SLOVENSKI STANDARD
oSIST prEN ISO 21912:2020

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Trdna alternativna goriva - Varno ravnanje in skladiščenje trdnih goriv (ISO/DIS 21912:2020)

Solid recovered fuels - Safe handling and storage of solid recovered fuels (ISO/DIS 21912:2020)

Feste Sekundärbrennstoffe - Sicherer Umgang und Lagerung von festen Sekundärbrennstoffen (ISO/DIS 21912:2020)

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Foreword

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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 300, *Solid recovered fuels*.

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.

Introduction

The modern society is based on production and consumption of an enormous variety of products, both for industrial and private use. After its intended use, the product will be disposed as waste by the user and will then enter the chain of waste management which includes a variety of handling, storage and processing/recycling methods.

With handling, transportation and storage of SRF (Solid Recovered Fuels) there is always a significant risk of fire and dust explosion. A fire or an explosion provides risks both for human health and the environment and cause large economical losses. It is therefore important that operators throughout the supply chain ensure that there is a developed strategy to prevent fires and to prevent dust explosions, and if a fire should occur, a readiness to handle the fire effectively to reduce the consequences.

Fires will, in addition to economic losses and effects on health and the environment, also have a negative impact on the confidence in the SRF industry and difficulty to obtain insurance coverage might also increase.

In facilities where dry combustible materials are handled such as in SRF facilities, there are several risks present for fires and dust explosions. A typical cause for an ignition of the material is friction heat or impact ignition sources generated within the processing chain. Such ignition sources can be generated due to mechanical wear or break-down, metal pieces and stones, material overfeeding, etc. Most mechanical machines contain moving parts that potentially could generate friction heat high enough to ignite the material. Examples are shredders, conveyors, screening/separation machinery and fans. Other sources causing ignitions are for example hot surfaces, electrical discharges, hot works and self-ignition inside storages.

An ignition source can ignite the material being processed or dust accumulations inside and around the machinery. It is important to take necessary measures for reducing the risk for ignitions. Accumulations of combustible dust should be avoided. However, dust can quickly accumulate to a stage where it can become a significant fire load.

This document provides support, advice and guidance to facility owners, logistics providers, equipment suppliers/manufacturers, consultants, authorities and insurance providers to assess and mitigate different risks when handling and storing SRF.

Solid recovered fuels — Safe handling and storage of solid recovered fuels

1 Scope

This document provides principles and requirements for safe handling, treatment and storage of solid recovered fuels (SRF), prepared from non-hazardous waste, to be used for energy purposes. This document covers process stages from point of acceptance of material to point of delivery of SRF.

This document excludes fuels that are included in the scope of ISO/TC 238 *Solid biofuels* and ISO/TC 28 *Petroleum products and related products of synthetic or biological origin*.

It uses a risk-based approach to determine what safety measures should be considered.

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

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

ISO/DIS 21637:2019, *Solid recovered fuels — Terminology, definitions and descriptions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/DIS 21637:2019 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 Parts of the SRF process

3.1.1
baling
the process of producing a compressed material bundle or package secured by wires, hoops, cords or similar.

3.1.2
belt conveyor
conveyor with an endless belt acting as a carrying and traction element

Note 1 to entry: There are several belt conveyor types, such as; troughed belt conveyor, deep troughed belt conveyor, pipe belt conveyor, walled belt conveyor, flat belt conveyor and radial conveyor.

3.1.3
belt feeder
shortened form of belt conveyor, normally running at slow speed, designed to extract or control the rate of flow of bulk materials from hoppers

Note 1 to entry: Some shortened form of *belt conveyor* (3.1.2), normally running at slow speed, designed to extract or control the rate of flow of bulk materials from hoppers are called belt feeder.

[SOURCE: EN 620:2002+A1:2010, 3.2.4]

3.1.4
box
storage which is open at least on one side

3.1.5
bucket elevator
elevator for loose bulk materials with buckets as the carrying medium attached to a belt or chains as the driving medium

Note 1 to entry: The bucket elevator consists of a strap forming belt, stretched vertically between a driving head pulley and a pulley of foot. Buckets are attached to the strap and the whole is enclosed in a metal frame.

