It is the continuation of a voice in an indoor space when the source which created it is entirely disappeared. It forms upon the reflection of the environment from the surfaces which define it.

Acoustic absorber panels are used for the control of the echoed voice. Thus, the words remain unchanged and are understood in the relevant environment. Large indoor spaces have longer echoing time compared to smaller places. The reason for that is sound waves hit the wall surfaces in longer times and they return from the surfaces. Balanced and absorber acoustic surfaces used at the same place regulate the irregular sound waves coming from all parts of the room and makes feel that the sound wave has been directed to the listener in the room directly. It provides the sound to be net and comprehendible. You may consider this application as an attuning of a music instrument. If each inner space is attuned correctly, correct and comprehendible sounds occur therein.

For enabling the insulation and appropriate acoustic of separate places, walls should have been covered by thick and heavy materials. Excellent absorber materials are requested to have satisfactory absorber coefficient average. Reflective materials have zero coefficient. The impact of the absorber materials which shall be applied correctly is that they decrease the intensity of the sound and prevent the reflection.

Acoustic Absorption: It is the absorption feature which the part converted into heat of the sound spread over a body is exposed to.



Sound Emission Impact Of The Acoustic Boards Depends On The Following Criteria

a. Indoor space area: Large indoor space areas require higher emission for medium frequency sounds.

b. Indoor space's distance to the back wall: Long distances increase echoing more.

c. Mineral wood used at the rear part of the board: It increases the affect of the emission.

Emission calculations for the indoor spaces are provided by separate calculation of each surfaces and of furniture and goods therein.

If the sound does not fade quickly, it makes reflections and deteriorate the hearing conditions. Voice reflection period in a volume depends on the conditions of the spaces which limit that volume. When the reflecting surfaces are covered by materials having a higher noise absorption factor, sound wave coming from the sound source is faded by a minimum reflection. Sound reflection period is found by an empirical formula introduced by SABİNE.

Sabine Formula

T : Sound reflection period a in seconds (Reverberation)

V : Volume of the room in meter cube

A : F1 α I + F2 α 2 +....+ Fn α n (m² square of all surfaces of the walls)

- F : Areas of surfaces in meter square
- α : Noise absorption coefficient
- T : Re reverberation period should be 1-2 seconds.

Sample :

The hall sizes; 6x14 m, height: 3 m, the walls of the hall are made of material having a noise absorption coefficient of 4%. How could we calculate the noise absorption coefficient of the material to be used on the ceiling for enabling appropriate hearing conditions in the hall?

Solution:

T = {(0,16 x V) / A} T= 2-1 May Be Consider T= 2 Consider V= 6 x14 x 252 = 3. m³ 0,16 = 2 x6)}]/ 252 x14) 2 + (14 x6)2 + (3x6+0,04 {(3x14 x α 2] α 0,16 = 2x(204)]/ 252 x84+(0,04 x84+ (8,16)) /40,32 = 2 [2 α x 2) 2 = 40,32x 2 + 8,16x 168 = 24 2 α 168= 16,32-40,32 2 α 84 x2 α 0,143 α α 0.1428 = (168 / 24) = 2 α Voice absorption coefficient of the ceiling should be 0,143.

	125Hz	250Hz	500Hz	1.00Hz	2,000Hz	4,000Hz
Glass	0,35	0,25	0,18	0,12	0,07	0,04
Thin Cement Plaster	0,01	0,01	0,02	0,02	0,02	0,05
Rough Cement Plaster	0,02	0,02	0,03	0,04	0,05	0,05
Ceramic Covering	0,01	0,01	0,01	0,02	0,02	0,02
Marble Grid	0,01	0,01	0,01	0,01	0,02	0,02
Linoleum Flooring	0,01	0,01	0,01	0,01	0,01	0,01
Parquet Flooring Over The Concrete	0,04	0,04	0,07	0,06	0,06	0,07
6mm Carpeting	0,03	0,09	0,25	0,31	0,33	0,44
Thick Rug	0,02	0,06	0,14	0,37	0,6	0,65
Covered Chair	0,44	0,6	0,77	0,89	0,82	0,7
Stone Wool With A Thickness Of 5cm	0,15	0,7	0,6	0,6	0,85	0,9
Fabric Curtain (0,2 kg/m2)	0,05	0,06	0,39	0,63	0,7	0,73
Perfofire Acoustic Board PF 16x16x8 mm PR % 20 DS 4000	0,41	0,74	0,89	0,64	0,63	0,65

