

ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Cipa Gres spa
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-CIP-20170141-CCC1-EN
Issue date	13/11/2017
Valid to	12/11/2023

Ceramic Tiles - Unglazed porcelain tiles CIPA GRES spa

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General Information

<p>CIPA GRES SPA</p> <hr/> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-CIP-20170141-CCC1-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Ceramic tiles and panels, 04.2017 (PCR tested and approved by the SVR)</p> <hr/> <p>Issue date 13/11/2017</p> <hr/> <p>Valid to 12/11/2023</p> <hr/> <p style="text-align: center;"></p> <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p style="text-align: center;"></p> <hr/> <p>Dr. Burkhard Lehmann (Managing Director IBU)</p>	<p>Ceramic Tiles - Unglazed porcelain tiles</p> <hr/> <p>Owner of the Declaration Cipa Gres spa Via Statale 467, 119 42013 Casalgrande - REGGIO EMILIA ITALY</p> <hr/> <p>Declared product / Declared unit Unglazed Porcelain / 1 m2</p> <hr/> <p>Scope: In this EPD the LCA results of one average square meter of unglazed porcelain tiles produced by Cipa Gres spa in the Italian production site Casalgrande di Reggio Emilia are declared. The life cycle assessment was calculated with a tool developed by Confindustria Ceramica with support of thinkstep AG.</p> <p>The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.</p> <hr/> <p>Verification</p> <table border="1"> <tr> <td colspan="2">The CEN Norm /EN 15804/ serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration according to /ISO 14025/</td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p style="text-align: center;"></p> <hr/> <p>Matthias Schulz (Independent verifier appointed by SVR)</p>	The CEN Norm /EN 15804/ serves as the core PCR		Independent verification of the declaration according to /ISO 14025/		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
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<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally						

Product

Product description / Product definition

Ceramic tiles, product by Cipa Gres spa in Casalgrande di Reggio Emilia plant, are made primarily of natural raw materials such as sand, clay, feldspar, kaolin and rhyolite. To minimize the use of natural resources, a percentage of recycled material both from external and internal ceramic tiles production is added to the mixing recipe.

The main type of ceramic tile is the fine porcelain stoneware, characterized by a very compact body, providing high performances. For LCA purpose, CIPA GRES SPA has identified an "average product" of ceramic tile.

Product dimensions may vary depending on the various sizes from 10cm x 20cm to 60cm x60cm; Thickness ranges from 7.2mm to 14mm

Application

The designated application for the EPD object product is both for wall and floor covering, for civilian and residential/industrial use.

For the placing on the market in the EU/EFTA (with exception of Switzerland), the Regulation (EU) No

305/2011 applies. The products need a Declaration of Performance taking into consideration /EN 14411:2012/ Ceramic tiles — Definitions, classification, characteristics, evaluation of conformity and the CEmarking.

Technical Data

Porcelain tiles conform to the following standards and specifications:

The data specified in the Declaration of Performance apply.

Constructional data

The main type of ceramic tile is the fine porcelain stoneware, characterized by a very compact body, providing high performances. Ceramica CIPA GRES SPA buys the dust and the producing-progress starts from the raw material-stocking to the final processes and packaging. For LCA purpose, CIPA GRES SPA has identified an "average product" of ceramic tile.

