

– CERTIFICATION –

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2008

This is to certify that:

Shaws since 1897 Ltd
Whitebirk Works
Higher Waterside
Waterside
Darwen
BB3 3NX
United Kingdom

Holds Certificate Number: FS 639695

and operates a Quality Management System which complies with the requirements of ISO 9001:2008 for the following scope:

The manufacture and supply of fireclay ceramic sinks and the supply of sink accessories.

For and on behalf of BSI:

Frank Lee, EMEA Compliance & Risk Director

Original Registration Date: 16/07/2015
Latest Revision Date: 16/01/2016

Effective Date: 13/03/2016
Expiry Date: 14/09/2018

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TEST REPORT

Lucideon Reference:	162769 (QT-40045/2/KNA)/Ref. 2/Supp1
Project Title:	CE Marking of Sinks and Additional Bespoke Tests - Resistance to Temperature Changes
Client:	Shaws Since 1897 Ltd Whitebirk Works Waterside Darwen Lancashire BB3 3NX
For the Attention of:	Mr. Anthony Cristoforo
Author(s):	Mr Peter Hancock
Report Date:	01 September, 2016
Purchase Order No.:	1299
Work Location:	Lucideon UK

This report supersedes the report issued on 25.08.2016.

Mr Nigel Leak
Consultancy Team
Reviewer

Mr Peter Hancock
Consultancy Team
Project Manager

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SUMMARY

Ten “Belfast” sinks were supplied to Lucideon from normal production at Shaws Since 1897 Ltd. These sinks were used to perform a series of tests to assess the durability of the products.

The test results have shown the sinks to have a very robust nature and to be highly resistant to serious damage. It can be expected that this type of sink will prove to be more durable than many competing products and that they will give a long service life.

1 INTRODUCTION

Ten sinks were supplied by Shaws Since 1897 Ltd for evaluation using standard and bespoke tests. The factors which were considered were:

a) Resistance to Temperature Changes, over the temperature range of 40 - 100ºC, bespoke test based on Section 5.4 of BS EN 13310.

b) Edge Chippping Resistance - In House Method based on EN 12980:2000.

c) Centre Impact Resistance - In House Method based on ASTM C368-88.

d) Impact Resistance – Based on BS EN ISO 10545-5.

e) Resistance to Chemicals & Staining Agents - assessing acetic acid, sodium hydroxide, ethanol, sodium hypochlorite, methylene blue and sodium chloride in accordance with BS EN 13310:2003 Section 5.5.

f) Resistance to Scratching – Based on PT38 using a diamond tip, using straightline reciprocating marking. Loading determined by experienced Lucideon operator and examined at intervals before 1000 cycles were completed.

g) Resistance to Abrasion - Based on ISO 9352 Taber Abrasion method.

Item a) was conducted by the Lucideon Materials team. Items b) – f) were conducted by the Lucideon Testing department using UKAS (United Kingdom Accreditation Service) accredited methods, and Item g) was conducted at a Lucideon Approved Laboratory.

2 RESISTANCE TO TEMPERATURE CHANGES

Five fireclay sinks were provided for testing. The sinks were numbered in order of being unloaded from the shipping pallet; the dates of manufacture stamped into their undersides were as follows:

Sink 1 - 03 APR 2016

Sink 2 - 19 APR 2016

Sink 3 - 18 APR 2016

Sink 4 - 19 APR 2016

Sink 5 - 10 APR 2016

2.1 Test Method and Areas

A bespoke test, based on Section 5.4 of BS EN 13310, was devised for this purpose. The sinks were tested complete, with a drain outlet and plug fitted.

Each sink was placed on, but not attached to, a steel bench. Each test commenced with the sink at an ambient temperature of 20 - 25ºC (68 - 77ºF).

1. 20 litres of heated water was run from a boiler directly into the centre of the sink over a period of 6 – 7 minutes, then allowed to stand for 2 minutes.
2. The heated water was drained off and replaced with 20 litres of water at ambient temperature, run in over 1 minute and allowed to stand for 2 minutes.

3. The water was drained off and replaced with a further 20 litres of water, as in 2.
4. The water was drained off and the sink was then filled with water at ambient temperature to the level of the overflow and the water. This was allowed to stand until the outer faces of the sink were cooled to ambient temperature.
5. The final volume of water was drained of and the inside of the sink was wiped dry.
6. Tests were made to detect damage.
   a. By "ringing" the sink. This involves striking the side to detect any change in the resulting sound; this is a frequently used method to detect damage in ceramic articles which may not be visible.
   b. By applying methylene blue dye to the interior surface to detect any cracks.
7. Testing resumed at the next highest water temperature.

2.2 Results

The results from the tests are listed in Table 1.

