

PRODUCT GUIDE



Cement Bonded Particle Board



NCL INDUSTRIES LTD.
(Boards Division)

Product Guide

INDEX

S.NO.	CONTENTS	PAGE
1.	UNDERSTANDING BISON PANEL (Physical Properties, Star Features, Sizes, Conditioning, Handling, Storage)	1
2.	WORKING WITH BISON PANEL (Tools, Fixing, Fixing Points, Jointing, Binding, Painting, Lamination)	4
3.	PARTITIONS (Studs & Tracks, Openings, Board Fixing, Services, Jointing, Flush Joints, Dwarf Partitions, Timber Studs, Partitions requiring more movement, Interior Partition Walls – requiring 3 to 5 mm gap, Exterior Walls – requiring 5 to 10 mm gap, Interior Walls for Tile Fixing, Timber Stud Partitions, Gap filling in Boards, Thermal Properties)	5
4.	PARTITIONS SYSTEM / FIRE RATING AND SOUND REDUCTION (Timber Studs Partitions, Steel Stud Partitions)	10
5.	DOORS (Panel Inserts, Flush Doors, Fire Doors)	11
6.	FALSE CEILINGS (Suspended Grid, Fixed Ceiling)	12
7.	FLOORINGS (Flooring for large areas, Floors with Ceramic Tiles)	13
8.	WORKING LOADS AND RECOMMENDED THICKNESSES	15
9.	OTHER APPLICATIONS (Decking, Wall Cladding, Sidings, Roof Underlay)	16
10.	PANEL HOUSES WITH BISON PANEL	17
11.	COMPARISON OF STANDARDS OF CEMENT BONDED PARTICLE BOARDS	18
12.	BISON LAM & DESIGNER BOARDS	19

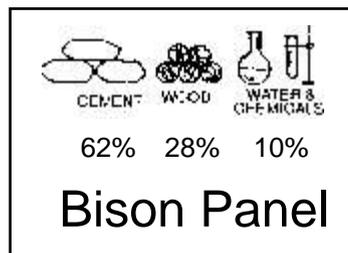
Understanding Bison Panel

Introduction

This manual contains general information and guidelines for understanding Bison Panel to get best results in its application.

Bison Panel conforms to IS 14276-1995

Bison Panel is a cement bonded particle board made out of 62% cement 28% wood. The wood used is of fast growing species like Eucalyptus and Casurina. Due to adoption of special manufacturing process, the panel acquires the strength, the durability of cement and easy workability of wood - a combination of qualities absent in other boards.



This multipurpose building board - a proven product in countries around the world is introduced in India by NCL with imported technology from Bison Werke of Germany.

Physical Properties

Density	1250 Kgs/m ³ (1100 Kgs minimum as per BIS)
Moisture content	9% ± 3% at Factory Point.
Modules of Elasticity (bending)	3000 N/mm ²
Bending strength	9N/mm ²
Transverse tensile strength (perpendicular to surface)	0.4 N/mm ²
Compressive strength (perpendicular to surface)	15 N/mm ²
Surface Alkalinity pH	Between 11 and 13
Nail holding power perpendicular to surface.	205 Kgs
Screw holding power perpendicular to surface	312 Kgs

Fire Resistance

Bison Panel is highly fire resistant and has been classified as incombustible material in many countries around the globe.

Tested in accordance to BS 476, Fire test on building materials and structures - part 6, 7 classified it as class 'O' building board with class 1 surface spread of flame.

Bison Panel can be used for the construction of fire resistant building elements to satisfy the criteria of I.S.O. 834-1975 and I.S. 3809-1979 for 1/2 hour to 4 hours fire rating.



Weather Resistant

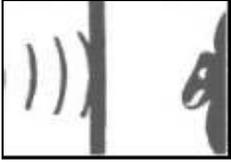
With cement constituting 62% of its composition the Bison Panel offers excellent resistance to weather. The board has been subjected to many cycles of soaking, freezing and heating without any sign of disintegration.

The board should generally be painted for external application to provide a weather seal.



Biological

Due to mineralisation of wood particles by cement, Bison Panel is resistant to termite and vermin attack. It does not support fungus growth. Even untreated samples exposed to contact with the ground surface for several years have shown no sign of rot or decay.



Sound Insulation

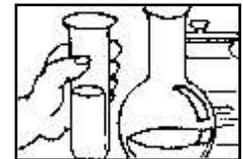
Air borne sound reduction varies between 30 and 37 dB for the frequency range 100- 3150 HZ according to thickness of Bison Panel. When used in stud partitioning, a reduction of over 60 dB can be achieved with suitable construction.

Thickness (mm)	6	8	10	12	16	18	20	30	40
Reduction (dB)	29	30	31	32	33	35	35	36	36

Chemically Stable

Bison Panel is produced by an irreversible process combining cement and wood particles into a chemically stable building material which maintains its strength with time and exposure to elements.

The board is unaffected by many dilute chemicals such as brines, bleaches, detergents and chlorine solutions.



Dimensionally Stable

Bison Panel has excellent dimensional stability in variable ambient temperatures and humidity conditions.

The swelling in thickness after 2 hours of immersion in water is 1% and after 24 hours immersion is only 1.5%.

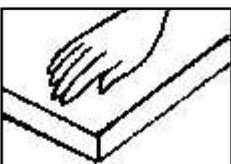
Longitudinal and transverse swelling will be approximately 0.3% for change in relative humidity of air from 30% to 95% at 20 deg C.

Wood Workability

Bison Panel can be drilled, sawn and sanded with normal wood working tools.

For bulk volumes, the Bison Panel should be cut with Tungsten Carbide Tipped circular saw and drilled with high speed steel drill bits.

Bison Panel can be fixed using screws and nails. Pre-drilling a hole slightly bigger than the shank would be required.



Smooth Surface

Bison Panel is light grey in colour with a smooth finish. It can be decorated with minimum preparation. Bison Panel can be finished with Laminates, foils and paints using Alkaline resisting adhesives, primers and paints.

Durability

Due to dense monolithic structure, installations throughout the world show that even without sealing, the cement bonded particle board suffers insignificant deterioration when exposed to extreme climatic conditions. The board can withstand any temperatures from - 40 to + 90 deg. C.

Bison Panel contains no hazardous material like Asbestos or Formaldehyde. Its process dust is harmless. When sawing, cutting or drilling the board, the use of a dust mask is recommended as power tools in particular can produce fine nuisance dust.

Sizes

Dimensions	2440 X 1220 mm (8' X 4')
	3050 X 1220 mm (10' X 4')
Thickness	6, 8, 10, 12, 16, 18, 20, 25, 30, 40 mm
Tolerance (Thickness)	6-10 mm \pm 0.7 mm
	12-16 mm \pm 1 mm
	20-40 mm \pm 1.5 mm
Length/Width	\pm 5 mm
Squareness	2.5 mm on the width of the panel

Normal Packing

Weight - 2 tons (approx) per pallet.

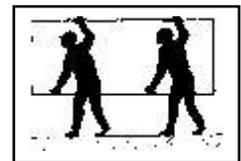
Thickness mm	No. of boards	
	2440 X 1220 mm (8' X 4')	3050 X 1220 mm (10' X 4')
6	80	70
8	60	50
10	50	40
12	40	35
16	30	25
18	30	25
20	25	20
30	17	14
40	13	10

Conditioning

At the factory, the boards are stored under controlled environmental conditions, so that they are delivered with a moisture content of 9% \pm 3%. On site they should therefore be stored dry within the area of application for a minimum of 24 hours. This will allow the material an acclimatisation period prior to fixing, to adjust to its working condition.

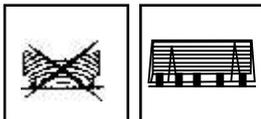
Handling

Strapped pallets should preferably be handled by fork lifts. If crane is used, broad plastic or fabric slings may be used, but not chain slings which can break the edges of the boards.



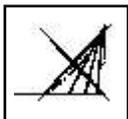
Bison Panels should be carried one by one and in vertical position. They should not be laid down on their edges but always laid flat.

When moving single boards manually they must be carried on edge by 2 men.



Storage

When storing Bison Panel, they must be laid flat on levelled surface. If out side, they must be protected - top and sides with water proof sheeting. Panels must never be stored on edge or leaned upright.



Bison Panel should be stored under cover in dry surroundings. Supports should be placed at regular intervals and in sufficient numbers according to the panel length, to avoid any deformation

Bison - Multi purpose board

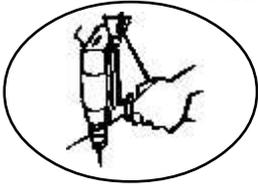
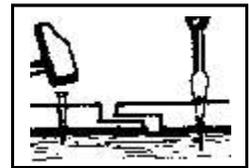
Bison Panel has innumerable applications - internally, it can be used in all places where an ordinary particle board can be used, for example :- Partitions, False Ceilings, Doors, Wall Cladings, Flooring, Kitchen Platforms, Table tops, Stair Cases, Louvers, Cabinets, Cabins and many more.

Working with Bison Panel

Tools

Working with Bison Panel is like working with any other particle board - Fastening is done in the same way as any other board. No special tools are required.

However for large volumes of cutting work, an electric power saw is recommended. A Power saw 1500 w - 4000 rpm with a blade of 250 mm dia provided with straight set teeth and tungsten carbide tips is ideal for use.

