DIVISION 7 **SECTION 07241**

EXTERIOR FINISH SYSTEM
GUIDE SPECIFICATION (with Metric analogs)
FOR TUFF II APPLICATION OVER
INSULATED CONCRETE FORMS (ICF)

01/04

PART I: GENERAL

l.01 DESCRIPTION AND SCOPE

A. Requirements contained within Division I (General Requirements) are applicable to the work required of this section.
Provide labor, materials, equipment and supervision necessary to complete the exterior wall and finish systems including:
   l. inspection and preparation of Insulated Concrete Form (ICF) substrate;
   2. application of Total Wall Self-sticking reinforcing mesh over the ICF substrate;
   3. application of Tuff II coating;
   4. application of backer rod and caulk sealant.

B. Related work specified elsewhere
   l. Masonry, Division 4
   2. Metal Framing and Flashing, Division 5
   3. Wood Construction, Division 6
   4. Sheathing, Division 9
   5. Caulking/Sealants/Insulation/Moisture Barriers, Division 7
   6. Portland Cement Plastering, Division 9

C. Referenced Documents:
   1. Standards
      ASTM B117 Test Method for Salt Spray (Fog) Testing
      ASTM C67 Mod. Test Method For Saturated Freeze/Thaw Cycles of Exposure
      ASTM C297 Test Method for Tensile Strength of Flat Sandwich constructions in Flatwise Plane
      UBC 26-9 (ISMA) Intermediate Scale Multistory Fire Test
      ASTM C1135 Test Method for Determining Tensile Adhesion Properties of Structural Sealants
      ASTM D968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
      ASTM 1784 Specification for rigid PVC
      ASTM D2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
      ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
      ASTM E108 Mod. Full Scale Structural Fire Testing of Wall Systems

ASTM E330 Test Method for Structural Performance by Uniform Static Air Pressure Difference
ASTM E331 Test Method for Water Penetration by Uniform Static Air Pressure Difference
ASTM E695 Method fro Measuring Relative Resistance to Impact Loading
ASTM G23 and G53 Accelerated Weathering for Exposure of Nonmetallic Materials
Fed Mil Spec 810D Test Method for Determining the Resistance to Mold and Fungus Growth
NFPA Standard Test Method 268 Radiant Heat Fire Test

2. Building Code Standards

National Building Code, Building Officials and Code Administrators (BOCA), Section 1406.0
Standard Building Code, Southern Building Code Congress International (SBCCI), Sections 717.4 and 717.5
Uniform Building Code, International Conference of Building Officials (ICBO), UBC Standard 26-4
International Building Code (IBC)
International Residential Code (IRC)

D. Terms and Definitions

Reinforced Full Synthetic System over ICF.

A class of exterior cladding where Total Wall Self-sticking reinforcing mesh is pressed onto the ICF surface followed by a 1/8” (3.2 mm) thickness of Tuff II coating.
Typically, one layer of Tuff II and reinforcing mesh are used, however, an additional layer of Tuff II and reinforcing mesh may be used to increase the impact resistance of the system.
The Total Wall reinforcing mesh is a woven glass fiber fabric which is coated with a protective plastic material.
Tuff II is a 100% Acrylic combination base coat and finish coat available in a chosen color and textured as specified in the field by the applicator.

1. ICF Substrate

A preformed rigid insulating foam plastic block that functions to reduce heat flow through a wall and to provide a surface for receiving the Total Wall reinforcing mesh followed by the Tuff II coating. Typically, Expanded Polystyrene (EPS) foam block will have an average foam density of 1.5 lb per cubic foot (24.03 g/liter) is used with outer average EPS thickness from the concrete core that will not exceed 4" (101.6 mm). The ICF block must meet specific performance and safety specifications as outlined in the ICF manufacturer’s specifications.

2. Total Wall Reinforcing Mesh

An open weave fiberglass fabric that is coated with a protective plastic. Average weight of the mesh is 4.3 ounces per square yard with an opening size of 0.17 inches. One face of the mesh has a permanently sticky adhesive to enable self-stick application.

4. Total Wall Tuff II

   A premixed, synthetic plaster material. It functions to provide a durable base coat and a decorative color and texture coat.

5. Accessories

   Optional items such as corner beads and casing beads that are utilized in the assembly of the system. Flashing for window and door treatment, decks, roof kick out areas and dormers are utilized. V-buck tape may be used to transition from window bucks to the ICF, especially in the absence of EIFS trim bands.

