



## NATURE AND LANDSCAPE MANAGEMENT STANDARDS

### MANAGEMENT OF SELECTED TERRESTRIAL BIOTOPES

#### SERIES D

### MEASURES TO IMPROVE THE STRUCTURE OF FOREST STANDS

SPPK D02 005:2014

Measures to improve the structure of forest stands.

Masnahmen, um die Struktur des Waldes zu verbessern.

This Standard is intended as a definition of work operations implemented in forests in order to adjust the species and spatial structure of forest towards a natural structure compliant with nature protection principles.

#### References:

Act no. 289/1995 Coll. on Forests and on amendment of certain acts (Forest Act)

**Act no. 326/2004 Coll. on Medical Plant Care and on amendment of certain acts**

Act no. 114/1992 Coll. on Nature and Landscape Protection

Act no. 13/1997 Coll. on Roads

Act no. 254/2001 Coll. on Waters and on amendment of certain acts (Waters Act)

Act no. 458/2000 Coll. on Requirements for Business and Public Administration in Energy Industries and on amendment of certain acts (Energy Act)

Act no. 266/1994 Coll. on Railways

Act no. 185/2001 Coll. on Waste and on amendment of certain acts

Act no. 477/2001 Coll. on Packaging and on amendment of certain acts (Packaging Act)

Act no. 133/1985 Coll. on Fire Prevention

Act no. 149/2003 Coll. on putting into circulation of reproduction material of forest tree species of species important for forestry and artificial crosses, intended for forest renewal and afforestation, and amending some related laws

Decree no. 77/1996 Coll. on prerequisites of applications for exemption or restriction and details of protection of land intended for performance of forest functions

Decree no. 83/1996 Coll. on Development of territorial forest development plans (OPRL) and definition of management units

Decree no. 29/2004 Coll. on Trade in Reproduction Material of Forest Tree Species

Decree no. 139/2004 Coll., laying down details on down details of transfer of seeds and seedlings of forest tree species, registration of origin of reproduction material and details of renewal of forest stands and afforestation of land declared land intended for performance of forest functions

Government Regulation no. 362/2005 Coll., laying down work and work procedure organisation methods that employers have to ensure in forest work and workplaces of similar nature

ČSN 48 2115 – Planting material of forest trees

ČSN 46 4902 – Cultivates of ornamental woody plants Common and basic regulations.

ČSN 73 3050 – Earthworks

LČR explanatory comments on ČSN 48 2115

PHARE 2003 – Collection of seeds and fruits off tall trees.

Data sheets of Šumava NP and PLA Administration.

List of Permitted Preparations and Other Products for Forest Protection in force for the current year. MoA CR.

Recommended rules for measurement and sorting of timber in the Czech Republic, MoA, 2002.

Information standard for forestry management, UHUL.

International standard CEC-L-33-T82 – properties of biologically degradable fats, oils and hydraulic fluids

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## 1. Standard purpose and contents

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The main objective of modern forest management is general application of the sustainable management principle while systematically employing nature-friendly management methods.

The standard “Measures to improve the structure of forest stands” is intended as a definition of work operations implemented in forests in order to adjust the species and spatial structure of forest towards a natural structure compliant with nature protection principles. It is intended for application on land intended for performance of forest functions in all forest categories. The description of forestry measures applies to tall forest; chapter 3.6 defines specific measures for low and medium forest. The subject matter of the standard is minimum measurable values and parameters of measures or requirements the meeting of which is a necessary prerequisite for optimum performance of respective activities and measures.

Forest management planning and design of each intervention is an activity requiring professional qualification. Said activity shall be done by the owner only in cooperation with a professional forest management appointed by the plot owner or a competent authority.

The application of the forestry measures specified below is defined by legislation in force, natural site conditions and forest stand condition.

The choice of measures in specific cases and the potential for their adjustment are governed by legislation in force for:

- stands promulgated as specially protected areas and their protective zones,
- stands that are a biotope for specially protected species or species of European significance,
- basic obligations of the forest owner mandatory by law,
- classification of stands by forest category and sub-category and resulting restrictions (categorisation by law or on owner’s request),

as well as management conditions:

- stand division and structure - mosaic of ages, species and sizes,
- ability and capacity for natural woody plant renewal,
- priority use of indigenous species for the site,
- ability to carry out renewal logging using small-scale clearcutting and curtain methods, effort to eliminate clearcuts,
- leaving of leave-trees and part of stand material on the site,
- stand pruning is aimed at target trees,
- game counts.

The procedures defined by the standard do not supplant applicable exemptions or approvals pursuant to special legal regulations.

The contractor is required to always act so as to prevent damage to health, nature, the environment and property. The contractor is liable for damage that it has caused by violation of its legal obligations unless it proves that it did not cause the damage. All work has to proceed in accordance with occupational safety requirements.

## Legal framework

**Act no. 289/1995 Coll.** on Forests and on amendment of certain acts (Forest Act) provides a basic legal framework for management of forests.

**Act no. 326/2004 Coll.** on Medical Plant Care and on amendment of certain acts defines the use of preparations and other products for plant protection.

**Act no. 114/1992 Coll.** on Nature and Landscape Protection guarantees general and special nature and landscape protection. Specifically among other things, it deals with general and special protection of plants and animals, special protection of areas, contractual protection of areas, defines requirements for indemnification for complicated farming and forestry as well as requirements for granting of exemptions from prohibitions in specially protected areas or exemptions from prohibitions for memorial trees and specially protected plant and animal species.

**Act no. 13/1997 Coll.** on Roads institutes restrictions to road use in terms of safety and defines conditions for road maintenance or management of land adjacent to roads.

**Act no. 254/2001 Coll.** on Waters and on amendment of certain acts (Waters Act) defines, among other things, planning in the area of waters, restrictions in protective zones of water sources, and defines particularly hazardous substances and hazardous substances.

**Act no. 458/2000 Coll.** on Requirements for Business and Public Administration in Energy Industries and on amendment of certain acts (Energy Act) defines the rights of electricity transmission and distribution system operators, gas producers and gas transport and distribution system and tank operators, and holders of licences for heat distribution.

**Act no. 266/1994 Coll.** on Railways defines, among other things, requirements for operation of railways, rights and obligations of entities in connection with delineation of passable profile and its safety.

**Act no. 185/2001 Coll.** on Waste and on amendment of certain acts defines categories of waste and their hazardousness and requirements for its disposal as well as obligations of waste originators, processors, importers and exporters.

**Act no. 477/2001 Coll.** on Packaging and on amendment of certain acts (Packaging Act) defines rights and obligations of corporate entities and natural persons doing business and jurisdiction of authorities with handling packaging and putting packaging and packaged products on the market or into circulation, recollection and reuse of packaging waste, as well as fees, protective measures, remedial measures and penalties.

**Act no. 133/1985 Coll.** on Fire Prevention defines requirements for work in forest stand as potential sources of risk of fire, danger to lives and health of persons and animals, and property.

**Act no. 149/2003 Coll.** on Circulation of reproductive material of tree species and artificial crossbreeds important to forestry intended for forest restoration and afforestation, and on amendment of certain acts (Forest Tree Reproductive Material Trade Act) defines conditions under which it is possible to put into circulation reproduction material of tree species and artificial crossbreeds important to forestry intended for forest restoration and afforestation and for maintenance and increasing of biological diversity of forest, including genetic diversity of trees, and for sustainable forestry.

**Decree no. 77/1996 Coll.** on prerequisites of applications for exemption or restriction and details of protection of land intended for performance of forest functions defines prerequisites of applications for exemption or restriction and details of protection of land intended for performance of forest functions and details for rehabilitation of such land.

**Decree no. 83/1996 Coll.** on Development of territorial forest development plans (OPRL) and definition of management units defines prerequisites of both said documents, containing, among other things, basic management recommendations according to the defined management units, definition of applicable amelioration and stabilisation woody plants and their minimum shares.

**Decree no. 29/2004 Coll.** on trade in reproduction material of forest woody plants defines minimum qualitative requirements for usable planting material and rules for use of reproduction material.

**Decree no. 139/2004 Coll.**, laying down details on down details of transfer of seeds and seedlings of forest tree species, registration of origin of reproduction material and details of renewal of forest stands and afforestation of land declared land intended for performance of forest functions.

## 2. Forestry planning – project planning

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### 2.1.1 Restrictions by site characteristics

- 2.1.1.1 Assessment of **site conditions** in terms of suitability for the respective woody plants, according to LT (SLT) unit, in connection with expected response of woody plants and the stand to the planned intervention and assumption of future development. The assessment is made using outputs from a valid typological mapping – typological map, which is part of the OPRL in force for the PLO. These documents are also adopted for the nature protection planning documentation – management plans.
- 2.1.1.2 Assessment of **terrain conditions** in terms of suitability for the technique used in respect of both own capacities and potential damage. A basic assessment is made using so-called terrain type. The terrain type is a standard component of FMP/O. It makes use of terrain classification of (UHUL, 1980), or (Macků, Popelka, Simanov, 1992). Based on technical affiliation, terrain types are combined into five terrain groups and each has usable devices assigned; this is technical standardisation.

### 2.1.2 Spatial and functional restrictions

- 2.1.2.1 It is necessary to respect **restrictive conditions** of forest cultivation activity arising from legislation in force and protective requirements pursuant to Act no. 114/1992 Coll., requirements relating to protective zones pursuant to Act no. 254/2001 Coll. on Waters, Act no. 458/2000 Coll. on Energy Networks, Act no. 13/1997 Coll. on Roads, Act no. 266/1994 Coll. on Railways. These restrictions shall be reflected in the forest categorisation pursuant to Section 6 of the Forest Act.
- 2.1.2.2 All planned measures have to be **in accordance** with **FMP/O in force**, which quantifies the planned measures and defines them spatially (MB, forestry maps 1 : 10,000), valid **management plans for specially protected areas and valid SRM** for SPAs and SACs of Natura 2000. In other cases, an approval of the necessary exemption by the applicable public authority is required.

### 2.1.3 Management methods and renewal procedures

- 2.1.3.1 **Negative selection** is an intervention whereby negative components of a forest stand are found and removed. Most commonly it is medical selection, species selection (removal of undesirable woody plant species, ill individuals, etc.)
- 2.1.3.2 **Positive selection** is an intervention finding positive components of a forest stand (desirable woody plant species, best-quality individuals, promotion of growth and fructification, etc.), which the intervention relieves and promotes (they become the object of long-term management).

- 2.1.3.3 Undergrowth management method in the form of **large-scale curtain cutting** is a procedure whereby stand renewal is ensured underneath a curtain of the stand logged in an area wider than twice the average height of the stand logged. No clearcuts may be produced.
- 2.1.3.4 Undergrowth management method in the form of **edge curtain cutting** is a procedure whereby stand renewal is ensured underneath a curtain at the edge of the area logged in an area that must not be wider than twice the average height of the stand logged, along the edge using curtain strips. No clearcuts may be produced.
- 2.1.3.5 Undergrowth management method in the form of **strip curtain cutting** is a procedure whereby stand renewal is ensured in a strip inside the stand logged, which must not be wider than twice the average height of the stand logged. No clearcuts may be produced.
- 2.1.3.6 Undergrowth management method in the form of **group curtain cutting** is a procedure whereby stand renewal is ensured inside the stand logged in an area typically of a circular shape with a diameter smaller than twice the average height of the stand logged. No clearcuts may be produced.
- 2.1.3.7 Clearcut management method in the form of **group (bowl) clear cutting** is a procedure whereby stand renewal is ensured on a clear surface established inside the stand, typically of a circular shape with a diameter smaller than twice the average height of the stand logged.
- 2.1.3.8 **Edge cutting** management method in the form of **edge cutting** is a procedure whereby stand renewal is ensured near (along) the stand wall both on the outer clear surface whose width does not exceed the average height of the stand logged and in the inner area under the protection of the stand logged. In order to improve renewal conditions, the inner side of the stand is curtained to a width twice the average height of the stand logged. The element may be located either at the edge of the stand - **removal cutting**, when the renewal progress heads towards the centre of the stand, or at the centre of the stand, when the renewal progress heads away from the centre of the stand, eccentrically in several directions - **fringe cutting**.
- 2.1.3.9 Selective management method in the form of **individual selection cutting**, whereby stand renewal is ensured continuously throughout the stand; it is done as selection of individual trees.
- 2.1.3.10 Selective management method in the form of **group selection cutting**, is done as selection of whole groups of trees that are undesirable or ready to harvest; stand renewal is ensured in groups.

### 3. Forestry measures

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#### 3.1. Forest renewal

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##### 3.1.1 Planting material quality



- 3.1.1.1 Seedlings have to conform to **quality indicators** pursuant to Decree no. 44/2010 Coll., Annexes 2, 3, 4 (Annex 6 for parts of plants and cuttings of poplars), the technical standard ČSN 482115 or ČSN 464902, as applicable; see SPPK A02 001, see LČR explanatory comments on ČSN 48 2115.
- 3.1.1.2 Seedlings intended for planting must not be sprouting, have inadmissible **defects** pursuant to Decree no. 44/2010 Coll., Annex 5., technical standard ČSN 482115; see LČR explanatory comments on ČSN 48 2115.
- 3.1.1.3 Woody plant species, registration number of recognised unit, confirmation of origin number, type of source, area of origin, qualitative indicators, number of seedlings, supplier and client have to be declared by means of a **passport for planting material**; it shall be given to the client together with the planting material.

### 3.1.2 Transport and care of planting material before planting

- 3.1.2.1 The **transport** has to be done under such conditions as to prevent damage to seedlings by drying, overheating or frost. If temperature decreases below zero, or raises above 25°C, seedlings can only be dispatched with the recipient's consent.  

