

# Difficult Liquid Ammonia Level Measurement Solved With Guided Wave Radar Transmitter

## RESULTS

- Eliminated maintenance
- Replaced mechanical float system
- Reliable, accurate level measurements despite changing conditions

## APPLICATION

Level measurement for a liquid ammonia storage tank

**Application Characteristics:** Heavy vapors, changing density, indistinct level surface

- Measurement Range: 23 meters (76 ft)
- Temperature: -40 °C (-40 °F)
- Pressure: 0.5 bar (7.5 psig)

## CUSTOMER

Chemical customer in China

## CHALLENGE

The Ethylene Plant of a major chemical factory in China was experiencing serious problems with the measurement of liquid ammonia in many of its storage tanks.

Ammonia can be a very difficult compound to measure reliably due to its tendency to change between its liquid and vapor states. The fluid density varies depending on its phase and the overall working pressure and temperature. The surface of the fluid tends to boil as it moves between states and the heavy vapors can attenuate the signal from non-contacting radar and limit its overall range capability.

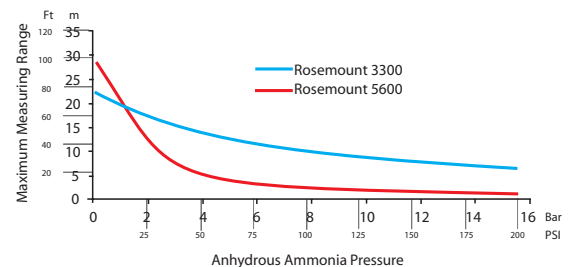
The existing measurements utilising “steel strip” level meters were extremely maintenance intensive and non-contact radar devices proved unreliable due to the heavy ammonia vapor.

## SOLUTION

Emerson offered the Rosemount 3300 Series Guided Wave Radar transmitter as the solution. The operation principle of this radar transmitter ensures accurate level measurement even if there is high concentration of vapors.



*The operation principle of the Rosemount 3300 ensures accurate level measurement even if there is high concentration of vapors.*



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The low frequency microwave energy of the 3300 is guided along the probe which helps it to maintain a good signal in the presence of vapors and turbulence. Since it measures the distance to the surface, the measurement is unaffected by changes in fluid density. While the speed of the microwave signal is slightly affected by the ammonia vapors, this is easily corrected in the software of the 3300 by entering the dielectric constant of the ammonia vapor via the Radar Configuration Tool.

The Ethylene Plant of the chemical company replaced the “steel strip” level meter with the Rosemount 3300 radar transmitter. The process installation was able to use the existing flanges. Due to the height of the tank, 23 meters (76 ft), a twin lead flexible probe was selected and since its installation, has provided accurate level measurements.

Following this successful trial on two large liquid ammonia storage tanks, the customer has replaced various other measuring points with consistently good results. The Rosemount 3300 transmitter is becoming the plant’s first choice as it upgrades its level measurements.

## RESOURCES

### Rosemount 3300

<http://www.emersonprocess.com/rosemount/products/level/m3300.html>

### Rosemount Technical Note: Measuring Ammonia with Radar

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