

RADAR Level Measurement with 80 Ghz RADAR



Only 5 % of all
applications
with radar

Who needs radar?

Exact measurement

Independent of the medium



Major Factors in Specifying a Radar

Choosing a Radar depended on **MANY FACTORS**

- **Mounting Position and options**
- **Maximum filling height**
- **Vessel dimensions – proximity of connection to sidewall**
- **The presence of foam**
- **Agitated product surfaces**
- **Vapour composition**
- **Vessel internal structures**
- **Dielectric constant (dK)**

Radar Technology - Choice of frequency

Radar Wave Length = Speed of light / frequency

$$\lambda = c / f$$

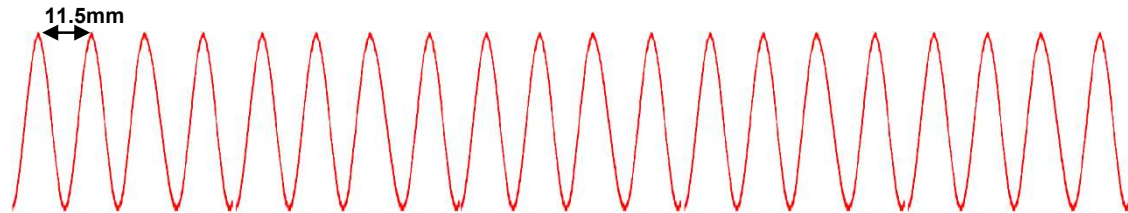
Frequency 6.3 GHz

wavelength $\lambda = 47.5$ mm



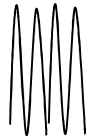
Frequency 26 GHz

wavelength $\lambda = 11.5$ mm



Frequency 80 GHz

wavelength $\lambda = 2.5$ mm



High frequency:



shorter wavelength



narrower beam angle



more focused signal



**ability to measure smaller vessels
with more flexible mounting**

Low frequency:



longer wavelength



wider beam angle



less focused signal



**Measurement with decreased reliability
in difficult applications**

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THESE LIMITATIONS ARE HISTORY

Setting new standards with 80 GHz



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LEVEL MEASUREMENT IS EASY: 80 GHZ RADAR!

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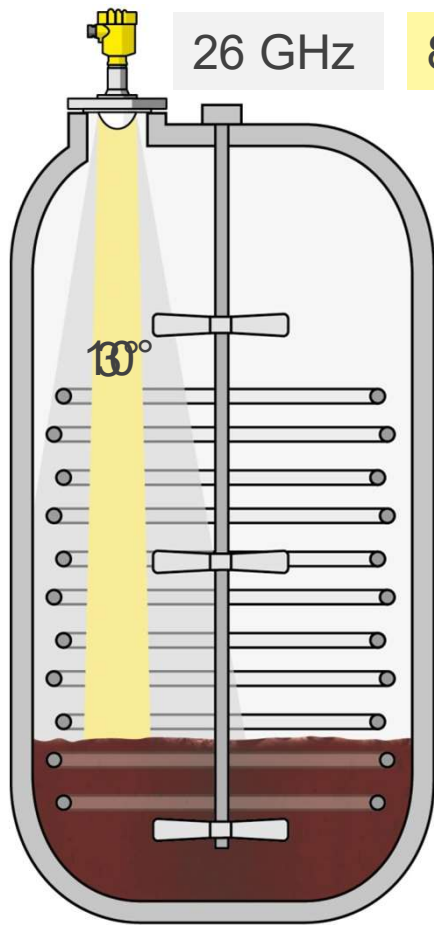
One sensor for liquids.



One sensor for bulk solids.

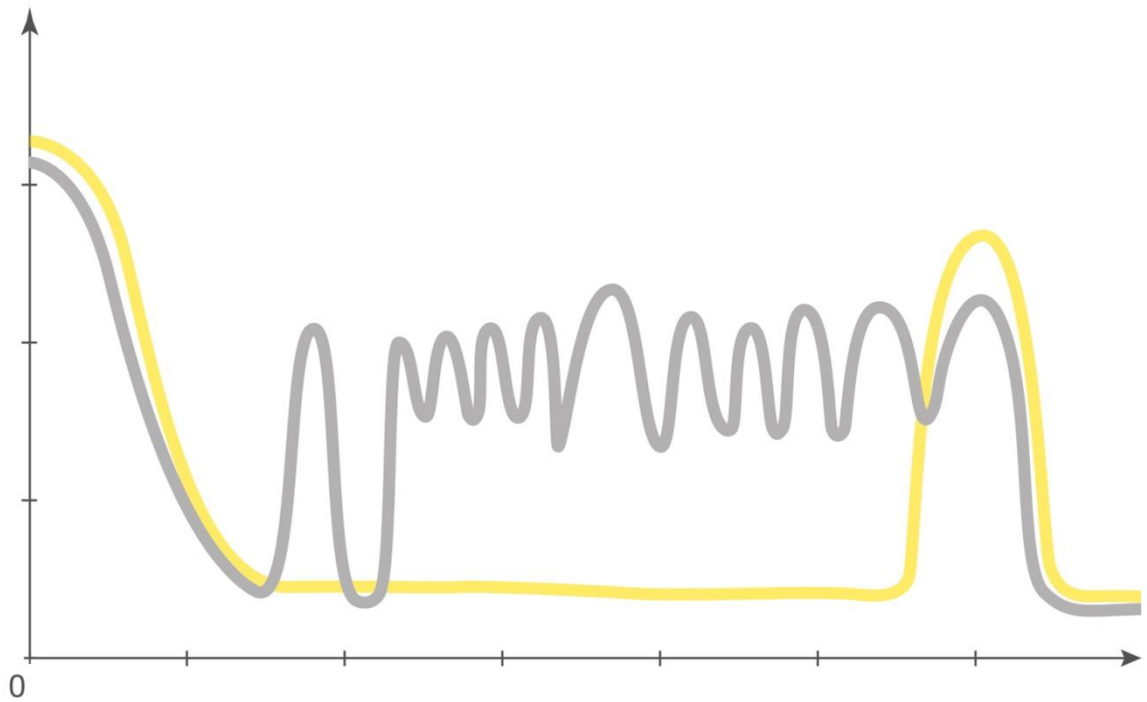
Why is focusing so important?



