

# DIE KERAMIK, DIE DEN CORONAVIRUS UND BAKTERIEN BEKÄMPFT\*

BAUEN WIR GEMEINSAM EINE BESSERE ZUKUNFT



Die bahnbrechende ADVANCE<sup>®</sup>Keramik ist für Böden und Wandverkleidungen. Sie garantiert einen hohen Schutz der Oberflächen und gesündere Räume. Dies geschieht anhand der antiviralen und antibakteriellen Eigenschaften dieser Keramik, sowie anhand ihrer Fähigkeit die Schadstoffe zu bekämpfen.

**ADVANCE<sup>®</sup>: Bauen wir gemeinsam eine bessere zukunft .**

\*Unter Belichtung kann ADVANCE<sup>®</sup> bereits nach 15 Minuten 90% der Coronaviren beseitigen und schon nach sechsständiger Belichtung 100%. Nach einer achtstündigen Belichtung bekämpft ADVANCE<sup>®</sup> die unterschiedlichen Typen von Bakterien um mindestens 95% bis zu 100%. Die mit ADVANCE<sup>®</sup> geführten Labortests sind auf der Internetseite [www.advancedceramic.it/de](http://www.advancedceramic.it/de) einsehbar.



Civilization of Beauty

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



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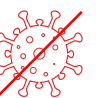
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ADVANCE<sup>®</sup> steht für umweltfreundliche Bodenbeläge und Wandverkleidungen aus Feinsteinzeug. Dieses Feinsteinzeug wird im Einbrandverfahren bei einer Brenntemperatur von über 1200 Grad hergestellt.

ADVANCE<sup>®</sup> besteht für 40% aus recycelten Materialien undes ist sowohl für den Wohnbereich als auch für gewerbliche Anwendungen geeignet. Die innovative Technologie von ADVANCE<sup>®</sup> istdank ihrer antiviralen, antibakteriellen und photokatalytischen Eigenschaften in der Lage, unsere Umgebung gesünder zu machen und die Schadstoffbelastung erheblich zu reduzieren.

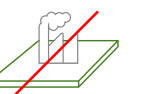
**ANTIVIRAL**



**ANTIBAKTERIELL**



**SCHADSTOFFMINDERND**





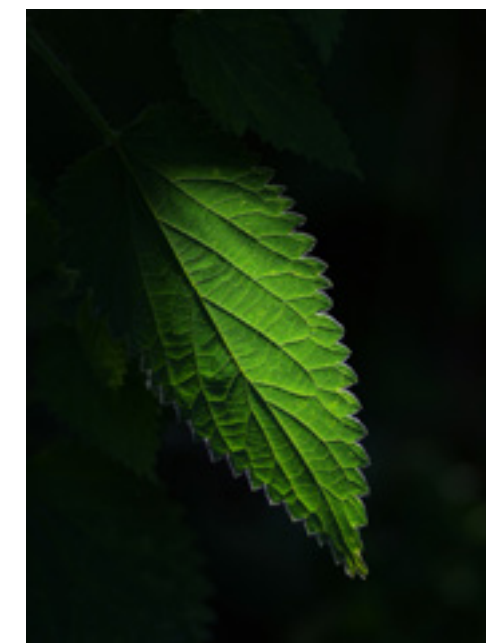
# ZUKUNFT, NATUR, WISSENSCHAFT

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AUS DEM ENGAGEMENT DER ITALCER-GRUPPE UND IHRER RÜCKSICHTNAHME AUF DIE UMWELT UND DEN SOZIALEN BEREICH IST ADVANCE® ENTSTANDEN.

DIESES NEUE PROJEKT SPIEGELT AUCH IHREN WILLEN WIDER, DER ZUKUNFT MIT EINER INNOVATIVEN, IM EINBRANDVERFAHREN HERGESTELLTEN KERAMIK ENTGEGENZUGEHEN: IHRE ANTIVIRALEN, ANTIBAKTERIELLEN UND PHOTOKATALYTISCHEN EIGENSCHAFTEN SIND IN DER LAGE, DIE GESUNDHEIT ZU SCHÜTZEN UND DIE UMWELTVERSCHMUTZUNG ZU REDUZIEREN.

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Unsere wichtigste Inspirationsquelle ist die **ZUKUNFT**, denn wir träumen von einer Welt, in der die kommenden Generationen immer nachhaltigere Materialien verwenden können, durch die es unserem Planeten besser geht, indem mögliche Kontaminationen durch Mikroorganismen und damit den Einsatz umweltschädlicher chemischer Reinigungsmittel reduziert werden.

Wir verwenden in erster Linie SnO<sub>2</sub> (Zinndioxid) und TiO<sub>2</sub> (Titandioxid) in biomimetischer Form: sie werden mit Prozessen gewonnen, in denen die Mechanismen der **NATUR** repliziert werden. Die Synthese erfolgt bereits im ersten Brennvorgang, anhand einer innovativen Produktionstechnik, die das Ergebnis einer revolutionären Forschungsarbeit im Bereich der **WISSENSCHAFT** der Materialien ist.



Zukunft, Natur, Wissenschaft  
unsere Inspiration

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ITALCER GROUP







Pierres des Châteaux

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



ADVANCE® ist eine innovative Technologie, eine hygienische und gleichzeitig umweltfreundliche Keramik. Diese neue Generation von Feinsteinzeug, Ergebnis einer langjährigen Forschungsarbeit, wurde in Zusammenarbeit mit Prof. Isidoro Lesci und dank beachtlicher Investitionen in unseren Labors entwickelt.

ADVANCE® trägt zur Eliminierung von Viren, Bakterien und schädlichen Mikroorganismen bei und wirkt der gesundheits- und umweltschädlichen Umweltverschmutzung entgegen.

Die antiviralen und antibakteriellen Eigenschaften des Keramikmaterials tragen entscheidend dazu bei, alle Arten von Viren und Bakterien sowie andere Mikroorganismen zu eliminieren, die nicht nur für die Umwelt, sondern auch für unsere Gesundheit schädlich sind.

Eine Innovation, die es ermöglichen wird, private Wohnungen und öffentliche Bereiche sicherer und gesünder zu machen, mit einer rund um die Uhr garantierten Hygiene, durch die auch der Einsatz von chemischen Substanzen und Reinigungsmitteln drastisch reduziert werden kann.



## FORSCHUNG UND INNOVATION

Unsere Forschungsarbeit beginnt im Jahre 2018, mit dem Ziel **Keramikoberflächen** im Einbrandverfahren **antiviral, antibakteriell und schadstoffmindernd zu machen**.

Mit großer Begeisterung und viel Stolz können wir heute sagen, dass wir hier hervorragende Resultate erzielen konnten: durch die innovative Formulierung eines im Einbrandverfahren bei extrem hohen Temperaturen aufgetragenen Bioverbundstoffes wird das **Wachstum von Viren und Bakterien auf der Keramikoberfläche unterbunden**.

Nach einer ersten experimentellen Phase im Labor haben wir das industrielle Verfahren auf die Produktionsanlagen unserer Gruppe übernommen. Die von uns erzielten Resultate wurden zur Bestätigung der tatsächlichen Merkmale von akkreditierten Labors geprüft. Das **TCNA** (Tile Council of North America) hat die antiviralen Eigenschaften (ISO18061:2014(E) für den CoronaVirus 229E) und die **antibakteriellen Eigenschaften** (ISO 27447:2019(E)) der ADVANCE®-Technologie bestätigt.

Die **schadstoffmindernden** Eigenschaften (UNI 11484) wurden von der Universität Turin, Fachbereich Chemie bescheinigt.

Die antibakteriellen Eigenschaften des Produkts ADVANCE® wurden auch von der Universität Ferrara bestätigt, während die photokatalytischen Eigenschaften von der Universität Turin bescheinigt wurden.

Die Normen ISO 18061:2014(E) und ISO 27447:2019(E) beschreiben die Methode, an die sich die Tests zur Bestimmung der antiviralen und antibakteriellen Eigenschaften photokatalytischer Materialien halten müssen. Die Norm UNI 11484 beschreibt dagegen die Methode zur Bestimmung der Fähigkeit der Reduzierung von gasförmigem Stickstoffmonoxid (NO) mittels photokatalytischer Wirkung.



