# RELIABLE TECHNOLOGY AND LOW OPERATING COSTS

## KANTHAL FILLING MACHINES, TYPE KOF

Since the early 1950s, when the principle was developed, filling machines have been built according to the KOF system.

The reasons are:

- Simple operation
- Reliability
- Low operating costs
- Low maintenance downtime
- High yield and uniform element quality.

**KANTHAL**
HEATING TECHNOLOGY

# FEEDING PRINCIPLE

KOF type filling machines are designed for production of metal sheathed tubular elements.

This tubular element type comprises a straight metal – normally round – tube and concentrically applied resistance coil. The coil is insulated from the tube by fused magnesia powder which is loaded into the tube by the KOF machine.

Insulating powder is gravity-fed, from a movable hopper, through the space between two concentric filling tubes which simultaneously guide the resistance coil.

Rods fastened at the top of the machine run through the inner filling tubes and hold the resistance coils by their upper terminals.

Filling is performed while vibrating the tubes, thereby increasing powder density.

At the lower end of the filling tubes special filling nozzles only permit powder to pass when the vibrator is operating.

## FILLING MACHINES, TYPE KOF-4, KOF-6

These machines are designed mainly for short to medium filling runs, and incorporate adjustment for different tube lengths and diameters. However, when changing the tube diameter, an additional set of filling tubes and accessories is required.

Machines should, preferably, be placed against a wall or pillar and provision made to ensure that ends of central rods inside filling tubes are at eye level.

This is particularly important where filling tubes are longer than 1.5 m.

## TECHNICAL DATA

| Capacity | KOF-4 | KOF-6 |
|---|---|---|
| Min. tube O.D., mm. | 6 | 6 |
| Max. tube O.D., mm. | 30 | 20 |
| Filling tubes, pcs. | 4 | 6 |
| Min. tube length, mm. | 150 | 150 |
| Max. tube length, mm. | 6,000 | 6,000 |
| Production: 1 hour (50 min.), m. | 25 | 35 |
| 1 week (40 h), m. | 1,000 | 1,400 |
| 1 year (46 weeks), m. | 46,000 | 65,000 |
| Production based on: | | |
| Filling speed = 160 mm/min. | | |
| Tube length = 1.5 m. | | |
| Time for tube handling 2 resp. 3 min. | | |

## Size

Height = 2 × max. tube length + 775 mm
Width = 890 mm
Depth = 320 mm
Weight = about 170 kg (depending on length, and number of filling tubes)

## Electrical Connection

The machines must be connected to 220 V single-phase. The rating is 350 W.

# DESIGN AND OPERATION

A hopper which accommodates 8 dm³ of insulating powder, is attached to the upper end of the filling tubes. The hopper-assembly with filling tubes is hoisted by an A.C. motor, equipped with a magnetic coupling, at a constant speed.

Standard filling speed of 160 mm/min. can be increased to 250 mm/min. with additional sprockets.

Maximum filling speed is determined by the space between the inner and outer filling tube.

After inserting a set of tubes and coils, the magnetic coupling is released and the filling tubes, with the hopper, are lowered manually to the bottom of the element tubes.

The vibrator is switched on simultaneously with the hoist motor and when the filling nozzles reach the top of the element tubes, the vibrator is automatically switched off to avoid powder overflow. Filling tubes continue to rise until the ends of the central rods are free, enabling the filled elements to be removed.
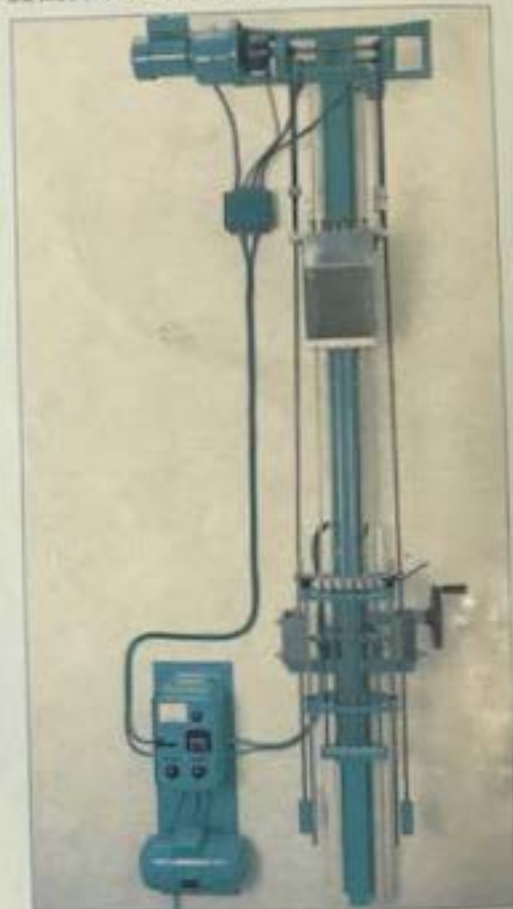


