

Achievements



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INNOVATIVE CONSTRUCTION SYSTEM FOR
REALIZATION OF ANTI-SEISMIC BUILDINGS
WITH LOW ENERGY CONSUMPTION AND WITH
ELEVATED ACOUSTIC INSULATION LEVEL.

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Eps formworks for realiza tion of reinforced concrete walls with high thermal insulation level

ICF Italia is an innovative system of supporting walls which guarantees realization of anti-seismic buildings with low energy consumption and with elevated acoustic insulation level. It is the result of the research accomplished by Consortium ICF Italia. The companies that make up the Consortium are located on the national territory and stand out for great experience in realization of Expanded Polystyrene (EPS) products for construction.

ICF Italia system specifications

ICF Italia panels, due to their particular conformation and structure, allow to:

Increase the buildings' quality. The panels have been developed in order to guarantee the maximum thermal and hygrometric comfort both in summer and in winter seasons. The panels, in accordance with Decree 311/2006, offer a high level of thermal insulation, homogeneity of materials and possibility to adjust their thickness, which guarantees the absence of thermal bridges, even at intersection points. The dynamic parameters for summer season performance have been defined and the absence of interstitial and superficial condensations has been verified.

Reduce construction costs. The new ICF consists of a "standard module" which allows to solve all executive problems without any special elements. However corner elements and lateral closing elements, necessary in particular cases, are available. Geographic distribution of the consortium Companies, as well as the fact that the panels can be supplied in a version "to be assembled at construction site", allows to reduce to the minimum the overall dimensions and therefore transport costs.

Minimize waste. Vertical dimension of the panels has been determined through accurate evaluation of standard heights of buildings (floor height, openings position), therefore in normal conditions there is no waste. The panels also have a minimum punch-down modularity equal to 25 mm, so they can be quickly and precisely cut lengthwise.

Accelerate executive operations. The dimensions of the new panels are enlarged in comparison with the systems that are usually available on the market; their inner structure is characterized by double "spacers"; therefore, assembly is quicker and reinforcement rods can be positioned in a precise and easy way. Application of all kinds of finishing is simplified by provisions such as, for example, exterior surface conformation which improves cement mortar adhesion.

Meet the requirements of technical regulations currently in force. The "spacers" geometry allows to comply fully with requirements of covers and distances between reinforcement rods, as requested by Decree 14/01/08. The spacer also guarantees final positioning of reinforcements with no further on-site binding needed, and makes it possible to reinforce even "critical areas" of the wall, with stirrups spaced at less than 10 cm.

Reduce risks for workers. Law Decree 81/08 ("Security on temporary and moving construction sites") introduces important directions on the matter of risks related to building activities in the phases of construction and maintenance of the buildings. ICF Italia system reduces the number of working phases and simplifies them, thereby minimizes the risks for workers.

The structure of the new panels ICF Italia is the result of recent evolutions and updates to new construction standards; it complies with all the requirements of regulations currently in force (in Italy and Europe) referring to energy saving, anti-seismic safety, acoustics and living comfort. It is worth noting the conformation of inner spacer, which makes it the only one that allows to position reinforcement rods in compliance with new technical regulations for constructions, and to guarantee anti-seismic safety and durability of reinforcement rods at the same time. The panels' modularity (120x52.5 cm) was developed specially to reduce the waste on construction site. Materials composing the panels are certified and provided with CE marking.

In the light of offering a complete service to satisfy all needs of builders and end users, the Consortium, together with formwork ICF Italia, has developed its proper "flooring" system. It consists of modular panels 60x150 cm, made of EPS with special metal inserts which support the final structure. It is possible to assemble the panels on construction site, reducing the costs, especially transport costs, and considerably simplifying executive operations (reducing the risks for workers).

The technical staff and designers of Consortium ICF Italia offer, for each product, a specific structural analysis in order to optimize the dimensions not only for the walls, but also for foundations and floor beams.

In such a manner, it is possible to introduce considerable savings of costs for realization of buildings "in shell condition".

Technical assistance at construction site is guaranteed by ICF specialized workers who support the workforce during the main construction phases: when needed, the Consortium has available for its customers specialized teams dealing with on-site assembly of panels and assistance at casting. In each case the executors are provided with a manual illustrating in detail all construction phases.

The structure of the Consortium with headquarters located in different areas of Italy, guarantees this kind of assistance all over the national territory, without delays and without any charges.

