UNITED STATES DEPARTMENT OF AGRICULTURE

Rural Utilities Service

BULLETIN 1728H-702

SUBJECT: **RUS Specification for Quality Control and Inspection of Timber Products**

TO: All Electric Borrowers

EFFECTIVE DATE: May 18, 2012.

OFFICE OF PRIMARY INTEREST: Transmission Branch, Electric Staff Division.

INSTRUCTIONS: Due to a correction, this Bulletin replaces RUS Bulletin 1728H-702, RUS Specification for Quality Control and Inspection of Timber Products, issued June 24, 2011.

PURPOSE: This bulletin describes the responsibilities and procedures pertaining to quality control by the producers and responsibilities for inspection of timber products produced in accordance with RUS timber specifications.

This bulletin is in a "user friendly" format of the text codified in 7 CFR 1728.201 published in the *Federal Register* on Friday June 24, 2011, and updated in a correction notice published in the *Federal Register* on May 18, 2012. Every effort has been made to ensure the accuracy of this document. However, in case of a discrepancy, the regulation at 7 CFR 1728.202 is the authorized source.

Jonathan Adelstein
Administrator

5/30/12
Date

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ABBREVIATIONS

AITC American Institute of Timber Construction
ALSC American Lumber Standards Committee
ANSI American National Standards Institute
APA American Plywood Association
AWPA American Wood-Preservers' Association
RUS Rural Utilities Service

DEFINITIONS

Agency refers to Rural Utilities Service (RUS), United States Department of Agriculture.

Arm refers to structural wood member used to support electrical conductors and equipment. Arm is used interchangeably with crossarm.

Certificate of compliance is a written certification by an authorized employee of the producer that the material shipped meets the requirements of this specification and any supplementary requirements specified in a purchase order from a borrower or the borrower's contractor.

Crossarm is a term used interchangeably with arm.

Independent Inspection relates to examination of material by an independent inspector employed by a commercial agency.

Inspection means an examination of material in sufficient detail to insure conformity to all phases of the specification under which it was purchased.

Lot is a quantity of crossarms of like size, conditioning and fabrication usually making up one treating charge.

Producer is used to describe the party who manufacturers and treats crossarms.

Purchaser refers to either the RUS borrower or contractors acting as the borrower's agent, except where a part of the specification specifically refers to only the borrower or the contractor.

Quality control designee refers to an individual designated by the producer to be responsible for quality control.

Reserve treated stock consists of timber products treated in accordance with this specification, prior to and in anticipation of the receipt of specific orders, and held in storage ready for immediate shipment.

Supplier is a term used interchangeably with producer or in some cases, may be distributor selling crossarms to the borrower.

Treating Plant is the organization that applies the preservative treatment to the crossarms

1. SCOPE

1.1 This specification describes the responsibilities and procedures pertaining to the quality control by producers and pertaining to inspection of timber products produced in accordance with the following RUS specifications: Poles, pole stubs, anchor logs - RUS Bulletin 1728F-700, RUS Specification for Wood Poles, Stubs and Anchor Logs and Wood crossarms – RUS Bulletin 1728H-701, RUS Specifications for Wood Crossarms

1.2 This specification also describes and designates responsibilities of RUS borrowers in regard to their purchases under the above referenced specifications.

2. GENERAL STIPULATIONS

2.1 Conformance of poles and crossarms to agency specifications for the most part is the responsibility of the producer's management. A member of the producer's staff shall be designated quality control designee and charged with the responsibility for the exercise of proper quality control procedures.

2.2 The requirements of AWPA M3 covering records, adequate laboratory, plant gauges, and other plant facilities including proper storage, shall be followed.

2.3 The methods of inspection described in this section shall be used no matter which plan timber products are purchased under, i.e., Insured Warranty Plan, Independent Inspection Plan, or Quality Assurance Plans, Bulletin 1728H-701 or Bulletin 1728F-700. The number of poles and crossarms actually inspected by monitors for quality control under a Quality Assurance Plan or the Insured Warranty Plan may vary from the number of poles and crossarms inspected under the Independent Inspection Plan. Under the Independent Inspection Plan, each pole and a sample number of crossarms shall be inspected.