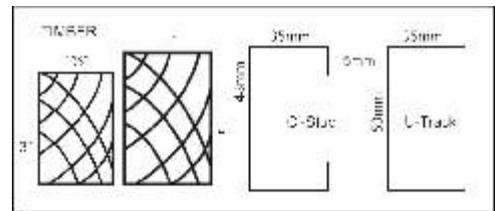


Similarly a hand held electric drill with high speed steel bits will be faster to work.

Fixing

Bison Panel can be fixed to timber or steel supports. Thin cold roll formed steel section in the form of studs and tracks are available in the market.

If timber studs are used choose a well seasoned wooden section of 1½"×3" or 2"×4". Rolled steel sections like C-Sections and U-Sections will be available in thickness 0.5 mm to 0.7 mm (galvanized). They can be used for interior work under controlled humidity conditions.



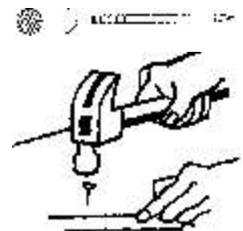
They can be used with advantage for applications like partitions, false ceilings, floors etc.

The boards must be supported on all four edges and at intermediate positions at centres not exceeding 610 mm. The board joints should occur on the centre supports.

Rust proof fixings should be used for all external applications or when conditions of high humidity and dampness are expected.

Nails and Screws

Bison Panel upto 8mm thick can be nailed directly to timber supports with round wire nails. For boards over 8mm thick, a pilot hole of 0.8 times the nail diameter must be predrilled. The nail length should be approximately 3 times the thickness of the board.

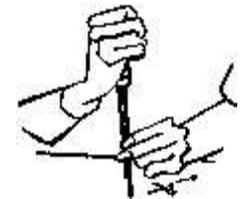


Screws

Three types of screws will be available in the market - Wood screws, Metal screws and Self tapping screws.

The wood screws are used for fixing Bison Panel to wooden supports. A prehole of 1.2 times the diameter of the screw shank shall be provided in the Panel before screwing. In case countersinking of head is necessary, slightly oversized hole can be drilled to required depth. The length of the screws shall be 2.5 to 3 times the thickness of the board.

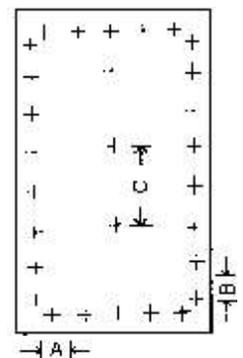
Regarding metal screws, fully threaded self tapping type screws must be preferred. The size of the screws will be according to thickness of the board and the gauge of framing. Predrilling of the board 1.2 times dia of shank is a must. The length of the screws shall be 2 to 2½ times the thickness of the board.



Fixing Points

The recommended fixing distance between two fixing points around the perimeter is 200 to 300 mm. The fixing distance between two fixing points in the intermediate support is 300 to 600 mm.

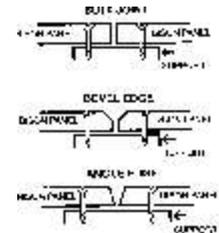
The fixing point has to be 15 mm (Minimum) to 30 mm away from the edge of the board. Similarly the fixing point shall be 40 mm to 75 mm away from the corner of the board.



Board thickness	Recommended Fixing away from the edge	Spacing of edge fixing A	Fixing on Intermediate Supports B
6 - 12 mm	Away by 1½ times the thickness of the board best if 20 mm from the edge	150 to 200 mm	300 - 400 mm
16 mm and 18 mm	Away by 1½ times the thickness of the board best if 30 mm from the edge	200 - 300 mm	400 - 500 mm
20 mm and above	1½ times the thickness of the board	300 - 400 mm	500 - 600 mm

Jointing

Bison Panel is subject to slight dimensional changes due to variations in temperatures and relative humidity of air. Provision should be made in the joint by allowing a gap of 2 to 3 mm. The gaps can be left as seams or sealed with cover strips as the case may be. These cover strips could be PVC, Aluminium or wood 'T' type profiles they are fixed in the gap by either screwing them or fixing with a synthetic adhesive.



Binding

Bison Panel has an alkalinity pH value 11 to 13. So alkaline resistant glues or adhesives are to be used for binding the panel. Please refer to adhesive manufacturer's specifications.

Painting

Bison Panel can be coated with any kind of paint including distempers, Acrylic resins, Acrylic emulsions, Epoxy systems, Silicon emulsions, Polyurethanes and most other alkali resistant Paints. The board has to be given a primer coat with cement primer / wood primer before applying decorative paints.



All kinds of boards will show a tendency to warp when exposed to unequal conditions, i.e. when one face is effectively sealed and the other face is left free. To avoid this, the other face must also be treated with a coating of equivalent effect in order to balance the board against warping.

Painting should be done when the board is completely dry and atmospheric humidity is dry. Whenever the board is subjected to different humidity conditions, the absorption or release of moisture in the board is very slow. Hence a minimum of 48 hours to 72 hours will have to be allowed to attain moisture equilibrium in the board.

Painting is not recommended when the moisture in the board is more than 12%, particularly in case of impermeable paints. When the board received from the factory is protected well, the moisture content will be 12% or less.

Laminations

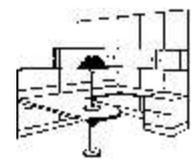
Bison Panel can be used for cold pressing or low temperature laminating. The surface of the board can take wood veneer, PVC, foils, melamine laminate and paper over lay etc. Prior to lamination, the board should be acclimatised for atleast 48 hours before providing decorative laminates. It should always be balanced by applying a compensating laminate on the other side. To control absorption of adhesive, the surface of the board may need to be primed with a dilution of the adhesive.

Prelaminated Bison Panels are manufactured by NCL under the brand name BisonLam. They are available in thickness ranging from 6 mm to 16mm. They are available in popular shades like Natural Teak, Sea Beach, Ivory and white. For more details contact helpline.

Partitions

The excellent qualities of fire resistance and acoustic insulation apart from natural resistance to weather, fungus, termite and vermin attack, makes the Bison Panel an ideal choice for partitions, in residential, commercial, industrial complexes and public buildings.

Bison Panel is an ideal material for many types of dry wall partitions including double skin, single skin, with steel and timber studs. These partitions are light in weight and economical.



Steel Studs

Steel stud partitions are very light and provide high values of fire resistance and sound insulation.

The basic system can be adopted to achieve upto 4 hours fire rating by the incorporation of thermal insulation materials and by providing various thicknesses of Bison Panel.

A typical partition wall is constructed by conventional stud and track method, which is known to most of the carpenters.

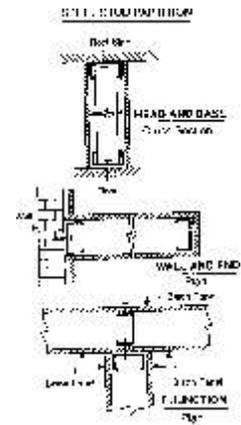


Galvanised steel studs (C section) 48 mm x 35 mm & 8 mm lip or 70 mm x 35 mm & 8 mm lip with suitable tracks (channel sections) are available in the market.

The tracks are fixed to the floor and ceiling by means of masonry nails or screws.

The vertical studs are cut to size and fitted (gripped) between the top and bottom tracks at 610 mm centres.

The length of the stud shall be 2 to 3 mm shorter to allow for expansion. When the partition is constructed between masonry walls, the starter stud and end studs will be fixed to the walls by screws spaced at 400mm centres. The Board is fixed on the studs with a gap of 2 to 3 mm to allow for expansion.



Openings

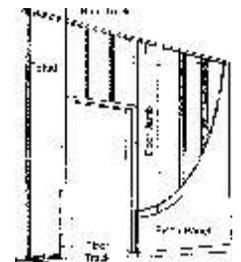
Openings required for doors and windows are marked on the studs and blockouts left while fixing the boards. Upon completion of board fixing, the doors and window frames are fixed with screws.

Board Fixing

The boards are cut slightly shorter than the over all floor to ceiling height. The board fixing is commenced from a fixed point with a full width board on the outside.

The board is fixed around the perimeter with self tapping self embedding screws fixed at 400mm centres duly maintaining minimum edge clearance.

The board is not fixed to intermediate studs until the boards on the other side have been fixed into place. This is to allow for adjustments to suit the width.



The process is continued till one side of the partition wall is complete. Wherever openings occur, the boards are cut to suit the frame of the opening. The installation of all services are completed at this stage.

Then the other side of the system is started with a board cut to half width. (This will ensure staggering of the vertical joints of inside and outside boards). Boards are fixed to the metal studs as previously described. The securing of the boards to the intermediate studs can now take place using recommended fixing centres.

Services

The vertical studs are normally provided with slots for running service lines.

When services are to be installed within the system, care is taken to ensure that fire resistance and sound insulation performance are not impaired.

Jointing

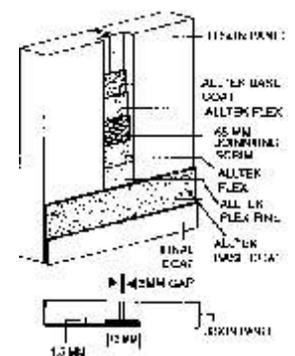
The grooves in the joints can either be painted neatly or covered with metal or plastic tee sections. In case flush joints are required, the following procedure is to be adopted using proprietary jointing compound.