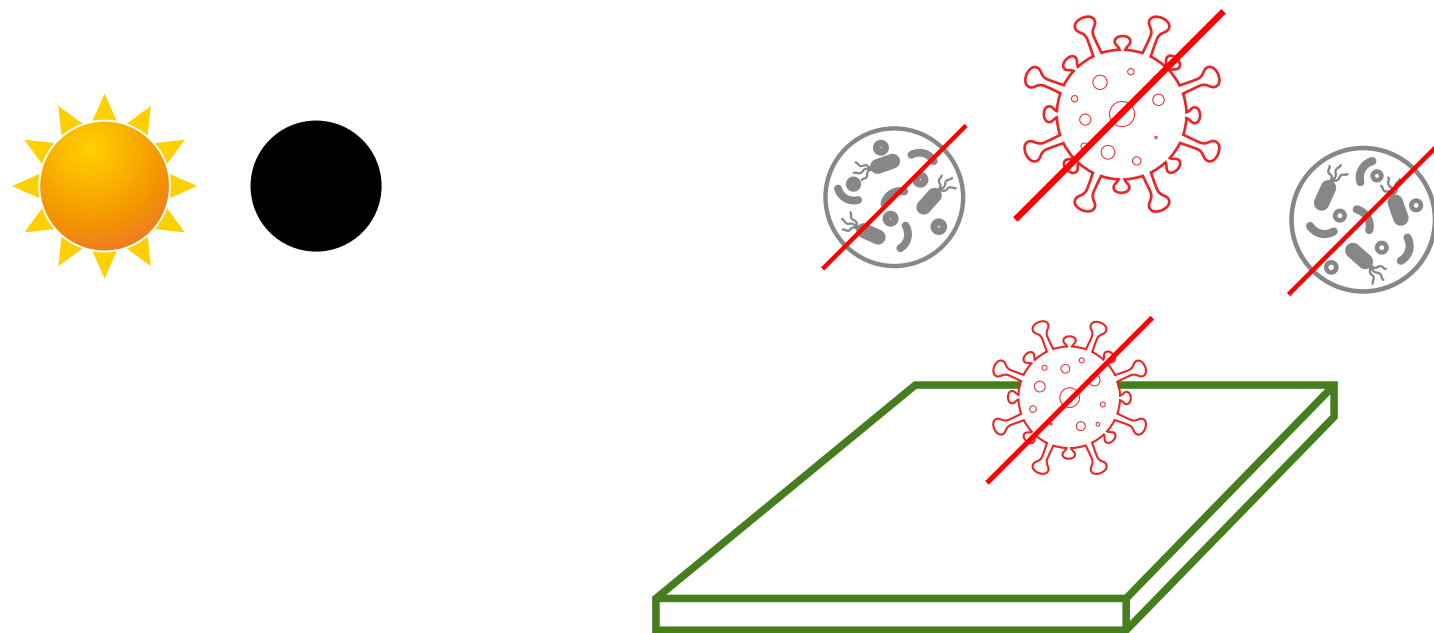


# ELIMINIERT VIREN, BEKÄMPFT BAKTERIEN\*

Die besondere Zusammensetzung dieses Feinsteinzeugs ermöglicht es, Viren und Bakterien abzutöten, die mit der Keramikoberfläche in Kontakt kommen.

ADVANCE® kann sowohl für Bodenbeläge als auch für Wandverkleidungen aus Keramik verwendet werden, und besitzt im Einbrandverfahren erzielte, antimikrobielle und photokatalytische Eigenschaften. Die Merkmale, die dieses Feinsteinzeug zu einem Produkt der neuesten Generation machen, werden während der ersten Herstellungsphase in die Keramik integriert (Einbrandverfahren bei über 1200°C). So werden sie zu natürlichen Produkteigenschaften, die die Fliesen während ihrer gesamten Lebensdauer gegen Viren und Bakterien schützen, ohne dass sie im Laufe der Zeit oder durch externe Faktoren beeinflusst werden. Da es sich nicht um eine Oberflächenschicht sondern um eine in die Keramik integrierte Eigenschaft handelt, bleibt diese auch langfristig unversehrt bestehen.

Die antiviralen und antibakteriellen Eigenschaften werden durch jede Art von Licht – sowohl Sonnenals auch Kunstlicht – verstärkt, doch wie Tests renommierter Labors bestätigen, bleiben diese Eigenschaften auch ohne Lichteinfall aktiv.



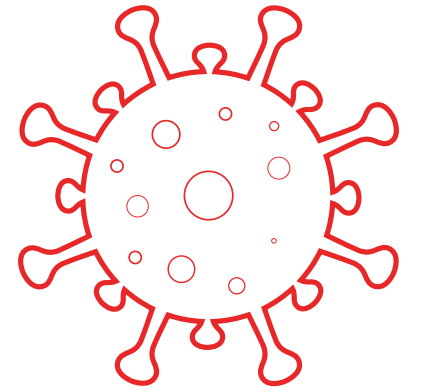
\*Bei den in der Tabelle angegebenen Bedingungen und mit den nachfolgenden Testergebnissen.

# PROPERTIES

## 1 - ELIMINIERT VIREN

ISO 18061:2014 (E) - Coronavirus 229E

TEST TCNA (TILE COUNCIL OF NORTH AMERICA)

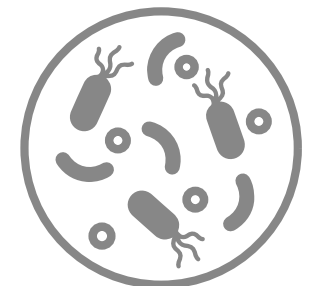


Expositionsdauer	Reduzierung mit UV-Exposition	Reduzierung ohne UV-Exposition
15 minuten	90%	-
30 minuten	90%	90%
1 stunde	90%	90%
6 stunden	100%	93%
8 stunden	100%	99%

## 2 - BEKÄMPFT BAKTERIEN

ISO 27447:2019 (E) - Escherichiacoli ATCC 8739

Stafilococco Aureo ATCC 6538



TEST OF LABORATORY CFR-UNIFE AND TCNA

Expositionsdauer	Reduzierung mit UV-Exposition	Reduzierung ohne UV-Exposition
8 stunden	Von minimal <b>95%</b> Bis maximal <b>100%</b>	Von minimal 93,4% Bis maximal 97,2%





Il Cerreto

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

Pierres des Châteaux

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

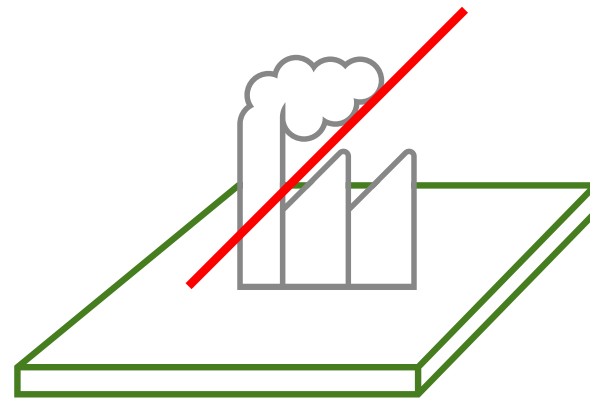


# EIGENSCHAFTEN

## 3 - REDUZIERTER UMWELTVERSCHMUTZUNG

UNI 11484

BESCHEINIGUNG DES FACHBEREICHES  
CHEMIE DER UNIVERSITÄT TURIN



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

**FLÜCHTIGE SCHADSTOFFE WERDEN IN UNBEDENKLICHE STOFFE UMGEWANDELT.**

Die schadstoffmindernden Eigenschaften des Feinsteinzeugs ADVANCE® verbessern auch die Qualität unserer Atemluft.

Die industrielle Produktion, der Einsatz von Klimaanlage und die Transportmittel tragen zum Ausstoß von Schadstoffen in die Luft bei. Durch die Verwendung von **ADVANCE®** in Außenbereichen, an den Fassaden von Wohnungen und Gebäuden, **können die NO<sub>x</sub>-Moleküle** (Stickstoffoxid) in nur drei Stunden **um 20,7% reduziert werden** (laut Bescheinigung der Universität Turin). Durch die von natürlichem Licht aktivierte photokatalytische Wirkung kann die Qualität der Luft so beachtlich verbessert werden.

Alle mit ADVANCE® realisierten Outdoor-Lösungen **tragen zu einer Verbesserung unserer Umwelt bei.**

Diese Technologie ist nicht nur sicher für unsere Gesundheit, sondern auch eine nachhaltige und umweltfreundliche Entscheidung, da sie einen einzigen Brennvorgang bei extrem hohen Temperaturen vorsieht, ohne Notwendigkeit nachfolgender Behandlungen und damit ohne weitere Umweltauswirkungen.





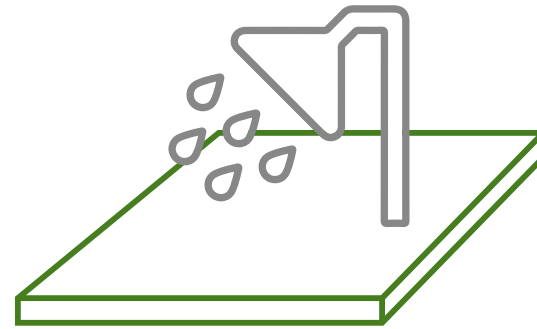
## EIGENSCHAFTEN

### 4 - BEKÄMPFT SCHMUTZ

**Reduziert den Einsatz chemischer Reinigungsmittel.**

Der Schmutz zersetzt sich auf den Keramikoberflächen von ADVANCE®. So können Bodenbeläge und Wandverkleidungen einfach mit Wasser und einem neutralen Reinigungsmittel sauber gehalten werden.

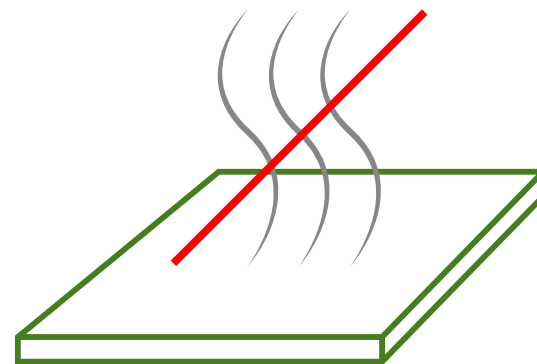
Bei Bodenbelägen im Außenbereich garantiert bereits das Abfließen von Regenwasser eine ausreichende Reinigung.



### 5 - HEMMT ÜBLE GERÜCHE

**Verwandelt organische Moleküle und reduziert so üble Gerüche.**

Ebenso wie die NO<sub>x</sub>-Moleküle zersetzen sich auch die für üble Gerüche verantwortlichen Moleküle, sobald sie mit der Oberfläche in Kontakt kommen und hemmen somit die Geruchsbildung.



Il Cerreto  
FLOOR: Chardonnay 23x149 (9'x58 1/4") Nat. Ret.



