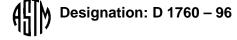
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An American National Standard

Standard Specification for Pressure Treatment of Timber Products¹

This standard is issued under the fixed designation D 1760; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers treatment of timber products by pressure processes in closed vessels with preservative materials and solutions.

1.2 This specification is divided into two general sections. Sections 1-9 cover requirements relating to all species and commodities, while Tables 1-7 show requirements relating to specific species and commodities. The purchaser should note that these individual requirements vary widely and, consequently, great care must be used in applying them in specific instances.

1.3 The values stated in inch-pound units are to be considered as standard.

2. Referenced Documents

- 2.1 ASTM Standards:
- D 347 Tables for Volume and Specific Gravity Correction for Creosote and Coal Tar²
- D 390 Specification for Coal-Tar Creosote for the Preservative Treatment of Piles, Poles, and Timbers for Marine, Land, and Fresh Water Use²
- D 391 Specification for Creosote-Coal Tar Solution²
- D 1034 Specification for Fluor-Chrome-Arsenate-Phenol²
- D 1035 Test Methods for Chemical Analysis of Fluor-Chrome-Arsenate-Phenol²
- D 1272 Specification for Pentachlorophenol²
- D 1325 Specification for Ammoniacal Copper Arsenate and Ammoniacal Copper Zinc Arsenate²
- D 1326 Methods for Chemical Analysis of Ammoniacal Copper Arsenate and Ammoniacal Copper Zinc Arsenate²
- D 1624 Specification for Acid Copper Chromate²
- D 1625 Specification for Chromated Copper Arsenate²
- D 1627 Methods for Chemical Analysis of Acid Copper Chromate²

- D 1628 Test Methods for Chemical Analysis of Chromated Copper Arsenate²
- D 1858 Specification for Creosote-Petroleum Solution²
- D 1860 Test Method for Moisture and Creosote-Type Preservative in Wood²
- D 2085 Test Method for Determining Chloride Used in Calculating Pentachlorophenol in Solutions or Wood (Lime Ignition Method)²
- D 2604 Specification for High-Boiling Hydrocarbon Solvent for Preparing Oil-Borne Preservative Solutions²
- D 2605 Specification for Volatile Petroleum Solvent (LPG) for Preparing Pentachlorophenol Solutions²
- D 3225 Specification for Low-Boiling Hydrocarbon Solvent for Oil-Borne Preservatives²
- D 5653 Specification for Copper bis (Dimethyldithiocarbamate)²
- D 5655 Test Method for Analysis of Copper Dimethyldithiocarbamate (CDDC) Treated Wood by Colorimetry²

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *preservative materials and solutions*—materials that when injected into wood protect it from the destructive action of fungi, insects, and marine borers.

3.1.2 *timber products*—include round, sawn, and otherwise fabricated materials of various species. Examples are utility poles, piles, posts, crossties, lumber, timbers, glued laminated timbers, plywood, and so forth.

ALL TIMBER PRODUCTS

4. General Requirements

4.1 The following requirements, except as modified, or supplemented by Tables 1-7, for the various species and types of material, apply to each of the treating processes and to all species and types of material. If these requirements are to be otherwise modified to meet special conditions, complete detailed instructions shall be given by the purchaser or specifier.

4.1.1 Maximum time duration (total elapsed time of a treating phase), maximum temperature, and maximum pressure limits shall not be exceeded. A phase shall begin when a change in conditions within the cylinder is initiated and shall end when either new conditions are imposed, or the cylinder is emptied of preservative.

¹ This specification is under the jurisdiction of ASTM Committee D-7 on Wood and is the direct responsibility of Subcommittee D07.06 on Treatments for Wood Products.

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Some requirements in this specification are similar to those in the Commodities Standards of the American Wood-Preservers' Association for treatment of timber products by pressure processes in closed vessels with preservative materials and solutions. Acknowledgment is made to the American Wood-Preservers' Association for its development of subject matter used in this specification.

