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Trdna alternativna goriva - Specifikacije in razredi (ISO/DIS 21640:2020)

Solid recovered fuels - Specifications and classes (ISO/DIS 21640:2020)

Feste Sekundärbrennstoffe - Spezifikationen und Klassen (ISO/DIS 21640:2020)

Combustibles solides de récupération - Spécifications et classes (ISO/DIS 21640:2020)

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Solid recovered fuels — Specifications and classes

ICS: 75.160.10

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Contents

Page

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 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 objective of this document is to provide a common classification and specification system for solid recovered fuels (SRF) to enable efficient trading of SRF, to promote their safe use in energy conversion activities and to increase the public trust. The document will facilitate a good understanding between seller and buyer, facilitate purchase, trans border movements, use and supervision as well as an effective communication with equipment manufacturers. The classification and specification system support authority permission procedures and ease the reporting on environmental issues.

SRF are produced from non-hazardous waste. The input waste can be production specific waste, municipal solid waste, industrial waste, commercial waste, construction and demolition waste, sewage sludge etc. It is thus obvious that SRF are a heterogeneous group of fuels. A well-defined system for classification and specification is therefore of significant importance to reach the above-mentioned objectives and intentions.

This document covers all types of SRF and will thus have a wide field of application. The aim of producing a solid recovered fuel is to use it for energy purposes at the highest possible energy efficiency.

This document describes the compliance rules which SRF shall meet to be classified according to this classification system. Classification enables statistical information of SRF properties in the market, thus increasing transparency in the use of non-hazardous waste in SRF and demonstrating development of this business field.

This document also describes how the supplier can establish specifications and a declaration of conformity to the different ISO standards for SRF.

It is important to emphasise that despite this standardisation of SRF, the standard should not be interpreted as end-of-waste criteria. Such criteria might be set at national or regional levels, but then in legislation and not in this standard. Also, it should be noted that the waste used for the SRF production should be such waste streams that are not suitable for re-use, preparation for re-use or efficient material recycling.

Figure 1 illustrates a simplified flow chain for SRF, from input of non-hazardous waste to end use of SRF. This document has an interface to all the stages in the chain, but SRF classification and specification are applicable at the point of delivery as shown in the figure. Requirements for how the input waste is collected and how to use the fuel are not part of this document.

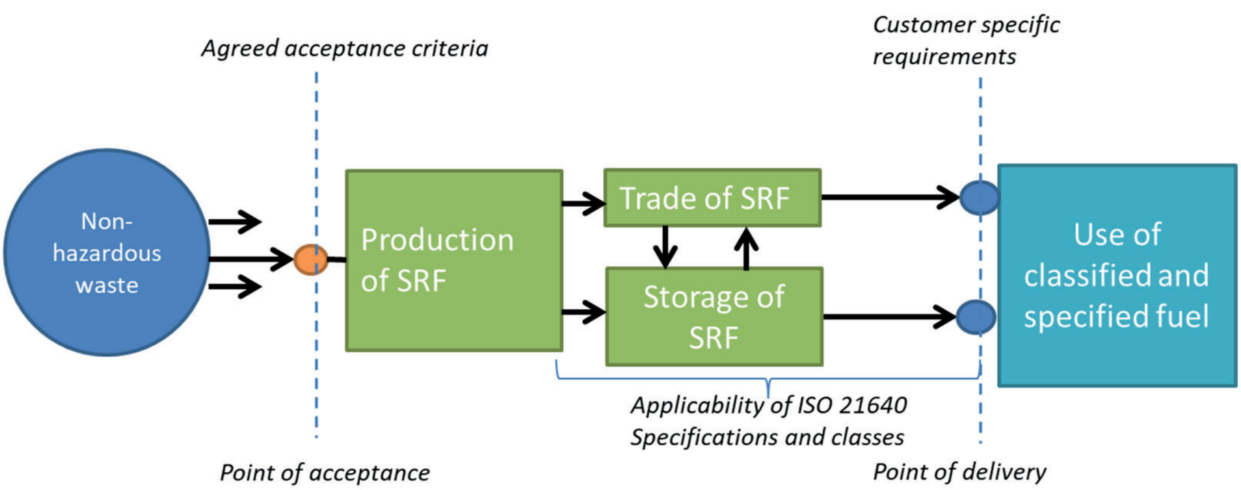

Figure 1 — Solid recovered fuels chain – This document on specifications and classes is applicable after production up to the point of delivery

NOTE This document is applicable to trading and storage of SRF. However, if during storage or trade the SRF is mixed with other SRF or other fuels, then the classification and specifications are no longer valid. If sold further, then the mixing would constitute a SRF production and thus a new classification and specification needs to be done.