Name	Value	Unit
Water adsorption acc. to /EN ISO 10545-3/	≤ 0,05	%

Bending strength acc. to /ISO 10545-4/	>35	N/mm ²
Modulus of rupture Breaking strength	≥1300	N
Resistance deep abrasion acc. to /ISO 10545-6/	120-150	mm ³
Thermal shock resistance acc. to /ISO 10545-9/	resistant	-
Linear thermal expansion coefficient acc. to /ISO 10545-8/	≤9	MK ⁻¹
Frost resistance acc. to /ISO 10545- 12/	resistant	-
Stain resistance acc. to /ISO 10545- 14/ Class 3 minimum - Resistance to	class 5	-
Resistance to chemicals for household use and swimming-pool salts acc. to /ISO 10545-13/	UA	-
Resistance to acids and bases acc. to /ISO 10545-13/	from ULA/UL B from UHA/UH B	-
Colour resistance to light exposure acc. to /DIN 51094/	No alteration after testing	-
Thermal Conductivity	ca. μ 1W/mk	-
Strength compressive	Media compression resistance (N/mm ²) 351 - (Kg/cm ²) 3578	-
Resistance to water vapor diffusion	ca. μ 120.000	-
Skid resistance Ramp Method acc. to /DIN 51130 BGR 181/	NC; R9-R10-R11	-
Skid resistance Ramp Method acc. to /DIN 51097 GUV 26.17/	NC; A;A+B;A +B+C	-
Skid resistance Pendulum acc. to /ENV 12633 BOE N°74 of 2006/	NC, Class 1 2- 3	-
Skid resistance Pendulum acc. to /BS EN13036-4:2011/	NC; PTV>36	-
Mean coefficient of friction B.C.R. acc. to /D.M. 236 14/6/89/	NC; μ>0,40	-
Skid resistance BOT 3000 (DCOF) acc. to /ANSI 137.1:2012/	NC; >0,42	-
Flexural strength acc. to /ISO 10545-4/	n.r.	
Impact resistance acc. to DIN EN ISO 10545-5/	n.r.	
Resistance to surface wear (class) acc. to DIN EN ISO 10545-7/	n.r.	

n.r. = not relevant

Cipa Gres spa porcelain tiles comply with the following standards and provisions:

- 2014/C 259/01 Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.
- /SASO ISO 13006:2016/ – Standard for Ceramic Tiles in Saudi Arabia.
- /SONCAP/ Standards organization of Nigeria conformity assessment program - Exporter and importer guidelines
- /CNCA-C21-01:2014/ Implementation rules for compulsory certification of decorative products and fitment products
- /QB Mark NF/ Tiles Ceramics for floor coverings, Associated with the UPEC brand
- /DEVL1104875A/ Ministry of Ecology, Sustainable Development, Transport and housing - Order of 19 April 2011 on the labeling of building or wall or floor covering products and paints and varnishes on their volatile pollutant emissions (VOC)

Base materials / Ancillary materials

- Feldspar 35%
- Clay 42%
- Silica sand 13%
- Rhyolite 4%

Main auxiliary additives:

- Dispersant
- Binder
- Fluidifying agents
- Pigments

Reference service life

The service life of tiles is in generally higher than 50 years /BNB 2011/.According also to US Green Building Council the service life of tiles could be as long as the life of the building itself. Therefore 60 years can be an alternative tile's life for U.S. GBG.

The results reported consider the tile's use of 1 year, then it could be possible to obtain use impacts referred to 50 or 60 years multiplying B2 values with for 50 or 60.

A reference-life according to /ISO 15686/ is not reported.

For the application and use the respective national provisions apply.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m² ceramic tile for covering walls and floors with an average weight of 22,15 kg. /GaBi/ data sets apply.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	22.15	kg/m ²
Conversion factor to 1 kg	0.045	-

System boundary

The entire life cycle of the product is considered (Type of EPD: cradle- to- grave) therefore every module described below is declared in this EPD.

Modules A1-A3 include those processes that provide energy and materials input for the system (A1), transport up to the factory gate of Meta spa plant (A2), manufacturing processes as well as waste processing (A3).

Module A4 includes the transport from the production site to the customer or to the point of installation of the tiles.

Module A5 considers all tile installation steps also packaging waste processing (recycling, incineration, disposal). Credits from energy substitution are declared in module D.

During this phase a ceramic material loss of 6,5% has been considered.

Module B1 considers the use of tiles. During the use of ceramic tiles no hazardous indoor emissions are expected to occur..

Module B2 includes the cleaning of the tiles. Provision of water, cleaning agent for the cleaning of the tile, incl. waste water treatment are considered.

Modules B3-B4-B5 are related to the repair replacement and refurbishment of the tile. If the tile is

properly installed no repair, replacement or refurbishment processes are necessary.

Modules B6-B7 consider energy use for operating building integrated technical systems (B6) and operational water use for technical building-related system. No operational energy or water use are considered. Cleaning water is declared under B2.

Module C1 regards demolition and de-construction processes of the tiles from the building.

Module C2 considers transportation of the discarded tiles to a recycling or disposal process.

Module C3 considers every process (collection, crushing process etc) for recycling of the tiles.

Module C4 includes all the landfill disposal process, including pre-treatment and management of the disposal site.

Module D includes benefits from all net flows in the end-of-life stage that leave the product boundary system after having passed the end-of-waste stage. Loads from packaging incineration and resulted energy credits (electricity and thermal energy) are declared within module D.

