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HARDSCAPE**

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NATURAL STONE

Installation Guide

ORCO Natural Stone Installation Guide (Non-Vehicular Applications)

Thank you for choosing ORCO Natural Stone products for your project. As you proceed with installation, the stone will soon become part of a *system* that is designed to both highlight the beauty of the stone surface as well as provide long term structural support. All the components of the system – specific site, native soil, drainage, base materials, bedding materials, joint spacing, edge restraints, and ORCO’s stone – must work together to achieve and maximize the value of this sizable investment. Proper installation is critical to overall customer satisfaction.


The cross sections and considerations described in this Guide cover most typical pedestrian, non-vehicular installations. They should be treated as best practices – based on experiences installing this natural stone throughout the world – and should serve as a starting point for developing a site specific design. Since every project is different, ORCO Block & Hardscape strongly recommends consulting licensed professionals to tailor installation to the particular site. Also, be sure to check with local permitting agencies to ensure proper permits are pulled and all special requirements are followed. With each site different, ORCO Block & Hardscape cannot guarantee or be responsible for any job site issues or failures attributed to use of this Guide.

Each installation method described here is a system used for most common conditions. Mortar set with grouted joints provides the best installation method for this premium product. This Guide covers pedestrian-only application methods.

- **Mortar Set Over New or Existing Concrete** – The concrete must be crack-free, without defects, and sloped for proper drainage. 3/8” grouted joints.
- **Up to 1/2” Mortar Set Over Existing Concrete** – When finish height is a concern, this option offers an alternative thinner application. The concrete must be crack-free, without defects, and sloped for proper drainage. 3/8” grouted joints.
- **Mortar Set Over Compacted Base** – Minimum 4” compacted base over undisturbed native soil. 3/8” grouted joints.
- **Over Wood Decking** – Grates provide sub-floor over joists for wood decking.

Given that the stone is a premium product, ORCO strongly discourages the use of sand set over compacted base construction methods.

For deck and rooftops, **Pedestal Installations** – with the stone sitting on top of pedestals – are gaining popularity. ORCO’s Piazza 24”x24” squares with sawn edges spread loads evenly and are perfect for this application. Since each project is highly technical and a custom installation, ORCO provides site specific guidelines created for us by Bison Innovative Products.

 **WARNING:** This product when cut or ground can expose you to Silica, crystalline (airborne particles of respirable size) which is known to the State of California to cause cancer. For more information go to <http://www.P65Warnings.ca.gov>.

Critical Items to Consider

Regardless of installation method, the following items should be reviewed at the start of every project.

- ORCO cross sections show typical base, concrete, and bedding thicknesses. Actual design specs should always be determined by qualified professionals. Never install stone over top soil or sand. It is the installer's responsibility to ensure all site and structural factors are properly addressed.
- Expansion joints may be required – typically 20' to 26' sections.
- Stone should be installed in areas that drain completely – avoid high water table, “ponding” areas, and areas that never dry out. Stone that stays wet promotes organic growth, discoloration, and delamination.
- Ensure the surface of the stone is installed at a 2% slope, pitched away from building structures.
- Always wet cut the stone and rinse residue from both sides. Use segmented diamond tipped blades. High strength brick blades and high density stone blades work best.
- Never use plate compactors on the stone surface.
- During installation, clean the stone surface as you go using clean water and sponge. Do not let the cementitious material set on the stone surface.
- Never use wire brushes or other abrasive metallic products to clean the surface. Nylon bristle brushes work best.
- High pressure washing can damage the stone's surface and should be left to trained professionals.
- Post installation use of cleaners and sealers should be formulated for use with natural stone. Always follow manufacturer's guidelines, which always include first testing cleaning performance in an inconspicuous spot. United Stonecare sealers and cleaners have a long history in protecting this high-end stone. For more information and cleaning instructions, visit unitedstonecare.com

