International Organization for Standardization
Organisation internationale de normalisation
Международная организация по стандартизации

STRATEGIC BUSINESS PLAN – ISO/TC 189 CERAMIC TILES

Executive summary

ISO/TC 189 deals with ceramic tiles and related installation materials such as adhesives, grouts, and membranes.

World ceramic tile production *has grown considerably over the last two decades. In fact, the 15.9 billion m^2 produced in 2023 (the most recent year data is available) was nearly one and a half times (+142.2%) more than the 6.6 billion m^2 produced in 2004 (source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles).*

The test methods, definitions, specifications, and classification of standards produced by ISO/TC 189 for ceramic tiles and installation materials (adhesives, grouts, membranes, etc.), have served to unify the industry and facilitate the international trade of products, which has become more streamlined. Subsequently, a higher level of trust has been developed between buyers and sellers over the years. The availability of these international standards, especially in markets where national standards are lacking, has increased the quality and properties of products in order to meet higher consumer expectations.

The committee is working to keep existing standards current with the new and latest developments taking place in the ceramic tile industry. The activity of the committee is now diversified across several different working groups, which cover test methods and minimum performance requirements for ceramic tiles, adhesives, grouts, and membranes. Additionally, installation guidance and sustainability criteria for ceramic tiles and installation materials are addressed.

The main objectives of the committee should be in addressing and/or completing the development of international standards for the following items: sustainability of ceramic tiles and installation materials, testing methods and specifications for ceramic tiles of traditional, smaller, and larger size and thickness, testing methods and specifications for tiling adhesives and grouts, and testing methods and specifications for tiling membranes, backing materials, and underlayments. Additionally, the committee aims to develop standards for characterizing wear/abrasion resistance of ceramic tiles, cleanability (tiles and grouts), flooring slip resistance (interior and exterior), embodied carbon, and several other attributes.

1 Introduction

1.1 ISO technical committees and business planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to identify the benefits expected from the availability of International Standards, and to ensure adequate resources for projects throughout their development.

1.2 International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: ISO (International Organization for Standardization) is responsible for all sectors excluding Electrotechnical, which is the responsibility of IEC (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of ITU (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 164 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the International Standard.

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its Technical Committees are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

2 Business Environment of the ISO/TC

2.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

The scope of ISO/TC 189 covers standard developments, definitions, and specification for ceramic tiles and installation materials.

Technologies for manufacturing ceramic tiles have been changing considerably in recent years, resulting in almost endless possibilities for designs, shapes, and sizes. This has expanded the market's application of ceramic tile products beyond what was previously considered.

Now, more than ever, the development of standards for ceramic tile products requires an innovative approach beyond conventional considerations. The continuous search of new markets and new technological practices requires increased attention to some existing standards that may not be fulfilling industry needs. For the benefit of the end consumer, new and revised standards may also need to address expanded product application and final destination of use (residential, commercial, social, safety, health, environmental, etc.).

Currently, the main priorities in the work of the committee are related to the following materials:

CERAMIC TILES: The majority of ceramic tiles produced in the world is manufactured by the pressed or "compacted" dust method, and the tile is fired to maturity in roller-hearth kilns. In the recent decade, the process became extremely automated and sophisticated with the ability of manufacturing larger format tiles, which are creating new opportunities. The technology and manufacturing process involved in forming, handling, glazing, firing, and testing of tiles is continuously evolving, so related products and development of standards should do so as well, wherever and whenever is possible. As manufacturers are increasingly able to sell larger-sized tiles, new challenges have been introduced pertinent to installation, shipping, and handling. These issues have been partially addressed by the TC, but more work is needed. The standards should continue to be updated so they may remain current to address ongoing innovations and meet evolving market expectations.

ADHESIVES and GROUTS: Because of the installation challenges presented by larger format tiles, as well as the generally expanded market for ceramic tile in a variety of applications, including exterior applications, adhesives and grouts with new formulae are continuously being developed. Standards should be maintained and updated as needed to facilitate successful product installations.

MEMBRANES: Because of the increasing need for waterproofing and uncoupling membranes in the marketplace, efforts to develop international standards related to these products have been initiated in recent years. Existing standards should be maintained as needed and new standards should be developed as the prevalence of these membranes continues to grow.

International efforts toward the convergence of standards are encouraged wherever and whenever possible. A clear example is the TC's approval of a common testing procedure (vacuum methodology) to determine the percentage of water absorption for ceramic tiles. A key metric for product classification, harmonization around the determination of water absorption has alleviated international debate, resolved misunderstandings, and reduced testing time and costs industry-

wide. This has expanded international trade of ceramic tiles and facilitated increased market acceptance.

Stakeholders especially active in ISO/TC 189 come from Europe, North America, South America, Australia, and Asia. While more work is required from participating stakeholders to achieve full harmonization of standards worldwide, it remains an important goal of the TC.

