SYSTEM FOR THE LIGHTENING OF BIDIRECTIONAL SLABS WITH FLAT INTRADOS

system for lightened slabs



new

FUNCTIONAL
RESISTANT
LIGHTWEIGHT

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Geoplast invites you to discover the power of lightness and to build without wasting the sources Nature gives us. In this way we sustain the future of our existence.

TO LIVE IN A HEALTHY HOUSE IS IMPORTANT BUT IT IS NOT ENOUGHT: IT MUST BE SAFE, TOO. GEOPLAST CARES ABOUT IT.

To live in a safe, healty and comfortable house, capable of resisting to any danger, is no more a dream, today this is possible! You just have to choose the right ally: polypropylene.

This is an extraordinary material, which can reduce the structure selfweight while mantaining it resistant at the same time. These charachteristics can make the difference in case of earthquake.

Compared to other materials used in traditional building, polypropylene does not absorb water, so it doesn't even release humidity over time: your house remains dry and comfortable.

Moreover, it is a recycled material that respects Nature.

Geoplast S.p.A. in Green Building Council Italy, The Network of Green Building



SUITABLE FOR:

the lightening of concrete slabs. The formwork is born from the need to combine the high performance of plate slabs with the required lightness in order to deal with the increasingly frequence of earthquakes.



NEW NAUTILUS replaces the antiquate and problematic lightenings in polystyrene and bricks to guarantee high structural performances, high qualitative standards and a perfect and homogeneous finishing of the intrados slab.



SCHOOL BUILDINGS SHOPPING CENTERS







System for the construction of lightened bidirectional slabs with flat intrados and large spans

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The slab lightening is the first step to realize a lightweight structure capable of dealing with eartquakes

lightness

The bidirectional flat intrados design allows the maximum lightening of the slab while mantaining high structural performances



NEW NAUTILUS

permits the building of slabs with up to 15 - 16 m span, without protruding elements (beams or dosserets)

versatility

NEW NAUTILUS can

A B

c be used in combination with prefabricated slabs such as predalles, or for the construction of foundation plates combinated with posttensioning systems

optimization

The combination between great spans and lighweight slabs permits load limitations over pilars and foundations and the optimization of the layout distribution of the pilars

waterproof

NEW NAUTILUS is made of polypropylene that is a waterproof element; therefore there can't be soaking issues or release of water over time

NEW NAUTILUS



	SIZES
Base	52 x 52 cm
Heights	16 - 20 - 24 cm



NEW NAUTILUS MATERIAL

Polypropylene	РР
Coefficient of thermal expansion	0.15 mm/m/°C

DOUBLE VERSION



The single formwork can be set up to be matched with another element in order to form double structures.

LARGER SLAB THICKNESS EASY ON-SITE INSTALLATION HIGH CONCRETE REDUCTION

In all elements there is a spacer tab that allows the correct distancing between the formwork.



Elements and accessories DIMENSIONAL TABLES NEW NAUTILUS







actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



SINGLE H16

52 x 52 x H16

PP

1.20

110 x 120 x H250

400

SINGLE H24

52 x 52 x H24 PP 1.50 110 x 120 x H250 400



SINGLE H2O

52 x 52 x H20 PP 1.30 110 x 120 x H250 400

actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet ************

12212222222222

Geoplast New Nautilus Evo



A lighter structure that deals at best with earthquakes

B

LOGISTICS ADVANTAGES

Steel and concrete savings permit the optimization of the building site

C

REI 120 CERTIFICATE

Laboratory report of fire resistance up to 1200'

D

REDUCED CONCRETE CONSUMPTION Reducing of the concrete consumption up to 20%

B

REDUCED IRON CONSUMPTION

Optimization of steel consumption reduced by 15% approximately

F

LOWER LOAD ON THE FOUNDATIONS

Possibility of reducing the sizes of the structure foundations



5% MORE ECONOMIC THAN

THE FULL SLAB

The sum of the descripted advantages guarantees economic savings

NEW NAUTILUS EVO



50	
['] ''	520

	SIZES
Base	52 x 52 cm
Heights	13 - 16 - 20 - 24 - 28 cm

NEW NAUTILUS EVO MATERIAL

Polypropylene	PP
Coefficient of thermal expansion	0.15 mm/m/°C

THE CENTRAL CONE



The **CENTRAL CONE** refines the traditional formwork and is born from Geoplast's building experience and structural needs. The choice to create a cone was necessary because of the difficulty in the construction of a homogeneous lower slab able to ensure all requested design and resistance charachteristics.

The main advantages improved with this formwork are:

- -High load-bearing resistance;
- Lifting reduction during the pour;
- Actual visual check of the lower slab finishing ;
- Guarantee of the completeness of the structural section;
- Homogeneous and perfect intrados finishing.



