

Following the details of a recent study conducted by the independent laboratory Biotech Testing Services on the antibacterial properties of PyroTex®

A. Determine the antibacterial properties of 100% PyroTex Blanket, generally

Scope of Method

The antimicrobial properties were evaluated by the ASTM E2149 13a method, titled as "Determining the Antimicrobial Activity of Immobilized Antimicrobial Agents under Dynamic Contact Conditions".

Name of Test

Evaluation of Antimicrobial Activity of Fabric samples by ASTM: E 2149-13a Method

Test Organisms Used

1. Staphylococcus aureus ATCC 6538
2. Escherichia Coli ATCC 25922

Sample	Test Organism	No. of Bacteria per sample (CFU/ml)		Percentage Reduction of Bacteria at 1h (R)	No. of Bacteria per sample (CFU/ml) at 24 hrs. (A)	Percentage Reduction of Bacteria at 24h (R)
		at 0 hrs. (B)	at 1 hour (A)			
Blanket fabric	Staph. aureus	1.79x 10 ⁵	1.12x10 ⁴	93.74	1.62 x 10 ³	99.07
	Esch. coli	1.91 x 10 ⁵	1.93x10 ⁴	89.89	4.50 x 10 ³	97.70

Interpretation

The sample labeled as Blanket fabric has shown 93.74% and 89.89% antimicrobial activity after 1 hour contact and 99.07% and 97.70% antimicrobial activity after 24 hours contact towards Staphylococcus aureus and Escherichia coli respectively when tested according to the ASTM: E 2149-13a Method.

B. Determine the antibacterial effectiveness of 100% PyroTex Blanket over usage

The blanket displaying antimicrobial properties when being used should also be effective on a day to day basis. Antibacterial properties whether or not it deteriorates, is maintained, the longevity of antibacterial property, whether reusing the blanket without washing are some of the questions that come to mind. To obtain a scientific answer to these probable usage related questions, 3 sets of experiments were designed. Experiments involved the use of Staphylococcus aureus as the also on the skin representative bacteria. Experiments were conducted in a chamber which mimicked a room.

Relative humidity of 55 - 60% RH was maintained throughout the experimental duration.

Study 1**Determination of the antibacterial efficacy of a fresh blanket, single usage**

Simulate the everyday usage of a new blanket and its property of bacteria elimination in 24 hours.

Bacteria were artificially inoculated on a triplicate set of fresh blankets on a daily basis on Day 1, Day 2 and Day 3. After 24 hours of contact, the surviving bacteria were counted to judge the antibacterial efficacy of the blanket.

Test Method

Evaluation of Antimicrobial Activity by MTCC 100 - 2012

Test Inoculum

Staphylococcus aureus ATCC 6538

Procedure

In a chamber mimicking a room, blanket pieces were layered in triplicates. Staphylococcus aureus at 1.80×10^8 cfu/ml was sprayed on individual, triplicate pieces in 3 sets in the same manner on three consecutive days as Day 1, Day 2 and Day 3.

After inoculation with bacteria on each set of blankets the surviving bacterial counts were determined after 24 hours to evaluate the effectiveness.

Additionally the 0 hours bacterial count was determined on each day to have the base line count of Staphylococcus aureus.

Day	Sample	No. of Staphylococcus aureus (CFU/Sample)		Percentage Reduction of Bacteria (R)
		Inoculated Sample at 0 hours (B)	Inoculated Sample at 24 hours (A)	
End of Day 1	Blanket Set 1	8.10×10^5	< 10	>99.99
Fresh inoculation End of Day 2	Blanket Set 2	1.66×10^6	< 10	>99.99
Fresh inoculation End of Day 3	Blanket Set 3	2.67×10^6	<10	>99.99

Fabric swatch in contact with individual test cultures for 24 hours at 37°C

Interpretation

The blanket samples have on all the three days (Day 1, Day 2 and Day 3) shown >99.99% reduction of bacteria when analyzed as per AATCC 100 - 2012 test method.

