



CONSTRUCTION METHODOLOGY





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group

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PART I.

**SINGLE FAMILY HOME
CONSTRUCTION SYSTEM**

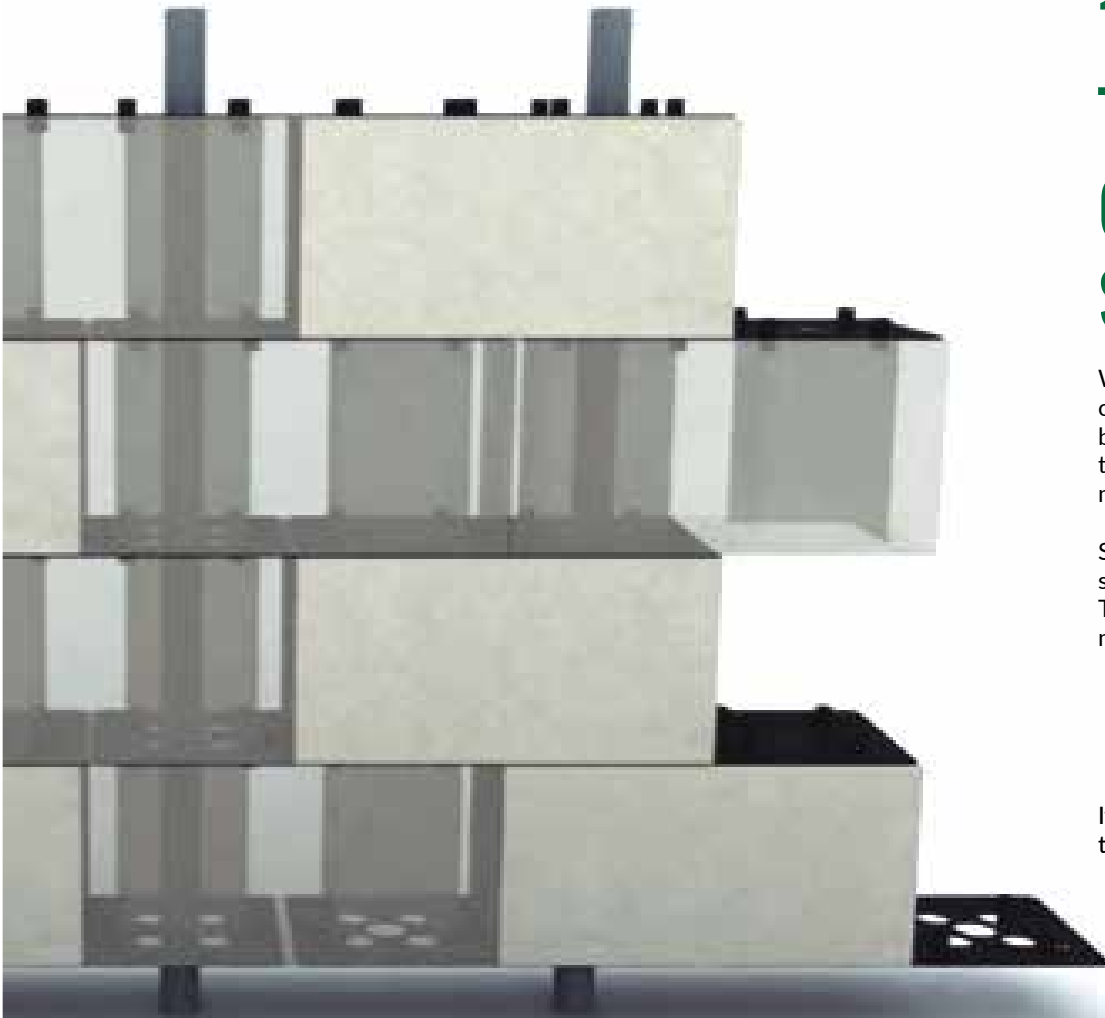
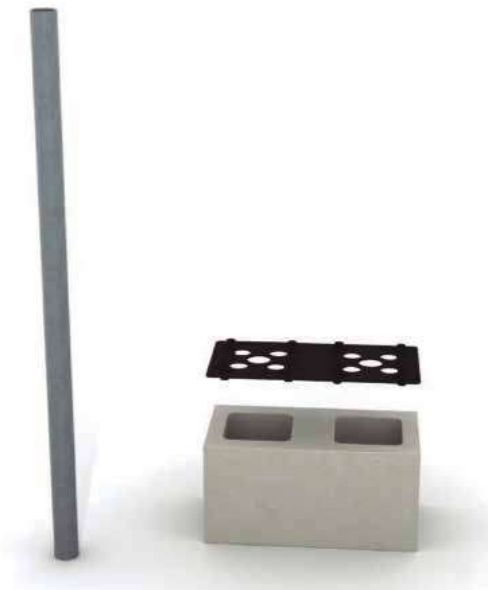
1. INTRODUCTION TO DRY CONSTRUCTION SYSTEM

