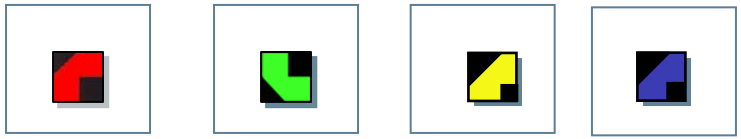
Ruredil
Chemicals for building

Seminar on Ruredil Technologies



- The ***Ruredil Group*** is a group of three fully owned Italian companies

- Headquarters are located at San Donato Milanese, south of Milan - Italy.

- The Ruredil Group operate in the building sector

Ruredil Group

Companies	Founded in year
Ruredil	1950
Rurmec	1975
Levocell	1977
Rurcem	1980

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Ruredil

Ruredil

The Company

- Founded 60 years ago, Ruredil is the leading company of the group.
- It operates in Italy, Europe, Mediterranean Basin , Middle East and America's .

The Products

- Cement additives
- Concrete admixtures
- Systems for structural reinforcement
- Mortars for masonry wall and concrete repair and protection
- Special inserts for the pre cast industry
- Natural soil stabiliser

Ruredil

100% Shares

100% Shares

Levocell

Rurcem

Ruredil
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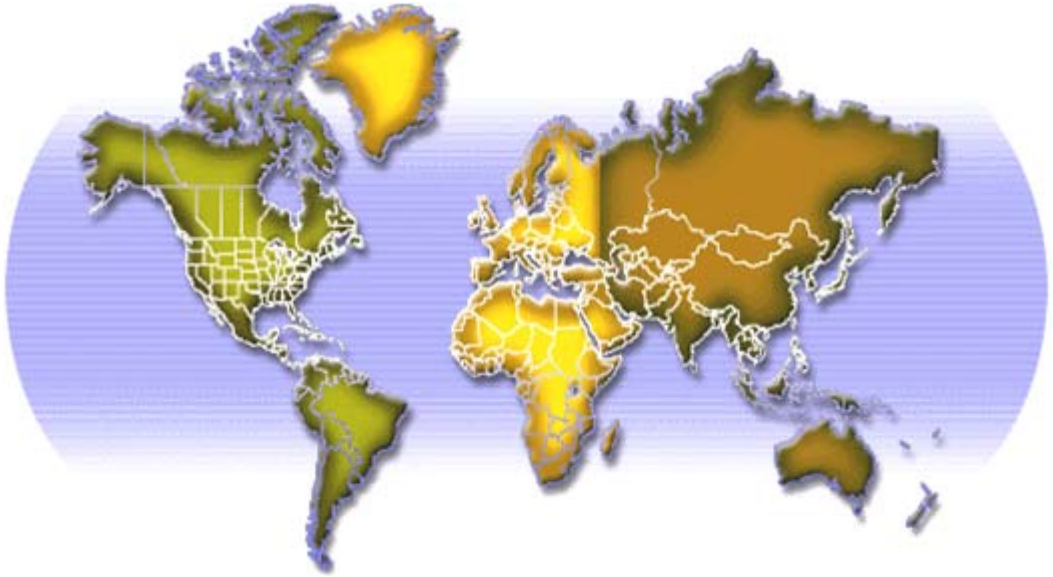
Chemical field

Sales organisation net - Italy

Ruredil - Levocell al 31.12.2011

- **50** agents
- **5** Area m.
- **17** Product m.
- **5** promoter

Ruredil Group - In the world -



- Algeria
- Austria
- Central America
- Caribbean
- Russia
- Cyprus
- France
- Greece
- Rumania
- Poland
- Spain
- Canada
- South Korea
- Switzerland
- Thailand
- Tunisia
- Ukraine

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Ruredil - Quality


CERTIFICAZIONE ITALIANA DEI SISTEMI QUALITÀ AZIENDALI
ITALIAN CERTIFICATION OF COMPANY QUALITY SYSTEMS

CERTIQUALITY

CERTIFICATO n. 950/2
CERTIFICATE No

RUREDIL SPA

20097 S. DONATO MILANESE (MI) - VIA B. BUOZZI 1

UNI EN ISO 9001:2000

SETTORE EA 12

Ricerca e sviluppo, produzione e commercializzazione di: additivi per cemento, calcestruzzo e malte; - premiscelati cementizi; prodotti chimici per l'edilizia.

Research & development, production and trade of: admixtures for cement, concrete and mortars; pre-mixed mortars; chemicals for building.

30/09/1997

04/09/2003

SINCERT

QUALITY


ICMQ

IQNet

CERTIFICATO
CERTIFICATE
97156

RUREDIL S.p.A.

Via Bruno Buozzi, 1 – 20097 San Donato Milanese (MI)

UNITÀ OPERATIVE
OPERATIONAL UNITS

Via Bruno Buozzi, 1 – 20097 San Donato Milanese (MI)
Via Grandi – 20097 San Donato Milanese (MI)

UNI EN ISO 9001:2000

PER I SEGUENTI TIPI DI PRODOTTI, PROCESSI E SERVIZI
COVERING THE FOLLOWING KIND OF PRODUCTS, PROCESSES AND SERVICES

produzione e commercializzazione sistemi per la movimentazione di elementi prefabbricati, sistemi antinfortunistici; commercializzazione di distanziatori e profili in plastica e cemento, matrici per cls, carte speciali, elementi di giunzione per barre d'armatura, carrelli a rulli per macchinari pesanti, sistemi per la produzione di pannelli sandwich

production of anchoring systems for concrete structural elements; trading of other special products and systems for construction

SINCERT

CISQ

The companies belonging to the Group have been operating, since 1997, under a certified UNI EN ISO 9001:2000 quality scheme, granted by two qualified indipendent bodies

is one of the major commitment and asset of the the Group.