## ANWENDUNGSBEREICHE – SICHERHEIT UND HYGIENE

Mit ADVANCE® will Italcer Group dazu beitragen, die Gesundheit und die Sicherheit der Ambiente zu verbessern, sowohl im öffentlichen als auch im privaten Bereich, durch Verkleidung aller Arten von Oberflächen in Wohnbereichen, Gesundheitsinstituten, Schulen, Flughäfen sowie in Gemeinschaftsräumen im Innen- und Außenbereich mit dieser innovativen Keramik.

Dank seiner natürlichen Eigenschaften verschönert ADVANCE® nicht nur das Ambiente, sondern es macht das auch gesund und hygienisch, für die Gesundheit und das Wohlbefinden von uns allen.



Einkaufszentren



Wellnesszentren



Fitness-Studios



Flughäfen



Restaurants



Bars & Lokale



Gesundheitsbereiche



Schulen



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



# UNSERE PRODUKTE

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IL CERRETO..... 40



Civilization of Beauty



CHENONCEAU

CHEVERNY

CHAMBORD

FONTAINEBLEAU

USSÉ

# PIERRES DES CHÂTEAUX



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

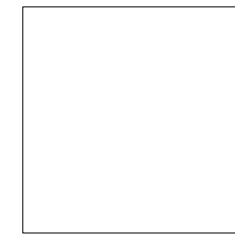
EINGEFÄRBTES FEINSTEINZEUG  
ISO 13006 - G - Bla (E < 0,5%) - UNI EN 14411 - G

**ADVANCE**  
ANTIBACTERIAL & BIO-AIR PURIFYING

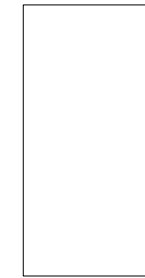
INDOOR R10-B

100% DESIGN  
AND PRODUCTION  
OF ITALY

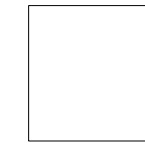
V3  
SHADE SPECTRUM  
HIGH



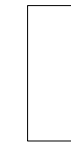
100x100 . 40"x40"  
Nat. Ret.



60x120 . 24"x48"  
Nat. Ret.



60x60 . 24"x24"  
Nat. Ret.



30x60 . 12"x24"  
Nat. Ret.

8,8 mm

modular system

GRAFISCHER ENTWURF  
FÜR FORMAT

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

15    30    16    32



8,8 mm R10-B

CHAMBORD



Grafischer Entwurf für Format 100x100 (40"x40")





8,8 mm R10-B



FLOOR: Chenonceau 100x100 (40" x 40") Nat. Ret.



# Pierres des Châteaux

8,8 mm R10-B



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

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



# Pierres des Châteaux

8,8 mm R10-B



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

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



# Pierres des Châteaux

8,8 mm R10-B

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



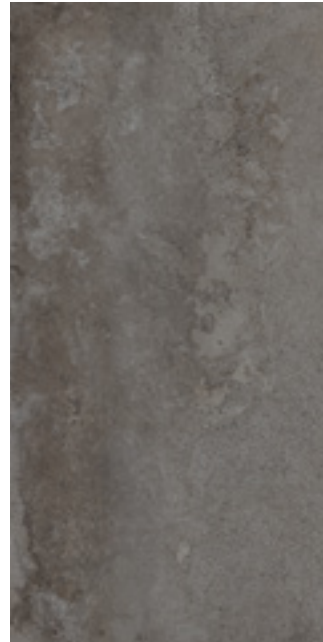
FLOOR: Chenonceau 100x100 (40"x40") Nat. Ret.  
WALL: Chenonceau 30x60 (12"x24") Nat. Ret.



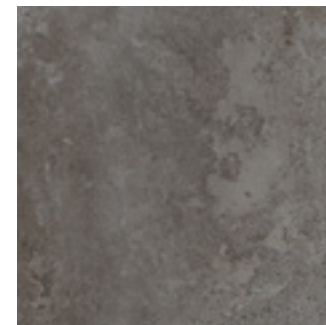
# Pierres des Châteaux

**Chenonceau**  
INDOOR

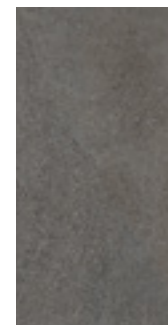
8,8 mm R10-B



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

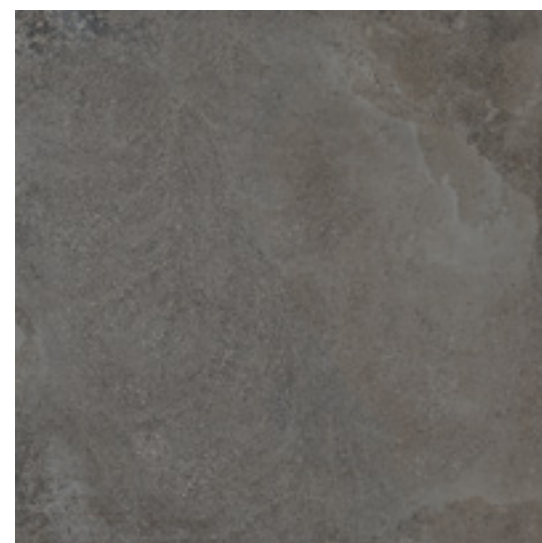


**60x60 . 24"x24"**  
Nat. Ret.  
**158020**



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

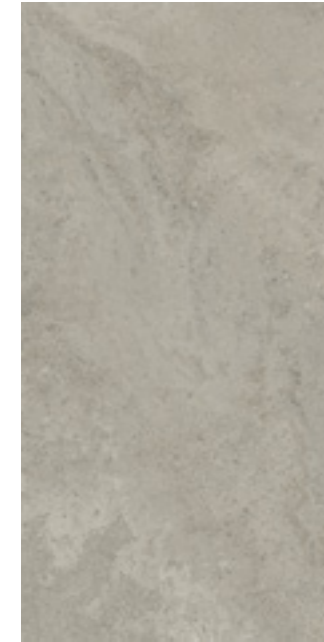
modular system



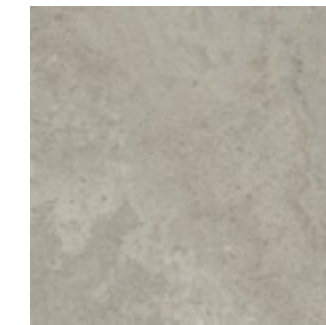
**100x100 . 40"x40"**  
Nat. Ret.  
**158065**

**Cheverny**  
INDOOR

8,8 mm R10-B



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



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



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

modular system



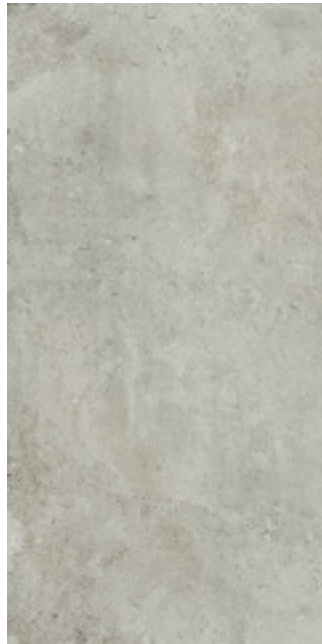
**100x100 . 40"x40"**  
Nat. Ret.  
**158061**



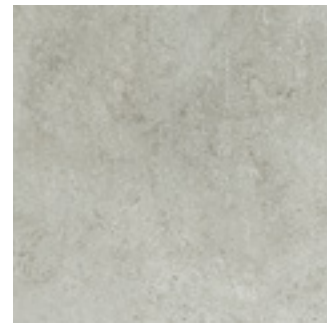
# Pierres des Châteaux

**Chambord**  
INDOOR

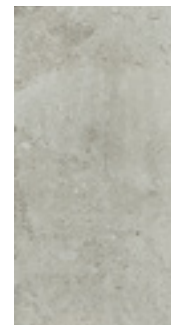
8,8 mm R10-B



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



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



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

modular system



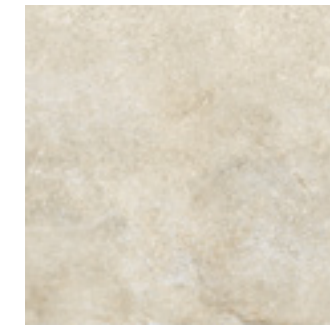
**100x100 . 40"x40"**  
Nat. Ret.  
**158062**