The root system of a bare-rooted or collected sapling has to be protected from drying within 1 hour of collection (planting, covering while in transport, storage, burying, treatment with gel preparations, etc.).
- 3.1.2.2 If plant material has to be **stored temporarily**, it has to be deposited in an adequate location after transport, protected from wind, sun, frost, drying and damage by game. The root system of seedlings has to be buried in moist sand, topsoil, peat, woodchips, compost, or covered with jute bags or mats to prevent drying and damage to root hairs. Seedlings have to be **watered** sufficiently depending on the weather and cover material used.
- 3.1.2.3 Temporary storage of bare-rooted seedlings before planting must not exceed 14 days. Any temporary **storage** has to be done **immediately after transport**.  

Seedlings with root systems treated with gel preparations have to be stored temporarily within 24 hours after transport.

Seedlings with root balls and in containers have to be stored temporarily within 48 hours after transport. Seedlings cannot be left in packaging long-term.

### 3.1.3 Area preparation

- 3.1.3.1 Removal of **weeds and self-seeded undesirable woody plant species** - mowing of the area is done using non-motorised tools or handheld motorised machines (see chapter 3.3.10).
- 3.1.3.2 Removed biomass shall be left on the site without any further modification.
- 3.1.3.3 Removal of **weeds and self-seeded undesirable woody plant species** - machinery-assisted area preparation using light suspended cutters on UKT. Mulching is done to destroy both growing weeds and brushwood and loppings

only up to the original surface level. Destruction of tree stumps (to the original surface level) is only done in the case of planned follow-up on machinery-assisted soil preparation or machinery-assisted afforestation (obstacle height).

- 3.1.3.4 **Biomass left after mulching** must not in any case exceed a layer thickness of 10 cm in the area.
- 3.1.3.5 Blanket area preparation using **herbicides** is carried out as destruction of invasive plant species (see chapter 3.4.4).

### 3.1.4 Soil preparation

- 3.1.4.1 Manual **soil preparation** for afforestation is done **at the hole** using a hoe and pickaxe in an area with min. dimensions 35x35 cm or 50x50 cm to a minimum depth of 50 cm (depending on the seedling species and RS/AG ratio; see dimensions of standard seedlings fit for planting), + 2 cm. The preparation is done max. 5 months before planting. Earth in the entire hole area has to be evenly hoed and its entire volume shall be pushed back into the hole.
- 3.1.4.2 Mechanical **soil preparation** for afforestation **at the hole** using a handheld **motor hole drill**, or hole drill carried by UKT, in an area with dimensions 35x35 cm up to minimum depth of 50 cm (depending on the seedling species and RS/AG ratio; see dimensions of standard seedlings fit for planting), + 2 cm. The preparation is done max. 5 months before planting. The entire volume of the earth shall be pushed back into the hole.
- 3.1.4.3 **Strip** mechanical **soil preparation** using a furrower carried by UKT (not a rotary device) is done over max 30% of the area being replanted.
- 3.1.4.4 On nutrient-poor soils and in cases of missing nutrients (elements) in the soil, the planting may include or be followed by **additional fertilisers**. The conditions for their use are governed by the product data sheet. Fertilisers may only be preparations included on the List of Registered Preparations and Products for Plant Protection in force for the applicable period, in accordance with Act no. 199/2012 Coll. on Medical Plant Care.

### 3.1.5 Planting procedure for bare-rooted material in holes

- 3.1.5.1 **The size** of the planting **hole**, dug manually or drilled, has to be larger than the depth and width of the seedling's root system. The minimum hole dimensions are:
- 25x25 cm - for seedlings up to 36 cm
  - 35x35 cm - for seedlings up to 70 cm
  - 50x50 cm - half-saplings, saplings

The entire volume of the hole has to be hoed to a depth depending on the seedling species and RS/AG ratio (see dimensions of standard seedlings fit for planting), + 2 cm.

- 3.1.5.2 Before planting, excessively long roots max. 6 mm thick (for seedlings above 81 cm of height the max. thickness is 10 mm) shall be **reduced by shearing off** by max. 25% of their length, pursuant to ČSN 482115. Roots reduced at the nursery

are left untreated.

- 3.1.5.3 Seedlings are **planted** during **vegetative rest**, but not into frozen soil or in freezing weather, after a major drought, during or before expected hot weather, etc.
- 3.1.5.4 The **root system** has to be spread to its original shape after insertion in the hole. Roots must not suffer deformation.
- 3.1.5.5 After backfilling the hole, the soil has to be **compacted** so that each root is in contact with soil (no air pockets) and the seedling cannot be pulled out of the hole by pulling at the terminal shoot.
- 3.1.5.6 Seedlings are planted so that the **root collar** is 3 - 4 cm below ground level; depending on water availability on the site, they may be planted up to 8 cm below ground level. Seedlings must not be planted with the root collar at or above ground level.
- 3.1.5.7 On particularly **drought-prone sites**, soil in the hole has to be covered with mulch (flipped turf, etc.), or the surface needs to be roughened to reduce water evaporation from the soil.
- 3.1.5.8 During drought and in drought-prone sites, the planting has to include or be immediately followed by a **watering**. The watering has to sufficiently and evenly saturate soil throughout the hole.
- 3.1.5.9 Water used for the watering must not be **contaminated** and has to conform to ČSN 75 7143. Its quality has to be checked periodically.
- 3.1.5.10 Planting in a layer of chipped **loppings** is inadmissible.
- 3.1.5.10 When **bringing soil in**, the same type of soil has to be used.

### 3.1.6 Planting procedure for root-balled material in holes

- 3.1.6.1 The **size** of the planting **hole** has to be adequate to the root ball so that the seedling can be inserted in the hole without any deformation to the root ball. The hole width has to be one and a half times the width of the root ball; the hole depth has to be at least 2 cm greater than the root ball depth.
- 3.1.6.2 The shape and size of the root ball is not adjusted before planting. The **root ball** has to be moist and cohesive during planting; peat-cellulose substrate must not dry up.
- 3.1.6.3 Seedlings supplied in containers can be **planted year-round**, unless the ground is frozen, in freezing weather or hot weather.
- 3.1.6.4 For seedlings in PE packaging, the packaging has to be removed without damaging or disrupting the root ball and damaging the roots. Once the root ball is inserted, the hole is backfilled with soil and gently compacted by treading to prevent air pockets. The surface of the root ball has to be covered with approx. 2 cm of soil (mulch). **Planting** with the root ball surface at or above ground level is inadmissible; the root ball must not dry up.
- 3.1.6.5 The use of **planting tubes and planting devices**(mandrel, scoop) for packaged seedlings is inadmissible.

- 3.1.6.6 In drought-prone sites, the planting has to include or be immediately followed by a **watering**. The watering has to sufficiently and evenly saturate soil throughout the hole.
- 3.1.6.7 Water used for the watering must not be **contaminated** and has to conform to ČSN 75 7143. Its quality has to be checked periodically.
- 3.1.6.8 Planting in a layer of chipped **loppings** is inadmissible.

### 3.1.7 Dual planting procedure for woody plants in holes

- 3.1.7.1 The **size** of the planting **hole**, dug manually or drilled, has to be larger than the depth and width of the seedling's root system. The minimum hole dimensions are:
  - 35x35 cm - for seedlings up to 36 cm
  - 45x45 cm - for seedlings up to 50 cm
  - 50x50 cm - for seedlings up to 70 cm

If using packaged seedlings, the hole shall conform to the dimensions in chapter 3.1.6.1 The entire volume of the hole has to be hoed to a depth depending on the seedling species and RS/AG ratio (see dimensions of standard seedlings fit for planting), + 2 cm.
- 3.1.7.2 For modification of root systems, procedure and **rules of planting**, watering, etc., see chapter 3.1.5, 3.1.6.
- 3.1.7.3 **Protective woody plants** are always planted taller than the height of the protected woody plant, namely by V2 of the height of the protected seedling, but min. 10 cm (seedling in the next height class). These seedlings are always planted simultaneously. Only coniferous woody plants are used, except MD.

### 3.1.8 Seed collection

- 3.1.8.1 **Only harmless methods** of climbing up the tree crown can be used – tree climbing equipment, Baumvelo-type climbing iron set, ladders, or scissor lift platforms.
- 3.1.8.2 **Seed collection** is done by plucking in the crown, shaking or knocking, or by collecting spontaneously fallen seeds in canvas.
- 3.1.8.3 When **climbing and moving in a tree**, as well as when shaking or knocking seeds, the living parts of the crown or trunk must not be damaged, and branches must not be broken or cut.
- 3.1.8.4 When collecting off the ground (in canvas), the soil surface must not be inadequately modified or scratched.
- 3.1.8.5 When collecting off **truck-mounted platforms**, vehicles must not travel outside forest tracks and skidding lines and inadequately damage soil surface.
- 3.1.8.6 Seeds and fruits can only be collected when they are **physiologically ripe**, dormant seeds when they are technically ripe.
- 3.1.8.7 Seeds and fruits intended for transport have to be cleaned to remove all impurities – duff, leaves, twig and bark fragments, etc.
- 3.1.8.8 Adherence to requirements of **occupational safety**, see GR no. 28/2002 Coll., **and work procedures**, see PHARE 2003 – Collection of seeds and fruits off tall

trees.

### 3.1.9 Self-seeding harvesting

- 3.1.9.1 Seedlings are **harvested** using a spade only; they are never plucked out.
- 3.1.9.2 Only seedlings of the same age (height) can be harvested; the optimum age is 2-5 years.
- 3.1.9.3 When **collecting** seedlings with a height of the aboveground portion up to 35 cm, the spade has to dig at least 15 cm deep; for aboveground height of 35 cm - 50 cm, the spade has to dig at least 20 cm deep.
- 3.1.9.4 The thickness of the **root collar** of harvested planting material has to conform to dimensions for standard plantable seedlings; see ČSN 482115.
- 3.1.9.5 After harvesting, the individual plants shall be **divided** into seedlings from light and seedlings from shade and marked for planting purposes.
- 3.1.9.6 **Root system adjustment** – mechanically damaged roots shall be reduced to approx. 10-15 cm in length for species without a taproot, and approx. 20 cm for species with a taproot.
- 3.1.9.7 Immediately after extraction, seedlings have to be **treated against drying** of the root system and transferred to the planting site; see chapter 3.1.2.

### 3.1.10 Post-production workplace adjustment

- 3.1.10.1 After the completion of works, the area must not remain littered with any **waste** in the form of packaging, used products, etc., generated in connection with implementation of measures in the forest. Everything shall be taken away and disposed of in accordance with legislation in force and instructions specified by manufacturers in manuals, data sheets, etc.
- 3.1.10.2 In the case of disruption to soil surface or damage to forest transport infrastructure in connection with the measures or associated traffic, respective **remedial action** is necessary immediately, including informing the owner thereof.

## 3.2. Protection against spruce bark beetle

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### 3.2.1 Rehabilitation by logging removing active material

- 3.2.1.1 **Rehabilitation is done** by logging using OMC or a harvester, and taking away the infected material.
- 3.2.1.2 **Logging** (see 3.5.4).
- 3.2.1.3 The infected tree has to be **taken away from the site** up to the pupal (“white rice”) stage, and must not be deposited near any risk areas. Transport of logged material (see 3.5.8, 3.5.9).
- 3.2.1.4 After the **end of measure implementation**, the area shall be left without any

trees with living spruce bark beetles and their developmental stages.

### 3.2.2 Rehabilitation of bark beetle material by bark removal

- 3.2.2.1 **Rehabilitation is done** using a OMC, harvester, felling or cutting of windfall away from the root ball and disbranching.
- 3.2.2.2 **Logging** (see 3.5.4).
- 3.2.2.3 **Barking** is done using manual barkers, handheld cutters, or a barking head mounted on a harvester; the trunk is rotated.
- 3.2.2.4 Bark and phloem have to be removed from the cut and disbranched trunk in its **entire surface** up to the living beetle stage; no leftover phloem must remain on the trunk showing eating marks and developmental stages of the bark beetle (“white beetle”).
- 3.2.2.5 In case barking is done with **hand barkers** in the period of completed development (“yellow beetle” stage), the barked material has to be disposed of (barking can be done on canvas and the barked material with remaining bark beetle can be burnt). The destruction by burning (exemption) has to proceed in accordance with legal regulations (see Act no. 133/1985).
- 3.2.2.6 After the **end of measure implementation**, the area shall be left without any trees visibly infected with spruce bark beetles and their developmental stages.

### 3.2.3 Rehabilitation of bark beetle material by bark removal from branched trees

- 3.2.3.1 **Rehabilitation is done** using a OMC, harvester, felling or cutting of windfall away from the root ball without disbranching.
- 3.2.3.2 **Logging** (see 3.5.4).
- 3.2.3.3 **Barking** is done using manual barkers or handheld cutters.
- 3.2.3.4 Bark and phloem have to be removed from the cut trunk in its **entire surface** except straight branch axils and branches as such; no leftover phloem must remain on the trunk showing eating marks and developmental stages of the bark beetle.
- 3.2.3.5 In case barking is done with **hand barkers** in the period of completed development (“yellow beetle” stage), the barked material has to be disposed of (barking can be done on canvas and the barked material with remaining bark beetle can be burnt). The destruction by burning (exemption) has to proceed in accordance with legal regulations (see Act no. 133/1985).
- 3.2.3.6 After the **end of measure implementation**, the area shall be left without any trees visibly infected with spruce bark beetles and their developmental stages.

### 3.2.4 Rehabilitation of bark beetle material by bark removal from standing trees

- 3.2.4.1 **Rehabilitation** by barking can be done using a cutter or hand barker, spurs can be used to climb the tree. Trees designated for rehabilitation shall be marked in

advance.

