

## IMPROVING BUILDING VALUE THROUGH FACADE WEATHERPROOFING



### 1.0 – Intro

#### A - Improving Building Value

Creating a building is one of the most demanding challenges that we as an individual or the company for which we work can undertake, and the major goal of all the players is to create the most valuable building with the available resources, within budget, and on time.

At the same time, buildings are a major part of our lives. We spend most of our lives inside buildings: we work inside of buildings and perform the majority of our non-work related activities inside of buildings. If we aspire to do these activities in comfort, healthily, safely and using the minimum possible resources, we must create comfortable, healthy, safe and sustainable buildings.

How the building performs with regards to all these considerations defines building value.

During the last years a lot has been done with regards to green building, but it is now clear that the market needs to focus and ally sustainability on its different dimensions (environmental, economic, social and cultural) with human health and wellbeing. In this way we may transform our buildings, and as a result our city's, for the benefit not only of the people living within, but for the planet as a whole. Taking a holistic approach to construction can only add value to a project

**“We shape our buildings  
and afterwards our buildings shape us” (1)**

#### B - Buildings – A giant puzzle in our cities

Buildings are comprised of a giant puzzle of different, individual components and materials. We must look at the whole building as an integrated structure. But we must also look deeply into each of building individual components and materials in order to achieve the ideal final solution, and so improving building's value.

## C - Facades – The impact on building value

Building envelope, and particularly facades, plays a crucial role on how the building performs during its life time and on how it addresses the above mentioned goals. Facades will greatly influence the value of a building as they determine:

- Aesthetics
- Protection against water and moisture
- Thermal efficiency
- Acoustic performance
- Natural lighting
- Indoor Air Quality
- Wind loads
- Durability

**“The façade is the filter between the climate outside and the conditioned space inside, it determines the appearance of the building and its performance” (2)**

The goal of this document is to support the market players and stakeholders on understanding how we can improve building value through façade weatherproofing.

Every building project has a unique set of program goals and technical requirements that should determine the façade waterproofing design. At the same time today’s market evolves more quickly than ever. It is essential to understand not only which are the state of the art solutions but also on how can these solutions facilitate the fulfilment of project requirements and add value to the final product.

**“Technological progress and industrialization of the construction industry means that the role is changing from controlling the design through a profound knowledge of materials and techniques, to a role of orchestration of a multitude of specialists skills, knowledge, and industry intelligence” (3)**



**Effisus Ecofacade Envelope** - Air tightness and water vapor management facade integrated system.

**Effisus Ecofacade** – Facade waterproofing solution.



(1) [Health, Wellbeing & Productivity in Offices – The next chapter for green building](#)

(2) [Façade Engineering & The Design Teams of the Future](#)

(3) [Façade Engineering & The Design Teams of the Future](#)

## IMPROVING BUILDING VALUE THROUGH FACADE WEATHERPROOFING

### CONTENTS

- 1.0 – Intro - Improving building value through façade weatherproofing
- 1.1 – Improving building value by sealing façade connections
- 1.2 – Sealing façade connections – Raising the standards: state of the art solutions
- 1.3 – Sealing façade connections – Improving building value with complete, tested and approved systems
- 1.4 – Sealing façade connections – Making each project a success with bespoke solutions
- 1.5 – Sealing façade connections – Assuring flawless installation
- 1.6 – Sealing façade connections – Costs-benefits analysis
- 1.7 – Sealing façade connections – Improving building sustainability
- 1.8 – Sealing façade connections – The importance of a trusted service
- 1.9 – Sealing façade connections – Successfully managing challenges at the job site
- 1.10 – Sealing façade connections – The role on the complete weatherproofing system



