

# THE TILES FIGHTING CORONAVIRUS AND BACTERIA\*

LET'S BUILD A BETTER FUTURE TOGETHER



Thanks to its antiviral, antibacterial and anti-polluting properties, the innovative ADVANCE<sup>®</sup> porcelain tile, suitable for floors and walls, ensures greater surface protection and guarantees healthier environments.

**ADVANCE<sup>®</sup>: Let's build a better Future together.**

\* After 6 hours of light exposure, ADVANCE<sup>®</sup> is able to eliminate 100% of coronaviruses and just after 15 minutes it will eliminate 90% of them. After 8 hours of light exposure, it fights against different types of bacteria, from a minimum of 95% up to 100%. The results of the laboratory tests carried out on ADVANCE<sup>®</sup> are available on our website [www.advanceceramic.it/en](http://www.advanceceramic.it/en)

**LA  
FABBRICA  
AVA**  
EXTRAORDINARY TILES

[lafabbrica.it](http://lafabbrica.it)



INTRODUCTION .....	<a href="#">5</a>
RESEARCH AND INNOVATION .....	<a href="#">8</a>
PROPERTIES .....	<a href="#">11</a>
MODE OF USE .....	<a href="#">18</a>
TEST REPORTS .....	<a href="#">56</a>

---

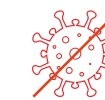
OUR PRODUCTS .....	<a href="#">20</a>
--------------------	--------------------

PIERRES DES CHÂTEAUX .....	<a href="#">22</a>
----------------------------	--------------------

IL CERRETO .....	<a href="#">38</a>
------------------	--------------------

ADVANCE® porcelain floor and wall tiles can be used for residential and non-residential solutions. They are made of eco-friendly and single-fired (over 1,200 degrees) porcelain stoneware and of 40% recycled raw materials. Thanks to its antiviral, antibacterial and photocatalytic properties, the innovative ADVANCE® technology is able to improve protection in the environment around us, making it healthier and reducing significantly pollution.

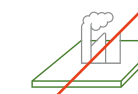
ANTIVIRAL



ANTIBACTERIAL



ANTI POLLUTION







Future, nature, science  
*our inspiration*

ITALCER GROUP



# FUTURE, NATURE, SCIENCE

---

ADVANCE® HAS BEEN CREATED  
THANKS TO ITALCER'S CARE  
AND ATTENTION FOR THE  
ENVIRONMENT AND THE  
COMMUNITY.

A NEW PROJECT WHICH  
REPRESENTS OUR DESIRE TO  
FOCUS ON THE FUTURE THANKS  
TO AN INNOVATIVE SINGLE-  
FIRED PORCELAIN TILE, WITH  
ANTIVIRAL, ANTIBACTERIAL AND  
PHOTOCATALYTIC PROPERTIES,  
ABLE TO SAFEGUARD HEALTH  
AND REDUCE POLLUTION.

---



Our first source of inspiration is the **FUTURE**. We dream of a world in which the new generations can use increasingly sustainable materials that help the well-being of the planet, reducing the possibility of microbial contamination and environmentally harmful chemical detergents.

We mainly use SnO<sub>2</sub> (tin oxide) and TiO<sub>2</sub> (titanium dioxide) that are biomimetic, i.e. obtained through processes that replicate those found in **NATURE**. Synthesis takes place during the single firing process via an innovative production technique stemming from a revolutionary research study in the field of materials **SCIENCE**.



Pierres des Châteaux  
FLOOR: Chambord 100x100 (40"x40") Nat. Ret.



ADVANCE® is an innovative technology, a hygienic and environment-friendly porcelain tile.

A new generation of porcelain stoneware, the result of a long-standing research project developed in our laboratories in collaboration with Professor Isidoro Lesci and supported by considerable investments.

ADVANCE® contributes towards eliminating viruses, bacteria and toxic micro-organisms and combats the environmental pollution dangerous to health and the environment.

The intrinsic antiviral and antibacterial properties of the porcelain tile material decisively contribute to eliminating every form of virus and bacteria, as well as other micro-organisms not only toxic for the environment but also for our health.

An innovation that will make homes and public places safer and healthier, with hygiene guaranteed 24/7, drastically reducing the use of chemical agents or detergents.



## RESEARCH AND INNOVATION

Our research programme started in 2018, with the aim of **making antiviral, antibacterial and anti-polluting** single fired porcelain surfaces.

With great enthusiasm and pride, today we can state that we have achieved extraordinary results: the innovative formulation of a bio-compound fixed in a single firing at extremely high temperatures makes this **porcelain surface hostile to the development of viruses and bacteria**.

After an initial laboratory experimentation phase, we fine-tuned the industrial process on the Group's production lines.

The outcome has been tested by accredited laboratories to attest the actual specifications. The TCNA (Tile Council of North America) has respectively confirmed the **ANTIVIRAL (ISO18061:2014 (E) on coronavirus 229E)** and **ANTIBACTERIAL (ISO 27447:2019 (E))** properties of the ADVANCE® technology.

Its **ANTIPOLLUTION (UNI 11484)** properties have been confirmed by the Department of Chemistry at Turin University.

The antibacterial properties of ADVANCE® have also been attested by the University of Ferrara, as well as University of Turin has attested its photocatalytic properties.

Standards ISO 18061:2014 (E) and ISO 27447:2019 (E) outline the methods that tests for determining the antiviral and antibacterial activity of photocatalytic materials must comply with. Whereas standard UNI 11484 describes the method for determining the capacity to reduce nitric oxide NO gas thanks to photocatalysis.



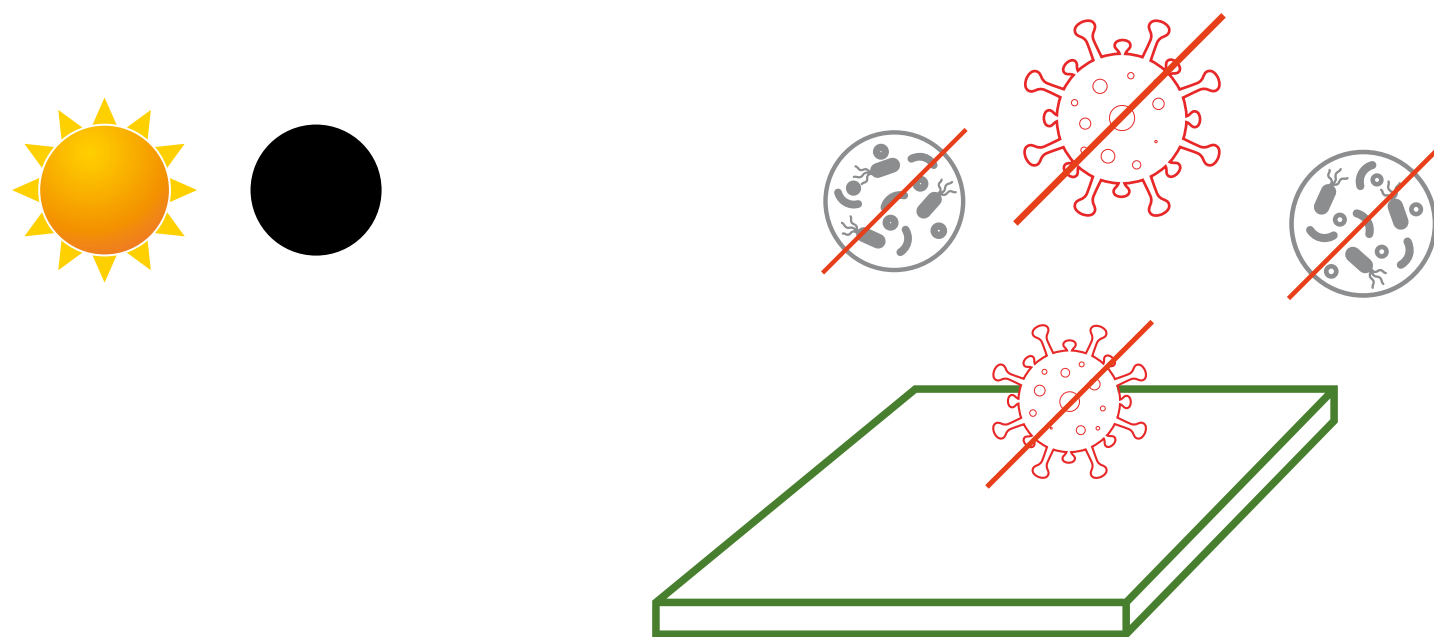
# ELIMINATES VIRUSES, FIGHTS BACTERIA\*

The special composition of this stoneware means that viruses and bacteria are destroyed if they come into contact with the tile surface.

ADVANCE® can be used to tile floors and walls and it features antimicrobial and photocatalytic properties achieved after a single firing.

These specifications, that qualify this stoneware as the latest generation of porcelain tile, are incorporated during the initial creation phase (a single firing at over 1200°C), thus becoming intrinsic properties of the product, providing protection against viruses and bacteria for the entire lifetime of the tile, without alterations caused by time or external agents. Because it doesn't consist in a topper on the surface of the porcelain tile, but it is an integral part of it, this property will continue to last through time.

The antiviral and antibacterial properties are enhanced by any solar and artificial light conditions, but as shown by tests made by laboratories of primary importance, these properties remain active even in dark conditions.



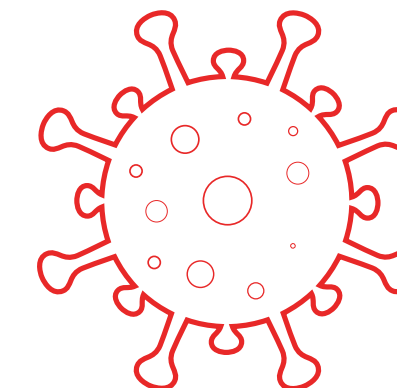
\*Under the conditions specified in the table and the test results below.




# PROPERTIES

## 1 - ELIMINATES VIRUSES

ISO 18061:2014 (E)  
Coronavirus 229E  
A virus H3N2\*

TEST TCNA (TILE COUNCIL OF NORTH AMERICA)

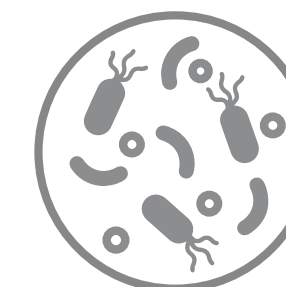





Exposure time 	Reduction under UV exposure 	Reduction under Dark conditions 
15 minutes	90%	-
30 minutes	90%	90%
1 hour	90%	90%
4 hours	99%	90%
6 hours	100%	93%
8 hours	100%	99%

## 2 - FIGHTS BACTERIA

ISO 27447:2019 (E) - Escherichiacoli ATCC 8739  
Stafilococco Aureo ATCC 6538

TEST OF LABORATORY CFR-UNIFE AND TCNA



Exposure time 	Reduction under UV exposure 	Reduction under Dark conditions 
8 hours	From minimum 95% To maximum 100%	From minimum 93,4% To max 97,2%





Il Cerreto

FLOOR: Amarone 23x149 (9"x58 1/2") Nat. Ret.

Pierres des Châteaux

WALL: Fontainebleau 60x60 (24"x24") Nat. Ret.

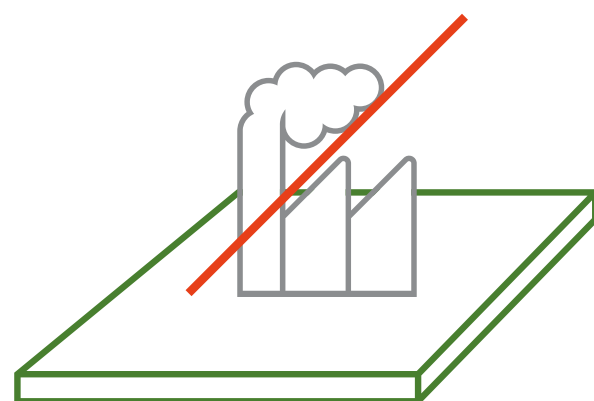


# PROPERTIES

## 3 - REDUCTION OF ATMOSPHERIC POLLUTION

UNI 11484

as attested by the University of Turin -  
department of chemistry



**-20,7% di NO<sub>x</sub>**

**Converts volatile pollutants  
into harmless substances.**

The anti-pollution properties of ADVANCE® stoneware also improve the quality of the air we breathe.

Industrial production, the use of air conditioning systems and vehicles emit pollutants into the atmosphere.

**ADVANCE®** used outdoors on the façades of buildings and apartment blocks, **reduces NO<sub>x</sub>** (nitrogen oxide) **molecules by 20.7%** (as attested by the University of Turin) in just three hours, considerably improving air quality thanks to the photocatalytic action activated by natural light.

Each outdoor solution designed using ADVANCE® **contributes towards improving the environment around us.**

The technology is not only safe for our health, but it is also a sustainable choice that takes care of the environment thanks to the single firing at a very high temperature, and because no further treatments are required and it has no further impact on the environment.



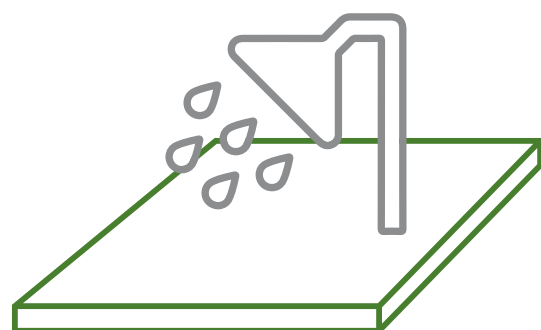


## PROPERTIES

### 4 - COMBATS DIRT

**Reduces the need to use chemical detergents.**

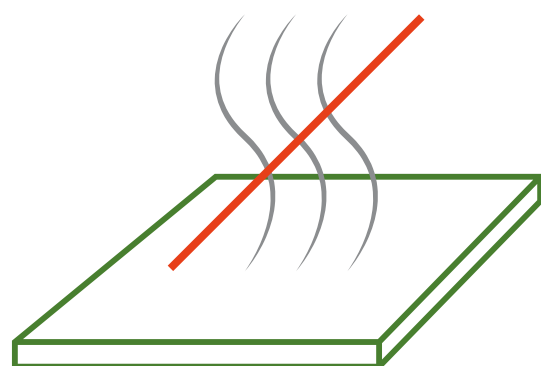
Dirt disintegrates on the surface of ADVANCE® tiles, floors and walls can be kept clean by just washing with a neutral soap and water. For outdoor floors, the flow of rainwater is enough to guarantee cleanliness.



### 5 - MITIGATES BAD ODOURS

**Reduces bad odours by converting the organic molecules.**

Furthermore, as for NO<sub>x</sub> molecules, the molecules that cause bad odours decompose as soon as they come into contact with the surface, thus mitigating any malodorous effect.





## MODE OF USE - SAFETY AND HYGIENE

With ADVANCE®, Italcer Group aims to contribute towards improving health and safety in public and private environments, thanks to this innovative porcelain tile, which can be applied to any type of surface in homes, healthcare environments, schools, airports and communal indoor and outdoor spaces.

With its intrinsic properties, ADVANCE® not only makes environments aesthetically beautiful but also healthy and sanitised for the health and well-being of everyone.



Residential



SPA



Shopping Centers



Airports



Gyms



Cafè



Restaurants



Schools



Healthcare Environments



Pierres des Châteaux  
FLOOR: Chenonceau 100x100 (40"x40") Nat. Ret.

# OUR PRODUCTS

---



PIERRES DES CHÂTEAUX..... 22

IL CERRETO..... 38





CHENONCEAU

CHEVERNY

CHAMBORD

FONTAINEBLEAU

USSÉ

# PIERRES DES CHÂTEAUX



FLOOR: Chambord 100x100 (40"x40") Nat. Ret.

