Estonian Woodhouse Association

STANDARDS OF THE ESTONIAN WOODHOUSE ASSOCIATION FOR LOG HOUSES

Standards of the Estonian Woodhouse Association for log houses have been prepared in cooperation between the Estonian Woodhouse Association, the enterprises belonging to the Estonian Woodhouse Association, Estonian University of Life Sciences and the Tallinn University of Technology. The standards are recommended minimum requirements for heated log houses produced in Estonia.

The standards include requirements for the quality of materials and the construction process in conformity with general building requirements.

The standards are applicable to both solid log and glue-laminated log buildings made as handcrafted as well as manufactured by machines, and they are valid at the moment of the delivery of the building.

Standards of the Estonian Woodhouse Association for log houses have been approved by the Management Board of the Estonian Woodhouse Association on 10 March 2011.

Revision 2 of the standards of the Estonian Woodhouse Association has been approved by the Management Board of the Estonian Woodhouse Association on 28 April 2011.

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1. Terms

1.1. **Twisted grain –** deviation of the direction of wood fibres from the direction of the log's longitudinal axis.
1.2. **Kerf** – a longitudinal slot on the upper or bottom side of the log, which helps to direct the fractioning of the log.
1.3. **Handcrafted log house –** a method of producing log houses, which does not use any special production lines or machine-tools for making log connections and/or in which the wall logs are not profiled.
1.4. **Glue-laminated log** – a wall beam or log glued together of two or more wooden elements, whose diameter or the thickness of the shorter side is at least 70 mm.
1.5. **Slider** – a metal detail, which enables movement in a fixed direction, used for connecting log walls and non-sinking construction parts.
1.6. **Sapwood –** external part of stem wood, which includes viable cells and directs the juices in a growing tree.
1.7. **Machined log house –** a method of producing a log house with the joints of the logs made by devices.
1.8. **Massive log –** a wall beam or log made of massive timber (not glued) with the diameter or thickness of the shorter side of at least 70 mm.
1.9. **Rot –** wood damage caused by fungi that change the structure of timber significantly by feeding on it. As a result, the physical properties of the timber deteriorate.
1.10. **Wall log –** the top wall log supporting rafters.
1.11. **Log back –** upper side of a wall log.
1.12. **Wane –** part of the log surface that has not been sawn off.
1.13. **Humidity of timber/ log –** the amount of water contained in timber and expressed in percentages of the timber mass.
1.14. **Purlin –** a horizontal bearing log in the roof structure supporting the rafters.
1.15. **Dowel –** a vertical stick in the logs penetrating two or more logs in order to ensure the stability of the wall.
1.16. **Blue stain –** a fungus growing on the surface of the timber. It does not damage the strength of the timber but has an impact on the visual appearance of the log.
1.17. **Tenon –** joint of a log (logs).
1.18. **Tender pole –** vertical support for ensuring the stability of the wall not connected with the openings or cross corner and for connecting the log construction with the non-sinking constructions.
1.19. **Burr –** a knot which has become a greyish-brown or multicoloured mass and which can be rubbed into powder.
1.20. **Groove –** longitudinal gutter-like hollow on the log, the edges of which copy the lower log and where the sealing material is placed.

2. General requirements

2.1. Timber used for log houses.
2.1.1. Both the European spruce *(Picea abies)* and Scots pine (*Pinus sylvestris*) are acceptable. In case of using other types of timber, their durability must be at least as good as that of

spruce and pine. Glue-laminated log can be used as well. The types of timber and log must be specified in the agreement.

2.2. Timber humidity

2.2.1. Pinewood shrinks in radial direction up to 4%, in tangential direction up to 7% and in longitudinal direction up to 0.3% while drying. Spruce has similar parameters.

2.2.2. Humidity content in timber is checked at least at a depth of 25 mm in the wood by means of special equipment measuring electrical resistance.

2.2.3. The average humidity content of the wall logs used in manufacturing log houses should not be more than 20% at the moment of manufacture. In case of logs, the average humidity content may vary by +/-3%.

2.2.4. The average humidity content of purlins, poles and posts used in manufacturing log houses cannot be more than 23% at the moment of manufacture.

2.2.5. The permitted humidity content of glue-laminated logs is up to 18%. Glue-laminated log needs to have a conformity certificate issued by the manufacturer.

