

SECONDARY COATING LINE NOKIA

The line is designed for secondary coating of optical fibers. The process starts at the dancer controlled pay-off unit where the fiber tension is set to the desired value. After extrusion coating, the fiber is cooled in two trough sections with presettable temperatures. This means that the correct cooling profile for each material can be easily adjusted. The coated fiber is dried with an air wipe, after which the diameter is measured. The output capstan controls the speed of the fiber. After the output capstan, the secondary coated fiber is gently taken up on a reel with the aid of a dancer and a traversing take-up.

Utility requirements:

|                     |  |
|---------------------|--|
| Electricity         | 460 V $\pm$ 10 %, 60 Hz $\pm$ 1 Hz,<br>3-phase |
| Extruder            | 12 kVA   |
| Cooling             | 30 kVA   |
| Heaters             | 5 kVA  |
| Pumps               | 5 kVA  |
| Pay-off and Take-up | 5 kVA  |
| Total               | 50 kVA   |
| Water               |  |
| Inlet temperature   | max. 25°C                                      |
| Pressure            | 2 - 6 bar                                      |
| Consumption         | max. 220 l/h                                   |
| Hardness            | 4 - 6 German dgr.                              |
| Ph-range            | 7 - 8  |

Main data for the line

|                              |                  |
|------------------------------|------------------|
| Diameter of fiber            | 0.05 - 0.5 mm    |
| Coating type                 | tight or loose   |
| Coated diameter              | 0.15 - 2.5 mm    |
| Structural speed of the line | max. 200 m/min   |
| Noise level                  | less than 85 dBA |

The line consists of the following items:

1. Beta pay-off MPO-700 with 2 heads
2. Belt wrap capstan BC200
3. Extruder MP 30-24D
4. Cooling trough JR 10
5. Air wipe
6. Diameter control unit
7. Pull out capstan BC 200
8. Take-up FSS 63 T
9. Line control cabinet
10. Jelly filling device
11. Isolation transformer

ITEM 1

1 off

BETA PAY-OFF MPO-700 W/2 HEADS

The unit comprises a stand into which up to eight pay-off modules or cartridges can be plugged, the plug-in modular system ensuring system flexibility, ease of installation and service simplicity.

Each cartridge has a 3-phase AC motor which is coupled to the output shaft. The choice of an AC motor guarantees a long life with high reliability, as it is not susceptible to the wear characteristics of DC motors. The AC motor is modified and connected in a Steinmetz configuration. The modification provides a characteristic that increases the motor speed when the torque decreases, this being the opposite to a conventional induction motor. Motor control is via a thyristor circuitry.

A dancer arm is used to sense wire tension by way of an inductive transducer which signals the motor to drive forward or in reverse, thus maintaining a constant tension. The tension of the arm is fully adjustable.

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ITEM 2

1 off BELT WRAP CAPSTAN BC200

The belt wrap capstan is positioned after the payoff. It can be operated in a speed regulated mode for 1% speed differential between the capstans or in a tension mode for tension control between the capstans.

Technical Data

|                 |                   |
|-----------------|-------------------|
| Speed, max.     | 200 m/min         |
| Gripping length | 200 mm wheel belt |
| Wheel diameter  | 200 mm            |

ITEM 3

1 off EXTRUDER, NOKIA MP 30 - 24 D  
for secondary coating.

The extruder consists of:

- Basic machine
- One (1) screw
- DC drive 7.5 HP (Reliance)
- Pressure gauge with display
- Hopper
- Screw push-out device, manual

Technical data

|                         |                |
|-------------------------|----------------|
| Barrel                  |                |
| material                | nitrited steel |
| hardness min.           | 48 - 54 HRc    |
| Max. operating pressure | 1000 bar       |

|                       |                |
|-----------------------|----------------|
| Screw                 |                |
| material for nylon 12 | nitrited steel |
| diameter              | 30 mm          |
| length                | 24 D           |
| speed,max             | 130 rpm        |

DB

|                                       |                       |
|---------------------------------------|-----------------------|
| Gear box                              |                       |
| reduction ratio                       | 16:1                  |
| thrust bearing dynamic capacity       | 720 kW                |
| lubrication                           | splash                |
| Heating and cooling system            |                       |
| temperature control accuracy          | +/- 1°C               |
| barrel heating                        | electrical            |
| barrel cooling                        | with air              |
| feed box cooling                      | with water            |
| number of heating zones<br>for barrel | 3                     |
| total barrel heating power            | 6.6 kW                |
| DC-drive                              |                       |
| power                                 | 7.5 HP                |
| nominal speed                         | 1750 rpm              |
| Utility requirements                  |                       |
| rated power                           | 12 kVA                |
| water supply and consumption          | 0.1 m <sup>3</sup> /h |
| Total weight                          | 350 kg                |

Description of Extruder NOKIA MP 30-24 D

Barrel

The barrel material is steel, nitriding depth min. 0.5 mm.

Screw

The screw is manufactured of nitrited steel. The whole profile of the screw is polished, not only the top of the flight. This increases remarkably the wear resistance of the screw, because friction between the screw and plastic material is lower.

### Gear box

Power from the drive motor to the screw is transmitted by a two step cylindrical gear which is splash lubricated. The gears are a helical type which assures vibration-free operation. The gear material is tempered steel.

The thrust bearing of the gear box is one of the most important components of the extruder. It bears the axial load from the extruder screw. The best bearing type is a thrust roller, which is able to bear large axial and radial loads. Due to its construction it is also able to compensate for position error between the gear box and screw. The thrust bearing of the MP 30 extruder is carefully chosen to withstand the maximum axial and radial loads calculated and to provide trouble-free operation.

