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# Level measurement With RAdio Detection And Ranging in Urea Plants

尿素装置雷达液位仪

# Radar 雷达



## Principle: 原理

To measure the dwell time between sending and the reflection of a micro wave by the surface of the medium. 测量发射到介质表面微波反射回来的滞留时间.

## Advantages: 优点

- Reliable, accurate, not influenced by changing process conditions. 可靠,精却,不被工艺条件所限制.
- Ambient and process conditions are no limitation. 适应各种环境和工艺条件.
- Easy installation due to small and compact design. 设计紧凑,体积小,易于安装

# Radar 雷达



## Two types: 两种类型

- Through Air (Horn antenna) Radar: 雷达 (角状天线)

To be used in a Reactor/PoolCondenser 用于合成塔/池式冷凝器

- Guided Wave (Rod antenna) Radar 导波雷达 (杆状天线)

To be used in a HP Stripper 用于高压汽提塔

# Horn Antenna radar



## Horn antenna 角状天线

1. to propagate and to focus the microwave.  
扩散和聚焦微波
2. to catch as much as possible echoed pulses. 捕捉更多的回波



# Horn Antenna radar



## Typical figures : 典型数据

- Frequency between 5 (low freq) to 26 GHz (high freq.)  
5 (低频) 到 26GHz (高频) 之间的频率
- Transmission power less than 1 mW  
发射功率小于 1mW
- Travelling time  $\pm 7$  ns per meter distance  
传播时间  $\pm 7$ ns/M
- Back received signal < 1% of transmitted signal  
后接收信号 < 1% 发射信号

# Rod Antenna Radar



## Rod Antenna Radar 杆状天线

Rod: to guide signal 杆: 信号导向

- Wave-guide eliminates false echos  
微波导向装置能消除错误回波
- Allows measurements under an angle  
允许有角度测量
- To minimize signal losses  
最小的信号损失

# Conclusions 结论

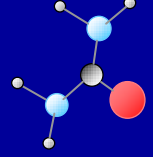


## Radar application in Urea Plants 用于尿素装置

Pre condition: 先决条件

Can only be used when Safurex<sup>®</sup> material is used (crevice corrosion) 该仪器仅限于 Safurex 合金材料制造 (防止裂纹腐蚀)

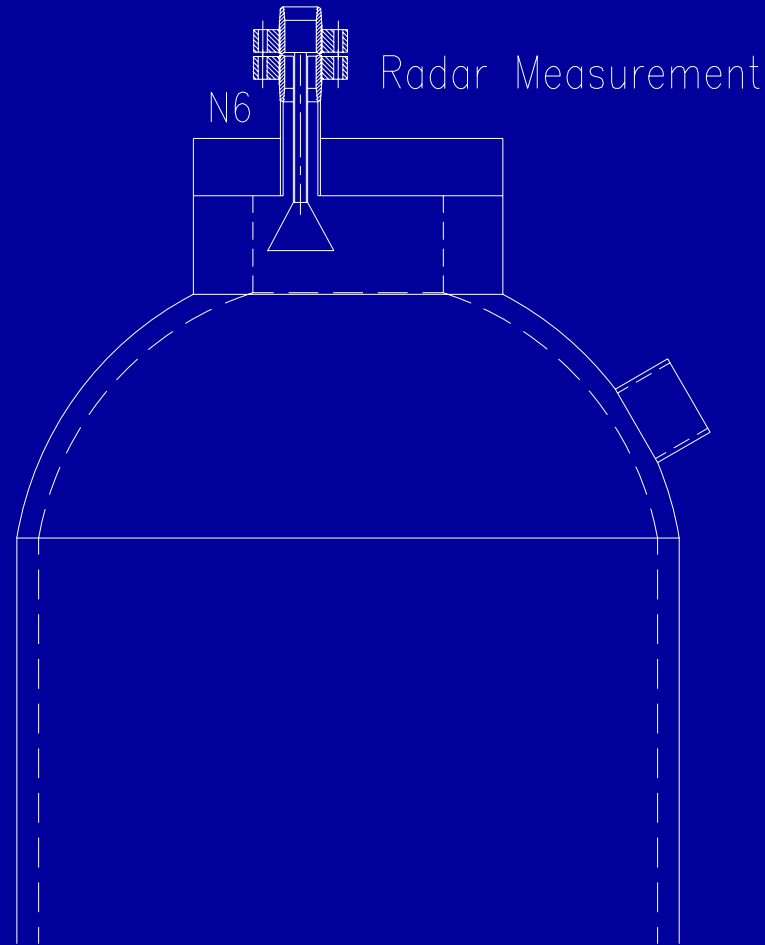
- In existing equipment (without modifications to the nozzle of HP Equipment) 可用于现有设备 (勿需对高压设备管口进行改造)
- In new equipment (only a 2" nozzle required)  
新设备 (只需2"管口)