Flush Joints

The board should be fixed with a 'gap' of 1-2 mm and in any case not exceeding 3 mm. Edges of the Bison Panel should be recessed to a width of 70 mm and a depth of 1.5 mm - 2.0 mm.

Ensure the moisture content of Bison Panel is within the stated specification of $9\% \pm 3\%$ before jointing commences. Use only the Alltek jointing/scrim materials and proceed as follows:

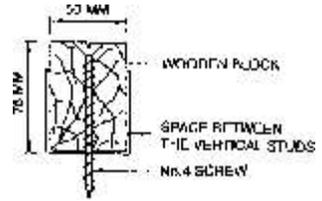
1. Lightly sand cut edges of boards to remove wood flakes and other irregularities. Apply an oil based alkaline resistant primer to the recess and immediate surrounding, say 2-3" either side of surfaces of boards which are to be joined. - Allow to dry.
2. Apply a thin layer of 'Alltek flex' to joint areas and embed a layer of the 65 mm wide 'Jointing scrim' by covering with a further layer of 'Alltek flex'. Allow to dry for 24 hours. For better results leave it for 4 or 5 days.
3. Apply a full coat of 'Alltek flex Fine' to joint and level off in a manner to leave slightly 'Proud'. Allow to dry for 24 hours and sand down to a flat smooth surface level with boards.
4. Nail and screw heads should be 'spotted' i.e. the impression over the heads should be filled flush with the boards surface. This is done with one or two application of the 'Alltek Flex Fine' filler. Alternatively polysulfide sealants available in the market can be used.



Dwarf Partitions (Half Partitions)

Double skin dwarf partitions are effective space dividers for work stations in offices and commercial buildings.

In the absence of the top fixing, the stability of the dwarf partitions depends only on the strength of bottom track. Hence the bottom track is strengthened either by using higher thicknesses of tracks or by stuffing the tracks with wooden scantlings. Anchoring to the floor is with deep screws and plugs spaced at closer intervals (300 mm).



Timber studs

Timber studs can be used in place of steel studs. In this case the frames are first assembled on the ground and then fixed between the floor and the roof. Boards are fixed only after completing the frame work.

Partitions requiring more movement in the board

Bison Panel is stabilized in the factory with a moisture content of $9\% \pm 3\%$. During its application at site of work, the moisture condition may vary according to ambient humidity and temperature in the atmosphere. It may take 24 to 72 hours to acclimatize with site conditions. So it is necessary to allow some time ranging from 24 hours to 72 hours as acclimatization period before it is put to use.

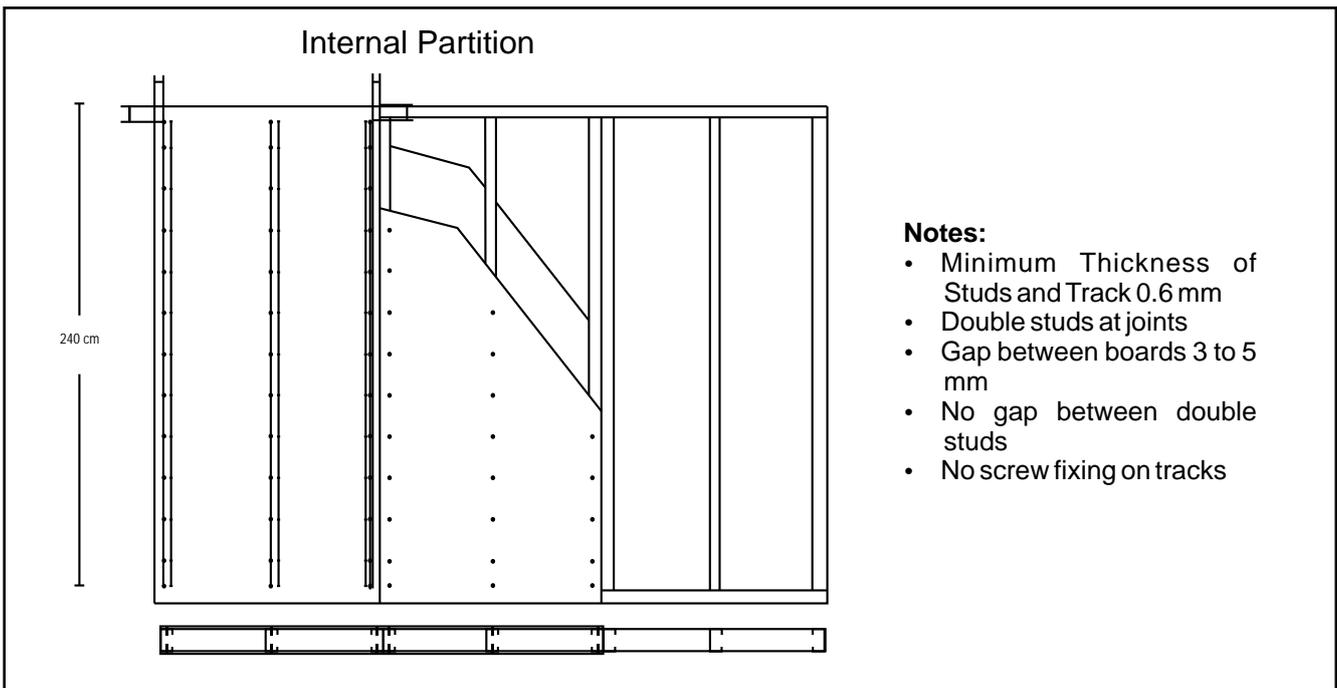
Even after fixing or put to use, the board will loose or gain some moisture due to atmospheric changes of temperature and humidity. This is common with wood or any other particle boards.

When such changes are taking place the board will have a movement due to expansion or contraction. So care as to be taken by providing adequate gaps at the board joints.

In the previous paras general application of the board for making partitions in ideal conditions is discussed. Slight loose holes in screw fixing points and a gap of 2 to 3 mm at the joints normally take's care of small movement in the board. The stress developed in the board due to movement will be distributed among all fixing points with out causing any stress concentration and consequent cracking. But in extreme cases where the movement in the board is predominantly more (say more than 3mm,) the method of construction of supporting frame for the partitions is discussed in the following paras.

Interior Partition Walls (double skin) requiring a gap of 3 to 5 mm at the board joints

In this case the edges of the boards at the joints are provided with independent C studs. This will allow necessary edge distance (20 to 30 mm) for screw fixing.



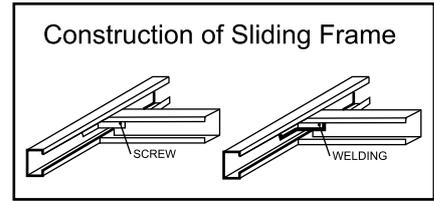
Notes:

- Minimum Thickness of Studs and Track 0.6 mm
- Double studs at joints
- Gap between boards 3 to 5 mm
- No gap between double studs
- No screw fixing on tracks

Screws fixing for the board is done on the vertical studs only (spaced at 610 cm or 2 feet). The board is not screwed to U-tracks provided at the bottom and top of the frame.

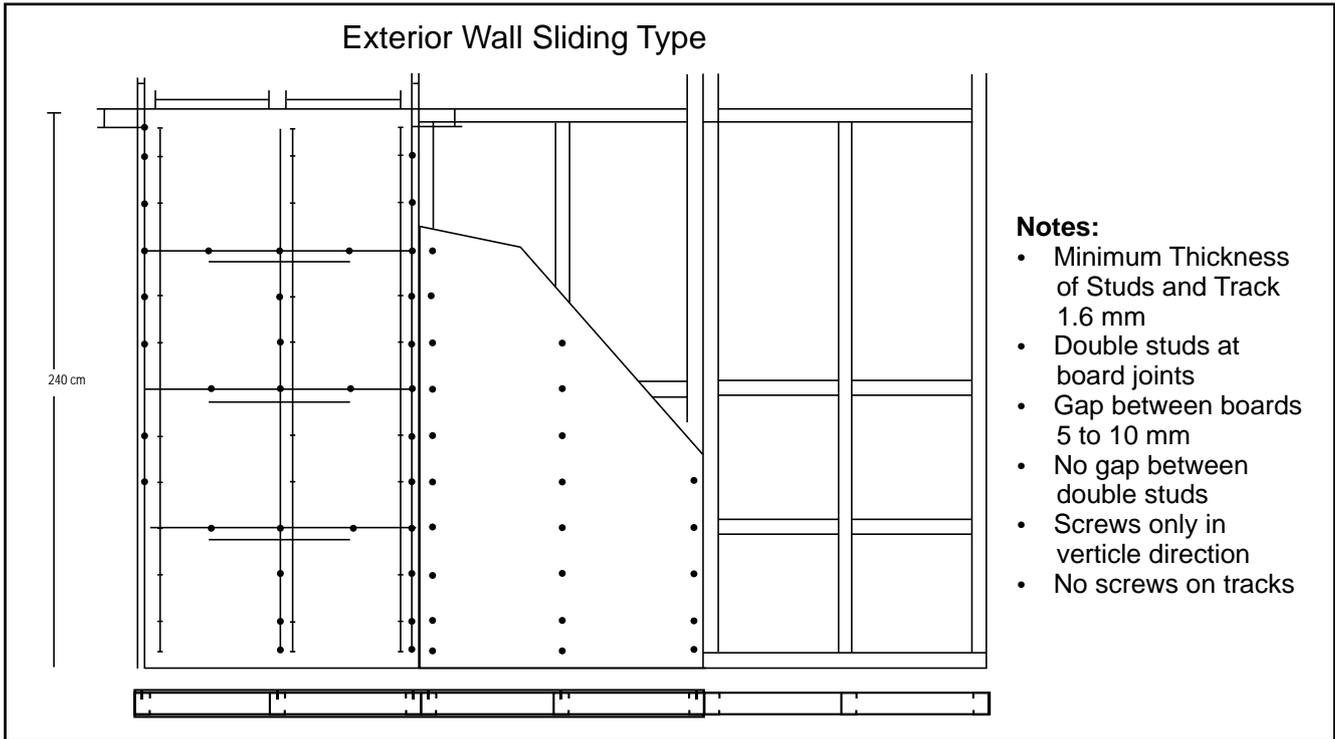
By this arrangement entire board along with the vertical studs will slide in the track when the movement in the board has taken place due to expansion or contraction without causing any stress to the board.