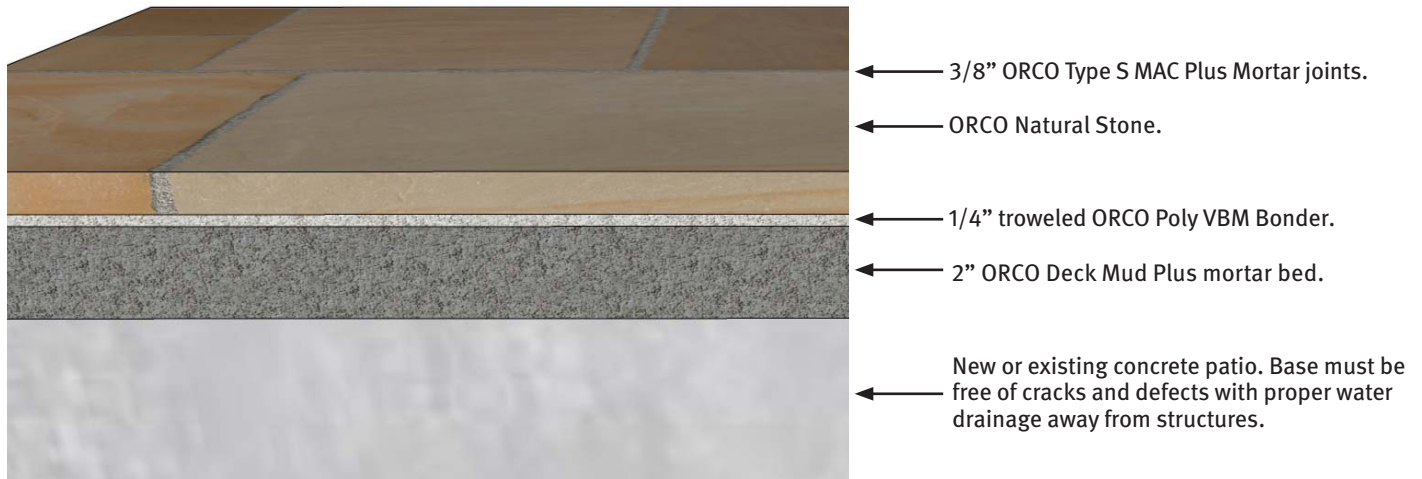
PERSONAL PROTECTIVE EQUIPMENT (PPE):

Minimum standards for job site PPE must be followed: including hard hat, protective gloves, protective shoes and high visibility clothing. In addition, safety goggles, N100 rated dust mask and proper gloves are required when cutting any stone.

ORCO NATURAL STONE STANDARDS:

ORCO Natural Stone is tested per ASTM C616 *Standard Specification for Quartz-Based Dimension Stone*. This test includes: flexural strength, water absorption, compressive strength. Slip Resistance determined per ASTM C1028. Installation methods based on recommendations from Tile Council of North America (TCNA) and ANSI/CTI A108.1 *Installation of Ceramic Tile – Wet Set or Dry Set Methods*.

MORTAR SET OVER NEW OR EXISTING CONCRETE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

New or Existing Slab:

Must be free of cracks and defects with proper drainage away from structures. Avoid areas prone to water migration through the slab. Slab must be built according to local authority having jurisdiction.

ORCO Deck Mud Plus:

3:1 dry pack mortar bed. Dry pack methods. Use of cement mixer is necessary to achieve proper consistency. Follow dry pack manufacturers recommendations to achieve a "brown sugar" consistency that is free of clumps or hydrated material. Place and screed material to a minimum of 2".

ORCO Poly VBM Bonder:

Mix bonding mortar per manufacturer's recommendations. Completely cover back of stone using 1/4" notch trowel.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Expansion Joints:

All expansion control joints must be brought to the surface. "Hidden" joints can crack the stone.

