



vestis

TECHNICAL GUIDE

Working aid

User's guide first edition for Vestis rolled products, designed for the application in the rainwater discharge and for architectural solutions.

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Mazonetto S.p.a.

35010 Loreggia (PD)

Z.I. – Via A. Ceccon, 10

Tel . 049 9322611 – Fax 049 9322650

www.mazonettometalli.it

mazonetto@mazonettometalli.it

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SUGGESTION:
the light bulb symbol indicates the presence of useful suggestions/advice



INSIGHTS:
The exclamation mark helps the reader to focus further information on the topic concerned

Mazzonetto S.p.a.

For more than 35 years Mazzonetto S.p.A. has been processing and marketing metals for the building trade. The company is now among the leaders in Europe in the market of metals for roofing and products for the rainwater discharge, thanks primarily to the investments in research and development of new and innovative products. The company's constant development has led to a physical expansion over an area of 55,000 m², of which approx.. 32,000 m² of covered area (plant and offices).

Alongside the internal research staff, the company calls on consultants who are experts in building technology and work on research at the IUAV University in Venice.

The company mission is to offer to architects, planners and trade experts the most apt products for roofing and facade cladding.

The result of this philosophy is Vestis, a high performance product, guaranteed by long life with special focus to the final appearance.

Technical department

Mazzonetto S.p.A. has its own internal technical department, named ATR (Roof and Facade Technical Department), offering through its technicians, solutions for the design and installation of its products. Designers facing metal for the first time find in the ATR a supporting partner to find the best solutions and metals to use, according to the different projects concerned.

Technical specifications and drawings on how to use Vestis rolled products are available for designers and installers.

Before using Vestis it is necessary to know well its specific features and respect the instructions given in this guide.

General features

Vestis is a flat rolled product for the building industry, composed of an aluminium core protected by a special coating which besides protecting the metal core distinguishes its aesthetic appearance with a wide range of bright colours and different shades. Vestis is a high quality performance product according to UNI EN 485-2 and UNI EN 573-3 standards for flat rolled products for the building sector.



Thanks to a strict quality control protocol, Mazzonetto S.p.A. guarantees a product that is suitable for the production of rainwater drainage components, for roofing and for facade cladding. Vestis stands out for:

- long life;
- lightness;
- competitiveness if compared with non-ferrous metals used in the same applications;
- wide range of shapes and colours giving maximum freedom of expression to the architects;
- sustainability and environmental respect



Bauxite is a sedimentary rock which is the main source for aluminium production

Properties of aluminium alloys

The base metal for Vestis is a 3005 series aluminium alloy containing manganese. The advantage given by manganese is that it increases the mechanical strength of the alloy and reduces the sensitivity to intercrystalline corrosion.

| Element | Si | Fe | Cu | Mn | Mg | Cr | Zn | Ti | Others each | Others total |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-------------|--------------|
| Min. | | | | 1 | 0,2 | | | | | |
| Max. | 0,7 | 0,8 | 0,3 | 1,5 | 0,6 | 0,1 | 0,4 | 0,1 | 0,05 | 0,15 |

With reference to the European standards for the classification of aluminium alloys, the afore mentioned chemical composition is expressed by the letter H (hardness), which refers to the work hardening by plastic deformation, followed by two digits: the first one is between 1 and 4 and indicates which process was used to achieve the strengthening of the metal, while the second one denotes the work hardening level and is between 1 and 9.



Here is a comparison table concerning the weight of commonly used metals for roofing

| Thickness 7/10 mm | Weight kg/mq |
|----------------------|-----------------|
| Vestis | 1,89 |
| Titanium Zinc | 5,00 |
| Prepainted steel | 5,50 |
| Copper | 6,23 |

Vestis is available in two different physical states, thus identifying two different product families: one mainly for rainwater drainage products and one for double standing seam.

| | Aluminium alloy | Heat treatment – work hardening level | Mechanical features | |
|---|-----------------|---------------------------------------|---------------------|------------|
| | | | Tensile strenght | Elongation |
| Vestis Line for rainwater drainage products (back side in the base colour) | 3005 Serie | H-41 | 130-180 Mpa | 8% min. |
| Vestis for roofing (back side in brown) | 3005 Serie | H-41 | 130-180 Mpa | 8% min. |

Vestis is a very lightweight product, greatly appreciated as it is easy to be processed and handled. Aluminium density is 2,73 kg/dm³. Protection foil weight is around 0,05 kg/mq.