- 3.2.4.2 The barking is done up to the “white rice” **stage**; barking is considered ineffective at the “yellow beetle” stage.
- 3.2.4.4 **Barking** is accompanied by disbranching up to the tree apex, up to a trunk thickness of 15 cm or at least 3 - 4 m below the top. Brushwood removal is part of the measure.
- 3.2.4.5 In case barking is done with **hand barkers**, the barked material has to be disposed of (barking can be done on canvas and the barked material with remaining bark beetle can be burnt). The destruction by burning (exemption) has to proceed in accordance with legal regulations (see Act no. 133/1985).
- 3.2.4.6 After the **end of measure implementation**, the area shall be left without any untreated trees visibly infected with spruce bark beetles and their developmental stages. Only marked trees are rehabilitated.

### **3.2.5 Rehabilitation of bark beetle material by chemical spraying of disbranched trees outside small-scale SPA, 1st and 2nd zones of NP and PLA**

- 3.2.5.1 **Rehabilitation** is done on fully branched trees; safety cutting of individual branches is permissible (max. 5% of branches); spurs are permitted. Spraying can be done using manual or mechanical pressure devices. Trees designated for rehabilitation shall be marked in advance.
- 3.2.5.2 Spraying is applied in case the bark beetle development has reached the **stage** of “white rice” to “yellow beetle”.
- 3.2.5.3 The **spraying** can only use preparations from the list of registered preparations for forest protection; the active component shall always be coloured with a **marker**. When handling the insecticide and doing the spraying, any handling of the insecticide outside the treated trunk has to be ruled out.
- 3.2.5.4 The trunk has to be treated chemically **in its entire surface**, up to a trunk thickness of min. 15 cm or at least 3 - 4 m below the top; the spraying has to be visible on the trunk due to the marker colour.
- 3.2.5.5 Spraying is **not applied** during rain, fog or strong wind.
- 3.2.5.6 In a meteorological situation where the first application has reduced the bark beetle activity and development in the tree phloem, a **second spraying** shall be applied after the period of defined effectiveness of the chemical preparation or after an extreme climate event (heavy precipitation, etc.).
- 3.2.5.7 After the **end of measure implementation**, the area shall be left without any untreated trees visibly infected with spruce bark beetles and their developmental stages. All marked trees are rehabilitated.

### **3.2.6 Rehabilitation of bark beetle material by chemical spraying of disbranched trees outside small-scale SPA, 1st and 2nd zones of NP and PLA**

- 3.2.6.1 **Rehabilitation** is done using a OMC, harvester, felling or cutting of windfall away from the root ball with disbranching. Spraying can be done using manual or

mechanical pressure devices.

- 3.2.6.2 **Logging** (see 3.5.4).
- 3.2.6.3 The **spraying** can only use “Permitted Preparations” from the current list; the active component shall always be coloured with a **marker**. When handling the insecticide and doing the spraying, any handling of the insecticide outside the treated trunk has to be ruled out.
- 3.2.6.4 The cut and disbranched trunk has to be treated chemically **in its entire surface**; the spraying has to be visible on the trunk due to the marker colour.
- 3.2.6.5 Spraying is **not applied** during rain, fog or strong wind.
- 3.2.6.6 Spraying is applied in case the bark beetle development has reached the **stage** of “white rice” to “yellow beetle”.
- 3.2.6.7 In a meteorological situation where the first application has reduced the bark beetle activity and development in the tree phloem, a **second spraying** shall be applied after the period of defined effectiveness of the chemical preparation or after an extreme climate event (heavy precipitation, etc.).
- 3.2.6.8 After the **end of measure implementation**, the area shall be left without any untreated trees visibly infected with spruce bark beetles and their developmental stages.

### **3.2.7 Rehabilitation of bark beetle material by chemical spraying of disbranched trees with cutting small-scale SPA, 1st and 2nd zones of NP and PLA**

- 3.2.7.1 **Rehabilitation is done** using a OMC, felling or cutting of windfall away from the root ball. Spraying can be done using manual or mechanical pressure devices.
- 3.2.7.2 **Logging** (see 3.5.4).
- 3.2.7.3 The **spraying** can only use “Permitted Preparations” from the current list; the active component shall always be coloured with a **marker**. When handling the insecticide and doing the spraying, any handling of the insecticide outside the treated trunk has to be ruled out.
- 3.2.7.4 The cut trunk has to be treated chemically **in its entire surface** including branch axils; the spraying has to be visible on the trunk due to the marker colour.
- 3.2.7.5 Spraying is **not applied** during rain, fog or strong wind.
- 3.2.7.6 Spraying is applied in case the bark beetle development has reached the **stage** of “white rice” to “yellow beetle”.
- 3.2.7.7 In a meteorological situation where the first application has reduced the bark beetle activity and development in the tree phloem, a **second spraying** shall be applied after the period of defined effectiveness of the chemical preparation or after an extreme climate event (heavy precipitation, etc.).
- 3.2.7.8 After the **end of measure implementation**, the area shall be left without any untreated trees visibly infected with spruce bark beetles and their developmental stages.



### 3.2.8 Rehabilitation of bark beetle material by chemical spraying of disbranched trees without cutting small-scale SPA, 1st and 2nd zones of NP and PLA

- 3.2.8.1 **Rehabilitation** of windfall is done by cutting out a strip of phloem using a OMC, handheld cutter or manual barker; spraying can be done using manual or mechanical pressure devices. Trees designated for rehabilitation shall be marked in advance.
- 3.2.8.2 In windfall, **a strip of phloem is cut out** at a height of 0.5-1.0 m above root beginnings along the whole trunk circumference, at least 10 cm wide; the strip is removed from the tree. No leftover phloem may be visible on the surface of the cut-out strip.
- 3.2.8.3 The **spraying** can only use “Permitted Preparations” from the current list; the active component shall always be coloured with a **marker**. When handling the insecticide and doing the spraying, any handling of the insecticide outside the treated trunk has to be ruled out.
- 3.2.8.4 The trunk has to be treated chemically **in its entire surface** including branch axils; the spraying has to be visible on the trunk due to the marker colour.
- 3.2.8.5 Spraying is **not applied** during rain, fog or strong wind.
- 3.2.8.6 Spraying is applied in case the bark beetle development has reached the **stage** of “white rice” to “yellow beetle”.
- 3.2.8.7 In a meteorological situation where the first application has reduced the bark beetle activity and development in the tree phloem, a **second spraying** shall be applied after the period of defined effectiveness of the chemical preparation or after an extreme climate event (heavy precipitation, etc.).
- 3.2.8.8 After the **end of measure implementation**, the area shall be left without any untreated trees visibly infected with spruce bark beetles and their developmental stages. All marked trees are rehabilitated.

### 3.2.9 Ordinary trap trees

- 3.2.9.1 **Logging** is done using a OMC, felling or cutting away from the root ball of the tree or windfall identified by the contracting authority, and tree disbranching.
- 3.2.9.2 **Logging** (see 3.5.4).
- 3.2.9.3 Removed **branches** shall be put across the lying trunk along its full length to shade it.
- 3.2.9.4 The trap tree is **felled in the direction** and place specified by the contracting authority; if such assignment is not made, then always in the direction away from the stand wall into the stand, or into the more shaded area and in a way enabling damage-free removal. The trap tree is marked once felled, and registered in an inspection log (sheet).
- 3.2.9.5 **1st wave trap trees** have to be set up by 15 April at the latest; by 30 April in areas over 800 m a.s.l. The date for setting up **2nd and 3rd wave trap trees** shall be specified by the contracting authority.
- 3.2.9.6 **The material shall be taken away** from the forest stands and properly

rehabilitation by the development of the “white rice” stage. Transport of logged material (see 3.5.8, 3.5.9).

### 3.2.10 Poisoned trap trees outside small-scale SPA, 1st and 2nd zones of NP and PLA

- 3.2.10.1 **Logging** is done using a OMC, felling or cutting away from the root ball of the tree or windfall identified by the contracting authority, and tree disbranching.
- 3.2.10.2 **Logging** (see 3.5.4).
- 3.2.10.3 The trap tree is **felled in the direction** specified by the contracting authority; if such assignment is not made, then always in the direction away from the stand wall into the stand, or into the more shaded area and in a way enabling damage-free removal. The trap tree is marked once felled, and registered in an inspection log (sheet).
- 3.2.10.4 **Brushwood produced** shall be put across the lying trunk along its full length to shade it.
- 3.2.10.5 Spraying is **not applied** during rain, fog or strong wind.
- 3.2.10.6 The cut and disbranched trunk has to be treated chemically **in its entire surface**.
- 3.2.10.7 In case the trap tree is infested despite the chemical spraying and bark beetles are developing normally in it, or if the infested trap tree cannot be removed from the forest stand on time, the trap tree shall be **repeatedly chemically treated** after disbranching, in its entire surface, exclusively while the bark beetle is in the “white rice” to “yellow beetle” stages.
- 3.2.10.8 The **spraying** can only use “Permitted Preparations” from the current list; the active component shall always be coloured with a **marker**. When handling the insecticide and doing the spraying, any handling of the insecticide outside the treated trunk has to be ruled out.
- 3.2.10.9 The trap tree shall be **taken out** from the forest stand within 30 days after application of the chemical preparation, unless specified otherwise. Transport of logged material (see 3.5.8, 3.5.9).

### 3.2.11 Tripods outside small-scale SPA, 1st and 2nd zones of NP and PLA

- 3.2.11.1 The **location** of the tripod shall be specified by the contracting authority.
- 3.2.11.2 The tripod consists of **raw spruce logs** 1.5 m long and at least 15 cm thick brought to the site.
- 3.2.11.3 The three logs are fastened on the site to form a tripod (pyramid), jointed at the top with a cramp iron or nails and wire, and a **pheromone evaporator** is hung in the middle of the tripod. The evaporator type shall be specified by the contracting authority based on knowledge of the pest species.
- 3.2.11.4 The **spraying** can only use “Permitted Preparations” from the current list; the active component shall always be coloured with a **marker**. When handling the insecticide and doing the spraying, any handling of the insecticide outside the treated trunk has to be ruled out.

- 3.2.11.5 Spraying is **not applied** during rain, fog or strong wind.
- 3.2.11.6 Tripods are **installed** before the start of the pest flight activity; if taking into account the reduction of harm to populations of the ant beetle (*Thanasimus sp.*), then approx. 12 weeks after the start of the pest flight activity (*Ips typhographus*). Tripods are **maintained** throughout the pest flight activity by repeated spraying and replacement of baits (based on product effectiveness defined by the manufacturer). Re-spraying and bait replacement shall be specified by the contracting authority.
- 3.2.11.7 There shall be a **record sheet** maintained on the number, locations, dates of installation and removal of tripods.
- 3.2.11.8 The stakes used shall be **taken out** of the forest stand and rehabilitation in accordance with legislation or disposed of (see product data sheets).

### 3.2.12 Pest traps

- 3.2.12.1 **Installation** comprises location of a pest trap specified by the contracting authority in the **specified place** - ramming of stakes or stand in the ground, fastening of pest trap on wooden stakes or metal stand, followed by hanging of a pheromone evaporator by 15 April, mounting of stickers showing dates of pest trap installation and its number for the purposes of maintaining an inspection log (sheet).
- 3.2.12.2 **Pest trap inspection** is done once every ten days; it identifies the numbers of bark beetles in the reservoir using a calibrated vessel; the quantity is recorded on the sticker and in the log, the reservoir contents are completely emptied into a transport bag (except living individuals of other insect species), the tray is cleaned and inserted back into the pest trap. Everything is entered in the inspection log (sheet).
- 3.2.12.3 **Pest trap reinstallation** refers to its removal off the stake or stand and transport to a newly defined place, including transport of the stakes or racks. To be specified by the contracting authority.

### 3.2.13 Post-production workplace adjustment

- 3.2.13.1 After the completion of works, the area must not remain littered with any **waste** in the form of packaging, used products, used pheromone evaporators, etc., including poisoned baits (logs) generated in connection with implementation of measures in the forest. Everything shall be taken away and disposed of in accordance with legislation in force and instructions specified by manufacturers in manuals, data sheets, etc.
- 3.2.13.2 Open-air **storage** of products is prohibited.
- 3.2.13.3 In the case of disruption to soil surface or damage to forest transport infrastructure in connection with the measures or associated traffic, **respective remedial action** is necessary immediately, including informing the owner thereof.
- 3.2.14.3 **Rehabilitation** of forest stand areas, deposits, forest tracks, paths and footpaths (ČSN 736108), watercourses and amelioration networks, enclosures and other facilities damaged by logging and transport of wood material has to commence

immediately after the completion of logging work in the respective forest stand, and completed by the end of the following month. In areas prone to water erosion, erosion troughs have to be rehabilitated by the end of the shift following the shift during which the troughs were made.

### 3.3. Mechanical forest protection

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#### 3.3.1 Individual protection of terminal bud against browsing

- 3.3.1.1 The **terminal shoot shall be protected** by covering (wrapping) with a suitable material (e.g., sheep's wool, hurds) to a length at least 10 cm from the top, or down to the first whorl.
- 3.3.1.2 Plastic and wooden spirals shall be **fastened stably** according to the manufacturer's instructions. The protection has to protrude at least 3 cm above the terminal bud.
- 3.3.1.3 The **installation** must not damage the terminal bud and deform or throttle new shoots during sprouting. It shall be carried out on all woody plants for which it is required.

