



AFECO

HEATING SYSTEMS

- ▶ Industrial Ovens & Furnaces
- ▶ Ferrous & Nonferrous Heat Treatment Plants
- ▶ Aluminum Die Casting Recycling Plants
- ▶ Aluminum Scrap/Chip Recycling Plant
- ▶ Advanced Electrical & Gas Fired Heat Processing Technology for Metal Industries

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AFECO
HEATING SYSTEMS



Introduction of Company

“AFECO” is a privately owned Company. With a strong foundation of qualified & skilled manpower and cutting-edge technology, it has grown & known as a “MECHATRONIX” Company in India

- Established in 1990.
- We are leading Furnace manufacturer since 25 years
- We have successfully installed 1000 + Furnaces all over the Globe.
- 30% Market share for export in Middle east & Gulf Country.
- 15 Numbers Experienced Engineers.
- 25 Numbers Skilled Labour, Total 40 Number Staff.
- An ISO 9001-2008 Certified
- 30000 Sqft Manufacturing Facility.

ENERGY EFFICIENT FURNACES & IT'S TECHNOLOGY

- The current market scenario is like nothing but every aspect of any manufacturing is comes at ENERGY SAVING.
- That may be in terms of Electricity, Fuel ,Gas, manpower, time etc.
- Keeping Global Energy availability & its future use & savings AFECO has emerged as a challenging manufacturer in terms of Making Energy Efficient Equipment in Heat Treatment, Melting as well as Holding Application.
- Day by day technology changes & needs, time changes.
- This requires more energy saving with respect to Environment.

AFECO HEATING SYSTEMS- Step towards Energy efficient Furnace Manufacturing

Alternative Heating Technologies :

The application of alternative heating technologies depends on the requirements for melt quality, productivity and energy efficiency. In principle either electrically or gas-fired furnaces can be used. In this context, with respect to costs the local pricing for the alternative energy play a decisive role.

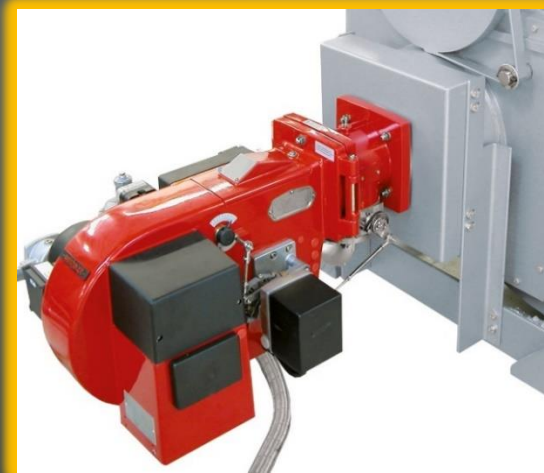
1. GAS HEATING

2. ELECTRICAL HEATING

1. GAS HEATING:

Gas-fired furnaces are ideal for Copper, Brass, Aluminum melting, particularly if equipped with exhaust gas discharge over the crucible edge. Side exhaust gas discharge is best if a high melt quality is required. However, a higher melt quality means a lower energy efficiency since a fuel-fired furnace with side exhaust gas discharge consumes approx. 20-25 % more energy than a furnace with an exhaust gas discharge over the crucible edge.

Fuel-fired furnaces provide for optimal energy efficiency in combination with highest melt quality due to their burner system that includes heat recovery via Recuperator. The hot exhaust gases from the furnace preheat the combustion air for the burner via a heat exchanger. This system leads to savings of up to 25 % compared to conventional fuel-fired furnaces with a side exhaust gas discharge.



Two-stage burner, mounted on furnace frame



Side-wall exhaust gas vent for AF- 12 models, see additional equipment

2.ELECTRICAL HEATING:

If the melt quality and energy efficiency take priority, an electrically heated furnace is the best choice. The heating is controlled very steadily and precisely. The melt is not polluted through emissions from a fuel-fired heating. Electrically heated furnaces can achieve up to 85 % of the melting performance of fuel-fired furnaces with a side exhaust gas discharge. If the furnaces are used only for holding, we recommend the Electrical Holding Crucible less Furnace models, which are very energy efficient due to their very good insulation and reduced connected load.



