

**SLOVENSKI STANDARD**  
**oSIST prEN ISO 20024-1:2019**  
**01-marec-2019**

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**Trdna biogoriva - Varno skladiščenje in ravnanje s peleti trdnega biogoriva za komercialno in industrijsko uporabo (ISO/DIS 20024:2019)**

Solid biofuels - Safe handling and storage of solid biofuel pellets in commercial and industrial applications (ISO/DIS 20024:2019)

Biogene Festbrennstoffe - Sicherheit von Pellets aus biogenen Festbrennstoffen - Sicherer Umgang und Lagerung in kommerziellen und industriellen Anwendungen - Teil 1: Allgemeines (ISO/DIS 20024:2019)

Biocombustibles solides - Manipulation et stockage en toute sécurité des granulés de biocombustibles solides dans des applications commerciales et industrielles (ISO/DIS 20024:2019)

**Ta slovenski standard je istoveten z: prEN ISO 20024**

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**ICS:**

27.190	Biološki viri in drugi alternativni viri energije	Biological sources and alternative sources of energy
75.160.40	Biogoriva	Biofuels

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**en**



# DRAFT INTERNATIONAL STANDARD

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## Solid biofuels — Safe handling and storage of solid biofuel pellets in commercial and industrial applications

*Biocombustibles solides — Manipulation et stockage en toute sécurité des granulés de biocombustibles solides dans des applications commerciales et industrielles*

ICS: 27.190; 75.160.40

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## 1 Foreword

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

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

13 Attention is drawn to the possibility that some of the elements of this document may be the subject of  
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15 patent rights identified during the development of the document will be in the Introduction and/or on  
16 the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents)

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

19 For an explanation on the meaning of ISO specific terms and expressions related to conformity  
20 assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers  
21 to Trade (TBT) see the following URL: [Foreword - Supplementary information](http://www.iso.org/foreword)

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

23

## 24 Introduction

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

27 The handling and storage of solid biofuels and their physical characteristics can lead to a risk for fire  
28 and/or explosion, but also health risks for example intoxication due to exposure to carbon monoxide  
29 (CO), asphyxiation due to oxygen depletion, and allergic reactions.

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

36 This document provides support, advice and guidance to facility owners, logistics providers, equipment  
37 suppliers/manufacturers, consultants, authorities and insurance providers to assess and mitigate risk  
38 when handling and storing solid biofuel pellets. General guidance is provided for personnel safety  
39 protection and personal precautions in accordance with generally accepted work safety requirements.  
40 As part of the determination and the assessment of risks for solid biofuels, defined test methods and  
41 standards are established or need to be developed. However, the ageing and degradation due to handling  
42 and storage of solid biofuels in actual environments will affect the characteristics. The consequence of  
43 this change of characteristics is that safety margins have to be established in relation to the actual analysis  
44 results.

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# Solid biofuels — Safe handling and storage of solid biofuel pellets in commercial and industrial applications

## 1 Scope

This document provides principles and requirements for safe handling and storage of solid biofuels pellets in commercial and industrial applications. It uses a risk based approach to determine what safety measures should be considered.

This document covers the handling and storage process of pellets in the following applications;

- at a pellet production plant from the outlet of the cooler unit until loaded for transportation
- at a commercial distributor from the receiving station until loaded for transportation and
- at an industrial end-user from the receiving station until fed into the fuel preparation or combustion process.

Although unloading and loading of e.g. vessels, trains or trucks are included, the safety issues following the loading and transport itself are not.

This document also gives specific guidance on detection and suppression systems and preparatory measures to enable safe and efficient firefighting operations. Guidance on the management of fire and explosion incidents is also specified.