#### 3.3.2 Individual protection of seedlings against browsing - tube

- 3.3.2.1 Only use "**dismountable**" tubes (with locks).
- 3.3.2.2 **Tube installation** is done by fastening a tube to at least one oak/locust cut stake at least 5 x 3.5 cm in cross-section, or larch/pine cut stake at least 6x4 cm in cross-section. The stake shall be rammed into the ground to a depth of at least 40 cm. Fastening can also be done using healthy, fresh spruce/larch/pine logs of an adequate diameter (cross-section matches that of cut stakes), driven into the ground and barked (at least 10 cm above ground surface). The stake height after installation may be max. 5 cm lower than the tube. Both protruding ends of the ties have to remain at least 10 cm long. The stakes have to be rammed vertically and must not allow movement; they must not be split at the top or otherwise damaged. On hard, stony ground, the stakes shall be fastened into pre-made holes (e.g., using a spike) in the ground of adequate dimensions; the stakes shall be pointed at the bottom before fastening. The gap produced between a fastened stake and the protector is max. 2 cm.
- 3.3.2.3 The tube shall be attached to the stake with galvanised tying wire at least 1.0 mm in diameter approx. 20 cm above ground and approx. 20 cm under the top edge of the tube. **The wire** tie produced by a double twist shall be fastened tightly around the stake; the excessive leftover wire has to be bent (not nipped) to prevent damage to the growing tree and minimise risk. Both protruding ends of the ties have to remain at least 10 cm long.

#### 3.3.3 Individual protection of seedlings against browsing - wire mesh

- 3.3.3.1 The **minimum diameter** of wire mesh protection around the seedling is 50 cm,

and its minimum height is 120 cm.

- 3.3.3.2 The protector shall only be made of **welded** wire mesh with min. wire thickness of 1.6 mm and max. mesh size (H/W) of 5 x 14 cm.
- 3.3.3.3 The **mesh connection** shall be strong and durable, in at least 3 points for protectors up to 120 cm tall, and 4 points for protectors up to 150 cm tall. Any excessive tying wire has to be wrapped around the vertical wire of the opposite end of the mesh with at least one full coil.
- 3.3.3.4 The **seedling axis** has to be at the protector axis. The terminal shoot shall be at the centre of the protector.
- 3.3.3.5 The **wire mesh** has to be **fastened** to at least 2 stakes, and at least one of the stakes shall be the same height or higher than the wire mesh. The other stakes may be lower than the wire mesh, no more than 10 cm lower. The stakes shall be spaced evenly around the wire mesh.
- 3.3.3.6 Oak/locust **cut stake** at least 5 x 3.5 cm in cross-section, or larch/pine cut stake at least 6x4 cm in cross-section, rammed into the ground to a depth of at least 40 cm. Fastening can also be done using healthy, fresh spruce/larch/pine logs of an adequate diameter, rammed into the ground and barked (at least 10 cm above ground surface). The stake height after installation may be max. 5 cm lower than the tube. The stakes have to be rammed vertically and must not allow movement; they must not be split at the top or otherwise damaged. On hard, stony ground, the stakes shall be fastened into pre-made holes (e.g., using a spike) in the ground of adequate dimensions; the stakes shall be pointed at the bottom before fastening. The gap produced between a fastened stake and the protector is max. 2 cm.
- 3.3.3.7 The wire mesh shall be **attached** to each stake with tying wire at least 1.0 mm in diameter, approx. 20 cm above ground and approx. 20 cm under the top edge of the tube and at the middle. The **wire tie** shall be produced by a double twist, fastened tightly around the stake; the excessive leftover wire has to be bent (not nipped) to prevent damage to the growing tree and minimise risk. Both protruding ends of the ties have to remain at least 10 cm long.

### 3.3.4 Permanent individual protection of seedlings against browsing - wire mesh

- 3.3.4.1 The **minimum diameter** of wire mesh protection around the seedling is 50 cm, and its minimum height is 200 cm.
- 3.3.4.2 The protector shall only be made of **welded wire mesh** with min. wire thickness of 2 mm and max. mesh size (H/W) of 5 x 11 cm.
- 3.3.4.3 The **mesh connection** shall be strong and durable, the tie distance max. 30 cm. Any excessive tying wire has to be wrapped around the vertical wire of the opposite end of the mesh with at least one full coil.
- 3.3.4.4 The **seedling axis** has to be at the protector axis. The terminal shoot shall be at the centre of the protector.
- 3.3.4.5 The protectors shall be fastened using **cut stakes** of oak/locust at least 5 x 3.5 cm in cross-section, of larch/pine at least 6x4 cm in cross-section, rammed into the ground to a depth of at least 40 cm. The stakes shall be rammed vertically and must not allow movement. The fastened stakes must not be split at the top or

otherwise damaged. On hard, stony ground, the stakes shall be fastened into pre-made holes (e.g., using a spike) in the ground of adequate dimensions; the stakes shall be pointed at the bottom before fastening. The gap produced between a fastened stake and the protector is max. 2 cm.

- 3.3.4.6 The wire mesh has to be **fastened to at least 2 stakes** and at least one of the stakes shall be the same height or higher than the wire mesh. The other stakes may be lower than the protector, no more than 10 cm lower. The stakes shall be spaced evenly around the protector circumference.
- 3.3.4.7 After the end of the stake lifetime, the protection can be **fastened with a fabric tie** to a protected tree, but only if it has a min. thickness at the top edge of the wire of 5 cm. Otherwise, the stakes have to be replaced.
- 3.3.4.8 The wire mesh shall be **attached** to each stake with tying wire at least 1.0 mm in diameter, approx. 20 cm above ground and approx. 20 cm under the top edge of the tube and at the middle. The **wire tie** shall be produced by a double twist, fastened tightly around the stake; the excessive leftover wire has to be bent (not nipped) to prevent damage to the growing tree and minimise risk. Both protruding ends of the ties have to remain at least 10 cm long.
- 3.3.4.9 If installing protectors on broadleaf woody plants exceeding the protector height, the trunk has to be attached at the top of the protector with **three ties** fastened to the protector circumference. Only **string or fabric ties** with declared resistance to **UV** radiation can be used, the min. tie thickness is 3 mm. The tie has to have a sufficient reserve for the trunk growth, approx. 5 cm.

### 3.3.5 Individual protection of seedlings against browsing - wooden enclosures

- 3.3.5.1 The **minimum diameter** of the protection around the individual is 50 cm.
- 3.3.5.2 Enclosures are built with a min. **height** of 160 cm as “low”, and above 160 cm as “high”.
- 3.3.5.3 Enclosures shall be **fastened with stakes** at the corners (min. 3 points) to a depth of at least 40 cm.
- 3.3.5.4 The material used for the corner stakes shall be **min. diameter** of 10 cm for “low” and 12 cm for “high” enclosures”. The stakes must not be split at the top or otherwise damaged; on hard, stony ground, the stakes shall be fastened into pre-made holes in the ground of adequate dimensions. The stakes shall be pointed at the bottom before fastening, and barked up to 20 cm above ground. They shall only be made of fresh material without signs of rot; the part driven into the ground shall be seared or primed with a suitable product, extending 10 cm above ground surface. Stakes can be treated only using preparation from the list of registered preparations for forest protection.
- 3.3.5.5 The min. cross-section of **slats** is 5 x 1.5 cm for “low” and 6x2 cm for “high” enclosures; transverse components 5 x 2.5 cm, max. gaps between slats 7 cm. The slats shall be fastened by the transverse components to the stakes with tying wire at least 1.0 mm in diameter or nailed to each stake in at least two points, approx. 20 cm above ground and approx. 20 cm under the top edge of the protection.
- 3.3.5.6 The **wire tie** shall be produced by a double twist, fastened tightly around the stake; the excessive leftover wire has to be bent (not nipped). Both protruding

ends of the ties shall be at least 10 cm long and bent so as not to damage the growing tree and minimise the risk of injury to game and persons, but not nipped. The stakes shall be at least the same height as the protection.

- 3.3.5.7 The **seedling axis** has to be at the protector axis. The terminal shoot shall be at the centre of the protector.

### 3.3.6 Individual protection of seedlings against browsing - wooden casing

- 3.3.6.1 The **minimum diameter** of the protection around an individual is 100 cm; i.e., the minimum distance of the protection axis is 50 cm at each point of the protection circumference.
- 3.3.6.2 The protection is built with a minimum **height** of 180 cm.
- 3.3.6.3 The protection shall be **fastened with stakes** at the corners (min. 3 points) to a depth of at least 50 cm.
- 3.3.6.4 Material used for the **corner stakes** has to be at least 15 cm in diameter. The fastened stakes must not be split at the top or otherwise damaged; the stakes shall always be fastened into pre-made holes in the ground of adequate dimensions. The stakes shall be pointed at the bottom before fastening, and barked up to 20 cm above ground. They shall only be made of fresh material without signs of rot; the part driven into the ground shall be seared or primed with a suitable product, extending 10 cm above ground surface. Stakes can be treated only using preparation from the list of registered preparations for forest protection. The fastened stakes must not allow movement.
- 3.3.6.5 The minimum cross-section of **slats** is 6 x 2.5 cm with max. gaps between slats 7 cm. The slats shall be fastened to the stakes with tying wire at least 2 mm in diameter, to each stake in at least three points, approx. 20 cm above ground and approx. 20 cm under the top edge of the protection.
- 3.3.6.6 The **wire tie** shall be produced by a double twist of tying wire at least 1.5 mm in diameter, fastened tightly around the stake; the excessive leftover wire has to be bent down (not nipped). Both protruding ends of the ties shall be at least 10 cm long and bent so as not to damage the growing tree and minimise the risk of injury to game and persons, but not nipped. The stakes shall be the same height as the protection.
- 3.3.6.7 The **seedling axis** has to be at the protector axis. The terminal shoot shall be at the centre of the protector.

### 3.3.7 Individual protection of trunk with mesh against game - gnawing, barking

- 3.3.7.1 The protection shall be made of **forestry wire mesh**.
- 3.3.7.2 The trunk protection is installed in the **extent** of 150 cm, approx. 50 cm above soil surface up to at least 200 cm above ground. The height down the slope is considered in sloping areas.
- 3.3.7.3 The wire mesh shall be **connected** with wire at least 1.0 mm in diameter so that the ties are not more than 25 cm apart; the wire mesh joint has to have **at least 10 cm of overlap**. The ties have to be twisted twice with loose ends at least 5 cm

long, bent inwards to minimise the risk of injury.

- 3.3.7.4 The wire mesh has to be tightened around the trunk to prevent its spontaneous movement, while preventing any restriction on the trunk growth (distance between wire mesh and trunk approx. 5 cm).

### 3.3.8 Individual protection of trunk with wraps against game - gnawing, barking

- 3.3.8.1 The protection is made using **own branches** growing on the trunk, or brushwood produced by logging. Obtaining brushwood from standing trees for this purpose is impermissible.
- 3.3.8.2 The trunk protection is installed in the **extent** of 150 cm, approx. 50 cm above soil surface up to at least 200 cm above ground. The height down the slope is considered in sloping areas.
- 3.3.8.3 The wrap made of bent branches shall be fastened to the trunk using solid plastic string at 2 height levels; wrap made of brushwood at 3 height levels. Branches and brushwood in the wrap shall be fastened so that a strong pull cannot **release them from the wrap**.
- 3.3.8.4 The wrap shall be fastened up to 30 cm from the bottom end of the branches.
- 3.3.8.5 The wrap shall be fastened to the trunk leaving sufficient reserve of the string for the trunk growth (approx. 5 cm).
- 3.3.8.6 The string thickness has to be at least 3 mm, and it has to be resistant to **UV** radiation.

### 3.3.9 Group protection against damage by game - enclosures

- 3.3.9.1 Enclosures can be built using **wood** of spruce, pine, larch, oak, locust, and ash.
- 3.3.9.2 **The wood** must not show any signs of rot. If using spruce or pine wood, it has to be fresh.
- 3.3.9.3 **Diameters** of the wooden sticks and stakes are measured **without bark** at the thinner end; the width of sawn wood is measured at the thinnest point without bark.
- 3.3.9.4 **Bottoms of posts** have to be barked, extending 10 cm beyond the post section in the ground.
- 3.3.9.5 **Each post** has to be **embedded firmly**. The whole for each post has to be pre-made (dug, drilled). Ramming of posts and load-bearing elements is permissible on non-bearing soils (very moist and waterlogged soils, sands, gravels, peat, etc.) and soils of disconnectivity class 1 and 2.
- 3.3.9.6 The **wooden post length** depends on the enclosure type. On steep slopes, the height is increased adequately so that the embedded posts reach the height of the top enclosure wire.
- 3.3.9.7 The bottoms of **braces** shall be **embedded** in the ground so as to prevent any movement, or nailed to a wooden peg of the same diameter rammed in the



ground, or to a tree stump.

- 3.3.9.8 **Braces** are **fastened** at 2/3 of stake height, with fronts cut obliquely so that the cut surface fits against the stake. In each direction change point, braces shall be attached to stakes in the direction against the wire mesh traction.
- 3.3.9.9 **Length of structural nails** shall be twice the diameter of the material nailed. Nail heads have to be hammered flush and any protruding spikes bent toward the wooden part of the enclosure.
- 3.3.9.10 The **wire mesh** is fastened using **nails** at least 80 mm long. The nails have to be hammered approx. 40 mm deep. Protruding heads of nails hammered in the upper half of the mesh height shall be bent up; in the bottom half, bent down.
- 3.3.9.11 Each enclosure shall include construction of a two-sided **ladder** (A-shaped) or agate. Enclosures up to 120 m long shall have one ladder or gate; above 120 m long, two, each one in the opposite corner or on the opposite side of the enclosure.
- 3.3.9.12 The ladder legs are identical to **post parameters**, rungs are identical to brace parameters. The ladder shall be fastened to enclosure posts with nails.
- 3.3.9.13 The **construction of wire enclosures** shall only use **special forestry knotted wire mesh** with a surface finish (steel wire galvanized at least once, min 70 g/m<sup>2</sup>, wire jointed with knots). Only wire mesh that is an effective protection against small game shall be used (denser horizontal wires at the bottom). For low enclosures up to 160 cm, the minimum number of horizontal wires is 15, min. diameter is 2 mm for guide wires and 1.6 mm for other wires; for high enclosures (180 cm or more), the min. diameter is 2.2 mm for guide wires and 1,8 mm for other wires, the minimum number of horizontal wires is 19 for 180 cm and 22 for 200 cm. The only exception is the wire mesh used for OP4 (see Annex 1, Enclosure models). The wire mesh shall be tightened on the outside of the post, the large meshing facing upwards; the meshing is finer and denser towards the ground. The wire mesh shall be nailed to the posts by the top and bottom guide wires, evenly across the full height of the post, with 5 nails per post (wire mesh up to 180 cm high) or 6 nails (wire mesh above 180 cm). Ground unevenness shall be levelled in advance so that there is not gap passable for game between them ground and the bottom of the wire mesh. The bottom guide wire shall be fastened to the ground as described for each enclosure type (see Annex 1). In the case of reinforced enclosure bottom, a bottom boom shall be fastened to the bottom guide wire, at least 7 cm in diameter; it is nailed along the full length of each bay.
- 3.3.9.14 Definition of **structural elements** of enclosures for the purposes of this standard

<b>Category</b>	<b>Purpose</b>	<b>Elements</b>
Load-bearing elements	Support functional elements	stakes, load-bearing booms, posts and braces
Functional elements	Perform actual purpose of enclosure	wire mesh, booms, fence laths
Reinforcement elements	Reinforce functional elements	cross booms, central posts, wire
Stabilisation elements	Provide stability for enclosure structure	braces

3.3.9.15 **Enclosure models** (see Annex 1).

