



ÖNORM M 7135

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Compressed wood and compressed bark in natural state – Pellets and briquettes Requirements and test specifications

Presslinge aus naturbelassenem Holz und naturbelassener Rinde – Pellets und Briketts – Anforderungen und Prüfbestimmungen

Comprimés de bois en bois à l'état naturel ou en écorce à l'état naturel – Pellets et briquettes – Exigences et spécifications d'essai

This Austrian Standard provides for the marking „ÖNORM M 7135 geprüft“ and „ ÖNORM M 7135 geprüft“, respectively.

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Preliminary note

This ÖNORM defines the characteristics of compressed wood or untreated compressed bark in natural state required for their use for energy use.

With regard to the contents of foreign matter and pressing aids this ÖNORM specifies provisions primarily intended to give the consumer the assurance that complete combustion of his fuel will not give rise to any environmentally harmful emissions exceeding the emissions generated by the technically correct combustion of wood or bark in natural state.

1 Scope

This ÖNORM serves to define requirements and test methods for compressed wood or compressed bark. It addresses manufacturers, planners, traders as well as persons who install and apply machines, equipment, tools and whole plants related to such compressed wood or compressed bark, and all others involved in producing, purchasing, selling and using these devices.

2 Normative references

The following normative documents include specifications which are part of this ÖNORM by reference in this text. Dated references do not cover later modifications or revisions of this publication. However parties to the contract who apply this ÖNORM are requested to consider the possibility to apply the latest versions of the normative documents mentioned in the following. If the references are undated, the latest edition of the normative documents referred to applies. Legal provisions must always be applied as amended.

ÖNORM M 7111	Concepts of energy economy – Energy of biomass, organic waste, wind and geothermal energy
ÖNORM M 7132	Energy-economical utilization of wood and bark as fuel – Definitions and properties
DIN 51718	Testing of solid fuels – Determination of the water content and the moisture of analysis sample
DIN 51719	Testing of solid fuels – Solid mineral fuels – Determination of ash content
DIN 51722-1	Testing of solid fuels – Determination of nitrogen content – Semi-micro Kjeldahl method
DIN 51724-1	Testing of solid fuels – Determination of sulfur content – Part 1: Total sulfur
DIN 51727	Testing of solid fuels – Determination of chlorine content
DIN 51900-1	Testing of solid and liquid fuels – Determination of gross calorific value by the bomb calorimeter and calculation of net calorific value – Part 1: Principles, apparatus, methods
DIN 51900-2	Testing of solid and liquid fuels – Determination of the gross calorific value by the bomb calorimeter and calculation of the net calorific value – Part 2: Method using isoperibol or static jacket calorimeter
DIN 51900-3	Testing of solid and liquid fuels – Determination of gross calorific value by the bomb calorimeter and calculation of net calorific value – Part 3: Method using adiabatic jacket
DIN 52182	Testing of wood – Determination of density
DIN ISO 3310-1	Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth (ISO 3310-1:2000)
BGBI. No. 240/1971	Standard Act of 1971
BGBI. No. 468/1992	Accreditation Act

3 Terms and Definitions

For the purpose of this ÖNORM, the definitions of ÖNORM M 7111 and the following definitions apply

3.1 compressed wood

fuel of various shapes and sizes, produced by compaction of wood particles

This includes classes HP1 (woodpellets), HP2 and HP3 (woodbriquettes).

3.2 compressed bark

fuel of various shapes and sizes, produced by compaction of bark particles

This includes classes RP1 (barkpellets), RP2 and RP3 (barkbriquettes).

3.3 pressing aids

products from the primary agricultural and forest biomass (such as corn wholemeal, cornflour, ryeflour) which are not chemically modified and – in order to facilitate the compression procedure and thus to improve the energy balance and the resistance to abrasion – may be admixed to the raw material for the production of wood pressings and bark pressings.

4 Description und use of the product

Compressed woodpellets and compressed barkpellets are pressings for energetic use in automatically supplied combustion systems. Compressed woodbriquettes and compressed barkbriquettes are pressings for energetic use in manually supplied combustion systems.

