

Technical Solutions for Renovation of Brick and Masonry

TECHNICAL BULLETIN
1032455

Dramatic improvements

Senenergy Wall Systems are the optimal solution for dramatically improving the looks, performance and value of aging brick, masonry and concrete buildings. Well known for their design flexibility, Senenergy Wall Systems are also an economical solution that will improve the quality of living inside a building while reducing a variety of maintenance and operating costs.

Senenergy Wall Systems are a beautiful, functional solution for exteriors when you are converting older brick/unit masonry/concrete factories, office buildings or warehouses for re-use as housing, offices, shops or multi-use combinations. Retail stores revenue increases when their exteriors are revitalized. Retail stores that change brands must have their appearance updated to conform with the brand's image. Senenergy Wall Systems provide fast, economical answers.

They have played a key role in many successful transformations of tired, underutilized, undervalued property near city centers. Developers benefit from more quickly and economically satisfying the pent-up demand of tenants who happily exchange long commutes to the suburbs for added leisure time and convenience that come from living in attractive urban communities.

Senenergy Wall Systems add continuity to clusters of buildings that lack unity; with Senenergy Wall Systems, a development team can create a campus that reflects a unified appearance.

It is as easy to use EIFS on renovation as it is on new construction. When modernizing property and adding new wings, count on their design flexibility to tie the property together visually.

As the property in a portfolio matures, act to **add value** as opposed to annually budgeting for repairs and maintenance that merely contribute to retaining value.

When replacing drafty windows with higher performance windows, it is practical to upgrade the entire wall assembly. The BASF Technical Department will help with details that properly integrate the windows and the wall system.

Senenergy Wall Systems are compatible with and complement brick, masonry and concrete buildings.

Renovation of Brick and Masonry - Specifics

As facades built in the 50's and 60's approach a critical point in their life cycles, owners must define plans for the continued use of these properties. Senenergy Wall Systems provide solutions to critical considerations related to energy, building movement and moisture.

Prior to the mid 1970's, brick, masonry and concrete were the principal modes of construction. Energy conservation was not a concern then. Unless older buildings have been retrofitted, they experience higher energy costs than comparably sized modern buildings. Updating these older buildings today without considering energy conservation is a missed opportunity.

According to the Canadian Mortgage and Housing Corporation, "inadequate structural connections, lack of expansion joints and inability to deal with water infiltration and moisture absorption tend to accentuate the inherent inflexibility of monolithic masonry and accelerate its failure." (Source: Brick Wall Reconstruction and General Renovation of a 3 Story Building; www.cmhc-schl.gc.ca)

Without thermal variations between the wall and the building structure, dynamic temperature conditions caused significant differential movement between the interior wood structure and the exterior wall. Senenergy EIFS applied up to four inches in thickness provides an R-value of 4 per inch over the entire opaque wall surface. They address the issue of thermal breaks, reducing that stress from the structure.

EIFS tend to be more economical than other renovation approaches. When developers want to retain the brick, the cost of repointing and the difficulty in obtaining matching brick to replace damaged units must be considered. If the cost outweighs the value, the use of EIFS can become the most cost effective option for addressing moisture and appearance issues.

The addition of insulation and retention of the brick or stone appearance can be accomplished by using Seneflex EIFS "brick-look" or "stone look" templates. "Popped" or missing bricks are expensive to replace, and matches to old bricks can be difficult to locate. When a single brick is to be replaced, the mason will likely need to remove the bricks around it in order to work the mortar.

Technical Solutions for Renovation of Brick and Masonry

As a rule of thumb, when 30% of mortar joints on a masonry building have failed, tuck pointing, a slow and expensive process, is required. A wall comprised of bricks measuring 3" by 8" each will require 11" of mortar per brick, which equates to 5.5 lineal feet of mortar per square foot of wall. Costs of tuck pointing will vary by region and according to the complexities of the work site, but at \$4 per lineal foot, the cost to repair a brick wall will be \$22 per square foot. Adding in the cost for replacing damaged and missing bricks, the bill for restoration can deter necessary repairs. In the meantime, deterioration of the exterior continues and possibly affects the stability of the structure and its interior.

The following information describes several typical conditions that could be encountered along with basic guidelines for addressing them prior to the installation of EIFS over brick.

Brick in generally good condition

In cases where the brick or masonry is generally sound and there are only minor moisture issues, the two most commonly used EIFS are the Senerflex Classic PB and the Senerflex Secondary Barrier Design. The latter includes a secondary air/weather barrier layer of Senershield™ over the old wall surface prior to attachment of the EPS insulation. If added protection against moisture is desired, water-managed Channeled Adhesive and Adhered Mat Designs work well.

An adhesion test is always recommended when plans include installation of EIFS over existing masonry or concrete. Sand, dust, dirt, sealers, efflorescence, environmental contaminants and bond breakers could have negative effects upon adhesion. Prior to the adhesion test, surfaces must be cleaned.