**Fontainebleau**  
INDOOR

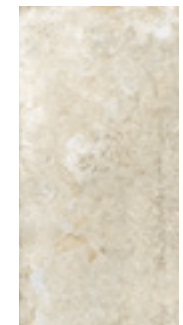
8,8 mm R10-B



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



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



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

modular system



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

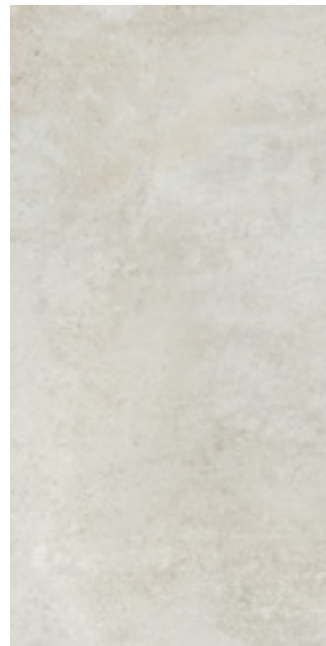


# Pierres des Châteaux

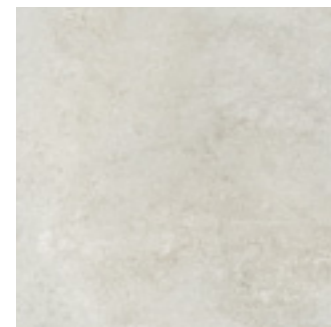
**Ussé**  
INDOOR

ANSI A - I37.1: 2012  
WET DYNAMIC COEFFICIENT OF FRICTION | DCOF ≥ 0,42

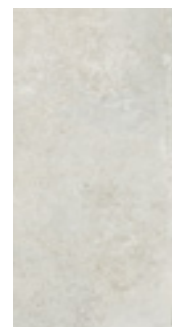
**8,8 mm R10-B**



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



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



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

modular system



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

**8,8 mm R10-B**

modular system



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



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



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

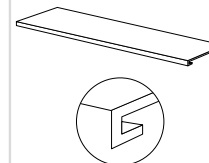


**100x100**  
40"x40"  
Nat. Ret.

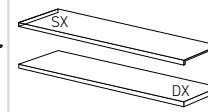


**7x100**  
3"x40"  
Nat. Ret.

**7x60**  
3"x24"  
Nat. Ret.



**33x60x3,2h**  
13"x24"x1 1/4"h  
Nat. Ret.



**33x60x3,2h**  
13"x24"x1 1/4"h  
Nat. Ret.

	158050	158020	158060	158065	158110	158120	158210	158220 DX 158230 SX
	158046	158016	158056	158061	158106	158116	158206	158216 DX 158226 SX
	158047	158017	158057	158062	158107	158117	158207	158217 DX 158227 SX
	158049	158019	158059	158064	158109	158119	158209	158219 DX 158229 SX
	158048	158018	158058	158063	158108	158118	158208	158218 DX 158228 SX

PRICE CODE	M122	M118	M110	M128	P034	P021	P156	P190
PRICE	€ 40,00 m <sup>2</sup>	€ 36,00 m <sup>2</sup>	€ 32,00 m <sup>2</sup>	€ 46,00 m <sup>2</sup>	€ 9,60 PZ/PCE	€ 6,00 PZ/PCE	€ 88,80 PZ/PCE	€ 122,40 PZ/PCE
ADVANCE PRICE QUOTE	€ 14,70 m <sup>2</sup>	€ 14,70 m <sup>2</sup>	€ 14,70 m <sup>2</sup>	€ 14,70 m <sup>2</sup>				

	Epal 80x120	Epal 80x120	Epal 80x120	Special pallet with sides 103x123x60 h.	Epal 80x120	Epal 80x120	Epal 80x120	Epal 80x120
PACKING cm h.	75	75	75	75	-	-	-	-
x	2	3	6	2	6	15	4	2
m <sup>2</sup> x	1,44	1,08	1,08	2	0,42	0,63	-	-
Kg x	29,82	25,54	22,64	36,68	8,10	13,28	20,70	10,80
x	32	40	48	24	-	-	-	-
m <sup>2</sup> x	46,08	43,20	51,84	48,00	-	-	-	-
Kg x	974	1042	1107	925	-	-	-	-



PINOT GRIGIO

CHAMPAGNE

SOAVE

CHARDONNAY

AMARONE

# IL CERRETO



Floor: Chardonnay 23x149 (9" x 58 1/2") Nat. Ret.

EINGEFÄRBTES FEINSTEINZEUG  
ISO 13006 - G - Bla (E < 0,5%) - UNI EN 14411 - G



100% DESIGN  
AND PRODUCTION  
OF ITALY



V2  
SHADE SPECTRUM  
MODERATE



INDOOR R10-B



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

GRAFISCHER ENTWURF  
FÜR FORMAT

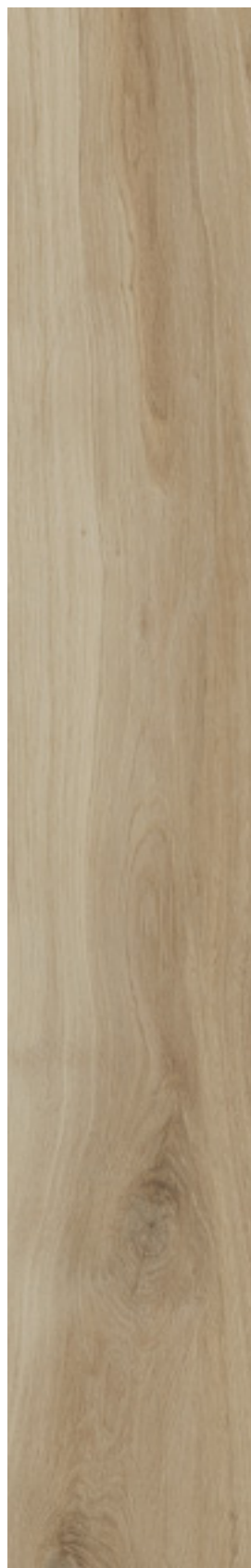
23x149  
8,8 mm

21



8,8 mm R10-B

## Chardonnay



Grafischer Entwurf für Format 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.



8,8 mm R10-B



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

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



# Il Cerreto

8,8 mm R10-B



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



# Il Cerreto

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

## Pinot Grigio INDOOR



8,8 mm R10-B

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

## Champagne INDOOR



8,8 mm R10-B

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

## Soave INDOOR



8,8 mm R10-B

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

## Chardonnay INDOOR



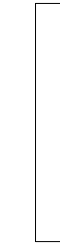
23x149 . 9"x58 1/2"  
Nat. Ret.  
**157041**

## Amarone INDOOR



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

8,8 mm R10-B



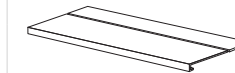
23x149  
9"x58 1/2"  
Nat. Ret.

Skirting



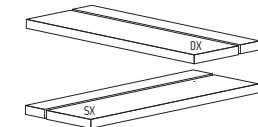
6,5x149  
2 1/2"x58 1/2"  
Nat. Ret.

Straight-edge step  
\*\*



33x120x3,2h  
13"x48"x1 1/4"h  
Nat. Ret.

Straight-edge step  
LH/RH corner  
\*\*



33x120x3,2h  
13"x48"x1 1/4"h  
Nat. Ret.

PINOT GRIGIO	157044	157109	157209	157219 DX 157229 SX
CHAMPAGNE	157045	157106	157206	157216 DX 157226 SX
SOAVE	157043	157107	157207	157217 DX 157227 SX
CHARDONNAY	157041	157108	157208	157218 DX 157228 SX
AMARONE	157042	157110	157210	157220 DX 157230 SX













PRICE CODE	M126	P040	P235	P282
PRICE	€ 44,00 m <sup>2</sup>	€ 11,90 PZ/PCE	€ 168,00 PZ/PCE	€ 230,00 PZ/PCE
ADVANCE PRICE QUOTE	€ 14,70			

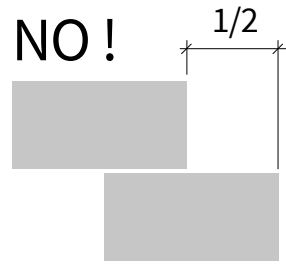
	Pallet 77x152	Epal 80x120	Epal 80x120	Epal 80x120
PACKING cm h.	55	-	-	-
x	3	6	2	1
m <sup>2</sup> x	1,03	-	-	-
Kg x	21,31	9,94	20,7	10,8
x	36	-	-	-
m <sup>2</sup> x	37,08	-	-	-
Kg x	807,16	-	-	-



