PD ISO/TR 21916:2021



BSI Standards Publication

Solid recovered fuels — Guidance for the specification of solid recovered fuels (SRF) for selected uses

National foreword

This Published Document is the UK implementation of ISO/TR 21916:2021.

The UK participation in its preparation was entrusted to Technical Committee PTI/17, Solid biofuels.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2021
Published by BSI Standards Limited 2021

ISBN 978 0 580 97946 0

ICS 75.160.10

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 July 2021.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TR 21916:2021

TECHNICAL REPORT

ISO/TR 21916

First edition
2021-07

Solid recovered fuels — Guidance for the specification of solid recovered fuels (SRF) for selected uses

Reference number
ISO/TR 21916:2021(E)

© ISO 2021



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms, definitions and abbreviations ... **1**
3.1 Terms and definitions ... 1
3.2 Symbols and abbreviated terms ... 5

4 Compilation, structure and use of data ... **6**

5 SRF and other waste derived fuels ... **7**
5.1 General ... 7
5.2 Terms used for secondary fuels from waste ... 10
5.3 Rules for the classification and specification of SRF ... 14
5.4 Market for SRF and other waste-derived fuels ... 18

6 Coal co-combustion in the cement manufacturing industry ... **20**
6.1 General ... 20
6.2 End use requirements of SRF and other waste derived fuels ... 21
6.2.1 Technical limitation of the technologies ... 21
6.2.2 Quality requirements in plant permits ... 25
6.2.3 Quality requirements in general guidelines ... 25
6.2.4 Quality requirements in voluntary end user specifications ... 26
6.3 Typical values for SRF ... 27

7 Coal co-combustion in power plants ... **29**
7.1 General ... 29
7.2 End use requirements for SRF and other waste derived fuels ... 30
7.2.1 Technical limitations of the technologies ... 30
7.2.2 Quality requirements in plant permits ... 34
7.2.3 Quality requirements in general guidelines ... 34
7.2.4 Quality requirements in voluntary end user specifications ... 35
7.3 Typical values for SRF ... 36

8 Gasification ... **37**
8.1 General ... 37
8.2 End use requirements for SRF and other waste derived fuels ... 37
8.2.1 Technical limitations of the technologies ... 37
8.2.2 Quality requirements in plant permits ... 42
8.2.3 Quality requirements in general guidelines ... 42
8.2.4 Quality requirements in voluntary end user specifications ... 43
8.3 Typical values for SRF ... 44

9 Conclusions and guidance ... **45**

Annex A (informative) **Background references on the production of SRF and other waste derived fuels** ... **48**

Annex B (informative) **Fuel specification: Provisions in national standards, legislation, plant permits. General and national guidelines. Voluntary specification by the end user** ... **56**

Annex C (informative) **Background reference on technologies** ... **77**

Annex D (informative) **Typical values for SRF: background data and outcomes of a statistical assessment of measured values** ... **98**

Bibliography ... **121**

© ISO 2021 – All rights reserved

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 materials, including 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.

© ISO 2021 – All rights reserved

Introduction

Waste-to-energy is a broad term that covers much more than waste incineration. It includes various treatment processes that have different environmental impacts but also offer potential for the progress desired towards a low-carbon and circular economy. Processes that convert waste into solid fuels and generate electricity and/or thermal energy from it can play an increasing role in achieving such goals.

Traditionally, solid fuels recovered from waste have been used as an integrative fuel in incineration or co-incineration plants treating a mix of wastes, so as to improve the energy performance of the plant. There are also some dedicated SRF-EfW plants (e.g. incineration plants and industrial combustion plants recovering thermal and/or electrical energy from the solid recovered fuel alone).

An increasing role as substitutive fuel has occurred over time to allow a reduction of fossil fuel consumption and the impact on climate change and greenhouse gas emission of industrial activities with a high energy consumption. In recent years, the use of solid recovered fuels has expanded to other interesting and promising fields, such as gasification or combined gasification and pyrolysis. Waste gasification and co-incineration of the resulting syngas in a combustion plant, co-processing to power and material recovery in cement kilns and waste incineration in dedicated facilities can be highlighted as best proven techniques to increase the energy efficiency of waste-to-energy processes and optimize their contribution to national and global climate and energy goals.

All the above-mentioned waste-to-energy processes rank differently in the waste hierarchy and have different needs for fuel quality to ensure better plant management as well as compliance with requirements set by national and supranational legislation.

Quite an extensive family of solid fuels can be recovered from waste, with different physico-chemical properties and a quality that is not always well defined. Those produced from non-hazardous waste, classified as SRF (Solid Recovered Fuel), are specifically of interest in this document. The term SRF itself identifies a family of fuels that can differ in origin (input waste streams), composition and quality.

Many barriers still hamper the extensive development of SRFs. As discussed later, a continuing confusion in terminology can be highlighted. Solid fuels recovered from non-hazardous waste are identified in different countries by different terms (e.g. CSS, CDR, CDR-Q, RPF, SBS, CSR,), shipped with different waste codes, and an ambiguous use of the terms RDF and SRF still occurs. SRF is largely produced and traded as waste, different countries labelling it with different waste codes based on local waste legislation. An end-of-waste of SRF is allowed in some countries (e.g. Austria, Italy) if the fuels produced comply with specific and mandatory requirements legally set.

Solid recovered fuels are intended to be classified and specified according to ISO/TC 300 standards. Fuel specification is also the subject of national guidelines, in places addressed to specific end uses of the fuel (e.g. in cement kilns), and of local voluntary commitments on fuel properties between the producer and the end user aimed at ensuring that the latter meets its own technological, economic and environmental needs.

Generic (all solid waste) or specific (SRF) quality requirements are set by national or local regulators (e.g. administrative bodies authorized to issue plant permits), mainly to ensure that waste-to-energy plants at least meet the requirements for environmental and human protection and to regulate the role of waste-to energy plants within the national/regional waste management systems as a whole.

There are still acceptance problems in several countries that need to overcome, for example by reliable data, a high level of information and transparency.

To foster the application of SRFs in existing and new fields and to overcome existing barriers, it is therefore strategically essential for all interested stakeholders to define what quality requirements the SRF meets based on homogeneous, unambiguous and well-accepted criteria.

© ISO 2021 – All rights reserved

Solid recovered fuels — Guidance for the specification of solid recovered fuels (SRF) for selected uses

1 Scope

This document addresses the provision of background references that are helpful in defining a more detailed specification for SRF according to its specific end use for energy conversion (EfW plants) and to support the SRF market. The aim is to enable all the interested stakeholders – producers, end users, legislators, local authority bodies and standardization bodies – to guarantee that the SRF complies fully with technical, environmental and economic requirements and to facilitate its social acceptability when utilized for energy conversion.

This document is intended to provide references for the specification of SRF produced from non-hazardous waste streams and traded to EfW plants as waste. The quality of such SRF is specified through values for relevant fuel properties, appropriate to the subsequent end uses that have an expected growth or an established/well consolidated role in heat and power generation in waste-to-energy systems:

— coal co-combustion in cement kilns,

— gasification,

— coal co-combustion in power plants.

The SRF can also be used in other end-use applications but these are not addressed in this document.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviations

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:

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

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

3.1 Terms and definitions

3.1.1
BAT
best available technique
term used within the European Union for the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole

Note 1 to entry: “Techniques” includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

© ISO 2021 – All rights reserved