

Work Order	3981.4
Setup-Code	210310-1266-22196-01



Test Report

ISO 22196 (Mod)

Measurement of antibacterial activity on plastics surfaces

Test Object:

*FT samples versus Escherichia coli DSM1576 ATCC8739
ISML CC 02/023*

Work Order	3981.4
Setup-Code	210310-1266-22196-01

Report on Findings

Client: Lasselsberger Ceramics Romania
Address: 1 Beiusului Street
400394 Cluj-Napoca

Work order no.: 3981.4

Test object: FT samples versus *Escherichia coli* DSM1576 ATCC8739 ISML CC 02/023

Sample description: FT samples

Date of receipt of sample: 2021-Mar-05

Type of test: ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Test Germ: *Escherichia coli* DSM1576 ATCC8739 ISML CC 02/023

Test laboratory: QualityLabs BT GmbH

Address: Neumeyerstrasse 46a
90411 Nuremberg, Germany


Setup-Code: 210310-1266-22196-01

Sample material: ceramics

No. of pages in report: 7

Report on findings to the client: **Place and date of preparation:** Nuremberg, 2021-Mar-12
Recipient: Lasselsberger Ceramics Romania

Laboratory Director:


Dr. Sabine Krause, Laboratory Manager
QualityLabs BT GmbH

Work Order	3981.4
Setup Code	210310-1266-22196-01

Declaration on Quality Assurance

This investigation was performed and supervised according to the standard operating procedure "SOP zu ISO 22196 (Mod)" by QualityLabs BT GmbH. The laboratory and process are continually monitored by independent, external authorities, as well as by internal audits.

Archiving

A copy of the test report, a protocol of the measurement as well as the accompanying correspondence and business records are archived by QualityLabs BT GmbH. The retention period is at least 10 years.

Test description

Anti-bacterial activity is determined in accordance with a modified version of ISO 22196.

During the test, a thin liquid-film containing the bacteria (1.25×10^4 CFU / cm²) is applied directly to the test sample (5 cm x 5 cm). To avoid desiccation a foil (4cm x 4cm, Stomacher Bags) is applied. Immediately after inoculation, the bacteria from the reference sample are separated from the sample and the enveloping foil surfaces using ultrasound and vortex devices and the number of viable germs (CFU – colony-forming units) is determined (t_0 value). A further set of reference samples and samples given anti-microbial treatment is incubated with bacteria in a liquid-film and the enveloping foil in a damp environment at 37°C. After a minimum of 24 hours, the bacteria are separated from the sample surfaces using ultrasound and vortex devices and the number of viable germs is determined (t_{24} value).

Work Order	3981.4
Setup-Code	210310-1266-22196-01

Assessment of antimicrobial activity

A logarithmic germ reduction of ≥ 3 log scales of the antimicrobial sample in comparison to the respective reference is used as assessment criterion to pass the antimicrobial test.

Germ reduction [log scales]	Antibacterial activity
< 3	Not sufficient antimicrobial activity
≥ 3	Sufficient antimicrobial activity

Work Order	3981.4
Setup Code	210310-1266-22196-01

References to Testconditions

Testconditions		
Sample size	25	cm ²
Foil size	16	cm ²
Volume Inoculum	400	µl
Sample cleaning	backside with ethanol	-

References to deviations, preincubations, special test conditions

NONE

Work Order	3981.4
Setup-Code	210310-1266-22196-01

Test Results

Sample Name	Sample Code	t ₀ (cells/cm ²)			t ₂₄ (cells/cm ²)			Reduction [%]	Log Reduction	Reference
		9.7 x 10 ⁴	8.3 x 10 ⁴	7.6 x 10 ⁴	2.1 x 10 ⁵	1.3 x 10 ⁵	1.8 x 10 ⁵			
1 FT reference sample	12660803210003									
2 FT test sample no 1	12660803210004				< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4	
3 FT test sample no 2	12660803210005				< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4	

*see "Interpretation of Results", page 7

Test strain

Escherichia coli DSM1576 ATCC8739 ISML CC 02/023

Initial cell count inoculum / cm²

1.25 x 10⁴

Initials of the editor

AK AK

Measurement ended on

Mar-12-2021

Work Order	3981.4
Setup-Code	210310-1266-22196-01

Comments on test objects

NONE

Interpretation of the results based on the measurements

Both samples **FT test sample no 1** and **FT test sample no 2** showed a sufficient antimicrobial effect against *Escherichia coli* DSM1576 ATCC8739 ISML CC 02/023 in comparison with FT reference sample.

