

SEDIMENTARY MAGNESITE

SILICATE-BEARING GRADE FOR CERAMIC BODIES



ESKİŞEHİR BASIN · KIREÇKÖY OPERATION

Sedimentary magnesite occurs interbedded with clay horizons laid down in a lacustrine setting. Its soft texture, pale colour and low iron content are characteristic of this deposit type.

THIRTY YEARS IN ANATOLIAN MINERALS

Öncü Madencilik was founded in Eskişehir in 1994 as a mining, engineering and consultancy firm. Regular extraction began in 2006. In 2016 the company ended its consultancy activities to concentrate entirely on mining, and has invested in its operations ever since.

Today we work our own licensed deposits in the Eskişehir basin. The sedimentary magnesite we produce has been used for many years as a body raw material by the largest ceramic tile manufacturers in Türkiye.

1994 FOUNDED	4 MINING LICENCES
1,710 ha TOTAL LICENSED AREA	4.35 Mt ESTIMATED RESERVES
2 ACTIVE OPERATIONS	20+ PLANTS SUPPLIED

Our first shipment to Europe took place in 2022: the material was supplied in volume to one of the largest ceramic producers in Spain and used successfully in production. Exports have until now been handled through intermediaries; from 2026 we manage our overseas sales directly.



PIT AND DISPATCH AREA

WHAT WE SELL, AND WHAT IT DOES

Our product is raw, uncalcined sedimentary magnesite (MgCO_3). Its silicate-bearing structure makes the material behave differently in a ceramic body from refractory-grade magnesite, and that difference is precisely what makes it suited to tile bodies.

In a tile body, magnesite works as a secondary flux alongside feldspar. It lowers the peak firing temperature, raises mechanical strength and reduces water absorption. Because it acts strongly it is used in small proportions, and the effect on gas consumption per fired tonne is direct. Dosage is set by the producer's own formulation.

LOWER FIRING TEMPERATURE

Published work on magnesium-bearing fluxes reports reductions in the sintering peak of the order of 50 °C at optimum dosage.

HIGHER FIRED STRENGTH

Increases in green, dry and fired bending strength are reported for magnesite additions in wall and floor tile bodies.

LOWER WATER ABSORPTION

Denser vitrification at the same firing cycle, with firing shrinkage kept within standard once dosage is controlled.

PORCELAIN STONEWARE

FLOOR TILE BODIES

WALL TILE BODIES

ENGOBE / ROLLER COAT

BRICK & HEAVY CLAY



RUN-OF-MINE MATERIAL, AS SHIPPED

A TRANSFORMATION IN THREE STAGES

Magnesite does not melt in the kiln. It decomposes. The distinction matters: unlike a flux that simply melts, magnesite starts a reaction in situ, inside the body.

1 · DECOMPOSITION 550 – 700 °C

MgCO₃ breaks down, releasing carbon dioxide and leaving magnesium oxide behind. For material from the Eskişehir district the measured decomposition temperature is 610 °C.



2 · SILICATE FORMATION 860 °C+

The liberated oxide reacts with silica in the body to form pyroxene phases. These act as a skeleton within the body and support flexural strength.



3 · GLASSY PHASE AND DENSIFICATION

Part of the oxide forms no crystalline phase and enters the glassy phase instead. It loosens the glass network and lowers viscosity; as the liquid phase becomes more fluid, pores close at a lower temperature.

WHY RAW MAGNESITE, NOT CALCINED MGO

The magnesium oxide formed inside the body by decomposition is markedly more reactive than pre-calcined MgO added ready-made. You obtain a freshly formed oxide with a high surface area, and the reaction begins exactly where it is needed, around the grain.

This is why two materials with the same chemical formula behave differently in a ceramic body.

WHY MAGNESITE, NOT TALC

PROPERTY	MAGNESITE	TALC
MgO content	≈ %43	≈ %31,5
SiO ₂ carried with it	trace	≈ %59
Released on decomposition	CO ₂ water vapour	
Decomposition range	550-700 °C	900-1000 °C

Talc necessarily carries a large proportion of silica into the body along with the magnesium. Magnesite is an almost pure MgO carrier: you can adjust the magnesium level without disturbing the silica balance of your recipe. It also delivers roughly 40% more MgO per tonne.

