

ANNEXE A- Rules on movement, handling and storage of ribbed sheets, insulated metal panels and accessories

1. WRAPPING AND PACKAGING

Paragraph 9.10.1 of Standard UNI 10372:2013 is quoted in its entirety.

To maintain their durability in use, metal components for roofs must not be damaged during storage, transport, movement and laying operations. It is therefore advisable to provide temporary protection systems for the products relating to the performance required, especially of an aesthetic nature. During fabrication processes the above materials are generally protected with polythene film (adhesive or simply in contact), or with other solutions. During subsequent stages precautions must be taken to ensure that the following aspects are guaranteed:

- protection of the surface from abrasion, especially during movement;
- protection of corners and edges against knocks and crushing;
- protection against water or condensed moisture collecting;
- protection of the components which bear the weight of the entire pack, or of superimposed packs, against permanent deformation.

The profiled sheets and panels are generally packaged in packs. The number of sheets in the pack is such as to contain the overall weight of the pack itself within the limits imposed by the available means of lifting and transport.

Generally the materials used for packaging are: timber, expanded plastic materials, cardboard, polythene film (heat-shrink or stretchable) or others; binding is done with bands (never with iron wire) and suitable protection is used (edge protectors etc.). The bands must not be used as slings for lifting.

The packs of products must therefore always be provided with a support system which is such as to distribute the weight homogeneously and to make it possible to pick up the pack for movement.

By way of example and without limiting effect, the support system may be constituted by joists made of expanded plastic material or dry timber, or alternatively by sheets of composite materials, located at suitable spacing for the characteristics of the product.

The packaging must be appropriately specified at the ordering stage, depending on the modalities of transport (for example cage or crate for transportation which involves transshipment, or transport by train or by sea). A suitable type of packaging will need to be provided depending on the performance which is required of the product.

The making-up of the packages will be performed according to parameters preset by the manufacturer. Any different division of components and/or particular packaging, in relation to specific requirements of the Purchaser, must be agreed at the time of placing the order.

2. TRANSPORT

Paragraph 9.10.2 of Standard UNI 10372:2013 is quoted in its entirety.

The packs must be transported with suitable means in such a way that:

- the packs are supported on spacers made of timber or expanded plastic material, located at spacing appropriate to the characteristics of the product;
- the supporting surface is compatible with the shape of the pack (flat if the pack is flat, or if the pack is curved, a support must be created which maintains the same curvature);
- when stacking packs, suitable spacers made of timber or expanded plastic material are always interposed, if not present in the packaging;
- the packs do not overhang by more than 1 metre;
- the points are clearly marked on the packs where slings may be placed for lifting, if these are not otherwise identifiable;
- any other instructions from the manufacturer are observed.

In particular, the packs must be positioned on the flat, and underneath the packs themselves, spacers of timber or expanded plastic material must be placed, of suitable dimensions and in adequate numbers, positioned in perfect vertical alignment.

The packs must be secured by the carrier to the transport vehicle by transverse ties, with straps placed at a maximum spacing of 3 m, and each pack must in any event be provided with no fewer than two transverse ties.

When travelling, the load must always be covered, and above all the side facing in the direction of travel must be made impermeable. Purchasers arranging collection must instruct the drivers on the subject.

The load must be carried on a vehicle bed which is clean and free of obstructions. Vehicles already partly occupied by other materials or with an unsuitable bed are not acceptable for the load.

The goods must be positioned on the vehicles in accordance with the instructions of the carrier, who alone is responsible for the integrity of the load. The carrier must take particular care that the weight bearing on the lowest pack, and also the pressure exercised by the tie-points, do not cause damage, and that the straps do not in any way cause deformation of the product. Special loading conditions can be accepted only on the written proposal of the Purchaser, who assumes complete responsibility for them.

3. STORAGE

Paragraph 9.10.3 of Standard UNI 10372:2013 is quoted in its entirety .

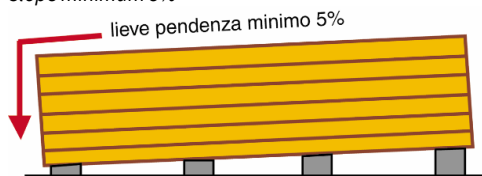
The shape of the components has been designed to allow them to be stored by stacking them so as to reduce to a minimum the space occupied in storage and transport; care must however be taken when stacking them so that no damage occurs to the surfaces.

The packs must always be kept raised off the ground, both in the warehouse and, even more so, on site. They must have supports preferably of timber or expanded plastic material with flat surfaces, with a length greater than the width of the sheets and at suitable spacing for the characteristics of the product. The supporting surface must be compatible with the shape of the packs (flat if the pack is flat, or if the pack is curved, a support must be created which maintains the same curvature).

The packs must be stored in places which are not damp, otherwise condensation will collect on the less well-ventilated internal components. This condensation is particularly aggressive towards metals, and cause the formation of oxidisation products (for example white rust on zinc).

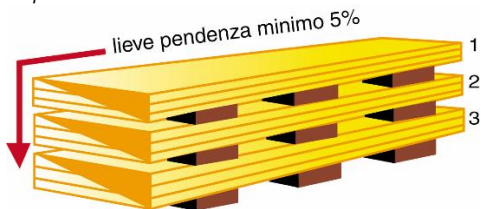
The packs must be stored in such a way as to encourage water to drain, especially if it is necessary to store them temporarily in the open air (see illustration).

