YARAN

Behgozin Parsa Co.

About the Company

Yaran Behgozin Parsa Co. is a manufacturer and supplier of:

- Medium and High Temperature Heating Systems and Components
- Medium and High Vacuum Systems and Components

- A complete and comprehensive range of vacuum and atmosphere-controlled systems
- Advanced technologies in heating and vacuum systems
- High quality and reliability of system's automation
- Unrivalled applications and systems engineering expertise

Yaran offers a comprehensive range of vacuum and atmosphere-controlled systems for all fields of laboratory and industrial applications.

Our unrivalled applications and systems engineering expertise is supported by our breadth of knowledge and years of experience.

Our customers receive added value from our initial advice, through to final installation and support.

Yaran provides:

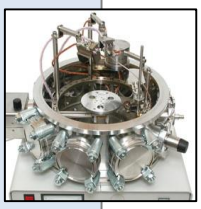
Yaran has an unparalleled reputation for reliability, excellence and innovation.

Our aim is to provide the advanced technology solutions, quality and service that our customers need.

Our excellence, experience and innovation make us your ideal partner in every application where clean and consistent high temperature vacuum system is mission-critical for better process results.

Yaran manufactures custom engineered and standard vacuum furnaces for a wide range of applications.

Products:



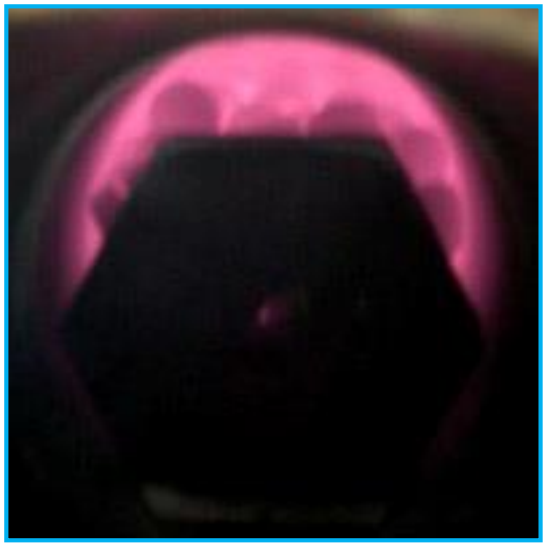
Industrial Vacuum Furnaces

Vacuum Resistance Furnace

Our industrial Vacuum Resistance Furnaces are applicable for temperatures up to 2200°C and can be equipped with several options. Some options we can provide on this high temperature furnaces include operation in Hydrogen, diffusion/turbo molecular pumping systems, heat exchanger for rapid cooling in gas, pyrometer, mass flow meter, etc. In other words, we will customize our furnaces to your specific needs.

This system could be equipped with an intuitive and easy to use computer interface, allowing full control of the furnace. In addition it provides data trends and storage (Data acquisition), display and logging of alarms, unlimited recipe profiles temperature control, security, etc.

These furnaces are multipurpose. Lighting industry, metal powder injection molding, tempering of sapphire, heat treatment of metals, sintering of pellets in the nuclear industry, manufacture of radar tubes, metallization of ceramic components, high vacuum brazing etc, are some common applications.

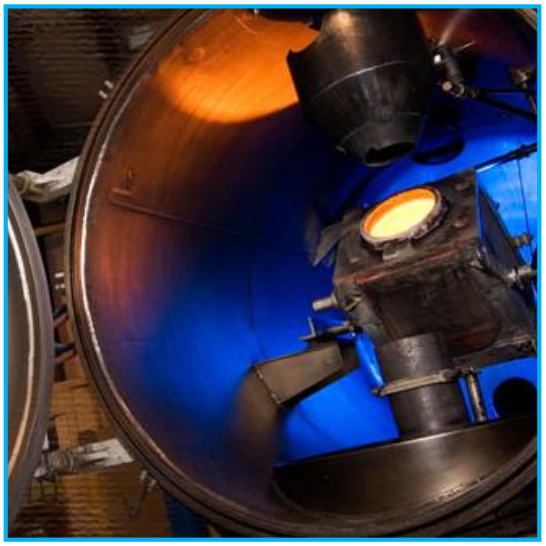


Vacuum Muffle Furnace

The muffle furnace is a furnace which the process atmosphere do not meet the heating elements/gas. In other words, there is a sealed chamber heating from around. Yaran designs and manufacture such furnaces up to working temperature of 1100 °C and vacuum of up to 10^{-4} mbar.