ANALYSIS

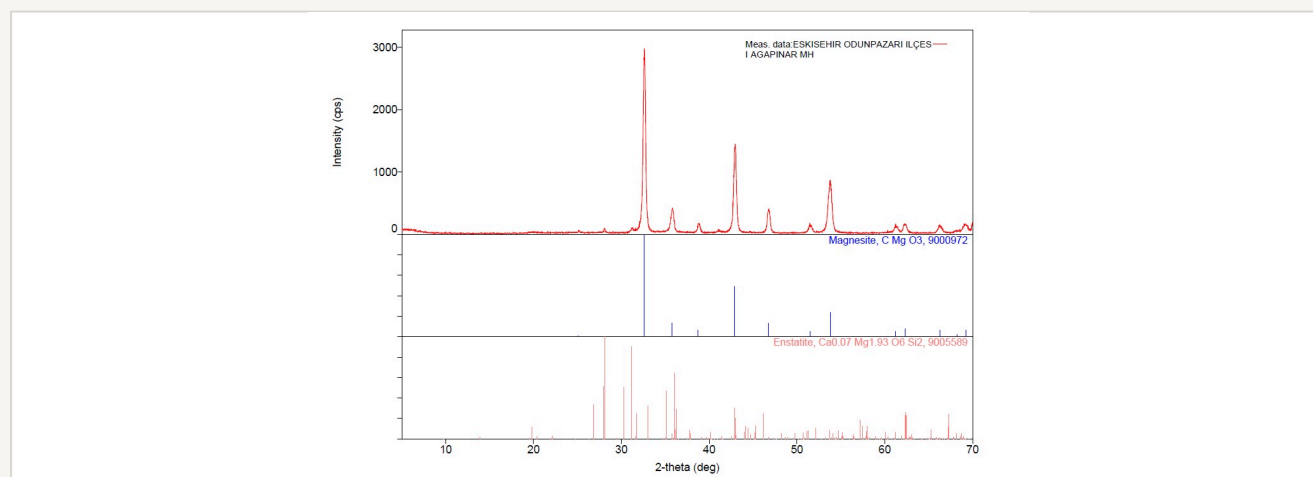
CHEMICAL COMPOSITION — average of two samples

OXIDE	MASS %
MgO	43,59
SiO ₂	4,97
CaO	1,42
Al ₂ O ₃	1,17
Fe ₂ O ₃	0,35
SO ₃	0,14
Na ₂ O	0,10
K ₂ O	0,08
P ₂ O ₅	0,05
Loss on ignition	48,11

MINERALOGY & PHYSICAL

PROPERTY	VALUE
Main phase (XRD)	Magnesite
Secondary phase(s)	Enstatite-type pyroxene
Free quartz	not detected
Moisture, 110 °C	seasonal *
Run-of-mine top size	approx. 300 mm
Colour	off-white
Form supplied	raw, uncalcined
HS code	2519.10
REACH	Annex V exempt

* Moisture varies with season. Material produced in the dry months is considerably drier than winter material. Moisture is determined and certified for every lot.



XRD PATTERN, SAM LABORATORY REPORT R26

TESTING

All figures above are taken from reports issued by **SAM, Seramik Araştırma Merkezi A.Ş.**, the ceramic research centre affiliated with Eskişehir Technical University. XRF was run on a Rigaku ZSX Primus and XRD on a Rigaku MiniFlex 600 over $2\theta = 5$ to 70° . Moisture by A&D MX-50 at 110°C . The values shown are the average of two samples taken in different periods; individual report figures are supplied on request. A certificate of analysis accompanies each shipment. Phase identification was carried out by search-match and does not include quantification.

TWO NUMBERS WORTH READING CLOSELY

Buyers of ceramic-grade magnesite watch two impurities above all: free quartz, which causes pinholing in glaze, and dolomite, which brings unwanted CaO into the body. This deposit is unusual on both counts.

SILICA IS BOUND, NOT FREE

X-ray diffraction identifies the secondary phase not as free quartz but as a magnesium silicate carrying trace calcium, an **enstatite-type pyroxene**. The 4.97% SiO₂ therefore enters the body already combined in a silicate lattice rather than as discrete quartz grains.

VERY LOW CALCIUM

At **1.42% CaO** the dolomite content of this material is minimal. Magnesite intended for ceramic bodies and glazes is specified as dolomite-free precisely because CaO shifts the flux balance.



POSITIONING AGAINST OTHER MAGNESITE GRADES

GRADE	MGO	SiO ₂	TYPICAL USE
Refractory grade	> %45	< %1,7	Furnace and kiln linings
Ceramic grade	%43,59	%4,97	Ceramic body flux
Magnesite-based clay	yakl. %39	yakl. %12,7	Wall tile bodies

The natural composition of the deposit falls between these two grades: high enough in MgO to act as a strong flux, low enough in calcium and free of discrete quartz to be safe in the body. This is not a property conferred afterwards; it comes from the geology of the site itself. The material is not offered as a refractory feedstock.



WORKING FACE — SEDIMENTARY BEDDING

LOWER FIRING TEMPERATURE, LESS FUEL

The magnesium oxide formed in the body by decomposition enters the glassy phase, loosens the glass network and lowers its viscosity. As the liquid phase becomes more fluid, pores close earlier; the same density is reached at a lower peak temperature.

