

QUARTERMASTER CORPS  
TENTATIVE  
SPECIFICATION.

J. Q. D. No. 226  
November 3, 1942.

DYEING (VAT) AND FINISHING OF DUCK AND  
TENT TWILL.

A. APPLICABLE SPECIFICATIONS.

A-1. The following specification, of the issue in effect on date of invitation for bids, shall form a part of this specification.

A-1a. Federal Specification -

CCC-T-191 - Textiles; general specifications, test methods.

B. TYPE AND GRADES.

B-1. Types.- This specification covers the vat dyeing and finishing of duck and tent twills.

B-2. Grade.- The grade shall be firsts.

C. MATERIAL AND WORKMANSHIP.

C-1. Materials.- The materials shall be as hereinafter indicated.

C-2. Workmanship.- The dyed and finished commodity shall be clean, well finished, and free from any defects which may affect appearance or serviceability.

D. GENERAL REQUIREMENTS.

D-1. See Section E.

E. DETAIL REQUIREMENTS.

E-1. Preparation.- Duck or twill containing size shall be well and thoroughly desized. The material shall be thoroughly scoured before dyeing. The piece goods shall be scoured with caustic soda plus soap, penetrating or wetting agents at boiling temperatures so that the scoured material when dried before dyeing shall be as absorbent as a blotting paper and shall wet-out immediately when spotted with a drop of cold water.

E-2. Dyes.- The dyes used shall be selected from the following dyes and their prototypes:-

Ponsol Brown AR, Indanthrene Brown RAP, Calcosol Brown R, Cibanone Brown GR, Carbanthrene Brown AR (all Color Index No. 1151).

Calcosol Olive R, Carbanthrene Olive R, Cibanone Olive 2R, Indanthrene Olive RA, Ponsol Olive AR (all Color Index No. 1150).

Calcosol Khaki G, Carbanthrene Khaki 2G, Indanthrene Khaki 2G,  
Ponsol Khaki 2G.

Indanthrene Olive TA; Ponsol Olive GGL; Amanthrene Olive Green  
B; Indanthrene Olive Green BA; Ponsol Green 2BL Indanthrene  
Yellow 3RD.

E-3. Dyeing.-

E-3a. Material lighter in cloth weight than No. 8 duck shall be dyed by the pigment pad method with a vat dye in an un-reduced highly dispersed state, and using a high pressure padder with a minimum of five tons pressure on the rolls, followed by reduction with a minimum of six ends in the jig and then development in the jig.

E-3b. Material No. 8 duck and heavier in cloth weight.- Jig dyeing of No. 8 and heavier ducks shall be acceptable provided good penetration of the dye and an even solid appearance of the dyed cloth is obtained. Thoroughly scoured and dried material shall be given four ends in the jig with the dye in an un-reduced highly dispersed state. This shall be followed by reduction with a minimum of six ends in the jig and then development in the jig.

E-3c. The dyed materials in every case shall be completely developed and thoroughly soaped at the boil and washed well in water before drying. The finished material shall be well penetrated with the dye and the color on face and back of the material shall be even and solid in appearance.

E-4. Color.- The color shall be that indicated in the invitation to bid and shall be a close color match to the approved standard.

E-5. Color fastness.- The color shall have good fastness when subjected to the following tests:-

Fastness to Weather. Samples to be exposed for 30 days.

Fastness to Crocking.

Fastness to Laundering Agents containing active chlorine.

Immerse samples for one hour in solution containing 0.7% available chlorine. Rinse thoroughly and dry.

E-6. Water Repellent Finish.- Unless otherwise indicated in invitation for bids, the finished material shall have a highly water repellent finish obtained with the use of aluminum acetate (sulphur-free), wax and soap and/or refined paraffin wax. The use of wax emulsions, applied by one or two bath methods is acceptable. The finished material shall contain not less than three (3) nor more than six (6) percent of wax.

E-6a. Hydrostatic Resistance.- The finished materials shall show a minimum hydrostatic resistance as shown below when tested on the outer apparatus, readings to be taken when the third drop of water appears:-

No. 4 Duck - 40 cm.

No. 6 Duck - 40 cm.

No. 8 Duck - 35 cm.

No. 10 Duck - 35 cm.  
No. 12 Duck - 35 cm.  
12.29 oz. Army Duck - 30 cm.  
9.85 oz. Army Duck - 30 cm.  
11.6 oz. Cloth, Cotton, Twill, Tent - 30 cm.  
7.9 oz. Duck, Shelter Tent - 30 cm.

E-6b. Spray Rating. - The finished materials shall show a spray rating of not less than ninety (90) plus when tested in accordance with the method described in Paragraph F-3d.

E-7. Mildew Resistance. - When specified in the invitation for bid, the finished duck shall have a mildew resistant finish and contain not less than two (2) percent orthophenylphenol or one and one-half (1-1/2) percent of pentachlorphenol or its equivalent by weight. The loss in breaking strength of the finished material shall be not more than ten (10) percent when samples are subjected to the soil burial test of Paragraph F-3c.

E-8. Sulphur Content. - The finished material shall be free from sulphur and its compounds. Slight traces of sulphur will not be a cause for rejection.

E-9. Loading materials. - The use of loading and/or finishing materials to increase the weight or breaking strength is prohibited.

E-10. Contractor's Inspection. - The contractor shall carefully inspect and test the finished materials for compliance with requirements of this specification before tendering them to the Government for final inspection and acceptance.

## F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Sampling. - Samples of any materials, not furnished by the United States Government, entering into the dyeing and/or finishing of the duck or cloth, shall be selected from time to time by the Government Inspector, and carefully examined and tests made to determine if they are in accordance with the requirements of this specification.

F-2. Inspection. - Inspection may be made throughout the entire process of dyeing and/or finishing. The passing as satisfactory of any detail in finishing or materials shall not relieve the contractor of responsibility for faulty workmanship or materials which may be discovered at any time prior to final acceptance. Final inspection of the finished commodity shall be made either at point of production or at point of delivery designated in the contract or purchase order of procuring agency. In case of plant inspection, every facility shall be afforded inspectors by the contractor for the prosecution of their work.

## F-3. Tests. -

F-3a. Tests shall be in accordance with Federal Specification CCC-T-191 insofar as applicable.

F-3b. Test for Sulphur.— Two solutions are made: Acid stannous chloride. One hundred (100) grams of stannous chloride crystals are dissolved in 100 cc hydrochloric acid (concentrated, 35%) and 50 cc distilled water is added. Lead Acetate solution— Five (5) grams of lead acetate are dissolved in water and made up to 100 cc with water. Add 1 drop of glacial acetic acid to clear up the solution if it is cloudy. To make the test, cover the sample in test tube with acid stannous chloride solution and place over the mouth of the test tube a filter paper upon which is placed 1 drop of lead acetate solution. The test tube is then heated slowly over a low flame and brought up to boiling. Prolonged boiling will reduce the sensitivity of the test.

F-3c. Test for Mildew resistance.— Soil Burial Test.

