

# NAV LiteBoard Technical Manual

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# NAV LiteBoard

## 1. Technical Data

	Test method	Unit	Thickness		
			19mm	38mm	50mm
Material class	DIN 4102-1			B 2	
	DIN EN 13501-1			D-s2, d0	
Formaldehyde emission class	EN120			<< E 1	
Density		kg/m <sup>3</sup>	480-500	400-450	430-450
Density variation		kg/m <sup>3</sup>	+/- 30		
		%	+/- 7	+/- 7.5	+/- 8
Length and width tolerances	EN 324-1	mm/m	+/- 5		
Thickness tolerances	EN 324-1	mm	+/- 0.3		
Right-angled	EN 324-2	mm/m	2		
Edges	EN 324-2	mm/m	1.5		
Curve		mm/m	≤2		
Humidity	EN 322	%	9 +/- 4		
Bending strength (MOR)	EN 310	N/mm <sup>2</sup>	5.5	6.0	6.0
Internal bond	EN319	N/mm <sup>2</sup>	0.18	0.18	0.2
Surface soundness	EN 311	N/mm <sup>2</sup>	0.6	0.8	0.8

## 2. Technical Properties

### - Comparisons between particle board and NAV LiteBoard

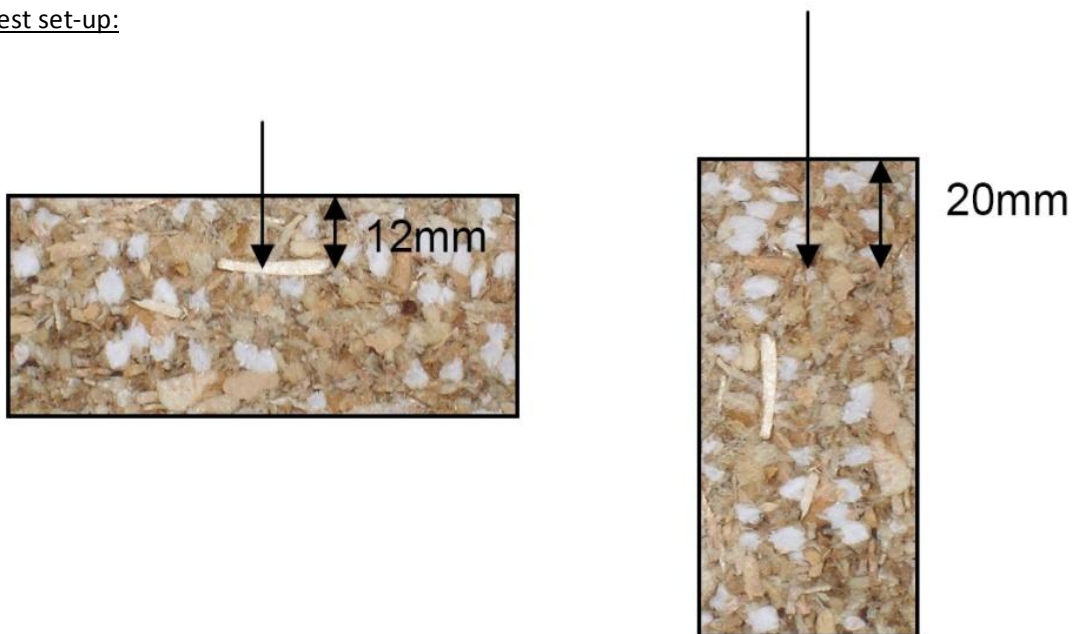
	Test	Unit	Thickness					
			19mm		38mm		50mm	
			Particle board	NAV LiteBoard	Particle board	NAV LiteBoard	Particle board	NAV LiteBoard
Raw density		kg/m <sup>3</sup>	620-650	450-500	620-650	400-450	620-650	400-450
Raw density tolerance		kg/m <sup>3</sup>	+/- 30					
		%	+/- 7		+/- 7.5		+/- 8	
Bending strength	EN 310	N/mm <sup>2</sup>	13	7.8	8.5	6.3	7	5.0
Internal bond	EN319	N/mm <sup>2</sup>	0.3	0.18	0.2	0.18	0.2	0.2
Surface soundness	EN 311	N/mm <sup>2</sup>	0.8	0.6	0.8	0.8	0.8	0.8

### 3. Basic Technical Data

#### 3.1 Screw extraction strengths

(Tested using the internal testing procedures developed by Nolte Möbel in Germany, based on EN 120 and the AMK data sheet)

Test set-up:



Example: Comparison of normal particle board with NAV LiteBoard, 38mm.  
Euro screw 5.0x30, pre drilled with 5mm drill.

