

高等院校专业英语系列教材

刘婷婷 张薇 主编

建筑设备 专业英语

*E*nglish for HVAC&R

中国建材工业出版社

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内 容 提 要

《建筑设备专业英语》作为高等院校专业英语系列教材之一, 充分结合了建筑设备专业特征, 本着覆盖面广、知识面宽的原则进行编写。共分为四个单元: 工程系统介绍、理论知识、室内空气环境、新兴技术及重要技术。

本书针对性较强, 通过材料的阅读和练习, 读者可基本掌握专业英语的基础知识, 为其阅读英语专业论文打下良好基础。另外, 在每篇课文的后面还选取了与本课题有关的阅读材料和习题, 供学生使用, 可提高学生的自学能力, 并能拓宽学生的知识视野。每篇课文以及阅读材料均附有参考译文。主要内容包括: 供热系统、通风系统、空气调节系统; 传热、制冷循环、负荷计算、流体流动; 空气污染物、室内空气品质研究趋势、热舒适; 热泵、空气处理机组与整体式 (空调) 机组、变风量系统、地板采暖。

本书可供高等院校本科学生作为教材使用, 也可供本专业技术人员作为提高专业英语阅读与写作能力的参考读物。

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刘婷婷 张 薇 主编

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本书编委会

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前 言

建筑设备专业的学生在两年基础英语和科技英语学习的基础上,需要对专业英语知识有所了解,目的在于:扩大专业英语词汇,以便阅读专业文献;掌握英语文献查阅技巧;对本专业的国际动态有所了解。着重培养学生的英语阅读和翻译的技能,并要求能在此基础上进一步提高听、说、写的能力。

《建筑设备专业英语》作为高等院校专业英语系列教材之一,充分结合了建筑设备的专业特征,本着覆盖面广、知识面宽的原则进行编写。我们将此教材分为四个单元:工程系统介绍、理论知识、室内空气环境、新兴技术及重要技术。

结合几年来本课程的教学经验,编者在选材上作了取舍:注重专业基础内容和暖通空调制冷领域目前的热点科研方向。所列生词、短语和注释也是教学实践中学生经常提出的问题,因此针对性较强。此外,每课还安排了习题。通过上述材料的阅读和练习,读者可基本掌握专业英语的基础知识,为其阅读英语专业论文打下良好基础。另外,在每篇课文的后面还选取了与本课题有关的阅读材料,供学生使用,可提高学生的自学能力,并能拓宽学生的知识视野。每篇课文以及阅读材料均附有参考译文。

上述课文和阅读材料语言规范,题材广泛,覆盖本专业的重要内容:供热系统、通风系统、空气调节系统;传热、制冷循环、负荷计算、流体流动;空气污染物、室内空气品质研究趋势、热舒适;热泵、空气处理机组与整体式(空调)机组、变风量系统、地板采暖。语言材料的难易程度切合学生的实际水平。本教材重视语言技能训练,突出对阅读和翻译能力的培养,以求达到《大学英语专业阅读阶段教学基本要求》所提出的教学目标:“通过指导学生阅读有关专业的英语书刊和文献,使他们进一步提高阅读和翻译科技资料的能力;并能以英语为工具获取专业所需的信息。”

本教材的编写得到了多位教师的协助和指正。其中所有英文材料由刘婷婷收集并编写;刘婷婷、张薇、李国建、林素菊、田娟荣、邹艳参与了课文翻译、阅读材料翻译和课后练习的编写工作;陈红兵为材料翻译提出了许多宝贵意见并予以修正;沈沁、田浩参与了收集资料 and 统稿、校稿工作。本书有关材料节选整理自有关原版教材和论文集,特向原作者表示真诚的感谢!

本教材读者定位为高等院校本科学生,也可供本专业技术人员作为提高专业英语阅读与写作能力的参考读物。由于编者水平有限,时间仓促,书中如有疏漏和不妥之处,恳请广大读者批评指正。