## 2 Normative references

<https://standards.iteh.ai/catalog/standards/sist/1e469f0f-5e40-4573-9ce7-406fd2efbac1/sist-20024-1>

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 12100, *Safety of machinery -- General principles for design -- Risk assessment and risk reduction*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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>

### 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.

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

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

80 **3.1.2**

81 **finer**

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

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

84 **3.1.3**

85 **ignition source**

86 source of energy that initiates combustion

87 [SOURCE: ISO 13943:2008, 4.189]

88 **3.1.4**

89 **product safety data sheet**

90 specification sheet defining physical aspects, characteristics and health and safety data for a product

91 **3.1.5**

92 **self-heating**

93 exothermic reaction within a material resulting in a rise in temperature in the material

94 [SOURCE: ISO 4880:1997]

95 **3.1.6**

96 **self-ignition**

97 ignition resulting from self-heating

98 [SOURCE: ISO 4880:1997]

99 **3.1.7**

100 **smouldering**

101 slow combustion of a material without light being visible and generally evidenced by an increase in temperature  
 102 and/or by smoke

103 [SOURCE: ISO 4880:1997]

104 **3.1.8**

105 **solid biofuel pellets**

106 densified biofuel made from woody biomass with or without additives usually with a cylindrical form, random  
 107 length typically 5 to 40 mm and diameter up to 25 mm and broken ends

108 Note 1 to entry: The raw material for wood pellets is woody biomass in accordance with Table 1 of ISO 17225-1.  
 109 Pellets are usually manufactured in a die, with total moisture content usually less than 10 % of their mass on wet  
 110 basis.

111 Note 2 to entry: The woody biomass used as feedstock for pellet making is milled to size in accordance with  
 112 customer specification. Determination of the particle size distribution of the constituents of pellets should be done  
 113 according to ISO 17830.

114 Note 3 to entry: Based on the definition of wood pellets in ISO 16559:2014.

115 **3.2 Risk management**

116 **3.2.1**

117 **accident**

118 incident resulting in fatality, disease, injury or other damage

119 [SOURCE: ISO 21101:2014, 3.25]

120 **3.2.2**

121 **emergency**

122 serious situation requiring immediate action

123 [SOURCE: ISO/TR 21102:2013, 2.8]

124 **3.2.3**

125 **fail-safe**

126 term applied to equipment or a system so designed that, in the event of failure or malfunction of any part of the  
127 system, devices are automatically activated to stabilize or secure the safety of the operation

128 [SOURCE: ISO 13628-7:2005, 3.1.49]

129 **3.2.4**

130 **harm**

131 injury or damage to the health of people, or damage to property or the environment

132 [SOURCE: ISO/IEC Guide 51:2014, 3.1]

133 **3.2.5**

134 **hazard**

135 potential source of harm

136 [SOURCE: ISO/IEC Guide 51:2014, 3.2]

137 **3.2.6**

138 **hazardous event**

139 event that can cause harm

140 [SOURCE: ISO/IEC Guide 51:2014, 3.3]

141 **3.2.7**

142 **hazardous situation**

143 circumstance in which people, property or the environment is/are exposed to one or more hazards

144 [SOURCE: ISO/IEC Guide 51:2014, 3.4]

145 **3.2.8**

146 **incident**

147 event or occurrence, which can, but does not necessarily, create a risk of harm, including possible risks due to  
148 shearing, crushing, falling, impact, trapping, fire, electric shock, exposure to weather etc.

149 [SOURCE: ISO/TS 25740-1:2011, 3.13]

150 **3.2.9**

151 **inherently safe design**

152 measures taken to eliminate hazards and/or to reduce risks by changing the design or operating characteristics of  
153 the product or system

154 [SOURCE: ISO/IEC Guide 51:2014, 3.5]

155 **3.2.10**

156 **intended use**

157 use in accordance with information provided with a product or system, or, in the absence of such information, by  
158 generally understood patterns of usage

159 [SOURCE: ISO/IEC Guide 51:2014, 3.6]

