

# Innovative 2017 Geopolymer products prepared with automatic industrial mixers

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# **Automatic 5 liter Mixer for geopolymers for R&D, university and laboratory testing**



technology and research by  
Alex Reggiani and designer  
Athos Reggiani



TACITA / RESET

GHITECH sistemi 22/06/2017 12:15:16

Velocità impostata 30.0 Hz Velocità manuale 0.0 Hz

+ -

↑ ↓

AVVIA CICLO

PAUSA CICLO

PAUSA TIMER

| ○

Codice esecuzione: 2 Fase 0

	SET		FIL	
Tempo di miscelazione	0.0	S	0.0	S
Tempo pausa	0.0	S	0.0	S
Tempo di fase			0.0	S
Tempo pausa ciclo			0.0	S
Tempo pausa timer			0.0	S

DATI DI CICLO

RICETTE

WEINTEK



# **Wood-based geopolymer composite**



## Hemp based geopolymer composite

**Cream colored Metakaolin based:** Density from 0,5 to 1 g/cm<sup>3</sup> ; Flexural Strength > 15MPa (only engraved on surface) after 28days ; Compressive Strength > 50 MPa after 7 days, > 100MPa after 28 days (difficult to break, very elastic);

**Rose colored Metakaolin based:** Density from 0,7 to 1 g/cm<sup>3</sup> ; F > 15MPa (only engraved on surface) after 28days ; Compressive Strength > 50 MPa after 7 days, > 100MPa after 28 days (difficult to break, very elastic);

**Dark grey fly ash/slag based:** Density from 0,75 to 1,2 g/cm<sup>3</sup> ; F > 15MPa (only engraved on surface) after 28days ; Compressive Strength > 50 MPa after 7 days, > 100MPa after 28 days (difficult to break, very elastic).



## Fir wood based geopolymer composite



## Lolla (similar to rise-husk) based geopolymer composite



# Foamed geopolymer



## Structural (heavy) GP foams

**White colored Metakaolin/slag based** Density about  $0,7 \text{ g/cm}^3$  , Flexural Strength after 28 days =  $3,7 \text{ MPa}$ , Compressive Strength after 28 days =  $16,2 \text{ MPa}$ .

**Cream colored Metakaolin based** Density about  $0,6 \text{ g/cm}^3$  , Flexural Strength after 28days =  $3,6 \text{ MPa}$ , Compressive Strength after 28days =  $12,8 \text{ MPa}$ .

**Rose colored metakaolin/slag based** Density about  $0,65 \text{ g/cm}^3$  , Flexural Strength after 28days =  $4 \text{ MPa}$ , Compressive Strength after 28days =  $11,5 \text{ MPa}$ .

In all foams it is possible to add nano additive for hydrorepellency.



## **Thermal-insulating (lightweight) GP foams**

### **White colored Metakaolin/slag based**

Density about 0,28 g/cm<sup>3</sup> , Flexural Strength after 28days = 1 MPa, Compressive Strength after 28days = 2,2 MPa. Lambda 0,062.

### **Cream colored Metakaolin based**

Density about 0,3 g/cm<sup>3</sup> , Flexural Strength after 28days = 1,6 MPa, Compressive Strength after 28days = 2,8 MPa. Lambda 0,065.

**Light brown colored zeolite/slag based** Density about 0,26 g/cm<sup>3</sup> , Flexural Strength after 28days = 1,5 MPa, Compressive Strength after 28days = 2,5 MPa. Lambda 0,06.

# Sprayed geopolymer fire-resistant foam S.C.GP-G6

Passed the Fire-resistance test at 1000°C for 2 hours  
in compliance to REI 120 Italian standard for fire  
protection

Compressive strength: 2,5-4,5 MPa

Flexural strength: 1,5-2,6 MPa

Setting Time: 90 minutes

Expansion: 80%

Density: 0,3 g/cm<sup>3</sup>

Thermal conductivity:  $\lambda = 0,065$

This product could be use to pass resistance to fire test and to protect metals  
from fire and also from penetration of chlorine ion so to avoid oxidation

# Passive Cooling Insulation

**renca**



Betonsteinwerk und  
Baustoffhandel seit 1964.