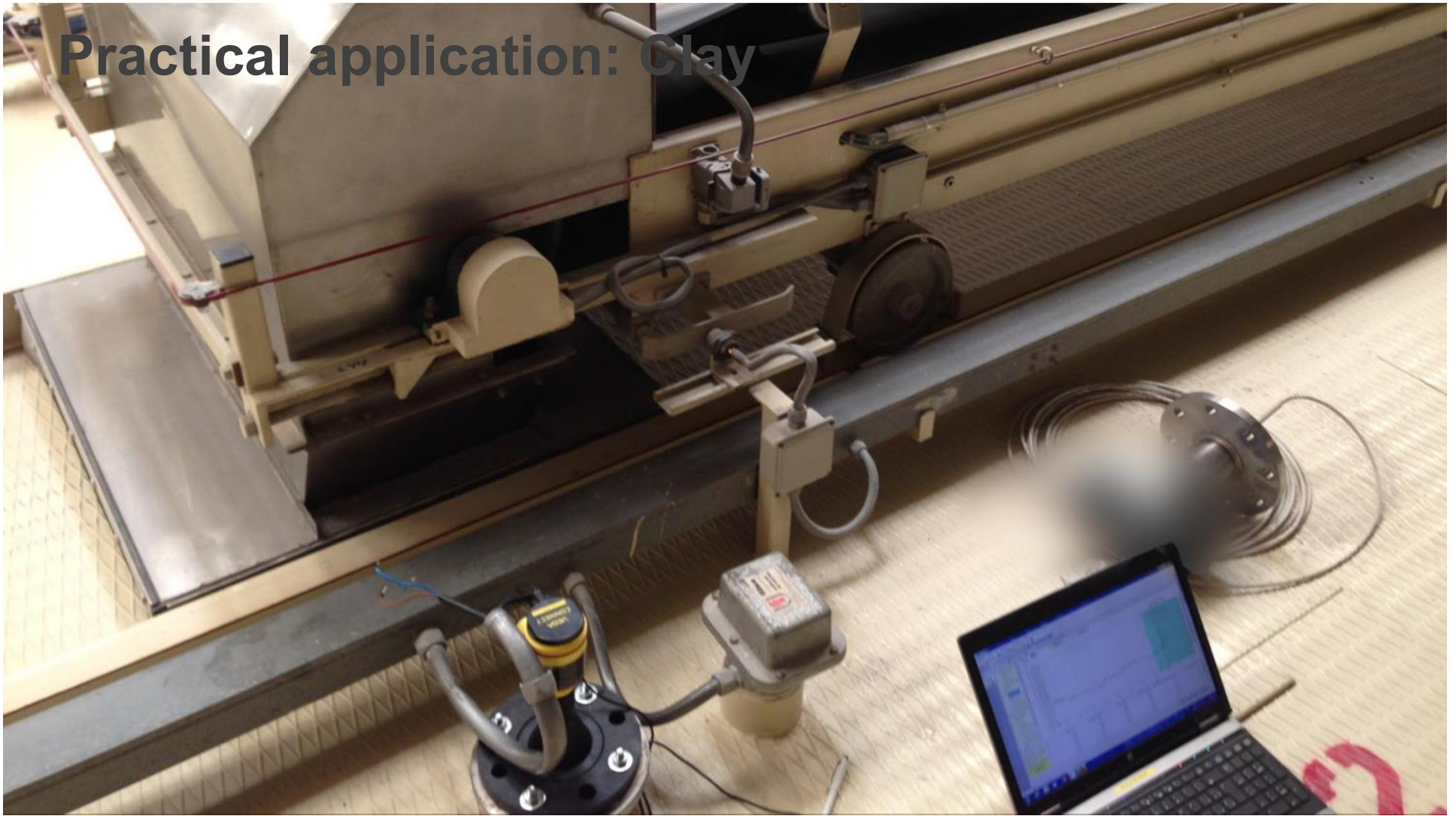


26 GHz

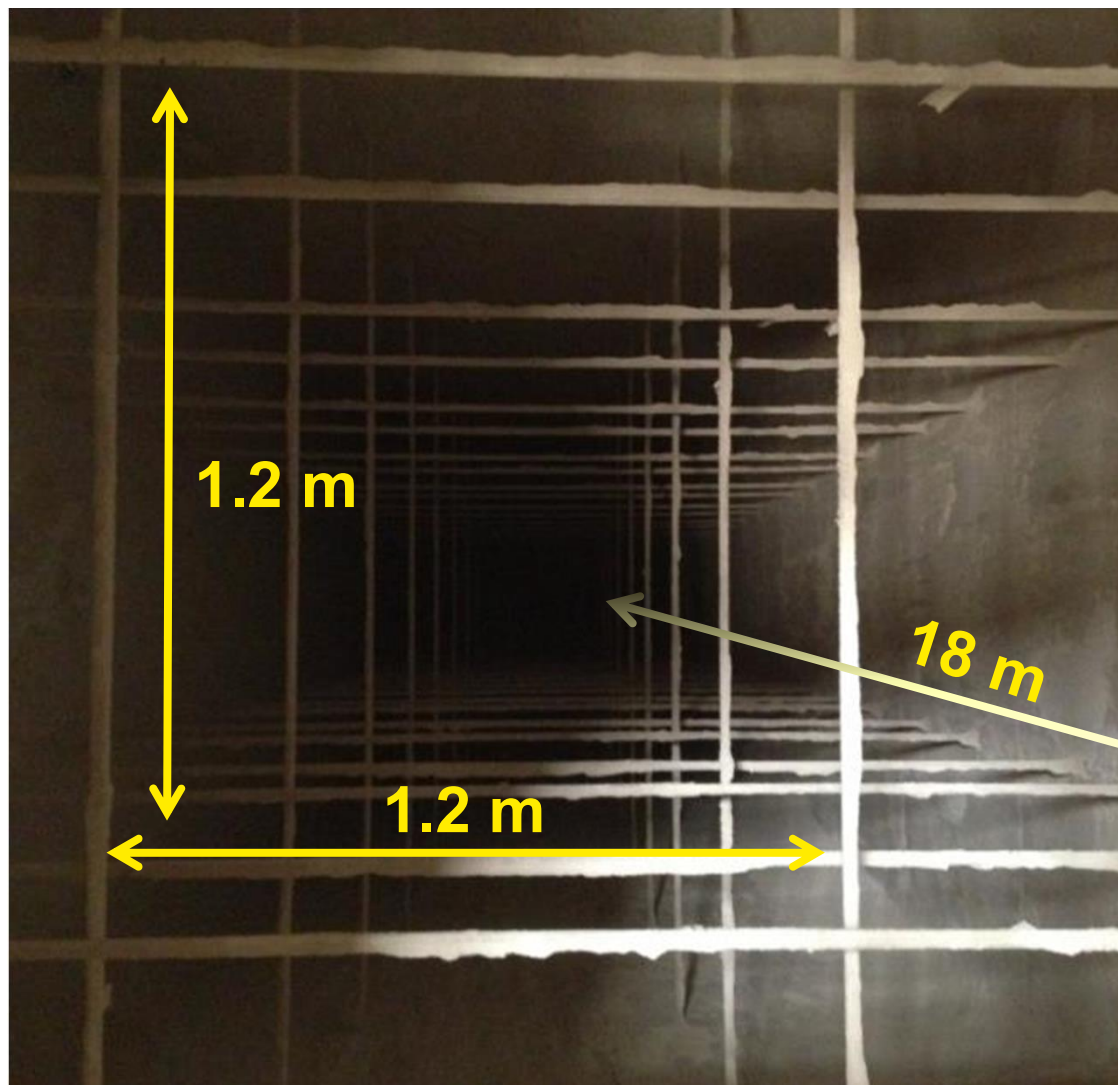
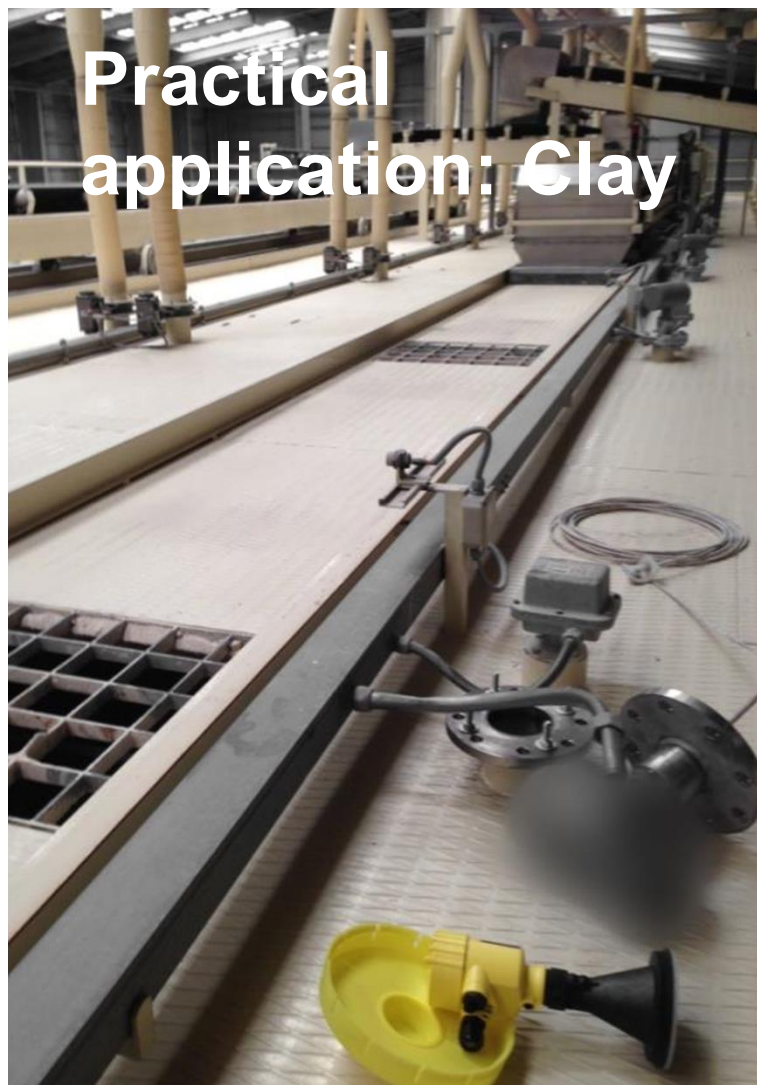
80 GHz



Practical application: Clay



Practical application: Clay



Smaller antennas are built due to
80 GHz frequency

Focusing

Frequency



Antenna diameter



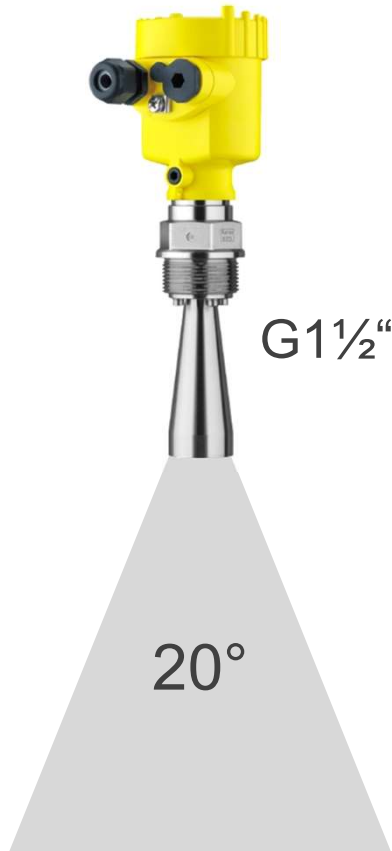
If the beam angle stays the same, the following applies:

The higher the frequency, the smaller the antenna.