F-3c(1). Duck and Twill.— The test specimens shall be 4 inches in width and 6 inches in length with the longer dimension parallel to the filling yarns. Twelve (12) specimens shall be cut from each fabric to be tested.

F-3c(2). Leaching in Water before Burial.— Treated materials shall be leached in cold running water for 24 hours before burial in soil.

F-3c(3). Soil.— The soil for the burial test shall be rich in the forms of microbial life that decompose cellulose. It shall be composted according to usual greenhouse practice in which layers of any sandy loam field soil approximately 5 in. thick are interspersed with layers of fresh horse manure approximately 3 in. thick until the total aggregate layers have a thickness of at least 5 ft. This compost is allowed to ferment for 3 to 4 months, then turned. The turning is repeated at intervals of 3 or 4 months until the process has continued for 12 months. The material is then put through a soil shredder and a 4 mesh screen. Suitable composted soils may be obtained from local greenhouses or gardens.

F-3c(4). Burial Procedure.— In a greenhouse or other suitable room, make up the composted soil in at least 5 in. in thickness. The beds shall be smooth and firm to give a level, uniform surface. The soil shall be well sprinkled with a spray fine enough to prevent washing or deformation of the surface. The fabric specimens shall be buried horizontally and covered with 1/4" composted soil. When first buried, the soil shall be well wet down.

F-3c(5). Conduct of Burial Test.— The specimens of each test shall be buried as described above and allowed to remain for a period of 14 days. During this entire period the soil shall be sprinkled twice each day and maintained at a moisture level which according to greenhouse practice is best for growing plants.

This condition is determined by the following test: a handful of the soil is lightly squeezed in the hand. It should feel moist to the touch but when dropped to the bed from an elevation of about 2 ft. it should crumble. The temperature of this soil at a depth of 1 in. below the surface shall be 75° F. (plus or minus 5° F) during the period of burial. After removal from the soil the specimens shall be rinsed to remove any adhering soil, dried at 100 to 150° C, conditioned and subjected to tests for breaking strength.

F-3d. Spray Rating.- Fit a small spray nozzle with approximately 20 holes .035 in diameter to a funnel. The test specimen is clamped to a suitable frame which is mounted at an angle of  $45^{\circ}$  so that the center of the specimen is 6 inches directly below the nozzle. Pour 250 cc of water at  $80^{\circ}$  F. in the funnel. After the spray, tap one edge of the frame against a solid object, then rotate  $180^{\circ}$  and once more tap at point where previously held. (See sketch, figure 1, illustrating suitable apparatus for this test.) Rate sample visually as follows:

- 100 - No sticking, spotting or wetting of upper surface.
- 90 - Slight random sticking or spotting of upper surface.
- 80 - Wetting of upper surface at a majority of points where water sprays impinge.
- 70 - Partial wetting of whole of upper surface subjected to spray pattern.

G. PACKAGING, PACKING AND MARKING.

G-1. Not applicable to this specification.

H. NOTES.

H-1. Before production is commenced, unless otherwise specified in invitation for bids, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be submitted to the contracting officer for test and approval.

H-1a. After production has begun, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be furnished from every lot of 10,000 yards or less.

NOTICE:- When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

NOTE:- Unless otherwise specified in invitation for bid or purchase order, copies of this specification may be obtained at the following point:-

Jeffersonville Quartermaster Depot, Jeffersonville, Indiana.

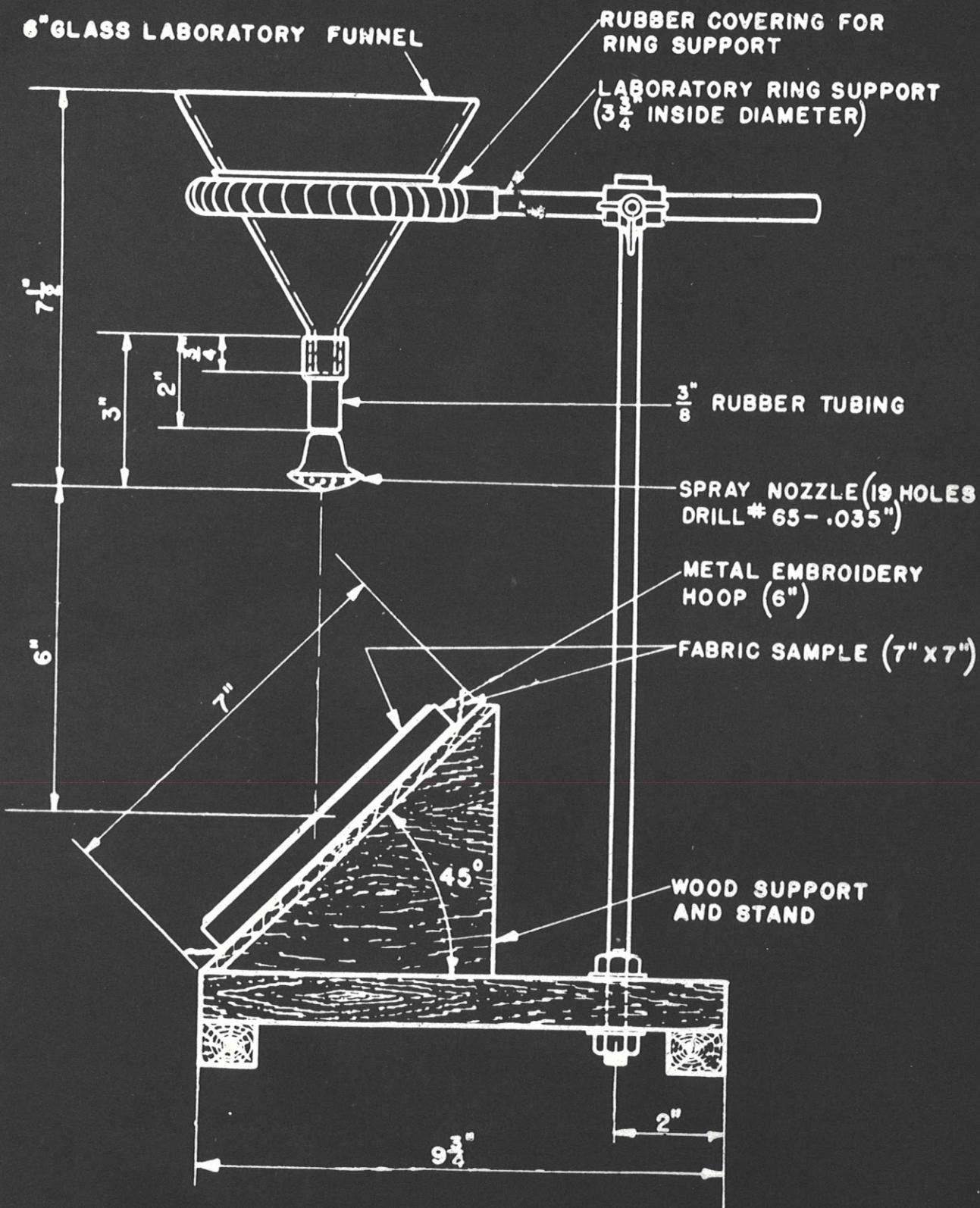


FIG 1

QUARTERMASTER CORPS  
TENTATIVE  
SPECIFICATION

Never  
Approved

HISTORICAL FILE

J. Q. D. No. 226A  
December 16, 1942  
Superseding J.Q.D. No. 226  
November 3, 1942

DYEING (VAT) AND FINISHING OF DUCK AND TENT TWILL.

