

SLOVENSKI STANDARD
oSIST prEN ISO 20023:2017
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Trdna biogoriva - Varnost peletov trdnega biogoriva - Varno ravnanje in shranjevanje lesnih peletov za uporabo v stanovanjskih in drugih manjših napravah (ISO/DIS 20023:2017)

Solid biofuels - Safety of solid biofuel pellets - Safe handling and storage of wood pellets in residential and other small-scale applications (ISO/DIS 20023:2017)

Biogene Festbrennstoffe - Sicherheit von biogenen Festbrennstoffen - Sichere Handhabung und Lagerung von Holzpellets in häuslichen- und anderen kleinen Feuerstätten (ISO/DIS 20023:2017)

Biocombustibles solides - Sécurité des granulés de biocombustible solide - Manipulation et stockage des granulés de bois en toute sécurité dans des applications résidentielles ou d'autres à petite échelle (ISO/DIS 20023:2017)

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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

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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.

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

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

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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 handling and storage of solid biofuels and their physical characteristics 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 reliable energy source may be jeopardized and financial losses due to business interruptions could occur. Difficulty to obtain insurance coverage will also increase.

At the moment it is difficult for facility owners, logistics providers, equipment suppliers/manufacturers, consultants, authorities and insurance providers to determine reasonable measures and an appropriate level of protection due to a lack of harmonized standards and recommendations.

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 actual environments will affect the characteristics. The consequence of this change of characteristics is that safety margins have to be established in relation to the actual analysis results.

For small scale appliances and handling of small quantities of pellets up to 100 t requirements of the standard support end-users not educated in safety aspects or requirements of solid biofuel handling. Health risks are closely related with 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 maintaining quality and are therefore also addressed in this standard.

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 delivery 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 and other health risks. It is applicable to wood pellets in accordance with 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.

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

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)*

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

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3.1 General terms**3.1.1****dust**

fragmented material of small size passing a 500 µm sieve caused by a non-voluntary process as opposed to powder which is normally manufactured to size

Note 1 to entry: There is no official definition of what constitutes dust in terms of physical size (see ISO 16559). In this standard dust is determined by using sieves according to ISO 3310-1. The particle size of 500 µm has been determined based on Gestis explosion database, see [21].

Note 2 to entry: In EN 12779 dust is defined as particles of wood emanating from processing at woodworking machines. The particle size for dust is set to less than 0,5 mm. In general dust is often considered as particles below 75 µm in diameter, which settle out under their own weight but which remain suspended for some time.

3.1.2**fines****F**

small sized particles in fuel below a certain pre-defined size, usually 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]

3.2 Terms related to transportation and delivery**3.2.1****bulk transport**

pellets transported loose, typically in walking floor trucks, other trucks with closed cargo area or blower trucks (3.10)

3.2.2**blower truck**

vehicle with a pneumatic discharge system using compressed air

Note 1 to entry: Examples of blower truck include, silo-truck and rotary feeder truck

3.2.3**silo truck**

fully pneumatic blower truck (3.9) 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 into the stream of compressed air for pellet conveying

3.2.5

day hopper

hopper 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 (3.5)

3.2.7

connector

solid 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 (3.12)

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 (3.19) and the fill connector of the pellet store during the pneumatic delivery process and/or connection between the suction fan and the suction connector of the store

3.2.9

safety data sheet

SDS

document specifying the properties of a substance, its potential hazardous effects for humans and the environment, and the precautions necessary to handle and dispose of the substance safely

[SOURCE: ISO 14937:2009, 3.12]

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 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

ISO/DIS 20023:2017(E)**3.3.4****customized store**

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

Note 1 to entry: 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**storage container**

fully enclosed container that is built independently of the building structure

Note 1 to entry: Storage containers can be made of materials permeable or impermeable to air such as metal, concrete, plastics, wood or textiles.

3.3.7**fill pipe**

connecting pipe of metal, which connects the fill connector with the pellet store

3.3.8**small bag**

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

3.3.9**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**

For residential and other small scale appliances only pellets according to ISO 17225-2 class A1, A2 or B shall be used to guarantee safe handling, storage and combustion of pellets.

Pellets of different diameters or qualities shall not be mixed.

If there is a safety data sheet (SDS) for wood pellets issued by the manufacturer/supplier it 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 small 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. It is difficult to describe in detail all variables that might affect the pellets in practice, the technical background and potential hazards are summarized in this clause for the most important hazards such as:

- emissions of volatile compounds and oxygen depletion,
- backflow of flue gases,
- fines and dust,
- uncontrolled ignition and smouldering,
- decomposition, and
- swelling.

