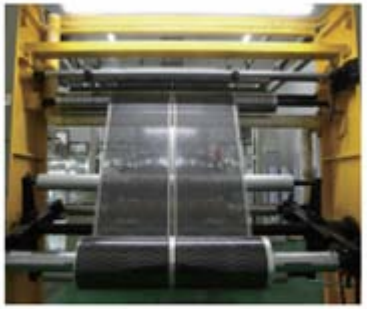
Zhonghui Floor Heating

ZHONGHUI FLOOR HEATING PRODUCT MANUAL

BENEFIT COUNTRY

BENEFIT CIVILIAN

BENEFIT CORPORATION



Advanced Technology

Waterless Heating

Green Evolution

Saving Energy and Low Carbon

CONTENT

About ZHONGHUI

Heilongjiang ZHONGHUI Floor Heating Co., Ltd, as the earliest company develops and produces electrothermal film, is built in 1999 and located in High-tech Development District of Pingfang, Harbin. Cooperating with Dupont of America and Harbin Institute of Technology, ZHONGHUI Floor Heating Co., Ltd is devoted to national ecological heating business. Independently, ZHONGHUI invents the electrothermal film and related technology applications by relying on advantage of techniques and intellects, and firstly applies this invention in underground. For now, whether her scale of production or her market share is leading this field. Chairman Yin Huilai is honored as “pioneer of electrothermal film”.

ZHONGHUI Low Carbon Electrothermal Film Heating System installs the independently-invented electrothermal film under floor and warms up rooms naturally and evenly by no-damage infrared light after connecting to electricity. Compared with traditional heating system, ZHONGHUI Low Carbon Electrothermal Film Heating System can meet heating demands much better and its efficient conversion rate of heat, which is 99.68%, is greener. Through thermostat, ZHONGHUI Low Carbon Electrothermal Film Heating System can warm and adjust every single room’s temperature separately, which realizes the true meaning of the energy saving. On condition that the rate of building energy efficiency reaches 65%, the expense of ZHONGHUI Low Carbon Electrothermal Film Heating System is lower from 1/3 to 2/3 than central heating.

Through the past 12 years, ZHONGHUI Floor Heating has owned the largest professional production base of electrothermal film and has become the biggest supplier in the world, whose annual output is over 500-million units and product value is near 20 billion RMB each year. The selling network covers 21 provinces, cities, municipalities and 58 prefecture-level cities and its productions are sold abroad such as America, Canada, Germany and Russia.

ZHONGHUI Electrothermal Film is the only qualified heating product in line with requirements of Heating Design Specification in China and has got the independent intellectual property rights. ZHONGHUI awarded with 21 national patents—four invention patents, 16 utility model patents and one design patent, the property of her product has reached the international advanced level and passed the ISO9001 international quality system authentication, ISO9002 international environmental quality system authentication, European Union CE certification and American UL certification.

In the field of floor heating in China, ZHONGHUI Low Carbon Electrothermal Film Heating System is the only one that is authorized by National Development and Reform Commission(NDRC) as the “National High-tech Industrialization Project”, in which the state and the government invest 20 million RMB as technical and fund support and on which the National Science and Technology Department, the State Administration of Taxation, the National Foreign Trade and Economic Cooperation, the General Administration of Quality Supervision, Inspection and Quarantine and the State Environmental Protection Administration bestow the “ National Key New Product Certificate”. In 2004, ZHONGHUI Low Carbon Electrothermal Film Heating System was classified as “National High-tech Industrialization Demonstration Project” by NDRC.

ZHONGHUI Floor Heating, run on the concept of “Benefit Country, Benefit Civilian, Benefit Corporation” and the core belief of “Faith in Cooperation, Share in Profit”, keeps forging ahead and opening up to spread the modern heating system which is low-carbon green and fit with Chinese housing characteristics into everyone’s home.

BASIS

What is ZHONGHUI Electrothermal Film?

Selected polyester film that can release heat after connecting to electricity.

The conversion rate of heat is as high as 99.68%.

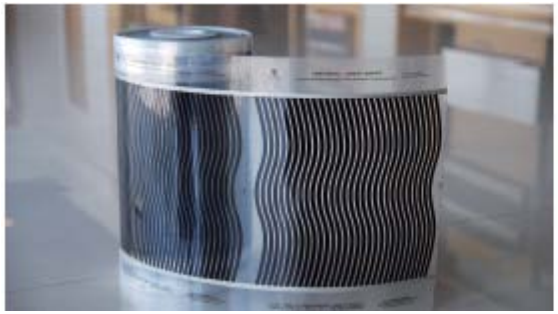
The only electrothermal film that can be installed underground and is suitable to Chinese housing characteristics.