TECHNICAL INFORMATION

Frequency Definitions



Low Frequency

(100 Hz)

Low frequency is an effective frequency which does not feel the hardness of the walls. It hits everything on its route with the same power. A huge amount of energy hits on the wall and same amount of energy is reflected from the wall following the direction equal to the impact angle. We may relate a sound wave with water in order to clarify the concept. If we hit a handful water to the water, we see that ; intensity of the most of the water which hit on the wall loses very small part of its initial power and reflect on the other direction. It is important to know how the low frequency sound wave develops herein.

v= c/f c: Velocity of the sound in the air 340m/s f: Defines the reference frequency. v= 3.4= 100/ 340 m.

As it can be observed, low frequency has a considerable sound wave length (a considerable length in 3.4m acoustic) and this forms the main characteristic feature of the walls which have vibration ability. Example : If we consider a cyclic move with a frequency (just like a motor) the wave length shall be v = 10 = 34/340 m.



Medium Frequency

If we hit same amount of water on the wall but if we full a full bottle right now, we shall have a less impact than the previous one We instinctively know that medium frequency shall have a lower impact than the low frequency on a surface the direction of the reflecting waves shall be also completely different from the various ones as well. (as is shown in the example graphic) Assuming that medium frequency equals to 1.000 Hz, than the time wave length shall be V =0.34 = 1.000 /340 = 34 cm.

We should not forget that a medium frequency- wave length is shorter than low frequency- wave length.



High Frequency

If we continue our example based on the water spilled from a hand a bottle, we may also think to spray the same amount of water by a injection syringe. There shall be no apparent stain over the wall but it is obvious that water droplets shall pursue the ways over the surface more fast or slow by reflecting them to the directions which are completely different. Therefore, high frequency feel all burrs of the wall and move in a way which we can describe it smart wave. It follows the ways which are determined by the materials and which are formed by the structural morphologic structures of the surfaces. If we accept a high frequency as; 10.000 Hz, than

V shall be = 0.034=10.000/340 m= 3.4 cm

Frequency References



Board Properties

Reflecting Boards

Used so that the sound waves should hit the plane surface boards and return. Generally, the types of board which direct the frequency towards the people at the halls and which facilitate hearing are called the reflecting boards. No any application is made over the surfaces of the boards.



Absorber Boards

Used so that echoed or undesired noises could be absorbed. In places where resonance occurs, the sound becomes more comprehendible level due to absorber boards. Over the surfaces of the boards, various absorption is provided by applying drilling and slot operation. Absorber boards; after being perforated, are applied by putting 0.2 mm- seal fabric to the rear part, 3cm -stone wall and by leaving an air space therein.





Scattering Boards

It is a board model which provides the sound waves which hit on the board surface are scattered to separate directions. The sound is provided to be directed homogeneously and to more listener. Jointed and perforated treatments over the boards' surfaces are used to distribute the sound waves within the volume and to strengthen them.





TECHNICAL INFORMATION

When you focus on the expectations of the customers, it is easy to set priorities. Quality can be reached by taking precautions.

Our International Quality Certificates





ENVIRONMENT

Our Responsibility Against The Nature

As a result of living and environmental friendly life healthy societies exist. Providing the maintenance of variety and productivity of the biologic systems shall comply with sustainability standards.

Products used under the brand name of Perfofire are 95% natural. They are easily recycled and does not harm the environment. Inner core of the produced composite board is made of plaster and their upper covering is made of wooden material coverings. Plaster is produced by less energy compared to other construction materials. Plaster has no adverse impact on the environment and human health. It does not involve carcinogenic substance, it does not harm human health and skin. Plaster is made of a single item; gypsum.

Surfaces we use in the top layers of the boards are made of natural wooden coverings. Use of natural wooden coverings do not lead forests to get decreased but leads them to live consciously under required care and attention. Wood is the single construction material which is renewable. Wood, with its living and breathing structure, is the organic substance which is the most familiar with the human nature. Use of trees in Perfofire board production is less by %97 compared to other wood derivative boards. With the amount of wood we use for production, we contribute to the protection of the forests which are getting decreased due to excessive use.