Theoretical weight can be different from the real one considering metal and coating thickness according EN 13523-1 and EN 485-2 norms.

| Nominal thickness | Average weight kg/mq |
|---------------------|----------------------|
| Vestis 0,70 mm | 1,95 |
| Vestis Line 0,80 mm | 2,25 |
| Vestis Line 1,00 mm | 2,75 |

The winning combination of the base metal with the coating make Vestis a product with excellent resistance to rust perforation caused by weathering agents and very easy to work.

The external coating is composed as follows:

Front side: all Vestis coils have a 35 µm thick coating.

Back side: all Vestis coils in 0,7 mm have the back side (inner side) consisting of a primer coating and a 20 µm thick polyester paint in testa di moro (brown), while the Vestis Line coils in 0,8 and 1 mm have the same base color as the visible side, always with primer coating and a 20 µm thick polyester paint.

Supply details

Vestis is available in coils, with a 500 mm wide internal cardboard core and protected by an external branded film.



Available thicknesses

Vestis is available in 0,70 mm.

Vestis Line is available in 0,80 and 1,00 mm.

On request, other thicknesses can be produced.



Protection film used for Vestis coils in 0,7 mm.

Standard widths

500 - 650 – 1300 mm for Vestis.

1000 – 1250 mm for Vestis Line.

Other widths and dimensions on request.

Standard weight

Coils from 60 kg to 2000 kg are available.

Traceability

Front side: Vestis coils in 0,70 mm can be supplied with a protective film which must be removed after installation, being a temporary protection. Products with film must not be exposed to UV rays for long time. For all other thicknesses the film is available on request.

Transport

Uncoated as well as precoated products are sensitive to the effects of moisture and condensation. Consequently, during transportation the material must be protected both from steam and moisture and from mechanical damage and abrasion. Upon delivery it is recommended to inspect the material and report any damage caused by mechanical impact or water infiltration. Leave the material in the original packaging until it has reached the temperature of the surrounding environment (at least 24/48 hours). If the coils are stored on the ground, they must be placed on felt in order to prevent damages due to uneven ground or other factors.

Storage

Prepainted material must be protected against humidity, rain and condensation. Ideal storage conditions in the warehouse entail a ventilated and temperate environment with a temperature preferably between 15°C and 30°C. Avoid strong temperature fluctuations. Care should be taken to prevent the product from being exposed or coming into contact with corrosive products, such as chemicals substances, solvents or hazardous fumes.

The metal should be used within 6 months from its arrival. If the storage period exceeds 6 months, it is necessary to carry out folding and profiling trials before proceeding with the production.

If the material is temporarily stored outdoors, it should not be completely wrapped in plastic coverings. It is necessary to protect it but air must be allowed to circulate freely, to avoid condensation. We recommend not storing the product outdoor for long periods.

Handling

Prepainted material can be handled like any other rolled metal. Nevertheless, it is important to remember that its surface is like that of a finished product. For this reason it requires the same attention paid to a finished product ready for the delivery to the end user.

On construction sites

When the material is handled with lifting systems, be particularly careful to protect the sides and bottom part. It is recommended to use nylon (or neoprene-coated) strips or belts, but it is not suggested to use unprotected steel cables. If forklift trucks are used, handling and lifting operations must occur with the aid of specific tools for coils. During assembly, any metal particles produced by blanking, cutting, drilling or printing should be removed with care to avoid the formation of incrustations on the painted surface. Please bear in mind that superficial damages produced during the various operations can be largely avoided with the use of protective films. It is important, however, that these protective films are removed within 30 days after installation.

