Presidency of the Islamic
Republic of Iran
Vice Presidency for
Science and Technology

Tenth Volume

METALS AND CERAMICS

Knowledge-Based Products and Equipment


بسم الله الرحمن الرحيم

TENTH VOLUME

Knowledge-Based Products and Equipment
Metals and Ceramics

Presidency of the Islamic Republic of Iran Vice Presidency for Science and Technology

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Knowledge-Based Products and Equipment

Tenth Volume: Metals and Ceramics

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Preface

One of the key factors in a nation's industrialization and economic complexity is technology. Complex economies can connect vast networks of individuals with relevant information to produce a variety of knowledge-based goods. Indeed, the types of goods or products that are ultimately supplied to international markets are taken into account when determining the complexity of an economy.

A knowledge-based economy is one in which the application of knowledge and information plays a significant role in shaping production and distribution, and where investments in knowledge-based businesses have drawn particular attention. Along with enhancing nations' competitiveness, the transformation of economies into knowledge-based economies has the potential to have a significant impact on international trade.

7000 knowledge-based businesses in Iran provide knowledge-based goods that are the result of the expertise and experience of professionals and university graduates. These businesses, which occasionally resemble enormous technology factories, sold more than 10$ billion worth of goods last year and exported 1$ billion or so to various nations. The Presidential Deputy for Science and Technology is recognized as the most significant authority for direction, leadership, and development of the technology area in Iran. It serves as a support organization for startups and knowledge-based businesses by finding and selecting these enterprises. This book, along with 19 other books, is a carefully curated selection of goods with a track record or export potential that was put together using data provided by chosen businesses for presentation to foreign clients, business people, and government and academic officials interested in using these goods. To review the company's manufacturing and distribution records, access to technical knowledge and specialized human resources, production and export capacities, and after-sales services, two specialized and commercial committees were formed separately, and each committee reviewed the products in detail with the participation of technical and commercial experts.

In this procedure, specialized committees were held with the collaboration of the experts of the center of companies and knowledge-based institutions of the Deputy for Science and Technology, headed by ***Dr Reza Asadi Fard*** and Coordinated by ***Engineer Mojtaba Houshmandzadeh***. In addition, ***Engineer Mehdi Ghaleh Noei*** and ***Engineer Ruhollah Estiri*** presided over commercial committee meetings, which also included businessmen from the private sector, and I want to express my gratitude to these two groups for their work and assistance.

I also want to appreciate the project manager, ***Zahra Afzali***, who has taken on a lot of responsibility and given close attention to the project's design and development from the beginning with innovative ideas.

I also think it's important to recognize and express my gratitude to my other colleagues for their efforts in gathering, reviewing, contacting firms, selecting, and rewriting texts, and finally editing and creating this book:

Project monitoring and editing team: ***Mohammad Torabi, Fereshte Elahi***

Evaluation team: ***Mohammad Hassanzadeh***

Editorial team: ***Azam Danesh***

Design team: ***Mohammad Hossein Pourdabbaq, Masoud Khalili***

I want to underline that the aforementioned goods may be offered in a variety of ways in the country of destination, including export of end products, export of semi-finished and assembled products at the destination, joint production in the destination country and other economic cooperation. In each of the aforementioned scenarios, the Export Development and Technology Exchange Fund is prepared to co-invest in the target countries and guarantee the purchases as a financial sponsor of knowledge-based export enterprises.

The book's conclusion also includes a list of export management firms authorized by the Deputy for Science and Technology for communication, Iran Houses of Innovation & Technology (iHiTs), located in several countries, and commercialization and technology transfer agencies. Finally, I am hoping that this book will be beneficial to the readers and provide them with a thorough grasp of Iranian technological advancements.

Regards,
Mehrdad Amani Aghdam
CEO of Export Development and Technology Transfer Fund

Metals and Ceramics

Knowledge-based products and equipment

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CHAPTER 2

Advanced Ceramics

Introduction

The Origin of Industry and Export in The Eyes of Iranians

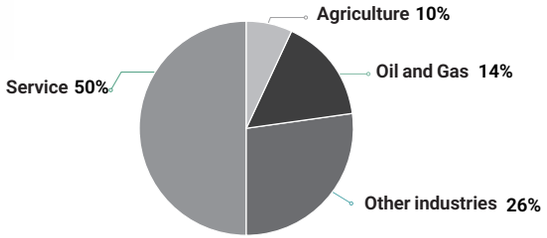
The ancient land of Iran has long been the source of knowledge and industry, and Iranians have played a significant role in the development, evolution and promotion of science and human awareness. Most historians of the world believe that most of the advances in science and human civilization are owed to Iranian civilization and the most brilliant works of art and the highest industrial levels has come from the minds of Iranians. Metalworking industries, agricultural industry, pharmacy and alchemy with themes including tile glazing, carpet dyeing, fabrics and glass were some of the industries that were considered by ancient Iranians. In parallel with the special attention to the development of industry, the history of mutual trade relations between Iranians and other civilizations in East and Central Asia, Europe and Africa has a long history, and Iranians have played a significant role in the expansion of global altruism since long ago by being on the route of the Silk Road and maritime trade.

We Iranians today, like our ancestors, consider industry, art and production in our ancient land to be a transformative and constructive place, and we consider the development of technological interactions and the trade of knowledge-based industrial products with other countries as an opportunity for friendship and the expansion of ties.

Industry and Export in Today's Iran

Industrial development has a very important place in the plans and policies of the Islamic Republic of Iran due to the creation of value added, job creation, increase in exports and reduction in imports, and the transition from an economy dependent on oil and mineral raw materials to an industrial and manufacturing economy, especially an economy dependent on new technologies, is a grand plan that has been adopted for this purpose. Currently, 50% of Iran's gross domestic product is allocated to services and another 50% to industry and manufacturing, which includes 10% agriculture and food industry, 14% oil and gas industry, and 26% other manufacturing industries.

The Share of Various Activities in Iran's GDP

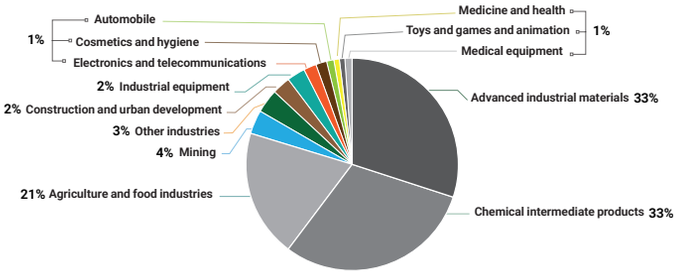


In the meantime, various industries such as pharmaceuticals, medical equipment, construction, communications and telecommunications, energy, mining, chemicals, etc. have a special share of Iran's gross domestic product, and their production, in addition to covering a considerable amount of country's domestic needs, are exported to various destinations.

According to World Customs Organization data, in 2021, the Islamic Republic of Iran had exports equal to 75 billion dollars, almost half of which is allocated to non-oil industries and processed industrial products. Advanced industrial materials, chemical intermediate products, agricultural products and food industry are all among the biggest exporting industries with more exports.

Iran's Exports in 2021

Ref: Trade Statistics for International Business Development [1]



[1] www.trademap.org

Regarding the main export destinations of Iran, it should be noted that **China, India, Indonesia, Russia, Uzbekistan, Ghana, Germany and South Africa**, as well as among the regional neighbours, **Iraq, Turkey, UAE, Afghanistan, Pakistan, Oman, Turkmenistan, and Azerbaijan** account for the largest dollar value of imports from Iran.

Where the New Technologies Stand in Iran's Industry

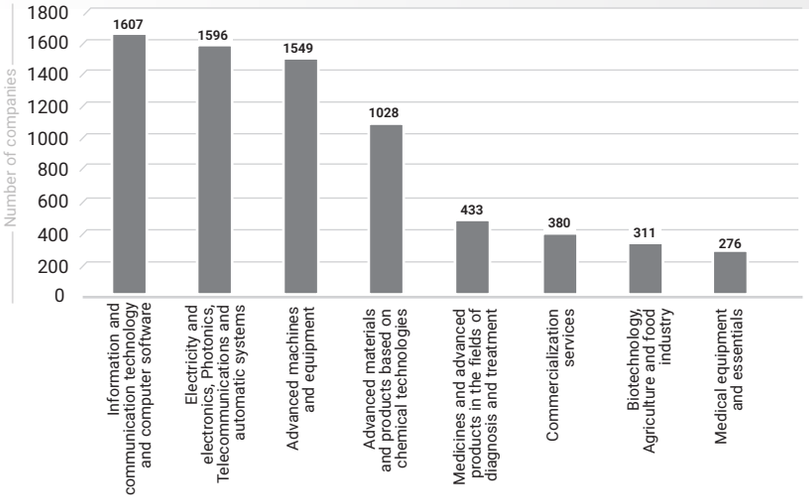
Paying attention to the development of new technologies, commercialization and its influence on manufacturing industries has caused the Islamic Republic of Iran to experience a growing progress in this field in the last decade; An issue that has taken place in Iran in the form of the development of knowledge-based enterprises. Based on this, the meaning behind knowledge-based enterprise is as follows:

A private company that produces products or provides services that have the following three features:

1. The product or service provided by the company has a high or medium to high technology level and its technical knowledge has a significant technical complexity (technology level condition).
2. The product or service design in the company is based on internal research and development or technology transfer (Research and development-based design condition).
3. The company is able to produce and provide the mentioned goods or services to the market (production condition).

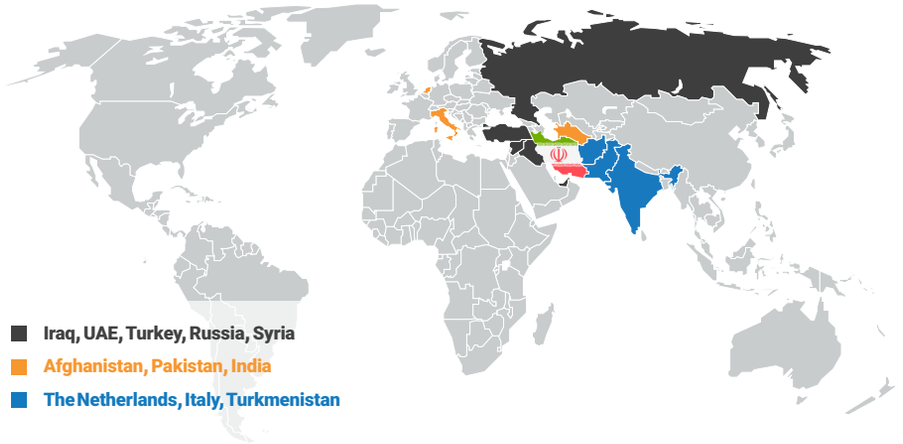
Currently, more than 7 thousand knowledge-based enterprises in Iran are producing products and providing services in the field of various technologies. These companies produce more than 15,000 products or services in total, and their direct employees, which generally include people with a high level of education, are around 250,000 people.

The Number of Knowledge-Based Companies - Technology Fields



The export of Iran's knowledge-based enterprises has been growing in the last 5 years, and these companies currently account for about %2 of Iran's non-oil exports.

The Largest Export Destinations of Iranian Knowledge-Based Enterprises in the Last 5 Years



The Status of Knowledge-Based Products in Metals and Ceramics

Metals and ceramics are advanced intermediate materials used in industrial production processes. The Islamic Republic of Iran has a relative advantage in the production of these materials due to its primary mines and the development of parent industries related to its processing. Because in the past few decades, processing and creating added value in local resources has always been considered by Iranian industrialists and policymakers, and the process whose output is the production of advanced materials has been a part of Iran›s economic driving force.

According to the reports of the Central Bank, the share of the industry sector in GDP is around %26. In relation to the position of metal and ceramic industries, it can be stated that Iran›s mining industry is the producer of raw materials needed for the production of advanced metal and ceramic materials, and other industries such as electricity, steel, construction, oil and gas, etc. are either processors or consumers. Therefore, the advanced materials industry has a very close relationship with a wide range of industries in Iran. Metal and ceramics industries also have a special place in Iran›s exports. In recent years, about 11,500 million dollars, which includes about %15 of Iran›s total exports, have been allocated to this field.

Due to the availability of primary resources required for the production of many metal and ceramic products in Iran, as well as the dependence of other industries on this field, the foundations for the growth of many knowledge-based technologies and products have been provided in it. This statement can be proved considering the activities of more than 400 Iranian knowledge-based companies and the supply of more than 600 technological products by them.

In the last few years, due to the importance of producing strategic industrial items and creating technological transformation in this way, this industry comprises about %6 of the volume of knowledge-based production and employment.

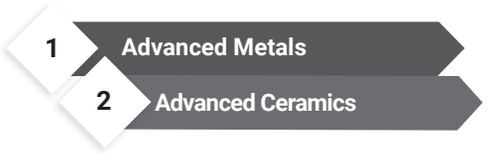
Finally, regarding the export of knowledge-based products of this industry, it needs to be mentioned that a total of 830 million dollars worth of products of knowledge-based companies active in the field of metal and ceramics industries have been exported outside Iran in the last 5 year.

The Percentage of Metals and Ceramics Companies from All the Knowledge-Based Enterprises

The Main Export Destinations of Iranian Knowledge-Based Enterprises in the Fields of Metals and Ceramics

The Division of Knowledge-Based Products in Metals and Ceramics

As previously mentioned, due to the existence of the primary resources required for the production of many products of metal and ceramics industries in Iran, as well as the dependence of other industries on this field, the foundations for the growth of many knowledge-based technologies and products have been provided in it. In this book, products have been collected that can be divided into the following categories:



The following describes each category and their subcategories in order to give a general understanding of these areas.

1 Advanced Metals

Advanced metal materials are metal compounds that have much higher strength, hardness, and malleability than any of their components. The amount and ratio of each of these components determines the properties of the desired alloy. These modern alloys are made by adding a few percent of another metal to the base metal and have industrial applications in various ways. Advanced steel and non-steel alloys, super alloys, etc. are part of this group. Porous metal structures are known as metal foam and have high strength and low weight. Metal foams that are used in the water treatment industry can be made of aluminum. Alloys based on titanium, chromium and silicon are advanced corrosion resistant metal materials. Corrosion occurs not only by exposure of metal to oxygen in the presence of water, but also in the presence of acids or harsh industrial chemicals and is one of the destructive processes in various industries.

- **First Section | Advanced Steels:**

Advanced steel alloys that have properties such as anti-abrasion, anti-corrosion, flexibility, etc., have additives such as nickel, chromium, molybdenum, vanadium, tungsten, cobalt, manganese, etc., and in this subcategory, industrial parts or related steel alloy ingots are presented.

- **Second Section | Advanced Metal Alloys:**

Products produced by knowledge enterprises using advanced metal alloys, such as alloys based on magnesium, chromium, cobalt, silicon, vanadium, aluminum, etc., are presented in this subcategory. In some cases, such as magnesium, these alloys can be produced and offered in the form of ingots.

- **Third Section | Advanced Metal Coatings:**

In this subcategory, advanced metal parts coated with one of the anodic or cathodic methods are presented. Also, various types of mineral, metal, etc., coatings that can be applied on industrial metal parts are included in this subcategory.