### 3.3.10 Weed mowing

- 3.3.10.1 **Mowing** of weeds **involves** removal of herbaceous vegetation and undesirable woody plants up to 1 cm thick at the ground level.
- 3.3.10.2 Mown material shall **remain on site**. It shall be spread over the area so as not to prevent growth of treated trees, cause deformation of tumbling of trees.
- 3.3.10.3 In **mowing in patches**, the mowing is done around a tree on all sides to the distance equalling the height of the surrounding weeds, to prevent tumbling of the seedling.
- 3.3.10.4 In **mowing in strips**, weeds are removed from the whole strip, and unmown strips areas far from the trees as is the height of the surrounding weeds, to prevent tumbling of the seedling.
- 3.3.10.5 The height of the **stubble** shall be no more than one third of the tree height.
- 3.3.10.6 Mowing must not result in **damage** to the tree trunk.
- 3.3.10.7 Mowing has to be **carried out** by the end of September.

### 3.3.11 Dismantling of enclosures or individual protection

- 3.3.11.1 **Wire mesh** left after dismantling of enclosures or individual protection has to be **separated** from wooden components (posts, braces).
- 3.3.11.2 **All metal and plastic parts**, as well as any wooden parts that cannot be left in the forest stand, have to be taken out of the forest stand and disposed of in accordance with legislation in force.
- 3.3.11.3 **Wooden parts** shall be piled in places where they can safely decompose. Nails shall be removed, or their spikes shall be safely bent to prevent injury.
- 3.3.11.4 The dismantling must not lead to **damage to woody plants and cultivates** in the forest stand. Defined transport lines must not suffer inadequate tree damage.

### 3.3.12 Post-production workplace adjustment

- 3.3.12.1 After the completion of works, the area must not remain littered with any **waste** generated in connection with implementation of measures in the forest. Waste has to be taken away and disposed of in accordance with legislation in force.
- 3.3.12.2 In the case of disruption to soil surface, damage to enclosures and individual protection devices, damage to forest transport infrastructure, damage to trunks of standing trees in connection with the measures or associated traffic, respective **remedial action** is necessary immediately, including informing the owner thereof.

### 3.4. Forest protection - use of chemical preparations in forest protection

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#### 3.4.1 Use of preparations

- 3.4.1.1 Implementation of measures may only use **preparations** that are included on the list of registered preparations for forest protection.
- 3.4.1.2 Use, dilution, application methods and conditions, transport, temporary storage of chemical preparations and their leftovers, etc., in connection with any measures shall proceed **in accordance with requirements of manuals of data sheets** for the preparation and requirements pursuant to applicable legislation for the activity or area in question.

#### 3.4.2 Protection of seedlings against browsing using repellents

- 3.4.2.1 **Coating** is done at the beginning of the vegetative rest, by 30 November at the latest as **winter coating**, and immediately after full foliation and maturing of annual shoots as **summer coating**.
- 3.4.2.2 The repellent product shall be applied to the whole **terminal shoot**, including the bud; to the last whorl of coniferous seedlings as well. **The functionality and durability of the coating after the product application** has to be guaranteed for the whole time until the following treatment, i.e., at least until 31 March of the following year for winter coating.
- 3.4.2.3 If using colourless products, e.g., when dipping entire bundles before planting for seedling protection against browsing, sufficient application of the product to seedlings at the centre of the bundle has to be ensured. **Colourless products** require the **addition** of appropriate colourants for inspection purposes.
- 3.4.2.4 All required seedlings **have to be coated sufficiently**.
- 3.4.2.5 The application must not **damage** the terminal bud and break or otherwise damage the terminal shoot.
- 3.4.2.6 If using **scent repellents and fences**, the max. clear distance according to the manufacturer's instructions and circumstances has to be observed so as to ensure the impassability of the cordon. This does not apply to point protection.

#### 3.4.3 Protection of woody plants against barking/gnawing

- 3.4.3.1 The **product has to be applied** evenly to the entire surface of the treated trunk at its bottom, but at least up to 150 cm above ground; from 50 cm to 200 cm above ground across the entire trunk surface to repel deer game. **The functionality and durability of the coating after the product application** has to be guaranteed for the whole required time.
- 3.4.3.2 **All the trees** marked in an area have to be treated.

#### 3.4.4 Blanket destruction of invasive and expansive plants using herbicides

- 3.4.4.1 The **prerequisite** for blanket application of a chemical preparation by spraying is 80-100% coverage of the area with invasive and expansive plants. It can be done only using mechanical sprayers, either back-mounted or handheld. Motorised sprayers must not be used. The application must not endanger specially protected species.
- 3.4.4.2 The application is to foliage, and a harmless colourant shall be added for inspection purposes. If drying and **defoliation** of all the sprayed plants does not occur within 3 weeks after the application, the intervention shall be repeated.
- 3.4.4.3 Application of preparations shall be done **in the growing season from March to September**. Application must not be done in strong wind, on wet foliage after rain, and at least three hours before rain.
- 3.4.4.4 The application has to result in a **90% coverage** of the foliage surface.
- 3.4.4.5 Dead matter produced by the intervention has to be **removed** from the area before the next growing season. The material removal date has to correspond to the product effect time, within 1 month after the application.

### 3.4.5 Point destruction of invasive and expansive plants using herbicides

- 3.4.5.1 **Application** of the product has to be done on the entire cut surface immediately after cutting off the trunk (within 20 minutes at the latest in justified cases). Vegetation around the coating site must not be stained.
- 3.4.5.2 **Application shall be done in August-September**, at least three hours before rain. If the deadline is missed, the stumps have to be cut down again and herbicide shall be applied again.
- 3.4.5.3 The application shall use 50 - 60% **concentration** of the product. Solution application has to include a harmless colourant for inspection purposes.

### 3.4.6 Post-production workplace adjustment

- 3.4.6.1 All **waste** generated in connection with implementation of measures in forests has to be taken away from the area immediately after the completion of works and disposed of in accordance with legislation in force, manuals and data sheets.
- 3.4.6.2 In the case of disruption to soil surface, damage to forest transport infrastructure, damage to trunks of standing trees in connection with the measures or associated traffic, **respective remedial action** is necessary immediately, including informing the owner thereof (see 3.5.11).

## 3.5. Forest logging – management, pruning, harvest logging

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### 3.5.1 Shear and pluck thinning

- 3.5.1.1 **Carried out** manually using motor/non-motor handheld tools. String trimmers can be used in justified cases.

- 3.5.1.2 **Cut material** shall be left on site so that it does not cause tumbling of growing woody plants or lie on top of them.

### 3.5.2 Cut thinning

- 3.5.2.1 **Carried out** using OMC or string trimmers with biodegradable lubricants (oils).
- 3.5.2.2 All the **marked** individuals shall be removed from the area. The resulting stand structure after the intervention has to match the structure (cultivation plan, number and quality of individuals left) of the pre-made **model** (teaching) **areas**. **Boundaries** of model areas and intervention areas **are marked** on the outermost trees with a horizontal stripe. These trees shall **remain** on site after completion of work for inspection of the entire intervention area.
- 3.5.2.3 After cut thinning (felling) completion, material shall be pulled to the ground and cut (sliced) into sections; **thin-growth material** shall **remain on site**. Cut trees shall lie on the ground with their entire length and be sliced into sections no longer than 3 m for broadleaf and 2 m for coniferous trees, and **disbranched** if necessary.
- 3.5.2.4 In the case of forest stand **restoration**, all cut material shall be removed from the area or cleared away (see 3.5.10).
- 3.5.2.5 **The cut** of the stump shall be horizontal or at an obtuse angle; acute angles are inadmissible. The maximum stump height is 15 cm.
- 3.5.2.6 In the case of **disbranching** of standing trees, the bark on the trunk must not be damaged. Damaged trees shall be treated (see 3.5.11.5).

### 3.5.3 Juvenile thinning

- 3.5.3.1 Juvenile logging is **carried out** using OMC, or in justified cases (see 3.5.3.2) using a harvester with biodegradable lubricants (oils).
- 3.5.3.2 Logging using **tree harvesters** is carried out during extensive random logging (calamity) and in continuous homogenous forest stands with an adequate stock. The soil surface and standing trees must not be excessively damaged. Vehicle travel is only permissible on frozen ground and over snow cover, or on existing or specifically designated lines that employ all options for reducing tyre pressure on soil surface (brushwood, tyre type, number of axles, etc.), but outside moist and waterlogged areas.
- Only biodegradable lubricants and hydraulic fluids can be used.
- 3.5.3.3 It is necessary to remove all **marked** individuals. **Boundaries** of intervention area shall be **marked** on the outermost trees with a horizontal stripe. These trees shall **remain** on site.
- 3.5.3.4 The felling concerns thick-growth wood, including **disbranching and cutting** (slicing) of **material** to required sections; the maximum trunk diameter of the tip left is 7.0 cm. **Thin-growth material** produced by the logging as well as material that died naturally in the course of the stand development (to the extent of safety wood volume for leaving in stands pursuant to Section 32 of the Forest Act) shall **remain on site**; it has to lie on the ground with its entire length and be sliced into

sections no longer than 3 m for broadleaf and 2 m for coniferous trees.

- 3.5.3.5 **The cut** of the stump shall be horizontal or at an obtuse angle; acute angles are inadmissible. The maximum permissible stump height is 30 cm above ground surface, measured at the top on slopes.
- 3.5.3.6 Felling and subsequent handling must not lead to inadequate **damage to standing trees**. Damaged trees shall be treated (see 3.5.11.5).
- 3.5.3.7 In the case of **disbranching** of standing trees, the bark on the trunk must not be damaged. Living branches must not be removed, including damage and removal of natural seedage.

#### 3.5.4 Harvest logging

- 3.5.4.1 Harvest logging is **carried out** using OMC, or in justified cases (see 3.5.4.2) using a harvester with biodegradable lubricants (oils).
- 3.5.4.2 Logging using **tree harvesters is carried out** in extensive random logging (calamity) or in continuous homogenous stands (including curtain or selective logging) and if using clear or edge cutting techniques. The soil surface and standing trees must not be excessively damaged. Vehicle travel is only permissible on frozen ground and over snow cover, or on existing or specifically designated lines that employ all options for reducing tyre pressure on soil surface (brushwood, tyre type, number of axles, etc.), but outside moist and waterlogged areas.  
Only biodegradable lubricants and hydraulic fluids can be used.
- 3.5.4.3 The felling concerns thick-growth wood, including **disbranching and cutting** (slicing) of **material** to required sections; the maximum trunk diameter of the tip left is 7.0 cm. **Thin-growth material** produced by the logging as well as material that died naturally in the course of the stand development (to the extent of safety wood volume for leaving in stands pursuant to Section 32 of the Forest Act) shall **remain on site**; it has to lie on the ground with its entire length and be sliced into sections no longer than 3 m for broadleaf and 2 m for coniferous trees.
- 3.5.4.4 It is necessary to remove all **marked** individuals. **Boundaries** of intervention area shall be **marked** on the outermost trees with a horizontal stripe. These trees shall **remain** on site.
- 3.5.4.5 **The cut** of the stump shall be horizontal or at an obtuse angle; acute angles are inadmissible. The maximum stump height is 30 cm.
- 3.5.4.6 Felling and subsequent handling must not lead to inadequate **damage to standing trees**. Damaged trees shall be treated (see 3.5.11.5).

#### 3.5.5 Establishment of osieries and willow beds from maturing stands

- 3.5.5.1 When **establishing a willow bed** with round-headed willows, the trunks with the terminal apex shall be cut at the **height as requested or identified** by the contracting authority.
- 3.5.5.2 When **establishing an osiery**, the trunks shall be cut at the height of max. 50 cm.

- 3.5.5.3 The **establishment cuts** shall be made in accordance with SPPK A 02 002 – Pruning of trees.

### 3.5.6 Establishment of osieries and willow beds from cuttings and seedlings

- 3.5.6.1 **Establishment** of an osiery from seedlings is done by planting (see 3.1.5).
- 3.5.6.2 **Establishment** of an osiery from winter branch cuttings is done in early spring after freezing days (by March); they shall be planted vertically in the ground using a dibber so that the top bud is at the ground level in moist areas without weeds.

### 3.5.7 Pruning of osieries and maintenance of willow beds

- 3.5.7.1 **Pruning** to head is done in accordance with SPPK A 02 002 – Pruning of trees.