Slope minimum 5%



If storage is not followed shortly by picking the sheets up for laying, it is as well to cover the packs with protective tarpaulins. Attention must be paid to any electrochemical corrosion caused by contact between different metals, including during the period of storage. Generally it is preferable not to stack the packs; if it is considered possible to stack them because of their light weight, spacers of timber or expanded plastic material, with as large a supporting surface as possible, must always be interposed, in suitable numbers and always located in line with the supports of the packs below (see illustration).

Slope minimum 5%



The best storage conditions are in closed areas, with light ventilation, free from damp and dust.

In any event, and in particular for storage on site, a suitable, stable support surface must be provided, which will not allow water to collect.

The packs must not be positioned in areas close to manufacturing processes, for example metal cutting, sanding, painting, welding etc., nor in areas where the crossing or parking of operating vehicles could cause damage (collisions, splashing, exhaust gases etc.).

A maximum of three packs may be stacked, with an overall height of approximately 2.6 metres, and in this case the supports must be suitably thickened.

In the event that the materials are covered with protective film, this film must be completely removed at the fitting stage, and at all events not later than 15 (fifteen) days from the date of the "notice of goods ready for delivery" (in the absence of such notice, the delivery date is valid) provided that the packages are stored in a shady, covered, ventilated place protected from any kind of bad weather. Any further specific instructions from the supplier must be followed.

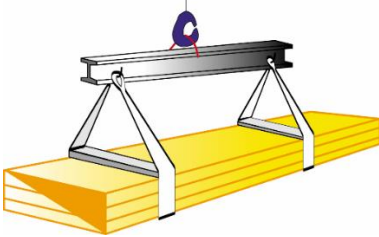
On the basis of knowledge acquired, in order to maintain the product's original performance, it is advisable, subject to compliance with these rules, not to exceed six months of continuous storage in a closed and ventilated environment, while the period of storage in the open air must never exceed two weeks. The materials must anyway always be protected from direct solar radiation, because this can produce alterations.

In the case of protection by tarpaulins, it is necessary to ensure that they are waterproof, and that there is adequate ventilation to avoid condensation collecting and pockets of water forming.

4. LIFTING AND HANDLING

Paragraph 9.9.4 of Standard UNI 10372:2013 is quoted in its entirety.

The packs must always be lifted by slings positioned at a minimum of two points, separated by a distance not less than half the length of the packs themselves. Lifting must preferably be carried out using slings woven from synthetic fibre (nylon), of a width not less than 10 cm so that the load on the sling is distributed and does not cause deformation (see illustration).



Suitable spacers must be used consisting of robust lengths of flat timber or plastic located above and below the pack, in order to prevent direct contact between the slings and the pack.

These spacers must have a length at least 4 cm greater than the width of the pack, and a width not less than that of the sling. In any event, the lower spacers must have a width sufficient to prevent the weight of the pack from causing permanent deformation to the lower sheets.

Care must be taken to ensure that the slings and the supports cannot move during lifting, and that the manoeuvres are performed gradually and with caution. When the packs are offloaded onto the roof structure, they must be placed only on surfaces which are suitable for supporting them, both in terms of strength and of support conditions, and also in relation to other work which is in progress. It is advisable always to ask the works manager for authorisation for offloading the packs.

Suitable protective equipment must be used (gloves, safety shoes, overalls etc.) when handling the sheets, in compliance with the applicable regulations.

When an individual sheet needs to be moved, this must always be done without dragging it over the one below. It should be rotated to a vertical position beside the pack and then carried by two or more people depending on its length, keeping it vertical (see illustration).



Gloves and lifting equipment must be clean and of a kind that will not cause damage to the sheets.

The use of fork-lift trucks for moving the sheets is not recommended, as this is likely to cause damage.

Packs offloaded at roof height must be suitably secured to the structure.

Annex B - Quality standards for ribbed sheets and insulated metal panels

Ribbed sheets and insulated metal panels are used for walls, roofs and floors in civil and industrial buildings. The quality standards quoted in the present Annex must be the subject of prior agreement between Purchaser and Vendor at the time of confirming the order. The aesthetic factor lies outside the intrinsic characteristics of the products and does not constitute a normal supply requirement. The harmonised European product standards, valid for obtaining CE Marking, are UNI EN 14782:2006 and UNI EN 14783:2013 for ribbed sheets, UNI EN 14509:2013 for double-skinned insulated metal panels (with two metal sheets), and ETAG 016 for single-skin insulated metal panels.