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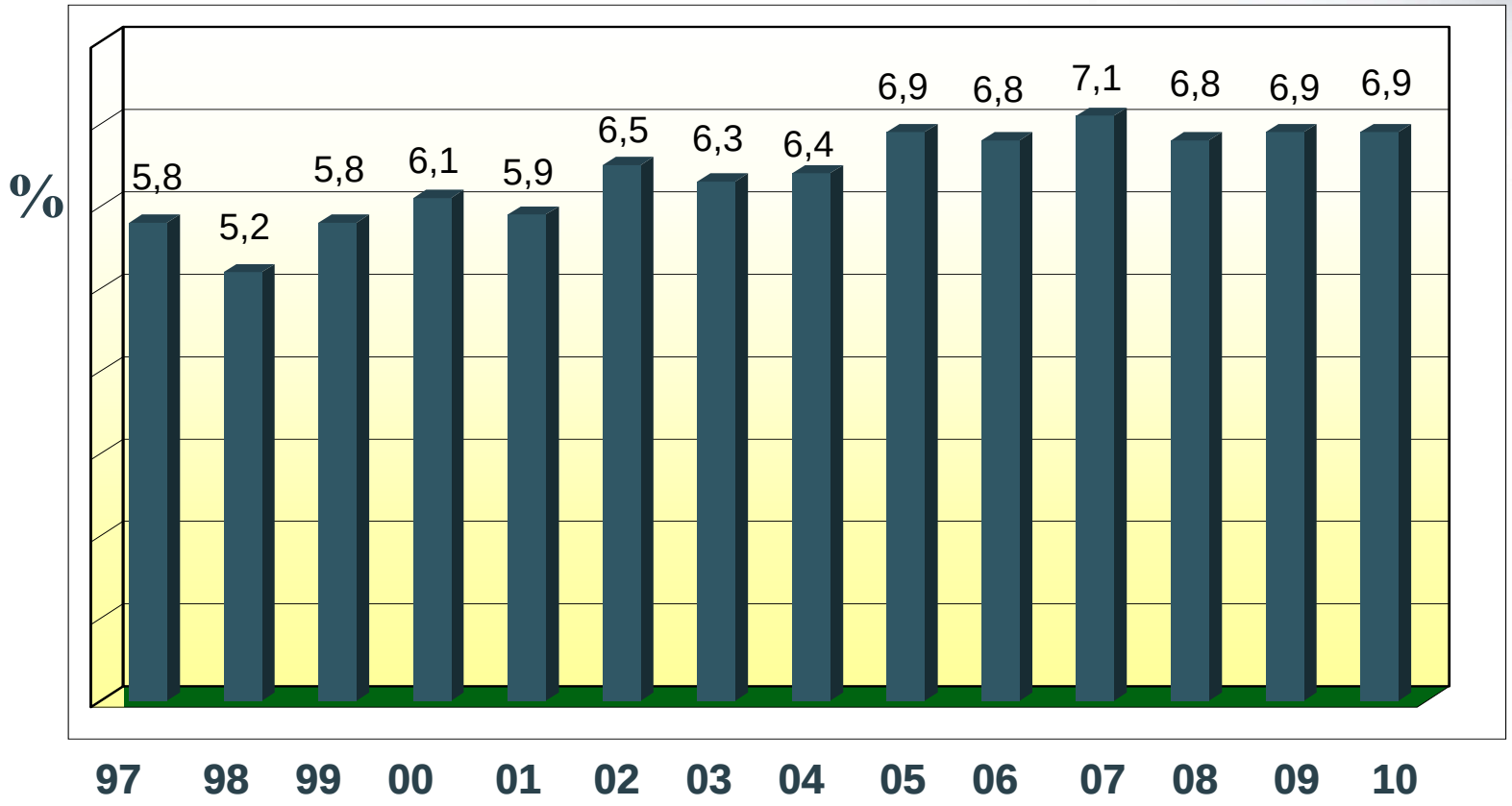
Ruredil - *The R. & D.*

Research & Development

- The Group devotes more than 7% of its turnover to R&D
- R&D is developed, both at the Ruredil Research Centre and working in close cooperation with Universities and external Research Institutes.
- The R&D efforts often allow Ruredil to patent internationally the products developed.

Research & development / Investments



- Ruredil - R & D
- Engineering

- University of Bergamo
- University of Bologna
- University of Brescia
- University of Catania
- University of Napoli

- University of Potenza
- University of Venezia
- University of Edinburgh
- University of Miami

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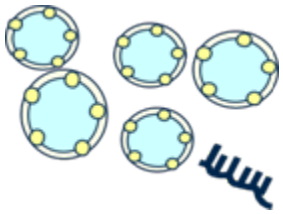
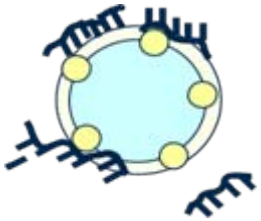
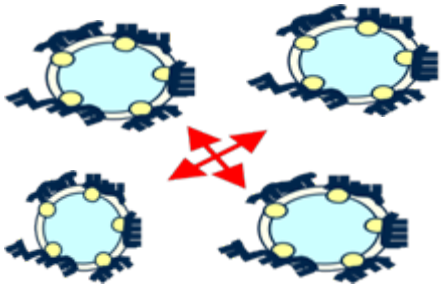
Ruredil - The Tecnology

History of concrete chemicals

Year		Name
• 1930	MLS	Modified Lignin-sulphonate
• 1940	GN	Gluconate
• 1970	NS	Naphtalene-sulphonate
• 1980	MS	Melamine-sulphonate
• 1990	VC	Poly Vinyl copolymer
• 2000	PC	Poly Carboxylic copolymer

Concrete admixtures - Polycarboxilate

Step	Mixing	Adsorption	Dispersion
Function	Mechanical blending	Physical and chemical adsorption	Electrostatic repulsion and Steric hindrance
Scheme	Cement particle  Ergomix - Polycarboxilate		

Ruredil
Chemicals for building

Ruredil Group

Ergomix 6000

Highly effective superplasticiser containing polycarboxylate with hybrid lateral chains for high performance concrete

Product Description

ERGOMIX 6000 is a highly effective superplasticiser for making high performance concretes characterised by a low water to cement ratio, greater mechanical resistance in all kinds of curing treatments, especially brief curing cycles, and good maintenance of workability.

ERGOMIX 6000 is an additive containing latest generation acrylic polymers which can drastically reduce the problems with performance associated with traditional acrylic additives, which are sometimes affected by the type of cement used.

ERGOMIX 6000 has polyethylene oxide (PEO) chains of different lengths. The long chains directly affect cement particle dispersion and mechanical resistance to short curing cycles.
The short chains, due to their molar relationship with the carboxylic groups in the main chain, have a direct impact on maintaining mix workability

ERGOMIX 6000 contains no chlorides and conforms to UNI EN 934-2 T3.1-3.2.

Typical applications

For making:

- normal ordinary reinforced and pre-compressed reinforced concretes;
- self-compacting concretes;
- high/ultra-high strength concretes.

Packing, storage, dosage

- ERGOMIX 6000 is available in 210 litre drums, 1000 litre tanks, 10.000 litre tanks or in bulk for delivery in tank trucks;
- store product in a place with a temperature excursion of between +5°C and +40°C;
- dosage varies from 0.3% and 1% (0.3-1 litres per 100 kg cement) depending on consistency

Properties

Use of ERGOMIX 6000 makes it possible to:

- produce high performance concrete with a low water to cement ratio;
- have no negative impact on mix workability;
- produce concrete offering good mechanical resistance, even with brief curing, permitting a drastic reduction in both normal and forced (steam) curing cycles;
- obtain excellent performance with use of any type of hydraulic binder;
- obtain manufactures of great aesthetic value.

Examples

A) Mix design for ordinary pre-compressed reinforced concrete with natural curing

	Dosage
CEM I 52,5R	400 kg/m^3
Fine sand 0 ÷ 4 mm	650 kg/m^3
Pea-sized gravel 4 ÷ 8 mm	300 kg/m^3
Fine gravel 8 ÷ 12 mm	450 kg/m^3
Gravel 10 ÷ 20 mm	450 kg/m^3
ERGOMIX 6000	0.55%
Water/concrete ratio	0.42
Slump	24 cm

Evolution of compression strength

16 hours	**28 days**
38.3 MPa	69.1 MPa

B) *Mix design for SCC steam cured concrete*

	Dosage
CEM I 52,5R	400 kg/m^3
Sand 0 ÷ 2 mm	600 kg/m^3
Crushed gravel 2 ÷ 6 mm	280 kg/m^3
Crushed gravel 5 ÷11 mm	320 kg/m^3
Gravel 8 ÷ 16 mm	500 kg/m^3
Calcium carbonate	80 kg/m^3
ERGOMIX 6000	0.7%
A/Fines	0.35
Slump Flow	71 cm

Evolution of compression strength

16 hours	**28 days**
40.0 MPa	61.5 MPa

Ruredil
Chemicals for building

Ruredil Group

Ergomix 6005

Broad-spectrum precast superplasticizer with optimum workability

Product description

ERGOMIX 6005 is a superplasticizer used to prepare concrete with low W/C ratio characterized by high-mechanical resistance under different curing conditions and workability retention.

ERGOMIX 6005 is an excellent additive used for the production of precast concrete which requires medium/long time periods for concrete mix laying and distribution.
This additive is very easy to use if compared with traditional acrylic additives which require the use of certain cement types.