² Annual Book of ASTM Standards, Vol 04.10.

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ACC 0.25 (4,0) 0.50 (8.0) not recommended 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) 2.50 (40.0) 0.25 (4,0) 0.40 (6.4) not recommended 0.40 (6.4) 1.50 (40.0) ^F CDDC ^H (as copper metal) FCAP 0.25 (4.0) not recommended not recommended not recommended 0.25 (4.0) not recommended 0.25 (4.0) not recommended Penetration 2.5 in. (64 mm) unless 85 % of sapwood 0.40 in. (10.2 mm) and 90 % of sapwood less than 5 in. (127 mm) in thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service A borer core shall be taken from the incised faces of 20 pieces in each charge. If 80 % of the borings meet the penetration requirements the charge shall be accepted. Borings not meeting the penetration. Conditioning air seasoning, kiln drying, Boulton drying, steaming (water-boome treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming. ^G Steaming. ^G 240 (117) 240 (117) 240 (117) 240 (117) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
CCA, Types A and C 0.25 (4.0) 0.40 (6.4) 2.50 (40.0) 0.25 (4.0) 0.40 (6.4) not recommended CDDC ^H (as copper metal) 0.45 (7.2) not recommended not recommended 0.45 (7.2) not recommended Penetration 2.5 in. (64 mm) unless 85 % of sapwood 0.40 in. (10.2 mm) and 90 % of sapwood less than 5 in. (127 mm) in thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service Determination of penetration <i>F</i> A borer core shall be taken from the incised faces of 20 pieces in each charge. If 80 % of the borings meet the penetration requirements the charge shall be accepted. Borings not meeting the penetration. Conditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: ⁶ 240 (117) 240 (117) Duration, max, h 6 22 (558.8) Heating in preservative: 210 (99)		0.25 (4.0)	0.50 (8.0)	not recommer	nded	0.25 (4.0)	0.50 (8.0)	not recommended	
0.45 (7.2) not recommended not recommended 0.45 (7.2) not recommended PCAP 0.10 (1.6) 0.20 (3.2) not recommended 0.25 (4.0) not recommended Penetration 2.5 in. (64 mm) unless 85 % of sapwood 0.40 in. (10.2 mm) and 90 % of sapwood less than 5 in. (127 mm) in thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service Determination of penetration <i>F</i> A borer core shall be taken from the incised faces of 20 pieces in each charge. If 80 % of the borings not meeting the penetration requirements the charge shall be accepted. Borings not meeting the penetration requirements shall show evidence of preservative penetration. Zonditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: ^G 22 (558.8) Temperature, max, °F (°C) 240 (117) Duration, max, h 6 Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: Temperature, max, °F (°C) Temperature, max, °F (°C) 210 (99)			. ,				· · ·	2.50 (40.0) ^E	
CDDC ^H (as copper metal) 0.10 (1.6) 0.20 (3.2) not recommended not recommended 0.25 (4.0) not recommended Penetration 2.5 in. (64 mm) unless 85 % of sapwood 0.40 in. (10.2 mm) and 90 % of sapwood less than 5 in. (127 mm) in thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service Determination of penetration <i>F</i> A borer core shall be taken from the incised faces of 20 pieces in each charge. If 80 % of the borings not meeting the penetration requirements the charge shall be accepted. Borings not meeting the penetration. Zorditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: ^G 240 (117) 6 Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: 210 (99)	CCA, Types A and C	()	. ,		,	· · /	()		
