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Description

The present invention relates to a panel for the attachment of equipment, especially electrical equipment.

5 The distance between centres of holes provided for the attachment of equipment units such as meters, circuit-breakers, fuse boxes can vary from one design to another and is not known at the time of manufacture of the panel. Furthermore, the nature and arrangement of
10 equipment units is liable to change from one installation to another.

Document FR-A-2 358 079 describes a panel for the attachment of equipment and made of plastic material, one surface of which consists of a network of ribs
15 located at right angles to each other which define recesses having a square cross-section. Each recess can receive a fixing-screw, the threaded portion of which bites into the side wall of this recess.

This type of panel does not prove wholly
20 satisfactory. The pitch between two recesses is relatively substantial and if one recess cannot be employed, the point of attachment cannot be displaced by less than one pitch either in height or in width.

Taking into account the angle of slope of the
25 recess walls, which is intended to endow the recesses with their progressively decreasing cross-section, the

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screws have a tendency to engage obliquely, especially if it has not been possible to find a recess having an ideal location for carrying out the attachment.

It is also known from document DE-B-1 160 917
5 to construct a panel provided with holes disposed in three different directions.

In a structure of this type, it is not possible, however, to reduce the spacing between the holes without reducing the strength of the panel to an unacceptable
10 extent. It is therefore necessary to provide adjusting lugs which make the panel more costly and substantially complicate the installation of equipment devices on the panel.

The aim of the invention is to overcome these
15 disadvantages by providing an equipment panel which offers a greater degree of freedom for adjusting the points of attachment to the distance between centres of the mounting holes of the equipment units to be mounted.

In accordance with the invention, the equipment
20 mounting panel provided on its surface with a network of ribs defining between them recesses which are intended to receive fixing screws is characterized in that the ribs are directed in three different directions and define hexagons or triangles.

25 There are thus established three different directions of repetitive alignment of the recesses, which

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increases the possibilities of relative displacement from a given recess which is considered to be unsuitably located for constituting a point of attachment.

In an advantageous embodiment, the generator-
5 lines of the recess walls are substantially parallel to each other in a zone adjacent to the recess inlets.

This recess zone ensures guiding of the screws at right angles to the panel while the screws are being fitted on the panel.

10 Further particular features and advantages of the invention will also become apparent from the description given hereinafter.

In the accompanying drawings which are given by way of example and not in any limiting sense :

15 Figure 1 is a top view of the equipment mounting panel ; the left-hand portion of the figure relates to one embodiment of the panel with hexagonal recesses and the right-hand portion of the figure relates to another embodiment of the panel with triangular
20 recesses, only a certain number of these recesses being illustrated ;

Figure 2 is a top view of the hexagonal recesses, to a larger scale ;

Figure 3 is a top view of the triangular
25 recesses, to a larger scale ;

Figure 4 is a view of the recesses in cross-

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section along the plane IV-IV of Figure 2 ;

Figure 5 is a view of the recesses in cross-section along the plane V-V of Figure 3 ;

Figure 6 is a plan view of another embodiment
5 of the panel ; and

Figure 7 is a plan view of another embodiment of the panel.

In the example of construction shown in Figure 1, the rectangular panel 1 which is intended for mounting
10 electrical equipment such as meters, circuit-breakers or fuse boxes in a building is constructed of thermoplastic material. Each corner of the panel 1 is provided with a drilled hole 2 for attaching it to a partition face, for example to a wall.

15 That face of the panel 1 which is intended to be visible after attachment of the panel is provided with a network of ribs between which are defined recesses 3a, 3b. The rib network is surrounded by a border 4.

20 In accordance with the invention, the ribs are directed in three different directions X-X, Y-Y, Z-Z (Figures 2 and 3) separated in pairs by an angle of substantially 60°.

In the example shown on the left-hand side of
25 Figure 1 and in Figure 2, the recesses 3a have a cross-section in the shape of a regular hexagon. The diagonal

of a hexagon and a rib constituting one of the sides of two adjacent hexagons succeed each other alternately in each direction X-X, Y-Y or Z-Z.

As shown in Figure 4, in a zone 6 adjacent to the opening of the recesses 3a, the generator-lines of the walls of the recesses 3a are parallel to each other. The zone 6 thus constitutes a prism having a hexagonal cross-section. The cross-section of the zone 7 which is adjacent to the zone 6 progressively decreases from the zone 6 to the bottom wall 8 of the recesses 3a.