- **Fourth Section | Pure, Rare and Precious Metals:**

This subcategory includes high purity metals (such as copper cathode with %99.99 purity), rare metals (such as Antimony and Silicon) and finally metal derivatives (such as metal powder) which are widely used in the production process of industrial parts. It should be noted that the production process of some of these products is based on recycling.

- **Fifth Section | Other Advanced Metals:**

In this subcategory, other advanced metal products produced by knowledge enterprises that do not belong to any other subcategories are presented.

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2 Advanced Ceramics

Advanced industrial ceramics are inorganic and non-metallic solid materials that are used at high pressure and temperature. Ceramics are created from the combination of metallic and non-metallic elements. Modern ceramics possess various properties and characteristics and have a wide range of applications in industry from making bones and teeth to industrial cutting tools. Advanced chemical ceramics can be in the form of foam and ceramic membrane and are used in environments in close proximity to chemicals and fluids. One of the other applications of chemical ceramics is water treatment systems.

Advanced biological ceramics are biomaterials that have high compressive strength, good wear resistance and low friction, and are suitable for joint applications. Therefore, they are a suitable alternative for the regeneration of hard tissues of the body. Advanced electric ceramics include various types of insulators, conductors, semiconductors, superconductors, piezoelectrics, etc. Thus, in general, ceramics produced by Iranian knowledge enterprises can be divided into the following subcategories:

- **First Section | Synthetic Ceramic Raw Materials:**

In this subcategory, powders and other raw and base materials for producing all kinds of industrial ceramics such as alpha alumina, as well as ceramic products that can be used in the production of other ceramic parts such as ceramic paint and glaze, ceramic fibers, etc. and have been introduced and offered.

- **Second Section | Advanced Thermal Ceramics:**

Knowledge-based products in this subcategory are mostly of two types of refractories and thermal coatings. The physical, chemical, mechanical and thermomechanical properties of refractories do not change at high temperature and therefore, they are offered in shaped or shapeless form and used in various industries. Thermal coatings are usually used on metal surfaces in order to protect components against long-term thermal stresses.

- **Third Section | Advanced Mechanical Ceramics:**

In this subcategory, products have been included that are made of different ceramics such as alumina and zirconia, and are used as part of the production line to process other materials. For example, the ceramic ball placed in this subcategory is used to grind materials with high hardness.

- **Fourth Section | Advanced Optical Ceramics:**

Ceramics that have optical properties such as fluorescence, optical deflector, optical reflection, infrared reflection, light transmission, etc. are included in this subcategory. These ceramics are used in the production of various products such as glass.

- **Fifth Section | Advanced Magnetic Ceramics:**

Magnetic ceramics are a subset of ferromagnetic materials, which are divided into two groups: magnetically hard and magnetically soft. Knowledge-based products included in this subcategory often include magnetic ferrites, and ceramic oxides are used as the main component of raw materials in them.

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Metals and Ceramics

First Chapter

Advanced Metals

- Advanced Steels
- Advanced Metal Alloys
- Advanced Metal Coatings
- Pure, Rare and Precious Metals
- Other Advanced Metal Materials

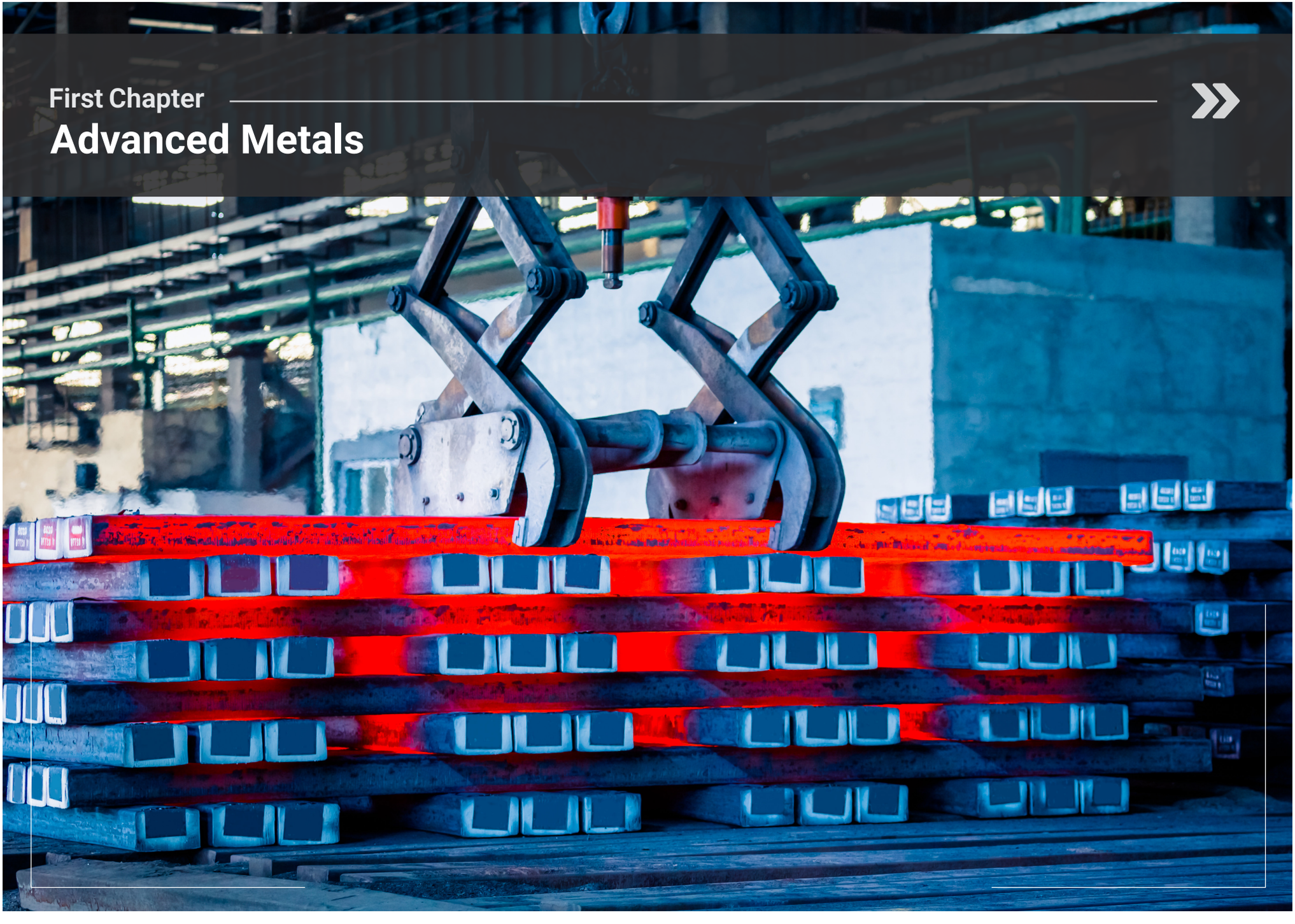
Second Chapter

Advanced Ceramics

- Synthetic Ceramic Raw Materials
- Advanced Thermal Ceramics
- Advanced Mechanical Ceramics
- Advanced Optical Ceramics
- Advanced Magnetic Ceramics

First Chapter

Advanced Metals



1st CHAPTER

FIRST CHAPTER | Second Chapter

Advanced Metals

Sections:

- *Advanced Steels*
- *Advanced (Metal) Alloys*
- *Advanced Metal Coatings*
- *Pure, Rare and Precious Metals*
- *Other Advanced Metals*

Micro-Alloy Steels

Conventional, Low Alloy Carbon, Low Alloy High Strength HSLA Micro-Alloy Steels

Iran Alloy Steel Co.

www.iasco.ir

Product Introduction:

High strength low alloy steel, which is also called “micro-alloy steel”, is prepared by adding a small amount of alloy elements such as vanadium, columbium and titanium, and has advantages over ordinary carbon steel. Micro-alloy steels entered the world industry in the late 1960s and can be considered a type of low-alloy steel with high strength. The most important advantage of micro-alloy steels is the reduction of energy consumption and cost in production, especially in the car manufacturing. In industries where weight reduction is a priority (such as the automotive industry), the use of micro-alloy steels is more common. The strength of the product made with these materials varies from 415 to 825 MPa without heat treatment. Due to the fact that micro-alloy steels are used in narrower metal parts, corrosion causes a significant reduction in strength of these types of metals.

Main Export Destinations:

England, South Korea, Turkey, Spain, Germany, Netherlands, Azerbaijan, Armenia, UAE, , Italy, Belgium, Bulgaria, Portugal, Thailand, Turkmenistan, Czech Republic, Iraq, Oman, Ghana, Pakistan, Afghanistan

Export History:

500,000 - 1,000,000 $

Founded:

1991

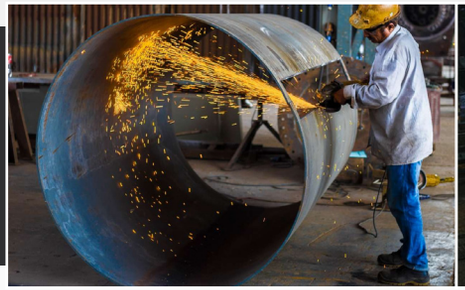
Application:

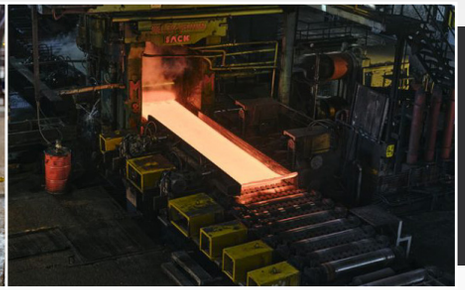
Car parts, bolts and nuts, high strength construction bars and...

This product is a final B2B consumer product.

Technical Specifications:

- Low alloy
- Sensitive to temperature
- Relatively high complexity





MO40 Steel Sheet

Navard Va Ghataat Pooladi Co.

www.ghataat.com

Product Introduction:

Mo40 or 17225 steel is a chromium molybdenum alloy steel. This product is widely used in the manufacture of industrial equipment that is under pressure or impact and high heat (such as beams, columns, gears, etc.). This steel belongs to the category of low carbon alloys and has tensile strength, very high hardness resistance and suitable corrosion properties.
In general, the main feature of chromium-molybdenum steel is heat resistance up to 500-600 degrees Celsius on the one hand and maintaining strength and abrasion resistance on the other hand; Also, among the other properties of this steel, we can mention its excellent weldability and suitable plasticity.

Main Export Destinations:
Turkey, Turkmenistan, Iraq, Afghanistan

Export History:
500,000 - 1,000,000 $

Founded:
1995

Application:

- Cement industry rollers
- Steel industry rollers
- Connecting rods (con-rods) of car axles
- Production of machinery
- Giant gears

This product is a final B2B consumer product.

Technical Specifications:

- Heat resistance up to 500 to 600 degrees Celsius
- Resistant to abrasion
- Excellent welding ability
- Heat treatment capability
- Very good formability (plasticity)

Martensitic Wear-Resistant Steel Parts (EMC 50)

Esfahan Malleable Co.

www.emcasting.com

Product Introduction:

Low-alloy abrasion-resistant steels are among the most widely used materials in the mining industry. In general, parts that are subject to impact and abrasion are produced from this material. Due to its hardness and high impact resistance, in many cases, this steel can be replaced with parts made of abrasion-resistant second-hand steels such as Hardox. Of course, due to the limitations of casting, it can usually be used in parts with a complex geometric shape and a thickness greater than 15 mm.

Founded:
1997

Application:

- Types of rock breaker hammers
- Bucket teeth in road construction and mining machinery
- Mill liners, chutes, feeders and similar equipment with a thickness greater than 15 mm
- Shredder blades in the recycling industry
- Replacement with all parts made of manganese steel (Hadfield)

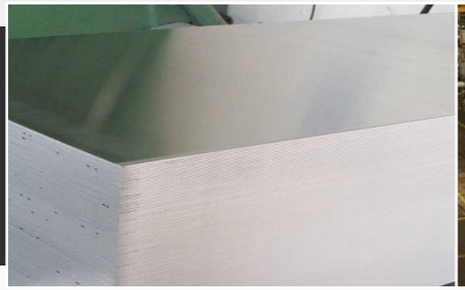
This product is a final B2B consumer product.

Technical Specifications:

Microscopic structure	70 to 80%
Alloying elements amount	Less than 5%
Hardnesses	45 Rockwell C
Impact energy	Up to 40 J

Advantages:

- High hardness and excellent impact resistance
- Welding capability
- Reducing the total price by eliminating the forming and machining operations
- Lower material price compared to similar processed steels



5000 Series Aluminum Alloys Products with Low Magnesium Percentage

Navard Aluminum Co.

www.navardaluminum.com

Product Introduction:

5000 group products with low magnesium have good properties such as: corrosion resistance and good strength. For this reason, these products are used as heat exchangers, fuel and food storage tanks, and functional sheets. Various aviation, marine, and automobile industries are among the centers where these materials are used. Aluminum alloy with 2 or 3% magnesium only recovers during hot deformation. Due to incomplete DRX occurrence, by increasing of magnesium to more than 4% and secondary phase precipitation, hot deformation will face applicability problems; However, in small amounts of magnesium, significant inhomogeneity does not occur, and alloy preparation and casting also face less challenges.

After casting in the rolling line, the aluminum slab is first cut, and then, if a suitable surface quality is needed or if we want to eliminate surface defects caused by casting, it is chipped; After that, the slab will be transferred to the preheating furnaces. The selection of the furnace temperature in the assembly is mainly based on the melting temperature of the alloy. The heated slab reaches a thickness of 7 mm after several hot rolling passes.

The design of the rolling stages will generally be based on the power of the device, increased applicability and microstructure design. The cold rolling of the alloy is done in a four-roller cold rolling machine, and for this alloy, it will continue up to a thickness of 0.4 mm. After cutting the sheet (depending on the type of order), it will be annealed.

Main Export Destinations:
Turkmenistan and Iraq

Export History:
1,000,000 - 10,000,000 $

Founded:
1972

Application:

Aviation, marine and car manufacturing industries

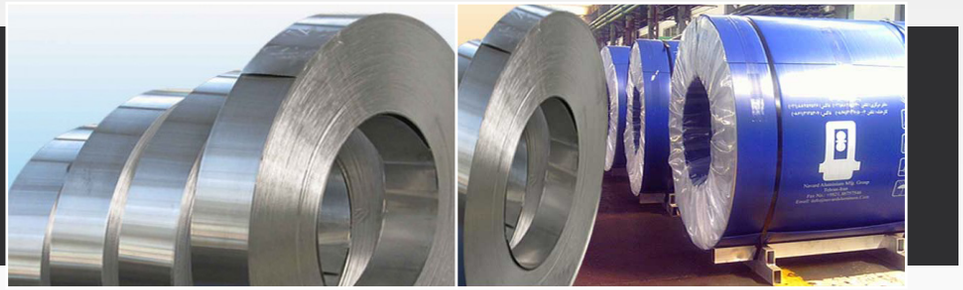
This product is a final B2B consumer product.