FCAP 0.25 (4.0) not recommended not recommended 0.25 (4.0) not recommended not recommended Penetration 2.5 in. (64 mm) unless 85 % of sapwood 0.40 in. (10.2 mm) and 90 % of sapwood less than 5 in. (127 mm) in thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service Determination of penetration <i>F</i> A borer core shall be taken from the incised faces of 20 pieces in each charge. If 80 % of the borings meet the penetration requirements the charge shall be accepted. Borings not meeting the penetration. Conditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: ^G 240 (117) Duration, max, h 6 Vacuum, min, in, (mm) at sea level 22 (558.8) Heating in preservative: 210 (99)	CDDC ^H (as copper metal)	· · /				0.45 (7.2)	not recommended	not recommended	
Determination of penetration F thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service A borer core shall be taken from the incised faces of 20 pieces in each charge. If 80 % of the borings meet the penetration requirements the charge shall be accepted. Borings not meeting the penetration. Image: Service Jack Pine, Lodgepole Pine, and Red Pine Image: Conditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: Condition, max, h 6 Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: 210 (99)		()	()			0.25 (4.0)	not recommended	not recommended	
Determination of penetration A bone totle shall be taken non-interaction of the penetration requirements the charge shall be accepted. Borings not meeting the penetration. gene charge if 80 % of the borings meet the penetration requirements the charge shall be accepted. Borings not meeting the penetration. Jack Pine, Lodgepole Pine, and Red Pine Conditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: ^G Temperature, max, °F (°C) 240 (117) Duration, max, h 6 Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: Temperature, max, °F (°C) 210 (99)		thickness, 0.50 in. (12.7 mm) and 90 % of sapwood thicker than 5 in. and for coastal waters service					d thicker than 5		
Conditioning air seasoning, kiln drying, Boulton drying, steaming (water-borne treatments or ice-coated or frozen materials with oil treatments only), heating in the preservative or a combination Steaming: ^G Temperature, max, °F (°C) 240 (117) Duration, max, h 6 Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: Temperature, max, °F (°C) 210 (99)		each charge. If 80 % of the borings meet the penetration requirements the charge shall be accepted. Borings not meeting the penetration requirements shall show evidence of preservative							
Steaming: ^G treatments only), heating in the preservative or a combination Steaming: ^G 240 (117) Duration, max, h 6 Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: Temperature, max, °F (°C) Temperature, max, °F (°C) 210 (99)			Ja	ack Pine, Lodge	pole Pine	, and Red Pine			
Temperature, max, °F (°C)240 (117)Duration, max, h6Vacuum, min, in. (mm) at sea level22 (558.8)Heating in preservative: Temperature, max, °F (°C)210 (99)	5					rials with oil			
Duration, max, h6Vacuum, min, in. (mm) at sea level22 (558.8)Heating in preservative: Temperature, max, °F (°C)210 (99)	5	240 (117)							
Vacuum, min, in. (mm) at sea level 22 (558.8) Heating in preservative: Temperature, max, °F (°C) 210 (99)									
	Vacuum, min, in. (mm) at sea level Heating in preservative:	22 (558.8)							
Duration, max, h 6 h seasoned, green optional			n antional						

