

## Test your solid biofuel for ash melting behaviour



### Slagging problems depend on fuel quality

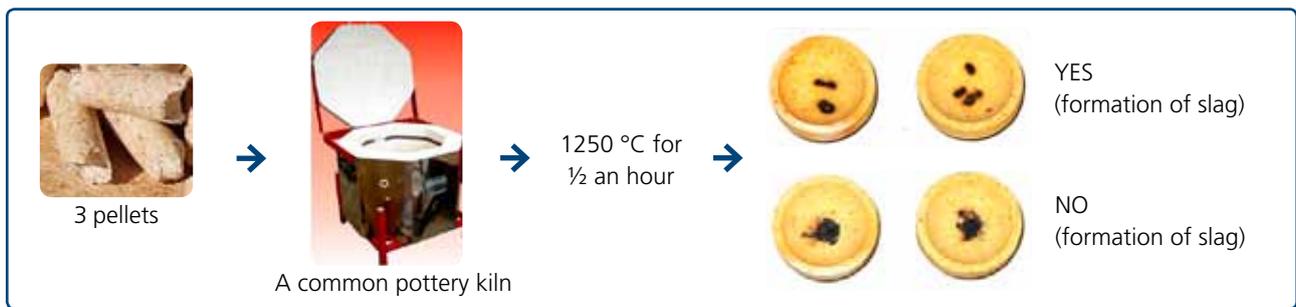
By using wood pellets of good quality troublefree combustion is obtainable. Combustion of wood pellets of poorer qualities or of fuel pellets made of other raw materials than pure wood may on the other hand induce ash fusions on the grid. Formation of slags will trouble the ash removal and prompt operation disturbances.

The problem occurs when the melting temperature of the ash is too low, not necessarily due to the amount of ash. A large ash content in the fuel however will increase the problem.

### May the problems be predicted?

Whether problems with slagging occur depend on the actual combustion plant. Some plants are more sensitive than others towards diverging fuel qualities.

FORCE Technology offers various types of fuel testing. The obtained results of these testing's together with operational experiences based on former deliveries of fuel, provide a good basis for predicting possible slagging problems.



FORCE Technology's simple slagging test

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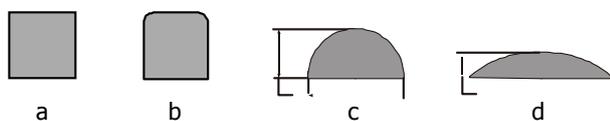
FORCE Technology has developed a simple slagging test for fuel pellets, especially levelled at plants that need to use pellets of the best quality or plants that wish to guard themselves against slagging problems.

We carry out the test in our laboratory, directly on the existing pellets. The test is however so simple that a producer, an importer or a major user of fuel pellets will be able to do the test in connection with a quality control of the pellets.

The test distinguishes between high quality pellets as regards ash melting behaviour and pellets of all other qualities. The principle of the simple slagging test is illustrated at the top of this page. From this illustration it appears that the test answers the question "Is there a risk of slagging problems?" by a Yes or a No.

### Ash fusibility, standard method

The method is described in CEN/TS 15370-1 and is based on the traditional coal method (ISO 540). The method has been used for many years concerning all forms and types of solid fuels. For this test is prepared a representative analysis sample which is ashed in the laboratory. Of the ash is prepared a small test specimen, which is observed during slow heating to 1500 °C under controlled conditions. During the process the characteristic temperatures are determined, based on the profiles of the test specimen shown below.



Profiles for the characteristic temperatures

The profiles show:

- Start
- Deformation temperature
- Hemisphere temperature
- Flow temperature.

### Further information

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The standard method is far more differentiated than the simple slagging test and can be used internationally as regards fuel specifications. It is also part of the requirement specifications for the Nordic Eco-labelling of wood pellets.

### Elements composition

A completely different type of test is to determine the content of ash forming elements in the fuel. Wood fuels with high bark content or impurities such as sand or gravel contain e.g. a much higher content of silicon than pure heartwood. Based on experiences with the element composition of a fuel in relation to observed ash melting behaviour of the fuel it is possible to evaluate the quality of new fuel deliveries.

The element composition of a fuel or a prepared fuel ash may be determined by traditionally wet chemistry. We also provide XRF (X-Ray Fluorescence) screening, as a fast and cheaper alternative.

An XRF screening may be carried out directly on existing fuel pellets saving time for sample preparation for this type of fuel. The results however, are more reliable when carried out on a prepared analysis sample, based on a larger number of pellets.

### Competences

FORCE Technology is an independent, approved technological service company with long standing expertise within utilisation and testing of solid fuels and residues. We are accredited by the Danish Accreditation, DANAK and participate actively in the on-going standardisation work within the areas.