

**MACHINES AND PLANT FOR THE PRODUCTION OF
COLOURED CONCRETE ROOF TILES**



BRIEFING ABOUT THE HISTORY OF THE PRODUCT

The historical evolution of the tiles as integrated element for roofing, go back to 5.000 years ago in China, where they were very used and produced at first with clay, better identified today as flat tiles superposed one with the other to prevent rain water with better durability in comparison with foregoing roofing systems.

More attention on clay roof tiles comes from Romans about 3.000 years after, as per shape and concept, to born a real architecture of the roof on which many evidences are today present.

The first evidences about concrete roofing tiles go back to 1844 in Bavaria (Germany) and they were produced manually, craft level by pressing device without any colour and realised, as per aspect and finishing to be used mostly in mountain areas.

Not until the yearly 1900's the concrete roofing tile was introduced as a product and its real history started. A new production concept was adopted introducing first machines.

Around 1940, concrete tiles were considered as indispensable roofing products introducing standard dimensions thanks to exceptional permeability and strength characteristics, creating step by step and in the next years an industrialised production technology with extrusion automated process, employing for it steel or aluminium pallets.

Today the concrete roofing tiles represent the bigger element for roof exploitation, the strong alternative to clay tiles for its impassable physic-mechanical characteristics, easier to produce, minimum costs for energy and labour requested for the production.

The large choice of tile profiles and accessories today available, and an ample range of colours and finishing are the right performance to face every exigent market demand with professionally.

CHARACTERISTICS OF THE RAW MATERIALS

The basic raw materials used for the production of coloured concrete roof tiles are easier to find and they are extraordinary valorised after mixed between those, creating an important and must popular product to grow continuously in the world.

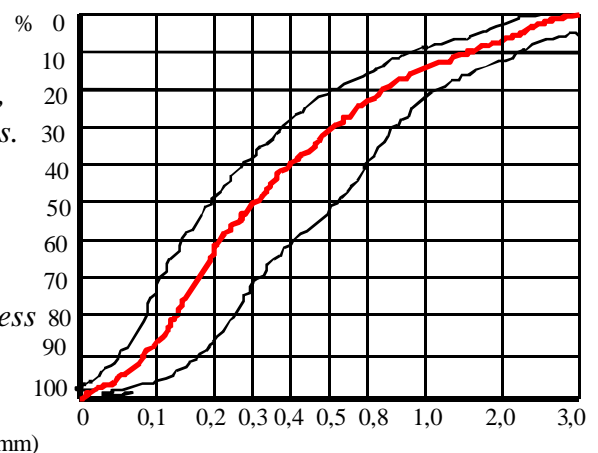
- **CEMENT:**

Ordinary Portland cement, type 325/350 M2/kg is normally recommended for the production of concrete roof tiles in general conditions. To reduce curing time and in case of production of the tiles in cold climates, rapid hardening cement type 425/525 M2/kg shall be suggested.

- **SAND :**

The recommended sand for manufacturing tiles should be particularly prepared in right granulometry, preferable to use river sand, washed and free of excess clay and lime

The ideal granulometry of the sand shall be selected between 0,1 mm and 3 mm (max. 4 mm), to obtain a linked structure, especially resistant between particles to perform good close surface finish without porosity



