Section 4.2

Calender Base Supply

Type: 1x8 Roll Janus MK2 - Online

Design Data

Design sheet width	6198	mm	= 244	"
Design speed (mechanical)	1220	m/min	= 4000	fpm
Papergrade: LWC				
Operating speed Phase 1max.	732	m/min	= 2400	fpm
Operating speed Phase 2max.	1021	m/min	= 3350	fpm
Papergrade: Newsprint				
Operating speed Phase 1max.	870	m/min	= 2850	fpm
Operating speed Phase 2max.	1173	m/min	= 3850	fpm
Number of rolls	1x8			
Operating speed Phase 1max.	870	m/min	= 2850	fpm
Operating speed Phase 2max.	1173	m/min	= 3850	fpm
Paper width before Calender	6198	mm	= 244	"
Nip pressure:				
Design nip pressure, max:	475	N/mm	= 2713	pli
Limited nip pressure because covers:	400	N/mm	= 2284	pli
minimum nip pressure:	50	N/mm	= 286	pli
Surface temperature	150	°C	= 300	°F

Disposition of the Rolls

Top:	1.	NIPCORECT roll with plastic cover	897	mm dia.	= 35.3"
	2.	FLEXITHERM chilled iron roll	680	mm dia.	= 26,8"
	3.	Plastic covered roll	707	mm dia.	= 27,8"
	4.	Plastic covered roll	712	mm dia.	= 28,0"
	5.	FLEXITHERM chilled iron roll	680	mm dia.	= 26,8"
	6.	Plastic covered roll	717	mm dia.	= 28,2"
	7.	FLEXITHERM chilled iron roll	680	mm dia.	= 26,8"
Btm:	8.	NIPCORECT roll with plastic cover	897	mm dia.	= 35.3"

Manufacturing tolerances of FLEXITHERM rolls are ± 1%

Configuration: the calender rolls are arranged in a 45° angle.

Frames

1 Pair of steel frames

of **open** design, equipped with 8 rolls.

Cross bars connect both frames, thus forming a perfectly strong unit. The inclined form of the frame results in the most favourable force distribution in the pressure and/or tension zone of the frame when pressure is applied especially with wide calenders. The frames allow suitable and clear arrangement of the guide rolls, platforms, gangways, and other additional devices such as gloss meters, etc.

The entire frame design and construction is vibration free under even extreme operation conditions.

2 Sole plates

Steel welded construction with levelling screws.
Note: the embedded foundation frame is not included
(basic engineering by Voith Paper)

Hydraulic System

1 Pair of hydraulic cylinders

built into the frame base.

Levelled movement of bottom roll as well as intermediate rolls is guaranteed by linear motion potentiometer at each side of the support of the bottom roll. All local operations are controlled from the main control desk.

Zone Controlled Rolls

NIPCORECT Roll System

for instant CD caliper control at top and bottom nip with 18 + 2 zones consisting of:

2 NIPCORECT rolls

each self-loading with 18 individually controlled pressure zones in the primary direction across the roll face and 2 counter-acting zones at the roll edges

each consisting of:

1 Stationary beam

with oil supply pipes (multi-tube bundle with bulk heads for each zone) in the central bore, integrated front and rear journals, self-aligning spherical roller bearings on front and rear, beam of carbon steel

1 set of hydrostatically acting bronze pistons

2 front and rear end cover plates, with internal shell centering bearings and seals

2 adapter pieces with multi-port oil entry connectors, mounted on each end of the roll journals

2 Multi port connector couplings

with integrated oil feed bores (for 18 + 2 zones), including flexible high pressure hoses as connection to the oil pressure control blocs

2 articulating mounting arms for multiport connector couplings

1 Roll shell

of grey cast iron, with plastic cover with a hardness of 91 Shore D ±1 (Cover type: Safir S)

1 Pair of dummy heads

1 Encased gear box

with drive shaft, oil lubrication, and coupling bell for the rotating roll shell

Heated Rolls

3 FLEXITHERM rolls

with peripheric bores (duo pass), special design for direct oil heating. The shells are made of chilled cast iron with a hardness of 550 ±20 °HV. The journals are made of multiforged steel and are bolted onto the shell. The special design and heat transfer insulation minimize the local overheating/thermal crowning of the roll edges.

2 SUME^{CAL} GD coatings

with Ra 0,05 µm surface roughness, surface hardness ≥ 1100 HV

3 **Rotary joints**

large size, of most modern designed with oil supply and drain facilities including flexible hoses and flanges.

3 **Protection hoods**

for the rotary joints incl. torque control to detects joint damages

Note:

The rolls are provided for direct oil heating/cooling. The rolls are designed to allow a max. roll surface temperature up to 150 °C.

Plastic Covered Rolls

3 **Plastic covered rolls**

Special design for direct water temperature control. The shells are made of grey iron. The journals are made of multi-forged steel and are bolted onto the shell.

