



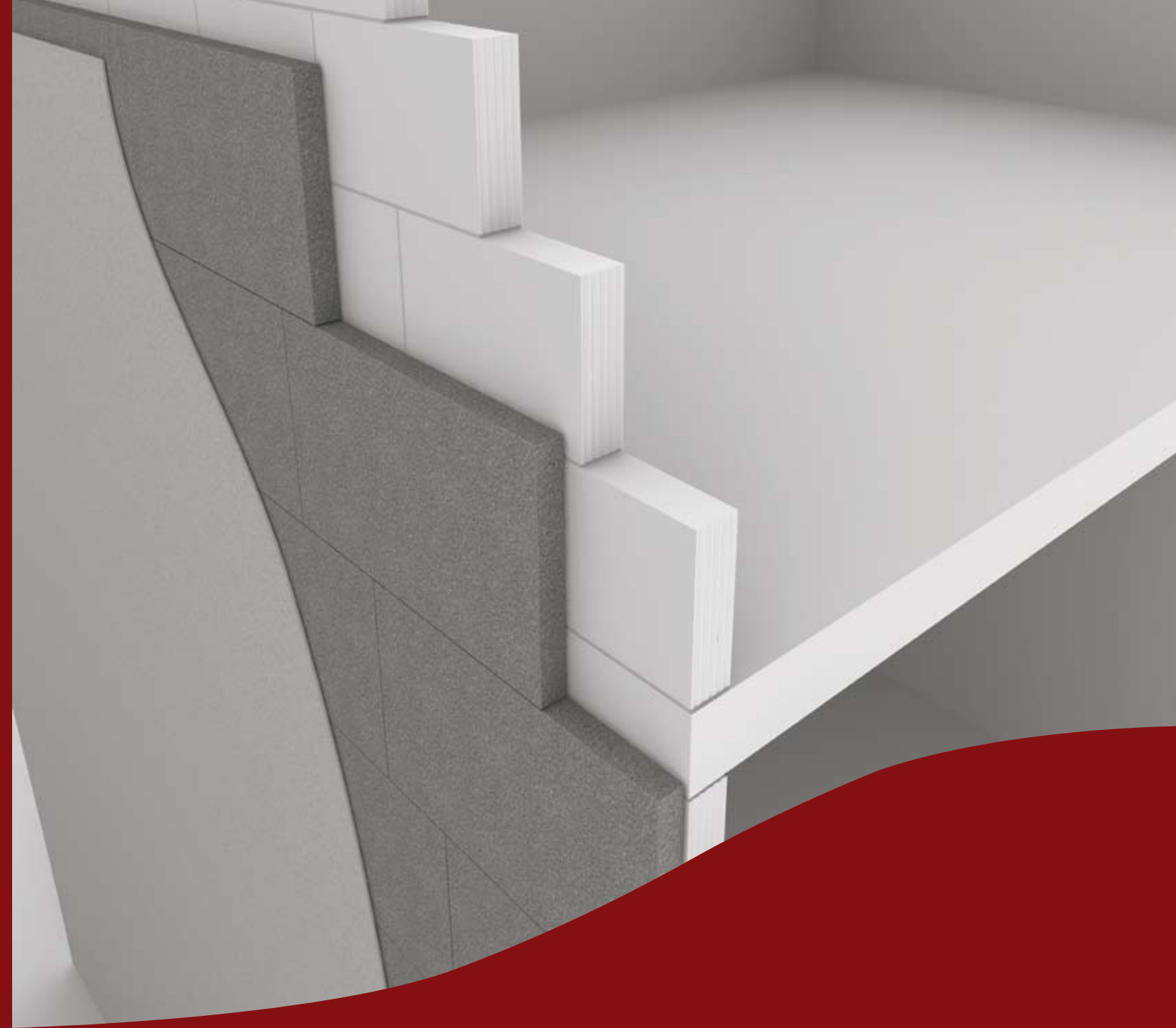
Additional information about Neopor®

- **Brochure: Neopor® – Innovation in Insulation**
- **Application Brochure: Wall Insulation**
- **Neopor® Film: Innovation in Insulation**
- **Website: www.neopor.basf.com**

Note

The data contained in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, this data does not relieve processor from carrying out their own investigations and tests. Neither does this data imply any guarantee for certain properties nor the suitability of the product for a specific purpose. Any descriptions, drawings, photography, data, proportions, weights, etc. given herein may change without prior notice and does not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (May 2008)

