American Standard for Nursery Stock

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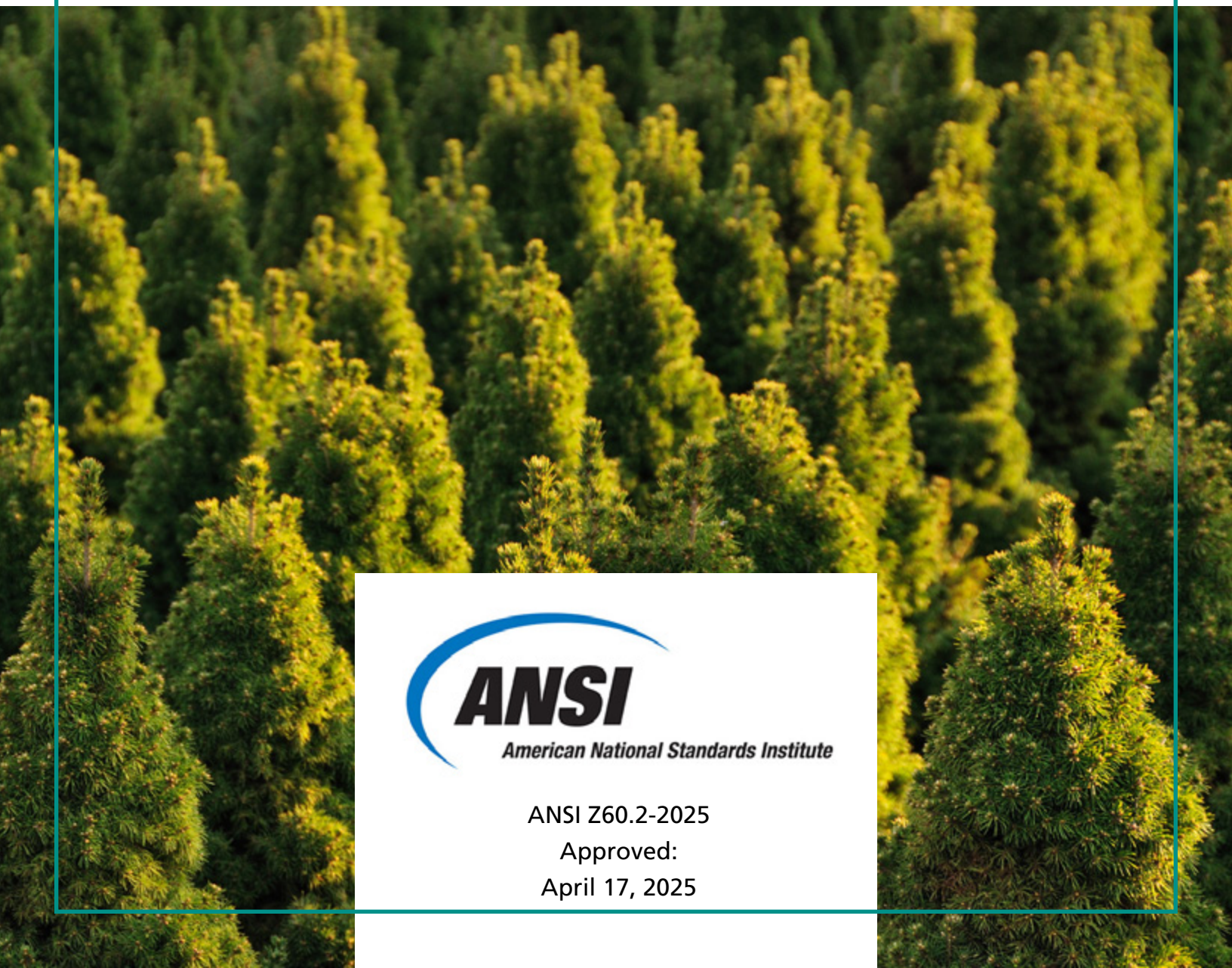

ANSI

American National Standards Institute

ANSI Z60.2-2025

Approved:

April 17, 2025

American National Standards

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An American National Standard implies a consensus of those materially affected by its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer or producer, the purchaser, and the general public. Compliance with an ANS is voluntary, and the existence of an ANS does not in any respect preclude anyone from manufacturing, producing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. The parties to a commercial transaction should expressly agree that an ANS applies.

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The American Standard for Nursery Stock (ANSI Z60.2) is published by:

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Annex A: Foreword

The information contained in this Annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Annex may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain the requirements necessary for conformance to the standard.

History of the American Standard for Nursery Stock (ANSI Z60.2)

On January 1, 2014, AmericanHort was formed with the consolidation of the American Nursery & Landscape Association and OFA—The Association of Horticulture Professionals. With a combined 220+ years of experience serving the horticulture industry, the vision of the AmericanHort merger is to unify the industry, improve collaboration, increase organizational efficiencies, and expand support for the industry's businesses. With that goal in mind, AmericanHort represents the entire horticulture industry, including breeders, greenhouse and nursery growers, retailers, distributors, interior and exterior landscapers, florists, students, educators, researchers, manufacturers, and all of those who are part of the industry market chain. It is the leading national association for the industry, and its size and scope makes AmericanHort the largest association for garden retailers in the world.

One of the early activities of the American Nursery & Landscape Association, formerly the American Association of Nurserymen, was the development of a standardized system of sizing and describing plants to facilitate the trade in nursery stock. The association's Committee on Standards was formed in 1921, and the first edition of "Horticultural Standards" was published in 1923. From time to time, these standards were revised and expanded to meet the needs of the industry.

After World War II the association elected to make the standards a national standard by adhering to the procedures of the American Standards Association. The first edition published under the procedures of the American Standards Association (forerunner of the current American National Standards Institute, or "ANSI") was published on June 22, 1949. Since then, the American Standard for Nursery Stock (ANSI Z60.2) has been revised from time to time in accordance with ANSI procedural requirements.

A major revision occurred from January 2005 through August 2013 to create ANSI Z60.1, which was approved in April 2014. Since then, a light revision has taken place from January 2024 through April 2025 to produce ANSI Z60.2, which was approved on April 17, 2025.

Each revision is developed by the association's Horticultural Standards Committee. The proposed revisions were then submitted to a "canvass list" comprising horticulture-focused companies, individuals, and related government agencies for their review and endorsement in order to develop "evidence of industry consensus" to meet ANSI requirements for accredited national standards. The results of the canvass ballots unanimously approving the revisions were provided to ANSI and approved on April 12, 2025.

Kamron Newberry
Managing Editor

For comments or recommendations, please see Page 97.

Horticultural Standards Committee

The following individuals served on the Horticultural Standards Committee during the 2024-2025 revision cycle (please note that some professional affiliations may have changed since service):

Kent Fullmer	Fullmer's Landscaping (OH)
Matt Edmundson	Arbor Valley Nursery (CO)
Tom Fessler	Woodburn Nursery & Azaleas Inc (OR)
John Rausch	Star Roses and Plants (PA)

The following individuals served on the Horticultural Standards Committee during the 2005-2014 revision cycle (please note that some professional affiliations may have changed since service):

Ronald Amos	Evergreen Nursery Company (WI)
Craig Aston	A&D Landscaping (UT)
Rick Barrett, ASLA	American Society of Landscape Arch. (KS)
Richard Bocci	Carlton Plants (OH)
Earl Ervey	Blue Sterling Nursery (NJ)
Dave Fujino	DWF LLC (CA)
Kent Fullmer	Fullmer's Landscaping (OH)
Paul Gagnon	Tunpetti Corp (ON)
Dr. Edward Gilman	University of Florida (IL)
Alex Head	CJ Fiore (IL)
Joseph "Jamie" Jamison	Brandywine Nurseries, Inc. (DE)
Alan M. Jones	Manor View Farm, Inc. (MD)
Eric Joy	Christensen's Plant Center (MI)
Gary Knosher	Midwest Groundcovers (IL)
W. Scott McAdam	McAdam Landscaping (IL)
Lisa Minter-Bustin	Minter Country Garden (BC)
Seth Nicholson	The Bruce Company (WI)
Tim Power	Law's Nursery, Inc. (MN)
Kurt Reiger	High Caliper Growing (OK)
Peter Scarff	Scarff's Nursery (OH)
Bill Stensson	Sheridan Nurseries (ONT)
Marcus vandeVliet	MV Consulting (DE)
Tim Vogel	Bailey Nurseries (MN)
Dr. Gary Watson	Morton Arboretum (IL)
Rick Wells	Monrovia Growers (CA)

2025 Canvass List

The following organizations agreed to participate in the "canvass" review process (please note that not all of the organizations returned a ballot):

Arizona Department of Agriculture
Belmont Nursery
Brentano's Tree Farm
City of Denver, Colorado
City of Roanoke, Virginia
Environmental Landscape Solutions
Everde Growers
Maine Department of Agriculture, Conservation and Forestry
Manor View Farm
Monrovia
North Dakota Department of Agriculture
Simnitt Nursery
Southwest Wholesale Nursery
Prides Corner

Normative References

The following documents are cited in the standard and are indispensable for the application of the standard:

Tree, Shrub, and Other Woody Plant Management – Standard Practices – Part 1 – Pruning (ANSI A300). Tree Care Industry Association (https://treecareindustryassociation.org/business-support/ansi-a300-standards/).

United States Standards for Grades of Christmas Trees. Fresh Products Branch, Fruit and Vegetable Programs, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, DC. October 30, 1989, and as thereafter may be revised. (https://www.ams.usda.gov/grades-standards/christmas-trees-grades-and-standards).

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Annex B: How To Use This Publication

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A. General Information.

The purpose of the American Standard for Nursery Stock (ANSI Z60.2, the "Standard") is to provide buyers and sellers of nursery stock with a common terminology, a "single language," in order to facilitate commercial transactions involving nursery stock. For instance, the Standard establishes common techniques for (a) measuring plants, (b) specifying and stating the size of plants, (c) determining the proper relationship between height and caliper, or height and width, and (d) determining whether a root ball or container is large enough for a particular size plant.

For specifiers or buyers, it is important that you provide growers or distributors with specifications that conform to the terms of the Standard. For growers or distributors, it is important that product specifications in catalogs or contract proposals conform to the terms of the standard. If either party to a transaction that purports to implicate the Standard fails to comply with the Standard, conflicts are much more likely to occur because the two parties are "speaking different languages." In such cases, contract terms control the transaction, and the Standard may not help resolve the conflict.

The Standard is intended for use by professional horticulturists and landscape architects with an understanding of common horticultural terms, plant nomenclature, and plant attributes. It is not applicable to transactions with the retail consumer, who cannot be expected to have the horticultural knowledge necessary to apply its terms. Retail consumer transactions are controlled primarily by consumer protection laws, such as those requiring accurate information in advertisements and on labels or signage.

B. Organization and Procedure

1. Before you locate the standards for a particular plant, you should know: (a) what type of plant it is (e.g., a shade or flowering tree, a coniferous or broadleaf evergreen, perennial, ground cover or vine, etc.), (b) the growth habit of the particular species or cultivar, (e.g., upright, conical, spreading, multi-stemmed, etc.), (c) the method of production and packaging of the plant at the time it will be sold (e.g., balled and burlapped, in-ground fabric bag, bare root, containerized, etc.), and (d) the buyer's intended purpose for the plant (e.g., seedlings for conservation or restoration plantings, young plants for nursery production, understock for budding/grafting, or for sale to the retail or landscape trade for use in a managed landscape).

2. Familiarize yourself with the "General Standards" section, which includes standards that are applicable to all nursery stock, with exceptions and particular applications noted, and addresses many of the most important issues regarding nursery stock specifications.

3. Find the appropriate section or chapter for the plant. Each section heading includes a brief explanation of its general applicability.

4. In the applicable section, determine which table or sub-section applies to the plant. Review the introductory information and the text that describes the plants covered by each table or sub-section.

5. For tables, locate the row that provides the standards for the plant. Keep in mind that, in most cases, the tables represent minimum relationships and that the Standard encourages parties to exceed the minimums in the tables. Also, note the various exceptions to the minimums.

6. Examples of plants are only to clarify the factors used to determine plant types within each section. Only a few examples are listed and are not complete lists of all genera within each plant type. Users must have horticultural knowledge or access to horticultural resources to determine the plant type of an unlisted species.

7. If you are unable to locate the information under the first plant group selected, you should review other sections and determine whether there may be another plant group to which the plant belongs.

8. The Annex provides both a glossary of terms used in the Standard as well as a metric conversion table.

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Section 1: General Standards

The following standards are applicable to all nursery stock, with exceptions and particular applications noted.

1.1 Required specifications

1.1.1 Plant size specification required

Specifications must include plant size, by caliper, height, or width, as appropriate to the plant type as set forth in the appropriate plant type section, except for certain perennials and non-winter-hardy shrubs, which may be specified by container class only (See Section 13 - herbaceous perennials, ornamental grasses, groundcovers, and vines, and Section 3.1.0 - Type 0 tender deciduous shrubs).

1.1.2 Plant size intervals

Plant size specifications should include only the minimum measurement of the desired plant size interval. The measurement so specified is the minimum size allowable and shall include plants from that minimum size up to but not including the minimum size in next larger size interval. Acceptable size intervals for each plant type are shown in the appropriate plant type section. For instance, a specification for a "2.5 in. cal." Type 1 shade tree references the "2.5 to 3 inch" caliper size interval, while a specification for a "5 ft." Type 4 spreading tree references the "5-6 ft." height size interval.

1.1.3 Container class specification required

Specifications for container grown nursery stock shall include a container class specification, in accordance with Table 1, below, in addition to the plant size specification. Containers marketed and sold that indicate a "trade" or "#" designation must have volumes within the ranges shown in Table 1 in order to comply with this standard.

1.1.3.1 Container class volume ranges

Table 1. Container class volume ranges			
Container class specification	Container volume range		Box size equivalent
	Cubic Inches Min - Max	Cubic Centimeters Min - Max	
#SP1	0.1 – 9	0.1 – 163	
#SP2	10-15	164 – 261	
#SP3	16 – 30	262 – 507	
#SP4	31 – 63	508 – 1,048	
#SP5	64 – 136	1,049 – 2,229	
#1	152 - 251	2,492 – 4,115	
#2	320 - 474	5,246 – 7,770	
#3	628 - 742	10,285 – 12,164	
#5	785 – 1,242	12,860 – 20,360	
#7	1,337 – 1,790	21,913 – 29,343	
#10	2,080 – 2,646	34,090 – 43,376	
#15	2,768 – 3,696	45,376 – 60,589	
#20	4,520 – 5,152	74,096 – 84,457	20-inch box
#25	5,775 – 6,861	94,669 – 112,472	24-inch box
#45	9,356 – 11,434	153,317 – 187,377	36-inch box
#65	13,514 – 16,517	221,456 – 246,051	42-inch box
#95/100	20,790 – 25,410	340,686 – 416,394	48-inch box

1.1.3.2 Incomplete specifications for container grown plants

If a plant size specification is required and only container class is specified, the specification is incomplete, and the Standard does not provide a corresponding minimum plant size (for exceptions, see Section 13 - herbaceous perennials, ornamental grasses, groundcovers, and vines, and Section 3.1.0 - Type 0 tender deciduous shrubs).

Tables showing recommended container class specifications are to be used as a guideline in determining which container class specification should accompany the plant size specification and may not be used as the basis for rejecting nursery stock based on the minimum or maximum plant size shown in the tables in cases where a specification does not include a plant size specification. In such cases, the parties should refer to the "general root system requirement" for all container grown nursery stock (see Section 1.6 below) to determine whether the root system complies with the Standard.

1.1.3.3 Unclassified containers

Parties to a transaction may agree that nursery stock will be in an "unclassified" container, which is a container with a volume not included within the recommended container class volume ranges.

1.1.3.4 Relation of container classes with imperial volumes

Each container class includes a range of acceptable container volumes and is not limited to a single container volume (e.g., a certain number of "gallons"). The volume ranges for container classes #1 through #100 include the volume of a container that, if such a container were manufactured, would hold the equivalent number of gallons as the container class number.

Standard users should refer to container manufacturers' volume specifications for compliance with the Standard. Nursery stock specifications that reference only an imperial volume measurement, such as "quarts" or "gallons," are not in accordance with the Standard.

If the specifier requires that containers precisely match the gallon equivalent of the container class number, the specifier must explicitly state that the containers need to be 'true to size.' Such containers should be labeled with a "True" or "T" designation after the "#" classification (e.g., #5True or #5T). Compliance with this specification ensures that the containers meet the exact volume standard for their class. The method for determining true size calculations is as follows:

Number of Gallons x 231 = Cubic Inches

Number of Gallons x 3,785 = Cubic Centimeters

1.1.3.5 Small plant containers ("SP" designation)

Generally, containers commonly referenced in the industry as "four-inch" or "quart" containers are #SP4 containers (1 qt. = 57.75 cubic inches). If growers, buyers, or specifiers include dimension measurements or imperial volume references, they are encouraged to also specify "round" or "square" and to reference the appropriate container class in the Container Class Table in order to ensure adequate soil volume in the container.

1.1.3.6 Dimension measurements for square containers

Dimension measurements for square containers shall be taken along one side and not diagonally.

1.1.3.7 Box size equivalents

For purposes of the Table 1, box size "equivalent" indicates that a box size may be specified in lieu of the indicated equivalent container class, and nursery stock in an equivalent box size shall be accepted in the trade as in conformance with a specification for container-grown nursery stock in the equivalent container class indicated, and vice-versa. Boxes are not required to have volumes that are "equal to" or within the volume range of the indicated equivalent container class, or vice-versa.

1.1.4 Shearing designation specification required for evergreens

Specifications for evergreens (see Section 4 Coniferous evergreens and Section 5 Broadleaf evergreens) shall include a shearing designation.

1.1.4.1 Shearing designations

1.1.4.1.1 Natural

Grown with only corrective or reparative pruning, leaving the form that is natural for the species. Never sheared. Specify as "N."

1.1.4.1.2 Semi sheared or lightly sheared

Symmetrically sheared, pruned, or disbudded when the plant is young and then only periodically thereafter during the life of the plant. The intent is to retain an intermediate level of density while retaining the form that is natural for the species and not limiting the height of the plant over a period of time. The trunk caliper shall not be significantly larger than the trunk caliper of a plant that has been allowed to grow as a natural form, as defined above. Specify as "LS."

1.1.4.1.3 Sheared

Annually or semi-annually sheared, pruned, or disbudded to retain a symmetrical shape, make the plant very dense, and limit the height and width of the plant over a period of time. The trunk caliper of the plant will, therefore, continue to increase at a disproportionate rate to the plant size and will be larger than the trunk caliper of a plant that has been allowed to grow naturally. Specify as "S."

1.1.4.1.4 Altered form

Sheared or pruned to attain a shape or branching habit that is not natural for the species, such as topiary, espalier, trained with wire, etc. (see Section 1.4.4, below). Specifications should include minimum root ball size or container class.

1.1.4.1.5 Compliance with specifications with no shearing designation

If a specification does not include a shearing designation, nursery stock fitting the definition of any shearing designation, except altered form, shall be deemed as acceptable for purposes of this section 1.1.4.

1.2 Methods of measurement

1.2.1 Measuring caliper

For fruit trees (Section 8), small fruits (Section 9), understock (Section 10), and seedling trees and shrubs (Section 11), caliper measurement shall be taken at the root collar or at other points expressly described in those sections.

For all other nursery stock, caliper measurement shall be taken six inches above the ground level for field grown stock and from the soil line for container grown stock, which should be at or near the top of the root flare, and six inches above the root flare for bare root plants, up to and including the four-inch caliper size interval (i.e., from four inches up to, but not including, 4½ inches). If the caliper measured at six inches is four and one-half inches or more, the caliper shall be measured at 12 inches above the ground level, soil line, or root flare, as appropriate.

Seldom are tree trunks perfectly round. The most accurate measurement will result from the use of a diameter tape. Caliper measurements taken with manual or electronic "slot" or "pincer" type caliper tools should be the average of the smallest and largest measurements.

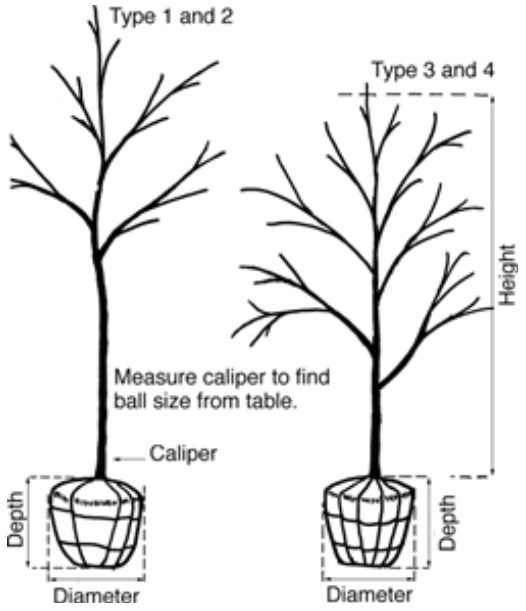


Figure 1. Measurement - field grown trees – single-stem

1.2.2 Measuring height and spread

1.2.2.1 General application

Height measurement shall be taken from ground level for field grown stock and from the soil line for container grown stock, which should be at or near the top of the root flare, and from the root flare for bare root plants.

Spread measurement shall be the average spread of the branches of the plant, without leaves for deciduous shrubs, including leaves for evergreens (see Figure 2).

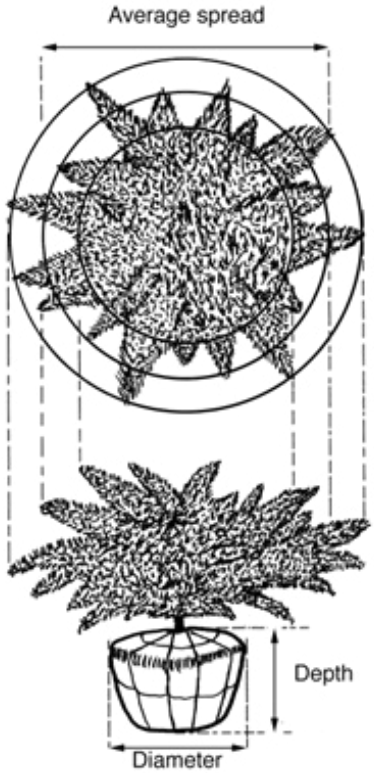


Figure 2. Average spread measurement – evergreens

1.2.2.2 Height measurement – deciduous shrubs

For deciduous shrubs, height measurement shall extend to the top of all canes meeting the height specification, as appropriate to the plant type. This is generally at a point below the tallest point on the plant. For example, a 2′ Type 2 deciduous shrub should have four canes reaching at least 2′, even if two or three canes are taller than 2′ (see Figure 3).

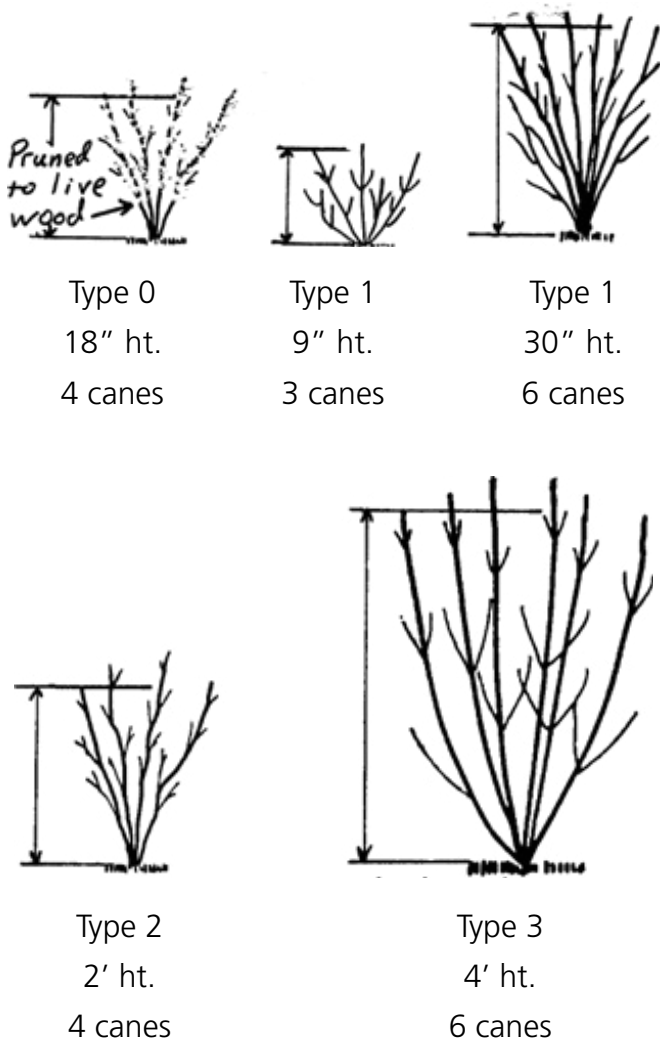
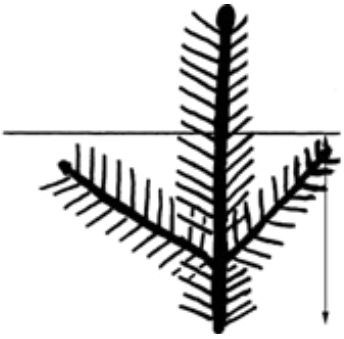


Figure 3. Measurement of deciduous shrubs

1.2.2.3 Height measurement - evergreens

For evergreens, height measurement shall not be taken at the tip of the leader but should be taken at the midpoint between the uppermost whorl(s) and the tip of the leader (see Figure 4 and Figure 5).



