ДОНСКОЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

УПРАВЛЕНИЕ ДИСТАНЦИОННОГО ОБУЧЕНИЯ И ПОВЫШЕНИЯ КВАЛИФИКАЦИИ

Кафедра «Иностранные языки»

Учебное пособие

«ЛЕКСИКА И ТЕРМИНОЛОГИЯ В ПРОФЕССИОНАЛЬНО-ОРИЕНТИРОВАННЫХ ТЕКСТАХ НА АНГЛИЙСКОМ ЯЗЫКЕ»

Автор
Басенко Г.В.

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Аннотация

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Представлен комплекс лексических упражнений, позволяющий более эффективно освоить новую лексику и терминологию по строительной тематике в профессионально-ориентированных текстах на английском языке, в соответствии с Федеральным государственным образовательным стандартом высшего образования.

Предназначено для бакалавров и магистрантов технических направлений подготовки.

Автор

к. филол. наук, доцент кафедры «Иностранные языки» Басенко Г.В.

Оглавление

ВВЕДЕНИЕ

Данное пособие предлагается для изучения и систематизации новой лексики и терминологии в профессионально-ориентированных текстах на английском языке для обучающихся по техническим направлениям подготовки бакалавров и магистрантов.

Методическая значимость и новизна пособия заключается в реализации профессионально-ориентированного подхода к овладению новой лексики и терминологии на иностранном языке. Тексты, подобранные по пяти техническим направлениям, снабжены различного вида лексическими упражнениями, позволяющими отрабатывать новую лексику как в устной, так и в письменной речи. Комплекс упражнений основывается на профессионально-ориентированных текстах узкой направленности, что делает процесс обучения более эффективным и мотивированным, а также способствует формированию профессиональной лингвистической компетенции студентов технических направлений подготовки. В пособии также предложены профессионально-ориентированные тесты для дополнительного чтения, позволяющие расширить познавательный кругозор в пределах изучаемого направления, и специальный терминологический англо-русский словарь для работы с профессиональной лексикой и терминологией по предложенным техническим направлениям подготовки.

Пособие может быть использовано как для аудиторных занятий, так и для самостоятельной работы в изучении английского языка.

UNIT 1. THE BUILT ENVIRONMENT

Before you start

Ex. 1. Read and translate the following key terms and concepts. Consult the vocabulary at the end of this book.

Key terms and concepts:

- ✓ changes in the environment
- ✓ internal environment
- ✓ outdoor environment
- ✓ acoustic environment
- ✓ environment conditions
- ✓ weather conditions
- ✓ properties of the building envelope
- ✓ heat gains
- ✓ heat losses
- ✓ heat transfer
- ✓ airstreams
- ✓ energy consumption
- ✓ heating
- ✓ underheating
- ✓ overheating
- ✓ cooling
- ✓ humidity controls
- ✓ thermal control
- ✓ thermal insulation
- ✓ conduction
- ✓ convection
- ✓ radiation
- ✓ evaporation
- ✓ ventilation
- ✓ hypothermia
- ✓ atmospheric pollutants
- ✓ biological effluent pollution
- ✓ building services engineer

Reading Focus

Ex. 2. Read and translate the following text paying attention to the key terms and concepts given above.

The building as an environmental filter

One of people's basic needs is to maintain a constant body temperature, and the metabolism regulates heat flows from the body to compensate for changes in the environment. We have become experts in fine-tuning the environmental conditions produced by the climate in relation to the properties of the building envelope to avoid discomfort. A simple tent or a cave may be sufficient to filter out the worst of adverse weather conditions, but the ability of this type of shelter to respond to favourable heat gains or cooling breezes may be too fast or too slow to maintain comfort.

Outside the tropics, houses may be advantageously oriented towards the sun to take advantage of solar heat gains, which will be stored in the dense parts of the structure and later released into the rooms to help offset heat losses to the cool external air during winter. Buildings within the tropical zone require large overhanging roofs and shutters over the windows to exclude as much solar radiation as possible and to shade the rooms. Thus the building envelope acts to moderate extremes of climate, and by suitable design of illumination and ventilation openings, together with heating, cooling and humidity controls, a stable internal environment can be matched to the use of the building.

Vocabulary Focus

Ex. 3. Look through the text again and choose the appropriate adjectives from the text to complete these terms. Translate them into Russian.

1) _____*adverse*_____ weather conditions – *неблагоприятные погодные условия*;
2) _____ heat gains – _____ ;
3) _____ roofs – _____ ;
4) _____ extremes of climate – _____ ;
5) _____ internal environment – _____ .

Ex. 4. Complete the following sentences with the words from the text and translate them into Russian.