Note 2 to entry: The foot of the elevator is equipped with a chute in which the buckets are filled by shovelling and a head shape suitable for evacuating grain by projection centrifugal.

[SOURCE: EN 618:2002+A1:2010, 3.1.3 – modified: notes to entry were added]

3.1.6
bunker
storage which is closed on four sides and reachable from the top

3.1.7
chain conveyor
conveyor for loose bulk materials with a chain as the driving medium having attached flights or scraper flights moving the material "en masse" in an enclosing trough

3.1.8
chain reclaimer
for loose bulk materials with a chain as driving medium having attached flights or scraper flights moving the material in an open drop-in pit of drive over pit

3.1.9
conveyor system
number of linked conveyors with their ancillary equipment and control system

[SOURCE: EN 620:2002+A1:2010, 3.1 – modified: "control system" was added]

3.1.10
crushing
mechanical reduction of particle size by exerting mainly blunt deforming forces to a material

3.1.11
density separation
separation of mixed materials by using density-differences of the different fractions for classification.

Note 1 to entry: With respect to SRF-production, most common application of density separation is wind shifting applying airflow as conveying/transport medium. A process of separation by different densities of particles and fluids.

3.1.12
dust collection system
system that collects free dust from the air in process systems

3.1.13
electromagnetic separation of non-ferrous metals
separation of non-ferrous metals by inducing temporary magnetic forces

Note 1 to entry: This term is also known as eddy current separators.

[SOURCE: ISO/DIS 21637:2019, 3.33]

3.1.14
enclosed conveyor
conveyor which is enclosed to avoid contamination between the interior and the exterior environment

3.1.15
enclosed storage
storage that is enclosed to avoid contamination between the interior and the exterior environment

3.1.16
feeder
a mechanical device for delivering material at a controlled rate

[SOURCE: ISO 1213-1:1993, 10.1.02]

3.1.17
ferrous metal separation
separation of ferrous metals by use of permanent magnetic forces

[SOURCE: WT REF BAT 2017 Draft]

3.1.18
fine shredding
shredding of materials to an average particle size of 20 mm - 50 mm

3.1.19
idler
mechanical element rotating on internal bearing and fitted to support the belt

Note 1 to entry: On *belt conveyors* (3.1.2), several idlers can be used. These are called e.g. troughing idler (which supports the belt and maintains it in a troughed form), carrying idler, return idler.

3.1.20
main shredding
mechanical reduction of particle size of material via shredding it to average particle size of 50 mm - 100 mm

3.1.21
manual separation
separation of material particles individually by hand or mechanical solution

3.1.22
optical identification
recognition of material particles individually by optical vision

[SOURCE: ISO/DIS 21637:2019, 3.68]

3.1.23
pneumatic conveying
method of transporting bulk materials by means of air through pipes or ducts

3.1.24
pre-shredding
mechanically reducing particle size of material by shredding it to average particle size of 100 mm – 300 mm

3.1.25
screening
separation of larger particles from material flow, typically >150 mm

3.1.26
screw conveyor
conveyor for loose bulk materials with a trough or tube as the carrying medium, the material being moved by the action of a rotating screw.

3.1.27
screw reclaimer
mobile equipment located bellow a stockpile for continuously reclaiming bulk materials using a screw as the carrying or conveying medium

[SOURCE: EN 618:2002+A1:2010, 3.3.8]

3.1.28
shredding
mechanical reduction of particle size by tearing, cutting or other means

[SOURCE: ISO/DIS 21637:2019, 3.92]

3.1.29
silo
part of a continuous handling system used to contain intended kind(s) of bulk material(s) during a certain period of time.

Note 1 to entry: The silo is usually charged from the top and discharged from one or more outlets at the bottom or side.