Silicon Carbide Heaters

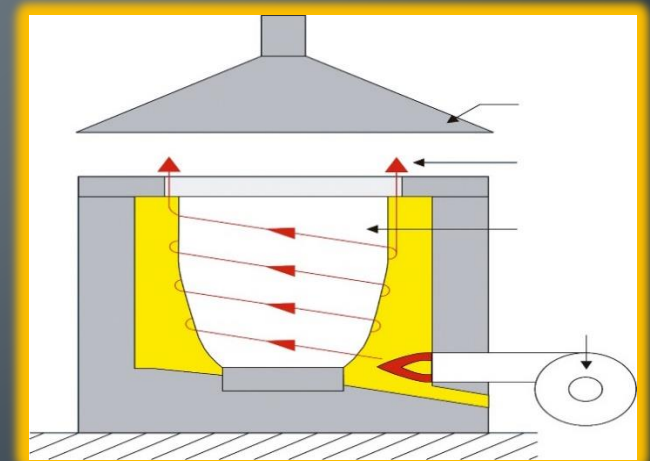
Alternative Exhaust Gas Systems :

Exhaust gas discharge over the crucible edge

Exhaust gas discharge over the crucible edge is the standard design for our gas and oil-fired furnaces, except for the TB models for furnace temperatures of 1200 °C, since these furnaces are normally used as holding furnaces. Due to the high melting performance, the furnaces are perfectly suited for melting. This type of exhaust gas discharge is characterized as follows:

- Very high melting performance, ideal for use as a melting furnace
- Low power consumption since the crucible is not just heated from the outside but part of the heat also enters the crucible from above. Energy savings of up to 20 % compared to furnaces with a side exhaust gas discharge.
- Limitations on the melt quality due to higher burn-off and increased hydrogen absorption by the melt from the exhaust gases

Bath control not recommended



Side Exhaust Gas Discharge Without Recuperator

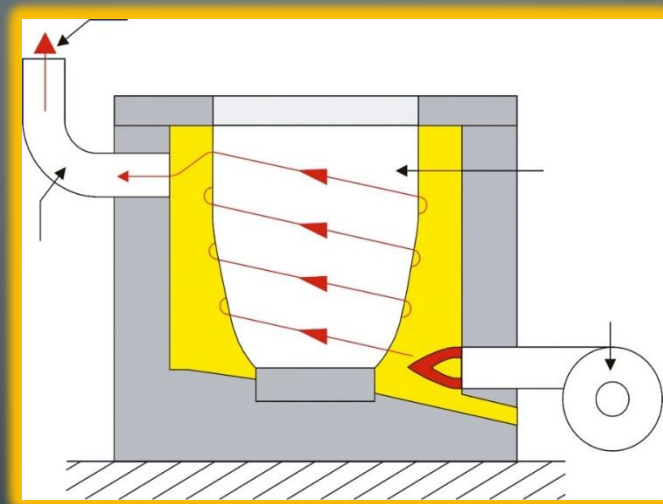
a) without Recuperator Technology

Side Exhaust Gas Discharge:-

The side exhaust gas discharge is available for all fuel-fired crucible furnaces. Although the melting performance is not as high as with an exhaust gas discharge over the crucible edge, it provides for better melt quality and, in combination with a bath control, is highly recommended for holding operation.

- High melt quality due to low burn-off and reduced hydrogen inclusions in the melt
- Swing lid-reduction of power consumption up to 50 % during holding with a closed swing lid
- Operator exposed to less heat in the area above the crucible
- Best melt quality if a bath control for precise temperature control is used
- Lower melting performance compared to furnaces with exhaust gas discharge over the crucible edge

