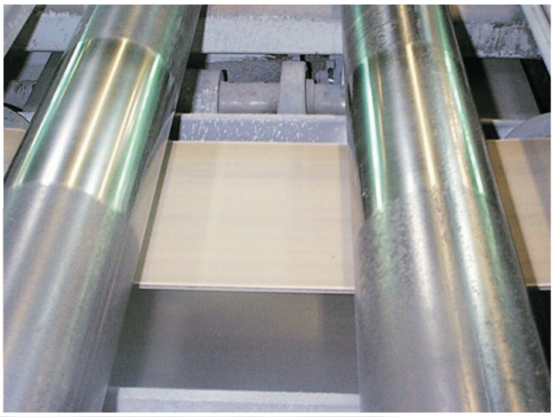
esbelt

Conveyor belts



ISO 9001:2008

Process Belts for the Manufacture of Insulation Materials

INTRODUCTION: THERMAL INSULATION MATERIALS

Heat insulation is a material used in construction and characterised by high heat resistance. Common heat insulation materials include:

1. ROCK WOOL

2. FIBREGLASS

3. GYPSUM BOARD (commonly known as Pladur® panels)

There are also other insulation elements, such as expanded polystyrene, extruded polystyrene, PU foam, and others, but these are not dealt with in this report.
Today, there are manufacturers of insulation materials in many countries, operating with a large amount of fabrics, involving a high number of conveyor belts for different processes.
The best known manufacturers of insulation materials are:

- Saint Gobain Isover	- Isobox Henry	- Owens-Corning	- CertaintTeed
- Knauf Insulation	- URSA	- Pittsburg-Corning	- Thermafiber
- Rockwool	- Glava	- Efisel	- BASF
- Platres Lafarges	- Polyglass	- Recticel	- ...

1. ROCKWOOL

Rockwool

Product Definition

ROCK WOOL (STONE WOOL): A flexible material made of inorganic fibres, consisting of interlacing filaments of stone materials that form a filter that contains air, keeping it immobile. The raw material is basalt, which melts at approx. 1,500 ºC and from which short, thick fibres are obtained.

Applications

Mineral wool is widely used and is known for its good sound and heat insulation qualities.

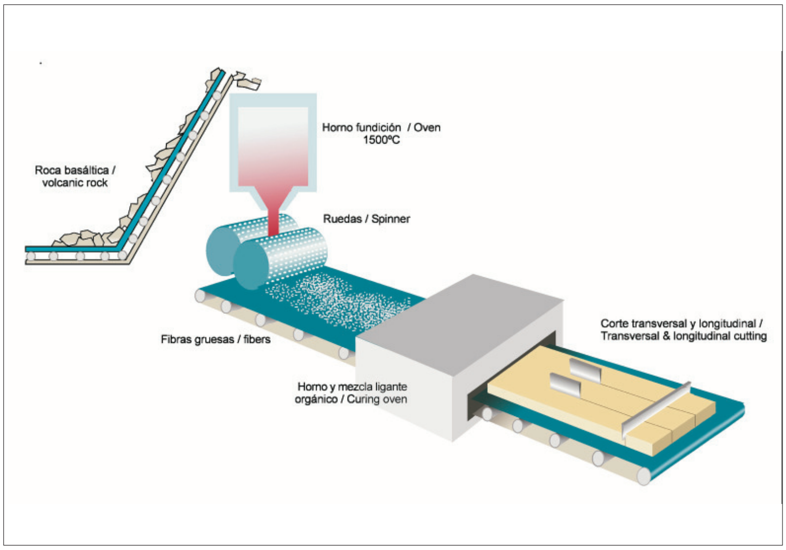
This product is used in the construction industry as fire insulation, as it can withstand temperatures of up to 700 ºC.

Rock Wool Production Line

A complete rock wool production line consists in a machine assembly that processes the material from melting to packaging.

The first stage is *POLYMERISATION* which consists of four phases:
A. Melting and Spinning.
B. Pendulum System.
C. Vacuum line.
D.Curing: chemical binding agents are added.

The second stage is the *FINISHED PRODUCT FORMATION,* which consists of:
F. Cutting.
G. Coating applications.
H. Packaging.



A - MELTING & SPINNING

The raw materials (basalt or recycled materials) are mixed and melted at high temperature in the furnace (between 1,300 – 1,500 ºC) and are poured into wheels spinning at high speeds, transforming the material into fibres through the centrifugal force.