As no effect of the testing was detected in the first two samples, the lowest temperature tests (at 40 and 50ºC) were not performed on the subsequent samples.

No effect was detected by the "ringing" method in any test.

Table 1 - Results of Dye Application Test after Temperature Change Cycles

Heated Water Temperature (ºC)	Heated Water Temperature (ºF)	Sink 1	Sink 2	Sink 3	Sink 4	Sink 5
40	104	No effect	No effect	Not tested	Not tested	Not tested
50	122	No effect	No effect	Not tested	Not tested	Not tested
60	140	No effect	No effect	No effect	No effect	No effect
70	158	No effect	No effect	No effect	No effect	No effect
80	176	No effect	No effect	No effect	No effect	No effect
90	194	No effect	No effect	No effect	No effect	No effect
100	212	No effect	No effect	No effect	No effect	No effect

The test results show that the samples were resistant to the temperature changes which can be expected from alternating hot and cold water supplies.

3 UKAS TESTS

Test House reports for each of the tests are attached as Appendices 1 - 6. Most of these are self-explanatory, however there are some comments on these tests in addition which are outside of the scope of the accreditation.

Some reports refer to the samples being “deviating”. This is due to the adaptation of test methods intended for a range of different products to assess the sinks; as a result the samples tested are of differing thicknesses, etc. for the products for which the tests were originally developed.

3.1 Impact Resistance

The “strength factor” results of the centre impact test according to ASTM C368-88 (Appendix 2) should be considered as only having shown the initial surface damage of minor chipping; none of the samples were broken through even when subjected to the maximum impact energy possible with the apparatus.

Comparable test results on fine fireclay samples with normal thicknesses for sanitaryware (8 – 10 mm) typically show initial failure values of ~ 0.2 ft.lbf, but this is also the “final failure” value as the samples are broken.

Overall, this does show that the Shaws sinks will withstand significantly more energetic impacts than normal sanitaryware products without suffering catastrophic damage.

The “Coefficient of Restitution” values quoted in Appendix 3 can be related to fully fixed floor tiles and indicate a high degree of resistance to impact damage.

3.2 Resistance to Scratching

Visible scratches were produced by each of the tests, although the shortest test (5 cycles) only produced a faint scratch line.

Initial examinations were unable to determine whether the most extreme test (1000 cycles run over the same location) had worn through the glaze layer. Subsequent optical microscopic examinations were used to clarify the situation.

Examining the cut edges of the samples indicted that the typical thickness of the glaze layer was 0.25 mm, with an apparent layer of engobe 0.15 - 0.2 mm thick lying beneath it.

Measurements of the scratch width were made using calibrated graduations in a microscope while the scratches were examined, giving the values shown in Table 2. The scratch produced in the 5 cycle test showed a slightly uneven nature, with the indenter appearing to have broken the surface intermittently during the test. The higher cycle tests showed more uniform, well-defined grooves cut into the glaze.

The diamond indenter used had a cone-shaped tip, with an included angle of 110 degrees at the tip. Using this value, scratch depths corresponding to the measured widths were calculated; these are listed in Table 2.

Table 2 - Dimensions of Scratches Produced by Diamond Indenter

Cycles	Scratch Width (mm)	Scratch Depth (mm)	Comments
5	0.1 - 0.15	0.042 - 0.063	Rather “patchy” surface scratch, little penetration.
10	0.15 - 0.2	0.063 - 0.084	Shallow groove cut into glaze
20	0.15 - 0.2	0.063 - 0.084	Shallow groove cut into glaze
40	0.2	0.084	Shallow groove cut into glaze
1000	0.35	0.148	Clearly visible groove cut into glaze

None of the test scratches penetrated through the glaze layer, with the extreme case of the diamond tip being given 1000 cycles run over the same location only reaching just over half of the glaze layer thickness. As the worn groove becomes wider with increasing depth, the process has a progressively slowing effect. Therefore, it is not considered possible to scratch through the glaze layer to the underlying body and produce a staining issue.

Overall, the results indicate that normal service conditions would not cause any significant effect on the glaze surface.

4 ABRASION RESISTANCE TEST

The abrasion resistance test report is attached as Appendix 7. The results show the glaze finish to be very resistant to abrasion, with only some reduction in the gloss of the glaze surface evident after heavy abrasion.

5 DISCUSSION

The test work has shown the sinks provided to be very robust and durable, with degradation only occurring in extreme circumstances.

Most ceramic products would suffer catastrophic damage if subjected to impact energies which the Shaws sinks withstood with no more effect than minor surface chipping at the point of impact. Sinks produced from alternative materials (metals, polymers, filled resins, most natural stones, etc.) will be greatly more susceptible to damage from impact, abrasion, scratching and chemical attack than the Shaws sinks.