Stakeholders that are relevant to the ceramic tile sector include: manufacturers, distributors, installers, builders, architects, building and homeowners, residents, and maintenance personnel. These stakeholders are concerned with the appearance, ease of installation, safety, ease of maintenance, health, sustainability, and appropriateness of products.

ISO/TC 189 is not aware of technical barriers to trade in ceramic tile from a standards viewpoint, except for slip resistance. No economic impact has been assessed. Patents have not been a major impediment, as many designs are mature, and licensing programs are in place for newer products.

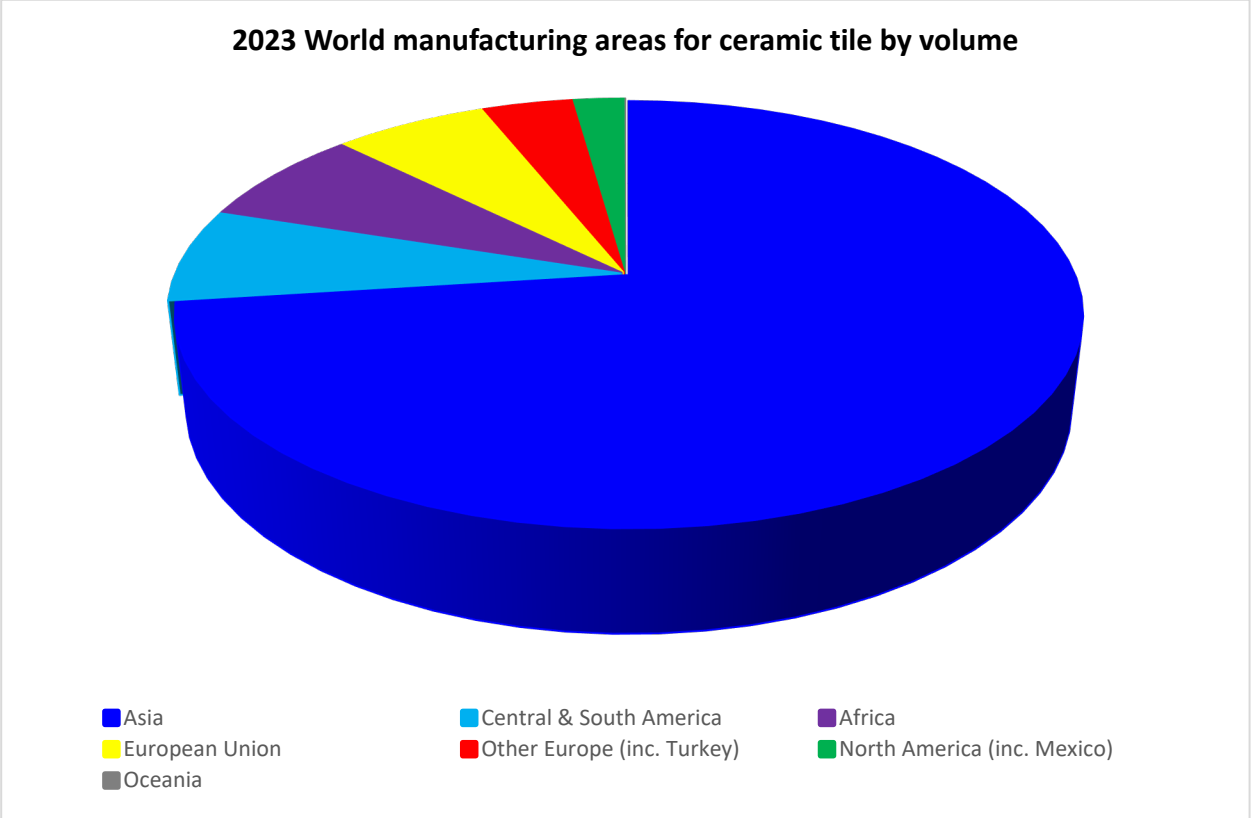
2.2 Quantitative Indicators of the Business Environment

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the ISO/TC:

Table 1 – World manufacturing regions for ceramic tiles

Regions	2023 World production (millions of m^2)	% of World production	% change 2022/2023
Asia	11,627	73.0%	-5.0%
Central & South America	1,124	7.1%	-10.3%
Africa	1,178	7.4%	9.9%
European Union	1,039	6.5%	-18.0%
Other Europe (inc. Türkiye)	615	3.9%	-4.2%
North America (inc. Mexico)	349	2.2%	-7.7%
Oceania	5	0.0%	0.0%
Total	**15,937**	**100.0%**	**-5.5%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024


2023 World manufacturing areas for ceramic tile by volume
Asia
Central & South America
Africa
European Union
Other Europe (inc. Turkey)
North America (inc. Mexico)
Oceania