ERGOMIX 6005 is chloride-free in compliance with standard UNI EN 934-2 T3.1-3.2

Typical applications

It is used to prepare:

- Reinforced concrete and pre-stressed reinforced concrete
- Self-compacting concrete
- Highly-resistant concrete
- Low W/C concrete

Packaging, storage, dosage

- ERGOMIX 6005 is available in drums of 210 litres, tanks of 1000 litres or in bulk, to be delivered with tank trucks;
- Storage temperature range should be comprised between +5°C-+40°C;
- Depending on consistency and type of concrete desired, dosage may vary from 0,4% and 1,4% (0,4-1,4 litres per 100kg of cement).

Recommendations for use

Product should be added after complete addition of mix water to obtain maximum yield.

Properties

ERGOMIX 6005 is used to:

- Prepare concrete with low W/C ratio with no negative influence on rheology and workability;
- Prepare concrete during summer time whenever high workability and resistance are required with short curing times;
- Obtain high-performance concrete, independently from the type of hydraulic binder used;
- Obtain excellent aesthetic concrete.

Example

Mix design for ordinary Cao/Cap concrete with natural curing

	Dosage
CEM I 52,5R	400 kg/m^3
Gravel quarry	820 kg/m^3
Sand	800 kg/m^3
Riddled sand	100 kg/m^3
ERGOMIX 6005	0,8%
W/C	0,46
Slump	t_0 = 22 cm
	$t_{30'}$ = 22 cm
	$t_{60'}$ = 20,5 cm

Compressive strength development

16 hours	7 days	28 days
35,6 MPa	48,7 MPa	75,4 MPa

Concrete quality and finish

ERGOMIX 6005 is ideal to prepare concrete with excellent rheology and aesthetic finish.
Reduced porosity and easy mix vibration drastically reduce surface bubbles with consequent concrete finish improvement.

No. 1305

Ruredil
Chemicals for building

Ruredil Group

Ergomix 209 H

Highly effective superplasticizer for ready mix concrete with long workability time

Product description

ERGOMIX 209 H is a superplasticizing additive based on latest generation polycarboxylate ether for high performance prefabricated concrete with extended workability.
ERGOMIX 209 H drastically reduces the problems associated with the performance of conventional acrylic additives, which can sometimes be affected by the type of cement used.

ERGOMIX 209 H permits use of significantly less water in the mix, maintaining optimal workability and high initial and final mechanical resistance.

ERGOMIX 209 H is chloride-free and complies with standard UNI EN 934-2 T3.1-3.2.

Typical applications

It is used for preparation and laying of:

- precast or ready mix concrete requiring long-distance transportation;
- Hot weather cast;
- highly durable concrete;
- highly waterproof concrete;
- concrete with excellent aesthetic quality and finish.

Packaging, storage, dosage, yield

- ERGOMIX 209 H is available in 210 litre drums, 1000 and 8000 litre tanks or else in bulk, with tank trucks.
- Store product at temperatures of between +5°C and +40°C.
- Depending on concrete type and consistency, product dosage varies from 0.6% to 1.2% (0.6-1.2 litres per 100 kg of cement).

Recommendations for use

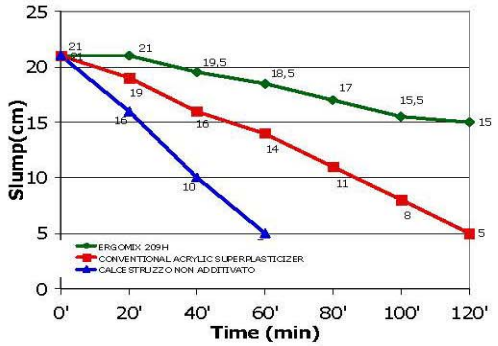
ERGOMIX 209 H should be added after complete addition of mix water to obtain maximum yield.

Properties

ERGOMIX 209 H is used to:

- prepare concrete with a low W/C ratio with no negative effect on the workability and rheology of fresh concrete;
- maintain workability for long time periods, especially in summer;
- guarantee optimum workability for the time required for transportation and laying, even in hot climates;
- obtain durable concrete which complies with standards EN 206-1 and UNI 11104.

Maintainance of workability in the time



Concrete quality and finish

ERGOMIX 209 H is used to prepare concrete with excellent rheology and aesthetic qualities.
Its reduced porosity and the easy of vibrating the concrete mix drastically reduces surface bubbles, improving the aesthetic quality of the resulting manufactures.

Ruredil
Chemicals for building

Ruredil Group

Concretan 200 L

Retardated high range water reducer - superplasticiser for ready mixed concrete

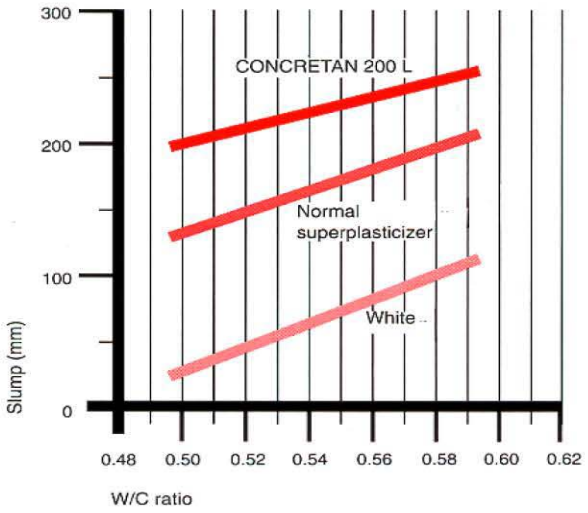
Compressive strengths increase at the same slump

Concrete Mix design :

- Type CEM I 42,5;
- Cement factor : 350 kg/m3
- CONCRETAN 200 L : 1% by vol. on cement weight

	W/C	Slump	Compr. Strengths MPa			
		mm	1dy	3d	7d	28d
Reference	0,6	180	10,6	25,3	30,2	36,8
Trad. Superpl.	0,5	180	17,3	29,8	36,5	44,1
Concretan 200 L	0,45	180	20,0	34,0	41,0	49,3

Example of workability according to different W/C ratio



Not recommended for

- concrete where very high early strengths are required;
- precast concrete.

Concrete quality and finish

Quarry face concrete can be obtained due to segregation removal and bleeding reduction. Compactness and low porosity allow high-quality concrete finish to be obtained.

Ruredil
Chemicals for building

Ruredil Group

Polan VX/CF

Chlorides free setting time accelerator and anti freezing agent

Product description

POLAN VX/CF is a liquid admixture which, when added to cement mixes, makes it possible to apply them even at very low temperatures.
It exerts an energetic catalyzing action on the setting and hardening reactions of concrete with quick liberation of hydration heat and contemporaneous lowering of the freezing temperature of mixing water.
It conforms to *ASTM C-494/86 type* "*C*" and **UNI EN 934-2 T.6** regulations.

POLAN VX/CF does not contain chlorides.

Typical applications

Any type of casting to be made at low temperatures to speed up concrete setting times (concrete, cementitious mixes and mortars in general).