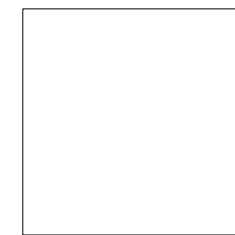
COLORED BODY PORCELAIN STONEWARE  
ISO 13006 - G - Bla (E < 0,5%) - UNI EN 14411 - UGL

**ADVANCE**<sup>®</sup>  
ANTIBACTERIAL & BIO-AIR PURIFYING

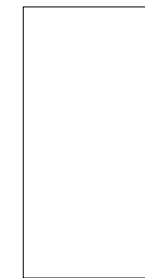
INDOOR R10-B

100% DESIGN  
AND PRODUCTION  
OF ITALY

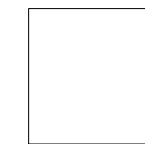
V3  
SHADE SPECTRUM  
HIGH



100x100 . 40"x40"  
Nat. Ret.



60x120 . 24"x48"  
Nat. Ret.



60x60 . 24"x24"  
Nat. Ret.



30x60 . 12"x24"  
Nat. Ret.

8,8 mm

modular system

PATTERN BY SIZE

100x100 8,8 mm	60x120 8,8 mm	60x60 8,8 mm	30x60 8,8 mm
-------------------	------------------	-----------------	-----------------

15	30	16	32
----	----	----	----



# Pierres des Châteaux



8,8 mm R10-B

## CHENONCEAU



Pattern by size 100x100 (40"x40")



8,8 mm R10-B

FLOOR: Chenonceau 100x100 (60°x40°) Nat. Ret.





# Pierres des Châteaux

8,8 mm R10-B



FLOOR: Cheverny 100x100 (40"x40") Nat. Ret.  
WALL: Ussé 100x100 (40"x40") Nat. Ret.  
WALL AND LOW WALL: Cheverny 100x100 (40"x40") Nat. Ret.  
WASHBASIN: Cheverny 30x60 (12"x24") Nat. Ret.

FUSION BATHTUB - DEVON&DEVON

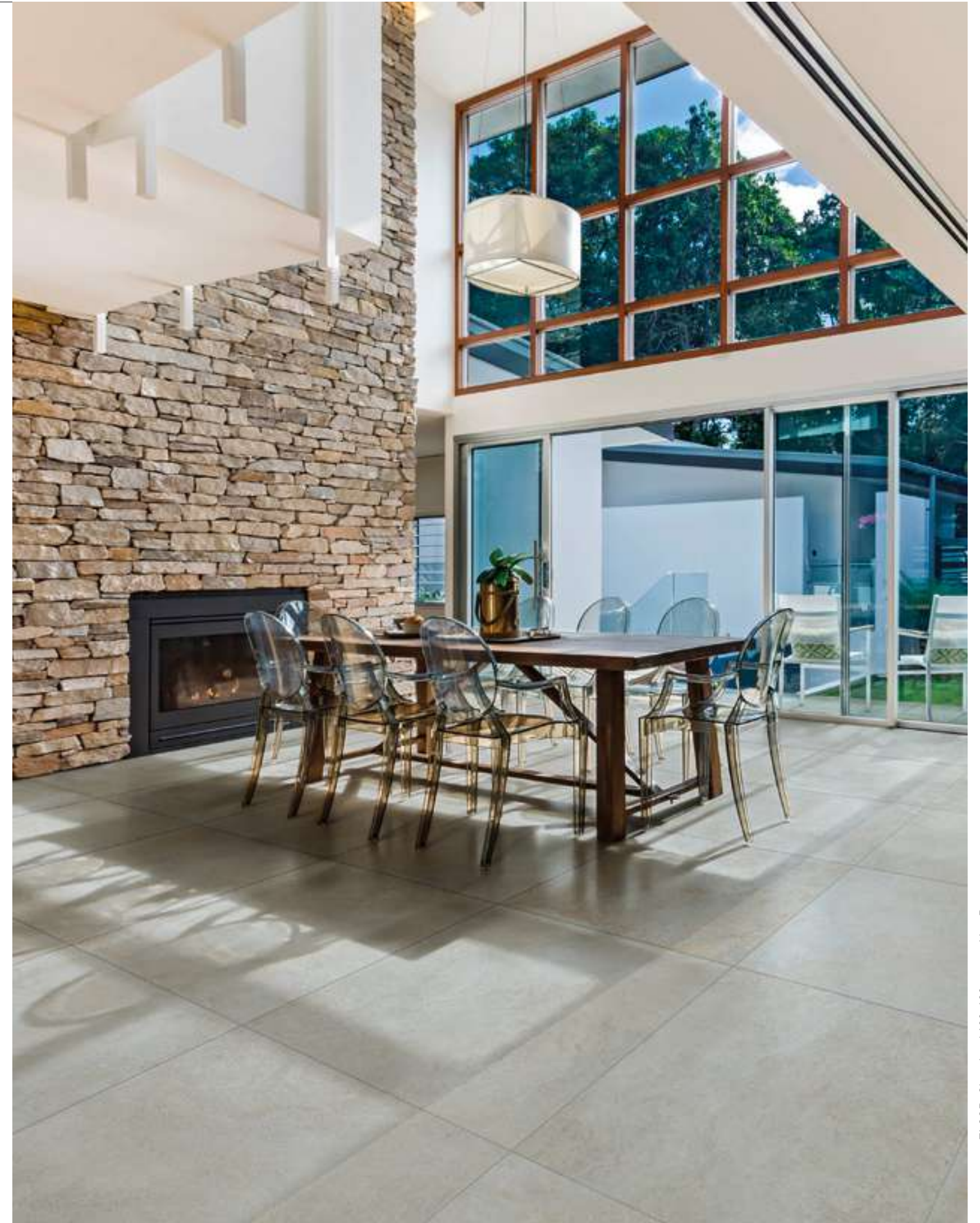
FLOOR: Ussé 60x120 (24"x48") - 60x60 (24"x24") - 30x60 (12"x24") Nat. Ret.



# Pierres des Châteaux

8,8 mm R10-B

FLOOR: Fontainebleau 100x100 (40°x40°) Nat. Ret.





# Pierres des Châteaux

## Chenonceau

8,8 mm R10-B



**100x100 . 40"x40"**  
Nat. Ret.  
**158065**



**60x120 . 24"x48"**  
Nat. Ret.  
**158050**



**60x60 . 24"x24"**  
Nat. Ret.  
**158020**



**30x60 . 12"x24"**  
Nat. Ret.  
**158060**

modular system

Pattern by size 100x100 (40"x40")



## Cheverny

8,8 mm R10-B



**100x100 . 40"x40"**  
Nat. Ret.  
**158061**



**60x120 . 24"x48"**  
Nat. Ret.  
**158046**



**60x60 . 24"x24"**  
Nat. Ret.  
**158016**



**30x60 . 12"x24"**  
Nat. Ret.  
**158056**

modular system

Pattern by size 100x100 (40"x40")





# Pierres des Châteaux

## Chambord

8,8 mm R10-B



**100x100 . 40"x40"**  
Nat. Ret.  
**158062**



**60x120 . 24"x48"**  
Nat. Ret.  
**158047**



**60x60 . 24"x24"**  
Nat. Ret.  
**158017**



**30x60 . 12"x24"**  
Nat. Ret.  
**158057**

modular system

Pattern by size 100x100 (40"x40")

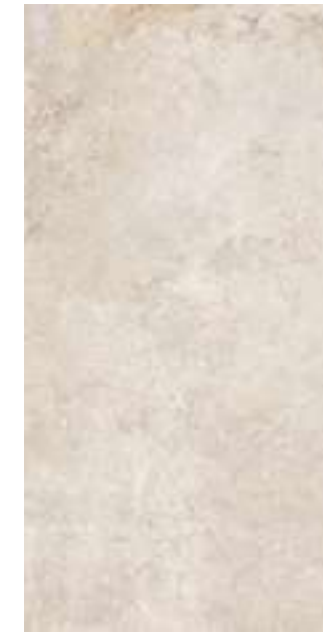


## Fontainebleau

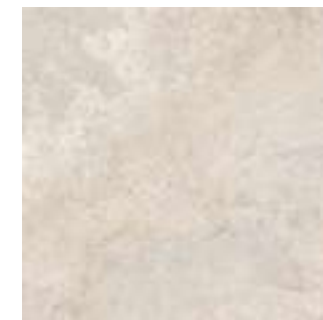
8,8 mm R10-B



**100x100 . 40"x40"**  
Nat. Ret.  
**158064**



**60x120 . 24"x48"**  
Nat. Ret.  
**158049**



**60x60 . 24"x24"**  
Nat. Ret.  
**158019**



**30x60 . 12"x24"**  
Nat. Ret.  
**158059**

modular system

Pattern by size 100x100 (40"x40")



# Pierres des Châteaux

Ussé

8,8 mm R10-B



**100x100 . 40"x40"**  
Nat. Ret.  
**158063**



**60x120 . 24"x48"**  
Nat. Ret.  
**158048**



**60x60 . 24"x24"**  
Nat. Ret.  
**158018**



**30x60 . 12"x24"**  
Nat. Ret.  
**158058**

modular system

Pattern by size 100x100 (40"x40")



ANSI A - 137.1: 2012  
WET DYNAMIC COEFFICIENT OF FRICTION | DCOF ≥ 0,42

8,8 mm  
R10B

	100x100 40"x40"	60x120 24"x48"	60x60 24"x24"	30x60 12"x24"
	Nat Ret	Nat Ret	Nat Ret	Nat Ret
CHENONCEAU ●	158065	158050	158020	158060
CHAMBORD ●	158062	158047	158017	158057
CHEVERNY ●	158061	158046	158016	158056
FONTAINEBLEAU ●	158064	158049	158019	158059
USSÉ ●	158063	158048	158018	158058
<b>Price code</b>	<b>M128</b>	<b>M122</b>	<b>M118</b>	<b>M110</b>

Pezzi Speciali / Trims. Pièces speciale. Die Sonderstücke

8,8 mm

	7x100 Nat Ret	7x60 Nat Ret	33x60 Nat Ret	33x60 Nat Ret
CHENONCEAU ●	158110	158120	158210	158231SX 158220 DX
CHAMBORD ●	158107	158117	158207	158227 SX 158217 DX
CHEVERNY ●	158106	158116	158206	158226 SX 158216 DX
FONTAINEBLEAU ●	158109	158119	158209	158229 SX 158219 DX
USSÉ ●	158108	158118	158208	158228 SX 158218 DX
<b>Price code</b>	<b>P040</b>	<b>P025</b>	<b>P156</b>	<b>P190</b>

Imballi / Packings. Emballage. Verpackung

	PCS/BOX	MQ/BOX	KG/BOX	BOX/PAL	MQ/PAL	KG/PAL	PACKING	PACKING SIZE
<b>8,8 mm</b>								
100 x 100	2	2,00	40	24	48,00	986	PALLET CON SPONDE	103 x 123 x 74h
60 x 120	2	1,44	27,32	32	46,08	896	EPAL	80 x 120 x 75h
60 x 60	3	1,08	20,31	40	43,20	834	EPAL	80 x 120 x 75h
30 x 60	7	1,26	24,00	48	60,48	1.174	EPAL	80 x 120 x 75h



**Pallet speciale con sponda**  
Special pallet with sides.  
Palette spéciale avec bords.  
Spezial-Palette mit Wandungen.



**Epal / Pallet**

PEZZI SPECIALI. TRIMS	PCS/BOX	MQ/BOX	KG/BOX	PACKING	PACKING SIZE
<b>8,8 mm</b>					
BATTISCOPIA 7x100	6	0,42	8,10	EPAL	80 x 120
BATTISCOPIA 7x60	15	0,63	13,28	EPAL	80 x 120
GRADINO COSTA RETTA 33x60x3,2h**	4	-	20,70	EPAL	80 x 120
GRADINO COSTA RETTA 33x60x3,2h SX/DX**	2	-	10,80	EPAL	80 x 120

**\*\* A disposizione solo su richiesta. Tempi di consegna: 30gg**  
Available upon request only.  
Delivery terms: 30 days  
Disponible seulement sur requête.  
Délais de livraison: 30 jours  
Verfügbar auf Anfrage.  
Lieferzeit: 30 Tage



PINOT GRIGIO

CHAMPAGNE

SOAVE

CHARDONNAY

AMARONE

# IL CERRETO



Floor: Chardonnay 23x149 (9"x58 1/2") Nat. Ret.

COLORED BODY PORCELAIN STONEWARE  
ISO 13006 - G - B1a (E < 0,5%) - UNI EN 14411 - GL

**ADVANCE**<sup>®</sup>  
ANTIBACTERIAL & BIO-AIR PURIFYING

100% DESIGN  
AND PRODUCTION  
OF ITALY

V2  
SHADE SPECTRUM  
MODERATE

INDOOR R10-B



23x149 . 9"x58 1/2"  
Nat. Ret.

8,8 mm

PATTERN BY SIZE

23x149  
8,8 mm

21

# Il Cerreto



8,8 mm R10-B

## Chardonnay



Pattern by size 23x149 (9"x58 1/2")



8,8 mm R10-B



FLOOR: Il Cerreto Amarone 23x149 (9"x58 1/2") Nat. Ret.  
WALL: Pierres des Châteaux Fontainebleau 60x60 (24"x24") Nat. Ret.



# Il Cerreto

8,8 mm R10-B



FLOOR: Amarone 23x149 (9"x58 1/2") Nat. Ret.

FLOOR: Champagne 23x149 (9"x58 1/2") Nat. Ret.



# Il Cerreto

8,8 mm R10-B



FLOOR: Soave 23x149 (9"x58 1/2") Nat. Ret.

## Pinot Grigio



8,8 mm R10-B

**23x149** . 9"x58 1/2"  
Nat. Ret.  
**157044**

Pattern by size 23x149 (9"x58 1/2")



## Champagne



8,8 mm R10-B

**23x149** . 9"x58 1/2"  
Nat. Ret.  
**157045**

Pattern by size 23x149 (9"x58 1/2")





## Soave



8,8 mm R10-B

23x149 . 9"x58 1/2"  
Nat. Ret.  
157043

Pattern by size 23x149 (9"x58 1/2")



## Chardonnay



8,8 mm R10-B

23x149 . 9"x58 1/2"  
Nat. Ret.  
157041

Pattern by size 23x149 (9"x58 1/2")



## Amarone



8,8 mm R10-B

23x149 . 9"x58 1/2"  
Nat. Ret.  
157042

Pattern by size 23x149 (9"x58 1/2")



8,8 mm  
R 10 B

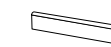


23,4x148  
9 1/8"x58 1/4"

	Nat Ret
PINOT GRIGIO	157049
CHAMPAGNE	157050
SOAVE	157048
CHARDONNAY	157046
AMARONE	157047
<b>Price code</b>	<b>M119</b>

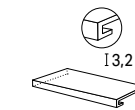
### Pezzi Speciali / Trims. Pièces speciale. Die Sonderstücke

8,8 mm  
R 10 B



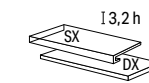
**Battiscopa**  
Skirting

6,5x148



**Gradino costa retta\*\***  
Straight nosed stair\*\*

33x120



**Gradino costa retta SX - DX\*\***  
Straight-edge step L-R

33x120

	Nat Ret	Nat Ret	Nat Ret
PINOT GRIGIO	157114	157209	157219 DX 157229 SX
CHAMPAGNE	157111	157206	157216 DX 157226 SX
SOAVE	157112	157207	157217 DX 157227 SX
CHARDONNAY	157113	157208	157218 DX 157228 SX
AMARONE	157115	157210	157220 DX 157230 SX
<b>Price code</b>	<b>P046</b>	<b>P235</b>	<b>P282</b>

### Imballi / Packings. Emballage. Verpackung

	PCS/BOX	MQ/BOX	KG/BOX	BOX/PAL	MQ/PAL	KG/PAL	PACKING	PACKING SIZE
8,8 mm 23,4 x 148	3	1,04	20,75	48	49,92	1.016	PALLET	152 x 77,6 x 16,1h



Epal / Pallet

PEZZI SPECIALI. TRIMS	PCS/BOX	MQ/BOX	KG/BOX	PACKING	PACKING SIZE
8,8 mm BATTISCOPA 6,5 x 148	6	-	9,94	EPAL	80 x 120
GRADINO COSTA RETTA 33 x 120 x 3,2h**	2	-	20,70	EPAL	80 x 120
GRADINO COSTA RETTA 33 x 120 x 3,2h SX/DX **	1	-	10,80	EPAL	80 x 120