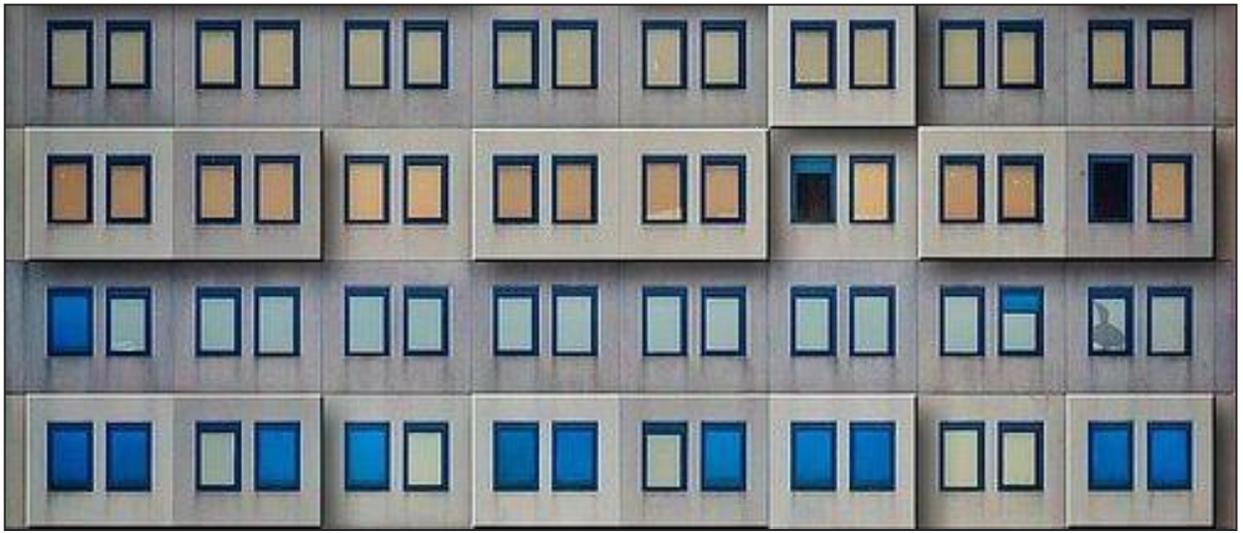
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### 1.0 Intro



### 1.1 Improving building value by sealing façade connections

#### A - The Building Enclosure - Weatherproofing

In our introduction we have briefly analyzed the importance of a building's façade and its impact on a building's global performance and final value.

A building's façade is the filter between the climate outside and the conditioned space inside and as such it has to address / control multiple loads and functions. Focusing only on climate related loadings, a building, and its enclosure, experience different conditions or microclimates, depending on the project's location, landscape, adjacent buildings, façade and roof configuration, among others. This microclimate has to be taken into consideration when designing a façade solution.

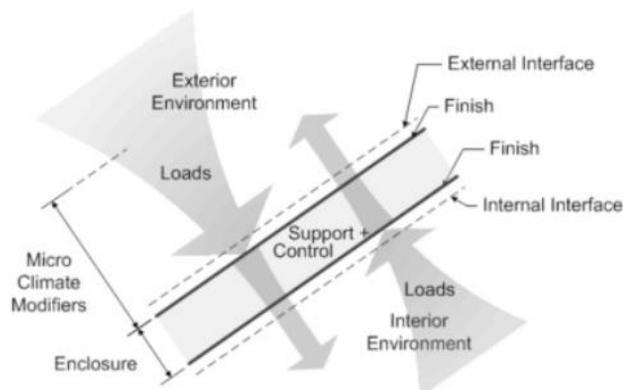


Fig. 1 Building enclosure and its functions (1)

The performance of a façade should be analyzed taking into consideration how it behaves in relation to the different loadings generated by the exterior environment, the interior environment, and the building enclosure itself.

There is a complete list of [climate related loadings](#) (2) that a façade needs to address, such as:

- Solar light
- Heat
- Water
- Air
- Moisture

In this Ebook we will focus on façade weatherproofing but more in particular on the control of water, air and moisture, ensuring watertightness, airtightness and moisture management in facades.