编 者
2009年6月

Contents

Unit I Engineering System	1
Lesson 1 Heating Systems	1
Reading Paragraph A Gas Heating System and Oil Furnaces	11
Reading Paragraph B Cast-iron Radiators	13
Lesson 2 Ventilation Systems	17
Reading Paragraph A Exhaust Hoods	26
Reading Paragraph B Ceiling Diffusers	29
Lesson 3 Air Conditioning System	33
Reading Paragraph A Room Air Conditioner	46
Reading Paragraph B Air-Conditioning Project Development and System Design	49
Unit II Theory	55
Lesson 4 Heat Transfer	55
Reading Paragraph A Heat Transfer Augmentation	66
Reading Paragraph B Modeling in Heat Transfer	72
Lesson 5 Refrigeration Cycles	76
Reading Paragraph A Refrigerants	89
Reading Paragraph B Refrigeration History	94
Lesson 6 Load Calculations	99
Reading Paragraph Cooling Load Calculation Methodology	109
Lesson 7 Fluid Flow	116
Reading Paragraph A Basic Relations of Fluid Dynamics	126
Reading Paragraph B Historical Development of Fluid Mechanics	131
Unit III Indoor Air Environment	136
Lesson 8 Air Contaminants	136
Reading Paragraph A Air Cleaners for Particulate Contaminants	147
Reading Paragraph B Bioaerosols	149
Lesson 9 Indoor Air Quality Research Trends	155
Reading Paragraph A VOCs Emission from an HVAC-System	163
Reading Paragraph B Hazard Recognition ,Evaluation and Control	167
Lesson 10 Thermal Comfort	170
Reading Paragraph A Secondary Factors Affecting Thermal Comfort	180
Reading Paragraph B Management of Indoor Environment	184

Unit I Engineering System

Lesson 1 Heating Systems

Part I Text

There are many types of heating systems: forced-air, hot water, radiant, infrared, and unit heaters. Sources of heat may be classified by types of fuels—oil, gas, or electric. Gas and oil systems include forced-air, hot water, and unit heaters. Electric systems consist of infrared and radiant systems.

Types of Heating Systems

According to EIA Commercial Buildings Characteristics 1992, for the 57.8 billion ft² of heated commercial buildings in the United States in 1992, the following types of heating systems were used:

Warm air heating systems using warm air furnace 27%

Hot water heating systems using boilers 33%

Heat pumps 13%

District heating 8%

Individual space heaters and others heaters 19%

Modera (1989) reported that nearly 50% of U. S. residential houses are using warm air heating systems with direct-fired warm air furnaces.

Warm Air Furnaces

A *warm air furnace* is a device in which gaseous or liquid fuel is directly fired or electric resistance heaters are used to heat the warm supply air.¹ Natural gas, liquefied petroleum gas (LPG), oil, electric energy, or occasionally wood may be used as the fuel or energy input. Among these, natural gas is most widely used. In a warm air furnace, the warm air flow could be *upflow*, in which the warm air is discharged at the top, as shown in Figure 1.1 (a) and (b); *downflow*, with the warm air discharged at the bottom; or *horizontal flow*, with the warm air discharged horizontally.

Hot Water Boilers

Types of Hot Water Boilers. A *hot water boiler* is an enclosed pressure vessel used as a heat source for space heating in which water is heated to a required temperature and pressure without evaporation.² Hot water boilers are fabricated according to American Society of Mechanical Engineers (ASME) codes for boilers and pressure vessels. Boilers are generally rated on the basis of their gross

output delivered at the boiler's outlet. Hot water boilers are available in standard sizes from 50 to 50,000 MBtu/hr (1 MBtu/hr = 1000 Btu/hr) .

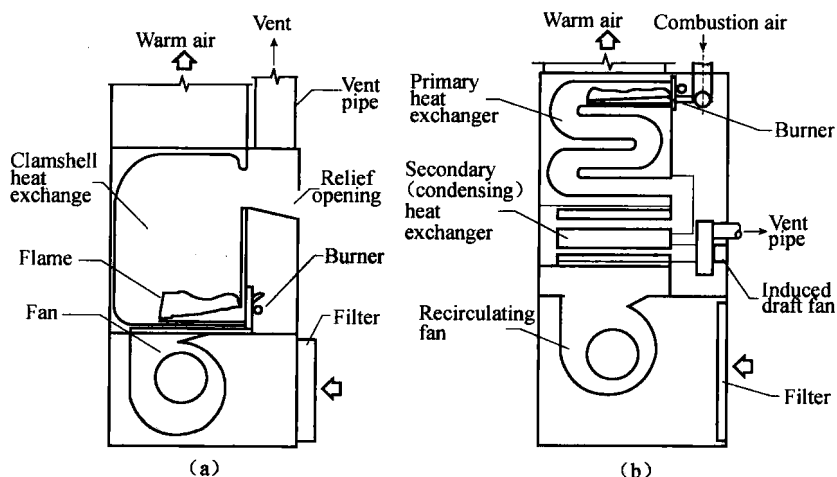


Fig. 1.1 Upflow warm air gas furnace

(a) a natural-vent gas furnace; (b) a power-vent high-efficiency gas furnace

According to EIA Characteristics of Commercial Buildings (1991), the percentages of floor area served by different kinds of fuel used in hot water and steam boilers in 1989 in the United States are gas-fired, 69% ; oil-fired, 19% ; electric, 7% ; others, 5% .