® = registered trademark of BASF SE

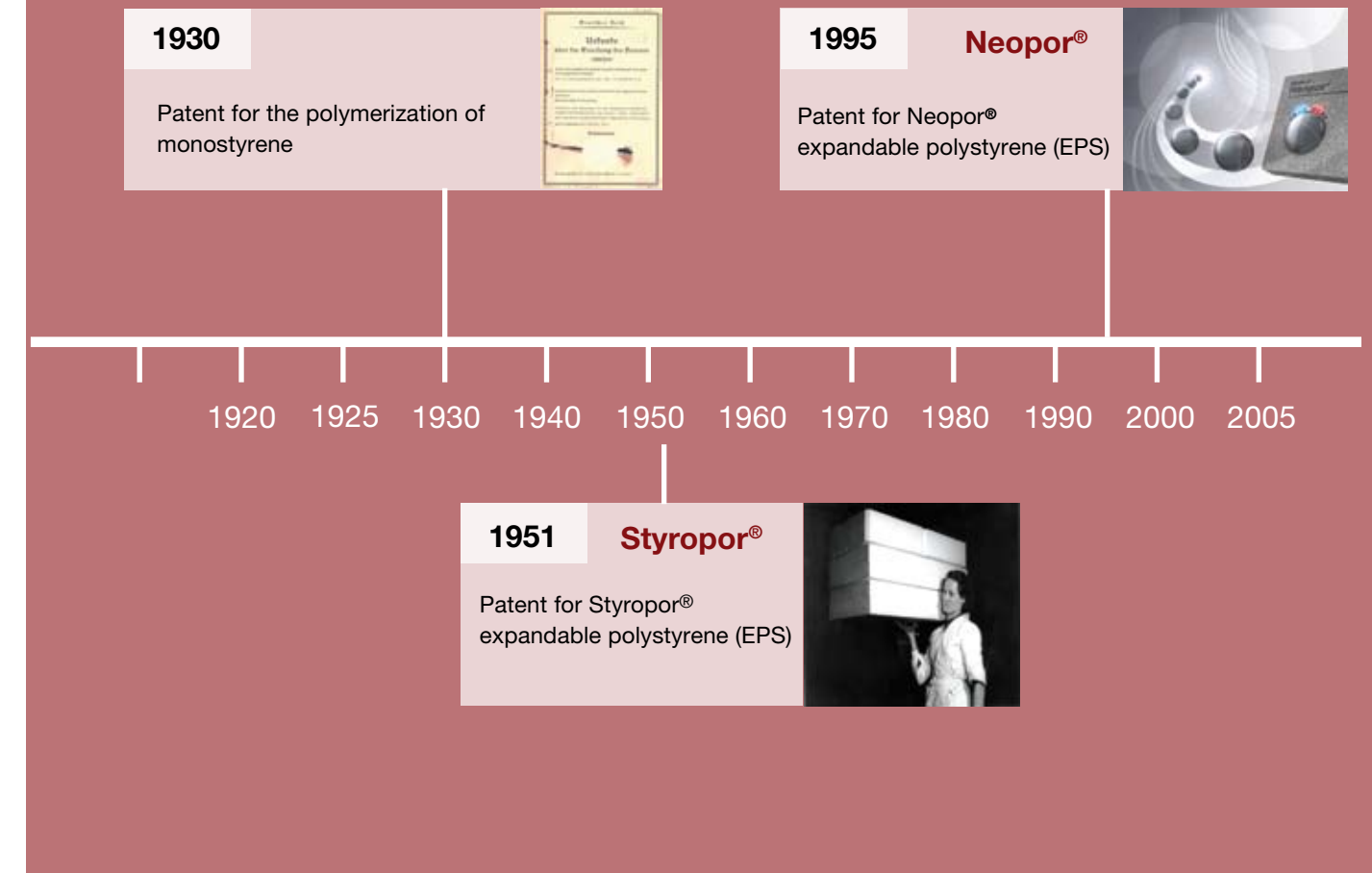


BASF Corporation
1609 Biddle Avenue
WYANDOTTE, MI 48192
USA
www.neopor.basf.com



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BASF INSULATING MATERIALS: A LONG TRADITION OF LEADING SOLUTIONS FOR EFFICIENT THERMAL PROTECTION.

STYROPOR® – the brand behind an unmatched success story. With the invention of expandable polystyrene (EPS), BASF introduced a classic to the world more than 50 years ago. Even today, Styropor® EPS occupies worldwide positions both in efficient insulation and in protective packaging.

BUILDING UPON STYROPOR®, BASF developed innovative Neopor® EPS. Like Styropor®, Neopor® insulating material is expanded and processed into foam blocks, panels and molded parts.

THE CRUCIAL DIFFERENCE in Neopor® is that BASF integrated graphite within the Neopor® cell structure. The graphite reflects radiant heat and significantly improves insulation capacity. The compelling advantage: far less product achieves the same insulating effect. You can see the signs of this advantage in the silver-gray color of the product – and in the black on a bottom line.