6. Sealant

   A permanently flexible self-sticking compound that is used to seal seams in the system such as the seams occurring between the system and windows and doors.

1.02 DESIGN LIMITATIONS AND DETAILING

A. The maximum allowable system deflection, normal to the plane of the wall, is L/240.

B. All details shall conform with TOTAL WALL recommendations and shall be consistent with the project requirements.

   l. General

      a. At all exposed locations the ICF shall be completely encapsulated by the lamina.

      b. The ICF shall be separated from the interior of the building by l/2" (12.7 mm) gypsum wallboard or equivalent thermal barrier material which will limit the average temperature rise of the unexposed surface to not more than 250 F (119 C) after 15 minutes of fire exposure, when subjected to the ASTM E-119 time-temperature curve.

      c. The minimum thickness of EPS shall be 1/4” (6 mm), the average maximum thickness shall be 4” (101.6 mm).

         1. Exception: minimum thickness of EPS over plastic ties does not apply.
         2. Minimum thickness of EPS used for trim, extensions or laminations shall 3/4” (19 mm).

      d. The length and slope of inclined surfaces shall follow the guidelines listed below:

         l. Minimum slope: 6" (152.4 mm) of rise in 12" (304.8 mm) of horizontal projection.

2. Inclined surface shall not be used for areas defined as roofs by building codes.
4. Use not meeting the above criteria shall be approved in writing by Total Wall prior to installation.

2. ICF Substrate
   a. Shall be engineered to withstand all applicable loads, including live, dead, positive and suction wind, seismic, etc. Appropriate factors of safety shall be used.
   b. The maximum deflection under positive or suction full design loads of the substrate system shall not exceed L/240.
   c. The substrate shall not have any planar irregularities of greater than 1/4" (6.35 mm) in 8 lineal feet (2.4384 M).
3. Expansion Joints
   a. Continuous expansion joints shall be installed at the following locations:
      l. Where expansion joints occurring the substrate.
      2. Where building expansion joints occur.
      3. Where the system abuts other materials.
   b. Expansion and contraction of the system & adjacent materials shall be taken into account in the design of expansion joints, with proper consideration given to sealant properties, installation conditions, temperature range, coefficient of expansion of materials, joint width-to-depth ratios, etc.
   c. Isolation joints are required around all wall protrusions, including doors and windows.
4. Details
   a. Total Wall's latest published information shall be followed for standard detail treatments.
   b. Non-standard detail treatments shall follow the recommendations of Total Wall.
   c. Corners shall be reinforced by wrapping reinforcing fabric around the corner from both directions for a minimum of 8" (203.2 mm). Tuff II shall be applied to the first layer of mesh before the second layer of mesh is laid.
   d. Openings shall be reinforced using a 9 l/2" (241.3 mm) wide by 12" (302.9 mm) long strip of Detail Mesh laid at a 45 degree angle to the opening corner.
   e. Commercial and residential window openings shall be trimmed if necessary with EPS foam lamina to cover dissimilar adjoining materials and to facilitate construction of either a standard isolation joint or fillet bead of approved sealant and backer.

C. All areas requiring higher than standard impact resistance shall be detailed in the drawings and described in the contract documents.

D. The use of dark colors must be considered in relation to estimated wall surface temperatures as a function of local climate conditions.

I.03 QUALITY ASSURANCES

A. Contractor
The contractor shall meet the approval of the General Contractor. The contractor shall provide the equipment, manpower and supervision necessary to install the system in compliance the project plans and specifications.

B. ICF manufacturer
The ICF Manufacturer shall be: Reward Wall, Keeva, BuildBlock, Amvic, Eco Block, Arxx, Dow, Polysteel, or as approved in writing by Total Wall and as recognized by Total Wall as capable of producing ICFs to meet the system requirements.

I.04 SUBMITTALS

A. Sample : The contractor shall prepare for the General Contractor samples of 1’ by 1’ (30 cm by 30 cm) of Total Wall lamina over EPS board to exhibit the texture and color of the finish desired. The General Contractor shall review the panel and determine the suitability of the finish presented.

B. The contractor shall submit a list of projects, exhibiting the contractor's installation skills. The list shall include project name, location, description of work and date.

C. Total Wall’s literature, including application instructions, specifications and details.

D. The ICF Manufacturer Systems documentation.

I.05 PRODUCT DELIVERY AND STORAGE

A. Delivery: Deliver all materials supplied by Total Wall in original, unopened containers with legible manufacturer’s identification intact.