This method of fixing is called sliding frame or moving frame method.



Exterior walls (double skin) requiring gap of 5 to 10 mm at the board joints

In this case also sliding frame method will have to be adopted. For external applications the thickness of Bison Panel shall be 12mm or 16mm as the case may be.



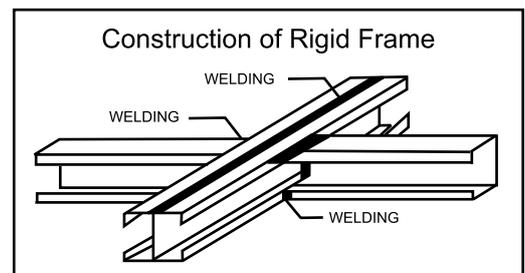
The galvanized studs and tracks should have a thickness of 1.6mm or 2 mm.

Note: In sliding frame method since the edges of the boards are provided with double studs at the joints, the staggering of the board joints will not be possible.

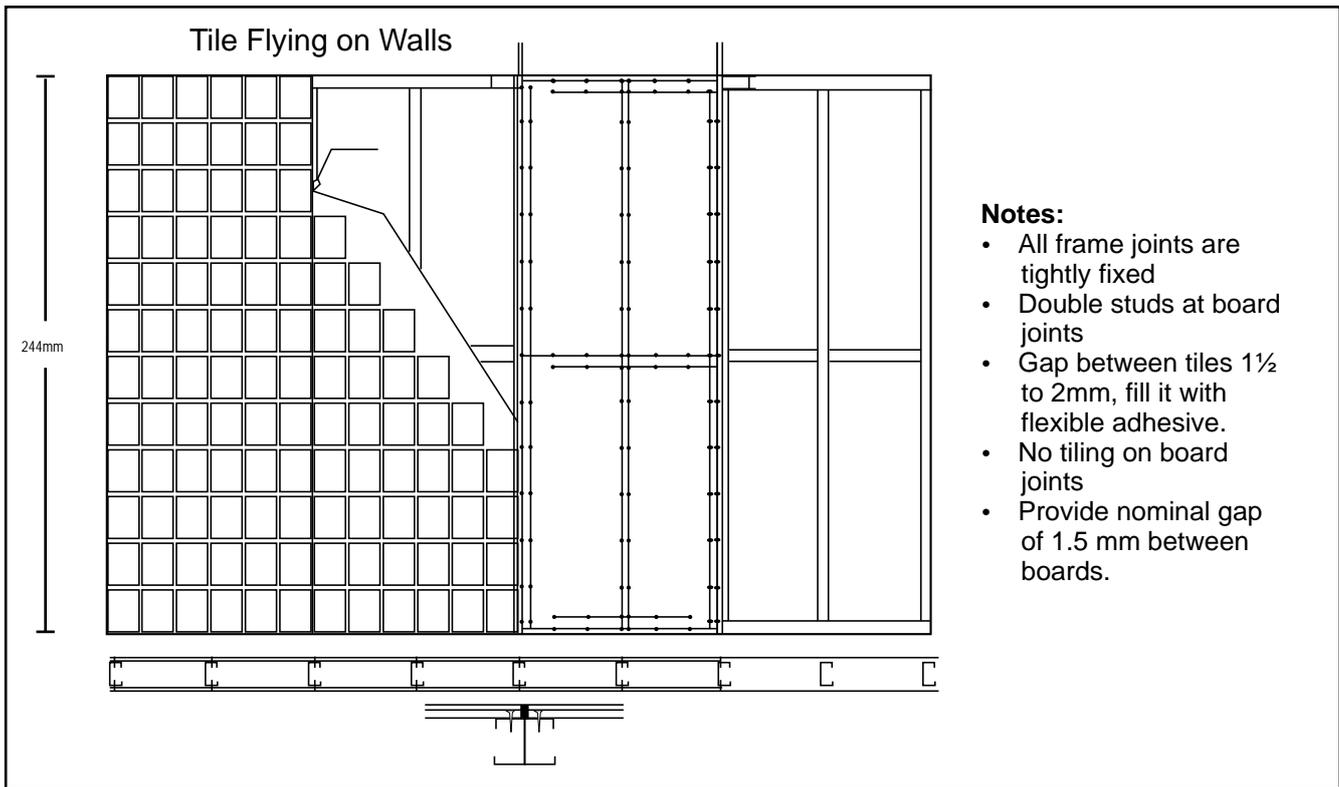
Interior walls for tile fixing

For tile fixing minimum thickness of Bison Panel should be 12mm. When tiles are to be fixed on internal walls the following procedure is recommended.

The supporting frame should be rigid. The vertical studs should be spaced at 2'-0 or 610 mm centers. Horizontal studs should be spaced at 4'-0 or 1220 mm centers. Double studs are to be provided at the board joints. The entire frame including double studs should be tightly fixed to each other either by proper screwing or by welding. Similarly the frame is also rigidly fixed to top and bottom tracks. The board is screwed to frame both in vertical as well as horizontal direction as per the recommended spacing.



On the other side of the board a water repellent paint may be coated to avoid moisture ingress or pick up by the board.



Two types of permanently elastic adhesives are available in the market. One is acrylic and the other cement based.

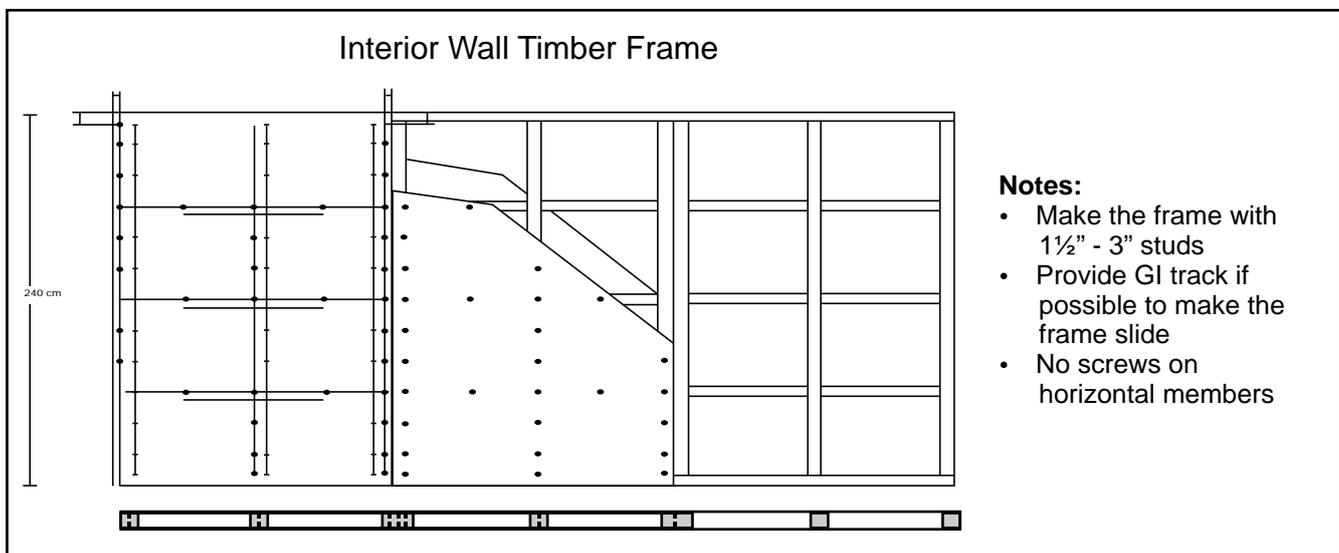
If acrylic adhesive is used it may be applied as per user's guide on the board and the tiles fixed with a gap of 2mm. The gaps can be filled with highly elastic tile adhesive. Tiling on the board joints should be avoided.

When cement mortar is used for tile fixing, a wire mesh be spread and fixed on the surface of Bison panel with screws. Tiles can be fixed on the board with 15mm to 20mm thick mortar bed. Tiling is also possible on the board joints in this case.

The supporting frame for Bison Panel for tile fixing shall have a minimum thickness of 1.6mm. To ensure rigidity of the frame it is better to provide vertical and horizontal studs at closer intervals particularly in case Acrylic tile adhesive is used for tile fixing.

Timber stud partitions (double skin) for interiors

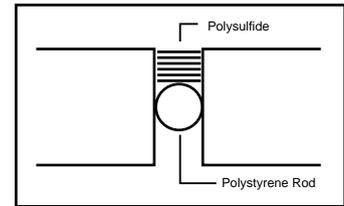
Bison Panel 8mm or 10 mm can be used for internal partitions. The frames can be made with seasoned wooden reapers of size 1½" x 3" or 45 x 75mm. The spacing of the wooden studs shall be 610 x 610mm or 2' x 2'. Double studs are provided at the board joints. The frame shall be sliding type in U tracks fixed at floor and soffit. The gap between the boards can be 3 to 5mm as required.