5 Requirements

5.1 Fuel requirements

Table 1

Characteristics	Unit	Testing according to section	Compressed wood			Compressed bark		
			HP 1 wood-pellets	HP2	HP3 wood-briquettes	RP1 bark-pellets	RP2	RP3 bark-briquettes
Diameter D	mm	6.2	$4 \leq D < 10^1)$	$10 \leq D < 40$	$40 \leq D < 120$	$4 \leq D < 10^1)$	$10 \leq D < 40$	$40 \leq D < 120$
Length	mm	6.2	$\leq 5 \times D^2)$	$\leq 4 \times D^2)$	≤ 400	$\leq 5 \times D^2)$	$\leq 4 \times D^2)$	≤ 400
bulk density	kg/dm ³	6.3	$\geq 1,12^3)$	$\geq 1,00$	$\geq 1,00$	$\geq 1,12^3)$	$\geq 1,10$	$\geq 1,10$
Water content	%	6.5	$\leq 10,0$	$\leq 10,0$	$\leq 10,0$	$\leq 18,0$	$\leq 18,0$	$\leq 18,0$
Ash content ⁴⁾	%	6.6	$\leq 0,50$	$\leq 0,50^5)$	$\leq 0,50^5)$	$\leq 6,0$	$\leq 6,0$	$\leq 6,0$
Net calorific value ⁴⁾	MJ/kg	6.7	$\geq 18,0$	$\geq 18,0$	$\geq 18,0$	$\geq 18,0$	$\geq 18,0$	$\geq 18,0$
Sulphur content ⁴⁾	%	6.8	$\leq 0,04$	$\leq 0,04$	$\leq 0,04$	$\leq 0,08$	$\leq 0,08$	$\leq 0,08$
Nitrogen content ⁴⁾	%	6.9	$\leq 0,30$	$\leq 0,30$	$\leq 0,30$	$\leq 0,60$	$\leq 0,60$	$\leq 0,60$
Chlorine content ⁴⁾	%	6.10	$\leq 0,02$	$\leq 0,02$	$\leq 0,02$	$\leq 0,04$	$\leq 0,04$	$\leq 0,04$
Abrasion	%	6.11	$\leq 2,3^6)$	-	-	$\leq 2,3^6)$	-	-
Pressing aids ⁷⁾	%	7.3	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2

1) The diameter to indicate according to 7.6 shall be within a tolerance of $\pm 10\%$ of the indicated diameter

2) A maximum of 20 % of the mass of the compressed wood or compressed bark may have a length up to $7,5 \times D$.

3) see 6.3.1

4) water free state (wf)

5) The ash content may be up to 0,80 % if the used wood in natural state already shows a natural higher ash content. The proof has to be produced by the manufacturer during third-party surveillance.

6) see 6.11

7) The testing of sort and quantity of the pressing aids is performed within the third-party surveillance according to 7.3.2 on the basis of the documentation of the manufacturer.

5.2 Impurities and foreign matter

Compressed wood and compressed bark may be produced only from wood or bark in natural state, even if addition of pressing aids according 3.3, is admitted.

The following foreign matters are not permitted:

- wood preservatives or tree-trunk preservatives containing biocides,
- glues and/or plastics,
- varnishes and other coating materials.

5.3 Fines

The fines resulting from abrasion during the production has to be eliminated before leaving the production. If it can be proven, that the fines are eliminated at an other station of the transport chain, this elimination is not necessary.

6 Methods of testing (measuring methods, test procedures)

6.1 Sampling

Samples may be taken in either of two ways:

6.1.1 Sampling from goods being conveyed

The sample material needed, is taken from the stream of goods in the form of at least 5 separate specimens, with a mass of at least 0.5 kg each. The samples must be taken at the last possible place of the production site.

The individual samples must be taken at sufficiently long intervals to allow a multiple (at least ten times) of the mass of an individual specimen to pass the conveyor section between two consecutive samplings.

6.1.2 Sampling from stationary goods

The sample material required, at least 5 individual specimens with a mass at least 0.5 kg each of, must be taken from the storehouse, from the transport vehicle, the pallet, the container, etc., as uniformly distributed as possible.

6.2 Determination of dimensions

From classes HP3 and RP3 (briquettes) at least 5 individual samples must be measured. From classes HP1, HP2, RP1 and RP2 a mass of 20 g up to 100 g (some 20 individual pressings) from one of the 5 individual samples has to be taken by random sampling and must be measured.