### 3.5.8 Timber removal

- 3.5.8.1 The entire operation involves fastening and transport of material from the site P (stump) outside of tracks, all the way to the **skidding line or track** - the site VM (export site), unfastening, including temporary stacking on piles, bundles, etc. If using a harvester, removal proceed simultaneously with logging (see 3.5.3, 3.5.4).
- 3.5.8.2 All the **logged** (contracted) **timber over 7 cm in diameter** at the thin end of the trunk (thick-grown wood) shall be transported out of the stand logged.
- 3.5.8.3 **Technologies used:**
- after cut thinning - manually, horse, rope on UKT and SLKT,
  - after juvenile thinning, in restoration logging mostly using the undergrowth and selective management methods, in hollow cuts, etc., horse, rope on UKT and SLKT, iron horse, rope systems - removal is connected with skidding operation (see 3.5.9).
- 3.5.8.4 **Timber transport** has to be as **considerate** as possible to standing trees, self-seedlings, cultivates and soil surface. Damaged trees shall be treated (see 3.5.11.5).
- 3.5.8.5 Machinery and equipment used for timber transport have to use **biodegradable** lubricants and hydraulic fluids.
- 3.5.8.6 If using **rope systems**, ropes and directional pulleys must not be tied to living standing trees without adequate padding; trees must not be used as pulleys.
- 3.5.8.7 Standing trees must not be used as ends for **temporary timber storage**.

### 3.5.9 Timber skidding

- 3.5.9.1 Involves fastening or loading and transport of material from the site VM (export site) exclusive down a **skidding line or track** - to the site OM (departure site), including unfastening or unloading and storage in a deposit.
- 3.5.9.2 **All the wood** removed from stands is transported. If combined with removal, all the wood **logged**(contracted) **over 7 cm in diameter** at the thin end of the trunk

(thick-grown wood).

3.5.9.3 **Technologies used:**

- horse,
- semitrailed by UKT,
- semitrailed by SLKT,
- exporting rig,
- rope systems - skidding is most commonly combined with timber removal (see 3.5.9).

3.5.9.4 **Timber transport** has to be as **considerate** as possible to standing trees, self-seedlings, cultivates and soil surface, forest transport network and facilities, and the timber transported. Damaged trees shall be treated (see 3.5.11.5).

3.5.9.5 Machinery and equipment used for timber transport have to use **biodegradable** lubricants and hydraulic fluids.

3.5.9.6 If using **rope systems**, ropes and directional pulleys must not be tied to living standing trees without adequate padding; trees must not be used as pulleys.

3.5.9.7 Standing trees must not be used as ends for **timber storage**.

### 3.5.10 Clearing of brushwood and loppings

3.5.10.1 **Storage of brushwood and loppings into piles or strips** with a maximum width (base diameter) of 3 m, parallel to existing and planned skidding lines in the stand. The piles or strips shall be distributed in the area so as to prevent exclusion of parts of the area from restoration. The piles or stripes must not be located in areas with existing restoring woody plants (self-seedage or cultivates). The continuous length of a strip must not be longer than 50 m.

3.5.10.2 When **spreading brushwood** and loppings across the stand, no part of the brushwood may be in multiple layers, i.e., preventing ability of woody plants to regenerate and grow. All spread brushwood has to be in contact with soil surface.

3.5.10.3 When **chipping loppings** and leaving them in the area, the defined principles have to be observed (see 3.1.3).

3.5.10.4 Brushwood and loppings must not be left and stored in the immediate proximity of forest tracks, OM, paths, ditches and watercourses.

### 3.5.11 Post-production workplace adjustment

3.5.11.1 After the completion of works, the area must not remain littered with any **waste** (packaging, used products, etc.) generated in connection with implementation of measures in the forest.

3.5.11.2 In the case of disruption to soil surface or damage to forest transport infrastructure in connection with the measures or associated traffic, **respective remedial action** is necessary immediately, including informing the owner thereof.

3.5.11.3 **Rehabilitation** of forest stand areas, deposits, forest tracks, paths and footpaths



(ČSN 736108), watercourses and amelioration networks, enclosures and other facilities damaged by logging and transport of wood material has to commence immediately after the completion of logging work in the respective forest stand, and completed by the end of the following month. In areas prone to water erosion, erosion troughs have to be rehabilitated by the end of the shift following the shift during which the troughs were made.

- 3.5.11.4 **Passability of forest tracks** and flow capacity of watercourses and amelioration networks have to be ensured by the end of the work shift.
- 3.5.11.5 **Damaged standing trees** (scraped trunks) have to be treated with an appropriate preparation (see 3.4.1) by the end of the work shift between 1 March and 30 November; within 7 days otherwise.
- 3.5.11.6 Any **blowdowns**, half-blowdowns and hanging trees resulting from a logging intervention have to be removed preferably within the work shift; if all available resources are spent, then during the next work shift at the latest.
- 3.5.11.7 If an **enclosure is damaged**, at least a makeshift repair preventing entry of game into the enclosure has to be made by the end of the work shift; after completion of works, the makeshift repair has to be replaced with a durable repair and restoration of the original condition within two calendar days.

## 3.6. Low and medium forest

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### 3.6.1 Coppicing in low and medium forest

- 3.6.1.1 **Carried out** using OMC, hand saw or string trimmer.
- 3.6.1.2 The harvesting has to be done so that the stump is as low as possible with a **smooth oblique cut** surface without any grooves. Bark must not be damaged during the harvest.
- 3.6.1.3 Trees that do not measure 10 cm at breast height during the harvest shall be cut immediately at the ground; thicker trees at 10-20 cm at breast height shall be cut so that the **stump height** is up to 5 cm. The stump left after trees in excess of 20 cm at breast height shall be up to 10 cm high.
- 3.6.1.4 The **stump height** for woody plants sprouting from roots **is not defined**. However, it must not exceed 30 cm above ground.
- 3.6.1.5 Coppicing is done in low forest exclusively during **vegetative rest**, ideally in early spring, but no later than 28 February.

### 3.6.2 Renewal cutting of leave-tree layer of medium forest

- 3.6.2.1 Intervention carried out using OMC.
- 3.6.2.2 **The cut** shall be smooth, oblique, without any acute angles in the cut surface (see 3.5.4).
- 3.6.2.3 **Logging** for wood (see 3.5.4).

### 3.6.3 Pruning of medium forest

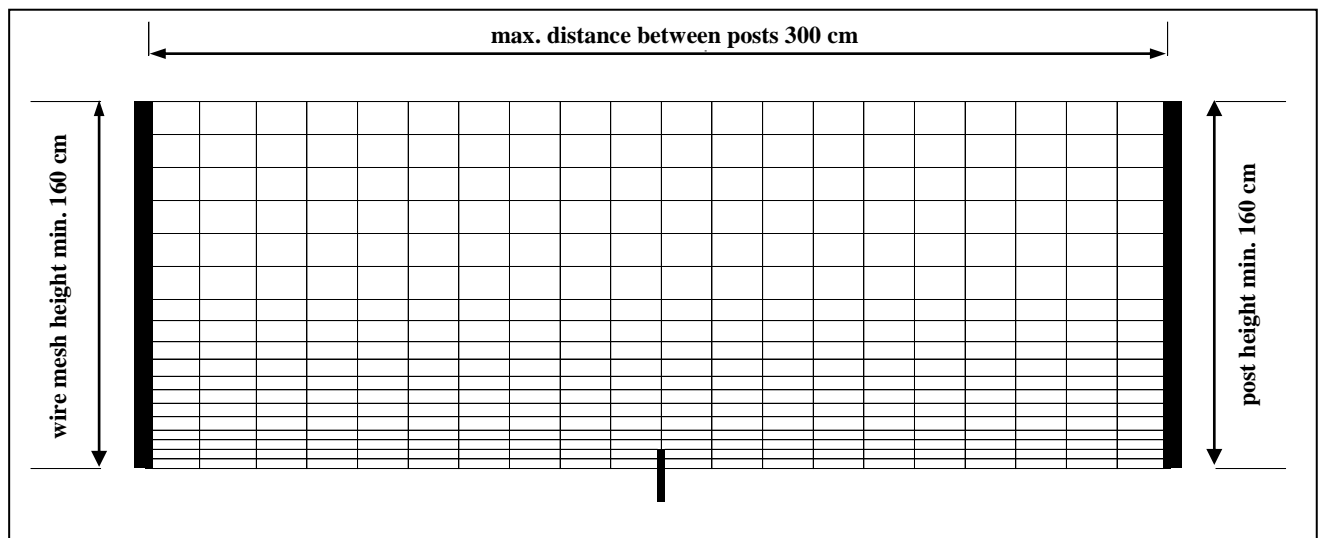
- 3.6.3.1 Thinning (**shear or cut thinning**) shall be carried out as negative medical selection with removal of all damaged or infected individuals (see 3.5.1, 3.5.2).
- 3.6.3.2 **Juvenile pruning** shall be carried out as positive selection; it has to relieve future leave-trees (so-called saplings; see 3.5.3); this is accompanied by pruning of **trunk shoots** (suckers). After the intervention, all the future leave-trees shall have an absolutely **free crown**; they have to be relieved by felling all the trees in their immediate vicinity.
- 3.6.3.3 **Disbranching** of leave-trees, i.e., reduction to trunk shoots. Disbranching has to be done up to a sucker thickness of 2 cm, up to a min. height of 6 m. These shoots are removed in early spring together during leave-tree harvest.

**Annexes:****Annex 1: Enclosure models****OP 1 Low wire 160/3**

Height: min. 160 cm, bay length: max. 300 cm.

The wire mesh is fastened to stakes embedded in the ground by the thicker end, to a min. depth of 40 cm. In each direction change point, stakes shall have wind bracing in the direction against the wire mesh traction; otherwise, every third stake shall have wind bracing at 2/3 of its height at a min. angle of 45°. The bottom edge of the wire mesh is firmly fastened to the ground with a peg (or peg and nail) at the middle of each bay.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. diameter</i>	<i>Min. width (halved)</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>stakes</i>	<i>round wood</i>	<i>10 cm</i>	-	<i>200 cm</i>
<i>functional</i>	<i>wire mesh</i>	<i>160 cm</i>	-	-	-
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>7 cm</i>	-	<i>160 cm</i>
		<i>halved round wood</i>	-	<i>9 cm</i>	-

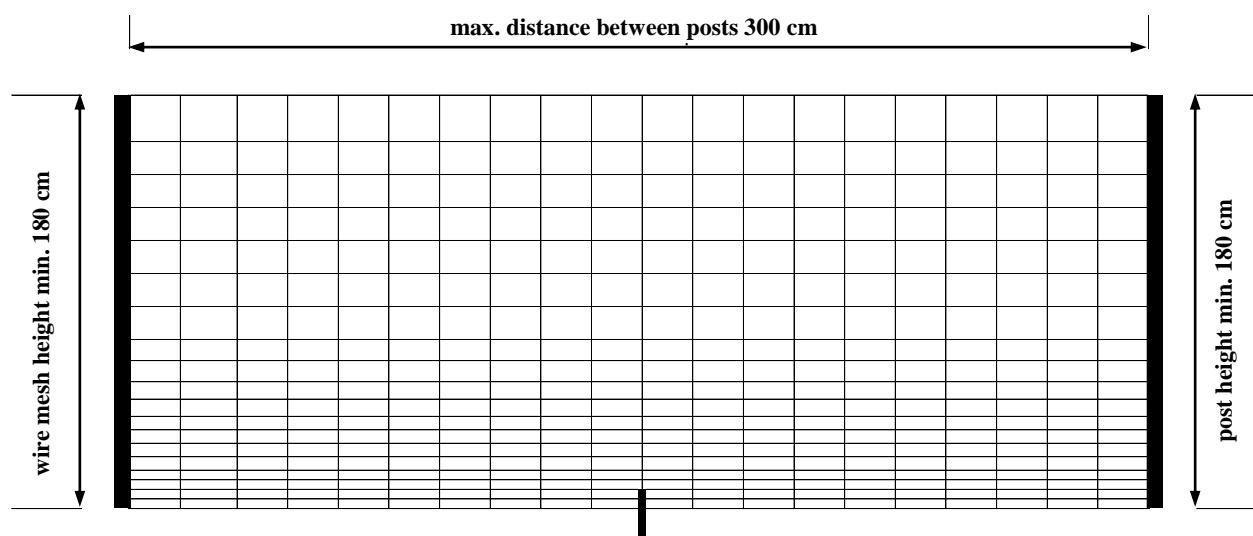


**OP 2 High wire 180/3**

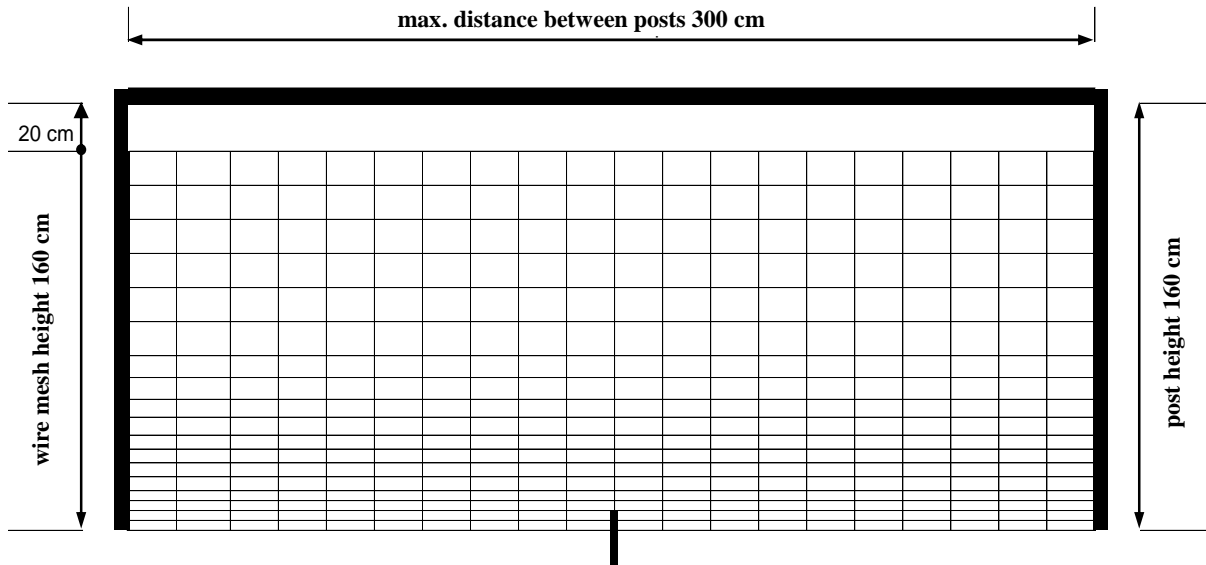
Height: 180 cm, bay length: max. 300 cm.

