



**BUDAN**  
**h500**

ACOUSTIC PANELS

# Instructions for Contractors

2024

PW "BUD-MASZ" MACIEJ STACHLEWSKI,

ENSURES HIGH QUALITY OF ITS PRODUCTS – BUDAN ANTI-NOISE ACOUSTIC PANELS AND GUARANTEES THAT THE PANELS WILL MAINTAIN CONSTANT ACOUSTIC AND ANTI-CORROSION PARAMETERS WHEN PROPERLY INSTALLED AND WHEN APPROPRIATE TRANSPORT, STORAGE, USE AND MAINTENANCE PRINCIPLES ARE APPLIED.

**ALL WORK RELATED TO THE INSTALLATION AND MAINTENANCE OF BUDAN PANELS SHOULD BE CARRIED OUT BY PERSONS WITH APPROPRIATE QUALIFICATIONS TO PERFORM THE INDIVIDUAL WORKS AND KNOWLEDGE AND SKILLS IN THE FIELD OF INSTALLATION AND OPERATION OF ALUMINIUM PRODUCTS.**

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## BUDAN PANELS

Since 1998, Bud-Masz has been continuously producing noise-reducing aluminium acoustic panels, which serve as fillings for noise-proof screens and enclosures.



Drawing1

Assembled noise barrier span with BUDAN panels

BUDAN panels are characterized by:

- low construction costs,
- the highest acoustic parameters <sup>1</sup>,
- high aesthetics
- any color scheme to match the surroundings,
- anti-graffiti coating - high resistance to acts of vandalism,
- lifespan of at least 30 years,
- extended warranty up to 10 years
- constant monitoring of the quality and parameters of the panels,
- resistance to weather conditions and corrosion,
- fire resistance - non-flammable materials,
- environmental protection - all materials used in production are recyclable,
- lightweight and modular construction enabling quick assembly.

## GENERAL NOTES

<sup>1</sup>Compliant with the harmonized standard EN 14388 :2005; -EN 14388 :2005/AC:2008., classes A4, B3 - the highest sound absorption and insulation

The dimensions of the screens and their location in relation to noise sources and zones protected from noise should be specified in an individual acoustic design taking into account the properties of BUDAN panels. When selecting panels during the design process, attention should be paid to their acoustic properties <sup>2</sup>.

The screen made of panels, as a light structure, can be placed on foundation piles. Depending on the type of investment, it is recommended to make drilled foundations (e.g. CFA method) or drive in prefabricated foundations. Both the length and diameter of the pile should be selected for a specific implementation after taking into account the ground conditions, height and location of the screen construction.

When designing the foundation spacing, do not forget about the maximum panel length <sup>3</sup>.

The most common structure for mounting panels are load-bearing columns with an I-section. Depending on the foundation method, the column structure can be equipped with a mounting base <sup>4</sup> or can be poured directly into the foundation pile.

In order to maintain the acoustic properties of the assembled screen, the space between the panel and the ground should be filled.

ground beams are most often used . The shape of the beam should be selected to suit the dimensions of the panel and structure, and should also take into account the terrain.

An acoustic screen made of BUDAN panels can also contain other elements, individually designed by the designer. These include:

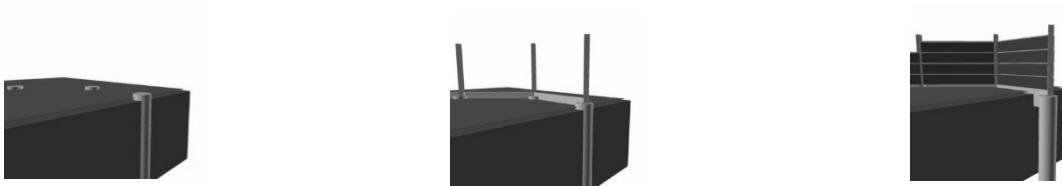
- additional finishing of the upper part of the screen with processing,

<sup>2</sup>The basic acoustic parameters are given by classes A (absorption) and B (insulation)

<sup>3</sup>For a typical panel  $L_{max} = 5000mm$

<sup>4</sup>Foot for screwing on anchors to the pile

- additional elements of the supporting structure column protecting the panels against theft,
- transparent modules <sup>5</sup>– can be combined with transparent screens,
- additional safety elements such as emergency exits, fire culverts,
- Without any additional elements, the screen can be covered with climbing plants as in the case of "green wall" screens <sup>6</sup>.



**Drawing 2**

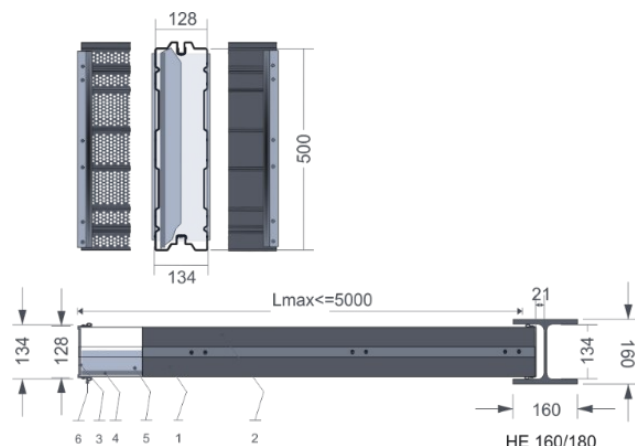
**Stages of building an acoustic shield**

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<sup>5</sup>Elements from other manufacturers must be compatible with BUDAN panels

<sup>6</sup>The common name for panels made of galvanized frames and steel bars filled with mineral wool.

## DIMENSIONS OF BUDAN PANELS



Drawing 2

### BUDAN h500 Standard Panel

BUDAN panels have standard dimensions:

- modular height 500mm (except for non-standard solutions)<sup>7</sup>,
- width 128mm + anti-vibration seals = from 134mm to 152mm<sup>8</sup>,
- any panel length from 500mm to 5000mm<sup>9</sup>,
- the length of the mounted panels should be less than the mounting clearance.<sup>10</sup>

Due to the cassette construction of the panels, the dimensional tolerance of the panel length is  $\pm 5$ mm.