Films of waterproof, insulating, moistureproof and high pressure resistant properties.

Temperature can be freely controlled with no overheating risk.

Four invention patents, 16 utility model patents and one design patent.

Brief Introduction to ZHONGHUI Low Carbon Electrothermal Film Heating System



The Low Carbon Electrothermal Film Heating System invented and provided by ZHONGHUI Floor Heating will be the intelligent product that is going to dominate the housing heating in future. Bathed in a warm room, people will have a healthier and greener life due to its energy-saving and considerate design.

Developed from agricultural greenhouses film and wall film popular in America and Europe, ZHONGHUI Electrothermal Film has become the third generation product invented independently by ZHONGHUI Floor Heating. By conquering technical difficulties and through localization transformation, ZHONGHUI Electrothermal Film is the only one that can be installed underground safely which provides heat under your feet. It's a kind of semitransparent polyester film filled with electrically conductive specialty inks and metal carrier bar, which can emit heat after connecting to electricity. It is with excellent flexibility and stretchability and is waterproof and moistureproof. Its heat conversion rate is as high as 99.68%.

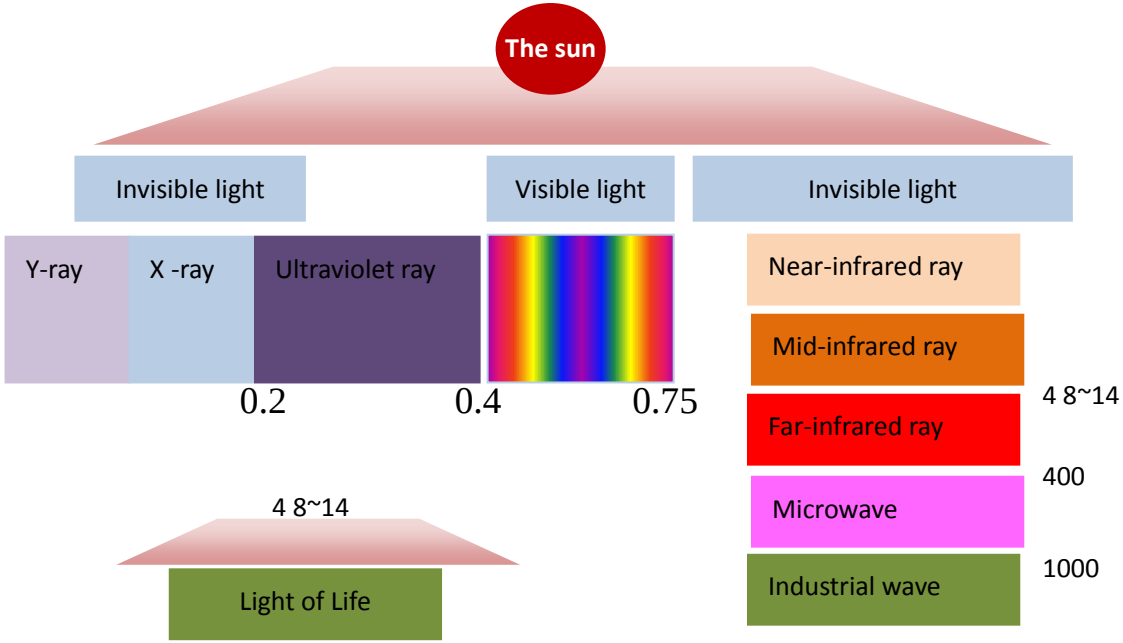
After connecting to electricity, ZHONGHUI Electrothermal Film will produce far-infrared light and emit heat by making use of concrete objects such as roofs, walls, grounds and furniture in the room to make room's temperature go up evenly. When the temperature reaches the scale you set by a thermostat, the system will cut off the power and stop heating and when the temperature is below the pre-set scale, the system will reboot and heat the room.

This is a unique way of heating which not only provides heat more even than traditional heating ways and makes air more fresh but also makes people free of dryness, frowst and floating dust. Moreover, the far-infrared light of 8 to 14 micron created by ZHONGHUI Electrothermal Film have functions of adjusting immune system and deferring senility which enable people to both enjoy warmness and obtain health. ZHONGHUI Electrothermal Film is your perfect and ideal heating product.