The life cycle assessment was calculated with a tool developed by Confindustria Ceramica with support of thinkstep AG.

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

LCA: Scenarios and additional technical information

The following technical information about declared modules and related scenarios are based on average data, according to European Ceramic Tile Manufacturers' Federation and in accordance with Cipa Gres spa.

Transport to the building site (A4)

Average default transportation scenarios are used and displayed table frame

Name	Value	Unit
Litres of fuel	31	l/100km
National destination Truck with a capacity of 27 tons (51 % of tiles sold)	300	km
European destination Truck with a capacity of 27 tons (34% of tiles sold)	1390	km
International distances (ship)	6520	km
Capacity utilisation volume factor (including empty runs)	0.85	-

Ceramic tiles are commercialized nationally, in Europe and the rest of the world.

Installation into the building (A5)

For the installation stage 3 options are defined, where different materials can be used.. For option 1, adhesives, mortar and water, for option 2 mortars and polysulphide dispersions, for option 3 also cementitious adhesives (different quantities for different tile sizes). These considerations are based on average data provided by various ceramic tiles manufacturers in Europe. In this EPD it is assumed that the tiles are installed by cementitious adhesive (option 3).

For the treatment of packaging waste, a European average scenario is used and illustrated taken from "Eurostat, 2013"; accordingly, the end of life consists in recycling, energy recovery and transfer to plastic and paper landfills, for wood, re-use, energy recovery and landfill is assumed.

The loss of ceramic material considered is 6.5%.

Name	Value	Unit
Cementitious adhesive	6	kg

Use or application of the installed product (B1) see section 2.12 "Use"

Ceramic tiles are robust and have a hard, abrasionresistant surface. There are no impacts on the environment during the use stage.

Name	Value	Unit
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Maintenance (B2)

Throughout their life, the ceramic coverings product shall be cleaned regularly, to a greater or lesser degree, depending on the type of building: residential, commercial, healthcare. Thus, the consumption of water and disinfectant have been considered. The values declared in B2 refer to a time period of one year.

Scenario for maintaining ceramic floor tiles:

Residential use: 0.3 ml of detergent and 0.002 l of water are used to wash 1 m² of ceramic floor tiles once a week.

Scenario for maintaining ceramic wall tiles:

Residential use: 0.3 ml of detergent and 0.002 l of water are used to wash 1 m² of ceramic floor tiles once every three months.

Name	Value	Unit
Floor tile Maintenance cycle	2400	Number/S L
Wall tile Maintenance cycle	200	Number/S L
Wall tile Water consumption	0,002	L
Wall tile Detergent	0,0003	L
Floor tile Water consumption	0,002	L
Floor tile Detergent	0,0003	L

Repair, replacement and refurbishment (B3,B4,B5)

The service life of ceramic tiles is in general the same as the building life time. Repair, replacement and refurbishment is not required for ceramic tiles.

End of life (C1-C4)

C1: This module, in accordance with the PCRs developed by the European Ceramic Tile Manufacturer, is not relevant to ceramic tiles.

C2: Ceramic tile demolition wastes are transported from the building site to a lorry container or treatment plant by truck and an average distance of 20 km is considered. The return trip is included in the system. It can be considered an average distance of 30 km from the container or treatment plant to the final destination. Results for the end-of-life are declared for the 2 different scenarios.

Name	Value	Unit
Scenario no. 1 Material Recycling	100	%
Scenario no. 2 Landfill	100	%
Scenario No. 1 Material to recycling	26.7	Kg
Scenario No. 2 Material to landfill	26.7	Kg

C3: The recycling scenario includes the treatment of ceramic material for later use as mineral / raw material. It is subdivided into 2 sub-scenarios:

- 1) Recycling 100%
- 2) Recycling 0%

C4: The landfill disposal scenarios used are subdivided into 2 sub-scenarios:

- 1) landfill 0%
- 2) landfill 100%

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Module D includes credits from material recycling of tiles and packaging materials, energy credits from thermal recovery of packaging.

Results for module D are declared for the 2 different scenarios.