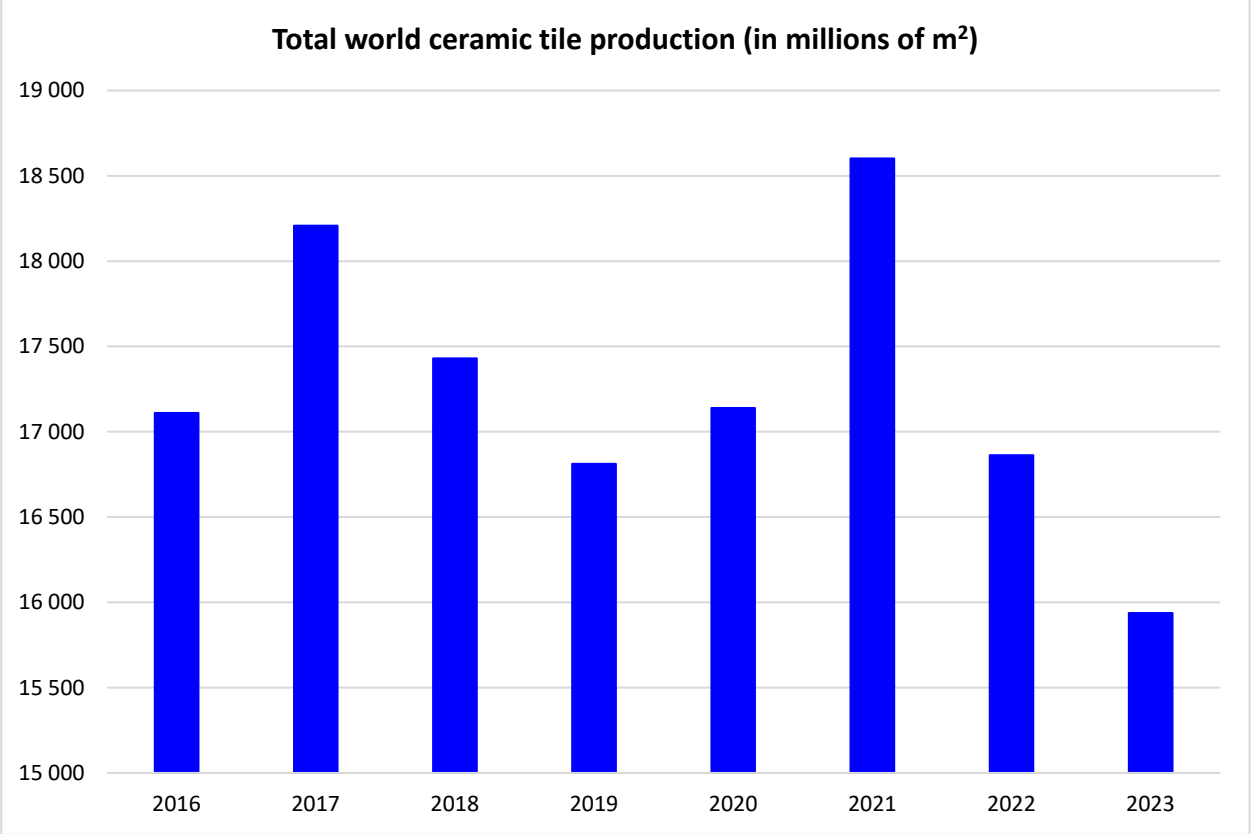
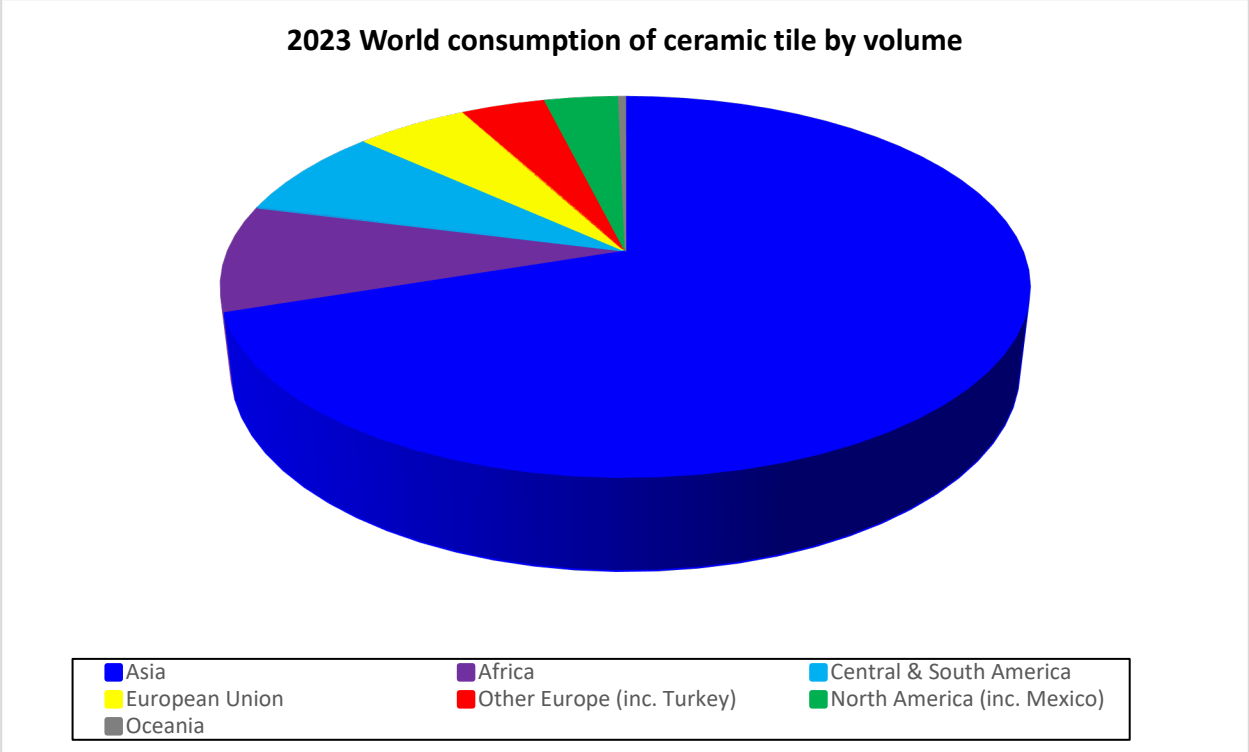