B - FORMING LINE (Pendulum system)

This system collects the fibres from the centrifuge. Its function is to prepare a homogenous ‘mattress’ of fibres. This phase of the process uses PU belts – **BREDA 20UF** and **12UF** – and PVC belts - **BREDA 20CF** and **12CF.**

Pendulum System
- Source - Rockwool.com

Fibre orientation
- Source - Rockwool.com

C - VACUUM LINE

Its function is to align the fibres to produce the right mechanical strength. A **BREDA 12CF** is used with widths ranging from 2,200 mm to 3,000 mm and lengths between 3.8 and 5.4 m.

D - ORGANIC BINDING MIXTURE AND CURING OVEN

Small amounts of binding agents are sprayed onto the product is then taken to an oven where it is baked at a temperature of approximately 200 °C so that the fibres are properly compacted through a polymerisation process (curing).

Longitudinal cutting - Source - Rockwool.com

E - CUTTING LINE

In the cutting phase, the product is conveyed on a **BREDA 20** or **30CF** belt and is given its final form (panels, mattresses, sheets and others) through a system of lengthways and crossways cuts.

F - COATING APPLICATION

If required, different products (paper, aluminium and others) are attached to the fibreglass panels and are then taken for trimming.

G - WINDING & PACKAGING

The packaging takes place at the end of the production line, where different machines package the product. It is packaged into panels or reels for subsequent storage and shipment.

The **BREDA** series belts, used in the rock wool production process, provide excellent performance thanks to their PVC which combines resistance to chemical products with resistance to abrasion.

2. FIBREGLASS

Product definition

FIBREGLASS: Fibrous material obtained from siliceous sand or recycled glass by melting, centrifuging and other treatments, which is used as sound and heat insulation. The melting temperature is around 1,200 ºC and long, thin fibres are obtained with a lower density than that of rock wool (10 to 50 kg/m^3 compared to 25 to 150 kg/m^3).

Applications

Heat insulation and soundproofing used in the construction industry in the form of thin sheets or panels, as well as many other industrial applications, such as yacht hulls, canoes, etc, and telecommunications, to manufacture optical fibres.

Fibreglass Manufacturing Process

The complete fibreglass manufacturing line is divided into the following phases:

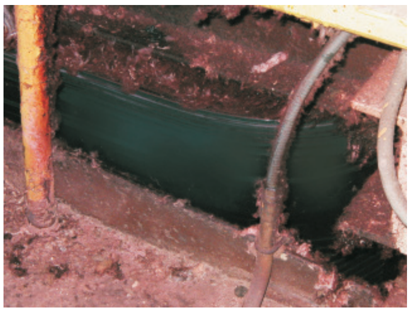
A - MELTING OVEN

The raw materials, a mixture of siliceous sand, recycled glass, etc., are sent to the furnace, where they are treated at very high temperatures (around 1,300-1,500 ºC). The melting technique combines oxygen and natural gas in order to provide clean combustion.

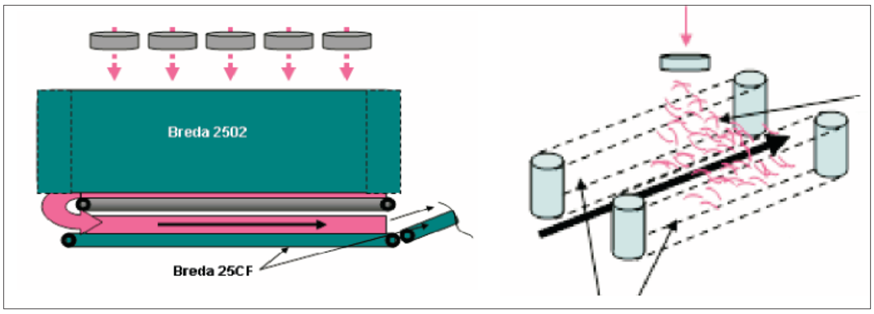
B - FIBRE PRODUCTION "SPINNING"

The melted glass, which reaches temperatures of 1,200 ºC, is distributed into channels towards the microperforated disk.
Through a process of centrifuging within the disk, the melted glass drops are pushed through micro-orifices, shaping them into fibres.

C – BINDER APPLICATION AND ‘MAT’ FORMATION



Using a spray system, a binder is added to the fibres, which is hardened with heat. These glass fibres drop onto a metal shaping belt between two vertical **BREDA 2502** belts (see drawing) known as the ‘hood wall’. Belt with K type bottom cover to protect the fabric. There are two belts per line, generally closed with RS62SS fasteners, with widths ranging from 230 to 350 mm.
The hood wall and shaping belt move continually as the mat forms.