Power consumption during melting around 25 % higher compared to furnaces with exhaust gas discharge over the crucible edge



b) with Recuperator Technology

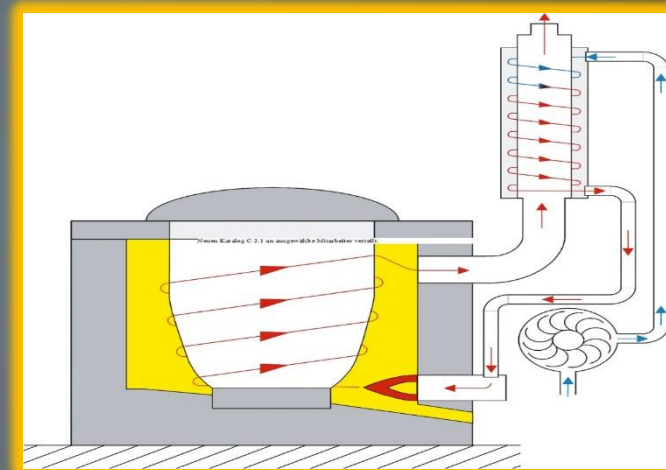
Side exhaust gas discharge with Recuperator technology

Fuel-fired furnaces with burner systems that include heat recovery via a Recuperator provide for optimum energy efficiency in connection with a top melt quality. The combustion air for the burner is pre-heated with the hot exhaust gases from the furnace via heat exchanger. The system results in savings of up to 25 % compared to conventional fuel-fired furnaces with side exhaust gas discharge.

Depending on the utilization the relatively higher acquisition costs pay off already after a short period of time.

- Burner systems with a Recuperator system save around 25 % of the power compared to furnaces with a side exhaust gas discharge
- High melt quality due to low burn-off and reduced hydrogen absorption in the melt
- Reduced power consumption by up to 50 % during holding with a closed swing lid
- Operator exposed to less heat in the area above the crucible
- Best melt quality if a bath control for a precise temperature control is used
- Lower melting performance than furnaces with exhaust gas discharge over the crucible edge

Power consumption during melting around 20-25 % higher than furnaces with exhaust gas discharge over the crucible edge



The gas-fired or oil-heated tilting furnaces

The gas-fired or oil-heated tilting furnaces in the TILTING product lines provide for high melting output, making them ideal for melting operations. The use of high-quality insulation materials results in very low energy consumption. The two-stage burner can be configured for either gas or oil operation. Designed with an exhaust vent over the crucible edge, these models achieve very high melting rates and optimum energy efficiency.

- AF../12 with T max of 1200 °C for aluminum and zinc alloys
- AF../14 with T max of 1400 °C, suitable for copper alloys with a maximum melting bath temperature of 1300 °C (appropriate in some cases for aluminum)
- Fuel heating with gas or oil
- Two-stage output control: High load for melting operation, low load for holding operation with automatic switching between both modes
- Modern burner system with optimized flame guide: High efficiency provided by over-pressure operation to keep out entrained air
- Gas system consisting of pressure regulator, gas filter, manometer and solenoid valves
- Safe flame monitoring
- Burner technology with easy-to-service design, e.g. flame head can be removed from the rear when the burner is swung out
- Burner technology compliant with DIN 746,
- Designed for natural gas or liquid natural gas with 8.8 kWh/m³ - 25.9 kWh/m³
- Required gas input pressure: 50 mbar
- High melting output powered by high-performance burners and high-quality insulation
- Crucible made of isostatically pressed clay-graphite or Silicon carbide.

- Electro-hydraulic tilting system with flame resistant HFC hydraulic fluid
- Safe, uniform and precise pouring enabled by the optimum pivot point of the furnace and the manual operation of the slider valve
- Multi-layered insulation with lightweight refractory bricks provide the furnace chamber lining, 1400 °C models come with an additional wear-and-tear layer made of copper-resistant refractory concrete
- Emergency outlet for safe discharge of the melt in case of a crucible break
- Exhaust gas discharge over the crucible edge, resulting in approx. 20 % more melting output compared to side exhaust discharge, design without swing lid
- Over-temperature limiter for the furnace chamber with automatic reset to protect against over-temperature. The limit controller switches off the heating when the pre-set limit temperature has been reached and does not switch it on again until the temperature falls below the setting again.