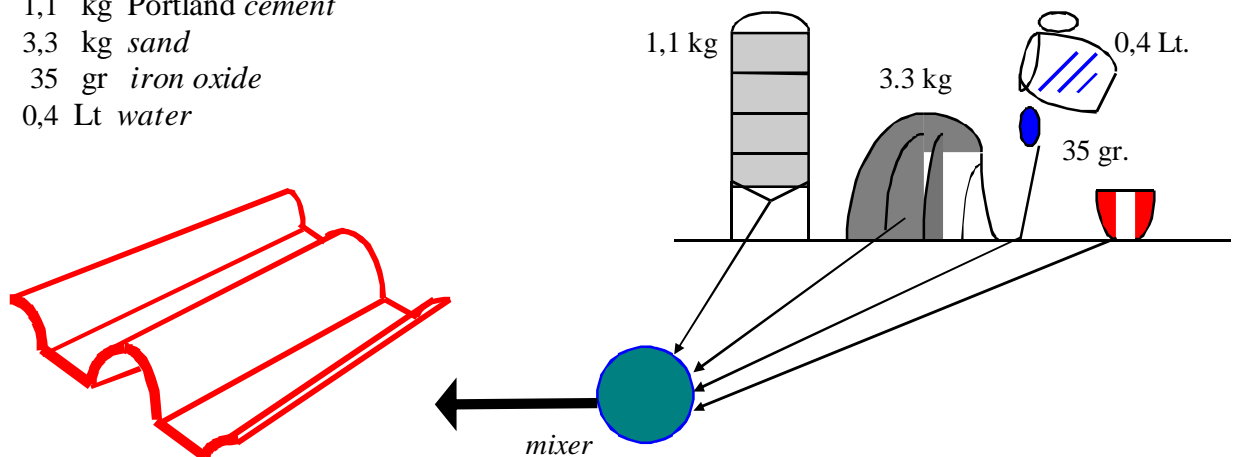
- **COLOUR:**

To have coloured concrete in order to simulate natural colours and similar to clay, iron oxide pigments shall be used to obtain every variety of colours, with exception for green colour (coming from chromium oxide) and blue (coming from cobalt oxide).

Iron oxide shall be added to cement directly in the mixer, in the quantity variable between 2,5% and 4%, depending on the intensity of colouring desired.

• REQUIRED QUANTITY FOR MANUFACTURING A TILE “DOUBLE ROMAN” PROFILE:

- about 1,1 kg Portland cement
- about 3,3 kg sand
- about 35 gr iron oxide
- about 0,4 Lt water



- **STANDARD DIMENSIONS:** 330 x 420 mm
- **THICKNESS :** about 12 mm
- **COVERING:** 10 tiles per sqm
- **WEIGHT :** about 4,6 kg each
- **CORRESPONDENCE :** “BRITISH STANDARD”
- **DEMOULDING OIL FOR PALLETS:** about 8 gr. per tile

• FINISHING

a) By our exclusive acrylic paint type “TP PAINTILE 630”, sprayed on fresh and dry tiles; to economise, the application of acrylic paint shall be made on dry tile only.

- effect : coloured or transparent plastification
- quantity: about 15 gr for each coating

b) By coloured slurry (paint composed by: 2 parts of cement + 1 part of water + 5% of cement quantity of iron oxide + fine sand in low proportion) only sprayed on the top of fresh tiles before curing.

Generally the fresh tiles to be paint with slurry are coloured in the whole mass with low quantity of iron oxide in respect of the normal value, but to economise, it's possible to spray slurry on grey tiles without any colour in the mix.

To have more brilliant plastification of the surface, shall be recommended to paint again the dry tiles with our acrylic “TP PAINTILE 630 - TRANSPARENT)

- effect : orange peel
- quantity: about 150 gr for a coating

c) Growing old of the tiles :

c.1 Production of tiles coloured in the whole mass, adding no-regular second colour tonality directly in the extruder.

Finishing suggested by our acrylic paint “TP PAINTILE 630 - TRANSPARENT” sprayed on the surface of fresh and dry tiles or, economising, only on dry tiles

- effect old tiles brilliant or satined

c.2 Production of coloured tiles in the whole mass with low percentage of iron oxide, then the tiles shall be sprayed with coloured base slurry and, subsequently, with second colour slurry sprayed irregularly and in no-continuous way on the top of fresh tiles before curing.