\*\* A disposizione solo su richiesta. Tempi di consegna: 30gg  
Available upon request only. Delivery terms: 30 days  
Disponible seulement sur requête. Délais de livraison: 30 jours  
Verfügbar auf Anfrage. Lieferzeit: 30 Tage



## IL CERRETO - Technical specifications

ISO 13006 - EN 14411 - ISO 10545 Standards

Nominal sizes (cm): <b>23,4x148</b>	Thickness (mm) : <b>8.8</b>
Sides: <b>Rectified</b>	Surface: <b>Advance</b>
	Product Group: <b>Bla-GL</b>

Technical characteristics		Test method	EN 14411 and ISO 13006 requirements	Italcer Average values
Dimensions	Length and width	ISO 10545-2	±0.6% and ± 2.0mm Rect. : ±0.3% and ± 1.0mm	Compliant
	Straightness of sides	ISO 10545-2	±0.5% and ± 1.5mm Rect. : ±0.3% and ± 0.8mm	Compliant
	Rectangularity	ISO 10545-2	±0.5% and ± 2.0mm Rect. : ±0.3% and ± 1.5mm	Compliant
	Flatness	ISO 10545-2	±0.5% and ± 2.0mm Rect. : ±0.4% and ± 1.8mm	Compliant
	Thickness	ISO 10545-2	±5% and ± 0.5mm	Compliant
Water absorption		ISO 10545-3	≤ 0.5%	Compliant
Modulus of rupture		ISO 10545-4	≥ 35 N/mm <sup>2</sup>	Compliant
Breaking strength (S)		ISO 10545-4	≥ 1300 N	Compliant
Abrasion resistance		ISO 10545-7	Declared class	PEI 5; PEI 4 (Pinot grigio); PEI 3 (Amarone)
Linear thermal expansion		ISO 10545-8	Declared value	$\alpha \leq 7.1 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$
Thermal shock resistance		ISO 10545-9	No alterations	Resistant
Frost resistance		ISO 10545-12	No alterations	Resistant
Chemical resistance		ISO 10545-13	Declared value	LA – HA
Household chemicals resistance		ISO 10545-13	B min.	A
Stain resistance		ISO 10545-14	Class 3 min.	5
Mohs Hardness		UNI EN 101	5 Min.	7
Slip Resistance		DIN 51130	Declared value	R10 ; R11 (out)
		DIN 51097	Declared value	B ; C (out)
		ANSI A137.1	Declared value	> 0.42
		B.C.R.A. Rep. CEC/81	Declared value	/
		BS 7976	Declared value	/
Shade variation		ANSI A 137.1	Not required	V2
Fire reaction		UNI EN 13501-1	-	A1 <sub>FL</sub> class
Thermal Conductivity		EN 12524	Not required	$\lambda = 1.3 \text{ W/m}\cdot\text{K}$
Light and colour fastness		DIN 51094	Not required	No variations

Rubiera, February 19 2024

Italcer Quality Department

## Pierres des Chateaux- Technical specifications

ISO 13006 - EN 14411 - ISO 10545 Standards

Nominal sizes (cm): <b>30x60; 60x60; 60x120; 100x100</b>	Thickness (mm) : <b>8.8</b>
Sides: <b>Rectified</b>	Surface: <b>Advance</b>
	Product Group: <b>Bla-UGL</b>

Technical characteristics		Test method	EN 14411 and ISO 13006 requirements	Italcer Average values
Dimensions	Length and width	ISO 10545-2	±0.6% and ± 2.0mm Rect. : ±0.3% and ± 1.0mm	Compliant
	Straightness of sides	ISO 10545-2	±0.5% and ± 1.5mm Rect. : ±0.3% and ± 0.8mm	Compliant
	Rectangularity	ISO 10545-2	±0.5% and ± 2.0mm Rect. : ±0.3% and ± 1.5mm	Compliant
	Flatness	ISO 10545-2	±0.5% and ± 2.0mm Rect. : ±0.4% and ± 1.8mm	Compliant
	Thickness	ISO 10545-2	±5% and ± 0.5mm	Compliant
	Water absorption		ISO 10545-3	≤ 0.5%
Modulus of rupture		ISO 10545-4	≥ 35 N/mm <sup>2</sup>	Compliant
Breaking strength (S)		ISO 10545-4	≥ 1300 N	Compliant
Abrasion resistance		ISO 10545-6	≤175 mm <sup>3</sup>	Compliant
Linear thermal expansion		ISO 10545-8	Declared value	$\alpha \leq 7.1 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$
Thermal shock resistance		ISO 10545-9	No alterations	Resistant
Frost resistance		ISO 10545-12	No alterations	Resistant
Chemical resistance		ISO 10545-13	Declared value	LA – HA
Household chemicals resistance		ISO 10545-13	B min.	A
Stain resistance		ISO 10545-14	Class 3 min.	5
Mohs Hardness		UNI EN 101	5 Min.	7
Slip Resistance		DIN 51130	Declared value	R10; R11(out)
		DIN 51097	Declared value	B; C (out)
		ANSI A137.1	Declared value	> 0.42
		B.C.R.A. Rep. CEC/81	Declared value	/
		BS 7976	Declared value	/
Shade variation		ANSI A 137.1	Not required	V3
Fire reaction		UNI EN 13501-1	-	A1 <sub>FL</sub> class
Thermal Conductivity		EN 12524	Not required	$\lambda = 1.3 \text{ W/m}\cdot\text{K}$
Light and colour fastness		DIN 51094	Not required	No variations

Rubiera, February 19, 2024

Italcer Quality Department

# TEST REPORTS



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 29622  
 Phone 864.646.8453 Fax 864.646.2821  
 Email testing@tcnatile.com Web www.TCNAtile.com

**TCNA TEST REPORT NUMBER:** TCNA-0001-21 **PAGE:** 1 OF 3

**TEST REQUESTED BY:** Italcer  
 Attn: Elena Vandelli  
 Via Emilia Ovest 53/a  
 Rubiera, 42048  
 ITALY

**TEST SUBJECT MATERIAL:** Identified by client as: **“Product name:  
 Gold - Royal Stone collection - Italcer Group”**

**TEST DATE:** 11/29/2021 - 12/28/2021

**TEST PROCEDURE:**  
 ISO 18061:2014(E): Fine Ceramics (Advanced Ceramics, Advanced Technical Ceramics) —  
 Determination of antiviral activity of semiconducting photocatalytic materials.  
 Test method was modified to test with Influenza A virus (H3N2).

**TEST CONDITIONS:**  
 Test sample size: 50 mm x 50 mm  
 Test viruses and cell lines:

Virus	Cell line
Influenza A virus (H3N2) ATCC VR-1679	MDCK ATCC CCL-34

Volume of test suspension applied on test sample: 0.15 mL  
 Infectivity titer of virus: 10<sup>6</sup> TCID50/mL  
 Exposure conditions: UV irradiation and Dark conditions  
 Exposure time: 4 hours  
 Environmental conditions for UV exposure: Temperature at 25°C ± 1  
 RH ≥ 90%  
 UV exposure intensity: 0.25 mW/cm<sup>2</sup>  
 UV lamp: Interlight F40 T10/BLB 130V 40W  
 UV light radiometer: Mannix UV340

This report is confidential and has been prepared for the exclusive use of the client. It is not an endorsement, approval, certification, or criticism of any product by TCNA. This report shall not be published in any form without prior written consent from TCNA.





**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 29625  
 Phone 864.646.8453 Fax 864.646.2821  
 Email testing@tcnatile.com Web www.TCNAtile.com

TCNA TEST REPORT NUMBER: TCNA-0001-21 PAGE: 2 OF 3

Test Results: Results of UV irradiation test performed on “Gold - Royal Stone collection - Italcser Group”

ISO 18061 using Influenza A virus (H3N2) on Gold - Royal Stone collection - Italcser Group					
Sample	Infectivity Titer	Exposure Conditions	Exposure Time	Reduction under UV exposure on non-treated*	Reduction under UV exposure on Gold - Royal Stone collection - Italcser Group *
“Gold - Royal Stone collection - Italcser Group”	10 <sup>6</sup> TCID50/mL	UV Irradiation at 0.25 mW/cm <sup>2</sup>	4 hours	No reduction	99%

Test Results: Results of Dark condition test performed on “Gold - Royal Stone collection - Italcser Group”

ISO 18061 using Influenza A virus (H3N2) on Gold - Royal Stone collection - Italcser Group					
Sample	Infectivity Titer	Exposure Conditions	Exposure Time	Reduction under Dark conditions on non-treated*	Reduction under Dark conditions on Gold - Royal Stone collection - Italcser Group *
“Gold - Royal Stone collection - Italcser Group”	10 <sup>6</sup> TCID50/mL	Dark (no UV light)	4 hours	No reduction	90%



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 29625  
 Phone 864.646.8453 Fax 864.646.2821  
 Email testing@tcnatile.com Web www.TCNAtile.com

TCNA TEST REPORT NUMBER: TCNA-0001-21 PAGE: 3 OF 3

**DISCLAIMER AND LIMITATION OF LIABILITY**

This report is provided for the sole use of the client and no one else. It is intended for professional use by a knowledgeable professional. If published by the client, it must be published in full, including this disclaimer and limitation of liability.

This report is not an endorsement, recommendation, approval, certification, or criticism by TCNA of any particular product or its application. TCNA recommends that anyone considering the use or installation of a particular product consult with the manufacturer or an industry professional for advice specific to the person’s needs and consider any applicable laws, statutes, codes, or regulations relevant to the particular product. TCNA does not know all the different manners and applications in which a client’s particular product might be used, and, therefore, it disclaims any and all duty to provide warnings or to further investigate the suitability of the use of a particular product in a particular situation.


Unless otherwise expressly stated, TCNA tested the specific test subject material provided by the client and identified in the lab report, as indicated by the client. TCNA does not independently verify the information provided by the client, and it makes no representation that similar results would be achieved with other, untested materials, even if such other materials purportedly have the same product name, are purportedly of the same or similar type of tile or product made by the client, or are purportedly from the same batch of tile or product. Nor does TCNA state that the date in this report is representative of production occurring at the same time or at any other time. Only the manufacturer may make that claim, based on sampling and quality control parameters beyond the knowledge and control of TCNA. TCNA does not provide any supervision, review, management, or quality control of any manufacturer’s production.

TCNA makes no representation that the client’s products are uniform or identical to the test subject material, that the test subject material is suitable for any particular use, application, or installation, or that it will exhibit the same properties when installed or used in a particular manner. The data provided in this report results from standardized laboratory testing performed under laboratory conditions. As such it does not represent all conditions under which the products may be used or subjected. For testing on actual materials being used or considered for a job site, contact TCNA for sampling provisions and possible testing.

This report is intended solely to provide the results of the test procedure stated above as performed on the test subject material provided by the client, and may not be relied on for any other purpose. TCNA MAKES NO OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY DISCLAIMED. IN THE EVENT OF A DISPUTE CONCERNING THIS REPORT, THE EXCLUSIVE REMEDY FOR CLIENT SHALL BE FOR TCNA TO REPEAT THE TEST REQUESTED, BUT IN NO EVENT SHALL TCNA BE LIABLE FOR AN AMOUNT GREATER THAN THE AMOUNT IT RECEIVED FROM CLIENT FOR THE TEST. UNDER NO CIRCUMSTANCES WILL TCNA BE LIABLE TO CLIENT FOR ANY OTHER DAMAGES (NOR SHALL IT BE LIABLE TO ANY OTHER PERSON OR BUSINESS ENTITY FOR ANY DAMAGES), INCLUDING WITHOUT LIMITATION ANY AND ALL DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES, RESULTING, IN WHOLE OR IN PART, FROM ANY USE OF, REFERENCE TO, OR RELIANCE UPON THE REPORT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. TCNA DISCLAIMS ALL LIABILITY TO ANY THIRD PARTY CONCERNING THIS REPORT. THE FOREGOING LIMITATION OF LIABILITY IS A FUNDAMENTAL ELEMENT OF TCNA’S AGREEMENT TO CONDUCT AND PROVIDE THE REPORT.

12/28/2021

Dr. Jyothi Rangineni  
 Research Scientist



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 864.646.8453 Fax 864.646.2827  
 Email testing@tcnatile.com Web www.TCNAtile.com

---

**TCNA TEST REPORT NUMBER:** TCNA-0002-21 **PAGE:** 1 OF 4

**TEST REQUESTED BY:** Italcer  
 Attn: Elena Vandelli  
 Via Emilia Ovest 53/a  
 Rubiera, 42048  
 ITALY

**TEST SUBJECT MATERIAL:** Identified by client as: **“Product name: Gold - Royal Stone collection - Italcer Group”**

**TEST DATE:** 10/21/2020 - 1/8/2021

**TEST PROCEDURE:**  
 ISO 18061:2014(E): *Fine Ceramics (Advanced Ceramics, Advanced Technical Ceramics) – Determination of antiviral activity of semiconducting photocatalytic materials.*  
 Test method was modified to test with Human Coronavirus 229E.

**TEST VIRUSES AND CELL LINES:**

Virus	Cell line
Human Coronavirus 229E ATCC VR-740	MRC-5 ATCC CCL-171


**ASTM Guidance on SARS-CoV-2 Surrogate Selection:**  
 Surrogates of SARS-CoV-2 used in this testing are Human Coronavirus 229E and OC43. Surrogates were selected based on guidance provided by ASTM E35 Committee for Pesticides, Antimicrobials, and Alternative Control Agents. Further information on surrogate selection guidance provided by ASTM can be found here – [https://www.astm.org/COMMIT/GuidanceCOVID19SurrogateSel\\_April242020press.pdf](https://www.astm.org/COMMIT/GuidanceCOVID19SurrogateSel_April242020press.pdf)

**TEST CONDITIONS:**

Test sample size:	50 mm x 50 mm
Volume of test suspension applied on test sample:	0.15 mL
Infectivity titer of virus:	10 <sup>6</sup> TCID <sub>50</sub> /mL
Exposure conditions:	UV irradiation and Dark conditions
Exposure time:	30 minutes to 8 hours
Environmental conditions for UV exposure:	Temperature at 25°C ± 1 RH ≥ 90%
UV exposure intensity:	0.25 mW/cm <sup>2</sup>
UV lamp:	Interlight F40 T10/BLB 130V 40W
UV light radiometer:	Mannix UV340

---

This report is confidential and has been prepared for the exclusive use of the client. It is not an endorsement, approval, certification, or criticism of any product by TCNA. This report shall not be published in any form without prior written consent from TCNA.



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 864.646.8453 Fax 864.646.2827  
 Email testing@tcnatile.com Web www.TCNAtile.com

---


**TCNA TEST REPORT NUMBER:** TCNA-0002-21 **PAGE:** 2 OF 4

**Test Results:** Results of UV irradiation test performed on **“Gold - Royal Stone collection - Italcer Group”**

ISO 18061 using Human Coronavirus 229E on Gold - Royal Stone collection - Italcer Group					
Sample	Infectivity Titer	Exposure Conditions	Exposure Time	Reduction under UV exposure on non-treated*	Reduction under UV exposure on <b>Gold - Royal Stone collection - Italcer Group</b> *
“Gold - Royal Stone collection - Italcer Group”	10 <sup>6</sup> TCID <sub>50</sub> /mL	UV Irradiation at 0.25 mW/cm <sup>2</sup>	15 minutes	No reduction	90%
			30 minutes	No reduction	90%
			1 hour	No reduction	90%
			2 hours	No reduction	90%
			3 hours	No reduction	90%
			4 hours	No reduction	96%
			6 hours	No reduction	100%
			8 hours	No reduction	100%

\* Reduction calculated as percentage per the initial infectivity titer inoculated on the surface of the tile sample





**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 864.646.8453 Fax 864.646.2821  
 Email testing@tcnatile.com Web www.TCNAtile.com


---

TCNA TEST REPORT NUMBER: **TCNA-0002-21** PAGE: 3 OF 4

**Test Results:** Results of Dark condition test performed on “Gold - Royal Stone collection - Italcer Group”

ISO 18061 using Human Coronavirus 229E on Gold - Royal Stone collection - Italcer Group					
Sample	Infectivity Titer	Exposure Conditions	Exposure Time	Reduction under Dark conditions on non-treated*	Reduction under Dark conditions on <b>Gold - Royal Stone collection - Italcer Group</b> *
“Gold - Royal Stone collection - Italcer Group”	10 <sup>6</sup> TCID50/mL	Dark (no UV light)	15 minutes	No reduction	No reduction
			30 minutes	No reduction	90%
			1 hour	No reduction	90%
			2 hours	No reduction	90%
			3 hours	No reduction	90%
			4 hours	No reduction	90%
			6 hours	No reduction	93%
8 hours	No reduction	99%			

\* Reduction calculated as percentage per the initial infectivity titer inoculated on the surface of the tile sample



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 864.646.8453 Fax 864.646.2821  
 Email testing@tcnatile.com Web www.TCNAtile.com

---

TCNA TEST REPORT NUMBER: **TCNA-0002-21** PAGE: 4 OF 4

**DISCLAIMER AND LIMITATION OF LIABILITY**

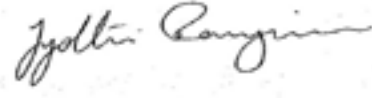
This report is provided for the sole use of the client and no one else. It is intended for professional use by a knowledgeable professional. If published by the client, it must be published in full, including this disclaimer and limitation of liability.

