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PART-WOOL BLANKETS FOR USE IN BARRACKS

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ABSTRACT

The properties of 33 part-wool blankets of 8 constructions were measured, and the changes produced by 10 washings were observed. It is concluded that part-wool blankets should prove quite satisfactory for use in barracks in place of the all-wool army blanket, thereby effecting a substantial saving of wool, which might be needed for other military purposes.

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I. INTRODUCTION

The amount of wool produced in the United States is not sufficient to meet military and civilian needs, and it has been necessary to import considerable quantities of the fiber annually. In a critical situation, such as exists at present, in which the supply routes might be cut, the available supply might not be adequate to meet the essential military needs. The conservation of wool and the utilization of substitute fibers are therefore of considerable importance. The Office of the Quartermaster General of the United States Army has recognized the urgency of this problem by appointing a wool conservation committee to review Quartermaster Corps specifications for wool materials.

One possible means of accomplishing conservation of wool would be by replacing the regular all-wool army blanket with a part-wool blanket in barracks and other indoor quarters in the United States. In order to have data upon which to base specifications for part-wool blankets, 33 blankets of 8 constructions, containing either 50 percent of wool and 50 percent of cotton or 25 percent of wool and 75 percent of cotton, were subjected to analyses and tests. The results of these tests and of the tests of the regular all-wool army blanket are given in this paper.

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II. EXPERIMENTAL PROCEDURE

The testing procedure described in Research Paper RP1529 [1] [3] and the equipment previously described [2, 3, 4] were used. The blankets were conditioned by exposure to air having a relative humidity of 65 percent and a temperature of 70° F, with a tolerance of ±2 percent in relative humidity and a temperature tolerance of ±2° F, and, except for thermal transmission, were tested under these conditions.

One blanket of each construction was washed in the military laundry at Fort Myer. The blankets were not renapped after washing. The properties of these blankets were measured after the first, fifth, and tenth washings.

Some of the blankets were tested at the U. S. Testing Co. The thermal-transmission tests were made in still air on equipment similar to that described by Cleveland [3] and also when the hood of the instrument was removed and a stream of air moving 6 miles per hour was directed across the sample. The blankets tested at the U. S. Testing Co. were washed once in a reversing wash wheel, in a 0.5-percent soap solution at 100° F for 10 minutes, followed by a 10-minute and a 1-minute rinsing also at 100° F. The samples were spread on a horizontal ventilated screen to dry.

The regular all-wool army blanket was washed in a commercial laundry and was not renapped.

III. RESULTS

The results of the tests are given in table 1. The following general conclusions may be drawn from them.

The unlaundered blankets containing 75 percent of cotton and 25 percent of wool were more compressible, thicker, more permeable to air, and had a greater insulating value than the unlaundered blankets containing 50 percent of cotton and 50 percent of wool and the regular all-wool army blanket. After 10 launderings the 2 series of blankets were essentially alike in these properties. The blankets increased in thickness, breaking strength, and weight per square yard with laundering and decreased in compressibility, air permeability, and thermal transmission. These changes resulted from the shrinkage of the blankets during washing. All the blankets were considerably felted after the tenth washing. This condition was indicated by the lowered compressibility and was quite apparent to the feel and in the general appearance of the blankets. In this respect the laundered blankets were more nearly like the all-wool army blanket than were the unlaundered blankets. The compressional resilience of the unlaundered blankets of 25-percent-wool content was lower than that of the 50-percent-wool blankets and very much lower than that of the regular all-wool army blanket. It increased with laundering, primarily because of the felting produced during laundering.

[3] Figures in brackets indicate the literature references at the end of this paper.

