ENTECH

High Temperature Furnaces

Contents

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Chamber furnaces up to 1500 °C - MF X / 15

The MF X / 15 chamber furnaces are built with silicon carbide SiC rod shaped elements placed across the roof, and beneath the hearth. In this design the elements are exposed to the furnace atmosphere. The instrumentation is built into a control cabinet, which is placed immediately below the furnace. As standard we equip the furnace with Eurotherm 2116CC.

This controller has a single setpoint with ramp function. There is a range of programmers to choose from if 2116 would not fit in your demands. As option for temperature failure we could equipped the furnace with Eurotherm 2132 with separate thermocouple to secure the chamber and elements from damages. The controllers can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – MF X / 15

Chamber Furnace

Max. temperature:	1500 °C
Max. working temperature:	1450 °C
Elements:	Silicon-carbide rod elements
Connection:	400 V, 50Hz AC or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type S (Pt/Pt 10%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
MF 1 / 15	125 x 125 x 150 mm	2,3 l.	770 mm	450 mm	540 mm	2500 VA
MF 2 / 15	150 x 150 x 200 mm	4,5 l.	870 mm	530 mm	660 mm	3500 VA
MF 3 / 15	150 x 150 x 300 mm	6,8 l.	870 mm	530 mm	660 mm	4800 VA
MF 4 / 15	200 x 200 x 350 mm	14,0 l.	925 mm	580 mm	660 mm	6700 VA
MF 5 / 15	230 x 230 x 460 mm	24,4 l.	1200 mm	650 mm	880 mm	8500 VA

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Chamber furnaces up to 1700 °C - ECF X / 17

The furnace is equipped with KANTHAL SUPER 1800 Molybdenum disilicide elements. These elements offer fast heat-up rates and operate up to 1800 °C without change in electric resistance due to ageing.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2408 P4. This programmer has four programs with 16 steps each. A range of other programmers or recorder solutions to choose from as options is also available. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – ECF X / 17

High Temperature Chamber Furnace

Max. Temperature:	1750 °C
Max. Working temperature	1700 °C
Elements:	Kanthal Super 1800 (Mosi2)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B (Pt 6% Rh / Pt 30% Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
ECF 20 / 17	250 x 250 x 350 mm	22 l.	1430 mm	700 mm	850 mm	10 kVA
ECF 40 / 17	275 x 275 x 520 mm	39 l.	1530 mm	750 mm	1000 mm	14 kVA
ECF 60 / 17	350 x 330 x 520 mm	60 l.	1620 mm	840 mm	1130 mm	20 kVA
ECF 100 / 17	400 x 400 x 600 mm	96 l.	1620 mm	840 mm	1130 mm	25 kVA
ECF 150 / 17	500 x 500 x 600 mm	150 l.	1820 mm	990 mm	1130 mm	36 kVA

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Rapid high temperature chamber furnaces 1700 °C - SF X / 17

The furnace is equipped with KANTHAL SUPER HT molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1800 °C.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 3208. There is a range of other programmers to choose from if 3208 would not fit in your demands. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

Technical data – SF X / 17

Rapid high temperature furnace

Max. temperature:	1700 °C
Max. working temperature:	1700 °C
Elements:	Kanthal Super 1800 (MoSi2)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B (Pt 6%Rh / Pt 30%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
SF 3 / 17	165 x 160 x 160 mm	4,2 l.	525 mm	600 mm	600 mm	3,6 kVA
SF 4 / 17	165 x 160 x 215 mm	5,7 l.	525 mm	600 mm	600 mm	4,8 kVA
SF 5 / 17	165 x 160 x 270 mm	7,1 l.	525 mm	600 mm	600 mm	6,0 kVA
SF 6 / 17	260 x 230 x 350 mm	20,9 l.	625 mm	800 mm	600 mm	8,0 kVA

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Rapid high temperature chamber furnaces 1800 °C - SF X / 18

The furnace is equipped with KANTHAL SUPER HT molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1800 °C.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 3208. There is a range of other programmers to choose from if 3208 would not fit in your demands. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

Technical data – SF X / 18

Rapid high temperature furnace

Max. temperature:	1800 °C
Max. working temperature:	1750 °C
Elements:	Kanthal Super 1900 (MoSi2)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type JM2040

Type	Chamber, H x W x D	Volume	H	W	D	Power
SF 3 / 18	165 x 160 x 160 mm	4,2 l.	525 mm	600 mm	600 mm	3,6 kVA
SF 4 / 18	165 x 160 x 215 mm	5,7 l.	525 mm	600 mm	600 mm	4,8 kVA
SF 5 / 18	165 x 160 x 270 mm	7,1 l.	525 mm	600 mm	600 mm	6,0 kVA
SF 6 / 18	260 x 230 x 350 mm	20,9 l.	625 mm	800 mm	600 mm	8,0 kVA

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Chamber furnaces up to 1800 °C - ECF X / 18

TECHNICAL DATA – ECF X / 18

High Temperature Chamber Furnace

Max. temperature:	1800 °C
Max. working temperature:	1800 °C
Elements:	Kanthal Super 1900 (MoSi2)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	JM2040 , (Pt 20%Rh / Pt 40%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
ECF 6 / 18	200 x 140 x 240 mm	6,7 l.	740 mm	940 mm	710 mm	10,0 kVA
ECF 10 / 18	220 x 140 x 315 mm	9,7 l.	815 mm	1160 mm	750 mm	13,0 kVA
ECF 20 / 18	260 x 240 x 315 mm	19,7 l.	970 mm	750 mm	750 mm	16,0 kVA

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Elevator furnaces up to 1500 °C - EEF X / 15

