

## **RIELLO BURNERS AND BIO-FUEL**

### **Synthesis of the experiences with the bio-fuel**

The features and the effects of the bio-fuel used on heating plants are the following:

- 1) Reduction of the polluting emissions of SO<sub>2</sub> and other by-products of the sulphur combustion (unlike the gas-oils, this bio-fuel does not have sulphur).
- 2) Lower net calorific value (about 14%) than the light-oil net calorific value with the necessity to increase the fuel volumetric output in order to have the same burner output.
- 3) Higher density and viscosity than the light-oil; these change the atomising features and involve (with the same pump pressure adjustments) an increase of the volumetric burner output (on average about 10%).
- 4) As general consequence of the points 2 and 3, according to the burner and the adjustment, there are not significant changes of burner output (after all higher output and lower net calorific value balance each other).
- 5) The different viscosity and density create also a compact and long flame with probable problems due to less stability and probable smoke (Bacharach) and CO presence on boilers with short combustion chamber.
- 6) Nitrile rubbers and some plastics soften after a long contact with this fuel: therefore for the burners with standard materials, the flexible oil pipes (intake and return), the seals of the oil valves, the hydraulic jacks of the air dampers and the pump are at issue.
- 7) The solvent power of the bio-fuel involves the melting of residual products and sludges inside the tanks. These materials remain in suspension in the fuel and could wear the components (i.e. nozzles, pump gears, ect.).

According to the a.m. indications, Riello has developed some relevant retrofit kits for two series of burners (Riello 40 and Press G burners) with flexible oil pipes, pumps, hydraulic jack, valve assembly (required in certain models): these kits make the burners suitable for working with bio-fuel.

In case of other RIELLO burners, it is necessary to analyse each time the modifications the burners need in order to make them suitable for the bio-fuel.

Regarding the RIELLO burners with retrofit kit, the precautions to follow are the following:

- a) Insertion of a filter in the fuel intake line (filtering degree 40 µm) to verify and to clean periodically;
- b) Use of nozzles with atomisation angle of 80° in order to have regular ignitions (without pre-heater also for small output) and short flames.

- c) Check the combustion adjustment with analyser for burnt gas, considering that the parameter like  $\text{CO}_2$  (and therefore air excess) and opacity are equivalent to those of the traditional light oil.
- d) An annual check concerning the rubber conditions of the seals and flexible pipes (anyway, it is advised an annual replacement of the flexible pipes, component more “at risk”).
- e) A careful cleaning of the tanks and pipes before the first bio-fuel supply, in order to reduce the quantities of residual products and sludges which could be dissolved.

A handwritten signature in black ink, appearing to read 'Bolognin', is written over a horizontal line that extends to the right and then turns vertically downwards at the end.

*Paolo Bolognin*

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