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Natural, shaped, laminated zintek®

## TECHNICAL SPECIFICATIONS (ref. - DOP. A03)

### 1 - FOREWORD: ZINTEK® IN THE CONSTRUCTION INDUSTRY

Zinc laminate has been used for many years in the construction industry, so as to make it, on a European level, the most popular non-ferrous material used for cladding and covering solutions. Zintek® is a high-quality zinc-copper-titanium alloy. The alloy must be produced with Z1 quality zinc with 99.995% pure Zinc in accordance with European standard EN 1179 with the addition of alloy elements that improve the characteristics of the laminate: Titanium increases its resistance to permanent deformation over time; Copper increases the tensile strength of the material.

The combination of both materials reduces the expansion coefficient of the alloy. The chemical-physical characteristics of zintek® allow optimal workability and weldability. Its resistance to atmospheric corrosion makes it possible to cut maintenance and repair costs, to enhance the value of building architecture within an extremely wide range of contexts. In fact, zintek® is a leading company within this sector thanks to the following factors:

- Respect for the environment;
- Affordability compared to other non-ferrous metals used in similar applications.
- Low-maintenance with opportune and coherent planning.
- Exceptional durability.
- Attractive aesthetic appearance.

### 2 – AIM OF TECHNICAL SPECIFICATION

This document aims to define the characteristics of zintek®, its range of use, functionality, performance, proper packaging, transport, storage methods, safety and compliance with standards and laws.

### 3 – SPECIFIC STANDARDS

Zintek® complies with the following standards:

- UNI EN 988: “Zinc and Zinc alloys – Specifications for rolled flat products and for building purposes”
- UNI EN 14783: “Fully-supported metal sheets and strips for roofing, external cladding and internal lining”

In standard UNI EN 988, specifications are provided for Zinc-Copper-Titanium alloy rolled flat products used in the construction industry and supplied in the form of coils, sheets or strips.

In standard UNI EN 14783, specifications and testing methods are provided for metal coils, strips and rolled flat sheets as well as components produced for fully-supported roofing, external cladding and internal lining purposes. In order to comply with this standard, it CE-marking is mandatory.

For further clarification, see the definition specified in the FPC (Factory Production Control) relating to CE-marking with regard to the term “fully-supported”: *Condition whereby it is necessary for there to be a load-bearing structure underneath the panel; or rather, panels supported by a continuous self-supporting structure (EN 501:1996) during the installation stage, so that the flat bottom parts are reinforced and therefore structurally supported (therefore, the product is not self-supporting as in EN 14782).*

#### Zintek standard®: UNI EN 988

##### a) Composition in %

| Element | Min. content | Max. content |
|---------|--------------|--------------|
| Cu      | 0.080        | 1.000        |
| Ti      | 0.060        | 0.200        |
| Al      | -----        | 0.015        |
| Zn(1)   | remainder    | remainder    |

(1) Z1-quality zinc (see UNI EN 1179 table)

#### Zintek standard®: UNI EN 988

##### b) Mechanical characteristics

|                                          |                         |         |
|------------------------------------------|-------------------------|---------|
| unit load deviation from proportionality | 0.2%<br>Rp 0.2<br>N/mm² | 100 min |
| Tensile strength                         | Rm<br>N/mm²             | 150 min |
| Elongation percentage at break           | A50mm<br>%              | 35 min  |
| Creep strain rate percentage             | %                       | 0.1 max |
| Minimum hardness                         | HV                      | 45      |

#### Calculation of the masses

| Nominal thickness | Approximate mass |
|-------------------|------------------|
| mm                | Kg/m²            |
| 0.60              | 4.3              |
| 0.65              | 4.7              |
| 0.70              | 5.0              |
| 0.80              | 5.8              |
| 1.00              | 7.2              |



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### 4 – INSTALLATION CONDITIONS AND STORAGE

Products in zintek® must be stored in a dry, ventilated location. It is necessary to keep the level of humidity under control. Stocks of these products must be protected against humidity. Therefore, storage outdoors must be avoided, and coils or profiles must be directly covered, unless ventilated spaces are left between one item and another. Moreover, it is necessary to avoid the formation of condensation if the temperature inside the warehouse drops below dew point.

The laminate must not be processed at temperatures below 10°C. It is advisable to carry out processing activities after having brought the temperature of the laminate up to the minimum value stated.

Details relating to the installation stage are given in the manual entitled “*Sviluppo in Architettura*” (“*Development in Architecture*”).