## PACKING

BUDAN panels are packed on returnable wooden pallets. Basic parameters of pallets with BUDAN panels:

Parameter	Value	IU
	maximum	
Pallet height	2.40	[m]

<sup>7</sup>Does not apply to cut panels

<sup>8</sup>The type of gasket attached to the panel is adapted for installation on wide-foot I-beam posts: - HEB160/HEA160 (internal width 134mm) or on special order - HEB180/HEA180 and C160).

<sup>9</sup>Length 6000mm is possible for non-standard solutions

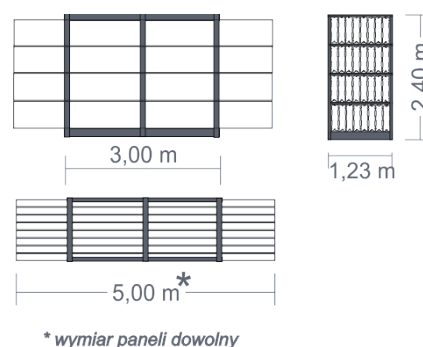
<sup>10</sup>For example, if the span length is 5000 mm (axial spacing of columns), a panel with a total length of  $4955 \pm 5$  mm should be installed.)

Pallet width	1.23	[m]
Pallet length	6.00	[m]
Pallet weight	2000	[kg]

Drawing 3

### Transport pallet parameters

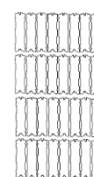
Each pallet can be wrapped in stretch foil upon customer request .



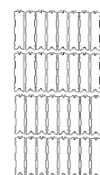
Drawing 4

### Dimensions of pallets with panels

Due to the different dimensions of the panels, the length of the pallet may vary. In the case of shorter panels, they are connected in rows on the pallet.



HEB160 -36 pcs



HEB180 -32 pcs

Drawing 5

### Number of panels on a pallet

The number of panels on a pallet may vary depending on the order and the length of the panels. The panels are arranged in 4 rows and 8 or 9 columns, depending on the

type of anti-vibration seal included with the panel, matched to the cross-section of the supporting structure column.

## TRANSPORT

Only the following vehicles may be used to transport BUDAN acoustic panels:

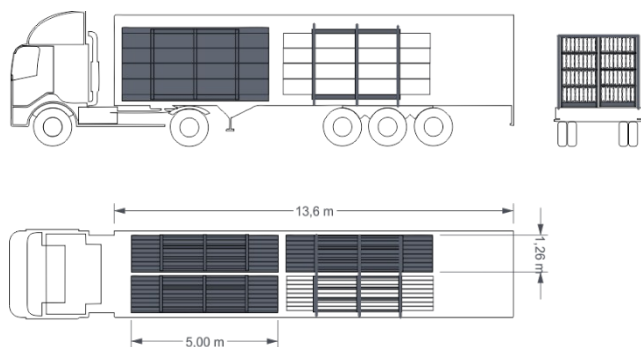
- technically efficient,
- covered,
- with a cargo box enabling loading from the top and side.

Loading areas must be clean. Wall and floor surfaces must be free of protruding nails and other sharp elements. Protruding elements must be suitably secured to avoid damaging the panels.

The length of the truck (loading box) must be such that the pallets rest along the entire length of the means of transport. It is not permitted to extend the pallet beyond the load-carrying box of the means of transport.

If after loading the total length of the tractor with semi-trailer and panel packages exceeds 16.5 m or the total length of the articulated vehicle (vehicle + trailer) with panel packages exceeds 18.5 m, the carrier must obtain a special transport permit.

Taking into account the condition of public roads, drivers transporting acoustic panels are obliged to periodically<sup>11</sup> check the effectiveness of the load (pallets) securing and, if necessary, improve the securing and securing of the load.



<sup>11</sup>The first 5 km, the next 100 km and each subsequent 100 km

## Drawing 6

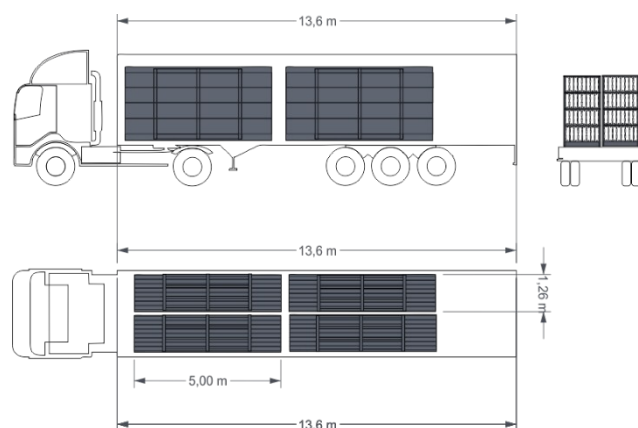
### Attaching transport belts

The recommended width of the loading area is 2500 mm, the required height of the loading area in covered vehicles is at least 2600 mm, and the maximum speed of transporting panels is 70 km/h.

The truck collecting the panels must be equipped with transport belts<sup>12</sup> to secure the load on the cargo bed. The number of belts depends on the length of the panels; the belt spacing is 3 belts per set of 2 pallets placed side by side, from 6 to 9 belts in total.

It is recommended that the vehicle transporting the load be equipped with 2 sets of flat slings with eyes, approximately 6 m long and with a lifting capacity of 30 kN for unloading.

Depending on the type and length of the panels, 4 or 6 standard pallets can be packed onto a truck with a 13.6 m long trailer. This corresponds to an amount from 280 m<sup>2</sup> to 400 m<sup>2</sup>.

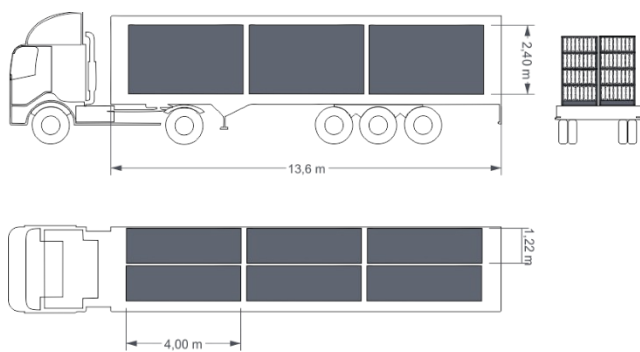


## Drawing 7

### Loading 5 m long panels

<sup>12</sup>Width of strips min. 50mm





**Drawing 8**

**Loading pallets with 4m long panels**

## UNLOADING

Before unloading the BUDAN panels, the technical condition of the packaging should be checked by external inspection.