TABLE 1 Treatment of Lumber, Timbers, Bridge Ties, and Mine Ties by Pressure Processes

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TABLE 1	Continued
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			le Pine, and Red Pine	
Incising	required	Jack Fille, Lougepo		
Treatment:	Tequiled			
Pressure, psig (kPa):				
min	75 (517)			
max	175 (1207)			
Expansion bath: temperature, max				
°F (°C)				
	220 (104)			
Final steaming ^G :				
Temperature, max, °F (°C)	240 (117) (not permitted for service in c	coastal waters)		
Duration, max, h	2			
			Jack Pine, Lodgepole Pine,	and Red Pine
		Above	Ground Contact	Coastal Waters
		Ground	Ground Contact	Coasial Walers
Results of treatment:				
mm) from surface):	ling zone for assay 0 to 0.60 in. (0 to 15.2			
Creosote and creosote solutions—I	by assay:			
Creosote		6 (96)	8 (128)	refusal
Creosote-coal tar solution		6 (96)	8 (128)	refusal
Creosote-petroleum solution		6 (96)	8 (128)	not recommended
Dil-borne preservatives—by assay:			· · ·	
	ions D 2604, D 2605, or D 3225 solvents	0.30 (4.81)	0.40 (6.4)	not recommended
ACC		0.25 (4.0)	0.50 (8.0)	not recommended
ACA and ACZA		0.25 (4.0)	0.40 (6.4)	not recommended
CCA, Types A and C		0.25 (4.0)	0.40 (6.4)	not recommended
FCAP		0.45 (7.2)	not recommended	not recommended
		0.25 (4.0)	not recommended	not recommended
Determination of penetration			I be taken from each of 20 pie	
	Northorn White Dine, Suga			
	Northern White Pine, Suga and Western White F		K	edwood
Conditioning	air seasoning, kiln drying, Boulton drying,			oulton drying, steaming (wate
	 borne treatments and ice-coated or froz treatments only), heating in preservative 			oated or frozen material with heating in preservative or a
	treatments only), heating in preservative		combination	fieading in preservative of a
Steaming: ^D			combination	
Temperature, max,	240 (117)		240 (117)	
°F (°C) Duration may b	6		4.5	
Duration, max, h /acuum, min, in. (mm) at sea level	6 22 (558.8)		4.5 22 (558.8)	
Heating in preservative:	22 (000.0)		22 (000.0)	
Temperature, max, °F (°C)	210 (99)		210 (99)	
Duration, max, h	6 h seasoned, green optional		6 h seasoned, green option	al
ncising	required		required	a
Treatment:	loquilou		loquilou	
Pressure, psig (kPa):				
min	50 (345)		50 (345)	
max	150 (1034)		125 (861)	
Expansion bath: temperature,			120 (001)	
max,° F (°C)	220 (104)		220 (104)	
Final steaming:	· · · ·		· /	
Temperature, max, °F (°C) Duration, max, h	240 (117) (not permitted for service in coal 1	astal waters)	240 (117) (not permitted for 1	service in coastal waters)
	Above		Above	
	Ground Ground Contac	t Coastal Waters	Ground Gro	und Contact Coastal Waters

Results of treatment: Retention, min, lb/ft³ (kg.m³) (sampling zone for assay 0 to 0.60 in. (0 to 15.2 mm) from surface):