The wire mesh is fastened to stakes embedded in the ground by the thicker end, to a min. depth of 50 cm. In each direction change point, stakes shall have wind bracing in the direction against the wire mesh traction; otherwise, every third stake shall have wind bracing at 2/3 of its height at a min. angle of 45°. A permissible option is to use 160 cm wire mesh with a top boom at 180 cm; in this case, the wire mesh shall always be tied to the boom at 1/3 from the end of the bay with galvanized tying wire at least 1.6 mm in diameter. The top boom is nailed to stakes from above. The bottom edge of the wire mesh is firmly fastened to the ground with a peg (or peg and nail) at the middle of each bay.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. diameter</i>	<i>Min. width (halved)</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>stakes</i>	<i>round wood</i>	<i>12 cm</i>	-	<i>230 cm</i>
<i>functional</i>	<i>wire mesh</i>	<i>180 (160) cm</i>	-	-	-
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>7 cm</i>	-	<i>175 cm</i>
		<i>halved round wood</i>	-	<i>9 cm</i>	-
<i>functional</i>	<i>top boom</i>	<i>round wood</i>	<i>9 cm</i>		-
		<i>halved round wood</i>	-	<i>10 cm</i>	<i>300 cm</i>



**OP 2 High wire 180/3 version with boom**



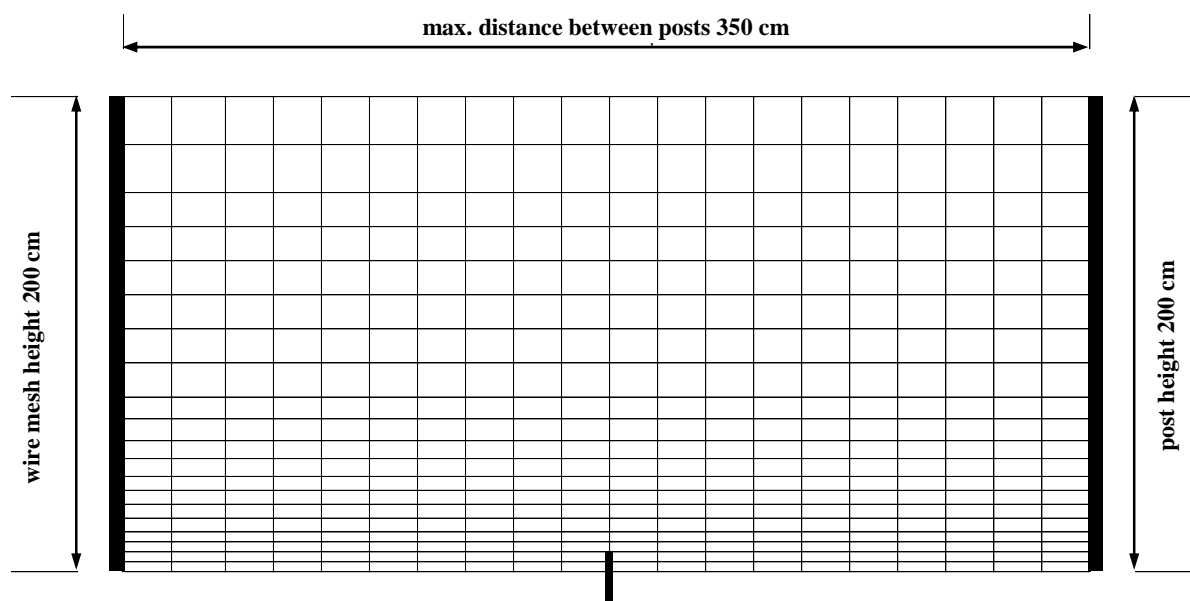
**OP 3 Mountain wire 200/3.5**

Height: min. 200 cm, bay length: max. 350 cm.

The wire mesh is fastened to stakes embedded in the ground by the thicker end, to a min. depth of 50 cm. In each direction change point, stakes shall have wind bracing at 2/3 of their height at a min. angle of 45°. The bottom edge of the wire mesh is firmly fastened to the ground with a peg (or peg and nail) at the middle of each bay.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. diameter</i>	<i>Min. width (halved)</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>stakes</i>	<i>round wood</i>	<i>12 (15) cm</i>	-	<i>270 cm</i>
<i>functional</i>	<i>wire mesh</i>	<i>200 cm height</i>	<i>see description below</i>	-	-
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>10 cm</i>	-	<i>195 cm</i>
		<i>halved round wood</i>	-	<i>10 cm</i>	-

Wire mesh: height 200 cm, no. of horizontal wires 25, span of vertical wires 15 cm, diameter 2.5 mm for edge wires, 2 mm for inner wires, 3xZn surface finish, i.e., at least 210 g/m<sup>2</sup>, meshing height above ground 16x5 cm, 3x10 cm, 2x15 cm, 3x20 cm.



**OP 4 Mountain high wire 220/3.5**

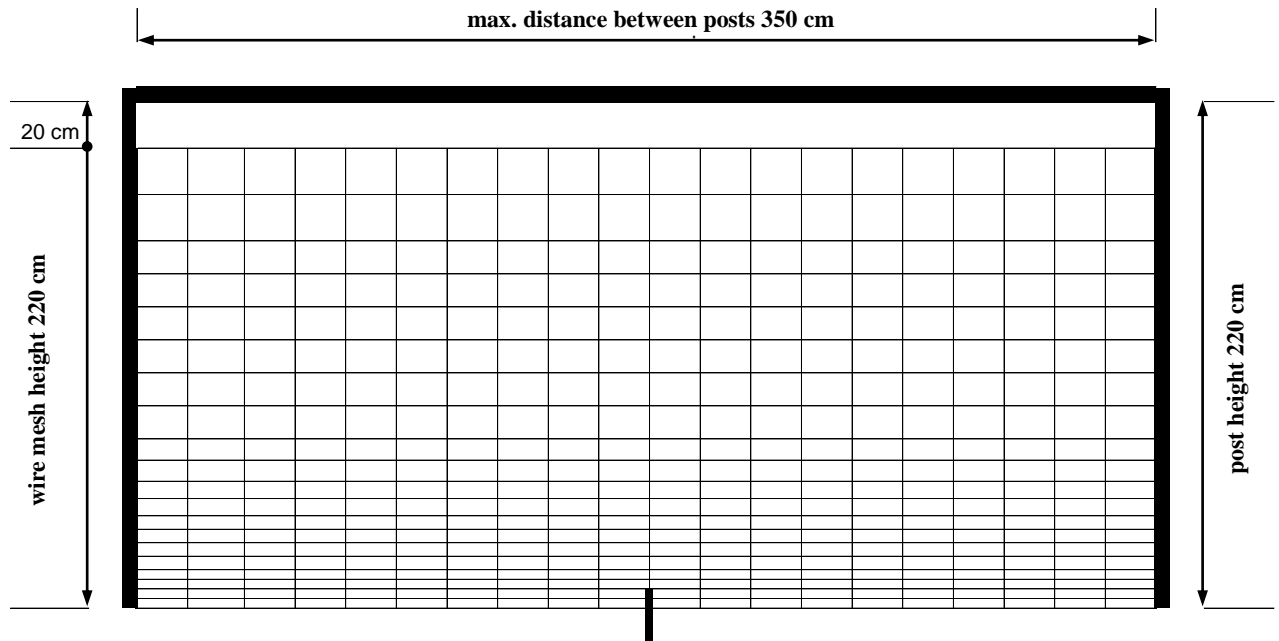
Height: min. 220 cm, bay length: max. 350 cm.

The wire mesh is fastened to stakes embedded in the ground by the thicker end, to a min. depth of 50 cm. Each direction change point shall have wind bracing with a brace on the side opposite the wire mesh traction, and every second stake shall have wind bracing with a brace at 2/3 of its height at a min. angle of 45°. The bottom edge of the wire mesh is firmly fastened to the ground with a peg (or peg and nail) at the middle of each bay.

A top boom is installed in each bay 20 cm above the top edge of the wire mesh; it is nailed to the stakes.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. diameter</i>	<i>Min. width (halved)</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>stakes</i>	<i>round wood</i>	<i>12 (15) cm</i>	<i>-</i>	<i>270 cm</i>
<i>functional</i>	<i>wire mesh</i>	<i>200 cm height</i>	<i>see description below</i>	<i>-</i>	<i>-</i>
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>10 cm</i>	<i>-</i>	<i>215 cm</i>
		<i>halved round wood</i>	<i>-</i>	<i>10 cm</i>	<i>-</i>
<i>functional</i>	<i>top boom</i>	<i>round wood</i>	<i>10 cm</i>	<i>-</i>	<i>-</i>
		<i>halved round wood</i>	<i>-</i>	<i>10 cm</i>	<i>350 cm</i>

Wire mesh: height 200 cm, no. of horizontal wires 25, span of vertical wires 15 cm, diameter 2.5 mm for edge wires, 2 mm for inner wires, 3xZn surface finish, i.e., at least 210 g/m<sup>2</sup>, meshing height above ground 16x5 cm, 3x10 cm, 2x15 cm, 3x20 cm.



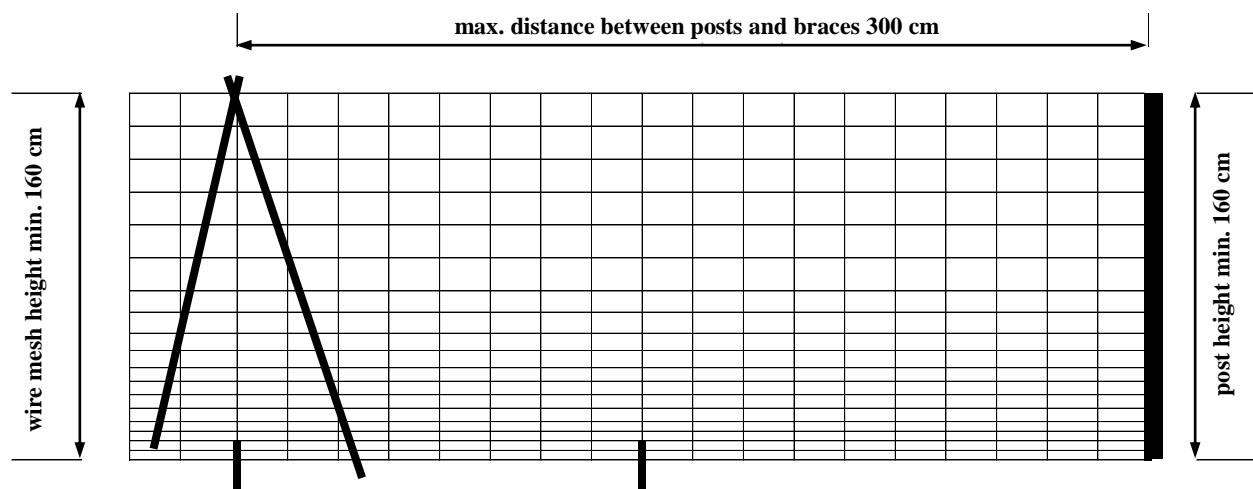


**OP 5 Semi-suspended 160/3**

Height: min. 160 cm, bay length: max. 300 cm.

The wire mesh is fastened using stakes combined with load-bearing braces. Between each two stakes, no more than 3 consecutive braces can be installed. Only stakes can be installed at direction changes. The stakes shall be embedded in the ground by the thicker end, to a min. depth of 40 cm. Braces shall be jointed with a nail of a length equalling at least the sum of diameters of the parts being jointed. In each direction change point, stakes shall have wind bracing in the direction against the wire mesh traction at  $2/3$  of its height at a min. angle of  $45^\circ$ ; otherwise, every second one. The bottom edge of the wire mesh is firmly fastened to the ground with a peg (or peg and nail) under each load-bearing brace and at the middle of each bay.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. Average</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>stakes</i>	<i>round wood</i>	<i>10 cm</i>	<i>200 cm</i>
<i>load-bearing</i>	<i>braces</i>	<i>round wood</i>	<i>7 cm</i>	<i>230 cm</i>
<i>functional</i>	<i>wire mesh</i>	<i>160 cm height</i>	-	-

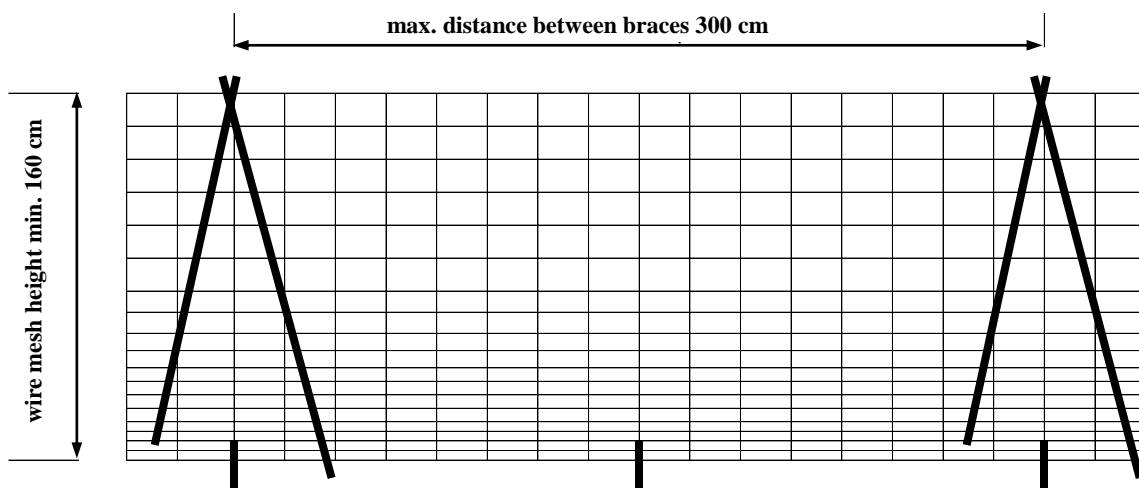


**OP 6 Suspended 160/3**

Height: min. 160 cm, bay length: max. 300 cm.