TABLE 1.—*Results of tests on blankets*

Blanket number	Number of washings	Thickness at—		Compressibility	Compressional resilience	Thermal transmission Btu/(°F×hr×ft²)	Air permeability ft³/(min×ft²) at 0.5-in. H_2O pressure	Breaking strength (grab)		Weight		Size		Shrinkage	
		0.1 lb/in²	1.0 lb/in²					Warp	Filling			Length	Width	Length	Width
Blanket 137A. 50% of wool, 50% of cotton (approx.)															
		in.	*in.*	*in.²/lb*	%			*lb*	*lb*	*oz/yd²*	*lb*	*in.*	*in.*	%	%
1	0	[a] 0.168	[a] 0.112	[b] 0.25	[c] 39	[d] 0.90	84	50	77	15.6	4.26	84.1	67.2		
2	0	.167	.111	.25	39	.90	85			15.8	4.29	85.0	66.9		
2	1	.211	.136	.26	40					17.8	4.24	76.3	64.6	10	3
2	10	.202	.155	.16	44	.81	55	60	100	19.7	4.22	75.6	58.5	11	13
3	0	.170	.106	.26	31		77			15.5	4.25	84.9	67.0		
3	0	[e] *.190				*1.04*(1.20)		*54	*88		*4.25	*83.0	*67.0		
3	1	*.237				*0.98*(1.01)								*7	*3
Blanket 138A. 50% of wool, 50% of cotton (approx.)															
4	0	0.165	0.110	0.28	42	0.86	90	52	57	14.3	3.99	85.3	67.8		
5	0	.170	.106	.27	35	.86	90			14.4	4.03	85.2	57.9		
5	1	.203	.130	.27	38					16.3	3.95	76.8	65.3	10	4
5	10	.197	.145	.18	50	.84	57	58	77	18.0	3.96	74.9	60.9	12	10
6	0	.174	.111	.26	33		83			14.5	3.99	84.5	67.6		
6	0	*.210				*.94*(1.16)		*54	*61		*3.96	*83.0	*67.4		
6	1	*.217				*.99*(1.22)								*7	*1
Blanket 139A. 50% of wool, 50% of cotton (approx.)															
7	0	0.178	0.117	0.24	40	0.90	84	52	89	15.4	4.13	83.4	66.8		
8	0	.180	.117	.26	28	.90	85			15.2	4.19	85.2	66.8		
8	1	.195	.134	.24	35					17.6	4.20	77.4	63.8	9	4
8	10	.196	.148	.16	49	.83	55	64	96	19.7	4.12	75.0	57.9	12	13
9	0	.167	.109	.26	36		87			15.0	4.16	86.3	66.9		
9	0	*.195				*1.00*(1.17)		*54	*92		*4.17	*83.9	*66.6		
9	1	*.215				*1.02*(1.22)								*10	*3

See footnotes at end of table.

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TABLE 1.—*Results of tests on blankets*—Continued

Blanket number	Number of washings	Thickness at—		Compressibility	Compressional resilience	Thermal transmission Btu/(°F× hr×ft²)	Air permeability ft³/(min×ft²) at 0.5-in. H_2O pressure	Breaking strength (grab)		Weight		Size		Shrinkage	
		0.1 lb/in²	1.0 lb/in²					Warp	Filling			Length	Width	Length	Width
Blanket 140A. 50% of wool, 50% of cotton (approx.)															
		in.	*in.*	*in.²/lb*	%			*lb*	*lb*	*oz/yd²*	*lb*	*in.*	*in.*	%	%
10	0	0.183	0.116	0.27	39	0.89	95	51	66	14.6	3.98	84.5	67.1		
11	0	.175	.112	.27	32	.89	90			14.7	4.05	84.6	67.2		
11	1	.215	.144	.25	36					17.1	4.07	76.3	64.7	10	4
11	10	.203	.146	.18	47	.82	59	59	83	18.7	4.01	74.0	60.0	13	11
12	0	.178	.114	.27	35		84			15.0	4.10	84.7	66.9		
12	0	*.205				*1.00*(1.19)		*54	*65		*4.10	*83.0	*66.8		
12	1	*.230				*1.04*(1.15)								*7	*1
Blanket 40050. 25% of wool, 75% of cotton (approx.)															
13	0	0.205	0.127	0.32	28	0.80	135	58	45	13.5	3.85	89.1	66.2		
14	0	.209	.131	.32	28	.80	131			13.7	3.87	88.9	65.6		
14	1	.242	.159	.26	32					15.9	3.70	78.0	61.8	12	6
14	10	.201	.144	.18	38	.79	75	59	53	17.4	3.61	74.3	58.0	16	12
15	0	.204	.127	.29	33		140			13.6	3.85	88.5	66.4		
15	0	*.222				*.99*(1.17)		*58	*49		*3.84	*87.3	*66.0		
15	1	*.250				*.97*(1.12)								*10	*4
16	0	.192	.127	.28	36		132			13.8	3.91	88.3	66.4		
17	0	.215	.126	.31	28		140			13.1	3.76	89.4	66.3		
18	0	.211	.127	.33	22		144			14.1	3.91	89.3	66.5		
Blanket 40051. 25% of wool, 75% of cotton (approx.)															
19	0	0.203	0.134	0.30	34	0.80	133	61	47	14.4	4.00	87.9	66.2		
20	0	.212	.135	.30	23	.80	137			14.1	3.99	88.8	66.2		
20	1	.239	.162	.25	28					17.1	3.94	77.1	62.0	13	6
20	10	.199	.150	.16	37	.77	74	60	61	17.9	3.72	75.0	57.3	16	14
21	0	.223	.136	.29	26		137			14.1	3.98	88.3	66.2		
21	0	*.215				*1.02*(1.20)		*64	*59		*3.95	*87.4	*66.3		
21	1	*.255				*0.95*(1.23)								*10	*6
22	0	.218	.133	.29	24		129			14.2	4.00	88.2	66.3		
23	0	.200	.123	.30	27		137			14.1	4.00	88.1	66.9		
24	0	.202	.126	.30	22		136			14.0	3.97	88.8	66.1		