We apply an innovative dry construction system consisting of the union of prefabricated concrete blocks by technicians specially designed connectors, allowing eliminate the use of cementitious mortar for joining concrete blocks.

System features or Technical specifications: assembling economic, safe, clean and, above all, fast. The system consists mainly of the following elements:

- **Technical concrete block**
- **Connector**
- **Galvanized steel tube**

It is an efficient alternative to traditional construction system or as a perfect complement to it.



2.- SYSTEM ELEMENTS

The main elements of the system are as follows:

TECHNICAL PRECAST CONCRETE BLOCK

Blocks with dimensions and special shapes, designed to ensure the perfect union between the block and the connector.

Standard parts (Length x Width x Length mm):

400x200x200
200x200x200

SPECIAL PARTS FOR ROOF SLOPE FORMATION:



The system blocks are manufactured under the quality standards CE mark (European market), offering particularly high hydrophobic properties and flame retardants terms.

Additionally, these blocks can be used as load bearing blocks.

SIZE	PIECES	WEIGH
40x20x20		17,3
40x20x10		8,8
40x30x20		22
Cumbrera		9,8
HC1*		11,3
HC2*		12,8
HP1		8,5
HP2		10,7
40x10x20		10





CONNECTORS

Its design allows a very versatile modulation of concrete blocks, offering different possibilities of joining both vertically and horizontal level. Its various openings facilitate the assembly building structure and the channeling of the various facilities for conditioning it.

GALVANIZED STEEL TUBE

They are used for structural or functional features additional stiffness:

Structural tubes: Put together the structure of the construction union making foundation and the crowning, when the constructive application requires it.

Stiffness pipes: are those used to provide additional rigidity to the system.



3. MAIN ADVANTAGES OF DRY CONSTRUCTION SYSTEM

Great speed of execution (absence of elements such as rules, sinkers, mortar materials, etc).

System **can be fully recovered** for later use in other construction or modification of the existing one.

Great ability to **absorb vibrations and movements**.

Simplicity. Employment of **unskilled labor** in most applications.

System **self**.

Savings in supply of **materials** (No excess are generated).

Cleaning at the work area and level of waste in very low work.

Regardless of weather conditions.

No chases are made in the concrete blocks. Facilities are fully enclosed in the interior of the blocks.

Technical **connector** polypropylene is **recyclable**.

Very simple **supply of materials** to work.

Using **basic tools**, without concrete mixer truck, drawer, etc.

It is not necessary to supply electricity or water in the area of implementation of housing.

