

SIRIM TESTING SERVICES DEPARTMENT



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# TEST REPORT



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SAMM NO. 087

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**SIRIM QAS SDN. BHD.** (Company No. 410334-X)

Block 16, SIRIM Complex, 1, Persiaran Dato' Menteri, P.O Box 7035, 40911 Shah Alam, Selangor Darul Ehsan, Malaysia  
Tel. No. : 03-55446678/55446681 Fax No. : 03-55446688

## TEST REPORT

REPORT NO. : 2001KL00617

NUMBER OF PAGES : 1 OF 2

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Issued by : Chemical Testing Section, Testing Services Department

Issue date : 7<sup>th</sup> August 2001

Product : Fabric treated with HECS 2900

Reference standard/  
Method of test : Microbiological Evaluation according to Company Test Method

Applicant : HESC (M) SDN. BHD.  
6C 32, 3<sup>rd</sup> Floor, Plaza Pekeliling,  
Jalan Kampar, Off Jalan Tun Razak,  
50400 Kuala Lumpur.

Description of sample : Received one (1) sample of Fabric treated with HECS 2900 for testing.

Date received : 24<sup>th</sup> July 2001

Job. No : 01TSD02217

Approved by :

(HAHNAS MAHBUT)  
Senior Technical Executive

(NORLIA MUSA, AMIC)  
Manager  
Chemical Testing Section  
Building 16  
SIRIM QAS SDN. BHD.

## TEST REPORT

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### Test Results

**Sample** : Fabric treated with HECS 2900

**Test method** : Company Test Method

The tests were carried out as follows :

1. The test micro-organisms used were :  
*Pseudomonas aeruginosa*  
*Escherichia coli*  
*Staphylococcus aureus*
2. 100cm<sup>2</sup> fabric treated with HESC 2900 was inoculated with 10<sup>8</sup> bacterial cells of each test micro-organism and allowed to stand at 25 °C for 6 hours.
3. 100ml of sterile 0.1% peptone was added to the sample and stomached to dislodge the test micro-organism adhering to it.
4. The rendered peptone water was taken for determination of number of surviving test micro-organism
5. Initial count of each test micro-organism was also determined :

### Results

Test Micro-Organism	Initial count of test micro-organism in 100cm <sup>2</sup> sample	Count of surviving test micro-organism in 100cm <sup>2</sup> sample	% kill
1. <i>Pseudomonas aeruginosa</i>	4.3 x 10 <sup>8</sup>	3.4 x 10 <sup>2</sup>	99.99
2. <i>Escherichia coli</i>	2.6 x 10 <sup>8</sup>	< 10	> 99.999
3. <i>Staphylococcus aureus</i>	1.1 x 10 <sup>8</sup>	< 10	> 99.999



HAHNAS MAHBUT  
Senior Technical Executive  
Chemical Testing Section  
SIRIM QAS SDN. BHD.





**METHOD OF TEST**

As requested, the tests were carried out as follows :

- The test micro-organisms used were:  
*Pseudomonas aeruginosa* (ATCC 9027)  
*Escherichia coli* (ATCC 4157)  
*Staphylococcus aureus* (ATCC 6538)  
*Candida albicans* (ATCC 10231)
- 100cm<sup>2</sup> of the sample was inoculated with 10<sup>7</sup> bacterial cells of each test micro-organism and allowed to stand at 25°C.
- After contact time of 6 hours, 100ml of sterile 0.1% peptone was added to the sample and stomached to dislodge the test micro-organism adhering to it.
- The rendered peptone water was taken for determination of number of surviving test micro-organism.
- Initial count of each test micro-organism was also determined.


**RESULTS**

Test Micro-Organism	Initial count of test micro-organism in 100cm <sup>2</sup> sample	Count of surviving test micro-organism in 100cm <sup>2</sup> sample	% Kill
1. <i>Pseudomonas aeruginosa</i> (ATCC 9027)	4.5 x 10 <sup>7</sup>	1.2 x 10 <sup>4</sup>	99.97
2. <i>Escherichia coli</i> (ATCC 4157)	8.2 x 10 <sup>7</sup>	3.1 x 10 <sup>5</sup>	99.62
3. <i>Staphylococcus aureus</i> (ATCC 6538)	2.6 x 10 <sup>8</sup>	1.0 x 10 <sup>2</sup>	99.999
4. <i>Candida albicans</i> (ATCC 10231)	1.1 x 10 <sup>7</sup>	< 1.0 x 10 <sup>2</sup>	> 99.999

