

NATURAL HYDRAULIC LIME NHL3.5



FEN-X CHIARO is a natural hydraulic lime suitable for making highly-permeable masonry or plaster mortar with high sulfate resistance.

Its distinctive colouring allows it to be used on historical masonry, reducing the colour differential between the existing and the new. It thus becomes possible to reproduce particular colour and aesthetic effects through the use of local inert substances.

FEN-X CHIARO conforms to UNE EN 459-1 regulations regarding the "Definition, specification and conformity criteria for building lime," is classified as NHL 3.5, and possesses the CE conformity marking in accordance with applicable law.

Comes in: 25 kg. bags or loose from silos

FIELD OF APPLICATION

FEN-X CHIARO can be mixed with any inert substance which conforms to the norms of acceptance for inerts as stipulated by D.M. 03/06/68 appendix I.

FEN-X CHIARO is suitable for making bedding mortar for masonry bedding in terracotta, stone and solid brick, for the making or restoration of visible masonry joints in stone or solid brick, for the making of base-coat and finishing plaster which is both highly permeable and workable, as well as being non-reactive in the presence of sulfates.

FEN-X CHIARO, used for making plaster or masonry mortar, allows for the hygrometric regulation of surrounding environments, limiting the risk of condensation and the appearance of mildew.

CHEMICAL PROPERTIES

The average components of **FEN-X CHIARO** are summarized in the following table, indicating its chemical composition expressed as oxides:

CaO	69%	MgO	0,8%	Al ₂ O ₃	4,5%	K ₂ O	0,6%
Na ₂ O	0,3%	Fe ₂ O ₃	3%	SiO ₂	18%		

MINERALOGICAL PROPERTIES

FEN-X CHIARO is produced by the low-temperature heating of clayey lime (natural marl). Its principal mineralogical component is β -dicalcium silicate which, upon reacting with the water in the mixture, develops stable hydrated and chemically non-reactive compounds. These provide the mortar with the structural and elastic properties necessary for guaranteeing its durability over time.

FEN-X CHIARO does not contain tricalcium silicates and tricalcium alluminates, typically found in Portland cement.

MIXTURE PREPARATION

FEN-X CHIARO is to be mixed with selected inerts, free of organic substances and with a proper granulometric curve in the ratio of 350-450 Kg/m³, and clean water based on the desired consistency of the mixture. Mixing is to be carried out by hand or in a concrete mixer.

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APPLICATION

Mortar made on-site may be applied by hand or with an automatic machine suitable for the type of mixture created and inert substances used, respecting the warnings noted below as well as the standards of good workmanship. In the case of plaster, the rough surface must be smoothed with a trowel after screeding.

WARNINGS

Choice of inerts: **FEN-X CHIARO** is to be mixed with pure inert substances selected with a proper granulometric curve. Use of inerts with defects or an excess of fine particles will create a mixture that is unworkable ("lean" or "fat"), with improper strength and durability.

Wet surfaces: do not apply mortar made with **FEN-X CHIARO** on surfaces impregnated with water, or where water may come into contact with the material during the first week after application.

Protection against freezing: do not apply mortar made with **FEN-X CHIARO** at temperatures less than 5 °C and protect the product from freezing for the first 48/72 hours after application.

High temperatures, ventilation, absorbent surfaces: take all necessary precautions to avoid the mixture's drying too rapidly (moistening of the surface, making of a preliminary rough coat, etc.)

Compressive strength: the mechanical properties of any mortar depend upon numerous factors, both environmental (temperature, humidity, cure time) and related to the making of the mixture (binder dosage, amount of water in the mixture, type of inert substances). The type of inert substances and the binder/inert ratio are, therefore, necessary information for considering the compressive strength of any mortar in real terms. As an example of this, consider that the strength of **FEN-X CHIARO** after curing may increase by approximately 30-40% by using an inert selected with a maximum granulometry of 5 mm. instead of 2 mm., and up to 60% by using an inert selected with a maximum granulometry of 15 mm. instead of 2 mm.

