



Quality control of split logs and wood chips

A clear vote for the drying oven method

Georg Krämer is a pioneer when it comes to quality. The head of the Institute for Wood Technology in Bad Wildungen advertises relentlessly for the quality assurance and certification of wood fuels such as split logs and wood chips and develops solutions for professional equipment for test laboratories.

In recent years, firewood has become more and more attractive for heating buildings due to crude oil prices rising particularly in Europe and North America. What was once only a supplementary income for farmers turned into a major market. This resulted in increasing professionalism of equipment for the production, drying and processing of wood waste. This type of wood, which mostly cannot be used for the industry, makes up the larger part of material used for **fuel wood**.

Complicated test standards



Memmert drying oven UF for water content determination

Determining the humidity content in the vacuum

The department of quality assurance of a pharmaceutical expert determines the dry content of gel capsules in accordance

Meanwhile, there is a number of standards for the testing of **fuel wood**. Those who want to perform standard-compliant tests in Europe need to purchase a series of individual standards with up to 70 pages of content. Apart from the costs for the purchase of the standards, extensive expert knowledge is needed to understand and apply these standards properly. Georg Krämer wants to shed light into the dark, that is, develop practicable test and drying processes to standardise **fuel wood** and to be able to test its **quality** as early as in the processing stage.

So far, both large-scale consumers like hospitals, schools or the armed forces, but also individuals had to rely on statements by manufacturers and retailers without being able to test the **quality of wood**. Georg Krämer has compiled a guideline for the **quality assurance** of wood chips, with which the **quality of wood** can be assessed, in cooperation with the test laboratory of the University of Applied Forest Sciences Rottenburg and in accordance with EN 15234 and EN 14778 for the testing of biogenic fuels. Quite a number of criteria is considered for assessment, like for example storage, transport and loading type, the selection of raw wood, drying method, particle size, bulk density and above all, the ash and **humidity content**.

The most important laboratory tests for fuel wood

Once representative and homogenised samples are taken, the ash content is determined by burning a wood sample in a muffle furnace. The lower the ash content, i.e. the amount of ash remaining after burning the wood, the better the heating value of the wood. The **humidity content** is of particular importance for the heating value and thus the **quality of fuel wood**. Wood that is too damp is dried in the burning process and as a result more fuel is needed. The dryer the wood is, the more efficiently it burns and the less emissions are produced. In the long run, too high **humidity** of the wood causes malfunctions in the expensive heating system and consequently increases repair and maintenance costs. Moreover, damp wood can only be stored and traded to a limited extent. Under ideal conditions, ready-to-use split logs have a wood moisture content of 18 to 22% (=air-dried), at

with Standard 731 of the USP (United States Pharmacopeia), and the water content in accordance with USP 921 in a Memmert vacuum drying oven VO.

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maximum <25 %.

Determination of the wood moisture content by kiln drying

For the determination of the **wood moisture** content, Georg Krämer recommends **kiln drying** with the **drying oven method** to check the accuracy of common quick moisture meters. The wood sample is weighed at a measurement accuracy of one gramme and subsequently dried at 103 °C ± 2 until constant weight. Then, it is weighed again and its **moisture** content is determined according to the formula above. Georg Krämer, a man with practical experience, knows how many companies make do with drying samples. A standard kitchen oven is often used as an alternative to a **drying oven**. The wood expert however strongly advises against this. For one thing, neither the required precision nor the three to five times exchange of air necessary per hour can be guaranteed without forced circulation. For another thing, the household oven of course has no overtemperature protection and the device that runs at least 24 hours (and frequently over night) is nonetheless left to itself, not to mention the often unpopular smell of wood it leaves behind.

AtmoSAFE would like to thank Georg Krämer for his friendly support in writing this article.

Overview of focus topics

- Fuel wood, split logs, wood chips, wood briquettes
- Drying oven
- Determining the humidity and water content
- Drying oven method
- Kiln drying
- Wood quality

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$$\text{Wood moisture content in \%} = \frac{\text{water mass contained in the wood}}{\text{dry matter of the wood (dry weight)}} \times 100$$

Formula for the calculation of the wood moisture content by kiln drying

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