The main advantage compared to VRFs is no contamination between the materials inside the furnace and the heating elements.

The bright annealing of Copper and silicothermic reduction of Magnesium are some example of this type of furnaces.



Vacuum Induction Furnace

Induction is one of the most useful and clean heating methods for ferrous, non-ferrous and especial metallic materials. By addition of vacuum as the atmosphere of induction heating or melting, the system could be utilized for reactive or sensitive materials. Some of the applicable systems are vacuum induction melting (VIM), induction heat treating (VIHT) and skull melting (VSM).

VIM furnaces supply high quality production of alloys and pure metallic castings for critical aerospace and high technological industrial applications.

The main features are:
Clean and gas-free atmosphere, different atmosphere according to your requirements (Vacuum, Inert, and Reducing), excellent temperature uniformity, temperature up to 2000°C, fast cycle time, fast thermal response, precision programming and control, easy loading, fast response to parameter changes, etc.

Skull melting is an induction melting method for metallic materials that is used to melt highly reactive metals such as titanium. No molten metal ever comes into contact with the cooled copper walls (crucible) and the whole process takes place under an inert atmosphere.

Vacuum Arc Remelting Furnace

VAR furnaces are widely used to improve the cleanliness and refine the structure of standard air-melted or vacuum induction melted ingots. VAR of steels and super alloys as well as titanium and zirconium and their alloys are used in a great number of high-integrity applications where cleanliness, homogeneity, improved fatigue and fracture toughness of final product are essential.

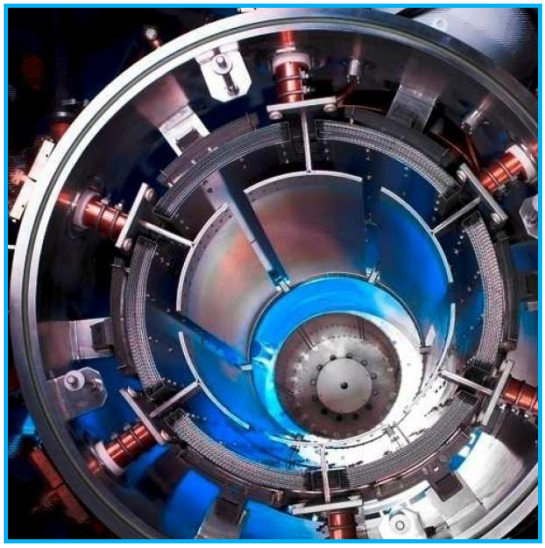
Aerospace, power generation, defense, medical and nuclear industries rely on the properties and performance of these advanced remelted materials.

The main advantages could be considered as follows:

- The solidification rate of molten material can be tightly controlled
- Under vacuum conditions high vapor pressure impurities escape from liquid metal to the vacuum chamber
- Reduces the need for large scale materials and labor expenses
- Reduces time to investigate new alloys and processing

Yaran has an agreement with the technical engineers of well-known manufacturer of such systems. So, we essentially can design vacuum arc remelting furnaces; for special steels or superalloys and also for the reactive materials like titanium.

Vacuum Resistance Furnace



This series of vacuum furnaces are compact front- or top-loading, bench top furnace which is designed for automatic program - controlled thermal processing, works in dry inert and reducing atmospheres.

The heat shielded work area includes Molybdenum/Tungsten hearth plates, with a design considering for uniform ramp and soaks processing temperatures up to 2200 °C.

The furnace chamber is constructed of double walled stainless steel with water passages between the walls. The heat shields and elements are constructed from the refractory metals and high alumina insulators support the elements.

Vacuum Induction Furnace

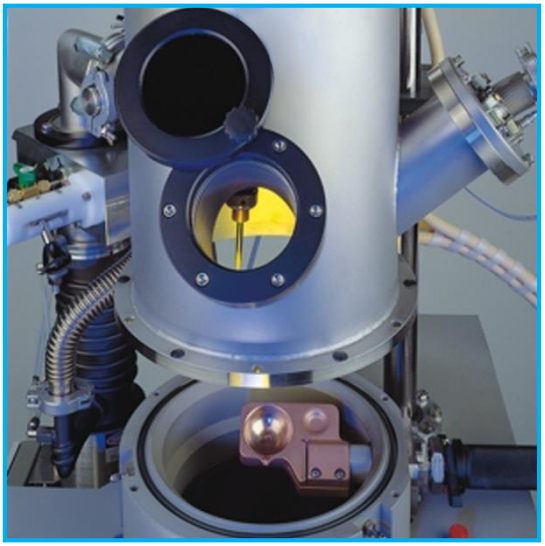
Induction is one of the most useful and clean heating methods for ferrous, non-ferrous and special metallic materials. It could be used for heating or melting. Some of the applicable systems are vacuum induction melting (VIM), induction heat treating (VIHT), melt levitation (VML) and skull melting (VSM).