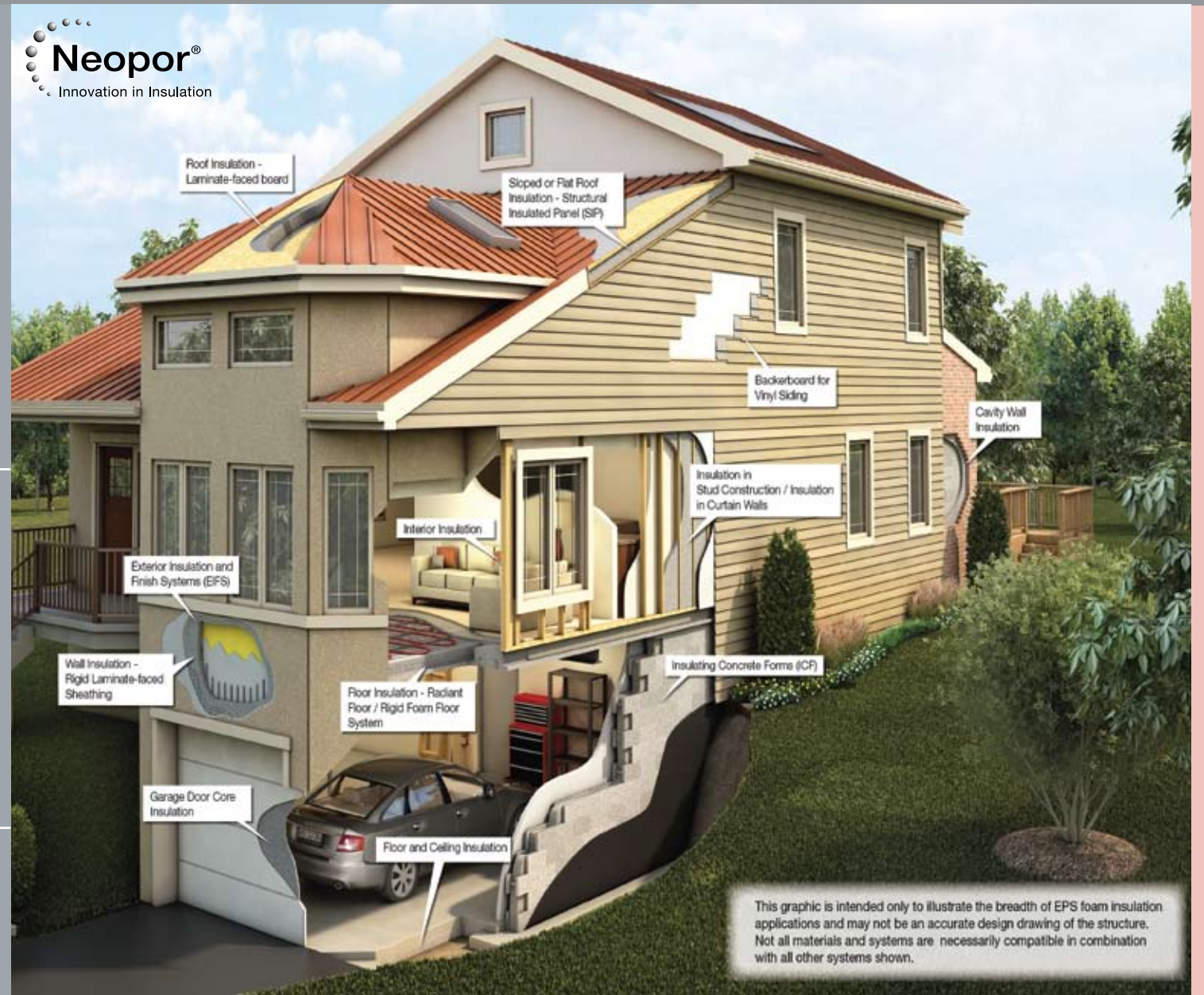


SMALL, ROUND, BLACK – ONE RAW MATERIAL, MANY APPLICATIONS

NEOPOR®: small black beads of polystyrene granules with a blowing agent for expansion. BASF produces this unique raw material, which foam manufacturers convert into insulating foams for a wide array of applications.

CONVERTERS EXPAND THESE BLACK BEADS on conventional EPS equipment and transform them into silver-gray foam blocks and molded parts – then cut the blocks into panels of different thicknesses.

INSULATING MATERIALS MADE OF NEOPOR® offer a higher insulating capacity using less material. They are easy on the environment and on the wallet. Neopor® insulating materials make a modern, ecologically sound lifestyle a reality. And that is what we call “Innovation in Insulation.”



INSULATION FOR THE FUTURE

With better insulation, you can keep energy costs and consumption from going through the roof – as well as the walls, floors, and basement. For new construction or renovation, Neopor® foam offers the new levels of insulation effectiveness needed for virtually all structural components.

Make Neopor® insulation the cornerstone of both your near-term and long-term efforts to save energy and money – not to mention the climate and environment.



EXTERIOR WALLS WITH NEOPOR® INSULATING MATERIALS

Heat lost through wall surfaces can add up to annual energy losses of 40%. Optimum thermal insulation from Neopor® panels is the practical way to stop such losses. Neopor® panels can also play a part in the structural performance of exterior walls, their air tightness, as well as their acoustic, fire and weather protection.

A UNIFORM ENVIRONMENT FOR CAREFREE COMFORT

Well-insulated exterior walls can actually raise the surface temperature of interior walls and increase the comfort of people inside. Insulated exterior walls with R-values of 15.15 to 16.15 hr ft² °F/Btu achieve an interior wall temperature only about two degrees lower than the room temperature. At a room temperature of 68°F, the interior wall temperature is 66.2°F and about 57°F to 59°F in the outer corners. As a result, no condensation forms, even if humidity is high at times.

AVOIDING THERMAL BRIDGES

Thermal bridges should be avoided at all costs. With Neopor® insulated panels, they can be avoided at a reasonable cost.

Gaps and leaks in a building shell create thermal bridges, as do the geometry of outer wall corners and structural components such as balconies and floors. Not insulating structural components properly is another cause. The result: heat flows

from indoors to outdoors, with money going out the window as well.

No one wins with thermal bridges. The contrast between cooler structural components and warmer ones introduces the risk of condensation, mold and water damage. Damaged property loses value in the long-term, energy is wasted throughout the life of the building and health and hygiene become a concern. Well insulated, airtight exterior components are the best way to prevent thermal bridging.

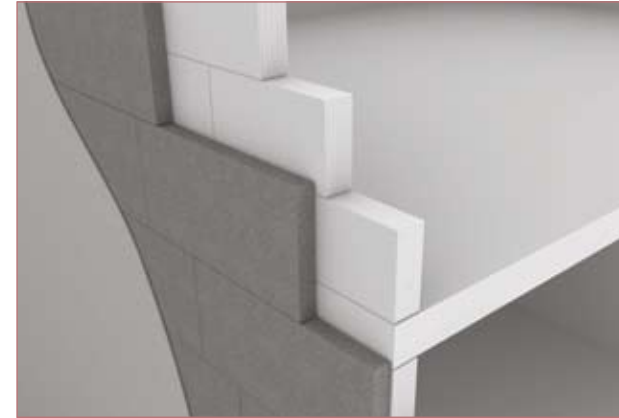
EXTERIOR WALL CONSTRUCTION

Exterior walls are the first and best places to save money through insulation. Neopor® panels efficiently insulate buildings from either inside or outside. Thermal insulation composite systems work well for exterior walls and core insulation for cavity masonry.

When exterior insulation is impossible, impractical or undesirable – to save a façade, for example – interior Neopor® insulation works quite well. For new construction, Neopor® insulating materials are appropriate for almost any type of wall.



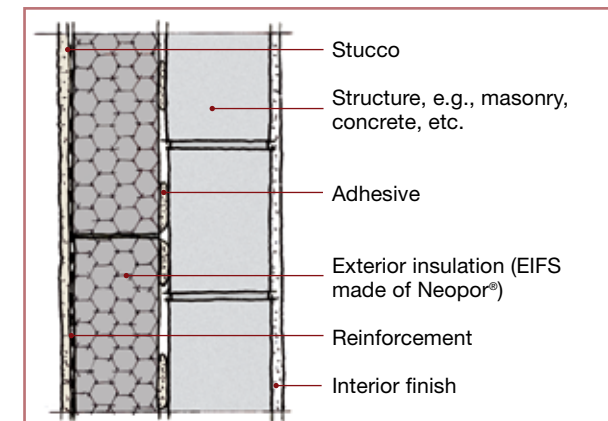
EXTERIOR INSULATION and FINISH SYSTEMS (EIFS)



Neopor® EIFS panels are lightweight, durable claddings that provide outstanding insulation value, eliminate thermal bridging and can incorporate an integral air barrier and water-drainage. EIFS can replace heavy brick and stone, eliminating the need to transport, store and apply heavy, massive materials, while generating very little construction waste.