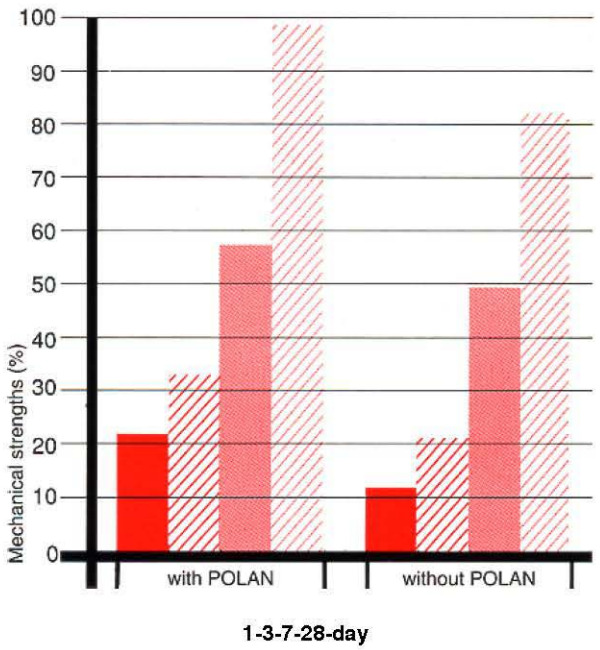
Packaging, storage, dosage

- POLAN VX/CF is supplied in 10 and 25 lt buckets, in 210 lt drums, 1000 lt tanks or in bulk for delivery by tanker truck;
- store the product at a temperature of between 0°C and +40°C;
- dosage may vary from 1 to 4% by cement weight (1-4 litres every 100 kg of cement) depending on the concrete casting temperature .

Use recommendations

POLAN VX/CF is to be added to the mixing water. Always use POLAN VX/CF complying with the standards concerning the laying of concrete at

Mechanical strengths development with curing time



Not recommended for

Applications in hot climate and/or for long hauls.

Concrete quality and finish

It is possible to obtain fair face concrete, thanks to the elimination of segregation and the reduction of bleeding, even when concrete is cast at low temperatures.

Ruredil
Chemicals for building

Ruredil Group

Retardite
Set retarding admixture

Product description
RETARDITE is a liquid set retarding admixture. The addition of this product makes it possible to maintain cementitious mixes fluid for quite long time periods.
It delays both beginning and end of cement setting reaction in proportion to the quantity of additive used.
Delay may vary from a few hours to up to 48 hours.
It is also available in the version **RETARDITE MT,** as a specific product for ready to use mortars.

It conforms to ASTM C-494/86 type "B" and UNI EN 934-2 T8 regulations.

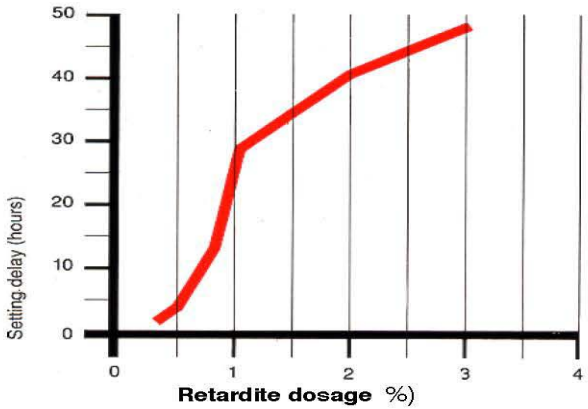
Typical applications
RETARDITE can be used for;
- long-distance transportation of ready mix concrete under hot weather conditions or long parking in the yard before laying;
- the elimination of cracks when building high structures with reduced sections where, due to the elastic sinking of the formwork, concrete has to adapt to the deformations before hardening;
- the elimination of cold joints between successive castings in order to obtain a monolithic structure through the slow and even setting of concrete;
- the total settling of concrete through vibration, before the final hardening phase.

Packaging, storage, dosage
- RETARDITE is supplied in 25 and 210 lt drums and 1000 lt plastic tanks;
- store the product at a temperature between 0°C and +40°C;
- dosage: directly add RETARDITE in the concrete mixer: proportion may vary from 0.3 to 3% by cement weight (from 0.3 to 3,0 kg per 100 kg of cement) depending on the delay desired.

Use recommendations
The slowing down of concrete setting time with RETARDITE, may be regulated by the variable dosage of the product and other important factors which considerably influence the setting phenomena of concrete, such as:
- mineralogical composition of cement;
- ambient temperature;
- aggregates temperature;
- water/cement ratio;
- cement dosage;
- concrete casting volume.

Testing mixes should be first prepare to check the effects of such factors and RETARDITE on concrete setting. In this way, it will be possible to determined the exact quantity of additive necessary to obtained the desired delay.

Setting time delay and RETARDITE dosage
Concrete Mix design :
CEM II A-L 42,5; dosage 300 kg/m3
W/C ratio = 0,50
Curing temperature - +20 °C



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Casseroil
Emulsifiable form release agent

Product description
CASSEROIL is a chemical release agent. It consists of a selected mixture of linear chain synthesis molecules and natural additives.
If diluted in water, it changes into a stable emulsion which may be stored for several days.
Keep containers well closed to avoid evaporation of water.
Always mix the emulsion before use.
It is particularly efficacious due to a series of chemical-physical reactions with the cement mix on the casting surface.
It has been specially designed to meet all traditional yard needs.
IN CONFORMITY WITH UNI 8866 NORMATIVE.

Typical applications
It may be used for any type of casting in the traditional building yard.

Packaging, storage, dosage, yield
- CASSEROIL is supplied in 10, 25 and 210 lt drums or in 1000 lt plastic tanks;
- dilution should be in accordance with the following proportions:
  - 1 part of CASSEROIL plus 15-20 parts of water, with a yield of 150-180 m^2 per litre, for each wooden formwork;
  - 1 part of CASSEROIL plus 5 parts of water, with a yield of 30-40 m^2 per litre, for metallic formworks.

Tax regulations
In accordance with the tax regulations in force, the form-oil CASSEROIL does not require any special documents other than the common delivery note, and does not require registration into any tax register. In fact, this product is not classified as a “petrol” product. Every invoice issued by Ruredil includes the phrase “Free from any circulation and storage restriction”.
The quantities held - since they are classified as “chemical products” and not as “petrol products” or similar – are not added to any quantities of oil products already held for other uses in the prefabrication plants (e.g. fuel products for steam

Use recommendations
- Do not exceed recommended dosage; overdosing may be harmful to the correct removal of the formwork and the final aspect of the casting surface;
- remove excess of product, if any, with a dry cloth;
- in the event of accidental dispersion, use sand or saw-dust to remove the product and get rid of the whole material using the incinerator.
- it is possible to perform successive treatments such as: plastering, painting, protective coatings, etc.;
- it reduces formwork cleaning and maintenance with consequent time-saving and production increase.

Action mechanism
According to the type of action mechanism, form release agents may be divided into "physical" and "chemical".
CASSEROIL is a chemical form release agent particularly effective thanks to a complex series of actions, of which a brief description is given below.
Stable emulsion form release agent, are made of two different components which are completely mixed:
- the natural oil as the main component, which exerts an intense action as physical form release agent;
- the aqueous solution of active principles in charge of the chemical form release agent.
When it comes into contact with the formwork, water of the emulsion evaporates, favouring the close contact of natural oil and active principles with the cement mix. In this way, the latter does not adhere to the formwork.

Not recommended
Application during or just before rain.

Concrete quality and finish
CASSEROIL has been carefully studied to improve external surfaces and concrete aesthetic

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Chemicals for building

Ruredil Group

Casseroil 200RS

Medium viscosity chemical release agent with corrosion inhibitors

The action of additives contained in CASSEROIL 200/RS is a result of a specific chemical reaction between the additives and the thin layer of cement paste directly in contact with the formworks. This action is protracted over time as the mix hardens. The action of the additives contained in CASSEROIL 200/RS goes beyond their effect on detachment; they are also intended to have a positive impact on the "exposed face" of the cast, to reduce dusting to a minimum and to inhibit rusting on the surface of the formworks.

Chemical analysis
Chemical tests conducted in authorised laboratories on the raw materials used to produce CASSEROIL 200/RS demonstrate that the product contains no benzenes or other volatile aromatic hydrocarbons, the main cause of odour and toxic effects in indoor working environments.
CASSEROIL 200/RS contains practically no benzo-α-pyrene or other polycyclic aromatic hydrocarbons (PAHs) and contains absolutely no polychloride biphenyls (PCBs).