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- 160 **3.2.11**  
 161 **reasonably foreseeable misuse**  
 162 use of a product or system in a way not intended by the supplier, but which can result from readily predictable  
 163 human behaviour
- 164 [SOURCE: ISO/IEC Guide 51:2014, 3.7, modified – Note 1 to entry and Note 2 to entry has been deleted]
- 165 **3.2.12**  
 166 **risk**  
 167 combination of the probability of occurrence of harm and the severity of that harm
- 168 NOTE 1 to entry: The probability of occurrence includes the exposure to a hazardous situation, the occurrence of a  
 169 hazardous event and the possibility to avoid or limit the harm.
- 170 [SOURCE: ISO/IEC Guide 51:2014, 3.9]
- 171 **3.2.13**  
 172 **risk analysis**  
 173 systematic use of available information to identify hazards and to estimate the risk
- 174 [SOURCE: ISO/IEC Guide 51:2014, 3.10]
- 175 **3.2.14**  
 176 **risk assessment**  
 177 overall process comprising a risk analysis and a risk evaluation
- 178 [SOURCE: ISO/IEC Guide 51:2014, 3.11]
- 179 **3.2.15**  
 180 **risk control**  
 181 process of decision-making for managing and/or reducing risk; its implementation, enforcement and re-evaluation  
 182 from time to time, using the results of risk assessment as one input
- 183 **3.2.16**  
 184 **risk criteria**  
 185 terms of reference against which the significance of a risk is evaluated
- 186 Note 1 to entry: Risk criteria are based on organizational objectives, and external and internal context.
- 187 Note 2 to entry: Risk criteria can be derived from standards, laws, policies and other requirements.
- 188 [SOURCE: ISO/IEC Guide 73:2009, 3.3.1.3]
- 189 **3.2.17**  
 190 **risk estimation**  
 191 process of assigning values to the probability of occurrence of events and their consequences
- 192 [SOURCE: ISO 13824:2009, 3.15]
- 193 **3.2.18**  
 194 **risk evaluation**  
 195 procedure based on the risk analysis to determine whether tolerable risk has been exceeded
- 196 [SOURCE: ISO/IEC Guide 51:2014, 3.12]
- 197 **3.2.19**  
 198 **risk management**  
 199 coordinated activities to direct and control an organization with regard to risk
- 200 [SOURCE: ISO/IEC Guide 73:2009, 2.1]

201 **3.2.20**  
202 **risk reduction measure**  
203 **protective measure**  
204 action or means to eliminate hazards or reduce risks

205 [SOURCE: ISO/IEC Guide 51:2014, 3.13, modified – Example has been removed]

206 **3.2.21**  
207 **residual risk**  
208 risk remaining after risk reduction measures have been implemented

209 [SOURCE: ISO/IEC Guide 51:2014, 3.8]

210 **3.2.22**  
211 **safety**  
212 freedom from risk which is not tolerable

213 [SOURCE: ISO/IEC Guide 51:2014, 3.14]

214 **3.2.23**  
215 **significant hazard**  
216 hazard which has been identified and which requires specific action to eliminate or to reduce risk according to the  
217 risk management

218 **3.2.24**  
219 **tolerable risk**  
220 level of risk that is accepted in a given context based on the current values of society

221 Note 1 to entry: For the purposes of this document, the terms "acceptable risk" and "tolerable risk" are considered  
222 to be synonymous.

223 [SOURCE: ISO/IEC Guide 51:2014, 3.15]

### 224 **3.3 Storage, handling and operation**

225  
226 **3.3.1**  
227 **bridging**  
228 process of forming stable bridges in a bulk storage of solids, preventing the discharging of the material

229 Note 1 to entry: Bridging can be of two basic categories: mechanical and cohesive bridging. The mechanical bridging  
230 is where large particles mechanically interlock and form an obstruction, the cohesive bridge occurs when particles  
231 bond together due to effects of moisture, fines concentration, particle shape, temperature, etc.

232 Note 2 to entry: Bridging is also called arching.

233 **3.3.2**  
234 **bulk material**  
235 amount of material within which component parts are not initially distinguishable on the macroscopic level

236 [SOURCE: ISO 11648-1:2003, 3.1.1]

237 **3.3.3**  
238 **bunker**  
239 bin or receptacle or compartment for storing fuel

240 Note 1 to entry: Bunker is a general term and might include various application and sizes, from small underground  
241 bunker for e.g. pellets storage to large bunkers at power plants for fuel storage located before the combustion  
242 furnace. Many bunkers have the shape of a hopper.