Materials	Standard	Reference	Value - notes
1. RIBBED SHEETS			
1.1 Characteristics			
1.1.1 Carbon steel	UNI EN 14782:2006		
	UNI EN 14783:2013		
	UNI EN 508-1:2014	3.2 e 4.2	
	UNI EN 10346:2015		S250GD DM (min. yield stress = 250 N/mm ²)
	UNI EN 10346:2015		Non-structural steels
	UNI 10372:2013		
1.1.2 Aluminium	UNI EN 14782:2006		
	UNI EN 14783:2013		
	UNI EN 508-2:2008	3.2 e 4.2	"Alloys: Vendor's declaration
(min. breaking load = 150 MPa) "			
	UNI 10372:2013		
	UNI EN 573-3:2019	3.	
	UNI EN 1396:2015	5.	
1.1.3 Stainless steel	UNI EN 14782:2006		
	UNI EN 14783:2013		
	UNI EN 508-3:2008	3.2 e 4.2	Type 1.3401 (AISI304)
	UNI 10372:013		
	UNI EN 10088-1:2014	4.	
	UNI EN 10088-2:2014	6.	Correction in: EC 1-2008 UNI EN 10088-2:2005
1.1.4 Copper	UNI EN 14782:2006		
	UNI EN 14783:2013		
	UNI EN 506:2008	3.2 e 3.4	Type: Vendor's declaration (except by specific request of the Purchaser, accepted by the Vendor)
	UNI 10372:2013		
	UNI EN 1172:2012	04/05/2009	
	UNI EN 1173:2008	3	
	UNI EN 1412:2017	4	Correction in: EC 1-2013 UNI EN 1412:1998
1.1.5 Metal facings	UNI EN 508-1:2014	3.2 e 3.4	

	UNI EN 10346:2015		
	UNI 10372:2013		Including different facings
1.1.6 Organic facings (preainted and plasticised)	UNI EN 10169-1:2012		
	UNI EN 508-1:2014	Annexe B	UNI EN 508-2-3:2008
	UNI 10372: :2013		
	UNI EN 1396:2015	6	
1.1.7 Multi -layer bituminous facings	UNI EN 14782:2006	Annexe A	
	UNI EN 14783:2013	Annexe A	
	UNI EN 508-1:2014	3.2.6	
1.2 DIMENSION TOLERANCE			
1.2.1 Carbon steel	UNI EN 10143:2006		Normal tolerances unless requested otherwise
	UNI EN 508-1:2014	Appendice D	
1.2.2 Aluminium	UNI EN 485-4:1996	3.1	
	UNI EN 508-2:2008	Appendice B	
1.2.3 Stainless steel	UNI EN 10088-2:2014	6.9 - Annexe B	
	UNI EN 508-3:2008	Appendice B	
1.2.4 Copper	UNI EN 1172:2012	6.4	
	UNI EN 506:2008	Appendice A	
	UNI EN 1172:2012		
1.3 REQUIREMENTS			
1.3.1 Performance	UNI EN 14782:2006		
	UNI EN 14783: :2013		
	D.M. 09.01.1996	Parte II	
	D.M. 14.09.2005	11.2.4.8.1.1	
	Regolamento (UE) n. 305/2011	Capo II Artt.4-5-6-7-Annexe III	Values declared by the Vendor for the purposes of CE Marking
1.3.2 Test methods (metallic coated tapes)	UNI EN 13523-0:2014		Values declared by the Vendor
1.3.3 Durability	UNI EN 10169-1:2012		
	UNI EN 1396:2015		
1.3.4 FIRE PERFORMANCES	UNI EN 14782.2006	Annexe C	
	UNI EN 14783:2013	Annexe B	
1.3.5 Calculation procedures (concentrated loads)	UNI EN 14782:2006	Annexe B	
1.3.6 Inspection and maintenance	UNI 10372:2013		
	AIPPEG general conditions of sale	Annexe D	

2. INSULATED METAL PANELS (DOUBLE SKINNED)			
2.1 Characteristics			
2.1.1 Rigid metal facings	The same references apply as in para. 1.1 above (excluding the specific prescriptions of UNI EN 14782:2006 and UNI EN 14783:2013)		
2.1.2 Insulants			
2.1.2.1 Rigid cellular plastics	UNI EN 13165:2016		PUR e PIR
	UNI EN 13164:2015		Polistirene
	UNI EN 13172:2012		Valutazione e conformità
2.1.2.2 Mineral fibre	UNI EN 13162:2015		
2.2 DIMENSIONAL TOLERANCES			
2.2.1 Rigid metal facings	The same regulations, references, values and notes apply as in para. 1.2 above		
2.2.2 Panel	UNI EN 14509:2013	Annexe D	
2.2.3 Blisters	" Blisters are defined as convex areas with a lack of adhesion between insulation and facing. In the absence of regulations, it is considered on the basis of experience that any blisters up to 5% of the area of the individual panel and with maximum dimensions per blister of 0.2 m2 are to be presumed not to prejudice the functionality of the panel. The above is to be considered valid even for panels where the insulation has the function of transmitting loads.."		
2.3 REQUIREMENTS			
2.3.1 Performance	UNI EN 14509:2013		
	UNI 10372:2013		
	Regolamento (UE) n. 305/2011	Capo II Artt. 4-5-6-7-Annexe III	Declaration of performance and CE Mark
2.3.2 Test methods	UNI EN 14509:2007	Annexe A	
2.3.3 Durability	UNI EN 14509:2013	Annexe B	
2.3.4 FIRE PERFORMANCES	UNI EN 14509:2013	Annexe C	
2.3.5 Calculation procedures	UNI EN 14509:2013	Annexe E	
2.3.6 Inspection and maintenance	UNI 10372:2013		
	AIPPEG general conditions of sale	Annexe D	
3. INSULATED METAL PANELS (SINGLE SKINNED)			
3.1 Characteristics			
3.1.1 Rigid metal facings	The same references apply as in para. 1.1 above (excluding the specific prescriptions of UNI EN 14782:2006 and UNI EN 14783:2013)		
3.1.2 Insulants			
3.1.2.1 Rigid cellular plastics	UNI EN 13165:2016		PUR e PIR
	UNI EN 13164:2015		Polistirene
	UNI EN 13172:2012		Valutazione e conformità
3.2 DIMENSION TOLERANCE			
3.2.1 Rigid metal facings	The same regulations, references, values and notes apply as in para. 1.2 above		
3.2.2 Panel	ETAG 016	Parte 1 e 2	Values declared by the Vendor
3.2.3 Blisters	Riferimento Punto 2.2.3		