The upper limit for determining average height for type 4 conifers is midpoint between the uppermost whorl and the tip of the leader.

For trees such as cedrus deodara without whorls, average height is measured to the uppermost side growth.

Figure 4. Height measurement – evergreens specified by height

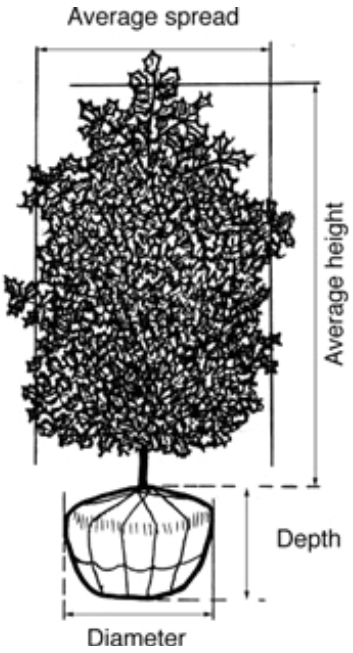


Figure 5. Height and spread measurement – evergreens

1.2.3 Required specifications for trees with multiple stems (trunks)

1.2.3.1 Desired form

Specifications for trees with multiple stems (trunks) shall include whether the form desired is shrub form, clump form, or multi-stem, as set forth in Section 2.5.

1.2.3.2 Height, minimum number of stems, caliper, method of caliper measurement

Specifications for shrub-form trees and multi-stem trees shall include height.

Specifications for clump form trees shall include the minimum required number of stems (trunks), height or caliper, as appropriate to the plant type, and the method used to determine the caliper measurement if the caliper is specified (see Section 1.2.3.3 below).

A two-stem tree shall be so specified.

1.2.3.2.1 Default specification if specifications do not include minimum number of stems

In the event that specifications for a clump form tree do not include the minimum number of stems (trunks), a three-stem tree shall comply with the specification.

1.2.3.3 Method of caliper measurement

When a caliper measurement is included in the specifications, the specifications shall also include the method used to determine the caliper measurement, shown below:

A. The number of required trunks and the minimum caliper of each required trunk.

B. The caliper of only the largest trunk, with all other required trunks within a certain caliper range of the largest trunk (e.g., by percent or within two smaller caliper sizes). This is the Canadian method.

C. The caliper specified is one-half (1⁄2) of the caliper of the three largest required trunks.

D. The caliper specified is the average of all required trunks.

1.2.3.3.1 Default specification if specifications do not include method of caliper measurement

In the event that a caliper specification does not include a method of measurement, compliance with the caliper specification shall be determined by Method C, as shown in Section 1.2.3.3, above.

1.3 Minimum requirements for all nursery stock

1.3.1 Correct identification requirement

All nursery stock transacted within the terms of the Standard shall be correctly identified by genus, species, and, if applicable, cultivar.

1.3.2 Minimum quality requirement

All nursery stock transacted within the terms of the Standard shall, at time of shipment, be substantially free of damaging insects and diseases, in good living condition, and typical in habit for the species in the region of the country in which it is grown.

1.3.3 Co-dominant stems - Type 1 and Type 2 shade trees

Unless specified as multi-stem trees (see Section 1.2, above), Type 1 and Type 2 shade trees (see Section 2) with co-dominant stems occurring within the lower half of the crown do not meet the minimum quality requirement set forth in Section 1.3.2 (see Figure 6, below).

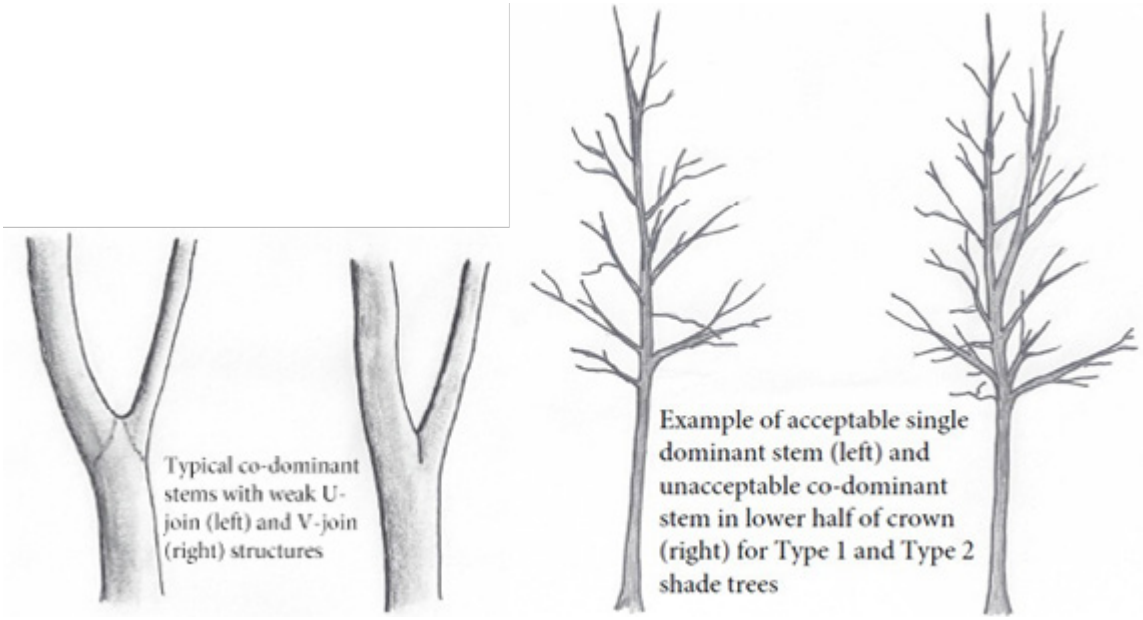


Figure 6. Co-dominant stems – Type 1 and Type 2 shade trees

1.3.4 Pruning cuts to correct injury, damage, or branching structure

Pruning cuts to correct injury, damage, or branching structure shall meet the provisions of the most recent edition of Tree, Shrub, and Other Woody Plant Management – Standard Practices – Part 1 – Pruning (ANSI A300) to satisfy the minimum quality requirement set forth in Section 1.3.2.

1.3.5 Plants not grown in the nursery

1.3.5.1 Collected plants

Plants collected from native stands or established plantings shall be so specified.

For collected bare root plants, the spread of roots shall be at least one-third (33%) greater than the spread of roots shown for nursery grown bare root plants.

For collected plants harvested with a root ball intact, the minimum root ball size shall be equal to the next larger size interval shown in the appropriate table for nursery grown stock.

Collected plants may be considered nursery grown when they have been successfully reestablished in the nursery and grown under regular nursery cultural practices for a minimum of two growing seasons and have attained adequate root and top growth to indicate full recovery from transplanting into the nursery.

1.3.5.2 Plantation grown plants

Plantation grown nursery stock shall be so specified.

For plantation grown plants harvested with a root ball intact, the minimum root ball size shall be equal to the next larger size interval shown in the appropriate table for nursery grown stock.

1.4 Optional specifications

1.4.1 Optional measurement specifications

Specifications may include measurement specifications in addition to the required specifications. For instance, if caliper is the only required specification, the specifications may also include height.

1.4.2 Optional descriptive or quality specifications

Specifiers and buyers are encouraged to provide additional specifications and appropriately detailed descriptive language to the extent that required specifications and minimum requirements do not provide sufficient detail for a particular transaction.

When specifications include optional quality designations, such as "specimen" or "quality grade," the desired characteristics shall be stated. For example, specifications should include deviations from standard minimums for caliper, height, root ball diameter, container or box size, etc., as well as other factors such as symmetry, crown width, fullness of branching, single or single dominant leader above the minimum point set forth in Section 1.3.3, age, specialized pruning techniques, or uniqueness of the plant. The determination of compliance with the term "specimen" shall be determined with reference to the descriptive characteristics provided in the specifier's or buyer's specifications.

1.4.3 Lowest branch height for street trees

Bid specifications for trees to be used as street trees shall include the minimum height of the lowest branch, or the height to which the trunk shall be free of branches, which shall bear a relationship to the size and kind of tree so that the crown of the tree is in good balance with the trunk.

Examples:

Acer platanoides, 2 in. cal., 12 to 14 ft., trunk free of branches 6 ft.

Quercus rubra, 3½ in. cal., 14 to 16 ft., lowest branch 7 ft.

1.4.4 Pruned or trained plants for other uses

Where a form of growth is desired which is not in accordance with a natural growth habit, this form should be so specified.

Examples:

Cut back or sheared - pruned back so as to multiply the branching structure and to develop a more formal effect.

Topiary - sheared or trimmed closely in a formal geometric pattern. Espaliered - trained on a structure of a specified shape and style.

1.4.5 Optional transplanting or root pruning specifications

In certain landscapes, such as street tree or container plantings with limited soil availability, or when the buyer desires a particularly well-formed root mass, specifications may include the minimum number of times that nursery stock shall have been transplanted (e.g., "trans. 3x") or root pruned.

In such cases, nursery stock may be shipped with a smaller root ball than would otherwise be allowed, and the minimum allowed smaller root ball may be specified. Minimum root ball sizes shown in each applicable section are based on plants that have not been transplanted after they have been lined out in the field, which is the typical and accepted practice in the industry.

For example, if root density is of particular importance to a seller, buyer, or specifier, the nursery stock may be designated in marketing materials or in specification documents as being transplanted or root pruned a certain number of times. In such cases, the grower may ship the nursery stock with a root ball size smaller than shown in the appropriate section.

This approach is intended to assist those members of the trade who recognize the value of enhanced cultural practices in the nursery industry.

1.5 Root ball requirements for field grown nursery stock

1.5.1 Root ball diameters

Tables throughout the Standard provide the recommended minimum root ball sizes for nursery stock that is (a) grown in the ground in the nursery without artificial root restriction devices, such as containers or fabric bags, (b) grown under favorable growing conditions, having received the proper cultural treatment to develop a well-branched root system, and (c) harvested with the ball of earth in which they are growing remaining intact (e.g., balled and burlapped).

Many factors affect the minimum root ball size. Although minimum ball size is not a required specification, parties to nursery stock transactions are encouraged to address minimum ball size in personal communications or specification documents prior to the transaction. The objective in all nursery stock transactions is for root balls to meet the following general requirement:

Ball sizes should always be of a diameter and depth to encompass enough of the fibrous and feeding root system as necessary for the full recovery of the plant.

Given the variety of acceptable cultural practices in the industry, the ball sizes set forth in each applicable section are based on those factors which are objectively observable and measurable: the height, width, or caliper measurement. Other cultural practices in the nursery, such as transplanting or root pruning practices or watering techniques, or soil types and local growing conditions, certainly affect the density of the roots, but are much more difficult to observe and measure within the context of the Standard.

It is recognized that plants having a coarse or wide-spreading root system because of natural habit of growth, soil condition, infrequent transplanting practice, or plants that are moved out of season, would require a root ball larger than the recommended size. It is also recognized that there may be circumstances where the sizes recommended may be excessive, such as stock grown in pots or other containers, field plants recently planted out from containers or with smaller balls, or plants which have been frequently transplanted or root pruned.

1.5.2 Plant in center of root ball

The center of the trunk(s) or stem(s) of the plant shall be in the center of the root ball. A tolerance of 10% of the diameter of the root ball is the maximum deviation allowable (See Figure 7). For example: For a plant with a 30-inch root ball, the center of the plant at ground level shall be within a three-inch circle 13 ½ inches from the outer edge of the ball.

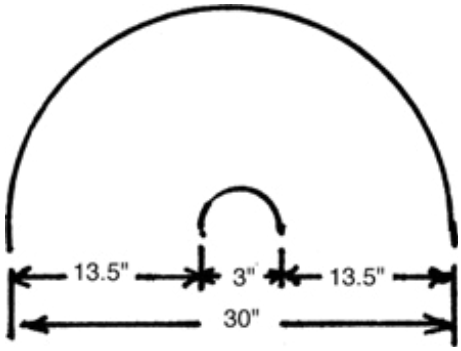


Figure 7. Example: Center of plant in center of root ball

1.5.3 Root ball depths

Measurement: Depth of the root ball is measured from the top of the ball, which in all cases shall begin at the root flare (see Figure 8). Soil above the root flare, from being deeply planted in the nursery as a young plant, as a result of maintenance practices in the nursery, or added during harvest, shall not be included in ball depth measurement, and should be removed.

Under certain soil and regional conditions, plants have root systems of proportionately less depth and greater diameter. These require a more shallow but wider ball to properly encompass the roots. Conversely, in other soils and in certain regions roots develop greater depth and less spread, requiring an exceptionally deep ball, which may be smaller in diameter and greater in depth than the size recommended.

For the greater part of the country, ball depths will carry the following ratios:

Root balls with diameters less than 20 inches - depth not less than 65% of the diameter of the ball.

Root balls with diameters of 20 inches and up - depth not less than 60% of the diameter of the ball.

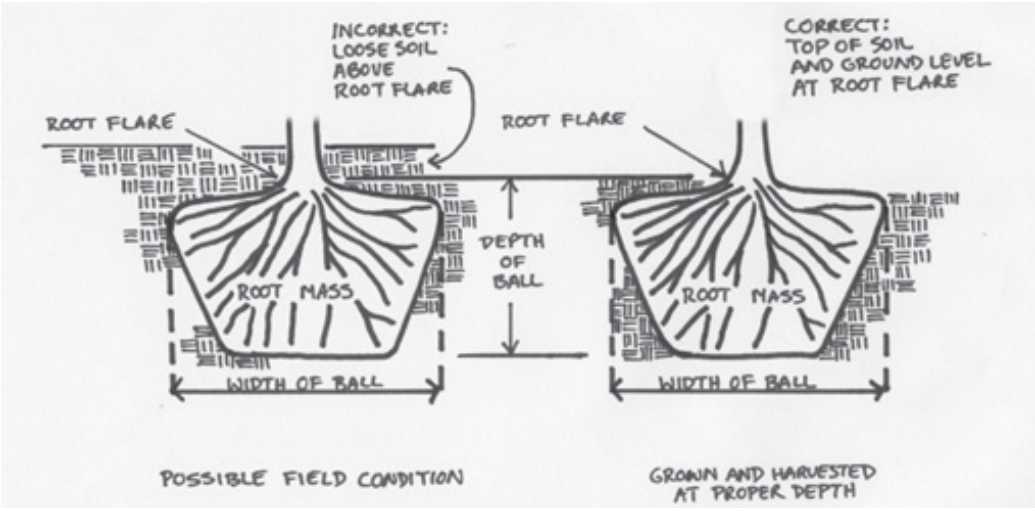


Figure 8. Measurement of root ball depths

1.5.4 Burlapping

Burlap or other suitable material shall be biodegradable and shall completely cover the root ball. This wrapping shall be between the earth ball and the lacing or ball supporting device.

1.5.5 Ball-supporting devices

If used, ball-supporting devices, such as wire baskets, shall hold the ball in a firm, rigid condition.

1.5.6 Use of digging machines recognized

It is recognized that balling of nursery grown stock can be accomplished by hand digging or by mechanical devices especially designed for nursery conditions. The use of digging machines is an acceptable nursery practice.

1.6 Container grown root systems

1.6.1 General requirement for container grown root systems

In all cases, the root system of container grown nursery stock shall meet the following general requirement:

Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball, but shall not have excessive root growth encircling the inside of the container.

1.6.2 Containers that encourage or manipulate root growth recognized

It is recognized that containers with holes or made of fabric as a method of aeration to prune roots, or with coatings to prevent roots from reaching the sides of the container, or shaped to train roots to grow vertically rather than encircle the container, are acceptable in the trade.

1.7 Box-grown

It is recognized that many trees are grown and shipped in boxes, and that this is an acceptable practice in the trade. Table 1 shows the relationship of box sizes and container classes accepted in the trade, although boxes may have substantially higher soil volumes than the container class equivalent shown.

1.8 In-ground fabric bag sizes

In-ground fabric bags should have minimum diameters, depths and cubic volumes as set forth in Table 2.

Table 2. In-ground fabric bag sizes

Diameter	Minimum depth	Minimum volume (cubic inches)	Minimum volume (cubic feet)
5 inches	4 inches	78 cubic inches	
8 inches	7 inches	352 cubic inches	
10 inches	9 inches	707 cubic inches	
12 inches	10 inches	1,131 cubic inches	.65 cubic feet
14 inches	12 inches	1,857 cubic inches	1.0 cubic feet
16 inches	12 inches	2,413 cubic inches	1.4 cubic feet
18 inches	14 inches	3,563 cubic inches	2.0 cubic feet
20 inches	14 inches	4,399 cubic inches	2.5 cubic feet
22 inches	16 inches		3.5 cubic feet
24 inches	16 inches		4.2 cubic feet
30 inches	18 inches		7 cubic feet

1.9 Above-ground fabric bags

An above-ground fabric bag, often referred to as a "grow bag," is a type of container made from durable fabric. Above-ground fabric bags should adhere to the container class volumes set forth in Section 1.1.3.1.

1.10 Deep Containers

Deep containers, or deep pots, are containers that are taller than they are wide. Standard users should refer to container manufacturers' dimension specifications for compliance with the Standard. Deep containers should adhere to the container class volumes set forth in Section 1.1.3.1.

Section 2: Shade and Flowering Trees

This section applies to plants generally sold to the retail and landscape trade. For lining out stock, including whips, see Section 7.

2.1 Type 1 shade trees

2.1.1 Classification of Type 1 shade trees

The height relationship to caliper, for Type 1 shade trees, is shown in Table 3, in Section 2.1.2, below.

It is recognized that climatic conditions in different sections of the country produce trees of different caliper-height proportions. Trees from one region of the country may have less caliper in proportion to height while trees from another section may have greater caliper in proportion to height than shown in Table 3 in Section 2.1.2, below, which shows the average height range and the typical maximum heights.

2.1.2 Specifications for Type 1 shade trees

Table 3. Specifications for Type 1 shade trees

Specifications for field grown Type 1 shade trees shall include plant size, by caliper. Specifications for container grown Type 1 shade trees shall include plant size, by height, through 7-8′ size designation, and container class or box size equivalent. Thereafter, plant size specification shall be by caliper.

Height measurements shall be in one-foot intervals. Caliper measurements shall be 1⁄8-inch intervals from ½" through ¾", ¼-inch intervals through 1¾-2", then ½-inch intervals through 5½-6", then one-inch intervals through 9-10", then two-inch intervals from 10-12" and up. Decimal equivalents to fractions may be used.

Examples: *Acacia stenophylla, Acer rubrum, A. saccharinum, Betula, Cinnamomum camphora, Eucalyptus microtheca, Fraxinus, Ginkgo, Gleditsia, Liriodendron, Platanus, Populus, Quercus macrocarpa, Q. palustris, Q. phellos, Q. virginiana* (southeastern climates)*, Salix. Tilia Americana, Zelkova serrata*

Caliper/ height specification	Average height range	Typical maximum height	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
½ in. / 4 ft.	4 to 5 ft.	6 ft.	12 in.	7 7/8 in	#2,#3,#5	5 in.
5/8 in. / 5 ft.	5 to 6 ft.	8 ft.	13 in.	8 3/8 in	#3, #5,#7	8 in.
¾ in. / 6 ft.	6 to 8 ft.	10 ft.	14 in.	9 in.	#5,#7,#10	8 in.
1 in. / 7 ft.	8 to 10 ft.	11 ft.	16 in.	10 3/8 in.	#7,#10,#15	10 in.
1 ¼ in.	8 to 10 ft.	12 ft.	18 in.	11 ¾ in.	#10,#15,#20	10 in.
1 ½ in.	10 to 12 ft.	14 ft.	20 in.	12 in.	#15,#20,#25	12 in.
1 ¾ in.	10 to 12 ft.	14 ft.	22 in.	13 1/8 in.	#15,#20,#25,#45	14 in.
2 in.	12 to 14 ft.	16 ft.	24 in.	14 3/8 in.	#20,#25,#45	16 in.
2 ½ in.	12 to 14 ft.	16 ft.	28 in.	17 in.	#25,#45,#65	18 in.
3 in.	14 to 16 ft.	18 ft.	32 in.	19 in.	#45,#65,#95/100	20 in.
3 ½ in.	14 to 16 ft.	18 ft.	38 in.	23 in.	#65,#95/100	22 in.
4 in.	16 to 18 ft.	22 ft.	42 in.	25 in.	#95/100	24 in.
4 ½ in.	16 to 18 ft.	22 ft.	48 in.	29 in.		30 in.
5 in.	18 ft. and up	26 ft.	54 in.	32 in.		
5 ½ in.			57 in.	34 in.		
6 in.			60 in.	36 in.		
7 in.			70 in.	42 in.		
8 in.			80 in.	48 in.		

2.2 Type 2 shade trees

2.2.1 Classification of Type 2 shade trees

Trees of slower growth than Type 1 that will not usually attain the height measurement in relation to caliper as in Type 1. The height, however, should not be less than two-thirds the height relationship given for Type 1, as shown in Table 4 in Section 2.2.2, below.

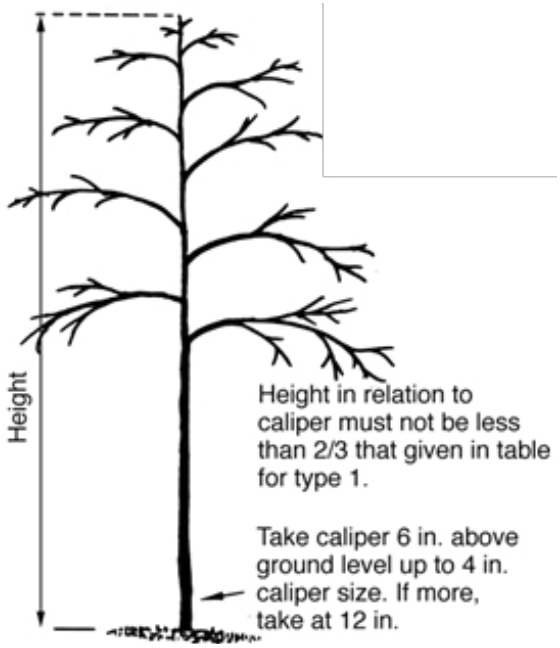


Figure 9. Measurement – Type 2 shade trees

2.2.2 Specifications for Type 2 shade trees

Table 4. Specifications for Type 2 shade trees

Specifications for field grown Type 2 shade trees shall include plant size, by caliper. Specifications for container grown Type 2 shade trees shall include plant size, by height, through 7-8′ size designation, and container class. Thereafter, plant size specification shall be by caliper.

Height measurements shall be in one-foot intervals. Caliper measurements shall be ¼-inch intervals through 1¾-2″, then ½-inch intervals through 5½-6″, then one-inch intervals through 9-10″, then two-inch intervals from 10-12″ and up. Decimal equivalents to fractions may be used.