## B - Controlling water, vapour and moisture on facades

- Controlling water ensuring watertightness

Protection against water penetration is, since the very beginning, a major function of a building's envelope. However, water leakages remain one of the most common building pathologies, and are definitely, one of those that most deeply affect the performance of our buildings and their value. Water leakages can almost instantaneously cause deterioration of the most common construction materials, uncomfortable indoor environment, and in worst cases, affect a building's structural stability by, for example, causing corrosion on metal structures.

- Controlling air and moisture ensuring airtightness and moisture management

With major efforts made initially in Europe and North America, [airtightness](#) (3) has now globally become a standard requirement for a building's envelope, with major efforts made recently by Australia and Canada, among other countries. It is essential to work towards energy consumption efficiency (energy consumption reductions reached through airtightness can reach up to 40%), maximizing thermal and acoustic insulation, and eliminating the risk of [mold](#) (4) and other building pathologies associated with [moisture](#) (5).

Moisture management is strictly associated with airtightness, and every building airtightness analysis has to consider facade moisture management, assuring that the designed solution eliminates the risk of condensations and allows the evaporation of internal existing or generated moisture.



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(1) [http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure\\_revised](http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure_revised)  
(2) [http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure\\_revised](http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure_revised). Please check fig. 1, 2 and 3  
(3) <http://rdh.com/wp-content/uploads/2014/04/Air-Leakage-Control-in-Multi-Unit-Residential-Buildings.pdf>  
(4) <https://www.wbdg.org/resources/moisturedynamics.php>  
(5) <https://www.wbdg.org/resources/moisturemanagement.php>

## C - Façade connections - The most common leakage paths

The number one rule to ensure a building's enclosure watertightness and airtightness, is to ensure the continuity of the water and air control layer.

However, a building's enclosure and in this case, specifically facades, are a combination of planar components, and each of these components is a three-dimensional, multi-layer ensemble that extends from the inside to the outside.

While it may be easier to define the watertight and airtight solutions for these planer components, usually the bigger challenges arise at the connection areas of these planar components, or at points where these planar components need to be perforated or penetrated by the passage, or fixation, of singular construction elements.

**These interfacing areas are the most common façade water and air leakage paths. Compromising the quality of a sealing solution for these areas means compromising the façade's complete watertightness and airtightness.**

## D - Sealing Façade Connections

Sealing façade interfaces such as the connections between, windows or doors, and the cladding wall, is usually a challenge.

These are areas where the convergence of very different materials, with very different properties and behaviors, happens, such as metal and concrete, or steel and plaster. These are also the areas where the larger facade movements have to be absorbed and where the selected construction materials are under bigger stresses or loads.

Meanwhile, these are areas that are not so expressive, volume wise, on a façade's complete packaging, and many times, properly designing the solution for these connections is not faced as a priority.