Before unloading, the safety transport straps must be unfastened on the truck.

**UNLOADING OF ORIGINALLY PACKED PANELS FROM THE VEHICLE SHOULD BE DONE USING A FORKLIFT OR MANUALLY. UNLOADING USING A CRANE IS NOT ALLOWED, EXCEPT FOR PALLETS WITH A REINFORCED STRUCTURE. THESE PALLETS ARE SPECIALLY MARKED AND MADE TO ORDER .**

**IN CASE OF INSTALLATION OF PANELS AT A GREAT HEIGHT, PLEASE INFORM US IN ADVANCE (DURING THE ORDER) IN ORDER TO STRENGTHEN THE TRANSPORT PALLETS LIFTED BY A CRANE.**

During unloading, the buyer is obliged to carry out a qualitative and quantitative inspection of the products in terms of obvious defects, confirmed by an acceptance protocol or confirmation of the entry on the WZ document

<sup>13</sup>.

**IF PANELS WITH OBVIOUS DEFECTS ARE INSTALLED, THE PRODUCT IS NOT COVERED BY THE WARRANTY.**

The following are considered qualitative and quantitative defects:

dimensional discrepancies,  
color inconsistencies,  
any mechanical damage,  
scratches and cracks in paint coatings,  
Quantitative discrepancies in the assortment.

Depending on the length of the panels, pallets can be unloaded:

manually,  
forklift,  
using a crane <sup>14</sup>, a beam traverse and 4-line loop slings with flat slings and eyes, approximately 6 m long.

## **PALLETS MUST NOT BE STACKED DURING UNLOADING.**

Pallets should be unloaded in places not exposed to mechanical damage, away from chemical substances, on a flat and hardened surface.

After unloading, pallets and panels should not be immersed in water or in direct contact with other liquids or bulk substances, especially soil.

**IF YOU NOTICE DAMAGE TO THE GOODS BEFORE OR DURING UNLOADING, NOTE IT ON THE WAYBILL (WZ). IF POSSIBLE, TAKE PHOTO DOCUMENTATION.**

**DO NOT INSTALL DAMAGED PANELS!**

**BUD-MASZ IS NOT RESPONSIBLE FOR THE COST OF REPLACING INSTALLED, DAMAGED PANELS.**

## MANUAL UNLOADING

The weight of the panel varies depending on the type and length and ranges from 10kg/m to 15kg/m.

<sup>13</sup>Material release document from the warehouse

<sup>14</sup>With reservations regarding reinforced pallets



It is possible to manually lift and carry the panel by 2 people.



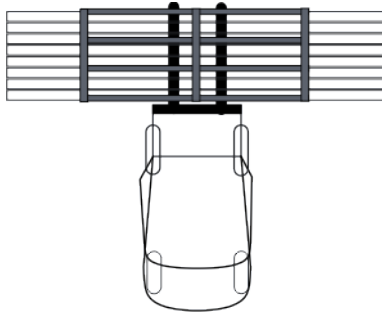
**Drawing 9**

Manual handling 2 people

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## UNLOADING WITH A FORKLIFT

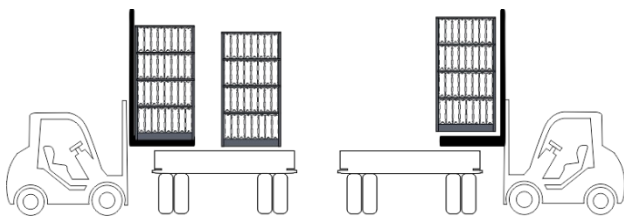
When unloading with a forklift, special attention should be paid to the lifting capacity parameters of the forklift.



**Drawing 10**

Pallet support area

The truck should be able to lift a pallet weighing 2.5 tonnes and the fork spacing should be adjusted to the pallet width of 1.23 m.

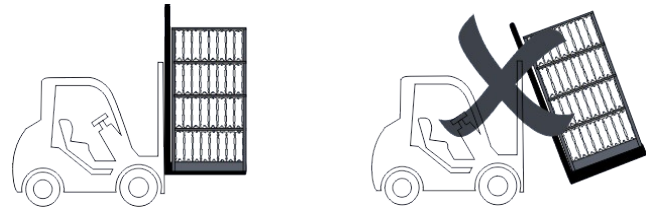


**Drawing 11**

Side unloading on both sides of the truck

**EACH TIME A PALLET IS REMOVED FROM A TRUCK USING A FORKLIFT, IT SHOULD BE PERFORMED BY A PERSON TRAINED AND AUTHORIZED TO OPERATE A FORKLIFT.**

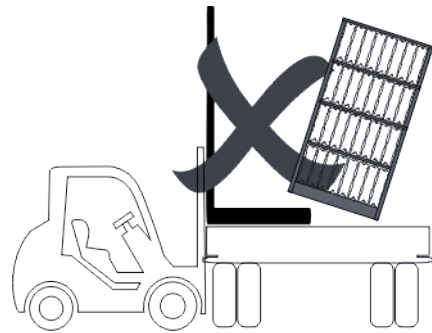
The pallet should be lifted centrally, the forks should be placed symmetrically between the central vertical board and the central base board of the pallet.



**Drawing 12**

Pallet placement and forklift transport

When unloading, the pallets should be pulled out one by one from each side of the truck or from above when lifting the pallets with a crane.



**Drawing 13**

Improper unloading, mismatched forks can damage the pallet

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## UNLOADING BY CRANE

**UNLOADING BY CRANE MAY ONLY BE PERFORMED ON PALLETS WITH A REINFORCED STRUCTURE .**

Pallets with a reinforced structure are specially marked and made to order.

**PALLETS MUST BE LIFTED ONE AT A TIME.**

Pallets should be lifted using a beam crossbeam and 2- or 4-line loop slings.

## REMOVING PANELS FROM PALLETS

After unloading the pallets from the truck, the side and top wooden elements of the pallet must be separated in order to remove the panels <sup>15</sup>.

All wooden elements, after dismantling, should be stored in a place not exposed to direct contact with dirt or water.

All wooden elements of shipping pallets are returnable.

Removing panels from pallets should be done manually.