APPENDIX 1 - Edge Chippping Resistance - In House Method based on EN 12980:2000

PHYSICAL TESTING REPORT

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UKAS TESTING
0013

Shaws Since 1897 Ltd
Whitebirk Works
Waterside
Darwen
Lancashire
BB3 3NX

FAO: Mr. Anthony Cristoforo

Report of Tests on: Shaws Since 1897 Ltd Fireclay Sinks

Your Reference: -

Lucideon Reference: (162769)-18462

Date Reported: 25-Jul-2016 **Order Number:** 1299

Date Logged: 20-Jun-2016 **Date(s) of Test(s):** 16-Jul-2016 **to** 23-Jul-2016

Determination of Impact Resistance of Non-Metallic Articles for Catering and Industrial Use

BS EN 12980: 2000

Edge Chipping Results

Test Specimen Description: Fireclay sinks

	Initial Failure	Final Failure
	J	J
1a	0.12	>0.73
1b	0.20	>0.73
1c	0.22	>0.73
1 - Mean	0.18	>0.73
2a	0.28	>0.73
2b	0.22	>0.73
2c	0.14	>0.73
2 - Mean	0.21	>0.73
3a	0.04	>0.73
3b	0.14	>0.73
3c	0.12	>0.73
3 - Mean	0.10	>0.73
4a	0.27	>0.73
4b	0.16	>0.73
4c	0.27	>0.73
4 - Mean	0.23	>0.73
5a	0.23	>0.73
5b	0.15	>0.73
5c	0.23	>0.73
5 - Mean	0.20	>0.73
6a	0.34	>0.73
6b	0.15	>0.73
6c	0.19	>0.73
6 - Mean	0.23	>0.73

Continued on Next Page

Mr Simon Hall
Manager

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Lucideon Test Results

Lucideon Reference: (162769)-18462

	Initial Failure	Final Failure
	J	J
7a	0.11	>0.73
7b	0.04	>0.73
7c	0.22	>0.73
7 - Mean	0.12	>0.73
8a	0.12	>0.73
8b	0.11	>0.73
8c	0.16	>0.73
8 - Mean	0.13	>0.73
9a	0.14	>0.73
9b	0.08	>0.73
9c	0.14	>0.73
9 - Mean	0.12	>0.73
10a	0.12	>0.73
10b	0.12	>0.73
10c	0.09	>0.73
10 - Mean	0.11	>0.73
Overall Mean	0.16	>0.73
Standard Deviation	0.05	

Tup Type: Cylindrical Ended

Tup Mass: 141.7 g

Specimen Support: Fixed

Sample Compliance: The samples meet the requirements of BS8654: 2015

The articles tested were selected by the client. Information not supplied.

The sample was deviating and as a result, the test result(s) may be invalid.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

End of Test Report

Mr Simon Hall
Manager

APPENDIX 2 - Centre Impact Resistance - In House Method based on ASTM C368-88

PHYSICAL TESTING REPORT

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Shaws Since 1897 Ltd
Whitebirk Works
Waterside
Darwen
Lancashire
BB3 3NX

FAO: Mr. Anthony Cristoforo

Report of Tests on: Shaws Since 1897 Ltd Fireclay Sinks

Your Reference: -

Lucideon Reference: (162769)-18462

Date Reported: 25-Jul-2016 **Order Number:** 1299

Date Logged: 20-Jun-2016 **Date(s) of Test(s):** 24-Jul-2016 **to** 24-Jul-2016

Determination of Impact Resistance

ASTM C368-88

No.	Impact Resistance Initial Failure ft.lbf	Impact Resistance Final Failure ft.lbf	Thickness inches
1	0.17	>0.54	1.510
2	0.20	>0.54	1.493
3	0.09	>0.54	1.517
4	0.12	>0.54	1.505
5	0.15	>0.54	1.346
6	0.09	>0.54	1.515
7	0.09	>0.54	1.392
8	0.10	>0.54	1.383
9	0.13	>0.54	1.419
10	0.07	>0.54	1.544
Mean	0.12	>0.54	1.462

Description of Test Specimen(s): Fireclay Sinks

Strength Factor: 0.68 lbf/in²

End of Test Report

Mr Simon Hall
Manager

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PHYSICAL TESTING REPORT

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Shaws Since 1897 Ltd
Whitebirk Works
Waterside
Darwen
Lancashire
BB3 3NX

FAO: Mr. Anthony Cristoforo

Report of Tests on: Shaws Since 1897 Ltd Fireclay Sinks

Your Reference: -

Lucideon Reference: (162769)-18462

Date Reported: 19-Jul-2016 **Order Number:** 1299

Date Logged: 20-Jun-2016 **Date(s) of Test(s):** 13-Jul-2016 **to** 15-Jul-2016

Determination of Impact Resistance - Coefficient of Restitution

BSENISO 10545-5: 1998

No.	Coefficient of Restitution (1)	Coefficient of Restitution (2)	Coefficient of Restitution (3)
1	0.70	0.69	0.70
2	0.70	0.69	0.71
3	0.70	0.69	0.70
4	0.67	0.68	0.69
5	0.68	0.69	0.69

Description of Test Specimen(s): 5 pieces (cut to 75mm x 75mm)

Average Coefficient of Restitution: 0.69

There was no visible damage to the tile surface.