Technical Specifications:

- The amount of magnesium is less than %4
- Thickness up to 0.4 mm
- Sheet width can be changed according to orders

Advantages:

High added value



5000 Series Aluminum Alloys Products
with High Magnesium Percentage (5083 and ALMG6)

Navard Aluminum Co.
www.navardaluminum.com

Product Introduction:

Among the various aluminum alloys, Al-Mg alloys have suitable properties, among which high strength, good corrosion resistance, good formability and weldability can be mentioned. Thus, these materials are widely used not only in the automotive industry, but also in the marine and aviation industries. In this alloy, the magnesium element can be dissolved up to 11.7%, which increases the strength by 30 to 40 MPa. Also, adding this element to aluminum increases the corrosion resistance of this alloy. It should be noted that although the increase of magnesium up to more than 3.5% increases the strength through its dissolution in the matrix, but at temperatures below 200°C, the resulting solution is supersaturated, which causes the formation of active deposits – electrochemically - in the grain boundaries. This will decrease the strength in these areas and increase susceptibility to Stress Corrosion Cracking (SCC). Therefore, by increasing the amount of magnesium to more than 5%, in addition to increasing the strength and brittleness of the material, the concentration of silane also increases with the partial occurrence of recrystallization.

Main Export Destinations:
Turkmenistan and Iraq

Export History:
1,000,000 - 10,000,000 $

Founded:
1972

Application:

Aviation, marine and car manufacturing industries

This product is a final B2B consumer product.

Technical Specifications:

- The amount of magnesium is more than %4 to %6
- Thickness up to 0.4 mm
- Sheet width can be changed according to orders

Advantages:

High added value

Aluminum-Magnesium Alloy with More than 5.5% of Magnesium

ECOALMAG6 and ECOALMAG8

Mahed Aluminium Co.

www.mahedaluminium.com

Product Introduction:

Aluminum alloys usually contain 90-96% aluminum with one or more alloying elements added to improve properties. Although many metals form alloys with aluminum, few of them have significant solubility in aluminum. Among the alloy additives, magnesium has a high solubility in aluminum. Despite the significant benefits of adding magnesium to aluminum alloys, the addition of magnesium in amounts greater than 5.5 weight percent faces many technological challenges. The most important challenge of this task is the difficulty of adding high amounts of magnesium to the aluminum melt. Due to the great tendency of magnesium to react with oxygen, with the increase in the amount of magnesium, the tendency to oxidation becomes more severe, and the control of melting and casting operations get complicated. As a result, large amounts of ofalls and oxide impurities are formed inside the aluminum alloy. The presence of these oxide particles, which are mostly aluminum-magnesium spinels, leads to a decrease in the quality of aluminum alloys and greatly reduces the formability and fatigue life of these alloys. Removing these impurities from the melt is often impossible or very difficult.

The addition of elements such as copper, zinc and silicon to aluminum changes the strengthening mechanism from solid solution to Precipitation hardening (age hardening), and thus limits the deformability of aluminum alloys. The magnesium element does not face such a limitation and without changing the strengthening mechanism, up to 17 weight percent of it is added to aluminum.

Main Export Destinations:
Turkey, the UAE, Iraq

Export History:
1,000,000 - 10,000,000 $

Annual Production Capacity:
1,800 Tons

Founded:
2007

Application:

- Production of aluminum-magnesium sheets with very high strength and low thickness (with rolling and extrusion methods)
- Construction of aerial structures

This product is a final B2B consumer product.

Technical Specifications:

ECOALMAG6 and ECOALMAG8 aluminum-magnesium alloys contain 6 and 8 weight percent of magnesium, respectively. Aluminum-magnesium binary alloy has very favorable plasticity and tensile properties. The density of ECOALMAG6 and ECOALMAG8 alloys is about 26,000 kg/m^3, which are produced in the form of billets with a diameter of 7 inches and by the Die-Cast method. The mechanical properties of the samples are according to the following table:

ECOALMAG8	ECOALMAG6
The yield strength is between 169 and 647 MPa (with the cold rolling process, the yield strength increases from 169 MPa to 647 MPa)	The yield strength is between 120 and 573 MPa (by performing the cold rolling process, the yield strength increases from 120 MPa to 573 MPa)
The ultimate tensile strength is between 347 and 690 MPa (with the cold rolling process, the ultimate tensile strength increases from 347 MPa to 690 MPa)	The ultimate tensile strength is between 292 and 593 MPa (by performing the cold rolling process, the ultimate tensile strength increases from 292 MPa to 593 MPa)
The elongation percentage is between %3.7 and %36.6 (by performing the cold rolling process, the elongation percentage of the alloy decreases from %36.6 to %3.7)	The percentage of elongation is between 2 and 36% (by performing the cold rolling process, the percentage of elongation of the alloy decreases from 36% to 2%)

Advantages:

- Optimum machinability
- High resistance to high corrosion
- High surface quality after plating process

Low Carbon Ferro-Chrome

Zob Iran Refractories Co.

www.zico-ref.ir

Product Introduction:

Ferrochrome is usually produced from the concentration, enrichment, pelletization, and agglomeration of chromium ore in the smelting recovery unit. When chromium is mixed with iron and nickel, it produces an alloy called nichrome. This alloy is resistant to high temperatures and makes units of different parts of cars and other products. Chromium can be obtained from the mineral chromite. Chromite is an oxide mineral composed of chromium, iron, and oxygen. To add chromium to steel and cast-iron, it is necessary to alloy it with iron; Therefore, high-carbon and low-carbon chromium ferroalloys are used in cast-iron, steel, and chromium metal casting industries for aluminum. This process is carried out using an aluminothermic reaction. Ferrochrome is regenerated by charging chromite, iron oxide, aluminum, ferro-silica, and melting aids for more fluidity of the slag created in the barefaced reactor. The difference between high-carbon and low-carbon ferrochrome is in the amount of charge of carbon-containing compounds and the control of the formulation parameters of the overall charge of the materials.

Founded:
2014

Application:

- Production of stainless steel, hard steels and some valuable alloys
- Plating and creating a hard and beautiful surface and also to increase anti-corrosion resistance
- In casting for the production of chrome iron
- To harden and increase the chemical resistance of steel

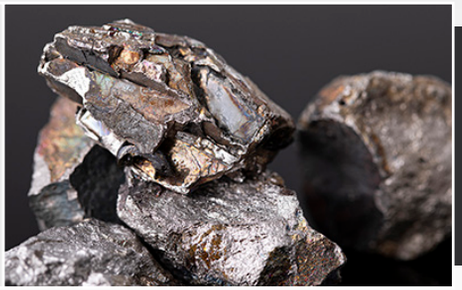
This product is a final B2B consumer product.

Technical Specifications:

Contains chromium, silicon, phosphorus, sulfur and carbon.

Advantages:

- The high-tech formulation of the final product
- Creating added value for the product through alloying technology



Ferro-Molybdenum

Aria Ferroalloy Co.

www.ariamoly.com

Product Introduction:

Ferro-molybdenum is an alloy additive that greatly increases the physical and mechanical properties of steel, creates a uniform microstructure in it, and in addition increases the hardness and impact strength of steel. This metal is cheaper and more economical as a ferroalloy, because molybdenum is a heavy metal with a high melting point, and if it is added as a ferroalloy, its density and melting point decrease. The method of preparing ferroalloys is through two types of open and closed reactors. Open reactor has lower efficiency and lower cost. This method is done by digging a hole in the ground and lining it with refractory material. After thermodynamic calculations and optimization of the ratio of each of the raw materials, the mixture of raw materials is poured into the open reactor and activated by performing a reaction arc. After a sufficient period of time due to the released heat, the materials melt and thick slag is appeared on the surface; After that, fermolybdenum is obtained by breaking the frozen melt from the slag with a Hilti hammer. To produce ferromolybdenum, molybdenum sulfur obtained from copper sludge should be converted into oxide and ferromolybdenum is produced by reduction method with iron.

This alloy is used in heavy casting, and in general, when steel needs high heat resistance, we make use of this alloy.

Main Export Destinations:

Belgium, Netherlands and Turkey

Export History:

1,000,000 - 10,000,000 $

Founded:

2011

Application:

- Making tools and machines
- Military equipment
- Refinery pipes
- High pressure parts
- Some parts related to cars, trucks, locomotives and ships
- High speed machining parts tool
- Cold-working tools
- For different types of drill bits
- For different types of drill and screwdriver bits
- For different types of (woodworking) chisels

This product is a final B2B consumer product.

Technical Specifications:

- Improved hardness
- Reduction of thermal brittleness
- Resistance to hydrogen cracking and sulfide stress cracking
- Increased thermal resistance
- Improved weldability

Advantages:

The added value created by the high-tech technical knowledge of product production

Gearbox and Propulsion Parts Produced by Powder Metallurgy Method

Mashhad Powder Metallurgy Co.

www.mpmiran.com

Product Introduction:

Parts such as car hubs and ABS clutch ring hubs are propulsion parts and must be produced by powder metallurgy. These parts have a tolerance of hundredth and a hardness of 60 to 110 HRB.
In the first step, after simulating the part and confirming the map, the design of the mold is done with the help of specified parameters, and then with the help of simulation with ANSYS software, the the mold defects are checked and the design is optimized; Finally, with the help of press and mold, the desired part is produced in raw form and is imported into the controlled atmosphere furnace for sintering. This piece itself has a simple appearance.

Founded:
1987

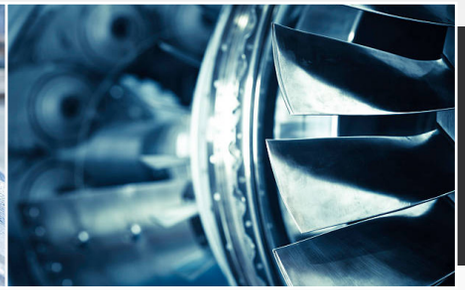
Application:

Car manufacturing industries

This product is a final B2B consumer product.

Technical Specifications:

- **Density of parts:** 6.6 grams per cubic centimeter
- **Breaking strength:** 850DN
- It has a surface roughness of 3.6 microns
- The powder used for these parts is F50U366 powder from HOGANAS company.



Cobalt-Based Super-Alloy Parts

Paya Mavad Co.

Product Introduction:

This collection includes alloying and manufacturing of parts made of cobalt base super alloy in 3 grades STELLITE 6, STELLITE 4 and TRIBALOY T-800. These products are used to make parts that are subject to abrasion and corrosion. Some of these products are: the bearings of the hot galvanized steelmaking line, seat and gate valves, etc.

Founded:
1904

Application:

To make parts for cases where there is severe abrasion and corrosion, (such as galvanized line bearings, steel factories, etc.)

This product is a final B2B consumer product.

Technical Specifications:

Density (g/cm^3)	Hardness (HRC)	Alloy
8.8	40-50	Stellite 4
8.4	36-45	Stellite 6
8.64	55-60	Tribaloy t-800

Advantages:

- The high-tech formulation of raw materials
- Production flexibility for different products and products that are produced in small quantities
- Competitive cost price

Nickel-Based Super-Alloy Parts

Esfahan Malleable Co.

www.emcasting.com

Product Introduction:

This group of products includes alloying and manufacturing of nickel base alloy parts (Inconel625, Hastelloy B2, Hastelloy C276 and Monel 400):

- **Inconel 625:** In addition to being resistant to a wide range of corrosive materials, this alloy also has high mechanical resistance. Due to the high percentage of nickel in the composition of Inconel 625, this alloy is resistant to chloride stress corrosion - which is one of the most common types of corrosion in the oil and gas and petrochemical industries. Also, Inconel 625 shows very good resistance against pitting corrosion and crevice corrosion. Due to the stability of the crystal structure of Inconel 625 at high temperature and the preservation of grain size after remelting, this alloy is a suitable option for applications where there is a need for a welding coating; This superiority makes the parts made of this alloy have good repairability.
- **Hastelloy B2:** A nickel-molybdenum alloy that exhibits unique resistance to corrosion in reduction environments - especially hydrogen chloride gas and hydrochloric acid environments. The low percentage of carbon in this alloy improves the properties of weldability, mechanical strength and proper corrosion resistance in the welding area. Also, the high percentage of molybdenum in Hastelloy B2 increases resistance to chloride stress corrosion.
- **Hastelloy C276:** The significant amount of chromium and nickel in the composition of Hastelloy C276 makes this super alloy have good corrosion resistance when faced with the combination of oxidizing and reducing acids. This alloy also shows a very good resistance against chloride crevice, pitting and stress corrosion.
- **Monel 400:** An alloy of nickel and copper that has excellent resistance to corrosion in sea water, natural salts and alkaline salts; Therefore, it is one of the main options in the construction of equipment that is in direct contact with sea water. Another advantage of Monel 400 is maintaining the mechanical resistance of this alloy in a wide range of temperatures from ultra-cold (cryogenic) to 550 degrees Celsius.

Founded:
1997

Application:

Oil, gas and petrochemical industries, power generation, aerospace

This product is a final B2B consumer product.

Advantages:

- High resistance to oxidation and corrosion
- High resistance to heat

Modified Mixed Matrix Membrane for CO_2 Removal

Mobtakeran Oxin Co.

www.oktc.ir

Product Introduction:

Achieving a CO_2 separation technology that is environmentally friendly and energy efficient is something that is more and more in demand day by day. In the use of polymeric membranes, these membranes have been shown to have limited commercialization in terms of permeability and selectivity. Recently, mixed matrix membranes have been developed to overcome such limitations. Generally, these membranes are made using two or more different materials with distinct properties. A material (usually a polymer) forms a continuous phase known as a matrix. The other substance forms an organic or inorganic dispersed phase, which is called filler. Background and filler are unchangeable and have different transfer properties. The work of this product has been to improve the carbon dioxide separation performance of pure polymer membranes and even the mixed matrix containing MOF particles. The results show that this products shows good performance (especially in the fields of carbon dioxide separation from methane and carbon dioxide from nitrogen).

Founded:
2017

Application:

- CO_2 trapping
- Removing carbon dioxide from chimney gas
- Natural gas purification and hydrogen purification

This product is a final B2B consumer product.

Technical Specifications:

Required raw materials:

- Methylimidazole (%99)
- Zinc nitrate hexahydrate (%99)
- Ethanol (%99.99)
- Normal hexane (%99.99)
- Distilled water

Advantages:

- Low concentration of ionic liquid in the final membrane
- High permeability of CO_2

FluxCore Arc Welding For Hardfacing Containing Nano-Scale Deposits on Steel

All Kinds of Anti-Abrasion Welding Wires and Plates

Namad Technology Development Co.

www.namadnanotech.com

Product Introduction:

Flux-cored arc welding (FCAW) wires have wide varieties and dimensions. The powder inside the welding wire consists of three different types of powder. The powder of the alloy materials that make up the excess weld which forms the chemical composition of the welding. Flux powders with a protective role. The gases produced from the burning of flux play the role of cooling and protection. Slag-inclusion powders play the role of protection by slag during the formation of the weld pool, and during welding with the formation of slag, the slag cover protects the weld pool against the atmosphere.

In appearance, there are three types of powder with different titles and functions in one powder welding wire. But the problem is that these powders are combined with different chemical compounds.

By investigating the current problems of various industries in the field of destruction and abrasion of equipment, Nomad company has produced welding wires with very high abrasion resistance, very high hardness (65 to 70 Rockwell C), and suitable for various working conditions, with diameters 1.6, 2.4 and 2.8 mm are available in the market. These welding wires can be easily used in the usual MIG/MAG welding method (CO_2 welding).

Founded:
2009

Application:

Various industries including cement, tiles, ceramics, crushing, mining, bricks

This product is a final B2B consumer product.

