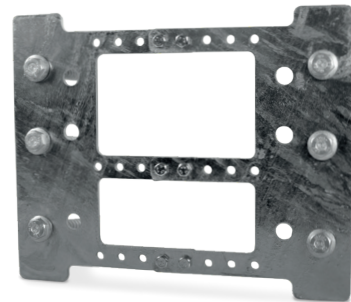
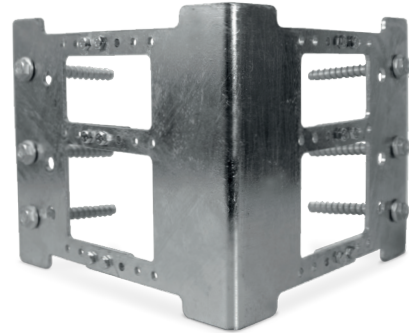


Steel Combo

Modular system for external confinement of beam-to column nodes in reinforced concrete structures composed of CE-marked hot-dip galvanized S355 steel modules and concrete screws in combination with Geolite 40 geo-mortar.

Steel Combo is composed of elements that can be easily assembled on site according to the geometry of the node and quickly dry-installed using special concrete screws, seismic performance category C2. Steel modules are notched, shaped and hot-dip galvanized to ensure high durability of the strengthening over time.



1. Compliant with the CAM (Minimum Environmental Criteria) requirements
2. Quick and easy dry connection using special concrete screws
3. Modular system that can be assembled directly on site
4. High durability thanks to galvanizing treatment
5. No change in geometry, mass or stiffness of the element
6. External confinement of beam-to-column nodes increasing strength and ductility

Areas of application

→ Intended use:

External confinement of facade and corner beam-to column nodes in reinforced concrete frame structures.

Instructions for use

→ Preparation of substrates

Before applying the Steel Combo system, it is necessary to: identify the position of the node; restore the concrete substrate and roughen it to a depth of at least 5 mm, equal to grade 8 of the Test kit for preparation of reinforced concrete and masonry substrates, by mechanical scarification or hydro-demolition; remove the concrete cover or any damaged concrete in depth. Subsequently, it is necessary to remove rust from the reinforcing rods, which must be cleaned by brushing (manual or mechanical) or sandblasting. Clean the treated surface removing any remaining dust, grease, oil and other contaminants using compressed air or a high pressure washer.

→ Preparation

- In order to apply the Steel Combo system, identify the geometry of the node panel, then assemble the facade and corner modules by fastening the appropriate Bolt-d8, Nut-d8, Washer-d8 assembly in two bores for each horizontal comb .
- If the node has a width of ≥ 40 cm, connect the facade and corner modules by means of the opposite P5 or P8 extensions of the same thickness as the connected modules. Fastening is always done using the appropriate bolt-d8, nut-d8, washer-d8 assembly in two bores for each horizontal comb.
- When using modules with a height of 20 or 30 cm and the node has a width of at least 50 cm, apply the vertical extensions PV5-125 and/or PV5-160 (in 30 cm-modules, place the two vertical extensions in different bores). Fastening is carried out using the appropriate Bolt-d8, Nut-d8, Washer-d8 assembly in one bore for each horizontal comb.
- Follow the specific instructions presented within the exploded views and the specific diagrams in the Kerakoll Technical Manual for the correct assembly of the modules based on the size of the node panel.

→ Application

Determine the position of the bores inside the longitudinal bars of the pillar, keeping as close as possible to them using the assembled module set on the surface of the joint as a template; the presence of multiple anchoring holes facilitates installation . Drill the bores with a diameter of 14 mm and a depth of 160 mm by roto-percussion.

Wet with water until the substrate is saturated yet with no excess water on the surface.

Carry out localised and/or generalised repairs by applying Geolite 40 manually with a trowel. When applying the product, make sure all cavities are filled and the reinforcing rods are embedded.

Follow the specific instructions presented within the exploded views in the specific brochure and the Installation Manual to position the D elements (in thickness equal to that of the connected modules), in case they are provided. They must be positioned under the appropriate F module in correspondence with the MMS-plus SS 16x130 connectors before installing the node. Place the set of modules on the still wet matrix, ensuring that they are perfectly embedded in the geo-mortar layer; take care that the mortar leaks and fills the bores . Install the MMS-plus SS 16x130 connectors using an impact wrench (maximum torque 600 Nm).