Total world ceramic tile production (in millions of m²)
19 000
18 500
18 000
17 500
17 000
16 500
16 000
15 500
15 000
2016
2017
2018
2019
2020
2021
2022
2023

Table 2 – World consumption regions for ceramic tiles

Regions	2023 World Consumption (millions of m^2)	% of World consumption	% change 2022-2023
Asia	10,920	69.9%	-6.5%
Africa	1,421	9.1%	12.5%
Central & South America	1,217	7.8%	-1.9%
European Union	831	5.3%	-17.1%
Other Europe (inc. Türkiye)	636	4.1%	0.2%
North America (inc. Mexico)	551	3.5%	-5.0%
Oceania	51	0.3%	0.0%
Total	**15,627**	**100.0%**	**-5.0%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024



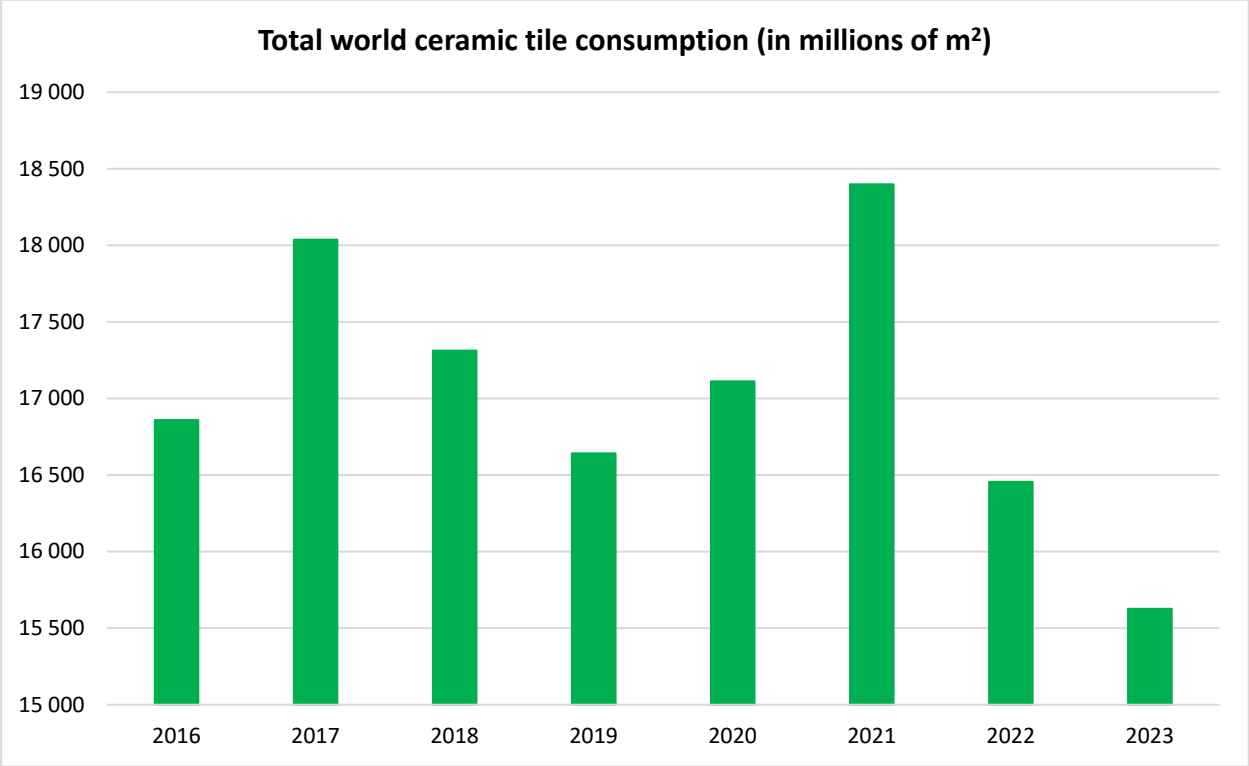