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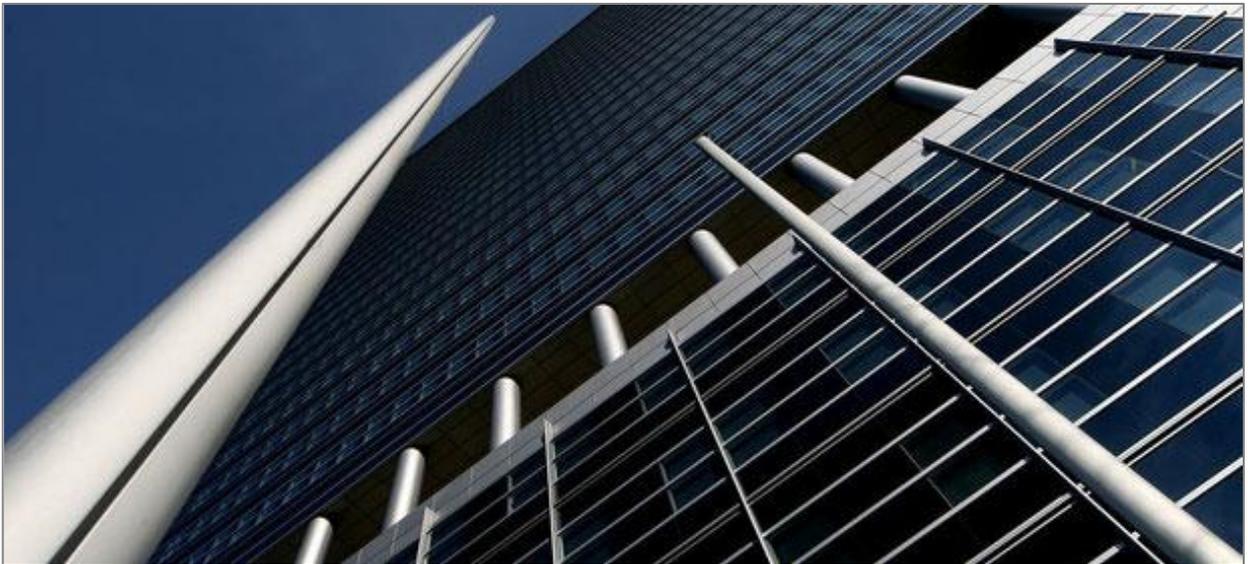


- (1) [http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure\\_revised](http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure_revised)
- (2) [http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure\\_revised](http://buildingscience.com/documents/digests/bsd-018-the-building-enclosure_revised) - Please check fig. 1, 2 and 3
- (3) <http://rdh.com/wp-content/uploads/2014/04/Air-Leakage-Control-in-Multi-Unit-Residential-Buildings.pdf>
- (4) <https://www.wbdg.org/resources/moisturedynamics.php>
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### 1.0 Intro

### 1.1 Improving building value by sealing façade connections



### 1.2 – Sealing façade connections – Raising the standards: state-of-the-art solutions

#### A – Façades - As good as its weakest points

A manufacturer designs its solutions detailing the interfaces between its system components, however the interfaces between different manufacturer's components and on-site constructed elements, such as concrete walls, are under responsibility of the specialized contractor only. Common difficulties arise when the work of two contractors converge.

The materials used on joint sealing are minor components of the building envelope and often contribute with the lowest percentage of a project's overall cost. However it is common sense that a façade will only be as good as its weakest points, which almost always happen to be its interfaces or joints.

Despite the above mentioned, joinery of façade components is, in most cases, not closely analyzed until the later stages of project designing and also not completely discussed until on-site installation comes up. At this point the standard solution will, many times, be fitted to all details. As a result, water leakages and other pathologies will appear as early as 1 or 2 years after the project's conclusion.

It is essential to carefully detail all building's joints and their sealing solutions at an early stage.

***“How the façade elements join should be considered early in the design phase”*** (1)

## **B – Building joints: Classification (2)**

Joints are made to join together elements of the building and may be used for two purposes:

- **Fixed joints**

These occur where materials are joined because maximum panel or unit sizes require the use of more than one element. Joints also occur where different materials or components meet. At a fixed joint the adjacent components are fastened together to prevent movement between them. The joint then has a constant size and shape and the sealant does not have to move significantly.

- **Movement joints**

These joints are created to allow the building and its cladding to move. Movement occurs because of temperature changes, wind loading and imposed loading, amongst other causes. Movement joints are made at the natural joints in the building where there would otherwise be fixed joints.

The shape and size of a movement joint will change daily and over longer periods of time. A sealant that can move in the required way is chosen for a movement joint and there is a wide range of performance available.

## **C - Designing joints and joints' sealing solutions**

### 1 – Identify where joints occur through the façade

Once general façade design is defined and main façade materials are selected, the designer should summary all the materials' interfaces occurring on the façade, as well as consult manufacturers to determine minimum number of expansion joints and their sizes, vertically and horizontally.