Examples: *Aesculus pavia, Brachychiton acerifolius, Celtis reticulata, Cladrastis kentukea, Cocculus laurifolius, Conocarpus erectus var. sericeus, Fagus sylvatica, Koelreuteria paniculata, Liquidambar styraciflua, Magnolia grandiflora, Nyssa sylvatica, Quercus alba, Q. fusiformis, Sorbus aucuparia, Syringa reticulata, Handroanthus caraiba, Tilia cordata, T. euchlora*

Caliper / height specification	Minimum height (2/3 Type 1 height)	Typical maximum height	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
¼ in. / 2 ft.					#1,#2,#3	5 in.
½ in. / 4 ft.	3 ft.	6 ft.	12 in.	7 7/8 in.	#2,#3,#5	5 in.
¾ in. / 6 ft.	4 ft.	7 ft.	14 in.	9 in.	#5,#7,#10	8 in.
1 in. / 7ft.	5 ft.	8 ft.	16 in.	10 3/8 in.	#7,#10,#15	10 in.
1 ¼ in.	6 ft.	9 ft.	18 in.	11 ¾ in.	#10,#15,#20	10 in.
1 ½ in.	7 ft.	10 ft.	20 in.	12 in.	#15,#20,#25	12 in.
1 ¾ in.	8 ft.	11 ft.	22 in.	13 1/8 in.	#15,#20, #25,#45	14 in.
2 in.	8 ft.	12 ft.	24 in.	14 3/8 in.	#20,#25,#45	16 in.
2 ½ in.	8 ft.	14 ft.	28 in.	17 in.	#25,#45,#65	18 in.
3 in.	9 ft.	15 ft.	32 in.	19 in.	#45,#65,#95/100	20 in.
3 ½ in.	9 ft.	16 ft.	38 in.	23 in.	#65,#95/100	22 in.
4 in.	11ft.	18 ft.	42 in.	25 in.	#95/100	24 in.
4 ½ in.	12 ft.	20ft.	48 in.	29 in.		30 in.
5 in.	13 ft.	22 ft.	54 in.	32 in.		
5 ½ in.			57 in.	34 in.		
6 in.			60 in.	36 in.		
7 in.			70 in.	42 in.		
8 in.			80 in.	48 in.		

2.3 Type 3 small upright trees

2.3.1 Classification of Type 3 small upright trees

This is a broad group including small, upright trees which may be grown in single-stem or multi-stem form.

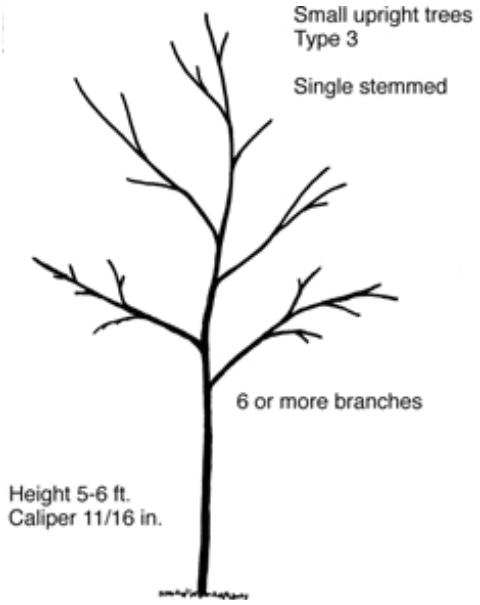


Figure 10. Type 3 small upright trees

2.3.2 Specifications for Type 3 small upright trees

Table 5. Specifications for single-stem Type 3 small upright trees

Measurement indicates height in feet through 5-6′ size interval, then caliper in inches thereafter.

Height measurements shall be in one-foot intervals.

Caliper measurements shall be ¼-inch intervals through 1¾-2″, then ½-inch intervals through 5½-6″, then one-inch intervals through 9-10″, then two-inch intervals from 10-12″ and up. Decimal equivalents to fractions may be used.

Examples: *Acer campestre, A. circinatum, Cercis, Chionanthus virginicus, Crataegus, Halesia, Malus* 'Adirondack,' *M.* 'Sentinel,' *Osmanthus fragrans, Photinia x fraseri, Podocarpus macrophyllus, Prunus cerasifera* 'Thundercloud,' *P. serrulata, P. subhirtella, Pyrus calleryana* 'Whitehouse,' 'Capitol,' *Styrax*

Height or Caliper Specification	Caliper	Minimum number of branches	Minimum Root Ball Diameter	Minimum Root Ball Depth	Acceptable Container Classes	Minimum acceptable in-ground fabric bag size (diameter)
2 ft.	5/16 in.	3	10 in.	6 ½ in	#1,#2	5 in.
3 ft.	7/16 in.	4	12 in.	7 ¾ in.	#2,#3	5 in.
4 ft.	9/16 in.	5	14 in.	9 in.	#3,#5	8 in.
5 ft.	11/16 in.	6	16 in.	10 3/8 in.	#3,#5,#7	8 in
¾ in.		7	16 in.	10 3/8 in.	#3,#5,#7	8 in.
1 in.			18 in.	11 ¾ in.	#5,#7,#10	10 in.
1 ¼ in.			19 in.	14 3/8 in.	#7,#10,#15	10 in.
1 ½ in.			20 in.	12 in.	#10,#15,#20	12 in.
1 ¾ in.			22 in.	13 ¼ in.	#15,#20,#25	14 in.
2 in.			24 in.	15 5/8 in.	#20,#25,#45	16 in.
2 ½ in.			28 in.	17 in.	#25,#45,#65	18 in.
3 in.			32 in.	19 in.	#45,#65,#95/100	20 in.
3 ½ in.			38 in.	23 in.	#65,#95/100	22 in.
4 in.			42 in.	25 in.	#95/100	24 in.
4 ½ in.			48 in.	29 in.	#95/100	30 in.
5 in.			54 in.	32 in.		
5 ½ in.			57 in.	34 in.		
6 in.			60 in.	36 in.		
7 in.			70 in.	42 in.		
8 in.			80 in.	48 in.		

2.4 Type 4 small spreading trees

2.4.1 Classification of Type 4 small spreading trees

This is a broad group including small, spreading trees of dwarf growth habit and certain large shrubs grown in single-stem or multi-stem form.

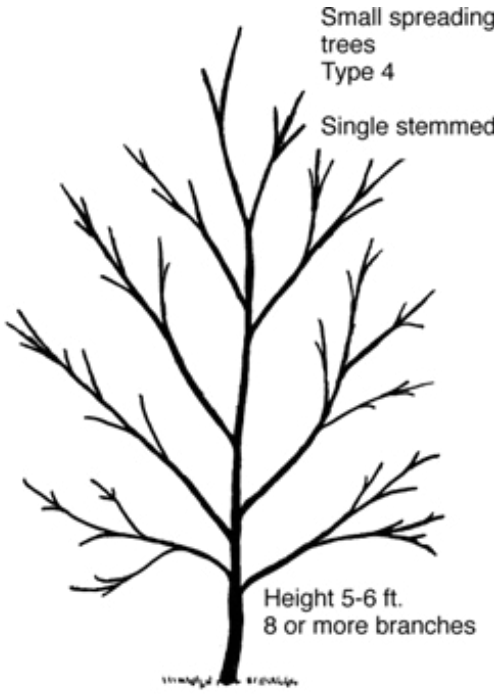


Figure 11. Type 4 small spreading trees

2.4.2 Specifications for Type 4 small spreading trees

Table 6. Specifications for single-stem Type 4 small spreading trees

Measurement indicates height in feet through 5-6′ size interval, then caliper in inches thereafter.

Height measurements shall be in one-foot intervals.

Caliper measurements shall be ¼-inch intervals through 1¾-2″, then ½-inch intervals through 5½-6″, then one-inch intervals through 9-10″, then two-inch intervals from 10-12″ and up. Decimal equivalents to fractions may be used.

Examples: *Vachellia farnesiana, Acer palmatum, A. griseum, Calliandra haematocephala, Melaleuca viminalis, Citris reticulata, Conocarpus erectus, Cornus florida, Laburnum x watereri, Lagerstroemia indica, Ligustrum japonicum* (tree forms)*, L. lucidum, Loropetalum chinensis, Magnolia x soulangiana, M. stellata, Malus sargentii, Olea europaea, Viburnum prunifolium, Vitex agnus-castus*

Height	Caliper	Minimum number of branches	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
2 ft.		4	10 in.	6 ½ in	#1,#2	5 in.
3 ft.		5	12 in.	7 7/8 in.	#2,#3	5 in.
4 ft.		7	14 in.	9 in.	#3,#5	5 in.
5 ft.		8	16 in.	10 3/8 in.	#3,#5,#7	8 in.
	¾ in.	8	16 in.	10 3/8 in.	#3,#5,#7	8 in.
	1 in.		18 in.	11 ¾ in.	#5,#7,#10	10 in.
	1 ¼ in.		19 in.	14 3/8 in.	#7,#10,#15	10 in.
	1 ½ in.		20 in.	12 in.	#10,#15,#20	12 in.
	1 ¾ in.		22 in.	13 1/8 in.	#15,#20,#25	14 in.
	2 in.		24 in.	15 5/8 in.	#20,#25,#45	16 in.
	2 ½ in.		28 in.	17 in.	#25,#45,#65	18 in.
	3 in.		32 in.	19 in.	#45,#65,#95/100	20 in.
	3 ½ in.		38 in.	23 in.	#65,#95/100	22 in.
	4 in.		42 in.	25 in.	#95/100	24 in.
	4 ½ in.		48 in.	29 in.	#95/100	30 in.
	5 in.		54 in.	32 in.		
	5 ½ in.		57 in.	34 in.		
	6 in.		60 in.	36 in.		
	7 in.		70 in.	42 in.		
	8 in.		80 in.	48 in.		

2.5 Trees with multiple stems (trunks)

2.5.1 General application

See Section 1.2.3 for required specifications for trees with multiple stems (trunks).

Trees with multiple stems (trunks) occur naturally in many genera or may be manipulated in the nursery.

"Suckers" from trunks or from the roots that have branching or form that are not typical for the species or cultivar shall not be treated as "stems" or "trunks."

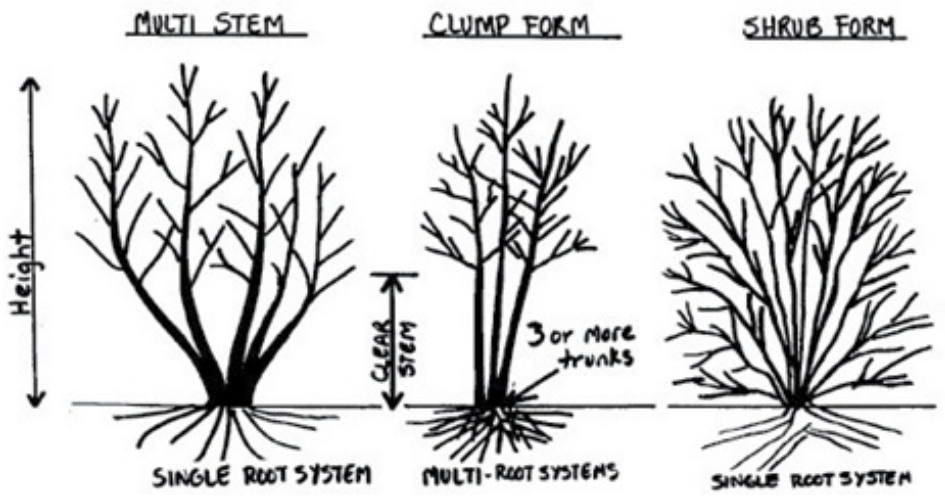


Figure 12. Classification of multi-stem, clump form, and shrub form trees

2.5.2 Shrub form trees

2.5.2.1 Classification of shrub form trees

This form is classified by the manner in which the plant is maintained, in that generally all persistent, thriving stems arising from the root crown or at a point just above the root crown are retained, and foliage is allowed to remain intact on branches close to the ground. Additional stems may grow from the root crown or at a point just above the root crown and be allowed to grow to maturity throughout the life of the plant, and older stems may be pruned to the ground. Also, species in this group generally do not exceed 15 feet in height at maturity, are generally Type 3 or Type 4 trees, and may naturally produce multiple stems without manipulation in the nursery.

Examples:

> Narrow or upright habit: *Amelanchier, Cornus kousa, C. mas, Corylus americana, Crataegus phaenopyrum, Laegerstroemia indica, L. 'Victor,' Syringa vulgaris, Viburnum lentago, V. opulus*
>
> Broad or spreading habit: *Acacia minuta, Aesculus parviflora, Betula nigra* 'Fox Valley,' *Cotoneaster multiflorus, Crataegus crus galli inermis, Hamamelis vernalis, Magnolia Betty, M. stellata, Prunus cistena, Viburnum lantana, V. rhytidophyllum*

2.5.2.2 Measurement intervals for shrub form trees

Height intervals for shrub form trees shall be as follows: one-foot intervals up to 7-8' height, then two-foot intervals thereafter.

2.5.3 Clump form trees

2.5.3.1 Classification of clump form trees

Where three or more young trees have been planted in a group and have grown together as a single tree having three or more main stems or trunks, distinguished from shrub form trees by the manner in which the plant is maintained, in that foliage is generally removed from the lower portion of the plant.

2.5.3.2 Unified root system of clump form trees

Clump form trees shall have a unified, well-established root system in order to allow harvest, shipment, and planting as a single root ball.

2.5.3.3 Measurement intervals for clump form trees

Plant size for Types 1 and 2 clump form trees may be specified by height or caliper up to 7-8′ height, and then should be specified by caliper thereafter. Types 3 and 4 clump form trees should be specified by height through 5-6′, then by caliper thereafter.

2.5.4 Classification of multi-stem trees

Where three or more main stems arise from the ground from a single root crown or at a point just above the root crown, distinguished from shrub form trees by the manner in which the plant is maintained, in that foliage is generally removed from the lower portion of the plant.

For species that naturally produce multiple stems from the roots, only a certain number of stems or trunks are retained when the plant is young and thereafter maintained as the plant matures.

Larger plants described in this section as "multi-stem" trees may alternatively be specified as "multi-trunk" trees.

It is recognized that, in certain regions of the country, some species are generally sold in the trade as tree forms rather than shrub forms even though they are allowed to retain most of the lower branches and foliage (example: Betula), but only a limited number of main stems or trunks are retained as the tree matures.

Examples (clump form or multi-stem): *Acer ginnala, A. rubrum, Alnus glutinosa, Amelanchier laevis, Betula nigra, Carpinus caroliniana, Cercidium, Cercis Canadensis, Cornus alternifolia, C. florida, Corylus avellana, Crataegus punctata, Fraxinus pennsylvanica var. lanceolata, Gleditsia triacanthos inermis, Hamamelis virginiana, Lagerstroemia* 'Natchez,' *Magnolia soulangiana, M. virginiana, Malus floribunda, Prosopis, Prunus padus, Syringa reticulata, Tilia cordata, T. euchlora, Viburnum plicatum, V. prunifolium*

2.5.4.1 Designation as "single trunk, low branching"

Where multiple stems or major branches originate from a single main stem at a point no higher than six inches from the ground. These types are created with specialized techniques rather than as natural to the species (e.g., grafted fruit trees, special forms of Malus).

This type shall be so specified. If the lowest branches are more than six inches from the ground, specify under the appropriate Section 2.1, 2.2, 2.3, or 2.4, above, and include "low-branched" specification.

2.5.5 Root ball diameters and container classes for clump form, shrub form, and multi-stem trees

2.5.5.1 Root ball diameters for clump form trees

Minimum root ball diameters for clump form trees shall be determined with reference to the appropriate plant type tables shown above in this Section 2, using the caliper equal to one-half (1⁄2) of the total caliper of up to the three largest required trunks, regardless of the method of caliper measurement used in the specification, and even if height only is specified (e.g., for Type 1 or 2 shade tree).

For clump form trees with more than 12 inches between the center points of any two trunks, one-half of that distance should be added to the root ball diameter shown in the appropriate plant type table to assure that a sufficient amount of roots around the perimeter of the ball are retained during harvest. For instance, if two trunks are 14 inches from center to center, seven inches should be added to the root ball size indicated in the appropriate plant type table.

A caliper measurement resulting from the application of the formula which falls between a caliper measurement in the appropriate plant type table should use the next larger caliper shown in the table (e.g., for Type 4 tree, Table 6, 3 ¾ inch caliper, round up to 4-inch caliper, requiring a minimum 42-inch root ball).

2.5.5.2 Root ball diameters and container classes for shrub form and multi-stem trees

Minimum root ball diameters for shrub form and multi-stem trees shall be determined by height, in accordance with the following Table 7, even if caliper measurements are included in the specifications.

Table 7. Root ball diameters and container classes for shrub form and multi-stem trees

	Narrow or upright habit (width no more than ½ height at maturity)	Broad or spreading habit (width at least ½ height at maturity)	
Average Height	Minimum Diameter Ball	Minimum Diameter Ball	Acceptable Container Classes
2 ft.			#2,#3
3 ft.			#3,#5
4 ft.	14 in.	22 in.	#3,#5,#7
5 ft.	18 in.	24 in.	#5,#7,#10
6 ft.	20 in.	28 in.	#7,#10,#15
7 ft.	22 in.	36 in.	#10,#15,#20
8 ft.	24 in.	36 in.	#15,#20,#25
10 ft.	32 in.	40 in.	#20,#25,#45
12 ft.	34 in.	42 in.	#25,#45,#65
14 ft.	36 in.	42 in.	#45,#65,#95/100
16 ft.	38 in.	44 in.	#65,#95/100
18 ft.	40 in.	46 in.	#95/100
20 ft.	44 in.	50 in.	

2.6 Palms

In size grading palm trees, height shall take precedence. Either of two heights may be specified: overall height or trunk height.

Overall height is the perpendicular height from the ground, which should be at or near the top of the root zone, to the top of the arc made by the uppermost arching frond with the tree standing in natural position.

Trunk height is measured from the ground line, which should be at or near the top of the root zone, to the base of the heart leaf.

In cases where the root ball or box (container) size is not specified, the minimum root ball size or box size recommended in this section shall be deemed acceptable (see Table 6 or Table 7).

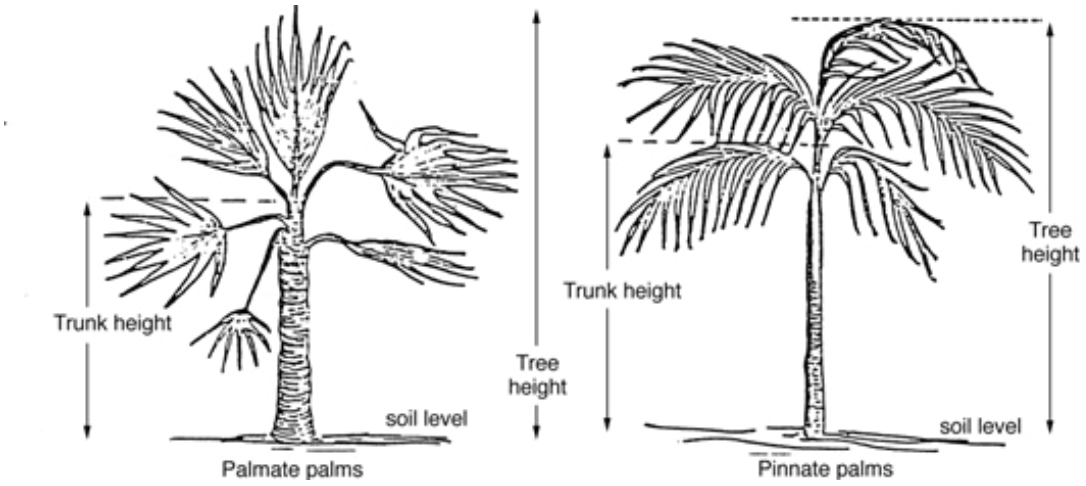


Figure 13. Palms

2.7 Caliper/height/root spread relationship for nursery grown bare root trees

All bare root trees shall have a well-branched root system characteristic of the species. The following table represents the minimum root spread for nursery grown shade trees.

Table 8. Caliper/height/root spread relationship for nursery grown bare root trees

Caliper	Average height range	Minimum root spread
½ in.	5 to 6 ft.	12 in.
¾ in.	6 to 8 ft.	16 in.
1 in.	8 to 10 ft.	18 in.
1 ¼ in.	8 to 10 ft.	20 in.
1 ½ in.	10 to 12 ft.	22 in.
1 ¾ in.	10 to 12 ft.	24 in.
2 in.	12 to 14 ft.	28 in.
2 ½ in.	12 to 14 ft.	32 in.
3 in.	14 to 16 ft.	38 in.

2.8 Field potted or field boxed

Field potted plants are field-grown nursery-grown plants, dug with a ball of earth still intact in which they are growing, and which, in lieu of burlapping, are placed in a container to retain the ball unbroken.

The minimum root ball sizes shall be equal to those specified in the appropriate plant type table for field grown nursery stock before being placed in the container.

2.9 Processed balled

Processed balled plants are field-grown, nursery-grown plants, dug bare root, while dormant, to which a growing medium is mechanically or manually formed around the roots to form a ball.

The minimum root ball sizes for processed balled trees shall be equal to those specified in the appropriate plant type table for field grown nursery stock.

Section 3: Deciduous Shrubs

This section applies to plants generally sold to the retail and landscape trade.
For liner grades see Section 7.

3.1 Minimum number of canes

The tables provided in this section show the typical minimum number of canes for each plant size for each plant type (See Section 1.2.2.2 and Figure 3 for measurement of deciduous shrubs). They are intended as guidelines to determine the minimum number of canes generally acceptable in the trade for deciduous shrubs. Specifiers may include the minimum number of canes in a specification if the guidelines shown in this section are insufficient for a particular transaction.

3.2 Type 0 tender deciduous shrubs

3.2.1 Classification of Type 0 tender deciduous shrubs

Plants having a tendency not to produce top growth that is fully winter hardy in certain parts of the country may be classified as Type 0 tender deciduous shrubs. It is general practice to prune to the ground or to live wood due to partial or complete die-back. Many types of plants may have various degrees of persistence in the woody stems in different parts of the country and would not be included as Type 0 plants in regions where stems reach maturity without significant die-back each year. In some cases, these plants are referred to as "woody perennials."

3.2.2 Specifications for Type 0 tender deciduous shrubs

Plant size (top growth) specification may be by height or spread, whichever is greater, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one-foot intervals from 3-4' and up.

Plants may not meet plant size specification or minimum number of canes at the time of shipment at certain times of the year but would be expected to reach the plant size specification and minimum number of canes during the first growing season after shipment. In cases where plants may be shipped after being pruned back and before reaching plant size specification, specifications shall also include a minimum spread of roots.

Specifications for Type 0 tender deciduous shrubs may include only the container size.

Table 9. Deciduous shrubs – Type 0 tender shrubs					
Plant size specification indicates height or spread, whichever is greater, after one full season of growth after shipment, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one foot intervals from 3-4' and up.					
Examples: *Buddleia, Caesalpina pulcherrima, Caryopteris, Hydrangea macrophylla, H. arborescens, Vitex*					
Height or spread	Minimum number of canes	Minimum spread of roots or root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
6 in.	2	3 in.	1 7⁄8 in.	#SP4,#1,#2	5 in.
9 in.	2	4 in.	2 5⁄8 in.	#1,#2,#3	5 in.
12 in.	3	5 in.	3 1⁄4 in.	#1,#2,#3,#5	5 in.
15 in.	3	7 in.	4 1⁄2 in.	#2,#3,#5	5 in.
18 in.	4	9 in.	5 3⁄4 in.	#3,#5,#7	8 in.
24 in.	4	11 in.	7 1⁄8 in.	#5,#7,#10	8 in.

3.3 Type 1 small or dwarf deciduous shrubs

3.3.1 Classification of Type 1 small or dwarf deciduous shrubs

Plants that typically do not grow to a mature height or spread exceeding three feet.

3.3.2 Specifications for Type 1 small or dwarf deciduous shrubs

Table 10. Deciduous shrubs – Type 1 small or dwarf shrubs					
Plant size specification indicates height or spread, whichever is greater, using three-inch intervals through 15-18", then six-inch intervals through 30-36"					
Examples: *Berberis thunbergii* 'Crimson Pygmy,' *Cotoneaster apiculata, C. dameri* 'Coral Beauty,' *C. horizontalis, Cytisus prostrata, Deutzia gracilis* 'Nikko,' *Forsythia* 'Arnold Dwarf,' *F. x bronxensis, F. x Gold Tide, Fothergilla* 'Blue Mist,' *Genista pilosa, Itea virginica Little Henry, Salix prostrata, Spiraea japonica var. alpina, S.* 'Gold Mound,' *S.* 'Little Princess,' *Symphoricarpos x chenaulti, Viburnum opulus nanum, Weigela floribunda* 'Minuet'					
Height or Spread	Minimum number of canes	Minimum spread of roots or root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
6 in.	3	4 in.	2 5⁄8 in.	#SP4,#1	5 in.
9 in.	3	6 in.	3 7⁄8 in.	#1,#2	5 in.
12 in.	4	8 in.	5 1⁄4 in.	#1,#2,#3	5 in.
15 in.	4	9 in.	5 3⁄4 in.	#2,#3,#5	5 in.
18 in.	5	10 in.	6 1⁄2 in.	#3,#5	8 in.
24 in.	5	11 in.	7 1⁄8 in.	#5,#7	8 in.
30 in.	6	12 in.	7 3⁄4 in.	#5,#7,#10	10 in.