# FILLING MACHINES, TYPE KOF-12, KOF-18, KOF-24

These machines are designed for long filling runs. More element tubes are filled simultaneously – the number depends of the diameter of the tubes – with fewer man-hours needed per element. The machine can be erected on the floor or in a suitable pit, and the top of the machine should be secured to a wall or a ceiling.

As the large, insulating powder hopper is at the top of the machine ample space must be left for easy access to the hopper for powder replenishment.

When clearance between machine and ceiling is small the hopper can be placed on the next floor above the machine. Powder is fed to the movable hopper through the ceiling, and overall machine height reduced by 510 mm.

# TECHNICAL DATA

| Capacity | KOF-12 | KOF-18 | KOF-24 |
|---|---|---|---|
| Min. tube O.D., mm | 6 | 6 | 6 |
| Max. tube O.D., mm | 24 | 18 | 12 |
| Filled tubes, pcs. | 12 | 18 | 24 |
| Min. tube length, mm | 150 | 150 | 150 |
| Max. tube length, mm | 5,000 | 5,000 | 5,000 |
| Production: 1 hour (50 min.), m | 70 | 100 | 130 |
| 1 week (40 h), m | 2,800 | 4,000 | 5,200 |
| 1 year (46 weeks), m | 130,000 | 185,000 | 240,000 |

Production based on:
Filling speed = 150 mm/min.
Tube length = 1.5 m
Time for tube handling:
3.2, 3.6 and 4.0 min. resp.

## Size

Height = 2 × max. tube length + 1,425 mm
Width = At the top: 1,945 mm – At the bottom: 965 mm
Depth = 355 mm
Weight = about 500 kg (depending on length, and number of filling tubes)

## Electrical Connection

The machine must be connected to 220 V single-phase.
The rating is 770 W.
The machine must also be connected to compressed air, 400–500 kPa.

## DESIGN AND OPERATION

The only difference between the KOF-12, 18 and 24 is in the number of filling tubes. With larger element tube diameters fewer tubes can be filled simultaneously. However, as basic components are the same, a KOF-24 can, for instance, be converted to a KOF-12 with the correct equipment.

Machine operation is similar to that of the KOF-4 and 6 units. However there are certain differences.

The movable hopper is refilled at the end of each cycle from the stationary hopper at the top of the machine.

A reversing motor raises and lowers the element tubes which are secured at their bottom end with a compressed air-operated clamping bar.

The mechanical operation of the tubes ensures a much shorter handling time compared with the KOF-4 and 6 types.

Operation speeds are adjustable, by changing sprocket wheels, to 150, 200 and 300 mm/min.

Example: Filling of 1,000 elements, 1,500 mm in length, 8 mm O.D. with a filling speed of 150 mm/min. or 160 mm/min. resp.

| | KOF-6 | KOF-24 |
|---|---|---|
| Total time per filling, min. | 13 | 14 |
| Total time for 1,000 elements, h | 36.1 | 9.7 |
| Handling time for 1,000 elements, h | 8.3 | 2.8 |

## SPECIFICATION REQUIRED WHEN ORDERING

1. Maximum tube length.
2. Outer diameter of the element tube.
3. Wall thickness of the element tube.
4. Outer diameter of the coil or terminal (whichever is largest).