ADDITIVES "rb bertomeu" vs CORROSION DUE TO VANADIUM AND SODIUM FROM HEAVY FUEL OIL OR CRUDE OIL

Technical document: RB-8

When burning heavy fuel oil or crude oil, fuels with a large quantity of metal impurities, the **"rb bertomeu"** additives, that are composed by Magnesium Organic salts of Fatty acids (molecules – trade secret) SOLUBLE in HYDROCARBONS, instigates the formation of non-corrosive compounds with a high fusion point (over 1,200°C), **preventing the presence of Vanadium Pentoxide (melts at 600-650ºC), low fusion point Sodium Vanadate (melts at 340-650ºC depending on the molar ratio V/Na)**

The action of fixing heavy metals (Vanadium), is also translated into a decrease in the oxidation of SO_2 to SO_3 (formed from the fuel oil's Sulphur) by minimizing its catalytic action on the reaction; as a consequence, the formation of Sodium sulfate is reduced (Na_2SO_2) that melts at 888 ºC and also diminishes the appearance of Sulphuric acid condensation when the combustion gases cool down and, along with it, cold corrosion. Likewise, the formation of Sulphur trioxide (SO_3) is neutralized, blocking the formation of Sulphuric acid (H_2SO_4) and Sodium Sulphate (Na_2SO_4). All of them are the main cause of corrosion in exhaust valves, turbo-compressors, gas turbines, heat exchangers, etc. and also of the formation of residual encrustation in these elements.

The chemical synthesis process by "rb bertomeu" produces the before-mentioned Magnesium Organic salts of Fatty acids completely soluble in hydrocarbons where the magnesium particles are Mg^{2+} ions, with a radius of 72 picometers (1 picometer is 1,000 times smaller than a nanometer).

The surface reactivity of these magnesium ions over conventional materials (oxides and hydroxides of magnesium) is about 10 times higher if the particles are nanometric and 100 times higher if the particles are micrometric.

The "rb bertomeu" additives with soluble Magnesium are the most reactive agents known to neutralize corrosion by Vanadium pentoxide and Sodium vanadates and cannot make any damage by hitting the gas turbine's blades because the Magnesium particles are molecules. Being the additive in molecular form, provides an active area (~ 1,800 m^2/g Mg) between 10 and 100 times higher than the one in nanometer-sized and micrometer-sized particles, and thereby increasing by a proportional factor the chemical reactivity.

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Especially corrosives (due to its low fusion point : around 350ºC) are the sodium vanadates with V_2O_5/Na_2O molar ratio = 3 , although other compounds with higher or lower molar ratio have fusion temperatures between 400º and 650ºC and can be also dangerous in some points of the engine where theses temperatures are reached.
For more information, please read our Technical document RB-7: "Heavy fuel oil and its corrosive effects in the industrial combustion"

The corrosion which appears in the turbo-compressors is usually produced over a longer period of time than in the exhaust valves of the engines. Through years of experimentation in power plants, reliable data is being collected which indicates that the regular use of the **"rb bertomeu" beco F1/ASF** additive notably increases the life of the turbo-compressors and reduces their cleaning necessities, run-time cleaning (by water injection, steam, dry milled vegetal shell , etc.), as well as in-depth cleaning of the dismantled equipment. This reduction of cleaning needs also means an important increase of the annual production of power due to the decrease of dismantling and rebuilding turbos downtime and to the lesser time operating at reduced power, as it is usual when cleaning is done during the operation time.

NOTES:

This document is an extract of a longer document, available at RB-27 Actions of the fuel oil additives **"rb bertomeu"**

You can find more information at the Bulletin No. 30 "Transferring the experience in large engines at power plants to gas turbines that run on heavy fuel oil or crude oil"

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