A. APPLICABLE SPECIFICATIONS.

A-1. The following specification, of the issue in effect on date of invitation for bids, shall form a part of this specification.

A-1a. Federal Specification -

CCC-T-191 - Textiles; general specifications, test methods.

B-1. TYPE AND GRADES. To determine body behavior of fabrics

B-1a. Types. - This specification covers the vat dyeing and finishing of duck and tent twills.

B-2. Grade. - The grade shall be firsts.

C. MATERIAL AND WORKMANSHIP.

C-1. Materials. - The materials shall be as hereinafter indicated.

C-2. Workmanship. - The dyed and finished commodity shall be clean, well finished, and free from any defects which may affect appearance or serviceability.

D. GENERAL REQUIREMENTS.

D-1. See section E.

E. DETAIL REQUIREMENTS.

E-1. Preparation. - Duck or twill containing size shall be well and thoroughly desized. The material shall be thoroughly scoured before dyeing. The piece goods shall be scoured with caustic soda or sodium carbonate plus penetrating or wetting agents and/or soap at boiling temperatures so that the scoured material when dried before dyeing shall be as absorbent as a blotting paper and shall wet-out immediately when spotted with a drop of cold water.

E-2. Dyes. - The dyes used shall be selected from the following dyes and their prototypes:-

Ponsol Brown AR, Indanthrene Brown RAP, Calcosol Brown R, Cibanone Brown GR, Carbanthrene Brown AR (all Color Index No. 1151).

Calcosol Olive R, Carbanthrene Olive R, Cibanone Olive 2R, Indanthrene Olive RA, Ponsol Olive AR (all Color Index No. 1150).

Calcosol Khaki G, Carbanthrene Khaki 2G, Indanthrene Khaki 2G, Ponsol Khaki 2G.

Indanthrene Olive TA; Ponsol Olive GGL; Amanthrene Olive Green B; Indanthrene Olive Green BA; Ponsol Green 2BL Indanthrene Yellow 3RD.

E-3. Dyeing:-

E-3a. Material lighter in cloth weight than No. 10 duck and not over 56 inches in width shall be dyed by the pigment-pad method with a vat dye in an unreduced highly dispersed state, and using a high pressure padder, followed by reduction with a minimum of six ends in the jig and then development in the jig.

E-3b. Material No. 10 duck and heavier in cloth weight. - Jig dyeing of No. 10 and heavier ducks and lighter ducks over 56" inches in width shall be acceptable provided good penetration of the dye and an even solid appearance of the dyed cloth is obtained. Thoroughly scoured and dried material shall be given four ends in the jig with the dye in an unreduced highly dispersed state. This shall be followed by reduction with a minimum of six ends in the jig and then developed in the jig.

E-3c. Shelter tent duck and twill prepared as in Paragraph E-1 may be dyed by method in paragraph E-3b eliminating the drying between the preparation and the dyeing.

E-4. Color.- The color shall be that indicated in the invitation to bid and shall be a close color match to the approved standard. The color shall match the approved shade before being given the water repellent and mildew resistant treatments.

E-5. Color fastness.- The color shall have a good fastness when subjected to the following tests:-

Fastness to Weather. Samples to be exposed for 30 days.

Fastness to Crocking.

Fastness to Laundering Agents containing active chlorine.

Immerse samples for one hour in solution containing 0.7% available chlorine. Rinse thoroughly and dry.

E-6. Water Repellent Finish.- Unless otherwise indicated in invitation for bids, the finished material shall have a highly water repellent finish obtained with the use of sulphur-free aluminum acetate or formate, wax and soap and/or paraffin wax. The use of wax emulsions, applied by one or two bath methods is acceptable. The finished material shall contain not less than three (3) nor more than six (6) percent of wax.

E-6a. Hydrostatic Resistance.- The finished materials shall show a minimum hydrostatic resistance as shown below when tested on the Suter apparatus, readings to be taken when the third drop of water appears:-

No. 4 Duck - 35 cm.

No. 6 Duck - 35 cm.

No. 8 Duck - 30 cm.  
No. 10 Duck - 30 cm.  
No. 12 Duck - 30 cm.  
12.29 oz. Army Duck - 25 cm.  
9.85 oz. Army Duck - 25 cm.  
11.6 oz. Cloth, Cotton, Twill, Tent - 25 cm.  
7.9 oz. Duck, Shelter Tent - 25 cm.

**E-6b. Spray Rating.** - The finished materials shall show a spray rating of not less than ninety (90) plus when tested in accordance with the method described in Paragraph F-3d.

**E-7. Mildew Resistance.** - When specified in the invitation for bids, the finished duck shall have a mildew resistant finish and contain by weight not less than two (2) percent orthophenylphenol or one (1) percent of pentachlorphenol or its equivalent. No crystallization of the mildew inhibitor shall be noticeable on the finished material. The loss in breaking strength of the finished material shall be not more than ten (10) percent when samples are subjected to the soil burial test of Paragraph F-3c.

**E-8. Sulphur Content.** - The finished material shall be free from sulphur and its compounds. Slight traces of sulphur will not be a cause for rejection.

**E-9. Loading materials.** - The use of loading and/or finishing materials to increase the weight or breaking strength is prohibited.

**E-10. Contractor's Inspection.** - The contractor shall carefully inspect and test the finished materials for compliance with requirements of this specification before tendering them to the Government for final inspection and acceptance.

#### **F. METHODS OF SAMPLING, INSPECTION AND TESTS.**

**F-1. Sampling.** - Samples of any materials, not furnished by the United States Government, entering into the dyeing and/or finishing of the duck or cloth, shall be selected from time to time by the Government Inspector, and carefully examined and tests made to determine if they are in accordance with the requirements of this specification.

**F-2. Inspection.** - Inspection may be made throughout the entire process of dyeing and/or finishing. The passing as satisfactory of any detail in finishing or materials shall not relieve the contractor of responsibility for faulty workmanship or materials which may be discovered at any time prior to final acceptance. Final inspection of the finished commodity shall be made either at point of production or at point of delivery designated in the contract or purchase order of procuring agency. In case of plant inspection, every facility shall be afforded inspectors by the contractor for the prosecution of their work.

