

Industrial Estate Valdeconsejo, Aneto St., 8-A, 50410  
Cuarte de Huerva (Zaragoza)

## REPORT 22AH01049

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# TESTS ON PREFABRICATED BOARDS

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| <b>• CLIENT</b>   |
| - Name: ANDARAGON, S.L.U.<br>- Address: Industrial Estate Las Norias, 19-A, Muel (Zaragoza)                           |
| <b>• QUOTATION</b>  |
| - Name: MECHANICAL CHARACTERISTICS OF FIBRE REINFORCED BOARDS<br>- Quotation No.: 21AH0428                            |
| <b>• SPECIMENS</b>  |
| - Specimen reference: 2022/00160<br>- Date of entry: 24/01/2022   |
| <b>• TESTS CARRIED OUT</b>  |
| - Wind load performance<br>- Date of test: 26/01/2022   |
| <b>• STANDARDS USED</b>   |
| - <b>Basic Document SE-AE</b> , Structural Safety - Actions in building construction, of the Technical Building Code. |

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## 1.- PRECEDENTS

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The applicant provides the laboratory with a 2100 x 2100 mm steel structure with two 2100x1050 mm TABIHAUS® prefabricated panels for a wind performance test.

The test specimen consists of two single-board TABIHAUS® panels fastened with TABIHAUS® polymer and self-drilling screws every 20 cm to a standard Steel Frame structure made of 90x50 mm galvanised sheet metal profiles consisting of a frame, a cross member and three intermediate studs. The thickness of the profiles is 1.2 mm.

The **TABIHAUS® Panel** is composed of an 8 mm TABIHAUS® board, itself composed of Epsom salt reinforced with double fibreglass mesh, longitudinal natural fibres dispersed in orientation, spherical foam particles, retardants, and waterproofing liquid, bonded to 14 mm high density XPS, with two-component adhesives.

The screws used are SFS reference BS-4.8 x 50.

## 2.- TEST METHODOLOGY

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For the test execution, the test specimen is fixed to a SITENOR testbed by means of clamping jacks as it is intended to be used on site.

Once the specimen is in place, positive and negative air pressures are applied to simulate the pressure (and suction) exerted by the wind on the buildings. This is done using ONE turbine built into the testbed.

For the calculation of the test pressures, the tables, and recommendations of the TBC in section 3.3 Variable actions have been used. Wind, from the expression:

$$q_e = q_b \cdot c_e \cdot c_p$$

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where:

- $q_e$ , is the wind pressure
- $q_b$ , is the dynamic wind pressure. In simplified form, 0.5 kN/m<sup>2</sup> can be adopted as a value at any point in the Spanish territory. More precise values can be obtained by means of annex D, depending on the geographical location of the work.
- $c_e$ , is the exposure coefficient, which varies with the height of the point under consideration, depending on the degree of roughness of the environment where the construction is located. It is determined in accordance with the specifications of section 3.3.3, taking the values of table 3.4 of BD SE-AE. In urban buildings up to 8 floors, a constant value, independent of the height, of 2.0 can be taken.
- $c_p$ , is the wind or pressure coefficient, dependent on the shape and orientation of the surface with respect to the wind, and when applicable, on the location of the point with respect to the edges of that surface; a negative value indicates suction. Its based in 3.3.4 and 3.3.5.

After the test has been carried out with the calculated test loads, the specimen is tested to burst pressure (or a maximum load of 3000 Pa). For this purpose, the test pressures are increased at intervals of 300 Pa until the burst pressure is reached.



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### 3.- TEST VALUES ADOPTED

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For the calculation of the test pressure, the most unfavourable values of dynamic pressure, exposure coefficient and wind coefficient have been adopted.

#### - Dynamic pressure, $q_b$

According to Annex D of BD SE-AE, the basic value of the dynamic wind pressure can be obtained with the expression:

$$q_b = 0,5 \cdot \delta \cdot V_b^2$$

Where  $\delta$  is the air density, which in general is 1.25 kg/m<sup>3</sup> and  $V_b$  is the basic wind speed value obtained from Figure D1 of BD SE-AE Annex 1, being the highest value of 29 m/s, corresponding to zone C.

