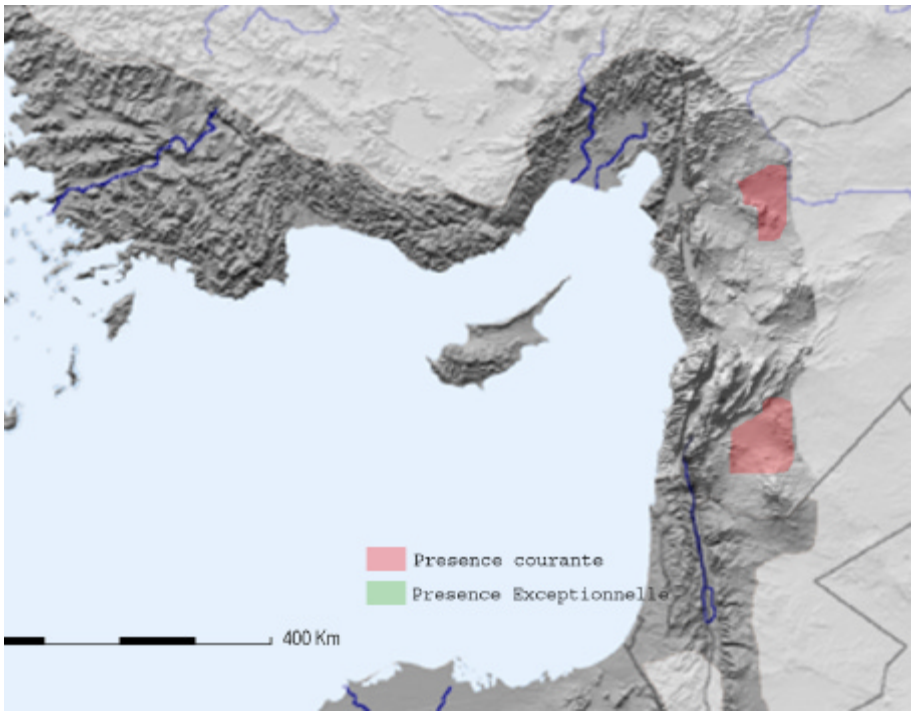
Building Techniques :

C1 – Wooden floor with wooden support, nailed or assembled

Country : Syria

PRÉSENTATION

Geographical Influence



Definition

Wooden floor with wooden support, nailed or assembled....

- Load bearing structure with beams and/or wooden joists of variable slenderness and span, according to the areas, qualities and characteristics of the species of trees used.

- Laying of nailed support (sometimes used as distribution support) laid above the joists, realised in wooden boards.

- Possible laying of a poured or hard-packed bond, constituting the layer of flooring.

- Finishing of the flooring surface, left in rough wood or with a floor covering out of ceramics or terracotta, in the case of a multi-layer floor.

Environment

Limited to 12 countries in the area: Algeria, Cyprus, Egypt, Spain, France, Greece, Israel, Morocco, Portugal, Tunisia, Syria, Lebanon and Turkey. One notes a common use of this type of floor in all types of environment, except for Cyprus: urban, rural, plain, mountain and sea side

Associated Floors:
You find them on the ground floor (when it is located above a cellar or an empty space), on the various levels of a construction, and can be used as roof terrace, particularly in Algeria, Egypt and in Morocco.
In Syria, this type of construction is common for buildings in all types of environment, with a slight difference in coastal areas and the south of the country.

Associated floors:
In Syria, this technique is used to make the floors of various storeys, and is almost standard in every sort of building.

Illustrations

General views :

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CONSTRUCTION PRINCIPLE

Materials

Nature and availability (shape in which it is found)

This type of floor is made up of:

- *a structural layer, held by the beams, joistings or log.*
- *generally the species used are local, like pine, caroubier, olive-tree, thujas or cedar.*
- *a support layer realised with boards, and possibly used as sacrifice formwork in the frame of a multi-layer floor.*
- *a layer of filling, constituting the flooring, in the frame of a floor containing nailed boards, making up a formwork. This complex is bare or associated to a layer of finishing (terracotta, plaster or whitewash...).*

1. A structural layer, held by the beams:

The realisation of the various beams takes two determining factors into account, in the MEDA area; on the one hand the quantity of forest resources, and on the other hand the nature of the species available.
The beams generally consist of joists resting or restrained in the masonry of the wall. They can be doubled by a primary structure made up of main beams, avoiding the use of intermediate posts, and ensure the large span crossings.
It should be noted that according to the areas and the types of construction, one can also use rough trunks, un-squared, to constitute the elements of a beam.
Finally, it should be noted that these type of elements are generally laid against stone walls. However, in Turkey a construction tradition of wooden panels (OTURTMA CATTI) integrates this type of

2. A support layer possibly used as sacrifice formwork:

This nailed layer is generally from 2 to 3 cm of thick and laid perpendicular to joistings.
However, they can be used as support layer, to form a surface of distribution hich can bear the weight of materials constituting the flooring.