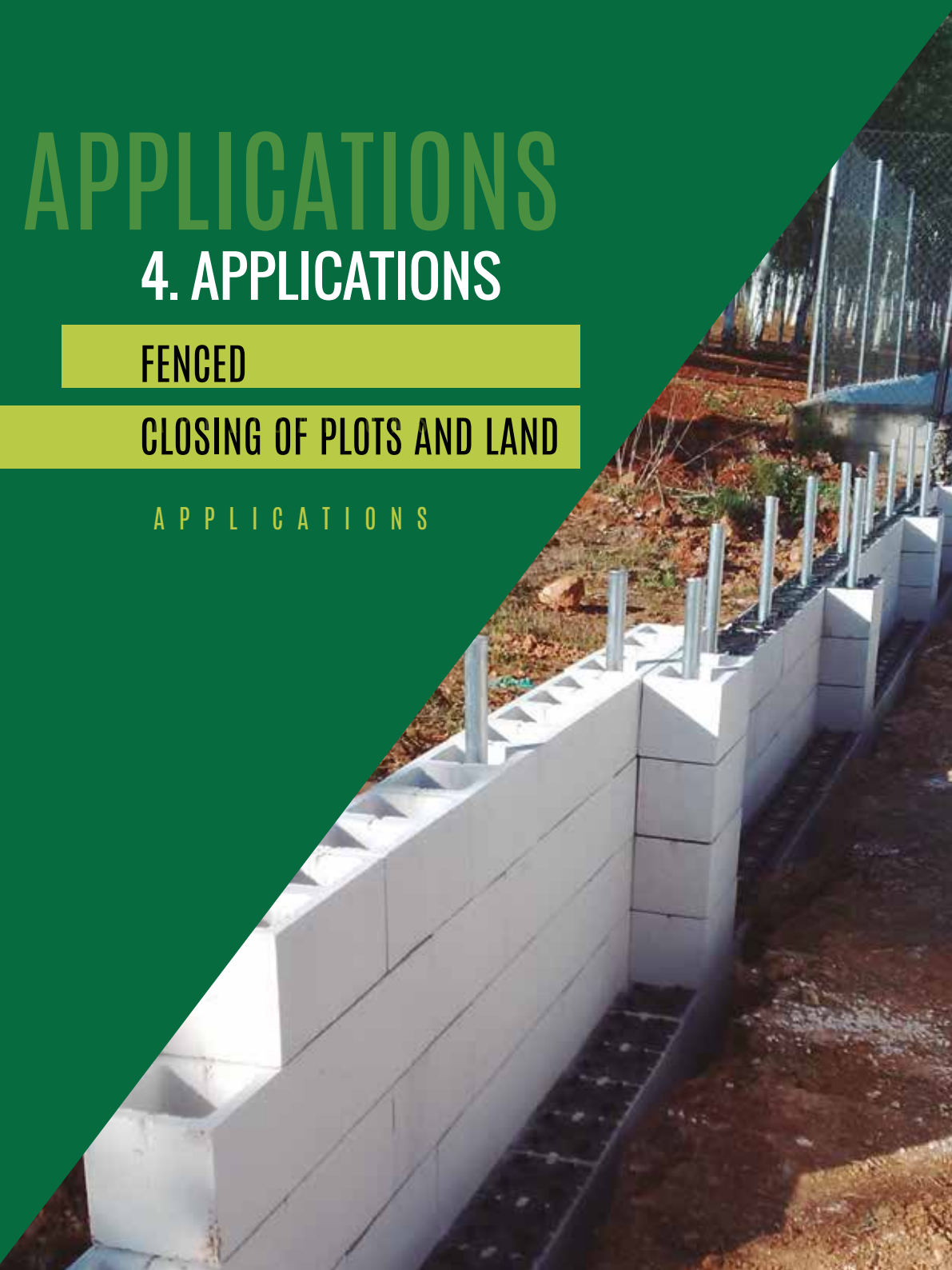
APPLICATIONS

4. APPLICATIONS

FENCED

CLOSING OF PLOTS AND LAND

APPLICATIONS





APPLICATIONS

BUILDINGS ENCLOSURE

AND INTERIOR PARTITIONS

OF BUILDINGS

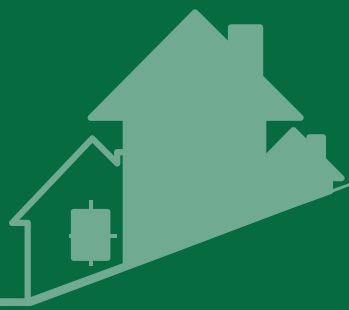
APPLICATIONS



APPLICATIONS

HOUSING

APPLICATIONS

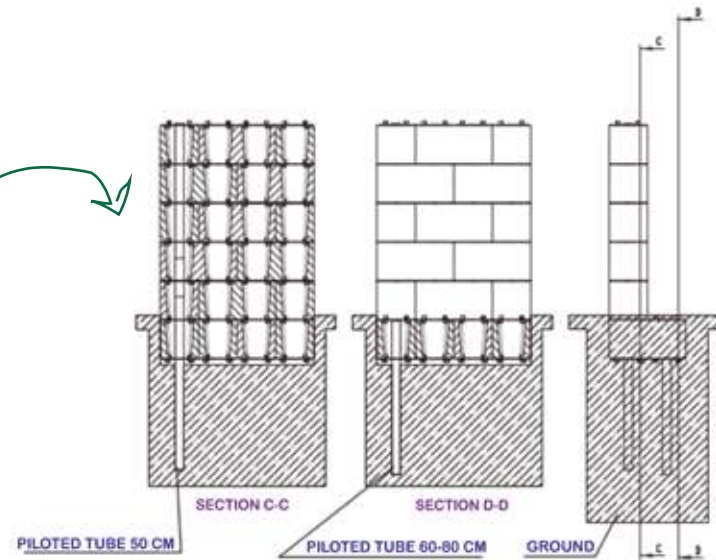


5. TECHNICAL DETAILS OF THE SYSTEM

A. ENCLOSURES / ENCLOSURES OF PLOTS AND LAND.

If the ring beams has been made with the traditional system, holes will be made in the concrete ring beams, so that in them, can be inserted metal plugs and threaded rods.