TECHNICAL DATA – EEF X / 15

Chamber Furnace

Max. temperature:	1500 °C
Max. working temperature:	1450 °C
Elements:	Silicon-carbide rod elements
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type S (Pt / Pt 10%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
EEF 3 / 15	180 x 150 x 150 mm	4,1 l.	830 mm	750 mm	500 mm	3,5 kVA
EEF 4 / 15	180 x 150 x 205 mm	5,5 l.	830 mm	750 mm	500 mm	4,8 kVA
EEF 5 / 15	180 x 150 x 260 mm	7,0 l.	920 mm	800 mm	550 mm	6,7 kVA
EEF 6 / 15	220 x 200 x 260 mm	11,4 l.	920 mm	800 mm	550 mm	8,5 kVA

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Elevator furnaces up to 1700 °C - EEF X / 17

TECHNICAL DATA – EEF X / 17

Rapid High Temperature Chamber Furnace

Max. temperature:	1700 °C
Max. working temperature:	1700 °C
Heating rate 20 - 1600 °C, SF 3 – SF 5:	15 minutes
Heating rate 20 - 1600 °C, SF 6:	30 minutes
Elements:	Kanthal Super 1800 ($MoSi_2$)
Connection:	400 V, 50 Hz AC
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B (Pt 6%Rh/Pt 30%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
EEF 3 / 17	180 x 150 x 150 mm	4,1 l.	830 mm	750 mm	500 mm	4,0 kVA
EEF 4 / 17	180 x 150 x 205 mm	5,5 l.	830 mm	750 mm	500 mm	4,8 kVA
EEF 5 / 17	180 x 150 x 260 mm	7,0 l.	830 mm	750 mm	500 mm	6,0 kVA
EEF 6 / 17	220 x 200 x 260 mm	11,4 l.	920 mm	800 mm	500 mm	6,8 kVA

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Thermal cycling furnace up to 1700 °C - EEF X / 17 HV

TECHNICAL DATA – EEF X / 17 HV

Thermal Cycling Furnace for Thermoschock

Max. temperature:	1700 °C
Max. working temperature:	1700 °C
Elements:	Kanthal Super 1800 ($MoSi_2$)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2704
Thermocouple:	Type B (Pt 6%/Rh / Pt 30%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
EEF 3 / 17-HV	180 x 150 x 150 mm	4,1 l.	900 mm	770 mm	900 mm	4,0 kW

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Lift Top furnaces up to 1800 °C - EHF XX / 18

ENTECH lift top furnaces are designed for the best possible temperature uniformity. This is also the reason for why we have chosen to fit elements along all four side walls with the same surface loading.

A lift top furnace will also give the user good possibilities for easy loading and unloading of charges.

As standard you can choose a fix mounted hearth as the picture on the left shows. As an option you can also choose a double hearth mounted on a sliding frame. As a third option we also offer this furnace with loose hearths which can be retracted and exchanged by means of a pallet wagon.

Another optional extra is the venting and exhaust system. The furnace can be equipped with a temperature controlled motorised exhaust port. The air inlets are placed through the bottom, and the outlets are placed in the top part of the chamber side wall.

All instrumentation is easily located on the side on the tower. All the cover plates are fan cooled in order to keep the outside temperatures of the furnace shell as low temperature as possible.

Technical data EHF – XX / 18

Lift top furnace testing

Max. temperature:	1800 °C
Max. working temperature:	1800 °C
Elements:	Kanthal Super 1900 ($MoSi_2$)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2404 P4, or optional
Thermocouple:	Type JM2040 (Pt 20 Rh / Pt 40%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
EHF 20 / 18	275 x 300 x 240 mm	20 l.	1850 mm	750 mm	1220 mm	16 kVA
EHF 30 / 18	275 x 360 x 300 mm	29 l.	1850 mm	750 mm	1220 mm	20 kVA
EHF 40 / 18	300 x 450 x 300 mm	40 l.	1850 mm	870 mm	1220 mm	26 kVA
EHF 80 / 18	360 x 600 x 360 mm	77 l.	1850 mm	1050 mm	1480 mm	32 kVA
EHF 120 / 18	450 x 720 x 360 mm	117 l.	1850 mm	1190 mm	1480 mm	36 kVA
EHF 200 / 18	500 x 800 x 500 mm	200 l.	1990 mm	1290 mm	1680 mm	42 kVA

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Chamber furnaces up to 2050 °C - ECF X / 20

The furnace is equipped with Zircothal™ elements. These elements are the main heating elements. The furnace is preheated with Kanthal Super 1900™ Molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1900 °C without change in electric resistance due to ageing. The instrumentation is built into a control cabinet, which is placed immediately to the right on the furnace.

The instrumentation consists of one double loop programmable controller unit, Eurotherm 2704. To measure the temperature inside the furnace, it is equipped whit two measure system. One ordinary thermocouple that control the preheating elements and one optical pyrometer that control the Zircothal elements. The furnace is bottom loaded and the chamber is enclosed inside an iron net box.

