

## LAMINATING

FOR COATING, LAMINATING,  
THERMOBONDING & FUSING



- ▶ Combine two, three or even more substrates
- ▶ Dry process
- ▶ Product changeovers within minutes



## WITH A KLIEVERIK YOU ALWAYS MAKE THE RIGHT CHOICE

There are many, many details that go into a Klieverik calender with a specific purpose in mind. These details culminate into a world class belt calender which precisely controls the critical variables of temperature, pressure and web handling during the laminating, coating, fusing or thermobonding process.

Our calenders use thermal oil for regulating and accurately maintaining the drum's surface temperature delivering precise thermal conduction heat. We use a unique expansion vessel for the oil (which expands up to 20% when heated) insuring that the drum is always 100% full of oil. This design, in junction with how we circulate the oil internally within the drum, means no temperature variations over the width or in time.

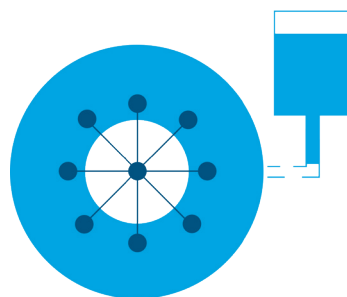
# LAMINATING, COATING, THERMOBONDING AND FUSING

You will get the perfect match for your production requirements as coating, laminating, fusing and heat-setting can all be done on the same machine. The Klieverik LFC calender is the most versatile concept in the market.

By using simple laws of thermodynamics, our heating elements are in direct contact with the thermal oil leading to shorter heating up times and higher energy efficiency.

Klieverik's LFC calenders are equipped with a high temperature resistant belt made out of Nomex material. The belt can be coated with a proprietary silicone which prevents pollution and allows for easy cleaning. The heating drum is covered by Teflon sheets or coating, ensuring optimal releasing properties of the product.

## Directly heated drum



Klieverik heated drum: a unique concept. Completely filled with oil because of expansion vessel. Directly heated because heating elements are directly in the oil. Best temperature consistency due to thorough mixing of the oil.

## SPECIFICATIONS

TYPE	DRUM WIDTH MM*	WORKING WIDTH MM	DRUM WIDTH INCH	WORKING WIDTH INCH	HEATING CYLINDER DIAMETER MM	HEATING CYLINDER DIAMETER INCH	MECHANICAL SPEED M/MIN (STANDARD)	MECHANICAL SPEED FT/MIN (STANDARD)
LFC-101	1850 - 3500	1650 - 3200	72.8 - 137.8	64.9 - 125.9	365	14.4	0.2 - 15	0.65 - 49.2
LFC-111	2000 - 3500	1800 - 3200	78.7 - 137.8	70.9 - 125.9	500	19.7	0.2 - 20	0.65 - 65.6
LFC-131	2000 - 6000	1800 - 5700	78.7 - 236.1	70.9 - 224.4	760	29.9	0.2 - 40	0.65 - 131.2
LFC-141	2000 - 6000	1800 - 5700	78.7 - 236.1	70.9 - 224.4	1070	42.1	0.2 - 40	0.65 - 131.2
LFC-151	2000 - 6000	1800 - 5700	78.7 - 236.1	70.9 - 224.4	1350	53.1	0.2 - 60	0.65 - 196.9
LFC-171	2000 - 6000	1800 - 5700	78.7 - 236.1	70.9 - 224.4	1800	70.9	0.2 - 80	0.65 - 262.5