B. Storage:

1. Store all products off the ground, under cover and protected from dampness and sun light.
2. Warning: EPS rigid insulation is combustible and may constitute a fire hazard if improperly used or installed. EPS insulation should be adequately protected. Use only as directed by the specific instructions for these products. During shipping, storage, installation or use, these materials should not be exposed to open flame or any ignition sources. For proper protection of rigid insulation,

consult the National Fire Protection Association (NFPA) standards or the authority having jurisdiction.

3. All liquid products shall be stored at 40 F (4.4 C) or above and protected from freezing. Protect from exposure to direct sunlight during storage.

l.06 JOB CONDITIONS

A. Install all materials in strict accordance with all safety and weather conditions required by the product literature, and in accordance with ASTM C926, paragraph 7, and as modified by the applicable standards of the authorities having jurisdiction.

B. Apply all coatings when the ambient temperature is 40 F (4.4 C) and rising. A minimum temperature of 40 F (4.4 C) should be maintained twenty-four hours after completion of work. Supplementary heat must be provided if stated temperature conditions do not exist. Do not apply coatings to a frozen surface.

C. Protect surrounding areas and surfaces during application of the wall system.

D. Protect system from precipitation during application and for a least 24 hours after application.

l.07 COORDINATION AND SCHEDULING

A. Closely coordinate work with related sections and trades.

B. Protect the tops of walls to prevent water from entering behind the system. Any required cap flashing, overhangs, or dip edges shall be installed as soon as possible after the finish coat has been applied.

C. Install all sealants in a timely fashion. Protect open joints from water intrusion with backer rod or other means until the sealant has been installed.

D. When required by code or job requirements, contract with a certified 3rd party EIFS Inspector prior to any Total Wall installation. The inspector shall be EDI (Exterior Design Institute) certified or other applicable certifying agency as approved by Total Wall, the General Contractor and the local code official, if applicable. The inspector will make a minimum of three on-site inspections, which will include the following examinations as applicable:

1. material storage and environmental application conditions,
2. trim EPS lamina or trim accessory installation
3. ICF substrate - type, condition
4. ICF preparation- washing off UV degradation,
5. ICF preparation - planar adjustments
6. ICF preparation - area rasping as required, proper filling of gaps between blocks, proper block joint alignment
7. trims and architectural enhancements-configuration and installation (if required),

8. mesh - type, labeling, back-wrapping, corner reinforcement, general installation,
9. coating - type, labeling, mixing, application,
10. sealant and backer rod - type, labeling, joint dimensions, joint preparation, joint placement, sealant application.

The inspector shall provide a minimum of three interim text reports and one final report which will include photographs.

PART 2: PRODUCTS

2.01 MANUFACTURERS

A. All materials related to EIFS shall be obtained from Total Wall, 390 Viking Circle, Rio, WI [888-702-9920] or a Total Wall approved supplier.

B. The ICF substrate shall be supplied by an approved ICF Manufacturer

2.02 EXTERIOR INSULATION SYSTEM COMPONENTS

A. Any Trim Accessories shall be UV resistant PVC as manufactured by either Vinyl Corporation (800-648-4695) or Plastic Components (800-327-7077). The trim accessories may consist of the following:
   1. window trim
   2. Casing Bead or corner bead
   3. Sloped Sill Wedge

B. Rigid insulation board use for lamination, trim, or repairs shall be 2' x 4' (0.6096M by 1.2192 M) Grade l EPS, meeting ASTM C578 performance standards, an average density of 1lb per cubic foot (16.2 g/L) (min), cured for 6 weeks at 68 F (20 C) or equivalent accelerated conditions, labeled with TOTAL WALL and code markings, and with a minimum thickness of 3/4" (19.05 mm) thickness and a maximum thickness of 4” (101.6 mm) as specified by drawings.

C. Adhesive - - shall be EnerFoam Urethane Foam.

D. Coating - - shall be Tuff II, a premixed ready-to-use base coat and finish coat. The selected mixture is used to coat over the Total Wall self-stick reinforcing fabric.