Editor: Mr. Karimi AK

Crosschecked: Mr. Shendi ES

References

ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Work Order	3981.3
Setup Code	210309-1266-22196-03



Test Report

ISO 22196 (Mod)

Measurement of antibacterial activity on plastics surfaces

Test Object:

*FT samples versus Staphylococcus aureus
DSM799 ATCC6538*

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Report on Findings

Client: Lasselsberger Ceramics Romania
Address: 1 Beiusului Street
400394 Cluj-Napoca

Work order no.: 3981.3

Test object: FT samples versus *Staphylococcus aureus* DSM799 ATCC6538

Sample description: FT samples

Date of receipt of sample: 2021-Mar-05

Type of test: ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Test Germ: *Staphylococcus aureus* DSM799 ATCC6538

Test laboratory: QualityLabs BT GmbH

Address: Neumeyerstrasse 46a
90411 Nuremberg, Germany

Setup-Code: 210309-1266-22196-03

Sample material: ceramics

No. of pages in report: 7

Report on findings to the client: **Place and date of preparation:** Nuremberg, 2021-Mar-11
Recipient: Lasselsberger Ceramics Romania

Laboratory Director:



Dr. Sabine Krause, Laboratory Manager
QualityLabs BT GmbH

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Declaration on Quality Assurance

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Archiving

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Test description

Anti-bacterial activity is determined in accordance with a modified version of ISO 22196.

During the test, a thin liquid-film containing the bacteria (1.25×10^4 CFU / cm²) is applied directly to the test sample (5 cm x 5 cm). To avoid desiccation a foil (4cm x 4cm, Stomacher Bags) is applied. Immediately after inoculation, the bacteria from the reference sample are separated from the sample and the enveloping foil surfaces using ultrasound and vortex devices and the number of viable germs (CFU – colony-forming units) is determined (t_0 value). A further set of reference samples and samples given anti-microbial treatment is incubated with bacteria in a liquid-film and the enveloping foil in a damp environment at 37°C. After a minimum of 24 hours, the bacteria are separated from the sample surfaces using ultrasound and vortex devices and the number of viable germs is determined (t_{24} value).

Work Order	3981.3
Setup-Code	210309-1268-22196-03

Assessment of antimicrobial activity

A logarithmic germ reduction of ≥ 3 log scales of the antimicrobial sample in comparison to the respective reference is used as assessment criterion to pass the antimicrobial test.

Germ reduction [log scales]	Antibacterial activity
< 3	Not sufficient antimicrobial activity
≥ 3	Sufficient antimicrobial activity

Work Order	3981.3
Setup-Code	210309-1266-22196-03

References to Testconditions

Testconditions		
Sample size	25	cm ²
Foil size	16	cm ²
Volume Inoculum	400	µl
Sample cleaning	backside with Isopropanol	-

References to deviations, preincubations, special test conditions

NONE

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Test Results

Sample Name	Sample Code	t_0 (cells/cm ²)	t_4 (cells/cm ²)	Reduction [%]	Log Reduction			
1 FT reference sample	12660803210003	9.7 x 10 ⁴	6.9 x 10 ⁴	1.6 x 10 ⁵	1.3 x 10 ⁵	1.6 x 10 ⁵	-	Reference
2 FT test sample no 1	12660803210004			< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4
3 FT test sample no 2	12660803210005			< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4

*see "Interpretation of Results", page 7

Test strain

Staphylococcus aureus DSM799 ATCC6538

Initial cell count inoculum / cm²

1.25 x 10⁴

Initials of the editor

AK AK

Measurement ended on

Mar-11-2021

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Comments on test objects

NONE

Interpretation of the results based on the measurements

Both samples **FT test sample no 1** and **FT test sample no 2** showed a sufficient antimicrobial effect against *Staphylococcus aureus* DSM799 ATCC6538 in comparison with FT reference sample.