[SOURCE: EN 617:2001+A1:2010, 3.1 – modified: part of definition was added as a note to entry]

3.1.30
step feeder
feeder which uses friction to transfer material
Note 1 to entry: Walking floor is an example of a step feeder.

3.1.31
under-screen fraction
material fraction that goes through screen

3.2 Risk management

3.2.1
residual risk
risk remaining after risk reduction measures have been implemented

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

3.2.2
risk
combination of the probability of occurrence of harm and the severity of that harm

Note 1 to entry: The probability of occurrence includes the exposure to a hazardous situation, the occurrence of a hazardous event and the possibility to avoid or limit the harm.

[SOURCE: ISO/IEC Guide 51:2014, 3.9]

3.2.3
risk analysis
systematic use of available information to identify hazards and to estimate the risk

[SOURCE: ISO/IEC Guide 51:2014, 3.10]

3.2.4
risk assessment
overall process comprising a risk analysis and a risk evaluation

[SOURCE: ISO/IEC Guide 51:2014, 3.11]

3.2.5
risk control
process of decision-making for managing and/or reducing risk; its implementation, enforcement and re-evaluation from time to time, using the results of risk assessment as one input

3.2.6
risk criteria
terms of reference against which the significance of a risk is evaluated

Note 1 to entry: Risk criteria are based on organizational objectives, and external and internal context.

Note 2 to entry: Risk criteria can be derived from standards, laws, policies and other requirements.

[SOURCE: ISO/IEC Guide 73:2009, 3.3.1.3]

3.2.7
risk estimation
process of assigning values to the probability of occurrence of events and their consequences

[SOURCE: ISO 13824:2009, 3.15 – modified: note was removed]

3.2.8
risk evaluation
procedure based on the risk analysis to determine whether tolerable risk has been exceeded

[SOURCE: ISO/IEC Guide 51:2014, 3.12]

3.2.9
risk management
coordinated activities to direct and control an organization with regard to risk

[SOURCE: ISO/IEC Guide 73:2009, 2.1]

3.2.10
risk reduction measure
protective measure
action or means to eliminate hazards or reduce risks

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

3.2.11
tolerable risk
level of risk that is accepted in a given context based on the current values of society

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

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

3.3 Operation and safety

3.3.1
hot particles
solid particles whose temperature that can be above minimum ignition temperature of flammable gases or vapours and combustible dusts.

3.3.2
intended use
use of a machine in accordance with information for use provided in the instructions

[SOURCE: : EN ISO 12100:2010, 3.23]

3.3.3
over size particles
particles exceeding a specific particle size

Note 1 to entry: This is dependent on the application and determined between the producer and user.

[SOURCE: ISO/DIS 21637:2019, 3.69]

3.3.4
particle size
size of the fuel particles as determined in a solid fuel

Note 1 to entry: Different methods of determination can give different results.

Note 2 to entry: See also *particle size distribution* (3.3.5) and *over size particles* (3.3.3).

[SOURCE: ISO/DIS 21637:2019, 3.71]

3.3.5
particle size distribution
proportions of various particle sizes in a solid fuel

[SOURCE: ISO/DIS 21637:2019, 3.72]

3.3.6
personal protective equipment
PPE
equipment that can include, but is not limited to, clothing, gloves, helmets, footwear and face protection

[SOURCE: ISO/TR 21808:2009, 2.1]

3.3.7
reasonably foreseeable misuse
use of a machine in a way not intended by the designer, but which can result from readily predictable human behaviour

[SOURCE: EN ISO 12100:2010, 3.24]

4 Introduction to the use of the standard

Even though risks in connection with handling, transportation and storage of SRF are recognized, factors affecting each risk are different depending on the material type, climate, processing equipment, etc. This document does not intend to focus specifically on the separated risks for individual components, but rather on how the components constitutes parts in a system and e.g. how hazards can be transferred. Therefore, broad and detailed instructions and recommendations on requirements for design and construction of facility and processes and for operation and maintenance of equipment are given in this document. Still the document is structured based on different parts in the SRF process. Stakeholders such as regulators, producers, and consumers of SRF are encouraged to develop the