Hot water boilers can be classified as *low-pressure boilers*, whose working pressure does not exceed 160 psig and working temperature is 250 °F or less, and *medium- and high-pressure boilers*, whose working pressure is above 160 psig and working temperature above 250 °F. Most of the hot water boilers are low-pressure boilers except those in campus-type or district water heating systems.

Based on their construction and material, hot water boilers can be classified as fire tube boilers, water tube boilers, cast-iron sectional boilers, and electric boilers. Water tube boilers are used mainly to generate steam. Cast-iron sectional boilers consist of many vertical inverted U-shaped cast-iron hollow sections. They are lower in efficiency and used mainly for residential and small commercial buildings. Electric boilers are limited in applications because of their higher energy cost in many locations in the United States.

Low-Pressure Warm Air Heating Systems

A low-pressure warm air heating system is often equipped with an upflow gas-fired furnace having a furnace heat capacity Q_f to air flow ratio V_a , Q_f/V_a , of 50 to 70 Btu/hr. cfm and a temperature rise immediately after the furnace of 50 to 70 °F.³ The supply temperature differential ($T_s - T_r$) is often 20 to 35 °F. The heating system is often integrated with a cooling system, forming a heating/cooling system.

Low-pressure warm air heating systems usually have a heating capacity not exceeding 100,000 Btu/hr. They are often used in residences and sometimes in small commercial buildings.

Low-Temperature Hot Water Heating System Using Fin-Tube Heaters

In a *low-temperature hot water heating system*, the operating temperature is 25 °F or less with a

maximum working pressure not exceeding 150 psig, usually less than 30 psig. Low-temperature hot water heating systems are widely used for space heating in residences and commercial buildings.

Fin-Tube Heaters. A *fin-tube heater* is a device installed directly inside the conditioned space to add heat to the space through radiant and convective heat transfer. A fin-tube heater consists of a finned-tube element and an outer casing as shown in Figure 1.2 (a). The tubes are often made of copper and steel. Copper tubes are generally 0.75, 1, and 1.25 in. in diameter and steel tubes 1.25 and 2 in. in diameter. The fins are usually made of aluminum for copper tubes and of steel for steel tubes. Fin density may vary from 24 to 60 fins per foot. A fin heater may have a maximum length of 12 ft. The outer casing of a finned-tube heater always has a bottom inlet and top outlet for better convection.

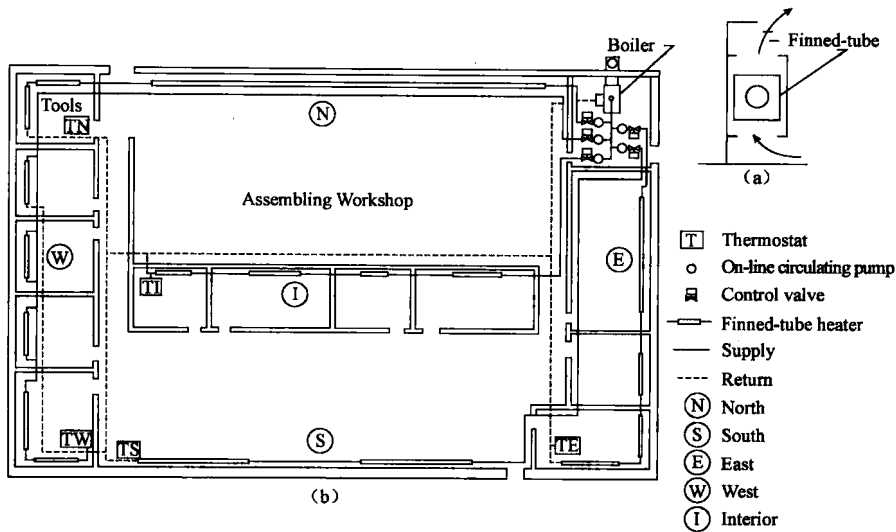


Fig. 1.2 A two-pipe individual-loop low-temperature hot water heating system
(a) finned-tube heater; (b) piping layout

Two-Pipe Individual-Loop Systems. Current low-temperature hot water heating systems using finned tube heaters are often equipped with zone controls. Zone controls can avoid overheating rooms facing south and under heating rooms facing north because of the effects of solar radiation.