Technical Specifications:

- Very high particle-metal abrasion resistance
- Very high welding efficiency
- Being self-protective
- Temperature resistance up to 850 degrees Celsius

Advantages:

- Very good functional properties
- Reasonably priced
- High Quality

Application:

Earthing and cathodic protection industries

Combustion Welding Powder

This product is a final B2B consumer product.

PETUNIA Co.

www.petuniaco.com

Product Introduction:

One of the methods of metal welding is welding with combustion welding powder. Combustion welding powder is known as an exothermic joint and is used in earthing and cathodic protection industries; One of its advantages is the permanent connection with a very low electrical resistance of earthing conductors with copper or steel. In the earth system, it is difficult to weld the wires in the underground network channels due to the rejection of the cables, so combustion welding is chosen.
Welding powder is composed of copper oxide, aluminum, sulfur, and several other substances. According to the mold type and size, it is offered in different weight sizes such as 32, 45, etc. In general, the production process of combustion welding powder includes creating copper oxide and crushing the materials by pounding and mixing the materials using a stirrer.

Main Export Destinations:
Turkey and Iraq

Export History:
Up to 500,000 $

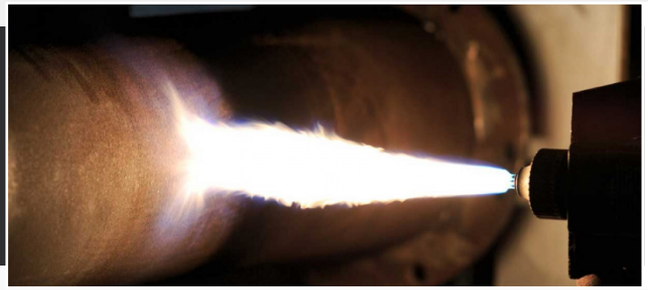
Founded:
1992

Technical Specifications:

- Graphite mold material
- Density 1.7 gr/cm^3

Advantages:

Facilitating the welding process in windy areas (it is difficult to carry out combustion in those areas)



Thermal Coatings of 1000 °C

Kimia Boumi Sazan Co.

www.kimsangroup.com

Product Introduction:

Anti-corrosion superheat coating is used at very high temperatures, to prevent corrosion and oxidation of aircraft engine parts, hot parts and blades of turbines and boiler parts against corrosive gases. The high-temperature superheat corrosion protection coating with a baking temperature of 850°C can protect metal surfaces up to a temperature of 1000°C against direct heat, oxidation and corrosive gases; Also, it has the ability to prevent corrosion and oxidation of metals and alloys and to show resistance in environments with high humidity and in the vicinity of various oils and petroleum-based and synthetic fuels. On the other hand, this product can have a very high hardness and tolerance against a wide range of tension, stretching and shocks due to its adhesive strength. This product is in a slurry state, it is sprayed on the desired surface in the form of a spray, it is placed as a layer on the surface of the desired piece and it gives high thermal resistance to that piece.

Main Export Destinations:

Azerbaijan, Uzbekistan, Turkmenistan

Export History:

Up to 500,000 $

Founded:

2015

Application:

- Airline industries
- Automotive and other industries where parts are exposed to high temperatures

This product is a final B2B consumer product.

Technical Specifications:

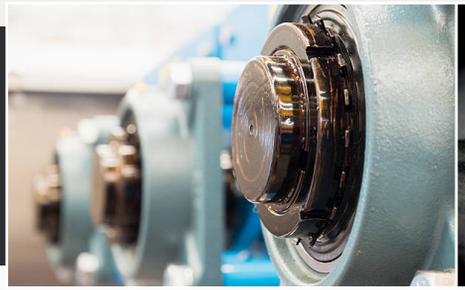
Coating's thermal resistance	100 °C
Impact resistance	100 lp. inch
Initial coating temperature	800 °C
1-layer-spray thickness	30 – 55 µm
Need to be polished	No
Viscosity	20 zahn cup
Gravimetry	1.6
pH	11.2
Electrical conductivity	Insulator
Solvent	Water
Main pigment	Metal oxides
Chemical resistance against Insulation	Water, fuel and oils 7808, 23699, 5606, jp4

Advantages:

- Protection of metal against corrosion and erosion at high temperatures
- High level of technology

International Standards or Permission:

- OHSAS: 18001:2007 health and safety management system standard certificate from BQS
- ISO 1004:2012 international standard customer satisfaction certificate from BQS
- ISO 14001:2015 international environmental system standard certificate from BQS
- ISO 9001:201 international standard certificate of quality management system from BQS
- Exploitation license from Iran Industry, Mine and Trade Organization (The ministry of Industry, Mine and Trade (IMT))



Trimetal Bearings Using Bronze Powder Coating Process

Atshin Panjeh Powder Metallurgy Co.
www.appm-co.com

Product Introduction:

This process is used for layering bronze powder on steel (iron) ST parts. Trimetal bearings have three layers, two layers are metal and one layer is polymer material. In fact, this part has a structure similar to bimetal parts, and the difference is that in these materials, a teflon layer is also placed on the anti-abrasion layer. In general, the layering process of bronze powder and polymer materials on trimetal bearings is to increase their abrasion resistance.
Technical knowledge in the field of producing trimetal bearings is related to how to put the bronze layer on the steel sheet and also prepare the appropriate metal powder. The production process of this product is such that at first the prepared ST iron materials are subjected to the necessary tests and controls and then they are cut into the required sizes; Next, the cut materials are washed and cleaned with special detergents until they are free of excess oils and waste. Parallel to the cutting of ferrous materials, the production of bronze powder of the second layer of trimetal products is done by atomizing (vacuum atomizing) method and its separation is done by granulation. Then the materials prepared by the powdering machine are poured on the pre-prepared ST sheets and placed inside the sintering furnace and on the moving chain of the furnace. By moving the chain into the furnace, the sintering operation takes place. Methane and air are injected into this furnace. The purpose of injecting the above gases into the sintering furnace is to prevent the powder and raw materials from oxidizing. After the sintering operation, the parts are placed in the tefloning site and the first layer of PTFE material is sprayed on their powder layer. Then, the second layer of PTFE material is sprayed on the parts and then they go through a rolling process; After the rolling operation, the channel and oil pools are created by the molds designed on the internal parts; Then, by performing fine cutting, the product is ready for the rolling process and becomes a bush. In the next step, rolling is done for the bushings. Then beveling and fine-tuning the length of the bush pieces and engraving the technical number on the pieces for tracking, identification and packaging are done.

Founded:
2015

Application:

- Rotary equipment
- Reciprocating compressors
- Modern diesel engines

This product is a final B2B consumer product.

Technical Specifications:

- High fatigue strength compared to Babbitt bearings
- The ability to withstand high applied pressure
- High strength and high working temperature

Advantages:

Added value due to the high-tech knowledge for the production process

Hard Coating Electrode
with Recycled Tungsten Carbide Particles

Espadana Surface Monitoring (PASSA) Co.

www.passaco.com

Product Introduction:

This product is an oxyacetylene welding electrode. Its central core is made of nickel metal and its cover is made of tungsten carbide and NiCrSiB alloy. Normally, companies and producers of this welding wire by purchasing tungsten carbide from the market and alloying the NiCrSiB compound and adding organic and inorganic binders to these compounds make a paste that can be coated on the electrode by extrusion method.
In addition to participating in the composition of the final composite, this coating should prevent rapid cooling of the welding area and cracking of the part. In addition, since this electrode must be slightly flexible, some plasticizer must also be added to the system so that the electrode coating does not crumble and does not undergo the so-called fall off situation with normal impacts during work.

Founded:
2019

Application:

Used to surface hardening in industry and coating

This product is a final B2B consumer product.

Technical Specifications:

- The central core of nickel metal
- Tungsten carbide coating and NiCrSiB alloy

Magnesium Ingot with A Purity of at Least 99.8%

Shemsh Felez Royal Co.

www.shfroyal.com

Product Introduction:

Magnesium, with a density of 1.7 grams per cubic centimeter, is known as the lightest industrial metal. Due to its unique features such as low density, excellent weldability, suitable machinability, high fluidity, and the need for low pressure in the die casting process, strategic magnesium metal is very attractive to be replaced with many aluminum or steel parts in aerospace and automobile manufacturing industries.

Despite magnesium's unique and attractive features, the exceptionally high reactivity of this metal at high temperatures has limited its use in various industries. The possibility of combustion or explosion caused by this limitation at high temperatures makes producing high-purity magnesium bars a severe challenge. One of these methods of producing magnesium metal on an industrial scale is the Silicothermic Reduction Process or the Pidgeon Process. This process generally includes the reduction of magnesium oxide by ferrosilicon under gas pressure at a temperature of about 1200 degrees Celsius. Metallic magnesium is vaporized and then distilled away from the hot zone. Distilled magnesium with a purity of 99.8% is melted and cast as bars.

Main Export Destinations:

England and the Netherlands

Export History:

Up to 500,000 $

Founded:

2007

Application:

Aerospace and car manufacturing industries

This product is a final B2B consumer product.

Technical Specifications:

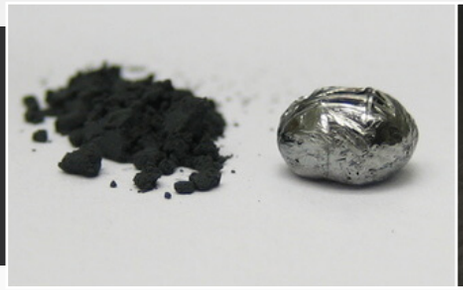
- Purity of at least %99.8 without dross and casting defects
- **(Weight Kg):** 7 and 12

Advantages:

- The only producer of magnesium in the Middle East by the method of thermal regeneration (Pidgeon process)
- Creating added value due to the high-tech technical knowledge of product production

International Standards or Permission:

- Quality approval from the Dutch RC inspection company
- Iranian National Standard No. 16589



Rhenium Derivatives

Ammonium Perrhenate NH_4ReO_4

Zanjan Boronz Co.

www.zanjanboronz.com

Product Introduction:

Rhenium with atomic number 75 is one of the rarest elements on earth (ppb 1) and has the highest boiling point and the third highest melting point among all elements. Extraction of this material is usually a side process but very important and strategic. Rhenium has a high temperature tolerance.

Main Export Destinations:
Netherlands, Turkey and UAE

Export History:
1,000,000 - 10,000,000 $

Annual Production Capacity:
200 Tons

Founded:
2014

Application:

- Aircraft industries (jet engines, missiles and fighters such as F14- to F35-)
- Oil and gas and petrochemicals (platinum-rhenium catalysts for the production of unleaded and high octane gasoline)
- Electronic connections and filaments of mass spectrometers

This product is a final B2B consumer product.

Technical Specifications:

- Rhenium above %69
- Potassium below 200 ppm

Advantages:

The production process of this product has high-tech technology

International Standards or Permission:
RC Netherlands reference laboratory has approved the company's product.

High Purity Nickel Hydroxide, Oxide, Chloride, Carbonate, Sulfate and Nitrate

Obtained from Used Catalysts, Lead and Zinc Filter Cakes

Goharfam Industrial Manufacturing Co.

www.goharfammfg.com

Product Introduction:

Nickel derivatives can be obtained by processing nickel ore such as pentlandite, pyrrhotite (nickel and iron sulfides) and garnierite (nickel and magnesium silicate) or by processing secondary sources such as zinc filter cake, alloys, steel shavings and used catalysts. .
In Iran, due to the absence or low mineral resources of nickel, this product is mainly produced through the processing of secondary sources, and few companies operate in this field, which are mainly catalyst manufacturers. These products have complex synthesis, process design, extraction and purification. The main complexity of them is in the design part of the industrial process of extracting and purifying products.

Founded:
2017

Application:

- Metal plating
- Making special batteries
- Steel production
- Military industries
- Catalysts used in oil, gas and petrochemical industries
- Refinement of vegetable oils
- Making special colored glasses

This product is a final B2B consumer product.

Technical Specifications:

- Sulfuric acid (%98)
- Nitric acid (%65)
- Dissolution process in the ambient temperature range up to 130 degrees Celsius

Magnesium Powder Produced by Mechanical Crushing Method

Amayesh Rah Mihan Co.

www.arami-co.com

aramico
Amayesh Rah Mihan Co.

Product Introduction:

In recent years, due to the special features that magnesium has, special attention has been paid to this valuable substance. The most important of these features are: low density, higher weight-to-strength ratio than aluminum, ability to form intermetallic compounds and high chemical activity. Magnesium is used as an intermediate product in aluminum and steel industries as an alloying element, reducing element or desulfurizing element, etc. Today, the main consumers of powdered and granulated magnesium are ferrous metallurgy. In these centers, magnesium is used as a desulfurizing agent. Also, magnesium granules covered with salt are used to produce high strength cast iron with spherical graphite. One the other hand to produce various ferrous and non-ferrous alloys, magnesium granules are used. Granular magnesium is also used as a source of hydrogen production along with the addition of salt.
In the process of producing magnesium powder by mechanical grinding method (on a laboratory scale), equipment such as lathes and ball mills have been used. In this process, first, with the help of a chipping machine, magnesium ingots are chipped and the chips are crushed in a chipping machine. Then, in a carbon dioxide atmosphere, with an additional crushing operation by a ball mill, very fine magnesium powder is produced. We also use a pellet/granule making machine to roll the shavings into spherical powder and granules; Finally, with the help of a vibrating screen (sieve), the size of the powder particles is determined.

Founded:
2009

Application:

Steel and aluminum industries

This product is a final B2B consumer product.

Technical Specifications:

- 80-20 mesh (180 to 850 microns)
- Minimum purity of %98
- Magnesium shavings or chips with length dimensions of 3-20 mm and thickness of 0.3-0.5 mm with purity of at least 98%

Advantages:

- Due to the high-tech knowledge in the production process, this product is associated with added value
- It has good quality.

Calcium-Aluminum (Ca-Al) Master Metal

Idea Production Co.

www.ipcometal.com

Product Introduction:

In the past years, using calcium in casting and making lead parts has increased the strength of this alloy. In many cases, lead-calcium alloys have replaced lead-antimony alloys, especially in manufacturing battery plates. The amount of calcium in these alloys is 0.03-0.15 weight percent, and recently aluminum has been added to these alloys as a calcium stabilizer. Alloys recently used to make battery plates under the name of calcium batteries usually have the following elements: calcium 0.05-0.12 weight percent, tin at most three weight percent, aluminum 0.002-0.04 weight percent, and less than 0.02 weight percent barium.

Due to the removal of elements such as antimony and arsenic in these alloys, the toxic compounds resulting from the reaction of hydrogen with these elements have been removed, and the possibility of sealing the battery has been provided. Anode plates in zinc electrowinning and all types of batteries with lead sheets are the primary consumers of this alloy. To use this alloy, a percentage of calcium should be replaced with aluminum to prevent the reaction of calcium with air by forming a protective film on the surface of the molten lead.

Main Export Destinations:

Turkey

Export History:

Up to 500,000 $

Founded:

2006

Application:

Battery industry

This product is a final B2B consumer product.