\*Standard width: 1850/2000 - 2750 - 3500 - 4000 - 4500 - 5000 - 5500 - 6000

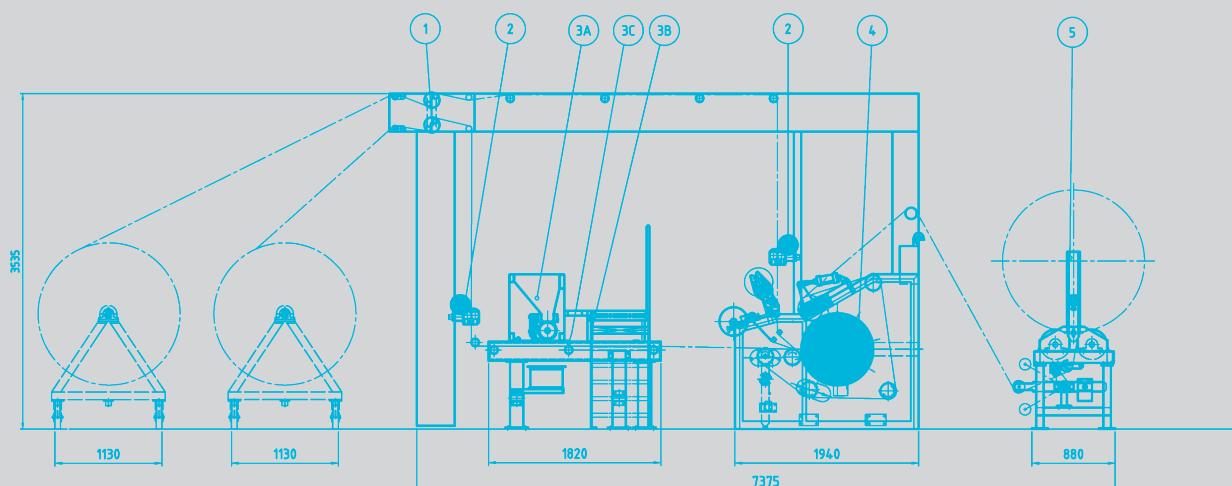
## LAMINATING CALENDERS MODEL LFC

Our complete LFC range of belt calenders can be customized to meet your specific production needs for any technical textile lamination. Our thermo processing expertise allows for two or more substrates to be combined under the influence of precise temperature, pressure and dwell time, resulting in the highest quality end products. The adhesion between the substrates can be obtained by the inherent thermoplastic characteristics of the substrates themselves or by adding thermoplastic adhesives in the form of films, webs or powders.

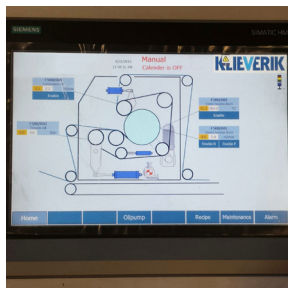


Klieverik belt laminators are delivered in drum widths from 1850 mm to 6000 mm and are capable of reaching (increased) line speeds up to 100 meters per minute. We offer solutions from stand-alone calenders which can be inserted/added to existing production lines or we can provide the entire laminating production line.

## LAY-OUT



## PROCESS AUTOMATION



Our equipment may be executed with PLC/operator touch screen control. This useful feature will allow you to set your desired critical machine settings as programmable stored recipes. It will also allow you to store process data for internal Quality Control or tracking production history. In addition, wireless

capabilities enable us to troubleshoot technical issues remotely anywhere in the world where the machine is located and WIFI is available.



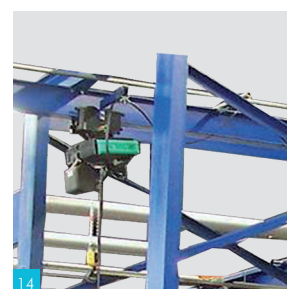
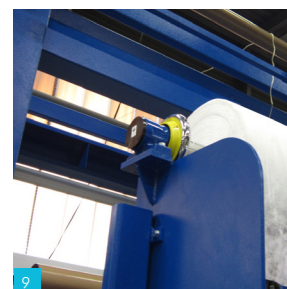
## OPTIONS MODEL LFC

Options:

- 1 Cooling rollers
- 2 Pressure roller outside the belt
- 3 Calibrating roller with Nip setting
- 4 Teflon seamless coating for heating drum
- 5 Forced internal oil circulation for highest accuracy
- 6 External heating/gas boiler in lieu of using electrical heating
- 7 Exhaust hood

Complete Production Line Options:

- 8 Unwinds and winding for substrates
- 9 Unwinds for films and webs, with tension controlled options possible
- 10 Seldedge guiders, lath or cord stretch rollers, steering frame
- 11 Accumulators or scrays for continuous nonstop processing
- 12 Cutting equipment
- 13 Inspection table
- 14 Platforms, cranes for roll handling
- 15 PLC operating system



## LAMINATING CALENDERS MODEL LFC - ECOSAFE

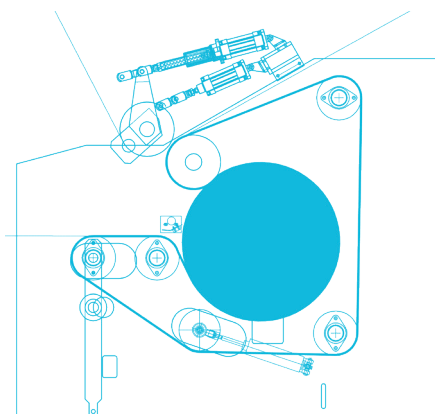
We have developed a special execution of the laminating calender with a modified web path: The Ecosafe calender. The Ecosafe is suitable for thick substrates, substrates that are sensitive to heat or pressure and/or high speed lamination. The Ecosafe concept combines adhesive application at high speed and minimal use of energy with the subsequent laminating of the second substrate outside the calender. The Ecosafe can operate with any type of thermoplastic adhesive powder, film or web and creates a very versatile and highly productive line.