Common Sense of Far-infrared Ray

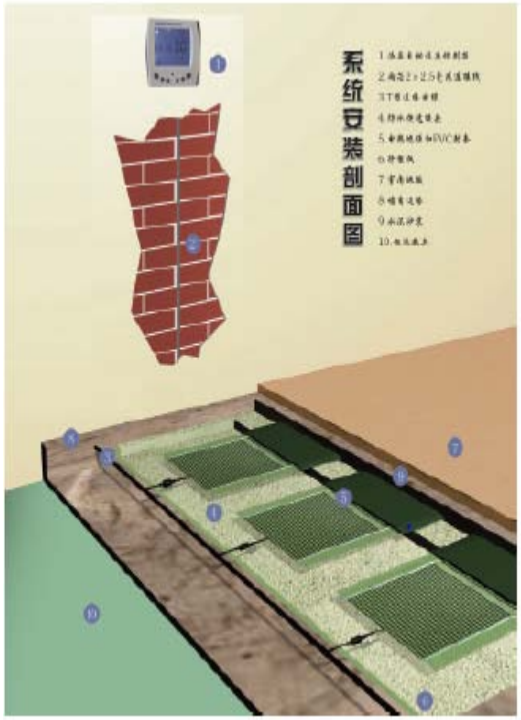
Roughly, sunlight can be divided into visible light and invisible light. The wavelength of visible light ranges from 0.39 to 0.77 micron to which the color of purple, blue, cyan, green, yellow, orange and red belong. Invisible light's wavelength is between 0.76 and 1000 micron. The light outside of the red light is invisible light, called infrared light or infrared ray.

People divide infrared ray with different wavelength range into near-infrared ray, mid-infrared ray and far-infrared ray. In general, infrared ray whose wavelength ranges from four to 400 micron is defined as far-infrared ray. On investigation of human's living environment in spacecraft under the condition of vacuum, weightlessness, ultralow temperature and overload, scientists find that the far-infrared ray with the wavelength of 8 to 14 micron is the necessary living condition for creatures. Thus, people call it "Light of Life". Through research, people find that the far-infrared ray with a wavelength of 9.5 micron is most similar to far-infrared ray took by human beings. It can work with water molecules of cells in human body best to activate organization cells, prevent ageing and strengthen immune system.



Composition of ZHONGHUI Low Carbon Electrothermal Film Heating System

ZHONGHUI Low Carbon Electrothermal Film Heating System, composed of electrothermal film, T cable, temperature sensor, cable conductor and thermostat and so on, is the only electrothermal film heating system that can be installed under concrete and cement mortar layer safely at present. Its construction technology is flexible that makes it belong to flexible high-tech heating product. For the whole heating system, except the temperature controller is installed on the wall of the room, other parts are all installed underground invisibly.



Main parts of the system

1. The heating unit

   The heating unit is made by connecting electrothermal film with conducting strip, junction line and T cable together. Inside, there are anti-leakage current system and anti-electromagnetic radiation protection system. Outside, it is sealed by PVC insulated and waterproof materials.

