

ttz Bremerhaven

NEWAPP Conference
Quality standards for HTC
products

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NEWAPP PROJECT

New technological applications for wet biomass waste stream products

Focus on:

1. Developing a new technical utilization pathway for turning biowaste into high value products.
2. Exploring which different products can be obtained from the selected waste streams after the HTC process
3. Elaborate standards and guidelines to support market penetration.
4. Develop techniques for increased added value of products.



Why are quality standards important?

“A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.” (ISO)

- Standards are lacking due to the novelty of the technology
- Lack of standards is a hindrance to market penetration of the products.



Most promising HTC products short term

- Solid fuels
- Soil conditioners



Standards for char as soil conditioner

- EBC - European Biochar Certificate
- IBI - International Biochar Institute - based in America

C content, nutrients, surface area, heavy metals, PAH, PCB...

-Biochar: Distinguished from charcoal and similar materials by the fact that biochar is produced with the intent to be applied to soil as a means to improve soil health, to filter and retain nutrients from percolating soil water, and to provide carbon storage. *Libra et al. Biofuels (2011) 2(1), 89–124*

-Biochar is a solid material obtained from the carbonization thermochemical conversion of biomass in an oxygen-limited environments. (IBI)



Quality standards for solid fuel

- Elaboration of NEWAPP standards for HTC.
- Participation on TC 238 for the elaboration of 17225-8 Graded thermally treated and densified biomass fuels



Solid fuels: NEWAPP standards

- *NEWAPP Specification of raw material and property classes for thermally treated biomass*

Biomass feedstocks included in ISO 17225-1 are valid for solid biofuel produced by HTC, not all are optimal: Due to the nature of HTC, the raw material will be mainly non-woody and wet biomass => In addition to the raw materials specified in ISO 17225-1, we include:

- Digestate: sludge and liquor resulting from anaerobic treatment of organic matter (waste or non-waste materials).
- Organic fraction of municipal waste.
- Sludge from water treatment facilities



NEWAPP Specification for HTC solid fuel pellets

	Use	Feedstock	Normative						Informative							
			N	S	Cl	NCV	Ash	Volatile	As	Cd	Cr	Cu	Pb	Ni	Zn	Ash fusion T°
Proposed limits			[% dry]	[% dry]	[% dry]	[MJ/kg]	[% dry]	[% daf]	ppm	ppm	ppm	ppm	ppm	ppm	ppm	[°C]
TAI	domestic use	orange peel, other feedstocks possible together with ash reduction post-treatment	1,5	0,1	0,1	> 19	5	< 75	5,0	5,0	50,0	20,0	50,0	50,0	200,0	1200,0
TAII	industrial use	green waste, digestate	2	0,2	0,15	> 18	10	< 75	10,0	10,0	50,0	100,0	100,0	100,0	300,0	1150,0
TAIII	industrial use	OFMW, sewage sludge	3	0,5	0,2	> 17	to be stated	< 75	to be stated	to be stated	to be stated	to be stated	to be stated	to be stated	to be stated	to be stated



NEWAPP contribution and proposal for ISO 17225-8 draft

- **Part 8: Graded thermally treated and densified biomass fuels**
- Technical Committee 238. : comprises several technologies: torrefaction, charring, steam treatment as well as HTC.



NEWAPP contribution and proposal for ISO 17225-8 draft

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	Units	Quality 1	Quality 2	Quality 3
Property class		TA1	TA2	TA3
Origin and source		2. 1 Herbaceous biomass from agriculture and horticulture 2.2.1 By-products and residues from food and herbaceous processing industry, chemically untreated herbaceous residues 3.1 Orchard and horticulture fruit 3.2.1 By-products and residues from food and fruit processing industry, chemically untreated fruit residues 4. Aquatic biomass	2. Herbaceous biomass 3. Fruit biomass 4. Aquatic biomass	2. Herbaceous biomass 3. Fruit biomass 4. Aquatic biomass
Diameter D and Length L ISO 17829	mm			
Moisture	%w, as received	$M10 \leq 10$	$M10 \leq 10$	$M10 \leq 10$
Ash	% w, dry	$A5.0 \leq 5.0$	$A10.0 \leq 10.0$	Value to be stated
Mechanical Durability	%w, as received	$DU97.5 \geq 97.5$	$DU96.5 \geq 96.5$	$DU95.0 \geq 95.0$
Fines	%w, as received	$F2.0 \leq 2.0$	$F2.0 \leq 2.0$	$F3.0 \leq 3.0$
Additives	W%, dry	Type and amount to be stated	Type and amount to be stated	Type and amount to be stated
Net calorific value, Q, ISO 18125	MJ/kg or kWh/kg as received	$Q18 \geq 18$ or $Q5.0 \geq 5.0$ Value to be stated	$Q17 \geq 17$ or $Q4.7 \geq 4.7$ Value to be stated	Value to be stated



NEWAPP contribution and proposal for ISO 17225-8 draft

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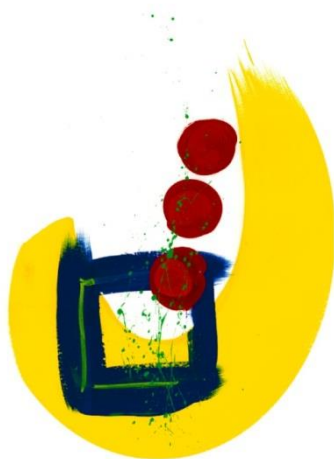
Bulk Density	Kg/m ³ as received	BD600 ≥ 600	BD600 ≥ 600	BD600 ≥ 600
Carbon C	w % dry	Value to be stated	Value to be stated	Value to be stated
Nitrogen N	w % dry	N1.5 ≤ 1,5	N2.0 ≤ 2,0	N2.5 ≤ 2,5
Sulphur S	w % dry	S0.1 ≤ 0,1	S0.2 ≤ 0,2	S0.5 ≤ 0,5
Chlorine Cl	w % dry	Cl0.1 ≤ 0,1	Cl0.2 ≤ < 0,2	Cl0.2 ≤ 0,2
Arsenic As	ppm	≤ 2*	≤ 2*	≤ 2*
Cadmium Cd	ppm	≤1*	≤1 *	≤1*
Chromium Cr	ppm	<50 *	<50 *	≤50 *
Copper Cu	ppm	<20 *	<20 *	<20 *
Lead Pb	ppm	<10 *	<10 *	<10 *
Nickel Ni	ppm	<10 *	<10 *	<10 *
Zinc Zn	ppm	<200 *	<200 *	<200 *
Volatile Matter	W % dry	Value to be stated	Value to be stated	Value to be stated
Ash melting behaviour f, CEN/TS 15370-1		Value to be stated	Value to be stated	Value to be stated
* informative, if higher to be stated				



Conclusions

- Data obtained in NEWAPP trials have allowed the preparation of a quality standard for HTC solid biofuels.
- NEWAPP consortium actively working and contributing to the ISO 17225-8 on thermally treated solid biofuels.
- The existence of quality standards will enable market penetration of HTC.

Thank you for your attention



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