Yaran's VIM furnace is specially designed to support high quality product by melting and casting operations. Our laboratory VIMs can be universally employed for melting of metals, alloys or special materials in crucibles made of ceramics or graphite under high vacuum, fine vacuum or different gas atmospheres with subsequent casting into moulds or forms in laboratory or small productions.

Some of the applications are listed in the following table:

Melt treatment	Investment casting	Materials
Re-melting and alloying	Precision casting	Precious metals
Degassing and refining	Directional solidification	Highly pure, highly alloyed steel
Homogenization melting	Single crystal growing	High temperature resistant materials on Fe- Ni- Co- basis
Recycling		Nonferrous metals
		Solar silicone and special materials
		Special- / super-alloys

Vacuum Arc (Re)Melting Furnace



Vacuum arc remelting (VAR) is the continuous remelting of a consumable electrode by means of an arc under vacuum. The advantages of arc melting are its highly concentrated energy and its straight forward control procedures. Yaran's VAR furnace overcomes serious problems that have been historically associated with conventional VAR operations after continuous research and development. Yaran offers innovative technology in system design and process control, which operate exclusively in vacuum, thus, special steel, super alloys, Fe, Ni, Co, and Ti-base alloys for high strength and temperature-resistant components achieve quality advances. Therefore, Yaran has developed the VAR to solve all of problems.

Some of the applications are listed in the following table:

Melt treatment	Materials being treated
Melting of reactive metals (titanium, zirconium and their alloys)	Super alloys for the chemical industry Special alloys for the electronics industry Special alloys for aerospace Structural steels for turbines and generator shafts

Main Uses
Removal of dissolved gases, such as hydrogen and nitrogen.
Minimizing the content of undesirable trace elements with high vapor pressure.
Improvement of material cleanness.
Directional solidification, less segregation.

Yaran manufactures two types of vacuum arc (re)melting (VAR) furnaces - melting furnaces for specialty steels and super alloys and reactive furnaces for titanium and other highly reactive metals. Both types are available in variety of sizes and production capacities.

Vacuum Tube Furnace

Yaran's high temperature tube furnaces can be designed for horizontal or vertical position with working temperature of up to 1800 °C. However, for special applications, the temperatures up to 2200 °C with Graphitic heating elements and insulators are pertinent.

Max. Temperature	1250	1450	1600	1700	1800	2200
Tube Type	Quartz, SS, 93%Al_2O_3	97%Al_2O_3	99%Al_2O_3	99.8%Al_2O_3	99.8%Al_2O_3	Graphite
Heating element	FeCrAl	SiC	$MoSi_2$-1700	$MoSi_2$-1800	$MoSi_2$-1900	Graphite

The high grade insulation materials consist of vacuum formed fiber plates and guarantee low energy consumption and high heating rates, due to their low thermal conductivity.

The programmable PID temperature controller enables programming up to 8, 10 or 30 step of heating, soaking and cooling. PC programming software is also available for JUMO controllers (Germany).

Several options like 2, 3, ... heating zones, rotary tubes, gas mixing and low or high vacuum pumps are available.

The main features which expand the application of such furnaces is a clean and highly controllable heating zone which could be used at different atmosphere from high vacuum to positive pressure of inert, reducing or even oxidizing gases.

Vacuum Chamber Furnace

These furnaces are employed for processes with defined oxygen percentages or 100% oxygen atmosphere. Processes involving nitrogen and argon are also possible, but for reaching to a high quality atmosphere, vacuum system with proper sealing could be utilized. Working temperature of up to 1250, 1450, 1600, 1700 and 1800°C are available.
Processes for piezoceramic materials are possible and all oxide materials can be sintered.