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 TABLE 1
 Continued

-	Above Ground	Ground Contact	Coastal Waters	Above Ground	Ground Contact	Coastal Waters
Creosote and creosote solutions—by assay:						
Creosote	6 (96)	8 (128)	refusal	8 (128)	10 (160)	20 (320) full cell
Creosote-coal tar solution	6 (96)	8 (128)	refusal	8 (128)	10 (160)	20 (320) full cell
Creosote-petroleum solution	6 (96)	8 (128)	not recommended	8 (128)	10 (160)	not recommended
	Northern White I	Pine, Sugar Pine, and \	Western White Pine		Redwod	
	Above Ground	Ground Contact	Coastal Waters	Above Ground	Ground Contact	Coastal Waters
bil-borne preservatives—by assay: Pentachlorophenol using Specifi- cations D 2604, D 2605, or D 3225 solvents Vater-borne preservatives—by as- cation.	0.30 (4.81)	0.40 (6.4)	not recommended	0.60 (9.6)	0.50 (8.0)	not recommende
say: ACC	0.25 (4.0)	0.50 (8.0)	not recommended	0.25 (4.0)	0.50 (8.0)	not recommende
ACA and ACZA	0.25 (4.0)	0.40 (6.4)	not recommended	0.25 (4.0)	0.40 (6.4)	not recommende
CCA, Types A and C	0.25 (4.0)	0.40 (6.4)	not recommended	0.25 (4.0)	0.40 (6.4)	not recommende
FCAP	0.45 (7.2)	not recommended	not recommended	0.45 (7.2)	not recommended	not recommende
	0.25 (4.0)	not recommended	not recommended	0.25 (4.0)	not recommended	not recommende
Determination of penetration	sapwood F	iTeh S s://star	If 80 % charge	of the borings shall be accep	en from each of 20 pie s meet the penetration oted. Borings not meet ow evidence of prese	n requirement, the
		Black G	Gum and Red Gum		Oak	
Conditioning		air seasoning, kiln dryi heating in preservati	ng, Boulton drying, steami ve or a combination		soning, kiln drying, Bo eservative or a combi	
Temperature, max, °F (°C) Duration, max, h		240 (117) 6 <u>ASTM</u> 22 (558.8) 220 (104) optional		not per bd62-28e 220 (10 optiona	ecca2c3fec/astr 04)	
icising reatment: Pressure, psig (kPa): min		125 (861)		125 (86	/	
max Expansion bath: temperature,		200 (1379)		250 (17		
max, °F (°C) inal steaming:		220 (104)		220 (10	,	
Temperature, max, °F (°C) Duration, max, h		1	ed for service in coastal wa	wate 1	 (not permitted for s) 	
				Above		
	Above Ground	Ground Conta	ct Coastal Waters	Above Ground	Ground Contac	t Coastal Water
esults of treatment: Retention, min, lb/ft ³ (kg/m ³) (by gage) Creosote and creosote solutions:		0 (120)	refueel	6 (06)	7 (110)	E
Creosote	6 (96)	8 (128)	refusal	6 (96)	7 (112)	refusal min 10 (160)
Creosote-coal tar solution	6 (96)	8 (128)	12 (192) minimum	6 (96)	7 (112)	refusal min 10 (160)
Creosote-petroleum solution bil-borne preservatives:	6 (96)	8 (128)	not recommended	6 (96)	7 (112)	not recommend
Pentachlorophenol using Specifi- cations D 2604, D 2605, or D 3225 solvents Vater-borne preservatives:	0.30 (4.81	1) 0.40 (6.4)	not recommended	0.30 (4.81)	0.40 (6.4)	not recommende

TABLE 1 Continued

ACC		0.25 (4.0)	0.50 (8.0)	not recommended	0.25 (4.0)	0.50 (8.0)	not recommended
ACA and ACZA		0.25 (4.0)	0.40 (6.4)	not recommended	0.25 (4.0)	0.40 (6.4)	not recommended
CCA, Types A and C		0.25 (4.0)	0.40 (6.4)	not recommended	0.25 (4.0)	0.40 (6.4)	not recommended
FCAP		0.45 (7.2)	not recommended	not recommended	0.45 (7.2)	not recommende	ed not recommended
		0.25 (4.0)	not recommended	not recommended	0.25 (4.0)	not recommende	ed not recommended
Penetration	1.	5 in. (38 mm) unl	ess 85 % of sapwood	center o penetrat	f cross section. ion may be acc	rood. Red oaks, 65 Charges of recalcit epted if the wood is ment and if treatme	properly
Determination of penetration	A,B,C,D,E,F,G,H,I			F			

^A The species grouping, Hemfir, includes Western hemlock (*Tsuga heterophylla*), California red fir (*Abies magnifica*), grand fir (*Abies grandis*), noble fir (*Abies procera*), Pacific silver fir (*Abies analilis*), and white fir (*Abies concolor*).

^B Pacific Coast Douglas fir includes Douglas fir from west of the crest of the Cascade Mountains in Oregon, Washington, and Northern California and west of the crest of the Sierra Nevada Mountains in the rest of California. Interior Douglas fir is Douglas fir grown anywhere else.

^C Interior Douglas fir and Western larch are not suitable species to be used for lumber or timbers in coastal waters.

^D Steam-conditioning southern pine, ponderosa pine, red pine, or black or red gum lumber before treatment with ACC or CCA preservatives is prohibited except when the lumber is ice-coated or frozen.