3.3 REQUIREMENTS			
3.3.1 Performance	UNI 10372:2013		
	Regolamento (UE) n. 305/2011	Capo II Artt. 4-5-6-7-Annexe III	Values declared by the Vendor for the purposes of CE Marking
3.3.2 Other requirements	ETAG 016	Parte 1 e 2	Values declared by the Vendor
3.3.3 Inspection and maintenance	UNI 10372:2013		
	Condizioni generali di vendita AIPEGG	Annexe D	

ANNEXE C- Recommendations for fitting ribbed sheets and insulated metal panels

1. INTRODUCTION

These recommendations are intended to provide a reference informational support for fitting ribbed sheets and insulated metal panels. They are however supplementary to Standard UNI 10372:2013 “Discontinuous roofing. Code of practice for design and execution with metal sheets”.

Each job must take account of the needs of the specific site, which must be provided with suitable equipment for movement and laying, in accordance with the applicable legislation on safety and accident prevention.

The firm charged with the job of fitting the ribbed sheets/panels, besides knowing the characteristics of the materials used, must employ sufficient skilled manpower for the work on site, ensuring that the work is correctly performed in compliance with the plan specifications. Failure to observe these recommendations and incorrect execution of the operations on site exonerate the Vendor from all responsibility. Efficient organisation and a coordinated method of working provide the best conditions for overall working productivity.

2. CONSTRUCTION COMPONENTS

Unless otherwise expressly agreed upon in writing with the Seller, the items in question do not contribute in any way to the global or partial stability of the building structure; therefore, they are not suitable to bear vertical-horizontal loads or permanent static loads (excluding their own weight). In fact, they rest on an existing load-bearing structure, which must have been properly calculated and deemed suitable by the Purchaser for the positioning and installation of the items themselves, which only perform the function of covering/coating and/or improving the energy level of the building.

The same estimate evaluation shall be carried out at the charge and care of the Buyer to verify that the panels with polyurethane foam insulation are not used in constructions involving serviceability temperatures continuously being either too high or too low which can cause alteration of the main components of the panels themselves.

Ribbed sheets/panels are used in civil and industrial buildings for the construction of roofs, walls and floors; they are fitted to every kind of supporting structure: metal frameworks, normal reinforced and prestressed concrete, and timber.

The supporting structures and the relative fixing devices as well as the ribbed sheets/panels themselves, must be suitably dimensioned and must satisfy the intended design conditions in respect of safety, stability and functionality. Ribbed sheets and insulated metal panels are quick and easy to install, with the possibility of covering in one stretch the entire length of the slope of a roof, or the entire height of a wall or several spans of the floor. The length of the metal components is conditioned predominantly by transport and handling needs, as well as by the nature of the material used and the production technology.

The supporting surfaces should be compatible with the use and the fixing modalities of the ribbed sheets and insulated metal panels.

The most common types are:

1. ROOFS

- 1.1 ribbed sheets
 - 1.1.1 plain ribbed sheets
 - 1.1.2 sandwich construction executed on site
 - 1.1.3 deck executed on site
- 1.2 monolithic insulated panels
 - 1.2.1 prefabricated monolithic sandwich
 - 1.2.2 pre-insulated deck

2. WALLS

- 2.1 ribbed sheets
 - 2.1.1 plain ribbed sheets
 - 2.1.2 sandwich construction executed on site
- 2.2 monolithic insulated panels
 - 2.2.1 prefabricated monolithic sandwich

3. FLOORS

- 3.1 plain sheets
- 3.2 sheets with collaborating concrete
- 3.3 ribbed sheets with disposable formwork

The fitting sequence for roofs, walls and floors is different depending on the type involved.

3. PRELIMINARY OPERATIONS

Before undertaking the work of fitting on site, the installer must:

1. view the printouts of the plans and study the relative instructions
2. check the alignment of the supporting structures for the ribbed sheets/panels
3. check that the surfaces of the supporting structures which will be in contact with the ribbed sheets/panels, are compatible with each other or otherwise protected from possible corrosion by electrochemical action
4. make sure that there is no interference with aerial electrical lines in the manoeuvring area for the ribbed sheets/panels
5. make certain that the work at ground level and at a height is compatible with the other work on site
6. check the suitability of the area of the site chosen for the offloading and handling of materials, so that they do not suffer damage.