Elements and accessories DIMENSIONAL TABLES NEW NAUTILUS



SINGLE H16

52 x 52 x H16 PP 1.25 110 x 120 x H250 400



SINGLE H13

52 x 52 x H13 PP 1.18 110 x 120 x H250 400

actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



52 cm







actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



52 x 52 x H28 PP 1.55 110 x 120 x H250 400



SINGLE H24

52 x 52 x H24 PP 1.45 110 x 120 x H250 400



SINGLE H2O

52 x 52 x H2O PP 1.35 110 x 120 x H250 400



actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



actual size (cm) material weight (kg) package dim. (cm) Nr. pieces per pallet



Elements and accessories DIMENSIONAL TABLES

NEW NAUTILUS EVO



DOUBLE H40

Real size (cm) material weight (kg) Packaging size (cm) n° items per pallet







DOUBLE

H41

52 x 52 x H28+13

PP

2.73

110 x 120 x H250

200

DOUBLE

H44

52 x 52 x H24+20

PP

2.80

110 x 120 x H250

200

DOUBLE

H56

52 x 52 x H28+28

PP

3.10

110 x 120 x H250

200

H52

52 x 52 x H28+24 PP 3.00 110 x 120 x H250 200

DOUBLE



DOUBLE H48

52 x 52 x H24+24 PP 2.90 110 x 120 x H250 200

Real size (cm) material weight (kg) packaging size (cm) n° items per pallet

the upper **spacers**



In the upper section of the formwork there are uniformly distributed spacers 8mm thick. These elements allow the upper reinforcement to be placed directly over the formwork in order to guarantee a suitable concrete covering.



the side **tab**



Every formwork is provided with side spacers that allow the correct installation of the elements according to the width of the beams, which is to be calculated during the design stage. The elements are marked from 10 to 20 cm and can be hooked to the side loops.





the lower **foot**



The lower spacer feet are integral elements of the formwork: they are pressed molded with the rest of the item and allow the creation of the lower slab with a thickness evaluated during the design stage. The feet have a variable height from 5 to 10 cm.



Reduction of the **pillars number**

The guaranteed lightening of NEW NAUTILUS allows the obtainment of high structural qualities thanks to the bidirectional slab. Therefore, the creation of up to 15-16m spans is possible while mantaining a reduced weight of the slab. Moreover, compared to a full slab, the weight reduction permits the almost total elimination of protruding elements (lowered beams and dosserets). This lower flatness allows the simplification of subservices management, which will not face interruptions or difficult movings both during installation and performance.

Great spans Reduction of the slab self-weight Optimization of the pillars position







Increase of the seismic response

response of a building starts from a correct planning of the bearing structure. The construction of a firm slab whose load doesn't excessively affect the pillars and the foundations is a fundamental aspect; NEW NAUTI-

The increasing of the seismic | LUS system completes these concepts by creating a very firm bidirectional slab with a reduction of its self weight up to 20%. For these reasons **NEW NAUTILUS** system is the most successful solution for structures that will be erected in seismic zones.

Bidirectional slabs Weight reduction up to 20% Lower load on the bearing structure







Better management of the pillars

When building basement car parks or multi-storey car parks, the main aspect is the obtainment of the highest number possible of stalls. Through the building of bidirectional slabs and then lightening them with NEW NAUTILUS it is possible to create larger spans than

the traditional solutions but also to optimize the pillars position in order to create as much parking and manoeuvring space as possible. Finally there's the possibility to almost totally eliminate protruding elements, thus simplifying the subservices management.

Optimization of the pillars position Creation of large spans No protruding elements





Loads reduction

The use of NEW NAUTI- I LUS system is suitable for the construction of multistorey buildings. Compared to a full slab solution, NEW NAUTILUS allows the reduction of concrete consumption and weight of costs reduction.

of the slab up to 20%. This solution can be used in the whole building, in order to reduce the load on the pillars and the foundations. This always leads also to an economic benefit, in terms Weight reduction up to 20% Lower load on the pillars Reduction of the size of the foundations







Safety and spaces management

School buildings are the structures where prevention and safety have always to be guaranteed. Together with the availability of wide spaces for the students. NEW NAUTILUS system allows the realization of structural efficient slabs thanks to the bidirectional configuration which can easily face any seismic occurence due to the reduction of the selfweight of the slab. Moreoever, larger spans for a better space management can be easily built. Bidirectional configuration Seismic advantages Creation of large spans







An alternative to **prefabrication**

NEW NAUTILUS is the best alternative to prefabricated elements for the construction of commercial structures. The creation of lightened bidirectional slabs allows the obtainment of more its advantages.

spans up to 15-16 cm made of completely cast on-site concrete. Moreover, NEW NAUTILUS can be combined with post tensioning systems, highlighting even

Huge free spaces Combination with post-tensioning Overall costs reduction









Safety and **savings**

Hospitals are submitted to higher seismic standards because of the many people within that should be protected. NEW NAUTI-LUS is a perfect method to bestow a seismic response

on a building. Moreover, it allows the lightening of the structure mantaining even so high structural performances in order to face the huge loads typical of these buildings. Lower seismic mass High structural standards Easy subservices management







Ribbed slabs

Usually buildings erected on grounds with poor loadbearing capacity need expensive and difficult to build foundation piles. With NEW NAUTILUS it is possible to build very stiff foundation slabs which can distribute the loads on a wide surface. Therefore a structure composed by a lattice of beams between two slabs, which can reduce to the minimum the differential settlements, is created. Concrete reduction up to 20% Alternative to foundation piles High stiffness