The construction is made without stakes; the wire mesh is carried by braces, with tripods at direction changes. Outside direction change points, there are no more than 3 consecutive ordinary braces, followed by a tripod. Braces and tripods shall be jointed with a nail of a length equalling at least the sum of diameters of the parts being jointed. The bottom edge of the wire mesh is firmly fastened to the ground with a peg (or peg and nail) under each brace and tripod and at least one point of each bay.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. Average</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>braces</i>	<i>round wood</i>	<i>7 cm</i>	<i>230 cm</i>
<i>functional</i>	<i>wire mesh</i>	<i>160 cm</i>	-	-

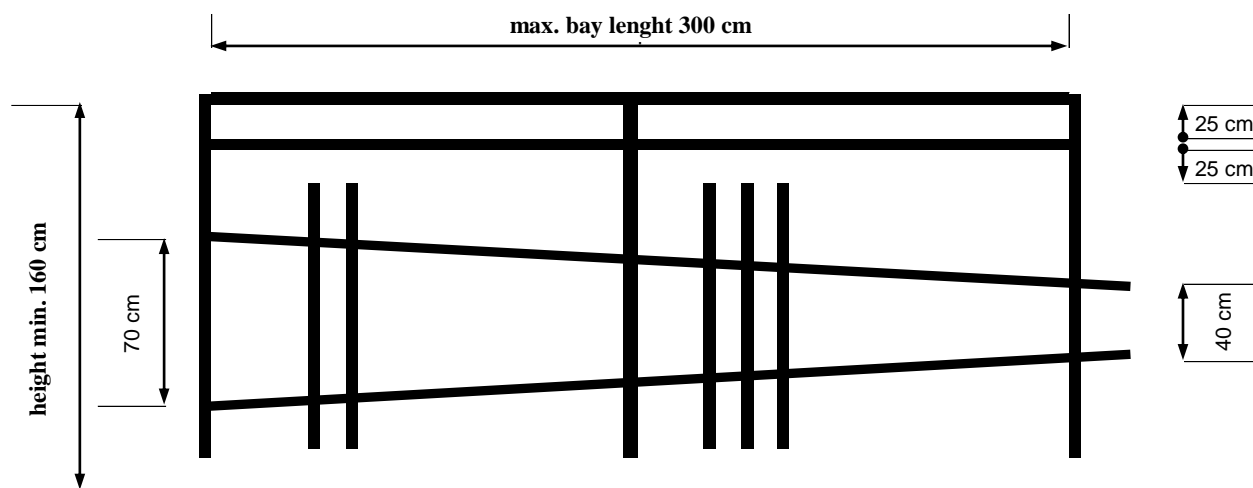


**OP7 Wooden model Pacov 160/3**

Height: min. 160 cm, bay length: max. 300 cm.

The construction is made without stakes using prefabricated sections. Stability is provided by wind braces (each joint on both sides) at 2/3 of their height at a min. angle of 45°. The maximum permissible gap between the fence laths is 10 cm. An alternative for the height of 180 cm is the addition of a third boom (max. gap 25 cm from bay); the posts are 190 cm long. When connecting the enclosure sections, a vertical linking segment 100 cm long is fastened to the load-bearing booms at the edges of the section with a longer distance between load-bearing booms on the side opposite to the laths and load-bearing posts.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. diameter</i>	<i>Min. width</i>	<i>Min. thickness</i>	<i>Length</i>
<i>load-bearing</i>	<i>load-bearing booms</i>	<i>round wood</i>	-	<i>6 cm</i>	<i>2.5 cm</i>	<i>340 cm</i>
<i>load-bearing</i>	<i>posts</i>	<i>sawn wood (slabs)</i>	-	<i>6 cm</i>	<i>2.5 cm</i>	<i>160 cm (190 cm)</i>
<i>functional</i>	<i>fence laths</i>	<i>sawn wood (slabs)</i>	-	<i>4 cm</i>	<i>2 cm</i>	<i>110 cm</i>
<i>functional</i>	<i>booms</i>	<i>sawn wood (slabs)</i>	-	<i>4 cm</i>	<i>2 cm</i>	<i>300 cm</i>
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>7 cm</i>	<i>alt. 6 cm</i>	<i>alt. 2.5 cm</i>	<i>160 cm</i>
	<i>connecting seg.</i>	<i>sawn wood (slabs)</i>		<i>6 cm</i>	<i>2 cm</i>	<i>100 cm</i>

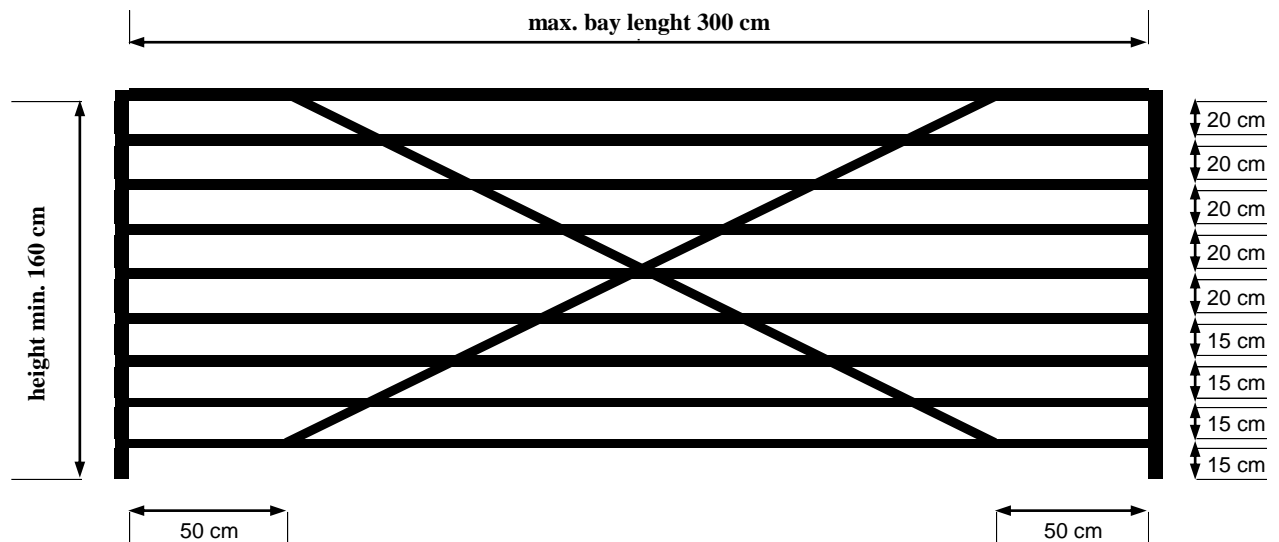


**OP 8 Wooden model Koliba 160/3**

Height: min. 160 cm, bay length: max. 300 cm.

The construction is made without stakes using prefabricated sections. Stability is provided by wind braces (on both sides at each joint) at 2/3 of their height at a min. angle of 45°.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. Average</i>	<i>Min. width</i>	<i>Min. thickness</i>	<i>Min. length</i>
<i>load-bearing</i>	<i>posts</i>	<i>sawn wood (slabs)</i>	-	<i>6 cm</i>	<i>2.5 cm</i>	<i>170 cm</i>
<i>functional</i>	<i>booms</i>	<i>sawn wood (slabs)</i>	-	<i>6 cm</i>	<i>2 cm</i>	<i>300 cm</i>
<i>Reinforcement</i>	<i>cross booms</i>	<i>sawn wood (slabs)</i>	-	<i>6 cm</i>	<i>2 cm</i>	<i>300 cm</i>
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>7 cm</i>	-	-	<i>160 cm</i>

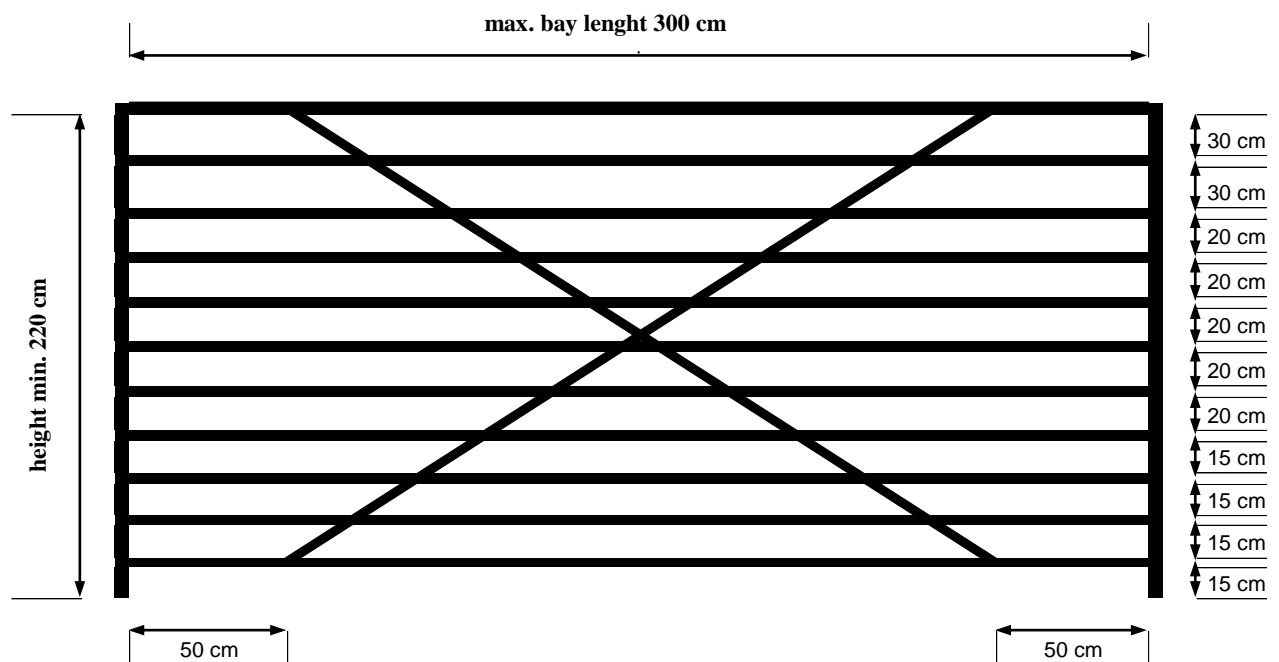


**OP 9 Mountain wooden 220/3**

Height: min. 220 cm, bay length: max. 300 cm.

The bays are manufactured in the forest by nailing onto stakes already embedded in the ground with the thicker end, to a min. depth of 60 cm. Every second stake shall have wind bracing on alternating sides (inside/outside) at 2/3 of their height at a min. angle of 45°. Stakes shall have wind bracing on the outside at direction change points.

<i>Element category</i>	<i>Element</i>	<i>Material</i>	<i>Min. diameter</i>	<i>Min. width</i>	<i>Min. thickness</i>	<i>Length</i>
<i>load-bearing</i>	<i>stakes</i>	<i>round wood</i>	<i>12 (15) cm</i>	-	-	<i>280 cm</i>
<i>functional</i>	<i>booms</i>	<i>sawn wood (slabs)</i>	-	<i>6 cm</i>	<i>2 cm</i>	<i>300 cm</i>
<i>Reinforcement</i>	<i>cross booms</i>	<i>sawn wood (slabs)</i>	-	<i>6 cm</i>	<i>2 cm</i>	<i>300 cm</i>
<i>stabilisation</i>	<i>braces</i>	<i>round wood</i>	<i>10 cm</i>	-	-	<i>210 cm</i>



**Annex 2: List of Nature and Landscape Management Standards developed  
(Series D, Management of selected terrestrial biotopes)**

- 00            General**
- 00 001       Terminology
- 01            Inspection, assessment, planning**
- 02            Work procedures**
- 02 001       Restoration of lawn associations using regional mixtures
- 02 002       Restoration of lawn associations unmanaged in the long term
- 02 003       Management of lawn associations
- 02 004       Disturbance management in non-forest areas
- 02 005       Measures to improve the structure of forest stands
- 02 006       Destruction of selected invasive plant and animal species
- 03            Occupational health and safety**

**Annex 3: List of abbreviations used**

FMP – Forestry management plan  
FMG – Forestry management guidelines  
MB – Management book  
OMC – one-man chainsaw  
UKT – versatile wheeled tractor  
SLKT – special wheeled forest tractor  
P – stump site  
VM – export site  
OM – departure site  
RS/AG – root system/aboveground part  
PLA – Protected Landscape Area  
NP – National Park  
SPA – specially protected area  
Tree species are abbreviated in the Czech version in accordance with forestry standards.  
SRM – set of recommended measures