2.4 Under the Independent Inspection Plan, the borrower should designate in the purchase order which inspection agency it has selected. Unless the borrower contracts for inspection as a separate transaction, the treating company shall obtain the services of the borrower's designated inspection agency. For reserve treated stock for purchase under the Independent Inspection Plan, the treating company shall obtain the services of an inspection agency.

2.5 Individual inspectors in the employ of Independent Inspection Agencies shall be experienced and competent. The inspector shall perform all phases of the inspection personally and in the proper sequence. The primary responsibility of the inspector is to determine for the borrower, by careful inspection and verification, that the timber products, preservative, and treatment to meet the requirements of Bulletins 1728F-700 and Bulletin 1728H-701 and that the methods, storage facilities, and production equipment conform to applicable specifications. For details of the inspector's qualifications see Appendix A of this bulletin.

2.6 Independent inspection agencies and inspectors shall maintain their impartiality. To do so, inspection agencies, inspectors, producers and brokers must maintain the greatest degree of separation and eliminate even the appearance of a conflict of interest. Inspection agencies shall not receive gratuities from or enter into financial agreements, other than for inspection services, with suppliers for which they perform inspection. Inspection agencies shall not provide gratuities or free services to suppliers. Inspection agencies shall not offer product warranties on inspected material.

2.7 Failure of an individual inspector to follow proper procedures or failure of an inspection agency to properly train and supervise inspectors or follow the appropriate RUS specifications constitutes grounds for RUS debarment of said company from future inspection of RUS financed material.

2.8 Inspection agencies shall have and maintain liability insurance in the amount of $500,000 and a surety bond or miscellaneous errors and omission insurance for consequential damages for not less than $250,000. Upon request, evidence of compliance to this requirement shall be forwarded to the agency. The evidence shall be in the form of a certificate of insurance or a Bond signed by a representative of the insurance or Surety Bonding company and include a provision that no change in, or cancellation of, will be made without the prior written notice to Chairman, Technical Standards Committee "A" (Electric).

2.9 Inspection agencies shall maintain their own laboratory that is properly equipped, and capable of completely analyzing the respective preservatives and retentions, and at a minimum able to run referee methods. This laboratory shall be independent from any treating plant laboratory. Independent Inspection Agencies may use one central laboratory.

2.10 Laminated materials manufactured for use on borrower systems shall comply with manufacturing and quality control requirements specified in ANSI O5.2. The product shall be marked and certified.

2.10.1 Laminated material shall be inspected in accordance with ANSI O5.2.

2.10.2 Quality control of material shall be performed to determine conformance with Bulletin 1728H-701 and AITC 200.

3. QUALITY CONTROL AND INSPECTION PROCEDURES FOR PRODUCT ACCEPTANCE

It is the responsibility of the plant quality control designee to perform the following procedures to ensure that a particular lot of material conforms to the requirements of the applicable Agency specification prior to treatment. After the plant quality control designee has performed these procedures, a particular lot of material shall be released to the inspector for verification of conformance.

3.1 Poles can be purchased under any of the three purchase plans. These plans are Insured Warranty Plan, Independent Inspection Plan, or a Quality Assurance Plan. Under all of these plans, all poles in a lot shall be inspected by the plant quality control designee.
Under the Insured Warranty Plan and a Quality Assurance Plan, the number of poles inspected by a third party inspector may be less than every pole, depending on the terms of the plans.

3.1.1 Ample space and assistance shall be provided by the treating plant for handling and turning to ensure that the surfaces of all items can be adequately inspected.

3.1.2 Under the Independent Inspection Plan, all poles shall be inspected by the Independent Inspector for conformance to the requirements of Bulletin 1728F-700 . If a pole is rejected and the cause of rejection is corrected, the rejected pole may be offered again for inspection as new material.

3.1.3 Dimensions, length, and circumference shall be measured by a standard steel tape to determine that they are in agreement with the details for class and length in the brand and butt stamp. If it is obvious by visual comparison, with a measured pole, that the brand information is correct, individual poles need not be measured. Pole circumference dimensions made prior to treatment shall govern acceptance. Reduction in dimension due to treatment and shipping shall be not more than 2 percent below the minimum for the pole class.