^{*E*} Retentions apply to red oak only. White oak of all sizes shall be treated to refusal.

^F A borer core shall be taken from each of 20 pieces in the charge. If 80 % of the cores meet the penetration requirements, the charge shall be accepted. Borings not meeting the penetration requirements shall show evidence of preservative penetration.

^G This retention applies to Pacific Coast Douglas Fir and is not recommended for Hemfir, Western Hemlock, or Western Larch.

^H Treatment of Pacific Coast Douglas fir and Western larch with CCA, Type A or C, shall only be valid when the material is chosen from permeable wood selected by treatment trials.

¹ Southern pine only.

TABLE 2 Treatment of Land and Fresh-Water Piles and Foundation Piles by Pressure Processes

	Southern Pine and Ponderosa Pine	Pacific Coast Douglas Fir ^{B,C}	ards Oak	Lodgepole Pine
Conditioning	air seasoning, kiln drying, steaming, heating in preservative, or a combination thereof	air seasoning, kiln drying, Boulton drying, heating in preservative, or a combination thereof	air seasoning, kiln drying, heating in preservative, or a combination thereof	air seasoning, kiln drying, steaming (for ice-coated or frozen piles only) Boulton drying, heating in preservative, or a combination thereof
Steaming:				
Temperature, max, °F (°C) Duration, max, h	southern pine: 15 ^A	not permitted	not permitted	240 (117) 6
Vacuum, min, in. (mm) at	ponderosa pine: 6 22 (558.8)			22 (558.8)
sea level Heating in preservative:				
Temperature, max, °F (°C)	220 (104)	seasoned 210°F (99 °C) and 6 h	220 (104)	220 (104)
Duration, max, h	optional	green or partially seasoned 220°F (104° C) and optional	optional	optional
Treatment:				
Pressure, psig (kPa)				
min	125 (861)	75 (517)	150 (1034)	100 (689)
max	200 (1379)	150 (1034)	200 (1379)	150 (1034)
Expansion bath: tempera- ture, max, °F (°C)	220 (104)	220 (104)	not permitted	220 (104)
Final steaming:	220 (104)	220 (104)	not permitted	220 (104)
Temperature, max, °F (°C)	245 (120)	240 (117)	not permitted	24 (117)
Duration, max, h	3	3	·	3
Results of treatment:				
Number of borings per charge	20	20	20	20
Retention, min, lb/ft ³ (kg/ m ³) (sampling zone for assay, in. (mm) from surface) Creosote and creosote solutions:	0 to 3.0 (0 to 76.2)	0 to 1.00 (0 to 25.4)	0 to 2.00 (0 to 50.8)	0 to 1.00 (0 to 25.4)
Creosote	12 (192)	17 (272)	6 (96)	17 (272)
Creosote-coal tar solution		17 (272)	6 (96)	17 (272)
Creosote-petroleum solution	12 (192)	17 (272)	6 (96)	17 (272)
Oil-borne preservatives:				
Pentachlorophenol using Specification D 2604 solvent	0.60 (9.6)	0.85 (13.6)	0.30 (4.81)	0.85 (13.6)
Water-borne preservatives:				