## STORAGE AND INTERNAL TRANSPORT ON THE CONSTRUCTION SITE

Panels stored outdoors should be thoroughly cleaned of plastic transport protection ( stretch foil ).

Pallets and panels should be stored on even and hardened surfaces.

It is absolutely necessary to avoid placing pallets and panels directly in places:

- accumulation of water,
- with high dustiness,
- exposed to mechanical damage,
- exposed to strong chemical compounds,
- with a particularly aggressive alkaline environment
- with a particularly aggressive acidic environment,
- direct long-term contact with: salt, its solutions and derivatives,
- direct, long-term contact with smoke, tar, oil and its derivatives,
- direct long-term contact with animal excrements,
- direct, long-term contact with other chemical compounds that may permanently damage the paint coating or contribute to corrosion of aluminium.

Failure to follow storage rules may result in damage to the panel coatings over a longer period of time.

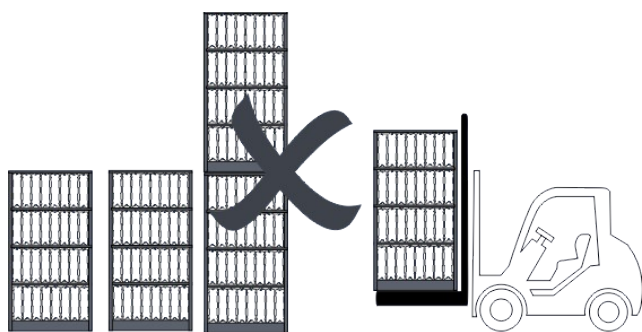
**IF THE PANELS ARE STORED AND INSTALLED LATER THAN 30 DAYS FROM THE DATE OF PRODUCTION, THE FOIL PROTECTING THE PANELS DURING TRANSPORT MUST BE REMOVED.**

**IT IS NOT PERMITTED TO STACK PALLETS WITH PANELS IN THE STORAGE AREA.**

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<sup>15</sup>in the case of screwed pallets, use a screwdriver with an appropriate tip,

in the case of pallets nailed together using a hammer



**Drawing 14**

**Pallets cannot be stacked**

Internal transport on the construction site should be carried out using a forklift - in the case of moving entire pallets or manually - in the case of moving single panels.

It is unacceptable to move or push stacked pallets without lifting them.

All wooden elements of the pallet are reusable and are a returnable item for which the manufacturer can charge a deposit.

## PREPARATION FOR ASSEMBLY

Before starting the installation of acoustic panels, the supporting structure should be checked for accuracy and compliance with the design <sup>16</sup>.

In particular, please pay attention to:

whether the spacing of the columns and their cross-section correspond to the design,



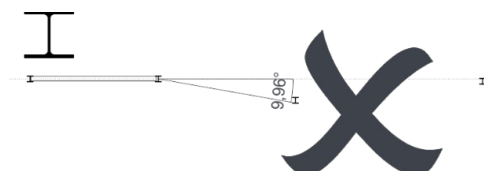
**Drawing 15**

**Screen linearity is correct**

whether the pole is placed correctly vertically, whether the linearity of the columns in the screen line is maintained,

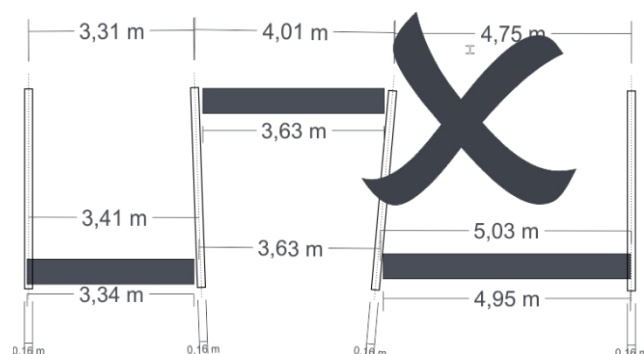
for the production and assembly of ground beams or other elements included in the project that may affect the assembly of the panels <sup>17</sup>.

**IN THE EVENT OF ERRORS OR INCONSISTENCIES, THE CONSTRUCTION MANAGER AND THE PANEL SUPPLIER OR THE MANUFACTURER MUST BE INFORMED .**



**Drawing 16**

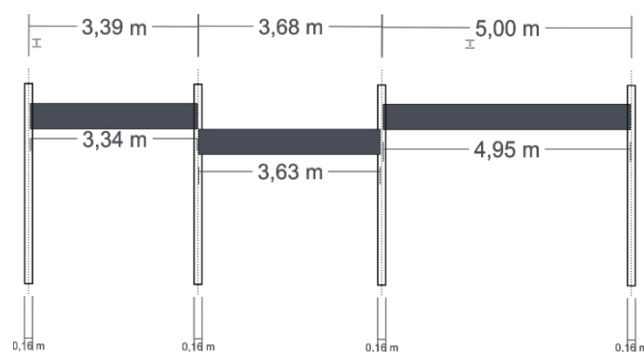
**Screen linearity is incorrect**



**Drawing 17**

**Incorrect vertical alignment of the structure**

Proper preparation of the structure will ensure trouble-free installation of panels prepared for a specific project.



**Drawing 18**

**Correct vertical alignment of the structure**

<sup>16</sup>Any differences must be removed before assembly.

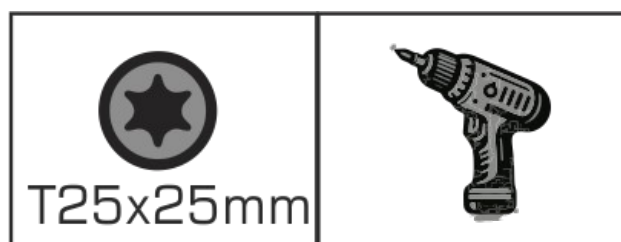
<sup>17</sup>If they were designed

**IT IS PROHIBITED TO PERFORM ANY WELDING OR PAINTING WORK NEAR THE PANELS, AS THIS MAY CAUSE PERMANENT DAMAGE TO THE PAINT COATINGS .**

## UNLOADING PANELS FROM A PALLET

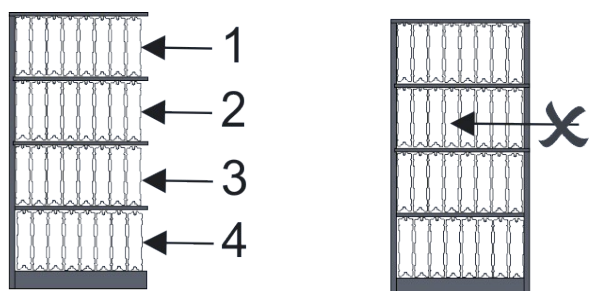
Acoustic panels should be transported and stored on the manufacturer's original pallets.