3.1.4 If 5 percent of the poles in a lot offered for inspection are defective, the inspector shall terminate the inspection. Re-examination of an entire lot by plant quality control shall be required when the number of rejected poles equals or exceeds 5 percent of the lot inspected. All defective or nonconforming poles either shall be removed from the lot or have their brands marked out.

3.1.5 Poles in a lot shall be inspected for decay and all poles shall be of the same seasoning condition. If the plant quality control designee suspects that decay is present, a slice from both ends shall be cut for closer examination. If 3 percent of the inspected poles in a lot show evidence of decay, the entire lot shall be unconditionally rejected without further sorting.

3.1.6 Moisture content, when limited by the purchaser, as stated on the purchaser's purchase order, shall be measured by calibrated electronic moisture meter. Calibration of the meter shall include not only the zero settings for the X and Y readings, but also two resistance standards for 12 and 22 percent moisture content.

3.1.7 Material failing to conform for moisture content may be retested upon request after a recalibration of the instrument. The results of the second test shall govern disposition of the lot.

3.1.8 Re-examination for any mechanical damage or deterioration and for original acceptance shall be conducted on timber products not treated within 10 days after original inspection.

3.2 Crossarms can be purchased only under either of two purchase plans. These plans are the Independent Inspection Plan or Quality Assurance Plans. Under the Independent Inspection Plan, crossarms are to be inspected prior to manufacture, during manufacture, and after treatment. Under a Quality Assurance Plan, crossarms are inspected according to the terms of the quality assurance program acceptable to Rural Utilities Service.

3.2.1 Inspection prior to treatment shall include:

3.2.1.1 Surface inspection of all ends of all arms. This is usually done on the stacks of arms prior to manufacture. Particular attention shall be paid to defects commonly found in the ends, such as compression wood, red heart and other forms of decay, shakes, splits, through checks, scantiness, honeycomb, and low density, determined by rings per inch and percent of summerwood. All non-conforming arms shall be rejected. Whenever the number of nonconforming arms is found to exceed 0.5 percent of the lot or one arm, whichever is greater, the entire lot shall be rejected for excess number of defective ends. After the producer has removed or marked out the defective material, the arms may be resubmitted for inspection.

3.2.1.2 Surface inspection of the lengthwise sides performed on a random representative sample. The sample size shall equal 20 percent of a lot size or 200 arms, whichever is smaller. The inspector shall examine side surfaces as they are slowly rotated. When necessary, the rotation may be stopped for closer inspection. All non-conforming arms shall be rejected. Whenever the number of nonconforming arms is found to exceed 2 percent of the sample size, the entire lot shall be rejected. After the producer has removed or marked out the defective material, the arms may be resubmitted for inspection.

3.2.1.3 Check of moisture content of the random sample by a calibrated moisture meter.

3.2.1.4 Check of crossarm dimensions of the random sample measured after surfacing.

3.2.2 Inspection during manufacture shall consist of:

3.2.2.1 Checking bolt and insulator pin holes for squareness and excessive splintering;

3.2.2.2 Checking brands for completeness, location, and legibility; and

3.2.2.3 Checking arms for conformance.

3.2.3 Under the Independent Inspection Plan, there shall be a final inspection after treatment for preservative retention and penetration and for damage.

3.3 Structural glued laminated timber shall be tested and inspected in accordance with AITC 200. Grade of lumber shall be inspected by a qualified grader for specified quality, so marked. Adhesives used for all structural arms shall meet requirements of ANSI O5.2 paragraph 5.2.

Melamine urea adhesives shall not be used. End joint spacing and limitations shall be in accordance with ANSI O5.2.

4. PRESERVATIVES.

4.1 Creosote shall conform to the requirements of AWPA P1/P13 when analyzed by AWPA Al sections 2, 3, 4, either 5 or 9, and 6, as follows:

4.1.1 Each occasional charge; and

4.1.2 The first charge and one of every five charges randomly selected in consecutive charges shall be analyzed.

4.2 Solutions of waterborne preservatives shall be analyzed for components in accordance with AWPA A2 or AWPA A9 and shall meet the requirements of AWPA P5 for composition. AWPA A2 shall be used as a referee method.