Gap filling in board joints

Flush joint with Alltek Flex is effective for gaps up to 3mm. For gaps between 5mm and 10mm or more a sealant like polysulfide has to be used. It is available in the market in white and light grey colour.

For thicker boards polystyrene foam bars can be filled in bottom of the gaps to save consumption of polysulfide sealant.



Thermal Properties

Thickness of Bison Panel	Thermal Resistance R:M ² k/W	Heat Transmission Co-efficient K:w/m ² R	Critical Value of Fire Resistance in Hours
6 mm	0.0231	3.722	-
8 mm	0.0308	3.666	0.07
10 mm	0.0385	3.565	0.15
12 mm	0.0461	3.471	0.21
16 mm	0.615	3.295	0.31
20 mm	0.769	3.136	0.38
40 mm	0.1538	2.527	0.61

Advantages of Bison Panel Partitions

- They are highly fire resistant, fire rating upto 4 hours is possible with suitable construction arrangement.
- Good sound proof.
- Moisture & Weather resistant
- Termite proof
- Economical, durable & elegant.

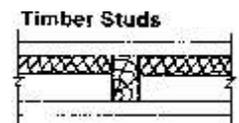
Partition Systems : Fire Rating And Sound Reduction

The supporting frames for fire rated partitions is same as described in previous paras where the interior gaps at joints are up to 5 mm and exterior gaps are up to 10mm.

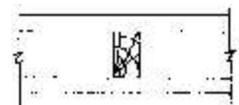
In both the cases sliding frame method using light structural steel studs and tracks having 1.6 to 2.3 mm thick may be used.

Timber Studs

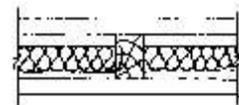
10 mm Bison Panel each side of 75 mm x 50 mm timber Studs at 610 mm centres with 25 mm thick Fibre Glass (12 kg/m³) to cavity :- 1/2 hour : 44dB at 100 - 3150 Hz.



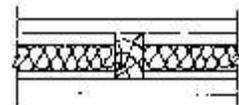
16 mm Bison Panel each side of 75 mm x 50 mm timber studs at 610 mm centres :- 1/2 hour : 45dB at 100 - 3150 Hz.



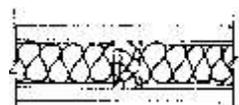
12 mm Bison Panel each side of 75 mm x 50 mm timber studs of 610 mm centres with 40 mm thick Rockwool (43 kg/m³) to cavity :- 1 hour : 46 dB at 100 - 3150 Hz.



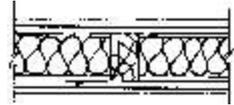
16 mm Bison Panel each side 75 mm x 50 mm timber studs at 610 mm centres with 40 mm Rockwool (43 kgs/m³) to cavity :- 1 1/2 hours : 47 dB at 100 - 3150 Hz.



As above but with 75 mm rockwool (43 mgs/m³) to cavity :- 2 hours : 47 dB at 100 - 3150 Hz.

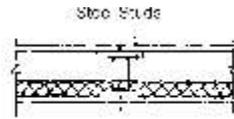


Two layers of 10 mm Bison Panel each side of 100 mm x 50 mm timber studs at 610 mm centres with 100 mm thick Rockwool (60 Kgs/m³) to cavity :- 4 hours : 48 dB at 100 - 3150 Hz.

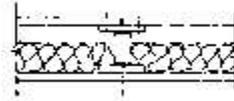


Steel Studs

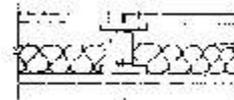
10 mm Bison Panel each side of 48 mm x 32 mm Galvanised steel studs at 610 mm centres faced with 100 mm x 10 mm Bison Panel strips with 25 mm thick Fibre Glass (60 kgs/m³) to cavity 1/2 hours : 45 dB at 100 - 3150 Hz.



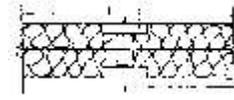
12 mm Bison Panel each side of 48 mm x 32 mm Galvanised steel studs at 610 mm centres faced with 100 mm x 12 mm Bison Panel strips with 50 mm thick Fibre Glass (60 kgs/m³) to cavity 1 hour : 52 dB at 100 - 3150 Hz.



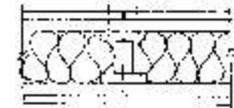
16 mm Bison Panel each side of 48 mm x 32 mm Galvanised steel studs at 610 mm centres faced with 100 mm x 16 mm Bison Panel strips with 50 mm thick Fibre Glass (60 Kgs/m³) to cavity 1 1/2 hours : 53 dB at 100 - 3150 Hz.



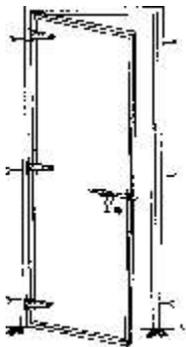
20 mm Bison Panel each side of 70 mm x 32 mm Galvanised steel studs at 610 mm centres faced with 100 mm x 20 mm Bison Panel strips with 2 layers of 50 mm thick Rock wool (60 kgs/m³) to cavity :- 2 1/2 hours : 53 dB at 100 - 3150 Hz.



Two layers of Bison Panel outer 12 mm and Inner 20 mm each side of 146 mm C stud boxed with 18 mm x 120 mm fillet at 610 mm centres with 100 mm Mineral wool *85 kgs/m³) to cavity :- 4 hours : 55 dB at 100 - 3150 Hz.



Doors



Bison Panel is excellent for doors and window shutters. It is durable and economical. The board is used both as panel inserts and as flush doors. In door shutter making the following guidelines will help to get best results.

As panel inserts

Bison Panel 8 mm, 10 mm and 12 mm are used as panel inserts depending on the size of the door. A thickness equal to 3 to 3.5 times the thickness of the panel insert is recommended for the wooden frame. This will ensure sufficient thickness of wood on either sides of the grooves. Ofcourse, the section used for the main frame is also depends on the size of door shutter.

The depth of the grooves for the panel inserts shall be 1.5 times the thickness of the panel insert. While inserting the panel in the groove, a depth of 1 to 1.5 mm is left free for taking care of expansion in the board if any.

The size of the groove should be just as much required for the tight fit of the panel.

The panel inserts shall be deep primed with a coat of primer paint in dry condition.

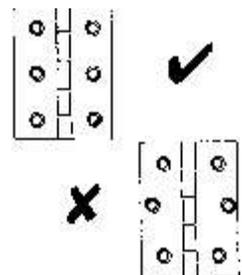
Lamination if any shall be provided on both sides of the panel inserts.

As Flush Doors

Bison Panel 16 mm thick with lipping can be directly used as door shutters. The lipping can be either with steel, timber or plastic.

When butt hinges are used wooden lipping provided for the board shall be as thin as possible to ensure maximum depth of penetration of screw into the board.

In case of light guage steel lipping, channel sections shall be preferred. This will protect the sharp edges of the board during misuse of the door shutter. Lip fixing shall be by screws, nails and also by glue.



Surface hinges or Tee hinges are preferred for Bison Panel shutters. However in case butt hinges have to be used, the screw holes of the hinges shall be located in the centre line of the thickness of the board.

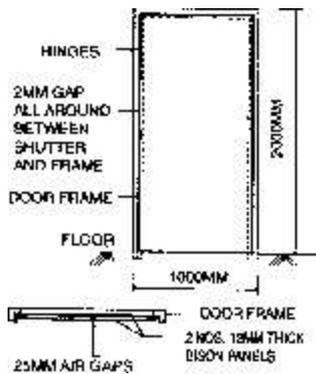
The screws shall be as thin as possible (dia not exceeding 25% of the thickness of the board) and the length of the screw shall be sufficient to allow a minimum depth of penetration i.e. 2 to 2.5 times the thickness of the board.

The board shall be deep primed either with cement primer or wood primer.

When laminated or finished with emulsion paints, same type of decoration shall be given on both sides of the board.

Fire Doors :

Bison Panels has an inherent fire resistant property, having a thermal conductivity of 0.25 Kcal/Hr/OC/M. This property can be technically utilised in the manufacture of Fire Resistant Doors.



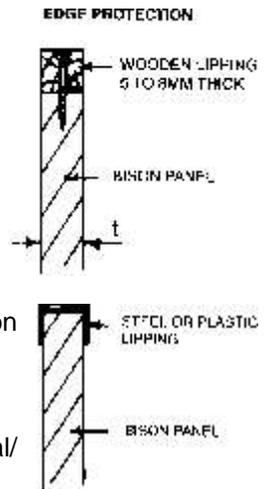
Half an hour fire resistant doors with Bison Board have been successfully tested at the Central Building Research Institute Roorkee. Shutter Frame is made out of hard wood with top, bottom, middle & intermediate rails and two vertical members, providing an air gap of about 25 mm. Bison Panels 12 mm thick, protected with a special coating are fixing on either side of the shutter frame.

Door Frame is also made of hard wood suitably painted with a special coating allround. Shutter is hung with 4 hinges from the door frame.