This report is not an endorsement, recommendation, approval, certification, or criticism by TCNA of any particular product or its application. TCNA recommends that anyone considering the use or installation of a particular product consult with the manufacturer or an industry professional for advice specific to the person’s needs and consider any applicable laws, statutes, codes, or regulations relevant to the particular product. TCNA does not know all the different manners and applications in which a client’s particular product might be used, and, therefore, it disclaims any and all duty to provide warnings or to further investigate the suitability of the use of a particular product in a particular situation.

Unless otherwise expressly stated, TCNA tested the specific test subject material provided by the client and identified in the lab report, as indicated by the client. TCNA does not independently verify the information provided by the client, and it makes no representation that similar results would be achieved with other, untested materials, even if such other materials purportedly have the same product name, are purportedly of the same or similar type of tile or product made by the client, or are purportedly from the same batch of tile or product. Nor does TCNA state that the date in this report is representative of production occurring at the same time or at any other time. Only the manufacturer may make that claim, based on sampling and quality control parameters beyond the knowledge and control of TCNA. TCNA does not provide any supervision, review, management, or quality control of any manufacturer’s production.

TCNA makes no representation that the client’s products are uniform or identical to the test subject material, that the test subject material is suitable for any particular use, application, or installation, or that it will exhibit the same properties when installed or used in a particular manner. The data provided in this report results from standardized laboratory testing performed under laboratory conditions. As such it does not represent all conditions under which the products may be used or subjected. For testing on actual materials being used or considered for a job site, contact TCNA for sampling provisions and possible testing.

This report is intended solely to provide the results of the test procedure stated above as performed on the test subject material provided by the client, and may not be relied on for any other purpose. TCNA MAKES NO OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY DISCLAIMED. IN THE EVENT OF A DISPUTE CONCERNING THIS REPORT, THE EXCLUSIVE REMEDY FOR CLIENT SHALL BE FOR TCNA TO REPEAT THE TEST REQUESTED, BUT IN NO EVENT SHALL TCNA BE LIABLE FOR AN AMOUNT GREATER THAN THE AMOUNT IT RECEIVED FROM CLIENT FOR THE TEST. UNDER NO CIRCUMSTANCES WILL TCNA BE LIABLE TO CLIENT FOR ANY OTHER DAMAGES (NOR SHALL IT BE LIABLE TO ANY OTHER PERSON OR BUSINESS ENTITY FOR ANY DAMAGES), INCLUDING WITHOUT LIMITATION ANY AND ALL DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES, RESULTING, IN WHOLE OR IN PART, FROM ANY USE OF, REFERENCE TO, OR RELIANCE UPON THE REPORT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. TCNA DISCLAIMS ALL LIABILITY TO ANY THIRD PARTY CONCERNING THIS REPORT. THE FOREGOING LIMITATION OF LIABILITY IS A FUNDAMENTAL ELEMENT OF TCNA’S AGREEMENT TO CONDUCT AND PROVIDE THE REPORT.




1/13/2021

Dr. Jyothi Rangineni  
Research Scientist

---

This report is confidential and has been prepared for the exclusive use of the client. It is not an endorsement, approval, certification, or criticism of any product by TCNA. This report shall not be published in any form without prior written consent from TCNA.



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 864.646.8453 Fax 864.646.282\*  
 Email testing@tcnabile.com Web www.TCNAfile.com

---

**TCNA TEST REPORT NUMBER:** TCNA-0492-20 **PAGE:** 1 OF 3

**TEST REQUESTED BY:** Italcer  
 Attn: Elena Vandelli  
 Via Emilia Ovest 53/a  
 Rubiera, 42048  
 ITALY

**TEST SUBJECT MATERIAL:** Identified by client as: **“B, B3”**

**TEST DATE:** 8/27/2020 - 9/30/2020


**TEST PROCEDURE:**  
 ISO 27447:2019(E): Test method for antibacterial activity of semiconducting photocatalytic materials – E. coli and S. aureus.

**TEST CONDITIONS:**

Test sample size:	50 mm x 50 mm
Test bacteria:	E. coli ATCC 8739 S. aureus ATCC 6538P
Volume of test suspension applied on test sample:	0.15 mL
UV exposure intensity:	0.25 mW/cm <sup>2</sup> and 1 mW/cm <sup>2</sup>
UV exposure time:	8 hours
Environmental conditions for UV exposure:	Temperature at 25°C ± 1 RH ≥ 90%
UV lamp:	Interlight F40 T10/BLB 130V 40W
UV light radiometer:	Mannix UV340

---

This report is confidential and has been prepared for the exclusive use of the client. It is not an endorsement, approval, certification, or criticism of any product by TCNA. This report shall not be published in any form without prior written consent from TCNA.



**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 864.646.8453 Fax 864.646.282\*  
 Email testing@tcnabile.com Web www.TCNAfile.com

---

**TCNA TEST REPORT NUMBER:** TCNA-0492-20 **PAGE:** 2 OF 3

**Test Results:** Results of testing performed on sample **“B”** UV irradiation

Sample	Bacteria	Inoculum cfu/ml	Test number	Percentage Reduction UV 0.25 mW/cm <sup>2</sup> *	Percentage Reduction UV 1 mW/cm <sup>2</sup> *	Percentage Reduction Dark*
<b>“B”</b>	<i>E. coli</i>	10 <sup>6</sup>	Test 1	96.4%	100%	93.4%
			Test 2	95.0%	100%	95.7%
			Test 3	95.9%	100%	95.9%
	<i>S. aureus</i>	10 <sup>6</sup>	Test 1	100%	100%	96.7%
			Test 2	99.9%	100%	95.5%
			Test 3	100%	100%	97.2%

\* Reduction in bacteria calculated per the initial number of bacteria inoculated on the surface of the bacteria

**Test Results:** Results of testing performed on sample **“B3”** UV irradiation

Sample	Bacteria	Inoculum cfu/ml	Test number	Percentage Reduction UV 0.25 mW/cm <sup>2</sup> *	Percentage Reduction UV 1 mW/cm <sup>2</sup> *	Percentage Reduction Dark*
<b>“B3”</b>	<i>E. coli</i>	10 <sup>6</sup>	Test 1	90.8%	100%	92.8.4%
	<i>S. aureus</i>	10 <sup>6</sup>	Test 1	99.1%	100%	94.9%

\* Reduction in bacteria calculated per the initial number of bacteria inoculated on the surface of the bacteria

---

This report is confidential and has been prepared for the exclusive use of the client. It is not an endorsement, approval, certification, or criticism of any product by TCNA. This report shall not be published in any form without prior written consent from TCNA.





**PRODUCT PERFORMANCE TESTING LABORATORY**  
 100 Clemson Research Blvd., Anderson, SC 2962E  
 Phone 854.646.8453 Fax 854.646.2821  
 Email testing@tcnabile.com Web www.TCNAtile.com

TCNA TEST REPORT NUMBER: TCNA-0492-20 PAGE: 3 OF 3

**DISCLAIMER AND LIMITATION OF LIABILITY**

This report is provided for the sole use of the client and no one else. It is intended for professional use by a knowledgeable professional. If published by the client, it must be published in full, including this disclaimer and limitation of liability.

This report is not an endorsement, recommendation, approval, certification, or criticism by TCNA of any particular product or its application. TCNA recommends that anyone considering the use or installation of a particular product consult with the manufacturer or an industry professional for advice specific to the person's needs and consider any applicable laws, statutes, codes, or regulations relevant to the particular product. TCNA does not know all the different manners and applications in which a client's particular product might be used, and, therefore, it disclaims any and all duty to provide warnings or to further investigate the suitability of the use of a particular product in a particular situation.

Unless otherwise expressly stated, TCNA tested the specific test subject material provided by the client and identified in the lab report, as indicated by the client. TCNA does not independently verify the information provided by the client, and it makes no representation that similar results would be achieved with other, untested materials, even if such other materials purportedly have the same product name, are purportedly of the same or similar type of tile or product made by the client, or are purportedly from the same batch of tile or product. Nor does TCNA state that the date in this report is representative of production occurring at the same time or at any other time. Only the manufacturer may make that claim, based on sampling and quality control parameters beyond the knowledge and control of TCNA. TCNA does not provide any supervision, review, management, or quality control of any manufacturer's production.

TCNA makes no representation that the client's products are uniform or identical to the test subject material, that the test subject material is suitable for any particular use, application, or installation, or that it will exhibit the same properties when installed or used in a particular manner. The data provided in this report results from standardized laboratory testing performed under laboratory conditions. As such it does not represent all conditions under which the products may be used or subjected. For testing on actual materials being used or considered for a job site, contact TCNA for sampling provisions and possible testing.

This report is intended solely to provide the results of the test procedure stated above as performed on the test subject material provided by the client, and may not be relied on for any other purpose. TCNA MAKES NO OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY DISCLAIMED. IN THE EVENT OF A DISPUTE CONCERNING THIS REPORT, THE EXCLUSIVE REMEDY FOR CLIENT SHALL BE FOR TCNA TO REPEAT THE TEST REQUESTED, BUT IN NO EVENT SHALL TCNA BE LIABLE FOR AN AMOUNT GREATER THAN THE AMOUNT IT RECEIVED FROM CLIENT FOR THE TEST. UNDER NO CIRCUMSTANCES WILL TCNA BE LIABLE TO CLIENT FOR ANY OTHER DAMAGES (NOR SHALL IT BE LIABLE TO ANY OTHER PERSON OR BUSINESS ENTITY FOR ANY DAMAGES), INCLUDING WITHOUT LIMITATION ANY AND ALL DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES, RESULTING, IN WHOLE OR IN PART, FROM ANY USE OF, REFERENCE TO, OR RELIANCE UPON THE REPORT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. TCNA DISCLAIMS ALL LIABILITY TO ANY THIRD PARTY CONCERNING THIS REPORT. THE FOREGOING LIMITATION OF LIABILITY IS A FUNDAMENTAL ELEMENT OF TCNA'S AGREEMENT TO CONDUCT AND PROVIDE THE REPORT.

10/15/2020

Dr. Jyothi Rangineni  
 Research Scientist

This report is confidential and has been prepared for the exclusive use of the client. It is not an endorsement, approval, certification, or criticism of any product by TCNA. This report shall not be published in any form without prior written consent from TCNA.



in collaborazione con Prof. Pier Giorgio Balboni  
 incarico di insegnamento come cultore della materia  
 "Microbiologia" dell'Università di Ferrara

**Rapporto di Prova / Test report N. 002/Cfr AV2020**

Data/ Date: 10/09/2020

Revisione 1 / Updated 1: 30/11/2020

Revisione 2 / Updated 2: 30/11/2020

**ISO 27447:2019 (E)**

*Measurement of antibacterial activity on plastics and other non-porous surfaces*

**Committente / Customer:** GRUPPO ITALCER Via Emilia Ovest 53/A 42048 Rubiera (Reggio Emilia)

**Campione/ Sample:** Serie Advance, linea Royal Stone – Gold. /  
 Advance series, Royal Stone - Gold line.

**Introduzione / Introduction**

**ISO 27447:2019. Fine ceramics (advanced ceramics, advanced technical ceramics) – Test method for antibacterial activity of semiconducting photocatalytic materials.**

La norma specifica un metodo di prova è generalmente applicabile ai materiali fotocatalitici e a prodotti con effetto antibatterico. La tipologia di materiali può essere di diversa caratteristica, ad esempio materiali utilizzati nei materiali da costruzione, quali ceramici fotocatalitici o semiconduttori in lamiera piana, cartone, a forma di lastra o tessuti che sono le forme di base dei materiali per varie applicazioni.

*The standard specifies a test method is generally applicable to photocatalytic materials and products with an antibacterial effect. The type of materials can be of different characteristics, for example materials used in building materials, such as photocatalytic ceramics or semiconductors in flat sheet, cardboard, sheet shape or fabrics which are the basic shapes of materials for various applications.*

**Sommario: / Abstract:**

Questa norma internazionale specifica un metodo di prova per la determinazione dell'attività antibatterica di materiali che contengono un fotocatalizzatore o hanno pellicole fotocatalitiche sulla superficie, misurando il conteggio dei batteri sotto l'irradiazione della luce ultravioletta.

*This International Standard specifies a test method for the determination of the antibacterial activity of materials that contain a photocatalyst or have photocatalytic films on the surface, by measuring the enumeration of bacteria under irradiation of ultraviolet light.*



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

**Termini e Definizioni / Terms and Definitions**

Fotocatalizzatore

sostanza che svolge molte funzioni basate su reazioni di ossidazione e riduzione sotto irradiazione ultravioletta (UV), compresa la decomposizione e la rimozione di contaminanti dell'aria e dell'acqua, deodorizzazione e azione antibatterica, autopulente e antiappannante.

Photocatalyst

substance that carries out many functions based on oxidization and reduction reactions under ultraviolet (UV) irradiation, including decomposition and removal of air and water contaminants, deodorization, and antibacterial, self-cleaning and antifogging actions.

Antibatterico

condizione che inibisce la crescita di batteri sulla superficie di materiali o panni a superficie piana.

Antibacterial

condition inhibiting the growth of bacteria on the surface of flat surface materials or cloths.

Valore dell'attività antibatterica del fotocatalizzatore per il metodo di adesione del film

differenza tra il numero totale di batteri vitali dei materiali a superficie piana trattati fotocatalitici e dei materiali non trattati dopo l'irradiazione UV.

Photocatalyst antibacterial activity value for film adhesion method

difference between the total number of viable bacteria of photocatalytic treated flat surface materials and non- treated materials after UV irradiation.

Lampada UV fluorescente

lampada che fornisce l'irradiazione UV-A entro un intervallo di lunghezze d'onda da 300 nm a 400 nm

Fluorescent UV lamp

lamp that provides UV-A irradiation within a wavelength range of 300 nm to 400 nm

Attività antibatterica

differenza nel logaritmo della conta delle cellule vitali rilevata su un prodotto trattato con antibatterico e un prodotto non trattato dopo l'inoculazione e l'incubazione dei batteri test.

antibacterial activity

difference in the logarithm of the viable cell counts found on an antibacterial-treated product and an untreated product after inoculation with and incubation of bacteria.



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

È stata valutata l'attività antimicrobica di provini di piastrelle di ceramica, trattate con una dispersione fotocatalitica effettuando il metodo secondo ISO 27447: 2019.

*In accordance with the ISO 27447: 2019 method, the antimicrobial activity of ceramic tile specimens treated with a photocatalytic dispersion was evaluated.*

Norma ISO applicata / ISO standard applied  
Data ricevimento: / Receipt date:  
Data inizio method test / Start of test method  
Data termine method test / Ends test method  
Revisione 1 / Updated 1  
Revisione 2 / Updated 2

**EN 27447:2019**  
03/09/2020  
03/09/2020  
10/09/2020  
25/09/2020  
30/11/2020

Identificazione del campione / Identification of the sample :  
Denominazione / Name of the product .....  
Dimensioni./ Dimensions (measures) .....