6.3 Determination of bulk density

6.3.1 Classes HP1 and RP1 (pellets) or HP2 and RP2

From each of the 5 individual samples two pieces of compressed wood or compressed bark must be taken according 6.2. The respective bulk density is determined in accordance with DIN 52182. The arithmetic mean value calculated from the 10 individual values shall be compared with the corresponding threshold value (table 1).

NOTE:

Because of the size of the samples it must be assumed that the measuring precision required in DIN 52182 for the determination of the volume of the pressings quantities HP1 and RP1 cannot be for attained. For this reason a deviation of the mean value up to 0.02 kg/dm^3 from the threshold value will be accepted for these two classes.

6.3.2 Classes HP3 and RP3 (briquettes)

From 5 individual samples one specimen each has to be taken, on which the bulk density can be determined with sufficient precision in accordance with DIN 52182. From the values of the bulk density determined in accordance with DIN 52182, the arithmetic mean value shall be calculated and compared with the threshold value (table 1).

6.4 Preparation of a mixed sample

For further examinations (6.5 to 6.11) a mixed sample has to be prepared from the 5 individual samples taken in accordance with 6.1.

6.5 Determination of water content

The water content is determined in accordance with DIN 51718. The quantity of the sample shall be between 10 g and 100 g. Differing from DIN 51718 the sample can be taken unground. The dry temperature for method A or B according to DIN 51718 shall be $103 \text{ °C} \pm 2 \text{ °C}$.

6.6 Determination of ash content

The ash content is determined in accordance with DIN 51719 (at 815 °C).

6.7 Determination of net calorific value

The net calorific value is calculated from the gross calorific value. The gross calorific value is determined in accordance with DIN 51900-1 to 3. The test report must quote the standard used as basis for this determination.

NOTE:

If no elemental analysis is performed, the value of the hydrogen content may be taken from ÖNORM M 7132:1998-07, table 1.

6.8 Determination of sulphur content

The sulphur content is determined in accordance with DIN 51724-1 or by similar methods.

6.9 Determination of nitrogen content

The nitrogen content is determined in accordance with DIN 51722-1 or by similar methods.

6.10 Determination of chlorine content

The chlorine content is determined in accordance with DIN 51727 or by similar methods.

6.11 Determination of abrasion of pellets

The abrasion behaviour is determined according to the following testing instruction with the Ligno-Tester¹⁾ or with an equivalent testing device (see [annex A](#)).

Before determination of abrasion, the fines must be separated by manually sieving with a sieve of 3.15 mm according to DIN ISO 3310-1.

100 g ± 0,5 g pellets are weighed and exposed in the Ligno-Tester¹⁾ for 60 seconds at 70 mbar in the airflow. At the end the pellets are weighed again and the abrasion calculated in %. The mean value is calculated from the results of 5 determinations. Pellets must be checked free of fines. If necessary, the fines have to be sieved according to 3.4. The dust filter of the Ligno-Tester¹⁾ must be changed after every third determination at the latest.

$$AR = \frac{m_E - m_A}{m_E} \cdot 100$$

AR ... abrasion in %

m_E ... mass of pellets before treatment in g

m_A ... mass of pellets after treatment in g

The abrasion can also be determined by any equivalent method. The equivalence of the method must be proven according [annex A](#).

NOTE:

Because of the expected deviation from the determination, a difference between the mean value and the threshold value of up to 0.2 % abrasion must be accepted.

7 Procedure for the proof of conformity with this standard

Proof of the quality of compressed wood or compressed bark in natural state is to be provided by an initial type testing, a continuous factory production control as well as a periodic third party surveillance (periodic test). In this connection a distinction is to be made between the requirements set out for initial type testing and the values to be tested continuously.

For the procedure of marking of compressed wood and compressed bark in natural state to be in conformity with this ÖNORM the following provisions apply:

7.1 Description of procedure

In case a product is to be marked to be in conformity with the present standard, according to § 3 (2) of the Federal Act on Standardization (BGBl. Nr. 240/1971) a prior testing covering the respective specifications of the present standard is to take place, carried out by a state-accredited testing laboratory²⁾.

¹⁾ Ligno-Tester LT II of Messrs. Borregaard Lignotech


²⁾ see Accreditation Act

This testing (initial type testing) shall cover all requirements set out in this standard as well as all other possibly existing safety regulations pertaining to the product according to § 4 of the Federal Act on Standardization of 1971.