- higher insulating performance
- thermal-bridge-free exterior components
- lightweight, non-glare
- good adhesive bonding

Neopor panels achieve higher R-values than standard EPS. With highly efficient exterior insulation, the HVAC load is reduced, allowing for downsizing of HVAC equipment and reduction of operating costs to maintain a comfortable environment. Textured acrylic surfacing systems achieve the look of stucco in a wide variety of colors and textures, offering broad design flexibility at a desirable cost.



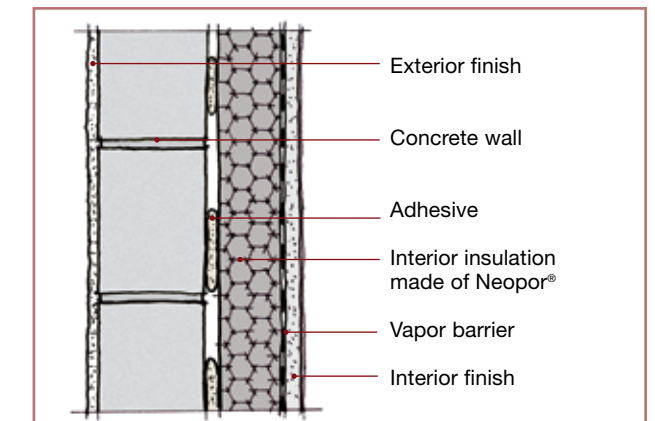
INTERIOR INSULATION



Internal thermal insulation achieves very good results for new construction or renovation work wherever external thermal insulation is not an option. Spaces that must heat quickly, or only for brief periods, will definitely benefit from interior Neopor® thermal insulation.

- heat rooms quickly
- consume less energy
- cost-effective, simple implementation
- higher surface temperatures

Composite panels made of Neopor®, which can be installed from floor to ceiling, are particularly convenient. When professionally sealed, they form an ideal substrate for painting, wallpapering or laying tiles. Assessing the outer wall's physical structure and insulating window soffits, floors and interior wall joints will reduce the formation of thermal bridges.



EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)



INSULATING CONCRETE FORMS (ICF)



INSULATION IN CURTAIN WALLS



INTERIOR INSULATION

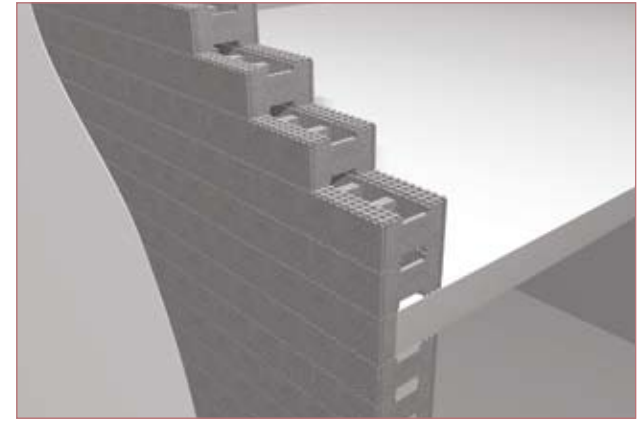


STRUCTURAL INSULATED PANELS (SIPs)



CAVITY WALL INSULATION

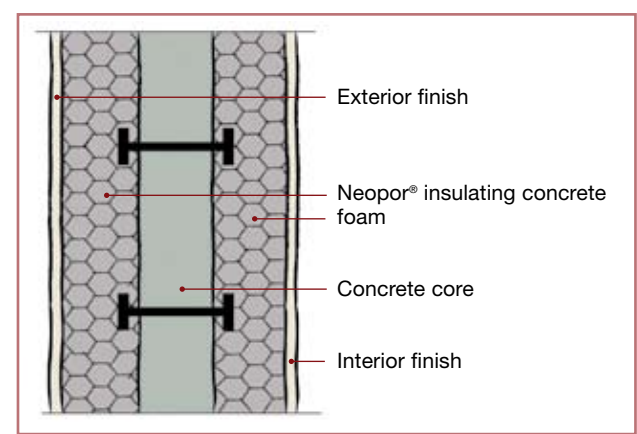
INSULATING CONCRETE FORMS (ICFs)



Insulating concrete forms (ICFs) are hollow foam forms installed at the construction site and filled with concrete. Whether for single family homes or multi-story buildings, Neopor® ICFs combine excellent thermal insulating properties with processing ease.

- no thermal bridges
- lightweight, handling ease
- speed of construction
- high degree of thermal insulation

With Neopor® blocks available in various wall thicknesses and designs, Neopor® ICFs enable contractors to build and insulate exterior walls at the same time. Thanks to excellent thermal insulating properties, Neopor® ICFs are well suited for the construction of low energy and passive houses



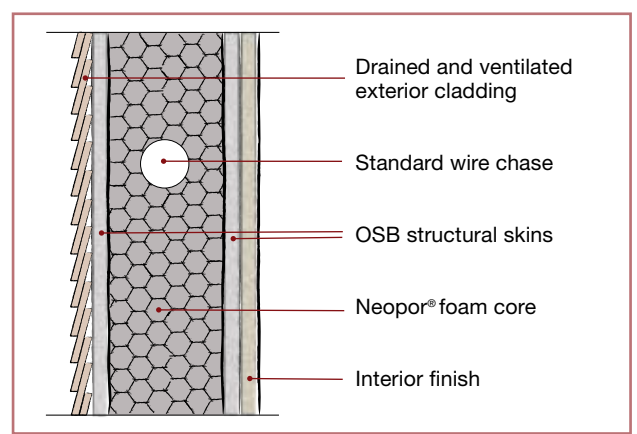
STRUCTURAL INSULATED PANELS (SIPs)



Building with structural insulated panels (SIPs) offers cost advantages to the builder in terms of speed of construction and reduced labor requirements, as compared to standard stick-frame construction. Also, SIPs help to reduce energy consumption significantly and at the same time help to make the indoor environment healthier and more comfortable.

