

Wallflex: aluminum structural panel

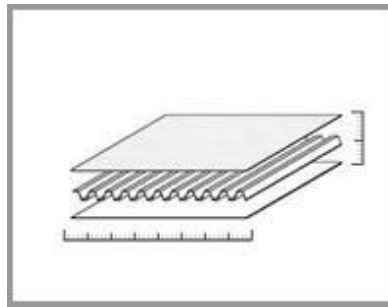
Technical Manual

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1 GENERAL CHARACTERISTICS

Wallflex is an aluminum, structural, international patented panel, composed by two external sheets, called layers, joined together by a metallic corrugated trapezoidal designed part, called core (see Fig. 1.1). The characteristic element of Wallflex panel family is the corrugated metal core, fabricated by a cold forming system. By gluing the corrugated core with a flat layer, we obtain monolayer Wallflex panel, a flexible part used for shaped element production.



1.1 Wallflex scheme

The realization of Wallflex panel takes place by gluing the corrugated core (see Fig. 1.2) between the two flat layers, in order to obtain an extremely rigid structural panel, with high mechanical properties and a considerable weight reduction.



1.2 Corrugated core

The main characteristic of Wallflex structural panel, which makes it unique in its structure, is represented by the particular deep-drawing on the oblique part of the corrugated core, making this panel more resistant and strong, therefore usable in various fields, including naval, railway and civil. In fact, at the same weight and thickness, the Wallflex panel resists better to compression, torsion and bending stresses, compared to other panels on the market.

Properties and advantages of Wallflex panel:

- Material: aluminum (possibility of having stainless steel and galvanized panels)
- High mechanical strength, determined by the trapezoidal geometry of the corrugated core, that allows to have a large area for gluing and by the particular deep drawing
- Lightness
- Flatness also on large dimensions
- Non-combustible MED certified
- 100% recyclable, with no previous separation of components
- Large availability of thicknesses and sizes
- Easy to work with common machine tools
- Possibility to realize shaped panels
- Availability of wide range of finishes

THICKNESS

The nominal standard thicknesses available are: 3 - 4 - 6 - 8 - 10 - 15 - 18 - 20 - 25 - 28 mm

On request, it is possible to make panels with different non standard thicknesses.

The real thickness of the panel is different from the nominal thickness and it depends on the layer thickness and on the finish used. For further information, see tables in Appendix A.

DIMENSIONS

Standard Wallflex dimensions:

- Natural Treated Raw Aluminum:
Width: 1020 – 1250 – 1500 mm
Length: from 2000 up to a 4000 mm
On request, panels with non standard sizes can be realized (length up to 5500 mm)
- Natural Anodized Aluminum:
Width: 1000 – 1250 – 1500 mm
Length: from 2000 up to a 4000 mm
On request, panels with non standard sizes can be realized .
Anodized panel is supplied with protective film.
- Prepainted Aluminum:
Width: 1000 – 1250 – 1500 mm
Length: from 2000 up to a 4000 mm
On request, panels with non standard sizes can be realized .
Prepainted panel is supplied with protective film.

Colours: RAL and NCS tables.

AMOUNT

The production of Wallflex does not require minimum quantities.

CODES FOR WALLFLEX® PANEL TYPES

Wallflex® is coded by:

- First letter: "W" - identifies the Wallflex panel
- Nominal thickness in double digits in mm
- Finish of the external layer in letter
- Finish of the inside layer in letter
- Thickness of external layer in 2 digits in tenths of a mm
- Thickness of inside layer in 2 digits in tenths of a mm
- Internal core thickness in 1 digit in tenths of a mm
- Internal core orientation in letter
- Width in cm
- Length in cm

Finishes:

G: Natural Treated Raw

A: Anodized

P: Prepainted

L: Laminate glued on corrugated core

M: Mirror aluminum glued on corrugated core

Z: Galvanized sheet

X: Stainless steel

Core orientation:

C: core parallel to the width (short side)

L: jointed core parallel to the length
(long side)

Example:

W10GG09063C125300:

Wallflex nominal thickness 10 mm, external layer in raw aluminum, inside layer in raw aluminum, external layer nominal thickness 0.9 mm, inside layer nominal thickness 0.6 mm, corrugated core sheet nominal thickness 0.3 mm, core parallel to the short side, width 1250 mm, length 3000 mm.

TECHNICAL MANUAL FOR WALLFLEX PANEL MANUFACTURING

2 CUTTING

2.1 Cutting by saw

Wallflex panel can be squared by circular saw (see Fig. 2.1), band saw, or by jigsaws; it is recommended the use of Widia tools with trapezoidal teeth in negative orientation.