TECHNICAL DATA – ECF X / 20

High Temperature Chamber Furnace (Bottom loaded)

Max. temperature:	2100 °C
Max. working temperature:	2050 °C
Elements 1:	Kanthal Super 1900™ ($MoSi_2$)
Elements 2:	Zircothal™
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2704 P4
Temperature measurement 1:	JM2040, (Pt 20%Rh /Pt 40%Rh)
Temperature measurement 2:	Optical Pyrometer

Type	Chamber, H x W x D	Volume	H	W	D	Power
ECF 1,5 / 20	150 x 100 x 110 mm	1,5 l.	1500 mm	1200 mm	800 mm	4,0 kW

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Dental sintering furnaces up to 1600 °C - SF X / 16

The furnace is equipped with KANTHAL GLOBAR SR silicon carbide elements. These elements offer fast heat-up rates and are able to operate up to 1600 °C.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 3208. There is a range of other programmers to choose from if 3208 would not fit in your demands. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – SF X / 16

Dental Sintering Furnace

Max. temperature:	1600 °C
Max. working temperature:	1550 °C
Elements:	Kanthal Globar SR (SiC)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 3208
Thermocouple:	Type S (Pt / Pt 10%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
SF 3 / 16	160 x 150 x 150 mm	3,6 l.	525 mm	600 mm	600 mm	3,2 kW
SF 4 / 16	160 x 150 x 200 mm	4,8 l.	525 mm	600 mm	600 mm	4,5 kW
SF 5 / 16	160 x 150 x 250 mm	6,0 l.	525 mm	600 mm	600 mm	5,5 kW

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Dental sintering furnaces up to 1700 °C - SF X / 17

The furnace is equipped with KANTHAL SUPER HT molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1800 °C.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 3208. There is a range of other programmers to choose from if 3208 would not fit in your demands. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – SF X / 17

Dental Sintering Furnace

Max. temperature:	1700 °C
Max. working temperature:	1700 °C
Elements:	Kanthal Super HT (MoSi2)
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 3208
Thermocouple:	Type B (Pt 6%Rh / Pt 30%Rh)

Type	Chamber, H x W x D	Volume	H	W	D	Power
SF 3 / 17	165 x 160 x 160 mm	4,2 l.	525 mm	600 mm	600 mm	3,6 kW
SF 4 / 17	165 x 160 x 210 mm	5,7 l.	525 mm	600 mm	600 mm	4,8 kW
SF 5 / 17	165 x 160 x 270 mm	7,1 l.	525 mm	600 mm	600 mm	6,0 kW

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We have over the years collected a vast base of knowledge

Our furnaces are designed with the best materials and components available on the market in order to fulfill best possible performance and duration. The process in the design begins with the customer demands in order to ensure the requirements for the furnace. Questions of importance in the design process:

- Temperature level
- Temperature profile
- Rate of heating up and cooling down

Normally the requirements are covered by a standard furnace which probably is the most economical solution. Our vast experience in furnace design will assist our customers to make an optimal choice of furnace. The strength of ENTECH is however the customized furnaces. You do not have to fit you demands into a standard furnace. We can produce the unit that fits your demands.

Heating

The technology used is primarily decided by the temperature level in the furnace chamber. When we are using oxidizing atmosphere metallic elements are used for temperatures up to 1300 ^{O}C. These elements are normally applied as wires mounted on ceramic support bars or embedded in the insulation.

When the operating temperatures reach up to a maximum of 1550 ^{O}C silicon carbide elements are used. They are applied as rods mounted horizontally or vertically.
Molybdenum-disilicide elements are used when the furnace temperature are up to 1800 ^{O}C. These elements are hairpin shaped and are mounted vertically hanging through the roof of the furnace alongside the furnace walls.

For furnaces operating up to 2100 ^{O}C the only elements that can operate in oxidizing atmosphere are Zirconium dioxide elements. They require very specific design solutions. For these furnaces only smaller chambers can be built. In even higher temperatures graphite is used, but in other atmospheres.

Insulating

In order to obtain good temperature uniformity the elements must be situated in the chamber depending on how the insulation is designed. We are normally using ceramic fibres or high temperature bricks as the hot face. A combination of lower grade insulation materials will then assure good operating economy, high temperature uniformity with a long life.

Controlling

The control of the furnace temperature is important and normally thyristor control is used. Also programmed controlling for taking the furnace up to temperature and for cooling down is often included in the temperature controller. Many customers also require data logging of temperatures and careful process control which is performed by computer control. We and our suppliers of elements, insulation materials and control instruments will give you a unique possibility to have just your requirements handled in a professional and economic way.

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Horizontal Tube furnaces up to 1200 °C - ETF XX / 12 – X

ETF 30-40 / 12

ETF 60 / 12 –II

TECHNICAL DATA – ETF XX / 12 – X

Horizontal tube furnace

Max. temperature:	1200 °C
Max. working temperature:	1150 °C
Elements:	Kanthal A-1 metallic resistance wire
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type N