After completing the drills, concrete blocks will stack and polypropylene templates to the height of 1 meter.



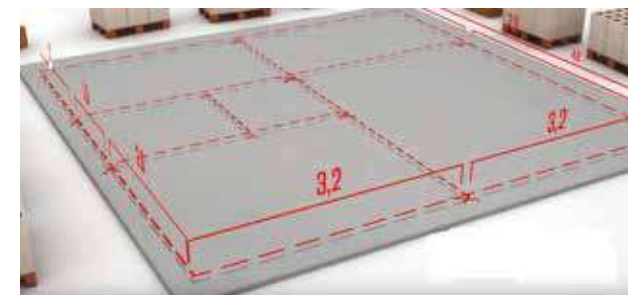
B. HOUSING

Steps:

Making the foundations of reinforced concrete thick as terrain features.

Upon completion of the concrete foundation, staking housing will take place, defining the facade and the interior layout of the house.

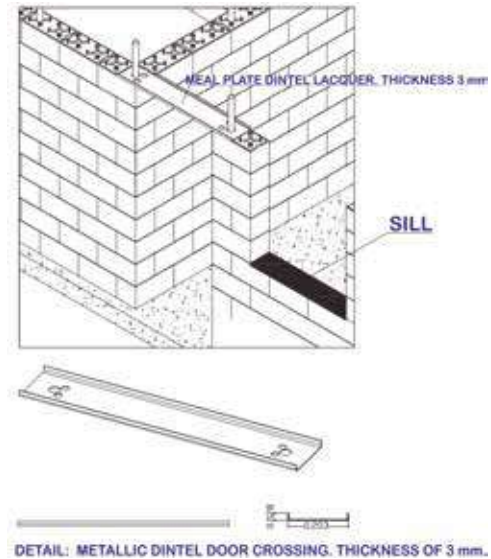
Later, it will begin to place the connector, marking where the drill will be held for the placement of the metal block.



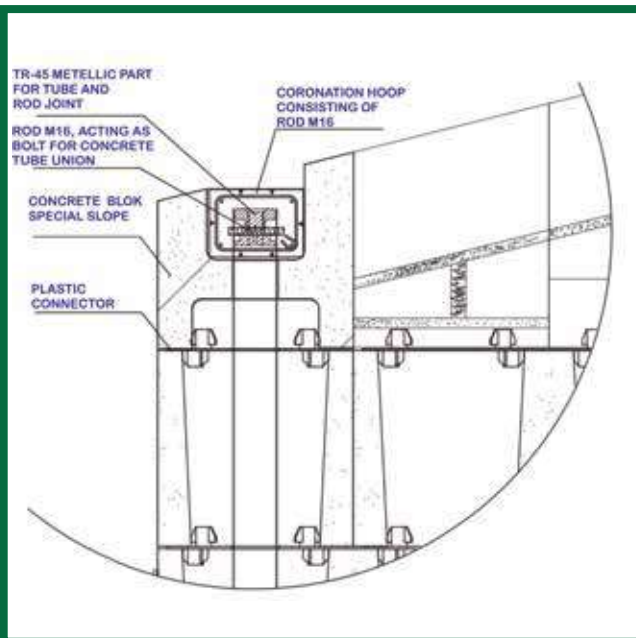
Then they are placed on the connectors the first course or row of concrete dowl.