Manufatti in cemento e  
Commercio materiali edili dal 1964.



una gamma completa  
di soluzioni per l'edilizia:

Tetti,  
pavimentazioni  
e manufatti in cemento.



LA CEMENTIFERA



# Geopolymer concrete blocks

## Geopolymer concrete blocks (water/oil repellent)



**Whitish colored Metakaolin/slag based** , Density about 2,2 g/cm<sup>3</sup> , Flexural Strength after 7days = 5,5 MPa, Compressive Strength after 7days = 10,4 MPa, completely water/oil repellent after 4h.

### **Rose colored Metakaolin/slag based**

Density about 2,1 g/cm<sup>3</sup> , Flexural Strength after 7days = 3,5 MPa, Compressive Strength after 7days = 5,8 MPa, very cheap product not treated for water repellency.

### **Grey fly ash/slag based**

Density about 2,2 g/cm<sup>3</sup> , Flexural Strength after 7days = 3,3 MPa, Compressive Strength after 7days = 6,8 MPa, completely water/oil repellent after 4h.



# Geopolymer mortars for Venice restoration

(including low-thickness continuous GP floorings)



# Self-cleaning geopolymer concrete





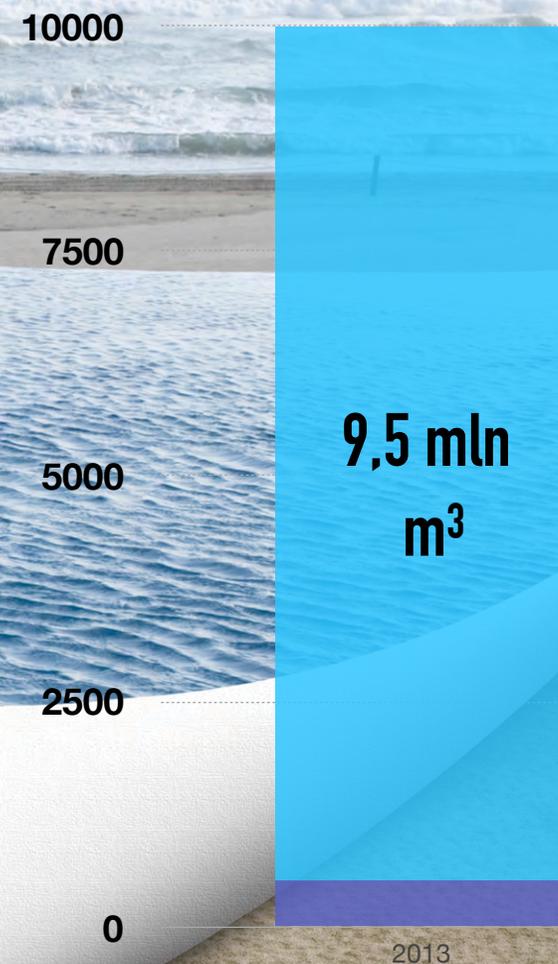
Richard Meier & Partners Architects, LLP