2.1 Circular saw blade: n. 80 teeth, 250 mm diameter, 32 mm hole diameter, n. 8000 rpm max

Repetitive or complex machining operations can be performed by machining centres. It is recommended to use mechanical fixture on circular machines and clamping systems with pneumatic vacuum system which, while preserving the panel by vibration, allows net and clean cuts.

“V” shaped grooves can be realized using circular saw with “V” 90° teeth (for example using Widia circular saw with 48 teeth, 250 mm diameter, 92° - 94° tooth angle).

It is recommended a well made clamping system and an implant that works on the top of the panel, in order to achieve a defined depth of cutting. In alternative, results of good precision can be obtained with a machine provided with touch probe.

In order to obtain 90° junctions, it is possible by gluing 45° squared elements or by using a machine for “folding” cutting.

It is possible to perform adjustments on worksite by using standard manual tools (for example small circular saws, shown in Fig. 2.2).



2.2 Circular saw for manual cutting

2.2 Cutting by shears, moulding

Wallflex panel can be cut by conventional hammer shears and by moulding, can be notched or punched with mechanical or hydraulic systems. In these cases, the edge of the panel will be compressed on one side (see Fig. 2.3).



2.3 Panel with a compressed side

2.3 Milling

Wallflex panel can be easily worked with both manual and automated tools. Wallflex panel’s processing is very similar to the wood’s one and special expedients are not required (such as lubrication and or cooling). There are two main type of machining, for which are requested different types of drills and hand tools:

- Inside core milling: usually performed to insert a “T” profile; milling can be realized by manual cutter with 50 mm diameter blade (see Fig. 2.4) or by automatic milling machine (toupie type o work centre)
- Edge beveling or chamfering: performed by vertical and frontal manual milling or by work automatic centre



2.4 Manual milling machine

Every manual tool needed to realize the indicated operations is available on the market and does not have particular specific to work Wallflex panel.

3 SHAPING

3.1 Angle

Wallflex panel differs from simple metal sheets or other similar products for its excellent structural characteristics, which allow a large number of project solutions. Techniques to obtain angular elements is simple, since:

- A reinforcement structure is not necessary
- Edge angle radius, obtained by folding or bonding two elements cut at 45°, is very small (0 up to 1 mm)
- Assembly work is easy and restrained

Angular element realization can be made in three main ways:

1. By folding
2. By assembling individual elements
3. By bending (for reduced thickness panels only)

1. Folding:

- Panel custom cutting
- “V” counterbore with incision: the incision must reach the inside layer, leaving 0.2 mm of material; is better to use 90° - 92° “V” teeth blade
- Taping of the non incised part
- Glue insertion inside the groove
- Folding of the two sides to obtain the angular element
- Fixing in clamping or by taping (possibly with brackets placed inside)

2. Individual elements assembly

- Panel custom cutting in order to obtain individual elements with 3 or 4 sides cut at 45°
- Single elements composition on a worktop
- Taping
- Glue insertion inside the groove
- Folding of the two sides to obtain the angular element
- Fixing in clamping or by taping (possibly with brackets placed inside)

3. Bending

- Panel custom cutting
- Bending by hydraulic bending machine

Every processing can be performed by standard tools used for wood processing, such as saws, shapers, machining centres, ... (suitably equipped with Widia tools).

3.2 Shaping

Wallflex is a panel that allows the realization of shaped (curved) elements, in three main ways, thanks to its internal structure:

- Realization of a monolayer panel, made by one layer and the corrugation core: it is flexible and shapeable
- Calendering of Wallflex panel (made by both layers and the corrugated core). This method is suitable for 4 and 6 mm thickness only. By using 2 and 4 roll calenders, it is possible to shape the panel along the longitudinal direction of the corrugated core. Limitations: reduced thickness and large curve radius (larger than 2000 mm)
- Shaping by template, in order to obtain shaped panels with curve radius larger than 100 mm. A monolayer panel is put on a curved template, then the external layer is glued on the curved monolayer panel and the entire panel is stick on the template. At the end of the gluing process, a shaped Wallflex panel is obtained, rigid, self-supporting and with curve radius equal to the template's one

3.3 Drilling

Wallflex panel can be drilled by drills available on the market, both manual and with pillar, or by mills. For particular drilling processing, a work centre it is suggested. In case of non-through holes, for the insertion of threaded inserts, it is recommended to work with a depth limiter, in order to avoid inside layer damages.

4 FIXING

4.1 Fixing by rivets

Wallflex panels can be fixed one to another or one to other materials by using rivets or threaded inserts available on the market. Rivets or threaded inserts can act on both layers (they will be visible on both sides) or on one layer only.

