



Biochar – Biocoal – Biocarbon – Actual International Standardisation Activities

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Citation: Josef Rathbauer (2026) Biochar – Biocoal – Biocarbon – Actual International Standardisation Activities. J. of Geo Eco Agr Studies 3(1): 1-4. WMJ/JGEAS-129

Abstract

The production of Biochar, Biocoal and Biocarbon has got a lot of momentum. In former times mostly seen as an energy carrier other purposes for these materials are occurring (e.g. food/feed additive, soil amendment material, industrial uses). There are only very few people aware that a lot of international standardisation activities are under way. The internationally created ISO documents are best practice compromises which are highly acknowledged.

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Submitted: 16.02.2026

Accepted: 23.02.2026

Published: 02.03.2026

Keywords: Biochar, Biocoal, Biocarbon, Standardisation, ISO TC 238

Standardisation – General Information

The general objective of standardisation is to create widely accepted documents which are defining specifications of products, procedures of processes and for the determination of properties (e.g. water content of a fuel). The standardisation activities are organised on three different levels. On national level the national standardisation bodies are installed (e.g. Austrian Standardisation International – ASI; Deutsches Institut für Normung – DIN).

CEN – Comité Européen de Normalisation (<https://www.cencenelec.eu/>) is the next level, the European standardisation organisation. All EU member states and some associated countries (e.g. Norway, Switzerland) are active in this European standardisation platform. The CEN headquarter is in Brussels. The developed documents are published as European Norms (EN). On the global level ISO – International Organisation for Standardisation (<https://www.iso.org/home.html>) is providing standards. These two international organisations

serves as host for the development and update of standards. The active experts are nominated by their respective national standardisation bodies. The abbreviation before the number of a standard show where this document has been developed. The ISO 17225 series has been created by ISO, has then be published as European standards by CEN. Then all European standards have to be published by the national standardisation bodies of the EU member states and the associated countries obligatorily. So, it comes at the end for instance to ÖNORM EN ISO 17225-1.

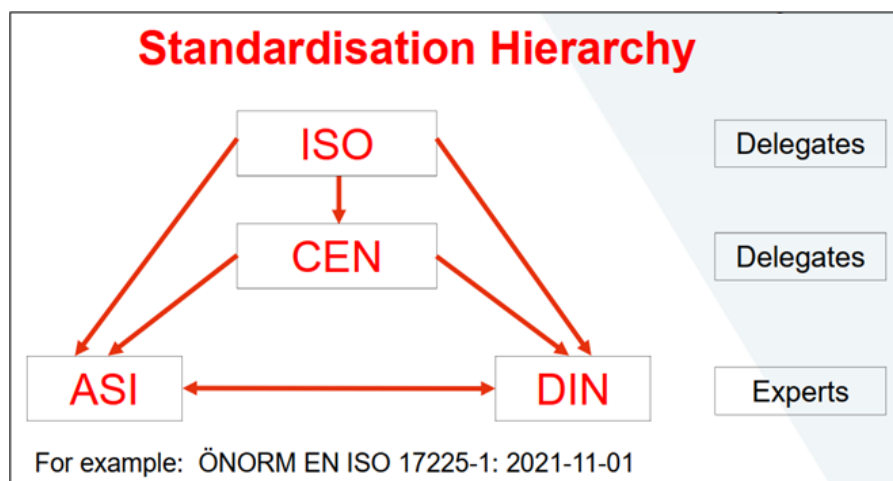


Figure 1: Standardisation Hierarchy

The creation procedure of a standards is well defined. A new issue has to be addressed in a so called New Work Item Proposal. Here the objectives and the content are specified and brought to the voting. At least 5 members (national standardisation bodies) of a technical committee have to support this issue and the standard's development with experts. By the project leader a working draft (WD) is prepared and discussed within the dedicated working group. The following stages are the committee draft (CD), the Draft International Standard (DIS) and the Final Draft International Standard (FDIS). The CD, DIS and FDIS are sent out to the members of the technical committee for commenting and voting. Finally, the new standard is published. The duration of such standard development process lasts to 36 months. Every five years a systematic review is carried out where the participating members are asked if the respective document has to confirmed or revised.

Besides an International Standard the possibility exists to create Technical Specifications (TS) or Technical Reports (TR) with fewer commenting and voting steps.

ISO TC 238: Solid Biofuels and Pyrogenic Biocarbon

In the year 2008 the Technical Committee (TC) 238 Solid Biofuels of the International Standardisation Organisation (ISO) started its standardisation activities. Actual there are 30 participating members (national standardisation bodies) and 22 observing members (national standardisation bodies) active in this ISO TC (<https://www.iso.org/committee/554401.html>).

Some 48 standards concerning terminology, specifications and classes, sampling and sample preparation, physical and chemical test methods as well as safety issues, have been developed and published.

In the year 2021 the Task group 1: "Biochar" has been established. Some 80 stakeholders brought in their expertise for identifying the needs of standardisation issues in this specific area. There were considerations with several ISO TCs if they are willing to develop classification and determination standards for biochar, biocoal and biocarbon.