Figure 1.2 (b) shows the piping layout of a *two-pipe individual-loop system* that is widely used in low-temperature hot water heating systems. Two-pipe means that there are a supply main and a return main pipe instead of one common main for both supply and return. Individual-loop means that there is an individual loop for each control zone. Several finned-tube heaters in a large room can be connected in series, while finned-tube heaters in several small rooms can be connected in reverse return arrangement.

The sizing of low-temperature hot water pipes is usually based on a pressure drop of 1 to 3 ft per 100 ft of pipe length. For a small low-temperature hot water heating system, an open-type expansion tank is often used. A diaphragm tank is often used for a large system. On-line circulating pumps with low head are often used.

Part Load and Control. Usually a hot water sensor located at the exit of the hot water boiler is used to control the firing rate of the boiler at part-load operation. Its set point is usually reset accord-

ing to the outdoor temperature. Zone control is provided by sensing the return hot water temperature from each individual loop or zone and then varying the water volume flow rate supplied to that zone by modulating the speed of each corresponding on-line circulating pump or its control valve. ⁴ For hot water heating systems using multiple boilers, on and off for each specific boiler depend not only on the heating demand, but also on minimizing the energy cost.

Infrared Heating

Infrared heating is a process that uses radiant heat transfer from a gas-fired or electrically heated high temperature device to provide space heating on a localized area for the health and comfort of the occupants or to maintain a suitable indoor environment for a manufacturing process. ⁵

An *infrared heater* is a device used to provide infrared heating. Heat radiates from an infrared heater in the form of electromagnetic waves and scatters in all directions. Most infrared heaters have reflectors to focus the radiant beam onto a localized area. Therefore, they are often called *beam radiant heaters*. Infrared heaters are widely used in high-ceiling supermarkets, factories, warehouses, gymnasiums, skating rinks, and outdoor loading docks.

Gas Infrared Heaters. Infrared heaters can be divided into two categories: gas and electric infrared heaters. *Gas infrared heaters* are again divided into porous matrix gas infrared heaters and indirect gas infrared heaters. In a *porous matrix gas infrared heater*, a gas and air mixture is supplied and distributed evenly through a porous ceramic, a stainless steel panel, or a metallic screen, which is exposed to the ambient air and backed by a reflector. Combustion takes place at the exposed surface with a maximum temperature of about 1600°F. An indirect infrared heater consists of a burner, a radiating tube, and a reflector. Combustion takes place inside the radiating tube at a temperature not exceeding 1200°F.

Gas infrared heaters are usually vented and have a small conversion efficiency. Only 10% to 20% of the input energy of an open combustion gas infrared heater is radiated in the form of infrared radiant energy. Usually 4 cfm of combustion air is required for 1000 Btu/hr gas input. A thermostat often controls a gas valve in on-off mode. For standing pilot ignition, a sensor and a controller are used to cut off the gas supply if the flame is extinguished.

Electric Infrared Heaters. An *electric infrared heater* is usually made of nickel-chromium wire or tungsten filaments mounted inside an electrically insulated metal tube or quartz tube with or without inert gas. The heater also contains a reflector that directs the radiant beam to the localized area requiring heating. Nickel-chromium wires often operate at a temperature of 1200 to 1800°F. A thermostat is also used to switch on or cut off the electric current. An electric infrared heater has a far higher conversion efficiency and is cleaner and more easily managed.

Gas and electric infrared heaters should not be used in places where there is danger of ignitable gas or materials that may decompose into toxic gases.

Part II New Words

radiant/'reidiənt/a.

发光的, 辐射放热的

infrared/'infərə'red/a.

红外线的

hydronic/'haɪ'drɒnik/a.

液体循环加热 (或冷却) 的

horizontal/'hɒrɪ'zɒntl/a.