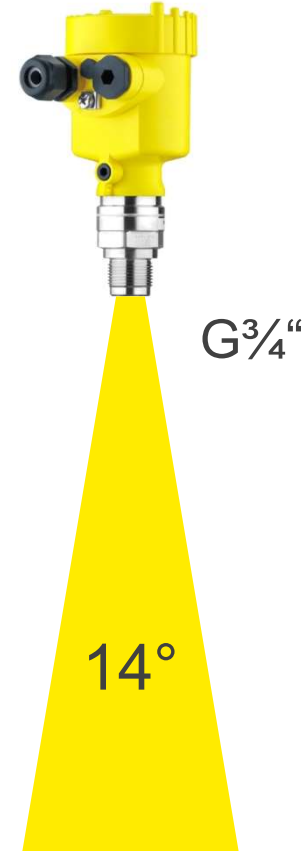
→ Smaller process fittings

Small antennas

26 Ghz

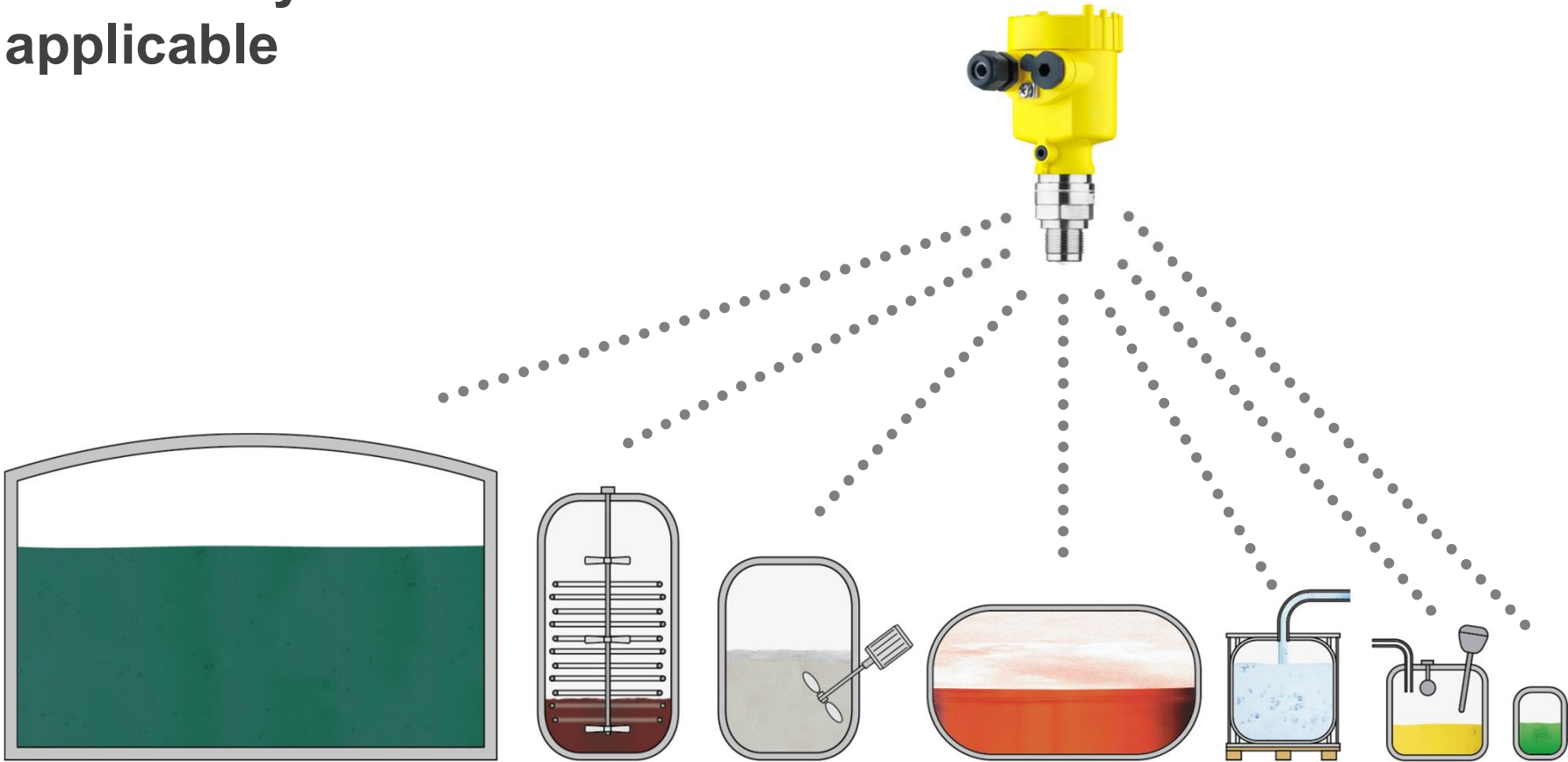


80 Ghz





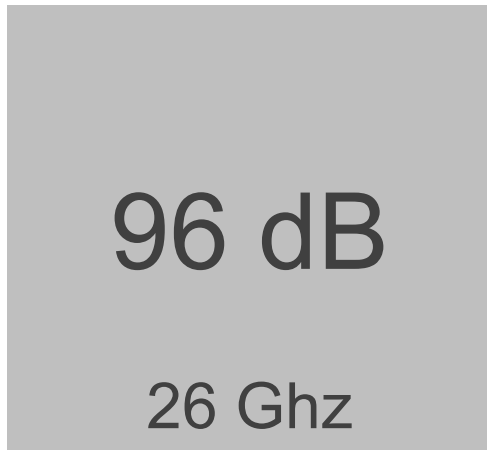
**Universally
applicable**

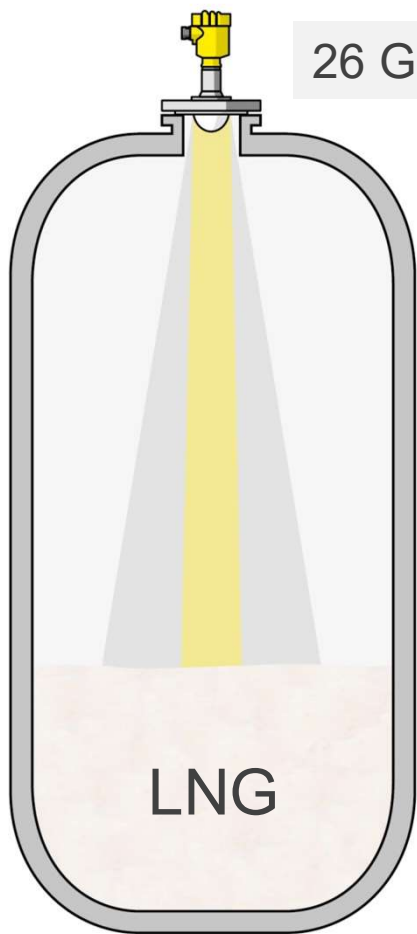


What benefits does a high dynamic range offer for liquids?