# Installed in Reactor 合成塔内安装

**Horn  
antenna**

角状天线

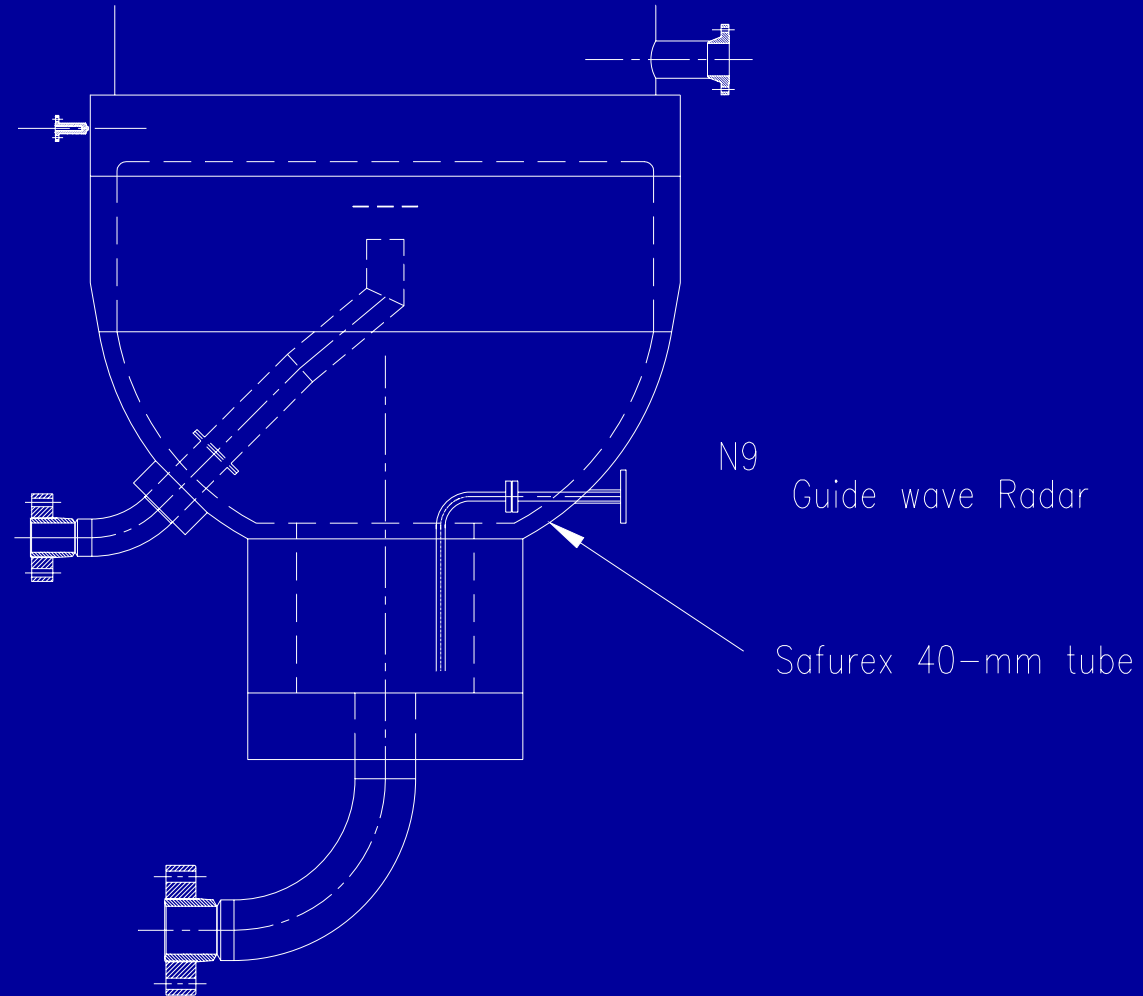


# Installed in Stripper 汽提塔内安装

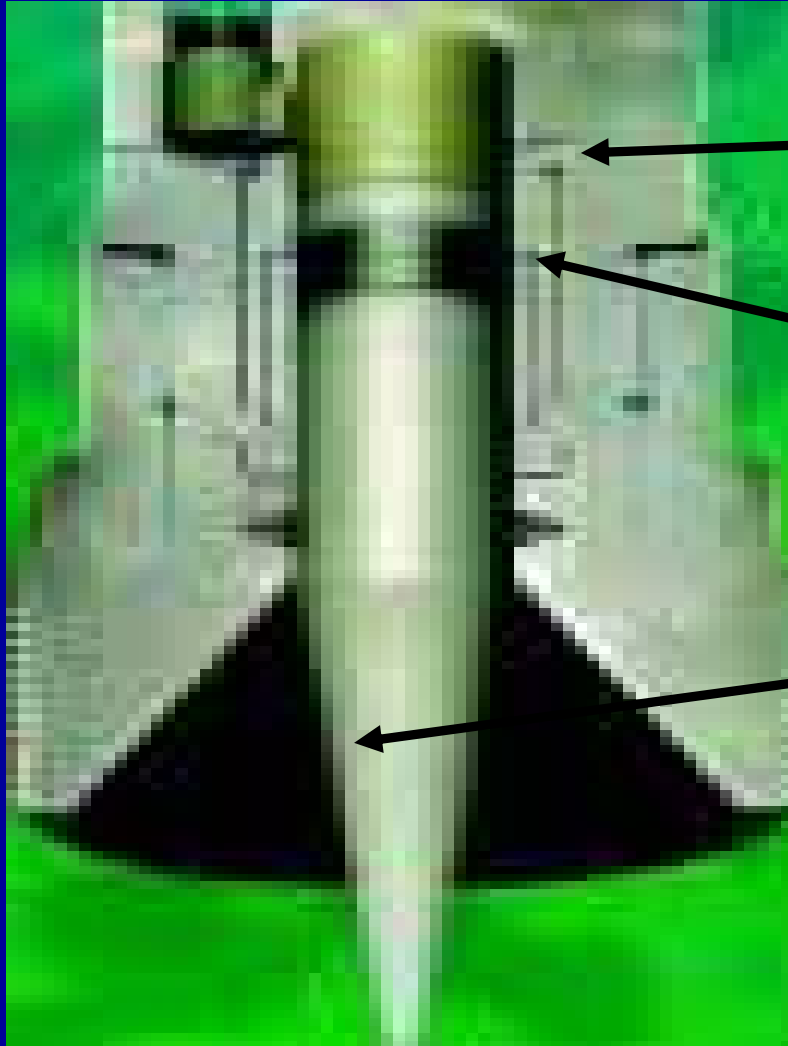


**Rod  
antenna**

杆式天线



# Design for Urea application 用于尿素装置



Safurex<sup>®</sup> House  
特殊Safurex 外壳

Stuffing box 填料盒  
(PTFE/Aramide)

Ceramic transmitter  
陶瓷变送器

# Features 特性

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- Accurate measurement ( $\pm 10-15$  mm) 精确测量
- No maintenance 勿需维修
- No spare parts 勿需备件
- **No radiation!** 无放射线！
- No re-calibration 勿需再标定
- Unlimited lifetime 永久使用
- Easy to install 易于安装
- Easy to handle 易于操作
- Can be used in existing equipment without modifications  
能用于现有设备，勿需改造