Standard	Inner dia.	Hot zone	H	W	D	Power
ETF 30 / 12	30 mm	300 mm	550 mm	440 mm	270 mm	800 W
ETF 40 / 12	40 mm	300 mm	550 mm	440 mm	270 mm	1100 W
ETF 50 / 12	50 mm	500 mm	650 mm	660 mm	360 mm	1800 W
ETF 60 / 12	60 mm	500 mm	650 mm	660 mm	360 mm	2200 W
ETF 70 / 12	70 mm	500 mm	650 mm	660 mm	360 mm	2800 W
ETF 80 / 12	80 mm	500 mm	750 mm	670 mm	400 mm	3500 W
ETF 110 / 12	110 mm	800 mm	855 mm	980 mm	500 mm	5500 W
Two zone	**Inner dia.**	**Hot zone**	**H**	**W**	**D**	**Power**
ETF 30 / 12-2	30 mm	2 x 150 mm	550 mm	440 mm	270 mm	800 W
ETF 40 / 12-2	40 mm	2 x 150 mm	550 mm	440 mm	270 mm	1100 W
ETF 50 / 12-2	50 mm	2 x 250 mm	650 mm	660 mm	360 mm	1800 W
ETF 60 / 12-2	60 mm	2 x 250 mm	650 mm	660 mm	360 mm	2200 W
ETF 70 / 12-2	70 mm	2 x 250 mm	650 mm	660 mm	360 mm	2800 W
ETF 80 / 12-2	80 mm	2 x 250 mm	750 mm	670 mm	400 mm	3500 W
ETF 110 / 12-2	110 mm	2 x 400 mm	855 mm	980 mm	500 mm	5500 W
Three zone	**Inner dia.**	**Hot zone**	**H**	**W**	**D**	**Power**
ETF 30 / 12-3	30 mm	100+200+100 mm	550 mm	540 mm	270 mm	1200 W
ETF 40 / 12-3	40 mm	100+200+100 mm	550 mm	540 mm	270 mm	1600 W
ETF 50 / 12-3	50 mm	200+400+200 mm	650 mm	940 mm	360 mm	2000 W
ETF 60 / 12-3	60 mm	200+400+200 mm	650 mm	940 mm	360 mm	2600 W
ETF 70 / 12-3	70 mm	200+400+200 mm	650 mm	940 mm	360 mm	3600 W
ETF 80 / 12-3	80 mm	200+400+200 mm	750 mm	960 mm	400 mm	4400 W
ETF 110 / 12-3	110 mm	200+400+200 mm	855 mm	980 mm	500 mm	5500 W

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Vertical tube furnaces up to 1200 °C - VTF XX / 12 - XX

VTF 50 / 12

Rittal cabinet

The furnace is a type generally referred to as a tube furnace. These furnace types are equipped with KANTHAL A-1 elements which are wound around a ceramic tube. This design results in a robust furnace where the elements are protected from the furnace atmosphere as well as from mechanical damage. The elements offer moderate heat-up rates and are able to operating up to element temperatures of 1200 °C without change in electric resistance due to ageing. The instrumentation is built into a separate control cabinet. The control unit consists of an Eurotherm 2116 single setpoint controller or 2408 P4 programmable controller (option). The controller receives its signal from thermocouple type N.
As we manufacture the furnace ourselves we can design the furnace very freely.

TECHNICAL DATA – VTF XX / 12 - XX

Vertical Tube Furnace

Max. temperature:	1200 °C
Max. working temperature:	1150 °C
Elements:	Kanthal A-1 metallic resistance wire
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type N

Standard	Inner dia.	Hot zone	H	W	D	Power
VTF 30 / 12	30 mm	300 mm	480 mm	360 mm	360 mm	800 W
VTF 40 / 12	40 mm	500 mm	680 mm	360 mm	360 mm	1400 W
VTF 50 / 12	50 mm	500 mm	680 mm	360 mm	360 mm	1800 W
VTF 60 / 12	60 mm	500 mm	680 mm	360 mm	360 mm	2200 W
VTF 70 / 12	70 mm	500 mm	680 mm	360 mm	360 mm	2800 W
VTF 80 / 12	80 mm	500 mm	680 mm	360 mm	360 mm	3500 W

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Tube furnaces up to 1200 °C - ETF 30-40 / 12 H-V

The furnace is a type generally referred to as a tube furnace. These furnace types are equipped with KANTHAL A-1 elements which are wound around a ceramic tube. This design results in a robust furnace where the elements are protected from the furnace atmosphere as well as from mechanical damage. The elements offer moderate heat-up rates and are able to operate up to temperatures if 1200 °C without change in electric resistance due to ageing.

The tube can be moved to operate in horizontal, vertical or in an angular position. The instrumentation is built into the control cabinet immediately below the furnace. The control unit consists of an Eurotherm 2116 single setpoint controller or optional.

The controller receives its signal from thermocouple type N.

TECHNICAL DATA – ETF 30 – 40 / 12 H–V

Horizontal / Vertical Tube Furnace

Max. temperature:	1200 °C
Max. working temperature:	1150 °C
Elements:	Kanthal A-1 metallic resistance wire
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type N

Standard	Tube dia.	Hot zone	H	W	D	Power
ETF 30 / 12 H-V	30 mm	300 mm	770 mm	580 mm	270 mm	800 W
ETF 40 / 12 H-V	40 mm	300 mm	770 mm	580 mm	270 mm	1100 W

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45° Tube furnaces up to 1200 °C - ETF 30-40 / 12 X

ETF 30-40 / 12

ETF 60 / 12 –II

This is a special model which is used in the purpose of amealing labratory crucibles. For instance this furnace is convenient for cleaning LECO-crucibles.

TECHNICAL DATA – ETF 30 – 40 / 12 X 45°

Horizontal Tube Furnace

Max. temperature:	1200 °C
Max. working temperature:	1150 °C
Elements:	Kanthal A-1 metallic resistance wire
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type N

Standard	Inner dia.	Hot zone	H	W	D	Power
ETF 30 / 12 X	30 mm	300 mm	770 mm	580 mm	270 mm	800 W
ETF 40 / 12 X	40 mm	300 mm	770 mm	580 mm	270 mm	1100 W

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Horizontal Tube furnaces up to 1500 °C - ETF XX / 15 – X

ETF 40 / 15

ETF 40 / 15

TECHNICAL DATA – ETF XX / 15 / X

Horizontal Tube Furnace

Max. temperature:	1500 °C
Max. working temperature:	1450 °C
Elements:	Silicon-carbide rod elements
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID or optional
Thermocouple:	Type S (Pt / Pt 10%Rh)

Standard	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 15-S	30 – 50 mm	300 mm	650 mm	650 mm	400 mm	2800 VA
ETF 50-70 / 15-S	50 – 70 mm	300 mm	750 mm	650 mm	450 mm	3500 VA