Dynamic range

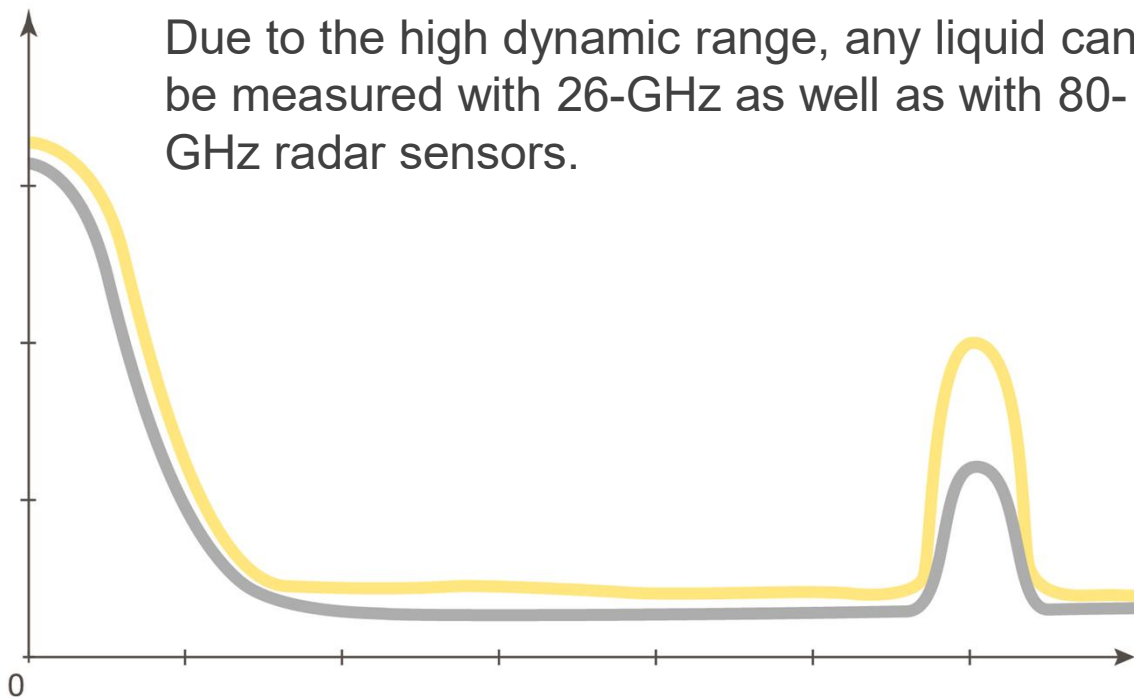
24 dB \rightarrow 200 x
larger signals





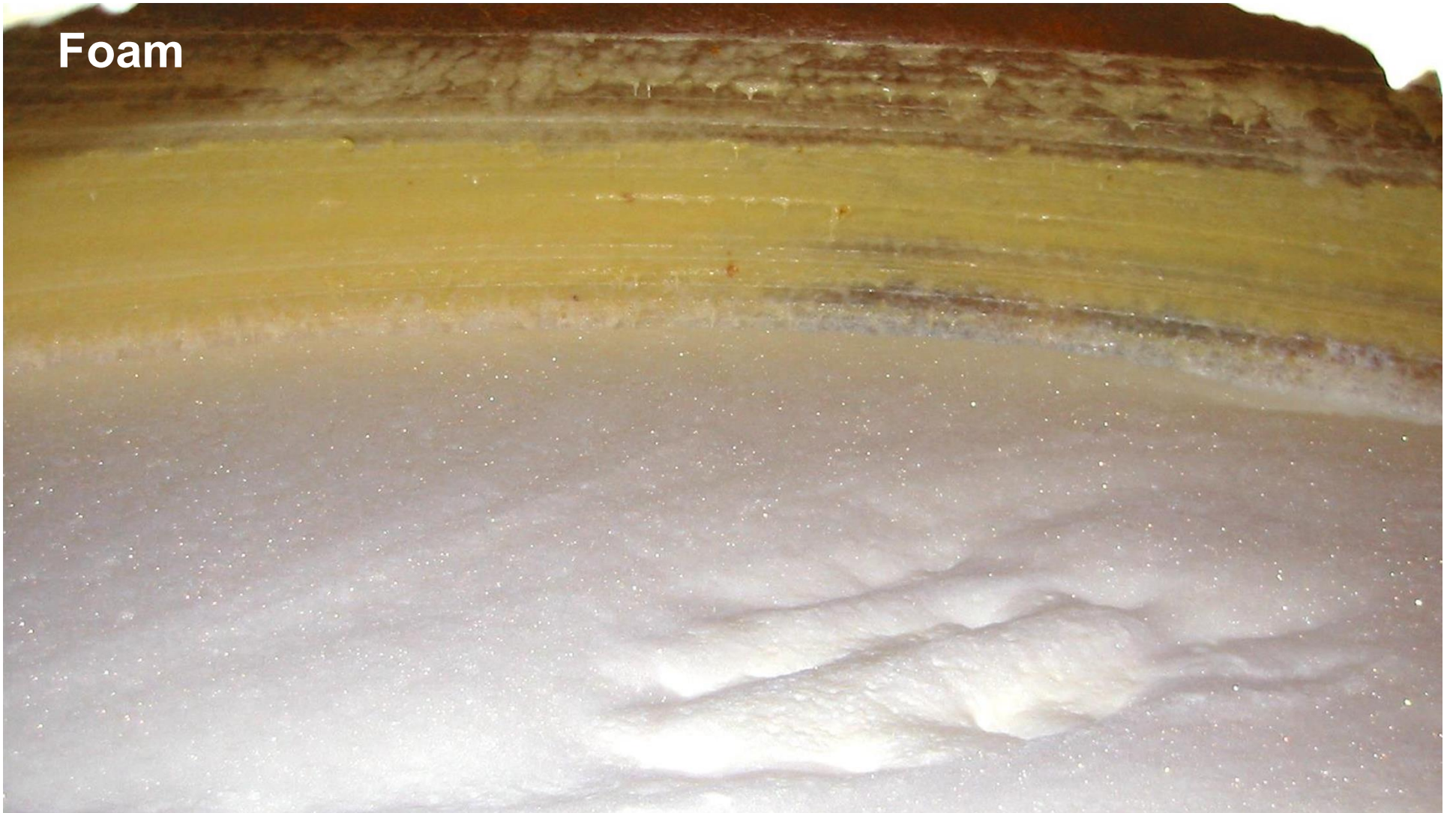
26 GHz

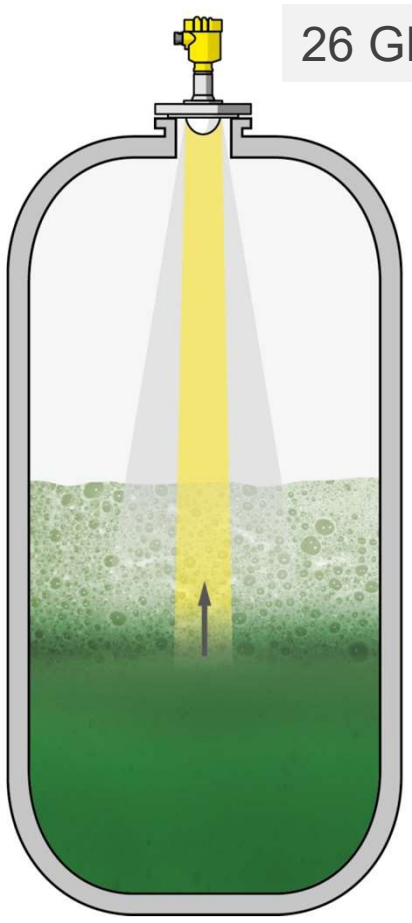
80 GHz



What advantage does 120 dB have compared to 96 dB?

