Panelizing With Exterior Insulation Finish Systems

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Panel Detailing:
Proper detailing insures that panels can be fabricated and erected within previously established parameters of cost and scheduling while still satisfying demands for quality and aesthetics. Proper detailing insures that the panelization processes of fabrication and erection can be performed by building trades in accordance with accepted construction practices. Through proper detailing, a panelized wall system can reflect the realities of the panel manufacturing processes, yet still satisfy the aesthetic considerations of design professionals. The benefits of proper detailing are reflected in reduced costs and accelerated installation schedules.

1. Panel Joints.
A good guideline for the sizing of panel joints is 3/4” horizontal and vertical separation of wall panels. A similar dimension is recommended at the intersection of a panelized wall system and existing or in-place construction. Panel joints of 3/4” allow adequate space for priming of the surface prior to caulking and for installation of the required backer rod and compatible sealant between panels. (Refer to Detail #1.)

2. Parapets and Flashings:
A weather resistant panel system is dependent upon proper installation and detailing of parapet caps and roof flashings.

The alternatives are:
a. Insulation Board Cap-The EIFS System is extended over the parapet and down the backside to intersect with the roof flashing assembly. In these instances, the System, at the parapet, is sloped inward toward the roof at an angle that provides positive drainage. The backside of the panel facing the roof is finished in-place to facilitate installation of the panel and the roofing and flashing assembly. (Refer to Detail #2.)
b. Metal Cap Flashing—Upon completion of panel system erection, a cap flashing is installed over the top of the parapet panel. Ideally, the cap flashing is fabricated of extruded aluminum. The cap flashing has an angle sloped toward the roof facilitating positive drainage. Additionally, the cap flashing is secured to the parapet panels and set in a full bed of mastic or caulking. The cap flashing is then caulked at both sides of the panel where it extends or flashes over the panel system. (Refer to Detail #3.)

3. Reglets:
The use of drip reglets is suggested at panels with soffits returning to window heads. Drip reglets minimize the amount of water that is transmitted along the surface of the soffit to the window head during inclement weather. A continuous drip reglet—router cut within the insulation...
board and finished integrally with the lamina or reinforcing mesh—is the most effective means of constructing a Drip Reglet.

4. Impact Resistance:
Impact resistance of the panel system should be considered in relation to panel location on the building and projected building usage. All EIFS manufacturers offer a variety of reinforcing meshes that are geared toward the specific impact resistance needs of individual projects. Heavier grades of mesh are typically utilized at high traffic areas or areas subjected to potential abuse. (i.e. schools, loading docks, etc.).

Process of Panelization:
1. Panel Fabrication:
Steel studs are the ideal method of meeting varied structural requirements as they are available in a wide variety of sizes, gauges and configurations, each with unique performance properties that can be matched to specific engineering requirements.

After architect approval of shop drawing and engineering submittals prepared by the panel manufacturer, fabrication of the light gauge steel panel framework begins.

Steel studs are cut to exact lengths according to the approved shop drawings. Individual studs are subsequently assembled to required sizes and configurations in heavy steel devices known as fixtures or jigs.

To insure the exacting tolerances required of EIFS panels, the fixture tables are repeatedly checked for proper alignment during the panel fabrication process.

Specialized angled or curved panels are readily fabricated without excessive cost utilizing locally fabricated brake or roll formed metal angles as a means of joining conventional steel studs in an infinite variety of configurations.

Panels exceeding 20' in length or 8 by 12' in height are often internally braced with 1-1/2" or 2" 16 ga. channel iron or 3" 16 ga. flat strapping as a means of reducing potential deflections which may occur in the handling, transportation, and installation processes. These bracing materials are incorporated within panel framing members.

All panel framing members are welded together utilizing highly effective and efficient wire feed or M.I.G. welding equipment. After all welding operations have been completed, the resultant deposits of molten flux (referred to as slag)
are removed. To prevent corrosion, all welds are then painted with a material compatible with the stud finish. Today the majority of panel framing is done with galvanized steel studs to further reduce potential corrosion.