Long zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 15-L	30 – 50 mm	450 mm	700 mm	800 mm	450 mm	4800 VA
ETF 50-70 15-L	50 – 70 mm	450 mm	800 mm	800 mm	500 mm	6000 VA

Two zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 15-2	30 – 50 mm	2 x 150 mm	650 mm	650 mm	400 mm	2800 VA
ETF 50-70 15-2	50 – 70 mm	2 x 150 mm	750 mm	650 mm	450 mm	3500 VA

Three zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 15-3	30 – 50 mm	3 x 150 mm	700 mm	800 mm	450 mm	4800 VA
ETF 50-70 15-3	50 – 70 mm	3 x 150 mm	800 mm	800 mm	500 mm	6000 VA

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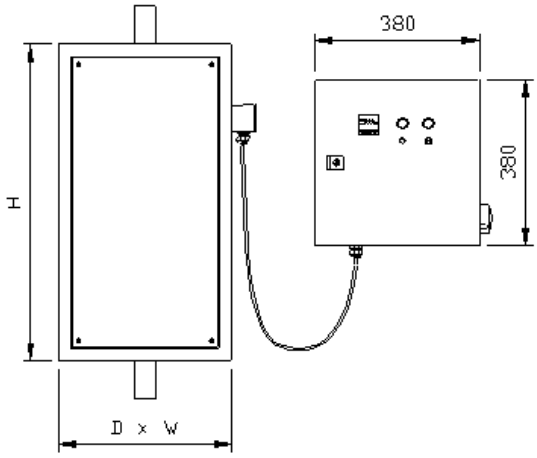
Vertical Tube furnaces up to 1500 °C - VTF XX / 15



Floor standing transformer in IP 23. Cabinet not shown in this sketch.

TECHNICAL DATA – VTF XX / 15

Vertical Tube Furnace

Max. temperature:	1500 °C
Max. working temperature:	1450 °C
Elements:	Silicon-carbide rod elements
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type S (Pt / Pt 10%Rh)

Standard	Tube dia.	Hot zone	H	W	D	Power
VTF 30-50 15	30 – 50 mm	300 mm	725 mm	450 mm	450 mm	3500 VA
VTF 50-70 15	50 – 70 mm	300 mm	750 mm	500 mm	500 mm	4200 VA

Long zone	Tube dia.	Hot zone	H	W	D	Power
VTF 30-50 15-L	30 – 50 mm	450 mm	875 mm	450 mm	450 mm	5000 VA
VTF 50-70 15-L	50 – 70 mm	450 mm	900 mm	500 mm	500 mm	6600 VA

Two zone	Tube dia.	Hot zone	H	W	D	Power
VTF 30-50 15-2	30 – 50 mm	2 x 225 mm	875 mm	450 mm	450 mm	3500 VA
VTF 50-70 15-2	50 – 70 mm	2 x 225 mm	900 mm	500 mm	500 mm	4200 VA

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Horizontal Tube furnaces up to 1700 °C - ETF XX / 17 - X

ETF 30 – 50 / 17X

ETF 30 – 50 / 17

TECHNICAL DATA – ETF XX / 17 – X

Horizontal Tube Furnace

Max. temperature:	1700 °C
Max. working temperature:	1700 °C
Elements:	Kanthal Super 1800 (MoSi2)
Connection:	400 V, 50 Hz, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B (Pt 6 % / Pt 30%Rh)

Standard	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 17-S	30 – 50 mm	300 mm	870 mm	590 mm	445 mm	4500 VA
ETF 30-70 / 17-S	50 – 70 mm	400 mm	935 mm	720 mm	480 mm	6000 VA

Long zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 17-L	30 – 50 mm	600 mm	870 mm	890 mm	445 mm	6000 VA
ETF 50-70 / 17-L	50 – 70 mm	600 mm	935 mm	920 mm	480 mm	7500 VA

Two zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 17-2	30 – 50 mm	2 x 150 mm	870 mm	590 mm	445 mm	2x2800 VA
ETF 50-70 / 17-2	50 – 70 mm	2 x 200 mm	935 mm	720 mm	480 mm	2x3500 VA

Two zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 17-3	30 – 50 mm	3 x 200 mm	870 mm	890 mm	445 mm	3x2000 VA
ETF 50-70 / 17-3	50 – 70 mm	3 x 200 mm	935 mm	920 mm	480 mm	3x2500 VA

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Horizontal Tube furnaces up to 1800 °C - ETF XX / 18 - X

ETF 30 – 50 / 18

ETF 30 – 50 / 18

TECHNICAL DATA – ETF XX / 18 – X

Horizontal Tube Furnace

Max. temperature:	1800 °C
Max. working temperature:	1750 °C
Elements:	Kanthal Super 1900 (MoSi2)
Connection:	400 V, 50 Hz, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type JM20/40 (Pt 20% / Pt 40%Rh)

Standard	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 18-S	30 – 50 mm	300 mm	870 mm	590 mm	445 mm	4500 VA
ETF 50-70 / 18-S	50 – 70 mm	400 mm	935 mm	720 mm	480 mm	6000 VA

Long zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 18-L	30 – 50 mm	600 mm	870 mm	890 mm	445 mm	6000 VA
ETF 50-70 / 18-L	50 – 70 mm	600 mm	935 mm	920 mm	480 mm	7500 VA

Two zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 18-2	30 – 50 mm	2 x 150 mm	870 mm	590 mm	445 mm	2x2800 VA
ETF 50-70 / 18-2	50 – 70 mm	2 x 200 mm	935 mm	720 mm	480 mm	2x3500 VA

Two zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 18-3	30 – 50 mm	3 x 200 mm	870 mm	890 mm	445 mm	3x2000 VA
ETF 50-70 / 18-3	50 – 70 mm	3 x 200 mm	9350 mm	920 mm	480 mm	3x2500 VA

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Water-cooled stainless tube end caps

The purpose of these end caps is to enable high temperature test in controlled atmosphere. The end caps are for the ease of use divided into two pieces, sleeve and gable.