TECHNICAL DATA

Apparent density	approx. 1100 kg/m ³
Setting time	> 60'
Stability	< 1 mm
Compressive strength after 28 days	3.5 < σ_c < 10 N/mm ²
CaO _{free}	10 - 11 %
Refinement (exceeding 0,09 mm)	< 3 %
pH	> 10.5
Fire reaction class (D.M. 14/01/85)	A1

TECHNICAL SPECIFICATIONS

TASSULLO FEN-X CHIARO natural hydraulic lime in conformance with UNI EN 459-1 regulations, is classified NHL3.5 and possesses the CE conformity marking in accordance with applicable law, suitable for making plaster mortar, masonry mortar, finishing mortar, for exposed facing or joint restoration, with a distinctive colour tone suitable for the reproducing of colour or aesthetic effects on original mortars, and non-chemically reactive in the presence of sulfates; obtained by the on-site adding of pure inert substances selected with a ratio of 350 - 450 Kg/m³, plus water.

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COMPRESSIVE STRENGTH

The compressive strength of **FEN-X CHIARO** is determined per the stipulations of UNI EN 459-2 regarding the carrying-out of testing. The compressive strength is determined after 28 days of curing on 4 x 4 x 16 cm. blocks, made using 450 grams of binder, 1350 grams of normalised inerts and 248 grams of water. Both the methods and timeframes for the making and curing of the mixture are specified in the testing procedures stipulated by UNI EN 459-2 and are subject to verification.

NATURAL HYDRAULIC LIME CLASSIFICATION

Natural hydraulic lime are classified based on normalised compressive strength as shown by the following table :

classification	Compressive strength at 7g	Compressive strength at 28g
NHL2	\	$2 \leq \sigma_c \leq 7 \text{ N/mm}^2$
NHL3.5	\	$3,5 \leq \sigma_c \leq 10 \text{ N/mm}^2$
NHL5	$\sigma_c \geq 2 \text{ N/mm}^2$	$5 \leq \sigma_c \leq 15 \text{ N/mm}^2$

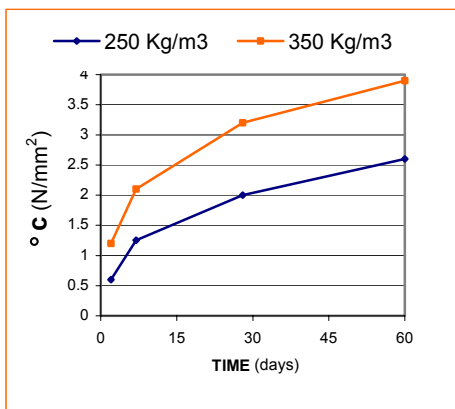
All of the lime types listed in the table must all respect the following chemical parameters:

classification	SO ₃	Free lime
NHL2	$\leq 3 \%$	$\geq 15 \%$
NHL3.5	$\leq 3 \%$	$\geq 9 \%$
NHL5	$\leq 3 \%$	$\geq 3 \%$

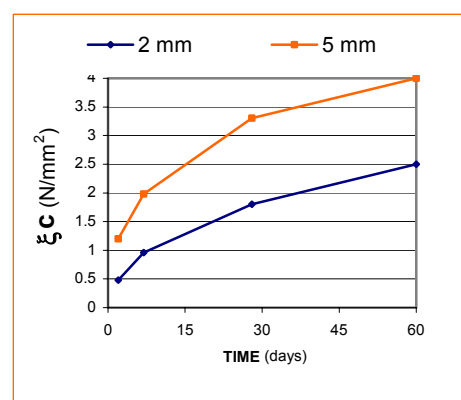
FEN-X/CHIARO is classified as NHL3,5 per the requirements stipulated by UNI EN 459-1.

IN-PLACE COMPRESSIVE STRENGTH

The mechanical properties of any mortar made on-site depend upon numerous factors, both environmental (temperature, humidity, cure time) and related to the making of the mixture (binder dosage, amount of water in the mixture) and the selection of inerts. The type of inert, the ratio of FEN-X/CHIARO / inerts, and the ratio of water / FEN-X/CHIARO are therefore necessary information for determining in real terms the compressive strength of any mortar. The following charts can help to give you an idea of the information reported above:



In-place strength in proportion to dosage



In-place strength in proportion to inerts