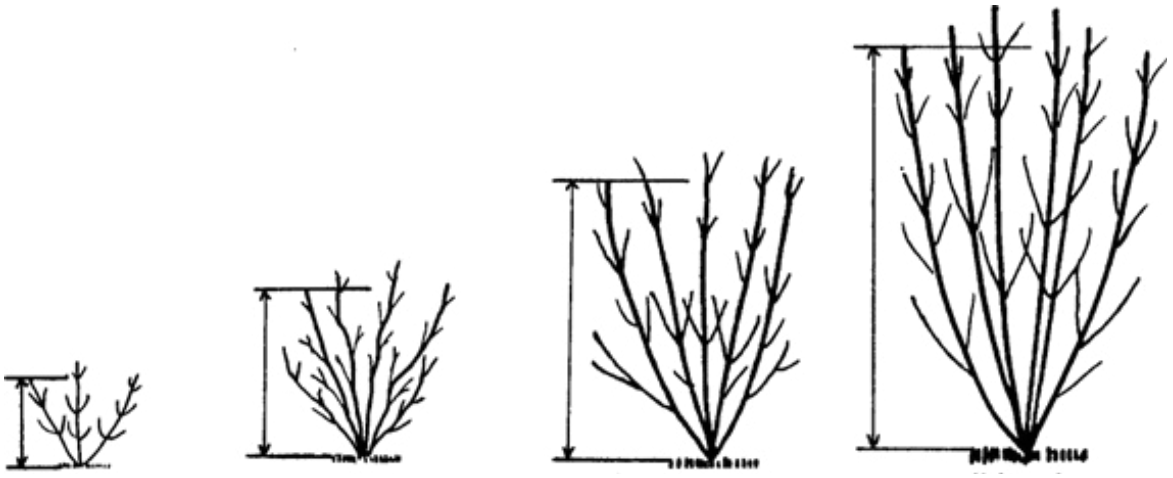
3.4 Type 2 intermediate deciduous shrubs

3.4.1 Classification of Type 2 intermediate deciduous shrubs

Plants that typically mature at a height or spread from three feet up to seven feet.

3.4.2 Specifications for Type 2 intermediate deciduous shrubs

Table 11. Deciduous shrubs – Type 2 intermediate					
Plant size specification indicates height, using three-inch intervals through 3-6″, then six-inch intervals through 18-24″, then one-foot intervals from 2-3′ to 6′7′					
Examples: *Azalea x* (exbury, mollis hybrids), *Chaenomeles japonica, Cornus sericea, Cotoneaster divaricatus, Euonymus alata* 'Compacta,' *Fothergilla* 'Mount Airy,' *Lagerstroemia indica* 'Victor,' *Potentilla fruticosa, Spiraea x bumalda* 'Froebelii,' *S. nipponica* 'Snowmound,' *S. x vanhouttei, Viburnum carlesii, V. juddi, Weigela floribunda Wine & Roses,* 'Vanicek,' *W. florida* 'Java Red'					
Height	Minimum number of canes	Minimum spread of roots or root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
6 in.	3	6 in.	3 7⁄8 in.	#SP4,#1	5 in.
12 in.	3	8 in.	5 1⁄4 in.	#1,#2	5 in.
18 in.	4	10 in.	6 1⁄2 in.	#2,#3,#5	8 in.
2 ft.	4	12 in.	7 3⁄4 in.	#3,#5,#7	8 in.
3 ft.	5	14 in.	9 in.	#5,#7,#10	10 in.
4 ft.	5	18 in.	11 in.	#7,#10,#15	12 in.
5 ft.	6	24 in.	14 in.	#10,#15,#25	14 in.
6 ft.	6	30 in.	18 in.	#15,#25	16 in.



12″ ht., 3 canes 2′ ht., 4 canes 4′ ht., 5 canes 6′ ht., 6 canes

Figure 14. Type 2 intermediate deciduous shrubs

3.5 Type 3 large or tall deciduous shrubs

3.5.1 Classification of Type 3 large or tall deciduous shrubs

Plants that grow to a mature height exceeding seven feet.

3.5.2 Specifications for Type 3 large or tall deciduous shrubs

Table 12. Type 3 large or tall deciduous shrubs

Plant size specification indicates height, using three-inch intervals through 3-6", then six-inch intervals through 18-24", then one-foot intervals through 5-6', then two-feet intervals from 6-8' and up.

Examples: *Amelanchier laevis, Cornus racemosa, Forsythia* (tall varieties)*, Hamamelis virginiana, Ilex verticillata, Ligustrum* (tall varieties), *Physocarpus, Syringa '*Madame Lemoine*,' Viburnum opulus, V. lantana, V. plicatum, Weigela floribunda '*Eva Radke'

Height	Minimum number of canes	Minimum spread of roots or root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
12 in.	3	8 in.	5 1⁄4 in.	#1	5 in.
18 in.	4	10 in.	6 1⁄2 in.	#2,#3	8 in.
2 ft.	5	12 in.	7 3⁄4 in.	#2,#3,#5	8 in.
3 ft.	5	16 in.	10 in.	#5,#7,#10	10 in.
4 ft.	6	20 in.	12 in.	#7,#10,#15	12 in.
5 ft.	6	24 in.	14 in.	#10,#15,#25	14 in.
6 ft.	7	30 in.	18 in.	#10,#15,#25	16 in.
8 ft.	8	36 in.	21 in.	#15,#25,#45	18 in.
10 ft.	9	44 in.	26 in.	#25,#45,#65	22 in.
12 ft.	10	52 in.	31in.	#45,#65,#95/100	24 in.

3.5.3 Exception for Type 3 deciduous shrubs with a narrow habit

Deciduous shrubs with a narrow habit may have significantly fewer canes and a significantly smaller spread of harvested roots than shown in the table. Some varieties may be most desirable with single canes, regardless of height.

Examples: *Cornus alternifolia, Syringa vulgaris, Viburnum lentago.*

Section 4: Coniferous Evergreens

This section applies to plants generally sold to the retail and landscape trade. For lining out stock, see Section 7.

4.1 Determining root ball, container, or fabric bag size

For **natural** or **semi-sheared** conifers, root ball size shall be determined in accordance with the appropriate plant type tables in Section 4 below.

For **sheared** form conifers specified as "S" in accordance with Section 1.1.4, the following language shall apply:

Where it has been a cultural practice to shear, prune, disbud, or otherwise impede the natural growth rate of this group of plants, other than by root pruning, caliper measurement shall be used to determine the minimum root ball diameter, container class, or in-ground fabric bag size.

Measurement of trunk diameter of sheared conifers shall be made in the manner set forth in Section 1.2.1 - Measuring caliper. In those cases where branches interfere with caliper measurement, the caliper shall be taken just above, and as near to, the six-inch or 12-inch location on the trunk as practicable.

4.2 Optional minimum or maximum caliper specifications

In addition to the required height or spread designation, specifications may include minimum or maximum calipers to limit root ball size, and sellers may include minimum or maximum calipers within size intervals in inventory and marketing materials.

4.3 Dwarf conifers are not a separate classification

Dwarf varieties are not classified as a separate plant type for purposes of this section. They should be classified and specified in accordance with the appropriate plant types set forth in this section, in accordance with the natural habit of the particular cultivar.

4.4 Type 1 conifers - creeping or prostrate

4.4.1 Classification of Type 1 conifers

Plants that generally do not exceed three feet in height at maturity, with spread increasing over time with little or no increase in height. Tall plants with a weeping habit should not be included in this plant type.

4.4.2 Specifications for Type 1 conifers

Table 13. Specifications for Type 1 conifers

Plant size specification indicates minimum average spread, using three-inch intervals through 15-18", then six-inch intervals through 42-48", then one-foot intervals from 4-5' and up.

Examples: *Juniperus horizontalis cultivars, Juniperus chinensis var. procumbens, Juniperus communis* 'Repanda'

Plant size (spread)	Caliper (for sheared conifers)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
3 in.				#SP4, #SP5	5 in.
6 in.				#SP5, #1	5 in.
9 in.		8 in.	5 in.	#1,#2	5 in.
12 in.		10 in.	6 ½ in.	#2,#3	5 in.
15 in.		12 in.	7 ¾ in	#3,#5	5 in.
18 in.		14 in.	9 in.	#3,#5,#7	8 in.
24 in.		16 in.	10 3⁄8 in.	#5,#7,#10	8 in.
30 in.		18 in.	11 ¾ in.	#7,#10,#15	10 in.
36 in.		24 in.	14 ½ in.	#10,#15,#25	10 in.
42 in.		26 in.	15 ½ in.	#10,#15,#25,#45	10 in.
4 ft.		28 in.	16 ¾ in.	#15,#25,#45,#65	10 in.
	3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
5 ft.		36 in.	21 ½ in.	#25,#45,#65,#95/100	12 in.
	3 ½ in.	38 in.	22 ¾ in.	#65,#95/100	22 in.
6 ft.		40 in.	24 in.	#95/100	14 in.
	4 in.	42 in.	25 in.	#95/100	24 in.
7 ft.		46 in.	27 in.		16 in.
	4 ½ in.	48 in.	29 in.		30 in.
8 ft.		52 in.	31 in.		16 in.
	5 in.	54 in.	32 in.		
	5 ½ in.	57 in.	34 in.		
	6 in.	60 in.	36 in.		
	7 in.	70 in.	42 in.		
	8 in.	80 in.	48 in.		

4.5 Type 2 conifers - semi-spreading

4.5.1 Classification of Type 2 conifers

Height will be less than spread (less than a ratio of 1:1). Height will be at least one-half the spread up to 30-36" spread; the height will remain less than the spread thereafter, varying somewhat according to the natural growth of the particular species and method of handling.

4.5.2 Specifications for Type 2 conifers

Table 14. Specifications for Type 2 conifers

Plant size specification indicates average spread, using three-inch intervals through 15-18", then six-inch intervals through 42-48", then one-foot intervals from 4-5' and up.

Examples: Juniperus chinensis 'Pfitzerana,' *J. sabina cultivars, Picea abies* 'Nidiformis,' *Taxus media* 'Densiformis'

Plant size (spread)	Minimum height	Maximum height	Caliper (for sheared conifers)	Minimum root ball diameter	Minimum root ball depth	Acceptable container Classes	Minimum acceptable in- ground fabric bag size (diameter)
3 in.	1 ½ in.	3 in.				#SP4, #SP5	5 in.
6 in.	3 in.	6 in.				#SP5, #1	5 in.
9 in.	4 ½ in.	9 in.		8 in.	5 in.	#1,#2	5 in.
12 in.	6 in.	12 in.		10 in.	6 ½ in.	#2,#3	5 in.
15 in.	7 ½ in.	15 in.		12 in.	7 ¾ in	#3,#5	5 in.
18 in.	9 in.	18 in.		14 in.	9 in.	#3,#5,#7	8 in.
24 in.	12 in.	24 in.		16 in.	10 3⁄8 in.	#5,#7,#10	8 in.
30 in.	15 in.	30 in.		18 in.	11 ¾ in.	#7,#10,#15	10 in.
36 in.	21 in.	36 in.		24 in.	14 ½ in.	#7,#10,#15,#25	10 in.
42 in.	27 in.	42 in.		26 in.	15 ½ in.	#10,#15,#25,#45	10 in.
4 ft.	33 in.	4 ft.		28 in.	16 ¾ in.	#15,#25,#45	10 in.
			3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
5 ft.	42 in.	5 ft.		36 in.	21 ½ in.	#25,#45,#65	12 in.
			3 ½ in.	38 in.	22 ¾ in.	#65,#95/100	22 in.
6 ft.	51 in.	6 ft.		40 in.	24 in.	#95/100	14 in.
			4 in.	42 in.	25 in.	#95/100	24 in.
7 ft.	60 in.	7 ft.		46 in.	27 in.		16 in.
			4 ½ in.	48 in.	29 in.		30 in.
8 ft.	70 in.	8 ft.		52 in.	31 in.		16 in.
			5 in.	54 in.	32 in.		
			5 ½ in.	57 in.	34 in.		
			6 in.	60 in.	36 in.		
			7 in.	70 in.	42 in.		
			8 in.	80 in.	48 in.		

4.6 Type 3 conifers - broad spreading, globe, and compact upright

4.6.1 Classification of Type 3 conifers

Spread will usually be equal to a height up to 12-15" spread. Thereafter, the relation of height to spread will vary somewhat according to natural growth of the particular species and method of handling as these plants mature, but height to spread ratio should never exceed 2:1.

Many broad spreading and globe types included in this classification will have the same or greater spread as height, even in the larger sizes.

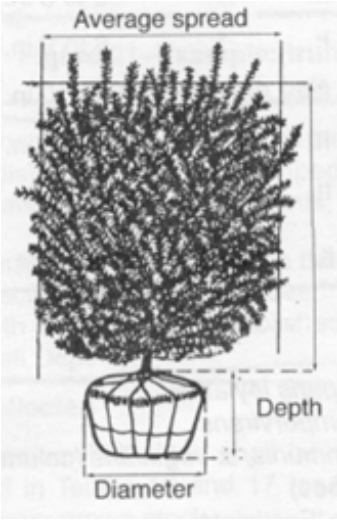


Figure 15. Measurement – Type 3 coniferous evergreens

4.6.2 Specifications for Type 3 conifers

Table 15. Specifications for Type 3 conifers

Plant size specification indicates height, using three-inch intervals through 15-18", then six-inch intervals through 42-48", then one-foot intervals from 4-5' and up.

Examples: *Chamaecyparis obtusa* 'Gracillis,' 'Nana,' *C. pisifera* 'Plumosa Nana,' 'Squarrosa Minima,' *C. thyoides* 'Heather Bun,' *Juniperus chinensi* 'Blaauwii,' *Juniperus squamata* 'Meyeri,' *Juniperus virginiana* 'Globosa,' *Picea pungens* 'Globosa,' *Pinus mugo* 'Pumilio,' *Taxus media* ' Brownii,' *Thuja occidentalis* 'Globosa,' 'Little Gem,' 'Hoveyi,' 'Compacta,' 'Woodwardii,' 'Hetz Midget,' 'Danica,' 'Little Giant,' ' Holmstrup,' *T. orientalis* 'Goldbush'

Plant size (height)	Minimum spread	Maximum spread	Caliper (for sheared conifers)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
3 in.						#SP4, #SP5	5 in.
6 in.	6 in.	8 in.				#SP5, #1	5 in.
9 in.	9 in.	12 in.		8 in.	5 in.	#1,#2	5 in.
12 in.	10 in.	15 in.		10 in.	6 ½ in.	#2,#3	5 in.
15 in.	12 in.	18 in.		12 in.	7 ¾ in	#3,#5	5 in.
18 in.	15 in.	21 in.		14 in.	9 in.	#3,#5,#7	8 in.
24 in.	18 in.	30 in.		16 in.	10 3/8 in.	#5,#7,#10	8 in.
30 in.	21 in.	36 in.		18 in.	11 ¾ in.	#7,#10,#15	10 in.
36 in.	24 in.	42 in.		24 in.	14 ½ in.	#7,#10,#15,#25	10 in.
42 in.	28 in.	4 ft.		26 in.	15 ½ in.	#10,#15,#25,#45	10 in.
4 ft.	32 in.	5 ft.		28 in.	16 ¾ in.	#15,#25,#45,#65	10 in.
			3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
5 ft.	40 in.	6 ft.		36 in.	21 ½ in.	#25,#45,#65,#95	12 in.
			3 ½ in.	38 in.	22 ¾ in.	#65,#95/100	22 in.
6 ft.	48 in.	7 ft.		40 in.	24 in.		14 in.
			4 in.	42 in.	25 in.	#95/100	24 in.
7 ft.	56 in.	8 ft.		46 in.	27 in.		16 in.
			4 ½ in.	48 in.	29 in.		30 in.
8 ft.	64 in.	9 ft.		52 in.	31 in.		16 in.
			5 in.	54 in.	32 in.		
			5 ½ in.	57 in.	34 in.		
			6 in.	60 in.	36 in.		
			7 in.	70 in.	42 in.		
			8 in.	80 in.	48 in.		

4.7 Type 4 conifers - cone type (pyramidal)

4.7.1 Classification of Type 4 conifers

The ratio of height to spread of properly grown material should not be less than 5:3

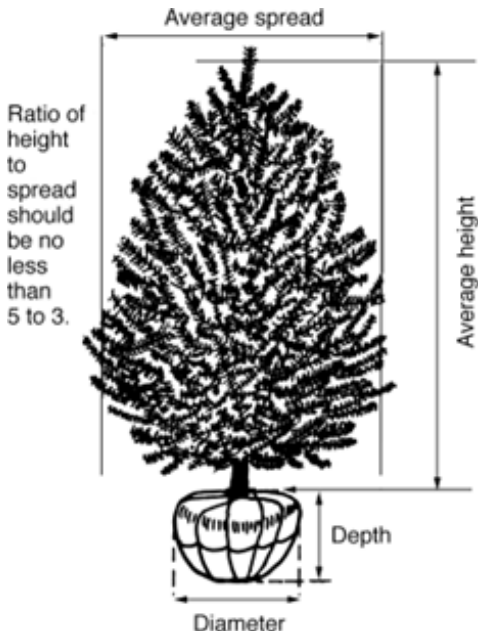


Figure 16. Determining average height – Type 4 coniferous evergreens

4.7.2 Specifications for Type 4 conifers

Table 16. Specifications for Type 4 conifers

Plant size specification is by height, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one-foot intervals through 9-10', then two-foot intervals from 10-12' and up.

Examples: *Abies, A. concolor, Cedrus deodara, Chamaecyparis pisifera* and varieties (except dwarf types), *Picea abies* (conical types)*, P. glauca, P. pungens, Pinus* (except dwarf types), *Pseudotsuga menziesii, Taxus cuspidata* 'Capitata,' *Thuja occidentalis, T. orientalis* (conical types)*, Tsuga canadensis, T. caroliniana. T. heterophylla*

Plant size (height)	Maximum spread	Caliper (for sheared conifers)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	3 in.				#SP3, #SP4	5 in.
6 in.	6 in.				#SP4,#SP5,#1	5 in.
9 in.	9 in.				#SP5,#1	5 in.
12 in.	12 in.		8 in.	5 in.	#1,#2	5 in.
15 in.	15 in.		10 in.	6 ½ in.	#2,#3	5 in.
18 in.	18 in.		12 in.	7 ¾ in	#2,#3,#5	8 in.
24 in.	21 in.		14 in.	9 in.	#3,#5,#7	8 in.
30 in.	24 in.		16 in.	10 3⁄8 in.	#3,#5,#7,#10	10 in.
3 ft.	30 in.		18 in.	11 ¾ in.	#5,#7,#10	10 in.
4 ft.	36 in.		20 in.	12 in.	#7,#10,#15	10 in.
5 ft.	4 ft.		22 in.	13 ¼ in.	#7,#10,#15,#25	12 in.
6 ft.	4 ½ ft.		24 in.	14 3⁄8 in.	#10,#15,#25,#45	14 in.
7 ft.	5 ft.		26 in.	15 ½ in.	#15,#25,#45,#65	16 in.
8 ft.	5 ½ ft.		28 in.	16 ¾ in.	#25,#45,#65,#95/100	16 in.
9 ft.	6 ft.		32 in.	19 in.	#45,#65,#95/100	18 in.
		3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
		3 ½ in.	38 in.	23 in.	#65,#95/100	22in.
		4 in.	42 in.	25 in.	#95/100	24 in.
		4 ½ in.	48 in.	29 in.		30 in.
		5 in.	54 in.	32 in.		
		5 ½ in.	57 in.	34 in.		
		6 in.	60 in.	36 in.		
		7 in.	70 in.	42 in.		
		8 in.	80 in.	48 in.		
		9 in.	90 in.	54 in.		

4.8 Type 5 conifers - broad upright

4.8.1 Classification of Type 5 conifers

This group includes the broader, upright-growing evergreens, which develop a straight-sided form with many upright branches or "leaders." The ratio of height to spread of properly grown material should not be less than 2:1.

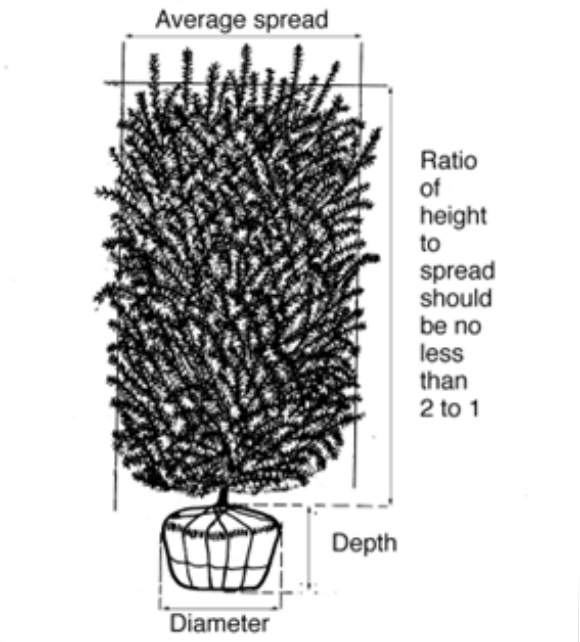


Figure 17. Measurement - Type 5 coniferous evergreens

4.8.2 Specifications for Type 5 conifers

Table 17. Specifications for Type 5 conifers

Plant size specification indicates height, using three-inch intervals through 15-18", then six- inch intervals through 30-36", then one-foot intervals through 9-10', then two-foot intervals from 10-12' and up.

Examples: *Chamaecyparis lawsoniana* 'Allumii,' *C. pisifera* 'Filifera,' *Juniperus chinensis* 'Keteleeri,' 'Mountbatten,' *J. scopulorum* 'Wichata Blue,' *Taxus media* 'Hicksii,' 'Hatfieldii,' *Thuja occidentalis* 'Wareana'

Plant size (height)	Maximum spread	Caliper (for sheared conifers)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in- ground fabric bag size (diameter)
3 in.	3 in.				#SP3,#SP4	5 in.
6 in.	6 in.				#SP4,#SP5,#1	5 in.
9 in.	9 in.				#SP5,#1	5 in.
12 in.	12 in.		8 in.	5 in.	#1,#2	5 in.
15 in.	15 in.		10 in.	6 ½ in.	#2,#3	5 in.
18 in.	18 in.		12 in.	7 ¾ in	#2,#3,#5	8 in.
24 in.	21 in.		14 in.	9 in.	#3,#5,#7	8 in.
30 in.	24 in.		16 in.	10 3⁄8 in.	#3,#5,#7,#10	10 in.
3 ft.	30 in.		18 in.	11 ¾ in.	#5,#7,#10	10 in.
4 ft.	36 in.		20 in.	12 in.	#7,#10,#15	10 in.
5 ft.	4 ft.		22 in.	13 ¼ in.	#7,#10,#15,#25	12 in.
6 ft.	4 ½ ft.		24 in.	14 3⁄8 in.	#10,#15,#25,#45	14 in.
7 ft.	5 ft.		26 in.	15 ½ in.	#15,#25,#45,#65	16 in.
8 ft.	5 ½ ft.		28 in.	16 ¾ in.	#25,#45,#65,#95/100	16 in.
9 ft.	6 ft.		32 in.	19 in.	#45,#65,#95/100	18 in.
		3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
		3 ½ in.	38 in.	23 in.	#65,#95/100	22in.
		4 in.	42 in.	25 in.	#95/100	24 in.
		4 ½ in.	48 in.	29 in.		30 in.
		5 in.	54 in.	32 in.		
		5 ½ in.	57 in.	34 in.		
		6 in.	60 in.	36 in.		
		7 in.	70 in.	42 in.		
		8 in.	80 in.	48 in.		
		9 in.	90 in.	54 in.		

4.9 Type 6 conifers - columnar type

4.9.1 Classification of Type 6 conifers

This group includes the upright growing evergreens which naturally develop a straight sided form or one that tapers only slightly from the ground to a point more than half the height.

The broader types will usually have a ratio of height to spread of 4 to 1. Many forms, however, will not attain this ratio, and even those of broad habit may be trimmed to advantage into a narrowed form. However, in most cases the ratio of height to spread should be less than 5 to 1.