Combination with **predalles slabs**

NEW NAUTILUS can be combined with the typical prefabricated slabs for the construction of semi-prefabricated slabs, both unidi-

rectional and bidirectional; these plastic elements avoid the polystyrene lightening that may lead to the following issues: No soaking issues Clean construction site Load-bearing capacity

Problems using polystyrene



Poor load-bearing capacity



Soaking and water release over time



Too light elements



Vents are required

INSTALLATION INSTRUCTIONS



1 BASE DECK PREPARATION



2 LOWER REINFORCE-MENT & FULL ZONES



③ INSTALLATION OF NEW NAUTILUS







FINAL REINFORCE 5 1st STAGE OF THE
 MENT INSTALLATION
 CONCRETE POUR

6 PAUSE BETWEEN THE 1st AND THE 2nd POUR



⑦ 2nd STAGE OF THE CONCRETE POUR



8 DISMANTLING

BUILDING DETAILS Building on-site technical specifications



Benefits of the lower feet for the creation of the lower base



Visual check of the actual finishing of the lower base



The pour should be performed in two stages (max 1h between the 1st and the 2nd stage)



Particular reinforcement system with pulvines punching over the pillars

NEW NAUTILUS | TECHNICAL ASSISTANCE

DEVELOPMENT AND ASSISTANCE how to optimize the performances of a lightened slab



Modelling of the finishing elements for structural checks.



Geoplast Technical Assistance

The Geoplast Technical Department ensures the necessary support at every stage of the construction. After analyzing the specifications and design constraints of the project, our technical staff will design the most suitable formwork layout, also including any accessory items. If necessary, on-site assistance can be agreed upon to follow installation, pour and dismantling operations.

SLABS 026 D



	Den un utidate	Beamsaxle	Formwork	NEWNAU	JTILUSEVO	NEWNAUTILUS	
HEIGHT	(cm)	spacing (cm)	bearing (pieces/m²)	concrete consumption (m³/m²)	Formwork volume (m³/pcs.)	concrete consumption (m³/m²)	Formwork volume (m³/pcs.)
H13 SINGLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.060 0.064 0.067 0.071 0.074	0.028		
H16 SINGLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.081 0.086 0.091 0.094 0.097	0.032	0.079 0.084 0.089 0.093 0.096	0.033
H2O SINGLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.104 0.110 0.116 0.120 0.125	0.039	0.102 0.108 0.114 0.118 0.123	0.040
H24 SINGLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.128 0.135 0.140 0.146 0.151	0.046	0.125 0.132 0.138 0.144 0.149	0.047
H28 SINGLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.154 0.161 0.168 0.175 0.180	0.051		
H26 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.121 0.129 0.135 0.142 0.148	0.057		
H29 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.141 0.150 0.158 0.166 0.172	0.060		
H32 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.162 0.171 0.181 0.189 0.195	0.064	0.158 0.168 0.178 0.186 0.192	0.066
H33 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.165 0.174 0.183 0.191 0.199	0.067		
H36 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.185 0.196 0.207 0.214 0.222	0.070	0.181 0.192 0.203 0.211 0.219	0.073
H37 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.188 0.199 0.208 0.217 0.225	0.071		
H40 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.208 0.220 0.232 0.240 0.250	0.078	0.204 0.216 0.228 0.236 0.246	0.080
H41 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.215 0.225 0.235 0.246 0.255	0.079		
H44 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.232 0.245 0.256 0.266 0.276	0.084	0.227 0.240 0.252 0.262 0.272	0.087
H48 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.255 0.269 0.281 0.292 0.302	0.092	0.250 0.264 0.276 0.288 0.298	0.094
H52 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.282 0.295 0.308 0.321 0.332	0.097		
H56 DOUBLE	12 14 16 18 20	64 66 68 70 72	2.44 2.30 2.16 2.04 1.93	0.308 0.322 0.336 0.349 0.361	0.102		

PRELIMINARY DESIGN ANALYSIS

Thickness evaluation

For preliminary design of a lightening slab with NEW NAUTILUS from the table at the right it is possible to extract the thickness of the slab on the basis of the detailed calculation and the loads that act on the slab.

Example

For a load of $400+300 \text{ kg/m}^2$ (accidental + permanent) and spans (distance between the pillars) of 8 m, the thickness should be at first approximation of about 30 cm (lower base + lightening+ upper base).

Because of duty conditions or particular load situation, some ad hoc modellings could be necessary. Please contact Geoplast Technical Department first.



52 cm 16 cm 52 cm 16 cm 52 cm

Consumption calculation

The table on page 26 allows the calculation of the concrete consumption, that is the slab weight on the basis of the lightening and the axle spacing. Please note the the concrete consumption for the slabs has to be added.

Example

For a slab of 7+16+7 cm with a beam from 16 cm the concrete consumption will be of 0.091 (NEW NAUTILUS EVO H16) + 0.07 (lower base) + 0.07 (upper base) for a total of 0.231 m³/m² and a weight of 577.50 kg/m².





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