The installer must carry out all fitting operations in accordance and compliance with all applicable safety regulations. In addition, for lifting, handling and offloading the ribbed sheets/panels at height, see Paragraph 4 of Annexe A.

Personnel engaged in fitting must be equipped with footwear with soles that will not damage the external facing. For cutting operations on site, suitable equipment must be used (jigsaw, shears, nibbler etc.). The use of equipment with abrasive discs is not recommended.

For fixing operations it is advisable to use a power screwdriver with torque limiter.

For roofing work in particular, the alignment and overlap of adjoining panels must be perfectly carried out to avoid the formation of condensation.

4. ROOFS

SLOPES

The slope of the roof depends on the environmental conditions, the design solution chosen and the type of roof itself.

For roofs with pitch without intermediate end-to-end joints (i.e. with sheets of a length equal to the length of the roof), the slope to be adopted is usually not less than 7%. For lower slopes the supplier's instructions must be followed.

In cases where there is an end-to-end overlap, the slope must take account of the type of joint and the material used, besides the specific environmental conditions.

For deck roofs, the slope may be reduced to the minimum which will allow the water to drain off properly.

FITTING SEQUENCES

These are the essential points for a correct fitting sequence.

A) Plain ribbed sheets and prefabricated monolithic sandwich (types 1.1.1 and 1.2.1)

1. Fit the gutters and any under-ridge pieces and connecting flashings.
2. Remove any protective film from the roofing panels/sheets and from the accessories.
3. Lay the roofing panels/sheets starting from the eaves and from one end of the building, taking care to align and overlap the panels/ sheets correctly and to check that they are perfectly square with respect to the underlying structure.
4. Secure the panels/sheets systematically, after checking that they are perfectly lined up. All left-over materials must be promptly removed, with particular attention to metal offcuts.
5. Lay subsequent courses of panels/sheets overlapping the eaves course (in the case of a pitch requiring two or more courses). In the case of panels, the insulation must first be removed in the overlap area.
6. Fix the panels/sheets at every rib along the lines of the ridge, eaves, valleys and end-to-end overlaps.
7. Fit the finishing parts (ridges, cappings and flashings in general) and any corresponding insulation.
8. Remove all left-over materials and make a general inspection of the roof, with particular attention to the fixings and the areas connecting with other elements making up the roof.

B) Sandwich construction executed on site (type 1.1.2)

B.1) Sandwich construction with parallel ribbed sheets

1. Fit the gutters and any connecting flashings: depending on the plan specifications, this may be done before laying the inner sheet or before laying the outer sheet.
2. Remove any protective film from the roofing sheets and from the accessories.
3. Lay the inner sheet starting from the eaves and from one end of the building, taking care to align and overlap the sheets correctly and to check that they are perfectly square with respect to the underlying structure.
4. Secure the sheets systematically, after checking that they are perfectly lined up. All left-over materials must be promptly removed, with particular attention to metal offcuts.
5. Lay subsequent courses of sheets overlapping the eaves course (in the case of a pitch requiring two or more courses).
6. Fix the sheets at every rib along the lines of the ridge, eaves, valleys and end-to-end overlaps.
7. Fit suitably-sized rigid spacing pieces, positioned as on the plans. In the case of metal spacing pieces, it is advisable to provide a thermal break between these distance pieces and the outer ribbed sheet. If the secondary support structure provides a direct housing for the inner sheet, the rigid spacing pieces mentioned above are superfluous.
8. Lay the insulation (taking care to ensure that the thermal insulation is uniform) and any layers which have a specific function (e.g. vapour barriers, separating layers etc.), and any head-end "buffers".
9. Lay the outer sheet, following steps 2–6 of sequence B1.
10. Remove all left-over materials and make a general inspection of the roof, with particular attention to the fixings and the areas connecting with other elements making up the roof.

B.2) Sandwich construction with crossed ribbed sheets

1. Remove any protective film from the roofing sheets and from the accessories.
2. Lay the inner sheets starting from the eaves and from one end of the building, taking care to align and overlap the sheets correctly and to check that they are perfectly square with respect to the underlying structure.
3. Secure the sheets systematically, after checking that they are perfectly lined up. All left-over materials must be promptly removed, with particular attention to metal offcuts.
4. Fit the flashing pieces which connect to the first sheet (under-ridge pieces, connectors, special components).
5. Fit suitably-sized rigid spacing pieces, positioned as on the plans. In the case of metal spacing pieces, it is advisable to provide a thermal break between these distance pieces and the outer ribbed sheet. In the event that the inner sheet consists of continuous metal strips, the spacers are not necessary, but it is always advisable to provide a thermal break.
6. Lay the insulation (taking care to ensure that the thermal insulation is uniform) and any layers which have a specific function (e.g. vapour barriers, separating layers etc.), and any head-end "buffers".
7. Lay the outer sheet, following steps 1–8 of sequence A (Plain ribbed sheet).

C) Deck executed on site (type 1.1.3) and pre-insulated deck (type 1.2.2)

Follow the fitting instructions for the inner sheets in sequence B.1. Carry out the seam fixing along the longitudinal overlaps.

In the case of decks executed on site, the insulation is provided by the insulant applied subsequently.

