

Developing a US Woodchip Heating Fuel Quality Standard- Summary of Existing Standards

Why a woodchip standard for the United States?

Modern wood heating at commercial, institutional, and industrial scales is receiving increasing attention throughout the United States, particularly in colder regions with high dependence on oil and propane as heating fuels. Use of wood fuels can have significant economic and environmental benefits, including providing markets for low grade wood from forest management and forest health treatments, rural economic development, reducing dependence on expensive fossil heating fuels, and mitigating climate change by reducing greenhouse gases when displacing high carbon intensity fossil fuels.

Despite market growth in the woodchip heating market, there remain real and perceived issues regarding air emissions, boiler efficiency, boiler performance, and overall system reliability. These issues still hinder the expansion of the modern wood heating market. There are some energy policy makers, air quality regulators, public health advocates, and environmental activists concerned about elevated air emissions associated with wood combustion, compared to some fossil fuels, or about its environmental sustainability.

Wood fuel quality directly impacts how efficiently, reliably, and cleanly these systems burn. Presently, woodchips used in modern wood heating in the U.S. are not governed by any technical standard nor are standardized chip specifications informally used or accepted in the marketplace. Consequently, no manufacturer of wood combustion technology can guarantee consistent, high performance.

Standardized fuel is essential for establishing the necessary trust and faith that a given heating technology is a viable option that can be broadly recommended. The adoption of a woodchip standard is essential for the continued growth and mainstream adoption of wood heating for commercial and institutional applications.

A woodchip heating fuel standard allows buyers and suppliers to describe the wood fuel in a manner that is accurate and lacks ambiguity. It simplifies communications among market players and limits the risk of misunderstandings relative to the product sold. Just like one cannot use #2, or #4 oil, or gasoline, or diesel interchangeably, if one attempts to use woodchips of any quality or moisture content with any woodchip boiler, it may lead to system failures and may void the warranty.

Woodchip standards can ensure that:

1. The fuel is appropriate for the combustion equipment
2. The customer knows what he or she is getting
3. The producer knows what woodchip grade their local market demands, and how to produce, store, and distribute that specific woodchip grade
4. Trouble-shooting of failures of the combustion system is simplified
5. There is an increased confidence in the equipment and its performance, as well as the fuel and its performance, which ultimately builds the market for woodchip fuel

Key parameters need to be defined in a woodchip standard. Knowing this information is essential for storage, handling, and combustion:

- Moisture Content
- Dimensions
- Ash content
- Origin (what do the chips consist of, where do they come from)

Existing Woodchip Standards

Four Woodchip Standards are currently noteworthy:

- ISO - International Organization for Standardization ISO 17225-4:2014 is the international standard that has been adopted by Canada and the European Union.
- EN 14961:2010 was the European Union standard that was in use before the ISO standard superseded it. The European standard served as the basis for the new ISO standard.
- ÖNORM M7 133 were the Austrian standards that were in use prior to the European and ISO standards and boiler manufacturers sometimes still refer to them.
- The German Standards Institute (Deutsches Institut für Normung) also developed its own biomass fuel standards (DIN 66 165), and these too can sometimes be encountered, especially as manufacturer specifications.

ISO/TC 238 and CEN/TC 335 have decided to apply the Vienna agreement, which means that European standards are superseded by new ISO standards. Currently according to the Agreement most ISO standards already supersede European (CEN) standards for solid biofuels. Since these ISO standards have been produced under the so-called Vienna Agreement, they automatically also become European standards, and get the designation EN ISO. As such these standards then replace the existing European standards, so for example the EN 16964 Solid Biofuels, Requirements and classes has been replaced by the EN ISO 17225.

The table below provides a summary of the key normative and descriptive requirements of the most commonly encountered standards. The table is color coded to highlight if the parameter is normative (required) or descriptive (informative and not a requirement of the standards):

Table Color Coding:

Normative
Normative for certain grades of wood: by-product of wood industry (ISO) or chemically handled wood (EN)
Informative (no highlight)

Parameter	ISO	EN 14961	ÖNORM M7 133
Origin	A1/A2/B1/B2	1.1/1.2/1.3/1.4	
Particle Size (mm)	P16S/P31S/P45S	P16A/P16B/P45A/P45B/P63/P100	G30/G50/G100/G120/G150
Moisture Content	M10/M25/M35 (for B1)	M10/M15/M20/M25/M30/M40/M45/M55/M55+	W20/W30/W35/W40/W50
Ash Content	A1.0 (for A1)/A1.5 (for A2)/A3.0 (for B)	A0.5/A0.7/A1.0/A1.5/A2.0/A3.0/A5.0/A7.0/A10.0/A10.0+	A1/A2
Bulk density	BD150/BD200/BD250/BD300 (for A2)	BD150/BD200/BD250/BD300/BD350/BD400/BD450/BD450+ (if traded by volume)	S160/S200/S250
Nitrogen	N1.0 (for grade B)	N0.3/N0.5/N1.0/N2.0/N3.0/N3.0+ (for 1.2.2, 1.3.2)	
Chlorine	Cl0.05 (for grade B only)	Cl0.02/Cl0.03/Cl0.07/Cl0.10/Cl0.10+ (for 1.2.2, 1.3.2)	
Sulfur	S0.1 (for grade B only)		
Arsenic	<=1 (for grade B only)		
Cadmium	<=23.0 (for grade B only)		
Chromium	<=10 (for grade B only)		
Copper	<=10 (for grade B only)		
Lead	<=10 (for grade B only)		
Mercury	<=0.1 (for grade B only)		
Nickel	<=10 (for grade B only)		
Zinc	<=100 (for grade B only)		
Net energy content	MJ/kg or kWh/ m ³ l	(LHV)) as MJ/kg or kWh/m ³ l	

The ISO and EN standards and measurement protocols are described in a number of documents. The specification are found in “Fuel specification and classes” and the definitions and methods for measuring each parameter are described in the other documents listed in the table below.