Solid recovered fuels — Specifications and classes

1 Scope

This document specifies a classification system for solid recovered fuels (SRF), and a template containing a list of characteristics for the specification of their properties, enabling trade and use of SRF supporting the protection of the environment.

SRF are produced from non-hazardous waste.

NOTE 1 Untreated municipal solid waste as such cannot be considered SRF. Untreated municipal solid waste can however be feedstock to plants producing SRF.

NOTE 2 Chemically treated solid biofuels that do not contain halogenated organic compounds or heavy metals at levels higher than those in typical virgin material, can be defined as solid biofuels and thus be part of the standards series ISO 17225[1].

2 Normative references

The following referenced documents are indispensable for the application 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/DIS 21637:2019, *Solid recovered fuels — Terminology, definitions and descriptions*

ISO/DIS 21660-3:2019, *Solid recovered fuels — Determination of moisture content using the oven dry method — Part 3: Moisture in general analysis sample*

ISO/DIS 21656:2019, *Solid recovered fuels — Determination of ash content*

ISO/DIS 21654:2019, *Solid recovered fuels — Determination of calorific value*

ISO/DIS 21645:2019, *Solid recovered fuels — Methods for sampling*

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
classification of solid recovered fuels
categorizing of solid recovered fuels into classes focusing on the key properties – NCV, Cl and Hg that are defined by boundary values.

3.2
specification of solid recovered fuels
list of properties that characterizes solid recovered fuels.

Note 1 to entry: A templates for such specifications are given in Annex A (normative) in this standard.

4 Symbols and abbreviations

The symbols and abbreviations used in this document comply with the SI system of units as far as possible.

Table 1 — Symbols and abbreviations

Symbol	Item
(d)	dry (dry basis)
d_x	particle diameter where x denominates the share of particles passing through a sieve of that size
(ar)	as received
w-%	weight-percentage
A	Designation for ash content on dry basis $A_{(d)}$ [w-%]
BC	Designation for biomass content. Can be stated by mass, energy or share of total carbon
BD	Designation for bulk density as received [kg/m^3]
M	Designation for moisture content as received on wet basis, M_{ar} [w-%]
P	Designation for the particle size of the main fraction (>95% by weight) related to size intervals.
NCV	Designation for net calorific value as received, $q_{p,\ \mathrm{net,\ ar}}$ [MJ/kg or kWh/kg or MWh/t] at constant pressure
VM	Designation for volatile matter on dry basis [w-%]

NOTE 1 MJ/kg equals 0,277 8 kWh/kg (1 kWh/kg equals 1 MWh/t and 1 MWh/t are 3,6 MJ/kg). 1 g/cm^3 equals 1 kg/dm^3. 1 mg/kg equals 0,000 1 % or 1 ppm.

5 Principles

The classification system is based on three important characteristics, referred to the main SRF characteristics: an economic characteristic (net calorific value), a technical characteristic (chlorine content) and an environmental characteristic (mercury content). The characteristics are chosen to give a stakeholder an immediate but simplified picture of the fuel in question.

The classes also impose limitations on what can be called SRF restricting it with a minimum net calorific value as well as maximum values of chlorine and mercury. Fuel outside the ranges of the classes shall not be defined as SRF.

Only fuels derived from non-hazardous waste that meet the SRF ISO Standards can be classified as SRF.

The classification itself is not enough for an intending user or other stakeholders. The level of detailed information needed depend on several different factors. Such factors might be; the end use of the SRF, legislative demands, character of the input material, and the technology used either in production or end use of the SRF. Relevant fuel properties are thus to be given in the specification of the SRF. Some of the fuel properties are deemed so important that they are obligatory to specify whereas others can be recorded voluntarily, e.g. upon request of the user.

It is important that SRF meet specified quality requirements which are to be determined based on a defined lot size by a minimum number of measurements.

6 Classification

The classification system (Table 2) for SRF is based on limit values for three important fuel characteristics. These are the net calorific value (NCV); chlorine content (Cl); mercury content (Hg).

Due to the statistical distribution pattern of the characteristics the values shall be presented as:

— NCV (ar) mean (arithmetic);

— Cl (d) mean (arithmetic);

— Hg (ar) median and 80th percentile

The average, median, and percentiles are determined on the quantity of SRF as specified in Clause 8.

NOTE 1 80th percentile is the value on or below which 80% of the observations fall.

Not all kinds of SRF are suited for all types of energy recovery installation, see CEN/TR 15508[2].

Each of the classification characteristic is divided into 5 classes. The SRF should be assigned a class number from 1 to 5 for each characteristic. A combination of the class numbers makes up a class code (see example below). The characteristics should be considered as equal important and thus no single class number determines the code. The class code shall be included in the specification as described in Clause 9.

