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Solid biofuels — Determination of bulk density

Biocombustibles solides — Détermination de la masse volumique apparente

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Contents

Page

Foreword

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The committee responsible for this document is ISO/TC 238, *Solid biofuels*.

Introduction

Bulk density is an important parameter for fuel deliveries on volume basis, and together with the net calorific value, it determines the energy density. It also facilitates the estimation of space requirements for transport and storage. This International Standard describes the determination of the bulk density of pourable solid biofuels, which can be conveyed in a continuous material flow.

For practical reasons, two standard measuring containers with a volume of 5 l or 50 l were chosen for the determination. Due to the limited volume of these containers, some fuels are therefore excluded from the scope of this International Standard. This, for example, applies for chunk wood, non-comminuted bark, baled material and larger briquettes. The bulk density of such fuels can be calculated from their mass and the volume of the container or lorry used for transportation.

To decide on the actual storage volume requirement of a solid biofuel the different storage conditions, which usually differ largely from the conditions of sample analysis (e.g. height of heap versus volume of the standard measuring container, moisture content) also have to be taken into account.

The described method herein includes a defined shock exposure of the bulk material for several reasons. A shock leads to a certain volume reduction, which accounts for compaction effects occurring during the production chain. These compaction effects are mainly due the fact, that the fuel is usually transported and/or stored in containers or silos that are much larger than the measuring container as chosen for the described method. Thus, in practice, the higher mass load leads to an increased load pressure and to settling of the material, which can also be additionally enhanced by the vibrations during transportation. Furthermore, filling or unloading operations in practice usually apply a higher falling depth than the one chosen for the performed test. This will also result in a respectively higher compaction due to the increased kinetic energy of the particles falling. A procedure which applies a controlled shock to the sample was thus believed to reflect the practically prevailing bulk density in a better way than a method without shock. This is particularly true when the mass of a delivered fuel has to be estimated from the volume load of a transporting vehicle, which is a common procedure in many countries. For a rough estimation on how susceptible the different solid biofuels are towards the shock exposure, some research data are given in Annex A. The data show a compaction effect between 6 % and 18 % for biomass fuels.