**T25 TORX bit** screws .



Drawing 19- TORX T25

You need to unscrew the screws from the boards on one side of the pallet, put the dismantled boards aside. Then you can manually pull the panels off the pallet by grabbing the panel closest to the dismantled boards on both sides, pulling the panels from the top.



Drawing 20- Unloading panels from the pallet

**It is forbidden to break pallets or tear out boards.**

**It is forbidden to slide the panels towards the side covers and seals. Slide the panels may damage the coatings.**

When removing the panels, be careful not to throw the panels and place them flat.



Drawing 21- arrangement of panels removed from the pallet

## PROTECTIVE FOIL

Acoustic panels can be protected from dirt and damage with a protective film. After a short time, due to the impact of atmospheric factors, the film can vulcanize, crack and it may be difficult to remove it.

The Buyer undertakes to remove the protective foil from the acoustic panel claddings within 60 days from the production date or delivery date given in the delivery note, but no later than before commencement of installation.

**IF A PANEL DEFECT IS REVEALED AFTER REMOVING THE FOIL , THE BUYER UNDERTAKES TO DISCONTINUE INSTALLATION OF FURTHER PANELS AND TO IMMEDIATELY REPORT THE DEFECTS TO THE SUPPLIER OR MANUFACTURER, I.E. NO LATER THAN BEFORE INSTALLATION OF FURTHER PANELS.**

**THE SUPPLIER AND THE MANUFACTURER SHALL NOT BE LIABLE FOR ANY DAMAGE SUFFERED BY THE BUYER AS A RESULT OF THE INSTALLATION OF DEFECTIVE GOODS, IN PARTICULAR FOR THE COSTS OF DISMANTLING AND REASSEMBLING ACOUSTIC PANELS.**

## INSTALLATION

**THE PANELS MUST BE INSTALLED IN ACCORDANCE WITH APPLICABLE INSTRUCTIONS, APPROVALS, POLISH STANDARDS AND CONSTRUCTION STANDARDS.**

The panels should be installed no later than 180 days from their production date.

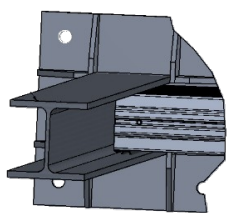
Before installation, it is necessary to remove the foil protecting the panels during transport. It is not allowed to install the panels with the protective foil. **THE FOIL IS A RECYCLABLE MATERIAL"**

WHEN INSTALLING THE PANELS, DO NOT USE TOOLS THAT MAY DAMAGE THE PAINT COATING.

IT IS STRICTLY FORBIDDEN TO:

HITTING THE PANELS,  
LOWERING PANELS FROM A HEIGHT IN THE  
PROFILE OF A STRUCTURAL COLUMN,  
CUTTING PANELS,  
DRILLING THROUGH PANELS,  
UNSCREWING THE PANELS,  
UNRIVETING OF PANELS,  
ANY OTHER MECHANICAL INTERFERENCE

DURING INSTALLATION, THE PANELS SHOULD BE CAREFULLY INSERTED BETWEEN THE SHELVES OF THE STRUCTURAL COLUMNS.

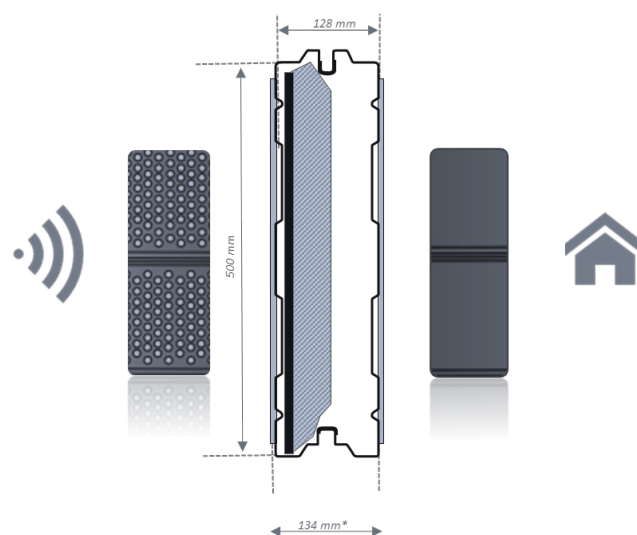


**Drawing 22**

Inserting panels into the pole

THE PANELS ARE MOUNTED HORIZONTALLY.

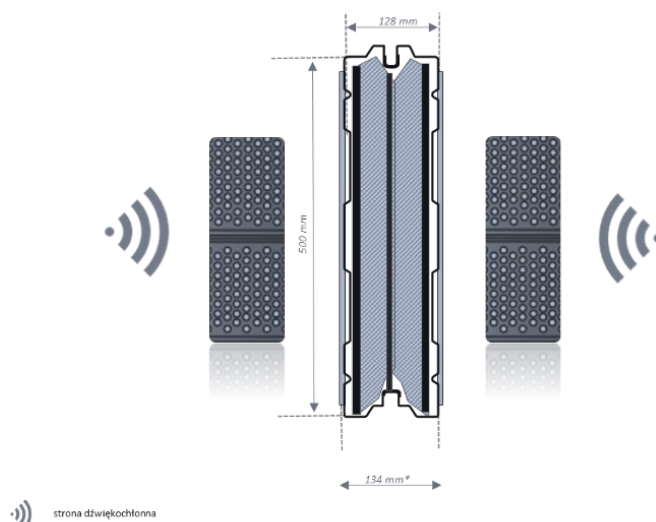
BUDAN acoustic panels are mounted with the perforated side away from the noise source.