4.3 Pentachlorophenol shall contain not less than 95 percent chlorinated phenols and should conform to AWPA P8 in hydrocarbon solvent AWPA P9, Type A.

4.4 Copper Naphthenate in hydrocarbon solvent AWPA P9 Type A shall contain not less than 6 percent nor more than 8 percent copper in the form of Copper Naphthenate and shall conform to AWPA P8 when analyzed in accordance with AWPA A5.

5. PLANT FACILITIES AND INSPECTION DURING TREATMENT

5.1 Manufacturing and treating plant facilities shall conform to paragraph 3, AWPA M3. Pressure plants shall be equipped with recording instruments to register time, pressure, temperature and vacuum during each cycle of treatment. Pressure plants shall also be equipped with indicating thermometers and pressure and vacuum gauges to check the accuracy of the recorders. Work tanks shall be equipped with a thermometer. Thermal treating vats shall be equipped with a time and temperature recorder and with an indicating thermometer. Temperature recording devices are not mandatory for plants treating exclusively with waterborne preservatives.

5.2 Temperature and humidity readings throughout the kiln shall be recorded on a recording chart and verified by observation of direct reading equipment. Gauges and recording equipment shall be calibrated annually.

5.3 Recording instruments shall be checked with calibrated indicating gauges and thermometers, per AWPA M3. Inaccuracies shall be referred to the treating plant for prompt correction. If an inaccuracy which indicates error resulting in non-compliance with this specification indicating possible damage to the material, the inspector shall reject the charge.

6. RESULTS OF TREATMENT

6.1 Poles shall be tested for retention and penetration by means of a calibrated increment borer 0.2 inches ± 0.02 inches in diameter in accordance with procedures in AWPA M2. Under the Independent Inspection Plan, all treating charges shall be tested for retention and penetration. Plant quality control and independent inspection shall do their analyses separately. Under the Insured Warranty Plan and Quality Assurance Plans, the frequency of testing retention and penetration may vary according to the agency approved plan.

6.1.1 Unless otherwise specified, borings shall be taken approximately 1 foot above the face brand to 1 foot below the face brand. For pressure treated Western Red Cedar and all butt treated poles, borings shall be taken approximately 1 foot below groundline.

6.1.2 Penetration compliance shall be determined in accordance with AWPA A3. Chrome Azurol S and Penta-Check shall be used to determine penetration of copper containing preservatives and penta, respectively.

6.2 Retention sampling shall be when there are 20 or more poles in the treating charge, the retention sample for creosote shall consist of 20 assay zones from southern pine and Douglas-fir poles. All poles in charges with fewer than 20 poles shall be bored once. Charges with less than 15 poles shall be bored once and bored again on a random basis to obtain a minimum of 15 assay zones.

6.2.1 Retention samples shall be taken from 20 poles in charges of 20 or more poles.

6.2.2 Retention samples for Alaska yellow, western red, and northern white cedars shall consist of a minimum of 30 assay zones for creosote and waterborne preservatives. For penta charges of fewer than 30 poles, the sample shall contain the assay zone from each pole in the lot.

6.2.3 Retention samples shall consist of borings, representative of pole volumes for each class and length in the charge. Further selection and marking of poles of mixed seasoning, volume, and location on the tram shall be made as illustrated in the following table:

Number of Poles	Class/Length	Vol. in Cu. Ft.	% of Total Volume	Number of Borings
27	7/30	232	15	3
26	4/35	447	29	6
11	5/35	163	10	2
55*	6/35	704	46	9
		Total 1,546		

*If a portion of these poles were green and some partially seasoned, then the number of borings should reflect the approximate percentage of each.

6.2.4 When material in a lot consists of fewer pieces than the designated minimum number of samples for assay, additional borings shall be taken so as to make up at least the minimum sample and in such manner that the sample is representative of the lot of material with respect to any variations in size, seasoning condition, or other features that might affect the results of treatment.