For mercury, the higher of the two statistical values (median and 80th percentile) in a Hg data set determines the class.

EXAMPLE An SRF with a median value of 0,03 and 80th percentile value of 0,07 belongs to Hg class 3 (according to Table 2).

NOTE 1 The performances of the plant where SRF is used are depending on the properties of the SRF and more significantly on the design and operating conditions of such a plant.

NOTE 2 The limit values used for different classes must not be mixed up with limit values set by the competent authority in an environmental permit or other equally binding documents.

NOTE 3 The specific transfer factor for mercury of a given process and the proportion of SRF will determine which classes can be used. Examples of transfer factors for existing processes are given in CEN/TR 15508[2].

Table 2 — Classification for solid recovered fuels

Classification characteristic	**Statistical measure**	**Unit**	**Classes**				
			1	**2**	**3**	**4**	**5**
Net calorific value (NCV)	Mean	MJ/kg (ar)	≥ 25	≥ 20	≥ 15	≥ 10	≥ 3
Chlorine (Cl)	Mean	w-% (d)	≤ 0,2	≤ 0,6	≤ 1,0	≤ 1,5	≤ 3
Mercury (Hg)	Median 80th percentile	mg/MJ (ar) mg/MJ (ar)	≤ 0,02 ≤ 0,04	≤ 0,03 ≤ 0,06	≤ 0,05 ≤ 0,10	≤ 0,10 ≤ 0,20	≤ 0,15 ≤ 0,30

7 Specifications

7.1 General

The SRF shall be specified according to the template in Annex A. Annex A consists of properties that are obligatory to specify. If the producer and the end user have agreed upon additional properties to be specified, those should be documented in a similar way.

For specification of the properties in Annex A, determination shall be made according to ISO test methods (Technical specifications or regional/national standards can be used if no ISO test method is available). For additional properties, ISO test methods are recommended but other relevant methods may be used. If other methods are used, it shall be stated in the (fuel) specification.

7.2 Origin

The specification of origin is based on the origin and source of waste input material as described in Table 1. The material accepted for SRF production are those that are not suitable for material recycling.

This might as an example include reject streams from packaging recycling/sorting. The main origin-based solid recovered groups are:

1. Non- hazardous industrial waste

   There are several waste streams generated within industry and commerce that could be used to produce SRF. Different industrial sectors typically generate different kind of wastes, like manure from agriculture or fibre reject streams from pulp and paper industry. For this reason, there are several subcategories set up (Table 3). However packaging waste are generated in a lot of different industries and commerce operations. In this case they are often quite similar and are thus not specified for individual industries. In this post is also included the packaging materials from construction projects.

2. Non-hazardous construction and demolition waste

   Construction waste and demolition waste differ from each other already because constructing means building something new while waste from demolition normally comes from old structures. In renovation projects, both construction and demolition typically take place simultaneously, and thus generates both types of waste. The waste from the construction and demolition industry used for SRF production are mainly different wood and plastic fractions although also bituminous mixtures considered as non-hazardous waste might be used. The possibility to source separates the materials at construction and demolition sites might be limited thus often resulting in a mixed waste fraction.

3. Non-hazardous waste from waste management facilities

   Waste received at waste management facilities are treated in diverse ways. It might be water treatment, composting, anaerobic treatment, sorting, crushing and densifying. When doing these treatments, the plants will end up with different waste streams aimed for recycling, recovery or disposal. Some of these can be used for the production of SRF.

4. Non-hazardous waste from material recycling facilities

   During the recycling process, there will be material that does not fulfil the quality criteria. These reject streams might be potentially used for the production of SRF.

5. Non-hazardous municipal solid waste and similar non-hazardous commercial waste

   Although an untreated mixed municipal waste stream could not be called SRF, it still can be used for the production of SRF. In this section, there is also bulky waste and waste from gardens and parks as well as waste from markets. Source separated material streams (e.g. paper, plastics etc.) are not intended as direct raw material for SRF production but are rather intended for material recycling. Reject from these kinds of materials can be found above under bullet 4 Non-hazardous waste from material recycling facilities.

6. Non- hazardous waste not otherwise specified in the list.

   If the waste origin is not covered in the above categories, it should be declared here. The origin of the waste should be described as clearly as possible.

It is not unusual that waste fractions that are intended for production of SRF (or for combustion) are mixed during the logistic chain, thus there could be waste from different origins in the same transport. However, the principle is to give as much detail about the origin as possible. Thus, if waste have been collected from different industries (and not being packaging waste) then the separate codes of origins should be stated.