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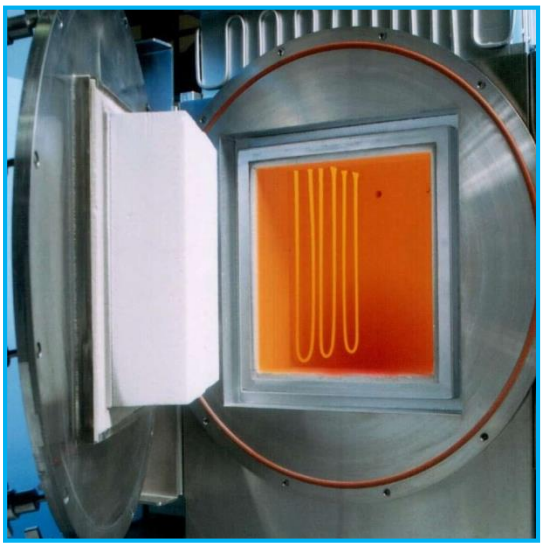
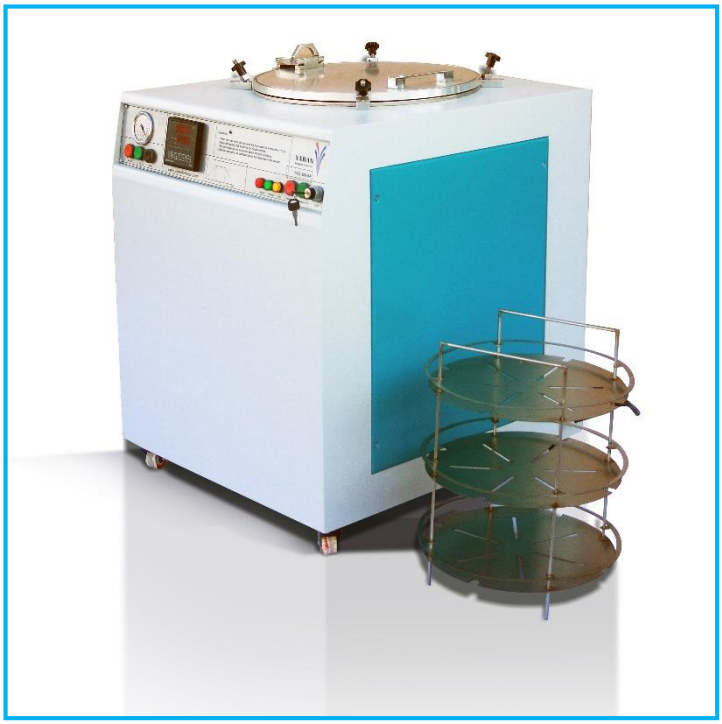


Other possibilities include the heat treatments of metals, crystal growing and the manufacture of ceramic powders. Hydrogen processes are limited to 1000°C. Vacuum operation is only recommended in low vacuum ranges.

The heat treatments, brazing, degassing and debinding, pyrolyses, siliconization and sintering are some common uses of chamber furnaces.



Vacuum Oven

Yaran Vacuum Ovens are some of the most rugged vacuum ovens available today. Each oven features over-temperature protection, Teflon seated vacuum valves, microprocessor temperature control, and an easy-to-read vacuum gauge.

Yaran Vacuum Ovens are equipped with silicone gaskets. While these gaskets resist a wide variety of temperatures and pressures, they can breakdown in the presence of solvents and acids. For solvent applications we recommend using the Buna M gaskets, and for acidic applications the Fluorosilicone gaskets.

User-friendly Standard Instrumentation

Standard Instrumentation features programmed operation with operational settings such as constant mode and automatic start/stop. Thermo Scientific Vacuum Oven offers maximum flexibility, large temperature control display with a maximum temperature of 600°C, control configurations and display options.

Radiant warm-wall heating system optimizes uniformity and conserves chamber space for drying, curing, heat treatment, vacuum embedding and plating and similar production line applications.

Vacuum Oven Applications
Moisture Determination, Out Gassing Solids, Aging Tests, Plating, Chemical Resistance Studies, Drying of Paper, Rubber and Textiles, Desiccating, Dry Sterilization, Out Gassing Liquids, Vacuum Storage, Electronic Process Control

Vacuum Coaters (CVD-PVD)

CVD Equipment's Uniform Heated, Dual Chamber, Ultra High Vacuum Thermal Evaporator and Chemical Vapor Deposition System is an automatically controlled research unit for processing of 25 – 150 mm diameter or smaller wafers. The Thermal Evaporation Process Chamber can operate up to 900 °C and the CVD Deposition Process Chamber at temperatures up to 1800°C .