6.2.5 Analyses for preservative retention shall be performed as follows:

6.2.5.1 Creosote retention shall be analyzed by AWPA A6;

6.2.5.2 Penta retention shall be analyzed by AWPA A5 or AWPA A9. Copper pyridine method is required when timber may have been in contact with salt water and for all species native to the Pacific coast region, unless the raw material invoice specifically states that the material either has not been in contact with salt water or has been shown by analysis to have contained no additional chlorides before treating;

6.2.5.3 Copper Naphthenate retention shall be analyzed by tests in accordance with AWPA A5 or AWPA A9;

6.2.5.4 Waterborne preservatives retention shall be analyzed by tests in accordance with AWPA A2, AWPA A7; or AWPA A9; and,

6.2.5.5 Prior to unloading a tram, the inspectors may take their own samples and analyze them concurrently with the quality control designee, but each shall work independently, and quality control data shall be presented before acceptance of the charge.

6.3 The penetration sampling of poles shall conform as follows:

6.3.1 Group A poles consist of poles with a circumference of 37.5 inches or less at 6 feet from butt.

6.3.1.1 Bore 20 Group A poles or 20 percent of the poles, whichever is greater. Accept if 100 percent of the sample conforms; otherwise, bore all pole.

6.3.1.2 Re-treat the charge if more than 15 percent of the borings are found to be nonconforming.

6.3.1.3 Re-treat all nonconforming poles if 15 percent or fewer fail the requirement.

6.3.2 Group B poles consist of poles with circumference greater than 37.5 inches at 6 feet from the butt.

6.3.2.1 For Group B poles 45 feet and shorter, bore each pole and re-treat only those found to be nonconforming, unless more than 15 percent fail; in that case, re-treat the entire lot.

6.3.2.2 For Group B 50 feet and longer, bore each pole twice at 90 degrees apart around the pole and accept only those poles conforming to the penetration requirement in both borings. All nonconforming poles may be re-treated only twice.

6.3.3 All bored holes (nominal 0.2 of an inch diam. bit) shall be promptly filled with treated, tight-fitting wood plugs.

6.4 Under the Independent Inspection Plan, all treated charges of crossarms shall be tested for retention and penetration. Plant quality control inspectors and independent inspectors shall do their analyses independently. Under the Quality Assurance Plans, the frequency of testing retention and penetration may vary according to the plan.

6.4.1 The penetration and retention sample shall consist of 20 (48 for creosote) outer 6/10 of an inch for Douglas-fir and 1 inch for Southern Yellow Pine zones from borings taken from any face except the top face at a location as close to the end as possible being at least 3 inches from the end of the arm and no closer than 3 inches from the edge of any holes. For laminated material, borings shall be taken from laminates on a random basis.

6.4.2 Preservative penetration shall be tested by taking not less than 20 borings from 20 crossarms in each charge, determined in accordance with AWPA A3-08 (incorporated by reference in §1728.97). Chrome Azurol S and Penta-Check shall be used to determine penetration of copper containing preservatives and penta, respectively.

6.5 Laminated material shall be checked for any evidence of delamination due to treatment and for the identifying quality stamp of AITC or American Plywood Association (APA).

6.6 If used for analysis, x-ray fluorescence instruments (XRF) shall be accurate and reliable, and they shall generate reproducible results. Instruments shall have thorough instructions which should include recommendations on drying techniques, equipment, and density calculations. These drying recommendations shall be followed when using XRF instruments.

6.7 To check the precision and accuracy of the in-plant x-ray fluorescence units (XRF) being used by producers, at least once monthly the independent inspector shall take a retention sample previously analyzed in the producer's laboratory and rerun it in the inspection agency's own laboratory. This sample shall be run utilizing either the XRF or recognized referee method for the given preservative. If the analytical results are within $\pm$ 5% of retention value that was previously obtained on the sample using the plant's XRF unit, the plant instrument needs no further calibration. All XRF units maintained by independent agencies as part of their required laboratories shall be calibrated at least quarterly either by the referee method for each preservative treatment being analyzed by said agency or by comparison with a set of graduated treated wood standards.