Technical Specifications:

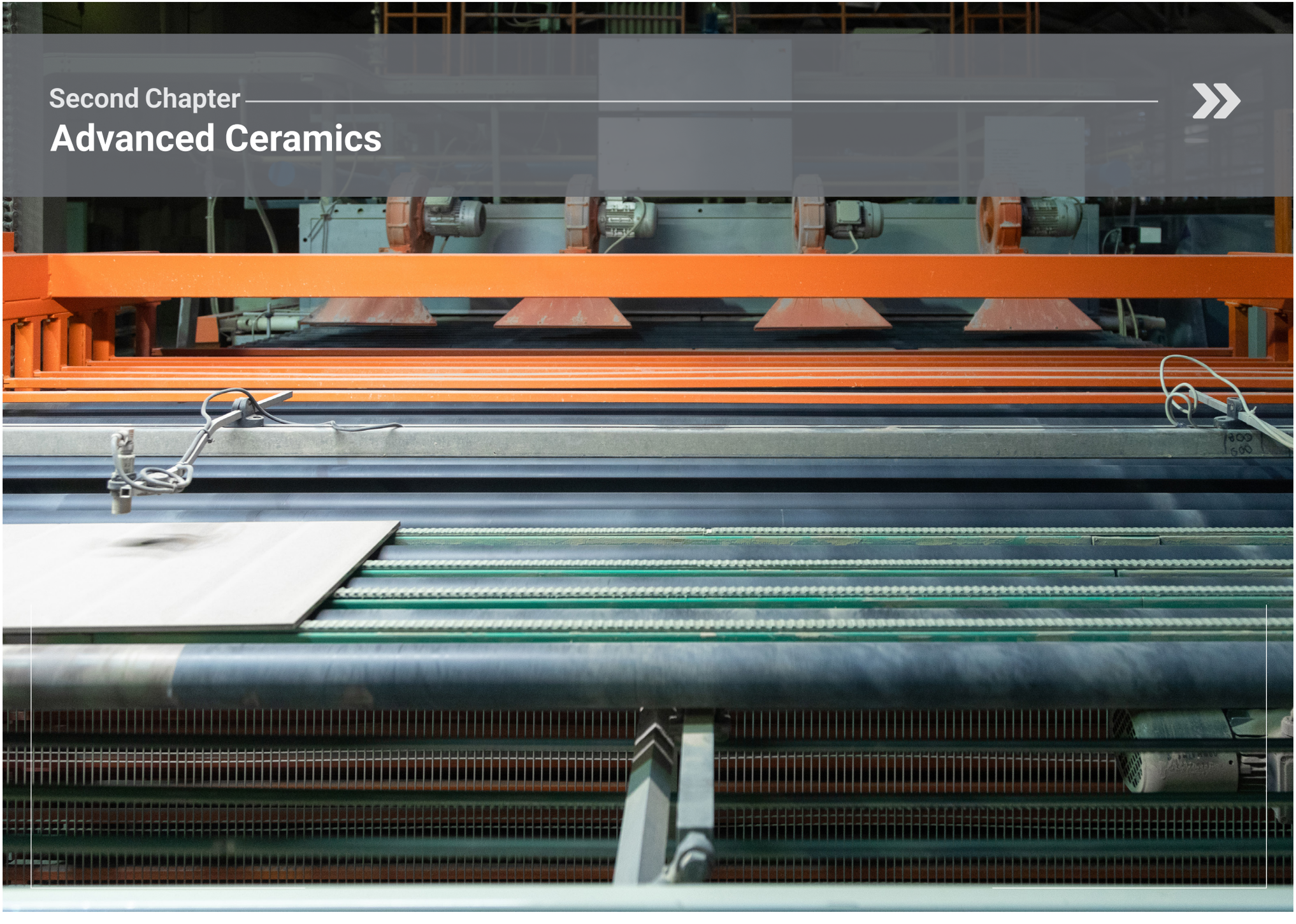
Technical Specifications	Description
State of Matter	Solid
Melting Point	550-800 ℃
Boiling Point	1484 ℃
Density	1.55 gr/cm^3

Advantages:

- Higher efficiency
- Has a longer shelf life
- Easier Storage conditions

Second Chapter

Advanced Ceramics



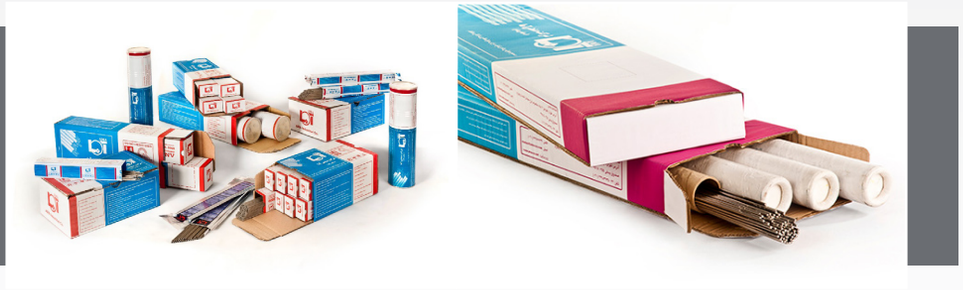
2nd CHAPTER

First Chapter | SECOND CHAPTER

Advanced Ceramics

Sections:

- *Synthetic Ceramic Raw Materials*
- *Advanced Thermal Ceramics*
- *Advanced Mechanical Ceramics*
- *Advanced Optical Ceramics*
- *Advanced Magnetic Ceramics*



Coated Electrodes
for Manual Metal Arc Welding Process

AMA Industrial Co.

www.ama-co.com

Product Introduction:

Coated electrodes are one of the most common methods for manual welding in small and large industries. Since these electrodes can weld in special conditions such as high altitude, geometric complexity, etc., they are widely produced and consumed in the country. Each electrode consists of a core and a cover. The core of the electrode is usually an alloy wire with standard diameters of 2, 4, etc. Depending on the operating conditions of the electrode and the type of welding and welding metals, in addition to the core of the electrode, it's coating also has different types. Combining more than ten different materials for each kind of electrode with specific weight ratios and using raw mineral materials is the most critical complexity of this product.

There are different types of electrodes produced in the Ama industrial complex, which are:

- Rutile and alkaline coated electrodes used for welding non-alloyed steels
- Special cast-iron electrodes
- Coated electrodes for nickel base alloys
- Coated electrodes for fine-grain structural steels
- Coated electrodes for creep-resistant steels
- Electrodes for welding stainless and heat-resistant steels

Main Export Destinations:
Russia, Armenia, Tajikistan, Iraq, Syria and Afghanistan

Export History:
1,000,000 - 10,000,000 $

Annual Production Capacity:
22,000 Tons

Founded:
1959

Application:

Welding of all kinds of metals, alloys and repairs of industrial machinery

This product is a final B2B consumer product.

Technical Specifications:

The coating of the electrodes is made of mineral materials that absorb the humidity of the environment. After the electrode welding metal is placed in the environment defined in the standard (humidity: %80 and temperature: 27 degrees Celsius for 9 hours), an average of 0.25 weight percent of the moisture is absorbed by its coating.

- Prevention of rusting and contamination of the electrode rod during storage
- Protection and stabilization of electric arc
- Protection of welding by generated gases
- Protection of the weld by the slag formed due to the burning of the electrode cover
- Prevention of heat loss and heat dispersion in the environment
- Preventing the weld from cooling down quickly
- Preventing excessive growth of weld surface granulation
- Fluidization of melt flow
- Control the depth of welding penetration

Advantages:

Higher quality and variety of products among Asian producers and equal quality compared to most European producers

International Standards or Permission:

- Nano scale certification for moisture absorption resistant electrodes (electrodes with R suffix)
- Level 3 patent certificate (taken for moisture absorption resistant electrodes)
- Certificate from official representatives of Lloyd's Institute for some products

Flux for Submerged Arc Welding of General Structure
Sub-Powder Welding Powders

AMA Industrial Co.

www.ama-co.com

Product Introduction:

One of the welding methods used today is the use of sub-powder welding. In this method, by creating an electric arc between a tungsten electrode and the workpiece, the filler is melted, and welding is done. In this process, the tip of the electrode is placed inside a powder of particular minerals, and the arc is formed under this powder along the welding path. Sub-powder welding powders are mineral materials such as common oxides (rutile, alumina, calcium, silica, etc.) and metal materials (such as Ferro-silica, ferrochromium, Ferro molybdenum, etc.) that stabilize the arc and create slag during welding. These powders are divided into pre-melted and agglomerated. The produced powders have types of calcium silicate - manganese silicate - calcium silicate alloy - rutile aluminate - alkaline aluminate, and alkaline fluoride. Types of sub-powder welding powders produced by Ama Industrial Partners are:

Main Export Destinations:
Russia, Armenia, Tajikistan, Iraq, Syria and Afghanistan

Export History:
1,000,000 - 10,000,000 $

Annual Production Capacity:
2,500 Tons

Founded:
1959

Product's Name	Descriptions
Subpowder welding powder AMA-OP 132	It is agglomerated alkaline aluminate.
Subpowder welding powder AMA-AP380-3	It is of alkaline aluminate type.
AMA OP120TT powder	It is suitable for longitudinal welding of oil and gas pipes as well as spiral pipes in the form of several wires (up to five wires).
AMA-OP121TT powder	It is agglomerated alkaline fluoride type.
Subpowder welding powder AMA-OP122	It is suitable for two-wire, back-to-back and multi-wire sub-powder welding, as well as double-sided welding in one pass for the production of thick pipes.
Subpowder welding powder AMA-OP139	It is agglomerated rutile aluminate
Subpowder welding powder AMA-OP176	It is agglomerated manganese silicate.
AMA OP181 sub-powder welding powder	It is agglomerated rutile aluminate.
Subpowder welding powder AMA-OP71Cr	It is special agglomerated Alkaline fluoride with very little carbon.
AMA AP720 welding powder	It is a type of alkaline fluoride agglomerate.
AMAOP250A and AMAO-P350A powders	It is an alloy agglomerate type.

Application:

- For stainless steels for base metals
- It is used to create a hard coating layer for machinery parts, moving gears, rails, caterpillar support rollers, etc.
- Creating a hard coating layer for connections, end of piston rod and road construction machinery equipment.

This product is a final B2B consumer product.

Technical Specifications:

To prepare welding powder, consider that this powder should be in the form of granules. At first, after accurately weighing the formulation by load cells, the materials are entered dry in the mill. After reaching the desired size, they are separated with the help of a sieve vibrator. Then they enter the mixer and the granulator using specific amounts of water, sodium, and potassium silicate. After drying in a rotary oven at a temperature of 200 degrees and using a rotary oven at a temperature of 800 degrees, they're baked and, after sifting and sorting, are sold in different sizes based on different standards in welding.

- Protecting the metal surface from oxygen during welding
- Controlled cooling of molten metal
- Providing the possibility of alloying

Advantages:

Higher quality and variety of products among Asian manufacturers and equal quality compared to most European manufacturers

International Standards or Permission:

Product certificate for some products manufactured by Lloyds Institute official representatives

Knowledge-based products and equipment

Application:

- Steel and petrochemical industries
- Welding of pressure vessels
- Power plants
- Shipbuilding and dock building industries

Welding Powder

Kavosh Joosh Co.

www.kavoshjoosh.com

Product Introduction:

One of the common welding methods in these days is the use of submerged arc welding. Submerged arc welding powders are mineral materials such as common oxides and metal materials that stabilize the arc and create slag during welding. These powders are divided into pre-melted and agglomerated. In order to prepare welding powder, at first, after accurate weighing of the formulation by load cells, the materials are entered dry in the mill and after reaching the desired size, they are separated with the help of sieve vibrator.Then it enters the mixer and enters the granulator with specific amounts of water, sodium and potassium silicate; After drying, it is baked in a rotary oven, and then after sieving and sorting, it is sold in different sizes based on different standards in welding. One of the most important things in determining the formulation of these powders is the use of various ceramic oxides that form a glass with high viscosity at the melting temperature and are easily separated from the weld surface after cooling. Failure to separate the mud or slag from the weld will cause many problems. In welding powder, various compounds are usually used for welding alloying. The use of raw materials with a reasonable price and an optimal combination requires a research and development (R&D) process. This company has made more than 20 types of welding powder based on reverse engineering during the last 15 years and due to its high market share in the country, it has been able to meet the market's needs in terms of quality.

Main Export Destinations:
Germany, UAE, Turkey and Iraq

Export History:
1,000,000 - 10,000,000 $

Founded:
1985

This product is a final B2B consumer product.

Technical Specifications:

- The produced powders have types of calcium silicate - manganese silicate - calcium silicate alloy - rutile aluminate - alkaline aluminate, alkaline fluoride.
- The final powder is in the form of granules.

Advantages:

- Supplying market needs in terms of quality
- Mass production and creation of high added value

Alpha Alumina Powder with More than 94% Purity

Arad Lian Pharavar Aria Co.

www.alphaoxide.com

Product Introduction:

Aluminum oxide does not exist in nature in pure form, and it is necessary to obtain this material through chemical and physical processes. The most common approach is processing using the bauxite mineral, which has 45 to 85% aluminum oxide. The rest of the impurities include silica and other materials such as iron oxide and titanium oxide. A chemical process is used to purify bauxite. In this process, bauxite is dissolved in soda solution under high pressure in an autoclave, and then gibbsite or aluminum hydroxide is obtained in the precipitation stage. In the following, this material, along with impurities, is separated from the solution and dried during the process of washing and sedimentation. The important point is that some of the impurities remaining in the extracted hydroxide penetrate the gibbsite structure in an intergranular way and cause impurities in the aluminum hydroxide product; In addition to the presence of impurities in this substance, it is necessary to stabilize it and achieve a stable structure. In this regard, aluminum hydroxide should be calcinated at a temperature higher than 1500 degrees Celsius and control the temperature and time needed to produce aluminum oxide with a more stable phase. In this case, the stable phase is the crystalline phase of alpha aluminum, which parameters such as crystal size, powder density, and sodium impurity significantly affect this material's final quality.

Founded:
2016

Application:

- Production of industrial ceramics, engineering ceramics, refractories, glaze catalysts
- In oil, gas and petrochemical industries

This product is a final B2B consumer product.

Technical Specifications:

- More than %94 purity aluminium
- The product is all corundum

Alpha Alumina Powder with More than 92% Purity

Finding and Innovation Ceramics Co.

www.yaftehaceramics.com

Product Introduction:

Alpha alumina is an intermediate product used in various industries; This product appears as a white and swollen powder. The specific surface area of alpha alumina is very low, so this material shows good resistance to high temperatures. Alpha alumina is not classified as activated alumina and often has no catalytic activity. Alumina has different crystal structures, most of which are unstable. The only stable phase is the alpha alumina phase. The usual method to synthesize a-Al_2O_3 is the calcination of alumina powder at high temperatures.

Main Export Destinations:
Middle Asia

Export History:
Up to 500,000 $

Annual Production Capacity:
6,000 Tons

Founded:
2005

Application:

As an intermediate product in ceramic industries, refractories, abrasive materials and ceramic mill balls and other advanced industrial ceramics.

This product is a final B2B consumer product.

Technical Specifications:

- Uniform crystal structure
- Reproducibility of properties, although in high tonnages
- Control of nucleation and crystal growth up to 2 µm

Advantages:

- Reproducibility of properties, although in high loads
- Using the proper DuPont to prevent excessive growth of crystals
- Economical price
- No dependence on foreign materials
- Possibility of supply in high voltage
- The possibility of changing the properties depending on the customer's needs

Application:

Production of pigmented solar cells

Reflector Anatase TiO_2 Paste

Sharif Solar Co.

www.sharifsolar.ir

This product is a final B2B consumer product.