水平的

vessel/'vesəl/ <i>n.</i>	容器
evaporation/i'væpəreɪʃən/ <i>n.</i>	蒸发
fabricate/'fæbrikeit/ <i>v.</i>	制作, 构成, 捏造, 伪造, 虚构
convective/kən'vektiv/ <i>a.</i>	传送性的, 对流的
copper/'kɒpə/ <i>n.</i>	铜
modulate/'mɒdjuleɪt/ <i>v.</i>	调整, 调节, (信号) 调制
category/'kætɪɡəri/ <i>n.</i>	种类, 类别, [逻] 范畴
electromagnetic/ɪlekt'rəu'mæɡnɪtɪk/ <i>a.</i>	电磁的
thermostat/'θə:məstæt/ <i>n.</i>	自动调温器, 温度调节装置
extinguish/ɪks'tɪŋɡwɪʃ/ <i>v.</i>	熄灭, 消灭, 压制, 使黯然失色, 偿清
ignitable/ɪɡ'naɪəbl̩/ <i>a.</i>	易起火的, 可燃性的, 易燃的
decompose/ˌdi:kəm'pəʊz/ <i>v.</i>	分解, (使) 腐烂
toxic/'tɒksɪk/ <i>a.</i>	有毒的, 中毒的

Part III Phrases and Expressions

natural gas	天然气
forced-air	强迫通风
heater	加热器, 发热器
warm air heating system	暖风供热系统
warm air furnace	暖风炉
hot water heating system	热水供热系统
heat pump	热泵
direct-fired warm air furnace	直燃式暖风炉
hot water boiler	热水锅炉
steam boiler	蒸汽锅炉
liquefied petroleum gas (LPG)	液化石油气
fire tube boiler	烟管锅炉
water tube boiler	水管锅炉
cast-iron sectional boiler	铸铁模块锅炉
electric boiler	电锅炉
heating capacity	供热能力
fin-tube heater	肋管式加热器
heat transfer	传热
two-pipe individual-loop system	双管式单循环系统
overheat	过热
solar radiation	太阳辐射
circulating pump	循环泵
infrared heater	红外线加热器
reflector	反射体, 反射镜
beam radiant heater	光束式辐射加热器

porous matrix gas infrared heater
nickel-chromium wire
tungsten filament
quartz tube

多孔式气体红外线加热器
镍铬导线
钨丝
石英管

Part IV Notes

1. A *warm air furnace* is a device in which gaseous or liquid fuel is directly fired or electric resistance heaters are used to heat the warm supply air.

[译文] 暖风炉是一种加热空气的设备, 它通过气体或液体燃料直接燃烧, 或电阻式加热器来加热空气。

[分析] 句中 in which 引出的定语从句的先行词是 a device; gaseous or liquid fuel is directly fired 后省略了 to heat the warm supply air.

2. A *hot water boiler* is an enclosed pressure vessel used as a heat source for space heating in which water is heated to a required temperature and pressure without evaporation.

[译文] 热水锅炉是一种用作房间供热热源的密闭式的压力容器, 它可以把水加热到需要的温度和压力而不引起汽化。

[分析] 句中 used as a heat source for space heating 和 in which 引导的从句均修饰 an enclosed pressure vessel.

3. A low-pressure warm air heating system is often equipped with an upflow gas-fired furnace having a furnace heat capacity Q_f to air flow ratio V_a , Q_f/V_a , of 50 to 70 Btu/hr. cfm and a temperature rise immediately after the furnace of 50 to 70 °F.

[译文] 低压暖风供热系统通常采用顺流式燃气炉, 它的供热量与送风量的比值为 50 ~ 70 Btu/hr. cfm, 通过此燃气炉空气温度可以升高 50 ~ 70 °F。

[分析] 句中动名词短语 having a furnace...修饰 an upflow gas-fired furnace.

4. Zone control is provided by sensing the return hot water temperature from each individual loop or zone and then varying the water volume flow rate supplied to that zone by modulating the speed of each corresponding on-line circulating pump or its control valve.

[译文] 区域控制是这样进行的: 传感器感应每个循环回路或区域的回水温度, 然后通过调整循环泵的转速或控制阀来调节该区域的循环水量。

[分析] 主语是 zone control, 谓语是被动式 is provided; sensing...and then varying...是并列关系, 共同作状语; supplied to that zone 作定语修饰 the water volume flow rate, by modulating the speed...作 the water volume flow rate 的状语。

5. *Infrared heating* is a process that uses radiant heat transfer from a gas-fired or electrically heated high temperature device to provide space heating on a localized area for the health and comfort of the occupants or to maintain a suitable indoor environment for a manufacturing process.