## FEATURES ECOSAFE CONCEPT

- 1 Cost effective due to high speed, minimal consumption of energy and adhesive
- 2 Versatile in usage: use with or without Ecosafe extension
- 3 Ecosafe web path makes all types of lamination materials possible even rigid materials
- 4 Eco friendly alternative to flame bonding: no toxic fumes, untreated and thus lower cost foam can be processed.



## THE ECOSAFE IS AVAILABLE IN 3 DIFFERENT LEVELS OF EXECUTION

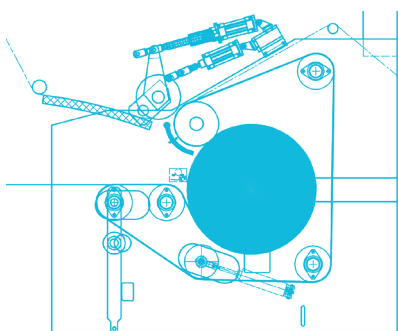


### ECOSAFE - L

**Cost effective solution for laminating a stable, basic substrate to a lightweight top substrate with the use of an adhesive with a long open time, consisting of:**

- 1 Speed increase of laminating line
- 2 Laminating roller on the belt
- 3 Pneumatic pressure setting for this laminating roller
- 4 Teflon sheet covering of the roller
- 5 Additional guiding roller for the basic substrate

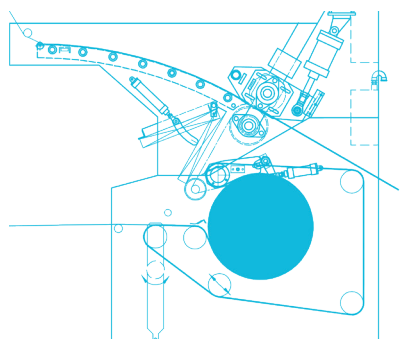




## ECOSAFE - B

**Extended solution for laminating stable, basic substrates, to thick top substrates and all kind of adhesives, consisting of:**

- 1 Speed increase of laminating line
- 2 Laminating roller on the belt
- 3 Pneumatic pressure setting for this laminating roller
- 4 Teflon sheet covering of the roller
- 5 Additional guiding roller for the basic substrate
- 6 IR conditioning unit to keep the adhesive open on the basic substrate
- 7 Electrically heated conditioning plate for the top substrate to prevent an adhesive cold shock



## ECOSAFE - C

**Complete Ecosafe solution suitable for all kinds of (tension) sensitive substrates and all kinds of adhesives, with a very high degree of evenness over the adhesive melting process, consisting of:**

- 1 Forced internal oil circulation for highest accuracy
- 2 Teflon seamless coating for the heating drum
- 3 Speed increase of laminating line
- 4 Tension control with measure roller for basic substrate
- 5 IR conditioning unit to keep the adhesive open on the basic substrate
- 6 Electrically heated conditioning plate for the top substrate to prevent an adhesive cold shock
- 7 Set of separate driven laminating rollers
- 8 Pneumatic pressure or NIP setting (0-50 mm)