Product Introduction:

This paste is used to make a layer of TiO_2 (titanium dioxide) with the ability to respread light. Titania particles are produced with the anatase phase and in the 400-150 nm size range. This product is produced using titanium tetraisopropoxide raw material and the hydrothermal method. Next, the synthesized particles are mixed with a specific ratio of solvent and a viscosifying compound. The main complexity of the product production process is the optimization of stable and suitable paste formulation for printing.

The production process of transparent titanium dioxide paste has a high technological level due to the control of several parameters of the production process to obtain particles with anatase crystal phase in the range of 400-150 nm, as well as the absence of agglomeration of particles with a high percentage of solids and stability for one year.

Founded:
2014

Technical Specifications:

Nanoparticles	Anatase – TiO_2
Particle size	> 100 Nanometers
Concentration	28 weight percent
Physical appearance	Doughy
Color	white
Storage	2-8 °C

Advantages:

- The main complexity of the production process
- Optimizing the formulation of stable and suitable paste for printing, which leads to the creation of uniform layers with proper guidance.

Reflector Rutile SiO_2 Paste with Silicon Dioxide Shell

Sharif Solar Co.

www.sharifsolar.ir

Product Introduction:

This paste is used to make a layer of TiO_2 (titanium dioxide) with the ability to reflect and respread light. The paste contains rutile TiO_2 particles of several hundreds of nanometers with a coating of SiO_2. This type of scattering layer has great reflection power; on the other hand, it does not cause a drop in the electrical properties of the cell. Due to its insulating properties, this paste can make separator layers in monolithic cells. The paste contains submicron particles of titania with a rutile phase (average size 400 nm) and a nanometer shell of silica (thickness 70 nm) as a reflective layer with the ability to reflect nearly one hundred percent in all visible wavelengths. The concentration of titania in the final product is 28 weight percent. The production process of rutile titanium dioxide transparent paste with a silicon dioxide shell is complex. The reason for this complexity is the need to control several parameters in its production process. These parameters include: creating a strategy to obtain particles with a rutile crystal phase and with an average size of 400 nm, forming a silicon dioxide shell with a nanometer thickness on titania, as well as non-agglomeration of particles with a high percentage of solids (28 weight percent) and long-term stability (more than three years).

Founded:
2014

Application:

Production of pigmented solar cells

This product is a final B2B consumer product.

Technical Specifications:

Nanoparticles	Rutile coated with SiO_2 – TiO_2
Particle size	250-500 Nanometers
SiO_2 shell	70 Nanometers
Concentration	28 weight percent
Physical appearance	Doughy
Color	white
Storage	2-8 °C

Advantages:

- Light-reflecting particles have optical properties.
- In a range of different wavelengths, light is reflected in the same way. This property increases the absorption of light in high wavelengths.
- Stability of more than three years
- The scattering layer has very good reflection power
- Preventing the loss of electrical properties of the cell
- Construction of separating layers in monolith cells

Bulk Ceramic Fibers Based on Alumina and Silica

Sepid Ceramic Fiber Co.

www.scfc.ir

Product Introduction:

Ceramic fiber is a type of artificial fiber made of aluminum silicate, which is formed by melting kaolinite with a high percentage of alumina or more conventional materials including a combination of pure alumina powder and mixed silica. Alumina and silica mixture is prepared by two methods of blowing in tge melt or centrifugal, after melting in electric resistance furnaces at a temperature of about 1800°C. In the melt blowing method, the fiber length reaches up to 100 mm, and in the centrifugal method, the fiber length reaches up to 300 mm. The formed fibers are white, glassy or non-crystalline. To prepare fibers with special applications, zirconium oxide, lime, magnesium oxide or other oxides are also added to the furnace charge.
Bulk ceramic fibers, which include a mass of long and refractory ceramic fibers with random direction distribution, can be used as a suitable alternative to asbestos.

Founded:
2002

Application:

- Steel industries (lining, insulating support, sealing, etc.)
- Non-ferrous metal industries (insulation of bush, furnace ducts and roofs, lining, sealing, separation filter, etc.)
- Oil and petrochemical industries (for boilers, catalyst base, insulation around burners and reactors, etc.)
- Tile and ceramic industries (sealing, lining, etc.)
- Chemical industries (lining, sealing, filter separation, etc.)
- Glass industry (hot repairs of molten bricks)
- Transportation industries (brake pads, sound and thermal insulation of body and exhaust pipe, catalytic converters, etc.)
- Sound insulation

This product is a final B2B consumer product.

Technical Specifications:

Color	White
Service temperature	1100-1300 °C
Classification temperature	1260-1450 °C
Density	80 kg/m^3
Fiber diameter	2-3 and 3-5 µm
Fiber length	50-100 and 100-300 µm
Linear shrinkage	≤ 4%
Thermal conductivity	0/0-2/3 W/m.k°

Advantages:

- Light weight
- Flexibility and high tensile strength at the same time
- Fast installation
- Low thermal conductivity
- Low thermal energy storage
- High resistance to thermal shock
- High resistance to corrosion
- High thermal stability
- Chemical stability in oil, acid and base (alkaline) environments and sound insulation

International Standards or Permission:

- ISO 9001
- ISO 14001

Alternatives to Zinc Oxide (FP 110, FP 120)
Used in Tile and Ceramic Industries

Yazd Farapoyan Co.

www.fapois.com

Product Introduction:

Zinc oxide with a melting point of 1975 °C is one of the weak fluxes that will act as a refractory at low temperatures. One of the problems in supplying glaze raw materials is the instability of quality and the high price of zinc oxide used in this industry. In recent years, some glaze manufacturers have been able to reduce some of the zinc oxide used in the glaze with other materials such as barium carbonate, etc. In contrast, their addition to the glaze has increased the consumption of compounds such as potassium nitrate and boric acid. Therefore, this company, having experience producing products that replace zircon, has made another compound to reduce the consumption of zinc oxide and replace it in the glazing industry using the sol-gel method.

Annual Production Capacity:
2,000 Tons

Founded:
2010

Application:

Ferrite and glazing industry

This product is a final B2B consumer product.

Technical Specifications:

Maintaining the desired properties, including:

- The coefficient of expansion
- Brightness
- And smoothness of the surface.

Advantages:

- Significant reduction in the cost of raw materials
- Prevent currency outflow
- Use of internal resources

Ultra High Temperature Ceramics Powder (UHTCs) Including Hafnium Diboride, Hafnium Carbide, Zirconium Diboride, Aluminum Nitride Whisker

Pishro Ceramic Mehr (PCM) Co.

www.pishroceramic.com

Product Introduction:

The ceramic powders produced in the Pishro Ceramic Mehr Company include hafnium diboride, hafnium carbide, zirconium diboride, zirconium carbide, aluminum nitride whiskers, tungsten carbide, and hexagonal boron nitride. These high-temperature ceramics are a group of inorganic and non-metallic materials with a melting point above 3000 degrees Celsius and are generally made of borides and carbides of transition metals such as zirconium, hafnium, niobium, and tantalum. Borides have a higher position among high-temperature ceramics due to the simultaneous combination of thermal shock resistance, creep resistance, and thermal conductivity. Also, among the borides, hafnium diboride and zirconium diboride show the best oxidation resistance at high temperatures, good thermal and electrical conductivity, chemical stability, and high hardness. Zirconium diboride and hafnium diboride are oxidation-resistant materials at temperatures above 2000°C. Also, in the comparison between diboride zirconium and diboride hafnium, diboride zirconium has a lower density and price than diboride hafnium. In the carbothermal synthesis of zirconium diboride and hafnium diboride, a boron carbide side product is also possible if the process variables are not carefully controlled. Although boron carbide is a valuable material with functional properties, it will destroy properties along with zirconium and hafnium borides.

Founded:
2015

Application:

- Engines
- Ultrasonic equipment
- Plasma arc electrodes
- Cutting tools
- The thermal elements of furnaces and heat shields
- The aerospace industry

This product is a final B2B consumer product.

Technical Specifications:

- Sub-micron dimensions and close to the nano scale
- **Hafnium carbide:** one of the most resistant materials to temperature with a melting point of 3900 degrees Celsius, melting point and very high hardness.
- **Zirconium carbide:** has a melting point of 3500 degrees Celsius, high hardness and low density of 6.75 grams per cubic centimeter.
- **Tungsten carbide:** melting temperature of 2900 degrees Celsius, very high hardness and high Young's modulus, bulk modulus and high shear modulus.
- **Aluminum Nitride:** in different forms such as particles, thin layers (films), whiskers, etc., excellent mechanical properties, very high thermal conductivity and electrical conductivity equal to that of an insulator in each of the mentioned forms.
- **Hexagonal Boron Nitride:** having a structure similar to graphite due to boron and nitrogen ionic bonds, as a reinforcing material with the aim of improving resistance to thermal shock, improving fracture toughness and also increasing the possibility of machining.

Advantages:

- High hardness
- High thermal stability
- High solid phase stability

Alumina-Magnesite-Carbon Brick
Alumcarb - AMC

Iran Refractory Products Co.

www.irepco.com

Product Introduction:

A.M.C alumina magnesite carbon refractories have shown good properties in comparison with M.C carbon magnesite refractories. These properties include: lower thermal conductivity, higher wear resistance and better corrosion resistance against molten steel. In this way, these materials have been proposed and used as a suitable replacement in different areas of the knee in the world. This product is used as a lining of refractories in the steel industry.

One of the most important features of these bricks is their volumetric expansion during operation. This volumetric expansion prevents the penetration of melting in the place of connection of bricks and increases the life of refractory to a significant extent. This brick is made of bauxite, alumina fuse, burned dead magnesite and carbon as raw materials and phenolic resin as binder. The used phenolic resin turns into carbon after exposure to high temperature and leads to an increase in the volume and stable expansion of these bricks. After crushing and granulating alumina and magnesite and adding carbon in a powder mixer, the required amount of phenolic resin is added to the above mixture, and then it is pressed into the form of bricks, and after being arranged in the wagons, it enters a tunnel with an approximate temperature of 200 degrees Celsius. The bricks are produced in this stage. After visual inspection and quality control tests, the bricks are packed in pallets and prepared for sale.

Main Export Destinations:
Armenia and Georgia

Export History:
Up to 500,000 $

Founded:
1985

Application:

Steel industry

This product is a final B2B consumer product.

Technical Specifications:

- **Raw materials:** bauxite, fused alumina, burned dead magnesite, carbon and phenolic resin (as a binder).
- In order to prevent the oxidation of carbon and graphite, antioxidants such as Al and Si are used in very small amounts.

Advantages:

- It has a longer lifespan compared to other dolomite magnesite or carbon magnesite bricks
- Has the highest number of melts in the melt ladle

Application:
Steel industry

Graphite Electrode Coating

Pat Roshan Nikta Co.

www.patron.group

This product is a final B2B consumer product.

Product Introduction:

Normally, the use of graphite electrodes in steelmaking with electric arc furnaces depends on the technology used and other effective parameters. In this way, the consumption coefficient of graphite electrodes will have a value in the range of 1.5 to 4 kg per ton. Due to the relatively high share of graphite electrode in the finished steel price, reducing the consumption coefficient of graphite electrode is one of the most important goals in steel factories with electric arc furnaces and Ladle (cauldron) Refining Furnaces (LRF). In order to achieve this goal, there are different solutions, including protecting the electrode from oxidation or delaying the oxidation of the electrode. Therefore, graphite electrode coating with Alcopat brand name has been designed and produced in this company.
After placing the coated electrode on the arc furnace by forming a strong adhesive layer on the surface of the electrode, it can be prevented that electrode surface from falling during the steel production process. The formed layer, while sticking to the surface of the electrode, will prevent the passage of oxygen to its surface; Also, on this layer, with the reaction between different components of the composition, a refractory layer is also formed. While this layer is a refractory layer, at high temperature it prevents the passage of heat and the reaction of oxygen in the atmosphere of the arc furnace with the layers below.

Main Export Destinations:
Russia, Turkey, Georgia, Iraq, Pakistan and Afghanistan

Export History:
Up to 500,000 $

Founded:
2013

Advantages:

Saves on graphite electrode

Alumina Spinel Refractory Mass
Induction Furnace Mass

Zob Iran Refractories Co.

www.zico-ref.ir

Product Introduction:

Alumina spinel refractory mass is a mass that can be used in the walls of induction furnaces during steel production. Commonly, silica mass is used in the walls of induction furnaces, which is very suitable for producing cast iron. But an alkaline or neutral mass should be used due to the steel reaction and its slag with silicon mass. This mass is chemically neutral and has at least 80% alumina. The higher price of this mass is due to the higher cost of the raw materials used.
One of the ways to increase the sinterability is using nanometer compounds in the refractory, which is not economically justified due to the high price of these materials. Based on the research done by its experts, this company has started using additives for better sintering. In fact, with this work, the cost problem is completely solved; on the other hand, it is possible to mix this powder uniformly inside the mass. This will cause the formation of very fine particles in situ inside the mass and better sintering of the outer layer.

Founded:
2014

Application:

Wall of induction furnaces during steel production

This product is a final B2B consumer product.

Technical Specifications:

Brand name	ZicoRamAl 86
Raw material	High quality alumina, magnesia and spinel
Maximum grain size (mm)	0-6mm
Installation method	Vibrating-ramming
Nature of bond	Ceramic
Required material (t/m3)	3.0-3.2
Maximum service temperature (°c)	1850

Advantages:

- Increasing sinterability by using special additives and eliminating the cost of this method by using nanometer materials.
- The possibility of uniform mixing of this powder inside the mass

Stopper and Nozzle Alumina
Aluminum Oxide

Dirgodaz Amol Co.

www.dirgodazamol.co

Product Introduction:

The nozzle is a refractory piece placed on the bottom of the tundish, and its task is to direct the melt from the tundish to the mold of the continuous casting machine. Tundish nozzles have different types that vary depending on the casting time. The stopper inside the mold controls the melt flow.
These nozzle and stopper are made of refractory concrete, including alumina silicate, graphite, fillers, and refractory grains. After mixing, these materials are poured into casting molds and then heated for baking.

Main Export Destinations:
Turkmenistan

Export History:
Up to 500,000 $

Founded:
1999

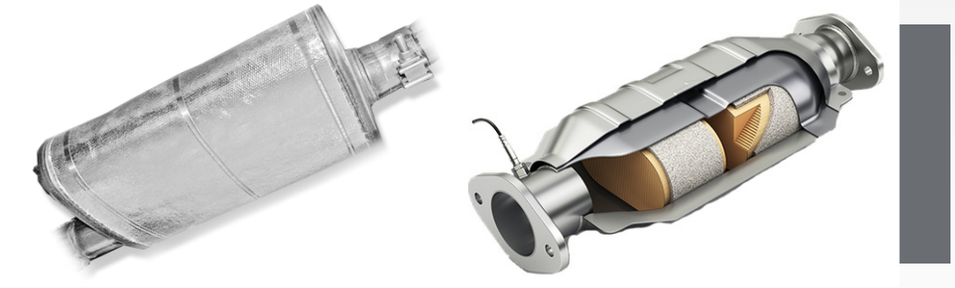
Application:

Casting of ferrous and non-ferrous metals

This product is a final B2B consumer product.