In the case of pre-insulated decks, temporary local removal of the insulation needs to be carried out before fixing.

The seal is provided by the layers applied subsequently (bituminous sheathing or synthetic membrane etc.).

5. WALLS

FITTING SEQUENCES

The following are the essential points for a correct fitting sequence.

A) Plain ribbed sheets and prefabricated monolithic sandwich (types 2.1.1 and 2.2.1)

1. Fit the base flashing (when specified) at the foot of the wall, aligned with the level of the supporting structure, as well as the flashing which necessarily has to be fitted before the wall (drip above the window-frames, connectors for openings, internal corner connectors etc.), after removing any protective polythene film.

2. Remove any protective film from the wall panels/sheets.
3. Fit the panels/sheets starting from the foot of the wall, taking care that joints are correctly aligned and executed, and checking that the panels are upright.
4. Secure the panels/sheets systematically, after checking that they are perfectly lined up.
5. In the event that the height of the wall or the nature of the material necessitates fitting successive courses of sheets/panels in vertical sequence, the joints must be made in line with a frame element of the structure. The procedure is as follows:
 - flat panel: butt joint, with a suitably-profiled connecting flashing between the panels
 - ribbed panel and ribbed sheet: like flat panel but sealed by means of an overlap.
6. Fit the finishing components (corner strips, perimeter edging, wall-to-roof connectors etc.).
7. Carry out a general inspection and cleaning of the wall, paying particular attention to the fixings and the joints with the door and window frames, and with other components of the wall itself. In the case of walls with horizontally positioned ribbed sheets/panels, refer to the plan specifications.

B) Sandwich construction executed on site (type 2.1.2)

B.1) Sandwich construction with parallel ribbed sheets

1. Fit the base flashing (when specified) and any connecting flashings: depending on the plan specifications, this may be done before fitting the inner sheet or before fitting the outer sheet, after removing any protective polythene film.
2. Remove any protective film from the wall sheets.
3. Fit the sheets starting from the foot of the wall, taking care that joints are correctly aligned and executed, and checking that the panels are upright.
4. Secure the sheets systematically, after checking that they are perfectly lined up.
5. In the event that the height of the wall or the nature of the material necessitates fitting successive courses of sheets in vertical sequence, the joints must be made by overlapping the sheets in line with a frame member of the structure.
6. Fit suitably-sized rigid spacing pieces, positioned as on the plans. In the case of metal spacing pieces, it is advisable to provide a thermal break between these distance pieces and the outer ribbed sheet. If the secondary support structure provides a direct housing for the inner sheet, the rigid spacing pieces mentioned above are superfluous.
7. Lay the insulation (taking care to ensure that the thermal insulation is uniform) and any layers which have a specific function (e.g. vapour barriers, separating layers etc., according to the particular requirements dictated by the use of the building). This operation must be carried out simultaneously with fitting the inner sheet.
8. Fit the outer sheet, following steps 2–5 of sequence B.1.
9. Fit the finishing components (corner strips, perimeter edging, connectors to the roof and to the walls etc.).
10. Carry out a general inspection and cleaning of the wall, paying particular attention to the fixings and the joints with the door and window frames, and with other components of the wall itself.

B.2) Sandwich construction with crossed ribbed sheets

1. Remove any protective film from the wall sheets and from the accessories.
2. Fit the sheets starting from the foot of the wall, taking care that joints are correctly aligned and executed.
3. Secure the sheets systematically, after checking that they are perfectly lined up.
4. Fit the flashing pieces which connect to the first sheet (connectors, special components etc.).
5. Fit suitably-sized rigid spacing pieces, positioned as on the plans. In the case of metal spacing pieces, it is advisable to provide a thermal break between these distance pieces and the outer ribbed sheet. In the event that the inner sheet consists of continuous metal strips, the spacers are not necessary, but it is always advisable to provide a thermal break.
6. Fit the base flashing (when specified) at the foot of the wall.
7. Fit the insulant (taking care to ensure that the thermal insulation is uniform) and any layers which have a specific function (e.g. vapour barriers, separating layers etc., according to the particular requirements dictated by the use of the building). This operation must be carried out simultaneously with fitting the outer sheet.
8. Fit the outer sheet, following steps 2–5 of sequence B.1.
9. Fit the finishing components (corner strips, perimeter edging, connectors to the roof and to the walls etc.).
10. Carry out a general inspection and cleaning of the wall, paying particular attention to the fixings and the joints with the door and window frames, and with other components of the wall itself.

6. FLOORS

FITTING SEQUENCES

The following are the essential points for a correct fitting sequence.

A) Plain sheets (type 3.1)

1. Fit any perimeter flashings.
2. Remove any protective film from the floor sheets.
3. Lay the sheets, taking care to butt or overlap them correctly. Check that they are perfectly aligned and square with the underlying structure.
4. Secure the sheets systematically according to the plan specifications, after checking that they are perfectly lined up. Carry out the seam fixing along the longitudinal overlaps. All left-over materials must be removed, with particular attention to metal offcuts.
5. Finish the floor according to the plan specifications, avoiding stressing the floor panels with concentrated loads.