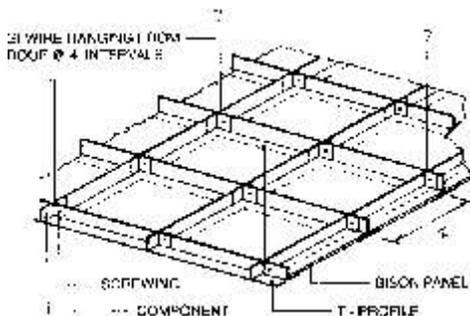
Doors to cater to fire rating up to 1 hr also can be manufactured from Bison Panel, with special insulating material mats filled in the core.

These doors are very cost effective as compared to any other fire resistant doors.

For further details, please contact the technical cell of NCL Industries Limited, Hyderabad.



False Ceilings



The ceiling system adopted for Bison Panel is the usual suspended ceiling system which has gained popularity in the building industry. The usual methods adopted for any other suspension ceiling also will hold good for the Bison Panel.

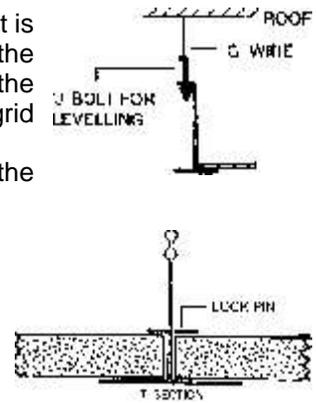
The thickness of the Bison Panel for false ceiling can be 6 mm or 8 mm depending on the requirement of thermal comfort.

The false ceiling can be either 'T' grid type or flush jointed type. In either case the longitudinal supports shall be spaced at 610 mm intervals and cross supports at 610 mm or 1220 mm centres.

Grid System

- Grid can be made either with steel or aluminium Tee sections or with timber with suitable wall line supports. The suspension arrangement can be with G.I. wires of adequate guage taken to required level from the soffit.
- Bison Panels 6 mm and 8 mm thick are recommended for false ceilings.
- The grid shall be 610 x 610 mm or 610 x 1220 mm (2'0 x 2'0 or 2'0 x 4'0.)
- In case, Aluminium T-sections are used for the grid, the minimum thickness of the section shall be 1.2 mm and size 30 x 35 mm.
- Suspenders can be either 8 swg G.I. wire or 0.7 x 12 mm G.I. flats. They are available in the market as coils.
- The maximum distance allowed between suspenders in longitudinal direction and cross direction is 1220 mm or 4'0. Closer intervals may be adopted depending on the soffit conditions.
- It is necessary to introduce a turn buckle in the suspender for easy and faster levelling of the grid. Ordinary G.I. J-bolt can serve as turn buckle.
- It is important to fix wall rest perfectly level, as the level of the entire grid depends on the level of wall rest.

- In areas where change in humidity and temperature are appreciable and frequent, it is desirable to provide a lock pin on the top of the panels to ensure structural integrity of the grid and the panel. The lock pin can be either a headless nail or a screw taken across the web of the Tee section (please refer sketch). This will avoid lifting of the Board in the grid due to thermal expansion that may take place in the material of the grid or the Board.
- Wherever the lighting points occur, extra suspenders will have to be provided to take the load of the outfits.
- The panels will have to be painted in dry condition on both sides and the ends in particular before inserting them in the grid.
- A clearance of 1-2 mm shall be given between the board and the grid on all sides for taking care of thermal expansion if any.



Fixed Ceiling

Fix light steel box section beams 100mm X 50mm and 1.6mm / 2mm thick at 4'-0 or 1220mm intervals across the walls or suspend them by means of suitable clamps fixed on the soffit.

Fix principal C studs 75 X 50 X 20 – 1.6mm thick below the beams with screws.

Fix common studs between principal studs at 4 feet intervals with suitable clamps.

The board will have to be fixed on principal joists as well as common joists with 3 to 5mm gap. The gap can be filled with Acrylic filler or polysulfide as the case may be.

Provide independent principal studs at the edge of the boards.

Painting for the board has to be done on both sides and edges.

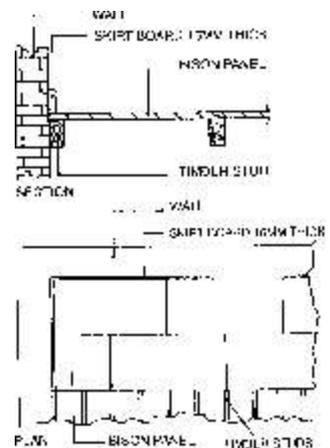
When timber studs are used the same procedure may be followed.

Floorings

Bison Panel is the first choice, in many countries, as an alternative to wooden flooring, to suit different climatic conditions - as a thermal insulating floor, as a covering for under floor heating systems, hollow flooring, floating floors and mezzanine flooring.

For application as basic flooring, the following guidelines are recommended:

1. The minimum thickness for flooring shall be with 16 mm panels.
2. The supporting rafters are to be spaced at 610 mm centre to centre or less. The edges of the boards are to be fully supported and fixed to rafters with screws at 400 mm centres. Oversize holes are to be drilled into the board for allowing expansion.
3. The supporting rafters should be of non twisting type, since the screws may be forced out by continuous traffic loads. Curved and round supports are not permitted.
4. No gaps need be given for board joints. They can be fixed flush. But, a gap of about 10 to 15 mm must be left on the periphery of the floor next to walls to allow for expansion. The gap can be concealed by a skirting board.
5. When laid, the boards should be staggered lengthwise preferably by half their length, but atleast by a third of their length from row to row, it does not matter whether they are cavity floors or floated floors.
6. The joint between the boards must always be positioned over a support. In addition to screwing, it is better to bond the joints, with alkaline resistant adhesives as this will hold the panels more firmly together and increase overall rigidity.
7. In order to avoid creaking, the edges will have to be provided with tongue and groove.



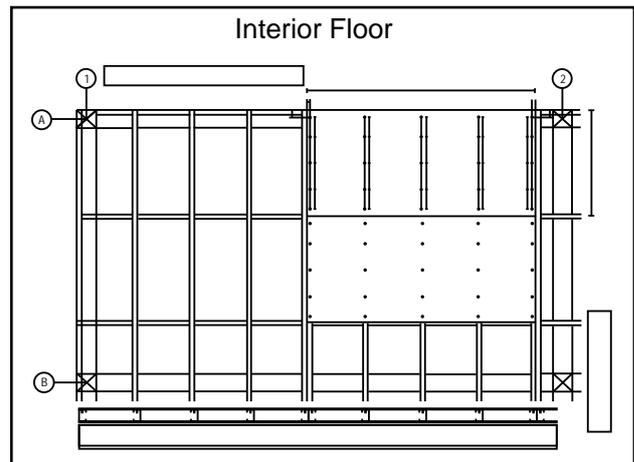
8. The choice of either steel or timber supports depends mainly on the thermal insulation, fire rating and sound insulation requirements.
9. The boards may be deep primed with a coat of primer and kept in dry condition. If damp boards are used for flooring, the water vapour will collect and will cause the floor coverings (PVC etc) to become loose from the boards.

Flooring for large areas

For large floors the gap given at periphery at the wall line may not be sufficient to accommodate the movement in the boards. So in addition to gap at the periphery of the walls, Board joints will have to be provided in the supporting frame. This is explained below.

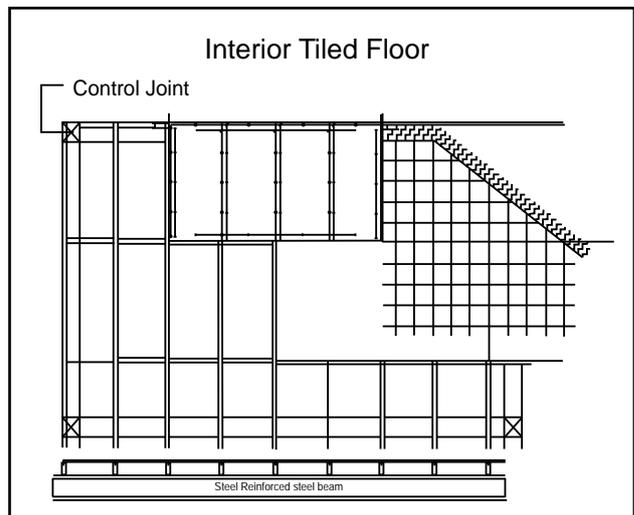
Light guage steel sections like C studs 100 X 50 X 20 – 2.3mm thick or 150 X 75 X 20 – 3.2mm thick may be selected to have required strength as per the plan of the supporting RCC beam or R.S.Js provided in the structure.

- Place Principal Joist across the beams at 60 or 40mm apart and common joists at 60 or 40mm apart as required.
- Provide independent joists at the board joints.
- Fix boards (minimum 20mm thick) only on the principal joists with a gap of 3 to 5mm.
- Fill the gap with Acrylic filler or Polysulfide.
- This will have a sliding frame effect and takes care of the movement in the board.
- Decorate the floor with lacquer spray, clear polyurethane or clear epoxy as desired.



Floors with ceramic tiles

- The minimum thickness panel shall be 20mm or 25mm.
- Light guage steel sections of 2.3 or 3.2mm thick may be selected as required.
- The Principle joists may be at 400 or 600cm and common joists at 120mm. Provide double frame at joint between boards.
- Provide control joints at 4.8 M or 6M ant also around the periphery of the room.
- Lay the boards in staggered pattern and fix the boards on principle as well as common joists.
- Use elastic tile adhesive as per the users guide for fixing the tiles. Fill the tile joints with highly elastic filler. Avoid tile fixing on board joints.
- Control joints may be filled with polysulfide or elastic filler.
- It is better if a coat of water repellent paint is given on the back side of the panels before fixing the panels on the frames.