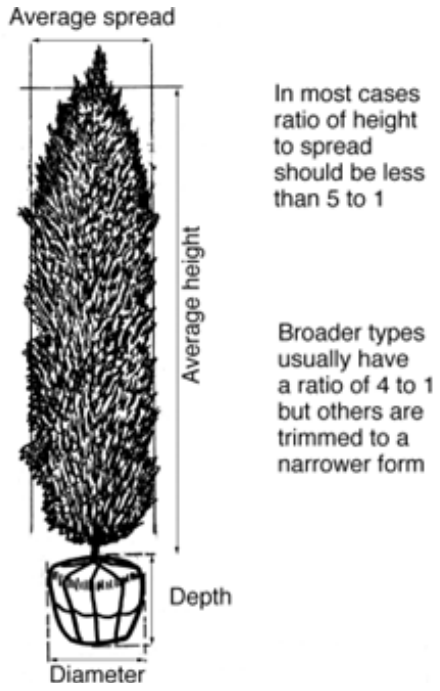


Figure 18. Measurement – Type 6 coniferous evergreens

4.9.2 Specifications for Type 6 conifers

Table 18. Specifications for Type 6 conifers

Plant size specification indicates height, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one-foot intervals through 9-10', then two-foot intervals from 10-12' and up.

Examples: *Cupressus x leylandii, Cupressus sempervirens, Juniperus communis* 'Suecica Aurea,' *J. virginiana* (columnar type varieties), *Taxus baccata* 'Fastigiata,' *Thuja occidentalis* 'Smaragd,' *T. orientalis* (columnar type varieties)

Plant size (height/ caliper)	Maximum spread	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	1 ½ in.			#SP3,#SP4	5 in.
6 in.	3 in.			#SP4,#SP5,#1	5 in.
9 in.	4 ½ in.			#SP5,#1	5 in.
12 in.	6 in.	7 in.	4 ½ in.	#1,#2	5 in.
15 in.	7 in.	8 in.	5 ¼ in.	#2,#3	5 in.
18 in.	8 in.	9 in.	6 in	#2,#3,#5	8 in.
24 in.	9 in.	11 in.	7 in.	#3,#5,#7	8 in.
30 in.	10 in.	13 in.	8 ½ in.	#3,#5,#7,#10	10 in.
3 ft.	12 in.	14 in.	9 in.	#5,#7,#10	10 in.
4 ft.	15 in.	16 in.	10 3⁄8 in.	#7,#10,#15	10 in.
5 ft.	18 in.	18 in.	11 ¾ in.	#7,#10,#15,#25	12 in.
6 ft.	21 in.	20 in.	12 in.	#10,#15,#25,#45	14 in.
7 ft.	24 in.	22 in.	13 in.	#15,#25,#45,#65	16 in.
8 ft.	30 in.	24 in.	14 in.	#25,#45,#65,#95/100	16 in.
9 ft./2½ in.	36 in.	26 in.	15 ½ in.	#45,#65,#95/100	18 in.
3 in.		28 in.	17 in.	#65,#95/100	20 in.
3 ½ in.		32 in.	19 in.	#95/100	22in.
4 in.		36 in.	22 in.		24 in.
4 ½ in.		40 in.	24 in.		30 in.
5 in.		44 in.	26 in.		
5 ½ in.		48 in.	29 in.		
6 in.		54 in.	32 in.		
7 in.		66 in.	40 in.		
8 in.		78 in.	47 in.		
9 in.		90 in.	54 in.		

Section 5: Broadleaf Evergreens

This section applies to plants generally sold to the retail and landscape trade. For lining out stock, see Section 7.

5.1 Determining root ball, container, or fabric bag size

For **natural** or **semi-sheared** broadleaf evergreens, root ball size shall be determined in accordance with the appropriate plant type tables in Section 5 below.

For **sheared** form broadleaf evergreens, specified as "S" in accordance with Section 1.1.4, the following language shall apply:

Where it has been a cultural practice to shear, prune, disbud, or otherwise impede the natural growth rate of this group of plants, other than by root pruning, caliper measurement shall be used to determine the minimum root ball diameter, container class, or fabric bag size.

Measurement of trunk diameter of sheared evergreens shall be made in the manner set forth in Section 1.2.1 – Measuring caliper. In those cases where branches interfere with caliper measurement, the caliper shall be taken just above, and as near to, the six-inch or 12-inch location on the trunk as practicable.

5.2 Optional minimum or maximum caliper specifications

In addition to the required height or spread designation, specifications may include minimum or maximum calipers to limit root ball size, and sellers may include minimum or maximum calipers within size intervals in inventory and marketing materials.

5.3 Dwarf broadleaf evergreens not a separate classification

Dwarf varieties are not classified as a separate plant type for purposes of this section. They should be classified and specified in accordance with the appropriate plant types set forth in this section, in accordance with the natural habit of the particular cultivar.

5.4 Type 1 broadleaf evergreens - spreading

5.4.1 Classification of Type 1 broadleaf evergreens

Plants that generally do not exceed three feet in height at maturity, with spread increasing over time with little or no increase in height. Tall plants with a weeping habit should not be included in this plant type.

5.4.2 Specifications for Type 1 broadleaf evergreens

Table 19. Specifications for Type 1 broadleaf evergreens

Plant size specification indicates minimum average spread, using three-inch intervals through 15-18", then six-inch intervals through 42-48", then one-foot intervals from 4-5' and up.

Examples: *Calluna vulgaris* (and cultivars), *Carissa grandiflora* 'Green Carpet,' *Cotoneaster dammeri, C. horizontalis* (and cultivars), *Cytisus* 'Lydia,' *Ilex crenata* 'Helleri,' *Mahonia nervosa, M. repens*

Plant size (spread)	Caliper (for sheared evergreens)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.				#SP4,#SP5	5 in.
6 in.				#SP5,#1	5 in.
9 in.		8 in.	5 in.	#1,#2	5 in.
12 in.		10 in.	6 ½ in.	#2,#3	5 in.
15 in.		12 in.	7 ¾ in	#3,#5	5 in.
18 in.		14 in.	9 in.	#3,#5,#7	8 in.
24 in.		16 in.	10 3/8 in.	#5,#7,#10	8 in.
30 in.		18 in.	11 ¾ in.	#7,#10,#15	10 in.
36 in.		24 in.	14 ½ in.	#10,#15,#25	10 in.
42 in.		26 in.	15 ½ in.	#10,#15,#25,#45	12 in.
4 ft.		28 in.	16 ¾ in.	#15,#25,#45,#65	12 in.
	3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
5 ft.		36 in.	21 ½ in.	#25,#45,#65,#95/100	14 in.
	3 ½ in.	38 in.	22 ¾ in.	#65,#95/100	22 in.
6 ft.		40 in.	24 in.	#95/100	16 in.
	4 in.	42 in.	25 in.	#95/100	24 in.
7 ft.		46 in.	27 in.		18 in.
	4 ½ in.	48 in.	29 in.		30 in.
8 ft.		52 in.	31 in.		18 in.
	5 in.	54 in.	32 in.		
	5 ½ in.	57 in.	34 in.		
	6 in.	60 in.	36 in.		
	7 in.	70 in.	42 in.		
	8 in.	80 in.	48 in.		

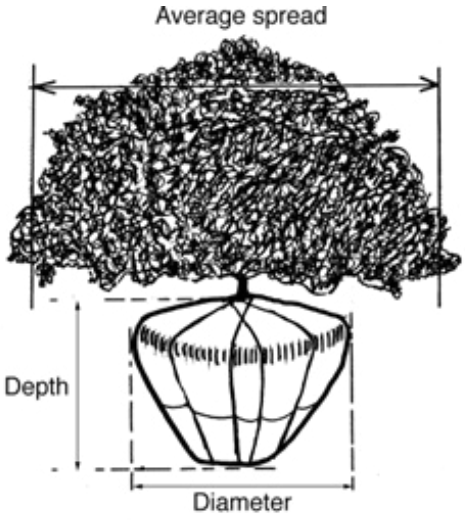


Figure 19. Measurement – Type 1 broadleaf evergreens

5.5 Type 2 broadleaf evergreens - semi-spreading

5.5.1 Classification of Type 2 broadleaf evergreens

Height will be less than spread (less than a ratio of 1:1). Height will be at least one-half the spread up to 30-36" spread; the height will remain less than the spread thereafter, varying somewhat according to natural growth of the particular species and method of handling.

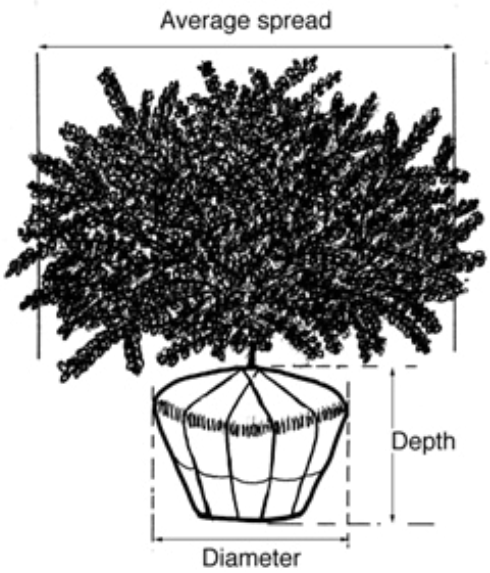


Figure 20. Measurement – Type 2 broadleaf evergreens

5.5.2 Specifications for Type 2 broadleaf evergreens

Table 20. Specifications for Type 2 broadleaf evergreens

Plant size specification indicates average spread, using three-inch intervals through 15-18", then six-inch intervals through 42-48", then one-foot intervals from 4-5' and up.

Examples: *Berberis verruculosa, Cotoneaster franchetii, C. salicifolia, Daphne odora, Ilex crenata* 'Convexa,' *I. Crenata* 'Hetzi,' *Leucothoe axillaris, L. fontanesiana, Pieris floribunda, Rhaphiolepis umbellata, Rhododendron (Azalea) obtusum* 'Amoenum,' *R. Gumpo and Kurume hybrid types, R. impeditum*

Plant size (spread)	Minimum height	Maximum height	Caliper (for sheared evergreens)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	1 ½ in.	3 in.				#SP4,#SP5	5 in.
6 in.	3 in.	6 in.				#SP5,#1	5 in.
9 in.	4 ½ in.	9 in.		8 in.	5 in.	#1,#2	5 in.
12 in.	6 in.	12 in.		10 in.	6 ½ in.	#2,#3	5 in.
15 in.	7 ½ in.	15 in.		12 in.	7 ¾ in	#3,#5	5 in.
18 in.	9 in.	18 in.		14 in.	9 in.	#3,#5,#7	8 in.
24 in.	12 in.	24 in.		16 in.	10 3⁄8 in.	#5,#7,#10	8 in.
30 in.	15 in.	30 in.		18 in.	11 ¾ in.	#7,#10,#15	10 in.
36 in.	21 in.	36 in.		24 in.	14 ½ in.	#7,#10,#15,#25	10 in.
42 in.	27 in.	42 in.		26 in.	15 ½ in.	#10,#15,#25,#45	12 in.
4 ft.	33 in.	4 ft.		28 in.	16 ¾ in.	#15,#25,#45	12 in.
			3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
5 ft.	42 in.	5 ft.		36 in.	21 ½ in.	#25,#45,#65	14 in.
			3 ½ in.	38 in.	22 ¾ in.	#65,#95/100	22 in.
6 ft.	51 in.	6 ft.		40 in.	24 in.	#95/100	16 in.
			4 in.	42 in.	25 in.	#95/100	24 in.
7 ft.	60 in.	7 ft.		46 in.	27 in.		18 in.
			4 ½ in.	48 in.	29 in.		30 in.
8 ft.	70 in.	8 ft.		52 in.	31 in.		18 in.
			5 in.	54 in.	32 in.		
			5 ½ in.	57 in.	34 in.		
			6 in.	60 in.	36 in.		
			7 in.	70 in.	42 in.		
			8 in.	80 in.	48 in.		

5.6 Type 3 broadleaf evergreens - broad spreading, globe, and compact upright

5.6.1 Classification of Type 3 broadleaf evergreens

Spread will usually be equal to or slightly less than height up to 12-15" spread. Thereafter, the spread may be less than the height, but in no case will the ratio of height to spread be more than 2:1 (height more than twice the spread).

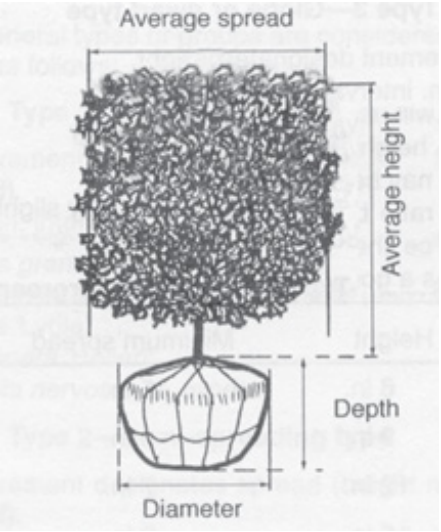


Figure 21. Measurement – Type 3 broadleaf evergreens

5.6.2 Specifications for Type 3 broadleaf evergreens

Table 21. Specifications for Type 3 broadleaf evergreens

Plant size specification indicates height, using three-inch intervals through 15-18", then six-inch intervals through 42-48", then one-foot intervals from 4-5' and up.

Examples: *Buxus microphylla* (dwarf cultivars), *B. sempervirens* 'Suffruticosa,' *Ilex cornuta* 'Rotunda,' *I. vomitoria* 'Nora,' *Kalmia buxifolia*

Plant size (spread)	Minimum height	Maximum height	Caliper (for sheared evergreens)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	3 in.					#SP4,#SP5	5 in.
6 in.	5 in.	8 in.				#SP5,#1	5 in.
9 in.	6 in.	12 in.		8 in.	5 in.	#1,#2	5 in.
12 in.	7 in.	15 in.		10 in.	6 ½ in.	#2,#3	5 in.
15 in.	9 in.	18 in.		12 in.	7 ¾ in	#3,#5	5 in.
18 in.	10 in.	21 in.		14 in.	9 in.	#3,#5,#7	8 in.
24 in.	14 in.	30 in.		16 in.	10 3⁄8 in.	#5,#7,#10	8 in.
30 in.	18 in.	36 in.		18 in.	11 ¾ in.	#7,#10,#15	10 in.
36 in.	22 in.	42 in.		24 in.	14 ½ in.	#7,#10,#15,#25	10 in.
42 in.	28 in.	4 ft.		26 in.	15 ½ in.	#10,#15,#25,#45	12 in.
4 ft.	32 in.	5 ft.		28 in.	16 ¾ in.	#15,#25,#45,#65	14 in.
			3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
5 ft.	40 in.	6 ft.		36 in.	21 ½ in.	#25,#45,#65,#95	14 in.
			3 ½ in.	38 in.	22 ¾ in.	#65,#95/100	22 in.
6 ft.	48 in.	7 ft.		40 in.	24 in.	#95/100	16 in.
			4 in.	42 in.	25 in.	#95/100	24 in.
7 ft.	56 in.	8 ft.		46 in.	27 in.		18 in.
			4 ½ in.	48 in.	29 in.		30 in.
8 ft.	64 in.	9 ft.		52 in.	31 in.		18 in.
			5 in.	54 in.	32 in.		
			5 ½ in.	57 in.	34 in.		
			6 in.	60 in.	36 in.		
			7 in.	70 in.	42 in.		
			8 in.	80 in.	48 in.		

5.7 Type 4 broadleaf evergreens – broad upright

5.7.1 Classification of Type 4 broadleaf evergreens

This group includes all of the larger growing upright broadleaf evergreens which vary considerably in ratio of spread to height. Well-grown material in most cases will have a height equal to if not greater than the spread. However, the spread should not be less than two-thirds of the height (height-to-spread ratio of 3:2)

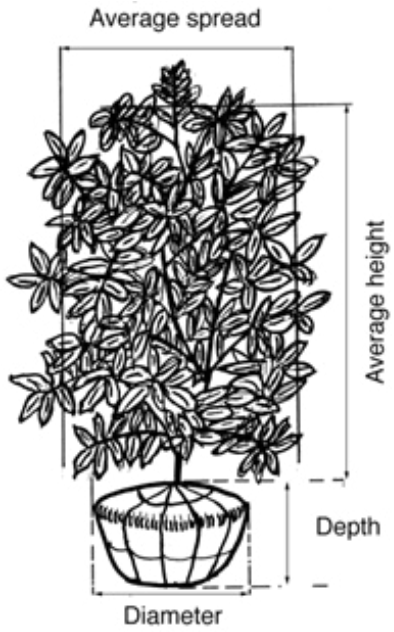


Figure 22. Measurement – Type 4 Broadleaf evergreens

5.7.2 Specifications for Type 4 broadleaf evergreens

Table 22. Specifications for Type 4 broadleaf evergreens

Plant size specification is by height, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one-foot intervals from 3-4' and up.

Examples: *Abelia grandiflora, Aucuba japonica* (and cultivars)*, Azalea* 'Rosebud,' *Berberis julianae, Cytisus* 'Burkwoodii,' *Elaeagnus pungens, Gardenia jasminoides, Ilex cornuta* (and cultivars)*, I. crenata* 'Rotundifolia,' *Kalmia latifoli, Ligustrum lucidum, L. japonicum* (shrub forms)*, Mahonia aquifolium, Pieris japonica, Rhododendron* (cultivars)*, Viburnum rhytidophyllum*

Plant size (height)	Minimum spread	Caliper (for sheared broadleaf evergreens)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	2 in.				#SP3,#SP4	5 in.
6 in.	4 in.				#SP4,#SP5,#1	5 in.
9 in.	6 in.				#SP5,#1	5 in.
12 in.	8 in.		8 in.	5 in.	#1,#2	5 in.
15 in.	10 in.		10 in.	6 ½ in.	#2,#3	5 in.
18 in.	12 in.		12 in.	7 ¾ in	#2,#3,#5	8 in.
24 in.	16 in.		14 in.	9 in.	#3,#5,#7	8 in.
30 in.	20 in.		16 in.	10 3⁄8 in.	#3,#5,#7,#10	10 in.
3 ft.	24 in.		18 in.	11 ¾ in.	#5,#7,#10	10 in.
4 ft.	28 in.		20 in.	12 in.	#7,#10,#15	12 in.
5 ft.	40 in.		22 in.	13 ¼ in.	#7,#10,#15,#25	14 in.
6 ft.	4 ft.		24 in.	14 3⁄8 in.	#10,#15,#25,#45	16 in.
7 ft.	4 ½ ft.		26 in.	15 ½ in.	#15,#25,#45,#65	18 in.
8 ft.	5 ft.		28 in.	16 ¾ in.	#25,#45,#65,#95/100	18 in.
9 ft.	6 ft.	3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
		3 ½ in.	38 in.	23 in.	#65,#95/100	22 in.
		4 in.	42 in.	25 in.	#95/100	24 in.
		4 ½ in.	48 in.	29 in.		30 in.
		5 in.	54 in.	32 in.		
		5 ½ in.	57 in.	34 in.		
		6 in.	60 in.	36 in.		
		7 in.	70 in.	42 in.		
		8 in.	80 in.	48 in.		
		9 in.	90 in.	54 in.		

5.8 Type 5 broadleaf evergreens – cone (pyramidal)

5.8.1 Classification of Type 5 broadleaf evergreens

This group includes all upright growing broadleaf evergreens which naturally develop in to a conical form. Similar to Type 4 plants, well grown material will have a height-to-spread ratio of 3:2. However, a greater spread is acceptable.

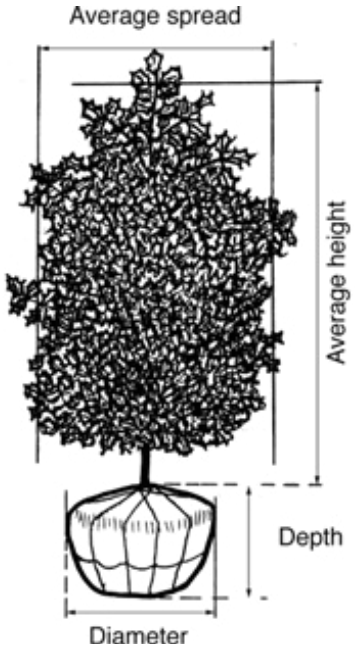


Figure 23. Measurement – Type 5 broadleaf evergreens

5.8.2 Specifications for Type 5 broadleaf evergreens

Table 23. Specifications for Type 5 broadleaf evergreens

Plant size specification indicates height, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one-foot intervals from 3-4' and up.

Examples: *Camellia japonica, C. sasanqua, Ilex aquifolium, I. opaca* (and cultivars), *Ilex attenuata* 'Foster No. 2,' *I.* 'Nellie R. Stevens,' *Illicium anisatum, Prunus caroliniana, P. laurocerasus, P. lusitanica*

Plant size (height)	Minimum spread	Caliper (for sheared conifers)	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	2 in.				#SP3,#SP4	5 in.
6 in.	4 in.				#SP4,#SP5,#1	5 in.
9 in.	6 in.				#SP5,#1	5 in.
12 in.	8 in.		8 in.	5 in.	#1,#2	5 in.
15 in.	10 in.		10 in.	6 ½ in.	#2,#3	5 in.
18 in.	12 in.		12 in.	7 ¾ in	#2,#3,#5	8 in.
24 in.	16 in.		14 in.	9 in.	#3,#5,#7	8 in.
30 in.	20 in.		16 in.	10 3⁄8 in.	#3,#5,#7,#10	10 in.
3 ft.	24 in.		18 in.	11 ¾ in.	#5,#7,#10	10 in.
4 ft.	28 in.		20 in.	12 in.	#7,#10,#15	12 in.
5 ft.	40 in.		22 in.	13 ¼ in.	#7,#10,#15,#25	14 in.
6 ft.	4 ft.		24 in.	14 3⁄8 in.	#10,#15,#25,#45	16 in.
7 ft.	4 ½ ft.		26 in.	15 ½ in.	#15,#25,#45,#65	18 in.
8 ft.	5 ft.		28 in.	16 ¾ in.	#25,#45,#65,#95/100	18 in.
9 ft.	6 ft.	3 in.	32 in.	19 in.	#45,#65,#95/100	20 in.
		3 ½ in.	38 in.	23 in.	#65,#95/100	22 in.
		4 in.	42 in.	25 in.	#95/100	24 in.
		4 ½ in.	48 in.	29 in.		30 in.
		5 in.	54 in.	32 in.		
		5 ½ in.	57 in.	34 in.		
		6 in.	60 in.	36 in.		
		7 in.	70 in.	42 in.		
		8 in.	80 in.	48 in.		
		9 in.	90 in.	54 in.		

5.9 Type 6 broadleaf evergreens - columnar

5.9.1 Classification of Type 6 broadleaf evergreens

This group includes the upright growing evergreens which naturally develop a straight sided form or one that tapers only slightly from the ground to a point more than half the height.

The broader types will usually have a ratio of height to spread of 4 to 1. Many forms, however, will not attain this ratio, and even those of broad habit may be trimmed to advantage into a narrowed form. However, in most cases the ratio of height to spread should be less than 5 to 1.

5.9.2 Specifications for Type 6 broadleaf evergreens

Table 24. Specifications for Type 6 broadleaf evergreens

Plant size specification indicates height, using three-inch intervals through 15-18", then six-inch intervals through 30-36", then one-foot intervals through 9-10', then two-foot intervals from 10-12' and up.

Examples: *Ilex crenata* 'Sky Pencil,' *Buxus* 'Graham Blandy,' *Buxus* 'DeeRunk,' *Buxus fastigiata*

Plant size (height/ caliper)	Minimum spread	Minimum root ball diameter	Minimum root ball depth	Acceptable container classes	Minimum acceptable in-ground fabric bag size (diameter)
3 in.	1 ½ in.			#SP3, #SP4	5 in.
6 in.	3 in.			#SP4,#SP5,#1	5 in.
9 in.	4 ½ in.			#SP5,#1	5 in.
12 in.	6 in.	7 in.	4 ½ in.	#1,#2	5 in.
15 in.	7 in.	8 in.	5 ¼ in.	#2,#3	5 in.
18 in.	8 in.	9 in.	6 in	#2,#3,#5	8 in.
24 in.	9 in.	11 in.	7 in.	#3,#5,#7	8 in.
30 in.	10 in.	13 in.	8 ½ in.	#3,#5,#7,#10	10 in.
3 ft.	12 in.	14 in.	9 in.	#5,#7,#10	10 in.
4 ft.	15 in.	16 in.	10 3/8 in.	#7,#10,#15	12 in.
5 ft.	18 in.	18 in.	11 ¾ in.	#7,#10,#15,#25	14 in.
6 ft.	21 in.	20 in.	12 in.	#10,#15,#25,#45	16 in.
7 ft.	24 in.	22 in.	13 in.	#15,#25,#45,#65	18 in.
8 ft.	30 in.	24 in.	14 in.	#25,#45,#65,#95/100	18 in.
9 ft./2½ in.	36 in.	26 in.	15 ½ in.	#45,#65,#95/100	20 in.
3 in.		28 in.	17 in.	#65,#95/100	20 in.
3 ½ in.		32 in.	19 in.	#95/100	22 in.
4 in.		36 in.	22 in.		24 in.
4 ½ in.		40 in.	24 in.		30 in.
5 in.		44 in.	26 in.		
5 ½ in.		48 in.	29 in.		
6 in.		54 in.	32 in.		
7 in.		66 in.	40 in.		
8 in.		78 in.	47 in.		
9 in.		90 in.	54 in.		

