

MIL-I-7171C

15 JUNE 1985

SUPERSEDING

MIL-I-007171B (Wep)

18 September 1963

MIL-I-7171A (ASG)

22 September 1954

MILITARY SPECIFICATION

INSULATION BLANKET, THERMAL-ACOUSTICAL

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope - This specification covers the requirements of composite blankets suitable for acoustical and thermal insulation of the walls of aircraft compartments within the temperature range of -65°F to 175°F.

1.2 Classification - Insulation blankets shall be of the following types, classes, and styles, as specified (see 6.2):

Type I	Quilted blanket
Type II	Cemented blanket
Class 1	Semi-stitched blankets
Class 2	Fully-stitched blankets
Style A	Non-porous trim cloth
Style B	Porous trim cloth

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

P-D-680	Dry Cleaning Solvent
V-T-295	Thread, Nylon
NN-P-515	Plywood, Container Grade
QQ-A-355	Aluminum Alloy, Plate and Sheet 2024

FSC 1560

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Federal (Cont'd)

QQ-M-44 Magnesium Alloy, Plate and Sheet (AZ31)
 UU-P-268 Paper, Kraft, Untreated, Wrapping
 UU-T-111 Tape, Paper, Gummed (Sealing and Securing)
 CCC-T-191 Textile Test Methods
 PPP-B-576 Box, Wood, Cleated, Veneer, Paper Overlaid
 PPP-B-591 Boxes, Fiberboard, Wood-Cleated
 PPP-B-601 Boxes, Wood, Cleated-Plywood
 PPP-B-636 Box, Fiberboard

Military

MIL-B-121 Barrier Material, Greaseproofed, Waterproofed, Flexible
 JAN-H-792 Humidity-Cabinet, Operation of
 MIL-A-3316 Adhesives, Fire-Resistant, Thermal Insulation
 MIL-B-5924 Batting, Insulation, Glass Fibers
 MIL-P-6264 Plastic Sheet; Vinyl Copolymer, Thin
 MIL-C-7514 Cloth, Coated, Synthetic and Fibrous Glass
 MIL-C-8104 Cloth, Cotton, Sheeting, Plain Weave Trim, Porous
 MIL-L-10547 Liners, Case, and Sheet, Overwrap, Water-Vaporproof or Waterproof, Flexible

STANDARDS

Federal

FED-STD-141 Paint, Varnish, Lacquer, and Related Materials, Methods of Inspection, Sampling, and Testing
 FED-STD-595 Colors

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Military

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-129 Marking for Shipment and Storage

(Copies of specifications, standards and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Materials - The insulation blanket shall be made from the following component materials:

3.1.1 Trim cloth -

3.1.1.1 Porous (Style B) - The porous cloth shall conform to MIL-C-8104 or MIL-C-7514, Type III.

3.1.1.2 Non-porous (Style A) - The non-porous cloth shall conform to MIL-C-7514, Types I or II.

3.1.2 Insulation batting - Unless otherwise specified, the insulating batting shall conform to MIL-B-5924, Type I.

3.1.3 Impervious membrane - The impervious membrane shall conform to MIL-P-6264.

3.1.4 Adhesive - The adhesive used in the cementing operations shall conform to MIL-A-3316, Types I or II.

3.1.5 Thread - The thread shall be nylon conforming to V-T-295, Type I, Size A.

3.1.6 Cloth backing - The backing of the insulation blanket shall be a close woven synthetic or fibrous glass fabric and the physical properties shall be as specified in Table I.

TABLE I

PHYSICAL PROPERTIES OF CLOTH BACKING

CHARACTERISTIC	CCC-T-191 METHOD NO.	REQUIREMENTS
Weight, ounces per square yard, max.	5041	2.0
Breaking strength, grab, pounds, min.	5100	
Warp		6.0
Filling		8.0

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3.2 Construction - The blanket construction shall be Style A conforming to Figure 1, or Style B conforming to Figure 2, and the following types and classes, as specified (see 6.2).

3.2.1 Quilted blankets, Type I - The quilted blankets shall conform to the pattern shown in Figure 3, and shall be semi-stitched (Class 1) or fully-stitched (Class 2) as specified, (see 6.2). There shall be approximately 5 stitches to the inch. The stitching shall not compress the blanket such that acoustic and thermal properties are affected.