General Environmental Information Regarding Our Products

Brand Name Of The Material: Perfofire, Fire-Resistant Acoustic Board **Manufacturer:** İsus 1932 Mobilya İnşaat ve Turizm Sanayi Tic. Ltd. Şti. **Place Of Production:** Ankara-TURKEY

Environmental Information: Selection of materials which do not involve hazardous substances against the environment and human health, which do not emit poisonous gasses when it burns, water based or environmental friendly chemical use, which does not involve chloro- fluoro carbon, with a higher rate of recycling

Wood Used: Board surfaces are manufactured from natural wooden covering leaves. Wooden coverings have FSC and COC certificates inner **Board Information:** Fiber plaster board is produced from the gypsum.

Paint and Polish Information: The paint and the polish materials we have been using are water based items. Therefore they are safe for human health.

Sawdust Wastes: Our sawdust wastes and sawdust coming out from the materials are collected by special dust collection systems. They are stored at such a level which do not harm the environment and our employees.

Fabric Information: The fabrics used have been prepared as based on the environmental approach. They are anti- bacterial and anti allergic.

Material Consumption: Cuts are made by optimization programs. Materials are prepared in the most productive manner and to have the minimum wastes.

Outages And Waste Parts: Residual wood and sawdust are used again for heat production. Wastes are used as pellet fuel.

Ecologic System: Boards manufactured provide contribution to the ecologic production.

Packaging And Transportation: Our cardboard packages and pellet materials are recycled. Pallet carriers are purchased as used material.





OUR BUSINESS PRINCIPLES

Our company has been acting in the sector for a long time as a preferred company by your distinguished customers based on advanced technology, elaborate workmanship, quality product approach and references. All our products are produced in diffe - rent technical properties and pattern according to the projects separately in line with our customers' requests.

We hereby deliver our products in three different ways to our customers and markets;

1. Material production is provided according to the measures given in the projects. They are produced in the properties given along with the assembly system in line with our customers' preferences. Materials are shipped from our factory in pallet packaged manner and with the labels.

2. Measures of the places where board applications shall be made and board models which shall provide the best acoustic performance in the relevant location are determined by our Company upon an elaborate work process. Our technical office prepares shop drawings and they are submitted to the customer's approval. The manufacture process is initiated upon the customer's approval. For the delivery of the products transportation process is organized and they are shipped to the delivery points. Our experienced assembly teams receive the products and they are assembled in a professional manner.

3. We make cutting, drilling, slot and various acoustic processes to the materials which supplied by our customers.

Manufacture Stage

Projects which have been sent along with their Cad and PDF drawings are evaluated by us carefully and are put into manufacture process. We produce solutions for your projects rapidly by the internet and we conclude your domestic and foreign projects successfully upon mutual agreement.

Our boards with standard measures and models provide economic prices and make the production fast and without any outage. You may utilize from our standard board measures specified in our catalogue your out of standard measures are produced according to your project. As regards your orders based on special measures, you are kindly advised to contact our technical office in order to learn whether your measures comply with the production prior to project design stage. It shall be useful to transmit below given information to us for your orders.

Sample : **Project Name** : Assembly Hall Application Area : Ceiling Height Board Material : Perfofire, Fire- resistant Acoustic Board Acoustic Model : Code No - PF 32 x 32 x 8mm DS1000 Thickness :13.5mm Front Surface Covering : Natural Oak Covering **Rear Side Covering** : Black Acoustic Stone Wool Seal Over Lining Fagus Covering Measure : 600mm x 2400mm Pattern Direction : 2400mm Direction Side Detail : KY6-, Solid Tree Side Band Frame polish Surface : Mate, Natural Polish Fire Class : Euro Class B-S1,d0 Assembly profile system : PX 4

SPECIFICATION PATTERNS



As the engineers and architects cannot find adequate information about the acoustic boards which provide fire security during the preparation of various projects, they face up difficulties while preparing the relevant specifications. Sometimes, when any information which are not relevant with the subject are written, some specifications may not be comprehended and these specifications may be published. Both the contractors and sub contractors may have difficulties to comprehend these texts. In order to prevent such problems, we hereby submit some specification patterns below. By changing the places of the board types and features which shall be selected within the catalogue you may form specifications according to the type of frequency and a panel model requested.