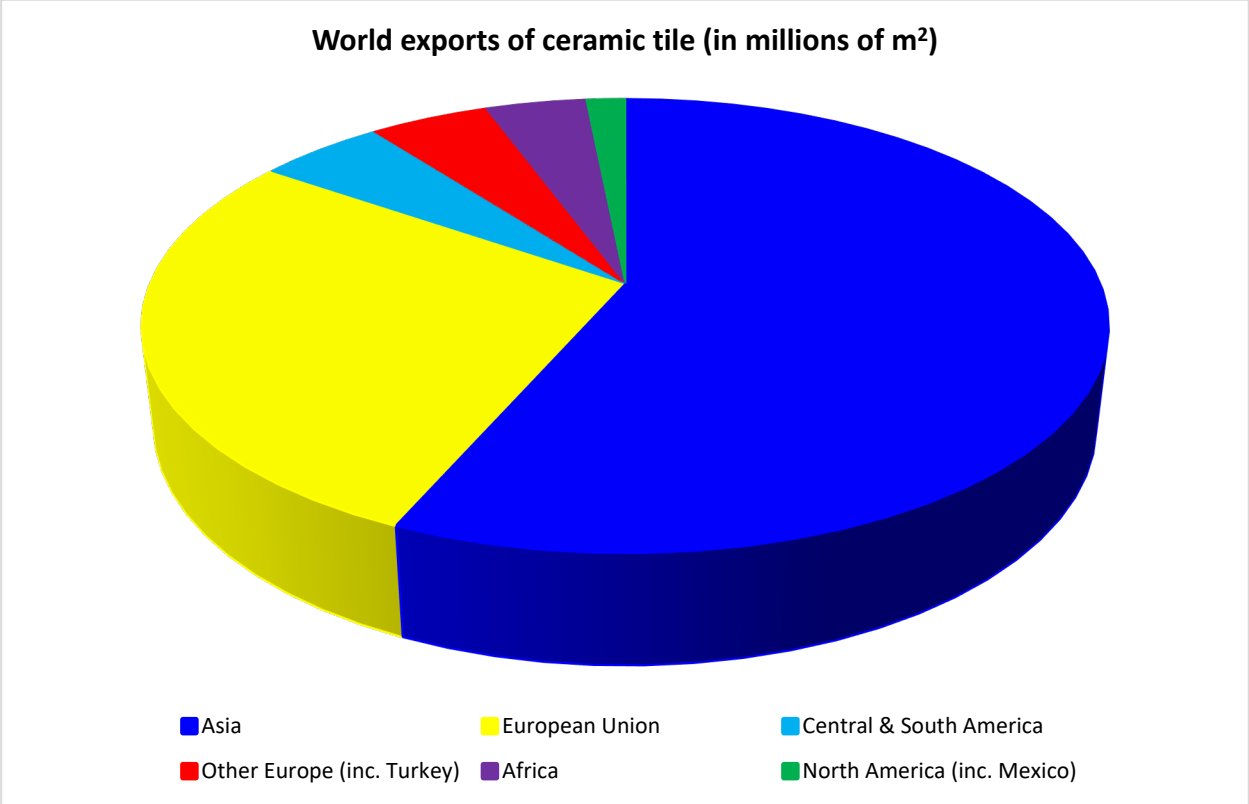


Table 3 – World exporting regions for ceramic tiles

Regions	2023 World exports (millions of m²)	% of World exports	% change 2022-2023
Asia	1,557	56.6%	15.0%
European Union	772	28.0%	-20.0%
Central & South America	138	5.0%	-17.4%
Other Europe (inc. Türkiye)	132	4.8%	-24.4%
Africa	111	4.0%	0.0%
North America (inc. Mexico)	43	1.6%	-9.2%
Oceania	0	0.0%	0.0%
Total	**2,753**	**100.0%**	**-2.3%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024


World exports of ceramic tile (in millions of m²)
Asia
European Union
Central & South America
Other Europe (inc. Turkey)
Africa
North America (inc. Mexico)