3.2.1.1 Semi-stitched blankets (Class 1) - All components except the impervious membrane shall be penetrated by the quilting stitches. The impervious membrane designated as element V in Figures 1 and 2 shall be bonded to the cloth backing of the quilted assembly with a thin continuous film of adhesive conforming to MIL-A-3316, Types I or II.

3.2.1.2 Fully-stitched blankets (Class 2) - The quilting stitches shall penetrate all components of the blanket.

3.2.2 Cemented blankets, Type II - The mating surface of the various components, except for that of the porous trim cloth and the insulating batting, shall be bonded with a thin, continuous film of adhesive. The porous trim cloth shall be bonded to the batting in evenly distributed spots, the aggregate area of which shall not exceed 10 percent of the area of the blanket.

3.2.3 Binding - The edges of cemented blankets, furnished cut to specific lengths, shall be bound with the trim cloth to provide strength and stability to the blanket section.

3.3 Shrinkage - The blanket shall not shrink during service to the extent that either the acoustic and thermal properties or the installation and removal shall be affected.

3.4 Color - Unless otherwise specified the gloss of the trim cloth shall be nonspecular and shall be furnished in one of four colors: Color numbers 34424, 36440, 36231, or 34516 conforming to FED-STD-595.

3.5 Stability - The blankets shall not visibly change in form, thickness or properties during handling and installation.

3.6 Width - Unless otherwise specified (see 6.2), the width of the assembled blankets shall be $36 \pm 1/2$ inches.

3.7 Thickness - Blanket thickness shall be uniform within the tolerance for the type specified in the contract (see 6.2).

3.7.1 Type I - The thickness of the quilted blanket shall be the nominal thickness specified (see 6.2) $+0.10$ or -0.0 inch, when measured as specified in 4.4.3.2.

3.7.2 Type II - The thickness of the cemented blanket shall be the nominal thickness specified (see 6.2) ± 25 percent, when measured as specified in 4.4.3.2.

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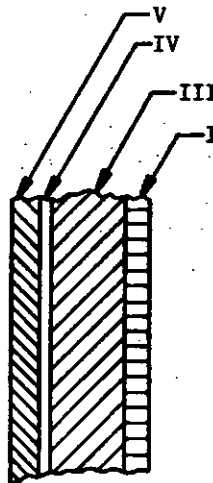


FIGURE 1. Construction of composite blanket with nonporous trim cloth, showing relative position of the elements in the blanket 1/

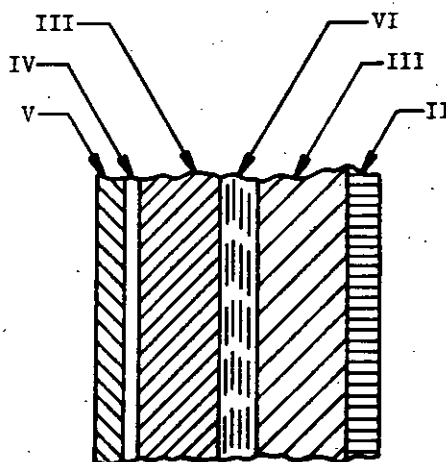


FIGURE 2. Construction of composite blanket using a porous trim cloth, showing relative position of elements in the blanket 1/

1/ ELEMENTS FOR FIGURES 1 AND 2

- I - NONPOROUS TRIM CLOTH
- II - POROUS TRIM CLOTH
- III - INSULATING BATTING
- IV - FABRIC BACKING
- V - IMPERVIOUS MEMBRANE, .0015 INCH THICKNESS
- VI - IMPERVIOUS MEMBRANE