## Technische Eigenschaften

### ISO 13006 (E) - G - Bla (E < 0,5%) UNI EN 14411 - G EINGEFÄRBTES FEINSTEINZEUG

	CARATTERISTICA SPECIFICATION CARACTERISTIQUE EIGENSCHAFT CARACTERISTICA СПЕЦИФИКА	METODO DI PROVA TEST METHODS METHODE D'ESSAI TESTVERFAHREN PRUEBA СТАНДАРТА ИСПЫТАНИЙ	VALORE PRESCRITTO GRES PORCELLANATO IN MASSA FIXED VALUE VALEUR PRESCRITE VORGESCHRIBENER WERT VALOR PRESCRITO ТРЕБУЕМОЕ ЗНАЧЕНИЕ	 Civilization of Beauty		
	CARATTERISTICHE DIMENSIONALI DIMENSIONAL CHARACTERISTICS - DIMENSIONS - DIMENSIONALE EIGENSCHAFTEN - CARACTERÍSTICAS DIMENSIONALES - ПРОСТРАНСТВЕННЫЕ ХАРАКТЕРИСТИКИ	ISO 10545-2	NATURALE	RETTIFICATO	LAPPATO / RETTIFICATO	
	LUNGHEZZA E LARGHEZZA LENGTH AND WIDTH - LONGUER ET LARGEUR - LÄNGE UND BREITE LARGURA Y LARGUEZA - ДЛИНА И ШИРИНА		± 0,6 %	CONFORME COMPLIANT CONFORME ERFÜLLT CUMPLE COOTBECTBYET	CONFORME COMPLIANT CONFORME ERFÜLLT CUMPLE COOTBECTBYET	CONFORME COMPLIANT CONFORME ERFÜLLT CUMPLE COOTBECTBYET
	SPESSORE - EPPAISSEUR - STÄRKE - ESPESOR - ТОЛЩИНА		± 5 %			
	RETTILINEITÀ DEGLI SPICOLI STRAIGHTNESS OF EDGES - RECTITUDE DES BORDS - RECHTCKIGKEIT DER ECKEN - ORTOGONALIDAD DE LAS ESQUINAS - ПРЯМОЛИНЕЙНОСТЬ ГРАНИ		± 0,5 %			
	ORTOGONALITÀ ORTHOGONALITY - ORTHOGONALITE - RECHTWINKLIGKEIT ORTOGONALIDAD - ПРЯМОУГОЛЬНОСТЬ		± 0,5 %			
	PLANARITÀ (Curvatura del centro - curvatura dello spigolo - svergolamento) PLANARITY (Curvature of centre - curvature of edge - bending) PLANARITE (Courbure du centre - courbure de l'arête - gauchissement) EBENHEIT (Krümmung der Mitte - Krümmung der Kante - Verdrehung) PLANEIDAD (Curvatura del centro - curvatura del canto - deformación) ЛИНЕЙНОСТЬ (Изгиб центра - изгиб кромок - перекосяк)		± 0,5 %			
QUALITÀ DELLA SUPERFICIE SURFACE QUALITY - QUALITÉ DE LA SURFACE - QUALITÄT DER OBERFLÄCHE CALIDAD DE LA SUPERFICIE - ПОВЕРХНОСТИ	95% DELLE PIASTRELLE ESENTE DA DIFETTI VISIBILI 95% OF TILES SHOW NO VISIBLE DEFECTS 95% DES CARREAUX SONT DÉPOURVUS DE DÉFAUTS VISIBLES 95% DER FLIESEN SIND FREIVON SICHTBAREN FEHLERN 95% DE LAS BALDOSAS EXENTAS DE DEFECTOS VISIBLES TAL 95% ПЛИТКИ НЕ ИМЕЕТ ВИДИМЫХ ДЕФЕКТОВ					
	ASSORBIMENTO D'ACQUA WATER ABSORPTION - ABSORPTION D'EAU - WASSERAUFNAHME ABSORCIÓN DE AGUA - ВОДОПОГЛАЩЕНИЕ	ISO 10545-3	CONFORME - COMPLIANT CONFORME - ERFÜLLT CUMPLE - COOTBECTBYET			
	RESISTENZA ALLA FLESSIONE BREAKING MODULUS - RESISTANCE A LA FLEXION - BIEGEFESTIGKEIT RESISTENCIA A LA FLEXIÓN - ПРОЧНОСТЬ НА ИЗГИБ	ISO 10545-4	CONFORME - COMPLIANT CONFORME - ERFÜLLT CUMPLE - COOTBECTBYET			
	SFORZO DI ROTTURA MODULUS OF RUPTURE - CHARGE DE RUPTURE - BRUCHLAST ESFUERZO DE ROTURA - СТОЙКОСТЬ НА ИЗГИБ	35 N/mm <sup>2</sup>	CONFORME - COMPLIANT CONFORME - ERFÜLLT CUMPLE - COOTBECTBYET			
	DETERMINAZIONE DELLA RESISTENZA A FLESSIONE E CARICO DI ROTTURA DETERMINATION OF BREAKING MODULUS AND MODULUS OF RUPTURE - DÉTERMINATION DE LA RESISTANCE A LA FLEXION ET À LA CHARGE DE RUPTURE - BESTIMMUNG DER BIEGEFESTIGKEIT UND DER BRUCHLASTBESTÄNDIGKEIT - DETERMINACIÓN DE LA RESISTENCIA A FLEXIÓN Y CARGA DE ROTURA - ОПРЕДЕЛЕНИЕ ПРОЧНОСТИ НА ИЗГИБ И РАЗРУШАЮЩЕЙ НАГРУЗКИ	UNI EN 1339:2005 / COR. 2011 ANNEX F	SPESSORE - THICKNESS EPPAISSEUR - STÄRKE ESPESOR - ТОЛЩИНА ≥ 7,5 mm: min. 1300 N < 7,5 mm: min. 700 N	SPESSORE 20 mm	CLASSE U11	
	RESISTENZA ALL'ABRAZIONE PROFONDA DEEP ABRASION RESISTANCE - RESISTANCE A L'ABRASION PROFONDE - BESTÄNDIGKEIT GEGEN TIEFENVERSCHLEIß - RESISTENCIA A LA ABRASION PROFUNDA - УСТОЙЧИВОСТЬ К ГЛУБОКОМУ СТИРАНИЮ ПО	ISO 10545-6	CONFORME - COMPLIANT CONFORME - ERFÜLLT CUMPLE - COOTBECTBYET			
	COEFFICIENTE DI DILATAZIONE TERMICA LINEARE THERMAL EXPANSION COEFFICIENT - COEFFICIENT DE DILATATION THERMIQUE LINEAIRE WÄRMESCHWUNGSKOEFFIZIENT - COEFFICIENTE DE DILATACION TERMICA LINEAL ЗКОЭФФИЦИЕНТ ТЕПЛООВОГО ЛИНЕЙНОГО РАСШИРЕНИЯ	ISO 10545-8	METODO DISPONIBILE AVAILABLE ON REQUEST METHODE DISPONIBLE VERFÜGBARES VERFAHREN METODO DISPONIBLE ОПРЕДЕЛЯЕТСЯ ПРОИЗВОДИТЕЛЕМ	≤ 7x10 <sup>-6</sup> °C <sup>-1</sup>		
	RESISTENZA AGLI SBALZI TERMICI THERMAL SHOCK RESISTANCE - RESISTANCE AUX ECARTS DE TEMPERATURE TEMPERATURWECHSELBESTÄNDIGKEIT - RESISTENCIA A CHOQUE TÉRMICO УСТОЙЧИВОСТЬ К ТЕМПЕРАТУРНЫМ ПЕРЕКПАДАМ	ISO 10545-9	METODO DISPONIBILE AVAILABLE ON REQUEST METHODE DISPONIBLE VERFÜGBARES VERFAHREN METODO DISPONIBLE ОПРЕДЕЛЯЕТСЯ ПРОИЗВОДИТЕЛЕМ	RESISTENTI - RESISTANT RESISTANTS - WIDERSTANDSFÄHIG RESISTE - УСТОЙЧИВЫ		
	RESISTENZA AL GELO FROST RESISTANCE - RESISTANCE AU GEL - FROSTBESTÄNDIGKET RESISTENCIA AL HIELO - МОРОЗОСТОЙКОСТЬ	ISO 10545-12	RICHIESTA - ALWAYS TESTED EXIGÉE - NOTWENDIG PEDIDO - ТРЕБОВАНИЯ	RESISTENTI - RESISTANT RESISTANTS - WIDERSTANDSFÄHIG RESISTE - УСТОЙЧИВЫ		
	PRODOTTI CHIMICI AD USO DOMESTICO ED ADDITIVI PER PISCINA HOUSEHOLD CHEMICALS AND SWIMMING POOL WATER CLEANSERS - PRODUITS CHIMIQUES COURANTS ET ADDITIFS POUR PISCINE - CHEM.PRODUKTE FÜR DEN HAUSHALTSGEBRAUCH UND ZUSATZ FÜR SCHWIMMBÄDER - PRODUCTOS QUÍMICOS PARA USO DOMÉSTICO Y CON ADITIVOS PARA PISCINA - БЫТОВЫЕ ХИМИЧЕСКИЕ СРЕДСТВА И СРЕДСТВА ДЛЯ БАССЕЙНОВ	ISO 10545-13	min. UB	UA		
	ACIDI ED ALCALI A BASSA CONCENTRAZIONE ACIDS AND LOW CONCENTRATION ALKALIS - ACIDES ET ALCALI A FAIBLE CONCENTRATION - SAUREN UND ALKALI IN GERINGER KONZENTRATION - ACIDOS Y ALCALIS EN BAJA CONCENTRACION - НИЗКОКОНЦЕНТРИРОВАННЫЕ КИСЛОТЫ И ЩЕЛОЧИ		COME DICHIARATO DAL PRODUTTORE AS DECLARED BY THE MANUFACTURER COMME LE DECLARE LE PRODUCTEUR WIE VOM HERSTELLER ERKLÄRT COMO DECLARA EL FABRICANTE COOTBECTBYET C. ЗАЯВЛЕНИЯМИ ПРОИЗВОДИТЕЛЯ	RESISTENTI RESISTANT RESISTANTS WIDERSTANDSFÄHIG RESISTE УСТОЙЧИВЫ		
	ACIDI ED ALCALI AD ALTA CONCENTRAZIONE ACIDS AND HIGH CONCENTRATION ALKALIS - ACIDES ET ALCALI A FORTE CONCENTRATION SAUREN UND ALKALI IN HOHER KONZENTRATION - ACIDOS Y ALCALIS EN ALTA CONCENTRACION - ВЫСОКОКОНЦЕНТРИРОВАННЫЕ КИСЛОТЫ И ЩЕЛОЧИ		METODO DISPONIBILE AVAILABLE ON REQUEST METHODE DISPONIBLE VERFÜGBARES VERFAHREN METODO DISPONIBLE ОПРЕДЕЛЯЕТСЯ ПРОИЗВОДИТЕЛЕМ	RESISTENTI RESISTANT RESISTANTS WIDERSTANDSFÄHIG RESISTE УСТОЙЧИВЫ		
	RESISTENZA ALLE MACCHIE STAIN RESISTANCE - RESISTANCE AUX TACHES - FLECKBESTÄNDIGKEIT RESISTENCIA A LAS MANCHAS - УСТОЙЧИВОСТЬ К ЗАГРЯЗНЕНИЮ	ISO 10545-14	METODO DISPONIBILE AVAILABLE ON REQUEST METHODE DISPONIBLE VERFÜGBARES VERFAHREN METODO DISPONIBLE ОПРЕДЕЛЯЕТСЯ ПРОИЗВОДИТЕЛЕМ	RESISTENTI RESISTANT RESISTANTS WIDERSTANDSFÄHIG RESISTE УСТОЙЧИВЫ		
	STABILITÀ DEI COLORI ALLA LUCE COLOUR STABILITY TO LIGHT - STABILITÉ DES COULEURS A LA LUMIERE - LICHTTECHTHEIT DER FARBEN - ESTABILIDAD DE LOS COLORES - УСТОЙЧИВОСТЬ ЦВЕТА	DIN 51094	NON DEVONO PRESENTARE APPREZZABILI VARIAZIONI DI COLORE THEY DO NOT HAVE TO SHOW VISIBLE COLOUR ALTERATION PAS DE MODIFICATIONS SENSIBLES DE COULEUR WEISEN KEINE SICHTBAREN FARBABWEICHUNGEN AUF NO DEBEN PRESENTAR VARIACIONES DE COLOR APRECIABLES НЕ ДОЛЖНЫ ИМЕТЬ ЗАМЕТНЫХ ХРАЗЛИЧИЙ ЦВЕТА	CONFORME COMPLIANT CONFORME ERFÜLLT CUMPLE COOTBECTBYET		
	COEFFICIENTE DI ATTRITO (SCIVOLosità) FRICTION COEFFICIENT (SLIP RISK) COEFFICIENT DE FROTTEMENT (GLISSANCE) REIBKOEFFIZIENT (GLÄTTE) COEFFICIENTE DE FRICCIÓN (DESIZABILIDAD) КОЭФФИЦИЕНТ ТРЕНИЯ (СКОЛЬЗКОСТЬ)	DIN 51130	DOVE RICHIESTO IF NEEDED SI DEMANDE AUF ANFRAGE SI REQUERIDO DE СЛЕДУЕТ	A RICHIESTA AVAILABLE ON REQUEST SUR DEMANDE AUF ANFRAGE BAJO PEDIDO ПО ЗАПРОСУ		
		DIN 51097				
		D.M.236/ 89				
		B.C.R.				
		ANSI A 137.1:2012				