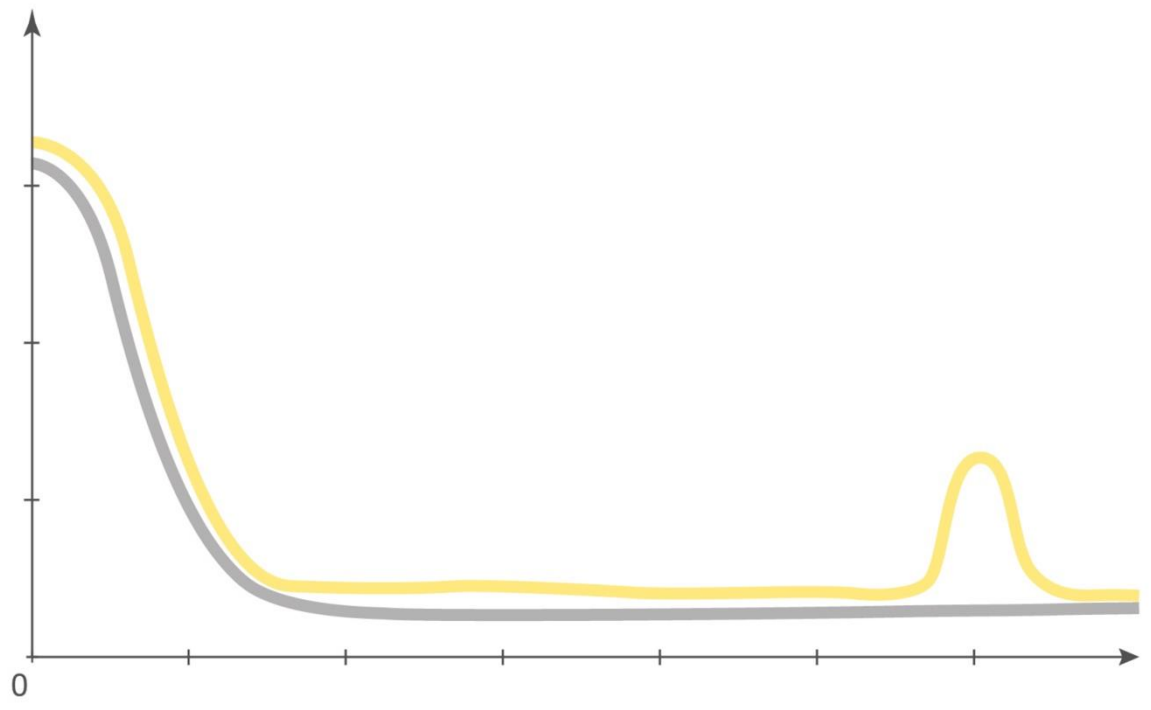
Foam



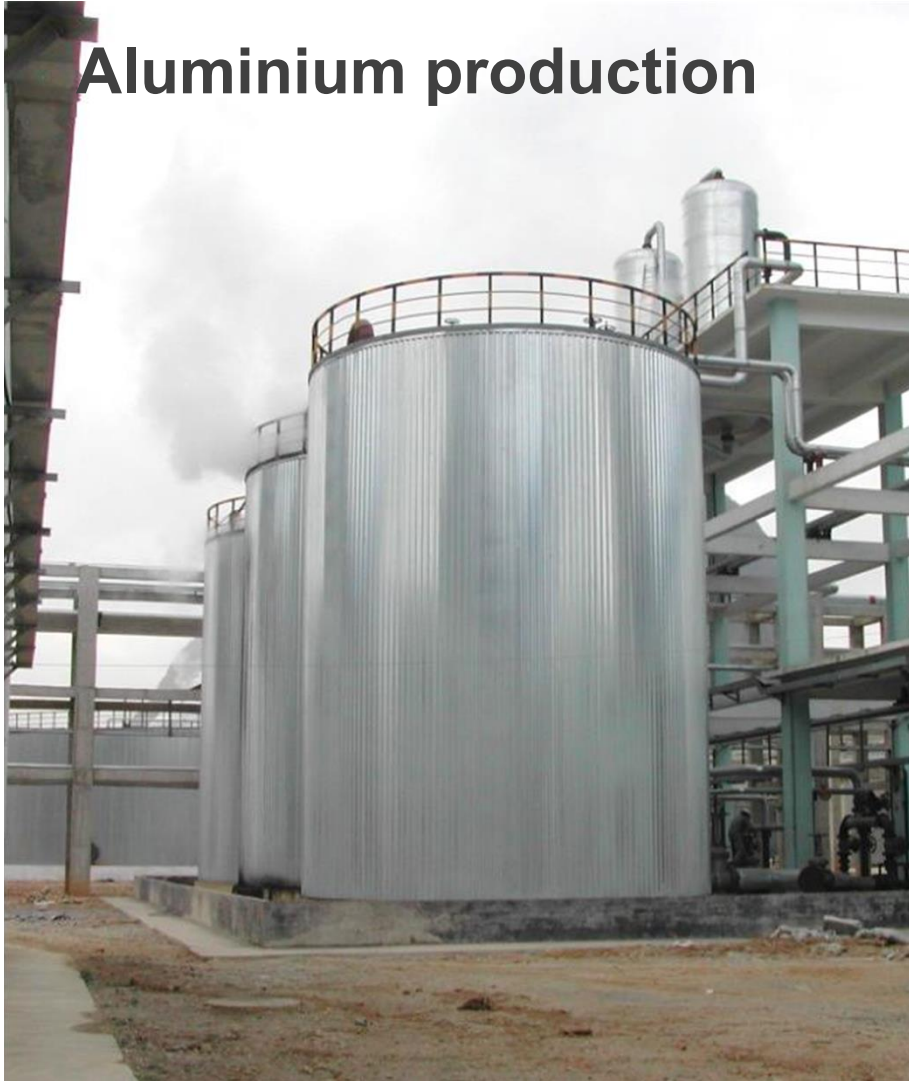


26 GHz

80 GHz



Aluminium production



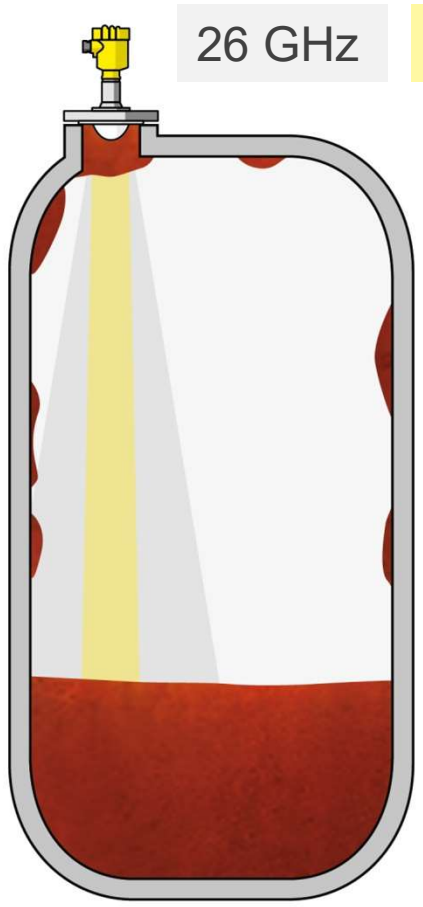
1.5 m of foam



Buildup and Condensation does