Section 6: Roses

This section applies only to grafted or budded field-grown garden roses when sold bare root, or individually wrapped and packaged, or in containers.

For roses grown on their own roots (not budded or grafted onto root stock), see section 3.1.0 - Type 0 deciduous shrubs.

6.1 General

All grades of roses shall have a well-developed root system and have proportionate weight and caliper according to grade and variety.

Roses shall be graded by number and caliper of canes.

Rose bushes that do not meet these standards for the individual grades are defined as CULLS. The grade-sizes for each classification are minimum sizes.

As used in the grade sizes below, "strong cane" means a cane that is healthy, vigorous, and fully developed so that it is hardened off at least to the minimum required finished shipping length. The caliper of the cane is measured not higher than 4 inches (10 cm) from the bud or graft union. The finished shipping length of canes meeting the applicable grade may not be less than 8 inches (20 cm).

6.2 Hybrid tea, grandiflora, floribunda, and climbing roses

Grade No. 1 — At least three strong canes 5⁄16 inch (0.8 cm) in caliper and up, branched not higher than 3 inches (8 cm) from the bud union.

Grade No. 1½ — At least two strong canes, 5⁄16 inch (0.8 cm) in caliper and up, branched not higher than 3 inches (8 cm) from the bud union.

Grade No. 2 — At least two canes, one of which shall be a strong cane, 5⁄16 inch (0.8 cm) in caliper and up. The second shall be 1⁄4 inch (0.6 cm) in caliper, branched not higher than 3 inches (8 cm) from the bud union.

Note: Although Floribunda roses are included in the above grade standard, it should be noted that Floribunda roses in this group will normally result in the marketing of rose bushes, which are, on average, lighter for this class.

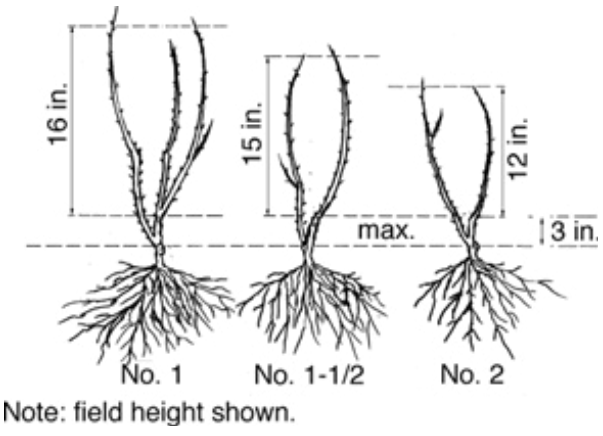


Figure 24. Hybrid tea, tea, grandiflora, etc., roses

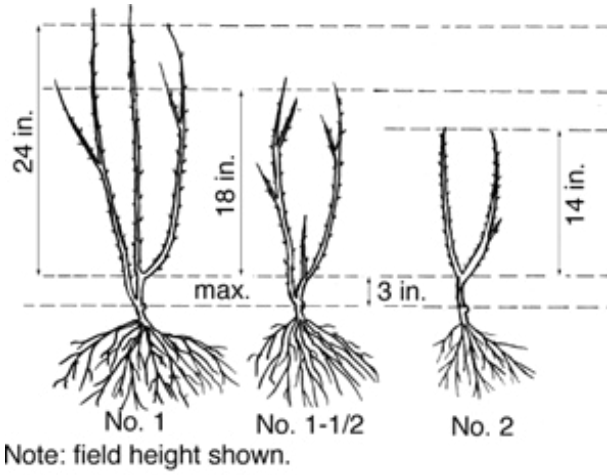


Figure 25. Climbing roses

6.3 Polyantha, shrub, landscape, and low growing floribunda roses

Grade No. 1 — At least three (strong) canes 1⁄4 inch (0.6 cm) in caliper and up, branched not higher than 3 inches (8 cm) from the bud union.

Grade No. 1½ — At least two (strong) canes, 1⁄4 inch (0.6 cm) in caliper and up, branched not higher than 3 inches (8 cm) from the bud union.

Grade No. 2 — At least two canes, one of which shall be a (strong) cane, 1⁄4 inch (0.6 cm) in caliper and up.

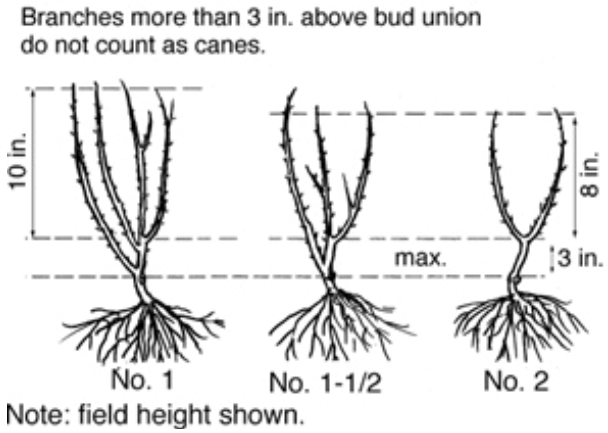


Figure 26. Polyantha roses

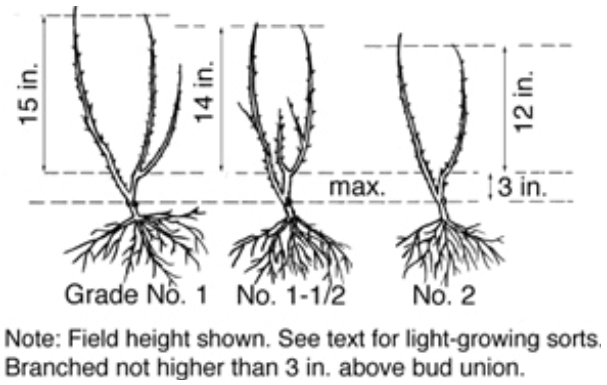


Figure 27. Floribunda roses

6.4 Field grown miniatures

6.4.1 Large grower miniatures

Grade No. 1 — At least 2 canes, one of which shall be 1⁄4 inch (0.6 cm) in diameter and the other 9⁄32 inch (0.7 cm) in diameter or 5 canes, one of which is 1⁄4 inch (0.6 cm) in diameter and 4 smaller healthy canes.

Grade No. 2 — At least 2 canes, one of which is 1⁄4 inch (0.6 cm) in diameter, plus 1 healthy cane.

6.4.2 Small grower miniatures

Grade No. 1 — At least two canes 9⁄32 inch (0.7 cm) in diameter or 5 small healthy canes.

Grade No. 2 — 2 healthy canes.

6.4.3 Root system

Grade No.1 — 5 inches (13 cm) or more in length, spaced 50% or more around the shank in a balanced fashion.

Grade No. 2 — 3 to 5 inches (8-13 cm) in length spaced 50% or more around the shank in a balanced fashion.

6.5 Tree roses

6.5.1 Standard tree rose 36" (91 cm)

Grade No. 1 — Height 36 inches (91 cm) or more. Standard cane size measured at 3 inches (8 cm) below the bud union shall be at least 7⁄16 inch (11 mm) in diameter. Bud development (head) shall have at least two bud eyes and shall be well-branched in a balanced fashion as defined under sections 5.2, 5.3, and 5.4. Standard cane shall be upright and straight.

Grade No. 1½ — Height 36 inches (91 cm) or more. Standard cane size measured at 3 inches (8 cm) below the bud union, shall be at least 7⁄16 inch (11 mm) in diameter. Bud development (head) shall have at least two bud eyes and shall be well-branched in a balanced fashion as defined under sections 5.2, 5.3, and 5.4 with 70 % or more head development.

Standard cane shall be upright and straight.

Grade No. 2 — Sub Standard—All Tree Roses not meeting the No. 1 or No. 11⁄2 grades described above are defined as Sub Standard.

6.5.2 Patio tree rose 18" (46 cm)

Grade No. 1 — Height at least 18 inches (46 cm) or more not to exceed 36 inches (91 cm). Standard size measured at 3 inches (8 cm) below the bud union, shall be at least 3⁄8 inches (10 mm) in diameter. Bud development (head) shall have at least two bud eyes and shall be well-branched in a balanced fashion as defined under sections 5.2, 5.3, and 5.4. Standard cane size shall be upright and straight.

Grade No. 2 — Sub Standard—All Patio Tree Roses not meeting The No. 1 Grade Are Defined as Sub Standard.

6.5.3 Mini-tree rose (miniature varieties)

Grade No.1 — Height at least 12 inches (30 cm) or more not to exceed 18 inches (46 cm). Standard size measured at 3 inches (8 cm) below the bud union, shall be at least 5⁄16 inches (8.0 mm) in diameter. Bud development (head) shall have at least two bud eyes and shall be well-branched in a balanced fashion as defined under sections 5.2, 5.3, and 5.4. Standard cane size shall be upright and straight.

Grade No. 2 — Sub Standard —All Mini-Tree Roses not meeting the No. 1 Grade are defined as Sub Standard.

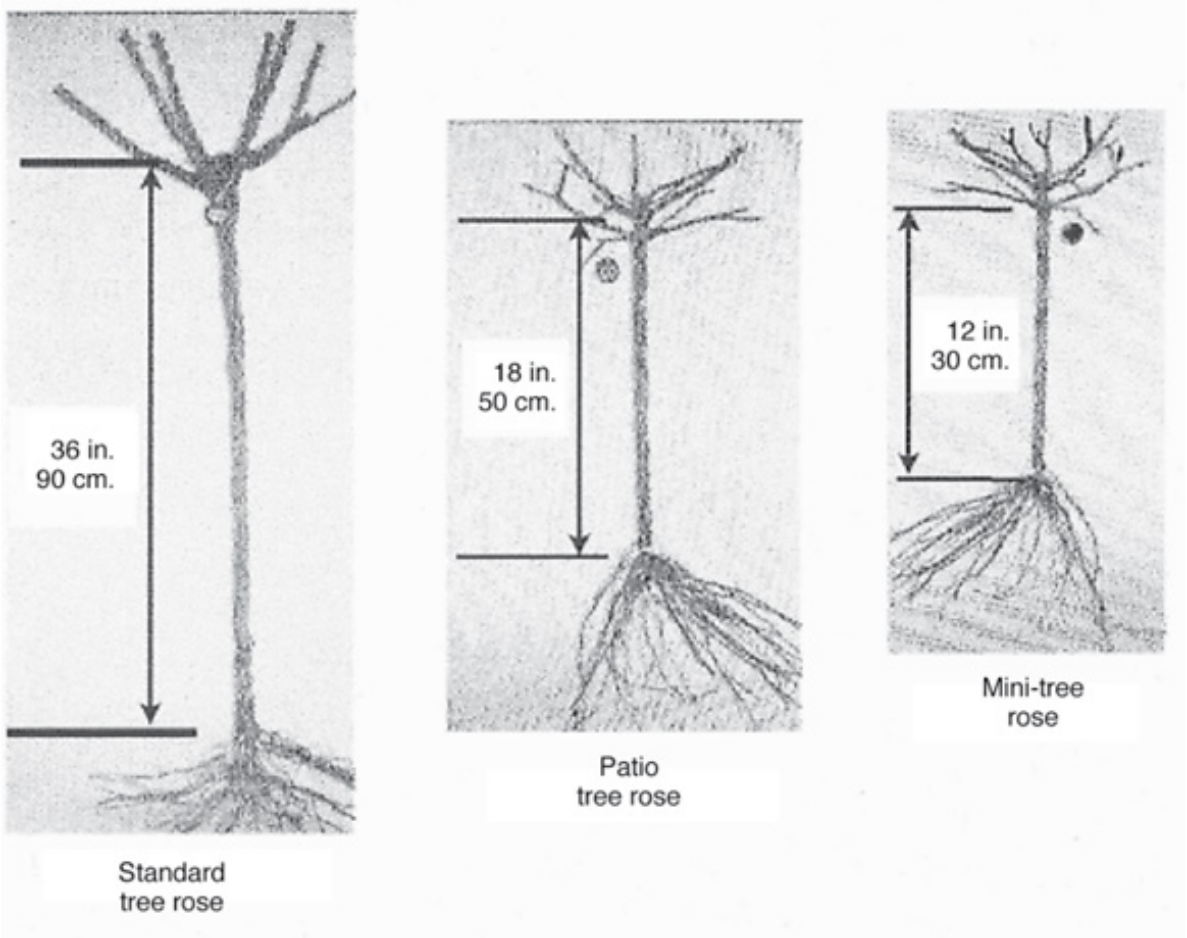


Figure 28. Tree roses

6.6 Container grown roses

All container-grown roses are field-grown roses that shall have been growing in the container in which they are marketed for a minimum of six weeks of the active growing season and for a maximum of two growing seasons. Roses may be cut back to a minimum of 4 inches (10 cm) above the bud union at the time they are potted and shall comply with the grades in which they are classified prior to pruning in preparation for potting.

All container-grown roses should be sold by both rose grade, as specified above, and by container size, as specified in Table 25 below. Container sizes shall agree with the container class table in Section 1 in Section 1.1.3.1.

Table 25. Minimum container sizes for container grown roses

Rose grade	Minimum container size
No. 1	#2
No 1½	#1
No. 2	#1

Section 7: Young Plants

This section applies to young plants graded by height or spread, including lining out stock, seedlings, whips, ground covers and vines generally sold for continued cultivation.

For understock (rootstock) plants generally graded by caliper and sold for grafting or budding, see Section 10.

For seedling trees used for reforestation or restoration purposes, see Section 11.

For ground covers and vines generally sold in #SP4 containers or larger, see Section 13.

7.1 General Specifications

Specifications for young plants may include any one or any combination of the following: the cultural history of the plant (see Section 7.1.1), the age of the plant (see Section 7.1.1), or the size of the plant in accordance with the guidelines set forth in Sections 7.2, 7.3, and 7.4. However, exceptions for specifications for unrooted cuttings and micropropagated plants are noted in Section 7.1.3 and 7.1.4, respectively.

Specifications for container-grown plants, in-ground fabric-bag-grown plants, above-ground fabric-bag-grown plants, deep container-grown plants, or plants in plug cells should also include the container classification in Table 1, fabric bag diameter, or plug tray specification (See Section 7.6).

The cultural history or age of the plant is not as important when height or caliper is specified, but it may be used in marketing materials or product listings and may be specified by the purchaser.

7.1.1 Cultural history specifications

When specifying plants by the cultural history or age of the plant, each propagation type or cultural history code is followed by the number of years applicable to the code. If age is specified, the age of a young plant is the total of the number of years in the plant history code.

7.1.1.1 Propagation and cultural history codes

Propagation Types
C = Cutting
U = Unrooted cutting
G = Grafted
L = Layered
S = Seedling
M = Micropropagated or tissue cultured
D = Division

Cultural History
R = Root pruned
P = Pot or container grown
T = Transplanted (one per time)
B = Bed grown
O = Not transplanted

Examples:

C1T2 (3-year plant: 1 year in the cutting bench, then transplanted once for 2 years)

S2T1T1 (4-year plant: 2 years in the seedling bed, transplanted twice for one year each time)

G1R1 (2-year graft, root pruned after first year).

M1T1 (2-year plant: 1 year established ex vitro from micropropagation, then transplanted for 1 year)

7.1.2 Plants collected from the wild

Plants collected from the wild shall be so designated.

7.1.3 Quality definition

The quality of all young plants offered is assumed to be normal for the species or variety unless otherwise designated.

7.1.4 Unrooted cuttings

Unrooted cuttings shall be from vigorous, healthy plants. They are to be graded by stem caliper, taken at the base of the cutting, and length.

7.1.5 Micropropagated plants (in vitro and ex vitro)

Micropropagated plants shipped from the lab may be specified by stage of growth:

In vitro

Stage 0 is the donor plant that is selected and prepared for culture initiation.

Stage I is the aseptically established terminal, or lateral, shoot meristem tissue taken from the donor plant and placed in a sterile culture vessel.

Stage II is an axillary unrooted shoot tip, often called a "microcutting" established after subdivision of stage I material.

Stage III is a rooted shoot tip with two or more roots, often called a "rooted plantlet."

Ex vitro

Stage IV is an established plant grown outside of a sterile culture vessel that has been sourced from an in vitro environment. Micropropagated plants shall be specified in accordance with the appropriate sub-section in Section 7: Young Plants. These plants are usually established in small pots or plug cells.

7.1.6 Pruning

Tops or roots will not be pruned unless specified by the grower or requested by the purchaser.

7.2 Method of measurement

Height measurement is from the ground level to the growing tips. Spread is the average diameter of the top growth.

7.3 Sizing intervals

7.3.1 Slow grower (dwarf and semi-dwarf)

Use 2-in. intervals up to 12 in.

Use 3-in. intervals from 12 in. up.

Examples: *Baptisia australis, Berberis thunbergii var. atropurpureum '*Crimson Pygmy,*' Picea abies '*Pygmaea*,' Sedum*

7.3.2 Medium grower

Use in 3-in. intervals.
Examples: *Achillea x* 'Coronation Gold,' *Rhododendron molle (Azalea mollis), Prunus laurocerasus* 'Zabeliana,' *Hedera helix*

7.3.3 Fast grower

Use 6-in. intervals.
Examples: *Acer rubrum, Betula pendula, Cytisus* 'Burkwoodii,' *Forsythia, Pinus* (except dwarf types)

7.4 Types of plants

Using the appropriate measurement interval shown in Section 7.3, above, measure the plants in accordance with the appropriate plant type section, below.

7.4.1 Type 1 - No stems

Measurement designates fullness, spread, root development, or the length of one side or the diameter of the container if the plant substantially fills the soil surface in the container.
Examples: *Ajuga reptans, Festuca ovina var. glauca, Miscanthus sinensis, Sagina subulata, Sedum*

7.4.2 Type 2 - Single stem

7.4.2.1 Spreading

Measurement designates spread (height not considered).
Examples: *Ceanothus gloriosus, Cotoneaster dammeri, Erica carnea, Juniperus horizontalis* 'Wiltonii,' *Mahonia nervosa, Thymus*

7.4.2.2 Semi-spreading

Measurement designates height. Height will usually equal spread.
Examples: *Aquilegia, Ilex crenata* 'Helleri,' *Juniperus chinensis* 'Pfitzerana,' *Lavandula*

7.4.2.3 Globe

Measurement designates height.
Examples: *Berberis thunbergii* 'Crimson Pygmy,' *Deutzia gracilis, Thuja occidentalis* 'Little Gem,' *Teucrium*

7.4.2.4 Medium upright

Measurement designates height. Height will usually be twice the spread.
Examples: *Chrysanthemum, Ilex crenata* 'Rotundifolia,' *Mahonia aquifolium, Pieris japonica, Rhododendron* (Kurume hybrid) 'Hinodegiri'

7.4.2.5 Upright

Measurement designates height.
Examples: *Acer palmatum, Achillea, Anemone, Betula papyrifera, Myrica californica, Pseudotsuga menziesii*

7.4.3 Type 3 - Stoloniferous

Measurement designates fullness or number of stolons.
Examples: *Gaultheria procumbens, Houttuynia cordata, Pachysandra terminalis, Vinca minor*

7.4.4 Type 4 - Rhizomatous, tuberous, or fibrous roots

Measurement designates number of eye divisions. See Section 13 for plants generally sold in containers larger than #SP4.
Examples: *Paeonia, Lamprocapnos spectabilis, Dahlias, Hosta*

7.4.5 Type 5 - Fans

Measurement designates number of fans (stems). Liner grade typically has a single fan or stem. See Section 13 for plants generally sold in containers larger than #SP4.
Examples: *Hemerocallis, Iris*

7.4.6 Type 6 - Bulbs, corms

See Section 12.

7.4.7 Type 7 - Vines

Measurement designates length and/or number of runners, and/or container size.

Examples: *Clematis, Hedera helix, Parthenocissus tricuspidata* 'Veitchii,' *Vitis, Wisteria*

7.4.8 Conifer plantation and reforestation plants

Conifer liners for Christmas tree plantation and reforestation uses are graded only by height unless a caliper is also specified. When caliper is specified, it is by millimeter intervals: 1 mm, 2 mm, 3 mm, 4 mm, 6 mm. See Section 11.

7.5 Unclassified

Any young plant not meeting the above specifications should be labeled "Unclassified."

7.6 Plants sold in containers, in-ground fabric bags, above-ground fabric bags, deep containers, and plug cells

Specifications for young plants sold in containers, above-ground fabric bags, and deep containers shall include plant size (height or spread as appropriate for the plant type in Section 7.4, above) and container class. Container classes shall agree with those in Table 1 in Section 1.1.3.1.

Specifications for young plants sold in **in-ground** fabric bags shall include plant size (height or spread as appropriate for the plant type in Section 7.4, above), and in-ground fabric bag diameter, most typically 5-inch or 8-inch diameter. In-ground fabric bag sizes shall agree with those in Table 2 in Section 1.8.

7.6.1 Plug cell specifications

A plug tray is a continuous sheet with plug cells. Specifications should include the number of plug cells per tray and cell size by volume.
Examples:

Cells/Tray	Cell in^3	Cell cm^3
32	8	131
72	3.31	54
128	1.51	25
288	0.7	11

Section 8: Fruit Trees

This section applies only to fruit trees sold to orchard or growing operations.

For fruit trees sold to the retail or landscape trade for resale or installation, typically classified as Type 4 small spreading trees, see Section 2.

8.1 General specifications

8.1.1 Minimum requirements

All fruit trees shall be healthy, with tops of good quality (i.e., leaf color appropriate for cultivar and no apparent injury), vigorous, and well rooted (except for unrooted cuttings), with growth normal for the species or variety (e.g., reasonably straight trunks according to habit of growth), unless otherwise specified.

All fruit trees 1/2-inch and larger should be branched. Branched trees should have a minimum of 5 branches, light-branched trees should have a minimum of 3-4 branches, and whips should have a minimum of 0-2 branches. Columnar fruit trees should be excluded from the branching requirement and should be sold by caliper or height.

Container grown fruit trees shall be specified by plant size (height or caliper) and container size. Container sizes shall agree with Table 1 in Section 1.1.3.1.

8.1.2 Cultural history specifications

When specifying plants by the cultural history or age of the plant, each propagation type or cultural history code is followed by the number of years applicable to the code. If age is specified, the age of a young plant is the total of the number of years in the plant history code.

Specifications that include cultural history specifications shall use the following letter codes:

Propagation types

C = Cutting

U = Unrooted cutting

G = Grafted

L = Layered

S = Seedling

M = Micropropagated or tissue cultured

D = Division

Cultural history

R = Root pruned

P = Pot or container grown

T = Transplanted (one per time)

B = Bed grown

O = Not transplant

Examples:

C1T2 (3-year plant: 1 year in the cutting bench, then transplanted once for 2 years)

S2T1T1 (4-year plant: 2 years in the seedling bed, transplanted twice for one year each time)

G1R1 (2-year: 1 year grafted, root pruned after first year).

M1T1 (2-year plant: 1 year established ex vitro from micropropagation, then transplanted for 1 year)

8.1.2.1 Unrooted cuttings

Unrooted cuttings shall be from vigorous current year or 1-year growth and may be graded by caliper and length.

8.1.2.2 Micropropagated plants (in vitro and ex vitro)

Micropropogated fruit trees shall adhere to the classification set forth in Section 7.1.5: Micropropagated Plants (in vitro and ex vitro).

8.1.3 Age specification

Age may be specified as one year, two years, etc.

8.2 Caliper and height measurement

Except for vegetatively propagated or micro-propagated plants (see section 8.5.3) and budded citrus (see section 8.6), the caliper should be taken 1 inch above the root collar or soil line, and the caliper shall take precedence. Height measurement should be taken from the collar. Height measurements indicated in the tables in this section are intended to represent average height of most varieties. Slow growing kinds may not meet indicated height measurements.

It is recognized that "high budding" may be practiced in the nursery to allow for deep planting for tree anchorage, trunk hardiness, preventing the loss of clonal or dwarfing rootstock attributes, etc. In all cases, however, height measurements shall be taken 1 inch above the root collar or soil line.