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TABLE 2 Continued

	Southern Pine and Po Pine	onderosa Pacific Coast	Douglas Fir ^{B,C}	Oak	Lodgepole Pine
ACA and ACZA CCA, Types A and C Penetration	0.80 (12.8) 0.80 (12.8) 3.5 in. (89 mm) unless sapwood ^D	1.00 (16.0) 1.00 (16.0) 90 % of 0.75 in. (19 mm) sapwood unles mm) ^D		not recommended not recommended 100 % of sapwood	1.00 (16.0) 1.00 (16.0) 0.75 (19 mm) and 85 % of sapwood unless 1.60 in. (41 mm)
	Southern Pine and Po Pine	nderosa Pacific Coast Do	uglas Fir ^{B,C}	Oak	Lodgepole Pine
Determination of penetration	A borer core shall be ta midway between the the top of each pile ir charge. Only the piles meet the penetration requirements shall be accepted.	butt and midway betwe to the the top of each s that charge. Only t meet the pene	en the butt and n pile in the he piles that	A borer core shall be tak midway between the b the top of each pile in charge. Only the piles meet the penetration requirement shall be a	utt and midway between the butt and the the top of each pile in the that charge. Only the piles that meet the penetration
		Red Pine	V	Vestern Larch	Jack Pine
Conditioning	(ice-co heating	ning, kiln drying, steaming ated or frozen piles only), in preservative, or a ation thereof		, kiln drying, Boulton ting in preservative, or a n thereof	air seasoning, kiln drying, steaming (ice- coated or frozen piles only), heating in preservative, or a combination thereof
Steaming: Temperature, max, °F (°C) Duration, max, h Vacuum: min, in. (mm) at sea Heating in preservative: Temperature, max, °F (°C) Duration, max, h	240 (117) 6 a level 22 (558.8 220 (104 optional))°F (99 °C) and 6 h oned or green 220°F	240 (117) 6 22 (558.8) 220 (104) optional
Treatment: Pressure, psig (kPa) min max Expansion bath: temperatu °F (°C) Final steaming:	100 (689) 150 (103 re, max, 220 (104	4)	75 (517) 150 (1034) 220 (104)	and optional ds.iteh.a review	100 (689) 150 (1034) 220 (104)
Final steaming: Temperature, max, °F (°C) Duration, max, h Results of treatment: Number of borings per cha Retention, min, lb/ft ³ (kg/m (sampling zone for assay	n ³) ds. teh. a 0 to 2.00	<u>AST</u> (0 to 50.8) ards/sist/3 d	240 (117) 0.5 20 0 to 1.00 (0 to		240 (117) 3 20 0 to 2.00 (0 to 50.8) - d 1760-96
from surface) Creosote and creosote solu by assay: Creosote Creosote-coal tar solutio Creosote-petroleum solu Oil-borne preservatives—by a Pentachlorophenol using S D 2604 solvent	utions— 12 (192) n 12 (192) tion 12 (192) assay:		17 (272) 17 (272) 17 (272) 0.85 (13.6)		12 (192) 12 (192) 12 (192) 0.60 (9.6)
Water-borne preservatives—I ACA and ACZA CCA, Types A and C Penetration Determination of penetration	0.80 (12.) 0.80 (12.) 2.5 (64 m sapwoo A borr c betwee pile in that me	3) im) in. unless 85 % of		and 85 % of sapwood in. (41 mm)	0.80 (12.8) 0.80 (12.8) 1.50 (38 mm) in. unless 85 % of sapwood E

^A Piles shall be steamed at 240 to 245°F for not more than 1 h/in. of the average midpoint diameter of the piles in the charge. Total steam conditioning time shall include all steaming time during which the temperature exceeds 200°F.

^B Pacific Coast Douglas fir is Douglas fir grown west of the crest of the Cascade Mountains in Oregon, Washington, and Northern California and west of the crest of the Sierra Nevada Mountains in the rest of California. Interior Douglas fir is Douglas fir grown elsewhere.

^C Treatment of Pacific Coast Douglas fir and Western larch with CCA, Type A or C, shall only be valid when the material is chosen from permeable wood selected by treatment trials.

^D Effective penetration must be continuous with both earlywood and latewood in each ring penetrated. Certain grain configurations or defects may make it difficult to determine actual depth of penetration in a core and shall be excluded from constituting a skip. These defects include but are not limited to pitch, pitch pockets, ingrown bark, and knots. A core of this type shall be disregarded and a new core taken from another location on the same member.

^E A borer core shall be taken midway between the butt and the top from each pile in the charge. Only the piles that meet the penetration requirement shall be accepted.