In the warehouse

The above recommendations are also applicable in the warehouse. The prepainted rolled products should be handled with the same care reserved to finished products. Moreover you should bear in mind the following aspects:

- the equipment must be cleaned and all surfaces in contact with the sheet metal must be smooth and free of irregularities;
- coil pads and cradles must be sufficiently resistant and capable of supporting heavy coils without any risk of damaging their surface;
- the coils must be protected against damage to the surface and edges, and under no circumstances they must be rolled on the ground;
- if the coils are stored on the ground after unpacking, they must be placed on felt in order to avoid damages due to unevenness of the ground or other causes, which can make the first turn unusable;
- coil stacking is not advisable;
- during unpackaging and cutting the steel strap any type of pressure that could affect more turns should be

avoided. If these pressures cannot be avoided, compressed fibreboard - or similar material - must be placed to protect the painted surface.

Once the coil is cut into sheets, rubbing between them must be avoided.

The use of clean and dry gloves is recommended.

Maintenance

Under normal service conditions, prepainted surfaces benefit from natural rainwater washing, whereas surfaces not exposed to rainfall are subject to dust deposits and other substances that can compromise the appearance of the product or even shorten its life.

We recommend programming inspections and washes to ensure the aesthetic appearance and product durability. For washing, it is possible to use warm water and neutral cleaning solutions. Avoid abrasive cleaners, highly alkaline materials and solvent-based detergents.

Sponges, soft brushes or water cleaners can help remove dirt from the product. If using a hydro-cleaning machine, use a pressure not exceeding 60 - 100 bar and a minimum distance of 50 cm. At the end of the operation, it is advisable to always rinse the surface with clean, cold water.

Reaction to UV-rays

The 35 µm thick coating of Vestis rolled products consists of a series of specifically studied layers. The action of sunlight independently from the level above the sea, does not change the physic-chemical properties of the coating.

The original colour of the coating may change slightly over time; however, these changes are within a-strict tolerance range and are uniform for all the surfaces that receive the same exposure.

Behaviour with temperature fluctuations and direct flame

Vestis can be stored at low temperatures without any risk of damage because it is a material that is not subject to frost. Unlike other metals, it can be folded even at low temperatures without the risk of microcracks forming on the base material.

Vestis should in no way be put in contact with direct flames; high temperatures can irreversibly damage the material.



While using the blow torch to install the roofing felt, hold the flame at a reasonable distance from the gutter



It is important that the installed metal can dilate. Direct fixings can only be used for small elements

Thermal expansion

The following table shows the thermal expansion coefficients of some common building materials:

| Metal | Thermal expansion coefficient mm/m/°C |
|-----------------|--|
| Stainless steel | 0,0104 |
| Fe 430 | 0,0108 |
| Copper | 0,0165 |
| Titanium zinc | 0,0222 |
| VESTIS | 0,0235 |
| Lead | 0,0289 |
| Zinc | 0,0290 |
| Plastic | 0,0700 |
| Glass | 0,0900 |

e.g. Let us assume we have a 10 mt long Vestis sheet.

The temperature at the time of installation is 10°C.

Remember that the metal can reach a temperature of 75°C in summer and -25°C in winter.

Summer stretching:

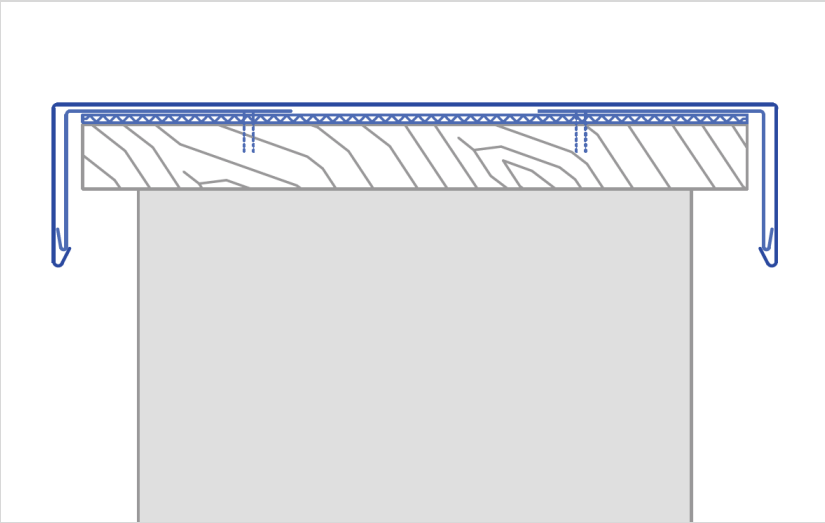
$$10 \text{ m} \times 65 \text{ }^\circ\text{C} \times 0.0235 \text{ mm/m/}^\circ\text{C} = 15.3 \text{ mm (+7.65 mm per side)}$$