Ideally, outdated windows that waste energy and leak moisture should be replaced as part of the renovation project. Regardless of the plan for the windows, if EIFS is being used, a means for flashing the window head and sill must be employed. In all cases pan flashing is recommended.

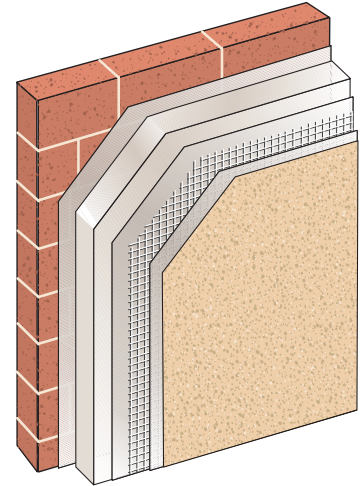
There is no standard window detailing for windows in renovation projects. If at all possible, shop drawings for the windows should be reviewed by the BASF Technical Service Department for specific recommendations.

Spalling – deteriorated brick, typically with missing mortar

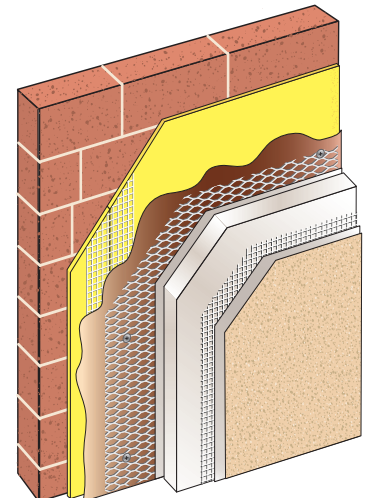
When spalling has occurred, related problems such as water damage might have already affected the interior of the wall in some way. Always consult with a structural engineer who can develop an assessment of the building that includes a thorough evaluation of damage. Depending upon the engineer's findings, the renovation plan could be as simple as adhering an EIFS insulation board to the existing surface or skim coating the wall. The findings might also lead to more involved planning to include build outs with an exterior sheathing such as Dens Glass Gold, partial demolition of existing walls, construction of new framing and/or attachment of PermaLath 1000 or 3.4 ounce metal lath (2.5 ounce may be acceptable on some projects – contact BASF Technical Service for additional information). If fastening sheathing, lath or framing over the existing wall, consult with a fastener manufacturer to select an appropriate fastener for the specific application. Fastener pull-out tests should be requested in order to confirm the integrity of the attachment to the existing walls.

Parge coats or levelers that are designed to fill in missing portions of individual bricks are available; we do not recommend any particular brand. Compatibility of the filler with the brick must be confirmed. If a particular product is selected because it bonds well to the surface,

Brick must always be clean and free of contaminants prior to adhesive attachment. Adhesion and/or pull tests are required.



Senerflex Secondary Barrier Design



Senerflex Adhered Mat Design w/Build Out

first remove all the loose mortar and brick. Then lay down the parge/leveler, following the manufacturer's instructions. It is also necessary to confirm that a bond will be created where the EPS adhesive contacts the leveler and undamaged bricks. The EIFS applicator will typically perform an adhesion test by following our guidelines (See: "Conducting Adhesion Testing"). If bond is acceptable, then the EIFS can be attached with adhesive. If the pull-away point of the adhesion test is not acceptable, mechanical attachment of the EPS to the brick will be necessary. Even when adhesion is acceptable, it is always wise to add two fasteners per insulation board as assurance.

If there are signs of moisture damage such as efflorescence, mold, discoloration, growth of vegetation, etc., the renovation plan must include addressing the roots of the problem. This could include such measures as flashing the tops of walls and parapets and removal of windows so that adequate flashing of the head and sill can be provided.

When the point of moisture entry is through the face of the brick or mortar joints, installation of EIFS over the wall will create a weather barrier that will eliminate surface penetration as a moisture source.

If the building owner attempted in the past to prevent moisture intrusion by sealing the face of the bricks, an adhesion test will verify that the EIFS can be bonded to those bricks. Adhesion tests should be performed at several points and various heights on each wall elevation.

BASF "Surface Stabilizer WB" is a bonding intermediary that is used to prepare glazed, chalky or sandy surfaces for adhesive attachment. A pull test is also advisable after the application of the Surface Stabilizer WB to confirm that the EPS can bond to the enhanced surface.

Brick with extensive efflorescence and/or vegetative growth

In most cases, power washing is effective in removing dust, dirt and environmental contaminants. Painted or sealed surfaces might require high-pressure powerwashing.

Perform an adhesion test after the powerwashing unless the EIFS will be mechanically attached. Consult with a knowledgeable fastener manufacturer to ensure selection of the best fastener for your specific application. (Wind-Lock – www.wind-lock.com – provides a chart with wind load ratings of its fasteners for various combinations of EPS thicknesses and substrates.)

Cracks in brick along mortar lines

When the mortar in older buildings contains distinct building movement crack patterns, you must determine whether the movement has stabilized and will not affect EIFS performance. If the cracks were patched or if sealant was used to seal the cracks, the condition of those repairs will disclose whether movement has continued. A structural engineer might be needed for a conclusive evaluation. If the wall is stable, installation of EIFS will follow procedures related to the surface of the brick.