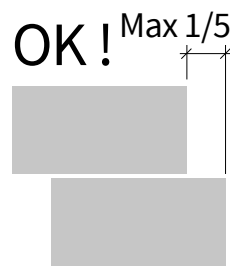
If you are laying same sized straightened-edged tiles, we recommend you keep a 2 mm joint.  
If you are laying different sized straightened-edged tiles (two or more sizes) together, we recommend you keep a 3 mm joint.  
In the case of non-straightened-edged tiles, we recommend you keep a 4 mm joint.

Si consiglia di mantenere una fuga di 2 mm per la posa in monofornato 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 conseil de préserver un joint de 2 mm pour la pose en mon format des articles rectifiés.  
On conseil de préserver un joint de 3 mm pour la pose en multiformat (de 2 formats et plus) des articles rectifiés.  
On conseil 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 Einzelfornat 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 monofornato o multiformato de los artículos rectificados.  
Se aconseja mantener una junta de 3 mm para la colocación en multiformato (de 2 formatos o más) de los artículos rectificados.  
Se aconseja mantener una junta de 4 mm en la colocación de los artículos con bordes no rectificados.



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.  
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All images are provided for illustrative purposes only and other colours and aesthetic features are available.

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Quanto riportato è da considerarsi indicativo e non esaustivo in riferimento ai colori e alle caratteristiche estetiche dei prodotti.

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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.



# TESTBERICHTE



**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> TCID50/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 29625  
 Phone 864.646.8453 Fax 864.646.2821  
 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 - Italcera Group”

ISO 18061 using Human Coronavirus 229E on Gold - Royal Stone collection - Italcera Group					
Sample	Infectivity Titer	Exposure Conditions	Exposure Time	Reduction under UV exposure on non-treated*	Reduction under UV exposure on Gold - Royal Stone collection - Italcera Group *
“Gold - Royal Stone collection - Italcera 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



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

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

ISO 18061 using Human Coronavirus 229E on Gold - Royal Stone collection - Italcera Group					
Sample	Infectivity Titer	Exposure Conditions	Exposure Time	Reduction under Dark conditions on non-treated*	Reduction under Dark conditions on Gold - Royal Stone collection - Italcera Group *
“Gold - Royal Stone collection - Italcera Group”	10 <sup>6</sup> TCID <sub>50</sub> /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





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**TCNA TEST REPORT NUMBER: TCNA-0002-21 PAGE: 4 OF 4**  
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1/13/2021

Dr. Jyothi Rangineni  
 Research Scientist

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**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

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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"	E. coli	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%
	S. aureus	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*
"B3"	E. coli	10 <sup>6</sup>	Test 1	90.8%	100%	92.8.4%
	S. aureus	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



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## 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.*



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### 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.*





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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	<b>EN 27447:2019</b>
Data ricevimento: /	Receipt date:	03/09/2020
Data inizio method test /	Start of test method	03/09/2020
Data termine method test /	Ends test method	10/09/2020
Revisione 1 / Updated 1		25/09/2020
Revisione 2 / Updated 2		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)*.....

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

Stoccaggio dei provini / *Storage conditions* .....

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*

Caratteristiche Cover o film di copertura: / *Characteristics Cover or covering film*

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*

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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





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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

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



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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 27447:20019 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: 20019 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



(Firma / Signature) Dr.ssa Alberta Vandini  
n. AA\_009993 G.N.R.  
in collaborazione con il / in collaboration with the  
Consorzio Futuro in Ricerca

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## 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.*



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### 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.*





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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 / <i>ISO standard applied</i>	<b>EN 27447:2019</b>	
<b>Metodo e requisiti / <i>Method and requirements</i></b>		
Data ricevimento: / <i>Receipt date:</i>		
Data inizio method test / <i>Start of test method</i>	03/09/2020	
Data termine method test / <i>Ends test method</i>	29/10/2020	
Revisione 1 / <i>Updated 1</i>	05/11/2020	
	30/11/2020	
Identificazione del campione / <i>Identification of the sample</i> :		
Denominazione / <i>Name of the product</i> .....		<b>MATERIALE CERAMICO:</b>
Dimensioni / <i>Dimensions (measures)</i> .....		<b>Serie Advance, linea Royal Stone – Gold. /</b>
		<b>CERAMIC MATERIAL:</b>
		<i>Advance series, Royal Stone – Gold line.</i>
		Campione trattato: / <i>Sample treated:</i>
		5 x 5 cm spessore / <i>thickness</i> 0,8 cm
		Campione non trattato: / <i>Untreated sample:</i>
		5 x 5 cm spessore / <i>thickness</i> 0,8 cm
Ditta produttrice / <i>Manufacturer.(Committente / Customer)....</i>		
Campionamento dei provini / <i>Sampling of specimens.....</i>		
Data del campionamento / <i>Date sampling</i>		
Fase preliminare: / <i>Preliminary phase</i>		
modalità di disinfezione dei campioni (pre-test) / <i>sample disinfection methods (pre-test).....</i>		
Stoccaggio dei provini / <i>Storage conditions</i> .....		
Caratteristiche Cover o film di copertura: / <i>Characteristics Cover or covering film</i>		
c) Metodo test e Validazione / <i>Test method and its validation:</i>		
Metodo / <i>Method</i> .....		
Neutralizzante / <i>Neutraliser</i> .....		
d) Condizioni sperimentali: / <i>Experimental conditions:</i>		
Periodo di analisi / <i>Period of analysis</i> .....		
Tempo di esposizione / <i>Exposition time</i>		
Caratteristiche lampada UV / <i>UV lamp characteristics.....</i>		
		Diluzione-neutralizzazione / <i>Dilution-neutralization;</i>
		<i>Soybean-casein digest broth with lecithin</i>
		<i>and polysorbate 80 (SCDLP)</i>
		dal 29/10/2020 al 05/11/2020
		<i>from 29/10/2020 to 05/11/2020</i>
		t = 8 ore
		intensità UV: 0.25 mW/cm <sup>2</sup>
		lampada UV – (PHILIPS -UV TUV)
		<i>UV intensity: 0.25 mW / cm<sup>2</sup></i>
		<i>UV lamp – (PHILIPS -UV TUV)</i>

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Identificazione del ceppo batterico utilizzato / <i>Identification of the bacterial strain used.....</i>	<i>Staphylococcus aureus</i> ATCC 6538
Volume inoculo della sospensione test di <i>St. aureus</i> / <i>Inoculum volume of the St.aureus test suspension</i>	
Temperatura di incubazione batteri / <i>Temperature of incubation of bacteria</i>	400 µl
(tecnica diluizione-neutralizzazione e conta in piastra in inclusione) / <i>Temperature of incubation of bacteria</i>	
( <i>dilution-neutralization technique and pour-plate method</i> )	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)*

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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 / Lab test:	Campione / Sample Serie Advance, linea Royal Stone - Gold	UM*1	Risultato / Result
<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 <sub>L</sub> = 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>	ΔR = Log (BL/CL)- 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



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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 / cm2.*

*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



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Futuro in Ricerca

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### ***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**

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Torino, June 8, 2020

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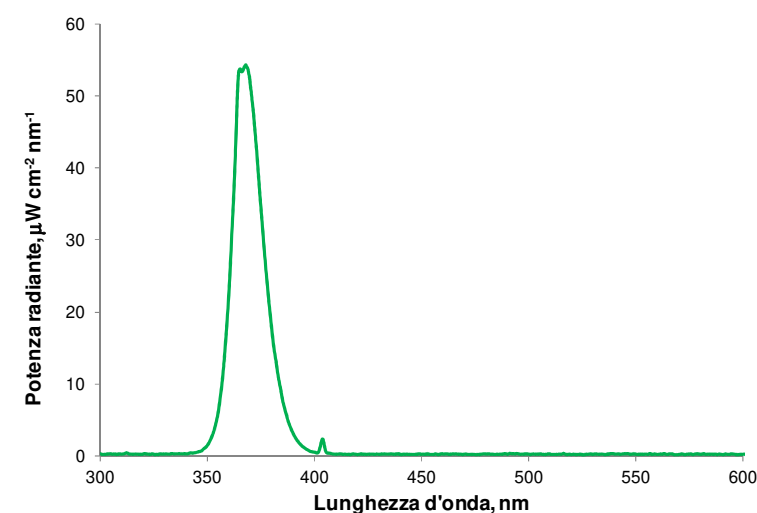


## 1. GENERAL TEST CONDITIONS

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.