8.3 Height-caliper relationships

The tables in this section indicate typical height-caliper relationships for fruit trees.

Exceptions: The following height-caliper relationship shall not be deemed applicable in the case of varieties categorized as genetic mutants. Each of these varieties shall be sized according to varietal characteristics.

Examples: 'Bonanza' dwarf peach, 'Sunburst' dwarf nectarine

Table 26. Height/caliper relationship for standard apple, sweet cherry, peach, almond, nectarine, pear, apricot, prune, and plum (one and two years)

Caliper		Height	
Inches	**Metric**	**Feet**	**Metric**
1⁄4 in.	0.6 cm	2 ft.	60 cm
5⁄16 in.	0.8 cm	2½ ft.	80 cm
3⁄8 in.	1.0 cm	3 ft.	90 cm
1⁄2 in.	1.5 cm	3½ ft.	1.00 m
5⁄8 in.	1.6 cm	4 ft.	1.25 m
3⁄4 in.	2.0 cm	5 ft.	1.50 m
7⁄8 in.	2.2 cm	5½ ft.	1.65 m
1 in. and up	2.5 cm and up	6 ft.	1.80 m

Table 27. Height/caliper relationship for standard sour-cherry and dwarf peach, pear, nectarine, apricot, prune and plum (on clonal rootstock only)			
Caliper		**Height**	
Inches	**Metric**	**Feet**	**Metric**
1/4 in.	.6 cm	2 ft.	60 cm
5/16 in.	0.8 cm	2½ ft.	80 cm
3/8 in.	1.0 cm	3 ft.	90 cm
1/2 in.	1.5 cm	3½ ft.	1.0 m
5/8 in.	1.6 cm	4 ft.	1.25 m
3/4 in.	2.0 cm	4½ ft.	1.4 m
7/8 in.	2.2 cm	4½ ft.	1.4 m
1 in.	2.5 cm	5 ft.	1.5 m

Table 28. Height/caliper relationship for dwarf apple (including clonal rootstock and interstem trees)			
Caliper		**Height**	
Inches	**Metric**	**Feet**	**Metric**
1/4 in.	0.6 cm	2 ft.	60 cm
5/16 in.	0.8 cm	3 ft.	90 cm
3/8 in.	1.0 cm	3½ ft.	1.0 m
1/2 in.	1.5 cm	4 ft.	1.25 m
5/8 in.	1.6 cm	4½ ft.	1.4 m
3/4 in.	2.0 cm	5 ft.	1.5 m
7/8 in.	2.2 cm	5 ft.	1.5 m
1 in.	2.5 cm	5½ ft.	1.65 m

8.4 Processed balled

A processed balled fruit tree is one dug bare root, while dormant, and a growing medium mechanically is formed in a ball around the roots.

The minimum ball size specifications for "processed balled" standard and dwarf fruit trees are presented in the following Table 29.

Table 29. Ball sizes – processed balled fruit trees

Caliper	Minimum Diameter Ball
1/4 in.	8 in.
5/16 in.	8 in.
3/8 in.	10 in.
1/2 in.	10 in.
5/8 in.	10 in.
3/4 in.	12 in.
1 in.	12 in.

8.5 Fruit tree seedlings and understock

8.5.1 Seedlings with limbs

In case of seedlings with limbs, there shall be at least 2 inches (5 cm) above the collar free of limbs for a minimum of one-half of the circumference of the seedling.

8.5.2 Apple and pear seedlings

In case of apple and pear seedlings, where the root description is given as branched or straight, the following shall apply:

Branched Root: Not less than three root branches shall be present within 5 inches (12.5 cm) from the collar.

Straight Root: The root shall carry the minimum caliper of the grade for not less than 6 inches (15 cm) below the collar.

8.5.3 Vegetatively propagated or micropropagated fruit understock

In the case of fruit understock grown from "C," "L," or "M" (see Section 8.1.2), the caliper shall be taken on the original cutting or layer at the point of budding.

8.5.3.1 Root system specification required

All forms of vegetatively propagated fruit rootstocks shall have a minimum of four rootlets on each cutting or layer.

Examples: Malling Merton Nos. 111, 106, M-7A, M-9, M-26, M-27 apple, *Prunus* 'Mariana'*, and Prunus cerasifera (P. myrobalana).*

Exception: Any rootstocks not meeting the above specifications for root systems shall be labeled as "unclassified" grade and the minimum numbers of rootlets specified.

8.6 Citrus

Citrus stocks are to be graded in 1⁄8-inch increments, beginning with 3⁄8-inch minimum caliper up to the 3⁄4-inch size. Recognized grades above 3⁄4-inch size shall be in increments of 1⁄4-inch.

Age is to be given in years. Caliper is to be taken 1⁄2-inch (1.5 cm) above the bud union. Minimum size to be 3⁄8-inch (1 cm), except that tangerine, mandarin, or lime trees may be sold in 5⁄16-inch (8 cm) caliper.

8.7 Marketing nomenclature

The following tables indicate approved marketing nomenclature for specific rootstocks, interstems, and rootstock/scion combinations. All sales literature and size claims should be based on these tables.

Table 30. Common Apple rootstocks/interstems

Miniature/ Very Dwarf	Dwarf Interstems*	Dwarf	Semi-Dwarf	Semi- Standard	Standard
EMLA.27 P.22	M.9/MM.111 M.9/MM.106 Bud.9/MM.111 Bud.9/MM.106 C-6/seedling	EMLA.9 Bud.9 MARK EMLA.26 G.11 G.41 G.214 **NAKB M.9 **NIC.29 **T337 **Pajam.1 **Pajam.2	EMLA.7 EMLA.26 G.30 G.210 G.890 G.935 G.969 Bud-10® Spur-Type cultivars grafted on semi-standard & standard rootstock	EMLA.106 Bud.118 Bud.119	*Malus domestica* "Yellow Del" CV *Malus domestica* "Antanovka" CV *Malus domestica* "Northern Spy" CV

*Trees grown with dwarf interstem grafted in the trunk between the roots and fruiting scions are categorized in the same size category as if the tree was grown on that root.

**All are clones of M.9

Bud.9=Budagovsky 9

Bud 118=Budagovsky 118

C=Charles Day

EMLA=East Malling Lansing

G=Geneva

MARK=Mac 9

MM.106=Malling-Merton 106

P.22=Polish 22

The above Table 30 illustrates relative dwarfing induced to a fruiting variety by the process of grafting onto a rootstock compared to the same variety grafted onto a rootstock of standard size.

Table 31. Common Pear rootstocks			
Dwarf	Semi-Dwarf	Semi-Standard	Standard
EMLA Quince A EMLA Quince C	OhxF333 OHxF40 (Brooks™ selections) Province Quince BA-29 Quince Quince Eline Pyrodwarf® Pyro™-233	OHxF97 OHxF217 OHxF87 (Brooks™ selections) Horner 4	*Pyrus betulaefolia* seedling *Pyrus ussuriensis* seedling *Pyrus communis* seedling *Pyrus calleryana* seedling *Pyrus* 'Winter Nelis' seedling

OHxF=Old Home x Farmingdale

EMLA=East Malling Lansing

The above Table 31 illustrates relative dwarfing induced to a fruiting variety by the process of grafting onto a rootstock compared to the same variety grafted onto a rootstock of standard size.

Table 32. Common Peach, nectarine, and almond rootstocks				
Genetic dwarf	Dwarf	Semi-Dwarf	Semi-Standard	Standard
Cultivars that are genetically less than 50 percent of standard size peach regardless of rootstock **Examples:** Honey babe Peach Nectar Babe Nectarine Garden Prince Almond	Pumiselect™	EMLA St. Julian A Citation Prunus St. Julian Inra.2	Nemaguard seedling *Prunus persica* 'Lovell' Krymsk® 86 MP-29 Controller 6 Bailey peach seedling	*'Hansen' 536 *Paramount™ GF677 CV *Cadaman™ Avimag CV *Viking *Barrier™ *Atlas

*Clonal – peach x almond hybrids

The above Table 32 illustrates relative dwarfing induced to a fruiting variety by the process of grafting onto a rootstock compared to the same variety grafted onto a rootstock of standard size.

Table 33. Common Plum and apricot rootstocks			
Dwarf	Semi-Dwarf	Semi-Standard	Standard
Pixy® Prunus Pumiselct™	EMLA St. Julian A Stark® Redleaf Peach Citation Prunus St. Julian A Inra.2 seeding Jaspi™ Fereley CV Julior™ Ferdor CV Krymsk® (1 VVA1)	Marianna 26-24 Marianna 4001 Torianel™ Avifel CV Ishtara™ Ferciana CV Marianna M.40 CV Krymsk® 86 MP-29 GF 8-1 *Prunus persica* 'Bailey' *Prunus persica* 'Halford' *Prunus persica* 'Lovell'	*Prunus persica* 'Lovell' seedling *Prunus cerasifera* Myrobalan seedling *Prunus americana* *Prunus armeniaca* Apricot seedling Myrobalan H29-C Marianna 4001 Marianna GF8-1 Nemaguard seedling

Table 34. Common Cherry rootstocks			
Dwarf	Semi-Dwarf	Semi-Standard	Standard
Gisela® 3 Gisela® 5 Cass, Corette® 1 Clare, Corette® 2 Clinton, Corette® 3 Crawford, Corette® 4 GM 61/1 Damil CV	Gisela® 6 Krymsk® 6	Gisela® 12 Krymsk® 5 Krymsk® 7 Performer™ mahaleb Maxma® 14 Brokforest CV *Prunus mahaleb* seedling	*Prunus avium* (Mazzard seedling) *Prunus avium* F 12/1 EMLA Colt

The above Table 34 illustrates relative dwarfing induced to a fruiting variety by the process of grafting onto a rootstock compared to the same variety grafted onto a rootstock of standard size.

Section 9: Small Fruits

This section applies to plants that bear small fruit.

9.1 General specifications

9.1.1 Quality definitions

The quality of small fruits is assumed to be normal for the species or variety unless otherwise designated.

All small fruit plants shall be well rooted. No injured, stunted, or odd shaped plants shall be included in any grade.

9.1.2 Propagation and cultural history codes

Propagation types

C = Cutting

U = Unrooted cutting

G = Grafted

L = Layered

S = Seedling

M = Micropropagated or tissue cultured

D = Division

Cultural history

R = Root pruned

P = Pot or container grown

T = Transplanted (one per time) B = Bed grown

O = Not transplanted

9.1.2.1 Unrooted cuttings

Unrooted cuttings shall be from vigorous growth and may be graded by caliper and length. Examples: Gooseberries, currants, blueberries.

9.1.2.2 Micropropagated plants (in vitro and ex vitro)

Micropropogated small fruit plants shall adhere to the classification set forth in Section 7.1.5: Micropropagated Plants (in vitro and ex vitro).

9.2 Method of measurement

9.2.1 Raspberries

9.2.1.1 Sucker and root cutting plants

Grade No. 1 — Sucker and root cutting plants, also tip plants, should be graded 3⁄16 inch and up in caliper at collar; sucker plants should have 10 inches or more of live top; tip plants, 8 inches or more live tops; and well rooted with at least one cross root below the crown, i.e., "L" or "T" root(s).

Grade No. 2 — Sucker and root cutting plants, also tip plants, 1⁄8 inch and up caliper at collar; sucker and root cutting plants to have 8 inches or more of live top; tip plants, 6 inches or more of live tops, and all proportionately well rooted.

9.2.2 Transplanted raspberries

Grade No. 1 — All transplanted raspberries should caliper 1⁄4 inch and up at collar and have 12 inches or more of live top, and be well rooted.

Grade No. 2 — Number two shall caliper 3⁄16 inch and up with 12 inches or more of live top and be well rooted with at least one cross root below the crown, i.e., "L" or "T" root(s).

9.2.3 Dewberries, blackberries, boysenberries, youngberries

9.2.3.1 Root cuttings

Grade No. 1 — Root cuttings should caliper 1⁄8 inch, and sucker plants should caliper 3⁄16 inch and up at the collar and have 12 inches or more of live top and be well rooted.

Grade No. 2 — Root cuttings should caliper 3⁄32 inch and up and sucker plants should caliper 1⁄8 inch and up at collar and have 8 inches or more of live top and be proportionately well rooted.

9.2.4 Transplanted blackberries

Grade No. 1 — Should caliper 1⁄4 inch and up at collar have 12 inches or more of live top and be well rooted.

9.2.5 Currants

Grade 2 Yr. No. 1 — Shall measure 12 inches and up in height, with two or more branches, and be well rooted.

Grade 1 Yr. No. 1 — Shall measure 9 inches and up in height; if single-cane plants, to be 12 inches high and be well rooted.

Grade 2 Yr. No. 2 — Same specifications as 1 Yr. No. 1.

9.2.6 Blueberries

All measurements indicate the overall height of the plant from crown to tip of plants. All well branched in proportion to height. For purposes of simplicity, only one size per "grade" will be listed. That size will be the minimum size allowable for that "grade" and shall include plants from that size up to, but not including, the next larger grade size.

1-year Rooted Cuttings	3 in.
2-year	9 in.
3-year	12 in.
4-year	18 in.

9.2.7 Gooseberries

Grade 2 Yr. No. 1 — Shall measure 12 inches and up in height, with three or more canes or equivalent side branches, and be well rooted.

Grade 1 Yr. No. 1 — Shall measure 8 inches and up in height, with two or more branches or equivalent side branches, and be well rooted.

Grade 2 Yr. No. 2 — Same specifications as 1 Yr. No. 1

9.2.8 Grape vines

Grading of grape vines is based mainly on the root system.

Grade 2 Yr. No. 1 — The lightest growing varieties should have 12 inches or more of live top; stronger growing varieties should be proportionately larger, and all well rooted.

Grade 1 Yr. No. 1 — Lightest growers should have 6 inches or more of live top; stronger growers should be proportionately larger, and all be well rooted.

Grade 2 Yr. No. 2 — Same specifications as 1 Yr. No. 1

9.2.9 Strawberry plants

Minimum Grade — There shall be at least 10 main roots, not less than 3 inches long, and a minimum crown diameter of 5⁄16 inch measured at the base.

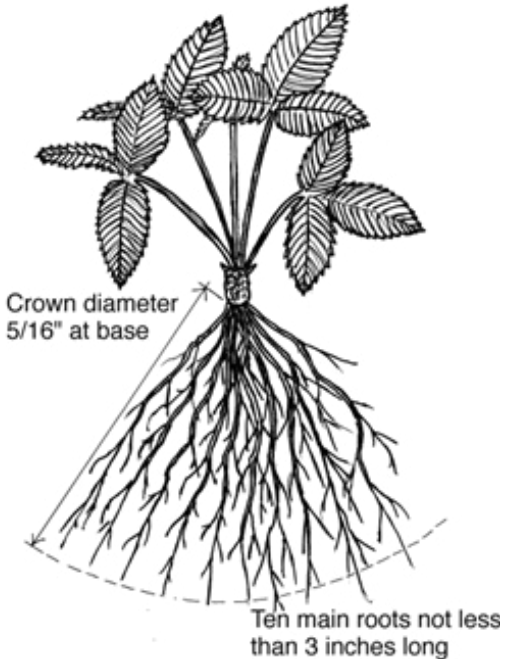


Figure 29. Strawberries – minimum requirements

9.2.10 Asparagus crowns

1 Yr. No. 1 — Shall not weigh less than 60 pounds per one thousand (1000) plant. Fifty percent of the root system shall exceed 5 inches in length.

2 Yr. No. 1 — Shall not weigh less than 120 pounds per 1000 plants. Fifty percent of the root system shall exceed 7 inches in length.

2 Yr. No. 2 — Shall not weigh less than 60 pounds per 1000 plants. Fifty percent of the root system shall exceed 5 inches in length.

3 and 4 Yr. No. 1 — Shall not weigh less than 200 pounds per 1000 plants. Fifty percent of the root system shall exceed 10 inches in length.

9.3 Container grown

All container grown small fruits sold in containers shall be graded by plant size (height or spread designated) or caliper, and container size. Container sizes shall agree with Table 1 in Section 1.1.3.1.

Section 10: Understock

This section is to cover plants (primarily shade, flowering, fruit, and nut trees) specified by cultural history or caliper generally used as rootstock for grafting and budding.

For plants graded by height, see Section 7 – Young Plants.

10.1 Quality definition

The quality of all understock offered is assumed to be normal for the species or variety unless otherwise designated. It is essential that the stem be reasonably straight.

Tops or roots may be trimmed as specified by the grower or requested by the purchaser. Evergreens should be transplanted frequently enough to create a good root system.

In order to produce a fibrous root system, species such as firs, pines, and similar sorts, which normally make a few coarse roots, should be transplanted every two years, and species such as Arborvitae should be transplanted every three years, as they naturally make better roots.

Broad-leaved evergreen species such as *Pyracantha coccinea* 'Lalandei,' which normally make a few coarse roots, should be transplanted every year, while those producing a good system of fibrous roots may be transplanted every second year.

10.1.1 Cultural history specifications

When specifying plants by the cultural history or age of the plant, each propagation type or cultural history code is followed by the number of years applicable to the code. If age is specified, the age of a young plant is the total of the number of years in the plant history code. Specifications that include cultural history specifications shall use the following letter codes:

Propagation types

C = Cutting

U = Unrooted cutting

L = Layered

S = Seedling

M = Micropropagated or tissue cultured

D = Division

Cultural history

R = Root pruned

P = Pot or container grown

T = Transplanted (one per time)

B = Bed grown

O = Not transplanted

Examples:

C1T2 (3-year plant: 1 year in the cutting bench, then transplanted once for 2 years)

S2T1T1 (4-year plant: 2 years in the seedling bed, transplanted twice for one year each time)

G1R1 (2-year graft, root pruned after first year).

M1T1 (2-year plant: 1 year established ex vitro from micropropagation, then transplanted for 1 year)

10.1.1.1 Unrooted cuttings

Unrooted cuttings shall be from vigorous growth and may be graded by caliper, taken at the base of the cutting, and length.

10.2 Method of measurement

Caliper shall be taken at the collar or ground line unless height is specified by purchaser, who shall indicate if he or she wants height only or height and caliper.

Age is not important when caliper is specified; however, it may be requested by purchaser.

10.2.1 Measurement specification

1/16 in.	(1.5 mm)
1/8 in.	(3 mm)
3/16 in.	(5 mm)
1/4in.	(7 mm)
3/8 in.	(10 mm)
1/2 in.	(1.5 cm)
5/8 in.	(1.6 cm)
3/4 in.	(2 cm)
1 in.	(2.5 cm)

10.3 Types of plants

10.3.1 Fruit and nut seedlings—seed-propagated stock

Exception: 3/16-inch "straight" of Apple seedlings shall be graded from 3/16-inch (5.0 mm) up to but not including 3/8-inch (1.0 cm) caliper.

10.3.1.1 Seedlings with limbs

There will be no limbs on one side of the seedling for at least 2 inches above the collar to ensure a budding or grafting area.

10.3.1.2 Root descriptions

In case of Apple and Pear seedlings, where the root description is given as branched or straight, the following shall apply:

Branched root: Not less than three root branches shall be present with 5 inches (13 cm).

Straight root: The root shall carry the minimum caliper of the grade for not less than 6 inches (15 cm) from the collar.

10.3.2 Vegetatively propagated plants

10.3.2.1 From layering

Stem caliper shall be taken 10 inches above the bottom of the layer (basal cut).

Roots — a minimum of 3 root nodes, each node containing at least 1 root.

10.3.2.2 Hardwood cuttings

On original hardwood cuttings, caliper is taken at the top of the cutting.

On cuttings with new growth above the original hardwood cutting, the caliper, and length are taken two inches up on the new growth.

10.3.2.3 Softwood cuttings

Caliper shall be taken at the collar or ground line.

10.3.2.4 Micropropagated plants (in vitro and ex vitro)

Micropropogated understock shall adhere to the classification set forth in Section 7.1.5: Micropropagated Plants (in vitro and ex vitro).

10.3.3 Unclassified

Any rootstocks not meeting the above specifications should be labeled "unclassified."

10.4 Evergreen lining out stock—recommendations

Evergreens should be transplanted frequently enough to create a good root system, which will ensure a minimum of transplanting loss and give the top room enough to start the branch framework properly, making a well-shaped specimen when placed in the nursery row.

In order to produce a fibrous root system, species such as *Abies, Pinus,* and similar sorts, which normally make a few coarse roots, should be transplanted every two to three years, and species such as *Arborvitae* and *Chamaecyparis* should be transplanted every three to four years, as they naturally make better roots.

Broad leaved evergreen species such as *Pyracantha coccinea 'Lalandei,'* which normally make a few coarse roots, should be transplanted every year, while those producing a good system of fibrous roots may be transplanted every second year only.

Trimming is also necessary to ensure a proper foundation for a good shape in the finished plant, although frequent transplanting will usually avoid the necessity of severe trimming.

10.5 Shade and flowering tree seedlings

Caliper shall be taken at the collar or ground line, and grades shall correspond to the following calipers:

1/16 in.	1/8 in.	1/4 in.
3/32 in.	3/16 in.	3/8 in.

10.6 Container grown understock

Specifications for understock sold in containers shall include caliper (except micropropagated plants; see section 10.3.2.4) and container class. Container classes shall agree with those in Table 1 in section 1.1.3.1.

10.7 In-ground fabric bag grown understock

Specifications for understock sold in in-ground fabric bags shall include caliper (except micropropagated plants, see section 10.3.2.4) and fabric bag diameter. Calipers will typically range from ¼ inch to ¾ inch, and fabric bags will typically be 5-inch or 8-inch diameter. Fabric bag diameters shall agree with those in Table 2 in Section 1.8.

Section 11: Seedling Trees and Shrubs

This section is to cover plants used for forest, game refuge, erosion control, restoration, shelterbelt, or farm woodlot plantings graded by cultural history, caliper, or height.

11.1 Quality definition

The quality of all seedling trees and shrubs is assumed to be normal for the species or variety unless otherwise designated. All plants are to have developed root systems, be free of insects and diseases as well as mechanical injuries, and be suitable for field planting in all respects. All conifers shall have dormant buds (except in the South) and secondary needles.

At the option of the purchaser, other special restrictions may be specified.

Tops or roots will not be trimmed unless specified by the grower or requested by the purchaser.

11.1.1 Cultural history specifications

Types

C = Cutting

U = Unrooted cutting

G = Grafted

L = Layered

S = Seedling

M = Micropropagated or tissue cultured

D = Division

Cultural

R = Root pruned

P = Pot or container grown

T = Transplanted (one per time)

B = Bed grown

O = Not transplanted

Coll. = Plants collected from the wild shall be so designated

Age = Sum of numbers following above codes

Example: S2T1T1 (4-year plant, 2 years in seedling bed, transplanted twice, one year each transplanting).

11.2 Method of measurement

Age is not important when height or caliper is specified; however, it may be used in listings or demanded by the purchaser.

When the caliper is important, measurements are taken at the root collar or ground line.

11.2.1 Deciduous or hardwood

When heights are to govern, the caliper specification is minimum, and when the caliper is to govern, the height specification is minimum.

Table 35. Minimum heights and root lengths for seedling calipers		
Caliper	**Min. Height**	**Min. Root Length**
1⁄16 in.	3 in.	4 in.
3⁄32 in.	3 in.	5 in.
1⁄8 in.	6 in.	6 in.
3⁄16 in.	12 in.	8 in.
1/4 in.	18 in.	10 in.
3⁄8 in.	24 in.	12. in.

Table 36. Minimum calipers for seedling heights* and root lengths		
Height	**Min. Caliper**	**Min. Root Length**
3 in.	1⁄16 in.	4 in.
6 in.	1⁄16 in.	4 in.
12 in.	3⁄32 in.	5 in.
18 in.	1⁄8 in.	6 in.
2 ft.	3⁄16 in.	8 in.
3 ft.	¼ in.	10 in.
4 ft.	3.8 in.	10 in.
5 ft.	7⁄16 in.	12 in.

*Suggested for commercial nurseries furnishing or purchasing stock for the retail trade, and still comply with demands for calipered stock.

11.2.2 Coniferous evergreens

For coniferous evergreens, height shall govern.

Table 37. Coniferous evergreen seedlings	
Height	Min. Caliper
6 in.	1⁄16 in.
9 in.	1⁄8 in.
12 in.	3⁄16 in.

11.3 Container grown and in-ground fabric bag grown seedlings

Specifications for container grown seedlings shall include height or caliper, as appropriate, and container class. Container classes shall agree with those in Table 1 in Section 1.1.3.1.

