

Substrates

The three purposes of a good substrate (or core board) are:

- to support the laminate;
- to resist bowing;
- to meet the required performance specification.

The surface of the substrate must be sufficiently smooth to prevent the transfer of defects through to the decorative laminate surface (commonly known as ‘telegraphing’).

Plywood, chipboard and medium density fibreboard (MDF) are good substrate materials for fabrication. Being cellulose-based, their dimensional movement characteristics are similar to those of decorative laminates.

Certain industrial applications call for specialised substrates such as mineral boards, metal sheets, honeycomb cores and plastic foams; these require special bonding and fabrication techniques.

The various substrates that may be used with Formica® laminates, together with their characteristics, are listed in the following table.

Substrate	Description and Suitability
Particleboard	<ul style="list-style-type: none"> • Structure (chip form, resin content and density) significantly affects quality and properties. • Boards manufactured to type P3 of EN 312-3 provide ideal substrates for applications in dry areas. • Boards manufactured to type P3 of EN 312-3 are available in flame-retardant grades to produce composite panels that conform to fire performance requirements of the Building Regulations. • Boards manufactured to type P5 of EN 312-5 have increased moisture resistance, so they suit installations subject to high humidity and frequent wetting.
Medium Density Fibreboard (MDF)	<ul style="list-style-type: none"> • Dry formed panel product manufactured from resin-bonded lignocellulosic fibres. • Excellent surface for laminating. • Excellent machining properties allow finely moulded and smooth edge finishes. • Properties well suited to furniture and cabinet work - its primary use. • Boards manufactured to type MDF of EN 622-5 are suitable for use in dry areas. • Boards manufactured to type MDF of EN 622-5 are available in flame-retardant grades to produce composite panels that conform to fire performance requirements of the Building Regulations. • Boards manufactured to type MDF-H of EN 622-5 have increased moisture resistance, so they suit installations subject to high humidity and frequent wetting.
Laminboard and Blockboard	<p><i>Laminboards</i></p> <ul style="list-style-type: none"> • Narrow core strips, less than 10mm in width and edge glued. • Excellent substrates for decorative laminates for cabinetry and high class carcass work. <p><i>Blockboards</i></p> <ul style="list-style-type: none"> • Suitable as substrates for decorative laminates only if core staves are fairly narrow and edge glued, with double or extra thick surface veneers. • Otherwise unsuitable because the cores may shrink unevenly in dry conditions, causing surface undulations (telegraphing).

Plywood	<ul style="list-style-type: none"> • Excellent substrate when from straight grained, low density hardwood or softwood with surfaces free from knots. • When bonded with waterproof adhesives (bond Class 3 of EN 314-2) the composite boards suit applications subject to high humidity and frequent wetting. • Available in flame-retardant grades to produce composite panels that conform to fire performance requirements of the Building Regulations.
Fibre building boards (hardboards)	<ul style="list-style-type: none"> • Not self-supporting. • Generally used as outer skins of sandwich panels, or as wall cladding panels with edges retained in extruded plastic or metal channel sections. • Surfaces may need sanding before bonding to improve adhesion.
Honeycomb cores	<p><i>Aluminium</i></p> <ul style="list-style-type: none"> • Ideal for producing rigid, lightweight panels faced on both sides with decorative laminate. • Widely used in the manufacture of curved ceiling panels (eg for railway coaches). • Usually bonded with epoxy resin adhesives. • Available in various thicknesses and cell sizes. <p><i>Kraft paper – non-impregnated</i></p> <ul style="list-style-type: none"> • Generally used as low-cost cores for sandwich panels faced with hardboard, or for plywood-faced hollow interior doors. • Also used for direct laminating with horizontal grades of laminate, for fixtures in caravans where low weight considerations are more important than impact resistance. • Cell sizes typically 15mm - 37mm in a variety of thicknesses. <p><i>Kraft paper – impregnated</i></p> <ul style="list-style-type: none"> • Resin impregnated paper is better than non-impregnated paper in resisting the effects of moisture. • Generally used in small cell sizes (eg 9mm - 12mm) and thicknesses of 15mm - 25mm.
Mineral based substrates	<ul style="list-style-type: none"> • Several different non-combustible substrates are available, the most common being boards based on Calcium Silicate. • Use decorative laminates only on boards of monolithic structure, and not on those boards produced by layering methods as these are more prone to delamination. • It is important to control moisture content of both laminate and substrate by proper storage before bonding.
Metals	<ul style="list-style-type: none"> • Aluminium and steels provide excellent substrates when the proper surface preparation is carried out before bonding. • Metals have different dimensional movement characteristics from decorative laminates; take this into account when considering the end application.
Foamed plastics (polystyrene, polyurethane, phenolic, etc) in rigid boards, or injected <i>in situ</i>	<ul style="list-style-type: none"> • Self-supporting. • Good thermal insulation. • Suitable for direct laminating. • Phenolic foams have excellent fire-retardant properties and low smoke emission.

NOTE:

The following materials are **NOT** recommended as substrates for the application of decorative laminates.

Substrate	Description
Plastered or cement-rendered wall surfaces	With rare exceptions, unsuitable for direct bonding because of surface irregularities, low internal bond strength and incompatible dimensional movement.
Gypsum board (plain or paper-faced)	The paper surface affords little restraint to the dimensional movement of decorative laminate, and can lead to cracking from screw holes and apertures.
Solid wood	Unsuitable except in very small sizes because of possible surface undulations caused by irregular dimensional movement.