Suspended Ceiling Specification Pattern

Full Holed Model PF 32x32x8mm PR %10 DS 2000 Specification Sample Of Fire Resistant Gypsum Acoustic Ceiling Panel Which , Is Coated With Natural Wood



The properties of the board to be used on the ceilings of this conference hall are as follows; low and medium frequency board which provides sound and fire insulation together, difficult blazing, of which poisonous smoke generation is extremely limited, which does not create flame droplets, A2 - s1, d0 vamp class, fire-resistant, covered by natural wood over the plaster. Perforation rates of these boards is %10.

Due to hit of sound waves with different frequencies which occur in the hall, the resonance shall be permitted and the voice shall be heard clearly, with a total thickness of 12.5 mm plaster board covered by 1st class wood covering shall be available, rear face shall be covered by natural plaster so as to prevent it to rotate after being pressed.

At the face of the board which looks at the hall, 2000 pieces of 8 mm – diameter holes coming from the rear part shall take per 1 m^2 . No cracks or swells shall take around the holes. These deteriorate voice absorption quality and create to visual pollution. Sides of the board shall be covered with 3mm solid bay window. The distance between the centers of the holes shall be 32mm x 32mm. The back face of the board shall have been covered by Soundtex trade name acoustic cloth with a thickness of 0.2 mm. This cloth is a specific synthetic fiber and stone wool based cloth produced specially which provides contribution to the absorption of the voice which entered into absorption chamber.

For the assembly of the boards to the wall, solid wood carcasses with a thickness of 4cm shall be mounted on the wall in balance and stone wall with a thickness of 3cm having a density of 50 kg/m³ stone wool shall be placed between them. To the ceiling of which the infrastructure has been prepared in this manner prior to assembly, fire resistant acoustic boards placed over the private polyethylene 5mm - voice blocker mattress shall be connected to carcass system through hanger system or through special paneling assembly clips. Panel sizes may be; 30x120cm , 60x120cm , 60x240cm , 120x240cm .

Covering type and the pattern shall be designed as requested by the administration. The test reports, as well as accredited certificates, which indicate the acoustic values of the model to be manufactured by the contracting company should reveal that they include the same values with the frequencies given below. Below given frequency values indicate frequency and absorption coefficient values of the acoustic materials to be applied. The administration hereby requests relevant certificates.

SPECIFICATION SAMPLES

f (Hz)	α_{s}
100	0,50
125	0,52
160	0,49
200	0,56
250	0,58
315	0,62
400	0,65
500	0,65
630	0,67
800	0,62
1000	0,63
1250	0,58
1600	0,56
2000	0,52
2500	0,49
3150	0,52
4000	0,47
5000	0,48

NRC Noise Absorption Coefficient shall be : 0.60.



Natural wood covering shall be placed over the fiber plaster board with a thickness of 12.5mm, A2 s1, fire class: d0 and fire retardant polish shall be applied. The test certificates are required to be submitted to the administration, indicating that; the fire class value is B-sl,d0 Euro Class alter the board are applied wood covering. After wooden covering is applied, plaster boards shall have a thickness of 13.5 mm and shall have B-s1, d0 Euro Class incombustibility according to EN 13501-1 fire standards.

For the assembly of fiber plaster natural wooden covering acoustic boards which shall be produced in appropriate size with relevant color and samples over the carcasses which have been prepared with appropriate intervals on the ceiling and where those intervals have been filled with stone wool; total cost of all materials and loss, transportation, workmanship, horizontal and vertical handling, scaffold assembly, loading and unloading, contractor 's interest and general expenses are included , 1 m² PF 32x32x8 mm 2000 pieces of perforated with an perforation space of % 10 model over plaster wooden covering acoustic board covering work price ...