Blanket 40052. 25% of wool, 75% of cotton (approx.)

25	0	0.197	0.127	0.30	35	0.85	119	56	47	14.1	3.98	88.3	66.2		
26	0	.224	.137	.31	27	.85	111			14.1	3.99	88.1	66.3		
26	1	.237	.161	.25	31					16.4	3.88	78.5	62.4	11	6
26	10	.189	.143	.17	38	.80	67	53	60	17.2	3.82	77.3	59.4	12	10
27	0	.215	.138	.29	22		115			14.4	4.04	88.8	66.3		
27	0	*.235				*.98*(1.17)		*60	*54		*4.03	*87.0	*66.1		
27	1	*.258				*.99*(1.20)								*10	*5
28	0	.217	.136	.30	23		117			14.3	4.03	88.1	66.2		

Blanket 40053. 25% of wool, 75% of cotton (approx.)

29	0	0.213	0.133	0.31	29	0.85	133	45	44	13.5	3.87	88.7	67.2		
30	0	.229	.137	.31	28	.84	140			13.6	3.81	88.4	66.8		
30	1	.249	.171	.26	28					15.6	3.68	78.0	62.7	12	6
30	10	.210	.155	.17	36	.81	80	50	54	16.9	3.54	75.0	58.0	15	13
31	0	.217	.135	.30	30		132			13.5	3.88	88.5	67.2		
31	0	*.225				*.96*(1.18)		*50	*47		*3.87	*87.6	*67.4		
31	1	*.245				*1.00*(1.10)								*5	*4
32	0	.225	.146	.28	21		137			13.6	3.89	88.3	67.2		
33	0	.209	.132	.32	29		135			13.4	3.86	88.7	67.3		

Regular army blanket. 100 percent of wool

34	0	0.152	0.098	0.23	48	0.96	101	63	59	14.3					
34	1	.163	.110	.23	49	1.00	69	71	60	15.8				4	6
34	10	.160	.111	.22	54	.91	75	70	62	16.5				8	6

[a] A presser foot 1 inch in diameter was used, except in those cases where the values are marked with an asterisk, which were obtained with a pressure foot 3.5 inches in diameter and a pressure of 0.0125 lb/in.^{2} at the U. S. Testing Co.

[b] A high value for compressibility indicates a greater amount of napping and less felting.

[c] A high value for compressional resilience indicates greater ability of the blanket to come back to its initial state upon release of a compressive load.

[d] A low value for thermal transmission indicates a high insulating value. The values within the parentheses were obtained with the upper surface of the specimen exposed to air moving at a speed of 6 miles per hour.

[e] The values marked with an asterisk in the table were determined by the U. S. Testing Co.

Tests for color fastness to light and washing made at the U. S. Testing Co., showed no appreciable difference between these blankets. All the blankets showed good color fastness when exposed for 50 hours in a Fade-Ometer and when washed for 30 minutes in a suds of 0.5-percent-neutral soap at 100° F. Wear tests made on the U. S. Testing Co. abrasion machine showed no significant difference in the wear resistance of these blankets.

The shrinkages of the part-wool blankets were nearly twice the shrinkage of the regular all-wool army blanket. To compensate for the rather large shrinkages of these blankets, the original dimensions should be increased.

The results of the tests indicate that the blankets tested compare quite favorably with the regular all-wool army blanket and therefore should prove satisfactory for use in barracks, provided allowance is made for shrinkage. The 75-percent-cotton and 25-percent-wool blankets probably will shed fibers more readily during use, which may be somewhat objectionable. Their greater thickness, compressibility, and lower thermal transmission commend them, and greater saving in wool would, of course, result from their use.

IV. REFERENCES

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[4] H. F. Schiefer and P. M. Boyland, *Improved instrument for measuring the air permeability of fabrics*, J. Research NBS **28**, 637 (1942) RP1471.

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