Study 2**Determination of the antibacterial efficacy of the blanket on repeated usage on a daily basis**

Observe the effectiveness of the blanket on repeated bacterial exposure. The blanket was artificially exposed to bacteria on a daily basis. The artificial exposure was continued on the same piece for three consecutive days. This was to substantiate the theory that the blanket on repeated usage maintains its antibacterial properties.

Test Method

Evaluation of Antimicrobial Activity by MTCC 100 - 2012

Test Inoculum

Staphylococcus aureus ATCC 6538

Procedure

In a chamber mimicking a room, the blanket pieces were layered in triplicates. Staphylococcus aureus at 1.80×10^8 cfu/ml was sprayed on individual/triplicate pieces in 3 sets in the same manner on all three sets on Day 1, Day 2 and Day 3. After 24 hours the surviving bacterial count was determined on Set 1. Set 2 and 3 were again inoculated at the end of Day 1. Set 2 was evaluated for surviving bacteria after the second 24 hour period. Set 3 was again inoculated at the end of Day 2. Set 3 was evaluated for surviving bacteria after the third 24 hour period. Additionally the 0 hours bacterial count was determined at the start of each day to have the base line count of Staphylococcus aureus.

Day	Sample	No. of Staphylococcus aureus (CFU/Sample)		Percentage Reduction of (R)
		Inoculated Sample at 0 hours (B)	Inoculated Sample at 24 hours (A)	
End of Day 1	Blanket Set 1	1.6×10^5	< 10	>99.99
Re-inoculation End of Day 2	Blanket Set 2	1.49×10^5	< 10	>99.99
Re-inoculation End of Day 3	Blanket Set 3	1.51×10^6	<10	>99.99

Fabric swatch in contact with individual test cultures for 24 hours at 37°C

Interpretation

Blankets at the end of Day 1, re-inoculated on Day 2 and re-inoculated on Day 3 have shown >99.99% reduction of bacteria when analyzed as per AATCC 100 - 2012 test method.

Study 3:

Determination of the antibacterial efficacy of the blanket exposed to bacteria once to observe its survival/regrowth over a longer duration

Observe the longevity of the antibacterial properties, the blanket was artificially exposed to bacteria only once.

The same blanket was evaluated over a period of time to observe if there is a redevelopment of microbes or whether the sterility of the blanket is maintained.

Test Method

Evaluation of Antimicrobial Activity by MTCC 100 - 2012

Test Inoculum

Staphylococcus aureus ATCC 6538

Procedure

In a chamber mimicking a room the blanket pieces were layered in triplicates. Staphylococcus aureus at 1.80×10^8 cfu/ml was sprayed on all the pieces in 3 in the same manner.

After 24 hours the surviving bacterial count was determined from Set 1

No re-inoculations were made.

After the second 24 hours the surviving bacterial count was determined from Set 2.

No re-inoculations were made.

After the third 24 hours the surviving bacterial count was determined from Set 3.

Additionally the 0 hours bacterial count was determined at the start of each day to have the base line count of Staphylococcus aureus.

Day	Sample	No. of Staphylococcus aureus (CFU/Sample)		Percentage Reduction of (R)
		Inoculated Sample at 0 hours (B)	Inoculated Sample at 24 hours (A)	
End of Day 1	Blanket Set 1	1.4×10^5	< 10	>99.99
No Re-inoculation End of Day 2	Blanket Set 2	1.55×10^5	< 10	>99.99
No Re-inoculation End of Day 3	Blanket Set 3	1.80×10^6	<10	>99.99

Fabric swatch in contact with individual test cultures for 24 hours at 37°C

Interpretation

The blankets without re-inoculation on Day 1, Day 2 and Day 3 have shown >99.99% reduction of bacteria when analyzed as per AATCC 100 - 2012 test method.

STUDY CONCLUSION

The experimental data generated during the laboratory tests conclude that the 100% PyroTex blanket is antibacterial in nature.

The antibacterial properties are maintained over days and on reuses without regrowth.