Wall Covering Specification Pattern

Code No. PF 16xl6x 8 mm DS 4000 PR%20 Fire resistant over plaster HPL Laminate covered acoustic wall board Specification Pattern



The manufacture of medium and high frequency noise absorber wall indicated on the premises within the scope of the project shall be applied on the halls side walls and rear walls. Technical properties; Acoustic boards shall have B2 incombustibility according to Euro class fire standards, poisonous smoke class shall be s1, level of flame dropping and spreading shall be d0. Laminate covering (hpl) shall be applied over the fiber plaster panel with A2 – s1, d0 – fire resistance, with a thickness of 12.5mm. The distance between the centers of the holes shall be 16 mm x 16 mm 1 m² do totally 4000 pcs. With a diameter of 8 mm hole application shall take place per 1 m². The perforation rate of these boards is %20. The back face of the board shall have been covered by an acoustic cloth with a thickness of 0.2 mm. This cloth is a specific synthetic fiber and stone wool based cloth produced specially which provides contribution to the absorption of the voice which entered into absorption chamber. The face of it which shall be adhered to the board is covered with HOT-MELT glue which has a different chemical property.

This glue melts in 100° and is adhered to the board under 120 pressure. If this temperature and pressure are not applied, the cloth gets swelled and stands up, and it is torn during the assembly and shall not be able to be used again. Pressure and temperature application should between these values. No cracks or swells should exist around the holes: These lead to parasitic sound echoing and lower quality vision. The noise absorption values of the boards should comply with the values indicated in the table given below. Boards shall vet with lamp- with a tenon, and shall be applicable where the assembly element on the wall should not be seen, with its own assembly clips.

Wall application shall be made mechanically with the clips of medium and high frequency noise absorber fire resistant acoustic boards over the existing wall surface of which the vertical and horizontal balance is perfect. For the assembly of the boards to the wall, solid wood carcasses with a thickness of 4cm shall be mounted on the wall in balance and stone wall with a thickness of 3cm having a density of 50 kg/m³ stone wool shall be placed between them. To the ceiling of which the infrastructure has been prepared in this manner prior to assembly, fire resistant acoustic boards placed over the private polyethylene 5mm - voice blocker mattress shall be connected to carcass system through hanger system or through special paneling assembly clips. Panel sizes may be; 40x120cm, 60x120cm, 40x240cm, 120x240cm. Fire resistant acoustic boards placed over the private polyethylene 5mm through hanger system or through special paneling assembly clips.

Color of the board surface covering shall be determined by the administration. Acoustic reports of the board which indicate the separate fire resistance reports and noise absorption reports for the acoustic fabric and surface covering as well as the fire resistance reports of the stone wool boards shall be submitted to the administration before the work is started. The test certificates which indicate that the fire class value of the board after being covered laminate is B-s1, d0 Euro Class should be submitted to the administration. Below given frequency values indicate frequency and absorption coefficient values of the acoustic materials to be applied. The administration hereby requests relevant certificates.

f (Hz)	α _s
100	0,49
125 160	0,61
200	0.67
200	0,87
315	0,82
400	0,86
500	0,87
630	0,84
800	0,84
1000	0,83
1250	0,81
1600	0,82
2000	0,77
2500	0,73
3150	0,74
4000	0,73
5000	0,72

NRC Sound Absorption Coefficient



1 m² price for the manufacture of the medium and high frequency noise absorber wall covering with above mentioned properties; including all kinds of material and loss, workmanship, transportation, horizontal and vertical bearings, loading- unloading, tool and instrument expenses, contractor's profit, general expenses and work scaffold.

Measure: The unit price of medium and high frequency noise absorber wall board covering is calculated over "m²".

ASSEMBLY AND MAINTENANCE

Transportation

- Handle carefully all the materials received.
- If the packets are rolled, dragged and fallen, sides of the boards may be broken or damaged.

• Materials are dispatched in packaged pallet. After opening the package, the boards should be stockpiled so that the moisture exposure should be prevented.

Construction Site Storage

• Our materials are appropriate for only being used in inner spaces and for storage therein. Packages are not water proof.

• Please do not place any other materials over the items received, do not step on it.

• Please do not place the materials under sunlight. Sun light may lead the materials to change their colors or to fade. C Surface deteriorations may occur in polished models.









Assembly Conditions

• Prior to begin assembly, it is recommended that the packages should be opened and should be ventilated at the area where the assembly shall be made and should be stockpiled horizontally one on the top of another.

• At the location where the assembly shall be made, prior to covering the walls, infrastructure installations should have been completed. Please be assured that fire, electric, sound, air conditioning, light installations have been completed.