More information concerning the listed hazards is compiled in informative Annex B.

4.3 General requirements for storage and handling of pellets

All handling and transport equipment shall be designed to minimise damage to the pellets. Abrasion of pellets and consequential formation of fines shall be minimized.

Dust emissions to the environment shall be kept as low as possible. Fines and dust accumulate on flat and inclined surfaces. These surfaces and other places where fines may accumulate shall be minimized. Unavoidable areas where fines may accumulate shall be cleaned regularly, see 6.1.3.

Accumulation of carbon monoxide (CO) and volatiles in closed storage facilities shall be avoided by proper ventilation of the facilities.

Wood pellets shall be protected against humidity and moisture. They shall be kept dry at all times.

All transport systems, including vehicles, conveyors and storage facilities shall be thoroughly cleaned from previously handled products except when used for the same dimension and quality of pellets.

NOTE Requirements for large storage facilities (> 100 t), packing and loading systems are provided in ISO/CD 20024.

5 Requirements for safe transport and delivery of pellets

5.1 General

The requirements will differ depending on the type of delivery to the end-user:

- Bulk pellets for residential and other small-scale applications are typically delivered by blower trucks. Requirements for this type of delivery, see 5.2.
- If bulk pellets are delivered by tippers or walking floor trucks and are unloaded at the end-customer into a trough or a bunker, see 5.3.
- If other vehicles are used for bulk transport the suitability of the transport system shall be evaluated.
- Pellets delivered in big bags, see 5.4
- Pellets delivered in small bags, see 5.5

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In all cases the pellets shall be protected against moisture (e.g. rain, snow or condensate) throughout the transportation process as well as during loading and unloading.

Loading of trucks is only permitted when the pellet temperature is less than 40 °C. Heating of pellets in the truck shall be minimized e.g. by using bright/reflective surface on the outside of the truck. Heating can also be caused by using hot compressed air, which raises the temperature of the pellets.

The specification of the pellets shall be in accordance with ISO 17225-2 and shall be stated on all delivery documentation and invoices.

All pellet handling areas shall be strictly non-smoking areas and have no naked flames.

5.2 Requirements for bulk delivery by blower trucks

5.2.1 Transport vehicles and their operation

To help the understanding of the following paragraphs, see Figure 1.

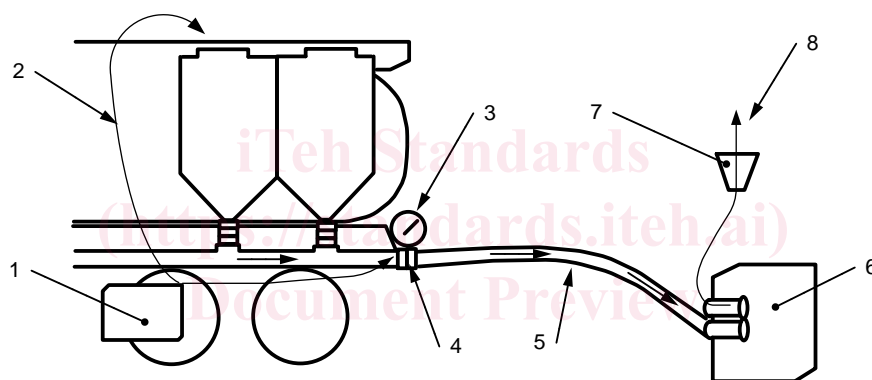


Figure 1 — Operating principle of the pneumatic delivery process using a silo truck.

Key

- | | |
|---|--|
| 1 compressor | 5 delivery hose |
| 2 pressurisation of silo compartment | 6 end-user's pellet store |
| 3 pressure gauge measures pressure in the discharge pipe or in the silo compartment | 7 suction fan with filter sock to extract the blower air and create a slightly negative pressure in the pellet store |
| 4 coupling on delivery vehicle | 8 exhaust air |

Mechanical damage of pellets caused by transport vehicles shall be minimized. Blower trucks shall be equipped with a low abrasion blowing feed system. Low abrasion may be obtained by using coated hoses. Sharp edges between hoses shall be avoided. The trucks should be equipped with a compressor that provides air for blowing the pellets. Where required, blower trucks shall have a mobile fan to extract the supply air from the storage facility during the delivery. Explosion protection for the mobile fan is not required. The capacity of this suction fan shall exceed the capacity of the blowing system of the vehicle. The extracted air shall be filtered (e.g. by fabric filter) to limit dust emissions to the environment. The connected filter bag shall be checked for fouling and shall be protected from rain or