Anybody wishing to mark the respective product as being in conformity with this standard and/or to place it on the market accordingly, must provide proof of evidence to the Austrian Standards Institute (ON) of the positive result of the initial type testing by means of a test report; he thus commits himself to fulfil the relevant conditions of ON concerning the use of this marking.

Since this standard prescribes the conclusion of a surveillance contract, notification about initial type testing has to be accompanied by the proof of evidence that a surveillance contract in accordance with the specifications set out in the present standard has been concluded with that testing laboratory, which has carried out initial type testing, stipulating that the testing laboratory is obliged to report to ON, without delay and provably, on its own initiative, on negative results of the inspection obtained during the surveillance as well as the expiration of the surveillance contract (e.g. due to a change of the applicant or the testing laboratory). Likewise the applicant is obliged to report, without delay and provably, to ON negative results of the inspection obtained during the surveillance as well as the expiration of the surveillance contract. In such a case, the licence for the marking according to § 3 (2) of the Federal Act on Standardization of 1971 becomes invalid.

ON records the name of the applicant, name, label or designation of the type of the product and, if necessary, additional data required, such as the designation according to the standard, quality class etc. in the register of products in conformity with standards and issues an attestation of registration covering these matters. For this administrative activity the applicant has to pay a certain fee, fixed by ON.

Upon fulfilment of the conditions given above the product may be marked by „ÖNORM M 7135 geprüft“ or „ M 7135 geprüft“. This marking is to be durably affixed to the packaging and has to be supplemented by all additional data prescribed in the present standard (such as manufacturer, identification data, classification of quality, performance). The mark shall not affect essential properties, such as strength of the product. An indication concerning the conformity of the product with the standard may also be given in delivery notes, sale and advertising material etc.

As to products lacking attestation of registration on the part of ON, these products must neither be marked or designated in any manner as described above, nor in another manner – i.e. according to § 3 (1) of the Federal Act of Standardization of 1971 – nor in a similar manner which might cause confusion. Attention is drawn to the fact that the offer for sale or placement on the market or circulation, respectively, of such products with an indication of a conformity with the standard represents an illegitimate marking entailing administrative penalty procedures according to § 8 of the Federal Act on Standardization of 1971 and/or appropriate consequences based on the law concerning the „Protection against unfair competition“.

Further details concerning the use of the logotype „ÖNORM“ and the mark „“, in connection with the respective number of the standard and the addition „geprüft“, are contained in the brochure of ON entitled „Conditions for the right to use the marking „ÖNORM ... geprüft“ or „ ... geprüft“ according to § 3 (2) of the Austrian Federal Act on Standardization of 1971“.

7.2 Initial type testing

The initial type testing is the first testing if all requirements mentioned in section 5 are met according to the test specified in section 6. This initial testing, including sampling, according to 6.1, has to be performed by an Austrian official testing laboratory³⁾.

7.3 Quality surveillance

7.3.1 Factory production control

The manufacturer is obliged to ensure factory production control. The factory production control must be performed by qualified personnel at least once a week and comprises the following checks:

- Determination of bulk density
- Determination of water content
- Determination of abrasion behaviour according 6.11
- Recording of sort and quantity of pressing aids, if applicable.

For the purpose of factory production control it is not necessary to use the methods mentioned in section 6. Nevertheless, the method used must guarantee the observation of the limited values determined by the reference method.

The results of the factory production control are to be recorded and are to be checked by the testing laboratory in the course of the surveillance inspection.

³⁾ see Accreditation Act

7.3.2 Third-party surveillance

Third-party surveillance means the inspection of compressed wood or compressed bark on the basis of a surveillance contract (see 7.1). Third-party surveillance must be performed by an officially authorized testing laboratory⁴⁾ at least once a year and comprises the inspection and assessment of the compressed wood or compressed bark according to sections 5 and 6. These inspections are carried out without previous notice and must be performed at each production site.

The compliance with the following requirements must be examined:

- Examination of the manufacturer's factory production control and sampling of the respective product according to 6.1 for inspection by the testing laboratory
- Requirements according to section 5
- Sort and quantity of pressing aids if applicable (e. g. on the basis delivery papers) relating to the produced quantity.