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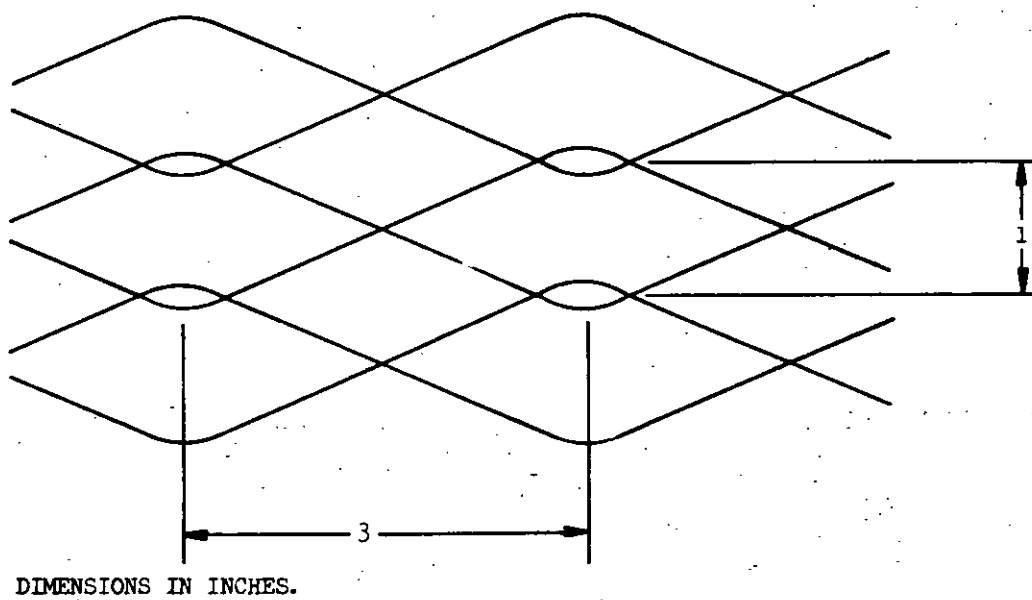


FIGURE 3. Quilting pattern

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3.8 Toxicity - Component materials used shall be of the type which do not emit toxic or noxious vapors in concentrations that will hinder the efficiency or comfort of the aircraft occupants. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the procuring activity to the appropriate department medical service who will act as an advisor to the procuring agency.

3.9 Sound attenuation - The sound attenuation properties of the blankets shall be as specified by the procuring activity (see 6.2).

3.10 Thermal properties - The thermal insulating properties of the blankets shall be as defined by the procuring activity (see 6.2).

3.11 Corrosion - The component materials of the blanket shall neither propagate corrosion of any aircraft material which it contacts nor emit corrosive vapors which will damage any portion of the aircraft.

3.12 Fire resistance - The assembled blankets shall be fire resistant to the extent that if ignited the blanket shall not support combustion.

3.13 Vibration disintegration resistance - The blankets shall develop or exhibit no appreciable packing, disintegration, or imperfections affecting the serviceability or appearance when subjected to the Vibration Test described in 4.5.3. The loss in weight of material during the testing shall not exceed 0.5 percent.

3.14 Workmanship - All details of manufacture, including the component materials used and the processing of the blankets, shall be in accordance with high-grade commercial practice. The occurrence of defects in the blankets shall not exceed the applicable acceptable quality levels specified herein.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection of materials and components - In accordance with paragraph 4.1, the supplier is responsible for insuring that materials and components used were manufactured, tested and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified or, if none, in accordance with specification, contract, or order. In the event of conflict between specifications, standards, and drawings, this specification shall govern.

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4.2 Lot - A lot of blanket material shall consist of one type, class and style made under essentially the same conditions and offered for delivery at one time. The lot size shall be expressed in units of a yard of length.

4.3 Sampling -

4.3.1 Sampling for yard-by-yard examination - The sample size for this examination shall be determined in accordance with MIL-STD-105, Inspection Level II. A sufficient number of rolls shall be selected at random from each lot so that the required sample yardage will be obtained by examining approximately 25 consecutive yards of each roll. The AQL shall be 2.5 major defects and 6.5 minor defects per 100 units.

4.3.2 Sampling for overall and dimensional examination - The sample size for these examinations shall be an appropriate piece of blanket material, taken from each of the sample rolls selected under 4.3.1. The acceptable quality level shall be 1.5 percent defective.

4.3.3 Sample for tests - The unit of product shall be two yards. The sample size shall be selected at random from the lot in accordance with the following:

<u>LOT SIZE (YARDS)</u>	<u>SAMPLE SIZE (UNITS)</u>
800 or less	2
801 to 22,000	3
Over 22,000	5

The lot shall be unacceptable if one or more units fail to meet any of the tests specified under 4.5.

4.3.4 Inspection procedures - Samples shall be conditioned in the standard atmosphere for at least 24 hours before testing. Unless otherwise specified, the physical properties specified in Section 3 apply to the average of the determinations made on a unit of the product.