Furnace chamber control with temperature measurement behind the crucible, recommended when using as pre-melt furnace./



Hydraulic Tilting system with flame resistant hydraulic fluid



Additional equipment

- Side exhaust gas discharge for melt and holding operation
 - Low burn-off provides for high quality melt
 - Low hydrogen absorption by the melt
 - Low heat exposure for the operator in the area above the crucible
 - Swing lid which, when closed during holding operation, saves up to 50 % energy
 - Approx. 20 % lower melting output than for exhaust gas venting over the crucible edge
- Insulated connecting piece (exhaust flue) for side-wall exhaust gas vent to a connected customer suction system
- Exhaust gas collection hood for furnaces featuring exhaust gas venting over the crucible edge
- Work platform or platform for easier charging
- Crucible breakage monitoring with optical and acoustic signal (only for models KB ../12)
- SMS-message to one or more mobile phones in case of crucible breakage. One or more furnaces can be connected to the messaging device in parallel
- Bath control system
 - Furnace control via the bath temperature
 - Thermocouples in the furnace chamber and the melt
 - Improved melt quality ensured by a reduction in temperature overshoots

Integrated safety controller system that, in case of bath thermocouple breakage, continues to operate the furnace at a reduced output to prevent the melt from solidifying

Capacity wise Firing Chart

Model	T max	Crucible	Capacity		Melting output ³		Consump tion holding lid	Consump tion melting	Burner output	Outer dimensions in mm			Weight in kg
			°C	Kg Al	Kg Cu	Kg Al/h	Kg Cu/h	closed KWh/h		KWh/kg	kW	W	
								AL					
AH 80/12	1200	TP 287	180	550	220 ¹	-	10	1.3 - 1.5	300	2030	1700	1510	1800
AH 150/12	1200	TP 412	330	970	240 ¹	-	11	1.3 - 1.5	300	2140	1900	1710	2200
AH 180/12	1200	TP 412 H	370	1200	260 ¹	-	13	1.3 - 1.5	300	2140	1900	1810	2400
AH 240/12	1200	TP 587	570	-	400 ¹	-	15	1.3 - 1.5	390	2650	2030	1810	2600
AH 360/12	1200	TBN 800	750	-	420 ¹	-	17	1.3 - 1.5	450	2650	2080	1910	2900
AH 400/12	1200	TBN 1100	1000	-	450 ¹	-	19	1.3 - 1.5	450	2650	2080	2080	3300
AH 40/14	1400	R 400/TP 982	120	400	-	330 ²	22	1.0 - 1.3	400	2070	1700	1770	2300
AH 60/14	1400	R 500	150	500	-	360 ²	25	1.0 - 1.3	400	2070	1900	1810	2500
AH 80/14	1400	R 600	180	600	-	380 ²	25	1.0 - 1.3	400	2070	1900	1910	2650

³The stated melting outputs are maximum values. Daily operation comes up to roughly 80 %

Stationery Side Exhaust GAS FIRED Furnace

Crucible Furnaces TBR with Recuperative Burner Gas-Fired, for Melting and Holding

The fuel-heated melting furnaces in the TBR product line fitted with the side exhaust gas discharge provide for optimum energy utilization combined with highest quality melt. Fitted with a burner system including heat-recovery system using a recuperative burner, the energy efficiency of ordinary fuel-heated melting furnaces is significantly improved.

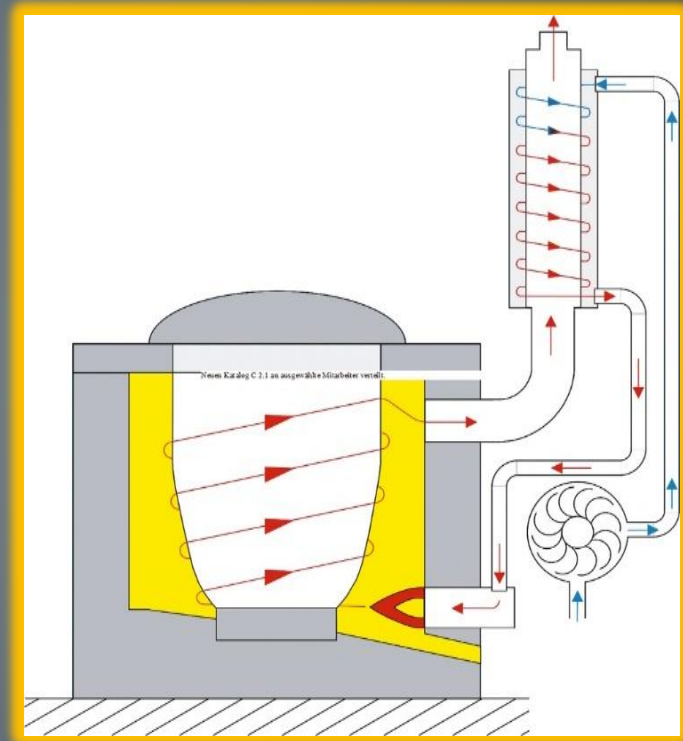
Depending on utilization the hot exhaust gases from the furnace are guided through a heat exchanger in order to preheat the combustion air for the burner. The system provides for energy savings of up to 25 % compared to ordinary fuel-heated furnaces with side exhaust gas discharge. The higher purchase costs are amortized within a short time.