**Drawing 23**

**BUDAN h500 Standard assembly**

BUDAN panels are equipped with their own stabilizing seals, thanks to which assembly is carried out only by inserting the cassette into a previously prepared structure. The low weight of elements assembled in a traditional way allows assembly without the use of a crane. Before starting assembly, the structure should be checked for accuracy and compliance with the design. In case of installation of spans above 20 m<sup>2</sup> using BUDAN panels, it is necessary to use transoms in the structure transferring vertical loads.



**Drawing 24**

**BUDAN h500 PA panel installation**

Panels should not be installed when the wind speed exceeds 10 m/s, or during precipitation and lightning or in dense fog. For dark-coloured panels, it is recommended to install them at temperatures between 10 °C and 25 °C.

The manufacturer is not liable for damage caused by the use of inappropriate installation and assembly materials, such as:

- silicones,
- glues,
- varnishes and solvents,
- other materials that may enter into a chemical reaction with product components.

The Manufacturer shall not be liable for any product defects resulting from their connection with other items that are not the Manufacturer's products or products that do not have the Manufacturer's recommendations or those mounted directly to the panels without the Manufacturer's consent, including in particular:

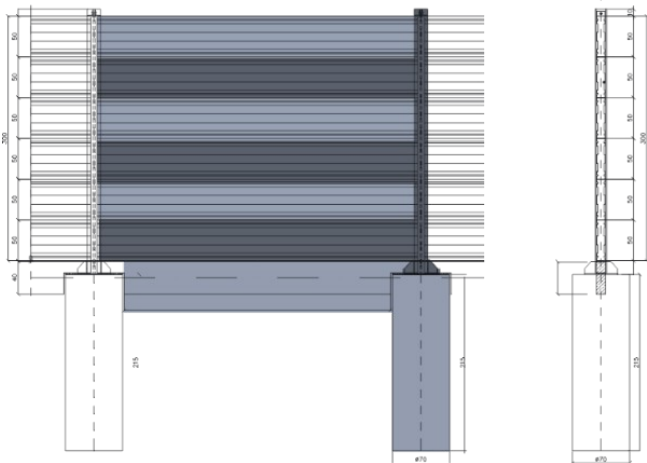
- all kinds of grates,
- tench,
- security elements,
- other elements not related to the product but attached to the panels.

BUDAN panels are normally installed in wide-foot columns by sliding them from above between the I-beam shelves.

**THERE IS NO NEED TO SCREW THE PANELS TO THE SUPPORTING STRUCTURE.**

It is permissible to use structures made of other profiles if they have been designed by a person with appropriate design qualifications.

**IT IS UNACCEPTABLE TO INSTALL PANELS IN STRUCTURAL COLUMNS THAT ARE NOT SUITED TO THE PANEL THICKNESS <sup>18</sup>.**



**Drawing 25**  
**Acoustic screen - general view**

The span of the noise-absorbing screen (housing) with BUDAN panels should consist of supporting structure pillars mounted on a foundation or attached to another structure.

The supporting structure columns are galvanized steel columns (optionally painted) with I or C profiles.

H	HEA160
	HEB160
	HEM160
	Standard gasket
	HEA180
	HEB180
	HEM180
C	C160
	C160E

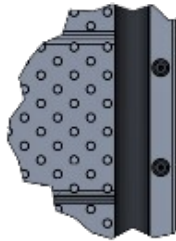
The selection of the structure should be made at the design stage.

Optionally, the panels can be placed on a prefabricated reinforced concrete ground beam .

<sup>18</sup> The panel with the included anti-vibration seal

The noise-proof screen or enclosure is filled with BUDAN acoustic panels.

BUDAN panels, depending on the type, have the ability to absorb sound on one or both sides and, depending on this, have 1 or 2 perforated facings (sides). The panels should always be placed with the perforated side <sup>19</sup>facing the noise source.



**Drawing 26**

#### Perforation holes

When installing acoustic panels up to <sup>20</sup>1.5m high in a supporting structure, the most practical method is manual assembly. The weight of the panel varies depending on the type and length, but should not exceed 15kg/m.

It is possible to manually move the panel by 2 people.

Inserting panels above 1.5m high requires the use of a crane, scaffolding or assembly platform. It is also possible to stack panels using a special gripper.

We insert each panel from the top of the supporting structure, maintaining a distance on each side from the column axis of  $22.5 \text{ mm} \pm 2.5 \text{ mm}$ .

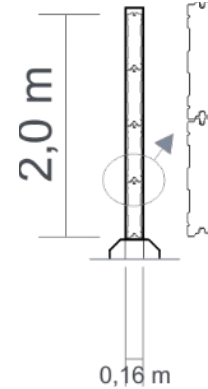
The panel is correctly mounted in the pole when it is placed centrally and the anti-vibration seal does not protrude beyond the lumen of the structure.

Each successively installed panel should be placed on the previous one, placing the double-wave-shaped groove profiled in the lower part of the panel on the tongue of the panel below.

<sup>19</sup>with holes

<sup>20</sup>3 modules of 500mm each stacked on top of each other

To ensure proper acoustic tightness of the connected panels forming the noise screen, check whether the tongue-and-groove locks fit together properly.

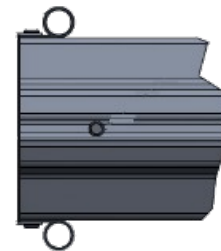


**Drawing 27**

#### Placing the panels in the column

For aesthetics, it is important to maintain the linearity of the horizontal joints.

The panel has seals attached to the side covers and adapted to the recommended mounting profile – C or H.



**Drawing 28**

#### Seals included with the panel

### THE PANELS ARE NOT SCREWED TO THE SUPPORTING STRUCTURE IN ANY WAY.

Panels that are installed incorrectly in the structure, not inserted centrally or whose lengths do not match the axial spacing of the posts may undergo thermal deformation. This is particularly true for panels in dark colours.

When exposed to direct sunlight, aluminum panels heat up.



In the case of darker colours, it is possible that due to the large temperature difference between the panel facings, thermal stresses may occur, affecting the operation of the panel embedded in the structure.

The effect of this stress may be a bulge in the panel surface . The bulge may be temporary (transient), i.e. appear only under certain conditions, e.g. very high sunlight.

All such effects do not adversely affect the acoustic parameters and load-bearing capacity of the panel, but they do deteriorate the aesthetics.