3. A layer of filling, making up the actual flooring.

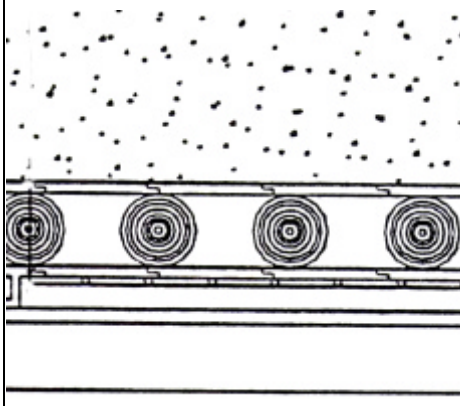
The layer of flooring consists of mortar (earth, plaster or lime, mixed with sand or other types of aggregates), hard-packed or dried earth.
The finishing of the flooring varies according to its use and the nature of construction. Left bare or covered with a simple blanket when it is located in a modest interior or under roof, it is covered with a blanket, made of terracotta or ceramic elements in the case of nobler constructions.
In Syria, this type of floor consists of structural poplar wood beams, which used to grow near cities, or cypress wood renown for its good quality, his / its endurance, its durability and pleasant scent. Another type of wood is also used, in the pine family, brought from Turkey and locally called "Ketrani". On top of the beams, a support layer is carried out with wooden boards assembled and nailed: this flooring is called "Tabak" locally. These boards are laid and carried out perpendicular to the beams.
The wooden beams can be round or square.

Modules, Dimensions, Dose ratio

Commonly, beam sections vary according to the quality of wood used, and the slenderness according to the height of the trees. Dimensions vary in section 15x20 to 8x15 cm, for spans going from 5,50 to 2,00 m. One thus finds a correlation between the span and trees, but also between the richness of building material resources, and the type of construction.
The boards constituting the floor have an average thickness of 3 cm for an average width of 15 cm. Length is linked to the distance between two centres of joist or beam.
The layer of mortar, lime or earth flooring varies according to the distances between the centres of beam, on average 0,60 cm for thickness from 15 to 60 cm.
In Syria, the dimension is 15 cm diameter for round beams and 20X20 cm for rectangular beams. They are laid on full width, plus 20 cm on each side of the wall.
The floor consists of "Tabak" boards which are an average 2 cm thick, for an average 20 cm width and 120 cm length, They are milled on the long sides, allowing the boards to overlap 1 to 1.5 cm, fastening the board system.
The thickness of earth floorings is variable, but they are carried out with an average 50 cm thickness.

Illustrations

Construction principle: general view



Construction principle: vertical section and construction

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CONSTRUCTION PRINCIPLE (CONTINUED)

Tools

Aside from Greece and Turkey, in addition to the traditional tools of the mason (saw, trowel, hammer...) and of the carpenter, no tool common was reported by the users of this technique.
In Syria, traditional mason and carpenter tools are used for the realisation of wooden floors: a small saw to cut wood, a right edge hammer to clean the wood, a hammer for nailing, a tool to flatten the wooden surface, a milling machine and a drill.

Trades

Trades number of people necessary
In the MEDA area, this technique is generally implemented by masons .
In Algeria, in Cyprus, in France, in Morocco, in Israel, and Turkey, a carpenter, under the orders of the mason, collaborates in the realisation of the work.
In Greece and Egypt, carpenters who carry out this type of work.
The teams vary from two to five people according to the difficulty of the work, particularly during the casting of the flooring, requiring speed for a better coherence of the work.
In Syria, this type of work is carried out by masons helped by carpenters: a mason and a carpenter, someone to handle the materials, and a person to clean the wood.