1) One of people's basic needs is *to maintain a constant body temperature*. – *Одна из основных потребностей людей – поддерживать постоянную температуру тела.*

2) We have become experts in _____.
3) A simple tent or a cave may be sufficient to _____.
4) Buildings within the tropical zone require _____.
5) Thus the building envelope acts to moderate extremes of climate, and by _____.

Writing Focus

Ex. 5. Read the text again and answer the following questions:

1) What is necessary to do to avoid discomfort produced by the climate and to keep a stable internal environment?

2) Can we do anything to offset heat losses in the houses during winter?

3) What should we do to exclude as much solar radiation as possible in the building within the tropical zone?

Reading Focus

Ex. 6. Study the following text and find the key terms and concepts from Ex.1. Translate the sentences with them into Russian.

Basic needs for human comfort

The building services engineer is involved with every part of the interface between the building and its occupant. Visually, colours rendered by natural and artificial illumination are produced by combinations of decor and windows. The acoustic environment is largely attributed to the success achieved in producing the required temperatures with quiet services equipment, all of which is part of the thermal control and transportation arrangements. Energy consumption for thermally based systems is the main concern, and close coordination between client, architect and engineer is vitally important.

Heat transfer between the human body and its surroundings can be summarized as follows:

Conduction

Points of contact with the structure are made with furniture. Clothing normally having substantial thermal insulation value and discomfort should be avoided.

Convection

Heat removed from the body by natural convection currents in the room air, or fast-moving airstreams produced by ventilation

fans or external wind pressure, is a major source of cooling. The body's response to a cool air environment is to restrict blood circulation to the skin to conserve deep tissue temperature, involuntary reflex action (shivering) if necessary and in extreme cases inevitable lowering of body temperature. This last state of hypothermia can lead to loss of life and is a particular concern in relation to elderly people.

Radiation

Radiation heat transfer takes place between the body and its surroundings.

The direction of heat transfer may be either way, but normally a minor part of the total body heat loss takes place by this method. Radiation between skin and clothing surfaces and the room depends on the fourth power of the absolute surface temperature, the emissivity, the surface area and the geometric configuration of the emitting and receiving areas. Thus a moving person will experience changes in comfort level depending on the location of the hot and cold surfaces in the room, even though air temperature and speed may be constant.

Some source of radiant heat is essential for comfort, particularly for sedentary occupations, and hot-water central heating radiators, direct fuel-fired appliances and most electrical heaters provide this. The elderly find it particularly difficult in keeping warm when they are relatively immobile, and convective heating alone is unlikely to be satisfactory. A source of radiant heat provides rapid heat transfer and a focal point, easy manual control and quick heat-up periods. Severe cases of underheating can be counteracted by placing aluminum foil screens in positions where they can reflect radiation onto the rear of the chair.

Overheating from sunshine can also cause discomfort and glare, and tolerance levels for radiant heating systems have been established.

Evaporation

Humid air is exhaled, and further transfer of moisture from the body takes place by evaporation from the skin and through clothing. Maintenance of a steady rate of moisture removal from the body is essential, and this is a mass transfer process depending on air humidity, temperature and speed as well as variables such as clothing and activity.

Ventilation

The quality of the air in a building depends upon the quantity, type and dispersal of atmospheric pollutants. Some of these, odorants, can be detected by the olfactory receptors in the nose. These are the odours, vapours and gases that ingress from the outdoor environment and are released from humans, animals, flora, furnishings and the

structural components of the building. Solid particles of dust, pollen and other contaminants often have little or no smell. These might be seen in occasional shafts of sunlight, and become visible when they have settled. Cleaning fluids such as ammonia, cigarette smoke, hair spray, deodorants and perfumes can be most noticeable. The inflow of diesel exhaust fumes, road tar, paint vapours and creosote creates unpleasantly noticeable pollution, even when of short duration. The presence of harmful pollutants such as carbon monoxide and radon gases is not detectable by the occupant.

Professor Ole Fanger has introduced units of subjective assessment for odorants only. The olf quantifies the concentration of odorous pollutants. The decipol is the evaluation of the pollutant as determined by the recipient through the olfactory sensations from the nose. One olf is the emission rate of biological effluents from one standard person, or the equivalent from other sources. One decipol is the pollution caused by one standard person when ventilated with 101/s of unpolluted air.

Office accommodation normally has one person for each 10 m^2 of floor area, so the biological effluent pollution load produced by normal occupancy is 0.1 olf/m^2. Smokers, building and furnishing materials and ventilation systems add to the pollution load. The average pollution in an existing building that has 40 % of the occupants as smokers produce a load G of 0.7 olf/m^2. A low-pollution building with an absence of smoking has a load G of 0.2 olf/m^2. When there is complete mixing of the ventilation air with the air in the room, the rate of supply of outdoor air that is necessary to maintain the required standard of air.