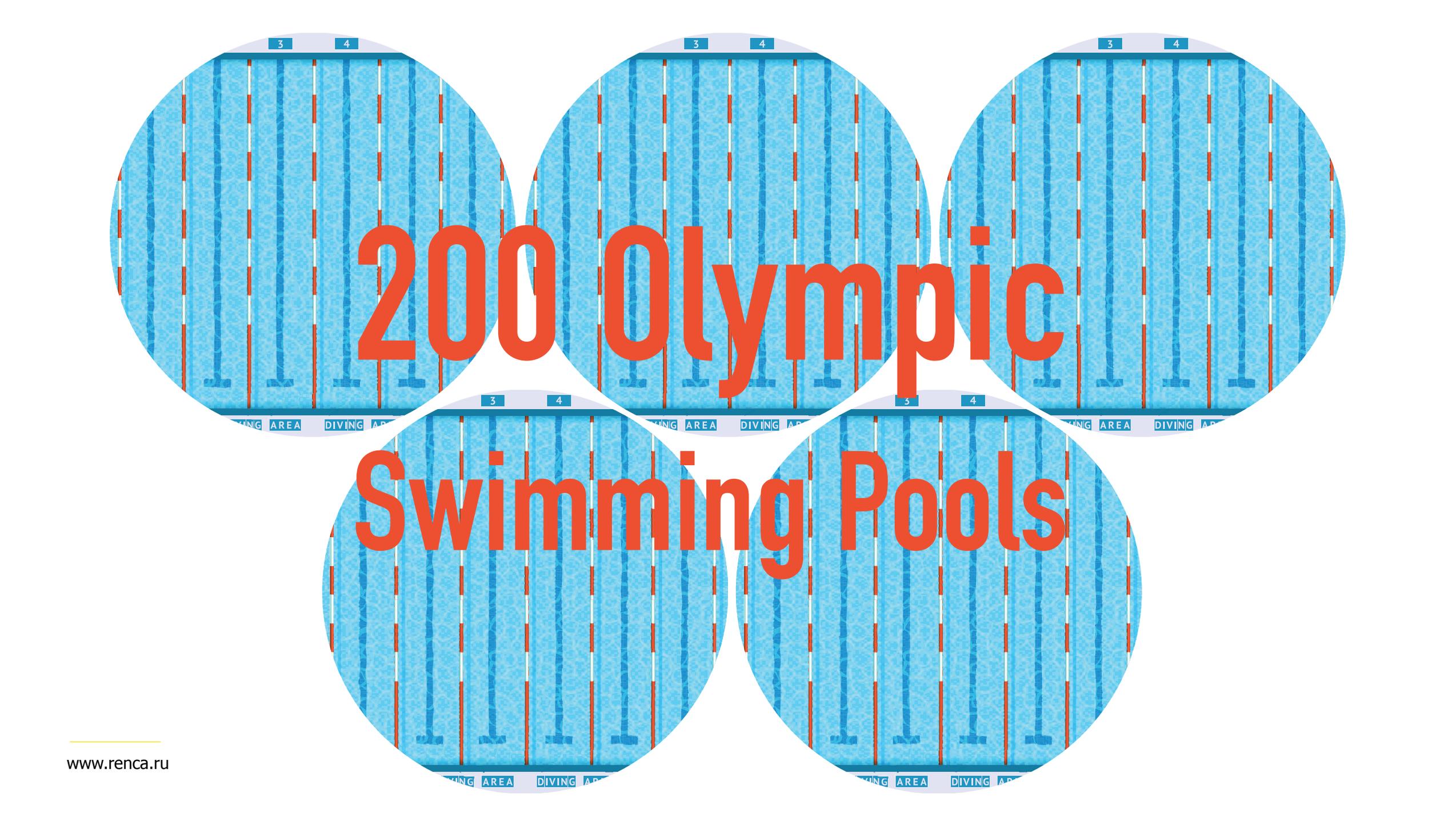
# Using sea water and sea sand in geopolymer concrete

According to World Cement Magazine

# Fresh Water Consumption in Dubai for Concrete Production



■ 95% - 9,5 mln  
■ 5% of save 0,5 mln



200 Olympic

Swimming Pools



# Raw materials and by-products suitable for GP production supplied by our company:

## GGBS

ground granulated blastfurnace slag

## Metakaolin

kaolin burned at 750°C

## Fly-ash

type F

## Microsilica

silica fume

## Soluble silicates

Na- and K- based water glass

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[www.renca.ru](http://www.renca.ru)





# geopolymer cement and geopolymer reagent geosilicate™:

**Thank you!**

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**renca**



**[www.geomits.com](http://www.geomits.com)**