	Extraction N
Surface – NAV LiteBoard	640
Surface – particle board	998
Edge – NAV LiteBoard	325
Edge – particle board	860

**Table 1: Comparison of screw extraction strengths – NAV LiteBoard vs. normal particle board**

Comparison: Euro screws – Spax screws

During the tests it was demonstrated that the use of Euro screws in place of Spax screws of the same size achieved an improvement in screw extraction strength of 20-30%

Example:        32mm particle board  
                      Euro screw 5.0x30mm, pre-drilled with 5mm drill  
                      Spax screw 4.0x30mm, pre-drilled with 4mm drill  
                      16mm screw-in depth

	Extraction N
Surface – Euro screw	494
Surface – Spax screw	410
Edge – Euro screw	228
Edge – Spax screw	160

**Table 2: Comparison of screw extraction strengths – Euro screw vs. Spax screw**

High quality parallel threaded screws are suggested for use with NAV LiteBoard - such as Häfele Hospa and Varianta screws, or Hettich Profix and Euro screws.

The length of the screws is an important decision. When fixing fittings into the edge of NAV LiteBoard, such as internal door hinges, using a longer screw will be beneficial. Häfele Hospa 4.5 x 60mm screws and hinges are a good combination for hanging internal doors.

When using Varianta or Euro screws, pilot holes are essential to avoid splitting of the surface layer of NAV LiteBoard. Once a screw has been set, do not over tighten as this may reduce the screws hold.

Screw positioning should be considered when fixing near the panels edge. Do not screw closer than 30mm to a corner, and 15mm to an edge.

If it is possible, from a design point of view, to double the screw-in depth of the screw into NAV LiteBoard, tests show that it achieves screw extraction values approaching those for standard particle board.



### 3.2 Other fittings technology

In our experience, NAV LiteBoard can be used with the standard fittings commonly used with normal particle board as, unlike honeycomb board, it has a solid core layer that provides purchase for the fittings.

Tests have shown that “Excenter fittings” are preferable to “defix fittings” in order to prevent fractures in the core layer.

The use of expansion anchors is recommended, for example - when mounting concealed hinges, in order to increase purchase in the board.