**F-3. Tests.** -

**F-3a.** Tests shall be in accordance with Federal Specification CCC-T-191 insofar as applicable.

F-3b. Test for Sulphur.— Two solutions are made: Acid stannous chloride. One hundred (100) grams of stannous chloride crystals are dissolved in 100 cc hydrochloric acid (concentrated, 35%) and 50 cc distilled water is added. Lead Acetate solution— Five (5) grams of lead acetate are dissolved in water and made up to 100 cc with water. Add 1 drop of glacial acetic acid to clear up the solution if it is cloudy. To make the test, cover the sample in test tube with acid stannous chloride solution and place over the mouth of the test tube a filter paper upon which is placed 1 drop of lead acetate solution. The test tube is then heated slowly over a low flame and brought up to boiling. Prolonged boiling will reduce the sensitivity of the test.

F-3c. Test for Mildew resistance.— Soil Burial Test.

F-3c(1). Duck and Twill.— The test specimens shall be 4 inches in width and 6 inches in length with the longer dimension parallel to the filling yarns. Twelve (12) specimens shall be cut from each fabric to be tested.

F-3c(2). Leaching in Water before Burial.— Treated materials shall be leached in cold running water for 24 hours before burial in soil.

F-3c(3). Soil.— The soil for the burial test shall be rich in the forms of microbial life that decompose cellulose. It shall be composted according to usual greenhouse practice in which layers of any sandy loam field soil approximately 5 in. thick are interspersed with layers of fresh horse manure approximately 3 in. thick until the total aggregate layers have a thickness of at least 5 ft. This compost is allowed to ferment for 3 to 4 months, then turned. The turning is repeated at intervals of 3 or 4 months until the process has continued for 12 months. The material is then put through a soil shredder and a 4 mesh screen. Suitable composted soils may be obtained from local greenhouses or gardens.

F-3c(4). Burial Procedure.— In a greenhouse or other suitable room, make up the composted soil in at least 5 in. in thickness. The beds shall be smooth and firm to give a level, uniform surface. The soil shall be well sprinkled with a spray fine enough to prevent washing or deformation of the surface. The fabric specimens shall be buried horizontally and covered with 1/4" composted soil. When first buried, the soil shall be well wet down.

F-3c(5). Conduct of Burial Test.— The specimens of each test shall be buried as described above and allowed to remain for a period of 14 days. During this entire period the soil shall be sprinkled twice each day and maintained at a moisture level which according to greenhouse practice is best for growing plants.

This condition is determined by the following test: a handful of the soil is lightly squeezed in the hand. It should feel moist to the touch but when dropped to the bed from an elevation of about 2 ft. it should crumble. The temperature of this soil at a depth of 1 in. below the surface shall be 75° F. (plus or minus 5° F) during the period of burial. After removal from the soil the specimens shall be rinsed to remove any adhering soil, dried at 100 to 150° C, conditioned and subjected to tests for breaking strength.

F-3d. Spray Rating.- Fit a small spray nozzle with approximately 20 holes .035 in diameter to a funnel. The test specimen is clamped to a suitable frame which is mounted at an angle of 45° so that the center of the specimen is 6 inches directly below the nozzle. Pour 250 cc of water at 80° F. in the funnel. After the spray, tap one edge of the frame against a solid object, then rotate 180° and once more tap at point where previously held. (See sketch, figure 1, illustrating suitable apparatus for this test.) Rate sample visually as follows:

- 100 - No sticking, spotting or wetting of upper surface.
- 90 - Slight random sticking or spotting of upper surface.
- 80 - Wetting of upper surface at a majority of points where water sprays impinge.
- 70 - Partial wetting of whole of upper surface subjected to spray pattern.

G. PACKAGING, PACKING AND MARKING.

G-1. Not applicable to this specification.

H. NOTES.

H-1. Before production is commenced, unless otherwise specified in invitation for bids, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be submitted to the contracting officer for test and approval.

H-1a. After production has begun, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be furnished from every lot of 10,000 yards or less.

NOTICE:- When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

NOTE:- Unless otherwise specified in invitation for bid or purchase order, copies of this specification may be obtained at the following point:-

Jeffersonville Quartermaster Depot, Jeffersonville, Indiana.

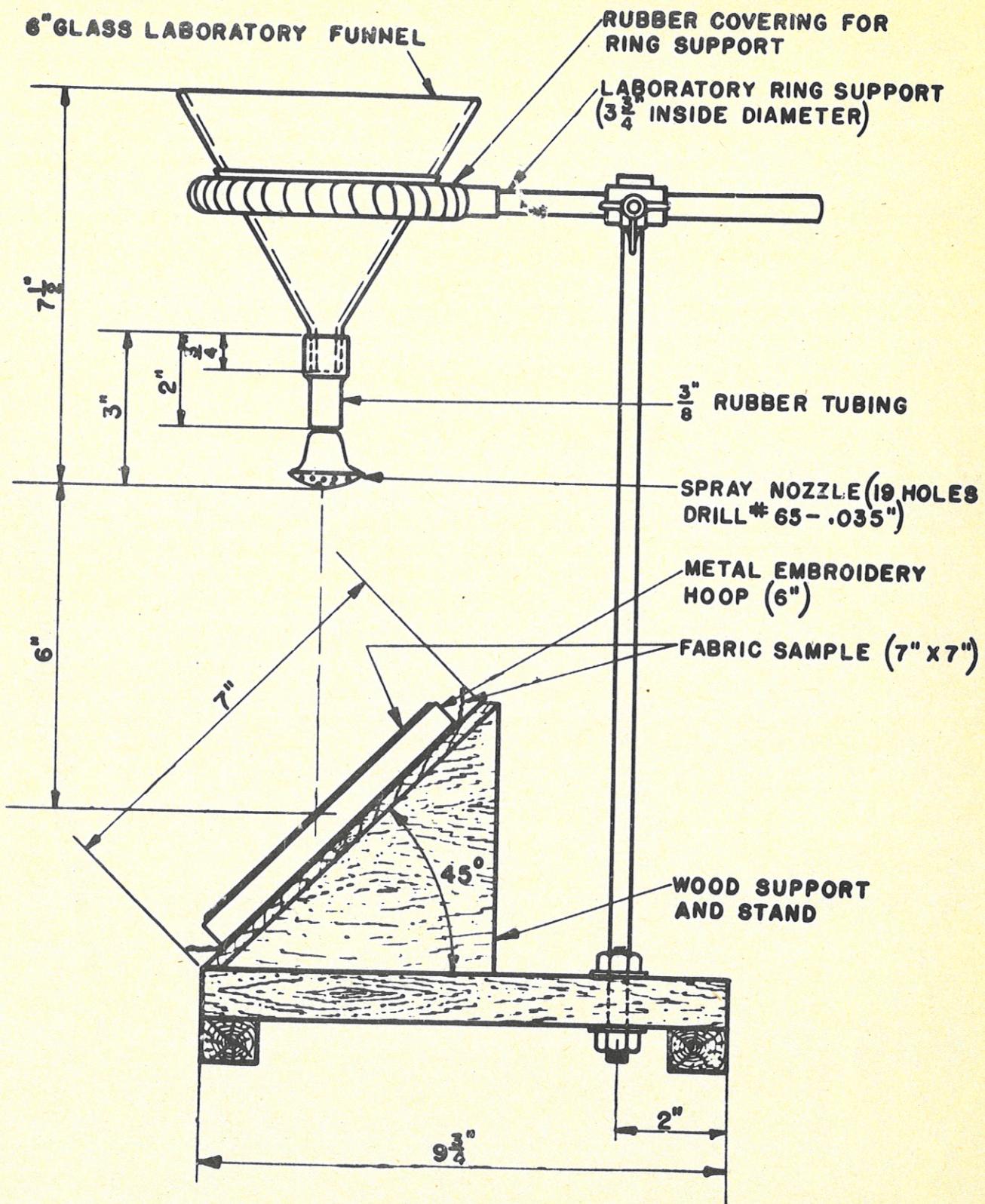


FIG 1

QUARTERMASTER CORPS  
TENTATIVE  
SPECIFICATION

*HISTORIC*  
*Superseded*  
*by JQW 226C*

J. Q. D. No. 226B  
April 20, 1943

Superseding

J. Q. D. No. 226A

December 16, 1942.