The sleeve will only need to be mounted once, while access into the process tube is gained by dismantling the gable from the sleeve.

The end caps are machined out of stainless steel, and each end cap contains two VITON o-rings. The o-rings are thermally protected by the water-cooling.

One end cap is equipped with a Swagelok gas inlet. While the other is equipped with a gas outlet with valve.

Custom made end caps to hold the ceramic tube

Mounted end cap

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Vertical tube furnaces up to 1700 °C - VTF XX / 17

VTF 50 / 17 with separate stand as option

Power Cabinet

Transformer

The furnace is equipped with KANTHAL SUPER 1800 Molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1700 °C without change in electric resistance due to ageing. The furnaces could delivered with a separate stand as picture above show.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2408 P4. This programmer has four programs with 16 step each. There is a range of other programmers to choose from if 2408 would not fit in your demands. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – VTF XX / 17

Vertical Tube Furnace

Max. temperature:	1750 °C
Max. working temperature:	1700 °C
Elements:	KANTHAL SUPER 1800 Molybdenum disilicide
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B (Pt 6 % Rh / Pt 30% Rh)

(Example of 1700 °C furnaces)

One Zone	Inside dia.	Hot zone	H	W	D	Power
VTF 30-50	Max 50 mm	260 mm	600 mm	450 mm	450 mm	5500 VA
VTF 50-70	Max 70 mm	400 mm	750 mm	500 mm	500 mm	8000 VA

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Horizontal Split tube furnaces up to 1100 °C - ESTF XX / 11 - X

ESTF 50 / 11

Power Cabinet

The ESTF/11 tube furnaces are built with fibre embedded resistance wire as half cylinder elements. There is a number of standard modules and most of these are possible to get custom made. These halfcylinder set the dimensions for the furnace. If you need a temperature gradient or avoid it, it is possible to divide the chamber into separate hot zones. The furnaces are delivered with a bracket for wall mounting.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2116. This is a single set point controller but there is a range of programmable controllers to choose between if 2116 would not fit in your demands. You will need one controller to every zone the furnace is built with. You can choose between master/slave communication or independent programming (Not available for 2116). The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – ESTF XX / 11 – X

Horizontal Split Tube Furnace

Max. temperature:	1100 °C
Max. working temperature:	1100 °C
Elements:	Fibre embedded metallic
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type N

One Zone	Tube dia.	Hot zone	H	W	D	Power
ESTF 40/11	20 - 40 mm	360 mm	490 mm	540 mm	505 mm	1600 W
ESTF 80/11	40 - 80 mm	360 mm	490 mm	540 mm	505 mm	1900 W
ESTF 100/11	40 – 100 mm	600 mm	490 mm	770 mm	505 mm	4600 W

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Vertical Split tube furnaces up to 1100 °C - VSTF XX / 11 - X

VSTF 120 / 11

The VSTF/12 tube furnaces are built with fibre imbedded KANTHAL A1 wire as half cylinder elements. There is a number of standard modules and most of these are possible to get custom made. These half cylinder set the dimensions for the furnace. If you need a temperature gradient or avoid it, it is possible to divide the chamber into separate hot zones. The furnaces are delivered with a bracket for wall mounting.

Power Cabinet

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2116. This is a single set point controller but there is a range of programmable controllers to choose between if 2116 would not fit in your demands. You will need one controller to every zone the furnace is built with. You can choose between master/slave communication or independent programming (Not available for 2116). The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – VSTF XX / 11 – X

Vertical Split Tube Furnace

Max. temperature:	1150 °C
Max. working temperature:	1100 °C
Elements:	KANTHAL A1 wire
Connection:	230 V, 50 Hz AC, or optional
Controller:	1-5 Eurotherm 2116, or optional
Thermocouple:	Type N

(Example of 1100 °C furnaces)

One Zone	Tube dia.	Hot zone	H	W	D	Power
VSTF 80/11	30 - 80 mm	300 mm	460 mm	425 mm	735 mm	1500 W
VSTF 80/11	30 - 80 mm	500 mm	660 mm	425 mm	735 mm	2600 W
VSTF 120/11	30 - 120 mm	500 mm	660 mm	510 mm	800 mm	3800 W
VSTF 120/11	30 - 120 mm	600 mm	760 mm	510 mm	800 mm	4600 W

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Horizontal Split Tube furnaces up to 1500 °C - ESTF XX / 15 - X

The ETF XX /15 tube furnaces are built with silicon carbide elements parallel along the ceramic work tube inside the chamber. The instrumentation is built into the control cabinet immediately below the furnace. As standard we equip the furnace with Eurotherm 2116CC. This controller has a single setpoint with ramp function. There is a range of programmers to choose from if 2116 would not fit in your demands. You will need one controller to every zone the furnace is built with. You can choose between master/ slave communication or independent programming. The controller can also have communication to a PC where you can set and monitor the temperature profiles.