### 2 - Identify the different types of joints

All the identified joints should be grouped up into types of joints. Similar joints, with similar requirements, should be considered as a single type of joint, where an identical joint sealing solution can be used. This will give an idea of how many different details will be needed to document the different joint designs.

### 3 – Determine the complete requirements for each joint type

For each type of joint it is necessary to determine the amount of movement that it needs to accommodate (movement joints), as well as all other joint requirements and special conditions.

### 4 – Select joint sealing material

Considering the requirements identified on stage 3, it is now possible to select the best solution for each joint type, and to develop all necessary design details as well as solution specifications and installation guidelines.

Accepting that there is no such thing as an “ideal sealant”, helps one to accept that it is strictly necessary to take into deep consideration all the joint requirements and particular features, in order to select the best sealing solution for each joint type.

## **D - Selecting a joint sealing solution**

Criteria that should be analyzed for selection:

- **Project characteristics**
  - Expected durability (service life time)
  - Expected movement
  - Joint geometry
  - Substrates - Compatibility and adhesion
  - Service environment (temperature, water, UV, acid rain, pollution)
  - Special applications (potable water or food service applications)
- **Performance**
  - Resistance to chemicals (ex: oil, fuel, hydraulic fluids, cleaning chemicals)
  - Resistance to biodegradation
  - Vandalism resistance
  - Loading resistance (pedestrian or wheeled vehicles)
  - Puncture, tear and abrasion resistance
  - Fire resistance
  - Maintenance requirements
- **Installation**
  - Installation environment (space limitations, weather restrictions, etc.)
  - Ease and speed of installation
  - Level of labor specialization
  - Error possibility
  - Waste management
- **Aesthetical concerns**
  - Color and color retention
  - Possibility of painting
- **Environmental concerns**
  - VOC's content
  - % of recycled and recyclable materials
  - Waste

Only when all solution performance requirements, for any identified joint group, are listed, considering the above criteria or others that might be relevant, it is possible to select the best joint sealing solution and develop the necessary project details. The “ideal” solution will completely depend on this analysis.

For small joints, with small movements, liquid sealants may be acceptable, but depending on the façade system, gaskets, rubber membranes or other customized solutions may be more effective. Technical support from manufacturers is key during every stage: joint sealing solution selection, specification and installation.

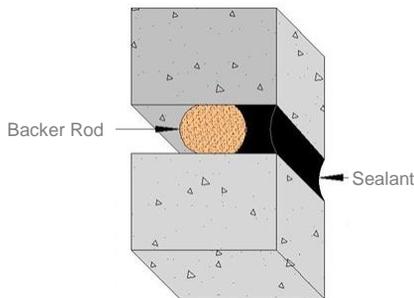


Fig. 1 Standard sealing detail with sealant and backer rod

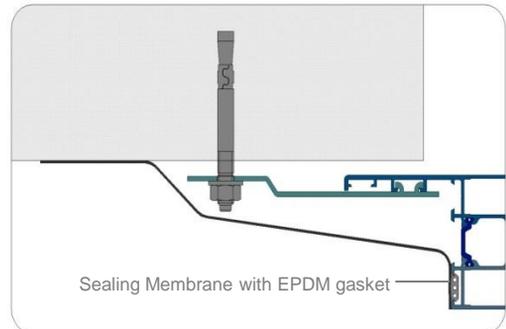


Fig. 2 Sealing membrane with clip-in gasket

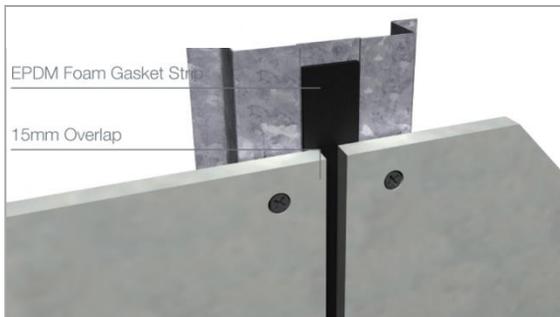


Fig. 3 Sealing detail with foam gasket strip



**The Effisus Way – Effisus Ecofacade**

- Complete and integrated system
- Continuous technical support
- Unlimited project customization options
- Maximum mechanical resistance
- Freedom of movement