Winter shrinking:

$$10 \text{ m} \times 35 \text{ }^\circ\text{C} \times 0.0235 \text{ mm/m/}^\circ\text{C} = 8,2 \text{ mm (-4,1 mm per side)}$$

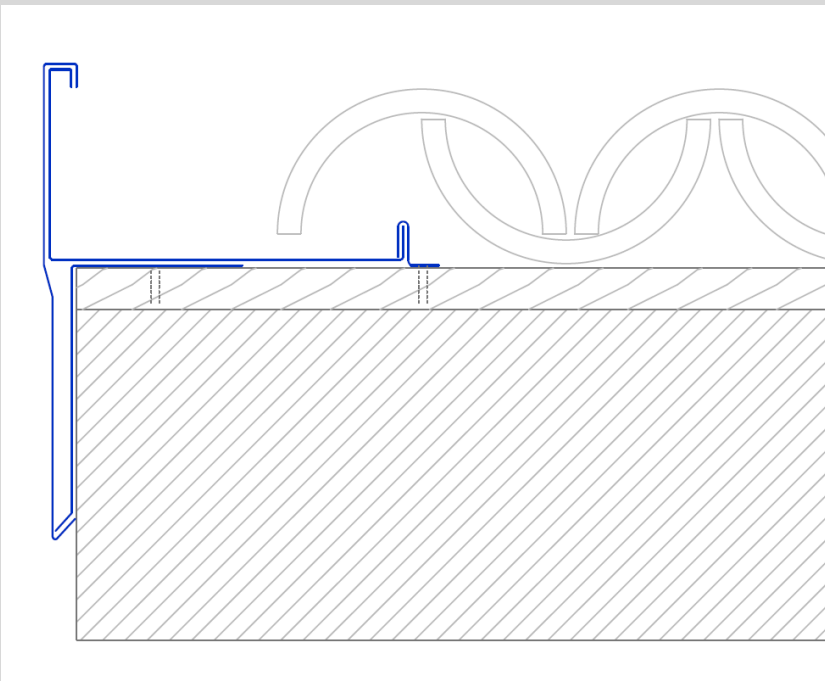
Overall Vestis has a dilatation of: $10 \text{ m} \times 100 \text{ }^\circ\text{C} \times 0,0235 \text{ mm/m/}^\circ\text{C} = \pm 23 \text{ mm } (\pm 11,75 \text{ mm per side})$

EXAMPLE OF WALL COVERING



The drawing alongside shows an excellent solution of indirect fixing, to allow the roofing element to dilate. It is important that the material is not in direct contact with concrete. To avoid this, use a wooden board or a separating layer

EXAMPLE OF LATERAL FLASHING



Example of lateral flashing with indirect fixings



If two metals with different chemical potential come in contact, it is necessary to use adhesive strips made of dielectric material (such as low-density polyethylene) to keep the materials separated

Reaction with other metals

Vestis may undergo bimetallic corrosion when in contact with other metals. This phenomena is more probable in case of “through hole” that appears when Vestis is joined to another metal by a fixing which perforates two layers of different metals. The two factors most contributing to corrosion are a very severe climate and the difference of chemical potential between the metals. The more aggressive the climate and the bigger the difference of chemical potential are, the greater corrosion attack will occur. Once this phenomenon has started, it tends to worsen over time, and cover more widespread areas. All aluminium alloys are subject to bimetallic corrosion.

While installing roof and facade coverings as well as rainwater drainage products, it is necessary to avoid the direct contact between two metals with different chemical potential, especially when there is much difference. Usually there can be contact if the finishing works, primarily the installation of gutters and pipes, are made with a different metal from the one used on the roof.

