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Solid biofuels — Safety of solid biofuel pellets — Safe handling and storage of wood pellets in residential and other small-scale applications

Biocombustibles solides — Sécurité des granulés de biocombustible solide — Manutention et stockage en toute sécurité des granulés de bois dans des applications résidentielles et autres applications à petite échelle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 238, *Solid biofuels*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

There is a continuous global growth in production, storage, handling, bulk transport and use of solid biofuels especially in the form of pelletized biofuels.

The specific physical and chemical characteristics of solid biofuels, their handling and storage can lead to a risk of fire and/or explosion, as well as health risks such as intoxication due to exposure to carbon-monoxide, asphyxiation due to oxygen depletion or allergic reactions.

There is a risk of injury or death associated with pellet storage, so safety measures shall be implemented. The possibility of fire and explosion incidents is a clear indicator that safety needs to be prioritized, first of all for human safety but also because interruptions in energy supply can have significant consequences. The market confidence in solid biofuels as a secure energy source may be jeopardized and financial losses due to business interruptions could occur. Difficulty to obtain insurance coverage will also increase.

As part of the determination and the assessment of risks for solid biofuels, defined test methods and standards are established or need to be developed. However, the ageing and degradation due to handling and storage of solid biofuels in particular environments will affect the characteristics. The consequence of this change of characteristics is that safety margins need to be established in relation to the actual analysis results.

For small scale applications and handling of small quantities of pellets up to 100 t, requirements of this standard support end-users not educated in safety aspects or requirements of solid biofuel handling. Health risks are associated with the quality of the fuel and therefore controlling the fuel quality reduces the risks, particularly of dust emissions. Logistics and the handling of the pellets play a major part in maintaining quality and are therefore also addressed in this standard.

Generally, facilities at end users with a storage capacity <100 t are covered by this document and larger stores will be covered by ISO 20024[1)]. However, storage capacity alone is not a good enough parameter on which to decide which standard to apply. A trader or larger end user might have a number of small storage facilities but may have a greater throughput of pellets during the entire year but with frequent filling and reclaiming or packaging. Depending on the characteristics of a specific facility, all of the principles covered in this document should be considered but all or only some parts of the systems/equipment described in ISO 20024 will be relevant.

A competent assessor should have knowledge and experience commensurate with the complexity of the facility (knowledge of solid biofuels is required) before selecting which standard and which clauses are applicable to the facility being considered.

1) Under preparation. Stage at the time of publication ISO/CD 20024:2018.

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Solid biofuels — Safety of solid biofuel pellets — Safe handling and storage of wood pellets in residential and other small-scale applications

1 Scope

This document provides principles and requirements for the safe handling and storage of wood pellets in residential and other small-scale applications. It covers the supply chain from loading of the delivery truck, requirements of delivery trucks, connections to the end-user's store and the delivery process. It also covers the design and construction of pellet storage systems. This document addresses risks of fires, dust explosions, off-gassing, oxygen depletion, damage to appliances and buildings through swelling of pellets and other health risks. It is applicable to wood pellets according to ISO 17225-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16559, *Solid biofuels — Terminology, definitions and descriptions*

ISO 17225-2, *Solid biofuels — Fuel specifications and classes — Part 2: Graded wood pellets*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

EN 13237, *Potentially explosive atmospheres — Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres*

3 Terms and definitions

For the purposes of this document, terms and definitions given in ISO 16559 and EN 13237, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 General terms

3.1.1
combustible dust
finely divided solid particles, with a particle size of 500 µm or less in nominal size, which may form explosive mixtures with air at standard atmospheric pressure and temperatures

Note 1 to entry: This includes dust and grit as defined in ISO 4225.

Note 2 to entry: The term 'solid particles' is intended to address particles in the solid phase but does not preclude a hollow particle.

[SOURCE: ISO/IEC 80079-20-2:2016, 3.1]

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3.1.2
fines
F
small sized particles in fuel below a certain pre-defined size, here less than 3,15 mm

Note 1 to entry: The amount of fines can be different after completion of production, bagging, transportation, unloading, distribution etc.

[SOURCE: ISO 16559:2014, 4.90, modified — "usually" replaced by "here" to indicate exact limit.]

3.2 Terms related to transportation and delivery

3.2.1
bulk transport
pellets transported loose, typically in tippers, walking floor trucks, other trucks with closed cargo area or *blower trucks* (3.2.2)

3.2.2
blower truck
vehicle with a pneumatic discharge system using compressed air

Note 1 to entry: Examples of blower trucks include silo-trucks and rotary feeder trucks.

3.2.3
silo truck
fully pneumatic *blower truck* (3.2.2) where pellets are loaded into special pressurised compartments emptied by applying compressed air and using compressed air for pellet conveying

3.2.4
rotary feeder truck
truck where pellets are discharged by gravity via a rotary valve (or star valve) into the stream of compressed air for pellet conveying

3.2.5
day hopper
hopper directly linked to the automatically stoked heating boiler

Note 1 to entry: Typically a day hopper holds a few days of pellet fuel up to 1 t. The filling of the hopper is a batch operation.

3.2.6
closing cap
cap made of metal or plastic, which seals the *connectors* (3.2.7)

3.2.7
connector
permanently installed coupling made of aluminium-alloys or steel, with a gasket ring for pressure and suction operation, which functions in the filling of the *pellet store* (3.3.2)

Note 1 to entry: There are different uses for connectors, such as filling and suction.

3.2.8
delivery hose
temporary connection between the pellet *blower truck* (3.2.2) and the fill connector of the pellet store during the pneumatic delivery process

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3.3 Terms related to storage

3.3.1
sloping floor
construction in the store that allows the fuel to be fed by gravity to the conveying system

Note 1 to entry: The aim is to achieve storage that completely drains without any intervention.

3.3.2
pellet store
room, container or other place where pellets are stored by the end-user before combustion

Note 1 to entry: Pellet stores can be self-built or pre-fabricated.

3.3.3
small pellet store
pellet store with a capacity of less than 15 t

3.3.4
individual customized store
pellet store that is individual custom-made into a building often including existing structures like walls

Note 1 to entry: Individual customized stores may be self-built by end-users.

3.3.5
pre-fabricated store
storage system built by specialist companies, erected at the end-user's premises

3.3.6
fill pipe
connecting pipe, which connects the fill *connector* (3.2.7) with the pellet store

3.3.7
small bag
bag for pellets with a typical filling weight between 8 kg and 25 kg

3.3.8
big bag
flexible intermediate bulk container (FIBC) made of flexible fabric that is designed for storing and transporting bulk materials with a capacity of 500 l and above

4 General

4.1 Product requirements

This document was developed to promote the safe handling, storage and combustion of pellets conforming to the fuel properties of ISO 17225-2, Classes A1, A2 and B. If other fuel types are used the principles contained herein might not apply.

A data sheet for wood pellets issued by the manufacturer/supplier may provide more specific information with regards to the product delivered, quality, safety and health aspects during handling and storage.

4.2 Hazards associated with amounts of pellets ≤100 t

Pellets react in their environment in different ways, especially with air and moisture and they are also sensitive to mechanical stress. To avoid hazards it is important to store and handle pellets accordingly.

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