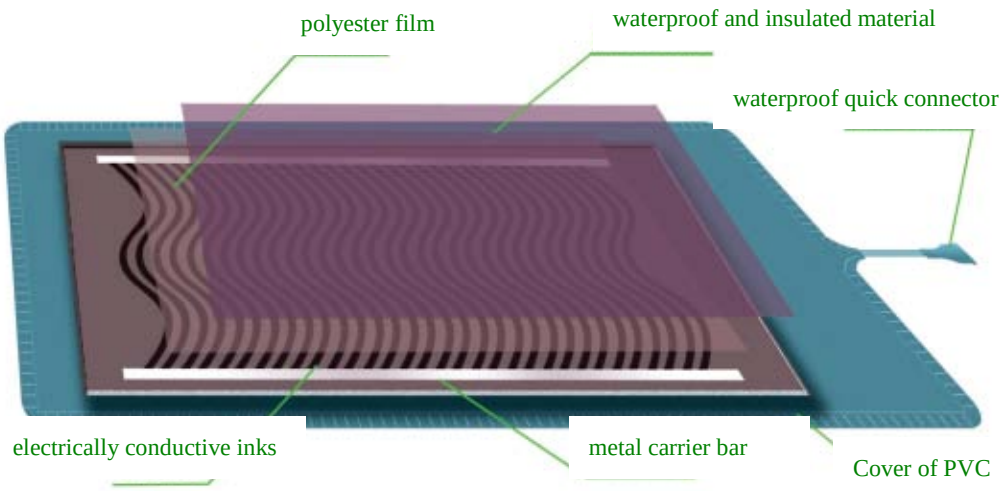
2. Temperature-control equipment

   The thermostat is used for measuring and adjusting indoor temperature in order to save electric energy. In general, a thermostat with dual sense can control temperature ranging from 5℃to 30℃There are two temperature sensors: one is put in the thermostat to measure the temperature of the room and the other is installed in upper filling layer of electrothermal film to sense ground's temperature. People can set every room's temperature separately between 5℃ and 30℃Once the temperature reaches the pre-set number, the thermostat will cut off the power; and if the temperature is lower than the pre-set number, the thermostat will automatically connect the power and the electrothermal film begins working.

3. Connecting lines

   T cable is a unique cable that connects several electrothermal films together as a group, which is made of 2.5mm^2 waterproof and insulated twin core cables.

Technical Parameters of ZHONGHUI Low Carbon Electrothermal Film Heating System



Size of each unit: 360mm(width)×315mm(length)×0.95mm(height)
Power of each unit: 20W±10% per unit
Power density: 80~160W/㎡
Rated operational voltage: 220V, 50Hz
Conversion rate of heat: 99.68%
Withstand voltage strength: extreme withstand voltage 3750V
Tensile strength: 20kg
Waterproof level: IPX7
Insulation resistance: above 100MΩ
Electromagnetic radiation: primary standard
Heat shrinkage: < 2%
Extreme surface temperature: while ZHONGHUI electrothermal film is working, the temperature will be not over 50℃ ZHONGHUI Low Carbon Electrothermal Film Heating System, if installed according to process specification, will not burn automatically due to overheating.

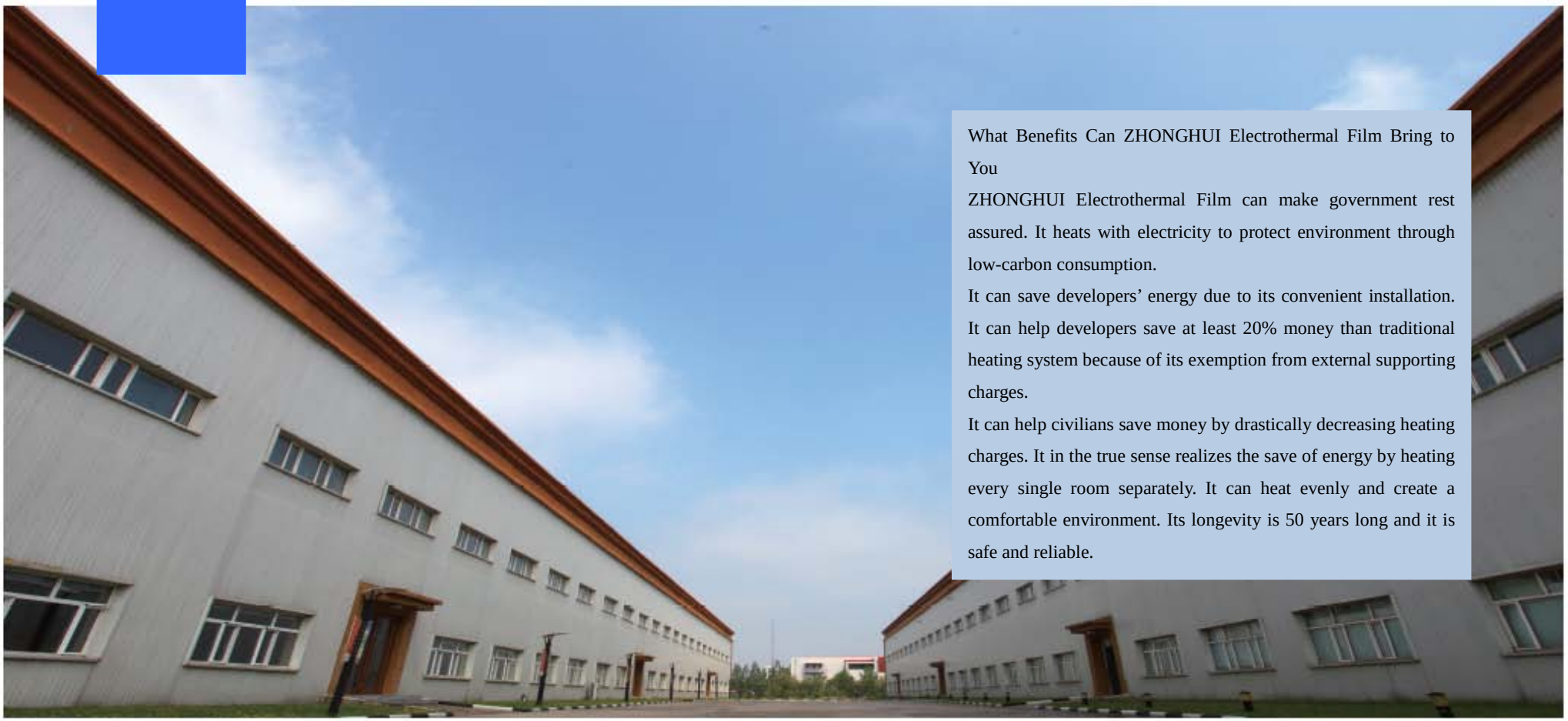
Temperature for use: -40℃~ 100℃
DKT：<50
Class of insulation: E class
Wavelengths of infrared ray: around 9.5 micron (working temperature)
Connector length: 9.45m ≤ 30 units
Weight: 0.16KG per unit
Longevity: over 50 years