*MOVE*

DYEING (VAT) AND FINISHING OF DUCK AND  
TENT TWILL.

A. APPLICABLE SPECIFICATIONS.

A-1. The following specification, of the issue in effect on date of invitation for bids, shall form a part of this specification.

A-1a. Federal Specification:-

CCC-T-191 - Textiles; general specifications, test methods.

B. TYPE AND GRADES.

B-1. Types. - This specification covers the vat dyeing and finishing of duck and tent twills.

B-2. Grade. - The grade shall be firsts.

C. MATERIAL AND WORKMANSHIP.

C-1. Materials. - The materials shall be as herein-after indicated.

C-2. Workmanship. - The dyed and finished commodity shall be clean, well finished, and free from any defects which may affect appearance or serviceability.

D. GENERAL REQUIREMENTS.

D-1. See Section E.

E. DETAIL REQUIREMENTS.

E-1. Preparation. - Duck or twill containing size shall be thoroughly desized. The material shall be thoroughly scoured before dyeing. The piece goods shall be scoured with caustic soda or sodium carbonate plus penetrating or wetting agents and/or soap at boiling temperatures so that the scoured material when dried before dyeing shall be as absorbent as a blotting paper and shall wet-out immediately when spotted with a drop of cold water.

E-1a. In lieu of scouring as required, goods may be processed with the use of suitable penetrating agents, provided

the required penetration, fastness and general appearance after dyeing are satisfactory. Such process must be disclosed and approved before production.

E-2. Dyeing. -

E-2a. Material lighter in clothweight than No. 10 duck and not over 56 inches in width shall be dyed by the pigment-pad method with a vat dye in an unreduced highly dispersed state, and using a high pressure padder, followed by reduction with a minimum of six ends in the jig and then development in the jig.

E-2b. Material No. 10 duck and heavier in cloth weight. - Jig dyeing of No. 10 and heavier ducks and lighter ducks over 56 inches in width shall be acceptable provided good penetration of the dye and an even solid appearance of the dyed cloth is obtained. Thoroughly scoured and dried material shall be given four ends in the jig with the dye in an unreduced highly dispersed state. This shall be followed by reduction with a minimum of six ends in the jig and then developed in the jig.

E-2c. Shelter tent duck and twill prepared as in Paragraph E-1 may be dyed by method in paragraph E-2b eliminating the drying between the preparation and the dyeing.

E-3. Color. - The color shall be that indicated in the invitation to bid and shall be a close color match to the approved standard. The color shall match the approved shade before being given the water repellent and mildew resistant treatments.

E-4. Color fastness. - The color shall have a good fastness when subjected to the following tests:-

Fastness to weather. Samples to be exposed for 30 days.

Fastness to Crocking.

Fastness to Laundering Agents containing active chlorine. Immerse samples for one hour in solution containing 0.3% available chlorine. Rinse thoroughly and dry.

E-5. Water Repellent Finish. - Unless otherwise indicated in invitation for bids, the finished material shall have a highly water repellent finish obtained with the use of sulphur-free aluminum acetate or formate, wax and soap and/or paraffin wax. The use of wax emulsions, applied by one or two bath methods is acceptable. The finished material shall contain not less than two (2) nor more than four (4) per cent of wax.

E-5a. Hydrostatic Resistance. - The finished materials

shall show a minimum hydrostatic resistance as given below when tested on the Suter apparatus, readings to be taken when the third drop of water appears:-

No. 4 Duck - 35 cm.
No. 6 Duck - 35 cm.
No. 8 Duck - 30 cm.
No. 10 Duck - 30 cm.
No. 12 Duck - 30 cm.
12.29 oz. Army Duck - 25 cm.
9.85 oz. Army Duck - 25 cm.
11.6 oz. Cloth, Cotton, Twill, Tent - 25 cm.
7.9 oz. Duck, Shelter Tent - 25 cm.

E-5b. Spray Rating.- The finished materials shall show a spray rating of not less than ninety (90) plus when tested in accordance with the method described in paragraph F-3d.

E-6. Mildew Resistance.- When specified in the invitation for bids, the finished duck shall have a mildew resistant finish attained by proper deposition in the fabric of suitable fungicides. The requirements for the mildew resistant finish shall be as specified in invitation for bids, contract, or order. No crystallization of the mildew inhibitor shall be noticeable on the finished material. The loss in breaking strength of the finished material shall be not more than ten (10) per cent when samples are subjected to the soil burial test of paragraph F-3c.

E-7. Sulphur Content.- The finished material shall be free from sulphur and its compounds. Slight traces of sulphur will not be a cause for rejection.

E-8. Loading Materials.- The use of loading and/or finishing materials to increase the weight or breaking strength is prohibited.

E-9. Contractor's Inspection.- The contractor shall carefully inspect and test the finished materials for compliance with requirements of this specification before tendering them to the Government for final inspection and acceptance.

## F. METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Sampling.- Samples of any materials, not furnished by the United States Government, entering into the dyeing and/or finishing of the duck or cloth, shall be selected from time to time by the Government Inspector, and carefully examined and tests made to determine if they are in accordance with the requirements of this specification.

F-2. Inspection.- Inspection may be made throughout

the entire process of dyeing and/or finishing. The passing ~~life~~ as satisfactory of any detail in finishing or materials shall not relieve the contractor of responsibility for faulty workmanship or materials which may be discovered at any time prior to final acceptance. Final inspection of the finished commodity shall be made either at point of production or at point of delivery designated in the contract or purchase order of procuring agency. In case of plant inspection, every facility shall be afforded inspectors by the contractor for the prosecution of their work.

F-3. Tests. -

F-3a. Tests shall be in accordance with Federal Specification CCC-T-191 insofar as applicable.

F-3b. Test for Sulphur. - Two solutions are made: Acid stannous chloride. One hundred (100) grams of stannous chloride crystals are dissolved in 100 cc hydrochloric acid, concentrated 35% and 50 cc distilled water is added. Lead Acetate solution - Five (5) grams of lead acetate is dissolved in water and made up to 100 cc with water. Add 1 drop of glacial acetic acid to clear up the solution if it is cloudy. Two square inches of the finished duck cut in small pieces is taken for the test. Cover the sample in a test tube of ordinary size with acid stannous chloride solution. Place over the mouth of the test tube a filter paper upon which is put one drop of lead acetate solution. The test tube is then heated slowly over a low flame and then brought up to boiling. A brown stain on the paper indicates the presence of sulphur. Prolonged boiling will reduce the sensitivity of the test.