- T max 1100 °C for aluminum and zinc alloys
- Two-stage output control: High load for melting operation, low load for holding operation with automatic switching between both modes
- Modern burner system with optimized flame guide: High efficiency provided by over-pressure operation to keep out entrained air
- Heat exchanger in the exhaust gas duct to preheat the combustion air for the burners
- Energy savings of up to 25 % in comparison to other fuel-heated melting furnaces featuring side-wall exhaust gas vents

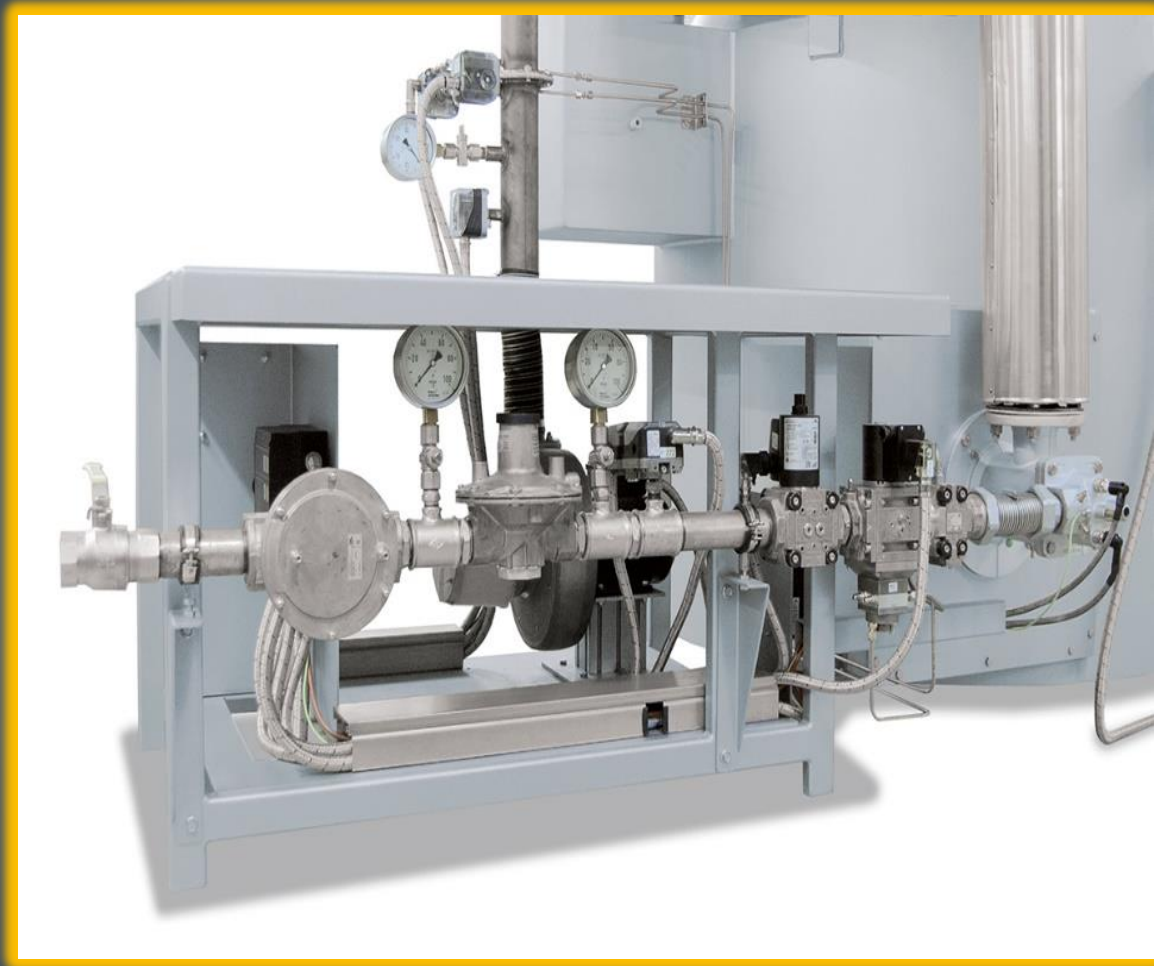


- Gas system consisting of pressure regulator, gas filter, manometer and solenoid valves
- Safe flame monitoring
- Burner technology with easy-to-service design, compliant with DIN 746, Part 2
- Designed for natural gas or liquid natural gas with 8.8 kWh/m³ - 25.9 kWh/m³
- Required gas input pressure 70 mbar
- Operation with other fuels and/or with another gas input pressure possible
- High melting output powered by high-performance burners and high-quality insulation
- Multi-layered insulation with lightweight refractory bricks provide the furnace chamber lining
- Emergency outlet for safe discharge of the melt in case of a crucible break
- Side exhaust gas discharge
 - Low burn-off provides for high quality melt
 - Low hydrogen absorption by the melt
 - Low heat exposure for the operator in the area above the crucible
- Over-temperature limiter for the furnace chamber with automatic reset to protect against over-temperature. The limit controller switches off the heating when the pre-set limit temperature has been reached and does not switch it on again until the temperature falls below the setting again.
- Furnace chamber control with temperature measurement behind the crucible

Heat Exchanger with Exhaust Gas Duct



Burner with gas supply system



Crucible Breakage Alarm Device

AFECO melting furnaces are equipped with emergency outlet. In case of crucible breakage or leaking melt the crucible breakage alarm device will provide for a warning as soon as fluid metal emerges from the emergency outlet. The warning signal of the alarm is both optical, with an signal lamp, and acoustic, using a horn. As additional equipment it is possible to send an alarm as SMS-message to one or more mobile phones. One or more furnaces can be connected to the messaging device in parallel.



Separate Bath Temperature Measurement Device