Editor: Mr. Karimi AK

Crosschecked: Mr. Shendi 01

References

ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Work Order	3981.2
Setup-Code	210309-1286-22196-02



Test Report

ISO 22196 (Mod)

Measurement of antibacterial activity on plastics surfaces

Test Object:

*WT samples versus
Escherichia coli DSM1576 ATCC8739 ISML CC 02/023*

Work Order	3981.2
Setup-Code	210309-1266-22196-02

Report on Findings

Client: Lasselsberger Ceramics Romania
Address: 1 Beiusului Street
400394 Cluj-Napoca

Work order no.: 3981.2

Test object: WT samples versus *Escherichia coli* DSM1576 ATCC8739 ISML CC 02/023

Sample description: WT samples

Date of receipt of sample: 05-Mar-2021

Type of test: ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Test Germ: *Escherichia coli* DSM1576 ATCC8739 ISML CC 02/023

Test laboratory: QualityLabs BT GmbH

Address: Neumeyerstrasse 46a
90411 Nuremberg, Germany

Setup-Code: 210309-1266-22196-02

Sample material: ceramics

No. of pages in report: 7

Report on findings to the client: Place and date of preparation: Nuremberg, 12-Mar-2021
Recipient: Lasselsberger Ceramics Romania

Laboratory Director:


Dr. Sabine Krause, Laboratory Manager
QualityLabs BT GmbH

Work Order	3981.2
Setup-Code	210309-1266-22196-02

Declaration on Quality Assurance

This investigation was performed and supervised according to the standard operating procedure "SOP zu ISO 22196 (Mod)" by QualityLabs BT GmbH. The laboratory and process are continually monitored by independent, external authorities, as well as by internal audits.

Archiving

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Test description

Anti-bacterial activity is determined in accordance with a modified version of ISO 22196.

During the test, a thin liquid-film containing the bacteria (1.25×10^4 CFU / cm²) is applied directly to the test sample (5 cm x 5 cm). To avoid desiccation a foil (4cm x 4cm, Stomacher Bags) is applied. Immediately after inoculation, the bacteria from the reference sample are separated from the sample and the enveloping foil surfaces using ultrasound and vortex devices and the number of viable germs (CFU – colony-forming units) is determined (t_0 value). A further set of reference samples and samples given anti-microbial treatment is incubated with bacteria in a liquid-film and the enveloping foil in a damp environment at 37°C. After a minimum of 24 hours, the bacteria are separated from the sample surfaces using ultrasound and vortex devices and the number of viable germs is determined (t_{24} value).

Work Order	3981.2
Setup-Code	210309-1266-22196-02

Assessment of antimicrobial activity

A logarithmic germ reduction of ≥ 3 log scales of the antimicrobial sample in comparison to the respective reference is used as assessment criterion to pass the antimicrobial test.

Germ reduction [log scales]	Antibacterial activity
< 3	Not sufficient antimicrobial activity
≥ 3	Sufficient antimicrobial activity

Work Order	3981.2
Setup-Code	210309-1266-22196-02

References to Testconditions

Testconditions		
Sample size	25	cm²
Foil size	16	cm²
Volume Inoculum	400	µl
Sample cleaning	backside with Isopropanol	-

References to devlatlons, preIncubatlons, special test conditions

NONE

Work Order	3981.2
Setup-Code	210309-1266-22196-02

Test Results

Sample Name	Sample Code	t_0 (cells/cm ²)	t_1 (cells/cm ²)	t_2 (cells/cm ²)	t_3 (cells/cm ²)	Reduction [%]	Log Reduction		
1 WT reference sample	12660803210001	8.0 x 10 ⁴	1.0 x 10 ⁵	7.6 x 10 ⁴	7.3 x 10 ⁴	8.3 x 10 ⁴	7.6 x 10 ⁴	-	Reference
2 WT test sample	12660803210002				< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4