• During assembly or handling, please carry the boards vertically, horizontal handling may lead the boards separated from each other.

• Do not let assembly to be made at un-plastered locations where glass works and flooring stages have not been completed.

• Products are manufactured by CNC controlled machines. The tolerance is ; +/-0,30 mm

• If the temperature falls extremely in the new buildings, boards either assembled or not may be harmed due to relative humidity. BY heating the building in winter shall enable the desired assembly environment.

• Natural covered wood boards may experience change of color and texture. In order to obtain the best result, color tones and vein pattern directions of the boards should be paid attention prior to assembly. We always recommend you to order additional plate in the stock. In the manufacturing processes to be made thereafter, the difference of color and texture shall be more apparent.

Use and Maintenance

• For removing dust, a soft brush may be attached to vacuum cleaner operating in lower power.

• Soft humid cloth should be used for cleaning. No detergent over 30 degree should be used for natural wood covered boards.

• Surfaces should not be cleaned with cleansers involving alcohol or ammoniac.

• Swells and deteriorations may appear in the materials in case of water contact. In such a case, boards are required to be renewed.

• Do not step on the boards, do not touch hard objects and scratch then stains.

• Wooden covered boards are affected from the sun light due to their organic structure. Their colors may be get darker in time.

• Damages occurred in the boards may be repaired by appropriate colored filling materials. If the board is damaged seriously, such boards should be replaced. Color difference shall occur in case of replacement. In such a case, board which are located in unimportant places and which are not seen may be replaced with the new ones.

DEFINITIONS

Fire

Perfofire Fire resistant acoustic board: It is a kind of board which combines its appreciation towards the human life with its product functionality, which decreases poisonous smoke generation compared to other wood boards and which provide safety against fire with its non- combustible structure .

Fires Test: TS EN 1-13501 and DIN 4102 standards classify the building materials according to their reactions against fire. These classes show the reactions of the materials against fire.

Fire classes: Indicates the spread of flame over the surface and increase of its reaction against fire and combustibility class value of the materials tested in laboratory environment.

Structural fire resistance: It is the occurrence of insulation barrier feature against heat and fire risks.

Acoustic

Frequency: Number of waves which pass over a specific point in every second.

Nrc, Noise Reduction Coefficient: The number which defines the changing noise absorption values. Hertz (Hz): Frequency measuring unit. One cycle/ circuit per second is one Hertz.

Noise Absorption: The transformation of the sound energy into heat energy while passing through a material or while reflecting or due to existence of resonance in an air space.

Noise Absorption Coefficient αw :

Noise absorption coefficient α **w**: Noise absorption coefficient is the rate of absorbed sound energy into the sound energy coming to the surface. This varies between 0 – 1. The value obtained by the multiplication of the area of a surface with the noise absorption coefficient is called the noise absorption of that surface.

Sabin: Measuring unit which defines the absorption of the sound by the surfaces. Generally, it is used for noise and sound insulation measurements. This unit is used in architectural acoustic and noise absorption coefficients of various surface materials are calculated and they are defined **accordingly. Alpha sabine aw dB Decibel:** Noise level pressure measuring unit.

Manufacture Codes

S Slot Width (mm) Α Distance Between Slots(mm) PR Perforation Rate DS Number Of Holes TD Full Hole SS Number Of Slot SP Scattering Board SLT With Slot Perforated Full Hole PF YST **Reflecting Side** KY Side Edge ТКМ Ceiling Tile Model TPM **Ceiling Board Model** PX Prafix Aluminum Bearer Panel Flooring Model PD

Legal Rights

- In the samples given in catalogue color and quality difference may occur due to printing. Please prefer your product according to original samples.
- Color and texture differences may occur in natural wood covered samples. Small samples show only a specific part of wooden texture not the whole of it.
- Products in the catalogue are introduced to our customers under the consideration of laboratory results. Our customers have the responsibility as to whether the information in the contents is appropriate or not.
- Our catalogues shall be valid until a new issue is published.
- Rights sourced from failure and printing errors are reserved.





High Fire Resistance









Aesthetics



Environmentally Friendly



Sound Insulation



Not Affected By Insects



Humidity Resistance



Recycle

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