The recesses 3a are capable of receiving screws 9 having a diameter comprised between M and D (Figure 2), where M is the length of a median of the hexagonal opening of the recesses, and D is the length of a diagonal of this opening. In practice, in the case of recesses 3a designed for screws having a mean diameter equal to 8 mm, for example, screws having a diameter within the range of 7 to 9 mm are permissible.

If a recess having a centre C1 (Figure 2) is slightly too low to ensure correct attachment of an equipment unit to be mounted on the panel, there is a possibility of choosing the recess having a centre C2 which corresponds to a pitch or relative displacement P of the point of attachment at right angles to the direction Z-Z which is equal to $\frac{M + e}{2}$, where e is the thickness of the ribs which separate the recesses 3a.

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Moreover, if the recess having a centre C1 is located too far to the right, the adoption of a recess having a centre C2 corresponds to a pitch parallel to the direction Z-Z which is equal to

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$$Q = (M + e) \frac{\sqrt{3}}{2} .$$

Generally speaking, the pitch values P and Q are smaller than in the case of a square having the same median in which the pitch values vary from

$$(M + e) \frac{\sqrt{2}}{2} \text{ to } M + e$$

10 depending on the orientation of the network.

Furthermore, in the case of one and the same length of median, a hexagonal-recess network comprises a greater number of recesses per unit of surface area than a square-recess network and therefore
15 offers a better choice of points of attachment.

When the suitable recess 3a has been chosen, the screw 9 (Figure 4) is engaged therein. The zone 6 of the recess 3a maintains the screw 9 in perpendicular relation to the network just before and during screwing
20 of the screw 9 in the zone 7 of the recess 3a.

In the example shown on the right-hand side of Figure 1 and in Figures 3 and 5, the cross-section of the recesses 3b is triangular. These recesses 3b are defined by three series of ribs which are parallel to
25 each other in each series, these series being directed along X-X, Y-Y and Z-Z respectively. One rib of each



series passes through each point of intersection, which defines a vertex for six equilateral triangles.

As shown in Figure 5, the recesses 3b are provided in the same manner as the recesses 3a with a
5 prismatic zone 6 adjacent to the opening, and a zone 7 which decreases in width to the bottom wall 8 of the recess 3b. However, the zones 6 and 7 are separated by a shouldered portion 11 which reduces the width of the zone 7 with respect to the zone 6.

10 The triangular recesses 3b are particularly advantageous since they make it possible to employ screws 9 ranging in diameter from a given value to double the value, that is, from the diameter of the inscribed circle L to the diameter of the escribed circle N.

15 For example, in the case of a mean diameter of 12 mm, screws having a diameter within the range of 8 to 16 mm are permissible.

In the example illustrated, the pitch or relative displacement at right angles to the direction
20 Z-Z is alternately equal to

$$R = \frac{H + e}{3} \text{ and to } S = \frac{2}{3} (H + e),$$

where H is the height of the triangles and e is the thickness of the ribs.

The relative displacement in a direction
25 parallel to the direction Z-Z is

$$T = \frac{\sqrt{3}}{3} (H + e).$$

The hexagonal recesses 3a or triangular recesses 3b consequently offer varied possibilities in both cases for the choice of points of attachment of equipment units. Furthermore, the rigidity of the networks formed by these recesses 3a or 3b is greater than that of square networks, which makes it possible to reduce the weight of plastic material employed.

Generally speaking, hexagonal recesses which provide six faces for engagement of the screw-thread are preferred when good resistance to wrenching is required. On the contrary, preference is given to triangular recesses if the diameters of the screws employed is very variable.

The manufacture of recessed panels calls for a mould which meets a high quality standard and is very costly. Furthermore, even if the distances between centres of equipment units to be mounted are not known with accuracy, it has been found within the scope of the invention that the majority of equipment to be mounted had points of attachment in the same zone.

The panel illustrated in Figure 6 is intended to make profitable use of this finding for the purpose of reducing the cost of production of panels.

This panel comprises a support 12 made of wood, metal, or thermosetting material, a fixing hole 2 being provided at each corner of the support for attaching it

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to the wall of a building, for example.