Finally, it was decided that these standard activities will be carried out by the experts of ISO TC 238. Based

on this decision the TC's title has been changed in the year 2024 to ISO TC 238: Solid Biofuels and Pyrogenic Biocarbon. The scope has been also adapted: Standardization of terminology, specifications and classes, sampling and sample preparation, test methods, and safety aspects in the field of raw and processed materials originating from arboriculture, agriculture, aquaculture, horticulture, forestry to be used as a source of thermally and non-thermally treated solid biofuels and pyrogenic biocarbon.

Following the existing task and working groups are listed with their specific field of expertise and planned and running activities.

Task Group Biocarbon

This task group is led by the Canadian standardisation body. More than 80 experts are active in this international network. A lot of specific publications and information about the needs of different industries have been collected. Fields of applications are soil amendment, metallurgic (industrial) applications and food/feed additives. This task group is not creating standards. The experts have an intensive exchange with the specific (following) working groups of this Technical Committee about the development and adaptation of standards.

Working Group 1: Terminology

The ISO 16559: Solid Biofuels and Pyrogenic Biocarbon – Vocabulary is under revision. The secretariat of this WG is held by DIN. Several specific terms and definitions concerning Biochar, Biocoal and Biocarbon as well as properties and explanations will be added.

Working Group 2: Specifications and Classes

This working group, led by the standardisation body of Finland (SFS), is hosting the ISO 17225 series which consists of 9 parts. In these documents the specifications and classes for solid biofuels (e.g. wood pellets, wood chips, log wood) are defined. The standard ISO 17225-8: 2023 Solid Biofuels – Fuel specifications and classes – Part 8: Graded thermally treated and densified biomass fuels for commercial and industrial use contains some parameters and specifications which are relevant for biochar too.

Nevertheless, two new work items have been started. The creation of ISO 17222-1: Pyrogenic Biocarbon – specification and classification – part 1: General Requirements development is led by the German experts (DIN). A working draft is ready for commenting within the working group. The final document will be an ISO standard.

The ISO 17222-2: Pyrogenic Biocarbon – specification and classification – part 2: Material based classification is led by French experts (AFNOR). A working draft is discussed within the working group. The finally aimed document is a technical specification.

The next step is the spreading of the committee drafts of these two documents for commenting to the ISO TC 238 members.

Working Group 4: Physical and Mechanical Test Methods

The experts of this working group are developing determination methods for physical properties. The Working group is led by the Canadian standardisation body (SCC). The main questions are if the existing methods for solid biofuels are suitable for pyrogenic biocarbon and if additional methods are needed.

The actual standards portfolio defines the determination of the moisture content, the bulk density, the particle density of pellets and briquettes, the particle size distribution for uncompressed fuels, the mechanical durability of pellets and briquettes, the length and diameter of pellets, the number of fines of pellets and several more.

After the adaptation of existing standards or the creation of additional standards these determination methods have to undergo round robin tests for getting performance data for repeatability and reproducibility.

Working Group 5: Chemical Test Methods

This working group is led by experts from the Netherlands standardisation body (NEN). The standards portfolio consists of methods for the determination of the ash content, the content of volatile matter, the calorific value, the ash melting behaviour, the C-, N-, H-content, the contents of major and minor elements, the content of S and Cl and others.

Similar to working group 4 an intensive discussion will be carried out which methods have to be adapted for the new considered carbon rich materials.

Working Group 6: Sampling and Sample Preparation

Working group 6 is led by experts of ANSI (USA) and dealing with sampling and sample preparation standards. The mainly addressed question is the suitability of the existing standards for the additionally considered materials. The right sampling guarantees representative batches for the determination of defined properties and specifications of contracts. Furthermore, the storage, transport conditions and preparation for these samples are defined.

Working Group 7: Safety Issues

This working group is led by experts of the Swedish standardisation body (SIS). The standards for solid biofuels created in this working group are covering the safe handling and storage of wood pellets in residential and other small-scale applications and in commercial and industrial applications. Furthermore, determination methods for off-gassing and oxygen depletion and self-heating of pelletized biofuels have been developed and published.

The safety issues for carbon rich material are essential and in specific cases completely different to common solid biofuels.

Summary and Conclusion

The experts of the ISO Technical Committee (TC) 238 Solid Biofuels and Pyrogenic Biocarbon are coming from 30 participating and 22 observing members (countries). All continents are represented. This shows the growing importance of solid biofuels and pyrogenic biocarbon.

There are some 48 already developed standards for solid biofuels which form the basis for the standardisation of Biochar, Biocoal and Biocarbon. The standardisation work for specific documents characterizing properties of carbon rich materials (ISO 17222-1, -2) has been started successfully.

For getting involved in this international standardisation process the contact to the respective national standardisation body is essential. In case that this national standardisation organisation is already a participating or observing member of ISO TC 238 a national mirror committee and a managing person are defined. There all the information and actual status of the respective standardisation activities are available.