The sample was deviating and as a result, the test result(s) may be invalid.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

End of Test Report

Mr Simon Hall
Manager

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PHYSICAL TESTING ANALYSIS REPORT

Description:	Resistance to Chemicals and Staining Agents (5.5)
Test Method:	BS 13310: 2003
Lucideon Reference:	(162769)-18462
Client:	Shaws Since 1897 Ltd Whitebirk Works Waterside Darwen Lancashire BB3 3NX
For the Attention of:	Mr. Anthony Cristoforo
Date Logged:	20-Jun-2016
Date of Tests:	13-Jul-2016 to 15-Jul-2016
Report Date:	19-Jul-2016
Purchase Order No.:	1299

Please find attached the results for the sample(s) recently submitted for analysis.

Mr Simon Hall
Manager

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KITCHEN SINKS – FUNCTIONAL REQUIREMENTS AND TEST METHODS
BS EN 13310: 2003 5.5 RESISTANCE AGAINST CHEMICALS AND STAINING AGENTS

Test Chemicals	Test Area
Acetic Acid 10% V/V	12.5 cm^2
Sodium Hydroxide 5% m/m	12.5 cm^2
Ethanol 70% V/V	12.5 cm^2
Sodium Hypochlorite 5% Cl_2	12.5 cm^2
Methylene Blue 1% m/m	12.5 cm^2
Sodium chloride 170g/l (50% dil)	12.5 cm^2

The glazed terracotta pieces exhibited no visible attack by any of the chemicals and stains applied.

END OF TEST REPORT

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PHYSICAL TESTING ANALYSIS REPORT

Description:	Resistance to Scratching (5.6)
Test Method:	Based on PT38 method using metal marking rig with diamond tip
Lucideon Reference:	(162769)-18462
Client:	Shaws Since 1897 Ltd Whitebirk Works Waterside Darwen Lancashire BB3 3NX
For the Attention of:	Mr. Anthony Cristoforo
Date Logged:	20-Jun-2016
Date of Tests:	15-Jul-2016 to 15-Jul-2016
Report Date:	05-Aug-2016
Purchase Order No.:	1299

Please find attached the results for the sample(s) recently submitted for analysis.

Mr Simon Hall
Manager

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KITCHEN SINKS – FUNCTIONAL REQUIREMENTS AND TEST METHODS - BS EN 13310:2003
RESISTANCE TO SCRATCHING

1 TEST METHOD

A modified version of the Lucideon in-house PT38 method was employed. Reciprocal indentations were made, 40 mm long at 20 N applied load, using a diamond scribe. The degree of visible scratching was observed after set reciprocal periods up to 1000.

2 RESULTS

After 1000 reciprocal scratches, initial investigation by optical microscopy was uncertain whether the scratches had penetrated through the glaze to the clay body.

3 CONCLUSION

To fully quantity the depth of scratching, we need to carry out additional surface analyses as advised by Karen Allright.

END OF TEST REPORT

APPENDIX 6 - Resistance to Abrasion - Based on ISO 9352 Taber Abrasion Method

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Customer details:	Lucideon Ltd Queens Road Penkhull Stoke-on-Trent Staffordshire ST4 7LQ	SATRA reference:	FLO0248286 /1629
		Your reference:	
		Date of report:	19 August 2016
		Samples received:	21 July 2016
For the attention of:	Peter Hancock	Date(s) work carried out:	21 July 2016 - 18 August 2016

TECHNICAL REPORT

Subject: Testing of 1 reference described by the customer as a 'glazed ceramic fire clay sink- white' to ISO 9352:2012. 750 cycles to be conducted utilising a S-33 Sandpaer strips under a 500g load according to requirements in BS EN 13310:2003.

Conditions of Issue:

This report may be forwarded to other parties provided that it is not changed in any way. It must not be published, for example by including it in advertisements, without the prior, written permission of SATRA.

Results given in this report refer only to the samples submitted for analysis and tested by SATRA. Comments are for guidance only.

A satisfactory test report in no way implies that the product tested is approved by SATRA and no warranty is given as to the performance of the product tested. SATRA shall not be liable for any subsequent loss or damage incurred by the client as a result of information supplied in the report.

