4. Laboratory test

4.1. Test methods

The laboratory tests for the proof of conformity of the pellet quality with the requirements of OENORM EN ISO 17225-2 were carried out at Holzforschung Austria (1), AT-1030 Vienna, at BEA Institut für Bioenergie GmbH (2), AT-1150 Vienna and at ESW Consulting Wruss ZT GmbH (3), 1120 Vienna.

OENORM EN ISO 16948 (C/H/N)[2]
OENORM EN ISO 16968 (minor elements)[3]
OENORM EN ISO 16994 (chlorine, sulfur)[1]
OENORM EN ISO 17828 (bulk density)[1]
OENORM EN ISO 17829 (dimensions)[1]
OENORM EN ISO 17831-1 (mech. durability)[1]
OENORM EN ISO 18122 (ash)[1]
OENORM EN ISO 18125 (net calorific value)[1]
OENORM EN ISO 18134-2 (moisture)[1]
OENORM EN ISO 18846 (fines)[1]
CEN/TS 15370-1 (ash melting behaviour)[2]

All the above-mentioned standards are applied in the current version.

4.2. Test results

Sample quality class ENplus A1

Parameter	Unit	Reference state	Result	Requirements according to	
				ENplus A1	ENplus A2
Diameter, D	mm	ar	**6,0**	6 ± 1 (8 ± 1)	6 ± 1 (8 ± 1)
Length, L	mm	ar	**18,3 (10 - 31)**	3,15 < L ≤ 40	3,15 < L ≤ 40
Moisture, M	%	ar	**6,7**	≤ 10	≤ 10
Ash, A	%	d	**0,5**	≤ 0,7	≤ 1,2
Ash deformation temperature, DT	°C	d	**1320**	≥ 1200	≥ 1100
Mechanical durability, DU	%	ar	**99,0**	≥ 98,0	≥ 97,5
Fines F (< 3,15 mm) bagged pellets	%	ar	**0,21**	≤ 0,5	≤ 0,5
Net calorific value, Q	MJ/kg	ar	**17,32**	≥ 16,5	≥ 16,5
Net calorific value, Q	kWh/kg	ar	**4,81**	≥ 4,6	≥ 4,6
Bulk density, BD	kg/m³	ar	**660**	600≤BD≤750	600≤BD≤750
Additives	%	d	**---**	≤ 2	≤ 2
Nitrogen, N	%	d	**0,09**	≤ 0,3	≤ 0,5
Sulfur, S	%	d	**< 0,005**	≤ 0,04	≤ 0,05
Chlorine, Cl	%	d	**< 0,005**	≤ 0,02	≤ 0,02
Arsenic, As	mg/kg	d	**< 0,50**	≤ 1	≤ 1
Cadmium, Cd	mg/kg	d	**< 0,10**	≤ 0,5	≤ 0,5
Chromium, Cr	mg/kg	d	**< 1,0**	≤ 10	≤ 10
Copper, Cu	mg/kg	d	**1,2**	≤ 10	≤ 10
Lead, Pb	mg/kg	d	**< 0,50**	≤ 10	≤ 10
Mercury, Hg	mg/kg	d	**< 0,05**	≤ 0,1	≤ 0,1
Nickel, Ni	mg/kg	d	**< 1,0**	≤ 10	≤ 10
Zinc, Zn	mg/kg	d	**7,2**	≤ 100	≤ 100

ar ... *as received*
d ... *dry basis*

HOLZ FORSCHUNG AUSTRIA

Sample quality class ENplus A2

Parameter	Unit	Reference state	Result	Requirements according to	
				ENplus A1	ENplus A2
Diameter, D	mm	ar	**6,0**	6 ± 1 (8 ± 1)	6 ± 1 (8 ± 1)
Length, L	mm	ar	**18,1 (10 - 35)**	3,15 < L ≤ 40	3,15 < L ≤ 40
Moisture, M	%	ar	**4,7**	≤ 10	≤ 10
Ash, A	%	d	**0,8**	≤ 0,7	≤ 1,2
Ash deformation temperature, DT	°C	d	**1320**	≥ 1200	≥ 1100
Mechanical durability, DU	%	ar	**97,8**	≥ 98,0	≥ 97,5
Fines F (< 3,15 mm) bagged pellets	%	ar	**0,31**	≤ 0,5	≤ 0,5
Net calorific value, Q	MJ/kg	ar	**17,68**	≥ 16,5	≥ 16,5
Net calorific value, Q	kWh/kg	ar	**4,91**	≥ 4,6	≥ 4,6
Bulk density, BD	kg/m³	ar	**690**	600≤BD≤750	600≤BD≤750
Additives	%	d	--	≤ 2	≤ 2
Nitrogen, N	%	d	**0,07**	≤ 0,3	≤ 0,5
Sulfur, S	%	d	**0,005**	≤ 0,04	≤ 0,05
Chlorine, Cl	%	d	**< 0,005**	≤ 0,02	≤ 0,02
Arsenic, As	mg/kg	d	**< 0,50**	≤ 1	≤ 1
Cadmium, Cd	mg/kg	d	**< 0,10**	≤ 0,5	≤ 0,5
Chromium, Cr	mg/kg	d	**< 1,0**	≤ 10	≤ 10
Copper, Cu	mg/kg	d	**0,73**	≤ 10	≤ 10
Lead, Pb	mg/kg	d	**< 0,50**	≤ 10	≤ 10
Mercury, Hg	mg/kg	d	**< 0,05**	≤ 0,1	≤ 0,1
Nickel, Ni	mg/kg	d	**< 1,0**	≤ 10	≤ 10
Zinc, Zn	mg/kg	d	**8,8**	≤ 100	≤ 100

ar … *as received*
d … *dry basis*