Topic	European (EN) standards	International (ISO) standards
Terminology	EN 14588	ISO/DIS 16559 ⁷
Fuel specifications and classes	EN 14961 series (6 parts)	ISO/DIS 17225 series (7 parts). ⁹
Fuel quality assurance	EN 15234 series (6 parts)	ISO/CD 17588
Sample and sample preparation	EN 14778 and EN 14780	ISO/NP 18135 ⁷ and ISO/NP 14780 ⁷
Physical and mechanical properties	17 standards published	10 standards under development
Chemical analysis	6 standards published	6 standards under development

ISO - International Organization for Standardization ISO 17225-4:2014

The European Union and Canada have adopted the ISO standard. Natural Resources Canada has created a 5 page summary document that provides a relatively user-friendly overview of the standard.

The international ISO standard for woodchips as solid biofuels is found under ISO 17225, which consists of the following parts, under the general title Solid biofuels — Fuel specifications and classes:

- Part 1: General requirements
- Part 2: Graded wood pellets
- Part 3: Graded wood briquettes
- Part 4: Graded woodchips
- Part 5: Graded firewood
- Part 6: Graded non-woody pellets
- Part 7: Graded non-woody briquettes

The table below summarizes the ISO standards and the current stage of development of the standards. A similar summary and schedule is available for the test methods documents.

WG 1 Terminology, definitions and description.

Item / revises	Title	Current stage	Next stage /Deadline
16559 (EN 14588)	Solid Biofuels — Terminology, definitions and descriptions	Published	

WG 2 Fuel specifications and classes.

Item / revises	Title	Current stage	Next stage /Deadline
17225-1 (EN14961-1)	Solid Biofuels — Fuel specifications and classes — Part 1: General requirements	Published	
17225-2 (EN 14961-2)	Solid Biofuels — Fuel specifications and classes — Part 2: Graded wood pellets	Published	
17225-3 (EN 14961-3)	Solid Biofuels — Fuel specifications and classes — Part 3: Graded wood briquettes	Published	
17225-4 (EN 14961-4)	Solid Biofuels — Fuel specifications and classes — Part 4: Graded wood chips	Published	
17225-5 (EN 14961-5)	Solid Biofuels — Fuel specifications and classes — Part 5: Graded firewood	Published	
17225-6 (EN 14961-6)	Solid Biofuels — Fuel specifications and classes — Part 6: Graded non woody pellets	Published	
17225-7	Solid Biofuels — Fuel specifications and classes — Part 7: Graded non woody briquettes	Published	
17225-8	Solid biofuels — Fuel specifications and classes- Part 8: Thermally treated and densified biomass fuels (36 months)	DIS ended 2016-04-15	FDIS latest 2016-10-07

EUROPEAN UNION, Implementation of EN 14961:2010

ISO/TC 238 and CEN/TC 335 have decided to apply the Vienna agreement, which means that European standards are superseded by new ISO standards. Prior to the ISO standard, the European Union had developed a standard on solid biofuel under CEN/TC 335. The fuel specifications and classes for all solid biofuels in the European Union were set out in CEN/TS 14961:2010, which defines certain parameters and property classes.

Below is an illustration of what a woodchip product label may look like under the CEN standard:¹

¹ Source: www.biomassenergycentre.org.uk

Supplier	Acme Woodchips Inc						
Product	Woodchips						
Quantity of delivery	4.00		Tonnes				
Origin	1.1.3.1		Broadleaf stemwood from ‘Barrow wood’				
Country	England						
Particle size	P16A ☺	P16B	P31.5	P45A	Other:		
Moisture content (% water by overall weight)	M20	M25	M30 ☺	M35	Other:		
Ash content	< 1.0		by weight				
Energy value	3,500	kWh per tonne		and	800	kWh per lose m ³	
Other information:	All our wood is sourced from sensitively managed coppice woodlands in the Hampshire. Further details see our website: www.acmewoodchips.co.uk						

ÖNORM M7 133: Austria

While the CEN/TC 335 suite of standards are intended to be the universal standards for solid biofuels across Europe, prior to these standards, many countries developed their own standards. The Austrian Standards Institute is ÖNORM. While ÖNORM is now adopting its own implementations of the CEN/TC 335 standards, some Austrian boilers specify fuel according to ÖNORM M7 133 for woodchips (Woodchips for energy generation: quality and testing requirements).²

² http://www.biomassenergycentre.org.uk/portal/page?_pageid=77,317197&_dad=portal&_schema=PORTAL