The table shows the reaction by coupling various metals with aluminium. The situation becomes critical if the galvanic coupling is immersed in sea water.



Never use copper rivets on Vestis

| Metal | <i>Bimetallic corrosion</i> |
|---------------------------------|---|
| <i>Chrome</i> | <i>Small to negligible</i> |
| <i>Copper and copper alloys</i> | <i>Serious</i> |
| <i>Titanium zinc</i> | <i>Negligible</i> |
| <i>Steel and iron</i> | <i>Negligible (except in marine environment)</i> |
| <i>Steel and Iron</i> | <i>Marked (especially in marine environment)</i> |
| <i>Tin</i> | <i>Negligible (except in sea water)</i> |
| <i>Galvanised steel</i> | <i>No effect as long as the zinc layer is not destroyed</i> |







Never use fixings (screws, rivets, nails, etc.) in copper, copper alloys or iron, only stainless steel or aluminium fixings should be used in these applications. Fixing elements in the Vestis colours are available.

Workability (how to bend Vestis)

Vestis is a very ductile rolled product and it can be bent up to 180°. To prevent any micro-cracking and any damage to the coating, some simple rules must be observed:

- a) avoid scratching the product with any sharp tool that could mark or cut the coating;
- b) make curved bends, not sharp corners or crushed bends. Make the bends with an internal curved radius of ≥ 1.5 times the thickness (equal to 1.5 T on the ECCA scale) according to UNI EN 485-2 standard.

If, during bending, the coating tears (because it is bent too tightly), the damage will only concern the area being bent and will not extend to the rest of the surface even after a long time.

| Indice ECCA* | Schema |
|--------------|--|
| 0T |  |
| 0,5T |  |
| 1T |  |
| 1,5T |  |
| 2T |  |
| 2,5T |  |

* ECCA: European Coil Coating Association

Rainwater drainage with Vestis

Any type of metal roofing profile can be realized using Vestis, such as gutters, flashings, valleys, roof ridges, perforated strips, etc., as long as the bending and installation rules given in this guide are observed.

The gutters can be installed either as suspended elements supported by hooks or as embedded gutters.

It is good practice to make the gutters with a slope of at least 3mm/m with respect to the discharges. Suspended gutters shall be installed so that in case of filling the water can overflow from the most external section.

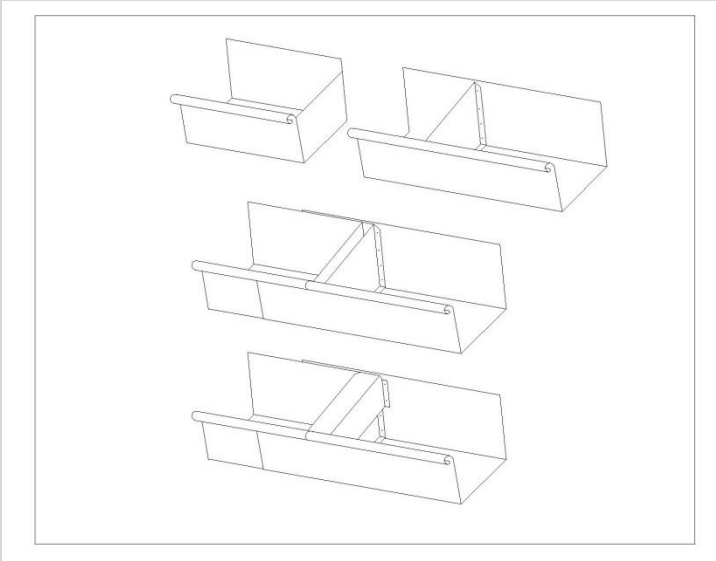
All the joints and fixings must be made so that the corresponding components can expand, shrink or slide without any obstacles to their movement, according to the different temperature ratios and without creating any unsealed points.