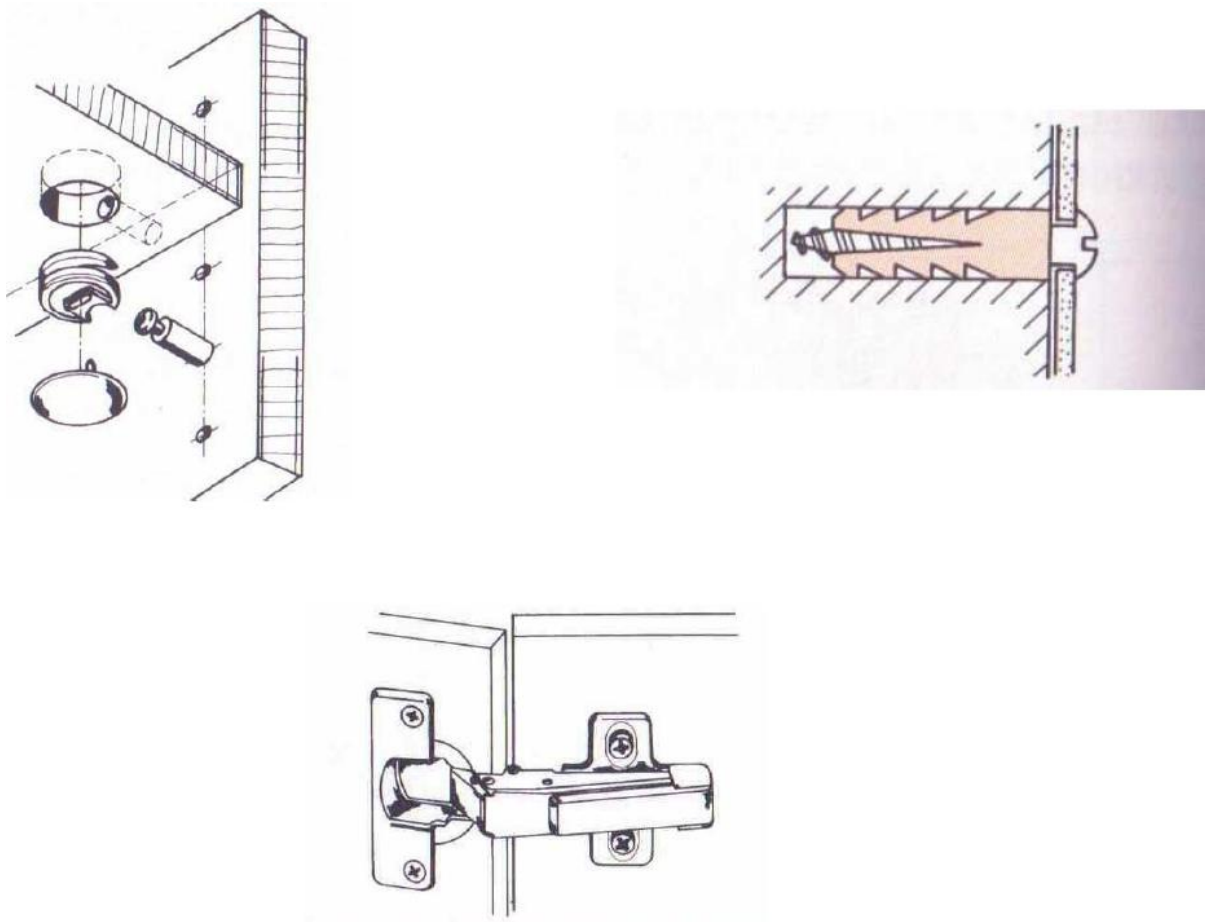


Figure 1: Sample fittings: Excenter (top left), expansion anchor with half-round screw (top right), concealed hinge (bottom)

Internal tests assessed the use of different types of connecting screws and thread inserts commonly used in the furniture industry and compared the results for NAV LiteBoard to those for normal particle board.

These tests have shown that the extraction strengths for normal particle board are on average approximately 30% better than for NAV LiteBoard. Nonetheless, the fittings grip the board well.

Glue-in thread inserts achieved very good results and are therefore particularly recommended.



Figure 2: Test design: Extraction of an extraction anchor



Figure 3: Glue-in thread insert after extraction tests in normal particle board and NAV LiteBoard

Accompanying long-term tests were conducted by Hettich in Germany. These included load cycle tests using NAV LiteBoard.

Both test series produced positive results.

The tested doors were still fully functional after the load cycle test.

No screws had come loose or twisted.

## 4. Fabrication

### ***4.1 Feeding of processing plants***

NAV LiteBoard is suitable for use with push-feeding systems in processing plants. However, for thick boards it is important to ensure that the transfer finger is sufficiently thick – otherwise there is a danger of fractures in the coating layer. For suction of the raw boards, it is necessary to adjust parameters such as air flow, pumping speed, number of suction cups and cross-section for the NAV LiteBoard. This is important as otherwise there is a danger of the cups sucking through the board due to its more porous surface. This does not apply to coated boards, which can be suctioned without difficulties. Generally, a vacuum blower is more suitable than a vacuum suction cup or ejectors.

Our supplier is successfully using a directly operated vacuum blower for high suction volume, manufactured by Schmalz, who also provided support in conducting a number of tests.

The vacuum blower has the following specifications:

- Pumping speed: 310m<sup>3</sup>/h
- Vacuum: -420 mbar
- Nominal output: 4.0 KW

The minimum air throughput per suction cup of 10-12 m<sup>3</sup>/h is another useful orientation value. There is no general rule of thumb for the feeding of processing plants using vacuum suction, as equipment and conditions vary and must therefore also be evaluated separately.

## 4.2 Surface finishing

Finish film with hot-melt adhesive	Very stable finish; for processing with standard equipment under the normal temperature and pressure conditions
Finish film with 2-component urea resin	Very stable finish, process with somewhat increased quantity of urea and higher pressure
Finish film with PVAC glue	Process with somewhat increased quantity of glue and higher pressure
Coating	Very stable finish: for processing with standard equipment; Edge: prior sealing of the core layer with UV putty or a blind edge is absolutely essential. More hot-melt adhesive or putty is required due to the coarser composition of the core layer.
HPL/CPL	Easy to process: Regrinding is required to improve the stability of the edge
Painting – Spray paint	Increased quantity of paint required due to more porous coating layer, increased quantity of primer and base colour required
Painting – Direct painting	Increased quantity of paint required due to more porous coating layer, increased quantity of primer and base colour required
Veneer	Somewhat increased quantity of PVAC glue required, easy to process
Melamine/KT	Easy to process; Important: For pressure-regulated controls, reduce the processing pressure

**Table 3: Comparison of coatings with NAV LiteBoard**

### 4.3 Cutting

NAV LiteBoard can be cut to size and milled on all standard wood working machines using the tools commonly used for particle board. There is no additional fouling of cutting tools.

Both hard metal and diamond-equipped tools can be used. No excessive adhesions are visible on the blade even after longer periods of operation.

To avoid fractures in the coating layer, NAV LiteBoard should always be sawn using a scoring saw, fractures in the core layer are avoided by using a protective saw where the saw blade exits. Likewise, the use of a protective cutter is also recommended. New, sharp tools should also be used to prevent fracturing of the edges.

Any sawdust and waste created are easily removed via existing extraction systems – in contrast to PVC; no separate extraction system is required.



Figure 4: Sectional view of NAV LiteBoard (above) and a normal particle board (below) with thick edge

#### 4.4 Edging

Edge processing is possible without major difficulties on standard edging lines. However, fine adjustments must be made to power units, fittings, tools and feeders.