**Notes :**

- < : Less than  
> : More than

  
 CHENG-SHAW LAY ENG (MRS)  
 TECHNICAL EXECUTIVE

  
 KAM-LEONG YIN PHENG (MRS)  
 MICROBIOLOGIST  
 FOR DEPUTY DIRECTOR  
 CHEMICAL AND MICROBIOLOGICAL  
 TEST CENTRE





# TEST REPORT

Your Ref \_\_\_\_\_ Date 13/07/2000  
Our Ref : 29S0002310-SLE-02 Page 1 of 5  
(Please quote our ref. no. in reply)  
DID 8701 202 / 7729 557 Fax 773 2912



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\*The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme\*



## SUBJECT

Evaluation of Coating System (on Fabric) for Mildew Resistance.

## CLIENT

Crusade Cleaning Services Pte Ltd  
20 Kallang Avenue  
6<sup>th</sup> Level, Pico Creative Centre  
Singapore 339411

Attn: Peter Ko  
Managing Director

## SAMPLE SUBMISSION DATE

14-06-2000

## DESCRIPTION OF SAMPLE

One piece of treated fabric.

As stated, the fabric was treated as follows

First coat EMS 2000 Antimicrobial Odour Remover Cleaner  
Second coat EMS 2900 Interior Fabric Antimicrobial Protector

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Singapore Productivity and Standards Board PSB Building 2 Bukit Merah Central Singapore 159035 Telephone: 2786666 Facsimile: 2786667 Telefax: GVT 312

evaluation/CCS



**METHOD OF TEST**

Federal Test Method Std No. 141B, Method 6271 "Mildew Resistance".

The test micro-organism used was *Aspergillus niger* (ATCC 6275).

Three test-specimens (Size : 32mm by 32mm) were prepared for the test.

Incubation period           7 days  
Incubation temperature    30°C  
Relative humidity          85 – 90%

Viability controls were prepared using two petri dishes containing solidified culture medium inoculated with the test-organism.

The extent of fungal growth on the incubated test specimens were rated as follows:

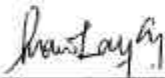
Observed growth on test-specimens	Rating
None	0
Traces of growth (less than 10%)	1
Light growth (10% - 30%)	2
Moderate growth (30% - 60%)	3
Heavy growth (60% to complete coverage)	4

**RESULTS**

Sample	Rating of fungal growth on test specimens at the end of incubation period	Photographs attached under Appendix
<b>Test Specimens</b>		
# 1	0	Test-specimen # 1
# 2	0	Test-specimen # 2
# 3	0	Test-specimen # 3
<b>Viability Control</b>		
# 1	4	Control Plate # 1
# 2	4	Control Plate # 2

Remarks :

The results indicated that the sample tested was resistant to the test organism used.