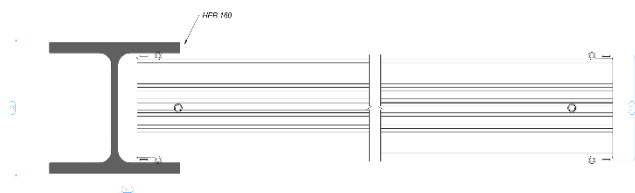
Due to the color, the temperature at which the panels will be installed should be taken into account. Installing panels in dark colors at low temperatures increases the heating effect of the panels in the summer.

It is therefore recommended that these panels be installed at temperatures above 10°C.

## DESIGN

BUDAN panels are equipped with their own stabilizing seals, so installation is done simply by inserting the cassette into a previously prepared structure.

The length of the mounted panels should be smaller than <sup>21</sup>the axial spacing of the posts by the mounting clearance.



Drawing29

Installation in HEB160

The type of gasket attached to the panels is matched to the column in which the panel will be mounted. The standard

<sup>21</sup> The installation clearance is 40mm-50mm from the axial spacing of the HEB /HEA columns; e.g. span length 5000mm (axial spacing of columns) a panel with a total length of 4960mm (4950mm) should be installed.

design is H160. Gaskets for other profiles should be specified at the ordering stage.



Drawing 30

Installation in HEB 180

**STRUCTURAL COLUMNS ARE NOT COMMERCIALY AVAILABLE.**

**BUD-MASZ IS NOT RESPONSIBLE FOR THE STEEL STRUCTURE .**

## WEATHER CONDITIONS

The correct installation of acoustic panels is significantly influenced by weather conditions: wind speed, precipitation and visibility.

Due to the relatively low weight of the panels with their large surface area, the wind speed during installation should not exceed 10 m/s. Panels should not be installed during precipitation <sup>22</sup>or lightning.

In case of dense fog or if visibility deteriorates due to dusk and there is no artificial lighting, the installation of panels should be stopped.

It is recommended to carry out assembly work at temperatures of 5°C to 20°C. At ambient temperatures below 4°C, the seals may harden, making it difficult to insert between the supports of the supporting structure.

Due to the possibility of dark surfaces heating up, <sup>23</sup>it is recommended to carry out installation at temperatures between 5 °C and 25 °C.

<sup>22</sup>Rain, hail or snow

<sup>23</sup>Especially for dark colored panels

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## HEALTH AND SAFETY

All work performed during the installation of acoustic panels must be carried out in accordance with generally applicable occupational health and safety regulations for installation work and under the supervision of authorized persons.

When installing acoustic panels at heights, safety devices in the form of ropes and assembly-type safety belts should be used.

Workers installing panels should be equipped with protective gloves because there is a risk of skin abrasion from aluminum elements.

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## PASSAGES IN PANELS

Cut-outs in anti-noise elements are made before the panels are installed. This weakens the cross-section and therefore the cut-out places should be suitably stiffened.

If you need to carry out the installation through an acoustic enclosure or make a technological opening, remember the basic rules:

- the dimensions of the hole diameter in one panel should not exceed 300mm,
- the hole should be located centrally in the vertical axis of the panel ,
- the hole should have a minimum distance of 100mm to all side edges,
- the hole should be finished with a reinforcing finish.

If it is necessary to make holes with large diameters, <sup>24</sup>the proposed solution is to use an additional steel structure in the size of the desired hole.

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## THE MANUFACTURER SHALL NOT BE LIABLE FOR PANELS MODIFIED OUTSIDE THE

**MANUFACTURER'S PRODUCTION FACILITY OR WITHOUT THE MANUFACTURER'S EXPRESS WRITTEN CONSENT.**

**ALL NON-STANDARD ELEMENTS THAT CAN BE PRODUCED SHOULD BE MADE BY THE MANUFACTURER .**

## MAINTENANCE, TECHNICAL CONDITION CHECKS AND OPERATION

BUDAN panels have been designed so that, in addition to fulfilling their basic function, protecting the natural environment from noise, they also meet aesthetic requirements .

**TO ENSURE THAT YOUR PANELS LAST AS LONG AS POSSIBLE, PLEASE FOLLOW THE RULES DESCRIBED BELOW.**

Aluminum panels should be subjected to annual inspection for technical condition.

In the event of minor damage to paintwork occurring during assembly or use, it must be repaired immediately.

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<sup>24</sup>Holes over 300mm

in case of minor paint defects below 10mm <sup>2</sup>	cleaning the surface of any bubbles under the paint coating and washing it with biodegradable, mild cleaning agents.
in case of larger paint defects exceeding 10mm <sup>2</sup> and not exceeding 7% of the total paint coating surface	cleaning the surface of any bubbles under the paint coat, washing with cleaning agents, making the necessary touch-ups using a primer and paint for aluminum recommended by the manufacturer

Damage to the coatings causes environmental contaminants to come into direct contact with the aluminum. In extreme cases, this can lead to the development of a pitting corrosion process. If a larger surface of the coating has been damaged, the panel should be cleaned of paint residues or a renovation painting should be carried out.

If, as a result of normal use, local changes in the paint coating occur, these areas should be protected.

In order to maintain the aesthetic appearance, it is recommended to wash and clean the panels every 12 months using mild and biodegradable detergents<sup>25</sup>.

### **ALKALINE CLEANING AGENTS SHOULD NOT BE USED. WASHING SHOULD BE DONE WITH SOFT BRUSHES, SPONGES OR WITH LOW PRESSURE.**

After each wash, it is necessary to thoroughly rinse the cleaning agent with clean water. The pressure of clean water used for rinsing must not exceed 5 MPa<sup>26</sup> at a distance of 30 cm to 40 cm from the panel. Rinsing should be done very carefully, starting from the top of the acoustic screen, so that all the cleaning agent is rinsed off.

<sup>25</sup>For example, a solution of water and liquid such as car shampoo.

pH values in the range 4–9.

<sup>26</sup>50bar

The water temperature should not exceed 30°C. An exception is rinsing with water to wash off grease, when the water temperature can be temporarily increased to 50°C. Grease can be removed with a soft cloth. Surfaces cleaned in this way must be immediately rinsed with clean water.

### **AVOID USING ORGANIC SOLVENTS OR ABRASIVE CLEANING AGENTS. DO NOT USE STEAM CLEANING OR RINSE WITH WATER AT AN AMBIENT TEMPERATURE BELOW 1°C.**

It is necessary to wash the panels after the winter season when:

Chemicals were used near the panels.  
there is persistent contamination that may damage the coatings through sandblasting, friction or vibration.