Working environment
Use of CASSEROIL 200/RS involves no toxological risk for workers, and so to protect workers' health it is sufficient to comply with practical standards of industrial hygiene.
In addition to these practices, we recommend use of gloves, which prevent the degreasing action on the skin common to all form removers.
Unlike form removers containing mineral oils and many chemical form removers available on the market, use of CASSEROIL 200/RS does not require medical examination every six months to comply with the requirements of Italian Presidential Decree n. 303 dated March 19, 1956.

Do not use for
"Sculptured" concretes obtained with polyurethane matrices, which require special form removers.

Concrete quality and finish
CASSEROIL 200/RS, like all Ruredil form removers, is particularly recommended for obtaining concrete surfaces with a high quality surface finish.

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Chemicals for building

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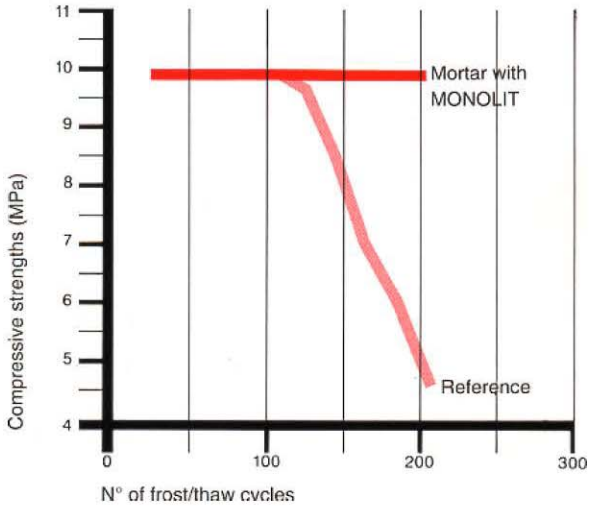
Monolit
Concrete air entraining and plasticising agent

Example: Mechanical strength variation in response to freeze/thaw cycles

Mortar Mix design :
Cement 325 PtI; dosage 350 kg/m^3
River type aggregates, max diam. 7-10 mm
W/C ratio = 0.5
MONOLIT dosage : 1‰ (V/W)



Concrete quality and finish

The increase in cohesion increase and improvement in mix workability make it possible to obtain finished surfaces of high aesthetic quality.

UNI EN 206 - 1

Concrete

How to identify

Concrete is identified by following parameters:

- Caracteristic strenght: (Rck)
- Concistency class (flow): from S1 to S5
- Exposition class: XC1 – XD1 – XS1 – XF1 – XA1)
- Max aggregates size: (D_{max})

Esempio

Rck 25, S4, XC1, D 22

Concrete

Flow

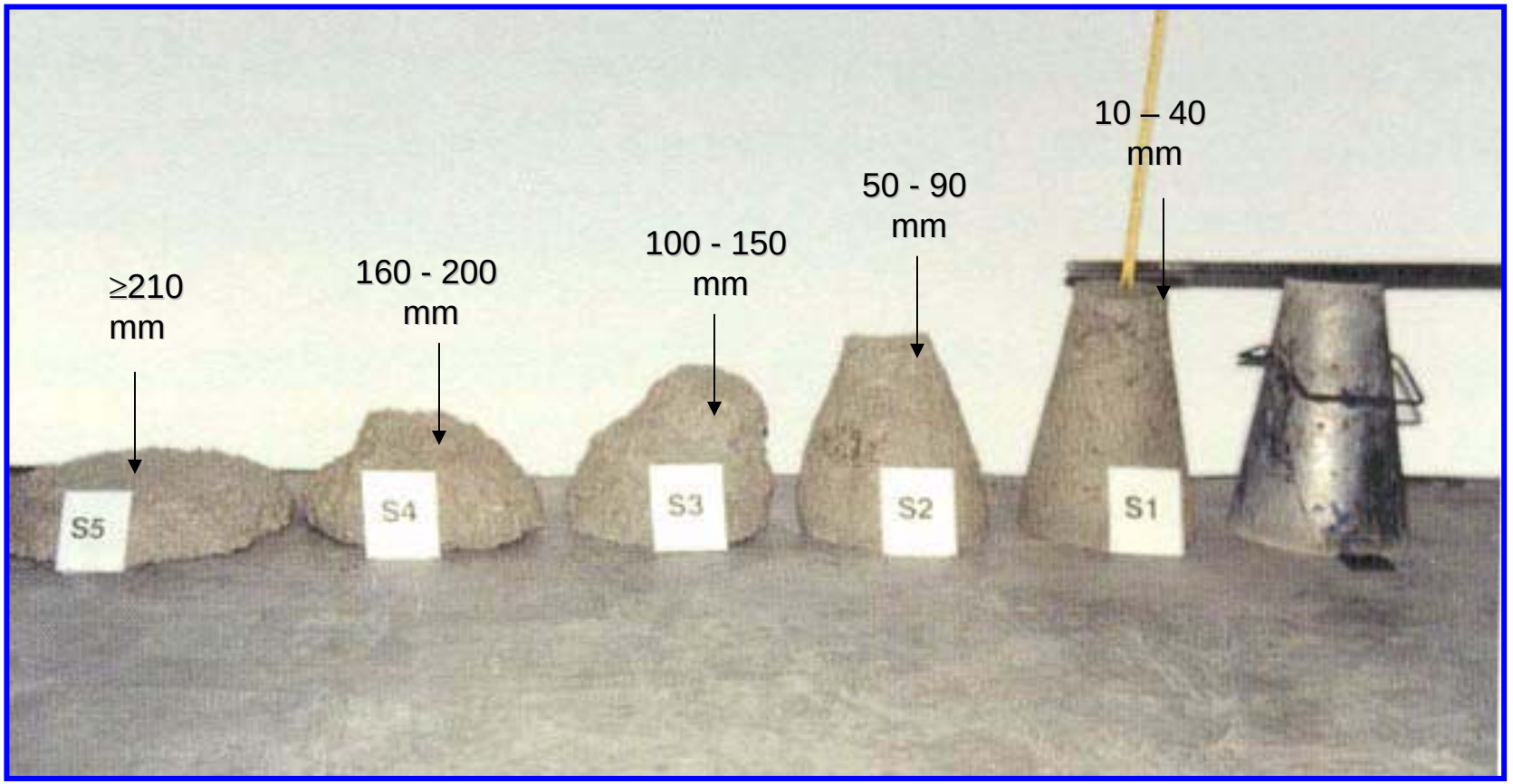
UNI EN 206 - 1

Type/ Class	Slump* (mm)	IDENTIFY/NAME	Application
S1	10 – 40	ZERO SLUMP	Concrete road/floors made with vibro-finisher
S2	50 – 90	PLASTIC	Concrete structures made with vertical moulds (Silos, cimney)
S3	100 – 150	SEMI-FLUID	Structures without steel reinforcement or with low amount of steel reinforcement with slop
S4	160 - 200	FLUID	Structures with medium amount of steel reinforcement
S5	≥ 210	SUPERFLUID	Structures with strong presence of steel reinforcement, with low section and/or complex geometry

* SLUMP = distance from the top of the cone

Concrete

Flow



UNI EN 206 - 1

Concrete

Esposition class

UNI 11104 Istructions for the application in Italy of EN 206-1 Norm

Denominazione della classe	Descrizione dell'ambiente	Esempi informativi di situazioni a cui possono applicarsi le classi di esposizione
1 Assenza di rischio di corrosione o attacco		
X0	Per calcestruzzo privo di armatura o inserti metallici: tutte le esposizioni eccetto dove c'è gelo e disgelo, o attacco chimico. Calcestruzzi con armatura o inserti metallici: in ambiente molto asciutto	Interno di edifici con umidità relativa molto bassa Calcestruzzo non armato all'interno di edifici. Calcestruzzo non armato immerso in suolo non aggressivo o in acqua non aggressiva Calcestruzzo non armato soggetto a cicli di bagnato asciutto ma non soggetto ad abrasione, gelo o attacco chimico.