*see "Interpretation of Results", page 7

Test strain	<i>Escherichia coli</i> DSM1576 ATCC8739 ISML CC 02/023
Initial cell count inoculum / cm²	1.25 x 10 ⁴
Initials of the editor	AK AK
Measurement ended on	12-Mar-2021

Work Order	3981.2
Setup Code	210309-1286-22196-02

Comments on test objects

NONE

Interpretation of the results based on the measurements

The sample **WT test** showed a sufficient antimicrobial effect against *Escherichia coli* DSM1576 ATCC8739 ISML CC 02/023 in comparison with WT reference sample.

Editor: Mr. Karimi AK

Crosschecked: Ms. Görgey CG

References

ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Work Order	3981.3
Setup Code	210309-1266-22196-03



Test Report

ISO 22196 (Mod)

Measurement of antibacterial activity on plastics surfaces

Test Object:

*FT samples versus Staphylococcus aureus
DSM799 ATCC6538*

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Report on Findings

Client: Lasselsberger Ceramics Romania
Address: 1 Beiusului Street
400394 Cluj-Napoca

Work order no.: 3981.3

Test object: FT samples versus *Staphylococcus aureus* DSM799 ATCC6538

Sample description: FT samples

Date of receipt of sample: 2021-Mar-05

Type of test: ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces

Test Germ: *Staphylococcus aureus* DSM799 ATCC6538

Test laboratory: QualityLabs BT GmbH

Address: Neumeyerstrasse 46a
90411 Nuremberg, Germany


Setup-Code: 210309-1266-22196-03

Sample material: ceramics

No. of pages in report: 7

Report on findings to the client: **Place and date of preparation:** Nuremberg, 2021-Mar-11
Recipient: Lasselsberger Ceramics Romania

Laboratory Director:



Dr. Sabine Krause, Laboratory Manager
QualityLabs BT GmbH

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Declaration on Quality Assurance

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Test description

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Work Order	3981.3
Setup-Code	210309-1268-22196-03

Assessment of antimicrobial activity

A logarithmic germ reduction of ≥ 3 log scales of the antimicrobial sample in comparison to the respective reference is used as assessment criterion to pass the antimicrobial test.

Germ reduction [log scales]	Antibacterial activity
< 3	Not sufficient antimicrobial activity
≥ 3	Sufficient antimicrobial activity

Work Order	3981.3
Setup-Code	210309-1266-22196-03

References to Testconditions

Testconditions		
Sample size	25	cm ²
Foil size	16	cm ²
Volume Inoculum	400	µl
Sample cleaning	backside with Isopropanol	-

References to deviations, preincubations, special test conditions

NONE

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Test Results

Sample Name	Sample Code	t_0 (cells/cm ²)	t_4 (cells/cm ²)	Reduction [%]	Log Reduction			
1 FT reference sample	12660803210003	9.7 x 10 ⁴	6.9 x 10 ⁴	1.6 x 10 ⁵	1.3 x 10 ⁵	1.6 x 10 ⁵	-	Reference
2 FT test sample no 1	12660803210004			< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4
3 FT test sample no 2	12660803210005			< 1.0 x 10 ¹	< 1.0 x 10 ¹	< 1.0 x 10 ¹	> 99.99	> 4

*see "Interpretation of Results", page 7

Test strain

Staphylococcus aureus DSM799 ATCC6538

Initial cell count inoculum / cm²

1.25 x 10⁴

Initials of the editor

AK AK

Measurement ended on

Mar-11-2021

Work Order	3981.3
Setup-Code	210309-1266-22196-03

Comments on test objects

NONE

Interpretation of the results based on the measurements

Both samples **FT test sample no 1** and **FT test sample no 2** showed a sufficient antimicrobial effect against *Staphylococcus aureus* DSM799 ATCC6538 in comparison with FT reference sample.

Editor: Mr. Karimi AK

Crosschecked: Mr. Shendi 01

References

ISO 22196-07: Plastics — Measurement of antibacterial activity on plastics surfaces