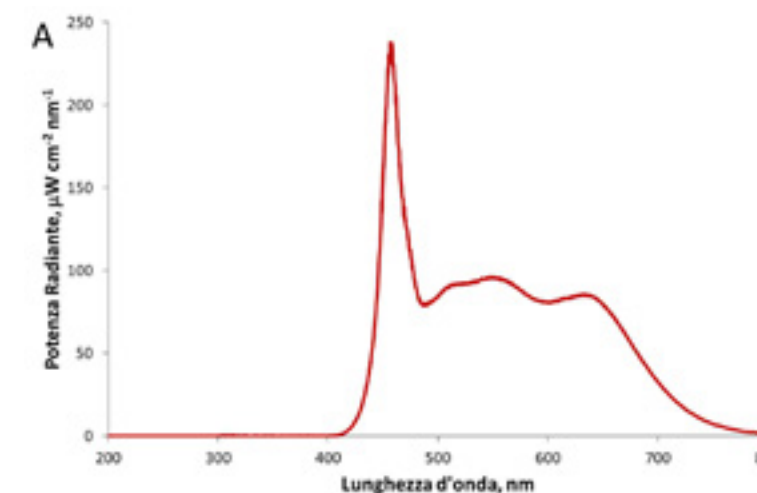
The determination of the NO/NO<sub>2</sub> content in the flow was carried out using an APNA 370 chemiluminescence detector (serial number WWSBNNW6). The measuring reactor had an internal volume of 3.6 dm<sup>3</sup>. The mixing inside the reactor was guaranteed by a compact axial fan EBMPAPST 612 JH (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.

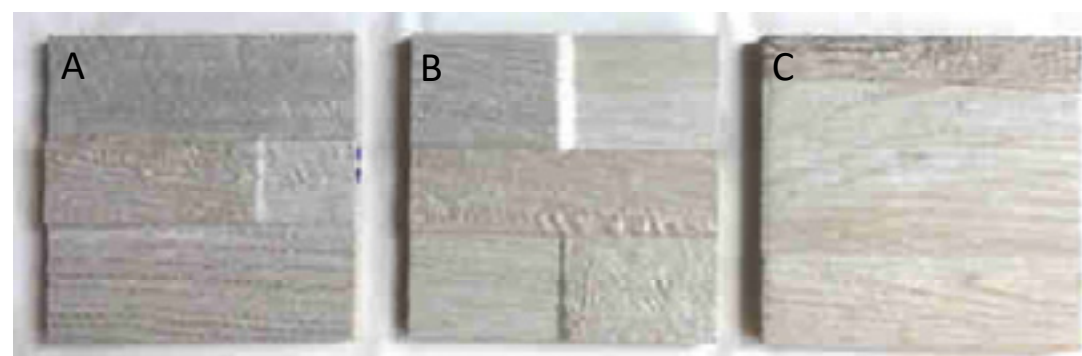


The tests in accordance with the UNI 11484 standard ("simplified" test) were performed on the samples as such **without any pretreatment**. The tests in accordance with the UNI 11484 standard, but with Visible radiation took place on the samples used for the test under UV radiation, but after washing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



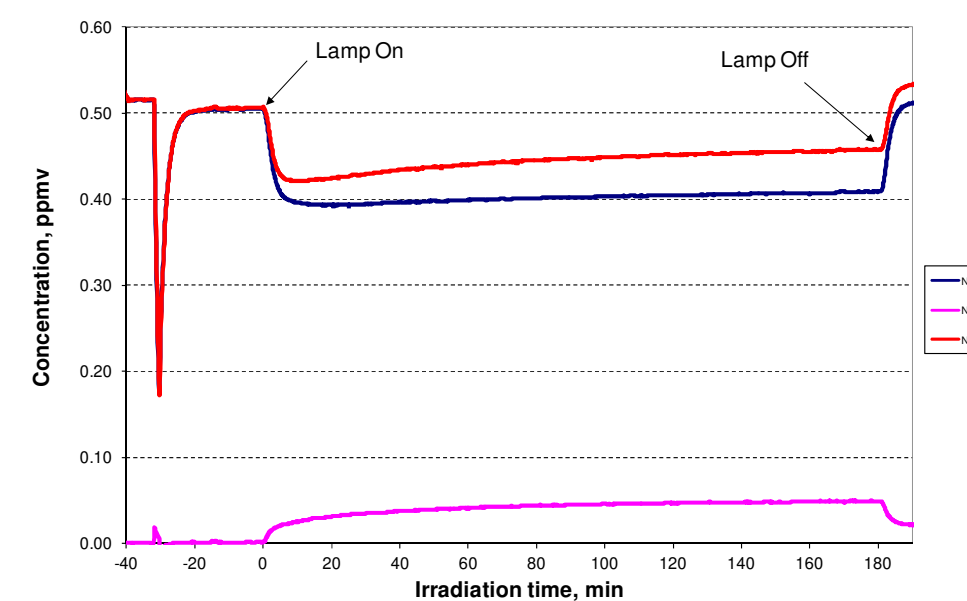
**Figure 3.** Pictures of the samples tested according to UNI 11484:2013: A = AR, B = BR, C = CR . The sample face reported is the irradiated one (UV and Visible irradiation) during the photocatalytic NO / NO<sub>x</sub> abatement tests.

### 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 $C_{NO_x}^{IN} = 0.000$ 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 $C_{NO_x}^{OUT,BUIO} = 0.016$ ppmv $C_{NO}^{OUT,LUCE} = 0.4972$ ppmv $\eta_{NO}^{foto} = 1.3$ %
Conversion in the dark in the presence of a sample	$\eta_{NO}^{buio} = 2.0$ % $\eta_{NO_x}^{buio} = -0.2$ %
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 <b>Figure 4</b> .
Observed rate of photocatalytic degradation	See <b>Table 2</b>
Remarks	<i>none</i>



**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 $C_{NO}^{OUT,LUCE} = 0.4972$ 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

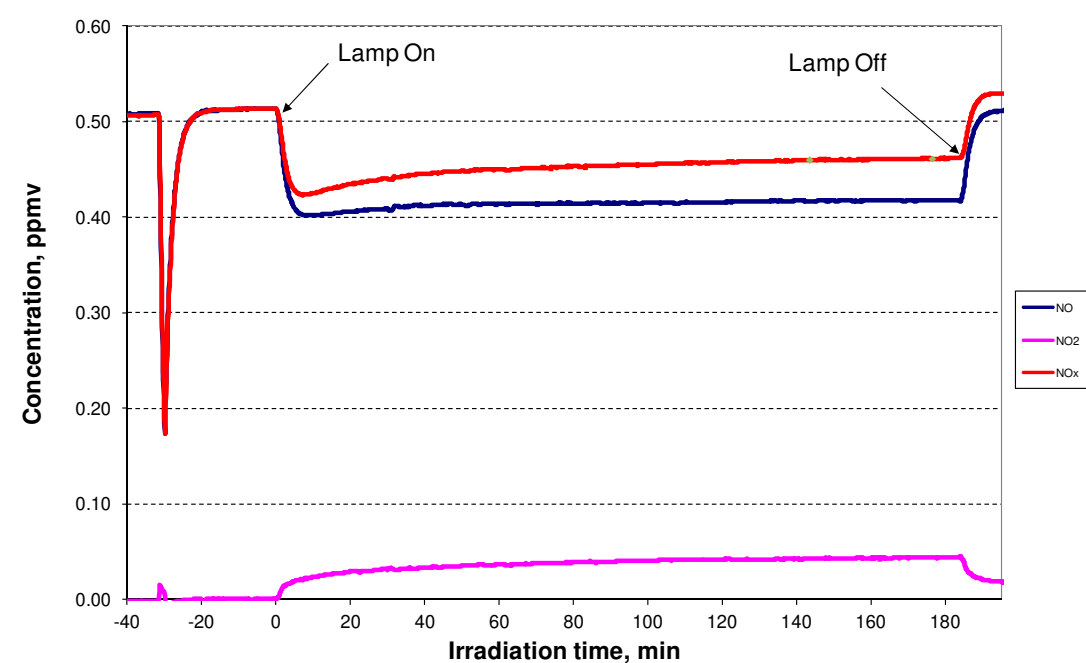


Figure 5. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on BR (UV) sample. Test dated 01/06/2020 and performed with UV irradiation in accordance with UNI 11484 (simplified).