F-3c. Test for Mildew resistance. - Soil Burial Test. -

F-3c(1). Duck and Twill. - The test specimens shall be 4 inches in width and 6 inches in length with the longer dimension parallel to the filling yarns. Twelve (12) specimens shall be cut from each fabric to be tested.

F-3c(2). Leaching in Water before Burial. - Treated materials shall be leached in cold running water for 24 hours before burial in soil.

F-3c(3). Soil. - The soil for the burial test shall be rich in the forms of microbial life that decompose cellulose. It shall be composted according to usual greenhouse practice in which layers of any sandy loam field soil approximately 5 inches thick are interspersed with layers of fresh horse manure approximately 3 inches thick until the total aggregate layers have a thickness of at least 5 ft. This compost is allowed to ferment for 3 to 4 months, then turned. The turning is repeated at intervals of 3 or 4 months until the process has continued for 12 months. The material is then put through a soil shredder and a 4 mesh screen. Suitable composted soils

may be obtained from local greenhouses or gardens.

F-3c(4). Burial Procedure. - In a greenhouse or other suitable room, make up the composted soil in at least 5 inches in thickness. The beds shall be smooth and firm to give a level, uniform surface. The soil shall be well sprinkled with a spray fine enough to prevent washing or deformation of the surface. The fabric specimens shall be buried horizontally and covered with 1/4" composted soil. When first buried, the soil shall be well wet down.

F-3c(5). Conduct of Burial Test. - The specimens of each test shall be buried as described above and allowed to remain for a period of 14 days. During this entire period the soil shall be sprinkled twice each day and maintained at a moisture level which according to greenhouse practice is best for growing plants.

This condition is determined by the following test: a handful of the soil is lightly squeezed in the hand. It should feel moist to the touch but when dropped to the bed from an elevation of about 2 ft., it should crumble. The temperature of this soil at a depth of 1 inch below the surface shall be 75° F. (plus or minus 5° F.) during the period of burial. After removal from the soil, the specimens shall be rinsed to remove any adhering soil, dried at 100 to 150° C., conditioned and subjected to tests for breaking strength.

In case of variations of results in the soil burial test conducted at different places, the results of the tests conducted by the contracting office shall be considered final.

F-3d. Spray Rating. - Fit a small spray nozzle with approximately 20 holes .035 in diameter to a funnel. The test specimen is clamped to a suitable frame which is mounted at an angle of 45° so that the center of the specimen is 6 inches directly below the nozzle. Pour 250 cc of water at 80° F. in the funnel. After the spray, tap one edge of the frame against a solid object, then rotate 180° and once more tap at point where previously held. (See sketch, figure 1, illustrating suitable apparatus for this test.) Rate sample visually as follows:-

- 100 - No sticking, spotting or wetting of upper surface.
- 90 - Slight random sticking or spotting of upper surface.
- 80 - Wetting of upper surface at a majority of points where water sprays impinge.
- 70 - Partial wetting of whole of upper surface subjected to spray pattern.

G. PACKAGING, PACKING AND MARKING.

G-1. Not applicable to this specification.

H. NOTES.

H-1. Before production is commenced, unless otherwise specified in invitation for bids, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be submitted to the contracting officer for test and approval.

H-1a. After production has begun, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be furnished from every lot of 10,000 yards or less.

NOTICE:- When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

NOTE:- Unless otherwise specified in invitation for bid or purchase order, copies of this specification may be obtained at the following point:-

Jeffersonville Quartermaster Depot, Jeffersonville, Indiana.

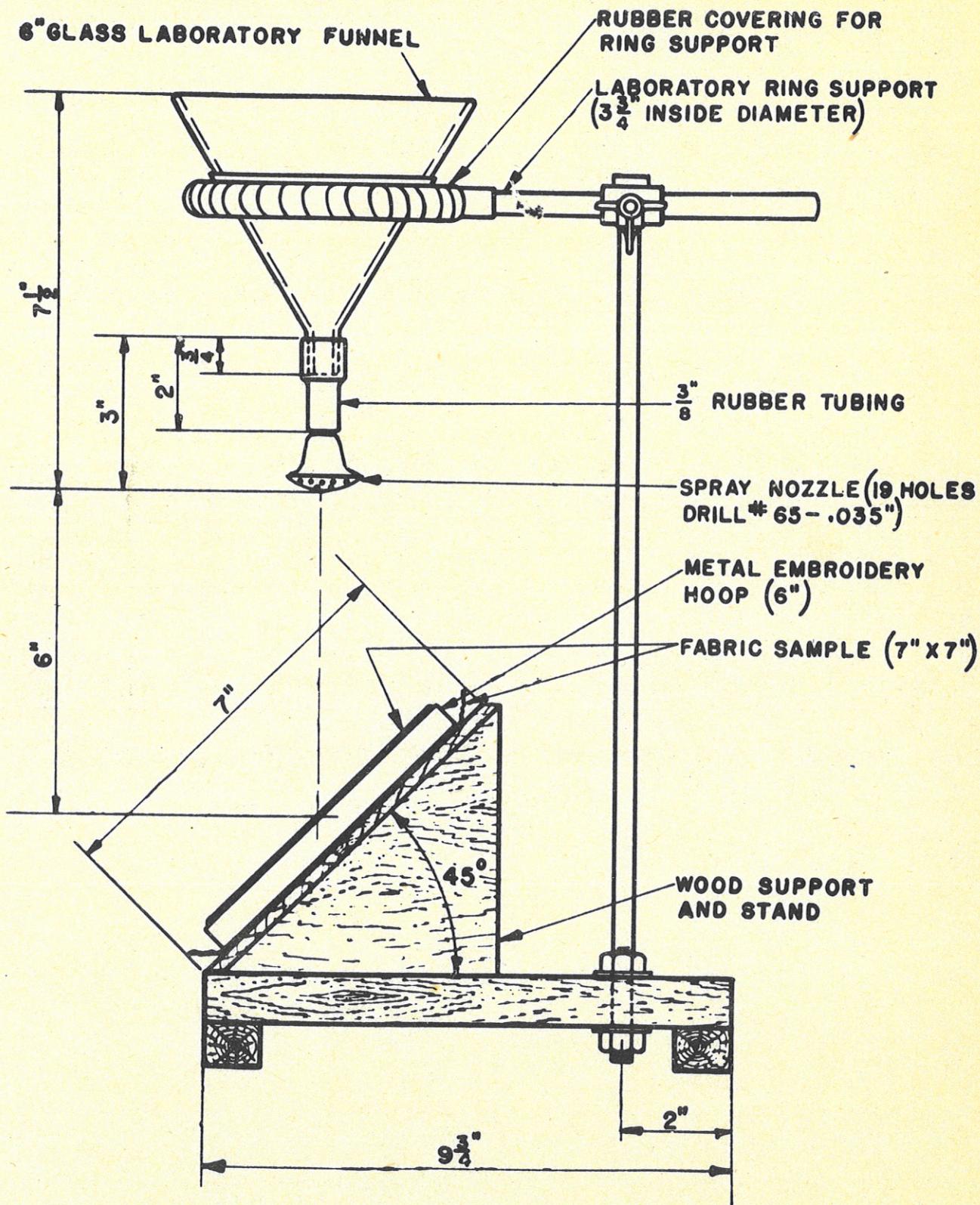


FIG 1

QUARTERMASTER CORPS  
TENTATIVE  
SPECIFICATION

J. Q. D. No. 226C  
21 August 1943  
Amendment No. 1  
24 October 1944

DYEING (VAT) AND FINISHING OF DUCK AND TENT TWILL.