4.2 Fixing by screws

Wallflex panel allows the use of common self-tapping screws. It is important to consider the following aspects:

- Self-tapping screws: no limitations
- Nuts and bolts: it is suggested to use sufficiently large washers to have a larger surface area
- It is recommended to use accessories in a material compatible with aluminium, in order to reduce contact corrosion processes

4.3 Junction by gluing

The use of adhesive to fix is the best choice, by esthetical and planning point of view (absence of screw and accessories). In addition, adhesives have a sealant action against liquids, distribute load forces and are relatively light. It is recommended to have planar, clean and with clean cuts surfaces in order to performing gluing. There are two types of glue:

- Surface glue: are used two-components polyurethane glues, that must be mixed according to a correct ratio between the glue and the catalyst. The glue must be spread uniformly using a roller, a spatula or a rake. To speed up the gluing process, it is possible to use a heating press
- Contact glue: generally more viscous. Are used mono-component polyurethane glues, which catalyze with moisture or temperature. They are used mainly for gluing decorative elements or accessories, for joining two Wallflex panels (to realize an angle, for example), for edging and for sealing.

An adequate glue choice depends on the material to pair to the panel, on the desired esthetical level and on the element to realize. Besides the standard adhesives on the market, approved low flame propagation and non-toxicity of the fumes compounds are available for the naval sector.

5 EDGING

5.1 Profiles

Wallflex edging types:

- Anodized aluminum extruded with “T” section: custom cutting of the panel, thickness milling by circular blade 50 mm diameter and 2.5 mm thickness, blowing to remove the chip; insertion of the glue and cutting of the profile. Depending on the glue type, the drying is from 5 up to 120 minutes
- Plastic or silicone rubber extruded with “T” section: custom cutting of the panel, thickness milling by circular blade 50 mm diameter and 2.5 mm thickness, blowing to remove the chip; insertion of the glue and cutting of the profile. Depending on the glue type, the drying is from 5 up to 120 minutes
- Anodized aluminium tapes: custom cutting of the panel, that goes through an edge bander in-line machine. At the end of this process, the edge is trimmed
- PVC tapes
- External layer folding: custom cutting of the panel in a larger dimension (1 panel dimension + thickness *2 + 1 mm in order to obtain both sides edging), then the panel passes through a toupie machine in order to remove part of the corrugation core and of the external layer. Then the inside layer is engraved by a “V” teeth blade. After the glue is spread, the edges are folded in 90° to close the thickness. Finally, after drying glue time is elapsed, the edge are trimmed
- Solid wood or solid PVC: custom cutting of the panel in a larger dimension (+ 1 mm), then the panel passes through a toupie machine in order to remove part of the corrugation core and blown to remove the chip. After the glue is spread, the solid edge is inserted. Finally, after drying glue time is elapsed, the edge are trimmed of 0.5 mm for side

5.2 Sealing

On request, the internal core channels of Wallflex panel can be sealed. Sealing can be performed through the use of plastic caps or other material on request. They represent an economical solution in which the sealing is more functional than aesthetic.

6 SURFACE FINISH

6.1 Cleaning

Wallflex panel is fabricated using surface treated aluminium in order to allow subsequent gluing or painting. Even if the degreasing is not recommended, if you want to carry it out, it is suggested the use of detergent soaked cloth and not to immerse the panel in acid or solvent tanks.

For the finite element normal cleaning, especially for the anodized aluminum elements, it is suggested the use of neutral pH light detergents.

All Wallflex products are produced with materials that have a protective film.

6.2 Coatings

Wallflex panel can be plated with different materials, among which there are:

- HPL and CPL plastic laminates
- Wood compounds laminates
- Wood laminates
- Wood veneer
- Synthetic and natural leather
- Wallpaper
- Tissues
- Tiles and stone
- Marbles and granites
- Glass
- Fibreglass
- *Solid surface*

It is possible to plate or coat later the finished panel.

In coating the panel with non metallic material, it has to be considered that:

- Press temperature must be adjusted according to coating material characteristics. It is suggested not to exceed 90°C in order to avoid alteration processes in the glue used for Wallflex panel fabrication

- Aluminum Wallflex® panel and coating material could have two different thermal expansion coefficients

To plate with plastic laminates, a good elastic adhesive must be used, in order to compensate any expansion; it must be used in minimum quantity and must be distributed uniformly.

6.3 Painting

Generally every painting techniques that do not exceed 90°C are suitable (included powder painting technique).

Wallflex can be realized with prepainted layer, both liquid and powder; it can also be plastered with common products on the market.