Cement based ceramic tile fix

- When tile fixing is done with cement mortar. First a coat of water repellent paint has to be given on both the surfaces of the board.
- The tile fixing has to be done on cement mortar bed of 30mm reinforced with wire mesh.
- Tile fixing in this case can be done on the boards joints also.

Working loads

The working loads for different thickness of Bison Panel are given in the following table. As 610 mm is recommended as optimum span, loads corresponding to 600 mm may be adopted. The values given under L/300 corresponds to safe loads allowing a deflection of 1 in 300 in the board.

Safe Working Loads

Thickness in mm	Span in mm L	2 to 3 supports		Multiple supports	
		Max load Kgs/Sq.M	$\frac{L}{300}$	Max Load Kgs/Sq.M	$\frac{L}{300}$
10 mm	300	267	148	333	185
	400	150	63	188	79
	500	96	32	120	40
	600	66	19	83	24
12 mm	300	391	278	457	457
	400	220	117	257	257
	500	141	60	164	145
	600	96	83	114	84
16 mm	300	697	659	812	812
	400	392	278	457	457
	500	251	143	293	293
	600	174	35	203	199
18 mm	300	915	895	1067	1067
	400	514	421	600	600
	500	329	215	430	384
	600	228	125	266	264
20 mm	300	1088	1088	1269	1269
	400	612	543	714	714
	500	392	278	547	457
	600	272	161	317	317
30 mm	300	2411	2411	2812	2812
	400	1356	1356	1582	1582
	500	868	865	1012	1012
	600	603	539	703	703
40 mm	300	2720	2720	3182	3182
	400	1625	1625	1909	1909
	500	972	960	1142	1142
	600	680	635	795	795

Recommended Thickness

Application	Panel thickness in MM							
	6	8	10	12	16	20	30	40
Partitions	-	-	<input type="checkbox"/>	<input type="checkbox"/>	-	-	-	Special Applications
Fire Rated	-	-	-	-	-	-	-	
Partitions	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	
Wall cladings	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	
False Ceiling	<input type="checkbox"/>	<input type="checkbox"/>	-	-	-	-	-	
Facia Panels	-	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	
Floors	-	-	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Almirah Planks	-	-	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	
Furniture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	-	
Sign boards	-	-	-	<input type="checkbox"/>	<input type="checkbox"/>	-	-	
Doors	-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	

Decking

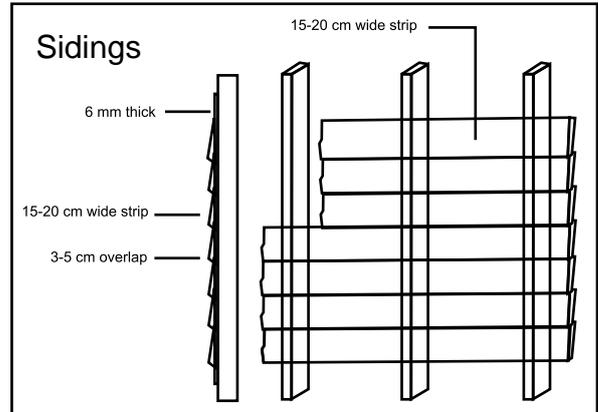
Bison Panel is ideal for Duct covers, Decking for Catwalk Bridges, Decking for operation platforms, Planking for steps, Parquet floors, Dance floors, Attics etc.,

Wall Cladding (Double Skin)

Wall cladding procedure is similar to exterior wall procedure i.e. sliding frame method. If provision for bottom and top track fixing is not possible, a box section or a hat profile may run along the wall for fixing the U – tracks.

Bison Panel Wall Siding

Panel sidings present a majestic and oriental look for the building walls. Bison Panel 12mm or 16mm thick is best for creating wall sidings. The sidings can be made with 8” to 12” widths in suitable lengths.

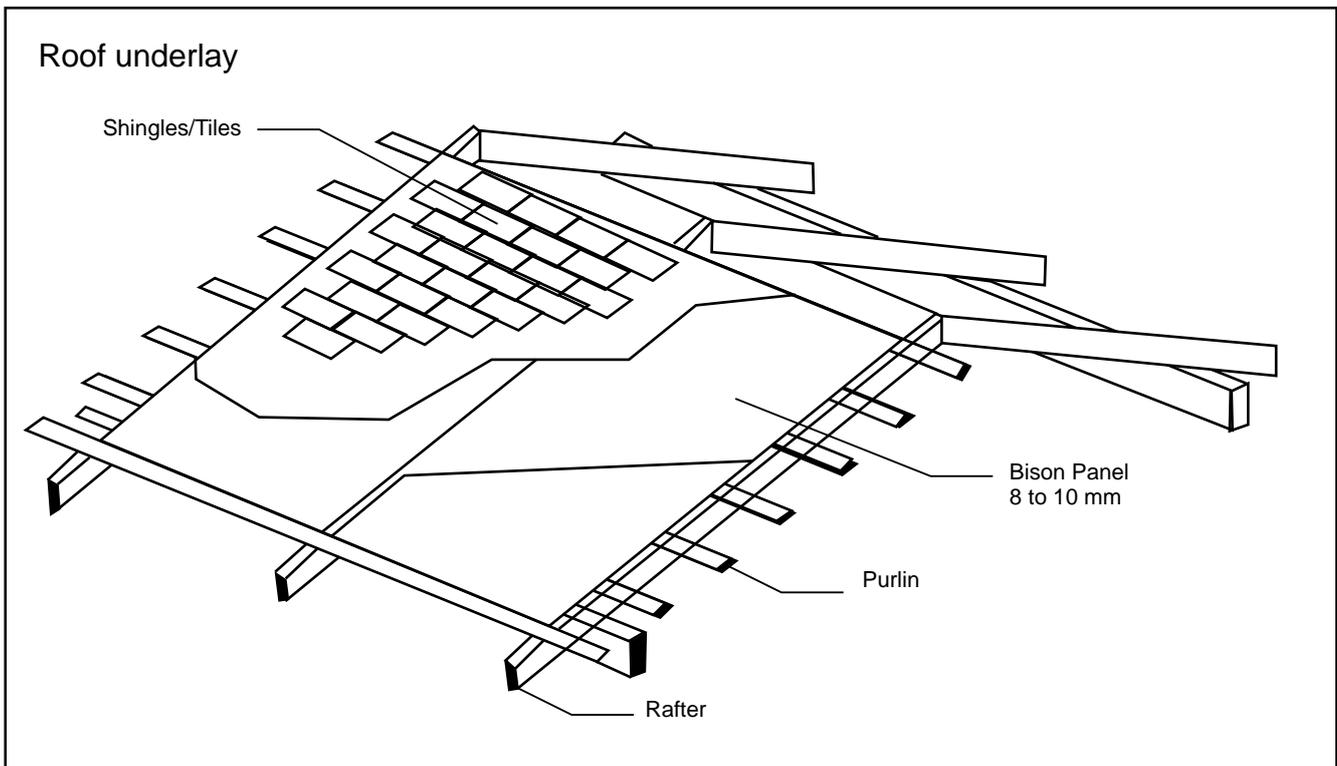


C Studs or timber studs, 2 feet or 610mm apart can be screwed to the structure. The installation can be done with an over lap of 30 to 50 mm.

For bottom most strip suitable packing equal to the thickness of the board strip can be given on the support to get required elevation. If required 8mm thick Bison panel can be used as under lay.

Roof underlays or Decking

Bison Panel 8 mm to 10 mm can be used for roof under lays or decking for fixing tiles or shingles. Roof under lays will serve to offer better thermal comfort and sound reduction. The panels are fixed on purlins over trusses spaced at designed intervals. C Sections, Box Sections or Timber Studs can be used as purlins. However spacings of trusses and purlins will have to be decided on the covering material used and as per the Structural Designer’s recommendations.



Panel Houses with Bison Panels

Bison panel is extensively used in countries abroad as the chief material for the construction of modular houses for dwelling purpose. The board is used for dry wall construction as well as on under lay for roofs.

NCL developed most innovative designs of Prefab Shelters using Bison Panel to suit Indian conditions. Thousands of shelters were supplied to many prestigious customers in the country in private and public sectors including Defence and Para military forces.



The models developed by NCL include Farm houses, Dwelling houses, Row houses, Project houses, Rest houses, Guest houses, Hill resorts, Store sheds, Pent houses, Security cabins, Mobile check posts, Industrial sheds, shelters for disaster management, Defence barracks, School buildings etc.



NCL has adopted simple track and panel system for accurate alignment of walls required for the shelters. The wall panels are inserted in bottom track fixed on foundation with screws and self expanding plugs. The panel walls, 4 feet width are inserted in 'W' profile are then aligned in the bottom track. Special panels are made to accommodate doors and windows. Another track channel is fixed on the top of the wall panels to make the walls stable.

Separate light weight steel box sections are provided as vertical posts for fixing trusses over which roof underlay sheets or GCI sheets are fixed.

The advantages of NCL Prefab shelters are many:

- The shelters are made in small components for easy transportation even to difficult terrains.
- As structures are light, they require very little foundation. They can be erected on any firm base or on stilts.
- The erection is simple and fast and requires no high skills.
- These shelters can be dismantled and re-erected with minimum loss of materials.
- They are comfortable, durable and cost effective since they save lot of project time.