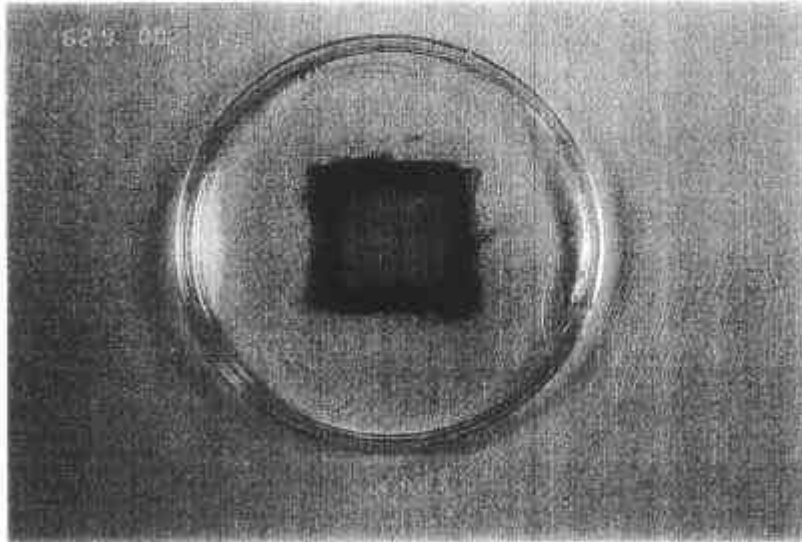


CHENG-SHAW LAY ENG (MRS)  
TECHNICAL EXECUTIVE

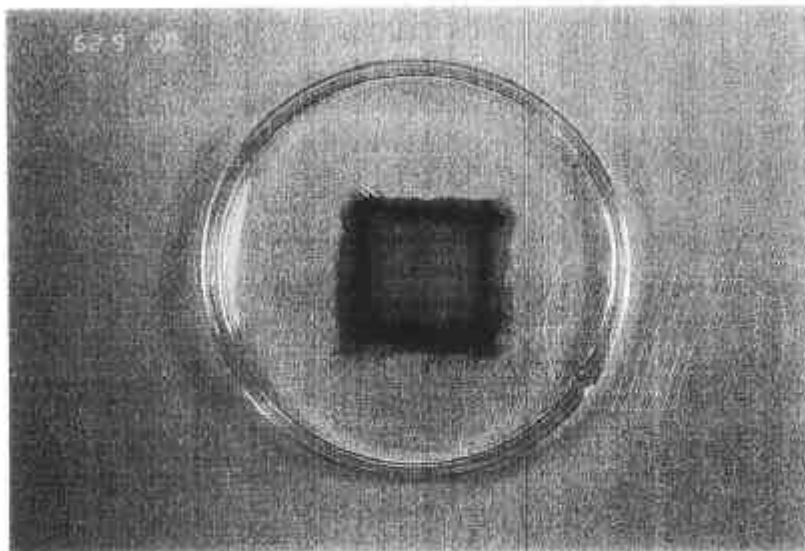


KAM-LEONG YIN PHENG (MRS)  
MICROBIOLOGIST  
FOR DEPUTY DIRECTOR  
CHEMICAL AND MICROBIOLOGICAL  
TEST CENTRE

APPENDIX



Test-specimen # 1

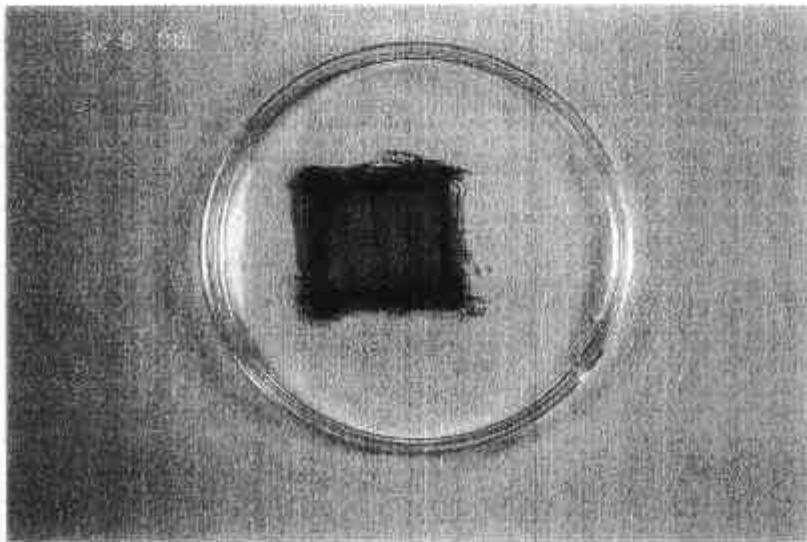


Test-specimen # 2

A handwritten signature in black ink, which appears to read "Jeffrey Chan". The signature is written in a cursive style and is located in the bottom right corner of the page.