not matter

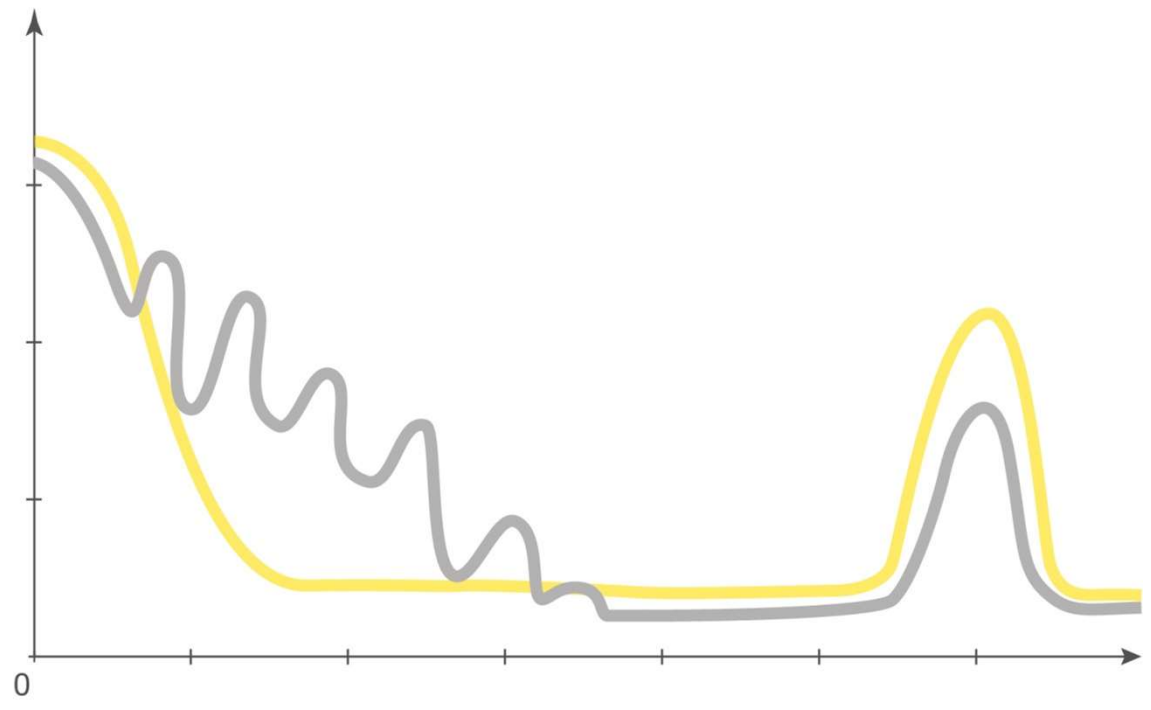
Buildup



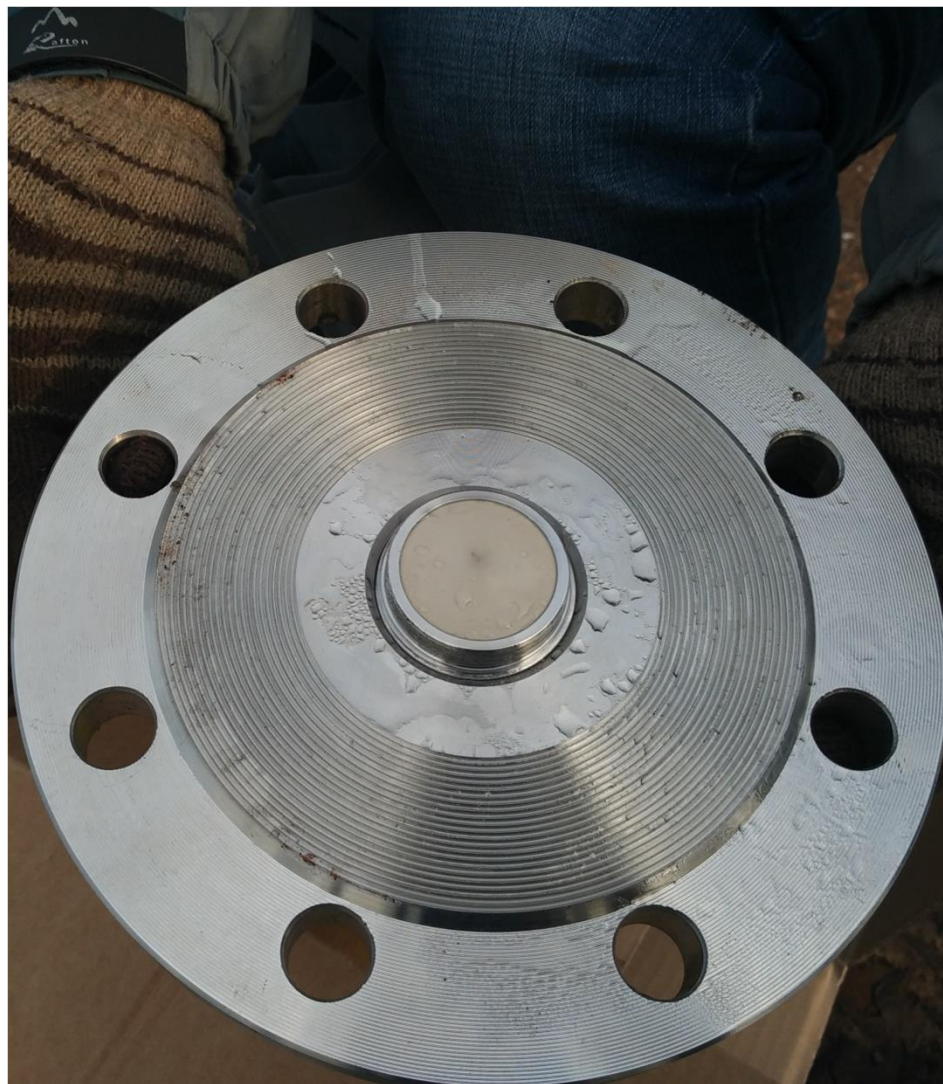


26 GHz

80 GHz



Sodium chloride brine



Oil regeneration





80 GHz

Focussing

Bulk solids

Liquids

Measuring range

Dynamic range

Glass window

Build-up

Nozzle

Small process connection

Condensation

Small vessel

Ball valve

Foam

Setting new standards with 80 GHz



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