On this panel are mounted two small rectangular plates 13, 14, the surface of each plate being provided with a network of ribs defining recesses 3a or 3b (not shown).

The upper plate 13 which is disposed vertically is intended to provide a single upper point of attachment of an electricity meter whereas the lower small plate 14 is arranged horizontally and intended to provide two lower points of attachment of the meter.

Preferably, the small plate 13 has a certain degree of freedom of translational motion in the direction F1 with respect to the support 12 and the small plate 14 has a certain degree of freedom of translational motion in the direction F2 at right angles to F1. By virtue of these degrees of freedom of translational motion, points of attachment having the precise distance between centres defined by the equipment unit to be mounted can be found more readily on the small plates 13, 14.

The alternative embodiment shown in Figure 7 also meets this need to seek the optimum distance between centres for the points of attachment.

In this alternative form, the network is subdivided into two adjacent half-networks 16, 17 each represented schematically by a series of lines parallel to

one of the three directions X-X, Y-Y, Z-Z. The two half-networks are relatively displaced through an angle A which is equal to approximately 10° in the example shown.

5 Thus the position of the equipment unit to be mounted can be adjusted along the direction F3 which is parallel to the boundary line between the two half-networks 16, 17 in order to find points of attachment 18, 19 which are separated by the suitable distance E
10 between centres.

As can readily be understood, the invention is not limited to the examples described and many arrangements may be made in these examples without departing from the scope of the invention.

15 Thus it follows that the cross-section of the recesses can vary, as is also the case with the number of directions of the ribs which can be greater than three.

20 The profile of the recesses is not limited to those of Figures 4 and 5. In fact, the profile of Figure 4 is applicable to recesses of triangular cross-section and, conversely, the profile of Figure 5 is applicable to recesses of hexagonal cross-section.

25 The values mentioned in regard to the pitches P, Q, R, S, T are given by way of indication since different pitches could be measured in directions which are oriented



differently with respect to any one of the directions X-X, Y-Y or Z-Z.

In the panel of Figure 6, the small plate 13 can have two half-networks such as 16, 17 of Figure 7.

5 Furthermore, the small plate 13 and/or the small plate 14 can have freedom of movement in all directions with respect to the support 12. To this end, they need only be provided on the opposite side of the network with a lug passed through a widened opening of the support, the
10 end of the lug being associated with a retaining member which is applied against the support 12 around this opening.

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C L A I M S

1. Mounting panel for equipment, provided on its surface with a network of ribs defining between them recesses (3a, 3b) which are intended to receive fixing
5 screws (9), characterized in that the ribs extend in three different directions (XX, YY, ZZ) and define hexagons or triangles.
2. Mounting panel in accordance with claim 1, characterized in that the three different directions (XX,
10 YY, ZZ) of the ribs are separated in pairs by an angle of substantially 60°.
3. Mounting panel in accordance with claim 2, characterized in that the recesses (3a) all have substantially the cross-section of a regular hexagon.
- 15 4. Mounting panel in accordance with claim 2, characterized in that the recesses (3b) all have substantially the cross-section of an equilateral triangle.
5. Mounting panel in accordance with any one of claims 1 to 4, characterized in that, in a zone (6)
20 adjacent to the inlets of the recesses (3a, 3b), the generator-lines of the walls of the recesses (3a, 3b) are substantially parallel to each other.
6. Mounting panel in accordance with claim 5, characterized in that the recesses (3a, 3b) progressively
25 decrease in size from the zone (6) having substantially parallel generator-lines to their bottom portion (8).



* C L M S *

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7. Mounting panel in accordance with claim 5,
characterized in that the recesses (3b) are reduced in size
near their bottom portion by a shouldered portion (11)
which is adjacent to the inner edge of the zone having
5 substantially parallel generator-lines (6).

8. Mounting panel in accordance with any one of
claims 1 to 7, characterized in that it comprises a
support (12) and small plates (13, 14) having a network of
ribs and mounted on the support at the presumed locations
10 of the screws for fixing the equipment.

9. Mounting panel in accordance with claim 8,
characterized in that the small plates (13, 14) have a
certain freedom of displacement against the support (12).

10. Mounting panel in accordance with any one of
15 claims 1 to 9, characterized in that the panel has two
half-networks (16, 17) which are angularly displaced to a
slight extent with respect to each other.



* C L M S *