Compared with other similar metal heating products, ZHONGHUI Electrothermal Film has a much better property of fire resistance. The electric property is more stable and there is no possibility of electromagnetic radiation. Besides, it owns the characteristic of PTC(short for positive temperature coefficient) and this means that as temperature goes up, the heating power will go down, which can avoid the risk of overheating.

Awarded Patents of ZHONGHUI Low Carbon Electrothermal Film Heating System

Number order	Patent number	Name	Patent type
1	ZL02210425.9	Self-limiting cryogenic radiation electrothermal film	utility model
2	ZL03211801.5	Product made of electrothermal film	utility model
3	ZL03260357.6	Intelligent radiation heater	utility model
4	ZL200720115445.X	Electrothermal film with properties of anti-leakage current and anti-electromagnetic radiation	utility model
5	ZL200620020895.6	Quick plug-in type waterproof and insulated cable used specially for electrothermal film	utility model
6	ZL200620020143.X	T cable	utility model
7	ZL200520021974.4	Electrothermal film heating facility	utility model
8	ZL200520021975.9	Electrothermal film	utility model
9	ZL 033468869	Heater	design patent
11	200920244408.8	Cryogenic, radiant and flexible electrothermal film with property of PTC	utility model
12	201020044707.X	Flat T-type waterproof cable with quick connector	utility model
13	201110062059.x	Cryogenic and radiant electrothermal film and fabrication method	invention patent
14	201120067770.x	Electrothermal film heating system	invention patent
15	201110081708.0	Gravure printing plant of electrothermal film	invention patent
16	201110060629.1	Electrothermal film of anti-leakage current and anti-electromagnetic radiation	invention patent
17	201110062060.2	Electrothermal film heating system	utility model
18	201120093330.1	Electrothermal film printing with automatic equipment for inks	utility model
19	201120093354.7	unit plant of Gravure printing of electrothermal film	utility model
20	201120093352.8	unit plant of electrothermal film drying	utility model
21	201120169310.8	composite element unit of electrothermal film	utility model

SUPERIORITY



What Benefits Can ZHONGHUI Electrothermal Film Bring to You

ZHONGHUI Electrothermal Film can make government rest assured. It heats with electricity to protect environment through low-carbon consumption.

It can save developers' energy due to its convenient installation. It can help developers save at least 20% money than traditional heating system because of its exemption from external supporting charges.

It can help civilians save money by drastically decreasing heating charges. It in the true sense realizes the save of energy by heating every single room separately. It can heat evenly and create a comfortable environment. Its longevity is 50 years long and it is safe and reliable.

If you are a government, ZHONGHUI electrothermal film can make your city—

Free from worry—You don't have to worry about energy saving and emission reduction targets, the building-up and deployment of thermal power plants and boiler-houses.

Save energy—You don't have to heat with non-renewable resources such as coal because ZHONGHUI electrothermal film heat with electricity.

Save water—The traditional boiler-house heating system wastes volumes of precious water. In contrast, ZHONGHUI electrothermal film heat without using any water.