For melting furnaces with only furnace chamber temperature control, a separate bath temperature measurement device can be used to check the bath temperature. The measurement device is suitable for a temperature range from 0 to 1300 °C, and can be delivered with different dip pipe lengths (200, 380, 610 mm). Temperature measurement is carried out using a Ni Cr-Ni thermocouple. The submersion length of the pipe would be 2/3 of the element length to achieve the most ideal reaction time. The average reaction time is 40 seconds. The thermocouple is suitable for all nonferrous metals except phosphor bronze

Furnace Control with the Eurotherm 3208

In the basic model, AFECO melting furnaces are equipped with furnace chamber control using the Eurotherm 3208 controller. The temperature is measured in the furnace chamber behind the crucible. Two set values and a heat-up ramp rate may be entered. For example, the set values could be the pouring temperature and the lower idle temperature. Optionally, a 7-day digital timer can be fitted to automatically switch between the two temperatures and different switching times can be selected for each working day.



Bath Control for Bale-Out and Tilting Crucible Furnaces (Cascade Control)

In the basic version, the bale-out and tilting crucible furnaces of the T.. and K.. product lines are equipped with a thermocouple in the furnace chamber behind the crucible. To achieve fast heat-up times the temperature is set significantly higher than the desired bath temperature. Therefore, this control allows very fast heating-up times, but results in considerable temperature overshoots in the melt due to the indirect temperature measurement.



As an option these furnaces can be equipped with a bath control system, which is particularly well-suited for holding operations. A second thermocouple in the bath is used in addition to the furnace chamber thermocouple to measure the bath temperature. Both temperatures are reconciled by the controller. The bath temperature is the target parameter and the chamber temperature is the working tool. This control system significantly improves the melt quality because overshoots can be effectively prevented. As an alternative to the thermocouple in the melt, a thermocouple in a special pocket in the crucible wall can be used (a special crucible with pocket is required) which measures the temperature of the crucible wall. Of course, this indirect control is not as precise as a measurement in the melt. However, the thermocouple is positioned in a protected location.