6.8 Each independent inspector and plant quality control personnel that use XRF instruments, shall be properly trained in the analysis of treated wood and preservatives under the supervision of a competent instructor. Proof of training shall be kept on file.

7. PRODUCT ACCEPTANCE

Under the Independent Inspection Plan, the inspector shall signify acceptance by marking each piece of accepted material with a clear, legible hammer stamp in one end prior to treatment and in the other end after treatment. The inspector shall personally mark each piece, and shall not delegate this responsibility to another person.

7.1 Charge Inspection Reports.

7.2 Inspection Reports shall include the following:

7.2.1 Total pieces offered by the producer, number of pieces rejected and cause of rejection:

7.2.2 Conditioning details of the material prior to treatment;

7.2.3 Copy of preservative analysis by preservative supplier;

7.2.4 The details of treatment; and

7.2.5 The results of treatment. Results shall include the following:

7.2.5.1 The depth of penetration for each sample and a summary of all poles rejected for insufficient penetration;

7.2.5.2 Separate worksheets for retention analyses, prepared by quality control designee and independent inspector.

7.3 On each inspection report the independent inspector and the plant quality control designee shall certify, in writing, that the material listed on the report has been inspected before and after treatment, and that the preservative used was analyzed in accordance with the requirements of this section.

7.4 Each inspector or inspection agency shall permanently retain for a period of 1 year a copy or transcript of each report of inspection, together with laboratory worksheets covering retention by assay and preservative analyses for the purchaser, and on request shall furnish a copy or transcript of any of these reports to the Chairman, Technical Standards Committee "A", Electric Staff Division, Rural Utilities Service, Washington, DC 20250-1569.

8. CHARGE NUMBERS ON RE-TREAT POLES

8.1 The letter "R" shall be added to the original charge number in the butts of all poles that are re-treated for insufficient penetration or retention of preservative.

8.2 All poles that fail to meet treatment requirements after two re-treatments shall be permanently rejected.

9. SAFETY PROVISIONS

Poles intended for agency borrowers shall not be inspected when, in the opinion of the inspector, unsafe conditions are present.

APPENDIX A

INSPECTORS' QUALIFICATIONS

Inspection agencies should see that inspectors assigned to the inspection of timber products and treatment for borrowers are competent and experienced.

In general, any of the following examples are considered as minimum qualifying experience before a new inspector may be permitted to inspect timber products for borrowers:

(a) Three years' experience as an inspector of timber and the preservative treatment of timber; or

(b) Three years' experience in timber treating plant quality control work; or

(c) Under the direct, on site, supervision of an experience, well-qualified inspector, the prospective inspector shall have performed the following:

(1) Inspected at least 10,000 poles and/or crossarms "in the white."

(2) Checked preservative penetration results on at least 10,000 poles and crossarms;

(3) Made at least 100 wood assays for preservative retention;

(4) Made at lease 25 analyses of each type preservative used on material the person is assigned to inspect; and

(d) In both (a) and (b) of this Appendix A, the experience should be not less than that required in (c).

(e) Inspectors experienced in the inspections of one product, such as poles, should not be qualified to inspect another product, such as crossarms, until the above experience is gained for each respective product.

(f) The inspector should be especially well informed in wood preservation and the operation of a timber treating plant, and be competent in preservative analysis and other laboratory work.

(g) In all cases, an inspector should be thoroughly instructed in the application of the specifications and the standards pertaining thereto before being permitted to independently inspect timber products and the treatments applied to them. Knowledge of these specifications and standards, as well as the inspector's proficiency, may be checked routinely by members of the agency staff.

APPENDIX B

METRIC CONVERSION FACTORS

TO CONVERT FROM	TO	MULTIPLY BY
foot (ft)	meter (m)	0.3048
inch (in)	centimeter	2.54
pound per cubic foot (pcf) (lb/ft^3)	kilogram per cubic meter (kg/m^3)	1.601846
pound per square inch (psi) (lb/in^2)	kilogram per square meter (kg/m^2)	703.0696
degrees Fahrenheit (X°F)	degrees Celsius (°C)	5/9(X°-32)