7 LEGAL NOTES

The content of this Technical Manual is purely indicative and not binding on the part of 5W S.r.l. ; it may be amended without notice. We recommend in any case a contact with our technical office, that can propose you viable solutions to your requests.

7.1 Patents

Wallflex panel is an exclusive patent of the company 5W S.r.l. deposited with practice and with international coverage.

Wallflex is a registered trademark.

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APPENDIX A

TABLES FOT WALLFLEX PANEL THICKNESS

THICKNESS 4 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
4	0,6	0,3	0,3	3,30	3,64
4	0,8	0,3	0,3	3,50	4,18
4	1	0,3	0,3	3,70	4,72
4	0,6	0,3	0,6	3,60	4,45
4	0,8	0,3	0,6	3,80	4,99
4	1	0,3	0,6	4,00	5,53
4	0,8	0,3	0,8	4,00	5,53
4	1	0,3	0,8	4,20	6,07
4	1	0,3	1	4,40	6,61

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 6 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
6	0,6	0,3	0,3	5,30	3,82
6	0,8	0,3	0,3	5,50	4,36
6	1	0,3	0,3	5,70	4,90
6	0,6	0,3	0,6	5,60	4,63
6	0,8	0,3	0,6	5,80	5,71
6	1	0,3	0,6	6,00	5,71
6	0,8	0,3	0,8	6,00	5,71
6	1	0,3	0,8	6,20	6,25
6	1	0,3	1	6,40	6,79

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 8 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
8	0,6	0,3	0,3	7,30	3,88
8	0,8	0,3	0,3	7,50	4,42
8	1	0,3	0,3	7,70	4,96
8	0,6	0,3	0,6	7,60	4,69
8	0,8	0,3	0,6	7,80	5,23
8	1	0,3	0,6	8,00	5,77
8	0,8	0,3	0,8	8,00	5,77
8	1	0,3	0,8	8,20	6,31
8	1	0,3	1	8,40	6,85

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 10 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
10	0,6	0,3	0,3	9,30	4,02
10	0,8	0,3	0,3	9,50	4,56
10	1	0,3	0,3	9,70	5,10
10	0,6	0,3	0,6	9,60	4,83
10	0,8	0,3	0,6	9,80	5,37
10	1	0,3	0,6	10,00	5,91
10	0,8	0,3	0,8	10,00	5,91
10	1	0,3	0,8	10,20	6,45
10	1	0,3	1	10,40	6,99

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 15 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
15	0,6	0,3	0,3	14,30	4,09
15	0,8	0,3	0,3	14,50	4,63
15	1	0,3	0,3	14,70	5,17
15	0,6	0,3	0,6	14,60	4,90
15	0,8	0,3	0,6	14,80	5,44
15	1	0,3	0,6	15,00	5,98
15	0,8	0,3	0,8	15,00	5,98
15	1	0,3	0,8	15,20	6,52
15	1	0,3	1	15,40	7,06

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 18 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
18	0,6	0,3	0,3	17,30	4,32
18	0,8	0,3	0,3	17,50	4,86
18	1	0,3	0,3	17,70	5,40
18	0,6	0,3	0,6	17,60	5,13
18	0,8	0,3	0,6	17,80	5,67
18	1	0,3	0,6	18,00	6,21
18	0,8	0,3	0,8	18,00	6,21
18	1	0,3	0,8	18,20	6,75
18	1	0,3	1	18,40	7,29

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 20 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
20	0,6	0,3	0,3	19,3	4,6
20	0,8	0,3	0,3	19,5	5,14
20	1	0,3	0,3	19,7	5,68
20	0,6	0,3	0,6	19,6	5,41
20	0,8	0,3	0,6	19,8	5,95
20	1	0,3	0,6	20	6,49
20	0,8	0,3	0,8	20	6,49
20	1	0,3	0,8	20,2	7,03
20	1	0,3	1	20,4	7,57

Other typologies available on request. Tolerance: ± 0.25 mm

THICKNESS 25 mm

Panel nominal thickness (mm)	Internal layer thickness (mm)	Corrugated core thickness (mm)	External layer thickness (mm)	Panel real thickness (mm)	Panel weight (Kg/mq)
25	0,6	0,3	0,3	24,3	4,86
25	0,8	0,3	0,3	24,5	5,4
25	1	0,3	0,3	24,7	5,94
25	0,6	0,3	0,6	24,6	5,67
25	0,8	0,3	0,6	24,8	6,21
25	1	0,3	0,6	25	6,75
25	0,8	0,3	0,8	25	6,75
25	1	0,3	0,8	25,2	7,29
25	1	0,3	1	25,4	7,83

Other typologies available on request. Tolerance: ± 0.25 mm

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