4.4 Examination -

4.4.1 In-process material examination and tests - The in-process examination and tests will be made at any point or any phase of the manufacturing process to determine whether the materials, construction, and workmanship are as specified in Section 3.

4.4.2 Yard-by-yard examination - Samples selected in accordance with 4.3.1 shall be examined for the defects identified and classified in Table II. The defects found shall be counted regardless of their proximity to each other except where two or more defects represent a single local condition of the blanket, in which case only the more serious defects shall be counted. A continuous defect shall be counted as one defect for each lengthwise yard or fraction thereof in which it occurs.

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TABLE II

CLASSIFICATION OF DEFECTS

DEFECT	MAJOR	MINOR
Cut, hole or tear - any	X	
Edge cut, torn, broken - extending into body of blanket	X	
Crease or wrinkle - hard embedded		X
Spots, stains, streaks - clearly visible		X
Width, not as specified	X	
Faulty adhesion - components separating	X	
Faulty stitching	X	
Any required component or part missing	X	
Assembly not constructed as specified	X	

#

4.4.3 Overall examination - Samples selected in accordance with 4.3.2 shall be examined for defects as listed in Table III. Each defect shall be counted no more than once in each piece examined.

TABLE III

OVERALL DEFECTS

Objectionable odor (see 3.8).
Uncleanliness throughout.
Color off-shade - not within established tolerance.
Edge curled, folded, rolled, slack or loopy, over more than half the piece*.
Thickness not uniform.
Stability faulty.

* Intermittently or continuously.

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4.4.3.1 Color - The color of the trim cloth shall be compared with the standard color chip specified in 3.4 and 6.2 in accordance with Method 4250 of FED-STD-141.

4.4.3.2 Thickness - To determine the thickness of the blanket, three thicknesses of material, each slightly less than one foot square, shall be piled on a flat surface and covered by an aluminum-alloy sheet 0.032 inch thick, having an area of one square foot. The distance between the flat surface and the aluminum cover sheet shall be measured at three or more points along each edge, and the average thickness of the blankets computed (see 6.2).

4.4.3.3 Dimensional examination - Samples examined under 4.4.3 shall be measured for conformance to width and length requirements in accordance with Methods 5020 and 5010 of CCC-T-191. A dimensional defect shall be defined as either:

(a) Any gross length of a roll less than the minimum roll length specified in the contract (6.2).

(b) Any gross length of a piece less than the minimum piece length specified in the contract (6.2).

(c) Any gross length of a piece less than the gross length marked on the piece ticket by 2 yards or more.

4.4.4 Unacceptable lots - The lot shall be unacceptable if either:

(a) The total of the actual gross lengths of the pieces in the sample is less than the total of the gross lengths marked on the piece tickets.

(b) The width of the blanket is not within the tolerance specified in 3.6, or in the contract (6.2).

4.5 Tests -

4.5.1 Fire resistance test - Samples of the assembled blanket shall be tested for fire resistance in accordance with CCC-T-191 Method 5903-T. The blanket shall not support a flame after the burner is removed.

4.5.2 Corrosion -

4.5.2.1 Preparation of test panels - Two sets of panels of polished aluminum and polished magnesium shall be prepared. Aluminum panels shall conform to QQ-A-355 and magnesium panels shall conform to QQ-M-44. Panels shall be 2 by 4 inches in width and length, respectively, and from 1/16 to 1/8 inch in thickness. Edges shall be rounded and two 1/8 inch diameter holes drilled at opposite corners of the 4 inch side. Panels shall be finished with 280-grit abrasive. Immediately prior to use, panels shall be

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cleaned by successive washings in solvent conforming to P-D-680 followed by boiling 95 percent synthetic methanol, and finally in boiling absolute methanol. An equal size specimen of the assembled blanket to be tested shall be attached to the panel by means of clips which will not cause or be susceptible to corrosion. The other panels shall be placed in the cabinet for comparison.

4.5.2.2 Procedure - The panels shall be suspended from 18-8 stainless steel or monel metal hooks in a humidity cabinet conforming to and operated in accordance with JAN-H-792. The exposure period shall be seven days at 95 percent relative humidity and 120°F. There shall be no difference between the type or extent of corrosion of the test sample and the sample for comparison.