B) Sheets with collaborating concrete (type 3.2)

1. Erect the formwork for containing the poured concrete.
2. Lay the sheets taking care to butt or overlap them correctly. Check that they are perfectly aligned and square with the underlying structure.
3. Secure the sheets systematically according to the plan specifications, after checking that they are perfectly lined up. Carry out the seam fixing along the longitudinal overlaps. Check that the ribbed sheets are free of oxides and oil stains and any other substances which would prevent adhesion to the concrete. All left-over materials must be removed, with particular attention to metal offcuts.
4. To avoid leakage of concrete at end-to-end joints between the ribbed sheets, apply a strip of adhesive sealing tape.
5. Position the welded mesh and/or any reinforcing steel in line with the supports or located by supplementary supports, depending on the plan specifications.
6. Pour the concrete, avoiding accumulations especially in the central area of the span.
7. If the plan specifications require the use of props to break up the spans, these must obviously be positioned before pouring the concrete, providing the ribbed sheets with any necessary braces against deformation.

C) Ribbed sheets with disposable formwork (type 3.3)

1. Erect the formwork for containing the poured concrete. The fitting instructions for sequence B apply, except for point 5, in which the reinforcing steel is obviously obligatory.

7. FIXING DEVICES

The fixing devices are an essential part of the roofing, wall and floor system. For this reason it is essential to use the fixing devices specified by the manufacturer of the ribbed sheets/panels.

Correct fitting requires the following:

For roofs:

- external facing (types 1.1.1 – 1.1.2 – 1.2.1): a complete set usually made up of screws, caps and the relative sealing gaskets, to be located at the crest of the ridge;
- external facing (types 1.1.2 – 1.1.3 – 1.2.2): screws with any gasket required

For walls:

- external facing (types 2.1.1 -2.1.2 -2.2.1): screws with gasket
- internal facing (type 2.1.2): screws with any gasket required
- prefabricated monolithic panels with “concealed” fixings: specific fixing kit

For floors: screws, nails, washers to be welded on site.

The density and positioning of the fixings depends on the characteristics of the building component, on the type and size of supports, and on the local climatic situation (winds in particular). Refer in any event to the plan specifications.

In the most frequently-occurring situations, the ribbed sheets/panels are fixed by means of screws which are different depending on the type of supporting structure.

1. Fixing to a metal framework:

- self-tapping screws and thread-forming/self-piloting screws (depending on the thickness of the support)
- self-drilling screws
- nails shot from a nail gun (for floors and inner sheets in siting and installation operations sandwich construction)
- threaded hooks with nut (in general for anchorage to tubular components)

2. Fixing to a timber framework:

- woodscrews
- threaded hooks

3. Fixing to reinforced and pre-stressed concrete:

Fixing is to steel or timber support components by the methods listed in paragraphs 1 and 2.

Direct fixing to reinforced and pre-stressed concrete is not recommended.

For deck roofs and for floors, seam fixing must be used, generally by means of rivets, along the longitudinal overlap, at not more than 1000 mm seam fixing centres.

For other roofing and wall components, seam fixing is recommended, depending on the shape of the overlap.

8. FINISHING COMPONENTS

The finishing components are an integral part of the job and make a decisive contribution to determining the project's performance characteristics. The manufacturer of ribbed sheets/panels is generally able to supply the finishing components, which must be used in accordance with the

plan and/or supply specifications.

The Purchaser must specify the type and range of finishing components which are of interest, depending on the requirements of the job. The manufacturer of ribbed sheets/panels is responsible for the conformity of materials to the confirmed order, solely and exclusively for those parts directly supplied and correctly used.

The finishing components include variously profiled gaskets, metalwork (ridges, under-ridge pieces, guttering, valleys and downpipes, flashings, drips, corner strips etc., translucent sheets, domes, ventilators, door and window frames and accessory components.

ANNEXE D - Instructions for the inspection and maintenance of roofs and walls in insulated metal panels and ribbed sheets

All buildings require a periodic systematic inspection and programmed maintenance, in order to ensure that the building will continue to function over time and maintain the required performance.

The checks to be performed at the time of the inspection are intended to be addressed both to the roof and wall components, and to the complementary works (joints, fixing devices, ridges, flashings, snow barriers, gutters, hips etc.), and to any technological equipment present (chimneys, smoke extractors, lightning protection etc.).

1. INSPECTION

1.1 During and immediately after the completion of fitting the insulated metal panels or ribbed sheets, it is the responsibility of the installing firm to arrange the removal of all the materials no longer necessary, including any traces of the temporary protection film. In particular, the firm must take the greatest care in removing metal swarf and abrasive items which have been deposited on the roof.

The work can only be signed off after the building envelope (i.e. the roof and walls, including the finishing components and in particular the gutters) has been adequately cleaned and is free from all extraneous material.

1.2 Inspections must be carried out at regular intervals. The first one must coincide with the signing-off of the works executed or with the corresponding test inspection.

The test must be addressed both to the functionality of the specific operations performed (roof and/or walls) and to the building in its entirety according to the plan specifications or as regards compliance with the contractual relationship between the Purchaser and the supplier, general contractor or fitting firms. Inspections must take place at six-monthly intervals (preferably in the spring and autumn of each year).