Note:- NCL executes bulk orders at Project sites. Please contact NCL Prefab Division for supply or technical guidance.

BISON PANEL : VOLUME & WEIGHT				
Thickness	Volume per board		Weight per board	
	(8' x 4') 2440 x 1220 mm	(10' x 4') 3050 x 1220 mm	(8' x 4') 2440 x 1220 mm	(10' x 4') 3050 x 1220 mm
	(Cu. mtrs)		(in Kgs)	
6 mm	0.0179	0.0223	23.22	29.02
8 mm	0.0238	0.0297	30.95	38.69
10 mm	0.0297	0.0372	38.69	48.36
12mm	0.0357	0.0446	46.43	58.03
16 mm	0.0476	0.0595	61.90	77.38
20 mm	0.0595	0.0744	77.38	96.73
30 mm	0.0892	0.1116	116.06	145.08
40 mm	0.1190	0.1488	154.75	193.44

Comparison of Standards of "Cement Bonded Particle Boards

Sl. No.	Name of the Properties	ISO (8335) 1987	B.S.I. Bs 5669 Part 4 1989	Bison DIN Standads	Bison Panel (Present Result)
1.	Divisonal Tolerance: Length (mm)	± 5.0 mm	± 5.0 mm	± 5.0 mm	± 5.0 mm
2.	Width (mm)	± 5.0 mm	± 5.0 mm	± 5.0 mm	± 5.0 mm
3.	Thickness (Unsanded) 6 mm to 15 mm	6 to 12 mm ± 1.0 mm	6 to 15 mm ± 0.9 mm	4 to 10 mm ± 0.7 mm	4 to 10 mm ± 0.7 mm
	16 to 27 mm	12 to 20 mm ± 1.5 mm	16 to 27 mm ± 1.2 mm	12 to 20 mm ± 1.0 mm	12 to 20 mm ± 1.0 mm
	28 to 49 mm	20 to 40 mm ± 2.0 mm	28 to 40 mm ± 1.7 mm	22 to 40 mm ± 1.5 mm	22 to 40 mm ± 1.5 mm
	Thickness (Sanded)				
	All thicknesses in mm	± 0.3 mm	± 0.4 mm	± 0.3 mm	± 0.3 mm
4.	Edge Straightness (mm/mm)	± 1.0 mm	1/1000 mm/mm	± 3.0 mm	± 3.0 mm
5.	Squarness	± 2.0 mm	2/1000 mm/mm	± 2.5 mm	± 2.5 mm
	Mech. Characteristics				
1.	Density (Kg/m ³)	Not less than 1000 kg/m ³		1250 ± 10% kg/m ³ (Not less than 1200 kg/m ³)	1250 ± 10% kg/m ³ (Not less than 1200 kg/m ³)
2.	Bending Strengths (Modulus of rupture)	Min. 9.0 N/mm ²	Min. 10 N/mm ²	Min. 9 N/mm ²	Upto 12 mm 11.5 N/mm ² Upto 30 to 40 mm 9 to 10 N/mm ²
3.	Modulus of Elasticity (MDE)	3000/N/mm ²	4500/N/mm ²	Min 3000 mm ²	Min 3000 mm ²
4.	Swelling in thickness % 24 hours after immersion	2%	1.5% to 1.8%	Max. 1.5%	0.5 to 1.0%
5.	Tensil strength (Perpendicular to the Surface)	-	Min. 0.45 N/mm ²	Min. 0.4 N/mm ²	0.6 to 0.9 N/mm ²
6.	Moisture (%)	6 to 12%	6 to 12%	6 to 12%	7 to 11%
7.	Screw Holding(N) (a) Surface	-	-	Min 1250 N	1250 N to 1600 N
	(b) Edge	-	450N	Min. 850N	Min. 1200 N
8.	Impact Strength mm/mm	Record	20 mm/mm	Min. 18.0 mm/mm	25 mm/mm

BISON PANEL - PRECAUTIONS

1. HANDLING : Carry the Panel vertically as the Panel may break due to sag and swing if carried horizontally. Do not lift the board when it is wet.

2. STORING : Stack the boards flat on a level ground or on level supports to avoid bending of the boards due to self-weight.

3. EDGE SUPPORTS : While fixing the board on a frame work all the edges of the board are to be fully supported. Unsupported edges may chip off.

4. NAILING/SCREWING : Drill a Prehole 0.8 times Dia before Nailing or 1.2 times in dia before Screwing to avoid local cracks.

5. EDGE CLEARANCE : Nail holes shall be away from the edge of the board by a minimum of 12 mm and away from the corner by a minimum of 40 mm

6. EDGE SCREWING : Screwing through the thickness of the board is not recommended for Boards less than 12 mm thick.

7. FIXING : Fix the Panels on flat frame. Do not fix on curved surfaces like pipes.

8. PAINTING : Bison Panel can be painted with variety of paints over a thick coat of cement primer/wood primer. Painting should not be done when the board is in wet condition.

9. BALANCING : When one side of the board is painted or laminated, the other side also requires painting / lamination to arrest warping in the board.

10. JOINTS : When ever the boards are fixed on the frame, a gap of 3 to 5 mm will have to be provided between board joints to take care of the movement in the board due to atmosphere changes in humidity.



BISON Lam : Prelaminated Bison Panels are manufactured by NCL under the Brand name BISON Lam. Bison Lam contributes to exterior grade qualities like fire, water, termite and fungus resistance of the plain Bison Panel with a beautiful look and finishes of Laminated Board.

Bison Lam is available in thicknesses viz., 6 mm, 10 mm, 12 mm and 16 mm in shades like Natural Teak, Light Gray, Sea Beach and Ivory.

The Lamination surface is impermeable to moisture and highly resistant to staining from Tea, Coffee, Washing Powder, Detergents etc. The surface can be cleaned with a wet cloth.

Other Laminations Available in Market

Bison Panel can be laminated with PVC and other laminates available in market.

Procedure:

Bison Panel has to be sanded, and then a coat of PVA (Polyvinyl Acetate) glue like "Fevicol" is to be applied. The laminate thereafter should be kept pressed uniformly for 18 to 24 hours for drying.



BISON Designer Board is a top quality product with the same physical properties and virtues of NCL's highly successful Bison Panel. These boards have diverse applications ranging from partitions to False ceilings, Wall Claddings and Building Facades. The boards are available in a range of self-embossed designs. Keeping aesthetics and practicality in mind, Bison Designer Boards have been designed to complement and enhance the ambience of the structures they grace, be it an office or a home. The boards are primer coated and ready for decorative paints of your choice.

The boards are strong, durable and offer a quality finish. These boards are available in Dimensions: 10x4 (3050 x 1220mm) and Thickness : 6 mm, 8mm, 10mm, 12mm, 16mm. For more details contact the dealer.

The information presented in the document is a general guide to good practice and is no form of warranty.

Prepared by Technical Cell,
NCL Industries Ltd., (Revised : Sept., 2011)

PREFAB SHELTERS WITH BISON PANEL



**Instant
Housing
Solutions**



Cement Bonded Particle Board



Cement Bonded Particle Board



PARTITIONS



FALSE CEILING



CUPBOARDS



KITCHEN PLATFORMS



CABIN



FIXED FURNITURE



CONFERENCE ROOM



STAIR CASE



WARD ROBE



FLOORING

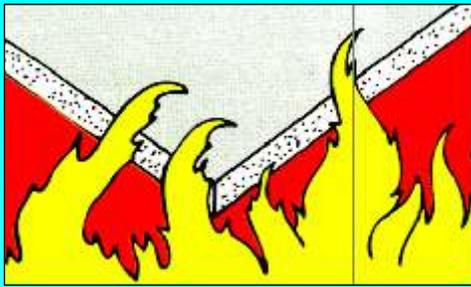


BOOK RACK



WALL CLADDING

From floor to roof and everything in between



FIRE RESISTANT



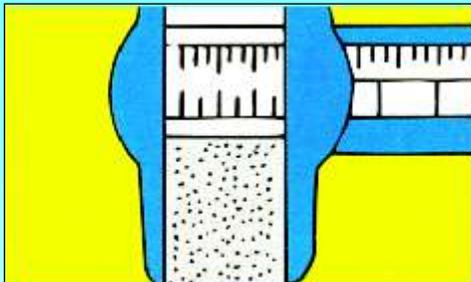
WEATHER RESISTANT



TERMITE RESISTANT



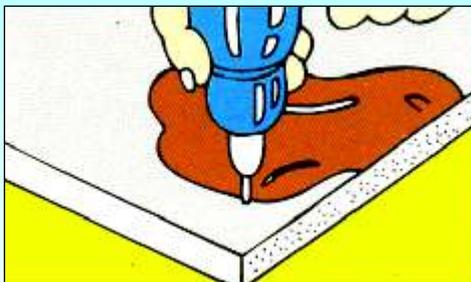
SOUND INSULATION



DIMENTIONALLY STABLE



SMOOTH SURFACE



WOOD WORKABILITY



CHEMICALLY STABLE



NCL INDUSTRIES LTD.
(Boards Division)



7th Floor, Raghava Ratna Towers, Abids, Hyderabad - 500 001.

Ph: +91 40 2320 3637, Fax: +91 40 2320 3417

Email: boards@bisonpanel.com Website: www.nclind.com

Helpline: 09390861880