[译文] 红外线供热是利用燃气或电加热设备, 通过辐射换热对房间局部进行供热的一种供热方式, 它可以为居住者提供健康、舒适的生活环境, 或者根据生产工艺要求维持适当的工作环境。

[分析] 主语是 Infrared heating, 谓语是 is, 宾语是 a process; that uses...to provide...or to maintain...为定语从句, 修饰 a process.

Part V Exercises

Exercise 1 Answering the following questions according to the text.

1. Tell the kinds of the heating systems mentioned in the text.
2. In 1992, which kind of heating system was most widely used in commercial buildings in the United States?
3. What does "two-pipe" mean in Two-Pipe Individual-Loop Systems?
4. What are the advantages of Electric Infrared Heaters?

Exercise 2 Filling the blanks according to the text.

Based on their _____, hot water boilers can be _____ as fire tube boilers, water tube boilers, cast-iron sectional boilers, and electric boilers. Water tube boilers _____ generate steam. Cast-iron sectional boilers _____ many vertical inverted U-shaped cast-iron hollow sections. They are lower in efficiency and used mainly for _____ and small commercial buildings. Electric boilers are limited in applications _____ their higher energy cost in many locations in the United States.

Exercise 3 Translate the following into Chinese or English.

- | | |
|-----------------------------|-------|
| 1. commercial building | _____ |
| 2. air flow ratio | _____ |
| 3. open-type expansion tank | _____ |
| 4. stainless steel panel | _____ |
| 5. 区域供热 | _____ |
| 6. 居住建筑 | _____ |
| 7. 太阳辐射 | _____ |
| 8. 辐射供热 | _____ |

Part VI Homework

1. Make sentences with the phrases below.

- a) ...the speed of...
- b) ...divide into...
- c) ...in the form of...
- d) ...be used to...

2. Translate the sentences into Chinese or English.

- a) Radiant floor systems use warm wires or pipes imbedded in the floor to heat the floor itself, which then emits infrared heat waves that strike your body and other objects, warming them.
- b) You might see baseboard heaters used as a home's sole source of heat, or for supplemental heat in cooler rooms or rooms that were difficult to outfit with ductwork.
- c) Because temperatures underground are nearly constant year-round—warmer than the outside air during the winter and cooler than the outside air during the summer—a ground-source heat pump can be much more efficient than an air-source heat pump and appropriate for both warm and cold climates.
- d) 人们都知道, 传统的燃煤锅炉因污染环境已逐步被新的采暖方式所取代, 单一以燃

煤为热源的格局已经改变。除城市热电联合生产的集中供热外，其他不同规模的燃煤锅炉房，都面临着煤改气的任务，供暖成本和供暖费用也将上升。

e) 虽然以城市热网、区域热网或较大规模的集中锅炉房为热源的集中供暖系统仍是城市住宅供暖方式的主体，但我国的分户热计量已从试点阶段进入逐步实施的阶段。

Part VII 参考译文

第1课 供热系统

供热系统类型很多，包括热风供热系统、热水供热系统、辐射供热系统、红外线供热系统和模块加热器供热系统。根据燃料类型的不同，供热系统的热源可以分为燃油、燃气和电加热三种。燃气和燃油供热系统包括热风、热水和模块加热器供热系统。电加热供热系统包括红外线和辐射供热系统。

供热系统的类型

1992 年电子工业协会的商业建筑特性资料显示，当年美国有 578 亿平方英尺的商业建筑供热面积，不同的供热方式所占比例如下：

- 利用暖风炉的暖风供热系统 27%；
- 利用锅炉的热水供热系统 33%；
- 热泵系统 13%；
- 区域供热 8%；
- 独立式房间加热器和其他供热方式 19%。

Modera 在 1989 年的报告中指出，美国大约有 50% 的居住建筑采用直燃式暖风炉供热系统。

暖风炉

暖风炉是一种加热空气的设备，它通过气体或液体燃料直接燃烧，或电阻式加热器来加热空气。天然气、液化石油气、油、电能或有时木材也可以作为燃料或热源。在这些燃料中，天然气的应用范围最广。如图 1.1 (a) 和 (b) 所示，在暖风炉中，暖气流会向上流动，在炉子的顶部暖气流排出。如果暖气流在底部排出，则气流向下流动；如果气流在中部排出，则气流水平流动。