Under this metal forming belt is the first pulling belt, **BREDA 25CF**, with mechanical joint, which then transfers to another inclined section. This conveys the mat to a metal belt that goes through the oven.
Different densities are obtained depending on the speed of the line.

BREDA 25CF *inclined conveyor to the oven.*

D - POLYMERISATION

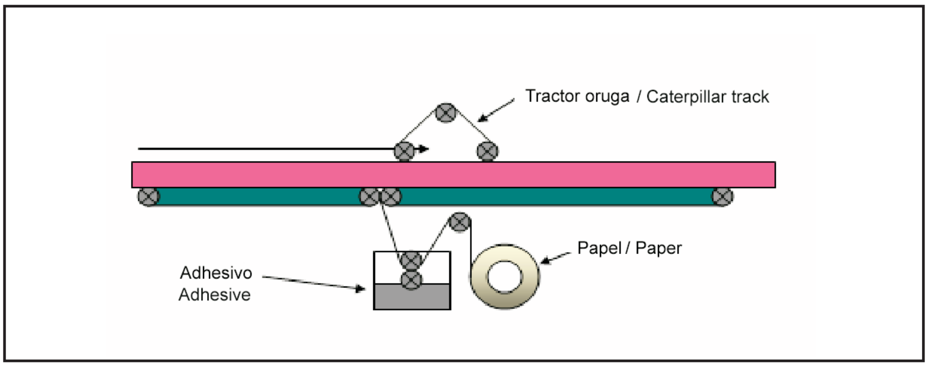
The fibres and the added binder are polymerised (cured) in an oven at a temperature of about 250 ºC, forming the product.

E - CUTTING LINE

The product leaves the polymerisation oven and goes to the cutting zone using pressurised water, obtaining different widths. The cut, wet fibreglass occasionally gets compressed, leaving bits stuck to the belt cover, possibly leading to a variety of problems (accumulation of fibres between the belt-pulley and rollers, static electricity due to the low density of the artificial fibres and loss of product). Our **HIPRO 12Y1R** has proved an excellent solution to all these problems, thanks to its antistatic qualities and its lightly embossed cover.

F - PAPER SECTION (COATING APPLICATION)

In this phase of the process, different products (aluminium, paper and others) are added with the aim of obtaining different technical products. For some types of insulation, a sheet of paper has to be stuck on one of the sides of the fibreglass mat. The drawing shows how the paper is added to the bottom with a coat of adhesive on one side, and sticks perfectly thanks to the pressure exerted by the caterpillar track fitted to the **BREDA 25CF**.



H - CROSS CUTTING AND PACKING

Finally, the product is trimmed crossways to the required size and packed in reels or, if it is rigid, in stacked panels..

3. GYPSUM BOARD

Product definition and applications

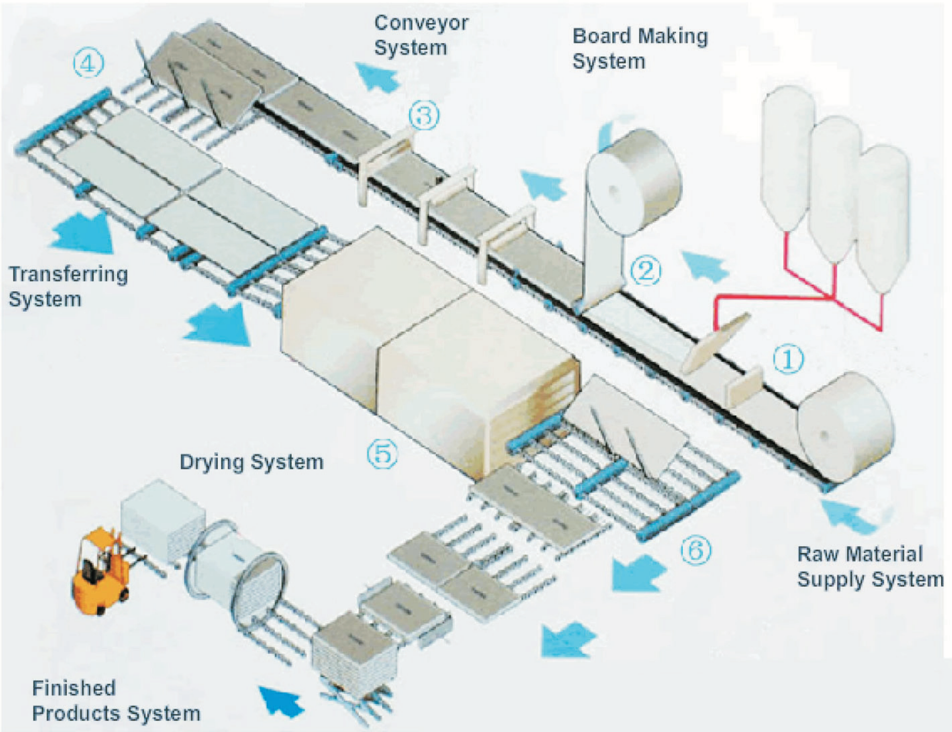
Gypsum plaster boards, commonly known as Pladur® panels, are boards made of sheets of plaster between two layers of cardboard, its components generally being plaster and cellulose.