Please note uncertainty of measurement has not been applied to the results in this report. SATRA uncertainty of measurement values are available on request.

Report signed by: Mandy de Wet
Position: Technologist
Department: Furniture and Floor Coverings

SATRA Technology Centre Ltd (a subsidiary of SATRA). Registered in England No. 3856296 at the above address.

TECHNICAL REPORT

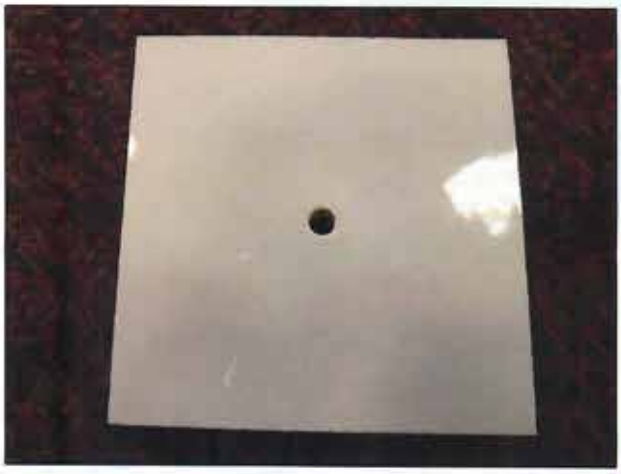
TESTING OF 1 REFERENCE DESCRIBED BY THE CUSTOMER AS A 'GLAZED CERAMIC FIRE CLAY SINK- WHITE' TO ISO 9352:2012. 750 CYCLES TO BE CONDUCTED UTILISING A S-33 SANDPAER STRIPS UNDER A 500G LOAD ACCORDING TO REQUIREMENTS IN BS EN 13310:2003.

As requested Lucideon Ltd, we have assessed the samples referenced as 'glazed ceramic fire clay sink- white', as detailed below.

SAMPLE SUBMITTED

Sample reference: 'glazed ceramic fire clay sink- white' (1)

Appearance:





Date received:	21 July 2016
Date Conditioned:	21 July 2016
Testing commenced:	18 August 2016
Testing completed:	18 August 2016
Testing conducted by:	Mandy de Wet

TESTS CARRIED OUT

- ISO 9352:2012 – Methods of testing plastics. Mechanical properties. Determination of resistance to wear by abrasive wheels. (2)(3)

Notes:

(1) The information supplied by the customer. Not verified by SATRA.

(2) Abrasive wheels used are CS 0 rubber wheels with S-33 sandpaper strips, which were replaced after each 100 cycles. 500g total loading on each arm. With stopping point at 750 cycles as per requirement.

(3) Method usually designed for plastic materials. Tested at customer's request.as it is specified in BS EN 13310:2003 Requirements - Kitchen sinks. Functional requirements and test methods.

(4) In SATRA's opinion the gloss effect is part of the white top layer with the beige layer being denoted as the "sub-layer" mentioned in the standard.

COMMENTS

ISO 9352:2012 - Methods of testing plastics. Mechanical properties. Determination of resistance to wear by abrasive wheels is intended to assess the wear properties of plastics in laboratory conditions.

100mm x 100mm samples were prepared (cut) by the customer and conditioned in a laboratory at 23 ± 2°C, 50 ± 5% Relative Humidity, for greater than 48hours.

Three samples were abraded using 'CS-0' rubber wheels with S-33 sandpaper abrasive strips under a load of 500g to 750 revolutions. Visual inspection took place after each cycle of 100 revolutions and the sandpaper S-33 replaced with a fresh strip. The stopping point was according to the requirement in BS EN 13310:2003 Requirements - Kitchen sinks. Functional requirements and test methods.

RESULTS

Sample Reference	Specimen	*BS EN 13310* (Requirement 750 cycles is endpoint)	Results (# of quadrants that showed wear through to sub layer)
'glazed ceramic fire clay sink- white'	1	No wear through to sub layer (≥ one point in each of the four quadrants depicts wear through)	0 of 4 –no wear through[4]
	2		0 of 4 –no wear through[4]
	3		0 of 4 –no wear through[4]

General observation all 3 tested specimens showed the same level of gloss removal[4] :-

@ 100 cycles slight gloss removal was observed in wear path.
@ 400 cycles moderate gloss removal was observed in wear path.
@ 600 cycles nearly complete gloss removal was observed in wear path.
@ 750 cycles complete gloss removal was observed in wear path.