## LAMINATING CALENDERS

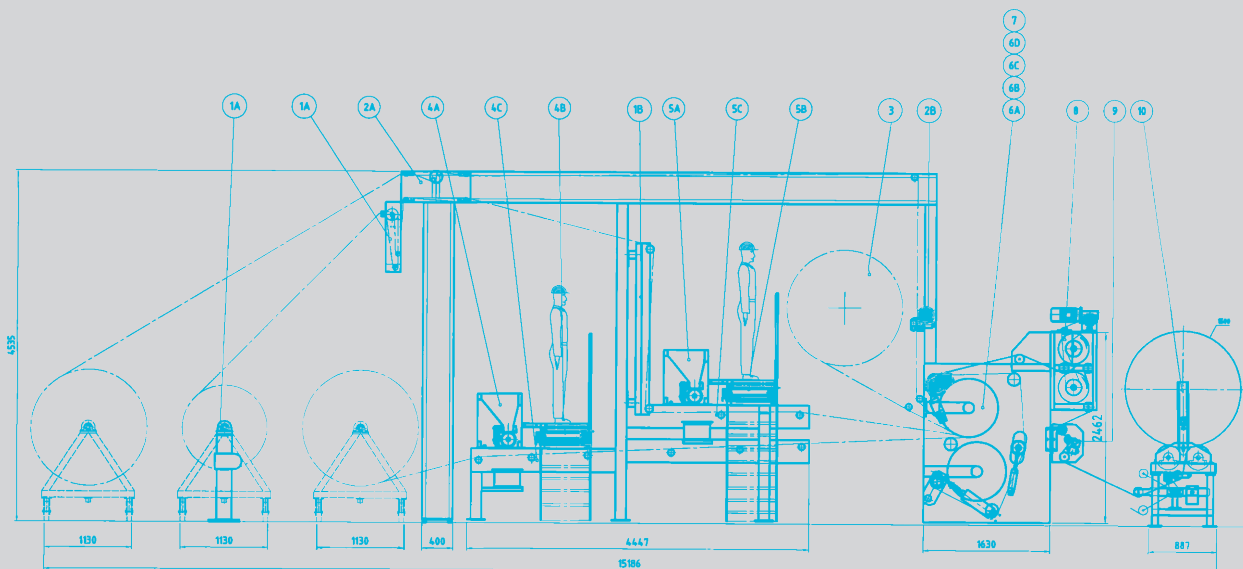
### MODEL LFC - DOUBLE DRUM

Another special execution of the LFC calender is the double drum calender. This execution has been designed to laminate multiple layers or to make a surface treatment on both sides of a substrate. It consists of two individually heated and controlled drums. The upper drum is the normal LFC calender

configuration and can be used for coating or laminating various substrates. The additional lower drum is used to add and store heat energy in the belt of the calender. This heat energy is then released when the belt runs upwards around the upper drum.



LAY-OUT

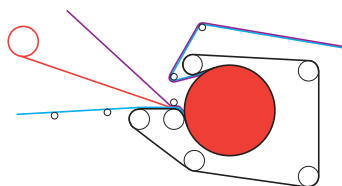




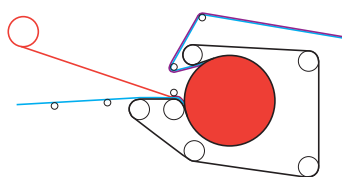
## LAMINATING AND COATING EXECUTIONS

### With films or webs

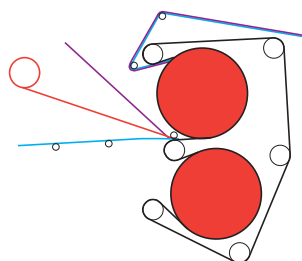
Laminating



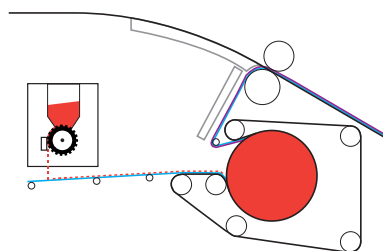
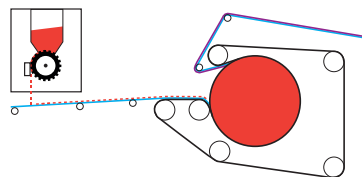
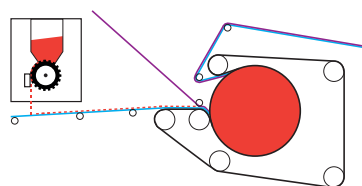
Coating



Special executions



### With powder



## POWDER SCATTERING DEVICE

Our Powder Scattering Device (PSD) has a specially designed applicator roller surface to ensure a regular scattering of any commercially available thermoplastic adhesive powder (approx. 80-500  $\mu$ ). The required amount of powder adhesive can be set with ease and this setting is then synchronized with the speed of the production line. Low amounts of just a few gr/m<sup>2</sup> for cost effective laminating or high amounts of powder for full surface coating are possible with the same

applicator roller: independent of the polymer type; EVA, PE, PA, PES, TPU etc.

An oscillating brush with stainless steel needles ensures a complete removal of the powder from the rotating applicator roller. The required working width can be adjusted to be step-less and asymmetric if required over the complete width. A bin underneath the scattering device collects any residual powder so that it can be reused avoiding waste.