Technical data – ESTF XX / 15 / X

Horizontal Split Tube Furnace

Max. temperature:	1500 °C
Max. working temperature:	1450 °C
Elements:	Silicon-carbide rod elements
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type S (Pt / Pt 10%Rh)

Standard	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 / 15-S	30 – 50 mm	280 mm	675 mm	710 mm	610 mm	2800 VA
ETF 50-70 / 15-S	50 – 70 mm	380 mm	760 mm	850 mm	680 mm	4500 VA

Long zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 15-L	30 – 50 mm	450 mm	675 mm	860 mm	610 mm	3500 VA
ETF 50-70 15-L	50 – 70 mm	450 mm	760 mm	1000 mm	680 mm	6000 VA

Long zone	Tube dia.	Hot zone	H	W	D	Power
ETF 30-50 15-2	30 – 50 mm	2 x 150 mm	675 mm	860 mm	610 mm	2800 VA
ETF 50-70 15-2	50 – 70 mm	2 x 150 mm	760 mm	1000 mm	680 mm	3500 VA

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Vertical Split Tube furnaces up to 1500 °C - ESTF XX / 15 - X

The VSTF/15 tube furnaces are built with silicon carbide elements placed along the sides inside the chamber. As we manufacture the furnace ourselves we can design the furnace very freely. If you need a temperature gradient or avoid it, it is possible to divide the chamber into separate hot zones.
The furnaces are delivered with a bracket for wall mounting.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2408 P4. This programmer has four programs with 16 step each. There is a range of other programmers to choose from if 2408 would not fit in your demands. You will need one controller to every zone the furnace is built with. You can choose between master/slave communication or independent programming. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – VSTF XX / 15 – X

VERTICAL SPLIT TUBE FURNACE

Max. temperature:	1500 °C
Max. working temperature:	1450 °C
Elements:	SiC
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2 408 P4, or optional
Thermocouple:	Type S (Pt / Pt 10%Rh)

(Example of 1500 °C furnaces)

One Zone	Tube dia.	Hot zone	H	W	D	Power
VSTF 40/15	30 - 60 mm	260 mm	670 mm	500 mm	840 mm	4000 VA
VSTF 75/15	30 - 80 mm	500 mm	720 mm	500 mm	850 mm	6000 VA

Three zone	Tube dia.	Hot zone	H	W	D	Power
VSTF 75/15-III	30 - 80 mm	2 x 250	920 mm	500 mm	850 mm	7500 VA

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Horizontal split tube furnaces up to 1600 °C - ESTF XX / 16 - X

ESTF 50 / 16

Power Cabinet

The furnace is equipped with KANTHAL SUPERTHAL 1800 Molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1600 °C without change in electric resistance due to ageing. If you need a temperature gradient or avoid it, it is possible to divide the chamber into separate hot zones. The furnaces are delivered with a bracket for wall mounting.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2408 P4. This programmer has four programs with 16 step each. There is a range of other programmers to choose from if 2408 would not fit in your demands. You will need one controller to every zone the furnace is built with. You can choose between master/slave communication or independent programming. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – ESTF XX / 16 – X

VERTICAL SPLIT TUBE FURNACE

Max. temperature:	1600 °C
Max. working temperature:	1550 °C
Elements:	KANTHAL SUPER 1800 Molybdenum disilicide
Connection:	400 V, 50 Hz AC, or optional
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B (Pt / Pt 10% Rh)

(Example of 1600 °C furnaces)

One Zone	Inside dia.	Hot zone	H	W	D	Power
ESTF 50/16-S	50 mm	250 mm	430 mm	460 mm	420 mm	2500 W

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Vertical Split tube furnaces up to 1700 °C - VSTF XX / 17 - X

VSTF 100 / 17

Power Cabinet

Transformer

The furnace is equipped with KANTHAL SUPER 1800 Molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1700 °C without change in electric resistance due to ageing. If you need a temperature gradient or avoid it, it is possible to divide the chamber into separate hot zones. The furnaces are delivered with a bracket for wall mounting.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2408 P4. This programmer has four programs with 16 step each. There is a range of other programmers to choose from if 2408 would not fit in your demands. You will need one controller to every zone the furnace is built with. You can choose between master/slave communication or independent programming. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

TECHNICAL DATA – VSTF XX / 17 – X

VERTICAL SPLIT TUBE FURNACE

Max. temperature:	1700 °C
Max. working temperature:	1650 °C
Elements:	KANTHAL SUPER 1800 Molybdenum disilicide
Connection:	400 V, 50 Hz AC
Controller:	Eurotherm 2408 P4, or optional
Thermocouple:	Type B

(Example of 1700 °C furnaces)

One Zone	Inside dia.	Hot zone	H	W	D	Power
VSTF 30-60/17	100 mm	300 mm	580 mm	500 mm	735 mm	6800 VA

Two zone	Inside dia.	Hot zone	H	W	D	Power
VSTF 80/17-II	200 mm	600 mm	770 mm	500 mm	735 mm	2 x 6800 VA

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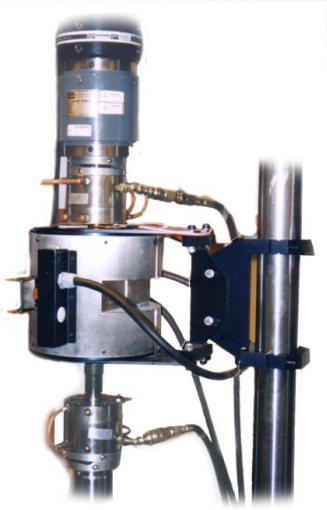
Tensile testing furnaces ETTF

In the ENTECH furnace program, you will find a number of vertical tube furnaces suitable for material testing.
The ESTF-type is a high temperature furnace with features especially suited for tension and tension/compression fatigue testing of metals and other materials where temperatures up to 1000 – 1100 ^{O}C are required. The heated length represents more than 85 % of the total height, and consists of three individually operated zones. The elements are embedded in ceramics fibre in sex half shells, which are independently exchangeable. The three zone control of this furnace results in very good temperature control over a large part of the total heated length. The control system is from our own design based on standard quality components. The controllers use digital PDSIO master-slave communication.