The Thermal Evaporation Process Chamber
Vacuum System is capable of pumping a clean Thermal Evaporation Process Chamber to a level of <2x10E-8 Torr at room temperature with no gas flows after a 24-hour bakeout. For a clean, baked-out chamber, loaded with a clean, baked-out Silicon wafer, and no gas flow, the pressure rise during heating will remain at <2X10E-7 Torr .
The Transfer Chamber Vacuum System is designed for pumping a clean Transfer Chamber to a level of <5X10E-7 Torr at room temperature with no gas flows.
The gas system is designed to be in close proximity to the process chamber gas inlet to allow for close coupling between components and the process chamber. This provides for minimal line length, dead space and allows for fast gas switching – typically 30 milliseconds (if faster switching is required we can mount the electric solenoid that provides the pneumatic signal on the gas valve to provide approximately 5 -10 millisecond response).

Melt-Spinners

Rapid solidification is an advanced method for production of amorphous or nano-crystalline ribbons in high vacuum or inert gas atmosphere. As a brief description, this process uses induction for melting of material in a suitable crucible with subsequent ejection of the melt onto a solid copper spinning wheel.

The cooling rate is around 100 K/sec and typical thickness of the produced ribbons could be 20 to 60 µm. The width between 1 and 25 mm is possible, depending on model and crucible.

As special features:
Adjustable, water-cooled crucible support for boron nitride, quartz or graphite crucibles; Compact, hermetically closed wheel drive with magnetic coupling; Modern RF or MF generators for melting; Linear velocity of 60 m/sec;

Standard versions of the melt spinners are delivered with boron nitride crucibles; quartz crucibles are available on demand.

Plasma Nitriding

Nitriding in pulse glowing discharge (Plasma Nitriding) is an efficient method to increase hardness and wear-resistance of metals and alloys. The basic technological advantage of this method is the low temperature at which the process is conducted (400-600°C) resulting in very small dimensional deformations and distortions.

Plasma nitriding of items is characterized by their active participation in glow discharge, since they serve as cathodes. Compared to standard gas nitriding, plasma nitriding has the following advantages:

- 3 to 5 times reduced duration of treatment
- 50% less energy consumption
- 50 to 100 times less working gas consumption
- Less distortions because plasma nitriding is performed at lower temperature and under a vacuum
- Higher surface, case, and core hardness
- Excellent wear resistance – plasma nitriding process produces a compound zone that is dense, nonporous, very hard but not brittle, and has a low coefficient of friction
- Reproducible results and better control compared to gas nitriding- the technological process of plasma nitriding is fully automated and computer controlled
- Very good surface finish - no additional mechanical treatments are necessary
- Necessity of activation of stainless steel is eliminated
- Easy masking - surfaces which require selective treatment are easily masked with reusable, mechanical masking devices – 100% effective
- Excellent hygiene and working conditions - the process is not toxic and abides by all modern requirements of environmental control

Thermal Controlling Units

Thermal controlling units are compact packages which enables every unprofessional to arrange a controllable and programmable electrical heating systems like high temperature furnaces.

Yaran's thermal controlling units are compatible with a wide range of heating elements like FeCrAl, SiC and $MoSi_2$ with power consumption up to 7KW. This system supports variety of thermocouple types such as: K, J, R, S, B, W, etc.

Yaran's thermal controlling units include a PID digital programmable thermometer with ability to control 10 steps of heating, cooling or soaking of program.

A power controlling unit is based on Triac technology as a processor, to control a proportional input/output voltage and current to stabilize temperature in heating and soaking periods. This helps to gain precise temperature uniformity in heating module.

High Vac. Units and Accessories

This turbo-molecular pump system is a fully assembled and ready-to-operate ultra high vacuum system as a table top unit for processes which require hydrocarbon-free high and ultra high vacuum.

Advantages to the user:

- High effective pumping speed
- Low ultimate pressure
- High pumping speed of the backing pump
- Compact, small, rugged unit, simple to operate with high level of reliability
- Installation of standard vacuum components in a compact frame
- Components such as the backing pump, frequency converter, vacuum gauge (optional)

The turbomolecular pump system consists of the following principal components:
- Grease lubricated turbomolecular pump TURBOVAC 50 with ceramic ball bearings, convection cooling and splinter guard
- Electronic frequency converter NT 13
- Dual-stage, oil sealed rotary vane vacuum pump TRIVAC D 4 B as backing pump
- Mains connection 230 V, 50 Hz

The pump system is prepared for installation of further components:
- Vacuum gauge
- Power failure venting valve
- Air cooling unit
- Assembly on the intake side with manifold, valves, gauge heads etc.
- Adsorption trap
- Exhaust filter
- Rotatable castors

Typical Applications

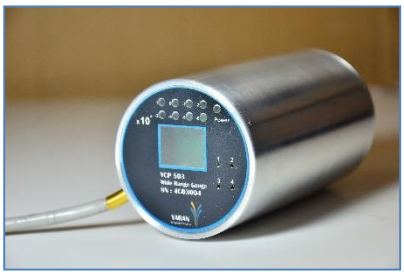
- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems
- Production of gas Lasers

Measurement and Control

Pirani Gauge for pressure range of atmosphere to $5x10^{-4}$ torr

The YPS 201 Pirani vacuum sensor is ideal for applications in the rough to medium vacuum range, including measurement of base pressures of mechanical vacuum pumps or start-up of system processes.