Finishing suggested by our acrylic paint “TP PAINTILE 630 - TRANSPARENT” sprayed on

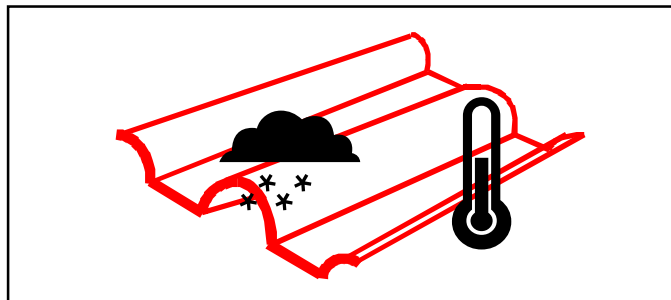
*the surface of dry tiles.
- effect : orange peel brilliant or satined*

CHARACTERISTICS OF THE TILES

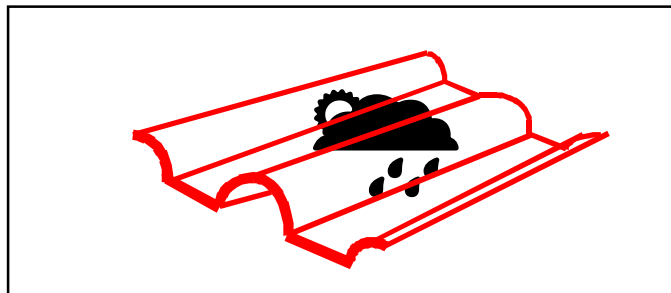
The concrete tiles represents, without any doubt, the basic element and the must evolved product from the point of view of technological-functionally used for the roofing

The concrete roofing tile has proved to be the most popular form currently used in the building industrialisation in the world.

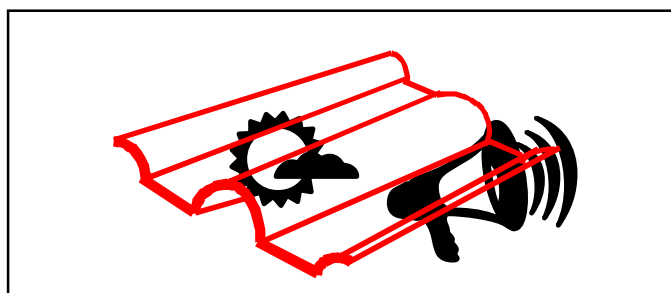
The following are just some of the reasons why the success of concrete tile as the ideal solution for roofing.



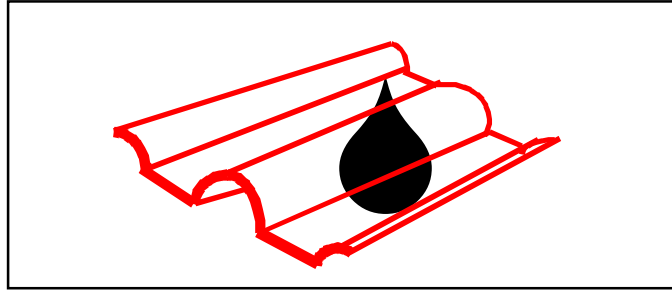
Frozen resistance: the concrete tile is capable to from the action of ice degradation



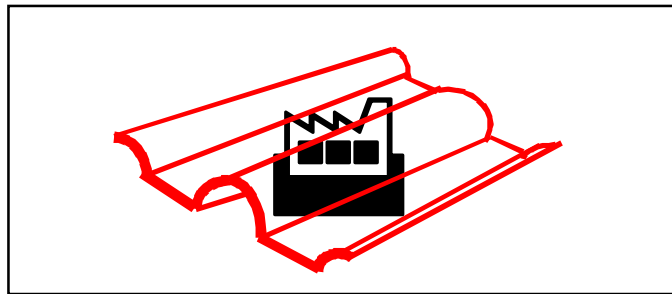
Waterproof: the concrete tile offer full protection for water permeability under rain action