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(1) <http://www.rci-online.org/interface/2010-BES-maing.pdf>  
 (2) <http://www.cwct.co.uk/construction/installation%20guide/INST-ALL.pdf#page=17>

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### 1.2 Sealing façade connections – Raising the standards: state-of-the-art solutions



### 1.3 Sealing façade connections – Improving building value with complete, tested and approved systems

#### A - Complete, tested and approved systems

Façades are traditionally designed to last and to withstand aggressive events, such as strong winds or heavy rain. Façade systems can be engineered to offer reasonable degrees of resistance to these effects, and it is only possible to achieve such degrees of durability and resistance, if the different components of the façade can, individually, guarantee these levels of durability and resistance.

When an architect, engineer or contractor, has defined, in general terms, the type of solution that is most adequate to each specific sealing detail, and its essential characteristics. Before selecting a specific manufacturer or brand, the architect, engineer or contractor, should confirm that:

- The solution to be specified in detail, is a complete and integrated solution, not only an isolated product without the specific accessories to be applied with and without options to fulfil special project requirements;
- The quality of each one of the solution components is under certification and control;
- The solution is tested and approved as a system (main components + accessories), as well as its application method, considering its typical applications.

## ▪ Complete systems

A complete system is a set of main components and accessories, with clearly defined application procedures or routines to perform a specific duty or solve a problem.

This is completely different from an isolated product. Within a system, all the necessary accessories to completely install the product will be included, in accordance with the defined system installation methodology, within the system scope of application. A system will, most of the times, also have different system options, to allow the adaptation of the system to specific project requirements.

For example, a system for sealing façade connections, based on EPDM weatherproofing membranes, will be comprised of:

- Main Component - Weatherproofing membranes
- Main Component Variations – To the application of the system on different conditions, or according with different project requirements
- Pre-fabricated pieces – Corners or complete collars
- Cleaner - To properly clean all surfaces before installation
- Primer – To properly prime porous or difficult surfaces, prior to installation
- Adhesives – To adhere the main components to different surfaces, or to seal main components' joints, or other details

Having a complete system, a clear definition of all its components and application methods, will significantly reduce the possibility of error or chemical incompatibilities. It will also make the architect's, engineer's or contractor's job much easier and safer.

Confirming the compatibility of this system with other construction systems with which it will interact is crucial, as well as the support from the supplier / manufacturer to understand the best system option and application method for each specific project and detail – this understanding and specification may significantly reduce human error possibilities during installation or the amount of required labor.

## ▪ Tested and approved systems – Quality assurance

[Quality assurance is a set of planned and systematic actions, made to ensure that products and services comply with specified requirements.](#) It not only involves checking the final quality of products to avoid defects, but also checking product quality in a planned way, during all its production stages. Quality assurance comprises the development of work and product design procedures, to prevent errors from occurring, based on planning backed up by quality manuals and tools.

The quality assurance of a system or product production is necessary to increase customer confidence in that the product will perform as promoted by the manufacturer and as he is expecting.

## Individual product approvals

The first step is to always ask for the technical specifications of each product that is part of the system, certified by a third party. This can be achieved for example, through the mandatory CE marking of regulated products.

CE marking implies that a product complies with relevant safety, health or environmental regulations, across the European Economic Area.