CONCLUSION

With regard to the wear resistance, according to ISO 9352 (Visual inspection), the sample submitted under the reference of 'glazed ceramic fire clay sink- white' achieved a good abrasive results according to BS EN 13310 requirement of No abrasion through the top layer into the sub layer on all three samples.[4]

TECHNICAL REPORT

TERMS AND CONDITIONS OF BUSINESS

1. GENERAL
Work done or services undertaken are subject to the terms and conditions detailed below and all other conditions, warranties and representations, expressed or implied are hereby excluded.

2. PRICES
Prices are based on current material and production costs, exchange rates, duty and freight and are subject to change without notice.

3. DELIVERY ESTIMATES
Delivery estimates are made in good faith and date from receipt of a written order and full information to enable us to proceed. While SATRA or its subsidiaries (hereafter referred to as "SATRA") make every effort to fulfil them, such estimates are subject to unforeseen events and if not maintained, cannot give rise to any claim. Offers "ex stock" are subject to prior sale.

4. CANCELLATION AND RETURNS
Cancellation of orders for goods, services, training or consultancy is only acceptable by prior agreement of SATRA and a charge will normally be made.

5. CLAIMS
Claims for errors, shortages etc should be notified within 10 days of date of receipt. In the event of goods damaged in transit, packing materials should be retained for examination; otherwise no liability can be accepted.

6. PAYMENT TERMS
Payment terms are net 21 days from date of invoice. Failure to comply with the terms of payment may result in delayed delivery of goods and services and a review of the Customer's credit account. Should the customer become subject to an administration order, or becomes bankrupt or goes into liquidation, SATRA has a right to cancel any contract and discontinue any work. SATRA reserves the right to adjust US Dollar and Euro sales price where customer exceeds credit terms and where the exchange rate has moved more than 10% since invoicing.

7. RETENTION OF TITLE
All goods remain the property of SATRA until paid in full. Under no circumstances will a customer's purchase order override SATRA's Retention of Title clause. In the case of software, the ownership of the software remains with SATRA. Payment of invoices in full will entitle the customer to use the software under licence until (a) they cease to be a member of SATRA or (b) they cease trading. In both instances, the licence shall then revert to SATRA.

8. GUARANTEE
All goods manufactured by SATRA are guaranteed both as regards material and workmanship. Any part returned carriage paid, within twelve months from date of supply and found defective, will be repaired or replaced at SATRA's option free of charge. SATRA admits no liability for loss, damage or delay consequent on any defect in any goods supplied by SATRA.

9. TEST REPORTS
Results given in test reports refer only to samples submitted for analysis and tested by SATRA. A satisfactory test report in no way implies that the product tested is approved by SATRA and no warranty is given as to the performance of the product tested. SATRA shall not be liable for any subsequent loss or damage incurred by the Customer as a result of information supplied in a test report.

10. TEST SAMPLES
Unless otherwise agreed in advance, test samples will be disposed of 6 weeks after the date of the final report. If required, samples can be returned at the Customer's expense.

11. RESPONSIBILITY
Every effort is made to ensure accuracy in description, drawings and other information in correspondence, catalogues, etc but no warranty is given in this respect and SATRA shall not be liable for any error therein. SATRA carries out all tests and/or advises only on the basis that the same are carried out, made or given without any responsibility whether for negligence or otherwise. SATRA and its servants or agents will not be liable for any damage or loss direct or indirect of whatsoever kind, whether or not the same results directly or indirectly from negligence on the part of SATRA or its servants or agents.

12. CONFIDENTIALITY
Unless specifically excluded in the terms of an individual contract between SATRA and its Customer, the following shall apply to all reports, advice, drawings, photographs, specifications or data:
   i. The above shall not be disclosed to third parties or used in litigation without the consent of SATRA.
   ii. Where SATRA has given consent to disclosure, the Customer shall draw the attention of the third party to these terms of business and the basis on which SATRA undertakes test, reporting and advising. The Customer shall indemnify SATRA for any failure to do so.
   iii. The above items are submitted to the Customer as confidential documents. Confidentiality shall continue to apply after completion of the business, but shall cease to apply to information or knowledge which may come into the public domain.

13. CONSTRUCTION AND ARBITRATION
The laws of England shall govern all contracts and the parties submit to exclusive jurisdiction of the courts of England, unless otherwise agreed.

Issue Date: 1st October 2009

Antimicrobial Test Report

Report Reference: **Shaws - 0001**

Client: **Shaws Since 1897 Ltd**

Material tested: Ceramic tiles

Test Laboratory: Anti-Microbial Test Division, Kyoto Biseibutsu Kenkyusyo
Yamashina-ku, Kyoto 607-8482, Japan

Evaluation of the antimicrobial performance of samples containing antimicrobial additives. All testing is conducted by an independent laboratory using the ISO 22196 / JIS Z 2801:2000 test method.

This report details the analysis carried out on the test samples, including an overview of the test method, the test results, an interpretation of those results and copies of the associated laboratory certificates.