This gives a dynamic pressure value of **0.52 KN/m<sup>2</sup>** for the most unfavourable case.

#### - Exposure coefficient, $c_e$

A value of **3.7** has been taken, which is the highest value in table 3.4. of BD SE-AE corresponding to a seashore area and 30 m height.

#### - Wind or pressure coefficient, $c_p$

In blocks of flats, with slabs that connect all the façades at regular intervals, with small openings or windows that are practicable or airtight, and compartmentalised inside, for the global analysis of the structure, it will be sufficient to consider global wind coefficients to windward and leeward, applying the wind action to the projection surface of the built volume in a plane perpendicular to the wind action. As global wind coefficients, those in table 3.5 of the BD SE-AE may be adopted.

For our case, a pressure value of **0.8** and a suction value of **-0.7** have been adopted, which would correspond to a slenderness in the plane parallel to the wind of  $\geq 5.00$ .

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With all this we calculate the wind pressure values, both for pressure and suction, for the most unfavourable cases, which will be used in the test:

|   |          |
|---|----------|
| $q_e = 0'52 \cdot 3'70 \cdot 0'8 = 1'54 \text{ kN/m}^2$     | pressure |
| $q_e = 0'52 \cdot 3'70 \cdot (-0'7) = -1'35 \text{ kN/m}^2$ | suction  |

The corresponding tables of BD SE-AE are attached in annex 1.



#### 4.- WIND LOAD TESTS

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| PRESSURE     |  |
|--------------|--|
| Applied load | 1571 Pa  |
| Remarks      | There are no breaks or disorders affecting the structure of the specimen.<br><br>A maximum deformation at the midpoint of 8,50 mm has been measured. |

| SUCTION      |   |
|--------------|---|
| Applied load | -1374 Pa  |
| Remarks      | There are no breaks or disorders affecting the structure of the specimen.<br><br>A maximum deformation at the midpoint of -9.56 mm has been measured. |

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| <b>BURST TEST</b>   |  |
|---|--|
| Maximum applied load  | <b>- 2100 Pa</b>   |
| Remarks   | Detachment of the panel and the insulator from the metal structure occurs.<br><br>A maximum deformation at the midpoint of - 15,85 mm has been measured. |
| <div style="display: flex; justify-content: space-around;">   </div> |  |
| Panel rupture   |  |