Performances

Physical (span...).
The spans go from 1,00m to 5,50 m. a possible increasing of the spans varies according to countries, the slenderness and the shape of the trees used, but also according to various construction processes. One can use intermediary/main beams, increase beam section, but also multiply intermediate support or bearing points (columns, posts), arches and carpenter techniques like the "traits de Jupiter" (zigzag bonds).
In Syria, the span of the wooden beams is limited to the width of the element which needs covering. Usually, the width does not exceed 4,5 cm.
As for the wooden boards, they are 120 cm long, placed one on the other, no matter what the width is.

Thermal - Acoustic.
In the case of a floor made with nailed boards only, thermal and acoustic performances are poor.
In the case of a floor with multi-layer flooring, and depending on the nature of the casting materials used; lime, sand, earth, this type of floor offers good acoustic and thermal performances.
In Syria, this floor has good acoustic and thermal performance.
The layer of earth and mortar, 50 cm thick, constitutes good insulation.

Waterproofing, protection against bad weather (top floor)
In Algeria, Egypt and in Morocco, this type of floor is also used as roof terrace.
In this case, waterproofing is implemented on the surface, made up of an average 3cm tight mortar layer, carried out with sand, lime, crushed brick, oil and ashes. This layer can be finished with an application of whitewash.
In Syria, most floor of this type are used as terraces, and are therefore usually protected by a layer of waterproofing made of tight mortar, 2 to 3 cm: lime, ashes, crushed pottery, finished with a last polished layer, 5 cm, using the same materials.

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ASPECT, PATHOLOGY

Aspect

Finishing, associated roofing.

Commonly, beams are left bare; however throughout MEDA countries, lime washes are also used, or thrown plaster, or painted decoration.
Nailed floors can also be left bare, painted or whitewashed.
Flooring surfaces can be left bare, particularly in roof attics, rural or modest interiors. They can also be protected with a blanket of lime, or, in the case of wealthier buildings, with terracotta elements, stone floorings, sometimes even Terrazo, since the end of the 19th century.
In Syria, the finishing of this type of floor is carried out in two layers:
- A transparent layer of linseed oil which is honey colour
- Another layer of natural oil colours made with a traditional mixture with egg white.

Ageing pathology

Linked to materials and climatic conditions :

Throughout the countries of the MEDA area, we find that the main causes of deterioration related to ageing are insects, mushrooms and especially moisture. We also find damages due to a lack of maintenance, particularly in water rooms and under roof: disintegrated lime mortars and rotting of the beams.
In order to avoid this deterioration, one carries out washing with whitewash or plastering of the beams, and regular checking of the roofings for leakage or damage.
In the countries using this floor technique for the realisation of roof terrace, we find an ageing of the structure under the effect of rain and moisture, when the layer of waterproofing is not maintained.
In Syria, the main causes for deterioration related to ageing are: insects, mushrooms and especially moisture. A lack of maintenance leads to a dissolution of the lime mortars, which then add loads on the floor and causes sagging and breaking of the beams.

Linked to the technique:

Generally, ageing pathologies related to the technique are linked either to a under-dimensioning of the primary structure or to an overload of the flooring, or to the quality of the wood used.
In Syria, generally, ageing pathologies related to the technique are caused by overload on the flooring, or poor wood quality.

ASSOCIATED WORKS

Openings

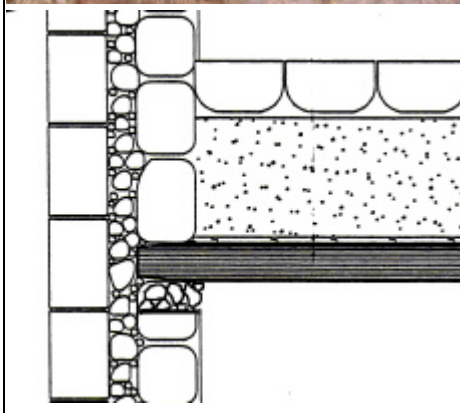
Généralement les ouvrages associés sont des trémies, destinés à assurer la circulation verticale par le passage d'un escalier ou d'une échelle de meunier.
In Syria, there is no opening reported for this kind of floor.

Connection framework - Vertical Structure (wall):

The connection with the vertical structure is carried out by embedding and sealing.
In Syria, the structural beams make up the lower layer of the floor, they are carried out over the full width of the element and penetrate 20 cm into the wall at each end, thus loading on the brick wall.
As for the boards, they do not have a structural role with the walls, except to cover the gaps and reinforce the beams.