Protect environment—ZHONGHUI electrothermal film has fundamentally avoided emitting volumes of smoke and dust during work as traditional heating facilities do. Conforming to the requirements of your city planning, it will not pollute the air or harm civilians' health.

If you are a developer, ZHONGHUI electrothermal film can make your project—

Decrease pressure of expense—ZHONGHUI electrothermal film don't need building plants such as boiler-house or heat transfer station as central heating system does. The saved land could be sued for public or green development. Also you don't need to pay connection fees necessary for central heating to related departments. You can invest by installments according to the process of the project which at bottom will reduce the investment in human and materials resources and will decrease the cost of development.

Proceed easy and smoothly—ZHONGHUI electrothermal film has a light weight and a small size which are convenient for carriers and save available room space. Even if general technicians can understand and complete its easy installation and application.

Pay conveniently—By way of buying electricity, ZHONGHUI electrothermal film has solved the difficulty of taking over heating charges and this will bring great convenience for property management.

Safe and be exempted from repair—ZHONGHUI electrothermal film has a 50-year long life. It is free from maintenance basically and free from repair completely which fundamentally removes the heating

If you are a user, ZHONGHUI electrothermal film may make you feel—

Comfortable—Compared with traditional water heating system, ZHONGHUI electrothermal film will provide you with a comfortable and warm environment just like the sunshine makes. It will make you free of frowst and dryness.

Flexible— You can begin your heating period earlier or later freely without any limit. You can set temperature for every single room separately. You can also adjust the temperature between 5℃ and 30℃ freely.

Healthy—The far-infrared ray emitted by ZHONGHUI electrothermal film contains no dust or noise. The far-infrared ray with a wavelength of 9.5 micron is most similar to the far-infrared ray took by human beings. It can work with water molecules of cells in human body best to activate organization cells, prevent ageing and strengthen immune system.

Beneficial—The general working cost of ZHONGHUI Electrothermal Film Heating System is lower than central heating system. In addition, the characteristics of controlling temperature separately deciding working mode accordingly can also drastically decrease heating costs by way of saving energy.

Safe—Waterproof, moistureproof and anti-leakage current properties make it more safe and reliable. It also avoids central heating system's risk of drip and leakage. It owns a 50-year long life.

Indoor space enlarged—Electrothermal Film, without radiator and line pipes, amounts to enlarging your indoor space.

Fig.1. In a same room, we install three kinds of heating system—air-condition, tinned radiator and ZHONGHUI Electrothermal Film Heating System to test. Meanwhile, we observe them through thermal mapper.

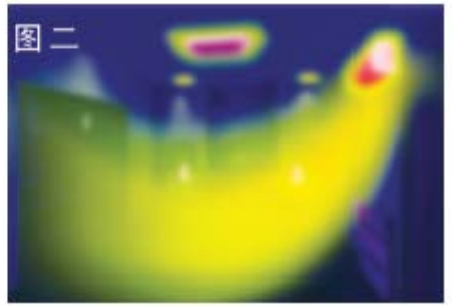


Fig.2. Air-condition: hot air is blew out vertically, which becomes upward-curving after meeting the cold radiation of the ground. From this we can see that only parts of the room are heated and it makes a lot of noise. Once air-condition is shutdown, the room temperature will go down rapidly.

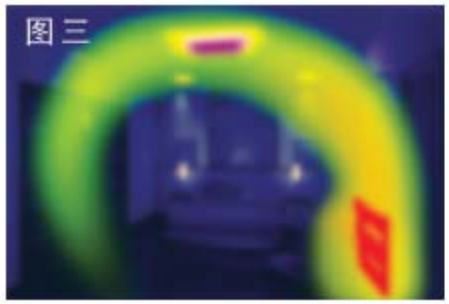


Fig.3. Tinned radiator: hot air travels around from down to up which can stir up floating dust result in dryness and air pollution. And this will do harm to health.

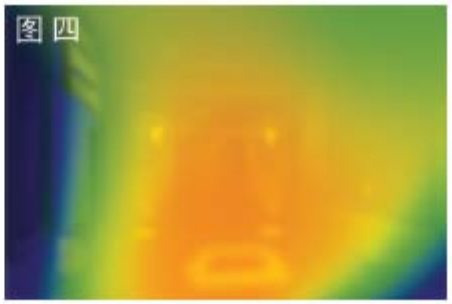


Fig.4. ZHONGHUI Electrothermal Film Heating System: on basis of far-infrared ray theory, ZHONGHUI Electrothermal Film Heating System takes use of walls to heat the room evenly without stirring up dust. And this makes people feel warm comfortably.