Vocabulary Focus

Ex. 7. Complete the sentences using the words from the box below and translate them into Russian.

a) emissivity, b) odorants, c) artificial illumination, d) a source of radiant heat, e) fluids, f) natural convection currents, g) air humidity

1) Visually, colours rendered by natural and _____ are produced by combinations of decor and windows.

2) Heat removed from the body by _____in the room air, or fast-moving airstreams produced by ventilation fans or external wind pressure, is a major source of cooling.

3) Radiation between skin and clothing surfaces and the room depends on the fourth power of the absolute surface temperature, _____, the surface area and the geometric configuration of the emitting and receiving areas.

4) _____ provides rapid heat transfer and a focal point, easy manual control and quick heat-up periods.

5) Maintenance of a steady rate of moisture removal from the body is essential, and this is a mass transfer process depending on_____, temperature and speed as well as variables such as clothing and activity.

6) Some of these, _____, can be detected by the olfactory receptors in the nose.

7) Cleaning _____such as ammonia, cigarette smoke, hair spray, deodorants and perfumes can be most noticeable.

Ex. 8. Find the English equivalents to the following words from the text given above.

1) теплоотдача,
2) проводимость,
3) сильные воздушные потоки,
4) ограничить циркуляцию крови,
5) сохранить постоянную температуру в тканях,
6) дрожь,
7) ослепление ярким светом,
8) дизельные выхлопные газы,
9) дорожная грязь, сажа,
10) лакокрасочные испарения.

Ex. 9. Read the following sentences and write whether they are T (true) or F (false). Correct the wrong sentences. Translate them into Russian.

1) The building services engineer is involved with every part of the interface between the building and its occupant. T/F
2) Energy consumption for thermally based systems is not the main concern. T/F
3) A moving person will not experience changes in comfort level depending on the location of the hot and cold surfaces in the room. T/F
4) The quality of the air in a building depends upon the quantity, type and dispersal of atmospheric pollutants. T/F

5) Cleaning fluids such as ammonia, cigarette smoke, hair spray, deodorants and perfumes cannot be most noticeable. T/F
6) The presence of harmful pollutants such as carbon monoxide and radon gases is easily detectable by the occupant. T/F
7) One olf is the emission rate of biological effluents from many people. T/F

Writing Focus

Ex. 10. Look through the text again and give its summary using the following phrases:

- The text is devoted to …
- The text is about …
- It puts forward the idea of …
- The main idea of the text is …
- It touches upon the problem of …

Ex. 11. Put these standard international (SI) units into the correct columns.

amp, Celsius, curie, hertz, joule, kelvin, newton, ohm, pascal, volt, watt

Chemistry (1)	Electricity (6)	Physics (2)	Temperature (2)

UNIT 2. WATER SUPPLY AND SEWERAGE

Before you start

Ex. 1. Read and translate the following key terms and concepts. Consult the vocabulary at the end of this book.

Key terms and concepts:

- ✓ sewer
- ✓ sewerage
- ✓ sanitation
- ✓ drainage
- ✓ to drain away
- ✓ catchment
- ✓ purification
- ✓ softening
- ✓ boiling
- ✓ condensation
- ✓ rain cycle
- ✓ water vapour
- ✓ to evaporate
- ✓ service reservoir
- ✓ underground basin
- ✓ rock stratum (strata)
- ✓ well
- ✓ dam
- ✓ spring
- ✓ cesspool
- ✓ conduit
- ✓ pollution
- ✓ contamination
- ✓ the salts of lime
- ✓ calcium carbonate
- ✓ calcium sulphate
- ✓ odour
- ✓ chemical fertilizers
- ✓ outbreaks of cholera
- ✓ base exchange method
- ✓ water treatment method

Reading

Ex. 2. Read and translate the following text paying attention to the key terms and concepts given above.

Cold water supply and distribution

All the water we use derives initially from the oceans and is made available to us by the rain cycle. The heat of the sun, to rise and form clouds of water vapour evaporates water at the surface of the ocean. These clouds are swept towards the land by the incoming sea breezes. Where there are hills the clouds are carried upwards into a cooler atmosphere and condensation takes place in the form of rain. The cycle is completed when the water so falling on the land drains away to streams and rivers and is carried back to the sea.

Some of the rainwater, of course, evaporates from the surface of the earth, from rivers and lakes. Some of the rain-water soaks into the earth and is held in underground basins of impervious rock strata, from where it can be raised by means of wells. Some of this water out pours from faults in the rock stratum and is available as a spring.