Once the height of 1 meter reached galvanized steel tubes are inserted.

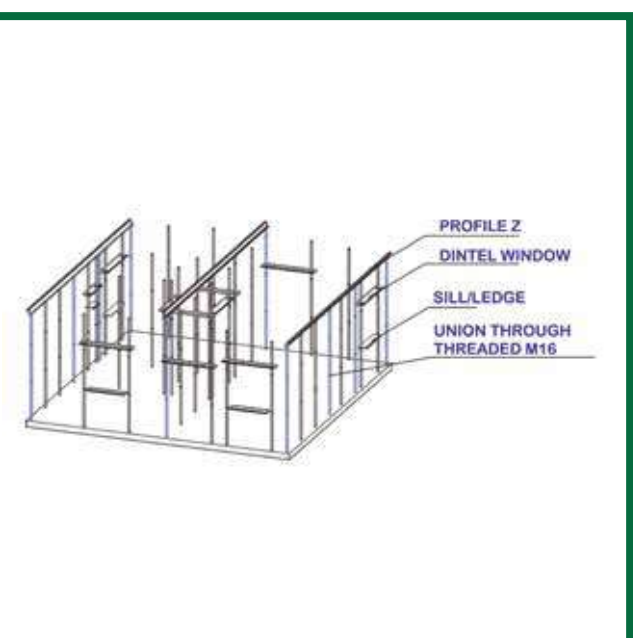
Hollow for door and window lintels by metal profiles placed in a "U".



From here, placing special cover parts will begin. Into them will be installed in the channel of special blocks, metallic profiles as "Z", which will join the galvanized pipes by 16 metric screws.

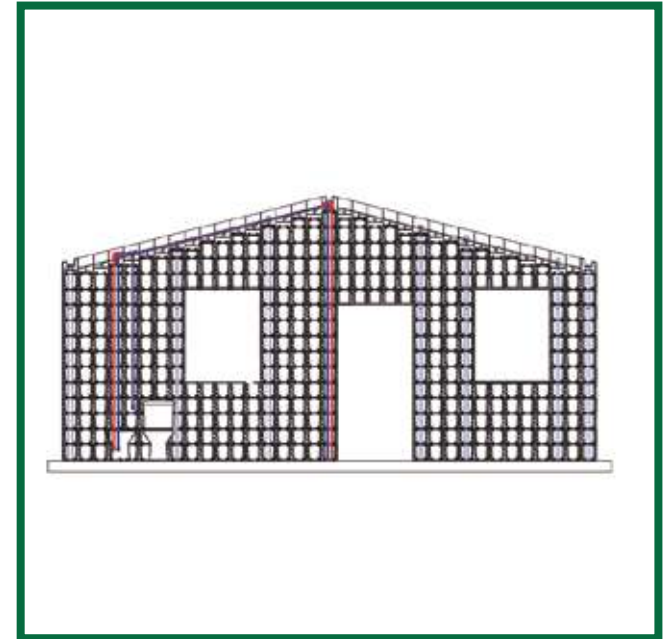


Using this profile Z, the structure of the housing is connected to the foundation of the house





Once made this union, it will begin to introduce the facilities of housing, without making any slash/chases. The facilities will be introduced vertically and the distribution thereof shall be for the housing through the enabled channels.



Should the housing requires the completion of a hoop coronation by concrete and steel rods, it will be located in the channel formed by the special pieces.



Finally, to complete the assembly of housing will proceed to the placement of window sills, roof, doors and windows.

6. LEGISLATION TO COMPLY

PIECES	TECHNICAL CHARACTERISTICS	REFERENCE VALUE	NORMATIVE/REGULATIONS
Technical Concrete Block	Compressive strength	> 6 N/mm ²	UNE-EN 771-3:2011 CE Marked
	Wicking	< 4,2 g/m ² . s	
	Absolute Density	2125 kg/m ³	
	Apparent Density	2148 Kg/m ³	
Block Fast System	Hard Impact	no breakages happen under an energy of 20 J	DITE 034 Guide ISO 7892:2012
	Soft Impact	no collapse, cracks, marks, happen with an energy of 20 J	
Technical Connector Polypropylene	Shear Strength	< 1,7 N/mm ²	CE Marked
Galvanized Steel Tube	Standar	-	UNE EN 10219
TR-45 metal part for joining galvanized tube and rod	Tensile Strength	18 kN	Test according to IT-39 procedure



PART II.