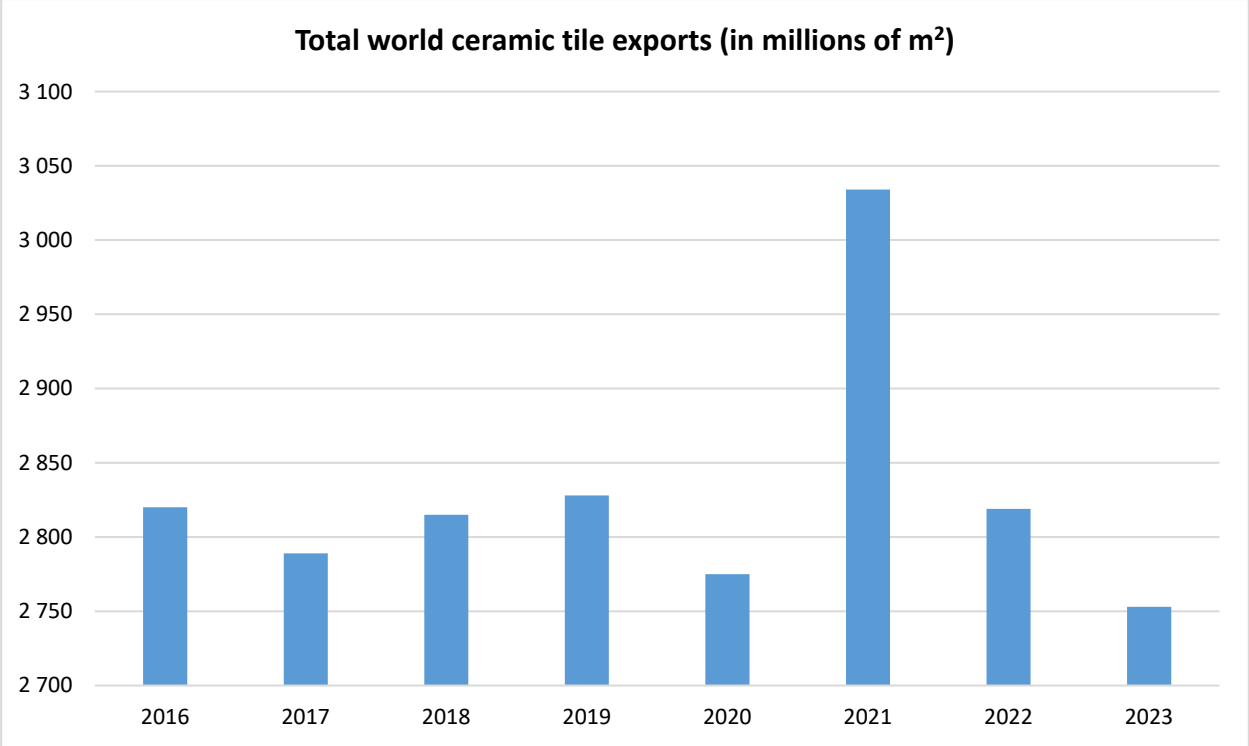

Total world ceramic tile exports (in millions of m²)
3 100
3 050
3 000
2 950
2 900
2 850
2 800
2 750
2 700
2016
2017
2018
2019
2020
2021
2022
2023

Table 4 – Largest ceramic tile importing countries

Country	2023 Imports (in millions of m2)	% of 2023 National Consumption	% of 2023 World Imports	% change 2022-2023
USA	195	73.8%	7.1%	-4.8%
Iraq	188	97.9%	6.8%	8.5%
France	111	93.6%	4.0%	-13.6%
Philippines	97	73.6%	3.5%	-8.9%
Germany	92	97.5%	3.3%	-27.0%
Indonesia	86	17.3%	3.1%	11.8%
South Korea	66	72.9%	2.4%	-2.8%
Thailand	62	34.2%	2.2%	-1.1%
Russia	60	28.1%	2.2%	41.7%
Israel	58	95.3%	2.1%	-0.6%
Total	1,014	55.1%	36.8%	-3.1%
World total	**2,753**	**17.6%**	**100.0%**	**-2.3%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024

Table 5 – Largest ceramic tile manufacturing countries

Country	2023 Production (in millions of m^2)	% of 2023 World production	% change 2022-2023
China	6,730	42.2%	-8.0%
India	2,450	15.4%	6.5%
Brazil	793	5.0%	-14.5%
Iran	450	2.8%	-6.3%
Indonesia	413	2.6%	-4.0%
Egypt	400	2.5%	5.3%
Vietnam	397	2.5%	-31.4%
Spain	394	2.5%	-21.2%
Italy	374	2.3%	-13.2%
Türkiye	372	2.3%	-3.4%
Total	12,773	80.1%	-6.9%
World total	**15,937**	**100.0%**	**-5.5%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024

Table 6 – Largest ceramic tile consumption countries

Country	2023 Consumption (in millions of m^2)	% of 2023 World consumption	% change 2022-2023
China	6,118	39.2%	-9.2%
India	1,700	10.9%	-2.9%
Brazil	694	4.4%	-5.7%
Indonesia	495	3.2%	1.2%
Egypt	390	2.5%	6.0%
Vietnam	375	2.4%	-25.7%
Saudi Arabia	295	1.9%	8.9%
Türkiye	264	1.7%	1.5%
USA	264	1.7%	-7.4%
Mexico	254	1.6%	-1.2%
Total	10,849	69.4%	-6.9%
World total	**15,627**	**100.0%**	**-5.0%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024

