

Application Note

Oxygen Sensor Cross Sensitivity with other Gases

Cross sensitivity with other gases:

The SST Sensing oxygen sensor measures partial oxygen pressure. Gases or chemicals that will have an influence on the life of the sensor or on the measuring results are:

1. Combustible Gases

Small amounts of combustible gases will be burned at the hot Pt-electrode surfaces or Al₂O₃ filters of the sensor. In general combustion will be stoichiometric as long as enough oxygen is available, the sensor will measure the residual oxygen pressure. Investigated were:

- H₂ (Hydrogen) up to 2%; stoichiometric combustion
- CO (Carbon Monoxide) up to 2%; stoichiometric combustion
- CH₄ (Methane) up to 2.5%; stoichiometric combustion
- NH₃ (Ammonia) up to 1500 ppm; stoichiometric combustion

2. Heavy Metals

Vapours of metals like Zn (Zinc), Cd (Cadmium), Pb (Lead), Bi (Bismuth) will have an effect on the catalytic properties of the Pt- electrodes. Exposures to these metal vapours has to be avoided.

3. Halogen and Sulphur Compounds

Small amounts (< 100ppm) of Halogens and/or Sulphur compounds have no effect on the performance of the oxygen sensor. Higher amounts of these gases will in time cause readout problems or, especially in condensing environments, corrosion of sensor parts. Investigated gases are:

- Halogens, F₂ (Flourine), Cl₂ (Chlorine)
- HCL (Hydrogen Chloride), HF (Hydrogen Fluoride)
- SO₂ (Sulphur Dioxide)
- H₂S (Hydrogen Sulphide)
- Freons
- CS₂ (Carbon Disulfide)

4. Reducing Atmospheres

Long time exposure to reducing atmospheres may in time impair the catalytic effect of the Pt-electrodes and has to be avoided.

5. Others

- Vapours (organic silicone compounds) of RTV (Room Temperature Vulcanised) rubbers are well known pollutants of zirconia based oxygen sensors. The organic part of the compound will be burned at hot sensor parts, leaving behind a very fine divided SiO₂ (Silicone Dioxide/Silica). This SiO₂ completely blocks the pores and active parts of the electrodes. If RTV rubbers are used we advise to use high quality, well cured.
- Dust. Fine dust (Carbon parts/soot) might cause clogging of the porous stainless steel filter and might have an effect on the response speed of the sensor.
- Heavy Shocks or Vibrations might alter sensor properties.
- Water vapour. Condensing water vapour might cause clogging of filters or internal corrosion of sensor parts. We advise to keep the sensor at operating temperature or standby temperature when exposed to exhaust gases. Direct exposure to water droplets has to be avoided.

6. General

The sensor has been developed for boiler combustion control applications and not for automotive combustion applications. Life tests have been performed in:

- A laboratory atmosphere.
- In exhaust gases of natural gas fired boilers.
- In exhaust gases of light oil.