This Specification is changed as follows:-

Add Paragraph "A-1b. Quartermaster Corps Tentative Specification:-  
J.Q.D. No. 591 - Packing Requirements for Fabrics for  
Tentage and Equipage."

Paragraph E-5 - Delete the last sentence and insert in lieu  
thereof:-

"The finished material shall contain not less than three  
(3) nor more than six (6) percent of wax."

Paragraph E-5a - Delete the table and insert in lieu thereof:-

"No. 4 Duck - 40 cm.  
No. 6 Duck - 40 cm.  
No. 8 Duck - 35 cm.  
No. 10 Duck - 35 cm.  
No. 12 Duck - 35 cm.  
12.29 oz. Army Duck - 30 cm.  
9.85 oz. Army Duck - 30 cm.  
11.6 oz. Cloth, Cotton, Twill, Tent - 30 cm.  
7.9 oz. Duck, Shelter Tent - 30 cm.  
9.0 oz. Combed yarn, high sley, flat duck - 55 cm."

Paragraph E-6 - Delete in its entirety and substitute the following:-

"E-6. Mildew Resistance. - When specified, the fabric shall be  
made mildew resistant by proper deposition in the fabric of no less than  
the amount of the inhibitor specified. This amount of inhibitor is the  
minimum which will give the finished commodity the desired protection  
under tropical conditions and shall be considered to be properly deposited  
if the fabric loses no more than ten (10) percent tensile strength when  
subjected to the soil burial test of Paragraph F-3c. No crystallization  
of the inhibitor shall be noticeable on the finished commodity."

Section G - Delete in its entirety and substitute the following:-

"G. PACKAGING, PACKING AND MARKING.

G-1. Packaging, packing and marking shall conform to the  
requirements of Specification J.Q.D. No. 591,"

NOTE:- Copies of this amendment may be obtained from the following point:-

Jeffersonville Quartermaster Depot,  
Jeffersonville, Indiana.

QUARTERMASTER CORPS  
TENTATIVE  
SPECIFICATION

6-349  
J. Q. D. No. 226C  
21 August 1943.

Superseding  
J. Q. D. No. 226B  
April 1943.

*Superseded by U.S. A. 21*  
DYEING (VAT) AND FINISHING OF DUCK  
AND TENT TWILL.

*HISTORICAL FILE COPY*  
April 1943. REMOVE

A. APPLICABLE SPECIFICATIONS.

A-1. The following specifications, of the issue in effect on date of invitation for bids, shall form a part of this specification.

A-1a. Federal Specification:-

CCC-T-191 - Textiles; general specifications, test methods.

B. TYPE AND GRADES.

B-1. Types.- This specification covers the vat dyeing and finishing of duck and tent twills.

B-2. Grade.- The grade shall be firsts.

C. MATERIAL AND WORKMANSHIP.

C-1. Materials.- The materials shall be as hereinafter indicated.

C-2. Workmanship.- The dyed and finished commodity shall be clean, well finished, and free from any defects which may affect appearance or serviceability.

D. GENERAL REQUIREMENTS.

D-1. See section E.

E. DETAIL REQUIREMENTS.

E-1. Preparation.- Duck or twill containing size shall be thoroughly desized. The material shall be thoroughly scoured before dyeing. The piece goods shall be scoured with caustic soda or sodium carbonate plus penetrating or wetting agents and/or soap at boiling temperatures so that the scoured material when dried before dyeing shall be as absorbent as a blotting paper and shall wet-out immediately when spotted with a drop of cold water.

E-1a. In lieu of scouring as required, goods may be processed with the use of suitable penetrating agents, provided the required penetration, fastness and general appearance after dyeing are satisfactory.

Such process must be disclosed and approved before production.

E-2. Dyeing.

E-2a. Material lighter in clothweight than No. 10 duck and not over 56 inches in width shall be dyed by the pigment-pad method with a vat dye in an unreduced highly dispersed state, and using a high pressure padder, followed by reduction with a minimum of six ends in the jig and then development in the jig.

E-2b. Material No. 10 duck and heavier in cloth weight. Jig dyeing of No. 10 and heavier ducks and lighter ducks over 56 inches in width shall be acceptable provided good penetration of the dye and an even solid appearance of the dyed cloth is obtained. Thoroughly scoured and dried material shall be given four ends in the jig with the dye in an unreduced highly dispersed state. This shall be followed by reduction with a minimum of six ends in the jig and then developed in the jig.

E-2c. Shelter tent duck and twill prepared as in paragraph E-1 may be dyed by method in paragraph E-2b eliminating the drying between the preparation and the dyeing.

E-3. Color. The color of the finished material shall be that indicated in the invitation for bid and shall be a close color match to the approved standard.

E-4. Color fastness. The color shall have good fastness when subjected to the following tests:-

Fastness to weather. Samples to be exposed for 30 days.

Fastness to Crocking.

Fastness to Laundering Agents containing active chlorine. Immerse samples for one hour in solution containing 0.3% available chlorine at P. H. 11. Rinse thoroughly and dry.

E-5. Water Repellent Finish. Unless otherwise indicated in invitation for bids, the finished material shall have a highly water repellent finish obtained with the use of sulphur-free aluminum acetate or formate, wax and soap and/or paraffin wax. The use of wax emulsions, applied by one or two bath methods is acceptable. The finished material shall contain not less than one (1) nor more than two (2) percent of wax.

E-5a. Hydrostatic Resistance. The finished materials shall show a minimum hydrostatic resistance as given below when tested on the Suter apparatus, readings to be taken when the third drop of water appears:-

No. 4 Duck - 35 cm.  
No. 6 Duck - 35 cm.  
No. 8 Duck - 30 cm.

No. 10 Duck - 30 cm.  
No. 12 Duck - 30 cm.  
12.29 oz. Army Duck - 25 cm.  
9.85 oz. Army Duck - 25 cm.  
11.6 oz. Cloth, Cotton, Twill, Tent - 25 cm.  
7.9 oz. Duck, Shelter Tent - 25 cm.

E-5b. Spray Rating.- The finished materials shall show a spray rating of not less than ninety (90) plus when tested in accordance with the method described in paragraph F-3d.