Zaragoza, 9 de febrero de 2022



**Jefe de Ensayos de Materiales**

Gustavo Royo Lantarón  
Lcdo. C.C. Geológicas





**Vº Bº del Director del Laboratorio**

Arantxa Mendizábal Aguirre  
Ingeniero Industrial

## ANNEX 1

### **BD SE-AE TABLES**

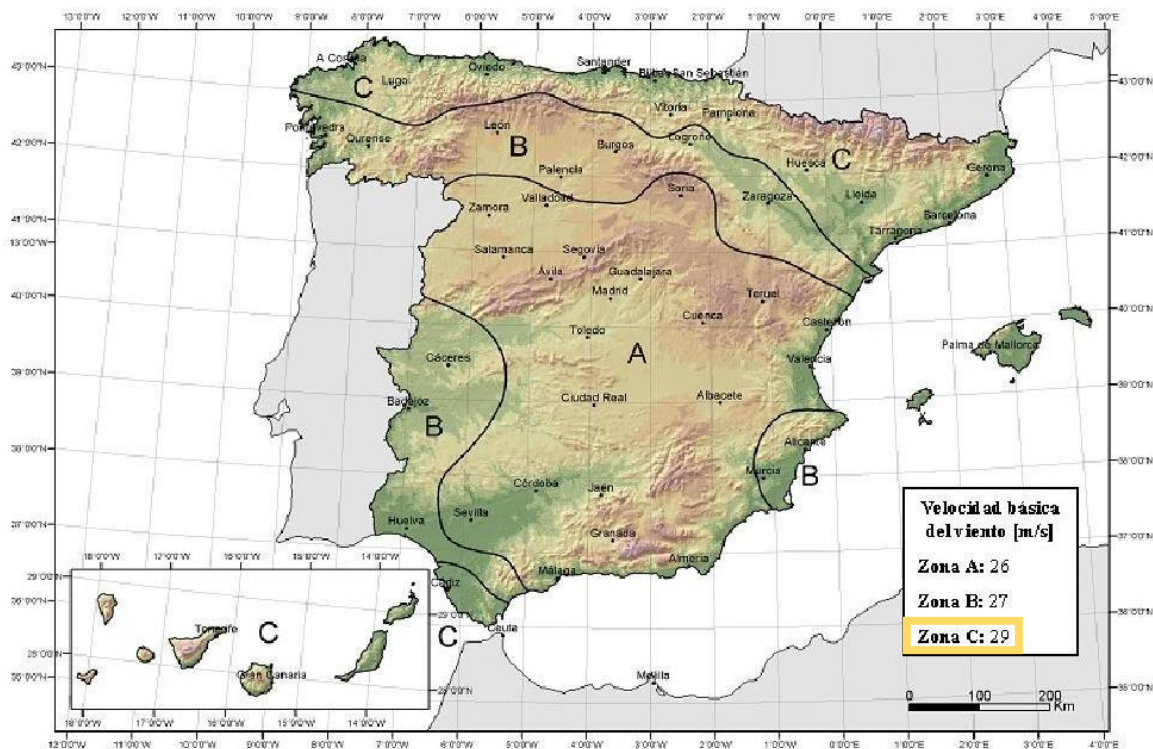


Figura D.1 Valor básico de la velocidad del viento,  $v_b$

Tabla 3.4. Valores del coeficiente de exposición  $c_e$

| Grado de aspereza del entorno  | Altura del punto considerado (m) |     |     |     |     |     |     |     |
|--|----------------------------------|-----|-----|-----|-----|-----|-----|-----|
|  | 3                                | 6   | 9   | 12  | 15  | 18  | 24  | 30  |
| I Borde del mar o de un lago, con una superficie de agua en la dirección del viento de al menos 5 km de longitud | 2,4                              | 2,7 | 3,0 | 3,1 | 3,3 | 3,4 | 3,5 | 3,7 |
| II Terreno rural llano sin obstáculos ni arbolado de importancia   | 2,1                              | 2,5 | 2,7 | 2,9 | 3,0 | 3,1 | 3,3 | 3,5 |
| III Zona rural accidentada o llana con algunos obstáculos aislados, como árboles o construcciones pequeñas       | 1,6                              | 2,0 | 2,3 | 2,5 | 2,6 | 2,7 | 2,9 | 3,1 |
| IV Zona urbana en general, industrial o forestal   | 1,3                              | 1,4 | 1,7 | 1,9 | 2,1 | 2,2 | 2,4 | 2,6 |
| V Centro de negocio de grandes ciudades, con profusión de edificios en altura                                    | 1,2                              | 1,2 | 1,2 | 1,4 | 1,5 | 1,6 | 1,9 | 2,0 |

Tabla 3.5. Coeficiente eólico en edificios de pisos

|                                      | Esbeltez en el plano paralelo al viento |      |      |      |      |        |
|--------------------------------------|---|------|------|------|------|--------|
|                                      | < 0,25                                  | 0,50 | 0,75 | 1,00 | 1,25 | ≥ 5,00 |
| Coeficiente eólico de presión, $c_p$ | 0,7                                     | 0,7  | 0,8  | 0,8  | 0,8  | 0,8    |
| Coeficiente eólico de succión, $c_s$ | -0,3                                    | -0,4 | -0,4 | -0,5 | -0,6 | -0,7   |