2.2.6. Due to shrinkage of timber (twice as much in tangential direction when compared to radial direction), splitting of logs is an inevitable result of the drying massive log. In order to reduce pressure in a log, a kerf could be used.

2.3. Factors that have an impact on the strength of a log.

2.3.1. Properties reducing the strength of a log:

single knots, max. size	1/3 of the log's diameter
twisted grain	up to 1:10 (in case of logs with a larger diameter than 26 cm; it is allowed in case of logs with a diameter of up to 25 cm)
maximum average width of annual rings	up to 6 mm
burrs and knotholes	allowed if replaced with sound timber
dead knots	allowed if it is not a falling knot
cracks (both the ones through entire cross-section as well the ones not through entire cross-section)	cracks as a result of drying are allowed
insect damage	not allowed
rot	not allowed

2.3.2. Properties not reducing the strength of a log:

wane	not allowed on visible parts (only in case of a machined log)
blue stain	allowed within a limited range
sapwood	allowed

2.4. Tolerances

2.4.1. In case of handcrafted log houses, the allowed tolerance of a log wall axis deviation is 1 cm per linear meter, and in case of a machined log, it is 0.5 cm per linear meter in relation to the vertical axis.

2.4.2. Deviation of the width of logs, used in machined log construction, from the nominal size can be max. +/- 1.5 mm at the moment of transference. In case of a handcrafted square log, the tolerance is +/- 5% of the width of the log construction at the moment of transference.
2.4.3. In case of a handcrafted log house, the difference in the height of the wall log at different points of the construction may be +/- 3 cm and in case of a machined log house, +/- 1 cm.

3. Constructions

3.1. Foundations
3.1.1. During the design and building process of the foundation, requirements of the log construction's designer and manufacturer as well as the fastening method of the log construction on the foundation must be taken into account.
3.1.2. The height of the foundation base from the surrounding ground needs to be at least 30 cm.
3.1.3. The first row of log walls needs to be separated from the foundation by hydro-insulation.

3.2. Log constructions
3.2.1. Log constructions need to be built on the foundation so that water could not access places between the foundation and log and between/on the logs.
3.2.2. Sinking of a log construction within 3-5% in the course of time is allowed. Sinking is caused by shrinkage of wall logs due to drying and by the compression of insulation between the logs due to gravity.
3.2.3. In order to equalize the difference in the sinking of interior and exterior walls, the bearing structures must be designed so that the walls would have as equal of a load as possible.

3.3. Joining logs in the wall construction
3.3.1. If it is impossible to use the logs in full length due to the length of the wall, it is allowed to join the logs.
3.3.2. Joining the logs in the wall construction is allowed by means of such joints and/or joining equipment that prevent the log from horizontal moving. In case of joining the wall without tenons, it should be observed that the minimum horizontal distance between the log joints on top of each other was at least 1.5 m.
3.3.3. Unlimited amount of finger joined logs can be used in the wall construction.

3.4. Groove
3.4.1. The width of a groove on a machined square log should be at least 60% of the log's diameter.
3.4.2. The width of a groove on a machined square log should be at least 40% of the log's diameter.
3.4.3. The width of a groove on a handcrafted square log in exterior walls should be, on average, 55% of the wall thickness but no less that 40% of the wall thickness.
3.4.4. The width of a groove on a handcrafted round log in exterior walls should be, on average, 35% of the log's average diameter but no less than 8 cm.
3.4.5. In case of handcrafted log houses, the back of the lower log should be at least 10 mm higher than the groove edges of the upper log in order to prevent water from getting in the

groove. Manufacturer of a machined log house must produce the groove in a way that would prevent water from leaking into it.

3.5. Compression of a log wall

3.5.1. In order to guarantee heat and wind resistance, compression of log joints should be carried out in conformity with the design documentation or by taking into account the distinctive features of the material used.

3.5.2. The insulation material visible between the logs as a result of installation must be duly cut off in order to prevent water from leaking between the logs.

3.6. Stiffening of walls

3.6.1. Stiffening of wall ends is necessary if the length of the part not joined is more than 650 mm in case of a square log and more than 1,200 mm in case of a round log wall.

3.6.2. The need for stiffening the walls must be predetermined in the house design or in the instruction of the manufacturing plant.