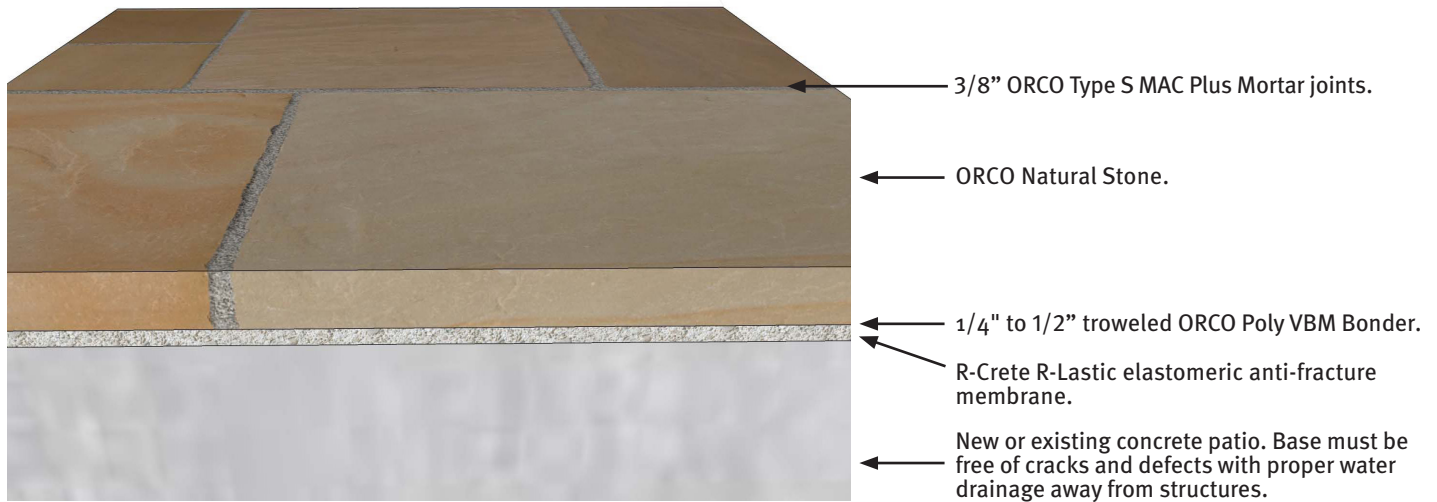
ORCO Type S MAC Plus Mortar:

Mix mortar per manufacturer's recommendations.

Joints:

Should be no larger than 3/8". Fill joints with ORCO Type S MAC Plus Mortar and tool. Promptly clean all residue from the stone surface.

UP TO 1/2" MORTAR SET OVER EXISTING CONCRETE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

New or Existing Slab:

Must be free of cracks and defects with proper drainage away from structures. Avoid areas prone to water migration through the slab. Slab must be built according to local authority having jurisdiction.

R-Crete R-Lastic:

Elastomeric anti-fracture membrane. Apply per manufacturer's recommendations. Roll or trowel.

ORCO Poly VBM Bonder:

Mix bonding mortar per manufacturer's recommendations. Completely cover back of stone using 1/4" notch trowel.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Expansion Joints:

All expansion control joints must be brought to the surface. "Hidden" joints can crack the stone.