Restore the removed concrete cover using Geolite 40, ensuring a minimum covering thickness of at least 10 mm.

→ Cleaning

Residual traces of Geolite 40 can be removed from tools and machines using water before the product hardens.

Special notes

- As an alternative to Geolite 40 geo-mortar and depending on the project requirements, the designer can choose to apply Geolite or the Geolite FRC system made up of Geolite Magma Xenon & Steel Fiber, providing adequate formwork for the casting.
- If the installed Steel Combo system is to be plastered or masked by a finishing coat, it is recommended to use Geolite Silt, Geocalce Multiuso or Rasobuild Eco Top, with Rinforzo V 50 in between.
- In order to guarantee further protection in particularly aggressive environments, a final application of Kerakover Acrilex Flex elastomeric paint is recommended. If possible, Kerakover Acrilex Flex has to be applied on non-strengthened areas as well.
- For further information on how to apply Geolite 40 and other products mentioned here, please refer to the individual product technical data sheets.

Certificates and marks



Abstract

Supply and laying of a strengthening system for the external confinement of beam-to-column nodes, composed of S355 steel modules, notched and shaped with a suitable profile and thickness, hot-dip galvanized, CE-marked according to EN 1090, execution class EXC3, compliant with the CAM (Minimum Environmental Criteria) requirements. They are applied by dry connections using CE-marked concrete screws, seismic performance category C2, using a certified, semi-rapid setting (40 min.), thixotropic, mineral geo-mortar, based on geo-binder, with very low petrochemical polymer content and free of organic fibres, specific for passivation, repair, smoothing, and guaranteed, long-lasting monolithic protection of structures in concrete and grouting of bars – such as Steel Combo, composed of suitable modules, MMS-Plus SS 16x130 connectors and Geolite 40 by Kerakoll – with the mortar's following certified technical characteristics: CE-marked and compliant with the performance requirements of Standards EN 1504-7, EN 1504-3 Classe R4; EN 1504-2 and EN 1504-6.

The price is per actually strengthened beam-to-column node. Delivery and installation of all the materials described above as well as everything else required to finish the job is included. Material acceptance tests, pre- and post-procedure testing, all aids required for the execution of the work to be considered as indirect safety costs are excluded.

Technical Data compliant with Kerakoll Quality Standard	
Steel modules	
Material	Steel
Strength class	S355
Execution class	EXC3
Tolerances	UNI EN 1090:2
Resilience	S355JR o S355J2
Reaction to fire	class A1
Available heights	200 / 300 / 500 / 700 mm
Available thicknesses	5 / 8 mm
Treatment	Hot-dip galvanization
Nuts and bolts (Bolt-d8, Nut-d8, Washer-d8)	
Material	Galvanized steel
Steel class	8.8
Diameter	8 mm
Yield strength fyk	640 N/mm²
Characteristic tensile strength ftk	800 N/mm²
MMS-plus SS 16x130 concrete screw	
Material	Galvanized steel
Diameter	16 mm
length	130 mm
Tensile strength NRk,s	111,1 kN
Shear strength VORk,s	50,2 kN
Maximum installation torque	600 Nm
Mark	CE-marked according to EAD 330232-01-0601
Seismic performance category	C2

Warning

- Product for professional use

→ abide by any standards and national regulations

→ use at temperatures between +5 °C and +40 °C

→ following application, protect from direct sunlight and wind

→ Store in a dry place and away from substances that may compromise the integrity

→ for further information about Geolite 40 and other products mentioned here, please refer to the appropriate documentation available on kerakoll.com
- the product is an item according to the definitions of the EC Regulation No. 1907/2006 and therefore does not require a Safety Data Sheet

→ for any other issues, contact Kerakoll Technical Customer Service:
+ 39 0536.811.516
www.kerakoll.com/contatti



The Rating classifications refer to the GreenBuilding Rating Manual 2012. This information was last updated in January 2025; please note that additions and/or amendments may be made over time by KERAKOLL SpA; for the latest version, see www.kerakoll.com. KERAKOLL SpA shall therefore be liable for the validity, accuracy and updating of information provided only when taken directly from its institutional website. The technical data sheet given here is based on our technical and practical knowledge. As it is not possible for us to directly check the conditions of your building site and the execution of the work, this information represents general indications that do not bind Kerakoll in any way. Therefore, it is advisable to perform a preliminary test to verify the suitability of the product for your purposes.