Illustrations

Aspect: finishing, painted ceilings



Associated works: Wall - roof connection - Vertical structure (wall)

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CONSTRUCTION PRINCIPLE (CONTINUED)

REALISATION DESCRIPTION

Le maçon peut procéder de deux façons :

Méthode 1 :
Monter les maçonneries et réaliser des réserves nécessaires pour accueillir les sections de poutre puis procéder à la pose des poutres après les avoir levées au moyen de palans et poulies.
Cette technique nécessite le bourrage ou le scellement au mortier des espaces entre mur et poutres. Monter la maçonnerie et, au fur et à mesure de l'avancement, poser les poutres, celles-ci servant ainsi d'échafaudage.
Puis poser une couche servant de dalle de répartition et de coffrage perdu.
Enfin couler la dalle.

Méthode 2 :
Monter les maçonneries et réaliser des réserves nécessaires pour accueillir les sections de poutre puis procéder à la pose des poutres après les avoir levées au moyen de palans et poulies.
Cette technique nécessite le bourrage ou le scellement au mortier des espaces entre mur et poutres. Monter la maçonnerie et, au fur et à mesure de l'avancement poser les poutres, puis procéder à la pose d'échafaudage et de coffrage sous ou entre les solives.
Enfin couler la dalle, attendre qu'elle sèche et reprendre le procéder de niveaux en niveaux.

In Syria, (Text in French)

Arrivé à la dernière rangée de pierre dans le mur, les poutraisons en bois sont placées en largeur et pénètrent de 20 cm dans les deux murs porteurs avec un intervalle de 15 cm entre elles de manière à ce qu'elles soient parallèles au petit côté de la pièce.

Puis, le vide entre les poutraisons est rempli par des moellons de petit calibre pour bien fixer ces poutraisons aux murs.

Une couche de planches de bois d'épaisseur de 2 cm appelée localement "Tabak" est mise sur les poutraisons. Ces planches sont fraisées des côtés de leur longueur permettant ainsi une immixtion de 1 à 1.5 cm, ce qui aide à fixer les planches entre elles et ne permet pas de passage de terre, fermant ainsi le vide entre les poutraisons.

La couche qui compose la dalle est d'une épaisseur de 50-70 cm plus une couche de carrelage formant ainsi le plancher de l'étage suivant.
Dans quelques bâtiments les poutraisons sont couvertes d'en bas par des planches décorées nommée "Tawan" pour donner un peu de décoration à la pièce.

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Syria – Wooden floor with wooden support, nailed or assembled

USE, EVOLUTION AND TRANSFORMATION

Use

Types of building

This process is common in Algeria, Cyprus, Egypt, Spain, France, Greece, Israel Morocco, Tunisia and Turkey, whatever the type of building and social use.

In Syria, this type of floor is used for the lower elements of a building and in some large rooms, "Mourabaa". Found in various cities in Syria: Alep, Damascus, Lattaquié, etc.

This floor is regarded both as an architectural and aesthetic element.

Period when the technique first appeared. Period when the technique is in use – still used today or disappeared :

Generally these techniques are regarded as being thousands of years old.

In Syria, the use of this type of floor started for all the floors in a building around the 17th century, it was used until the early 20th century. At present, this kind of floor is no longer built, but is still used for restoration and rehabilitation campaigns.

Reasons why the technique disappeared or has been modified :

These techniques have almost disappeared today, although the know-how hasn't been forgotten, particularly in France.

This know-how was taught and used until recently, little by little ceding to the concrete techniques, whose cost, maintenance and durability compete with this type of framework.

In Syria, the emergence of cement and use of reinforced concrete for floorings and floors substituted wooden floors: all the same, it is still used in rural environments, but on a very small scale.

Evolution / Transformation

The materials

Two contemporary techniques: solid poured flooring and metal beams/segment blocks type flooring.

In Syria, wooden structural floor are still in use, but in certain case there are used with reinforced concrete floorings: wooden floors are then on top, just for decoration.

The technical aspects

The technical aspects are first the easy use of concrete and its resistance.

In Syria, electric tools replaced some manual tools.

Evaluation of materials and replacement techniques

The replacement of traditional techniques with concrete leads on the one hand to a loss of ancestral know-how, but also to a change in features. If the resistance of the concrete is no longer to be proven, it nonetheless remains a bad phonic and thermal insulator. Moreover, the combination of its rigidity with more flexible support structures (traditional masonry walls) doesn't turn out for the best.

In Syria, nothing reported besides the Mediterranean commentary.

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