Additional equipment

Seven-day timer for switching between two temperatures (e.g. night-time reduction). Switching times can be separately selected for each working day

Additional equipment for H 700

The H 700 PLC features state-of-the-art bath control. It provides a combination of precise control, ease of operation and a wide variety of user applications and professional documentation. A touch panel using plain text provides a simple and clean user interface for programming and control.

- Furnace chamber control or alternatively bath control via cascade applicable
- Colored graphic display of all temperatures
- Touch panel provides a simple and clean user interface
- Seven day timer for temperature switching
- For each weekday, a program can be configured with 12 segments
- A separate, user-entered furnace preparation program that can be used to dry the crucible, etc. Access to the program is controlled by a key switch

Customer can switch between different languages



Additional equipment for H 700

- Manual Overriding of automatic control
 - If a running program needs to be extended (for example, when working overtime to meet a customer's schedule), a key switch can be used to put the programmer into Manual mode in order to continue working at the present temperature. In the background, the original program is continued, and when the key switch is turned back to Program mode, the furnace resumes its currently scheduled set point.
- Documentation of melting process
 - The H 700 controls can be upgraded with the AFECO Control Center package (NCC) on a personal computer. NCC controls provide for a professional documentation of the melting process among others, with the following features:
 - All relevant data, such as furnace chamber temperature, bath temperature, messages, etc. are always automatically stored as a daily file.

The switchgear is equipped with start and stop buttons. By pressing these buttons, the bath temperature is documented and stored as a file. For instance, customer batches can be monitored and archived separately.

Additional Equipment for all Controllers

- Temporary overriding of bath control to increase melting performance
 - When an empty crucible is recharged, the values measured by the bath thermocouple do not correspond to the actual temperature of the solid metal. Using melt bath regulation in this case would reduce the power available to melt the metal. A pushbutton on the panel allows the operator to temporarily bypass normal control, and have the controller maintain a higher than normal chamber temperature to melt the metal faster. A user-set timer (up to 120 minutes) and set point allows the operator to optimize the time it takes to melt. When the timer elapses, the controller resumes its normal control mode.



Multi-Step Switch

Electrical Tilting Furnace

Additional equipment

- Crucible made of clay graphite or Sic with higher heat conductivity
- Work platform or platform for easier charging
- Crucible break monitoring with optical and acoustic signal
- Bath control system
 - Furnace control via the bath temperature
 - Thermocouples in the furnace chamber and the melt
 - Improved melt quality ensured by a reduction in temperature overshoots

Integrated safety controller system that, in case of bath thermocouple breakage, continues to operate the furnace at a reduced output to prevent the melt from solidifying



NEW INNOVATIVE From

AFECO HEATING SYSTEMS

“ENERGY EFFICIENT HOLDING FURNACE”

“CRUCIBLE LESS”



Advantages of Energy Efficient Crucible less Furnace:

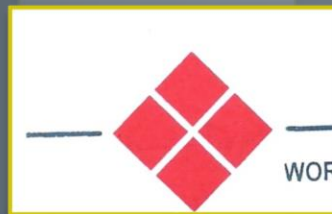
- . Excellent insulation properties secures an energy efficient construction.
- . Non wetting behaviour minimizes oxide build up.
- . High strength
- . Minimum heat and energy loss hence lower furnace shell temperature
- . Long lifetime
- . Ease of maintenance.
- . Using high erosion resistant ceramic board as hot face lining in direct contact with the molten Aluminium
- . The SILCAL 1100, light weight Calcium Silicates board and ceramic fibre boards are used as a backup insulation to further reduce the heat loss, shell temperature and weight
- . Efficient Silicon Carbide Heaters.



Silicon Carbide Heaters

Model	Capacity	Power
AFECO-EL-300	300 Kg.	3 KW
AFECO-EL-500	500 Kg.	6 KW
AFECO-EL-800	800 Kg.	9 KW
AFECO-EL-1000	800 Kg.	9 KW

SOME OF OUR CUSTOMERS



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THANK YOU

03/04/2018

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