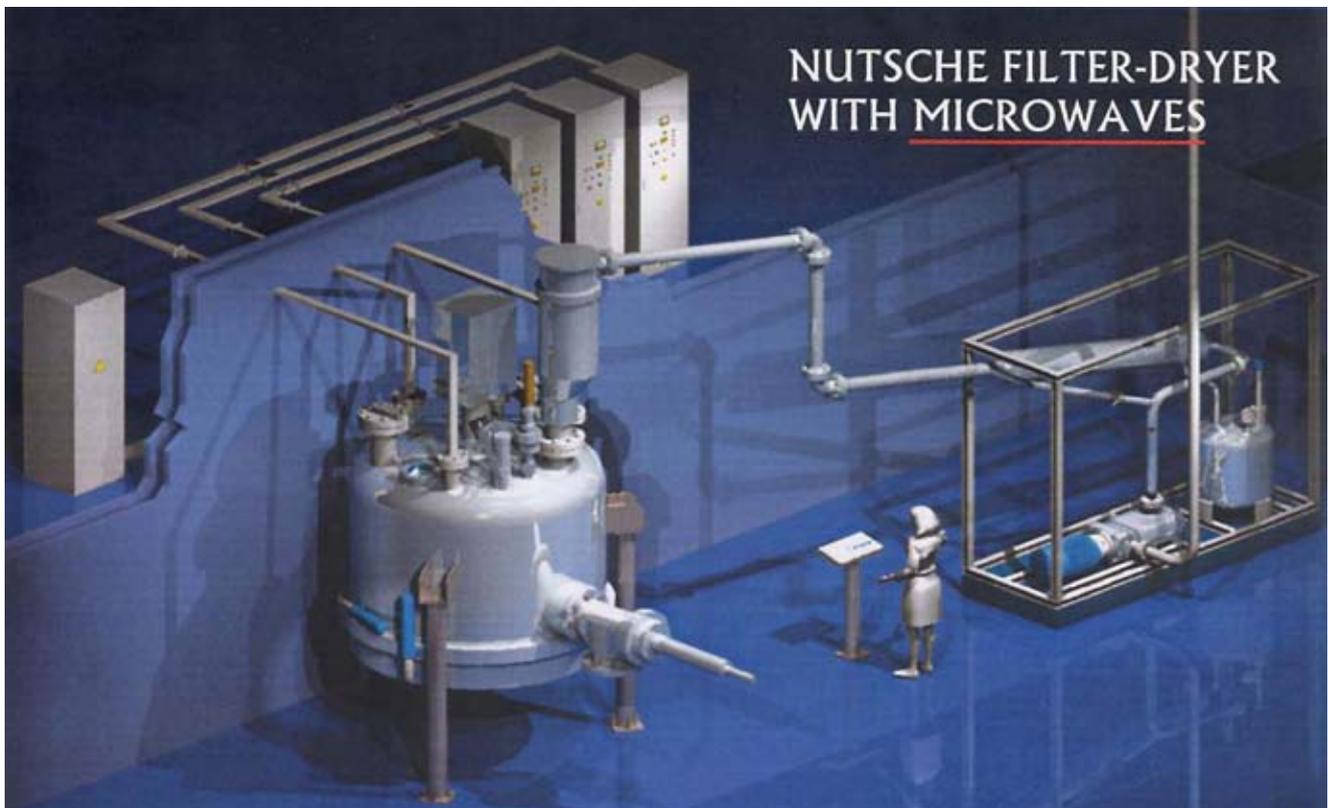


Supplemental Microwave Heating



Substantially reduced drying times

Equal drying throughout

Ideally suited for agglomerating, sticky products

Accurately controlled drying process

Microwave Heating

Microwave Duty Preparation

Preparation of a filter-dryer or dryer vessel for the installation of microwave heating entails sealing the vessel to prevent microwave leakage, the addition of nozzles for the feed of the microwaves into the vessel plus the installation of required sensors.

General Design Criteria

All nozzles and seals will be designed to contain the microwaves and avoid microwave leakage. Flanges will be of metal to metal contact type and/or have sufficiently thick PTFE insulation to prevent potential sparking. Sight and light glasses will have a metal screen with metal to metal contact installed for microwave containment. The mechanical seal type and its materials of construction are to be suitable for use of microwaves.

Provision is made for the installation of proximity switches to detect whether the microwave design items are present or not.

Microwave Generation and Transmission

The microwave system consists of a microwave generator with tuner, a waveguide to transfer the generated microwave power output to the filter-dryer vessel microwave nozzle plus all instrumentation required. The system includes the Magnetrons with variable output control, transmitted power indicators and tuners to match the generators to the filter-dryer or dryer vessel.

Instrumentation

Instrumentation provided with the microwave system amongst others includes transmitted microwave power indicators for heating energy control and an infrared sensor for product surface temperature measurement.