| | <i>Maximum gutter length in meters</i> | <i>Maximum distance in meters between 2 joints</i> | | | |
|--|--|--|--------------------------|--------------------------------|--------------------------|
| | | <i>Gutter width < 550 mm</i> | | <i>Gutter width >550 mm</i> | |
| | | <i>Mechanical joint</i> | <i>Elastomeric joint</i> | <i>Mechanical joint</i> | <i>Elastomeric joint</i> |
| <i>Embedded gutter with 2 free sides</i> | 11 | 11 | 8,5 | 8,5 | 5,5 |
| <i>Embedded gutter with 1 free side</i> | 5,5 | 5,5 | 4 | 4 | 3 |
| <i>Suspended gutter with 2 free sides</i> | 15 | 15 | 11 | 11 | 8,5 |
| <i>Suspended gutter with 1 free side</i> | 8,5 | 8,5 | 5,5 | 5,5 | 4 |

Expansion joints

There are basically two kinds of expansion joints: mechanical and synthetic rubber (elastomeric) joints.

Mechanical expansion joint



Synthetic rubber (elastomeric) joint



Sealants

Suitable products must be used to seal Vestis rolled products. We recommend the use of neutral cross-linking and low elastic modulus silicon sealants. These neutral sealants have excellent resistance to ageing, even in joints working for more than 20 years, there is no trace of surface microcracking or pulverisation,

despite the effects of weather. It is important that during polymerisation no acid or basic substances that could attack the coating develop.

When using these products, it is extremely important to observe the correct application instructions given in the technical sheet or documentation accompanying the product.

In all cases, the surface being sealed must be perfectly clean, free of grease and dry.

Instructions for use

Check the expiry date.

Check the working temperature for the product.

Clean, degrease and dry very carefully the surfaces in contact with the sealant.

Cleaning of the tools: with solvent till the sealant is in a plastic state; after hardening, mechanically only.

The sealant beads must be protected from UV-rays, by covering them and keeping them in the shade to lengthen the life of the seal.

Special attention must be paid to storage: silicon cartridges must be stored in a cool dry place. In these conditions, they can be stored for at least 12 months. Any cartridge that has been opened but not completely used can be stored for about 3 months if it is firmly closed.

Ecology and recyclability

Vestis does not release any harmful or polluting substances into the water and there are no risks for the environment. For the same reason, any discharge water running off Vestis does not dirty walls or floors with oxides, as it usually happens with copper for example.

Aluminium is harmless for flora and fauna, and there is no risk of pollution in the waterways. In fact no legislation limits its use, not even when directly in contact with food and beverages.

Aluminium for roofing or for other building purposes, is completely recyclable and can be re-used in numerous production sectors, maintaining a high market value even as scrap.

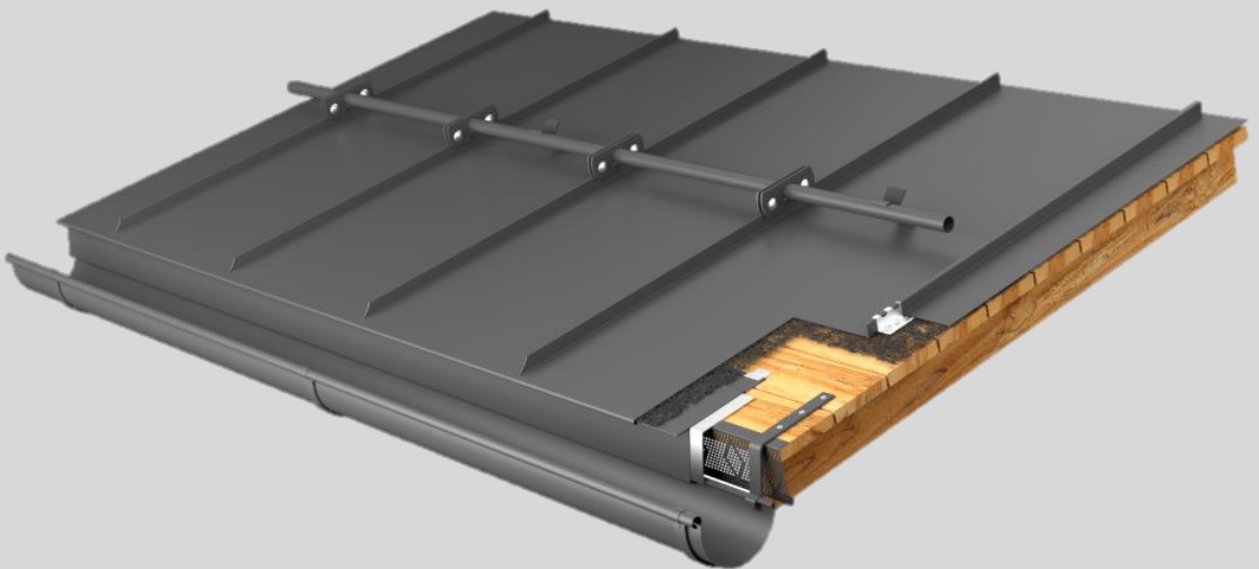
Roofing applications – Double standing seam system