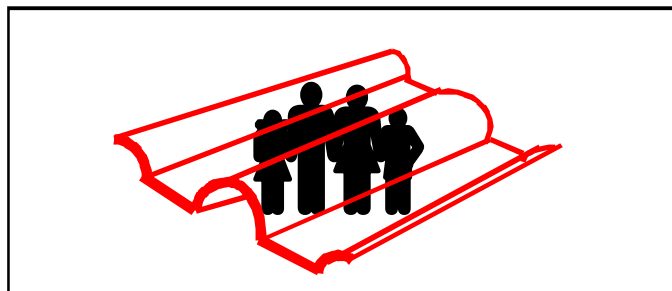
Insulation: the air space beneath a tile act as a very good thermal and acoustical insulation property



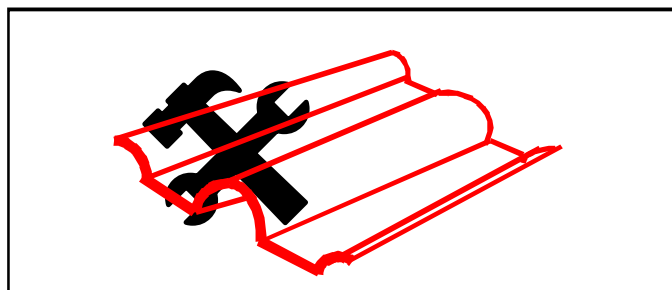
Weatherproof: the concrete tile offers full resistance, damages, against the actions of natural or artificial agents



Resistance to aggressive agents: the tile offers full resistance, without damages, against the actions of electrochemical corrosion



Strength: the tiles, thanks to strong flexion strength grade, can be walked and can resist to weight and crash



Maintenance: the concrete roof tiles are usually free of maintenance for the live of them

THE MANUFACTURING PROCESS

The mix, suitable for the production of concrete coloured tiles, is prepared by batching and mixing plant of necessary raw materials.

Water and iron oxide in powder (pigments) are added in the required quantity directly into the mixer.

When mix come ready to use, shall be delivered to extruder that provides, by “press-extrusion” process made from forming roller and pertinent finishing slipper, to get out extruded and profiled coloured belt on flux of moulds.

A cutting system provides to cut the concrete profiled flux in the exact dimensions of the moulds, realising finally the tiles.

So that, from now, the tiles shall be transported with its moulds till the end of curing time.

The fresh tiles (with moulds) coming from extruder, are transferred to the curing racks that, a time filled, shall be transported to the curing area.

In the same time, a racks with cured tiles shall be transferred from chambers to discharging area of the plant.

The conditions and timing necessary to assure a good curing of the tiles are:

- 24 hours : about 30°C inside of the curing chambers with relative humidity of 95%
- 8 hours : about 55°C “ “ “ “ “ “

Cured tiles with its moulds are separated by a depalleter to divide tiles from moulds.