Washing should be performed when the air temperature is consistently above 10°C.<sup>27</sup>

It is recommended to use technical solutions that limit the possibility of adverse phenomena already at the design stage of the noise barrier, e.g.:

- continuous immersion of panels,
- exposure to chemical vapors and strongly alkaline or acidic liquids.

During the implementation of the individual construction stages, it is very important to follow the recommendations regarding transport, unloading, storage and installation of acoustic panels.

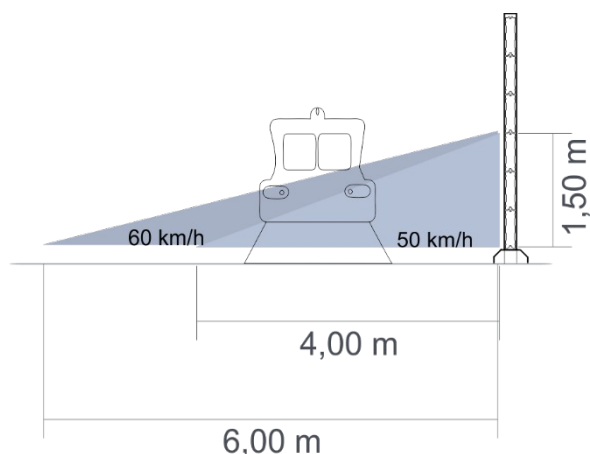
At the design stage, it is necessary to predict and design appropriate infrastructure elements depending on the installation location, e.g.:

- energy-absorbing barriers on roads,
- ground beams, etc.

<sup>27</sup>Most often the period of March–April.

## SNOW REMOVAL

When mechanically removing snow around acoustic panels, the speed parameters of the snowplow vehicle must be observed depending on the distance to the screen.



Drawing31

### Snow removal

The suggested ploughing speed for screens located 1m to 4m from the ploughing vehicle is 50km/h, for distances above 4m up to 60km/h.

## GRAFFITI REMOVAL

The panels may have an "anti-graffiti" coating, which is a specially selected varnish applied directly at the aluminum production stage.

Depending on the type of graffiti, its removal involves the use of appropriate cleaning methods, from wiping with a cloth <sup>28</sup> to using biodegradable graffiti removers.

anti-graffiti coatings, graffiti is removed using appropriate means adapted to the type of graffiti.

TYPE	Cleaner <sup>29</sup>
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<sup>28</sup>in case of simple contamination

<sup>29</sup>Legend:

A 90% alcohol (denatured alcohol)

Spray paint	A, C, D
Water-soluble marker	ABOUT
Permanent marker	A, B, C, D, E
Lipstick	ABOUT
Shoe polish	ABOUT

Graffiti can be removed using soft cloths, a paint polisher or using graffiti removal agents. Graffiti removal should occur within 30 days of the date of creation.

Before removing graffiti, the panel should be thoroughly cleaned using mild and biodegradable detergents.

In cases of drawings that are difficult to remove, it is recommended to use professional graffiti removers <sup>30</sup>.

Graffiti should be removed as soon as it appears. The graffiti removal process can be completed using clean water at a pressure of up to 5 MPa. The paint will return to its natural color after a few hours.

The optimal temperature of the environment and the surface being cleaned should be between 10° and 32°C.

**WHEN USING ANY WASHING, CLEANING OR GRAFFITI REMOVING AGENTS, IT IS ESSENTIAL TO FOLLOW THE INSTRUCTIONS FOR USE PROVIDED BY THE MANUFACTURER OF SUCH AGENTS.**

B	1:1 mixture of methylated spirits and detergent
C	Acetone
D	Trichloroethylene
E	Tetrachloroethane
About	Wiping with fabric

<sup>30</sup>For example AGS 5 SR – Anti Graffiti System, manufactured by Trion Tensid AB (Sweden)

When using any washing, cleaning or graffiti removal agents, the washed surface must be neutralized with water after use.

**WHEN USING ANY WASHING, CLEANING OR GRAFFITI REMOVAL AGENTS, IT IS ABSOLUTELY NECESSARY TO TEST THE GRAFFITI REMOVAL ON A SMALL AREA BEFORE STARTING WORK.**

#### VINES ON BUDAN PANELS

BUDAN panels should be planted with climbing plants that do not require additional supports, grids, ropes, scaffolding, etc.

As more than 20 years of observations have shown, BUDAN panel screens are very good supports for climbing plants.

Climbing plants efficiently grow over the panels, which is due to both the construction and the materials used.

The varied surface allows the plants to effectively cling to the support (screen) over the entire surface.

The perforated surface of the screen will be easily climbed by tendril-clinging vines <sup>31</sup>. Both surfaces, including the one without perforation, can successfully cover clinging <sup>32</sup> and root-clinging vines <sup>33</sup>.

Both the varnished aluminum stucco and the mineral wool protected against moisture with a glass veil are plant-friendly materials. The rebates and the adventitious roots stick to the panels without difficulty.

**FOR EACH PROJECT, PLANTS SHOULD BE SELECTED BY LOCAL HORTICULTURAL EXPERTS.**

The selection of plants should be developed individually for each screen with regard to use:

- size of growth,
- method of care (trimming, weeding, leaves, weight),
- possibility of ignition,
- danger of falling debris,
- the method and density of planting,
- type of substrate for plants (soil),
- way of hydration.

The choice of plants should be made taking into account the analysis of the costs of maintaining the planted screen.

The choice of plants must also be made depending on the location of the planting <sup>34</sup>.

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<sup>31</sup>For example, grapevines and Virginia creeper.

<sup>32</sup>For example, Virginia creepers

<sup>33</sup>For example, common ivy

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<sup>34</sup>Shade, partial shade, sun exposure

## NOTATKI

[illegible]

BUD-MASZ has been producing BUDAN aluminium acoustic panels since 1998. These panels are among the most commonly used noise-reducing elements used as fillings for noise-proof barriers and enclosures.

BUDAN panels are:

- the highest acoustic parameters,
- high aesthetics with high resistance to acts of vandalism,
- environmental protection as all materials used in production are recyclable,
- long-term use in difficult conditions.

Producent:

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