



# Technical Data Sheet

## NM Laminering 650

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Sida 1 av 3

### General Description

**NM Laminering 650** is a two pack, solvent-free, epoxy laminating system with a high TG and very high strength values.

Wetting and adhesive properties are very good to all kind of fibres.

**NM Laminering 650** can be used for both injection and hand lay-up. Pot life is extremely long, which means that it is possible to work with large objects without problems. The system with **NM Härdare 650 F** can be accelerated with **NM Accelerator 254**. **Accelerator is not recommended for injection due risk of blistering.**

**NM Laminering 650** has a very low vapour pressure and therefore, the system is almost odourless. Vacuum gives no gas in combination with **NM Härdare 650 B**, **NM Härdare 650 M** or **NM Härdare 650 F**.

### Processing Instructions

The mixture of components is very important, poor mixing may results in soft spots.

Mix thoroughly in a container, transfer the mixture into a clean container and mix further. Dosage should always be made on a scale with sufficient accuracy or a well calibrated dosage system.

Application is best done with a roller, but can also be done with a brush

### Surface Preparation

Film forming release agent is recommended, for example Marbocote 220. Wax-based release agents are normally not recommended and test should be performed before use of these types.

### Curing

Curing can take place at room temperature or as a post-curing at elevated temperature.

**NM Laminering 650** should first cure at room-temperature (20 – 23°C / 68 – 73°F) for 16 - 24 hours before post-curing.

A typical curing cycle could be one day at 23°C / 73°F and then a post-cure at 50°C / 122°F for 16 hours, or alternatively four hours at 100°C / 212°F.

It is important that the temperature is ramped up slowly to the final curing temperature. Normal increases are between 0.1 - 0.3°C per minute. It is often a combination of thickness and laminate structure, which determines the speed. The optimum cure cycle must be determined for each case.

**NM Laminering 650** can be stored for a longer period at room-temperature and be post-cured later.

**NM Laminering 650** can be used in combination with our hardener:

**NM Härdare 650 B**, approx. 180 min. pot-life. [Normal]

**NM Härdare 650 F**, approx. 90 min. pot-life.

**NM Härdare 650 M**, approx. 120 min. pot-life.

### Completion Work

By hand lay-up, it is important that before further treatment as laminating, filling, etc. occurs, it is done when the surface is still tacky.

A dry surface must be sanded to ensure adhesion to the next layer.

## Typical Properties

<b>Resin</b>	NM Laminering 650
<b>Hardener</b>	NM Härdare 650 B NM Härdare 650 M NM Härdare 650 F

### Mixing ratio:

Resin – Hardener 100 – 35 by weight

*Density:* 1096 kg/m<sup>3</sup>

*Viscosity:* 0.36 Pa·s

*Dry content:* 100%

	<b>NM Härdare 650 B</b>	<b>NM Härdare 650 M</b>	<b>NM Härdare 650 F</b>
<i>Pot life 100 g 20°C / 73°F:</i>	>180 minutes	120 minutes	90 minutes
<i>+5% NM Accelerator 254:</i>	20	17	13 minutes
<i>+10% NM Accelerator 254:</i>	10	9	7.5 minutes (only 50 grams)

### Development of T<sub>G</sub>

<i>24 h, 23°C / 73°F:</i>	32°C / 90°F	41°C / 106°F	45°C / 113°F
<i>7d, 23°C / 73°F:</i>	55°C / 131°F	55°C / 131°F	55°C / 131°F
<i>7w, 23°C / 73°F:</i>	71°C / 160°F	63°C / 145°F	63°C / 145°F
<i>16h, 50°C / 122°F:</i>	71°C / 160°F	71°C / 160°F	73°C / 163°F
<i>16h, 60°C / 140°F:</i>	81°C / 178°F	83°C / 181°F	84°C / 183°F
<i>16h, 60°C + 2h 100°C / 212°F:</i>	101°C / 214°F	94°C / 201°F	90°C / 194°F

### Flexural strength

<i>7 days at 23°C / 73°F:</i>	91.5 MPa	91 MPa	91 MPa
<i>16 hours at 50°C / 122°F:</i>	116 MPa	116 MPa	120 MPa
<i>16 hours at 60°C / 140°F:</i>	123 MPa	123 MPa	—

### E-modulus

<i>7 days at 23°C / 73°F:</i>	3.3 GPa	3.2 GPa	3.1 GPa
<i>16 hours at 50°C / 122°F:</i>	2.9 GPa	2.8 GPa	2.7 GPa
<i>16 hours at 60°C / 140°F:</i>	2.9 GPa	—	—

### Tensile strength

<i>7 days at 23°C / 73°F:</i>	69 MPa	69 MPa	—
<i>16 hours at 50°C / 122°F:</i>	70 MPa	70 MPa	—
<i>16 hours at 60°C / 140°F:</i>	72 MPa	72 MPa	—

### Elongation at break

<i>7 days at 23°C / 73°F:</i>	6.4 %	6.3 %	—
<i>16 hours at 50°C / 122°F:</i>	6.0 %	6.0 %	—
<i>16 hours at 60°C / 140°F:</i>	6.0 %	6.0 %	—

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**Water absorption**

*Sample cured 7 days at 23°C / 77°F*

24 hours:	+0.13 %	+0.13 %	+0.16%
7 days:	+0.43 %	+0.44 %	+0.44%

*Sample cured 16 hours at 50°C / 122°F*

24 hours:	+0.09 %	+0.10 %	+0.14%
7 days:	+0.37 %	+0.38 %	+0.40%

*Sample cured 16 hours at 60°C / 140°F*

24 hours:	+0.11 %	+0.12 %	+0.14%
7 days:	+0.40 %	+0.42%	+0.39%

**Properties of cured laminate**

*Test pieces made of 4 layers 290 gram twill.*

**Flexural strength**

7 days at 23°C / 77°F	465 MPa	462 MPa	—
16 hours at 60°C / 140°F:	501 MPa	505 MPa	—

**E-modulus**

7 days at 23°C / 77°F:	16 GPa	15.7 GPa	—
16 hours at 60°C / 140°F:	16 GPa	15.8 GPa	—

Colour:	Transparent
Normal packing:	27.0 kg
	6.75 kg
	1.350 kg

Cleaning solvent: Acetone

*Flexural strength and E-modulus according to ISO 178.*

*Tensile strength and elongation at break according to ISO 527.*

*Water absorption according to ISO 62.*

*T<sub>g</sub> measured according to DSC 20K/min*

**Disclaimer**

This product's technical specifications are developed by experience in field and laboratory by us.

We reserve the right to change products as well as data. Current data sheets are available at our website and with us. We cannot assume responsibility for use in areas that we do not know. The user shall always evaluate products for their intended use and we guarantee only the material properties. For every product we offer reference objects separately.