E. Reinforcing Mesh - A plastic coated self-sticking fiberglass reinforcing fabric as required and supplied by Total Wall:
   1. 4.3 oz - Standard, 25-35 in-lbs (2.8-4.0 Newton-M) impact

F. Water - Shall be clear, potable and free of foreign matter.

G. Sealant Systems:
   l. Shall be one of the following:
      a. Tremco, Inc.:
         l. Sealant: "Dymeric"
         2. Prime: Use manufacturer's

recommended Primer.
3. Backer Rod: Dow "Ethafoam"
4. Bond Breaker: 3M#226, 481, 710

b. Pecora Corporation:
l. Sealant: "Dynatrol II"
2. Prime: Use manufacturer's recommended Primer.
3. Backer Rod: Dow "Ethafoam"
4. Bond Breakers: 3M #480 or Valley Industrial Products #90

c. Dow Corporation:
1. Dow 790 series sealants (790, 791, 795)
2. Prime: Use manufacturer's recommended Primer.
3. Backer Rod: Dow "Ethafoam"

d. Pecora Corporation:
1. Pecora 890 sealant
2. Prime: Use manufacturer's recommended Primer.
3. Backer Rod: Dow "Ethafoam"

e. Sonneborn
1. Sonnolastic 150
2. Backer Rod: Dow "Ethafoam"

2. System materials shall be dried prior to Sealant Installation.
3. Color shall be selected by the Architect or Owner.
4. Alternate Sealants must be reviewed and approved by Total Wall in writing before use.

2.03 MIXING AND PREPARATION

A. TUFF II

l. The Total Wall Tuff II shall be stirred for 1 minute with a low speed mixer until a uniform workable consistency is obtained.
2. A small amount of water may be added to adjust workability. Maximum water addition not to exceed 6 oz. (0.177 Liters) per 5 gal (18.92 Liter) pail.
The water must be clean and potable.
3. No additives or material of any kind, such as rapid binders, antifreeze, accelerators, fillers, pigments, etc., shall be added unless specified by Total Wall.
4. The Total Wall Tuff II container shall be kept closed when not in use. Pot life of product in closed pail is 48 hours, then product must be remixed. Shelf life of product in closed pails is 18 months.
5. The mixing tool shall be cleaned immediately after use.

2.04 PERFORMANCE REQUIREMENTS

The TOTAL WALL system and its components shall meet the following performance requirements when applied over the approved ICF System:

A) ASTM E84 Surface Burning	FSI = 10, SDI = 35
B) ASTM E108 mod. Full Scale Fire Test	Pass (No Flame spread)
C) MIL STD 810D Mildew Resistance (Method 508.3)	28 days - no growth
D) ASTM E695 Full Scale Impact Loading	No Damage
E ASTM D968 Sand Abrasion 500 liters	260 L/ml, No Deleterious Effects
F) ASTM D2247 Water Resistance	No Deleterious Effects
G) ASTM B117 Salt Spray (300 hours)	No Deleterious Effects
H) ASTM E96 Water Vapor Transmission	approx. 1.5 perms
I) ASTM C67 mod. Saturated Freeze/Thaw (50 cycles)	No Deleterious Effects
J) ASTM C297 Tensile Adhesion	No failure in base or finish
K) ASTM E330 modified By E72-80 Negative and Positive wind Load	meets or exceeds (Pos 0.079, Neg 0.079 Kg/cm^2)
L) ASTM E331 Wind Driven Rain (5 gal/sq.ft./hour rain fall plus 65 mph wind)	No Penetration
M) ASTM D2797 Impact resistance	2.5 Newton-Meters
N) ASTM G23 Accelerated Weathering (2000 hrs)	No Deleterious Effects
O) ASTM C209 Tensile Strength	26 PSI (1.846 Kg/cm^2)
P) ASTM C203 Flexural Strength	1.41cm deflection at 33.4 Kg load
Q) Radiant Heat Fire Test NFPA 268	Pass
R) ISMA Fire Test (UBC-26-9)	Pass

PART 3 EXECUTION

3.01 INSTALLATION

A. The installation shall be performed strictly in accordance with Total Wall's current literature and current job specifications.

3.02 ICF Manufacturer Systems ICF Substrate

A. Requirements of Substrate

1. Any planar deflections or irregularities in the ICF substrate shall not exceed 1/4" in eight lineal feet. Deflections exceeding this value shall be corrected by ICF Manufacturer in accordance with their specifications or procedures.
2. Any UV degradation of the EPS shall be removed by washing or rasping. Washing the EPS shall be done with a controlled pressure fan spray of a water solution of Sodium Metaborate and surfactant as recommended by Total Wall.
3. Any small areas of concrete seepages or spatters shall be removed by rasping or other suitable mechanical means.
4. Any gaps in block joints of 1/8" or greater shall be filled with EnerFoam and rasped level after drying.
5. Any block joint misalignments of exceeding 1/16" shall be rasped to a tolerance of 1/16" or less. Rasping shall be performed in those areas in a manner that will not tend to produce picture framing of the ICF block.
6. Any localized deflections, protrusions or dents exceeding 1/16" shall be repaired using as combination of EnerFoam, 1 lb density EPS foam and rasping as required.
7. Items 2 - 6 above are the responsibility of the EIFS applicator.