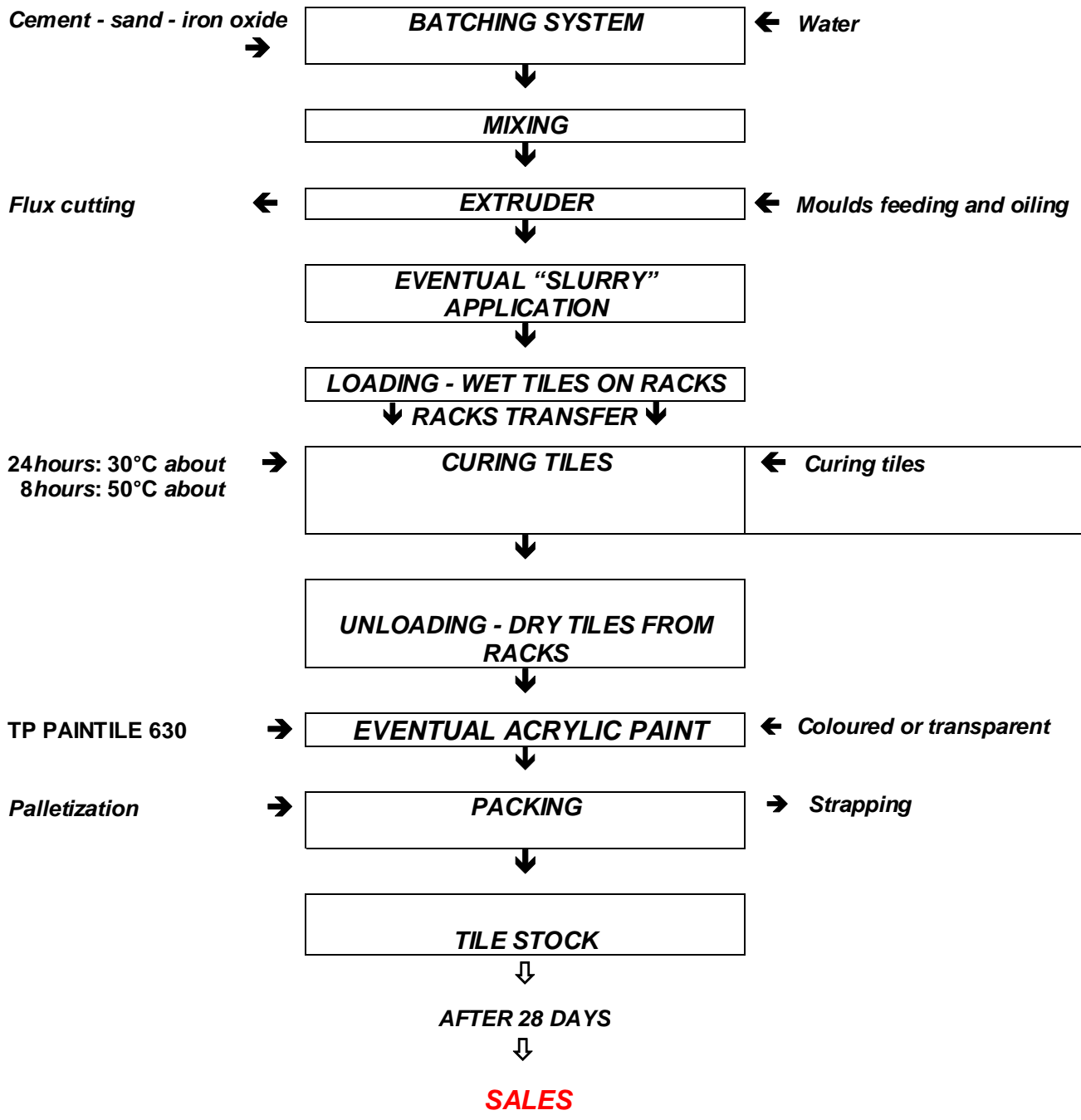
Separated tiles shall be delivered to packaging area, moulds shall be delivered to the extruder for a new production cycle, passing before entering in the extruder through to oiler to receive a coating of demoulding oil.

If request, dry tiles, before packaging, shall be painted with acrylic paint type “TP PAINTILE 630” (coloured or transparent) to have a protective brilliant coating and uniformity of colour.

The final effect of acrylic paint is like “plasticised”

If requested also, fresh tiles, coming from extruder end before curing process, shall be painted with coloured “ slurry ” to have a special effect on the top of the tiles like “ orange peel ”

In a separate area from the production of the tiles, the production of ridges and special pieces (fittings).