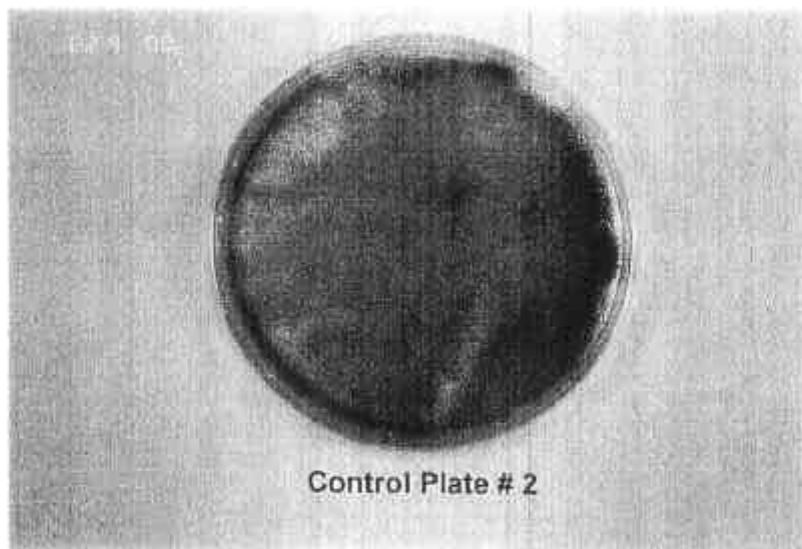
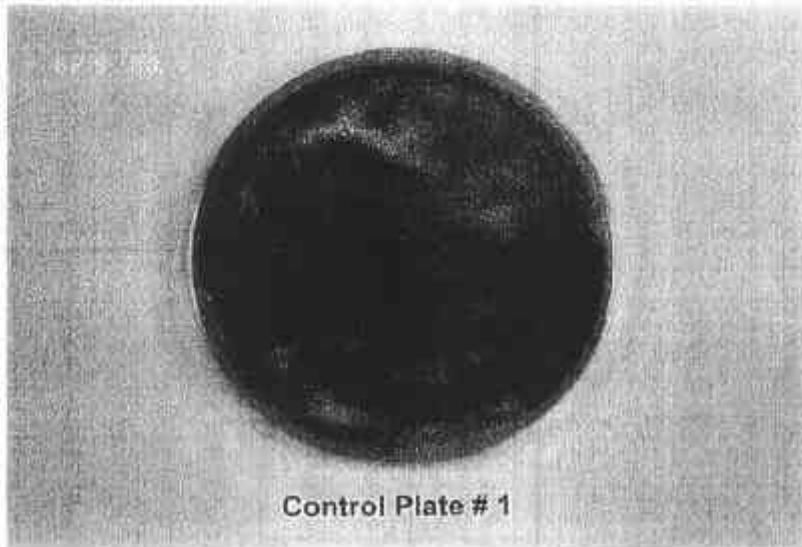
29S0002310-SLE-02

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an Standards Board



Test-specimen #

*Handwritten signature*



*Handwritten signature*



### **Declaration of Antimicrobial Properties of RS 1957**

As a private consulting microbiologist, I have analysed reports belonging to Mr Robert Goldsworthy, and originally produced by an Australian University. These reports concern tests that were done on the antimicrobial effectiveness of fabrics coated with an agent called RS 1957. The antibacterial, antifungal and antiyeast aspects of the coating are discussed below.

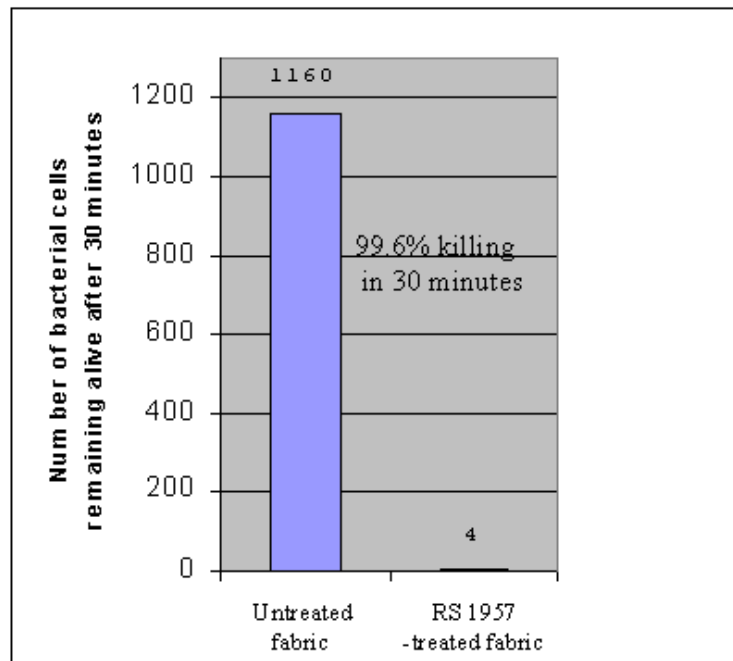
I confirm that:

1. RS 1957 treated fabric causes a 99.5% reduction in the number of bacteria *Staphylococcus aureus* in 30 minutes at 37 degrees Celsius. The test used was based on the American Association of Textile Chemists and Colourists (AATCC) protocol 100 (1977).
2. the antibacterial nature of RS 1957 is not diminished by hot ironing, nor by rinsing in water.
3. RS 1957-treated fabric which has been washed twenty times, shows 98% antibacterial activity over 6 hours in a modification of test AATCC-100. The washed fabric supplied accords with Australian Standard AS2001.5.4, as follows: each wash is 2 hours long and done in a top loading washing machine using a standardised detergent.
4. RS 1957 treated fabric causes a 95% reduction in the number of bacteria *Pseudomonas aeruginosa* in 6 hours at 37 degrees Celsius. The test used is based on the American Association of Textile Chemists and Colourists (AATCC) protocol 100 (1977).
5. RS 1957-treated fabric has an antiyeast activity against *Candida albicans* (the agent of thrush). This was judged by a modification of AATCC test 100 (i.e. modified to suit yeasts). The amount of the reduction was 99.7% over a 3 hour incubation period at 37 degrees Celsius.
6. RS 1957 treated fabric has a marked fungistatic property for which there is no quantitative test. In qualitative terms it is clear to the eye that there is a decisive lack of growth on RS 1957-treated fabric compared to growth on untreated fabric. The test organism was the black mould *Aspergillus niger*, and the test conforms to the AATCC protocol 30 (1993) section III.

Mr Robert Moore, Microbiology Consultant, 20<sup>th</sup> February 2000

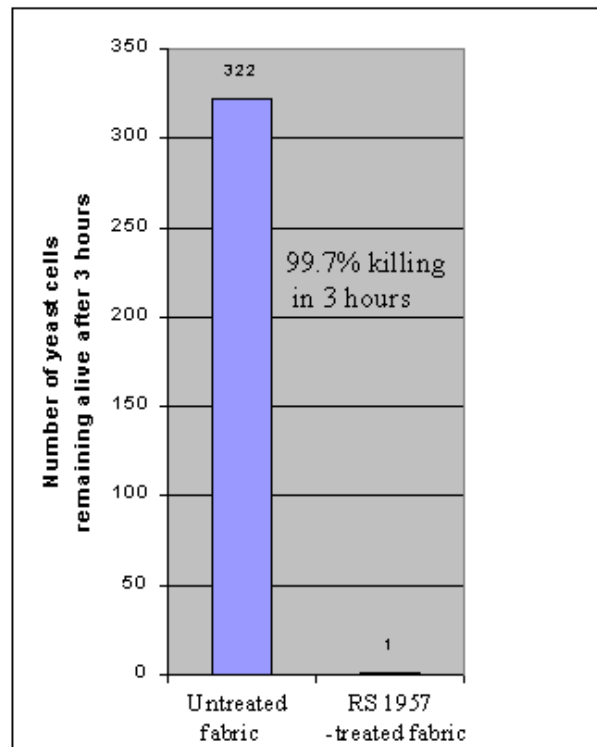
Sydney NSW Australia

## RS 1957 coating (on fabric) kills *Staphylococcus aureus* in 30 minutes



- **RS 1957 killing of *Staphylococcus aureus* under a modified test AATCC-100\***
  - The temperature during the test is 37 degrees Celsius. The test is conducted on fabric in a sterilised bottle.
  - 1 ml of growth medium that contained upwards of 100,000 bacterial cells was applied to the fabric at time zero. The fabric area is circular 10 cm diameter, sufficient to completely soak up the growth-medium bacteria mix.
  - The growth medium for bacteria during the test is Luria Bertani medium, a very nutritious bacterial growth medium.
  - After the contact period, bacteria were retrieved from each fabric using 100 ml of liquid with shaking for 30 seconds, then colony numbers were counted from a 1 ml sample of the 100ml.
  - RS 1957-treated and untreated fabrics had been rinsed-squeezed-rinsed 4 times with tapwater and subjected to hot dry ironing prior to the test.
  - \* This is a modification (for *S. Aureus*) of test 100 of the American Association of Textile Chemists and Colourists. Counts quoted are accurate to within 15% of an internal duplicate.
  - Killing time required under this test is within 6 hours (yet killing was achieved in 30 minutes in this case). A pass at the 85% reduction level is considered sufficient (note 99.5% was achieved).