- speed of construction, cost savings
- no thermal bridging,
- durability, low maintenance
- low environmental impact

The seamless, closed-cell rigid foam core helps reduce air leakage and thermal bridging through the panels by providing a continuous span of insulation. SIPs with a Neopor® EPS core, exhibit up to 20% higher insulating effects than those with a core of conventional EPS.



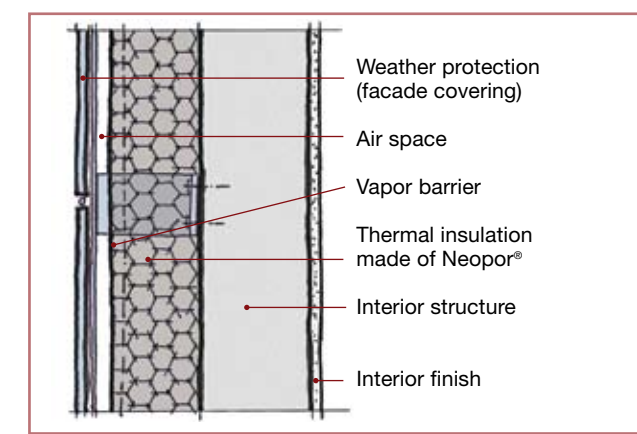
INSULATION IN CURTAIN WALLS



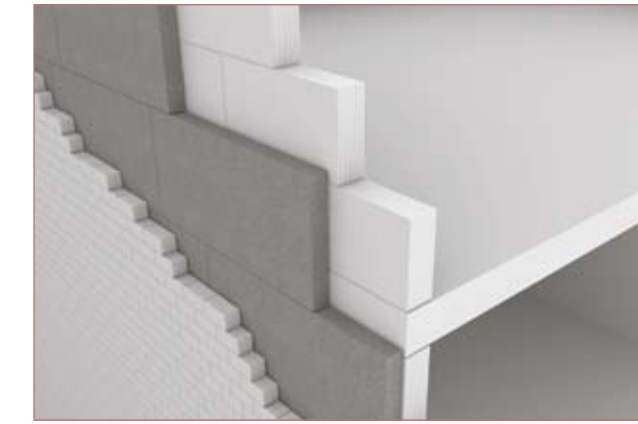
Curtain walls – consisting of substructure, insulating material, air layer and façade covering – address both design factors and certain technical, safety considerations.

- permanently dry thermal insulation
- individualized façade design
- good weather protection
- quick and dry installation

The two-layer system of a back-ventilated curtain wall separates the functions of weather protection and insulation, reliably eliminating any moisture arising from normal use of the building. Neopor insulation is exceptionally well suited for such facade systems.



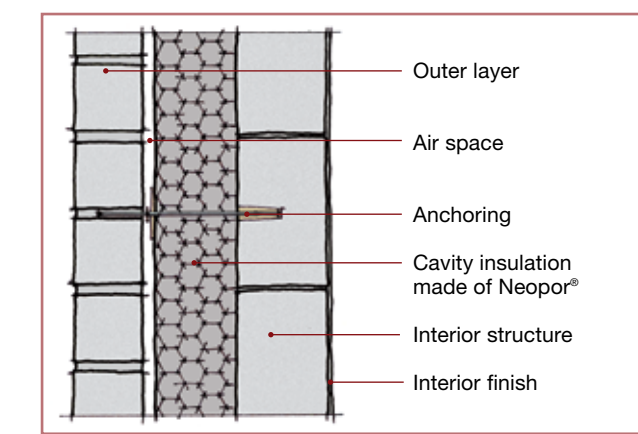
CAVITY WALL INSULATION



Cavity walls are ideal for new construction – architecturally and physically. Neopor® insulating materials are appropriate for both ventilated and non-ventilated cavity walls

- low water absorption
- durable, dimensionally stable
- high heat-storing capacity
- good weathering protection

The lower thermal conductivity of Neopor® insulating materials produces a higher insulating effect – exactly what is needed for the limited space between the outer frost-resistant masonry shell and the inner load-bearing structure in double-wall masonry.

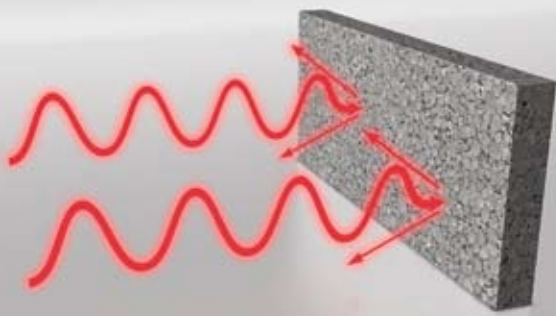




KEY FEATURES OF NEOPOR® INSULATING MATERIALS

THERMAL PROTECTION

The outstanding insulating efficiency of materials made of Neopor® foam gives engineers and processors decisive advantages in construction projects. Compared with conventional EPS, Neopor® materials help streamline structures through improved insulating results. Infrared absorbers and reflectors greatly reduce thermal conductivity, lowering permeability of radiant heat and providing up to 20% higher insulating effect than conventional EPS panels.



THERMOGRAPHIC IMAGE OF A HOUSING UNIT

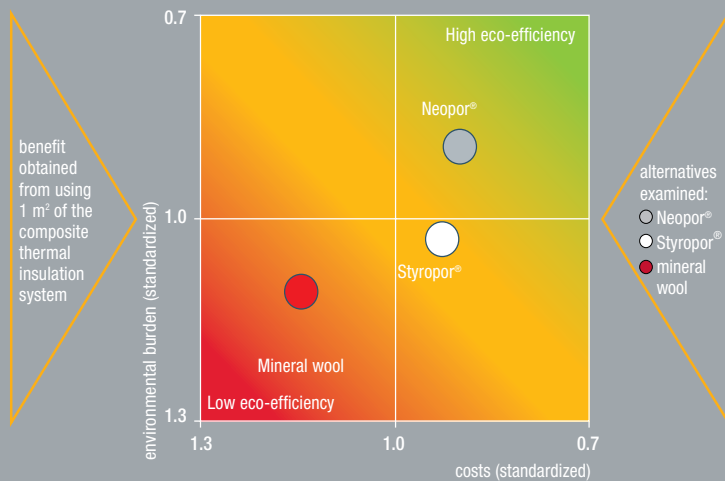
The yellow-red areas indicate increased heat loss through poorly insulated parts of the building.