Firing is the most energy-intensive stage of ceramic tile production and accounts for roughly 55–60% of total consumption. Every reduction in peak temperature translates directly into fuel saved. Because the material is a carbonate it also releases carbon dioxide on decomposition; the calculation below sets that process emission against the fuel saved. One tonne of fired tile is taken as the basis.

ASSUMPTIONS

Total energy	6.0 GJ / t
Share of firing	55%
Firing energy	3.30 GJ / t
Natural gas CO ₂ factor	56.1 kg / GJ
CO₂ from firing	185 kg / t
Our loss on ignition	48.11%
Assumed dosage	1%

BALANCE

SCENARIO	NET CO ₂
Process CO ₂ from magnesite	– 4.8 kg
Minimum scenario	+ 7.8 kg
Expected range, lower	+ 12.0 kg
Expected range, upper	+ 17.6 kg
Net gain range	+ 3 to + 13 kg

The minimum scenario counts only the reduction in sensible heat and disregards the fall in kiln losses. The expected range is derived from field project results showing that a 100 °C reduction delivers a 13–19% cut in carbon.

WHAT IT MEANS COMMERCIALY

The cost of the magnesite used for one tonne of tile is small beside the natural gas saved in the same production run. Even in the narrowest scenario the saving is several times the raw material cost; where the temperature reduction is fully realised, that ratio rises considerably.

The exact figure depends on your kiln cycle, your gas tariff and the dosage in your recipe. We would be glad to run this calculation together using your own production data.

DEPOSITS, PLANT AND SUPPLY

KIREÇKÖY OPERATION

Licensed area	860 ha
Estimated reserve	2,200,000 t
Method	Open pit
Flow	Excavate, load, stock

This is the deposit the ceramic-grade material comes from. It is a sedimentary magnesite laid down in a lacustrine setting: interbedded with clay horizons, soft in texture and pale in colour. Unlike hard vein-type magnesite it requires no drilling or blasting; it is won by excavation, loading and stockpiling, and shipped raw.

AKKÖPRÜ OPERATION

Licensed area	850 ha
Estimated reserve	2,150,000 t
Method	Drill, blast, excavate
Plant	Crush, screen, separate

This is the site where magnesite is produced. The material is processed through jaw crushers, screens, magnetic separators and a washing drum.

PRODUCTION CAPACITY

Annual output across our sites can reach **70,000 tonnes**. This level has been produced and shipped in past years.

Between November and May output varies with weather conditions. Delivery schedules are agreed jointly, taking account of the season in which the order is placed and the volume required.

EQUIPMENT

2 × EXCAVATOR

2 × TRUCK

1 × LOADER

2 × TRAILER

2 × JAW CRUSHER

1 × SCREEN

1 × WASHING DRUM

1 × SORTING UNIT

2 × DOUBLE-DECK SEPARATOR



AKKÖPRÜ OPERATION — LOADING AND DISPATCH

WHO BUYS THIS MATERIAL

Our material is used as a body raw material by more than twenty of the largest ceramic tile manufacturers in Türkiye. Türkiye is the world's fourth-largest ceramic tile producer, and these plants run the same body formulations, on the same equipment, as their European counterparts.

20+

OF THE LARGEST CERAMIC
TILE MAKERS IN TÜRKİYE

4.

TÜRKİYE RANKS FOURTH
AMONG WORLD TILE PRODUCERS

70,000

TONNES / YEAR PROVEN
OUTPUT AND DISPATCH

EUROPE

Our material has been supplied in volume to one of the largest ceramic producers in Spain and used successfully in production.

EXPORT

Until now our material has reached export markets through intermediaries. From 2026 export sales are handled in-house. For the buyer this means a single point of contact with the company that owns the deposit: technical questions answered by the producer, quality certified at source, delivery scheduled against our own extraction plan, and no trading margin in between.



LOADING AND DISPATCH

SUPPLY, PACKING AND CONTACT

PACKING & SHIPMENT

Bulk	yes
Big bag	yes
Port of loading	Gemlik
Incoterms	FOB · CFR · CIF
EU duty	A.TR, nil

SIZING

Supplied raw as standard. Crushing and screening to 500 µm and above can be arranged for volume orders and is quoted separately.

DOCUMENTATION SUPPLIED

Certificate of analysis	per lot
XRF / XRD reports	SAM, accredited
A.TR movement certificate	yes
Certificate of origin	on request
Free sample	yes

LOCATIONS

Head office in Eskişehir. The Kireçköy operation is in Odunpazarı district and the Akköprü operation in Beylikova district. Loading port Gemlik, approximately 250 km by road.

EXPORT SALES

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