Cold Cathode (or Penning) Gauge for pressure range of 10^{-3} to 10^{-8} torr



The YCS 301 Cold Cathode vacuum gauge system is well-suited for industrial, process and analytical applications including pressure measurement of high vacuum chambers and control of high vacuum systems.

Wide Rang Gauge for the range of atmosphere to 10^{-8} torr

The YCP 501 is a compact gauge designed to replace multiple conventional vacuum gauges by incorporating the latest sensor technology to permit seamless measurement of 10 decades of pressure. This gauge uses dual sensor technology. Rough vacuum, from atmospheric pressure to 10^{-3} torr is measured using a pirani sensor, while pressure from 10^{-3} to 10^{-8} torr is measured with an inverted magnetron cold cathode sensor.

Our **Vacuum Controller**, YVG 1001, is compact, with high reliability and several user friendly features. The main features are:

- A blue LCD monitor
- Simultaneity monitoring and control of 3 different sensors
- Supporting all different sensors produced by **Yaran**, by a simple USB port.
- Two independent set points are considered for each sensor.

Ceramic Products

Yaran supplies high quality industrial and advanced technical ceramics. We have the ceramic solution you need - whether it's engineered to your specifications or from our stock of standard products that are available for purchase now. These products are made from a variety of technical ceramic bodies including: Alumina, Mullite, Zirconia, and Silicon Carbide. Tubes, plates, crucibles, etc. are the most popular products.



Some applications are, Temperature Sensing, Thermocouples and Protection Tubes, Insulators for Thermocouples, Thermistors, and RTD's, Sight Tubes, Furnace Tubes Like Process Tubes, Furnace Liners, Burner Tubes, Instrument Systems as well as Oxygen and Carbon sensors, Sample Gas Injectors, Instrument Protection Sheaths, Metallurgy as TCS, Degassing & Injection Tubes, Low Pressure Stalk Tubes, and Burner Tubes, Fixtures, Pins, and Shrouds, Argon Purging Tubes, Ozone Generator Tubes, Crystal Growth Components and Laser Tubes.

Heating Elements

Yaran supplies high quality industrial ceramic base heating elements including **silicon carbide (SiC)** and **molybdenum disilicide (MoSi2).**

Silicon carbide (SiC) electric heating elements for element temperatures up to 1600°C, available in a wide variety of standard sizes and geometries.
SiC heating elements are capable of high power output, and may be mounted either vertically or horizontally. Because the element material remains rigid even at the maximum operating temperatures, no special supports are required, that simplifies the design of the equipment.

High-power electric **molybdenum disilicide** (MoSi2) heating elements with element temperatures up to 1850°C

MoSi2 heating elements are available as straight or bent elements in a wide range of shapes and sizes, all characterized by long life and consistent performance.
MoSi2 heating elements are characterized by good heat and electrical conductivity. They have low thermal expansion and withstand corrosion and oxidation.

The main **applications** for these ceramic heating elements are, High and Ultra-High Temperature Furnaces.

High temperature Ceramic Boards

Yaran also supplies the high temperature ceramic boards. Our rigid board products are manufactured to provide excellent performance in any application which requires a rigid form and high modulus of rupture. The products are designed to resist erosion, vibration, mechanical stress, and can be easily customized on jobs to fit any installation.

The grades of ceramic boards are known by their ultimate working temperature. In this manner, there are grades as 1260, 1430, 1600, 1700 and 1800 °C.

The standard dimensions are 25x600x900mm and 50x600x900mm.

These board products exhibit excellent thermal stability (low shrinkage) at very high operating temperatures. Another benefit of these board products is their extremely high modulus of rupture (MOR) in both the green and fired state. When the highest strength sag resistance is critical, both 1700 and 1800 grades are very well suited.

The applications are almost Heat Shielding and Furnace Lining, Lining of High Temperature Manifolds, Catalytic Converters, etc.

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