However, estimates and applications are contents provided inside on-line specifications, available on the [www.zintek.it](http://www.zintek.it) website.

### 5 - CHARACTERISTICS

| Physical and technological characteristics                        |                       |          |
|-------------------------------------------------------------------|-----------------------|----------|
| Description                                                       | Unit of measurement   | Value    |
| Density                                                           | Kg/dm <sup>3</sup>    | 7.14     |
| Melting point                                                     | °C                    | 419      |
| Specific heat at 20 °C                                            | kJ/kg°C               | 0.401    |
| Thermal conductivity at 20 °C                                     | W/m K                 | 109      |
| Electrical conductivity at 20 °C                                  | m/ohm mm <sup>2</sup> | 17       |
| Thermal expansion coefficient parallel to rolling (lamination)    | mm/m °C               | 0.022    |
| Thermal expansion coefficient transversal to rolling (lamination) | mm/m °C               | 0.017    |
| Re-crystallisation limit                                          | °C                    | > 300    |
| Elastic modulus                                                   | N/mm <sup>2</sup>     | > 80000  |
| Erichsen Cupping Test value                                       | mm                    | 7 – 9    |
| Lengthwise Bend test at 180° 20 °C                                | n°                    | 3 (min.) |
| Crosswise Bend test at 180° 20 °C                                 | n°                    | 5 (min.) |
| Stiffness                                                         | %                     | 40 – 55  |
| Non-magnetic                                                      |                       |          |
| Fireproof                                                         |                       |          |

|                                  |   |          |
|----------------------------------|---|----------|
| CE-marking method (UNI EN 14783) | - | System 4 |
|----------------------------------|---|----------|

**SURFACE APPEARANCE:** The natural appearance of zintek® is a glossy grey, smooth, shiny laminate. When exposed to adverse weather conditions, the surface is covered by a self-protecting layer that remains stable over time with a slate-grey tone. The oxidation process may change the chromatic coordinates of the surface in an uneven way, resulting in areas with different shades of grey. This is only a transitional process that will terminate with a pleasant, uniform colour covering the entire surface of the laminate. The natural appearance of the laminate may vary thanks to particular pre-patination surface treatments.

### 6 - PERFORMANCE

As for zintek® performance, see the section on CE-marking and the relative DOP documentation.

### 7 – SERVICE LIFE, BEHAVIOUR AFTER CONTACT WITH CHEMICAL SUBSTANCES AND CORROSION RESISTANCE

Contact with acid and alkaline substances must be avoided.

When different metals come into contact with each other, they can be damaged due to their potential difference, therefore, the zintek® laminate must never come into contact with copper and its alloys (such as brass), neither directly nor indirectly, for example, through the flow of rainfall that passes from covering solutions or copper items to others made of zintek® laminates.

| Durability         |                     |
|--------------------|---------------------|
| Environment        | Durability          |
| Countryside        | Over 100 years      |
| Industrial city    | 60 years            |
| Industrial cluster | 40 years            |
| Seaside city       | From 40 to 60 years |

### 8 – BEHAVIOUR ACCORDING TO CHANGES IN TEMPERATURE

The laminate is not affected by changes in temperature that occur after processing and installation. However, it is advisable to use hot air heaters in order to carry out bending operations when the temperature of the laminate is below 10 °C. Its melting point is at approximately 419 °C and its re-crystallisation limit, essential to perform the brazing technique, is at 300 °C. It is fireproof, resistant to UV-rays and no phenomena of erosion caused by the wind are known to date.



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### 9 – SUPPLY CHARACTERISTICS

#### Shaped laminates

Dimensions as per specific item.

#### Available thicknesses

0.60 – 0.65 – 0.70 – 0.80 – 1.00 mm

Upon request, other thicknesses are also available up to a maximum of 1.50 mm.

#### Tolerance

Thickness: The maximum deviation compared to the nominal thickness ordered must not exceed  $\pm 0.03$  mm.

Width: The maximum deviation compared to the nominal width ordered must not exceed  $0/+2$  mm.

Length: The maximum deviation compared to the nominal length of the metal sheet or strip ordered must never exceed  $0/+10$  mm.

Straightness: Deviation from straightness must never exceed 1.5 mm/m.

Flatness: Deviation from flatness must never exceed 2 mm/m.

### 10 – PACKAGING AND DELIVERY

For each transport operation, an appropriate dry, well-ventilated area must be guaranteed. The loading and unloading of vehicles must be carried out in a dry and/or indoor environment. It is necessary to avoid transporting the material on humid pallets and to make sure that the surface protection is adequate so as to avoid any potential damage being caused.