B. Windows and other penetrations

1. At window jambs, sills and heads, the EPS abutment shall be constructed to receive proper wrapping of reinforcing mesh and base coat so as to allow for a proper 1/2" sealant joint or alternatively a fillit bead joint. The EPS abutment may require trimming of existing EPS or lamination of additional EPS using approved adhesive or use of PVC accessory. In addition, the use of trim bands or reveals with properly beveled edges is permitted to aid in design esthetics and construction of proper sealant joints.
2. At window heads, a 3/8" grooved drip edge should be constructed into the EPS if possible. Determination of this shall be made by the applicator and TOTAL WALL.
3. Customized details for specific penetrations and terminations shall be provided by TOTAL WALL as deemed necessary by the applicator, the General Contractor, ICF Manufacturer and Total Wall.

3.03 INSTALLATION OF LAMINA (Mesh and Tuff II coating)

A. Mixing - - All materials requiring preparation shall be labeled accordingly; the contractor shall follow all instructions.

B. System Terminations - At all system terminations, the system shall be terminated with the proper wrapping of reinforcing mesh and basecoat or PVC accessory.

C. Installation of Rigid EPS Insulation for repair or trim or extension.

1. Grade l EPS
    a. Grade l EPS shall be applied to the substrate surface using EnerFoam.
    b. Grade l EPS pieces shall be precut to fit openings, corners or projections prior to application of the back-wrapping and approved adhesive.

2. Grooves which may be required as design feature shall be routed into the outside surface of the Grade l EPS, using a high speed router, hot groover, or hot knife and proper blade. The remaining thickness of the Grade l EPS at any point in the routed groove or feature shall not be less than 1/4" (6 mm).
3. Foam shapes of Grade l EPS, if used, shall be applied directly to the substrate or surface of the Grade l EPS.

D. Application of self-sticking mesh

1. Surface of the Grade l EPS shall be inspected and repaired as necessary.
2. Apply Total Wall Self-stick Reinforcing Mesh to the ICF surface in horizontal runs. Press the mesh onto the surface using a trowel or other suitable tool. Avoid sags or bulges. Overlap runs of mesh at least ½”. For larger area overlaps, such as at corners, apply Tuff II to the first layer before applying the second layer of mesh.
3. Apply Tuff II over the reinforcing mesh, allowing the mesh to gauge the coating thickness. Apply additional Tuff II as necessary so that the pattern of the Reinforcing Mesh is not visible beneath the surface of the base coating and a 1/8” (3.17 mm) average thickness is achieved. This may require two passes with the Tuff II in order to achieve the proper thickness. Apply texture to the Tuff II as required to achieve the desired result. Textures may be smooth, brush, freestyle, knock-down or spatter. Tuff II may also be spray-applied with a hopper gun to achieve a greater variety of appearances.
4. The Tuff II shall be applied continuously and in one operation to the entire wall surface, or to a logical break point. A wet edge shall be maintained. Work shall proceed toward natural wall stops and corners. A clean stainless

steel trowel shall be used. The Tuff II shall be protected from contamination, weather and damage for a minimum of 24 hours.

E. Sealant

1. Insure that proper backer rod, Primer and Sealant is installed at all required locations, such as expansion joints and isolation joints, in accordance with TOTAL WALL details and the sealant manufacturer specifications.
2. Sealant and backer rod shall be of the type and brand as specified in this document or as approved in writing by Total Wall for this application.
3. Primer shall be used when specified by the sealant manufacturer.
4. Sealant shall be bonded to dry Tuff II when possible and not to finish coat. Exceptions to this shall be approved by Total Wall in writing.
5. Sealant joint preparation, installation of backer rod and sealant installation shall be performed by an experienced applicator.

3.04 JOB SITE CLEANUP

A. All excess Total Wall system materials shall be removed from the job site by the applicator.

B. All surrounding areas where Total Wall materials have been applied shall be left free of debris and foreign substances.

3.05 INSPECTION

A. The applicator and a representative of the property owner's team shall inspect the ICF lamina Installation and prepare an inspection summary with a copy to Total Wall.

B. If an EIFS 3rd Party Inspector is used, a copy of the final report shall be submitted to Total Wall.