Building movement has pushed some brick obviously out of plane

This is a more dramatic condition than the situation described above. Bricks on either side of the cracked mortar appear to vary by 1/2" or more in depth.

When this condition exists, a structural engineer must first evaluate whether the building is still moving, requires internal bracing, has framing damage, etc. If there are no other significant issues or after the issues have been addressed, EPS (1 1/2" or 2" thick) can be attached over the brick (1/2" maximum beyond plane) via the "ribbon and dab" method of adhesive attachment. See illustration.

The "ribbon and dab" method utilizes six uniformly thick (1" thick by 4" diameter) dabs and a 1" thick perimeter ribbon of adhesive on the back of the insulation board. The board is pushed into place until level.

Heavily painted brick

Painting traps moisture in the brick. This might have led to other issues. A qualified inspector should determine if the brick and wall behind it are sound.

Power washing might remove the paint. Test some areas to see the results of power washing.

- If a large portion of bare and sound brick is revealed, adhesive application of EPS could be possible.

Confirm the bond by performing an adhesion test. Add two to four fasteners per board for assurance.

- If some paint remains, but adhesive bond can be accomplished, add two or four fasteners per board for assurance.
- As a second option, metal lath could be attached over the brick and the EIFS could be installed onto the lath using adhesive to bond the EPS to the lath.

With so many systems to pick from, which is best for you?

If you want a water managed EIFS and the existing surface is in a condition which will allow for adhesive attachment, we recommend the Channeled Adhesive Design.

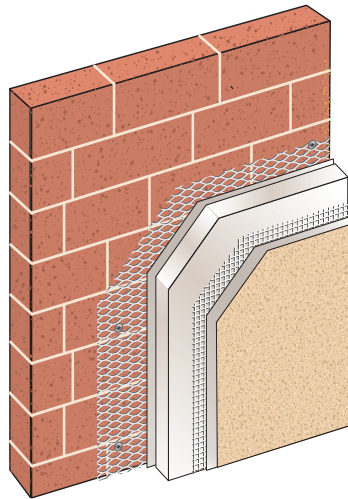
If you want a water managed EIFS but the existing wall surface will not allow for adhesive attachment, we recommend the Adhered Mat Design.

If the building is in an area where high wind load ratings are required, the systems with the highest wind load ratings will vary based upon whether you require water managed EIFS or have conditions suitable for adhesive attachment:

- primary barrier EIFS, adhesively attached: use Classic PB Design
- primary barrier EIFS, mechanically attached: consult BASF Wall Systems Technical Service
- water-managed EIFS, adhesively attached: use Channeled Adhesive Design
- water-managed EIFS, mechanically attached: use Adhered Mat Design

Call Us About Other Situations

This brief technical bulletin is intended as an overview to treating a variety of common conditions. If your building's conditions vary from these basics, or if you want to discuss them in greater detail, please contact your Senergy field representative or our Technical Services Department – 800-221-9255. Our business is providing wall system solutions for any application.



Senerflex Adhered Mat Design

Residential Policy

On one and two-family residential framed construction, BASF Wall Systems requires that the wall system selected be one that includes provisions for moisture drainage. The choices include Senturion® line of water managed EIFS, commercial Senerflex® Wall Systems integrating moisture management features, Senergy Stucco Wall System, and Senergy Cement-Board Stucco™ Systems. Senergy Exterior Surfacing Systems for insulating concrete forms are also acceptable. There are no exceptions to this policy. Under no circumstances will BASF Wall Systems warrant the use of any other system on this type of construction without expressed written authorization from BASF Wall Systems [Residential construction using EIFS on masonry (CMU) or poured concrete does not require the additional water management provisions described above.]

See the Senergy *Residential Policy Bulletin* for a more detailed discussion of this topic. Consult BASF Wall Systems Technical Services Department for specific recommendations concerning all other applications. Consult the Senergy web-site, www.senergy.cc for additional information about products and systems and for updated literature.

Disclaimer

This information and all further technical advice are based on BASF's present knowledge and experience. However, BASF assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights. In particular, BASF disclaims all CONDITIONS AND WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. BASF SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INDIRECT OR INCIDENTAL DAMAGES (INCLUDING LOSS OF PROFITS) OF ANY KIND. BASF reserves the right to make any changes according to technological progress or further developments. It is the customer's responsibility and obligation to carefully inspect and test any incoming goods. Performance of the product(s) described herein should be verified by testing and carried out only by qualified experts. It is the sole responsibility of the customer to carry out and arrange for any such testing. Reference to trade names used by other companies is neither a recommendation, nor an endorsement of any product and does not imply that similar products could not be used.

BASF Wall Systems

3550 St. Johns Bluff Road South
Jacksonville, FL 32224-2614
Phone 800 • 221 • 9255
Fax 904 • 996 • 6300
www.senergy.basf.com