**MATERIALE CERAMICO:**  
**Serie Advance, linea Royal Stone – Gold. / CERAMIC MATERIAL:**  
Advance series, Royal Stone – Gold line.  
Campione trattato: / Sample treated:  
5 x 5 cm spessore / thickness 0,8 cm  
Campione non trattato: / Untreated sample:  
5 x 5 cm spessore / thickness 0,8 cm

Ditta produttrice / Manufacturer.(Committente / Customer)....

**GRUPPO ITALCER** - Reggio Emilia

Campionamento dei provini/ Sampling of specimens.....

Eseguito dal committente / Performed by the customer  
03/09/2020

Data del campionamento / Date sampling

Fase preliminare: / Preliminary phase  
modalità di disinfezione dei campioni (pre-test) / sample disinfection methods (pre-test).....  
Stoccaggio dei provini / Storage conditions .....  
Caratteristiche Cover o film di copertura: / Characteristics Cover or covering film

Trattamento in autoclave a 121°C per 15 min.  
Autoclave treatment at 121 ° C for 15 min.

Temperatura ambiente / Room temperature  
Film in polypropylene 4 x 4 cm – spessore 0,10 mm / Polypropylene film 4 x 4 cm - 0.10 mm thick

c) Metodo test e Validazione / Test method and its validation:  
Metodo / Method .....

Diluzione-neutralizzazione / Dilution-neutralization;  
Soybean-casein digest broth with lecithin and polysorbate 80 (SCDLP)

Neutralizzante / Neutraliser .....

d) Condizioni sperimentali: / Experimental conditions:  
Periodo di analisi / Period of analysis .....

dal 03/09/2020 al 10/09/2020  
from 03/09/2020 to 10/09/2020


Tempo di esposizione / Exposition time

t = 8 ore

Caratteristiche lampada UV / UV lamp characteristics.....

intensità UV: 0.25mW/cm<sup>2</sup>  
lampada UV - 18 W a vapori di mercurio (PHILIPS PL-L. 18W/10/4P)  
UV intensity: 0.25mW / cm<sup>2</sup>  
UV lamp - 18 W mercury vapor





in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

Identificazione del ceppo batterico utilizzato /  
*Identification of the bacterial strain used*..... *Escherichia coli* ATCC 8739


Volume inoculo della sospensione test di E.coli /  
*Inoculum volume of the E.coli test suspension* 150 µl

Temperatura di incubazione batteri /  
*Temperature of incubation of bacteria* 35 °C ± 2 °C  
(tecnica diluizione-neutralizzazione e conta in piastra in  
inclusione) / *Temperature of incubation of bacteria*  
(*dilution-neutralization technique and pour-plate method*)


**Foto campioni / samples picture.**

Provini di Ceramica fotocatalitica Serie  
Advance, linea Royal Stone – Gold  
(ITALCER)  
(con trattamento) /  
*Specimens of photocatalytic ceramic Serie  
Advance, linea Royal Stone – Gold  
(ITALCER)  
(with treatment)*

Provini di Ceramica non fotocatalitica STD  
(ITALCER)  
(senza trattamento)  
*Non photocatalytic ceramic specimens  
STD (ITALCER)  
(without treatment)*



4



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

e) RISULTATI DEL TEST / *TEST RESULTS* :

Campione / *Sample*: Provini **Serie Advance, linea Royal Stone - Gold** (ITALCER) /  
*Specimens Advance series, Royal Stone – Gold line (ITALCER)*

Metodo analitico / *Analytical method* : ISO 24774: 2019 – *Film adhesion method*:  
Attività antibatterica di provini di ceramica fotocatalitica nei confronti di *E.coli* ATCC 8739 /  
*Antibacterial activity of photocatalytic ceramic specimens against E.coli ATCC 8739*

<b>Test di laboratorio / Lab test:</b>	<b>Campione / Sample</b> <i>Serie Advance, linea Royal Stone - Gold</i>	UM*1	Risultato / <i>Result</i>
<b>N</b> microrganismi sospensione batterica iniziale / <i>initial bacterial suspension microorganisms</i>		CFU*2 /ml	2,2x10 <sup>6</sup>
<b>A</b> – Valore medio microrganismi materiale non fotocatalitico dopo inoculo / <i>average number of viable bacteria of non-treated specimens, just after inoculation</i>		CFU*2 /ml	1,2x10 <sup>4</sup>
<b>B<sub>L</sub></b> – Valore medio microrganismi materiale non fotocatalitico dopo inoculo con irraggiamento UV / <i>average number of viable bacteria of non-treated specimens, after UV irradiation of intensity L</i>		CFU*2 /ml	9,8x10 <sup>3</sup>
<b>C<sub>L</sub></b> – Valore medio microrganismi materiale fotocatalitico dopo inoculo con irraggiamento UV / <i>average number of viable bacteria of photocatalytic treated specimens, after UV irradiation of intensity L</i>		CFU*2 /ml	1,9x10 <sup>2</sup>
<b>R<sub>L</sub></b> – Attività antibatterica materiale fotocatalitico con irraggiamento UV espresso in Logaritmo / <i>photocatalyst antibacterial activity value, after irradiation at a constant intensity (L) on a photocatalytic material express in Log</i>	R <sub>L</sub> = Log BL/CL	Log <sub>10</sub> *3	1,7
Riduzione (%) batterica del materiale fotocatalitico nei confronti materiale non fotocatalitico con irraggiamento UV / <i>Bacterial (%) reduction of photocatalytic material compared to non-photocatalytic material with UV irradiation</i>		%	98,4%
<b>B<sub>D</sub></b> – valore medio microrganismi materiale non fotocatalitico senza irraggiamento UV al buio / <i>average number of viable bacteria of non-treated specimens, after being kept in a dark place</i>		CFU*2 /ml	2,0x10 <sup>4</sup>
<b>C<sub>D</sub></b> – valore medio microrganismi materiale fotocatalitico senza irraggiamento UV al buio/ <i>average number of viable bacteria of photocatalytic treated specimens, after being kept in a dark place</i>		CFU*2 /ml	8,3x10 <sup>2</sup>
<b>ΔR (Delta R)</b> – Attività antibatterica materiale fotocatalitico / <i>photocatalyst antibacterial activity value with UV irradiation</i>	ΔR = Log (BL/CL)- Log (BD/CD)	Log <sub>10</sub>	0,25

\*1 UM= Unità di Misura / *Unit of Measure*  
\*2 CFU= Unità formante colonia o cellule batteriche o batteri / *Colony-forming unit or bacterial cells or bacteria*  
\*3 LOG<sub>10</sub>= Valore del Logaritmo in base 10 / *Logarithm value*

5



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

**f) CONCLUSIONI / CONCLUSIONS:**

Il metodo test secondo le condizioni di prova specificate nella norma ISO 27447:2019 determina la sopravvivenza del ceppo batterico test (*Escherichia coli* ATCC 8739) sulla superficie di provini di materiale ceramico, denominato **Serie Advance, linea Royal Stone - Gold (ITALCER)**, sottoposto a irraggiamento con UV per 8 ore, dimostrando che la riduzione batterica è pari al **98,4%**.

È possibile concludere in base ai requisiti e metodo della ISO 27447:2019 che il materiale ceramico fotocatalitico Serie Advance, linea Royal Stone - Gold (ITALCER), presenta una significativa attività inibitoria (antimicrobica) nei confronti del ceppo batterico *Escherichia coli* dopo irraggiamento UV.

Il campione Serie Advance, linea Royal Stone - Gold, trattato ad attività fotocatalitica nei confronti del non trattato, senza irraggiamento UV e mantenuto al buio per 8 ore, rileva attività antimicrobica e presenta una riduzione antibatterica pari al 96,5%.

*According to the test conditions specified in the ISO 27447: 2019 standard The test method determines the survival of the bacterial test strain (Escherichia coli ATCC 8739) on the surface of specimens of ceramic material, Advance series, Royal Stone – Gold line (ITALCER), radiated with UV rays for 8 hours, inducing bacterial reduction equal to 98,4%.*

*According to the requirements and method of ISO 27447: 2019 it can be concluded that the photocatalytic ceramic material Advance series, Royal Stone – Gold line (ITALCER) has a significant inhibitory (antimicrobial) activity against the bacterial strain Escherichia coli after UV irradiation.*

*Sample Advance series, Royal Stone – Gold line, treated with photocatalytic activity against the untreated, without UV irradiation and kept in the dark for 8 hours, has antimicrobial activity and shows a antibacterial reduction of 96,5%.*

g) locality, date:  
Ferrara, 10/09/2020  
Revisione 1 / Updated 1: 25/09/2020  
Revisione 2 / Updated 2: 30/11/2020

identified signature



in collaborazione con il / in collaboration with the  
Consorzio Futuro in Ricerca

(in collaborazione Firma / in collaboration Signature  
Prof. Pier Giorgio Balboni  
Prof. cultore della materia "Microbiologia"  
dell'Università di Ferrara in collaborazione con il Consorzio  
Futuro in Ricerca / Professor of the subject "Microbiology"  
of the University of Ferrara in collaboration with Consorzio  
Futuro in Ricerca

I risultati analitici si intendono riferiti esclusivamente al campione analizzato. Il presente Documento non può essere riprodotto neppure in forma parziale salvo approvazione scritta da parte del Responsabile. Questo report è valido elettronicamente, perché costituisce copia esatta controllata e firmata del certificato di analisi originale, conservato in accordo alle procedure di Norme di Buona Prassi di Laboratorio. /  
The results is referred only to the sample analyzed. The present certificate of analysis cannot be reproduced even in part without permission of Responsible of certificate. This report is electronically valid, because it is controlled and exact copy of the signed original of the certificate of analysis, stored procedures according to requirements of Good Laboratory Practice.



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

**Rapporto di Prova / Test report N. 010/Cfr AV2020**

Data/ Date: 05/11/2020

Revisione 1 / Updated : 30/11/2020

**ISO 27447:2019 (E)**

*Measurement of antibacterial activity on plastics and other non-porous surfaces*

Metodo e requisiti modificati.

**Committente / Customer:** GRUPPO ITALCER Via Emilia Ovest 53/A 42048 Rubiera (Reggio Emilia)

**Campione/ Sample:** Serie Advance, linea Royal Stone – Gold. /  
Advance series, Royal Stone - Gold line.

**Introduzione / Introduction**

**ISO 27447:2019. Fine ceramics (advanced ceramics, advanced technical ceramics) – Test method for antibacterial activity of semiconducting photocatalytic materials.**

La norma specifica un metodo di prova è generalmente applicabile ai materiali fotocatalitici e a prodotti con effetto antibatterico. La tipologia di materiali può essere di diversa caratteristica, ad esempio materiali utilizzati nei materiali da costruzione, quali ceramici fotocatalitici o semiconduttori in lamiera piana, cartone, a forma di lastra o tessuti che sono le forme di base dei materiali per varie applicazioni.

Il Metodo e i requisiti ISO 27447 riguardano il ceppo di prova, *Staphylococcus aureus*, e l'intensità della luce UV (0.25 mW/cm<sup>2</sup>).

*The standard specifies a test method is generally applicable to photocatalytic materials and products with an antibacterial effect. The type of materials can be of different characteristics, for example materials used in building materials, such as photocatalytic ceramics or semiconductors in flat sheet, cardboard, sheet shape or fabrics which are the basic shapes of materials for various applications.*

*According ISO 27447 the method and requirements concern the test strains, such as Staphylococcus aureus, and the intensity of UV light (0.25 mW/cm<sup>2</sup>).*

**Sommario: / Abstract:**

Questa norma internazionale specifica un metodo di prova per la determinazione dell'attività antibatterica di materiali che contengono un fotocatalizzatore o hanno pellicole fotocatalitiche sulla superficie, misurando il conteggio dei batteri sotto l'irradiazione della luce ultravioletta.

*This International Standard specifies a test method for the determination of the antibacterial activity of materials that contain a photocatalyst or have photocatalytic films on the surface, by measuring the enumeration of bacteria under irradiation of ultraviolet light.*





in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

**Termini e Definizioni / Terms and Definitions**

Fotocatalizzatore

sostanza che svolge molte funzioni basate su reazioni di ossidazione e riduzione sotto irradiazione ultravioletta (UV), compresa la decomposizione e la rimozione di contaminanti dell'aria e dell'acqua, deodorizzazione e azione antibatterica, autopulente e antiappannante.

Photocatalyst

substance that carries out many functions based on oxidization and reduction reactions under ultraviolet (UV) irradiation, including decomposition and removal of air and water contaminants, deodorization, and antibacterial, self-cleaning and antifogging actions.

Antibatterico

condizione che inibisce la crescita di batteri sulla superficie di materiali o panni a superficie piana.

Antibacterial

condition inhibiting the growth of bacteria on the surface of flat surface materials or cloths.

Valore dell'attività antibatterica del fotocatalizzatore per il metodo di adesione del film

differenza tra il numero totale di batteri vitali dei materiali a superficie piana trattati fotocatalitici e dei materiali non trattati dopo l'irradiazione UV.

Photocatalyst antibacterial activity value for film adhesion method

difference between the total number of viable bacteria of photocatalytic treated flat surface materials and non- treated materials after UV irradiation.

Lampada UV fluorescente

lampada che fornisce l'irradiazione UV-A entro un intervallo di lunghezze d'onda da 300 nm a 400 nm

Fluorescent UV lamp

lamp that provides UV-A irradiation within a wavelength range of 300 nm to 400 nm

Attività antibatterica

differenza nel logaritmo della conta delle cellule vitali rilevata su un prodotto trattato con antibatterico e un prodotto non trattato dopo l'inoculazione e l'incubazione dei batteri test.

antibacterial activity

difference in the logarithm of the viable cell counts found on an antibacterial-treated product and an untreated product after inoculation with and incubation of bacteria.



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

È stata valutata l'attività antimicrobica di provini di piastrelle di ceramica, trattate con una dispersione fotocatalitica effettuando il metodo secondo ISO 27447: 2019.

*In accordance with the ISO 27447: 2019 method, the antimicrobial activity of ceramic tile specimens treated with a photocatalytic dispersion was evaluated.*

Norma ISO applicata / ISO standard applied  
**Metodo e requisiti / Method and requirements**

**EN 27447:2019**

Data ricevimento: / Receipt date:  
Data inizio method test / Start of test method  
Data termine method test / Ends test method  
Revisione 1 / Updated 1

03/09/2020  
29/10/2020  
05/11/2020  
30/11/2020

Identificazione del campione / Identification of the sample :  
Denominazione / Name of the product .....  
Dimensioni./ Dimensions (measures) .....

**MATERIALE CERAMICO:**  
**Serie Advance, linea Royal Stone – Gold. /**  
**CERAMIC MATERIAL:**  
*Advance series, Royal Stone – Gold line.*  
Campione trattato: / Sample treated:  
5 x 5 cm spessore / thickness 0,8 cm  
Campione non trattato: / Untreated sample:  
5 x 5 cm spessore / thickness 0,8 cm

Ditta produttrice / Manufacturer.(Committente / Customer)....

Campionamento dei provini/ Sampling of specimens.....

Data del campionamento / Date sampling

**GRUPPO ITALCER - Reggio Emilia**

Eseguito dal committente /  
Performed by the customer  
03/09/2020

Fase preliminare: / Preliminary phase  
modalità di disinfezione dei campioni (pre-test) /  
sample disinfection methods (pre-test).....  
Stoccaggio dei provini / Storage conditions .....  
Caratteristiche Cover o film di copertura: /  
Characteristics Cover or covering film

Trattamento in autoclave a 121°C per 15 min.  
Autoclave treatment at 121 °C for 15 min.

Temperatura ambiente / Room temperature  
Film in polypropylene 4 x 4 cm – spessore  
0,10 mm / Polypropylene film 4 x 4 cm - 0.10  
mm thick

c) Metodo test e Validazione / Test method and its validation:  
Metodo / Method .....

Neutralizzante / Neutraliser .....