3.6.3. It is recommended to place tightening bolts in the external corners of the machined log construction in order to guarantee a better stability of the house, accelerate sinking of the log construction on account of compressing insulation material between the logs and to join the roof construction with the wall.

3.6.4. Tender poles need to be shorter than the hole by the reserve calculated for sinking.

3.6.5. Tender poles are fastened to the log wall in a way that they would not prevent the log wall from sinking.

3.7. Joining wall logs with dowels

3.7.1. Dowels need to ensure the stable position of logs as regards each other.

3.7.2. In case of machined log houses, the holes for dowels are made in the wall logs in the factory during the manufacturing process. In case of handcrafted log houses, the dowel holes can be drilled during the process of setting up, if the house is set up by the manufacturer.

3.7.3. Dowels need to be placed at least every 2 m by joining at least two logs vertically.

3.7.4. The dowel needs to be at least 5% shorter than the hole.

3.7.5. In order to guarantee straight and rigid walls, metal pipes, which have received anticorrosion treatment, can be used instead of dowels, if necessary.

4. Roof constructions

4.1. If the second floor has log walls, roof purlin (purlins) should be used in the bearing structure. If the bearing walls of the second floor have a framework, there is no direct need for that.

4.2. If the second floor has log walls, the rafters of the roofs that are steeper than 18 degrees and of broad gentle roofs always need to be joined with the sidewall by means of sliders.

5. Windows and doors

5.1. In order to allow the wall construction to sink, windows and doors are joined with the log wall by means of tender poles.

5.2. Upon setting the jambs of doors and windows, a reserve for sinking, as specified in the design, needs to be left between the upper part of the jamb and log, which is compressed with an insulation material that allows sinking.

5.3. The boards of the log house's door and windows are placed so that they would cover the tender poles and sinking reserves.
5.4. Windows and doors should be mounted so that they would guarantee protection against wind and water.

6. Floors

6.1. All standard floor structures are suitable for log houses.
6.2. Terrace floors need to be built so that water would not damage the exterior wall log.

7. Inserted ceilings

7.1. The bearing constructions of an inserted ceiling are usually joists made of a (wall) log or beam. Joists are set up during the wall building process or leaned on the wall by means of brackets after setting up the framework.
7.2. Sinking of the inserted ceiling together with the log wall needs to be taken into account in the building process of inserted ceilings.

8. Weatherboarding the wall and extra thermal insulation

8.1. Weatherboarding of a wall is used for changing the external appearance of the wall, insulating the wall or for protecting the log wall in damp rooms.
8.2. The base of the wall weatherboarding is a (wooden) framework. Vertical bars of the framework and weatherboarding are fastened in a way enabling the sinking of the log wall.
8.3. Additional thermal insulation may be used either on the inside or outside wall depending on the need. Condensation of humidity in the wall construction should be avoided.

9. Non-sinking constructions of a log house

9.1. Non-sinking walls are joined with the ceiling and/or walls in a way that enables sinking. The space for sinking is covered with a barrier board, if necessary.
9.2. In order to join brickwork and log wall, tender poles are generally used.
9.3. Sufficient reserve must be left for the sinking of a log wall or inserted ceiling between the log wall supported on the bearing non-sinking wall or between the inserted ceiling; bolts, insulation and barrier boards are mounted.

10. Stairways and rails

10.1. Stairways and rails are fastened so that sinking of the log house was enabled and that they would be in conformity with the design after the sinking of the log construction.

11. Supporting posts

11.1. Supporting posts need to be mounted in a way that enables the log construction to sink.

12. Surface treatment of exterior walls

12.1. Surface treatments that do not form a membrane should be used for external finishing of a log wall.
12.2. In order to have a more weatherproof wall, the surface of the exterior wall should be treated in conformity with the instructions of the manufacturer of the finishing material.

13. Wet rooms

13.1. Floors of wet rooms need to be built so that humidity could not access places between the wall and floor.

13.2. In order to install ceramic tiles on the log construction in wet rooms, a framework should be built on the log wall to enable the wall to sink and air to move between the log wall and moisture insulation.

14. Delivery and packaging of a log house set

14.1. The log house set needs to be stored weatherproof on the construction site.

14.2. At the moment of transference, the log house set should include drawings and documents describing the completeness of the set.

14.3. A log house set should include all the materials needed for setting up bearing structures unless clearly and unequivocally stated differently in the sales agreement.