Technical Specifications:

- Suitable thermo-mechanical properties
- Good resistance to thermal shock
- Good resistance to corrosion and abrasion



Thermal Insulator and Ceramic Based Protectors
Used in Car Catalytic Convertors (Mat Catalyst)

Adak Sanat Polymer (ASP) Co.

www.adaksp.com

Product Introduction:

Car catalysts, usually made of silicon carbide, are coated inside precious metals and increase the material value; Therefore, to keep the monolith from pressure and heat, MAT (thermal insulation and ceramic-based protectors) catalyst is used. Car catalysts are mainly installed in 2-ways: UNDER BODY (at a distance of 1 to 1.5 meters from the engine) or CLOSE COUPLED (with direct connection to the exhaust manifold). The variety of canning and engine types makes the MAT design customized so that the mat does not separate from the catalyst. The monolith must be entirely in place so that it does not dislodge due to the vehicle's pressure, back pressure, and vibration. Otherwise, a lot of damage will be done to the car; Therefore, the proper design of the MAT is necessary to withstand temperature, pressure, abrasion resistance, insulation, and prevent monolith breakdown.

Founded:
2015

Application:

Automobile industry

This product is a final B2B consumer product.

Technical Specifications:

- Catalyst pushing strength is about one megapascal
- Composed of ceramic fibers and vermiculite with binder
- It has three types of MAT: high vermiculite, low vermiculite and no vermiculite

Advantages:

High-tech formulation, process design and mechanical design

Ceramic Blanket Produced with Fibers
Based on Silica, Magnesia and Calcium Oxide

Sepid Ceramic Fiber Co.

www.scfc.ir

Product Introduction:

The ceramic blanket is a refractory, insulated, and flexible product. The primary material of this product is bulk ceramic fibers, and the composition of the fibers of this blanket is magnesia and calcium oxide.
These ceramic blankets are produced by the centrifugal method and have high durability, longevity, and extraordinary tensile strength.
Due to the presence of porosity between the fibers, in addition to high thermal resistance, the ceramic blanket also has excellent sound absorption properties, so in many cases, this product can be used as sound insulation.

Founded:
2002

Application:

- Steam boilers and thermal centers
- Insulation around the burners
- Lining hot surfaces of heat treatment furnaces
- Thermal sealing of the cover of heat treatment furnaces
- Casting nozzles cover
- Lining of cracking and reformer furnaces
- Insulation parts for bushes
- Ducts and roofs of absorption furnaces even in contact with melt, brake pads, etc.
- Sound insulation

This product is a final B2B consumer product.

Technical Specifications:

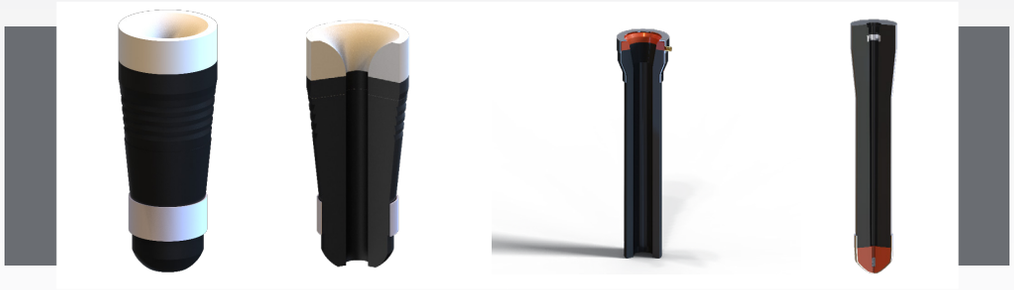
Color	white
Service temperature	1100 °C
Classification temperature	1200 °C
Density	96, 128, 160 kg/m^3
Fiber diameter	3-5 µm
Tensile strength	≥ 50 Kpa
Thermal conductivity	0.2-0.3 W/m. °k
Shot percentage	less than 30

Advantages:

- Creating added value due to the high-tech technical knowledge of the product
- The price is right

International Standards or Permission:

- ISO 9001
- ISO 14001



Special Refractory Parts

Tundish Flow Control Stopper

Zagros Special Refractories Co.

www.zagrosref.com

Product Introduction:

A stopper is used inside the tundish to stop and connect the melt flow. By entering the nozzle, this part closes the melt flow passage and allows the melt to pass by rising up. Stoppers are usually produced in two ways (with an argon gas injection system and without an argon gas injection system). In these parts, zirconia is also used in the slag area, which will increase the corrosion resistance of these parts against the melt. The use of magnesia carbon is necessary for steels containing calcium, and alumina carbon is used for alloy and stainless steels.

Founded:
2014

Application:

Steel industry for casting different grades of steel and slabs

This product is a final B2B consumer product.

Technical Specifications:

Properties	Measuring unit	Normal range of Max-Min	Sample size
Volume/density	gm/cm^3	2.48-2.55	2.52
Apparent porosity	%	19-22	20.5
Cold MOR	Mpa	12-15	14

Advantages:

- Resin selection and initial curing method
- Resin aging
- Mixing and size of granules and size of particles according to the specific function of these parts

Application:

Steel industry for casting and bar production

Casting Powder

Salim Sanat Sepahan Co.

www.salimsanat.ir

This product is a final B2B consumer product.

Product Introduction:

To prevent the contact of the molten steel surface with ambient oxygen and the collection of impurities, we can pour the product made by us on the molten surface of the mold. Also, to reduce the friction of the mold with the shell of the bar, increase the life of the mold and increase the quality of the output bar, some powder is melted and placed between the steel ingot and the mold. Paraffin oil is traditionally used to face this challenge. This oil does not have the desired performance of casting powder and is only used to collect slag on the molten surface. Casting powder is designed according to the combination of melt analysis and different casting speeds to have the best performance according to different casting conditions. The composition of this powder includes SiO2-CaO-Al2O3-C and so on.

Technical Specifications:

- **Powder (Bulk) density:** 0.8 - 0.9
- **Melting point:** 1180 °C
- **Sieve Analysis :** The size of %75 of the particles is below 70 microns

Advantages:

- High Quality
- Reasonable price
- Availability

Annual Production Capacity:
5,000 Tons

Founded:
2012

Refractory Products Based on Cordierite Mullite

Nasooz Alvand Co.

www.nasozalvand.com

Product Introduction:

Refractory products based on cordierite mullite have heat resistance up to 1300 degrees and with their high shock resistance, they go through high cycles (1000 cycles). The existing phases are about 60% cordierite phase and 40% mullite phase.

Founded:
2004

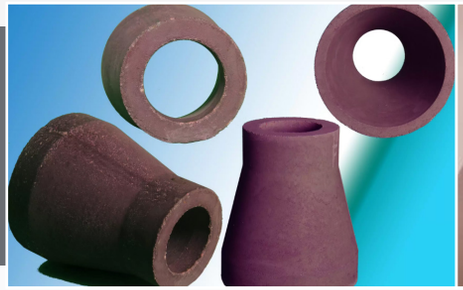
Application:

- As a bed for baking sanitary porcelain products and containers
- Production of paints, ceramic insulators, refractory parts of ceramic companies

This product is a final B2B consumer product.

Technical Specifications:

- **Water absorption percentage of products:** 8 to 10 percent
- **Density:** 2.8 grams per cubic centimeter
- **Bending strength:** 180 MPa
- **Baking temperature:** 1400-1350 degrees
- **Cooking time at peak temperature:** 3 hours
- **Shrinkage rate after baking:** %0.4



All kinds of Ceramic Parts of Alumina Base

and ceramic chamber of combustion chamber of gas turbines

Atlas Ceram Kavir (ACK) Co.

www.atlasceram.ir

Product Introduction:

Alumina-based ceramic products: These products must be homogenous with the melt in terms of phase and chemical properties due to their use in the steel industry and proximity to melt and corrosion. The freeze casting method is used in this company.

The ceramic chamber of combustion chamber of gas turbines: The combustion chamber of gas turbines usually has a high temperature of about 1100 degrees Celsius; Therefore, high thermal stresses and erosion of hot gases are expected in these parts. The refractories used in this industry have special conditions and must obtain rigorous approvals because the early and sudden failure and destruction of firebricks creates a fundamental problem in this industry; Therefore, the bricks of the combustion chamber of gas turbines must be very resistant to thermal shocks and withstand high temperatures in a long period.

Founded:
2009

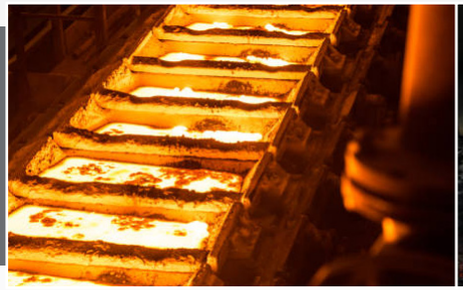
Application:

Steel Industry

This product is a final B2B consumer product.

Technical Specifications:

Physical characteristics of Ceramics of the combustion chamber	Description
Density	2.9±0.1 gr/cm^3
apparent porosity	18% ± 3
thermal conductivity	2.6 ± 0.2 w/mk
Resistance to thermal shock	> 30 shocks
Physical characteristics of alumina-based ceramics	**Description**
Density	2.8 – 2.85 gr/cm^3
Service temperature	1800 °C
Apparent porosity	18 %



Application:

Casting and steel industries

Tundish Alkaline Powder

Foulad Gostar Naqhsh-E Jahan Co.

www.fgnj.ir

This product is a final B2B consumer product.

Product Introduction:

In the process of continuous casting of steel, as an intermediate chamber ladle the and the mold, the tundish plays an important role in separating the dross and reducing the flow disturbances before entering the mold. Basically, the degree of cleanliness of the molten steel entering the mold is affected by the type of flow pattern, tundish functional form in flotation and removal of non-metallic impurities; Therefore, creating a suitable flow pattern and increasing the retention time of offals in the tundish will improve the process of separating offals and create clean steel.

This product is an alkaline powder that is placed on the surface of the melt and in addition to helping to insulate the tundish in order to prevent temperature drop, it absorbs impurities near the surface and by creating fluid slags, it cuts off the contact of the melt with air and decreases the re-oxidiation of the melt. Also, this product keeps the sulfur-containing compounds that enter the tundish along with the Patil slag and prevents sulfur from returning to the smelter. In the product production process, raw mineral materials such as argillite, perlite, refractory cement, slaked lime and limestone, magnesite, carbon and other additives have been used.

Founded:
2005

Technical Specifications:

- Absorption of aluminates and impurities
- Fast melting and non-hardening after absorption of impurities
- It has fast spreading capabilities after being placed on the melt
- Stability at process temperature
- No dust

Advantages:

- High-tech product formulation
- Appropriate viscosity
- Corrosion control of refractory bricks
- Not sticking to the body and not changing the composition of the melt

Tundish Insulation Powder

Foulad Gostar Naqhsh-E Jahan Co.

www.fgnj.ir

Product Introduction:

This product is an insulating powder that replaces rice bran in the continuous casting process, which is placed on the melt in the tundish and prevents its temperature from dropping. The use of rice bran brings problems such as the entry of oxygen to the molten surface as well as the entry of impurities. In addition, in some seasons of the year, the required amount of rice bran for avtive industries in the field of continuous casting cannot be provided. This product is a suitable thermal insulation and can be used together with Tundish play powder product or separately on the melt; Also, this product is able to trap the slag entering from the ladle to the tundish.

In the product production process, raw mineral materials such as perlite, wollastonite, boehmite, silica fibers, magnesite, carbon and other additives have been used for quick spreading and stability at the process temperature.

Founded:
2005

Application:

Casting and steel industries

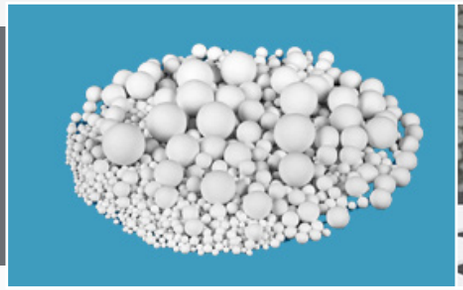
This product is a final B2B consumer product.

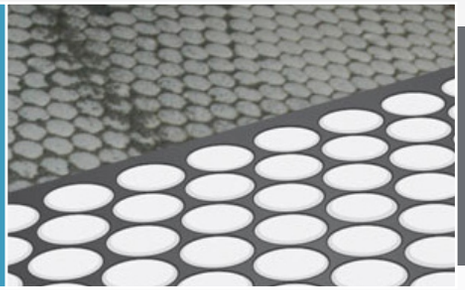
Technical Specifications:

- Fast spreading and high temperature stability
- Non-entry of oxygen and impurity to the molten surface

Advantages:

The high-tech formulation of the product





Alumina Ceramic Balls and Liner

Ardakan Industrial Ceramics Co.

www.aic.ir

Product Introduction:

Anti-abrasion liners (LA92): In various industries such as steel and mines, especially in the industries that deal with the processing of raw materials, the issue of equipment abrasion and corrosion has been a major and costly challenge. On the other hand, repairing or replacing damaged equipment requires stopping the production line and high repair costs. Therefore, the use of protective coatings in different materials has always been considered by designers as a basic solution. The use of hardened metals, especially abrasion-resistant steels, in many cases reduces the cost and lengthens the line stop intervals. However, the use of hard metals in environments that are exposed to moisture, are in contact with corrosive chemicals, are in the way of the passage of materials with high hardness, and high working temperatures are associated with serious challenges.

Anti-abrasion ceramics, especially ceramics with a high percentage of alumina (AL_2O_3) can be used as a suitable substitute for hard metals in the above conditions due to their unique mechanical properties.

Anti-abrasion balls: Ball mills are currently used as a crucial component in the process of preparing materials in various industries, including tile and ceramic industries, porcelain, glaze, paint and cement, mines, etc. The usual work procedure is that the materials enter a cylindrical chamber with abrasive balls and the cylinder starts rotating around its axis and the materials are ground in contact with the balls and the aluminum wall of the cylinder. The size of the material entered into the mill has a direct relationship with the size of the pellets. In addition, in this process, things such as: motor power, grinding speed, amount and size of pellets, type of pellets and wall (liner) with the materials entered into the mill, whether the grinding process is dry or wet, and whether it is continuous or discontinuous. , are subject to precise scientific calculations and laws.

Main Export Destinations:
Germany, China, Azerbaijan, Turkmenistan

Export History:
Up to 500,000 $

Founded:
1996

Application:

Grinding of sensitive raw materials with the presence of metals, including tile and ceramic materials, glaze, white cement and micronized chemical and mineral powders with high sensitivity

This product is a final B2B consumer product.