Comprehensive Comparison between ZHONGHUI Electrothermal Film and other Heating Modes

Heating Mode Comparison of Techniques	Radiator	Central air-condition	Single air-condition		Underground low-temperature radiation water coil	Underground heating cable	ZHONGHUI Electrothermal Film
Heat Source	City substation, coal-fired boiler room of residential area, gas-fired boiler, gas wall-hang boiler, electric boiler	Municipal power grid, ground source heat pump	Household electric		City substation, coal-fired boiler room of residential area, gas-fired boiler, gas wall-hang boiler, electric boiler	Household electric	Household power
Conversion Rate of Heat	Traditional coal-fired boiler: 70%; gas-fired boiler: 85%; electric boiler: 95%	90%	The rate is low. The lower the outside temperature is, the poorer the thermal efficiency.		90%	99%	99.68%
Property	Durability is good. The security of plumbing radiator is good but that of steam heating radiator is bad.	Durability is good. Security is good.	Durability is bad. Security is good.		Durability is common. Security is good but leakage is prone to appear after secondary house decoration.	Durability and security are good.	Both durability and security are great.
Manipulation	The whole pipe network system is complicated and can not control temperature individually (except electric boiler). And pipes are prone to run risks of drip and leakage.	The repair procedure is complicated. It needs cleaning in a regular period. It can adjust temperature individually.	The repair procedure is complicated. It needs cleaning in a regular period.		The processes of installation and repair are complicated. It can not control temperature individually.	The processes of installation and repair are complicated. It can control temperature individually.	The installation process is easy and the system is basically free of repair. It can adjust and measure temperature individually.
Expense	The cost is high for the initial investment (except gas wall-hang boiler) and the operation expense is high.	The cost is high for the initial investment and the operation expense is high.	The cost is lower for the initial investment but the operation expense is very high.		The cost is high for the initial investment and the operation expense is a little high.	The cost is not high for the initial investment and the operation expense is in control.	The cost is a little high for the initial investment but the operation expense is lower.
Spatiality	It will take up lots of space which	The outdoor units take up	It takes up available space.		It is laid under ground,	It is laid under ground,	It is laid under ground,

	in turn increase the pool area. Radiators waste available space.	lots of space and the indoor terminal takes up the upper space of the room.			which can enlarge available space.	which can enlarge available space.	which can enlarge available space.
External Coordination	The company of using radiators has to approach lots of external relations on heating guarantee (except gas wall-hang boiler).	Ground source heat pump needs more coordination.	Users can install it independently without necessity of external coordination.		The using company has to approach lots of external relations on heat source guarantee (except gas wall-hang boiler).	With no necessity of external coordination. The installation can proceed after the completion of the main parts of the using company's project.	With no necessity of external coordination. The installation can proceed after the completion of the main parts of the using company's project.
Internal Environment	The room is heated unevenly and there is a serious floating dust problem due to heated air.	The room is heated unevenly and there is a serious floating dust problem due to heated air.	The room is heated unevenly and there is a serious floating dust problem due to heated air.		The room is heated evenly because of radiant heating. The floating dust is less.	The room is heated evenly because of radiant heating. The floating dust is less.	The room is heated evenly because of radiant heating. The floating dust is less.
Environmental Conservation	Heavy environment pollution.	it's against environmental protection. Ground source heat pump may do damage to underground water.	Low degree of environment pollution		Heavier environment pollution	Basically with no environment pollution	Basically with no environment pollution
Comfortableness	A bit dry	Dry	Dry		Warm feet and cool head meet the demand of physiology.	Warm feet and cool head meet the demand of physiology.	Warm feet and cool head meet the demand of physiology.
Longevity	20 years	15 years	10 years		15~20 years	30~50 years	More than 50 years
Others							

1. After the installation of ZHONGHUI Electrothermal Film Heating System, the temperature of the system that has been out of use for a long time or for the first time use, should be leveled up slowly and gradually. For the first time use of this heating system, the temperature should be set high above 5℃-8℃than the room's. After working one or two days, users can adjust up the temperature gradually till it reaches the comfortable degree. If installed under concrete and cement layer, users have to wait for the curing time of the layer (around 30 days) before connect the power to test and adjust.
2. In the first 3~5 days, electrothermal film may consume volumes of energy while working which is normal as it is warming up the room. When the warming-up process finished, the consumption of energy will fall back to an average level.
3. As regards rooms where there's no people live for a long time in the heating period, the thermostat should set at a low temperature(5℃ around) in order to decrease operation costs and to protect indoor facilities from being damaged because of freeze.
4. If the area where electrothermal film is installed need to be set with furniture, to select furniture with legs is suggested.
5. In the installation-area, to drill or to carry out any other actions that may damage electrothermal film is forbidden.