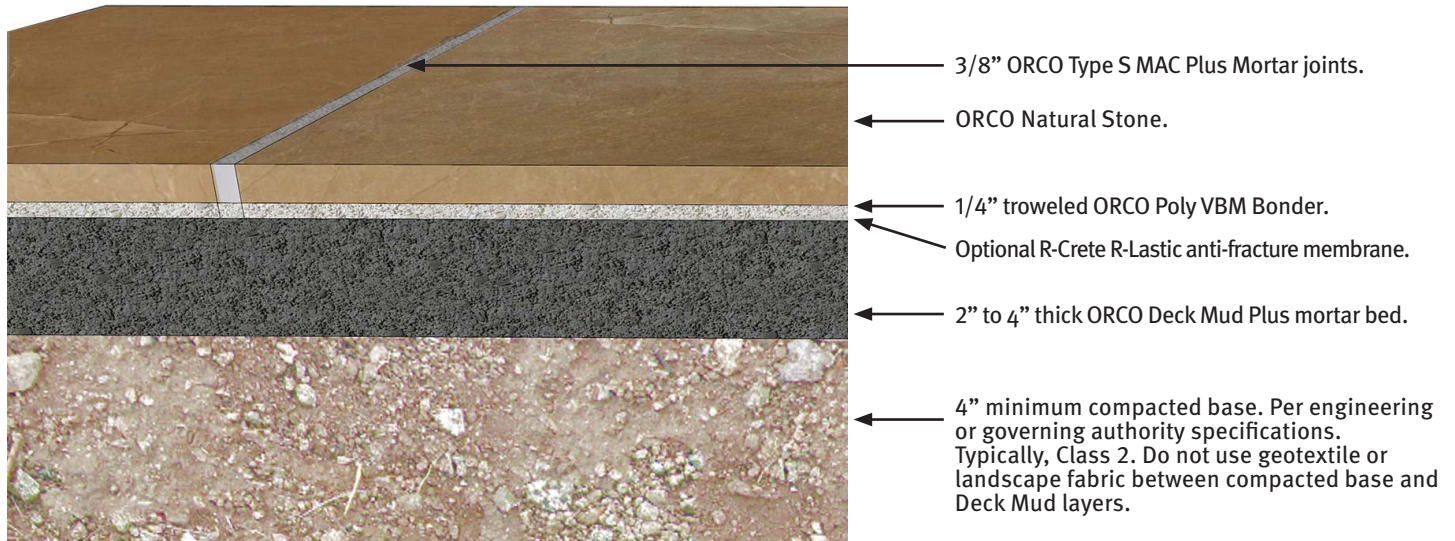
ORCO Type S MAC Plus Mortar:

Mix mortar per manufacturer's recommendations.

Joints:

Joints should be no larger than 3/8". Fill joints with ORCO Type S MAC Plus Mortar and tool. Promptly clean all residue from the stone surface.

MORTAR SET OVER COMPACTED BASE FOR PEDESTRIAN USE ONLY



Installation:

Native Soil Condition – Poor soils (clay and disturbed) may result in surface deformation, unwanted settlement, and/or cracking. Engineer consultation is recommended.

Layout:

Plan layout prior to starting installation. Paint outlines and spot all elements – planters, stairs, transitions, etc. Design area perimeter should be a minimum of 8" greater than edge of the stone to allow for placement of restraints. Use wood or steel stakes to mark excavation areas and check depth. Use a nylon mason's line to set the finished elevation of the stone. Measure all excavation and base thickness from the finish line marker. Laser levels are recommended for precise grading.

Site Drainage:

Final pavement elevations should slope away from any structure a minimum of 2%. Drains or other means of site drainage must be employed in areas where proper slope cannot be achieved. Max slope for pedestrian accessibility is 8%.

Excavation:

Excavation depth will depend on site conditions– particularly drainage, soil, and stone thickness. Pedestrian applications typically call for minimum of 4" Class 2 base.

Base Compaction:

Proper compaction is critical. Increasing base depth will provide greater stability. Compact subgrade to 98% Proctor Density. Avoid overly wet or dry soils.

ORCO Deck Mud Plus:

3:1 dry pack mortar bed. Dry pack methods. Use of concrete mixer is necessary to achieve proper consistency. Follow manufacturer's recommendations to achieve a "brown sugar" consistency that is free of clumps or non-hydrated material.

R-Crete R-Lastic:

Optional elastomeric anti-fracture membrane. Apply per manufacturer's recommendations. Roll or trowel.

ORCO Poly VBM Bonder:

Mix bonding mortar per manufacturer's recommendations. Completely cover back of stone using 1/4" notch trowel.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Tamp, level, and ensure proper drainage fall as you build.

Expansion Joints:

All expansion joints must be brought to the surface. "Hidden" joints can crack the stone.