The final operations in the manufacturing process are installation of the sheathing substrate and application of the EIF system. In addition to the size and spacing of steel studs the ultimate windload capacity of any EIF panel system is a function of the size and spacing of fasteners used to connect sheathing material to steel stud framing. The closer the spacing, the greater capacity of the system to resist both positive and negative windloading.
2. Panel Erection:
Prefabricated EIFS panels are erected in accordance with connection and installation details provided in approved panelization shop drawings. Panels are hoisted into position for attachment to the structure with cranes suitable to individual project requirements.

Panels are installed to horizontal and vertical alignment on the building utilizing reference lines, transits or laser alignment equipment.

After panel installation, it is critical that areas at roof flashings, parapet caps and other potential points of water infiltration be completed or temporarily secured to avoid potential damage to the backside of panels or the interior of the building.

Panelization Engineering:
Perhaps the most critical aspect of panelized EIFS construction is proper engineering of the entire wall assembly for compliance with model code requirements for fire, wind and seismic performance. A number of factors are involved in proper engineering and detailing of an EIFS panel system.

1. Stud Sire and Configuration:
Often steel studs are initially sized to satisfy a detailing of dimensional requirement of the project architect or designer. This is a good trial basis of stud selection, as manufacturers produce studs in a wide variety of dimensions and configurations. Individual variations have unique structural properties that can be evaluated in relation to specific design and structural criteria.

While this information will be helpful in the initial design of a system, the entire panel configuration, including studs and all components (i.e., angles, bridging, track, bracing or strapping) will need to be evaluated to determine that the entire framing assembly is in conformance with structural requirements.

2. Sheathing:
The most common substrate used in the fabrication of EIFS panels is gypsum sheathing. Gypsum sheathing is manufactured in different thicknesses to achieve higher structural capacities and with differing core and face constructions, depending on the degree of fire-resistance and weatherability desired.

The ultimate ability of an EIFS panel system to withstand both positive and negative wind forces is determined by screw size and spacing used to attach sheathing materials to steel panel framing members.

3. Connections:
Panels may be connected to the structure by welding, bolting, or a combination of welded and bolted connections. Connections can be characterized as fixed or unrestrained, depending upon their capacity for movement.

Detail #4: illustrates the connection of panel framing at the
Detail #5 illustrates a kicker or strut used to transfer wind loads from panel framing to the structure. The steel stud kicker is subsequently welded to an embedded plate placed in the bottom plane of the concrete floor assembly.

Detail #6 illustrates a bolted and welded connection often referred to as a moving connection. Connections of this type have the capability of withstanding seismic forces imposed on the panel system during an earthquake.

**Engineering and Shop Drawing Responsibilities**

The trend today is toward EIFS panelization contractors assuming total responsibility for engineering of the entire panel system. This enables the sophisticated panel contractor to develop a workable system geared toward the realities of his panel fabrication and installation procedures. Approached in this manner, the contractor has increased control of his bottom line profitability. In these instances, the contractor retains the services of a
A qualified structural engineer whom he works with throughout the course of any given project.

Concurrently, with engineering activities, shop drawings for the panel system are prepared by the contractor. These drawings reflect the actual materials and methods of panel fabrication and erection. A complete set of shop drawings consists of the following three components.

2. Erection Drawings:
Consisting of plans, elevations and details for fabrication and erection of the panel system. The drawings are dimensioned to facilitate coordination of the panel system with contract documents and other building trades.

2. Engineering Report:
Documenting through calculations, compliance of the erection drawings with project engineering requirements. It must be clearly stipulated in the contract documents, whether or not the engineering report will bear the seal of a P.E. registered in the locale where the project is being constructed. The erection drawings and engineering report are submitted to the architect for review and approval.

3. Shop Tickets:
These drawings are utilized by the panelization contractor for fabrication of the panels according to the erection drawings and engineering report. The shop tickets are not generally submitted to the architect for approval. Shop tickets are prepared after approval of the engineering report and erection drawings.

ABOUT THE AUTHOR:
An architect by profession, Stan Mason’s involvement with the design and engineering of panelization utilizing lightweight steel framing goes back many years. An industry consultant, he has been a featured speaker at Foundation-sponsored workshops at the American Collegiate Schools of Architecture (ACSA) Construction Materials & Technology Institute. Stan is Manager of Prefabrication Services for Dryvit Systems, Inc.