<b>Thin edge/Flat edge (up to 1.0mm) with unglued edging</b>	The use of a weak filled adhesive is recommended, application of somewhat greater quantity with normal temperature and pressure conditions
<b>Thick edge (up to 3.0mm) with preglued edging</b>	Very stable finish, highly recommended for thicknesses from 22mm; application of the thick edge prevents possible fractures in the core layer; somewhat greater quantity of hot-melt adhesive required → outstanding binding of the edge
<b>Veneer edge with PVAC glue</b>	Slightly greater quantity of glue required, after grinding the edge quality is comparable with that of particle board
<b>Veneer edge with hot-melt adhesive</b>	Slightly greater quantity of glue required, after grinding the edge quality is comparable with that of particle board
<b>ABS / PVC</b>	Processing is easy with slightly greater quantity of glue required, achieves a good edge quality due to the strength of the material

Table 4: A variety of possible edgings

Edges can also be finished on all standard equipment.

A grooving cutter with bevel is recommended for cutting grooves. An adequate distance to the edge must be ensured to prevent the edge cracking. Double-sided grooves can also be produced.



Figure 5: NAV LiteBoard 16mm, cross-section with cut groove

#### **4.5 Test series “Edging” conducted in partnership with HOMAG**

A close partnership was also maintained with Homag in relation to the edging tests conducted at Nolte Möbel. The results of these tests are presented in the following section:

NAV LiteBoard was subjected to a number of test series both on throughfeed and stationary machines. The results of these tests were presented to us by HOMAG.

##### ***Throughfeed machine (using example of Optimat KAL310)***

Feed rate: 20m/min

Temperature: 145°C

Adhesive: Unfilled hot-melt adhesive

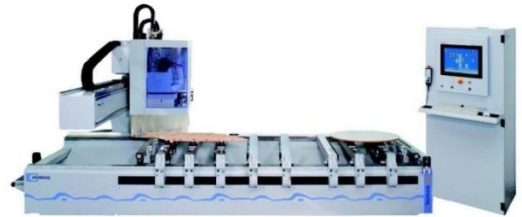
##### ***Stationary machine (using example of Optimat BAZ322)***

Vacuum pump: 140m<sup>3</sup>/h

Work table

Tools with cutters drawing to the centre of the board (prevents fractures in the coating layer)

**Results in brief:**



		Throughfeed Machine	Stationary Machine
Coated with melamine and/or lining film	Thin edge/ Flat edge	Increased quantity of glue required. Very good adhesion. For material thickness greater than 40mm, the core layer pushes somewhat. Thick edge recommended.	Increased quantity of glue required. The core layer fractures a little in the corner areas. The corners are not adequately compressed by the edge.
	Thick edge	Increased quantity of glue required. Very good edge adhesion. Highly recommended for material thicknesses greater than 40 mm.	Increased quantity of glue required. Recommendation: Saw edges straight or approach the corners from outside (counter direction).
Uncoated	Thin edge/ Flat edge	Increased quantity of glue required. Very good edge adhesion. For material thicknesses greater than 40 mm, the edge finish becomes a little unstable. Thick edge recommended.	Uncoated boards should be processed on a nesting machine. Vacuum rating <math><250\text{ m}^3/\text{h}</math>
	Thick edge	Increased quantity of glue required. Excellent edge adhesion. Edge adhesion is also very good with thick materials	Uncoated boards should be processed on a nesting machine. Vacuum rating <math><250\text{ m}^3/\text{h}</math>

Table 5: Results of test runs on edge materials



**Thin Edge:** Edge thickness 1.0mm. Tests conducted using hot-melt adhesive and melamine, ABS and acrylic edge banding.



**Thick Edge:** Edge thickness up to 3.0mm. Tests conducted using hot-melt adhesive and melamine, ABS and acrylic edge banding.

Figure 6: Thin and Thick edge with NAV LiteBoard

## **4.6 Design notes**

Like particle board, NAV LiteBoard already has a basic deflection due to its own weight. This can be countered using suitable design solutions.

To achieve especially good bending strength, substructures or concealed edge band should be used.

Static load tests (deflection caused by a load of 63kg over 28 days) conducted by CS Schmal showed that NAV LiteBoard has good deflection properties: for a board length of 1200mm, the test board showed a deflection of 3mm.

# **5. Environment**

## **5.1 Formaldehyde emissions**

NAV LiteBoard is manufactured just like normal particle board with E1 glue systems.

It is therefore below the threshold value of 8mg/100g set for E1 boards and calculated using the perforator method (according to DIN120).

The formaldehyde analyses have shown that formaldehyde emissions from NAV LiteBoard are even lower than those from particle board (on average between 4.0 and 5.0mg/100g).

# **6. Contact**

## **6.1 Head Office**

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