11.4 In-ground fabric bag grown seedlings

Specifications for seedlings sold in in-ground fabric bags shall include height or caliper, as appropriate to the plant type, and fabric bag diameter. Height will typically range from a few inches to 5 feet, calipers will typically range from ¼ inch to ¾ inch, and fabric bags will typically be 5-inch or 8-inch diameter. Fabric bag diameters shall agree with those in Table 2 in Section 1.8.

Section 12: Bulbs, Corms, and Tubers

12.1 General specifications

Bulbs and corms are generally sold under grade names such as "forcing size," "top-size," "large," etc. In the case of narcissus and daffodils, the designations of "double nose," to indicate a split bulb, and "round," are used.

With some groups, such as hyacinths, the grade names indicate usage; for example, "exhibition" and "forcing" sizes, and sizes more suitable for outdoor bedding purposes.

At the grower and wholesale levels, where more precise size information is imperative, actual size in inches or centimeters has been standard in the trade. With the need for international uniformity, size designations in most instances will be expressed in centimeters in circumference. In some instances, this type of measurement is not feasible (e.g., daffodils, peonies, caladiums, etc.), and another criterion (e.g., weight) is used.

12.2 Amaryllis

Designated by centimeters or inches of circumference.

Jumbo	36 cm. and up	(14 ¼ in. and up)
Exhibition	32 cm.	(12 ¾ in.)
Fancy	30 cm.	(12 in.)
Large	26 cm.	(10 ¼ in.)
Medium	22 cm.	(8 ¾ in.)
Small	20 cm.	(8 in.)

12.3 Anenomes

Designated by centimeters or inches of diameter.

Extra large	7 cm.	(2 ¾ in. and up)
Large	6 cm.	(2 ½ in.)
Medium	5 cm.	(2 in.)
Small	4 cm.	(1 ½ in.)

12.4 Begonias (tuberous)

Designated by centimeters or inches of diameter.

Giant	6 cm. and up	(2 ½ in. and up)
Extra large	5 cm.	(2 in.)
Large	4 cm.	(1 ½ in.)
Medium	3 cm.	(1 ¼ in.)
Small	2 cm.	(¾ in.)

12.5 Caladiums

Designated by centimeters or inches of diameter.

Giant	8 cm. and up	(3 in. and up)
Large	6 cm.	(2 ½ in.)
Standard	5 cm.	(2 in.)
Medium	4 cm.	(1 ½ in.)
Small	2 cm.	(¾ in.)

12.6 Callas

Designated by centimeters or inches of diameter.

Top	19 cm. and up	(7 ½ in. and up)
Large	5 cm.	(2 in.)
Medium	4 cm.	(1 ½ in.)
Small	3 cm.	(1 ¼ in.)

12.7 Cannas

Number of "eyes" or "buds" per root to be indicated. Any root with less than 2 "eyes" should not be offered to the public but may be suitable for growing in the nursery or for potting or bedding purposes.

12.8 Crocosmia

Designated by centimeters or inches of circumference.

Large	10 cm. and up	(4 in. and up)
Medium	6 – 8 cm.	(2 ½ - 3 in.)

12.9 Crocus

Designated by centimeters or inches of circumference.

Top	9 cm. and up	(3 ½ in. and up)
Large	8 cm.	(3 in.)
Medium	7 cm.	(2 ¾ in.)
Small	6 cm.	(2 ½ in.)

12.10 Dahlias

Designated by weight in grams. Each division shall have a portion of live crown and at least 1 "eye" or "bud."

No. 1	100 grams (or more)
No. 2	80 grams

12.11 Freesias

Designated by centimeters or inches of diameter.

Extra large	7 cm.	(2 ¾ in. and up)
Large	6 cm.	(2 ½ in.)
Medium	5 cm.	(2 in.)
Small	4 cm.	(1 ½ in.)

12.12 Gladiolus

Designated by centimeters or inches of circumference.

Jumbo	14 cm. and up	(5 ½ in. and up)
Large No. 1	12 cm.	(4 ¾ in.)
Large No. 2	10 cm.	(4 in.)
Medium No. 3	8 cm.	(3 in.)
Medium No. 4	6 cm.	(2 ½ in.)
Small No. 5	4 cm.	(1 ½ in.)
Small No. 6	3 cm.	(1 ¼ in.)
No Grade/No. 7	Under 3 cm.	(Under 1 ¼ in.)

12.13 Gloxinia (tuberous)

Designated by centimeters or inches of diameter.

Giant	6 cm. and up	(2 ½ in. and up)
Extra large	5 cm.	(2 in.)
Large	4 cm.	(1 ½ in.)
Medium	3 cm.	(1 ¼ in.)
Small	2 cm.	(¾ in.)

12.14 Hyacinths

Designated by centimeters or inches of circumference.

Top forcing	19 cm. and up	(7 ½ in. and up)
Large forcing	18 cm.	(7 in.)
Medium forcing	17 cm.	(6 ¾ in.)
Top bedding	16 cm.	(6 3⁄8 in.)
Large bedding	15 cm.	(6 in.)
Medium bedding	14 cm.	(5 ½ in.)

12.15 Iris - Dutch iris

Designated by centimeters or inches in circumference.

Large bulb varieties such as 'Wedgewood,' 'Ideal,' 'Prof. Blaauw,' and 'Blue Magic':

Top	10 cm. and up	(4 in. and up)
Large	9 cm.	(3 ½ in.)
Medium	8 cm.	(3 in.)

Smaller bulb varieties such as 'Excelsior,' 'White Van Vlict,' 'Imperator,' 'Golden Harvest,' 'H.C. Van Vlict,' and 'White Perfection':

Top	8 cm. and up	(3 in. and up)
Large	7 cm.	(2 ¾ in.)
Medium	6 cm.	(2 ½ in.)

12.16 Liatris

Designated by centimeters or inches of circumference.

No. 1 Flowering Size	10 cm. and up	(4 in. and up)
No. 2 Liner Size	8 cm.	(3 in.)

12.17 Lilies

Designated by centimeters or inches of circumference. Various species of lilies produce different size bulbs. These generally fall into two groups: the large bulb species such as 'Regal' and 'Easter'; and the smaller bulb species such as 'Tigrinum,' 'Umbellatum,' and 'Midcentury.'

Large Bulb Species		**Smaller Bulb Species**	
24 cm.	(9 ½ in.)	18 cm.	(7 in. and up)
22 cm.	(8 ¾ in.)	16 cm.	(6 3⁄8 in.)
20 cm.	(8 in.)	14 cm.	(5 ½ in.)
18 cm.	(7 1⁄8 in.)	12 cm.	(4 ¾ in.)
16 cm.	(6 3⁄8 in.)	10 cm.	(4 in.)

12.18 Muscari (grape hyacinths)

Designated by centimeters or inches of circumference.

Top	9 cm. and up	(3 ½ in. and up)
Large	8 cm.	(3 in.)
Medium	7 cm.	(2 ¾ in.)

12.19 Narcissus and daffodils

Narcissus bulbs are designated either as "double nose" (DN) or "round" (RN), and should be size-graded as DN I, DN II, DN III, or RN I, RN II, or RN III, or by using the appropriate "Top," "Large," or "Medium" designations, as shown below.

12.19.1 Double nose

Double nose means that bulbs show evidence of producing two or more flowers. Due to the double character of the bulb, circumference measurements cannot be used. *Size designation of DN bulbs is determined by the number of bulbs required to fill a 50-liter basket (50,000 cubic centimeters, 1.77 cubic feet, or 13.2 gallons).* Some cultivars tend to be larger than the average (e.g., "E.H. Krelage," "Sempre Avanti") or smaller than the average (e.g., "Poeticus," "White Sail").

The following chart shows examples of the number of DN bulbs per 50-liter basket for each size designation:

	(Size)		
	Top	Large	Med.
	DN I	DN II	DN III
Trumpet	200	275	375
'E.H. Krelage'	175	250	350
'Magnificence'	250	325	450
Large Cup	200	275	375
'Fortune'	225	300	400
'Sempre Avanti'	175	250	350
Small Cup	300	400	550
'Barret Browning'	200	275	375
'Verger'	275	350	450
Tazetta	275	350	475
'Geranium'	250	325	450
Poeticus	400	550	700
'Actea'	275	350	475
Double	300	400	550
'Cheerfulness'	275	350	475
'Texas' 250	325	450	450
'White Sail'	400	550	700

12.19.2 Round

Round means single-nosed bulbs which are fairly circular in cross-section.

While size may vary from the norm for certain cultivars, generally, the centimeters or inches of circumference are:

RD I Top	14 cm. and up	(5 ½ in. and up)
RD II Large	12 cm.	(4 ¾ in.)
RD III Medium	10 cm.	(4 in.)

12.20 Narcissus - Paper white

A type of bulb is normally much smaller than other types of narcissus.

Designated by centimeters or inches of circumference.

Top	16 cm. and up	(6 3/8 in. and up)
Large	15 cm.	(6 in.)
Medium	14 cm.	(5 ½ in.)
Small	12 cm.	(4 ¾ in.)

12.21 Ranunculus

Designated by centimeters or inches of diameter.

Giant	8 cm.	(3 in. and up)
Extra large	7 cm.	(2 ¾ in.)
Large	6 cm.	(2 ½ in.)
Medium	5 cm.	(2 in.)
Small	4 cm.	(1 ½ in.)

12.22 Tulips

Designated by centimeters or inches of circumference.

Top	12 cm. and up	(4 ¾ in. and up)
Large	11 cm.	(4 ½ in.)
Medium	10 cm.	(4 in.)
Small	9 cm.	(3 ½ in.)

12.23 Tuberoses

Designated by centimeters or inches of diameter.

Top	19 cm. and up	(4 in. and up)
First	8 cm.	(3 in.)

Section 13: Herbaceous Perennials, Ornamental Grasses, Groundcovers, and Vines

This section applies to plants generally sold to the retail and landscape trade.

For lining out stock sold within the wholesale trade for continued cultivation, or for plants listed in this section sold in containers smaller than #SP4, see Section 7 – Young Plants.

13.1 General specifications

Plants in this section should be specified by the form in which they are marketed: container grown, bare root, or field potted (see Section 13.1.1).

Specifications for certain container grown plants in this section shall include both plant size and container size, while specifications for other container grown plants in this section may include only container size. Even when only container size is required, specifiers are encouraged to also include a minimum plant size.

Propagation methods (Section 13.1.2) may also be specified.

13.1.1 Types (form in which marketed):

Container-grown — grown to a specified size in a container. Specify by indicating container class from Table 1 in Section 1.1.3.1.

Bare root — free or substantially free of any soil or growing media. Specify as "BR."

Field-potted — field-grown plants that are potted for delivery as they are dug from the field. Specify as "FP."

13.1.2 Propagation methods

The following codes should be used to specify propagation methods.

D = division

S = seedling

C = cutting

G = grafted

L = layered

M = micropropagated or tissue cultured

Coll. = Individual plants collected directly from the wild or collected from the wild and grown on in a nursery.

13.2 Herbaceous perennials sold by eye divisions, fans, or rhizomes

Specifications for plants included in this section shall include both plant size and container size. Specific standards are used for these perennials due to certain rhizomatous, tuberous, or other growth habits. Container sizes indicated are recommended minimums for the listed plant size.

13.2.1 Astilbe

1-2 eye division: #SP4 container
2-3 eye division: #SP5 container
3-5 eye division: #1 container
5 eye and larger: #2 container

13.2.2 Dicentra–Bleeding heart

1-2 eye division: #SP4 container
2-3 eye division: #SP5 container
3-5 eye division: #1 container
5 eye and larger: #2 container

13.2.3 Hemerocallis–Daylily

1-fan (stem) division, blooming size: #SP4 container
1 or 2 fan (stem) division, heavy root system: #SP5 container

Fan (stem) divisions of dwarf and miniature Daylilies are usually smaller than normal, while those of tetraploid Daylilies are generally larger.

1-Fan liner | 1-Fan division (blooming size) | 1-2 Fan division (heavy)

Figure 30. Examples of typical grades for *Hemerocallis*

13.2.4 Hosta ssp. – Funkia

1 eye, light grade: #SP4 container

1 eye, heavy grade (well rooted): #SP5 container

1-2 eye, heavy grade: #1 container

13.2.5 Iris

Iris ensata (Japanese Iris) and *Iris sibirica* (Siberian Iris):

1-2 fan (stem) division (at least 1 fan blooming size): #SP4 container

2-3 fan (stem) heavy blooming size division: #1 container

Bearded Iris — Dwarf, intermediate, and tall classifications:

Small non-blooming size rhizome: #SP4 container

Large blooming size rhizome: #SP5 container

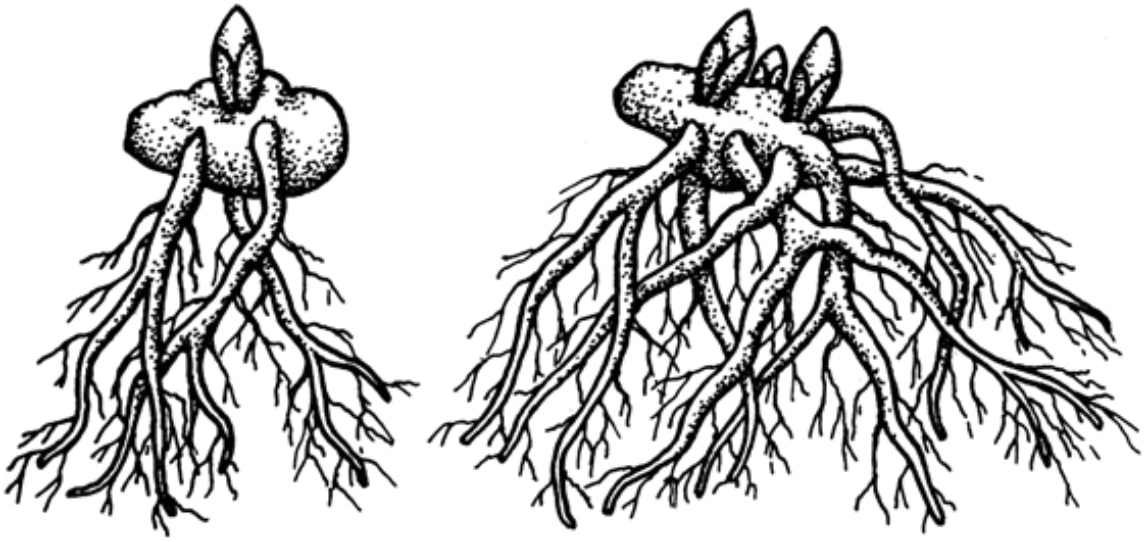
13.2.6 Paeonia - Peony

2-3 eye division: #SP5 container

3-5 eye division: #1 container

5 eye and up: #2 container

All eyes counted shall be flowering eyes or large nonflowering eyes on heavy roots. Small "eye" buds shall not be counted.



1-2 Eye Division

2-3 Eye division

3-5 Eye division

5 Eye and up

Figure 31. Examples of typical sizes for *Paeonia*

13.2.7 Papaver orientale - Oriental poppy

Light one-year plant:	#SP4 container
Heavy one-year plant (bare root, field-grown):	#SP5 container

13.3 Other herbaceous perennials

Herbaceous perennials not included in Section 13.2, shall be specified and sold by container class as shown in Table 1 in Section 1.1.3.1. The root mass of the plant shall satisfy the requirement stated in Section 1.6.1.

Examples: Echinacea, Gaura, Penstemon, Rudbeckia, Salvia, Veronica

13.4 Ornamental grasses

Ornamental grasses shall be specified and sold by container class, as shown in Table 1 in Section 1.1.3.1. The root mass of the plant shall satisfy the requirement stated in Section 1.6.1.

Examples: *Cortaderia, Festuca, Miscanthus, Muhlenbergia, Panicum, Pennisetum*

13.5 Groundcovers

Groundcovers shall be specified and sold by container class, as shown in Table 1 in Section 1.1.3.1. The root mass of the plant shall satisfy the requirement stated in Section 1.6.1. It may be helpful to include additional information in the specification, such as the number of runners. For plants sold in containers smaller than an #SP4, see Section 7.

Examples: *Ajuga reptans, Dalea greggii, Gazania rigens, Lantana montevidensis, Liriope, Lonicera japonica, Pachysandra procumbs, Vinca minor*

13.6 Vines

Specifications for vines may include stake height, if applicable, or minimum length and container class, as shown in Table 1 in Section 1.1.3.1. The root mass of the plant shall satisfy the requirement stated in Section 1.6.1. The longest trail of the vine shall reach at least the length of the stake (e.g., "Hedera helix, staked, 18" ht., #2)

Examples: *Bougainvillea, Campsis radicans, Clematis, Hedera helix, Macfadyena unguis-cati, Parthenocissus, Tecomaria capensis*

Section 14: Christmas Tree Standards

The standard herewith shall conform to and fully incorporate the "United States Standards for Grades of Christmas Trees," promulgated by the United States Department of Agriculture, effective October 30, 1989 (reprinted January, 1997), and as thereafter may be revised. The Christmas Tree Standards are available from the U.S. Grades and Standards, Specialty Crop, Agricultural Marketing Service, U.S.

Department of Agriculture, Washington, DC 20250 (https://www.ams.usda.gov/grades-standards/christmas-trees-grades-and-standards).

Annex C: Glossary

The information contained in this Annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Annex may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.

BALLED & BURLAPPED (B & B). Plants established in the ground that have been prepared for transplanting by digging so that the soil immediately around the roots remains undisturbed. The ball of earth containing the roots of the plant is then bound up in burlap or similar mesh fabrics.

BALLED AND POTTED (B & P). Plants dug with a ball of earth and placed in a container in lieu of burlapping.

BARE-ROOT (B.R.). Harvested plants from which the soil or growing medium has been removed.

BRANCH. An outgrowing shoot, stem or twig that grows from the main stem or trunk.

CALIPER. The diameter measurement of the stem or trunk of nursery stock. The location of the measurement depends on the plant type. For fruit trees, small fruits, understock, and seedling trees and shrubs, caliper measurement shall be taken at the root collar or at other points expressly described in ANSI Z60.2. For all other nursery stock, caliper measurement is taken six inches above the ground level for field grown stock and from the soil line for container grown stock, which should be at or near the top of the root flare, and six inches above the root flare for bare root plants, up to and including the four-inch caliper size interval (i.e., from four inches up to, but not including, 4½ inches). If the caliper measured at six inches is four and one-half inches or more, the caliper shall be measured at 12 inches above the ground level, soil line, or root flare, as appropriate. [also see Diameter Breast Height]

CANE. A primary stem which starts at a point not higher than ¼ the height of the plant.

COLLAR [ROOT COLLAR]. The line of junction between the root of a plant and its stem or trunk.

COLLECTED PLANT. A plant that has been gathered from the wild or taken from an established landscape planting; not grown in a nursery.

CONTAINER. A flat, pot, tub, etc., usually made of plastic, wood, ceramic, or metal, used to grow or hold one or more plants and which generally prevents the growth of roots beyond its side walls or bottom. (See "Grow Bag," below).

CONTAINER GROWN PLANT. A plant grown and marketed in a container (See also "Pot in Pot.")

CROWN. The portion of a tree comprising the branches.

DIAMETER BREAST HEIGHT (DBH). The outside bark diameter at breast height. Breast height is defined as 4.5 feet (1.37m) above the forest floor on the uphill side of the tree. For the purposes of determining breast height, the forest floor includes the duff layer that may be present, but does not include unincorporated woody debris that may rise above the ground line.

EYE. A dormant bud on a corm, tuber, or root division from which a stem will develop when the corm or tuber is planted.

FABRIC BAG. For purposes of ANSI Z60.2, fabric bags may be used above ground as "containers" or in the ground as "in-ground fabric bags" and are a type of container made from durable fabric.

FAN. Descriptive term for the growth habit of certain perennial plants, such as Iris and

Hemerocallis, which have no vertical stem because the leaves originate from the rhizome.

FIELD POTTED. See Balled and Potted.

GRADE. A grade is a classification unit based on a specific size or size range, number of stems or canes, etc. For the purposes of ANSI Z60.2, grade is not intended to describe quality, except for Roses.

GROWTH HABIT [HABIT]. The mode or rate of growth, general shape, mature size, and branching structure of a plant, without training or pruning, including the changes which take place seasonally during its life cycle (e.g., deciduous, flowering, fruiting, etc.).

HEIGHT. Unless otherwise specified, the vertical distance between the collar or ground line and the top of the stem, measured in the plant's natural position. Techniques for proper measurement are determined by the particular growth habit of the plant, and may not always extend to the tip of the stem.

MEDIUM. A mixture of two or more ingredients such as soil, peat moss, perlite, ground bark, etc., in which a container plant has been grown.

NURSERY STOCK. Plants grown in or obtained from a nursery.

PLUG. A cylinder of medium in which a plant is grown. The term is generally used to describe seedlings and rooted cuttings which have been removed from the container but with the medium held intact by the roots.

POT IN POT. A method of container-grown nursery production whereby a container is placed into another larger container which has been placed in or on the ground, surrounded by soil or mulching material, to aid in weed control and fertilization processes, maintain a more constant media temperature, and prevent the plant from being blown over by winds.

PROCESSED BALLED PLANT. A plant dug bare root, while dormant, to which a moist growing medium is added around the roots to form a ball designed to sustain plant growth.

ROOT BALL. The intact ball of earth or growing medium containing the roots of a nursery plant.

ROOT COLLAR. See COLLAR.

ROOT FLARE [TRUNK FLARE]. The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

ROOT PRUNING. The systematic pruning of roots of nursery plants growing in the field in order to stimulate branching of roots and the production of fibrous roots.

SPREAD. A term used to indicate the horizontal width of a shrub or the crown of a tree. Techniques for

proper measurement are determined by the particular growth habit of the plant, and may not always be the maximum distance between any two branch tips.

UNDERSTOCK, OR ROOTSTOCK. The term used to describe that part of a plant, including the collar and roots, on which another variety has been budded or grafted.

TRUNK. That portion of a stem or stems of a tree below the lowest branch.

TRUNK FLARE. See ROOT FLARE.

WHIP. A young tree without branches. In some species and grades, the initial eruption of branches, called "spurs," may be present.

WHORL. The arrangement of three or more buds, leaves, flowers, or twigs at the same node.

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Annex D: Metric Equivalents

The information contained in this Annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Annex may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.

The following table was prepared in cooperation with the Canadian Nursery Trades Association to assist in nursery trade between the U.S. and Canada as well as with other countries using the metric system.

The following "metric equivalents" are suggested for use in sizing nursery plants:

United States: Metric Equivalents			
For plants sized by height or spread		For plants sized by caliper	
US measure	Metric measure	US measure	Metric measure
4 in.	10 cm.	1⁄16 in.	1.5 mm.
6 in.	15 cm.	3⁄32 in.	2.4 mm.
7.5 in.	19 cm.	1⁄8 in.	3.2 mm.
8 in.	20 cm.	3⁄16 in.	4.8 mm.
9 in.	23 cm.	¼ in.	6.3 mm.
10 in.	25 cm.	9⁄32 in.	7.1 mm.
12 in.	30 cm.	5⁄16 in.	8.0 mm.
15 in.	38 cm.	3⁄8 in.	9.5 mm.
18 in.	46 cm.	7⁄16 in.	11.1 mm.
21 in.	53 cm.	½ in.	12.7 mm.
2 ft.	61 cm.	9⁄16 in.	14.3 mm.
2.5 ft.	76 cm.	5⁄8 in.	16.0 mm.
3 ft.	91 cm.	11⁄16 in.	17.5 mm.
3.5 ft.	1.07 m.	¾ in.	19 mm.
4 ft.	1.22 m.	7⁄8 in.	22 mm.
4.5 ft.	1.37 m.	1 in.	25.4 mm.
5 ft.	1.52 m.	1 ¼ in.	3.2 cm.
5.5 ft.	1.68 m.	1 ½ in.	3.8 cm.
6 ft.	1.73 m.	1 ¾ in.	4.5 cm.
7 ft.	2.13 m.	2 in.	5.0 cm.
8 ft.	2.44 m.	2 ½ in.	6.3 cm.
9 ft.	2.74 m.	3 in.	7.6 cm.
10 ft.	3.05 m.	3 ½ in.	9.0 cm.
12 ft.	3.66 m.	4 in.	10.0 cm
14 ft.	4.27 m.	4 ½ in.	11.0 cm.
16 ft.	4.88 m.	5 in.	13.0 cm.
18 ft.	5.49 m.	5 ½ in.	14.0 cm.
20 ft.	6.10 m.	6 in.	15.0 cm.
		7 in.	18.0 cm.
		8 in.	20.0 cm.

Recommendation to Revise American Standard for Nursery Stock (ANSI Z60.2-2025)

AmericanHort
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Columbus, OH 43215

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