4.5.3 Vibration disintegration resistance - A specimen at least 20 inches long and 12 inches wide shall be mounted with the long side vertically clamped in such a fashion that the top and bottom shall be open and the entire panel shall be free to vibrate horizontally. The specimen shall be vibrated horizontally for 12 hours through a double amplitude of at least 0.04 inch at a frequency of 1500 cycles per minute. Before the test is begun, the specimen shall be carefully weighed, and after completion of the vibration test, the specimen shall be weighed again and examined for evidence of packing, disintegration and other imperfections.

4.6 Packaging, packing and marking examination - Shipping containers fully prepared for delivery shall be examined to determine compliance with the packaging, packing and marking requirements of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging - Preservation and packaging shall be level A or C as specified (see 6.2).

5.1.1 Level A packaging -

Unit packaging - The amount of material and permissible number of lengths in each roll, shall be as specified by the procuring activity. Each roll shall be secured in such manner to prevent unwinding, loosening, or slippage during handling, shipping, or storage. The material shall be rolled on a heavy spiral fiber tube having an inside diameter of not less than 1 inch. The ends of the tube shall project not more than 3/4 inch beyond the ends of the material. The entire roll shall be wrapped with Kraft paper conforming to UU-P-268 Grade B basis weight 60 pounds and then overwrapped in waterproof barrier material conforming to MIL-B-121. Ends of the roll shall be completely covered. The wrapping shall be sealed by means of a moisture-resistant tape conforming to UU-T-111.

5.1.2 Level C packaging - The blanket material shall be packaged to afford the minimum degree of protection necessary to prevent deterioration or damage during shipment under normal environmental conditions and commercial modes of transportation.

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5.2 Packing - Packing shall be level A, B, or C as specified (see 6.2).

5.2.1 Level A - The blanket material packaged as described in paragraph 5.1 shall be packed in overseas type exterior containers conforming to PPP-B-591, PPP-B-601, PPP-B-636, or PPP-B-576. Plywood, when used, shall conform to NN-P-515 Class 2. Strapping and closures shall be in accordance with the appendix of the applicable container specification. Fiberboard containers shall not exceed the weight and dimension limits of the applicable container specification. The gross weight limit of wood and wood cleated containers shall not exceed 200 pounds. Exterior shipping containers shall be provided with a sealed waterproof case liner conforming to MIL-L-10547, and the appendix thereto.

5.2.2 Level B - The blanket material packaged as described in paragraph 5.1 shall be packed in domestic type exterior containers conforming to PPP-B-591, PPP-B-601, PPP-B-636, or PPP-B-576. Fiberboard containers shall not exceed the weight and dimension limitations of the applicable container specification. The gross weight of wood or wood cleated shipping containers shall not exceed 200 pounds.

5.2.3 Level C - The blanket material packaged as specified in 5.1 shall be packed in a manner to insure carrier acceptance and safe delivery at destination. Containers shall be in accordance with Uniform Freight Classification Rules or regulations of other carriers applicable to the mode of transportation.

5.3 Marking - In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use - The blankets covered by this specification are intended for use in the soundproofing and thermal insulation of aircraft.

6.2 Ordering data - Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type, class and style desired (see 1.2).
- (c) Color (see 3.4).
- (d) Width (see 3.6).
- (e) Thickness (see 3.7).
- (f) Quantity (length) required.

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(g) Sound attenuation.

(h) Thermal insulating properties.

(i) Selection of applicable levels of packaging and packing (see 5.1).

6.3 Changes from previous issue - The outside margins of this specification have been marked "#" to indicate where changes (deletions, additions, etc.) from the previous issue have been made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - MO

Navy - WP

Air Force - 69

Preparing activity:

Navy - WP

Project No. 5640-0048

Review activities:

Army - MO

Navy - WP

Air Force - 69

Note. Reviewer and User information is current as of the date of this specification. For future coordination of changes to this specification, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Documents.

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
<p align="center">INSTRUCTIONS</p> <p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).</p>		
SPECIFICATION		
MIL-I-7171C INSULATION BLANKET, THERMAL-ACOUSTICAL		
ORGANIZATION (Of submitter)		CITY AND STATE
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?		
A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE?		
<input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED (Printed or typed name and activity)		DATE

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