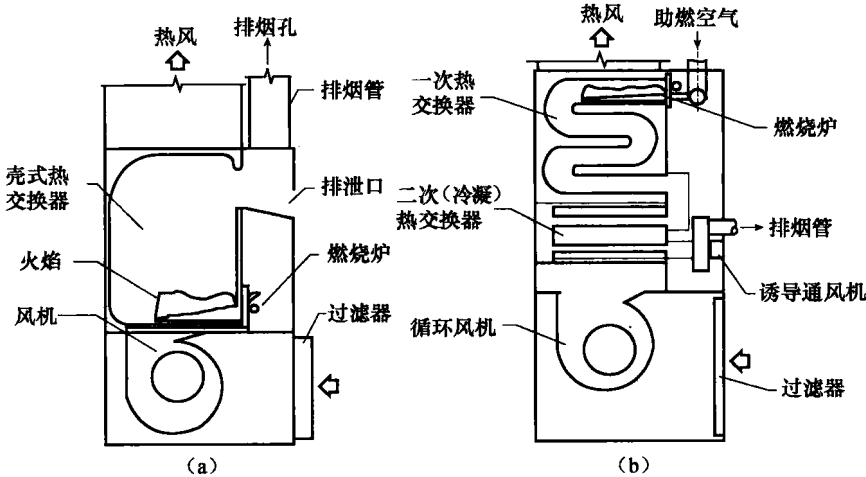


图 1.1 上流式暖风炉
(a) 自然排风暖风炉；(b) 高效机械排风暖风炉

热水锅炉

热水锅炉的类型。热水锅炉是一种用作房间供热热源的密闭式的压力容器，它可以把水加热到所需要的温度和压力而不引起汽化。热水锅炉要根据美国机械工程师协会的锅炉和压力容器规范进行制造。锅炉通常基于其产出总量进行标定，热水锅炉的标准容量为50 ~ 50000 MBtu/hr。

根据能源信息所1991年颁布的《商业建筑特性》，1989年美国的热水和蒸汽锅炉中所使用的各种类型燃料的供热面积所占比例依次为：燃气69%、燃油19%、电加热7%、其他5%。

热水锅炉可分为低压锅炉和中高压锅炉。低压锅炉的工作压力低于160磅/平方英寸，工作温度不超过250 °F，中高压锅炉的工作压力高于160磅/平方英寸，工作温度高于250 °F。除了校园型或区域热水供热系统，大多数的热水锅炉都属于低压锅炉。

根据锅炉本体的结构和材料，热水锅炉可分为烟管锅炉、水管锅炉、铸铁模块锅炉和电锅炉。水管锅炉主要用于蒸汽供热系统。铸铁模块锅炉由很多中空的U形铸铁翅片垂直倒装而成，它的效率比较低，主要用于住宅和小型商业建筑。在美国的很多场所，电锅炉由于其耗能高，使用范围受限。

低压暖风供热系统

低压暖风供热系统通常采用顺流式燃气炉，它的供热量与送风量的比值为50 ~ 70 Btu/hr. cfm，通过此燃气炉空气温度可以升高50 ~ 70 °F。供应温差($T_s - T_r$)通常在20 ~ 35 °F。这种供热系统通常和供冷系统组合在一起，组成供热/供冷系统。

低压暖风供热系统的供热量一般不超过100000 Btu/hr，通常用于居住建筑，有时也用于小型商业建筑。

肋管加热器低温热水供热系统

在肋管加热器低温热水供热系统中，工作温度不超过25 °F，最大工作压力不超过30磅/平方英寸。低温热水供热系统广泛应用于居住建筑和商业建筑的室内供热。

肋管式加热器。肋管式加热器是通过辐射和对流换热来向室内散热的一种设备，可以直接安装在需要供热的场所。如图1.2(a)所示，该散热器由肋管 and 外壳组成。管子一般由铜或钢制成，铜管的直径通常有0.75, 1, 和1.25英寸，钢管的直径通常有1.25和2英寸。对于铜管，肋片一般用铝制作；对于钢管，肋片则用钢制作。肋片的安装密度一般每英尺24 ~ 60片，一台加热器最长12英尺。为了更有效地对流换热，肋管式加热器的外壳通常在底部设置入口和顶部出口。

双管式单循环系统。目前利用肋管式加热器的低温热水供热系统一般进行区域控制。区域控制可以减少由于太阳辐射的影响而导致南向房间过热，北向房间不热的问题。

图1.2(b)所示为双管单循环系统管道平面图，这种系统广泛地应用在低温热水供热系统中。双管是指系统中的有一根供水干管和一根回水干管，而不是供水和回水共用一根管道。单循环是指对应每一个控制区域都设置一个单独的循环系统。在大房间内，散热器串联连接，而对于每个小房间，每组散热器则并联连接。