UNI EN 206 - 1

Concrete

Exposition class

UNI 11104 Istructions for the application in Italy of EN 206-1 Norm

Name of the class	Environnement description	Typical examples of application
5 Attacco dei cicli gelo/disgelo con o senza sali disgelanti		
XF1	Moderata saturazione d'acqua, in assenza di agente disgelante	Superfici verticali di calcestruzzo come facciate e colonne esposte alla pioggia ed al gelo. Superfici non verticali e non soggette alla completa saturazione ma esposte al gelo, alla pioggia o all'acqua
XF2	Moderata saturazione d'acqua, in presenza di agente disgelante	Elementi come parti di ponti che in altro modo sarebbero classificati come XF1 ma che sono esposti direttamente o indirettamente agli agenti disgelanti.
XF3	Elevata saturazione d'acqua in assenza di agente disgelante	Superfici orizzontali in edifici dove l'acqua può accumularsi e che possono essere soggetti ai fenomeni di gelo, elementi soggetti a frequenti bagnature ed esposti al gelo
XF4	Very high moisture, with presence of antifreeze agents or sea water	Horizontal surfaces such as roads or pavements exposed to frost and deicing salts in a direct or indirect element exposed to frost and subject to frequent wetting in presence of deicing agents or sea water.

UNI EN 206 - 1

Concrete

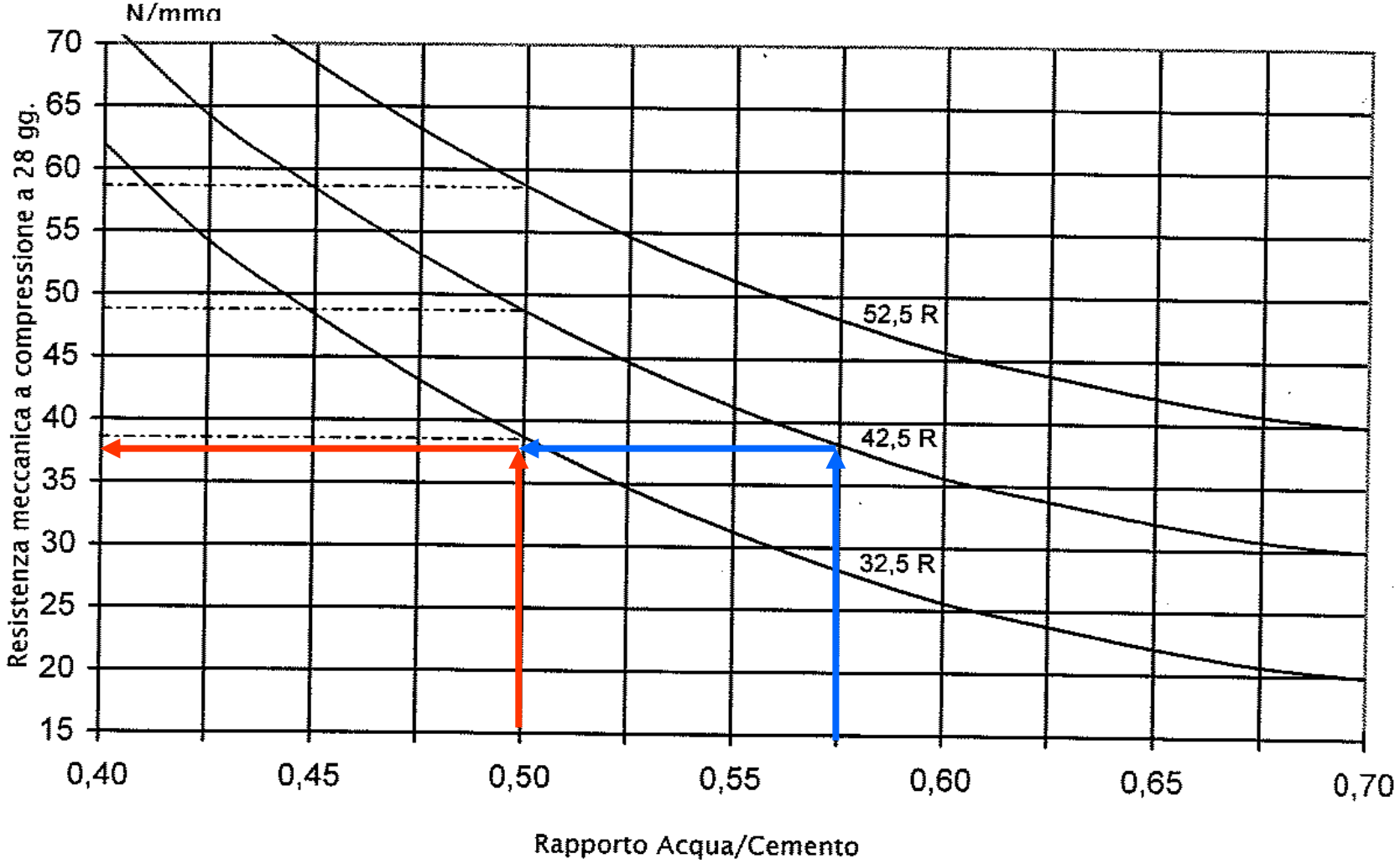
Prescription depending on exposition class

UNI 11104 | Table 4: Composition limits and concrete properties

Exposition class							
	Problem coming from freeze and thaw cycles				Aggressiv ambient for chemical pollution/other		
	XF1	XF2	XF3	XF4	XA1	XA2	XA3
Max w/c ratio	0,55	0,50		0,45	0,55	0,50	0,45
Minimum strength class	Rck 40	Rck 30		Rck 35	Rck 35	Rck 40	Rck 45
Min.cement content (kg/m^3)	320	340		360	320	340	360
Min. air content (%)		3,0					
Others	Aggregates conforms to UNI 12620 for freeze and thaw cycles				Sulphate resistent ciment is required		