With minimal maintenance in mind, our PSD is designed with easy removable split bearings and good accessibility to the oscillating brush and roller, meaning very little production downtime

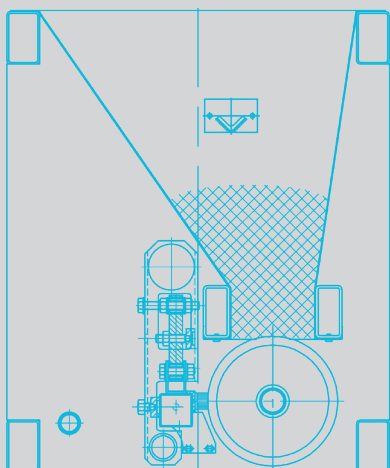
An automatic powder supply unit is also an option to be used in combination with the powder applicator. Executed with:

- ▶ Movement mechanism on a rail system for the supply nozzle
- ▶ Detection system for the powder level control
- ▶ Powder supply suction hose for connection to the thermoplastic storage vessel, big bag or container

Alternatively, a feeding system based on a spiral design can be offered.



### LAY-OUT



Working width (step-less adjustable)

Roller width

Powder particle size

Content of powder container

Maximum powder coating weight

1800 till 5700 mm

2000 till 6000 mm

80 till 500  $\mu$

140 L/m<sup>1</sup>

2000 gr/min per meter width

## Features:

- 1 A wide range of powders can be applied
- 2 Working width is freely adjustable
- 3 Optical powder level indicator
- 4 Desired coating weight synchronised with the speed of the calender
- 5 Minimal pollution and very accessible for cleaning
- 6 Heavy duty construction

## Options:

- 7 Ionisation bar for minimizing electrostatic polarity
- 8 IR section for sintering the powder to the substrate
- 9 Frame with bin and platform
- 10 Automatic powder supply unit
- 11 Cover for the buffer container and the scattering area

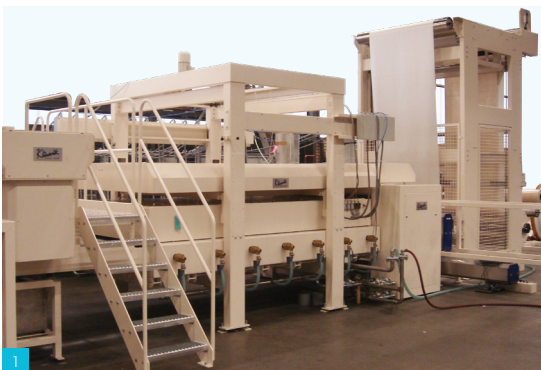
## IR SECTION AND OVEN

After the even scattering of the powder, it is important to avoid any wandering of the powder over the surface. In cases where the substrate surface is not able to maintain the powder in place, a compact Infra-Red (IR) section may be used to sinter the powder to the surface. The amount of energy can be adjusted to ensure the desired effect without damage to or uncontrolled shrinkage of the substrate. This also helps to reduce the amount of energy required.

For high melting powders (i.e. PEEK or PPS for prepreg – composite applications) an IR oven may be required. Klieverik offers custom built Infra-Red ovens based on radiation or closed IR lamps. The oven is configured with several sections that can be set at specific temperatures over the length and shut-off over the width to ensure the best possible energy application while limiting the amount of energy used. The bonding is performed by a two-roller nip with adjustable pressure and cooled/Teflon covered squeezing roller.

## Options:

- 1 Insulated covers and side panels
- 2 Roller bed, cooled if required
- 3 Transporting belts



## ABOUT KLIEVERIK

Klieverik Heli B.V. is a dynamic company, focused on rotary thermo-processing equipment for advanced textiles. With more than 40 years of experience we design, manufacture, install and maintain innovative industrial machinery. We manufacture stand-alone equipment and complete production lines. Our highly versatile machinery provides added value and improves the efficiency of textile printing and finishing operations.

We offer solutions with our rotary thermos-processing systems, also called heat presses or dwell calenders for applications such as:

- ▶ Dye sublimation printing and dye fixation  
(digital/analog printing)
- ▶ Laminating & coating of (technical) textiles
- ▶ Thermobonding of non woven
- ▶ Production lines for thermoplastic composite preregs
- ▶ Fusing and laminating of carpet/artificial grass

Klieverik also offers an in-house Technicum (R&D) testing facility, whereby we can provide 'proof of concept' samples for our customers using their own materials.

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