Diluzione-neutralizzazione /  
Dilution-neutralization;  
Soybean-casein digest broth with lecithin  
and polysorbate 80 (SCDLP)

d) Condizioni sperimentali: / Experimental conditions:  
Periodo di analisi / Period of analysis .....

dal 29/10/2020 al 05/11/2020  
from 29/10/2020 to 05/11/2020

Tempo di esposizione / Exposition time

t = 8 ore

Caratteristiche lampada UV / UV lamp characteristics.....

intensità UV: 0.25 mW/cm<sup>2</sup>  
lampada UV – (PHILIPS -UV TUV)  
UV intensity: 0.25 mW / cm<sup>2</sup>  
UV lamp – (PHILIPS -UV TUV)



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

Identificazione del ceppo batterico utilizzato /  
*Identification of the bacterial strain used*..... *Staphylococcus aureus* ATCC 6538

Volume inoculo della sospensione test di *St. aureus* /  
*Inoculum volume of the St.aureus test suspension*

Temperatura di incubazione batteri /  
*Temperature of incubation of bacteria*  
(tecnica diluizione-neutralizzazione e conta in piastra in  
inclusione) / *Temperature of incubation of bacteria*  
(*dilution-neutralization technique and pour-plate method*)

400 µl  
35 °C ± 2 °C

**Foto campioni / samples picture.**

Provini di Ceramica fotocatalitica Serie Advance, linea Royal Stone – Gold (ITALCER) (con trattamento) /  
*Specimens of photocatalytic ceramic Serie Advance, linea Royal Stone – Gold (ITALCER) (with treatment)*




Provini di Ceramica non fotocatalitica STD (ITALCER) (senza trattamento) /  
*Non photocatalytic ceramic specimens STD (ITALCER) (without treatment)*





4



in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

e) **RISULTATI DEL TEST / TEST RESULTS :**

Campione / *Sample*: Provini Serie Advance, linea Royal Stone - Gold (ITALCER) /  
*Specimens Advance series, Royal Stone – Gold line (ITALCER)*

Metodo analitico / *Analytical method* : ISO 24774: 2019 – *Film adhesion method*:  
Attività antibatterica di provini di ceramica fotocatalitica nei confronti di *Staphylococcus aureus* ATCC 6538  
*Antibacterial activity of photocatalytic ceramic specimens against Staphylococcus aureus ATCC 6538*

Test di laboratorio / <i>Lab test</i> :	Campione / <i>Sample</i> Serie Advance, linea Royal Stone - Gold	UM*1	Risultato / <i>Result</i>
<b>N</b> microrganismi sospensione batterica iniziale / <i>initial bacterial suspension microorganisms</i>		CFU*2 /ml	2,2x10 <sup>6</sup>
<b>A</b> – Valore medio microrganismi materiale non fotocatalitico dopo inoculo / <i>average number of viable bacteria of non-treated specimens, just after inoculation</i>		CFU*2 /ml	2,4x10 <sup>5</sup>
<b>B<sub>L</sub></b> – Valore medio microrganismi materiale non fotocatalitico dopo inoculo con irraggiamento UV / <i>average number of viable bacteria of non-treated specimens, after UV irradiation of intensity L</i>		CFU*2 /ml	1,0x10 <sup>5</sup>
<b>C<sub>L</sub></b> – Valore medio microrganismi materiale fotocatalitico dopo inoculo con irraggiamento UV / <i>average number of viable bacteria of photocatalytic treated specimens, after UV irradiation of intensity L</i>		CFU*2 /ml	2,3x10 <sup>3</sup>
<b>R<sub>L</sub></b> – Attività antibatterica materiale fotocatalitico con irraggiamento UV espresso in Logaritmo / <i>photocatalyst antibacterial activity value, after irradiation at a constant intensity (L) on a photocatalytic material express in Log</i>	$R_L = \text{Log BL/CL}$	Log <sub>10</sub> *3	1,6
Riduzione (%) batterica del materiale fotocatalitico nei confronti materiale non fotocatalitico con irraggiamento UV / <i>Bacterial (%) reduction of photocatalytic material compared to non-photocatalytic material with UV irradiation</i>		%	99,0%
<b>B<sub>D</sub></b> – valore medio microrganismi materiale non fotocatalitico senza irraggiamento UV al buio / <i>average number of viable bacteria of non-treated specimens, after being kept in a dark place</i>		CFU*2 /ml	1,0x10 <sup>5</sup>
<b>C<sub>D</sub></b> – valore medio microrganismi materiale fotocatalitico senza irraggiamento UV al buio / <i>average number of viable bacteria of photocatalytic treated specimens, after being kept in a dark place</i>		CFU*2 /ml	1,8x10 <sup>5</sup>
<b>ΔR (Delta R)</b> – Attività antibatterica materiale fotocatalitico / <i>photocatalyst antibacterial activity value with UV irradiation</i>	$\Delta R = \text{Log (BL/CL)} - \text{Log (BD/CD)}$	Log <sub>10</sub>	0,89
Riduzione (%) batterica del materiale fotocatalitico nei confronti materiale non fotocatalitico senza irraggiamento UV al buio / <i>Bacterial (%) reduction of photocatalytic material compared to non-photocatalytic material without UV radiation in the dark</i>		%	82,0%

\*1 UM= Unità di Misura / *Unit of Measure*  
\*2 CFU= Unità formante colonia o cellule batteriche o batteri / *Colony-forming unit or bacterial cells or bacteria*  
\*3 LOG<sub>10</sub>= Valore del Logaritmo in base 10 / *Logarithm value*

5





in collaborazione con Prof. Pier Giorgio Balboni  
incarico di insegnamento come cultore della materia  
"Microbiologia" dell'Università di Ferrara

f) **CONCLUSIONI / CONCLUSIONS:**

Il metodo test secondo le condizioni di prova specificate nella norma ISO 27447:2019 determina la sopravvivenza del ceppo batterico test (*Staphylococcus aureus* ATCC 6538) sulla superficie di provini di materiale ceramico, denominato **Serie Advance, linea Royal Stone - Gold (ITALCER)**, sottoposto a irraggiamento con UV per 8 ore, dimostrando che la riduzione batterica è pari al **99,0%**.

È possibile concludere in base ai requisiti e metodo della ISO 27447:20019 che il materiale ceramico fotocatalitico Serie Advance, linea Royal Stone - Gold (ITALCER), presenta una ottima attività antimicrobica nei confronti del ceppo batterico *Staphylococcus aureus* dopo irraggiamento UV a 0.25 mW/cm<sup>2</sup>.

Il campione Serie Advance, linea Royal Stone - Gold, trattato ad attività fotocatalitica nei confronti del non trattato, senza irraggiamento UV e mantenuto al buio per 8 ore, presenta attività antimicrobica e una riduzione antibatterica pari al 82,0%.

*According to the test conditions specified in the ISO 27447: 2019 standard the test method determines the survival of the bacterial test strain (Staphylococcus aureus ATCC 6538) on the surface of specimens of ceramic material, Advance series, Royal Stone – Gold line (ITALCER), radiated with UV rays for 8 hours, inducing bacterial reduction equal to 99,0%.*

*According to the requirements and method of ISO 27447: 20019 it can be concluded that the photocatalytic ceramic material Advance series, Royal Stone – Gold line (ITALCER), has an excellent antimicrobial activity against the bacterial strain Staphylococcus aureus after UV irradiation at 0.25 mW / cm<sup>2</sup>.*

*Sample Advance series, Royal Stone – Gold line (ITALCER),, treated with photocatalytic activity against the untreated, without UV irradiation and kept in the dark for 8 hours, has antimicrobial activity and shows a antibacterial reduction of 82,0%.*

g) *locality, date:*  
Ferrara, 05/11/2020  
Revisione 1 / Updated 1: 30/11/2020

*identified signature*



in collaborazione con il / in collaboration with the  
Consorzio Futuro in Ricerca

(in collaborazione Firma / in collaboration Signature  
Prof. Pier Giorgio Balboni  
Prof. cultore della materia "Microbiologia"  
dell'Università di Ferrara in collaborazione con il Consorzio  
Futuro in Ricerca / Professor of the subject "Microbiology"  
of the University of Ferrara in collaboration with Consorzio  
Futuro in Ricerca

I risultati analitici si intendono riferiti esclusivamente al campione analizzato. Il presente Documento non può essere riprodotto neppure in forma parziale salvo approvazione scritta da parte del Responsabile. Questo report è valido elettronicamente, perché costituisce copia esatta controllata e firmata del certificato di analisi originale, conservato in accordo alle procedure di Norme di Buona Prassi di Laboratorio. /  
*The results is referred only to the sample analyzed. The present certificate of analysis cannot be reproduced even in part without permission of Responsible of certificate. This report is electronically valid, because it is controlled and exact copy of the signed original of the certificate of analysis, stored procedures according to requirements of Good Laboratory Practice.*

**Dipartimento di CHIMICA  
Laboratorio CEA  
- Chimica Energia Ambiente-**

UNIVERSITÀ  
DEGLI STUDI  
DI TORINO  
ALMA UNIVERSITAS  
TAURINENSIS



Prof. Claudio Minero  
Via Pietro Giuria 5  
Tel. 011- 670-8449/5293  
Fax 011 – 6705242  
e-mail: claudio.minero@unito.it

**Test report**

**Determination of the photocatalytic activity with the tangential flow method -  
reduction of nitric oxide  
(UNI 11484 simplified method, in accordance with CEN / TS 16980-1: 2016)  
on materials - Rondine ceramica, Advance Rondine Collections 3D series  
for**

**Italcer S.p.A  
Via Emilia Ovest 53/A  
42048 Rubiera (Re)  
P.Iva: 00142060359**

Torino, June 8, 2020

## Index

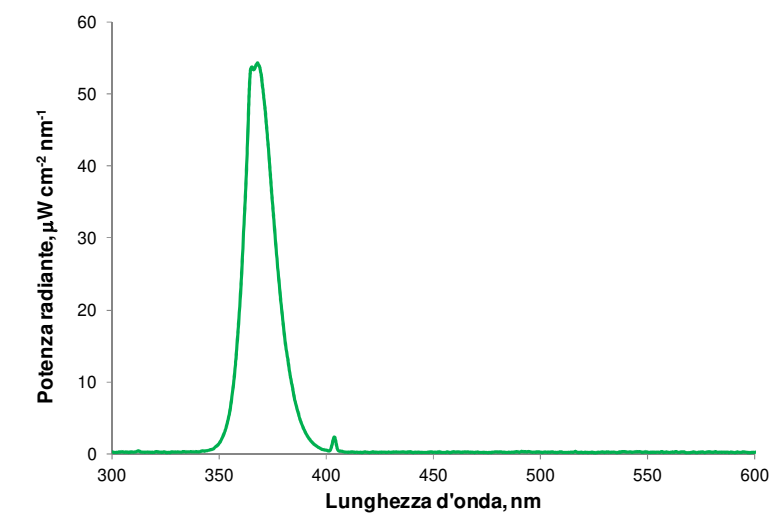
1. GENERAL TEST CONDITIONS.....	3
2. SAMPLES.....	4
3. EXPERIMENTAL RESULTS AND MEASURING CONDITIONS .....	6
3.1. SAMPLE "AR" (UNI 11484, UV) .....	6
3.2. SAMPLE "BR" (UNI 11484, UV).....	7
3.3. SAMPLE "CR" (UNI 11484, UV).....	8
3.4. SAMPLE "AR" (UNI 11484, VISIBLE) .....	9
3.5. SAMPLE "BR" (UNI 11484, VISIBLE) .....	10
3.6. SAMPLE "CR" (UNI 11484, VISIBLE) .....	11
4. SUMMARY OF RESULTS.....	12

## 1. GENERAL TEST CONDITIONS

The photocatalytic NO/NO<sub>x</sub> abatement tests were carried out using the method described in UNI 11484 (Determination of photocatalytic activity with a tangential continuous flow method - Abatement of nitric oxide - March 2013). The method follows the European Union technical specification CEN/TS 16980-1:2016 "Continuous flow methods – Part 1: Determination of NO in the air by photocatalytic materials". The tests were carried out with a simplified procedure, i.e. when the condition of stability of the concentrations measured under irradiation was reached or the maximum irradiation time was reached (according to the UNI 11484 180 minutes), the flow rate was not changed within the reactor, thus ending the test under these conditions. The irradiance was in UV 10 W m<sup>-2</sup> from 290 to 400 nm, e in deroga sotto irraggiamento visibile.

The determination of the NO/NO<sub>2</sub> content in the flow was carried out using an APNA 370 chemiluminescence detector (serial number WWSBNNW6). The measuring reactor had an internal volume of 3.6 dm<sup>3</sup>. The mixing inside the reactor was guaranteed by a compact axial fan EBMPAPST 612 JH (dimensions 60×60×32 mm) that provides a nominal flow equal to 70 m<sup>3</sup> h<sup>-1</sup>.

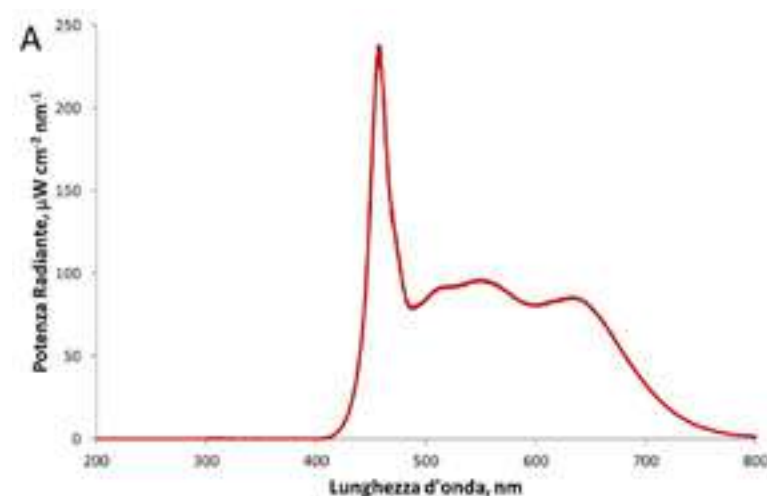
The irradiation took place with two different irradiation systems. In the first case, according to the indications of the UNI 11484 standard, the sample was irradiated in the UV by means of a set of two Philips PL-S 9W/2P BLB fluorescent lamps whose emission spectrum is shown in **Figure 1**. The intensity of the radiation incident on the sample was 10 W m<sup>-2</sup> between 290 and 400 nm.



**Figure 1.** Emission spectrum of the Philips PL-S 9W / 2P BLB lamp. The radiant power was measured in the same position in which the sample is housed by placing the Pyrex glass cover for closing the measuring reactor between the lamp and the sample.



In the case of Visible irradiation, at variance with the standard UNI 11484, it was used a LED illuminator (6500 K color temperature), assembled at the laboratories of the Department of Chemistry of the University of Turin, devoid of UV emission. The spectrum of this source (Figure 2) was characterized as shown below. The irradiance on the sample surface was **250 W m<sup>-2</sup> between 400 and 800 nm**.



**Figure 2.** Emission spectrum of the LED lighting system (6500 K color temperature). The radiant power was measured in the same position in which the sample is housed by placing the Pyrex glass cover for closing the measurement reactor between the lamp and the sample.

The irradiance at the surface of the samples was evaluated spectroradiometrically with the two employed irradiation systems, through the use of an Ocean Optics USB2000 + UV-VIS spectrophotometer equipped with an optical fiber having a diameter of 400 μm and length equal to 30 cm, and a cosine corrector (Ocean Optics CC-3-UV-T, PTFE optical diffuser, spectral range 200-2500 nm, external diameter 6.35 mm, field of view 180 °). The spectroradiometer was calibrated with an Ocean Optics DH-2000-CAL Deuterium-Halogen Light Source for UV-Vis-NIR measurements, calibrated in turn in absolute irradiance by the seller (Radiometric Calibration Standard UV-NIR, calibration certificate # 2162).