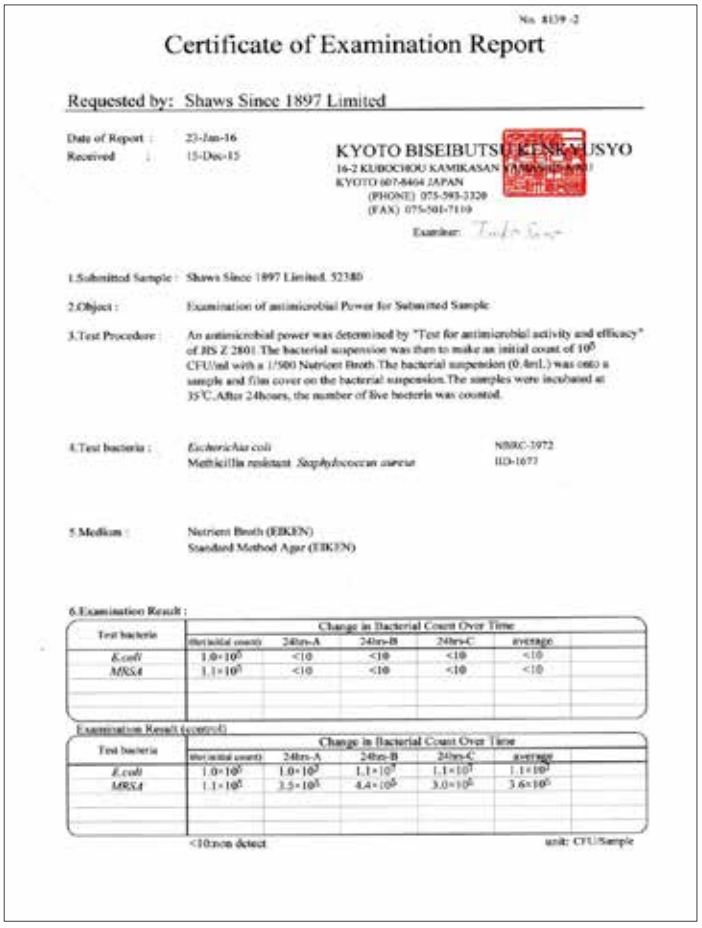
Where possible, all test materials are taken from samples of the actual product. Samples typically measure 50mm x 50mm, as specified by the JIS Z 2801:2000 method, although where this is impractical it is permissible to use smaller samples with the method being modified accordingly.

MRSA

Sample reference & description		0 hours	24 Hours	% change as comparison with control	Performance level
Control	Untreated polyethylene film	110000	360000	N/A	N/A
52380	Test Tiles A	110000	<10	>99.997% Reduction	EXCELLENT
52381	Test Tiles B	110000	<10	>99.997% Reduction	EXCELLENT

E. coli

Sample reference & description		0 hours	24 Hours	% change as comparison with control	Performance level
Control	Untreated polyethylene film	100000	11000000	N/A	N/A
52380	Test Tiles A	100000	<10	>99.9999% Reduction	EXCELLENT
52381	Test Tiles B	100000	<10	>99.9999% Reduction	EXCELLENT



No. 8139 -2

Certificate of Examination Report

Requested by: Shaws Since 1897 Limited

Date of Report : 23-Jan-16
Received : 15-Dec-15

KYOTO BISEIBUTSU KENKYUSYO
16-2 KUBOCHOU KAMIKASAN YAMASHINA-KU
KYOTO 607-8464 JAPAN
(PHONE) 075-593-3320
(FAX) 075-501-7110
Examiner:

1.Submitted Sample : Shaws Since 1897 Limited. 52380

2.Object : Examination of antimicrobial Power for Submitted Sample

3.Test Procedure : An antimicrobial power was determined by "Test for antimicrobial activity and efficacy" of JIS Z 2801. The bacterial suspension was then to make an initial count of 10^5 CFU/ml with a 1/500 Nutrient Broth. The bacterial suspension (0.4mL) was onto a sample and film cover on the bacterial suspension. The samples were incubated at 35°C. After 24hours, the number of live bacteria was counted.