Thermal and hygrometric performance

Interior insulation thickness (cm)	Concrete section (cm)	Exterior Insulation thickness (cm)	Transmittance (W/mq*K)	Thermal phase shift (h)	Diluting factor	Periodic thermal transmittance	Surface mass (Kg/mq)
6,00	15,00	6,00	0,262	7,910	0,041	0,011	348,60
6,00	15,00	7,50	0,235	8,037	0,037	0,009	349,05
7,50	15,00	7,50	0,213	8,177	0,033	0,007	349,50
7,50	15,00	10,00	0,184	8,428	0,029	0,005	350,25
7,50	15,00	15,00	0,145	9,102	0,024	0,004	351,75
6,00	20,00	6,00	0,261	8,727	0,030	0,008	463,60
6,00	20,00	7,50	0,234	8,851	0,027	0,006	464,05
7,50	20,00	7,50	0,212	8,988	0,024	0,005	464,50
7,50	20,00	10,00	0,183	9,237	0,021	0,004	465,25
7,50	20,00	15,00	0,144	9,909	0,018	0,003	466,75
6,00	25,00	6,00	0,259	9,698	0,022	0,006	578,60
7,50	25,00	7,50	0,211	9,958	0,018	0,004	579,50
7,50	25,00	10,00	0,183	10,206	0,016	0,003	580,25
7,50	25,00	15,00	0,144	10,879	0,013	0,002	581,75
7,50	30,00	7,50	0,210	11,041	0,014	0,003	694,50
7,50	30,00	10,00	0,182	11,290	0,012	0,002	695,25
panels "extra" version							
10,00	15,00	15,00	0,131	9,370	0,020	0,003	352,50
10,00	25,00	15,00	0,130	11,144	0,011	0,001	582,50
panels "maxi" version							
15,00	15,00	15,00	0,110	10,070	0,016	0,002	354,00
15,00	25,00	15,00	0,109	11,843	0,009	0,001	584,00

The values reported in the table derive from analytical evaluations, done in compliance with reference regulations, assuming exterior plaster and interior plasterboard thickness to be 15 mm.

ICF panels are available with insulation thickness varying from 6 to 15 cm and concrete layer thickness 15, 20, 25 and 30 cm. Particular conformation of punch-down elements prevents from concrete leakage and improves the stability during casting phase.

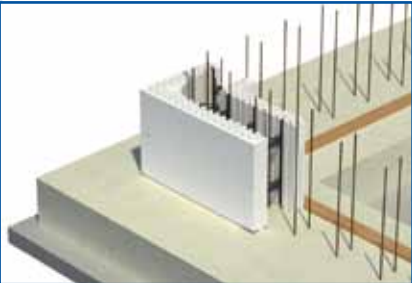
By means of simple assembly operations, ICF formworks allow to obtain reinforced or "lightly reinforced" concrete walls (in compliance with Decree 14/01/2008), already insulated, with values of transmittance varying from 0,100 to 0,260 w/mqk, depending on thicknesses, with thermal phase shift from 8 to 12 hours and with diluting factor lower than 0.010.



Construction phases



STORING THE PANELS



MAKING THE CORNER



CUTTING THE PANELS



T-INTERSECTION



MAKING THE OPENINGS



SHORING SYSTEM



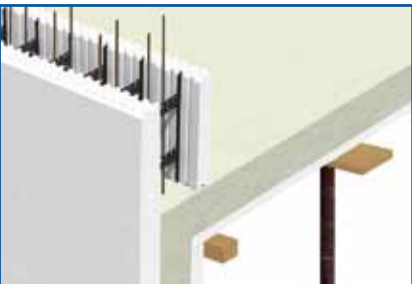
INSERTING THE REINFORCEMENT RODS



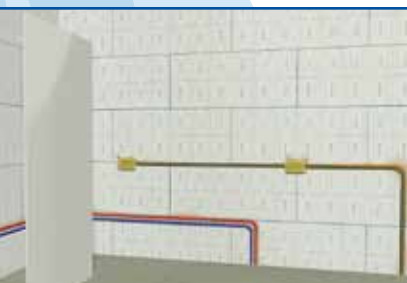
DETAIL: FLOORING-BALCONY



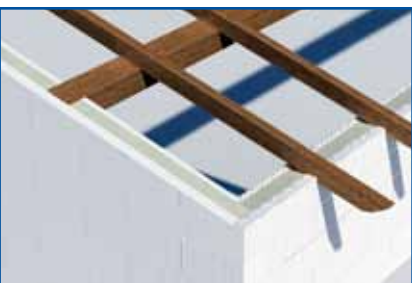
INSTALLATION OF ELECTRIC BOXES



WALL-FLOORING JUNCTION



APPLICATION OF PLASTERBOARD



WOODEN ROOFING

Following a few simple construction requirements guarantees, in conditions of normal operation, correct structural behaviour of walls realized with ICF Italia system: joints with foundations and floorings, intersections between walls and in correspondence of openings; methods of formwork rods collocation, of casting and finishing.

It is important to specify that the panels are supplied to construction site in the form of modular polystyrene elements without any structural function in themselves (as for definitions given by Decree 14/01/08: "products for construction" and not "products for construction for structural use"). To guarantee the correct structural behaviour of the supporting walls system, the panels should be properly completed by the contractor by means of integrative reinforcement rods and concrete casting.

The total amount of reinforcement rods depends on aisles and actual loadings of the building, therefore it is the designer's exclusive prerogative to determine this amount, depending on cases. Without ignoring construction requirements, practical application of ICF panels can be optimized by any executor, even if from our many years' experience, we suggests to follow our simple instructions, which favour a good result of the works.

The pictures show just an example of some specific operations, as it would not be possible, due to the limits of the present booklet, to show a complete representation of all executive phases.

We are in possess of specialized workforce, able to provide assistance (start-up) to the companies using the system for the first time.



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