低温热水系统的管道尺寸一般根据压降选择，每100英尺的压降大约是1 ~ 3英尺。小型低温热水供热系统通常采用开式膨胀水箱，大型系统采用卧式膨胀水箱。系统中还需要设置低水头循环泵。

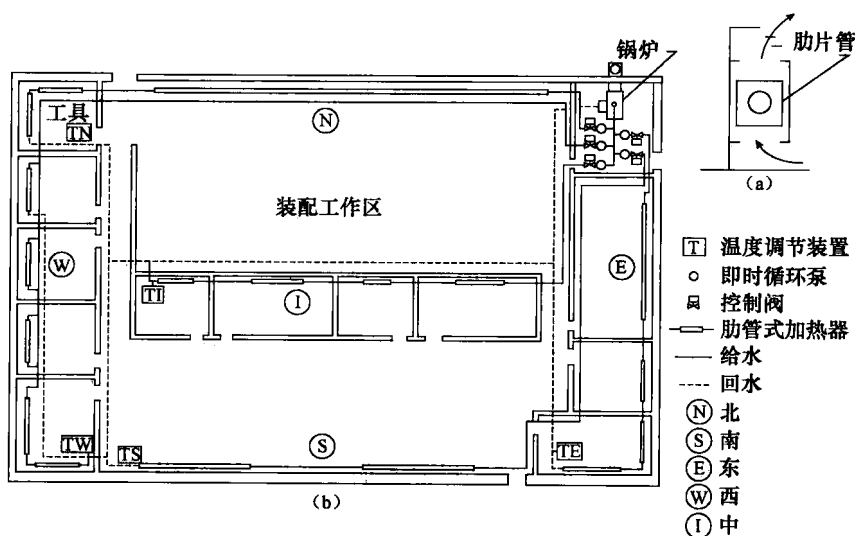


图 1.2 双管式单循环低温热水供热系统
(a) 肋管式加热器; (b) 管道平面图

部分负荷与控制。在热水锅炉的出口一般设置热水传感器，热水传感器在锅炉部分负荷运行时控制锅炉的燃烧强度，燃烧强度的设定值通常根据室外温度重新调整。区域控制是这样进行的：传感器感应每个循环环路或区域的回水温度，然后通过调整循环泵的转速或控制阀来调节该区域的循环水量。对于采用多个锅炉的热水供热系统，开关锅炉的数量不仅要根据供热系统的需要来确定，还要从节能的角度来考虑。

红外线供热

红外线供热是利用燃气或电加热设备，通过辐射换热对房间局部进行供热的一种供热方式，它可以为居住者提供健康、舒适的工作生活环境，或者根据生产工艺的要求维持适当的室内工作环境。

红外加热器是一种用来提供红外线供热的装置。热量以电磁波的形式从红外加热器向各个方向辐射。大部分红外加热器都有一个用来汇聚辐射光束的反射器。因此，红外加热器也被称作光束辐射加热器。红外加热器广泛应用于大空间超市、工厂、仓库、体育馆、滑冰场和室外装载码头。

燃气红外加热器。红外加热器可以分为两种类型，即燃气红外加热器和电红外加热器。燃气红外加热器又可以分为多孔基质燃气红外加热器和间接燃气红外加热器两种。在多孔基质燃气红外加热器中，燃气和空气的混合物通过暴露在空气中的多孔陶瓷、不锈钢面板或金属滤网后被均匀分布，然后通过反射器反射回来。当暴露的表面温度达到 1600°F 时，气体开始燃烧。间接红外加热器包括一个燃烧器、辐射管和一个反射器。当温度不超过 1200°F 时，在辐射管中就会产生燃烧。

燃气红外加热器通常有一个排风口，并且它的效率很低。露天燃烧的燃气红外加热器通常只有输入能量的 10% ~ 20% 能够以辐射的形式释放出来。通常 4 立方英尺的助燃空气需要 1000 Btu/hr 的燃气输入。恒温控制器控制燃气阀的开关。对于标准的引燃机构，传感器和控制器通常在火焰熄灭的时候切断燃气供应。

电红外线加热器。电红外线加热器通常由镍铬丝或钨丝装在电气绝缘金属管或石英管