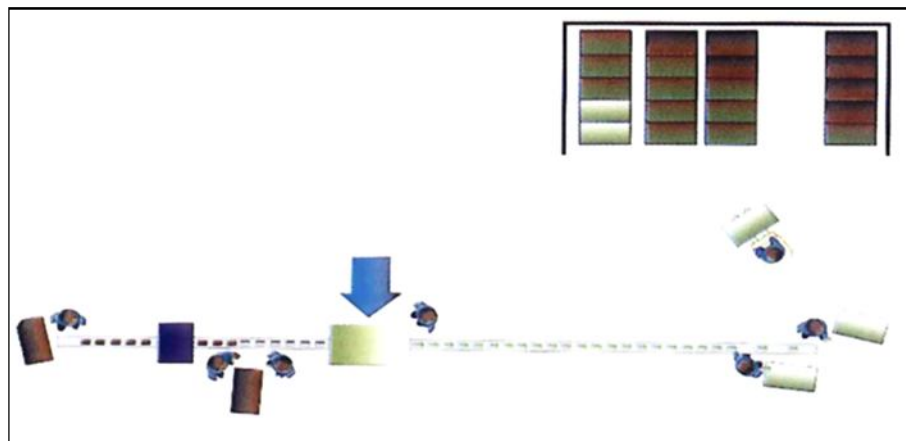
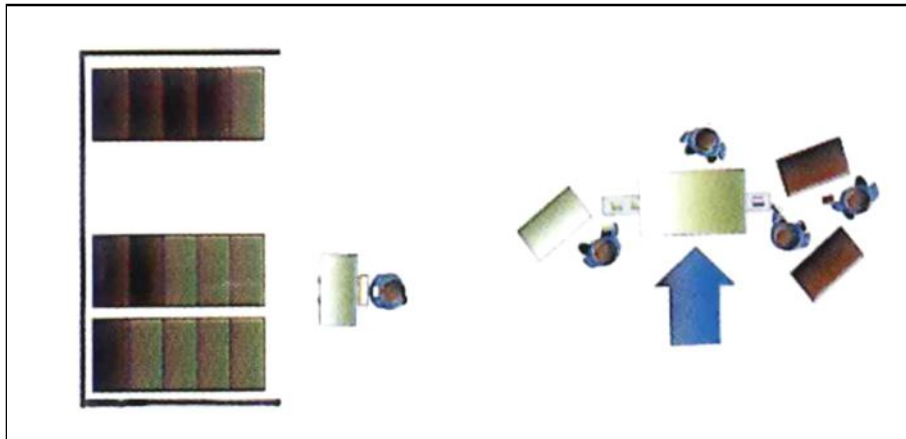
PROPOSED PLANTS FOR THE PRODUCTION OF COLOURED CONCRETE ROOFING TILES:
TILES:

TB 300

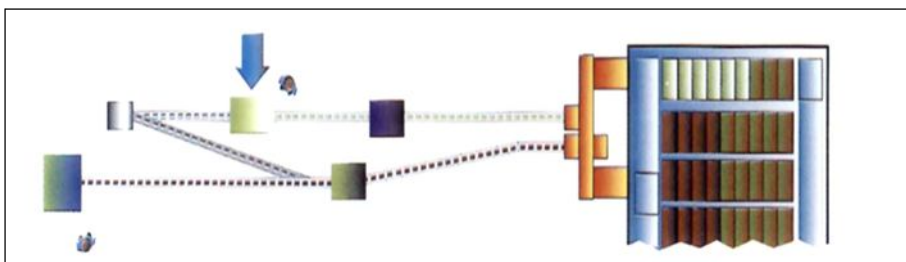
TB 600

TB 900

These machines / plants are the first interest step of production with no continuous cycle for the production of concrete roofing tiles, with capacity from 1000 to 8000 tiles per shift of 8 hours.



On demand it's possible supply high tech - fully automatic complete plants, for the production of concrete roofing tile up to **50.000 elements per 8 hours**.



Model	Type of plant	Profiles of the tiles	Capacity of the plant	covered area	Person.	Automation
			Tiles in 8 hours	m ²	par shift	
TP 300	semi-automatic	to be choose	from 1000 to 2.000	180	4/5	No
TP 600	semi-automatic	to be choose	from 2000 to 4000	250/300	5/6	No
TP 900	semi-automatic	to be choose	from 4000 to 8000	450/700	8	Possible !