## 2. SAMPLES

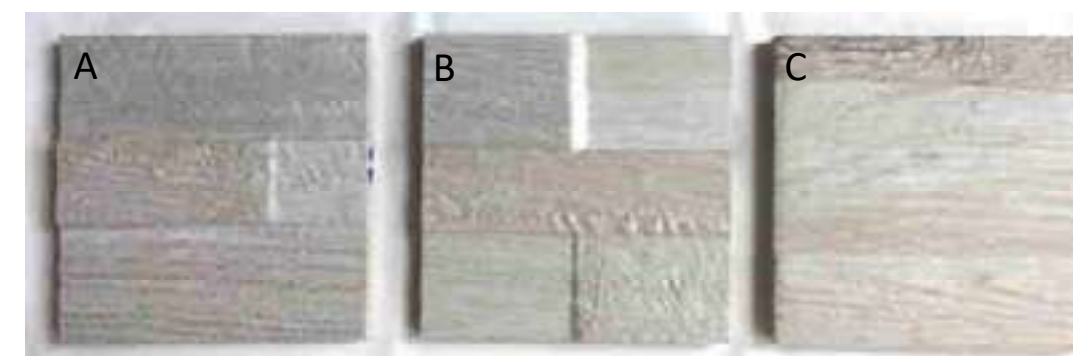
The samples (delivered directly by the client to UNITO on 21/05/2019) are 3 ceramic tiles (labeled AR, BR, CR, respectively, with dimensions 9.9 cm × 9.9 cm × 10 mm) with a potentially photoactive white paint deposited on one of the faces, whose photocatalytic properties are the subject of this document.

The tests in accordance with the UNI 11484 standard ("simplified" test) were performed on the samples as such **without any pretreatment**. The tests in accordance with the UNI 11484 standard, but with Visible radiation took place on the samples used for the test under UV radiation, but after washing with demineralized water and drying at 90 ° C.

The list of tested samples, with the respective irradiated surface area and an indication of the type of radiation used during the test, is reported in **Table 1**. The pictures of the tested samples are shown in **Figure 3**.

**Table 1.** Samples analyzed

Sample	Sample description	Irradiation	Test	Area, cm <sup>2</sup>	Pretreatment
AR (UV)	Ceramic tile	UV	NO/NO <sub>x</sub> , UNI 11484:2013	98.0	NO
BR (UV)	Ceramic tile	UV	NO/NO <sub>x</sub> , UNI 11484:2013	98.0	NO
CR (UV)	Ceramic tile	UV	NO/NO <sub>x</sub> , UNI 11484:2013	98.0	NO
AR(Vis)	Ceramic tile	Visible	NO/NO <sub>x</sub> , UNI 11484:2013 (Visible)	98.0	Washing with water after test in UV
BR(Vis)	Ceramic tile	Visible	NO/NO <sub>x</sub> , UNI 11484:2013 (Visible)	98.0	Washing with water after test in UV
CR(Vis)	Ceramic tile	Visible	NO/NO <sub>x</sub> , UNI 11484:2013 (Visible)	98.0	Washing with water after test in UV



**Figure 3.** Pictures of the samples tested according to UNI 11484:2013: A = AR, B = BR, C = CR . The sample face reported is the irradiated one (UV and Visible irradiation) during the photocatalytic NO / NO<sub>x</sub> abatement tests.

### 3. EXPERIMENTAL RESULTS AND MEASURING CONDITIONS

#### 3.1. Sample "AR" (UNI 11484, UV)

The following table shows the operating conditions used in the test and its results.

Initial concentration of nitrogen oxides before entering the reactor	$C_{NO}^{IN} = 0.515$ ppmv $C_{NO_2}^{IN} = 0.000$ ppmv
Gas flow	$F = 1.608$ dm <sup>3</sup> min <sup>-1</sup>
Temperature inside the reactor	$T = 29.2$ °C
Relative humidity inside the reactor	HR% = 45.1
Irradiance of the lamp to the sample surface (290-400 nm)	$I = 10$ W m <sup>-2</sup>
Time elapsed between the time the UV lamp is switched on and the start of the concentration recording	31.5 min
Conversion in the absence of sample	$C_{NO}^{OUT,BUIO} = 0.5036$ ppmv $C_{NO_2}^{OUT,BUIO} = 0.016$ ppmv $C_{NO_x}^{OUT,LUCE} = 0.4972$ ppmv $\eta_{NO}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buio} = 2.0$ % $\eta_{NO_2}^{buio} = -0.2$ %
Conversion under radiation in the presence of a sample	The graph showing the evolution of the concentrations during the various test steps is shown in Figure 4.
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

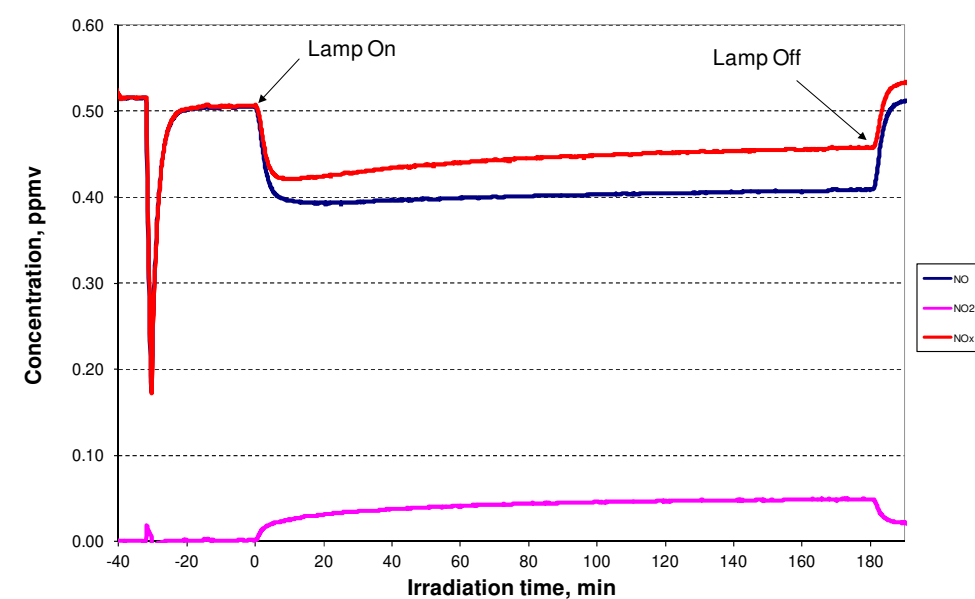


Figure 4. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on AR (UV) sample. Test dated 29-05-2020 and performed with UV irradiation in accordance with UNI 11484 (simplified).

#### 3.2. Sample "BR" (UNI 11484, UV)

The following table shows the operating conditions used in the test and its results.

Initial concentration of nitrogen oxides before entering the reactor	$C_{NO}^{IN} = 0.509$ ppmv $C_{NO_2}^{IN} = -0.002$ ppmv
Gas flow	$F = 1.608$ dm <sup>3</sup> min <sup>-1</sup>
Temperature inside the reactor	$T = 28.4$ °C
Relative humidity inside the reactor	HR% = 44.1
Irradiance of the lamp to the sample surface (290-400 nm)	$I = 10$ W m <sup>-2</sup>
Time elapsed between the time the UV lamp is switched on and the start of the concentration recording	31.5 min
Conversion in the absence of sample	$C_{NO}^{OUT,BUIO} = 0.5036$ ppmv $C_{NO_2}^{OUT,BUIO} = 0.016$ ppmv $C_{NO_x}^{OUT,LUCE} = 0.4972$ ppmv $\eta_{NO}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buio} = -1.0$ % $\eta_{NO_2}^{buio} = 0.1$ %
Conversion under radiation in the presence of a sample	The graph showing the evolution of the concentrations during the various test steps is shown in Figure 5.
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

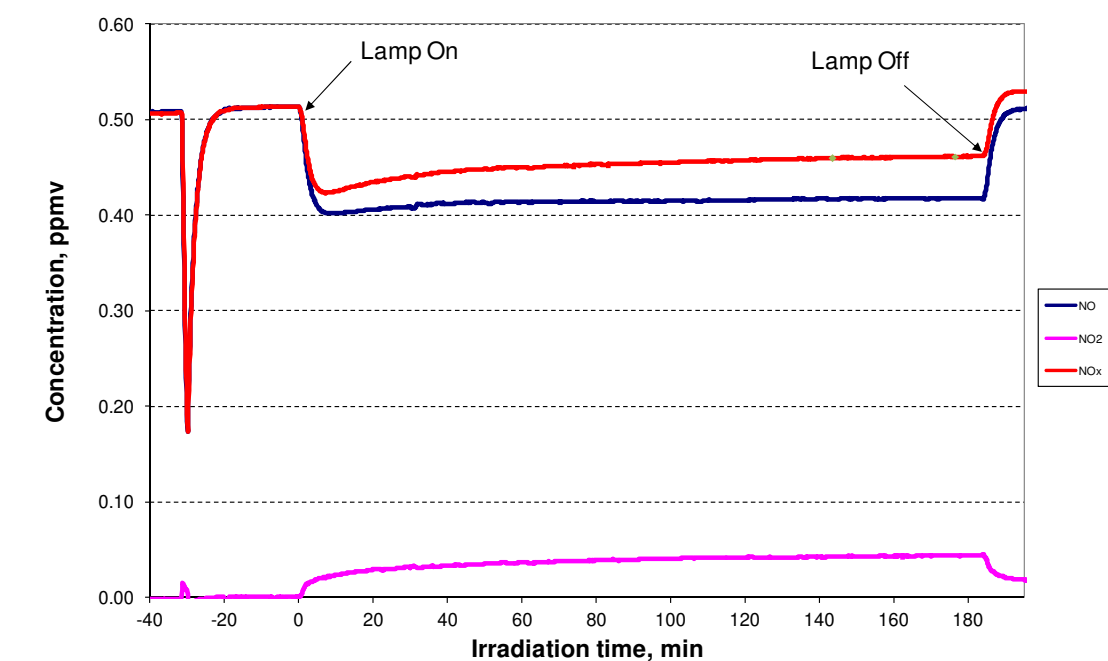


Figure 5. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on BR (UV) sample. Test dated 01/062020 and performed with UV irradiation in accordance with UNI 11484 (simplified).



### 3.3. Sample “CR” (UNI 11484, UV)

The following table shows the operating conditions used in the test and its results.

Initial concentration of nitrogen oxides before entering the reactor	$C_{NO}^{IN} = 0.513$ ppmv $C_{NO_2}^{IN} = 0.000$ ppmv
Gas flow	$F = 1.608$ dm <sup>3</sup> min <sup>-1</sup>
Temperature inside the reactor	$T = 28.7$ °C
Relative humidity inside the reactor	HR% = 43.4
Irradiance of the lamp to the sample surface (290-400 nm)	$I = 10$ W m <sup>-2</sup>
Time elapsed between the time the UV lamp is switched on and the start of the concentration recording	30.5 min
Conversion in the absence of sample	$C_{NO}^{OUT,BUIO} = 0.5036$ ppmv $C_{NO_2}^{OUT,BUIO} = 0.016$ ppmv $C_{NO}^{OUT,LUCE} = 0.4972$ ppmv $\eta_{NO}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buio} = 2.1$ % $\eta_{NO_2}^{buio} = 1.5$ %
Conversion under radiation in the presence of a sample	The graph showing the evolution of the concentrations during the various test steps is shown in Figure 6.
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

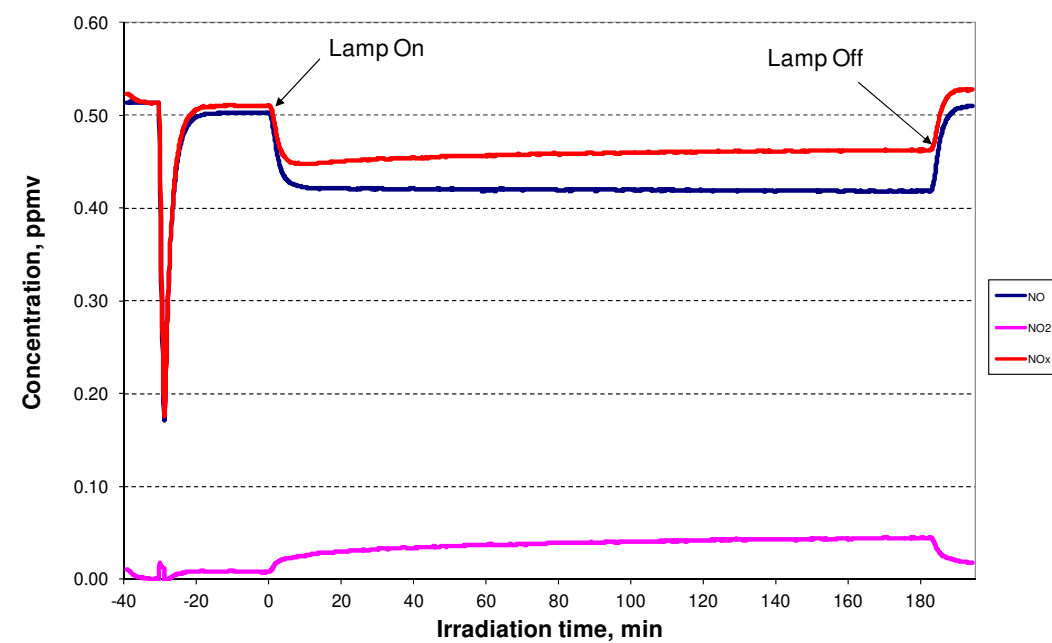


Figure 6. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on CR (UV) sample. Test dated 01/06/2020 and performed with UV irradiation in accordance with UNI 11484 (simplified).

### 3.4. Sample “AR” (UNI 11484, Visible)

The following table shows the operating conditions used in the test and its results.

Initial concentration of nitrogen oxides before entering the reactor	$C_{NO}^{IN} = 0.506$ ppmv $C_{NO_2}^{IN} = 0.001$ ppmv
Gas flow	$F = 1.608$ dm <sup>3</sup> min <sup>-1</sup>
Temperature inside the reactor	$T = 33.3$ °C
Relative humidity inside the reactor	HR% = 37.3
Irradiance of the lamp to the sample surface (in the VISIBLE range 400-800 nm)	$I = 250$ W m <sup>-2</sup>
Time elapsed between the time the VIS lamp is switched on and the start of the concentration recording	32 min
Conversion in the absence of sample	$C_{NO}^{OUT,BUIO} = 0.5036$ ppmv $C_{NO_2}^{OUT,BUIO} = 0.016$ ppmv $C_{NO}^{OUT,LUCE} = 0.4972$ ppmv $\eta_{NO}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buio} = -1.5$ % $\eta_{NO_2}^{buio} = 0.4$ %
Conversion under radiation in the presence of a sample	The graph showing the evolution of the concentrations during the various test steps is shown in Figure 7.
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