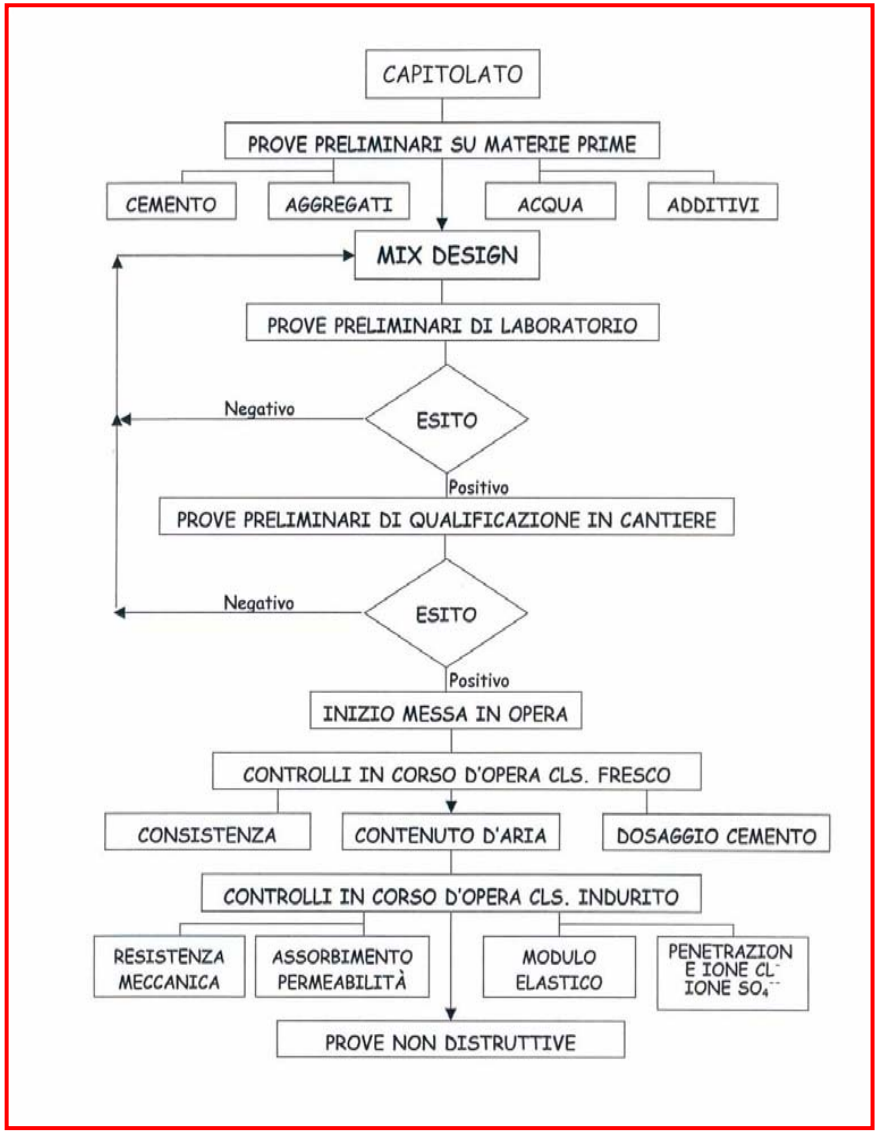
Concrete

w/c ratio choice



Concrete

Flow diagram



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References

KRK Brigde – Croatia – Fluiment

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References

KRK Brigde – Croatia – Fluiment

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References

Dodoni Tunnel – Greece 2006 – Fluiment

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References

Vourla Tunnel – 2005 – Fluiment

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References

Kalidromo railway Tunnel – 2011 – Ergomix 200

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References

Typhical precast elements

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References

Typhical precast elements

Customer: **GREECE ROAD ADMINISTRATION**

Location: **Egnatia Highway Toll Station (Greece)**

Surface : **8000 m2**

Rck : **35/45**

Floor tick.: **40 cm**


09/03/2007

R U R E D I I

R U R E D I I


Wirtgen
SP 500
09/03/2007


O&K
Wirtgen
SP 500
09/03/2007


09/03/2007


15/03/2007

R U R E D I I

Customer	:	FERRARA ROAD ADMINISTRATION
Contractor	:	IMPRESA C.& FIGLI - FERRARA
Surface	:	5000 mq
Rck	:	30
Additive	:	Concretan 200 L

R U R E D I

R U R E D I I

R U R E D I

R U R E D I

STRUCTURAL REINFORCEMENT

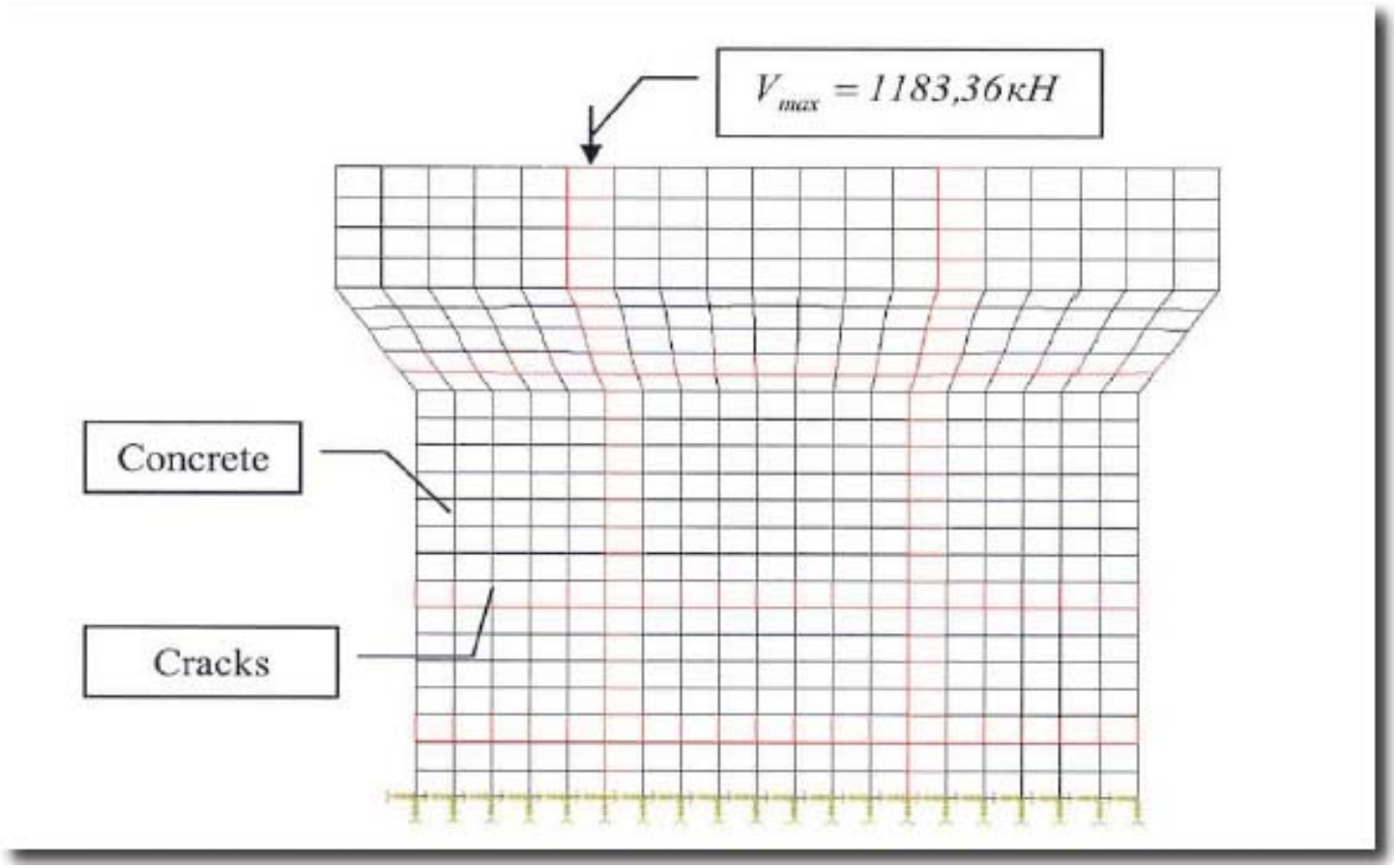
Building type: Bridge footings - Novosibirsk (RUSSIA)

