



**MECHANICALLY-STABILIZED EARTH (MSE)
RETAINING WALL PANELS**

GENERAL

Approval to furnish Mechanically-Stabilized Earth (MSE) Retaining Wall Panels shall be on the basis of certification from approved sources (approved plant prior to letting) and shall conform to all applicable specifications and design requirements. Approved sources are listed in [IM 445.03](#), [Appendix A](#).

PLANT APPROVAL

Plant approval shall be on the basis of certification, approved quality control plant and a recommendation by the District Materials Engineer responsible for the inspection of the plant.

An up-to-date Quality Control Plan that ensures all materials, mix design(s), workmanship and fabrication methods is required and shall be subject to the approval of the engineer.

MATERIALS

All aggregates, cementitious materials, admixtures and reinforcing steel, shall be from approved sources and shall comply with the requirements of the Iowa Department of Transportation Standard Specifications.

CONCRETE

- Cement content per cubic yard (cubic meter) shall be not less than 600 lbs. (360 kg) or more than 700 lbs. (420 kg).
- Coarse aggregate shall be Class 3 durability (as defined in [Article 4115.04](#)). The use of gravel is subjected to the approval of the Engineer, based on past history of deleterious and stain-producing material found in the aggregate source.
- Air content shall be 6.5% as a target value, with a maximum variation of $\pm 1.0\%$. When specified, or authorized, approved admixtures for the purpose of improving workability or for retardation may be used with prior approval of the Engineer.
- Mix design is subject to the approval of the Engineer.
- Compressive Strength
 - Strength prior to moving - 1800 psi (12.4 MPa)
 - Strength at 28 days – 4000 psi (27.6 MPa)

Acceptance of the concrete face panels with respect to compressive strength will be determined on a lot basis. The lot will consist of all production units (batches of concrete or panels) produced within a consecutive 7 day production period. Production units will be randomly selected according to the production day sample table and tested for compressive strength. Perform compression tests on the test specimens according to [Materials I.M. 315](#).

Table: Production day samples

Production Day Quantities	Sample Size
35 cubic yards (27 m3) or less (50 panels or less)	1
35-70 cubic yards (27-54 m3) (50-100 panels)	2
70-100 cubic yards (54-81 m3) (100-150 panels)	3
Over 100 cubic yards (81 m3) (150 panels)	5

- A minimum of six test cylinders shall be cast for each production unit sampled.
- Three test specimens shall be tested at 7 days and three at 28 days.
- A test will be the average compressive strength of three cylinders.

TOLERANCES

- A. Lateral position of the strips within 1.0 inch (25 mm)
- B. All dimensions within 1/4 inch (5 mm)
- C. Angular distortion with regard to the height of the panel shall not exceed 1/4 inch in 5 feet (5 mm in 1.5 m)
- D. Surface defects shall not be acceptable if objectionable. However, on smooth-formed surfaces defect shall not exceed 1/8 inch in 5 feet (2.5 mm in 1.5 m). On textured surfaces defect shall not exceed 5/16 inch in 5 feet (8 mm in 1.5 m).

CURING

- As soon as practical (after initial set) after casting, but not later than 30 minutes, panels shall be covered with wet burlap and kept wet. Within two hours of the initial covering, water shall be applied to the burlap by means of a continuous pressure-sprinkling system that is effective in keeping the burlap wet during the initial curing period. The initial curing period shall continue until the minimum moving strength is obtained.
- After the initial curing period is completed, panels may be moved from casting beds to a secondary curing area and covered with wet burlap and polyethylene (plastic) 3.0 mil (60 μ m) thick, properly secured to retain moisture.
- Concrete face panels shall not be left uncovered longer than 20 minutes during the moving process.
- Curing shall continue until the specified strength is obtained.
- Steam curing may be used and shall be subject for prior approval by the engineer.
- Forms shall remain in place until the moving strength is obtained – 1800 psi (12.4 MPa).
- Panels shall be acceptable for shipping or for placement when 28-day strengths have been obtained.

REJECTION

1. Failure to meet any of the specified requirements
2. Defects that indicate imperfect molding
3. Defects that indicate honeycomb or open texture concrete
4. Surface defects that exceed 5/16 inch (8 mm) in 5 feet (1.5 m)
5. Chipping, cracking or fractures

HANDLING, STORAGE & SHIPPING

- Units shall be handled with care, lifting shall be with padded straps or padded contact areas and shall be stored above ground on wooden or padded supports.
 - Support shall be adequate, firm, and shall be placed evenly to prevent sagging.
 - Handling shall be minimized.
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- Handling, storage and shipping shall be in a manner as to prevent and/or eliminate the causes of cracking, fracturing, damaging and excessive bending stresses.

LEVELING PAD

Leveling pad shall be concrete and shall have a nominal strength of 3500 psi.

REINFORCING & TIE STRIPS

- Tie strips shall be fabricated from hot-rolled steel conforming to the requirements of ASTM A570, Grade 50 or equivalent.
- Galvanization shall conform to the requirements of ASTM A123.
- Reinforcing strips shall be galvanized and shall be made of hot-rolled steel bars meeting the requirements of ASTM A572, Grade 65 and made into the required shape and dimensions. Strips shall be cut to lengths and tolerances as shown on the plans or shop drawings.
- Only plastic supports for reinforcing steel shall be accepted based on approved brands as noted in [IM 451.01](#), [Appendix A](#).

CERTIFICATION DOCUMENTS

The producer/fabricator of the MSE Retaining Wall Panels shall furnish on each shipment day a certified bill of materials or invoice, which identifies the county, project number, contractor's name and the number of panels **along with certified compression test data**. The certification of compliance shall be signed by a designated or responsible company representative and shall be stated as follows:

The materials itemized in this shipment are certified to be in compliance with the applicable ASTM Standards and the Iowa Department of Transportation Standard Specifications.

Authorized Signature & Date

One copy of the above-described documents shall be forwarded to the project engineer on the day the item(s) are delivered to the project and one copy shall be sent to the respective District Materials Engineer.