They come in different types, finishes and thicknesses, depending on the application (interior masonry, area requiring high heat or sound proofing, decoration, etc.).

Gypsum Board Manufacturing Process

A - MANUFACTURING THE STUCCO

The plaster is prepared by milling it and reheating it to eliminate excess water in its molecules. This produces the stucco. Additives are incorporated (fibreglass, starch and others) to obtain properties such as waterproofing, heat-proofing, etc. Finally, water, soap foam and accelerators are added.
These components are mixed to obtain a final paste, known as grout.

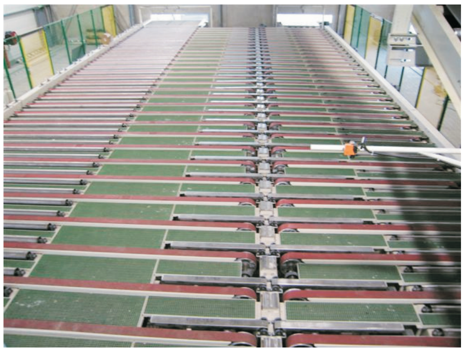


B - FORMATION AREA: PLACING THE PAPER SHEETS

The mixture is taken to the 'formation area' consisting of a continuous rubber belt which brings together 2 multi-ply cellulose sheets so that the plaster mixture is trapped between them. This conveyor is 240 m long and takes 4 minutes from beginning to end, allowing the plaster to harden and then be cut. In this part of the process, the board acquires the required width, thickness and edge shape. These conveyors use a belt with a **double CC cover.**

C - BOARD CUTTING AND TURNING LINE

Once the board has acquired a given consistency (the plaster has set), it is taken to the slitting area, where it is cut to the required size. In this process, the conveyors are fitted with the smooth **BREDA 33CF, 22CF** and **20CF** belts or the **ASTER 24QF** with a longitudinal pattern.



ASTER 24QF *at the board cutting and turning line.*

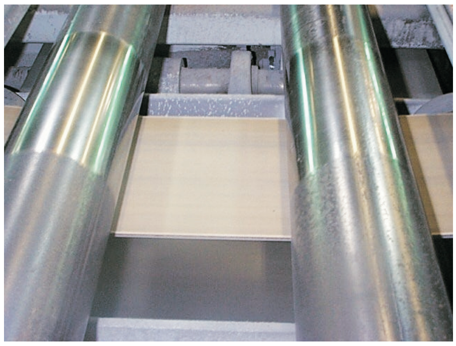
ASTER 24QF *at the transfer line to the oven.*

D - TRANSFER

The boards are taken to the transfer area, where two possible conveyor systems can be found:

-"Live roller" system using our double cover belts **ESPOT 30CC** and **40CC**.
- Parallel belt system. In this case, the **ASTER 24QF**, 6.4 mm thick with longitudinal pattern, provides excellent results.

> A major manufacturer has confirmed to us that our **ASTER 24QF** has enabled them to increase production. Specifically:
> - BA13 boards (13 mm thick). Production has increased from 70 m/min to **95 m/min.**
> - BA10 boards (10 mm thick): Production has increased from 95 to **120 m/min.**



"Live rollers system" driven by our ***ESPOT 30CC***

Different levels of conveyors with parallel ***ASTER 24QF*** *belts*

In this part of the process, the conveyors are inclined to insert the boards onto the different levels of trays in the oven. The longitudinal pattern of our **ASTER 24QF** provides the necessary grip for an inclined conveyor.