**RESIDENTIAL BUILDINGS
CONSTRUCTION SYSTEM**

1. CONSTRUCTION SYSTEM FEATURES

Construction system consists of a framework of profiles made from galvanized steel sheets of reduced thickness by cold forming.

these frameworks as panels, floor by floor, anchoring the lower sills, to the lower floor and the upper sill to heaven and upper floor are used.

These frameworks are then covered with plates of coatings, fiber cement sheets to the outer side, and plasterboard 'Plasterboard' or silicate plates inside and insulating side as rock wool or EPS, separated with a vapor barrier, bolted to the uprights and sills, thereby forming a building system 'dry', therefore differs from the traditional 'wet' masonry construction.

Its thermal and acoustic insulation makes it suitable for any climate, significantly reducing energy costs for heating and air conditioning.



2. ADVANTAGES OF THE SYSTEM

- Increases quality.
- The system allows the realization of any distribution of housing / building.
- Better quality control. Can be checked the quality of the materials previously, during and after the execution of the work
- Economic and runtime savings,
- Reduce dependence on a skilled workforce to achieve the final result expected.
- Be able run out the work with any type of material.
- Use sustainable construction systems.

3. ADVANTAGES OF THE SYSTEM

1. Lets adapt housing to the cultural specificities of each region.

- No limit on the distribution of housing.
- In one story homes structure is dimensioned to build a second plant in the future.

2. The cost of housing is cheaper.

3. Does not require skilled manpower for construction. Allows even the “self”

4. Improved insulation and this increases the comfort for people and decreases the energy cost of housing. We increase the external wall insulation to reach a thermal transmittance of 0.22 W/ m², improving the standard 4-fold (0.82 w/ m² CTE).

5. Decrease the duration of the work. The obvious advantages that this feature brings to reduce workplace accidents, and forward delivery dates.

6. No water is needed for construction. We saved 90% of the water needed to execute the work .

7. It reduces energy consumption and reduces CO₂ consumption by over 40%.

8. Improves performance in relation to earthquakes.

- The structure shared by load bearing walls around the perimeter of the walls.
- Mechanical joints gives greater security and flexibility to the buildings.
- Buildings are less heavy.

9. We increased fire protection to the exterior and interior walls using specific materials to prevent fire.

10. Does not generate waste to work.

11. It reduces noise pollution during construction. Also important values are achieved with sound insulation in exterior and interior walls.



ADVANTAGES OF THE SYSTEM

4. MATERIALS OF OUR SYSTEM:

4.1 INTERIOR



SILICATE PLATES

Product Application: Its use is recommended for internal partitions and/or suspended ceilings

MATERIALS

Concept	Value	Unit
Density	≤ 1100	kg/m ³
Dilatation Movement	≤ 0.20	%
Thermal Expansion (-20+80°C)	≤ 3.5 x 10 ⁻⁶	m/ m-k
Thermal conductivity (λ)	≤ 0.30	W/(m-k)
Water Absorption Capacity	≤ 60.00	%
Humidity Absorption Capacity	≤ 2.00	%
incombustibility	clase A	
Dry mechanical feature	flection	≥ 9.0 Mpa
	traction	≥ 7.0 Mpa

4.2 EXTERNAL



FIBER CEMENT PLATES

Product Application: Its use is recommended for internal partitions and/or suspended ceilings

MATERIALS

Concept	Value	Unit
Density	≥ 1.40	g/cm ³
Thermal Conductivity	≤ 0.45	W(m-k)
Water absorption capacity	≤ 28	%
Humidity Contents	≤ 10	%
Humidity Dilatation	≤ 0.25	%
Water immersion Swelling	Not observed	24 h
Incombustibility	A class	
Dry flection feature	≥ 20.0	Mpa
Traction	≥ 15.0	Mpa
Wet flection feature	≥ 15.0	Mpa
Traction	≥ 10.0	Mpa
Extraction resistance	≥ 110	N/mm
Impact resistance	does not crack after impact	

Physical Properties: Very strong, resistant to the immersion under water, non-fammable, high fire-resistance, non-conducting, Sustainable product (Exists in big quantities and needs only 20% energy to produce Portland). Can be cut with chainsaw. Maintains stability even when wet.