ORCO Type S MAC Plus Mortar:

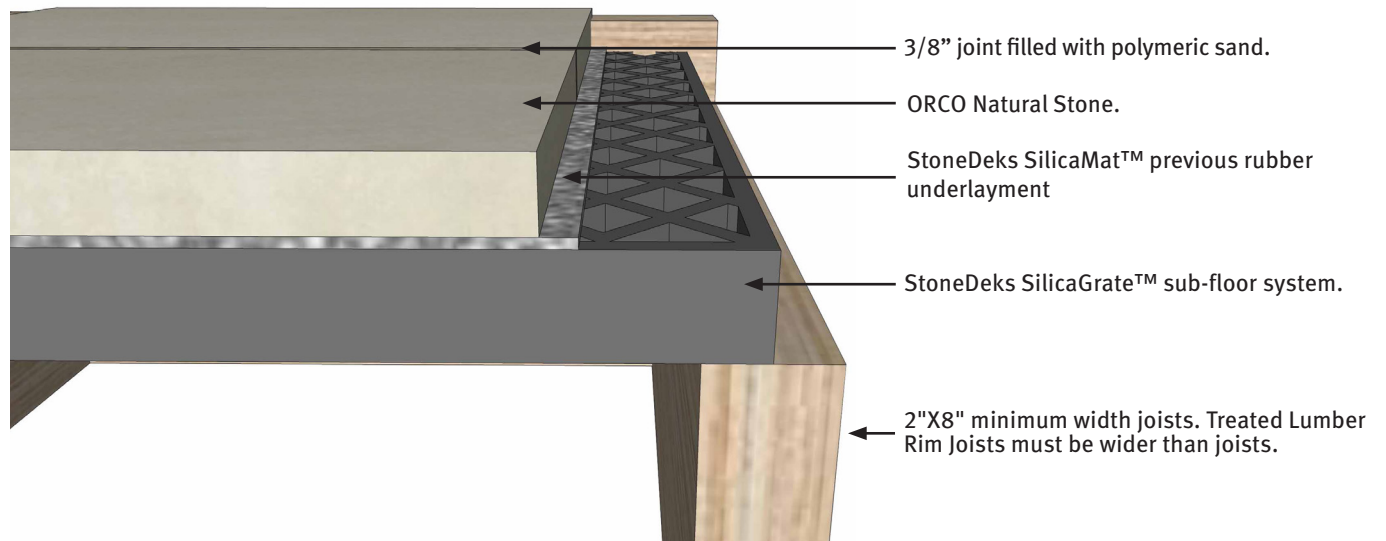
Mix mortar per manufacturer's recommendations.

Joints:

Joints should be no larger than 3/8". Fill joints with ORCO Type S MAC Plus Mortar and tool. Promptly clean all residue from the stone surface.

DESIGN AND INSTALLATION SPECIFICATIONS FOR A SPECIFIC SITE SHOULD ALWAYS BE DETERMINED BY QUALIFIED PROFESSIONALS

STRUCTURAL UNDERLAYMENT OVER DECKING FOR PEDESTRIAN USE ONLY



Installation:

Foundation – Decking must be installed on proper base. Consult permitting office for requirements. Follow local ordinances if decking is to be used on grade. Engineer consultation is highly recommended.

Layout:

Plan layout prior to starting installation. Spot all elements – planters, stairs, transitions, etc.

Decking:

Joists to be 2"X8". Rim joists must be treated lumber and wider than joists. Example, 2"X8" in conjunction with 2"X12" trim joists will allow for thickness of underlayment and thickness of natural stone paver. Follow local governing body permitting standards for decking design for every construction application.

Structural Underlayment

Use StoneDeks SilicaGrate™ which is rated for placement under natural stone. *Complete installation guidelines can be found at www.stonedeks.com*

Geotextile Underlayment

Use StoneDeks SilicaMat™ between structural underlayment and natural stone to help keep polymeric sand in place.

ORCO Natural Stone:

Stone should be washed with sponge and clean water to remove dust and residue.

Placement:

Use mortar tool or spacers to carefully align and place stone. Shimming maybe needed to accommodate placement.

Joints:

Should be no larger than 3/8". *Use polymeric sand to fill joints. Follow polymeric sand manufacturers guidelines.* Promptly clean all residue from the stone surface.



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