### 11 – COMPLIANCE WITH UNI EN 14783

Zintek hereby declares that it is in conformity with standard UNI EN 14783 with the following characteristics:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Zintek Srl, via delle Industrie 22<br/>30175 Porto Marghera (Venice, Italy)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>14</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>EN 14783:2013</b><br><br>A fully-supported metal product for roofing, external cladding, internal lining and tinsmithery purposes<br><br><b>Material:</b> Natural, shaped laminated zintek®<br><br><br><b>Dimensions:</b> As per specific item.<br><br><b>Nominal thickness:</b> from 0.60 mm to 1.50 mm - EN 501.<br><br><b>Water permeability:</b> Waterproof.<br><br><b>Dimensional tolerances:</b><br>Thickness: $\pm 0.03$ mm;<br>Width: $0/+2$ mm;<br>Length: $0/+10$ mm;<br>Straightness: $\leq 1.5$ mm/m;<br>Flatness: $\leq 2$ mm/m.<br><br><b>Steam and air permeability:</b> waterproof.<br><br><b>Release of dangerous substances:</b> no dangerous substances are released.<br><br><b>Reaction to fire:</b> Class A1 (CWFT).<br><br><b>Outdoor fire behaviour:</b> Class BROOF (t1), Class BROOF (t2), Class BROOF (t3), Class BROOF (t4).<br><br><b>Durability:</b> NPD. |



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### 12 – MAINTENANCE

The maintenance of zintek® products must be correlated and conducted in accordance with:

- Mandatory documents pursuant to Ministerial Decree dated 17<sup>th</sup> January 2018 “Technical Building Standards” - chapter 10;
- UNI 10372 “Instructions for the design, execution and maintenance of roofs made from metal sheeting” – chapter. 11;
- UNI 10724 “Rainwater collection and drainage systems”- chapter 5.

(The validity of the NTC 2018 is limited to Italy. As for EU and extra-EU countries, the respective national laws apply).

The maintenance document, both planned and managed under surveillance, must include, at the designer’s discretion, the following stages, regardless of the base material specified in this document, in any case, considering the parts of the building affected by maintenance:

| Building parts:                                                                                | Activities:                                                                                                     | Frequency:                                               |
|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| General for all elements                                                                       | Visual inspection (damage, dirt deposits, growth of moss and vegetation, connections and joints)                | Yearly                                                   |
|                                                                                                | In-depth precautionary check                                                                                    | 3-5 years                                                |
| Profiled elements for covering solutions and facades (seamed, shingles, slats, coffered, etc.) | Maintenance (replacement of worn or damaged elements, cleaning operations to remove dirt and material deposits) | 3-5 years                                                |
| Gutters and outflow pipes                                                                      | Check for obstructions                                                                                          | Every 6 months, after every storm or torrential downpour |
|                                                                                                | Check for deformations                                                                                          | Yearly, during the winter                                |
|                                                                                                | Removal of ice obstructing the rainwater channelling areas                                                      | Yearly, during the winter                                |
|                                                                                                | Check for humidity and discoloration of the adherent facades                                                    | 6 months                                                 |
| Roof water drainage system                                                                     | Inspection – securing of the functional capacity                                                                | Yearly                                                   |
| Connections and joints                                                                         | Inspection of the tightening torque and seals between elements.                                                 | Yearly                                                   |

### 13 – SAFETY

Currently, there is no legislation to regulate the monitoring of any dangerous substances released by zintek® products in zinc-copper-titanium alloy. In any case, the products are compliant with Directive 2011/65/EC (RoHS 2).

Just like any other metal sheet, also zintek®, due to its handling and processing (cutting and bending), is subject to mechanical risks such as cuts, lacerations and abrasions. For these reasons, workers must protect their limbs and eyes during assembly and installation with PPEs bearing CE-markings that guarantee at least the following degree of protection:

- Mechanically-resistant gloves with a minimum level of protection (in the following order: abrasion, cutting, tearing and perforation): 2332;
- Mechanically-resistant overalls or work clothes;
- S3 category safety shoes;
- Polycarbonate goggles, field of use: 4, type: S, class: 2, filtering action code: 5.

Other processing and installation risks to be assessed include:

- Scalds and burns after coming into contact with sheets exposed to sources of heat for a long time (or solar radiation);
- Slips and falls, in particular on sloping roofs, during winter months for the possible formation of thin layers of ice over zintek®.