At the first inspection, to be carried out by the installing firm or by the purchaser/owner according to what is specified in the contract or agreed between the parties, a check must be made to ensure that no extraneous materials or swarf from the work have been abandoned which could give rise to corrosion or damage with respect to the building envelope, or which could impede the correct drainage of rainwater.

It is in any event necessary to check that an accumulation of undesirable substances cannot be produced, such as dust, sand, leaves etc. It is also desirable for the purchaser/owner to be notified of potential weak points (such as lack of surface protection) over the entire building envelope, which could be sources of corrosion (for example by electrochemical action), with consequent premature deterioration also as regards the appearance of the building (rust stains, for example).

A comment should also be made on the location of the building: the purchaser/owner should be told about the type of atmosphere on the site, in relation to possible sources of accelerated corrosion (such as smoke) caused by adjacent buildings. The existing type of atmosphere should be known before purchasing the materials.

Subsequent inspections consist of a check on the general condition of the building envelope: state of conservation (i.e. durability) and functionality both of the ribbed sheets and/or insulated metal panels and of all the finishing and complementary components, including ridges, flashings, gutters, tightness of the fixings and any sealing which could

have an effect on the building envelope. The progress of ageing should be monitored, both physiological and pathological, so that any necessary ordinary and extraordinary maintenance can be scheduled.

At the same time, the efficiency of the system for draining rainwater, and of the other technological equipment should be checked.

2. MAINTENANCE

2.1 The building envelope, like any other product, must be periodically checked so as to detect in good time any problems which are about to occur and be able to deal with them promptly, thus reducing maintenance work to a minimum.

Maintenance operations must also be addressed to the principal finishing components (for example, anchoring devices and the interface with the supporting framework, and the secondary ones (for example rainwater downpipe inlets) which could compromise the overall functionality of the building envelope.

2.2 Programmed ordinary maintenance must be established and carried out by the owner, on items and at intervals which depend on the results of the inspections as well as on the general condition of the building and the existing environmental situation, as well as the conditions of use. It is in any event aimed at maintaining and adjusting to the functional needs of the fabric.

It may be sufficient to carry out regular cleaning of the surface of the roof and walls. Localised repairs may be necessary due to breakages, scratches and damage.

Any dirt stains indicate the evaporation of liquids which have run down the surfaces. During maintenance, therefore, besides removing the stains, it is necessary to eliminate the cause of water collecting (such as movement of the gutters in which it runs, settlement of the framework or distortion of the ridges, flashing etc.).

2.3 If the results of the inspections establish that there are conservation problems at work, an extraordinary maintenance operation must be performed by the owner and at his/her expense, with the aim of restoring the initial conditions.

These operations are intended to address the premature occurrence of problems of corrosion of the metal components, not envisaged at the design stage. These problems can arise from a general situation of the fabric being compromised by finishing works not meeting expectations in terms of durability, or from factors not pertaining to the works, such as flooding, ageing, condensation, electrochemical incompatibility, new sources of pollution, change of use etc.

The present Instructions govern the contractual relations between the Vendor party and the Purchasing party (addressee of the invoice). Failure to carry out or incorrect execution of inspection and maintenance operations exonerates the Vendor from all responsibility in the period between the despatch of the materials and the time limit for their presumed involvement under the terms of the applicable legislation (Article 1495 of the Civil Code, and Legislative Decree no. 24 of 2 February 2002).

The Purchasing party undertakes on its own account to adopt and to see that third parties concerned adopt the present Instructions, to the extent that they are limited to the obligations on the part of the Vendor provided by the applicable legislation (regarding instructions, limitations and expiry).

‘Third parties concerned and involved by the Purchaser’ is to be understood as meaning: trading companies, construction firms, fitting operators, contracting and commissioning organisations, and owners of the premises and subsequent owners who may take part in the transfer of ownership.

The commitment to inspection and maintenance is undertaken by the Purchasing party in relation to the Vendor party. The Purchasing party is to transmit the present commitment in its turn when it in its turn becomes a vendor, and so forth in succession as far as the owner of the premises.

For validation of the inspection and maintenance operations, the owner must in any event sign the acceptance of the commitment, on its own responsibility and at its own expense, to carry out inspection and maintenance operations. These operations are to be recorded in chronological order in a suitable register with all the technical checks noted, and with the description of the ordinary maintenance jobs and

any extraordinary maintenance jobs performed.

This register is to be set up on the initiative of the owner, and maintained and updated by the owner or by the building administrator under delegation from the owner. The register must be available and consultable as a document recording the proper management of the premises, always within the context of the Vendor’s relevant legal conditions.

The register must contain a record of the supply of the insulated metal panels and ribbed sheets, stating the name of the supplier, the details of the order confirmation, the type and characteristics of the materials (including catalogue references), the date of delivery to the site and the relative transport documents, and the subsequent chronology of the installation.

The names and addresses must also be entered in the register of: the designer, the works manager, the site safety manager, the tester, the main contractor and the fitting contractor (or the individual operators).

The identifiability and traceability of the supplies must thus be ensured for the entire duration of the validity of the present Instructions, which will terminate with the cessation of the relationship with the company producing the insulated metal panels or the ribbed sheets, with respect to its possible involvement under the terms of the law.