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Solid Biofuels Bulletin No. 5

GRADED **WOOD BRIQUETTES**

This bulletin, fifth in a series of bulletins, introduces different grades of wood briquettes, their appropriate use and the important parameters that can affect the fuel characteristics. The information on the graded wood briquettes is based on the CAN/CSA-ISO 17225 Part 3: Graded wood briquettes.

Wood briquettes for heat generation have been used in residential space heaters, boilers and in district heating for several decades.

Wood briquettes come in a variety of dimensions depending on the manufacturer. In general, they can be found in two sizes: larger, such as bricks or logs, and smaller, such as pucks (which fit in your hand) or cubes. As a densified fuel product, briquettes are a consistent solid biomass fuel similar to wood pellets. In comparison to wood pellets, briquettes are less dense, constituent particles are larger and typically require less drying leading to less power consumption in manufacturing and hence lower cost.

Various shapes and sizes of wood briquettes

Origins and Sources

CAN/CSA-ISO 17225 Part 3 Standard[1] classifies three grades of wood briquettes based on origins and sources: Grades A1 and A2 are intended for heating of residential and commercial buildings; Grade B briquettes are for larger-scale combustors, such as district heating and electricity production.

Raw biomass used to produce Grade A2 briquettes include sources used for Grade A1 and residues left behind from logging operations (tree tops, branches and low grade small dimension logs – classification 1.1.4) and whole trees without roots (classification 1.1.1)[2]. Raw biomass used to produce Grade A2 briquettes include sources used for Grade A1 and residues left behind from logging operations (such as tree tops and branches and low-grade small dimension logs—classification 1.1.4) and whole trees without roots (classification 1.1.1)[2]. Grade A1 briquettes contain low ash and nitrogen levels, while Grade A2 have slightly higher ash and nitrogen content.

Grade B further expands the briquette source material[2] to include residues from tree thinnings, prunings and arboriculture operations in city parks (classification 1.1.7), bark (classification 1.1.6), and chemically untreated used wood (classification 1.3.1). Grade B also includes chemically treated wood by-products (classification 1.2.2), as long as they do not contain heavy metals or halogenated organic compounds from treatment with wood

TABLE 1. Key specification of graded wood briquettes based on the CAN/CSA-ISO 17225 Part 3 Standard

Property Class	Unit	Grade A1	Grade A2	Grade B
Moisture, M	% of weight	≤ 12	≤ 15	≤ 15
High Calorific Value, Q	MJ/kg as received	≥ 17.5	≥ 17.3	≥ 16.8
Ash, A	% of weight	≤ 1.0	≤ 1.5	≤ 3.0
Particle Density, DE	g/cm^3 as received	≥ 1.0	≥ 0.9	≥ 0.9

preservatives or coatings. Sources are expected to be free of contaminants such as stones, glass, metal, sand, plastics and rubber.

Both softwood and hardwood species can be sourced for wood briquettes. It is anticipated that purposely grown woody crops, such as poplar and willow, grown on marginally productive land will be sourced for wood briquettes production in the future. For further details on the origins and sources, refer to Natural Resources Canada Solid Biofuels No.2 – Primer for Solid Biofuels[2].

Key Properties

The production of briquettes starts with size reduction of the raw feedstock and drying. Next, the material is compressed or extruded under high pressure in briquette machines before coming out in a variety of shapes and sizes as logs, bricks, cylinders, nuts or pucks. In Canada, additives and binders blended with biomass material to improve the quality of wood briquettes are not common.

Wood briquettes are distributed and transported in large plastic bags or stacked on pallets with plastic wrapping or cardboard packaging for distribution by truck or by shipping containers.

Wood briquettes, like wood pellets, are a highly consistent biomass fuel type which allows easy handling and storage, as well as efficient energy conversion.

A buyer of/user of wood briquettes should consider several quality characteristics, the most important of which are as follows (see Table 1):

- **Moisture content (M) and calorific value (Q) –** measured by lab testing.
- **Ash content (A)** – any restrictions regarding ash content and ash melting temperature as stipulated by the supplier of the combustion equipment need to be considered to minimize combustion equipment operational issues (clinker/slagging).
- **Particle density (DE) –** depending on the physical shape of the briquettes, particle density is used by some suppliers in lieu of bulk density to assist in estimating storage volume required.
- **Physical size of the briquettes –** recommended by the equipment supplier to avoid clogging the hoppers and augers that are used to feed the briquettes in automated systems.

Specifications of Properties for Graded Wood Briquettes

The term “graded” means that the feedstock as well as the quality of the briquettes have to comply with certain requirements as stipulated in the CAN/CSA-ISO 17225-3 Standard[1]. Table 1 is an excerpt from the CAN/CSA-ISO 17225 Part 3: Graded wood briquettes. It provides standards for three graded property classes: A1, A2 and B. The source materials as well as the briquettes are tested for compliance in accordance with a family of CAN/CSA-ISO testing standards, see NRCan Solid Biofuels Bulletin No.3 – CAN/CSA-ISO Solid Biofuels Standards[2].

For example, a label stating wood briquettes’ specifications of M9.0, A2.5 and Q17.0 indicates that the wood briquettes contain ≤ 9% moisture, ≤ 2.5 ash with a minimum calorific value of 17 MJ/kg. Based on these fuel property values, this wood briquettes is classified as Grade B.

M153-1/5E-PDF
978-0-660-05082-9

Safe Handling and Storage of Wood Briquettes

Wood briquettes need to be kept dry during storage to maintain their mechanical integrity and fuel quality.

Bulk storage spaces should be well ventilated and away from areas where people are present.

Dust can be created during handling of large volumes of briquettes, which may cause respiratory problems if inhaled, and increase risk of fires and explosions. Wood briquettes piles may self-heat, and temperature measurements in large storage spaces are therefore recommended to monitor heat build up.

A Safety Data Sheet (SDS) for wood briquettes is available with information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with wood briquettes.

References & Links

1. CSA Group - www.csagroup.org for CAN/CSA-ISO 17225 Solid Biofuels-Fuel specifications and classes – Part 1: General requirements, and, – Part 3: Graded wood briquettes.

2. Natural Resources Canada – www.nrcan.gc.ca for the Solid Biofuels Bulletins Series.

Acknowledgement

This bulletin was prepared in collaboration with Canadian Institute of Forestry, FPInnovations, Ontario Ministry of Natural Resources and Forestry, Pembina Institute, Wood Pellet Association of Canada, Wood Waste to Rural Heat.

M153-1/5E-PDF
978-0-660-05082-9