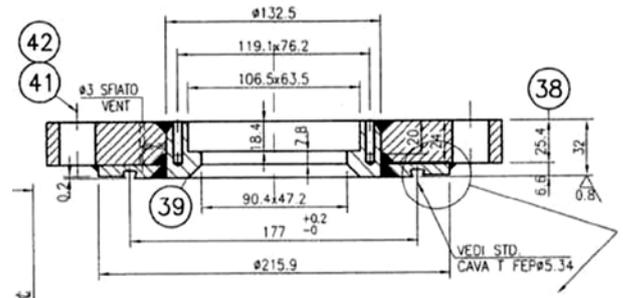
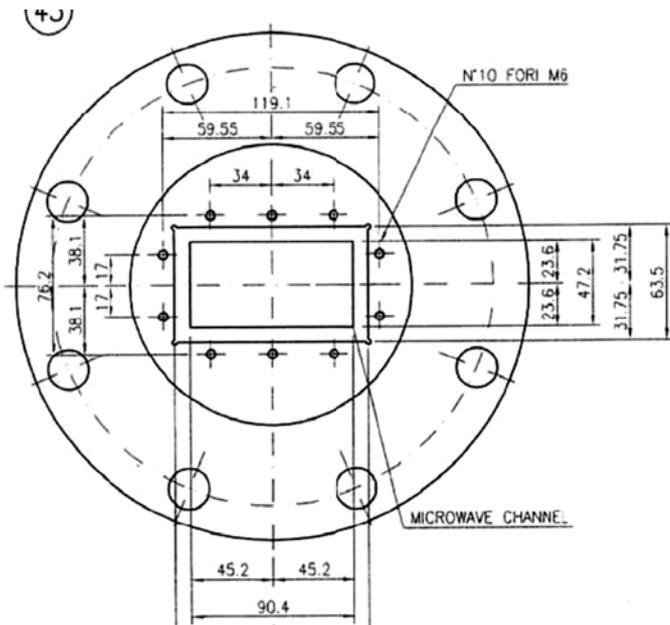
Microwave Control System and Documentation

Microwave specific hardware and software will be added to the filter-dryer or dryer control system to provide control of the microwave system. The permissible microwave power output level is interdependent with the vacuum level and thus the system will include vacuum control. Inputs such as temperature differential of coolant entering and leaving the condenser, quantity of solvent recovered and reflected microwave energy will be applied for endpoint detection. The control system documentation will be supplemented to include all relevant items for the microwave system supply.



Vessel design for microwaves

Microwave Heating



Flange design for microwave feed

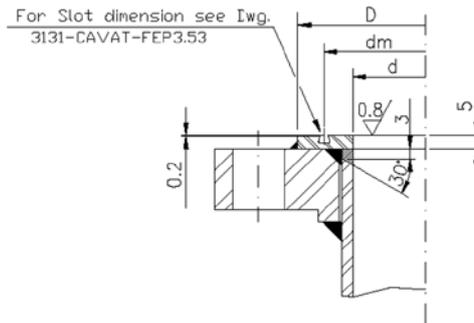
To feed the microwaves through the rectangular waveguides into the filterdryer. A quartz sight glass isolates the vessel interior from the purged wave guide.



6 kW microwave generator for outdoors installation

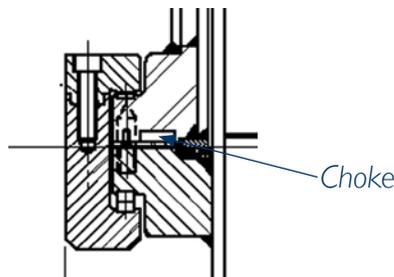
6 kW 2.45 GHz water cooled Magnetron, with tuner and interface for PLC control system.

Microwave Heating



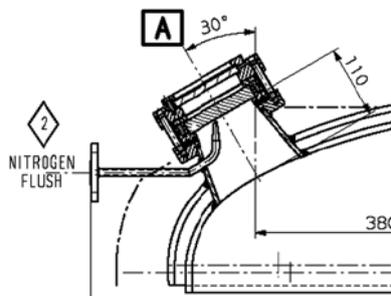
Flange design

A flange design to assure a defined flange seat pressure for good metal to metal contact is used throughout the design to prevent microwave leakage.



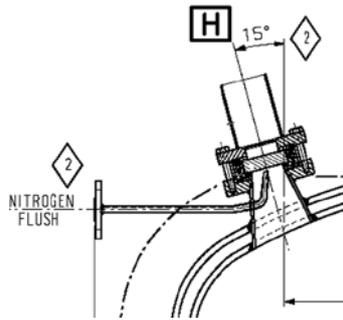
Main flange chokes

On the main vessel flanges where a defined flange seat pressure cannot be assured $\frac{1}{4}$ wavelength chokes are used to cancel out any microwave and thus to prevent microwave leakage



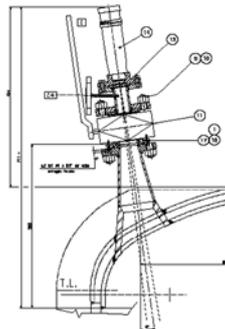
Sight glass with metal screen to prevent microwave leakage

Microwave Heating



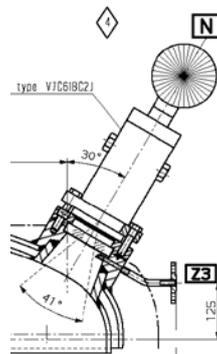
Glow sensor installation

The glow sensor is used to detect the onset of glow (UV radiation) in order to reduce microwave power before any sparking can occur.



Infrared sensor installation

An infrared sensor is used to measure the product surface temperature and adjust microwave energy in order to maximize efficiency and at the same time to prevent “frying” the product



Color camera and vessel light installation

Pressofiltro[®] PF 200 Pilot Filter Dryer



PF 200 pilot filter dryer with **all electric actuation** for a pharmaceutical application.

With connecting flange for an isolator (isolator supplied by third party) to permit sampling, dust containment during discharge, heel removal and filter cloth disposal.

The pilot filter dryer is prepared for **microwave duty** to further reduce drying times (picture at left shows a microwave generator installed for microwave leak testing).

The column mounted filter base for lowering and displacement to the side provides excellent access to replace the filter cloth and for inspection. Filter bottom with peripheral groove for filter cloth fixation with PTFE rope.

The PLC control unit with an Allen Bradley PanelView operator panel is attached to the rear of the skid.