4.Test bacteria : *Escherichia coli* NBRC-3972
Methicillin resistant *Staphylococcus aureus* JCD-1077

5.Medium : Nutrient Broth (EIKEN)
Standard Method Agar (EIKEN)

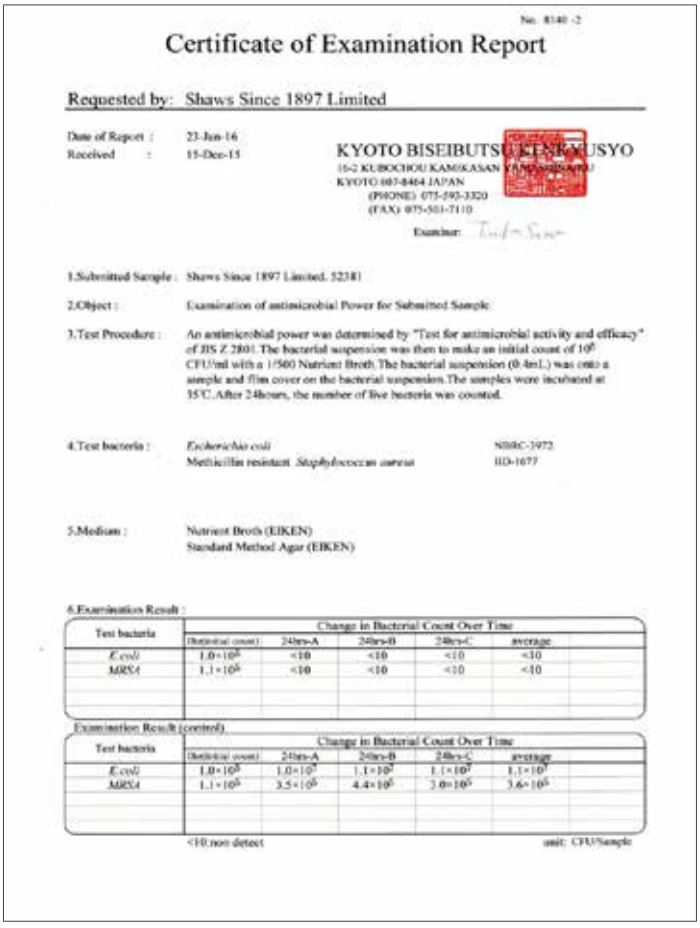
6.Examination Result :

Test bacteria	Change in Bacterial Count Over Time				
	(Bacterial count)	24hrs-A	24hrs-B	24hrs-C	average
E.coli	1.0×10^5	<10	<10	<10	<10
MRSA	1.1×10^5	<10	<10	<10	<10

Examination Result (control)

Test bacteria	Change in Bacterial Count Over Time				
	(Bacterial count)	24hrs-A	24hrs-B	24hrs-C	average
E.coli	1.0×10^5	1.0×10^7	1.1×10^7	1.1×10^7	1.1×10^7
MRSA	1.1×10^5	3.5×10^5	4.4×10^5	3.0×10^5	3.6×10^5

<10:non detect unit: CFU/Sample



No. 8140 -2

Certificate of Examination Report

Requested by: Shaws Since 1897 Limited

Date of Report : 23-Jan-16
Received : 15-Dec-15

KYOTO BISEIBUTSU KENKYUSYO
16-2 KUBOCHOU KAMIKASAN YAMASHINA-KU
KYOTO 607-8464 JAPAN
(PHONE) 075-593-3320
(FAX) 075-501-7110
Examiner:

1.Submitted Sample : Shaws Since 1897 Limited. 52381

2.Object : Examination of antimicrobial Power for Submitted Sample

3.Test Procedure : An antimicrobial power was determined by "Test for antimicrobial activity and efficacy" of JIS Z 2801. The bacterial suspension was then to make an initial count of 10^5 CFU/ml with a 1/500 Nutrient Broth. The bacterial suspension (0.4mL) was onto a sample and film cover on the bacterial suspension. The samples were incubated at 35°C. After 24hours, the number of live bacteria was counted.

4.Test bacteria : *Escherichia coli* NBRC-3972
Methicillin resistant *Staphylococcus aureus* JCD-1077

5.Medium : Nutrient Broth (EIKEN)
Standard Method Agar (EIKEN)

6.Examination Result :

Test bacteria	Change in Bacterial Count Over Time				
	(Bacterial count)	24hrs-A	24hrs-B	24hrs-C	average
E.coli	1.0×10^5	<10	<10	<10	<10
MRSA	1.1×10^5	<10	<10	<10	<10

Examination Result (control)

Test bacteria	Change in Bacterial Count Over Time				
	(Bacterial count)	24hrs-A	24hrs-B	24hrs-C	average
E.coli	1.0×10^5	1.0×10^7	1.1×10^7	1.1×10^7	1.1×10^7
MRSA	1.1×10^5	3.5×10^5	4.4×10^5	3.0×10^5	3.6×10^5

<10:non detect unit: CFU/Sample



Handcrafted *for life*

SHAWS OF DARWEN. WATERSIDE, DARWEN, LANCASHIRE, ENGLAND, BB3 3NX. TELEPHONE. +44 (0)1254 775111. FAX +44 (0)1254 873462.

www.shawsofdarwen.com