The seaming technique allows for joining sheets and strips that have been previously profiled by superimposing them and folding over the edges. They are anchored to the substructure using fixed and sliding clips fixed with screws. Thanks to its versatility, the double standing seam technique is the most versatile solution for the most complex shapes often which may be found in roofing designs.

The minimum height of the finished seam, equal to 23 mm, results from the lateral bending of the sheets which are joined together, through various operations, to form a double standing seam. By using profiling and bending machines, around 70 mm of material is lost on each section; the resulting clearance, equal to 3–5 mm, absorbs the transversal expansion of the sheets caused by thermal fluctuations.

The minimum required slope of the roof is 5% (3°).

Axonometric projection of double standing seam Vestis roof covering on a ventilated substructure.

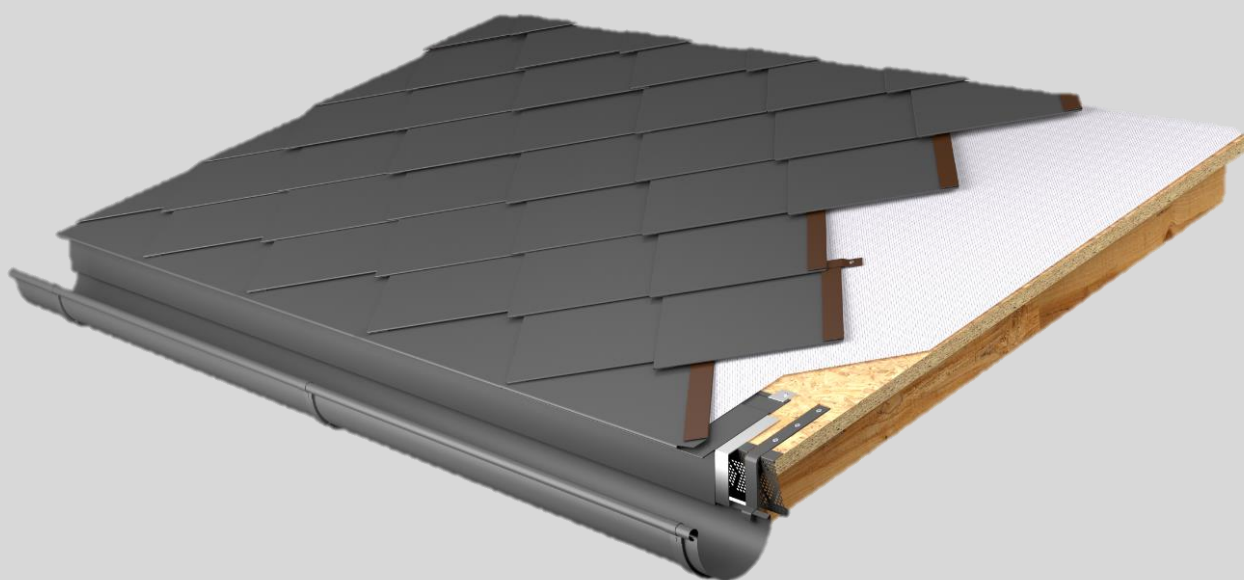


Roof and facade applications – shingles – scales

Shingles are diamond-shaped elements for applications on facades and roofs with slope exceeding 45%. Each shingle has two rims bent forward and two bent backwards by roughly 180°. The rims bent forward and backwards are arranged on parallel sides. Starting from the bottom, depending on the shape and type of the covering, the shingles can be mounted horizontally, vertically or diagonally; they are assembled starting from the left-hand or right-hand side.