Product Application: Proposed for building exteriors, for its durability and high fire-resistance, and also for its behaviour towards the cold.

FIBER CEMENT PLATES

The exterior fiber cement board allows, after the waterproofing treatment of joints has been completed, finishing the exterior of the building with paint, one coat mortar or cladding of any material (depending on the materials, adhesive paste or nuts and bolts and brackets will be used.)



4.3.-INSULATIONS



EXTRUDED POLYSTYRENE (XPS)

Concept	Value	Unit
Thermal conductivity (λ)	0.034	W/(m·k)
Thermal resistance	2.20	m ² K/W
Dimensional Stability 70°C and 90%	<5	%
Deformation under load and temperature 70°, 168h, 40kPa	<5	%
Absorption Total Water Immersion	<0.7	%
Incombustibilidad	E Class	
Dry Mechanical traction feature	>100	KPa
Airflow resistance (R)	0.32	kPa·s/m



GLASS WOOL

Thermal conductivity (λ)		≤ 0.36	W/(m·k)
Thermal resistance		1.80	m ² K/W
Dimensional Stability -23°C and 90%		1	%
Vapour permeability		1	μ
Incombustibility		clase A1	
Dry mechanical feature	Traction	3.88	KPa
Airflow resistance (R _s)		0.32	kPa·s/m



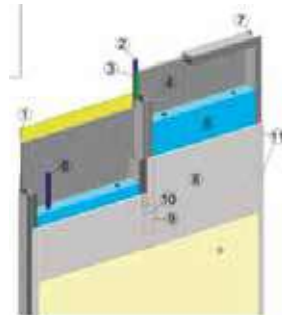
EXPANDED POLYSTYRENE (EPS)

Concept	Value	Unit	
Thermal conductivity (λ)	>0.035	W/(m·k)	
Density	>19	kg/m ³	
Incombustibility		clase E	
Dry mechanical feature	Traction	>150	kPa
	Compression	>100	kPa
	Flection	>150	kPa

5. ASSEMBLY SYSTEM

The construction system is simple and easy to assemble allowing the execution of buildings without the requirement of skilled manpower to achieve the expected levels of quality.

- 1: Rouch dressing
- 2: Butil band
- 3: Structural silicone
- 4: Fibercement
- 5: XPS (insulating)
- 6: Electrical pipe
- 7: Metallic profile
- 8: Calcium silicate
- 9: Mesh
- 10: Elastic skim coating
- 11: Screws
- 12: Painting



The profiles are 3 mm thickness, with widths of between 30 and 90 mm and heights of from 35 to 350 mm depending on the structural requirements that are subjected. The uprights can lead perforations to allow the passage of pipes and cables of the electrical installation and water.

HOUSE KIT (THERMAL CLASSIC)

Concept	Value	Unit
Steel type	S-235-JR	
Elastic limit	235	N/mm ²
lasticity E Modulus	210.000	N/mm ²
Thermal expansion coefficient (α)	1,2·10 ⁻⁵	



HOUSE KIT (LIGHT CONCRETE WALL)

Concept	Value	Unit
Steel type	S-235-JR	
Elastic limit	235	N/mm ²
lasticity E Modulus	210.000	N/mm ²
Thermal expansion coefficient (α)	1,2·10 ⁻⁵	

Concept	Value	Unit
Thermal Expansion (-20+80°C)	≤ 3.5 x 10 ⁻⁶	m/ m·k
Thermal conductivity (λ)	≤ 0.09	W/(m·k)
Thermal resistance	1.125	m ² K/W
Dimensional Stability -23°C and 90%	1	%
Vapour permeability	1	μ
ncombustibility	clase A1	
Dry mechanical feature	Traction	3.88 KPa
Airflow resistance (R _s)		0.32 kPa·s/m



ASSEMBLY

PROCEEDINGS

ASSEMBLY PROCEEDINGS



6. SLAB TYPES

Each project requires a specific structural calculation.