Third-party surveillance is to be carried out on the basis of a surveillance contract to be concluded by the person putting the product on the market and (in case this person is not identical with the manufacturer) by the producer with that testing laboratory having already carried out initial type testing. An individual surveillance contract for an undefined period of time is to be concluded for each referenced standard and each production site; this contract is to show an unambiguous and detailed reference to the products subject to surveillance (e.g. by means of an appendix with the possibility for updates). The surveillance contract is to include a provision according to which the testing laboratory is obliged to report without delay and provably to the Austrian Standards Institute on negative results of the inspection obtained in the course of the surveillance as well as the expiration of the surveillance contract. In case of a change of the surveillance body, a new testing laboratory has to decide whether to accept the results of the initial type testing and of the surveillance carried out so far or to carry out renewed testing.

7.4 Repeated test

If, in the course of inspection according to 7.3.2, the testing laboratory realizes that the factory production control has not been performed in compliance with the requirements of the standard or the compressed wood or compressed bark do not comply with individual requirements of section 5, a repeated test in a full scale of the third-party surveillance must be performed within a reasonable period of time which, however, cannot exceed 6 weeks.

In case the repeated test again reveals non-conformities with the referenced standard, this is to be reported to ON without delay and provably by the surveillance body which results in a deletion of the product from the register of products in conformity with standards.


7.5 Test report

The test report shall comprise a tabulated overall survey of the tested characteristics indicating the rated and the actual values.

The test report has to close with a confirmation that all tests provided for in the standard have been carried out and that (if applicable) all samples have met the required values.

7.6 Marking

The packaging of compressed wood or compressed bark according to ÖNORM M 7135 must show:

- Number of the standard with the logotype „ÖNORM” or the mark „”, each with the addition „geprüft”;
- registration number of ON;
- designation of the compressed wood or compressed bark according to 3.1 and 3.2, e. g. woodpellets;
- for classes HP1 and RP1 the diameter must be indicated, e. g. HP1 – diameter 6 mm;
- mass of contents;
- notice that the compressed wood or compressed bark must be protected against moisture during transport and storage;
- notice that briquettes expand during combustion, which must be taken into account when feeding the furnace (not necessary for pressings from screw presses);
- ash content of compressed wood of classes HP2 and HP3, if the content is higher than 0,5 %.

If the fuel is delivered without packaging, analogous information must be provided on the accompanying documents.

⁴⁾ see Accreditation Act

8 Transitional provisions for existing registrations of conformity with standards

For products already registered as being in conformity with the previous edition of ÖNORM M 7135 proof of evidence is to be provided in the course of the next inspection that they are also in conformity with the present edition of ÖNORM M 7135. This proof of evidence is to be submitted to ON in due time, since the registration will otherwise be deleted one year after publication of this standard, at the latest.

Until 6 month after publication of this standard the following applies to footnote 2, table 1: Maximum 20 % of the pressings mass may have a length of up to 10 x D.

Annex A (normative): Evidence of equivalence of a method for determination of abrasion

A.1 Determination of abrasion of homogeneous sampling material by reference method

A homogeneous sampling material (no mixed sample, constant water content, as small as possible differences in length, ...) shall be selected for the analysis.

The determination of abrasion of homogeneous sampling material is carried out according to [6.11](#), the mean value shall be calculated not from 5 but from 15 individual specimen taken by random sampling. In addition to the mean value also the standard deviation must be determined. If the standard deviation is less than 0.20 % abrasion, it will be assumed that the sampling material is homogeneous. If the standard deviation is higher or equal 0.20%, the used material will be classified as not homogeneous. In this case the analysis must be repeated with more appropriate material.

A.2 Determination of abrasion by comparative method

If evidence could be provided that the sampling material meets the required homogeneity criteria, 15 further separate specimens must be taken by random sampling. The quantity to be taken depends on the requirements of the comparative method. The determination of abrasion must be performed in accordance with an exactly defined testing instruction (description see [6.11](#) or equivalent standard). From these 15 determinations the arithmetical mean value and the standard deviation must be calculated.

A.3 Comparison of reference method and comparative method

The proof that these two methods are significantly different shall be supplied by a T-Test for two independent random samples (two-sided questionnaire, probability of error $\leq 1\%$). Furthermore, it has to be checked if the required homogeneity criteria is fulfilled when applying the comparative method (standard deviation $< 0.20\%$).

If there is no significant difference between the two methods at a presumed probability of error $\leq 1\%$, and if the standard deviation calculated from 15 abrasion values by the comparative method is less than 0.20 %, the comparative method is to be accepted as equivalent to the method mentioned in [6.11](#).