There is an axle plate equipped with a involute spline inside the thrust bearing, which transmits the torque to the screw. The involute spline is a considerably better alternative than a cotter joint, because the torque is transmitted to the screw over the total width of the spline and the load is evenly divided. In addition, the splines are self-centering, this makes the insertion and removal of the screw easier. A 50 L hopper is located between the gear box and the cylinder. To ensure smooth material flow to the screw, i.e. to avoid bridge-over of the feed hole, the hopper feed section is water cooled.

### Drive motor

The extruder has a thyristor controlled drive which provides the following features:

- wide control range of rotation speed
- rapid adjustment and high adjustment accuracy
- constant torque under the nominal rotation speed
- rotation speed independent of the load
- over load protection with current limit adjustment

Also, by using a DC-drive it is easy to synchronize the whole extrusion line.

Temperature control

The extruder barrel of the NOKIA MP 30-24 D has 3 heating zones. The barrel is surrounded with cast aluminum elements inside of which there are heating resistors. The heating power is 10.6 W/cm<sup>2</sup>. The elements are equipped with blowers for cooling.

The temperature is adjusted with PID-regulators, with thyristor output stages.

Pressure gauging

In the barrel of the extruder before the breaker plate there is a pressure gauge which is connected to a separate display unit located into the control panel of the extruder. The display unit is equipped with pressure control and there are two pre-settable limits. This protects the extruder from overpressure. Furthermore, the barrel is equipped with a mechanical rupture disc which protects the extruder, in the event that the electric pressure control should fail.

ITEM 3.1

1 off CROSS-HEAD NOKIA NH 2

Technical data

|                         |           |
|-------------------------|-----------|
| Outlet diameter         | max. 3 mm |
| Inlet diameter          | max. 2 mm |
| Number of heating zones | 2         |
| Heating power           | 1.2 kW    |
| Vacuum possibility      | yes       |
| Centering               | manual    |

Genca Adapter

This adapter is used to adapt the NOKIA extruder to a Genca head. It will be built according to customer supplied drawings of Genca head.

ITEM 4  
1 off      COOLING TROUGH, NOKIA JRF 10

Technical data

|                               |                        |
|-------------------------------|------------------------|
| Cooling length                | 9 m (3+3+3)            |
| Telescopic extension          | 1 m                    |
| Design length incl. telescope | 10 m                   |
| Water consumption             | 0.01 m <sup>3</sup> /h |
| Water tank volume             | 0.6 m <sup>3</sup>     |

The cooling trough is built of anodized aluminium elements with sealed covers and water collection boxes.

The trough is equipped with two water tanks, water pump and necessary piping.

The first cooling section is equipped with warm water circulation (temperature adjustable from 20 to 90°C).

The second cooling section is equipped with a water cooling system only.

ITEM 5  
1 off      AIR WIPE

A eject type, pneumatic powered air wipe for drying coated optical fiber.

ITEM 6  
1 off      DIAMETER CONTROL UNIT

A non-contact device for measuring of 0.05 to 4.0 mm coating diameters. Accuracy of diameter control: 0.002 mm (0.3-4.0 mm).

ITEM 7

1 off BELT WRAP CAPSTAN BC200

The belt wrap capstan is positioned after the cooling trough. It can be operated in a speed regulated mode for 1% speed differential between the capstans or in a tension mode for tension control between the capstans. The belt is pneumatically loaded, which in turn applies pressure to the wheel. The air pressure is adjusted according to the gripping force required.

Technical Data

|                 |           |
|-----------------|-----------|
| Speed, max.     | 200 m/min |
| Gripping length | 400 mm    |
| Wheel diameter  | 200 mm    |

ITEM 8

1 off TRAVERSING TAKE-UP FSS 63 T

This unit is used as a take-up stand.

On the carrier, there is a special traverse part called "scrap disc". It can be used for winding up not acceptable fibers; for instance, the starting length in an insulation line.

There is an opening through the shaft and a 10 mm opening through the scrap disc so that the fiber end can be taken out for a line measurement.

|                                   |               |
|-----------------------------------|---------------|
| Reel flange diameter              | 150 - 630 mm  |
| Reel width                        | 150 - 600 mm  |
| Reel diameter                     | 100 mm min.   |
| Reel weight                       | 20 kg         |
| Scrap disc width                  | 50 mm         |
| Traverse lay, per revolution      | 0.1 - 5 mm    |
| Speed                             |               |
| - reel                            | max 300 rpm   |
| - line, fiber                     | max 200 m/min |
| Tension                           |               |
| - fiber                           | 15 - 300 g    |
| - coated fiber                    | 50 - 300 g    |
| Diameter of fiber or coated fiber | 0.1 - 4 mm    |



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ITEM 9  
1 off

LINE CONTROL CABINET, NOKIA OPM 2000

The control of the process and the synchronization of the line components are both realized in the line control cabinet.

The following parameters are monitored continuously by digital panel displays. All necessary switches, push-buttons and signal lights are marked with clear operation texts.

- line speed
- screw speed extruder
- current of the drive motor
- fiber diameter
- zone temperature
- head pressure
- length of coated fiber and totalizer (1 m steps)
- speed or tension differential between the two capstans.

ITEM 10  
1 off

JELLY FILLING DEVICE FOR NH-2 HEAD

ITEM 11  
1 off

ISOLATION TRANSFORMER