Table 7 – Largest Ceramic Tile Exporting Countries

Country	2023 Exports (in millions of m^2)	% of 2023 National production	% of 2023 World exports	% change 2022-23
China	615	9.1%	22.3%	6.2%
India	589	24.1%	21.4%	39.6%
Spain	344	87.4%	12.5%	-20.1%
Italy	285	76.2%	10.3%	-20.0%
Iran	203	45.1%	7.4%	4.5%
Brazil	89	11.2%	3.2%	-21.8%
Türkiye	79	21.2%	2.9%	-37.9%
Ghana	53	43.8%	1.9%	0.6%
Poland	43	53.0%	1.6%	-14.5%
Mexico	38	14.3%	1.4%	-10.1%
Total	2,337	19.4%	84.9%	-1.3%
World total	**2,753**	**17.3%**	**100.0%**	**-2.3%**

Source: Mecs/ACIMAC Research Dept. "World Production & Consumption of Ceramic Tiles," 12th edition 2024

3 Benefits expected from the work of the ISO/TC

The expected outcome of the work of ISO/TC 189, as with any ISO technical committee, is the harmonization of test methods and specifications which serve to facilitate international trade.

The test methods in the ISO 10545 series have served to standardize the measurement of physical properties for ceramic tiles. Standardization of definitions and specifications for ceramic tile in ISO 13006 has served to ensure that a common language is spoken to determine properties relating to ceramic tiles. As with all international standards, ISO 13006 and the ISO 10545 series must be periodically revised and expanded as needed to incorporate evolution in the industry.

Continued development of test methods and specifications for adhesives, grouts, and membranes, contained within the ISO 13007 series, is needed to ensure successful installations as ceramic tile products evolve.

An international standard test method for slip resistance of ceramic tiles is needed to provide a uniform and consistent means of evaluating tile surfaces. Currently there is variation worldwide and across the flooring industry regarding the characterization of slip resistance. International agreement on this subject would minimize confusion, increase consumer safety, and expand the market.

As global attention to sustainability increases, continued development of standards for ceramic tiles and installation materials, contained within the ISO 17889 series, is needed to keep pace with market demands.

Standardization of embodied carbon in ceramic tiles is increasingly relevant today as the construction industry faces mounting pressure to reduce its environmental impact. Ceramic tiles require energy and raw materials to produce, and without standardized methods to measure and report their embodied carbon, it is difficult for stakeholders to make informed decisions that support low-carbon design goals. A more recent goal of the TC is to establish consistent metrics to help enhance transparency and support broader efforts to decarbonize the built environment in line with global climate targets.

4 Representation and participation in the ISO/TC

4.1 Membership

Countries/ISO member bodies that are P and O members of the ISO/TC 189 committee

4.2 Analysis of the participation

Several countries have adopted the ceramic tile standards administered by ISO/TC 189. Other countries have adopted the ISO/TC 189 standards "per se" or in other words, national tile and installation materials standards have been harmonized with ISO standards.

A listing of the countries that have attended meetings and participated in standard development for ISO/TC 189 is given in Table 8. Most active members in ISO/TC 189 are from the European Union, North America, Brazil, Japan, and China, which represents an important part of the worldwide production capacity and consumption. Conversely, countries in the South East Asia, Middle East, Africa and some other countries have historically been underrepresented. Efforts have been made to improve representation and participation in the ISO committee, including actions to encourage participation by some of the countries in the regions mentioned above.

Table 8 – Countries participating in meetings of ISO/TC 189

Country	Member body	Membership status
Australia	SA	P
Brazil	ABNT	P
Canada	SCC	P
China	SAC	P
Colombia	ICONTEC	P
Czech Republic	UNMZ	P
Germany	DIN	P
India	BIS	P
Indonesia	BSN	P
Israel	SII	P
Italy	UNI	P
Japan	JISC	P
Jordan	JSMO	P
Malaysia	DSM	P
Mexico	DGN	P
Morocco	IMANOR	P
Norway	SN	P
Portugal	IPQ	P
Spain	UNE	P
Sweden	SIS	P
Türkiye	TSE	P
United Kingdom	BSI	P
United States	ANSI	P

5 Objectives of the ISO/TC and strategies for their achievement

5.1 Defined objectives of the ISO/TC

The objectives of ISO/TC 189 will be addressed by Working Groups (WGs) in the following sections:

WG 1 - Test methods:

WG 1 is working to evaluate the need for new test methods which may include updating testing methods and specifications for ceramic tiles with traditional format and larger format, measuring dimension of large format tiles, resistance to wear/abrasion of ceramic tile surfaces, and determination of water reverse staining resistance. WG 1 will also discuss revisions to some of the ISO 10545 series of test method standards that may need revision as identified during systematic review.