Assessment will need to be CE marked and accompanied by a [Declaration of Performance \(DoP\)](#). This is intended to ensure that reliable technical information is provided about the performance of construction products in a common technical language and tested using consistent assessment methods. This consistency should also enable designers and specifiers to compare the performance of products more easily.

The DoP of a product that is suitable for sealing façade connections, usually provides the following information:

- Reaction to fire
- Resistance to water passage
- Water vapour properties
- Resistance to air passage
- Tensile strength
- Elongation
- Tear resistance
- Dimension stability
- Foldability at low temperatures
- Weathering by combined continuous stress, through UV exposure and high temperatures

The CE marking will also confirm that product is under periodical control and that products are tested periodically.

### System approvals

However the type of certification described previously guarantees only the product essential characteristics, and its production control. It says nothing about how this will perform with any accessory used to apply it, or about how this material will perform together with other building components. It does not harmonize the product with building regulations or recommend what products are appropriate for a project - responsibility that remains with designers, specifiers or contractors.

Façade connection sealing systems can also have a certification from a third part, specially when these are innovative solutions.

There are several certification bodies that have certification methods, defined to test and approve such systems and their application methods. Some examples:

- [Cahier de Charges - Socotec](#)
- [Avis Technique – CSTB](#)
- [IAB - Irish Agrément Board](#)
- [BBA – The British Board of Agreement](#)

These type of approvals are usually a mark of quality, safety and reliability. They will provide reassurance of the product's fitness-for-purpose. These usually provide the following information, which is most valuable to designers and contractors:

- Purpose of the solution and scope of the certification
- Product overview and product characteristics (including system accessories)
- Field of application
- Application guidelines (main directives, different supports, repairs, compatibility, etc.)
- Test results and final certification

## B - The purchase department – Demanding quality

The characteristics/standards of the construction materials need to be put down in product specifications and purchase orders, in unambiguous terms. The testing and inspection methods/procedures, the type of tests that are required to be conducted, all need to be specified accurately.

The purchase department can achieve the required quality of incoming construction material by:

- Conveying correct specifications;
- Assessing quality capability of the supplier before placing a purchase order;
- Insisting on proper certification of dispatched material, from the supplier’s facility;
- Proper packaging and transportation, to avoid deterioration, damage or breakage during transit;
- Testing and inspecting at the receiving end. Insisting on approved quantity and quality certificates;
- Proper storage in the warehouse/store, to avoid deterioration or damage during storage;

All these steps, used appropriately, help in insuring the right quality of the incoming construction materials; which ultimately reflects in the final product of the company.



### The Effisus Way – Effisus Ecofacade

#### Membrane options:

- Effisus Ecofacade Membrane – Standard weatherproofing membrane
- Effisus Ecofacade SA-Edge Membrane – Weatherproofing membrane with one or more embedded self-adhesive bands for application without the need for additional adhesives.
- Effisus Ecofacade P-Fix Membrane – Weatherproofing membrane with a quick-connection profile for fastening to the frame or facade without the need for additional accessories.
- Effisus Ecofacade SA-Edge + P-Fix Membrane – Weatherproofing membrane with self-adhesive band and quick-connection profile for applications without the need for accessories.



#### System accessories:

- Effisus Bonding KF Adhesive – Paste adhesive
- Effisus Bonding KF+ Adhesive – Paste adhesive with no solvents
- Effisus Coat NP Primer – Primer for porous substrates
- Effisus Setup PR – Cleaner for smooth surfaces
- Pre-fabricated corners – For quick installation without error
- Pre-fabricated collars or other pieces – Fully project customization

**Cahier des Charges SOCOTEC** – Ce procédé a fait l’objet d’une enquête technique n° DTM-B/13/535FV/FD valable jusqu’au 01/04/2016 dont les conclusions sont reconnues par l’ensemble des collaborateurs de SOCOTEC France.

**CE Certification** - Results of factory production control are according to the characteristics declared in the CE Specification Sheet. Standard - EN 13859-2

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