

The electrolysis of water creates a combustible optimized mixture of 2 parts Hydrogen (H) and 1 part Oxygen (O). Combustion of this gas mixture, also termed as detonating gas, again creates a few drops of water in vacuum. The combustion of the gas mixture by burning as a stable flame is, provided the needed knowhow is available, absolutely safe. Only very low gas pressure levels do exist and also there is only about a four liter of gas in the system at any time. No gas storage, it is JIT (just-in-time) gas production synchronized to the consumption. This means almost 1/100'000th of energy stored when compared to pressurized gas bottles, eg acetylene.

The Spirflame® has several independent multiple level staged gas excess pressure safety circuits. Even a flash-back introduced into the Spirflame® interns will be safely absorbed by the hi-strength tank volume design, patented USA 5,217,507 / Europe 0462825 / Germany DE 691 17 354.

A Spirflame model 250HP produces per hour a max of 250 liters of gas mixture, of which 2/3 are hydrogen (167 liter). The LIL (lower ignition level), is 4 vol%.

That means a model 250HP could feed its full gas output for 14 minutes into a *closed / sealed* volume of 1 m3 before the LIL of 4% would be reached.

A free gasing-out of a Spirflame® in a normal room environment can be considered as 100% safe.

Physics of the combustion of a mixture of 2 part Hydrogen + 1 part Oxygen

Mixture of 2H + 1O burns / recombines into some drops of water.

Vacuum results from this combustion. No pressurized media, as caused by combustion of ordinary gas will remain in system.

During combustion Pressure spike duration is about 8 - 15 millisecc. Spike might rise for a few ms to 18 bar.

Total duration of such a pressure increase is 15 to 25 millisecc.

Energy released by the combustion is mainly an acoustic <bang> + heat safely absorbed by the fluid and tank material.

Safety against excessive Gas pressures

The Pressure build-up for the gas produced by electrolysis is safely controlled and limited by the following functions:

Up to 170 mBar:

The SPR-3.1x Electronic control senses the pressure and adjusts the gas rate (direct relation to intensity of electrolysis current) to meet the dial selected pressure level.

Electronic Pressure Sensor fails:

The separate electric pressure switch (mechanical operation) switches at pre-set pressure level of 200 mBar and causes an oversized electromechanic relay to drop and cut-out ac power supply to the electrolysis power circuit. Gas production stops. Manual reset would be needed.

Electronic Control partially fails:

Failure of the electronic control normally stops gas production by blowing the control's on-board fuse or in case the electronic ac control circuit (Triac component) fails, then an oversized electromechanic relay drops and cuts-out ac power supply to the electrolysis power circuit. Gas production stops. Manual reset would be needed.

Electronic Control totally fails:

The separate electric pressure switch (mechanical operation) switches at pre-set pressure level of 200 mBar and causes an oversized electromechanic relay to drop and cut-out ac power supply to the electrolysis power circuit. Gas production stops. Manual reset would be needed.

Failure of All Safeguards:

In case all active safeguards would fail, then there are several internal flexible gas hose connections to release from connectors at pre-defined pressure levels.

A severe flame flash-back into the Spirflame® could blow one off too.

**Spirig Ernest
CH-8640 Rapperswil
Switzerland
fax (+41) 55 222 6969
info@spirig.com**