They are fastened one at a time through clips, screws or nails.

Axonometric projection of a roof covering with Vestis shingles on a ventilated substructure.



Façade applications – Angled standing seam

This is a variation of the vertical double standing seam, it has a final 90° bend of the edges rather than 180°.

In this way, it forms a corner abutment which has a wider exposed surface as compared to the double standing seam and gives the cladding a more pronounced structure, resulting in a highly flat effect with a considerable reduction in bulges.

Angled standing seam is currently the most successful solution for cladding facades and roof surfaces in full view thus satisfying specific aesthetic requirements.

Axonomic projection of angled standing seam Vestis facade covering on a ventilated substructure.



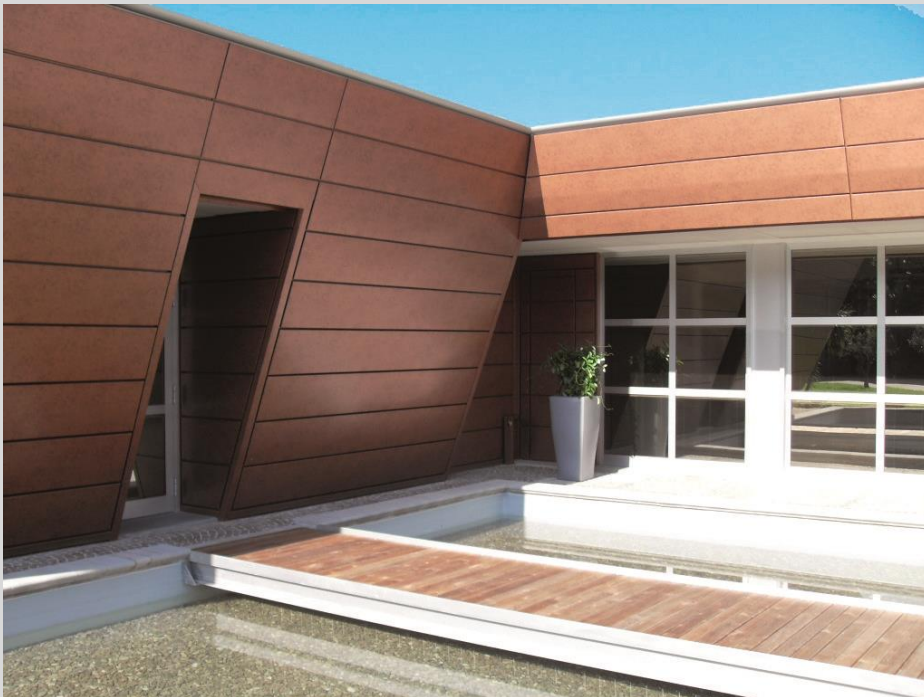
Façade applications – panels

Panels are facade elements generally available in lengths of up to 6,000 mm and widths of up to roughly 500 mm.

There are various types of panels with different characteristics: with male-female joint, with overlapping joint, horizontal and vertical. The panels are manufactured on rolling drums or bending machines. The on-site assembly is carried out with the male-female connection technique or with an overlapping joint.

The transversal expansion of the panels does not have a significant impact, while the longitudinal expansion of the cladding must be offset by an empty space or by a separation, in order to absorb the expansion.

Example of horizontal Vestis panels



Façade applications – cassettes

Cassettes are a type of cladding with bent edges on all sides. They come in a wide array of different sizes and shapes that are usually manufactured upon the specific indications of the designer.

The flexibility of these elements with regard to their format, arrangement of joints and anchoring techniques is truly considerable. The bent edges make it possible to install even large size panels whilst retaining the planarity.

The visual impact of the joints on all sides of the cassettes makes it possible to identify them as individual elements.

To enhance their resistance or further stiffen large-size cassettes, rigid materials such as multilayer plywood or OBS panels can be bonded on the back side.

Example of Vestis cassettes