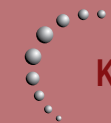
Photo: Ingenieur- und Sachverständigenbüro Dipl.-Ing. J. Deeters, 49716 Meppen, Germany.

ECO-EFFICIENCY

Eco-efficiency analysis evaluates efficiency from both an economic and an environmental standpoint. Compared with alternative products, Neopor® insulating materials offer a greater benefit at lower costs, with less environmental impact. A huge advantage is that they use as much as 50% less raw material, which in addition to lowering costs, saves resources and alleviates environmental burden. Neopor® materials also achieve the same insulation effect at 15% to 20% thinner profiles. In sum: a highly eco-efficient insulation for modern thermal protection.



Eco-efficiency analysis of thermal insulation composite systems used in the "Three-Liter House" in the Brunck neighborhood of Ludwigshafen, confirmed by the Öko-Institut in Freiburg and by the TÜV (German Technical Inspection Association).



KEY FEATURES OF NEOPOR® INSULATING MATERIALS

HIGHER EFFECTIVE R-VALUE

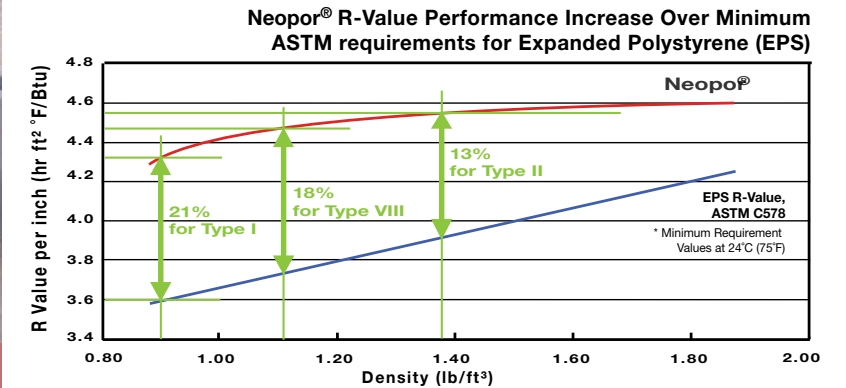
Insulating materials made of Neopor® offer a higher insulating capacity using less material. They are easy on the environment and on the wallet.



Insulating Concrete Forms (ICFs) offer solid, lasting construction that resists the ravages of fire, wind, and time as well as providing two built-in layers of foam insulation.



Building with Neopor® SIPs contributes to stronger, more energy efficient, comfortable, cost effective homes and buildings.



Expandable Polystyrene (EPS) Comparison with Neopor®

ASTM Density (U.S.)	Minimum Density, Lbs/Ft³ & Kg/m³	*Neopor® R-Value (per 1 in.)	**Minimum R-Value Req. for EPS ASTM C578	Increase in R-Value with Neopor® vs. Minimum ASTM Req. for EPS
Type I	.90 (15)	4.34	3.60	21 %
Type VIII	1.15 (18)	4.48	3.80	18%
Type II	1.35 (22)	4.53	4.00	13%
Type IX	1.80 (29)	4.59	4.20	9%

*Represents average value of data collected over 10 year period in Europe and converted from Lambda value to R-Value
 **Minimum requirement values at 24°C (75°F)

Neopor® increases its r-value in lower temperatures

ASTM Density (U.S.)	Minimum Density, Lbs/Ft³ & Kg/m³	Neopor® R-Value (per 1 in.) 75°F	Neopor® R-Value (per 1 in.) 50°F	Neopor® R-Value (per 1 in.) 40°F	Neopor® R-Value (per 1 in.) 23°F
Type I	.90 (15)	4.34	4.58	4.69	4.88
Type VIII	1.15 (18)	4.48	4.72	4.83	5.01
Type II	1.35 (22)	4.53	4.78	4.88	5.06
Type IX	1.80 (29)	4.59	4.81	4.90	5.07

*Represents average value of data collected over 10 year period in Europe and converted from Lambda value to R-Value
 Test conducted under CEN standards with CEN certified labs of F+W (Germany) and Salford University (UK)

STANDARD

BASF Neopor® has been qualified in accordance with the ICC-ES (International Code Council®) Acceptance Criteria for Foam Plastic Insulation (AC 12).

Insulating materials made of Neopor® have a flamespread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 (UBC Standard 8-1).



KEY FEATURES OF NEOPOR® INSULATING MATERIALS

UNITED STATES		EPS Test Results per ASTM C578			
Property	Units	Type VIII	Type II	Type IX	Standard
Density (U.S) Minimum Requirement	lbs/Ft ³ (Kg/m ³)	1.15 (18)	1.35 (22)	1.80 (29)	ASTM D1622 or C303
Thermal Resistance of 1.00 in. Thickness Minimum Requirement for EPS	F·ft ² ·h/Btu (K·m ² /W) 75 ± 2°F (24 ± 1°C)	3.8 (0.67)	4.0 (0.70)	4.2 (0.74)	ASTM C518
Thermal Resistance for Neopor®	F·ft ² ·h/Btu (K·m ² /W) 75 ± 2°F (24 ± 1°C)	4.5 (0.78)	4.5 (0.79)	4.6 (0.80)	Exceeds ASTM C518 minimum requirements
Compressive Resistance at yield of 10% deformation	PSI (kPa)	13.0 (90)	15.0 (104)	25.0 (173)	ASTM D1621 or C165
Flexural Strength, psi	PSI (kPa)	30.0 (208)	35.0 (240)	50.0 (345)	ASTM C203
Dimensional Stability (Change in Dimensions) max. %	@158°F (70°C) and 97% RH @ -40°F (-40°C)	2.0	2.0	2.0	ASTM D2126
Water Absorption by Total Immersion	Volume %	3.0	3.0	2.0	ASTM C272
Water Vapor Permeance	1" (25.4 mm), 1 perm (ng/Pa·s·m ²)	3.5 (201)	3.5 (201)	2.5 (143)	ASTM E96
Oxygen Index	Volume %	24.0	24.0	24.0	ASTM D2863
*Surface Burning Characteristics (ceiling only)	Flame Spread Smoke Developed	10 40	10 40	10 40	ASTM E84 or UL 723
Application Limiting Temperature	F° (C°)	165 (73.9)	165 (73.9)	165 (73.9)	ASTM C578, 1.1
Chemical Resistance <small>§ASFTI 120 Resistance to Chemicals</small>	Insensitive to water, the majority of acids and alkalis; sensitive to organic solvents.				
**Biological Behavior	No harmful effects on health known.				