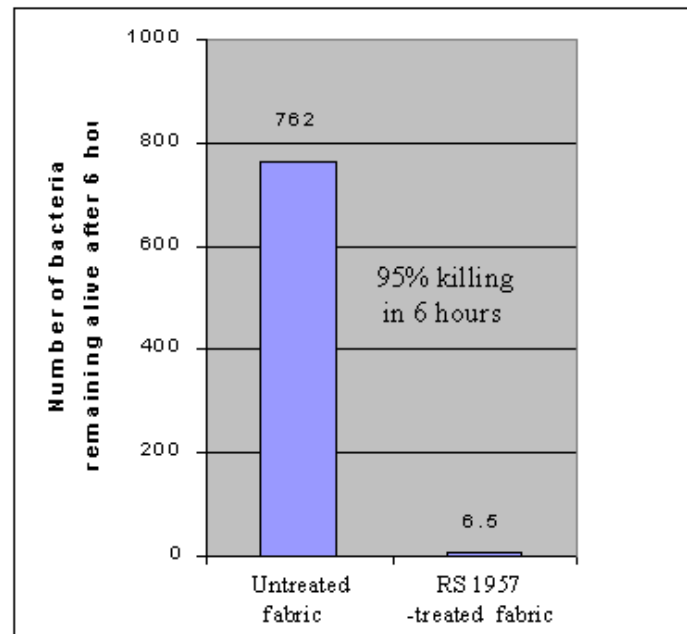
## RS 1957 coating (on fabric) kills *Candida albicans* in 3 hours



### ● RS 1957 killing of *Candida albicans* under test AATCC-100\*

- The temperature during the test is 37 degrees Celsius. The test is conducted on fabric in a sterilised bottle.
- The total number of yeast cells applied to the fabric was 320,000 cells in 1 ml of growth medium. The fabric area is 5 cm x 15 cm, sufficient to completely soak up the growth-medium yeast mix.
- The growth medium for yeast during the test is malt extract broth, a very nutritious yeast growth medium.
- After the contact period, bacteria were retrieved from each fabric using 100 ml of liquid with shaking for 30 seconds, then colony numbers were counted from a 0.1 ml sample of the 100ml.
- RS 1957 -treated and untreated fabrics had been rinsed-squeezed-rinsed 4 times with tapwater and subjected to hot dry ironing prior to the test.
- \* This is a modification (for *C. albicans*) of test 100 of the American Association of Textile Chemists and Colourists Counts quoted are accurate to within 15% of an internal duplicate .
- Killing time required under this test is within 6 hours (yet killing was achieved in 30 minutes in this case) A pass at the 85% reduction level is considered sufficient (note 99.5% was achieved).