3 **Plastic covers**

with a hardness of 91 Shore D ±1%, type Safir S

Roll Heating / Cooling

1 **Thermo-oil heating system**

for 3 FLEXITHERM rolls with individual temperature control for each roll:

oil temperature	max.	230	°C
cooling with mill water	max.	25	°C
installed heating power (each roll)		630	KW
cooling power (each roll)		260	KW

calculation based on Phase 2 LWC production with 1021 m/min, 475 N/mm, paper 60 g/m², considered cooling/heating rate is 2° C per minute (with open nips without paper)

consisting of:

1 Primary circuit with gas fired heater, with burner and heat exchanger to serve 3 secondary circuits

3 Secondary circuits, comprising:

3 Coolers

U-tube design shell and tube exchanger with stainless tubes

3 Pumps

(plus 1 common standby pump) including carbon steel strainers

Note: Motors are not included

1 Expansion tank

carbon steel, with external liquid level gauge, relief valve and pressurization regulator

3 Control circuits
with piping, fittings, flanges, etc. for internal installation of above specified components and with safety features, such as high temperature switch, low pressure switch, cooling water flow switch, etc.

1 Common storage tank
with transfer pump valves and controls

Notes:

- Above components are skid-mounted (storage tank and energy recovery vessel are separate units) and fully installed
- piping, vessels, tanks which are in contact with cooling water / condensate are in stainless steel, valves corrosion-resistant
- thermo oil piping in carbon steel
- insulation of the heating unit is not included
- smoke pipe is not included
- basis is an European supplier, field connections points in US-system

Roll Temperature Control System

1 Water temperature control system
for 3 plastic covered intermediate rolls:

water temperature	max.	80	°C
cooling with mill water	max.	25	°C

consisting of:

1 Heat exchanger steam/water (U-tube design)

1 Cooler (U-tube design)

1 Pump (plus stand by pump)
incl carbon steel strainers

1 Control circuit
with piping, fittings, flanges, etc. for internal installation of above specified components and with safety features, such low pressure switch, cooling water flow switch, etc.

Note: Motors not inlcuded
insulation of the unit is not included

Bearings

3 Pairs of spherical roller bearings
with housings for the Flexitherm rolls, bolted onto the lever arm. The housings are provided for central oil lubrication.

3 Pairs of spherical roller bearings

with housings for the plastic covered intermediate rolls, bolted onto the lever arm. The housings are provided for central oil lubrication.

1 Set of special hydraulic tools

for easier removal of the roller bearings of the FLEXITHERM rolls and plastic covered intermediate rolls.

1 Set of levers arms

for the intermediate calender rolls, pivot mounted at the calender side frame. The lever arms allow all movements of intermediate calender rolls at nip opening/closing and compensate as well roll diameter reduction due to grinding of the plastic covers.

1 Load compensation system

for the intermediate calender rolls with hydraulic cylinders, positioned on saddles at the calender frames. Each cylinder is acting for an effective accurate and reproducible compensation of loads.

2 Pairs of supports and brackets

for the bearing bushings of the NIPCORECT rolls.

Paper Web Run

To lead the paper web through the Janus Calender there are provided:

10 Paper guide rolls

with drive journal, shell of carbon fiber reinforced plastic, heads and journals of steel

roll diameter 530 mm

20 roll bearings of antifriction type with cast iron hourings

10 pairs of mounting supports with horizontal adjustment

2 Spreader rolls

with hard-chrome plated steel shell, supported via antifriction bearings on steel axle with fixed bow. Bearings with rotatable worm, gear and thrust bearing.

roll diameter 240 mm

1 belt drive for driving the spreader roll (without motor and coupling)

1 pair of mounting brackets

Roll Surface Cleaning

3 Roll doctors

for the FLEXITHERM rolls, doctor backs of carbon fibre reinforced plastic with blade holder (DST-type) and synthetic blades, with mounting journals, bearings with housings and seals. Pneumatically operated lift and loading mechanism, and electro-mechanical oscillator, with gear box and supports

5 Roll doctors

for the plastic covered rolls as described above but with steel blades.

Roll Exchange

3 Intermediate roll change devices

for faster and easier roll change. Hydraulically operating carrier arms for moving the intermediate plastic covered rolls into the roll change position. The rolls can be picked-up with special roll change tools by the overhead crane.

Note:

- Top roll will be picked-up directly with special roll change tools by the overhead crane. The crane is not included
- 2 crane hooks are necessary. A transport beam is not included.

Cut-off Knife

To avoid any paper accumulation in front of the top roll nip, we provide 1 pneumatically operated high-speed cut-off knife which is interlocked with the photo-electric cells and the emergency stop system of the calender.

Platforms

1 Movable platform

positioned between the calender frames

consisting of:

1 movable bridge made of metal sheet in rigit construction, protective railings and lateral roller guides for movement in 45° angle.

2 guide rails, fixed at the calender frame

1 set of stationary platforms

with stairs made of aluminium

2 movable stairs with platforms

positioned at the roll side in front of the bearing housings of the calender stack, consisting of:

2 movable stairs with platforms

with protective railings and roller guides for a lateral movement

guide rails with supports

Note:

- Just for roll change the movable stairs will be moved to get the rolls out of the stack.

Full Speed Web Threading System