Name	Value	Unit
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LCA: Results

The tables below show the results of the LCA. Basic information on all declared modules are provided chapter 4. There are two scenarios for the end-of-life (C3, C4 and D) analyzed: Scenario 1 considers 100% recycling, Scenario 2 considers 100% landfill

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE					CONSTRUCTION PROCESS STAGE	USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES	
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: Ceramics Tiles - Unglazed porcelain tiles 1 m²

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
GWP	[kg CO ₂ -Eq.]	165.00	1.01	2.77	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.07	0.00	0.00	0.43	-0.47	-408.00
ODP	[kg CFC11-Eq.]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AP	[kg SO ₂ -Eq.]	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EP	[kg (PO ₄) ³ -Eq.]	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POCP	[kg ethene-Eq.]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADPE	[kg Sb-Eq.]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ADPF	[MJ]	246.00	13.50	23.30	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1.34	0.00	0.00	5.57	-5.42	-4.65

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - RESOURCE USE: Ceramics Tiles - Unglazed porcelain tiles 1 m²

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	[MJ]	38.30	0.68	7.23	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.08	0.00	0.00	0.66	-1.07	-0.87
PERM	[MJ]	2.64	0.00	-2.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	[MJ]	40.90	0.68	4.77	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.08	0.00	0.00	0.66	-1.07	-0.87
PENRE	[MJ]	250.00	13.60	25.20	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1.39	0.00	0.00	5.78	-6.17	-5.30
PENRM	[MJ]	0.97	0.00	-1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	[MJ]	251.00	13.60	24.30	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1.39	0.00	0.00	5.78	-6.17	-5.30
SM	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.90	0.00
RSF	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	[m ³]	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Caption: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

Ceramics Tiles - Unglazed porcelain tiles 1 m²

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NHWD	[kg]	0.10	0.00	1.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.80	-1.09	-0.01
RWD	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CRU	[kg]	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	IND	IND
MFR	[kg]	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.70	0.00	0.00	0.00	IND	IND
MER	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	IND	IND
EEE	[MJ]	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	IND	IND
EET	[MJ]	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	IND	IND

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

References

Porcelain tiles conform to the following standards and specifications:

It may exist slight shade variations, according to /ISO10545-16/, (Delta) Ecmc <1.0 (UGL) Additional

requirements listed in the attachments from A to L of the norm /ISO 13006/ e /EN14411/ are: length and width (according to /ISO 10545-2 SECTION 2/), thickness (according to norm /ISO 10545-2 section 3/),

straightness of sides (according to /ISO 10545-2 section 4/), squareness of sides (according to /ISO 10545-2 section 5/), centre-curvature (according to /ISO 10545-2 section 6/-, side-curvature (according to /ISO 10545-2 section 6/); distortion (according to /ISO 10545-2 section 6/), Appearance (according to /ISO 10545-2 section 7/) percentage of acceptable tiles per lot: 95%

Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin(pub.):
Generation of Environmental Product Declarations
(EPDs);

General Principles

for the EPD range of Institut Bauen und Umwelt e.V.
(IBU), 2013/04
www.ibu-epd.de

/ISO 14025/

DIN EN /ISO 14025:2011-10/, Environmental labels
and declarations — Type III environmental
declarations — Principles and procedures

/EN 15804/

/EN 15804:2012-04+A1 2013/, Sustainability of
construction works — Environmental Product
Declarations — Core rules for the product category of
construction products

IBU PCR Part A: 2016-18-03 V1.4

Product category rules for products and services in the
construction sector.

Part A: Calculation Rules for Life Cycle Assessment
and Requirements for the Accompanying Report.

IBU PCR Part B: 2014-07-04 V1.6

Product category rules for products and services in the
construction sector.

Part B: Requirements for EPD for tiles and ceramic
panels.

GaBi

Life Cycle Assessment Software and Databases,
developed by thinkstep AG, Leinfelden-Echterdingen,
2016 (<http://documentation.gabisoftware.com/>).

Ceramics of Italy

Ceramics of Italy is the collective brand of the Italian
pottery industry (tiles, sanitary ware, ceramic tiles,
ceramics tiles, And crockery). It is synonymous with
tradition, quality, innovation and creativity, as well as
production guarantee made in Italy. Ceramics of Italy,
promoted by Confindustria Ceramica - the Italian
Ceramic Association - is a registered trademark of
Edi.Cer. SpA, organizer of Cersaie, the most important
international ceramic building and furnishing salon held
annually in Bologna, Italy (www.cersaie.com).



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