E-6. Mildew Resistance.- When specified in the invitation for bids, the finished duck shall have a mildew resistant finish attained by proper deposition in the fabric of suitable fungicides. The requirements for the mildew resistant finish shall be as specified in invitation for bids, contract or order. No crystallization of the mildew inhibitor shall be noticeable on the finished material. The loss in breaking strength of the finished material shall be not more than ten (10) percent when samples are subjected to the soil burial test of paragraph F-3c.

E-7. Sulphur Content.- The finished material shall be free from sulphur and its compounds. Slight traces of sulphur will not be a cause for rejection.

E-8. Loading Materials.- The use of loading and/or finishing materials to increase the weight or breaking strength is prohibited.

E-9. Before production is commenced, unless otherwise specified in invitation for bids, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be submitted to the contracting officer for test and approval.

E-9a. After production has begun, a three-yard sample of the finished goods and a two-yard sample of the grey goods from the same piece shall be furnished from every lot of 10,000 yards or less.

E-10. Contractor's Inspection.- The contractor shall carefully inspect and test the finished materials for compliance with requirements of this specification before tendering them to the Government for final inspection and acceptance.

#### METHODS OF SAMPLING, INSPECTION AND TESTS.

F-1. Sampling.- Samples of any materials, not furnished by the United States Government, entering into the dyeing and/or finishing of the duck or cloth, shall be selected from time to time by the Government Inspector, and carefully examined and tests made to determine if they are in accordance with the requirements of this specification.

F-2. Inspection.- Inspection may be made throughout the

entire process of dyeing and/or finishing. The passing as satisfactory of any detail in finishing or materials shall not relieve the contractor of responsibility for faulty workmanship or materials which may be discovered at any time prior to final acceptance. Final inspection of the finished commodity shall be made either at point of production or at point of delivery designated in the contract or purchase order of procuring agency. In case of factory inspection, every facility shall be afforded inspectors by the contractor for the prosecution of their work.

F-3. Tests.

F-3a. Tests shall be in accordance with Federal Specification CCC-T-191 insofar as applicable.

F-3b. Test for Sulphur. - Two solutions are made; Acid stannous chloride. One Hundred (100) grams of stannous chloride crystals are dissolved in 100 cc hydrochloric acid, concentrated 35% and 50 cc distilled water is added. Lead Acetate solution - Five (5) grams of lead acetate is dissolved in water and made up to 100 cc with water. Add 1 drop of glacial acetate acid to clear up the solution if it is cloudy. Two square inches of the finished duck cut in small pieces is taken for the test. Cover the sample in a test tube of ordinary size with acid stannous chloride solution. Place over the mouth of the test tube a filter paper upon which is put one drop of lead acetate solution. The test tube is then heated slowly over a low flame and then brought up to boiling. A brown stain on the paper indicates the presence of sulphur. Prolonged boiling will reduce the sensitivity of the test.

F-3c. Test for Mildew Resistance. - Soil Burial Test.

F-3c(1). Duck and Twill. The test specimens shall be 4 inches in width and 6 inches in length with the longer dimension parallel to the filling yarns. Twelve (12) specimens shall be cut from each fabric to be tested.

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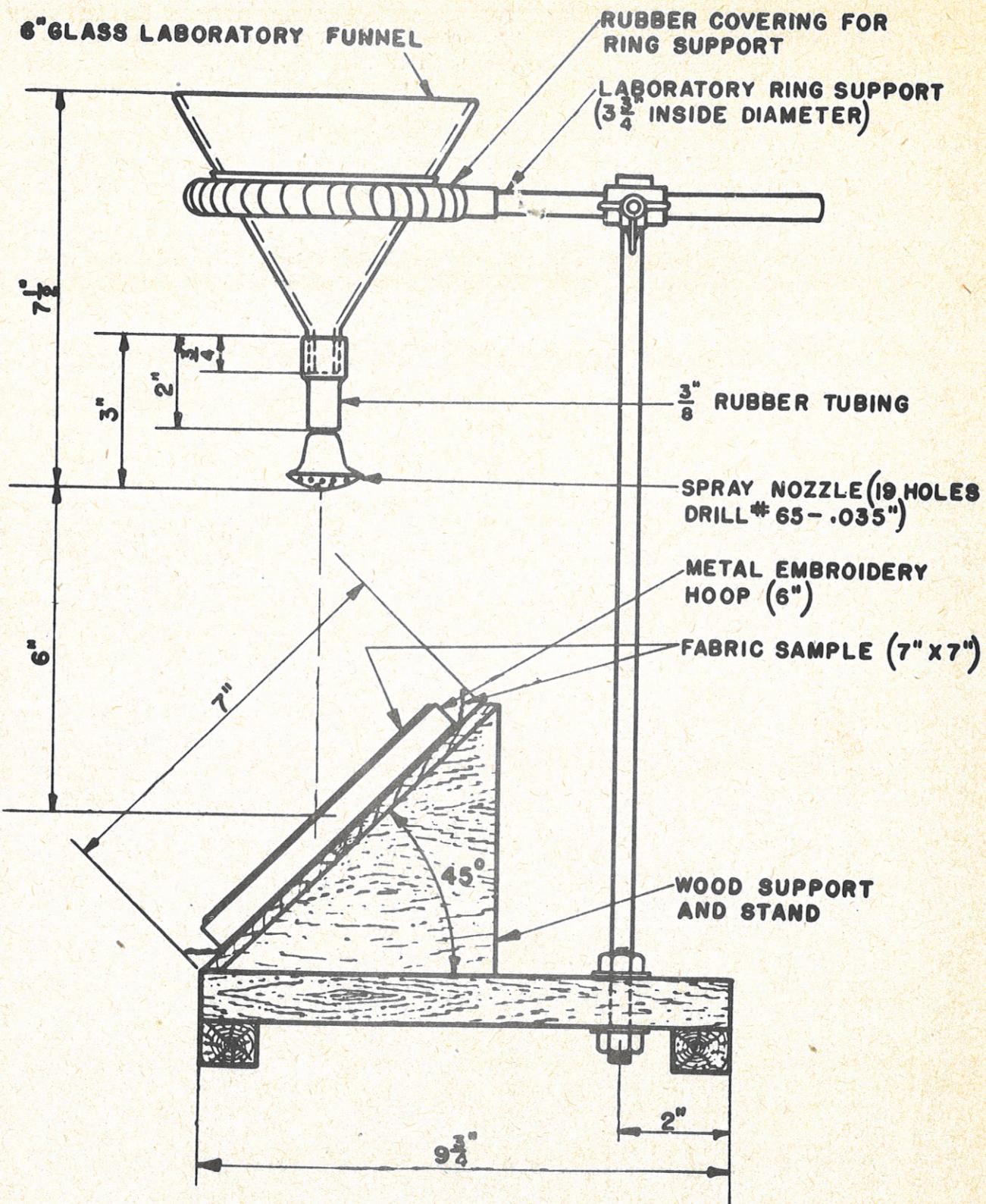


FIG 1