Ⅰ Installation Conditions

1. ZHONGHUI Electrothermal Film should be installed in residential housing meeting 65% of the standard of national building energy efficiency or in public building meeting 50% of the standard of national building energy efficiency.
2. Project design specification, energy-saving design specification, flat-vertical profile map, door and window schedule, electric and gaseous design specification, electric and gaseous system diagram and the ichnography of electricity and gas need to be provided by users.

ⅡDesign Criteria

1. The heating load is calculated completely in line with the criteria of the local energy-saving plan. In general, in eyes of multistoried buildings (at least three floors) and high-rises buildings, the heating load is around 50W~60W/㎡. As for buildings with less than three stories, the rate of work need to be increased and the heating load should be calculated precisely and accordingly.
2. Power distribution requirements: on the premise that buildings have reached the standard of national building energy efficiency, the power distribution should be used and adjusted reasonably. There is no extra costs basically for external network. The specific data should be further calculated by professional by referring to relative files.
3. How to decide the quantity of electrothermal film
   According to heating load of building heating design (referring to relative specifications of design), the quantity of electrothermal film for each room is calculated by the following formula:
   N= (1+K)Q/P
   N—the quantity of electrothermal film in need
   K—operating factor (K= 0.15~0.20)
   Q—calculated value of room's heating load (W)
   P—electric power of each electrothermal film (W)
4. How to arrange electrothermal film

Electrothermal film should be arranged in area with no covering.

Each room has a loop circuit and electrothermal film should be arranged by group.

Electrothermal film shouldn't be arranged under the ground placed with fix facilities.

Electrothermal film should be arranged at a distance of 300mm at least away from walls with windows.

Electrothermal film should be arranged at a distance of 150mm at least away from other walls with no windows.

Electrothermal film should be arranged at a distance of 50mm at least away from concealed device veneer.

The distance between two Electrothermal films is 20~60mm.

Ⅲ Environmental requirements before installation

1. Interior wall plaster should be brought to an end.
2. Concealed-laid pipelines of walls and grounds should be finished. Two pipes(pipe diameter 20mm) are expected to be set under the thermostat junction box (86-type box).
3. The surface of the ground should be cleaned with no sundries and should be flat. The overall flatness is within ±5mm.
4. The power distribution box of electrothermal film should take its place. The projects of power supply and branch circuit pipeline should be finished and power leads is brought in 86-type box.
5. A storeroom is needed for materials in job location.
6. The ground of rest room should be waterproof.
7. The temperature of job location should be not lower than 5℃
8. In process of installation, electrothermal film should avoid contacting with corrosive chemical substances.

Ⅳ Installation process of ZHONGHUI electrothermal film

1. The ground should be cleaned. A layer of plastic with a thickness of more than 0.05mm should be placed on the ground exposed to soil as the moistureproof layer.
2. Insulation materials (EPX or extruded sheet) with a thickness of 20mm~50mm should be laid through the ground. The gap between insulation materials and walls should be avoided.
3. To lay electrothermal film on insulation materials should be in step with construction drawings. Electrothermal film, thermostat and powerline should be connected together by T cable.
4. To test and check the whole set of electrothermal film to avoid short circuit and open circuit.
5. To lay a layer of plastic with a thickness of 0.05mm through the surface of electrothermal film as the protection layer.
6. To lay cement mortar or peastoneconcrete on the protection layer as the packing layer.
7. To lay floor board or floor tile designed for floor heating on the packing layer.

Quality Assurance and After-sales Service

ZHONGHUI Floor Heating provides users of electrothermal film with a 10-year warranty.

ZHONGHUI Floor Heating provides users with a two-year warranty for thermostat.

The quality insurance of ZHONGHUI Low Carbon Electrothermal Film Heating System is from Pacific Ocean Insurance Company.

Zhonghui Floor Heatin

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