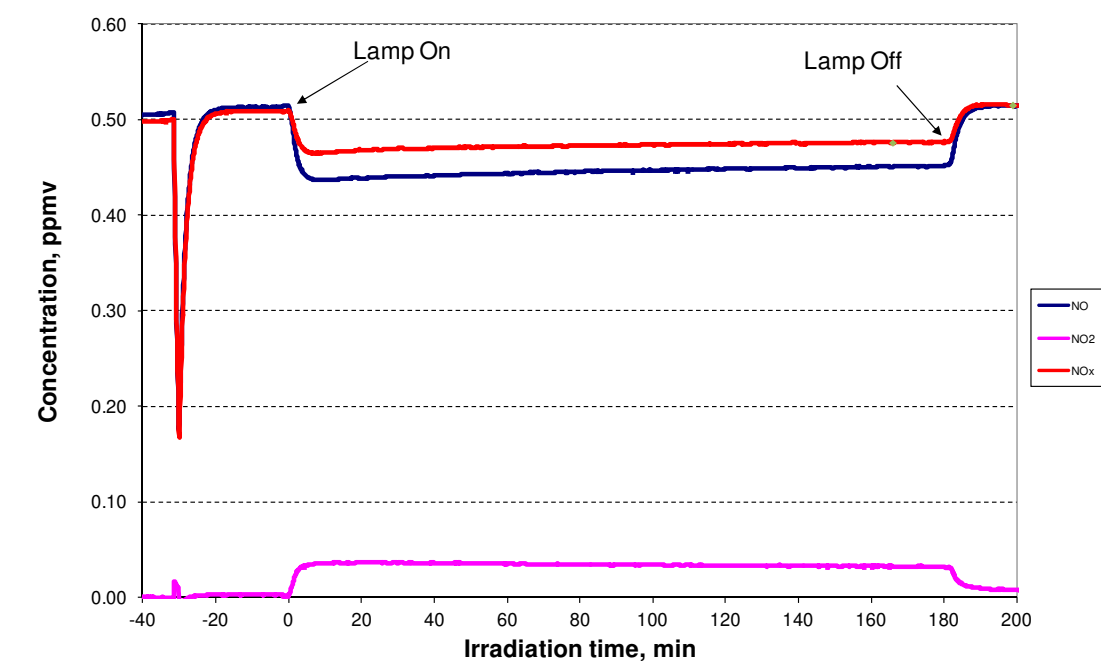
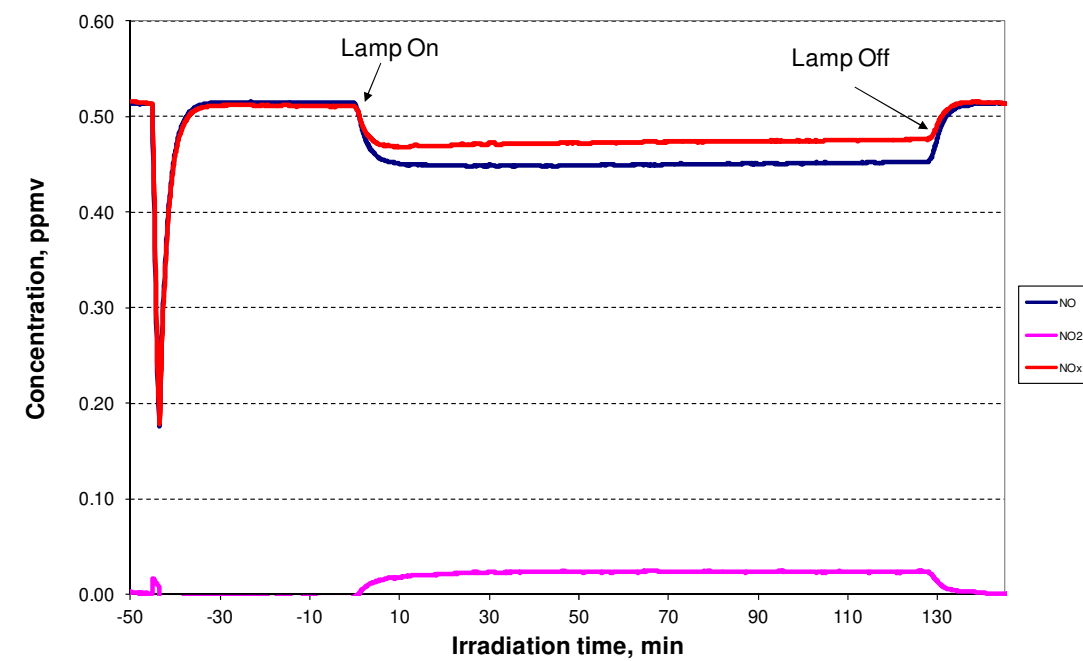


Figure 7. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on AR (Vis) sample. Test dated 03/06/2020 and performed in accordance with UNI 11484 (simplified) with VIS irradiation.

### 3.5. Sample “BR” (UNI 11484, Visible)

The following table shows the operating conditions used in the test and its results.

Initial concentration of nitrogen oxides before entering the reactor	$C_{NO}^{IN} = 0.513$ ppmv $C_{NO_2}^{IN} = 0.001$ ppmv
Gas flow	$F = 1.608$ dm <sup>3</sup> min <sup>-1</sup>
Temperature inside the reactor	$T = 33.4$ °C
Relative humidity inside the reactor	$HR\% = 36.6$
Irradiance of the lamp to the sample surface (in the VISIBLE range 400-800 nm)	$I = 250$ W m <sup>-2</sup>
Time elapsed between the time the VIS lamp is switched on and the start of the concentration recording	45 min
Conversion in the absence of sample	$C_{NO}^{OUT, BUIO} = 0.5036$ ppmv $C_{NO_2}^{OUT, BUIO} = 0.016$ ppmv $C_{NO}^{OUT, LUCE} = 0.4972$ ppmv $\eta_{NO, lamp}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buiO} = -0.3$ % $\eta_{NO_2}^{buiO} = -0.7$ %
Conversion under radiation in the presence of a sample	The graph showing the evolution of the concentrations during the various test steps is shown in <b>Figure 8</b> .
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

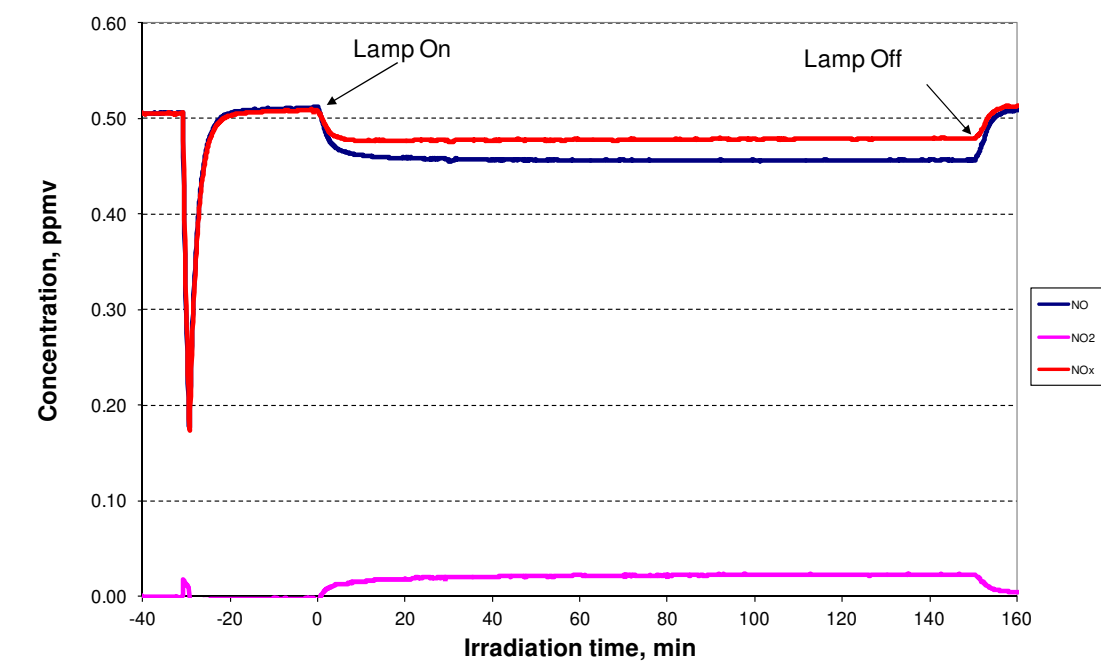


**Figure 8.** Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on BR (Vis) sample. Test dated 03/06/2020 and performed in accordance with UNI 11484 (simplified) with VIS irradiation.

### 3.6. Sample “CR” (UNI 11484, Visible)

The following table shows the operating conditions used in the test and its results.

Initial concentration of nitrogen oxides before entering the reactor	$C_{NO}^{IN} = 0.506$ ppmv $C_{NO_2}^{IN} = -0.001$ ppmv
Gas flow	$F = 1.608$ dm <sup>3</sup> min <sup>-1</sup>
Temperature inside the reactor	$T = 32.5$ °C
Relative humidity inside the reactor	$HR\% = 37.1$
Irradiance of the lamp to the sample surface (in the VISIBLE range 400-800 nm)	$I = 250$ W m <sup>-2</sup>
Time elapsed between the time the VIS lamp is switched on and the start of the concentration recording	31 min
Conversion in the absence of sample	$C_{NO}^{OUT, BUIO} = 0.5036$ ppmv $C_{NO_2}^{OUT, BUIO} = 0.016$ ppmv $C_{NO}^{OUT, LUCE} = 0.4972$ ppmv $\eta_{NO, lamp}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buiO} = -1.1$ % $\eta_{NO_2}^{buiO} = -0.5$ %
Conversion under radiation in the presence of a sample	The graph showing the evolution of the concentrations during the various test steps is shown in <b>Figure 9</b> .
Observed rate of photocatalytic degradation	See Table 2
Remarks	none



**Figure 9.** Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on CR (Vis) sample. Test dated 04/06/2020 and performed in accordance with UNI 11484 (simplified) with VIS irradiation.



#### 4. SUMMARY OF RESULTS

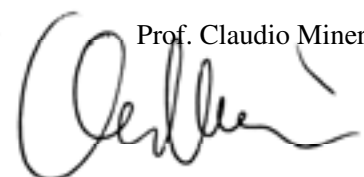
The specimens showed a measurable NO abatement under UV and Visible irradiation. The results of measurements of the photocatalytic activity according to UNI 11484 under UV (no pretreatment) and Visible irradiation (after washing with water) of the 3 samples are summarized in Table 2 (for NO/NO<sub>x</sub>). The conversions and rates are reported as average values calculated after 180 minutes of irradiation or when the stability of the conversion is attained in accordance with the UNI 11484.

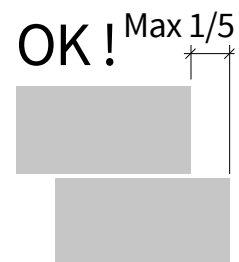
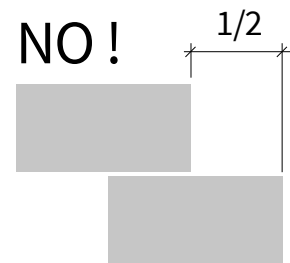
**Table 2.** Measurement results. The conversions refer to the measured values after 180 minutes of irradiation

Sample	Irradiation	$\eta_{NO,i}^{totale}$ , %	$\eta_{NO_x,i}^{totale}$ , %	$r_{NO,i}^{foto}$ ,	$r_{NO_x,i}^{foto}$ ,
				$\mu\text{g m}^{-2} \text{h}^{-1}$	$\mu\text{g m}^{-2} \text{h}^{-1}$ [j]
AR(UV)	UV	20.7	11.2	1450	1130
BR(UV)	UV	17.9	9.3	1370	1140
CR(UV)	UV	18.5	9.9	1240	1060
AR(Vis)	Visible	10.9	4.7	820	640
BR(Vis)	Visible	11.8	7.2	830	720
CR(Vis)	Visible	9.8	5.3	720	590

[j] The photocatalytic NO<sub>x</sub> conversion rate is expressed as  $\mu\text{g}$  equivalents of NO<sub>2</sub> converted per m<sup>2</sup> of sample in 1 hour.

Torino, June 8, 2020

Prof. Claudio Minero  




If you are laying same sized straightened-edged tiles, we recommend you keep a 2 mm joint.  
If you are laying different sized straightened-edged tiles (two or more sizes) together, we recommend you keep a 3 mm joint.  
In the case of non-straightened-edged tiles, we recommend you keep a 4 mm joint.

Si consiglia di mantenere una fuga di 2 mm per la posa in monoformato degli articoli rettificati.  
Si consiglia di mantenere una fuga di 3 mm per la posa in multiformato (da 2 formati e oltre) degli articoli rettificati.  
Si consiglia di mantenere una fuga di 4 mm per la posa degli articoli con bordi non rettificati.

On conseille de préserver un joint de 2 mm pour la pose en mon format des articles rectifiés.  
On conseille de préserver un joint de 3 mm pour la pose en multiformat (de 2 formats et plus) des articles rectifiés.  
On conseille de préserver un joint de 4 mm pour la pose des articles présentant des bords non rectifiés.

Es wird geraten, eine Fuge von 2 mm bei der Verlegung der geschliffenen Artikel im Einzelformat einzuhalten.  
Es wird geraten, eine Fuge von 3 mm bei der Verlegung der geschliffenen Artikel als Multiformat (2 Formate und mehr) einzuhalten.  
Es wird geraten, eine Fuge von 4 mm bei der Verlegung der Artikel mit ungeschliffenen Rändern einzuhalten.

Se aconseja mantener una junta de 2 mm para la colocación en monoformato o multiformato de los artículos rectificadas.  
Se aconseja mantener una junta de 3 mm para la colocación en multiformato (de 2 formatos o más) de los artículos rectificadas.  
Se aconseja mantener una junta de 4 mm en la colocación de los artículos con bordes no rectificadas.

For a perfect result, we recommend you use wedges during laying.  
Per un risultato ottimale si consiglia di utilizzare durante la posa i cunei.  
Nous conseillons d'utiliser les coins durant la pose pour un résultat optimal.  
Für ein ausgezeichnetes Ergebnis wird empfohlen, bei der Verlegung die Keile zu verwenden.  
Para obtener un resultado optimizado se aconseja utilizar las cuñas durante la colocación.

The colours, structures, and patterns of the tiles illustrated in the catalogue might not correspond exactly to the actual product.  
Le cromie, le strutture e le grafiche delle piastrelle riprodotte nelle immagini del catalogo potrebbero non corrispondere fedelmente al prodotto industriale.  
Les tonalités, les structures et les graphismes des carreaux reproduits sur les images du catalogue pourraient ne pas correspondre idéalement au produit industriel.  
Es ist möglich, dass die im Katalog abgebildeten Fliesen in Bezug auf Farbton, Struktur und Grafik vom Industrieerzeugnis abweichen.  
Las estructuras, los colores y las gráficas de las baldosas reproducidas en las imágenes del catálogo podrían no coincidir fielmente con el producto industrial.

## Product certification

La Fabbrica S.p.A. reserves the right to make any changes it deems fit in order to improve the product, without prior notice.  
All images are provided for illustrative purposes only and other colours and aesthetic features are available.

La Fabbrica S.p.A. si riserva di apportare, senza alcun preavviso, le modifiche che riterrà più opportune al fine di migliorare il prodotto.  
Quanto riportato è da considerarsi indicativo e non esaustivo in riferimento ai colori e alle caratteristiche estetiche dei prodotti.

La Fabbrica S.p.A. se réserve le droit d'apporter, sans préavis, les modifications qu'elle jugera opportunes afin d'améliorer le produit.  
Les informations ci-dessus sont fournies à titre indicatif et elles ne sont pas contraignantes en ce qui concerne les couleurs et les caractéristiques esthétiques des produits.  
Die Firma La Fabbrica S.p.A. behält sich vor, ohne jegliche vorherige Ankündigung jene Änderungen vorzunehmen, die sie zur Verbesserung des Produktes für angebracht hält.  
Die Angaben sind bezüglich der Farben und ästhetischen Eigenschaften der Produkte als Richtwerte und nicht als vollständig anzusehen.

La Fabbrica S.p.A. se reserva la posibilidad de introducir, sin obligación de aviso previo, las modificaciones que considere más indicadas para mejorar el producto.  
Las cualidades del material presentado deben considerarse de modo genérico, no siendo exhaustivas en cuanto a los colores y a las características estéticas de los productos.

100%  
DESIGN AND PRODUCTION  
OF ITALY

Ceramics of Italy

CE

CCC

Certificazione obbligatoria per l'esportazione in Cina. Certification mandatory for export to China.  
Certification obligatoire pour l'exportation en Chine.  
Für den Export nach China obligatorische Zertifizierung.  
Certificación obligatoria para la exportación a China.  
Обязательная сертификация для экспорта в Китай.

CQY  
CERTAQUALITY

A+



Tutte le piastrelle sono certificabili MOCA. All the tiles can be MOCA-certified. Toutes les carreaux sont certifiés MOCA.  
Alle Bodenfliesen sind nach MOCA zertifizierbar. Todas las baldosas pueden ser certificadas MOCA.





ITALCER S.p.A. SB | P. IVA 00142060359

*Amministrazione e Sede Legale  
Accounting and Legal Head Office*

Via Emilia Ovest 53/A - 42048 Rubiera (RE) - Italy  
Tel. +39 0522 625111  
Fax +39 0522 625160

*Uffici Commerciali, Showroom  
Sales Department, Showroom*

Via Emilia Ponente 2070 - 48014 Castel Bolognese (RA) Italy  
Tel. +39 0546 - 659911 - Fax +39 0546 - 656223  
info@lafabbrica.it - www.lafabbrica.it



FOLLOW US