Importantly, the flexibility that the system has to perform MIXED ACTIVITIES using traditional construction; floor slabs collaborating with concrete / lightweight forged "dry", roofs with flat roof / "gable roof" ...

METAL SHEET

Basic material		Rules
Metal type	S 280 GD	EN 10326
Metal thickness	0.7, 0.8, 1.0, 1,2 mm	EN 10143
Protection type	Galvanized	EN 10326
Traction resistance	360 N/mm ²	
Elastic limit	280 N/mm ²	

MIXED SLAB

Nominal thickness mm.	Mass Kp/m ²	Technical Data			
		Useful surface cm ² /m	Inertia cm ⁴ /m	W cm ³ /m	Yo cm
0,7	8.15	6.41	72.86	16.55	3.197
0,8	9.32	7.33	83.27	18.91	3.197
1,0	11.61	8.70	98.89	22.46	3.197
1,2	13.97	10.07	114.50	26.00	3.197

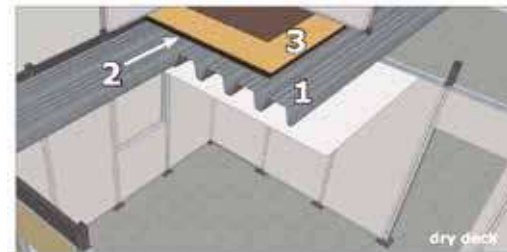


MIXED SLAB

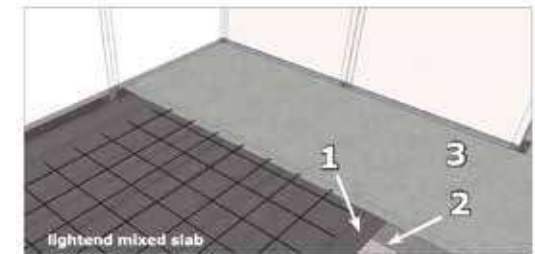
		roof inclination in meters							
		thickness	concrete mass	2	2,5	3	3,5	4	4,5
slab H=6cm	0,7	238	1200	920	640	420	280	180	
	0,8	238	1320	950	750	500	340	230	
	1	238	1370	1000	810	620	430	300	
	1,2	238	937	1060	850	700	520	370	

concrete slab	slab height H=cm			
Density 25kN/mm ³	6	8	10	12
Volume L/m ²	95.1	115.1	135.1	155.1
Mass Kg/m ²	238	288	338	388

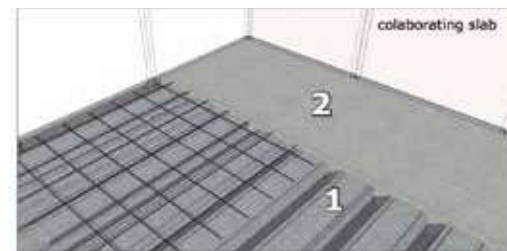
Electrical welded bar grid			
H=6 cm	H=8 cm	H=10 cm	H=12 cm
Ø4	Ø5	Ø5	Ø6
200x300	200x300	200x300	200x300
B 500T fy=500 N/m ²			



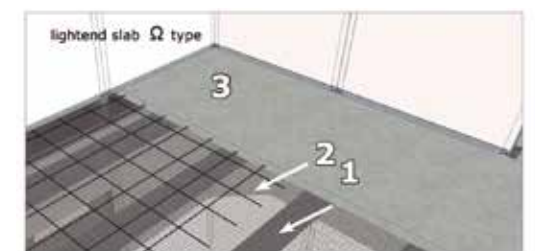
1. grooved galvanized sheet
2. acoustic membrane
3. OSB



1. grooved galvanized sheet
2. "rib lath" sheet type
3. armed compression coat



1. grooved galvanized sheet
2. armed compression coat



1. Ω type beams
2. "rib lath" sheet type
3. reinforced compression coat



15. COMPLIANCE WITH THE TBC (TECHNICAL BUILDING CODE), MANAGEMENT AND QUALITY CONTROL, CERTIFICATES, TESTS, APPROVALS.

The system fulfills the regulatory framework of the Technical Building Code, document where the basic requirements of quality, safety and habitability of buildings are established.



7. EXAMPLES OF CONSTRUCTIONS:







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