## RS 1957 coating (on fabric) kills *Pseudomonas aeruginosa* in 6 hours

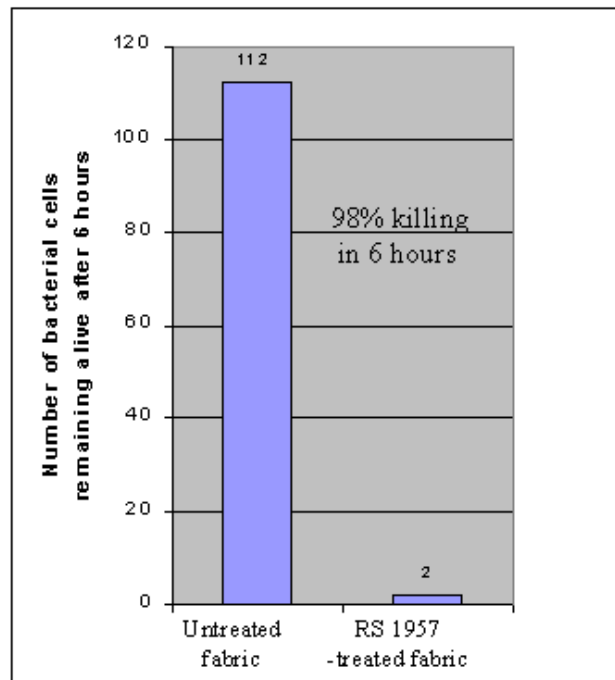


- **RS 1957 killing of *Pseudomonas aeruginosa* under test AATCC-100\***

- The temperature during the test is 37 degrees Celsius. The test is conducted on fabric in a sterilised bottle.
- The total number of bacterial cells applied to the fabric was 450,000 cells in 1 ml of growth medium. The fabric area is 5 cm x 15 cm, sufficient to completely soak up the growth-medium bacteria mix.
- The growth medium for bacteria during the test is minimal medium, which supports active growth and replication of *P. Aeruginosa*.
- After the contact period, bacteria were retrieved from each fabric using 100 ml of liquid with shaking for 30 seconds, then colony numbers were counted from a 0.1 ml sample of the 100ml.
- RS 1957 -treated and untreated fabrics had been rinsed-squeezed-rinsed 4 times with tapwater and subjected to hot dry ironing prior to the test.
- \* This is a modification (for *P. aeruginosa*) of test 100 of the American Association of Textile Chemists and Colourists. Counts quoted are accurate to within 15% of an internal duplicate .
- Killing time required under this test is within 6 hours (yet killing was achieved in 30 minutes in this case) A pass at the 85% reduction level is considered sufficient (note 99.5% was achieved).



## RS 1957 coating (on fabric) kills *Staphylococcus aureus* even after 20 washes



- **Killing of *Staphylococcus aureus* by RS 1957 -coated fabric that has previously been washed 20 times (each wash by Australian Standard AS2001.5.4). Test AATCC-100\*.**
- The temperature during the test is 37 degrees Celsius. The test is conducted on fabric in a sterilised bottle.
- 1 ml of growth medium that contained upwards of 100,000 bacterial cells was applied to the fabric at time zero. The fabric area is circular 10 cm diameter, sufficient to completely soak up the growth-medium bacteria mix.
- The growth medium for bacteria during the test is Luria Bertani medium, a very nutritious bacterial growth medium.
- After the contact period, bacteria were retrieved from each fabric using 100 ml of liquid with shaking for 30 seconds, then colony numbers were counted from a 1 ml sample of the 100ml.
- RS 1957 -treated and untreated fabrics had been rinsed-squeezed-rinsed 4 times with tapwater and subjected to hot dry ironing prior to the test.
- \* This is a modification (for *S. Aureus*) of test 100 of the American Association of Textile Chemists and Colourists Counts quoted are accurate to within 15% of an internal duplicate .
- Killing time required under this test is within 6 hours (yet killing was achieved in 30 minutes in this case) A pass at the 85% reduction level is considered sufficient (note 99.5% was achieved).

## RS 1957 coating (on fabric) is fungistatic against the black mould *Aspergillus niger*

Untreated fabric tests	Result after 6 days incubation	RS-1957-treated fabric tests	Result after 6 days incubation
Untreated fabric with <b>undiluted spore suspension</b>	macroscopic growth, sporulation/fruiting	RS 1957 fabric with <b>undiluted spore suspension</b>	microscopic growth, no sporulation/fruiting
Replicate of above	macroscopic growth, sporulation/fruiting	Replicate of above	microscopic growth, no sporulation/fruiting

Untreated fabric tests	Result after 6 days incubation	RS-1957-treated fabric tests	Result after 6 days incubation
Untreated fabric with <b>1 in 5 dilution of spore suspension</b>	macroscopic growth, sporulation/fruiting	RS 1957 fabric with a <b>1 in 5 dilution of spore suspension</b>	microscopic growth, no sporulation/fruiting
Replicate of above	macroscopic growth, sporulation/fruiting	Replicate of above	microscopic growth, no sporulation/fruiting

### Black mould\*-resistance of RS 1957 -treated fabric under a short-incubation version of test AATCC-30-III

- \*Black mould here means *Aspergillus niger*. A spore-suspension of these organisms was applied to fabrics resting on growth medium.
- The incubation period was 6 days.  
The incubation temperature was 30 degrees Celsius
- The growth medium was Mineral Water Agar (MWA), which supports active growth of *A. niger*.
- “Sporulation” is the generation of new black spores. The test continued only until the first black spores appeared on either the treated or untreated fabrics.
- #AATCC = American Association of Textile Chemists and Colourists.