ETTF Clam Shell Furnace

TECHNICAL DATA – ESTF XX / 11

Split Furnace, vertical three-zone furnace

Max. temperature:	1100 ^{O}C
Max. working temperature:	1100 ^{O}C
Elements:	Kanthal A-1 resistance wire.
Connection:	230 V, 50 Hz AC
Controller:	Eurotherm 2408 P4 as master with digital PDSIO-communication to two Eurotherm 2208 CC operating slaves. Time proportioning by PID-functions with Eurotherm TE 10-S Thyristor units.
Thermocouple:	Type S, three pcs. (Pt / Pt 10%Rh)

Type	Inside dia.	Hot zone lengths	H	W	D	Power
ETTF	40 mm	60 x 60 x 60	240 mm	530 mm	660 mm	3 x 425 W
ETTF	60 mm	60 x 60 x 60	240 mm	530 mm	660 mm	3 x 600 W

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Pit furnaces up to 1100 °C - EPF XXX / 11 - XXX

EPF 110 / 11 - 150

Rittal cabinet

The furnace is a type generally referred to as a tube furnace. These furnace types are equipped with KANTHAL A-1 elements which are wound around a ceramic tube. This design results in a robust furnace where the elements are protected from the furnace atmosphere as well as from mechanical damage. The elements offer moderate heat-up rates and are able to operating up to element temperatures if 1100 °C without change in electric resistance due to ageing.

The instrumentation is built into a separate control cabinet. The control unit consists of an Eurotherm 2_16 controller, 2116 single setpoint controller or 2416 programmable controller. The controller receives its signal from thermocouple type N.

As we manufacture the furnace ourselves we can design the furnace very freely.

TECHNICAL DATA – EPF XXX / 11 – XXX

Vertical Pit Furnace

Max. temperature:	1150 °C
Max. working temperature:	1100 °C
Elements:	Kanthal A-1 metallic resistance wire
Connection:	230 V, 50 Hz AC, or optional
Controller:	Eurotherm 2116 PID, or optional
Thermocouple:	Type N

Standard	Inner dia.	Hot zone	H	W	D	Power
EPF 100 / 11 - 150	100 mm	150 mm	350 mm	320 mm	360 mm	850 W
EPF 110 / 11 - 150	110 mm	150 mm	350 mm	320 mm	360 mm	900 W
EPF 120 / 11 - 150	120 mm	150 mm	350 mm	350 mm	390 mm	1100 W
EPF 140 / 11 - 150	140 mm	150 mm	350 mm	390 mm	430 mm	1300 W

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Continuous sintering furnace with rotary hearth

ENTECH has developed a high temperature furnace with features especially suited for sintering of small ceramic components. This furnace represents a revolution in high temperature sintering as it allows an entirely continuous production process. The handling is PLC-controlled and takes care of charging, rotation and unloading. For charging the piece is picked up from a feed table, and the sintering piece is placed on the same spot as before sintering.

The furnace can be delivered with either single zone or three-zone control. For three zones control the controllers use digital PDSIO master-slave communication. The three zone control results in very good temperature uniformity over the sintering zone.
Especially with shorter cycle times it is advisable to choose the three-zone control. The hearth literally transports heat with its rotation, and with faster rotation this should be compensated for. The furnace is lined with highest quality lightweight fibre materials graded to 1800°C.

View of the sintering furnace. This very simple process results in a continuous production flow.

TECHNICAL DATA – ECRF 4 / 18

Continuous Rotating Furnace

Max. temperature:	1750 °C
Max. working temperature:	1750 °C
Elements:	Kanthal Super 1900™.
Connection:	400 V, 50 Hz AC
Controller (three zones):	One Eurotherm 2404 P4 as master with digital PDSIO-communication to two Eurotherm 2204 CC operating as slaves. Phase angle fired thyristors, Eurotherm 461. One Eurotherm 2116 operating as policeman.
Thermocouple:	Type Pt 20%Rh / Pt 40%Rh

Inside height:	90 mm	**Overall height:**	1510 mm
Inside width:	65 mm	**Width:**	810 mm
Diameter at hearth CL:	360 mm	**Depth:**	1400 mm

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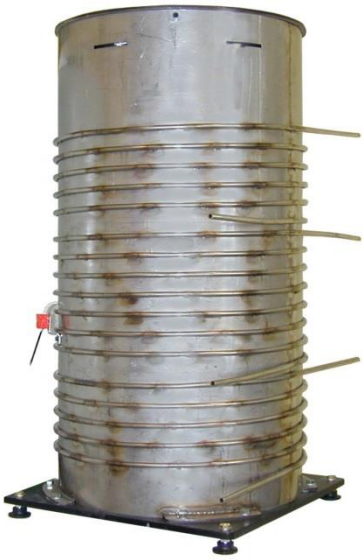
Water cooled furnaces up to 1800 °C



Watercooled vertical tube furnace

Watercooled chamber furnace

These furnaces are equipped with KANTHAL SUPER 1800 Molybdenum disilicide elements. These elements offer fast heat-up rates and are able to operate up to 1700 °C without change in electric resistance due to ageing. The furnaces can be delivered with a separate stand as picture above show.

The instrumentation is built into a separate control cabinet. As standard we equip the cabinet with Eurotherm 2408 P4. This programmer has four programs with 16 steps each. There is a range of other programmers to choose from if 2408 would not fit in your demands. The programmer can also have communication to a PC where you can set and monitor the temperature profiles.

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