

# Combustion of mixed pellets at Ariterm Oy



## Background

Ariterm Oy develops, produces and markets heating technology for renewable fuels like pellets, wood chips and firewood. Ariterm Oy has a tradition of hundred years to create environmentally sound, effective and reliable solutions for heating systems.

Ariterm Oy is a leading producer of bioheating systems in Scandinavia, The head office and plant is at Saarijärvi in Central-Finland. Main markets are in Nordic countries.



*A view of the boiler production at Saarijärvi plant (Ariterm Oy).*

## Boilers and burners

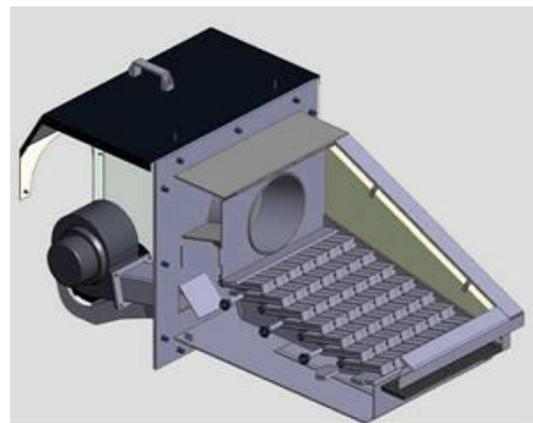
The production is certified in accordance with ISO 9001 and 14001 and quality assured in accordance with the highest category of the EU Pressure vessel directive (PED). In all Arimax and Ariterm –boilers is the maximum operating temperature 120°C and the certificate of the pressure device given by INS00-20. The products of Ariterm Oy are on the internet page [www.ariterm.fi/en](http://www.ariterm.fi/en).

## Burners of the experiments

Heating experiments of straw/peat (50/50) and reed canary grass/wood pellets were

done with two pelletburner; BeQuem pellet burner and the new Aritermin MultiJet-bioburner.

BeQuem -burner has a grate which is fed underneath. During every operating cycle, a small amount of pellets (150 g) is fed from the pellet storage via the external feeding system to the upper connection of the burner. The dosing is carried out by means of a separate dosing auger via the blocking feeder and burner auger to the combustion head. The safety zone is always remains intact even in the event of failure. Wood pellets burner is effective and burning is even, the efficiency is good, bullet proof solution, little ash, little cleaning.



*MultiJet – moving grate burner (Ariterm Oy).*

The second burner in the experiments was MultiJet 60kW. The burner is able to use wood chip of varying quality, wood and peat pellets, peat and various field fuels. The grate of the burner (40 – 1500 kW) is fully mobile and this enables the fuel to mix efficiently on its surface. The grate's mobility improves moving the ash from the burning head to the ash compartment, which is useful when using fuel that produces a lot of ash. The grate runs by spindle motor or, in the case of larger burners, hydraulics. The fuel is fed using a two-screwed feeding system that is essential to the structural fire safety of the equipment.



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## Results of experiments

First experiments of the straw/peat (50/50) – pellets were done with a BeQuem bowl burner of 40 kW. Two efforts were done at nominal affectivity, but the bowl fulfilled and choked rapidly. Probably it was lack of primer air. In a small efficiency the bowl burner worked acceptably but fouled little by little. Burning values were low and the carbon monoxide was high. The air holes of burning began to block and the conclusion was, that this type burner is not suitable for straw/peat –pellets. Results were equal also in reed canary grass/wood experiments.

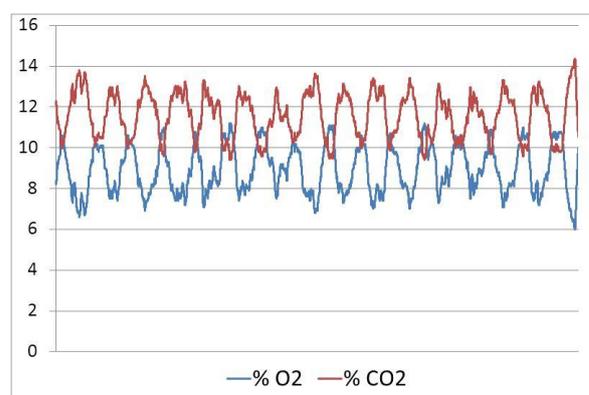
*Results from combustion experiences with 60 kW burner.*

Pellets	Straw/peat kaolin	Straw/peat without kaolin
CO-content, ppm	15 – 50, peaks 100-200	100 - 200, peaks 1000
CO <sub>2</sub> , %	10 - 14	12 -15
O <sub>2</sub> , %	7 – 10,5	5 - 10

Straw/peat –pellets, which included kaolin (2-3 %), was tested a MultiJet burner of 60 kW. Experiment was driven in nominal efficiency and the burner behaved like peat heating. Sintering was become some amount, when the burner was flaked out. During the burning there were not notable amount of slag and the moving grate ejected the small amount of slag from the grate. Generated slag was light and rather easy to brake. Burning values were outstanding, CO about 15 – 50 ppm. The time of the experiment was 5 hours and it was repeated three times.

Experiments were repeated 60 kW MultiJet – burner, but now there was not kaolin as the

additive of the peat/straw –pellets. Experiments were done equal way as previous experiments. Sintering was become some amount, when the burner was flaked out. During burning it was created little more slag than in the previous experiment, in which the pellets included kaolin. Moving grate took away the becoming slag. Burning values were still well e.g. CO was about 100 – 200 ppm. Pellets were little softer than pellets including kaolin.



*60 kW's burner, straw/peat –mix (50/50%) with kaolin.*

Also experiments with mix of wood and reed canary grass will be done with MultiJet burner.

## Conclusion

It was used peat/straw –pellets about 1500 kg in the experiments. Ash became clearly more than wood pellets, but as much as peat-pellets. In practice the pellets which included kaolin were clearly better fuel than pure peat/straw –mix. The experimental pellets are not suitable so called fixed grate burners.

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