*ASTM E-84 is not a requirement of ASTM C578.

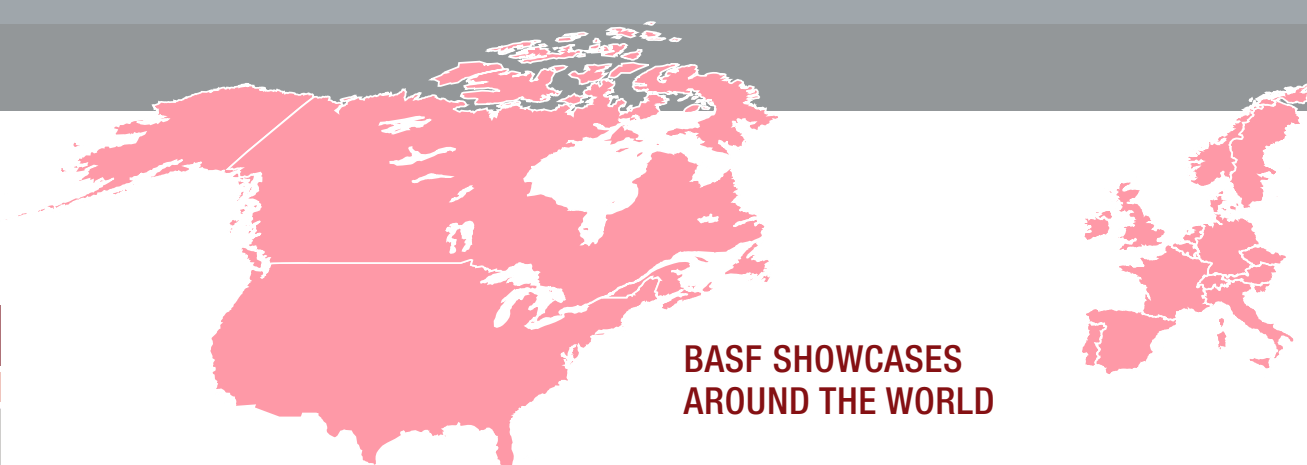
** Not included in ASTM C578.

Property	TABLE 1: MATERIAL PROPERTIES CAN/ULC-S701-05 (Ref: Clauses 4.1, 5.2.1.1 & 5.2.2.1)			
	Requirements			Test Method (see Note 1 below)
	Type 1	Type 2	Type 3	Reference Clause
Thermal Resistance, minimum m ² ·C/W (for 25 mm thicknesses)	0.65	0.70	0.74	6.3.3.1
Water Vapour Permeance, maximum, ng/Pa·s·m ² (see Note 2 below)	300	200	130	6.3.4
Dimensional Stability, maximum % linear change	1.5	1.5	1.5	6.3.5
Flexural Strength, minimum, kPa	170	240	300	6.3.6
Water Absorption, maximum % by volume	6.0	4.0	2.0	6.3.8
Compressive Strength, minimum, kPa	70	110	140	6.3.8
Limiting Oxygen Index, minimum %	24	24	24	6.3.9

Note 1: The test methods used to determine the above material properties provide a means of comparing different cellular plastic thermal insulations. They are intended for use in specifications, product evaluations and quality control. They are not intended to predict end-use product performance.

Note 2: Values quoted are maximum values for 25 mm thick samples with natural skins intact. Lower values will result for thicker materials. Where water vapour permeance is a design issue, consult the manufacturer.

Please Note: The technical and physical properties given in the table are guidelines for Neopor® insulating materials. The properties may vary depending on processing.



BASF SHOWCASES AROUND THE WORLD

BASF Better Home, Better Planet is all about homes that are more energy-efficient, faster to build, fortified against natural disasters, more affordable to own and have a lower impact on the environment. Around the world, BASF is actively involved in reshaping the way homes are built by providing innovative products to manufacturers, who in turn are creating building materials that help build better homes. By providing helpful information about its contribution to better building products and demonstrating how these products are used in various residential and commercial building projects around the world, BASF hopes to inspire homeowners, builders, architects and specifiers to seek out new and better options.



BASF NEAR-ZERO ENERGY HOUSE, PATERSON, NJ USA.

The BASF Near-Zero Energy Home, a philanthropic project designed as a demonstration of innovative BASF technologies, promotes high-performance energy efficiency and ecological benefits in home construction. The project, selected by the U.S. Green Building Council's (USGBC) pilot testing for Leadership in Energy and Environmental Design for Homes (LEED-H) rating system, achieved Platinum level. By bringing together the best building practices, materials and technology, the BASF Near-Zero Energy Home serves to show that chemistry can build a house that is swifter to build, affordable to own, fortified against natural disasters and energy and ecologically-efficient.

www.betterhomebetterplanet.com



NOTTINGHAM UNIVERSITY, UK, CREATIVE ENERGY HOME INITIATIVE: THE CREATIVE ENERGY HOMES PROJECT

The Creative Energy Homes project is a showcase of innovative state-of-the-art homes of the future built on University Park in Nottingham. As part of the project, BASF is building a house to demonstrate how BASF materials, including Neopor® EPS can be used to create an energy-efficient and affordable home. The cost of building is balanced against the requirement to make the house affordable to a first time buyer. And with available building land in short supply, the design of the BASF House has the flexibility to be used for semi-detached or terraced houses.

www.nottingham.ac.uk/sbe/creative_energy_homes



ZERO ENERGY HOUSE, LUDWIGSHAFEN, GERMANY: ENERGY CONSUMPTION REDUCED TO TECHNICAL ECONOMIC OPTIMUM

In view of rising energy prices, a zero-heating cost house can represent the optimum investment. LUWOG, BASF's housing company, has developed a concept that reduces energy consumption to an economic optimum using energy modernization measures. A thermal insulation composite system using Neopor® insulation boards provides a high-performance, energy-efficient building envelope. The energy for power, hot water and heat is produced by using renewable energy sources — the building earns its own low-heating costs.

www.basf.de/science_around_us

CHEMISTRY OF CONSTRUCTION

ENERGY EFFICIENCY
DURABILITY
SPEED OF CONSTRUCTION

BASF Construction Solutions

As The Chemical Company, BASF is a leader in the construction industry. With more than 600 products serving 75 construction product categories, BASF offers the broadest portfolio of products used directly on construction sites, or integrated into other products, to improve the performance of construction projects.