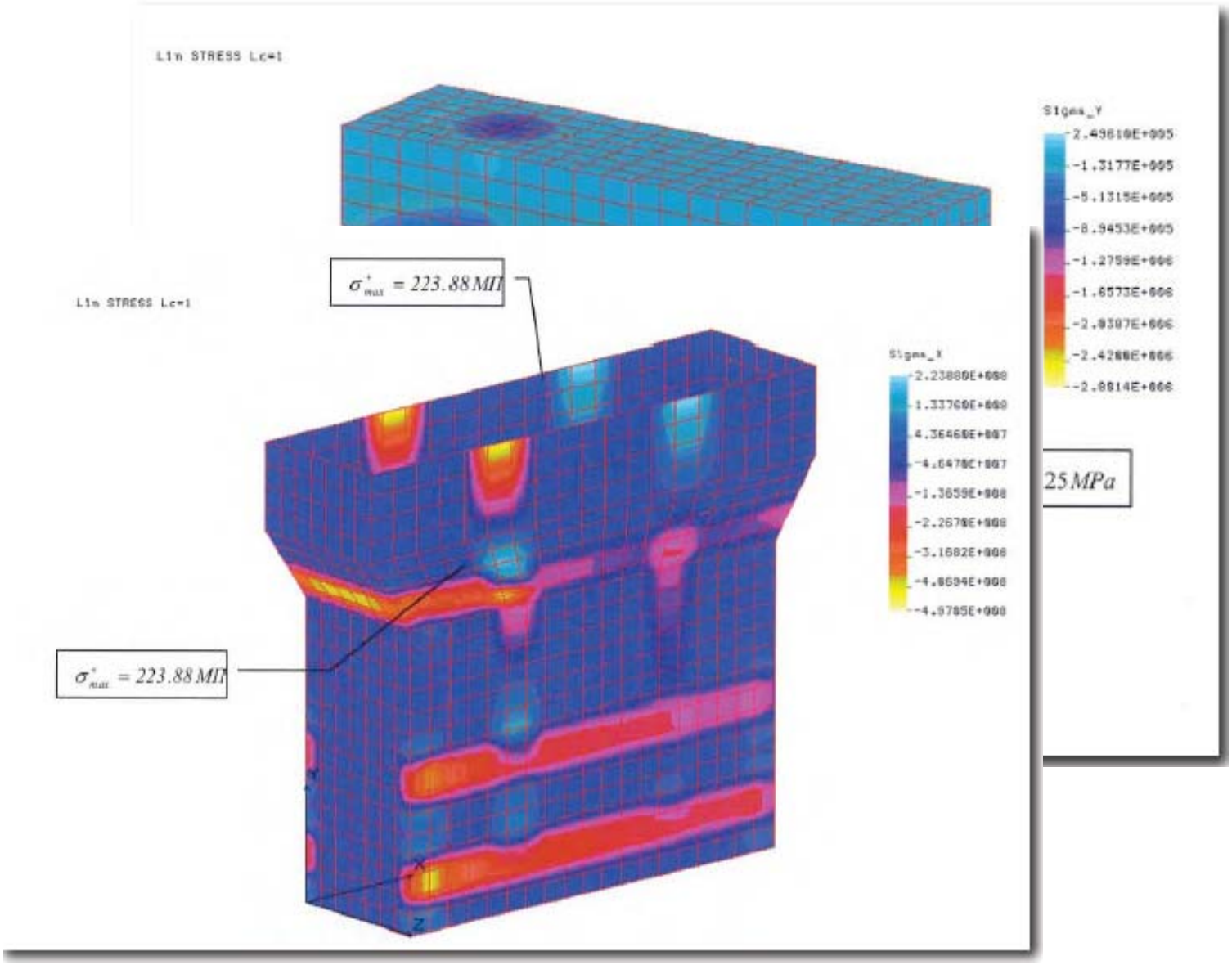
Application month / year: October / 2007

Products applied: Ruredil X Mesh Gold / M750

Used for : Footings strenghtening

Surface: 600 mq


$V_{max} = 1183{,}36 кН$
Concrete
Cracks


Lin STRESS Lc=1
Sigma_Y
2.49619E+005
-1.3177E+005
-5.1315E+005
-8.9453E+005
-1.2759E+006
-1.6573E+006
-2.0387E+006
-2.4288E+006
-2.8014E+006
Lin STRESS Lc=1
$\sigma^{+}_{max} = 223.88MPa$
Sigma_X
2.23889E+008
1.33760E+008
4.36468E+007
-4.6478E+007
-1.3659E+008
-2.2678E+008
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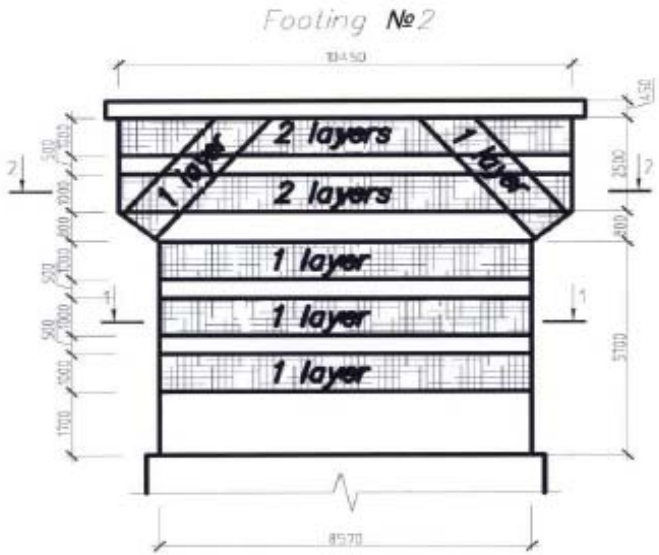
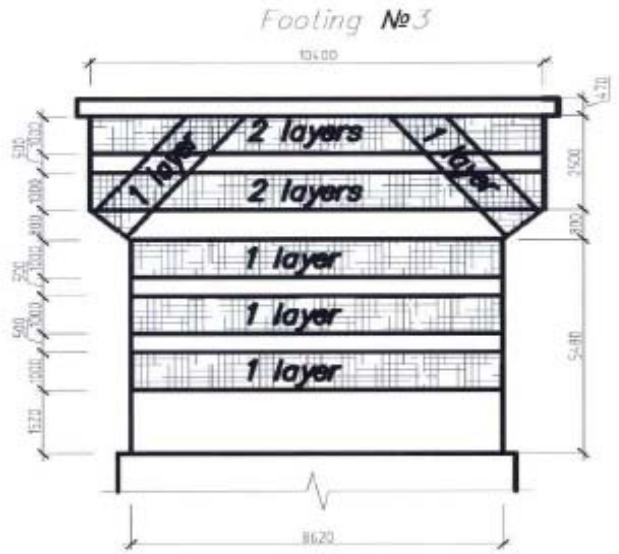
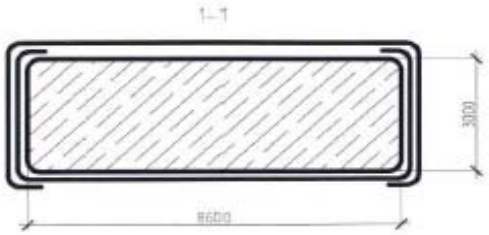
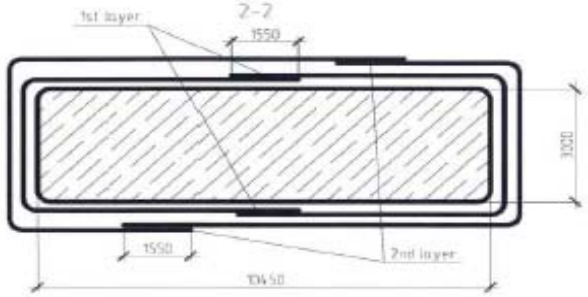
$\sigma^{+}_{max} = 223.88MPa$
25MPa


Footing №2
2 layers
1 layer
2 layers
1 layer
1 layer
1 layer
1 layer
8570


Footing №3
2 layers
1 layer
2 layers
1 layer
1 layer
1 layer
1 layer
8620


1-1
3000
8600


2-2
1st layer
1550
1020
1550
2nd layer
10450

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Thank you