E - OVEN OUTPUT

At the oven output (350 ºC) the boards are transferred to descending inclined conveyors, which require a belt with good adherence on the cover, obtained with our longitudinal Q pattern. These conveyors are fitted with: **ASTER 24QF** or **ASTER 33QF**. Finally, the boards are rotated again, in order to group them in twos, leaving the cream-coloured side on the inside, being the external side when used for walls and ceilings, which will be painted or decorated.

F - PALLETISING AND STORAGE

The pairs of boards are conveyed using a live roller system driven by our **ESPOT 30CC** and **40CC** to where they are stacked, labelled and packaged for storage.

ASTER 24QF *at the oven output*

BELTS INVOLVED IN THE DIFFERENT PRODUCTION PROCESSES

1. ROCKWOOL:

BREDA 12UF, 20UF, 12CF and 20CF: Forming line (Pendular system)

BREDA 12CF: Vaccum line.

BREDA 20CF and 30CF: Cutting line.

2. FIBREGLASS:

BREDA 2502 and 25CF: Binding application and 'mat' formation.

HIPRO 12Y1R: Conveyance of cut, wet material.

BREDA 25CF: Coating applications.

3. GYPSUM BOARD:

ASTER 24QF, BREDA 20CF, 22CF and 33CF: Board cutting and turning line.

ESPOT 30CC and 40CC: Transfer using live rollers and palletising and storage.

ASTER 24QF: Parallel belt transfer.

ASTER 24QF and 33QF: Inclined conveyors at the oven output.

ESPOT 30CC and 40CC: "live rollers" - palletising and storage.

May 2011

Belt type	Top cover					Bottom cover			Special characteristics	Constant (intermitent) temperature °C	Fabrics		Belt thickness mm	Belt weight Kg/m2	at 20°C A ●	B ○	Working load at 1% elong. N/mm	Max. roll width mm
	Material	Hardness °ShA	Colour	Thickness mm	Finish	Material	Colour	Thickness mm			Nº of plies	Weft			∅ mm	∅ mm		
ASTER 24QF	PVC	45	Red 01	4,50	Pattern Q		Natural		◕	- 5 (-15) + 80 (100)	2	Rigid	6.40	6.90	50	80	14	2000
ASTER 33QF	PVC	45	Green 00	3,40	Pattern Q		Natural		◒	- 5 (-15) + 80 (100)	3	Rigid	6.40	7.00	150	200	20	2000
BREDA 12UF	PU	93	Green 09	0,30	Smooth		Natural		FDA EU ● ▼ ▽ □ ◒	- 10 (-15) + 80 (105)	2	Rigid	1.60	1.90	40	60	10	2/3000
BREDA 20UF	PU	93	Green 09	0,50	Smooth		Natural		FDA EU ● ▼ ▽ □	- 10 (-15) + 80 (105)	2	Rigid	2.20	2.60	60	80	18	2/3000
BREDA 12CF	PVC	82	Green 00	0,50	Smooth		Natural		▼ □ ◕	- 5 (-15) + 80 (100)	2	Rigid	2.10	2.50	35	55	10	3000
BREDA 20CF	PVC	82	Green 00	1,00	Smooth		Natural		▼ □ ◒	- 5 (-15) + 80 (100)	2	Rigid	2.90	3.50	55	75	15	3000
BREDA 2502	PVC	82	Green 00	1,00	Smooth	PVC	Green	0,70	▼ □ ◕	- 5 (-15) + 80 (100)	3	Rigid	4.60	5.50	130	150	22	2000
BREDA 25CF	PVC	82	Green 00	1,00	Smooth		Natural		▼ □ ◒	- 5 (-15) + 80 (100)	3	Rigid	4.00	4.80	100	120	22	3000
ESPOT 30CC	PVC	73	White	2,00	Smooth	PVC	White	1,0	FDA EU (Ex) ▽ ◕	- 15 (-25) + 80 (100)	3	Flexible	6.20	7.70	200	250	30	2000
ESPOT 40CC	PVC	73	White	2,00	Smooth	PVC	White	1,0	FDA EU (Ex) ▽ ◕	- 15 (-25) + 80 (100)	4	Flexible	7.40	9.20	300	350	35	2000
HIPRO 12Y1R	HPVC	75	Green 23	0,60	Pattern Y1	RC	Black	0,10	▼ □ ◕	- 5 (-15) + 80 (100)	2	Rigid	2.00	2.30	25	50	10	2000