Our offer extends throughout the building envelope from roof to foundation:

In wall systems and insulation	Sealants & adhesives
Concrete & asphalt	In bridges & pavement
In windows & doors	HVAC & plumbing
Interior, Exterior	Cladding
Landscaping	Electronics

Whether new construction, retrofit or historical restoration, BASF chemistry makes a significant contribution to improved performance.

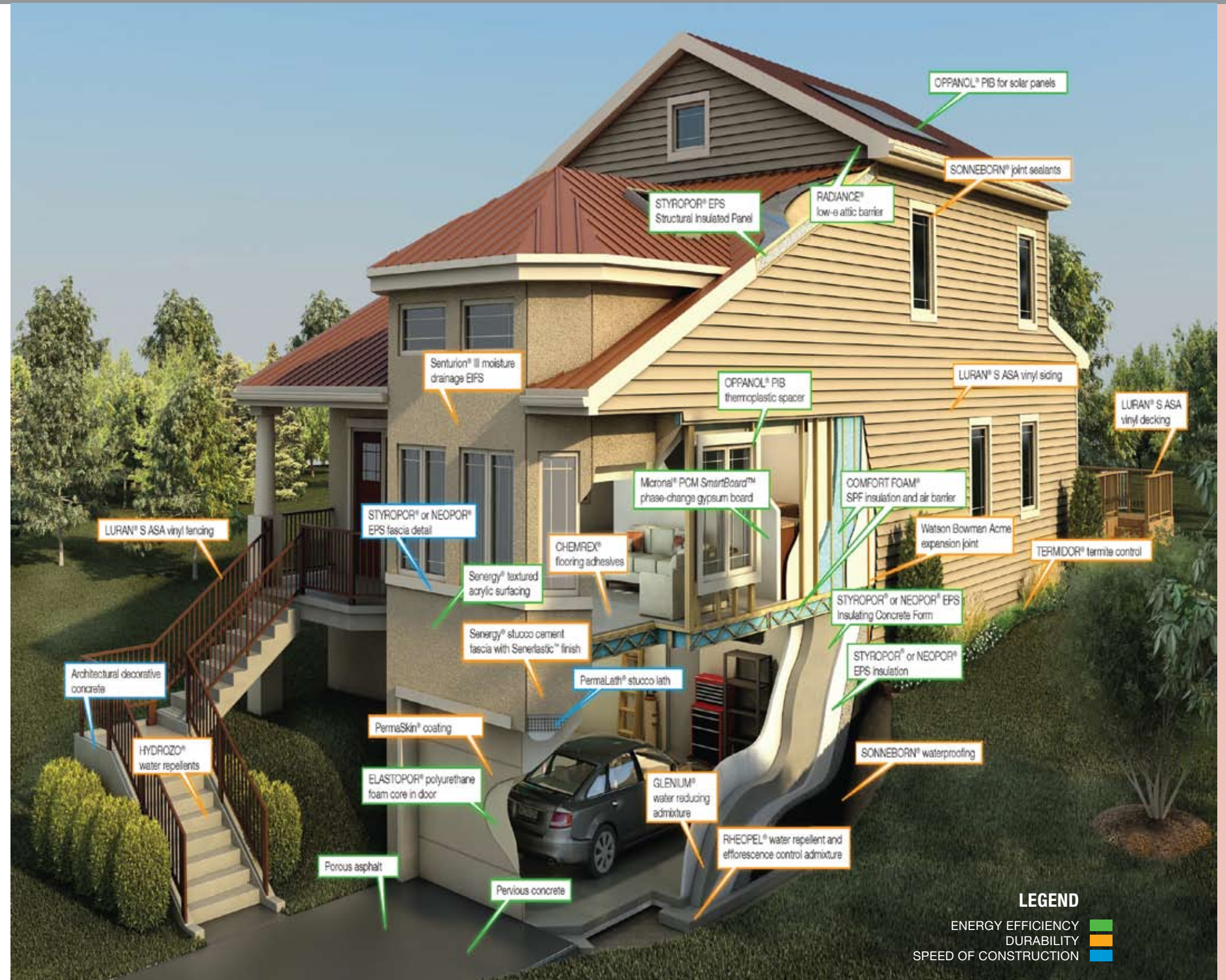
For more than half a century, BASF construction solutions and chemical ingredients have helped architects, engineers, designers, contractors, owners, builders and original equipment manufacturers make construction projects better with material choices that are proven to make a tangible difference to the performance of construction projects throughout their entire lifecycle.

If you are a construction professional, builder, project owner or an original equipment manufacturer for construction products, www.basf.com/construction provides you with useful information to help you be more successful in your construction work.

BASF offers more than 600 products for construction solutions used onsite, or as key ingredients for construction products for these segments:

- Commercial
- Highways & Streets
- Hospitals
- Lodging
- Manufacturing
- Office Buildings
- Power-Energy
- Recreation
- Residential-Improvement
- Residential-New
- Schools
- Sewage, Water Supply
- Telecommunications
- Transportation-Buildings
- Transportation-Infrastructure

For more BASF construction information, please visit: www.highperformancecommunity.com



www.basf.com/construction

This graphic is intended only to illustrate the breadth of the BASF construction portfolio and may not be an accurate design drawing of the structure. Not all materials and systems are necessarily compatible in combination with all other systems shown.