Technical Specifications:

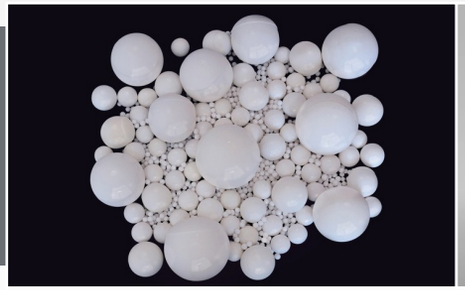
Bulk Density (gr/cm^3)	3.60 grams per cubic centimeter
Hardness (Mohs Scale)	9
Color	White
Porosity (percentage)	0
Comprehensive Strength	20,000 kg/m^2
3.0-3.2	Required material (t/m^3)
1850	Maximum service temperature (°c)

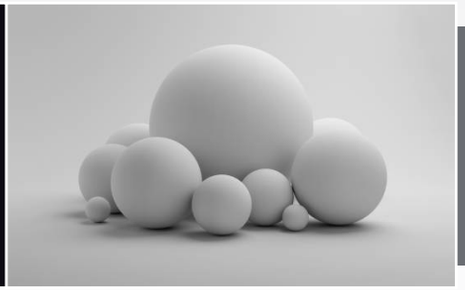
Advantages:

- Very high surface hardness
- Being amphoteric (neutral) and not reacting with various chemical substances, including alkaline and acidic environments.
- Ability to install easily and with various methods (gluing, welding, screwing)
- Easy and inexpensive repairs and maintenance
- Affordable price

International Standards or Permission:

- CE standard
- ISO 17025:2005
- Product quality verification certificate from National Iranian Oil Refining and Distribution Company





92% and 60% Alumina Balls

Finding and Innovation Ceramics Co.

www.yaftehaceramics.ir

Product Introduction:

One of the ways to turn crushed minerals into micronized powder is to use ball mills. In these mills, the mineral matter is quickly turned into micronized powder due to the repeated impact of high-density hard balls (92% alumina balls). Advanced ceramic findings with very high hardness, excellent abrasion resistance, and using 100% domestic raw materials have provided the best method of obtaining micronized powder of any mineral while maintaining the initial purity.

This product is a vital element and essential component for preparing the formulation and achieving micronized powder for consumer factories' forming and production processes. The difference between these and 60% balls is in the amount of alumina used, so it is used in cases that are less sensitive to impurities. The most commonly used bullets are 60% bullets.

Alumina liners, primarily used in the walls of ball mills, are considered an essential component in the preparation process of materials in various industries such as tile making, paint, porcelain and glaze, powder making, petrochemical, refinery, cement, etc. The most critical indicators in the construction of liners are resistance to corrosion and abrasion, and if the grinding materials are sensitive to impurities, these factors become more acute.

Main Export Destinations:
Uzbekistan, Middle Asia

Export History:
Up to 500,000 $

Annual Production Capacity:
Alumina balls 92%: 6,500 tons
Alumina balls 60%: 1,000 tons

Founded:
1976

Application:

- Used in the wall of the ball mills, as a basic component in the preparation process of materials in various industries such as tile, paint, porcelain and glaze, powder making, petrochemical, refinery, cement, etc.
- Used in the grinding ball mills for the production of non-colored and impurity-sensitive bodies
- Applied in various industries such as steel and mines, especially in industries that deal with the processing of raw materials.

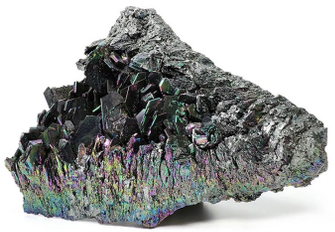
This product is a final B2B consumer product.

Technical Specifications:

- %92 alumina balls are advanced ceramic findings with very high hardness that can show great resistance to scratch and abrasion. These balls have Al_2O_3 with %92 purity and a hardness of 9 on the Mohs scale after diamond, which has a hardness of 10.
- %60 alumina balls also contain %60 corundum and %40 spinel. They are high-temperature controlled amorphous phase materials.

Advantages:

- High phase and elemental homogeneity of the structure to achieve special properties
- Resistance to special abrasions
- Corrosion resistance in certain environments
- Alumina liners as an alternative to hard metals
- High hardness



Application:

- Bulletproof vest
- Furnace
- Refractory bricks in the ceramic industry
- Car exhaust as heat exchangers

Silicon Carbide Parts

Fara Dama Bonyan Co.

www.faradamabonyan.com

فرادما بنیان

This product is a final B2B consumer product.

Product Introduction:

Temperature and heat have been one of the most important human tools to achieve development and progress. In the past years, the ceramic products of the country and its various industries were fired and sintered at a maximum temperature of 1750 degrees Celsius. Among the most important ceramic parts, we can mention all kinds of refractory materials, aluminum parts, etc.

In the process of developing the ceramic industry, acquiring local technical knowledge and infrastructure development is very important. One of the most important economic indicators in the field of engineering ceramics is the relatively high added value compared to the traditional tiles and ceramics industry.

SiC silicon carbide parts are one of the most important abrasion-resistant ceramics. Mechanical ceramics require a minimum sintering temperature of more than 2000°C.

Compared to the previous generation, silicon carbide has a lower density, which makes the armor parts lighter and harder.

These parts have very high hardness and mechanical strength of more than 300 MPa along with fracture toughness of more than 4 MPa.

Founded:
2010

Technical Specifications:

Physical characteristics:

Typical Physical Properties		
Physical	Units	Fara SS1
Composition	SSiC	
Density	g/cm^3	3.14
Hardness	Vickers GPa	2800
Grain Size	µm	4.2
Coefficient of Thermal Expansion, RT to 400°C	$\times 10^{-6}$ °C^{-1}	4.02

Mechanical chracteristics:

Flexural Strength	MPa	390
Compressive Strength	MPa	3900
Modulus of Elasticity	GPa	410
Fracture Toughness	MPa x $m^{1/2}$	4.6

Advantages:

- Having a homogeneous and uniform microstructure
- Hardness and high mechanical properties

Insert (Turning)

Almase Saz Co.

www.almasehsaz.com

Product Introduction:

Turning inserts are parts with high hardness and abrasion resistance used for chipping in the machining process. These tools have specific and standard shapes and are produced in particular dimensions. Unique inserts should be used depending on the machining operation type and the machined part's speed and material. Machining operations and loading speed are mentioned in the standards and manuals of each tool.

The production method of these parts is that first, tungsten carbide powder is weighed with cobalt, and then it is poured into attritors or tungsten carbide ball mills, then it is ground in a hexane environment for 7 hours and transferred to the spray dryer; After the formation of granules, the samples are pressed by multi-stage single-axis presses, and after deburring, they are ready for baking in a controlled atmosphere furnace or a furnace with high gas pressure. After the sample is baked and its complete sintering (frittage), the pieces are sized by the stone and are prepared for the coating stage.

Founded:
2008

Application:

For chipping in the machining process (depending on the geometry and properties of these inserts)

This product is a final B2B consumer product.

Technical Specifications:

- Approximate weight between 8 and 10 kilograms
- Hardness around 1400 to 2000 Vickers
- High strength of 400 MPa

Advantages:

- Ability to operate at high speeds
- High volume loading

International Standards or Permission:

- System management quality certificate from IQNET
- ISO 9001/2008

Application:

Steel industry

Tundish Nozzle with Zirconia Core

Afagh Refractory Co.

www.afaghceram.com

This product is a final B2B consumer product.

Product Introduction:

The tundish nozzle is a piece placed in the bottom of the Tundish; The molten steel is removed from it and continuously enters the mold of the casting machine. This piece contains a zirconia core that can withstand high pressure and temperature and determines the direction of the melt. Also, this part is disposable and must be changed the next time after melting. The important thing about it is that it is hazardous due to the large volume of the melt inside the tundish and the height of the CCM machine. If this piece is corrupted or broken, the entire tundish melt will flow from a high elevation and cause many dangers. To produce this product, stabilized zirconia should be used.

The core creates the main price of the nozzle and its function, so more than 90% of the cost and all the efficiency of this part depends on the zirconia core. The company has stabilized the zirconia powder itself through a research and development process and with various tests. It has eliminated the CIP process with the help of trials and studies.

Founded:

2009

Technical Specifications:

- High pressure telorence
- High temperature tolerance

Advantages:

There are many complications in determining the amount of pressure and nozzle cooking regime

Silica Powder with Iron Oxide Content of 0.013% for Preparing Glass (FF Grade)

Glass Raw Material Exploitation (Estekhraj) Co.
www.estekhrajco.com

Product Introduction:

In the production of glass, one of the main materials used is silica. In this process, the silica sand used is prepared in two ways: crushing sandstone and quartzites with a high percentage of silica or by processing quartzite sands. Granulation and purity of silica are most important parameters in the feed of glass factories. The most important impurities in these deposits are iron oxide and clay minerals. Iron oxide (Fe_2O_3) causes a green color in the produced glass and it is necessary to reduce it before consumption. The permissible amount of iron oxide varies between 0.07% (for the production of glass containers) and 0.01% (for the production of crystal and optical glasses). There are various methods for removing iron from silica, the most common of which are crushing, granulation, scrubbing, washing and softening, gravity separation, flotation, magnetic separation, and acid washing. From the point of view of mining experts, reaching this level of iron is very important. The things that are effective in increasing this rate include: change in process conditions such as solid percentage, type of acid, acid concentration, pH, temperature and degree of crushing, amount of magnetic field, retention time, etc.

Main Export Destinations:
Armenia

Export History:
Up to 500,000 $

Founded:
1974

Application:

Glass industries

This product is a final B2B consumer product.

Technical Specifications:

Amount of iron oxide available: %0.013

Advantages:

High added value

International Standards or Permission:

- ISO 10004
- ISO 45001
- ISO 50001
- ISO 14001

Application:

This product is suitable for making the following items:

- Permanent magnets
- Permanent magnet parts
- Production of anti-vibration magnetic insulation powder for car body
- Production of fridge and freezer door rubber magnets

Magnetic Powder of Strontium Ferrite

Isfahan Magnet Co.

www.magnet-e.com

This product is a final B2B consumer product.

Product Introduction:

The magnetic material of strontium ferrite with a hexagonal structure is one of the hard ferromagnetic oxides, which has many favorable characteristics. Among these features, we can mention low price, high magnetic hysteresis, high axial anisotropy, large coercive field, high Curie temperature, chemical stability, excellent corrosion resistance and also good microwave absorption properties. As a result, this material is considered a suitable option for various uses, such as making permanent magnets, DC electric motors, high-density magneto-optical and magnetic recording media, and microwave parts.
Strontium ferrite magnetic powder is made from a combination of iron oxide and strontium bivalent metal. This material is one of the ferri-magnetic materials, that is, in them, the atomic magnetic moments are not in the same direction and only partially neutralize each other.

Founded:
2007

Technical Specifications:

- Strontium ferrite with magnetic flux density
- BR>1300G (1500-1320G)
- Normal coercive force (HCB>800 OE (1200-900OE))
- Inherent compelling force (Orsted)
- (HCJ>2500-1700) 1700OE))
- Energy (BH) MAX>0.3MGOE (0.3-0.5))
- Material purity (iron oxide and strontium carbonate) is %98.5 or higher.

iHiT

Iran House of Innovation and Technology (iHiT)

Iran House of Innovation and Technology (iHIT) is one of the types of export intermediaries that launched under the auspices of the Vice President for Science and Technology in Kenya, China, Russia, Turkey, Syria and Iraq. In addition to accessing the export instructions, these houses provide variety of services for companies to enter the interactional service markets such as: private and shared workspace, permanent exhibition of products, finding business partners and investing in the target countries of export, company registration, product registration, medicine, medical equipment and trademarks registration, dispatch and admission of business delegations, hiring local specialists to present products and service.

TEHRAN iHiT

Manager: Mohammad Karami

Field of Activity: Permanent International Exhibition | Export of products and services of knowledge-based, creative and technology companies in Tehran

Country: Islamic Republic of Iran – Tehran

Services:

- Holding permanent exhibition of knowledge-based products and services
- Holding specialized events and meetings
- Providing dedicated and shared workspace in Tehran
- Identifying export opportunities
- Identifying opportunities for scientific, technological and industrial cooperation

Address: Hall 37A, Tehran International Exhibition, Tehran, Iran
website: www.ihit-expo.com
Tel No: (+98) 912 444 9958 / (+98) 21 910 737 37
Supervisor: Mohammad Mahdi Agharafiee
Office Phone: (+98) 912 706 9611

NAIROBI iHiT

Manager: Ali Baniamerian

Field of Activity: Export of products and services of knowledge-based, creative and technology companies

Country: Republic of Kenya – Nairobi

Services:

- Holding Permanent exhibition of products and services
- Providing dedicated and co-working space
- Holding the National Pavilion of the Islamic Republic of Iran in international exhibitions
- Export development of knowledge-based products
- Identifying opportunities for scientific, technological and industrial cooperation
- Providing export instructions of the Center for International Science and Technology Cooperation

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SUZHOU iHiT

Manager: Amir Ghorbanali

Field of Activity: Export of products and services of knowledge-based, creative and technology companies

Country: People's Republic of China - Shanghai

Services:

- Holding Permanent exhibition of products and services
- Export development of knowledge-based products
- Providing dedicated and co-working space
- Identifying opportunities for scientific, technological and industrial cooperation
- Holding the National Pavilion of the Islamic Republic of Iran in international exhibitions
- Providing export instructions of the Center for International Science and Technology Cooperation

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MOSCOW iHiT

Manager: Mahdi Deilam Salehi

Field of Activity: Export of products and services of knowledge-based, creative and technology companies

Country: Russian Federation – Moscow

Services:

- Holding Permanent exhibition of products and services
- Providing dedicated and co-working space
- Holding the National Pavilion of the Islamic Republic of Iran in international exhibitions
- Export development of knowledge-based products
- Identifying opportunities for scientific, technological and industrial cooperation
- Providing export instructions of the Center for International Science and Technology Cooperation

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ISTANBUL iHiT

Manager: Masoud Hasani

Field of Activity: Export of products and services of knowledge-based, creative and technology companies

Country: Turkey – Istanbul

Services:

- Holding Permanent exhibition of products and services
- Providing dedicated and co-working space
- Holding the National Pavilion of the Islamic Republic of Iran in international exhibitions
- Export development of knowledge-based products
- Identifying opportunities for scientific, technological and industrial cooperation
- Providing export instructions of the Center for International Science and Technology Cooperation

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Supervisor: Masoud Hasani
Office Phone: (+98) 21 882 227 55

DAMASCUS iHiT

Manager: Mohammad Hadi Zeighami

Field of Activity: Export of products and services of knowledge-based, creative and technology companies

Country: Syrian Arab Republic – Damascus

Services:

- Holding Permanent exhibition of products and services
- Providing dedicated and co-working space
- Export development of knowledge-based products
- Identifying opportunities for scientific, technological and industrial cooperation
- Holding the National Pavilion of the Islamic Republic of Iran in international exhibitions
- Providing export instructions of the Center for International Science and Technology Cooperation

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Iraq (Sulaymaniyah) iHiT

Manager: Hossein Salmani

Field of Activity: Export of products and services of knowledge-based, creative and technology companies

Country: Iraq – Sulaymaniyah

Services:

- Holding Permanent exhibition of products and services
- Providing dedicated and co-working space
- Holding the National Pavilion of the Islamic Republic of Iran in international exhibitions
- Export development of knowledge-based products
- Identifying opportunities for scientific, technological and industrial cooperation
- Providing export instructions of the Center for International Science and Technology Cooperation

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This book includes
selected knowledge-based Iranian products
in the field of

METALS AND CERAMICS

which is prepared for promotion in other countries.

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