### 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

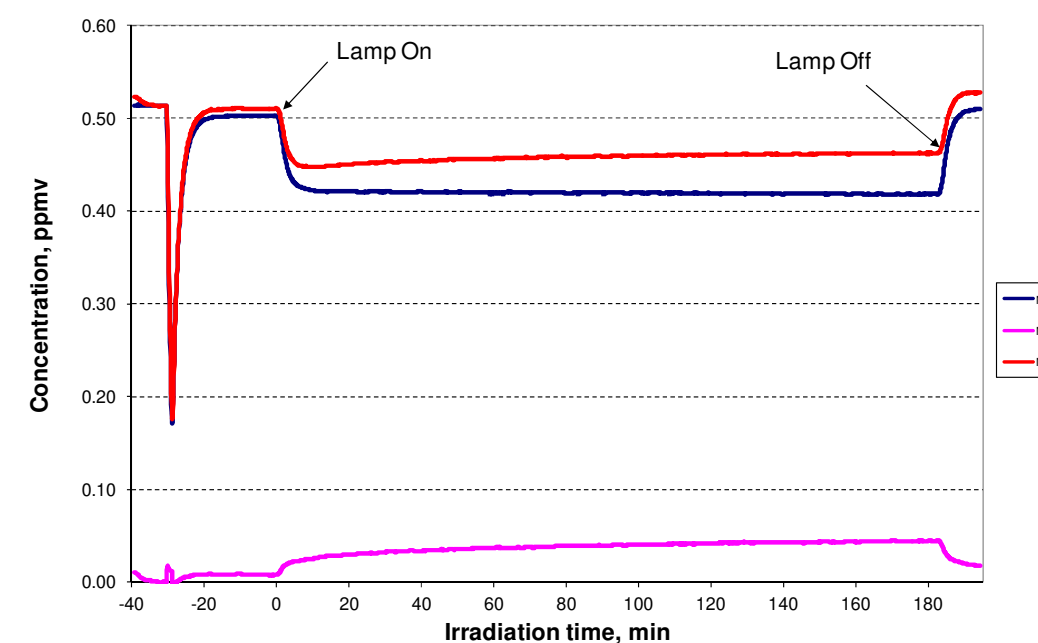
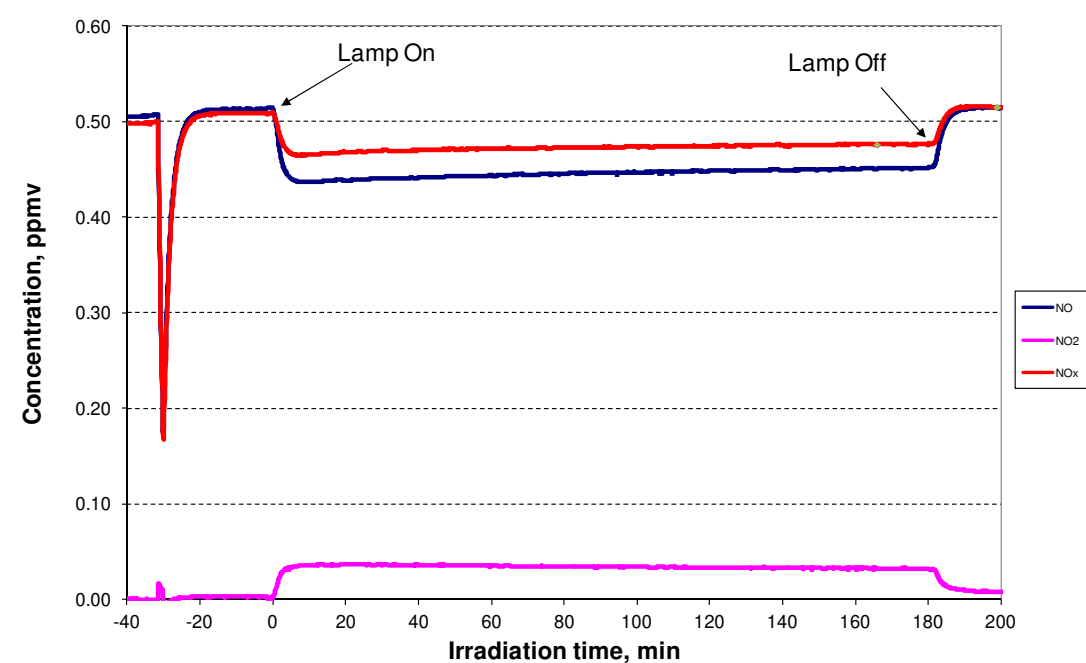


Figure 6. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on CR (UV) sample. Test dated 01/06/2020 and performed with UV irradiation in accordance with UNI 11484 (simplified).

### 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 $\eta_{NO, lamp}^{foto} = 1.3$ %
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 <b>Figure 7</b> .
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

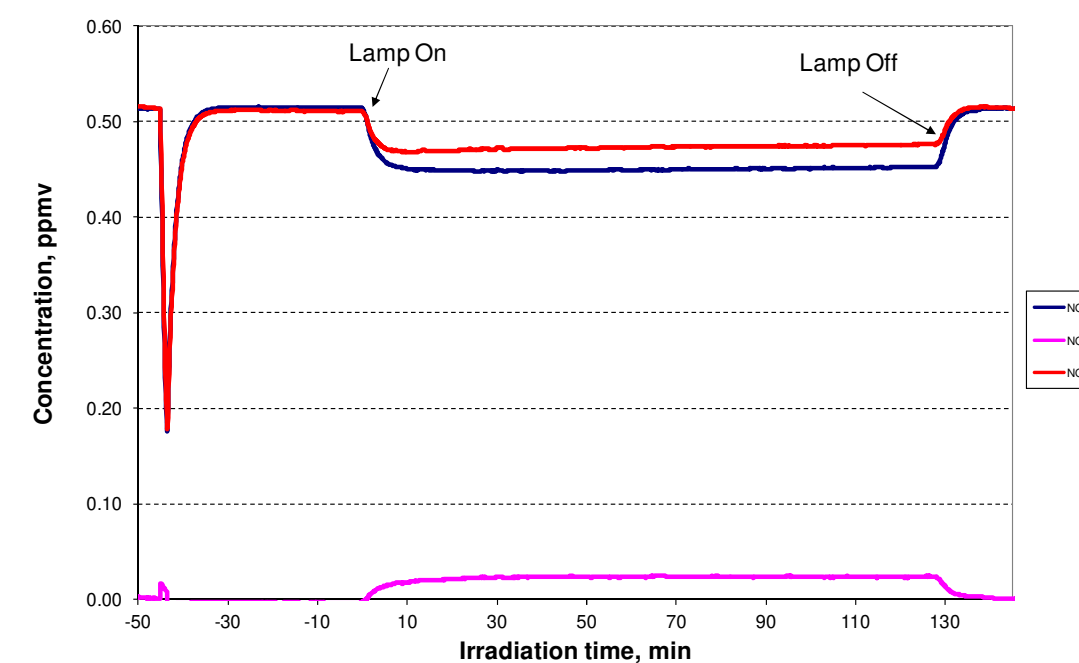


**Figure 7.** Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on AR (Vis) sample. Test dated 03/06/2020 and performed in accordance with UNI 11484 (simplified) with VIS irradiation.

### 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 Figure 9.
Observed rate of photocatalytic degradation	See Table 2
Remarks	none

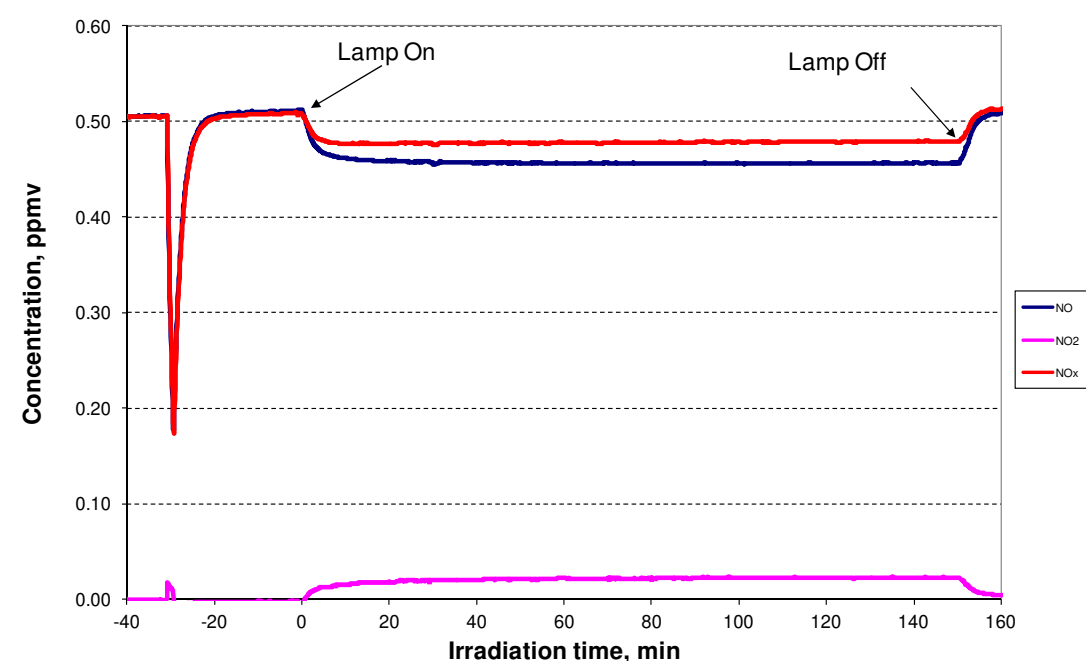


Figure 9. Concentration vs time for NO, NO<sub>2</sub> and NO<sub>x</sub> during the photocatalytic test on CR (Vis) sample. Test dated 04/06/2020 and performed in accordance with UNI 11484 (simplified) with VIS irradiation.

## 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	$\eta_{NO,i}^{totale}, \%$	$\eta_{NO_x,i}^{totale}, \%$	$r_{NO,i}^{foto}, \mu\text{g m}^{-2} \text{h}^{-1}$	$r_{NO_x,i}^{foto}, \mu\text{g m}^{-2} \text{h}^{-1} [i]$
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

[i] The photocatalytic NO<sub>x</sub> conversion rate is expressed as μg equivalents of NO<sub>2</sub> converted per m<sup>2</sup> of sample in 1 hour.

Torino, June 8, 2020

Prof. Claudio Minero

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