WG 2 - Product specifications:

WG 2 has worked on updating ISO 13006 Ceramic tiles – Definitions, classification, characteristics and marking to reflect evolution that has taken place in the ceramic industry. The latest version of ISO 13006 was published in 2018. WG 2 is currently working on new terminology for ceramic tile thickness, criteria for ceramic mosaic tiles, and several other topics.

WG 3 - Products for installation:

WG 3 is working to develop standards as part of the ISO 13007 series of test methods and product specifications for grouts and adhesives. Active work items concern the terms, definitions and specifications for grouts and adhesives used with ceramic tiles.

WG 4 - Thin tiles:

WG 4 is working to develop standards concerning “multilayer tiles,” including a method to measure the tensile adhesion strength of fibre-combined multilayer ceramic tile and tile adhesive, as well as standardization of definitions, classification, characteristics and marking for multilayer ceramic tiles.

WG 6 - Installation methods:

WG 6 recently completed work on two guidelines for installation ISO/TR 17870-1 Ceramic tiles – Guidelines for installation – Part 1: Installation of ceramic wall and floor tiles, ISO/TR 17870-2 Ceramic Tiles – Guidelines for installation – Part 2: Installation of thin ceramic wall and floor tiles, and ISO/TS 17870-3 Ceramic tiles – Installation – Part 3: Installation of large format porcelain tiles and panels by mechanical means onto a support structure.

WG 7 - Sustainability issues for ceramic tiling systems:

WG 7 recently completed work on ceramic tile sustainability standards ISO 17889-1 – Ceramic tiling systems – Sustainability for ceramic tiles and installation materials – Part 1: Specification for ceramic tiles and ISO 17889-2 Ceramic tiling systems — Sustainability for ceramic tiles and installation materials — Part 2: Specification for tile installation materials). It is currently working on Part 3 of the 17889 series for guidelines for the application and verification of Parts 1 and 2.

WG 8 - Antimicrobial properties of ceramic tile surfaces:

WG 8 recently completed work on a quantitative determination of antibacterial activity of ceramic surfaces (ISO 17721-1 – Quantitative determination of antibacterial activity of ceramic tile surfaces – Test methods – Part 1: Ceramic tile surfaces with incorporated antibacterial agents and ISO 17721-2 – Quantitative determination of antibacterial activity of ceramic tile surfaces – Test methods – Part 2: Ceramic tile surfaces with incorporated photocatalytic antibacterial agents).

WG 9 - Low modulus adhesives for exterior tile finishing:

WG 9 recently completed work on ISO 14448 Low modulus adhesives for exterior tile finishing. Additional work to update this standard is under consideration as a preliminary work item.

WG 10 - Slip resistance measurement for ceramic tile:

The WG 10 Convenor is working to build consensus and prepare a scope and justification for a new project to develop a method for measurement of the slip resistance of ceramic tile surfaces.

WG 11 - Uncoupling membrane for ceramic tile installation:

WG 11 is developing a new standard for performance properties of uncoupling membranes for ceramic tile installation. A collaborative test method development among the WG experts is ongoing.

WG 12 - Embodied carbon of ceramic tile and related products:

WG 12 was established in 2022 and is developing its first project under the series 22267, titled Ceramic tiling systems – Embodied carbon – Part 1: Calculation of embodied carbon of ceramic tile. Further work in the series is anticipated to occur beyond the development of Part 1.

5.2 Identified strategies to achieve the ISO/TC's defined objectives

ISO/TC 189 has already completed the main part of its work for ceramic tiles, grouts, and adhesives, but work shall continue for membranes, sustainability, slip resistance, and embodied carbon protocols for ceramic tiles. Continued work for ceramic tiles, grouts, and adhesives is intended to keep the existing standards current with developments in the industry. For all standards development, existing national standards are considered to arrive at a consensus. In some cases, this is a relatively straightforward proposition, but for issues such as slip resistance of ceramic tile surfaces, existing national standards are so divergent, that more work and discussion is needed to achieve consensus.

6 Factors affecting completion and implementation of the ISO/TC work programme

The current difficulties affecting the completion of the work programme are tied to reaching consensus on test methods for slip resistance measurement of ceramic tile surfaces.

7 Structure, current projects and publications of the ISO/TC

Information on ISO online

The link below is to the TC's page on ISO's website:

ISO/TC 189 on ISO Online

Click on the tabs and links on this page to find the following information:

- About (Secretariat, Committee Manager, Chair, Date of creation, Scope, etc.)
- Contact details
- Structure (Subcommittees and working groups)
- Liaisons
- Meetings
- Tools
- Work programme (published standards and standards under development)

Reference information

Glossary of terms and abbreviations used in ISO

General information on the principles of ISO's technical work