Many towns and cities use water direct from rivers and lakes. London uses the water of the Thames; Glasgow the water of Loch Katrine; Manchester the water of Thirlmere. Under such conditions of supply, very great care has to be taken that pollution is avoided and that there, is sufficient purification. Most local authorities, however, have not a large lake or river to draw upon. They find it necessary to set aside a suitable area in close proximity to the town as a catchment's area, or gathering ground, from which the water can be collected and impounded in a reservoir – usually a valley having a dam thrown across it. From here the water, is usually – but not invariably – piped by means of a large sized conduit to a service reservoir on the edge of the town. At this point any needful purification or softening is generally done.

The water from wells and borings is generally hard, i.e. it contains the salts of lime, either calcium carbonate, causing «temporary» hardness which can be removed by boiling, or calcium sulphate, causing «permanent» hardness which, cannot be removed by boiling but only by a system of water softening; the base exchange method is typical.

Vocabulary Focus

Ex. 3. Look through the text again and choose the appropriate adjectives from the text to complete these terms. Translate them into Russian.

1) *incoming* sea breezes – *поступающие морские бризы*;
2) _____ rock strata – _____;
3) _____ purification – _____;
4) _____ authorities – _____;

5) _____ hardness – _____.

Ex. 4. Complete the following sentences with the words from the text and translate them into Russian.

1) All the water we use derives initially from *the oceans and is made available to us by the rain cycle*. – *Вся вода, которую мы используем, первоначально приходит к нам из океанов и становится доступной для нас благодаря круговороту дождевой воды в природе.*
2) The cycle is completed when _____.
3) The water from the catchment's area or gathering ground can be _____.
4) «Temporary» hardness is caused by _____ and can be removed by _____.
5) «Permanent» hardness is caused by _____ and can be removed by _____.

Writing Focus

Ex. 5. Read the text again and answer the following questions:

1) How does the rain cycle work?
2) From where do many towns and cities use water?
3) What is generally done to avoid temporary and permanent hardness of water?

Reading Focus

Ex. 6. Study the following text and find the key terms and concepts from Ex.1. Translate the sentences with them into Russian.

From the history of sewerage

Man's sewerage practice has been known from ancient times. Explorations revealed sewers in Babylon dating from the 7th century before our era. Considerable information is available about the sewers of Jerusalem, works of this class in ancient Greek cities are fairly well known and the great underground drains of Rome have repeatedly been described.

The history of the progress of sanitation in London probably affords a typical picture of what took place quite generally about the middle of the 19th century in the largest cities of Great Britain and the United States. Well into the19th century while London outgrew the narrow limits of the city proper and its adjacent parishes and became a great metropolis, the centre of the world's commerce, sanitation was

as little considered as magnetism or the use of steam for power purposes.

The lack of central authority rendered a systematic study and execution of sewerage work impossible. As late as 1845 there was no survey of the metropolis adequate as a basis for planning sewers. The sewers in adjoining parishes were of different elevation so that a junction of them was impracticable.

But the strong feeling that good public health is a valuable municipal asset and depends largely upon good sewerage was the deciding factor in the growing popular recognition of the sanitary importance of a good sewerage system.

The first engineer who made a comprehensive study of metropolitan sewerage needs, thus described the conditions of London basements and cellars in 1847: «There are hundreds, I may say thousands of houses in this metropolis which have no drainage whatever and the greater part of them have stinking overflowing cesspools. And there are also hundreds of streets, courts and alleys that have no sewers». After 2 outbreaks of cholera a royal commission was appointed to inquire into sanitary improvements of London. In 1855 Parliament passed an act for the better local management of the metropolis which laid the basis for the sanitation of London.

In the continent a marked progress in sewerage began in 1842 when a severe fire destroyed the old part of the city of Hamburg. The portion ruined was the oldest and it was decided to rebuild it according to the modern ideas of convenience. As a result Hamburg was the first city which had a complete systematic sewerage system throughout built according to modern ideas. The system proved so well designed and maintained that twenty five years after the sewers were completed they were found by a committee of experts to be clean and almost without odour.

At the present time the problem of good sanitation is closely connected with that of protecting the purity of natural water reservoirs, since often the same body of water must serve both as a source of water and as a recipient of sewage and storm drainage. And it is this dual use of water in nature and within communities and industrial premises that establishes the most impelling reasons for water sanitation.

The source of pollution lies largely in the effluents of industry, urban life, agricultural production and transport. The worst pollution is being caused by the chemical industry. Modern agriculture which utilizes huge quantities of chemical fertilizers also pollutes the ground water and rivers.

Despite the growing improvement in water treatment methods many regions of the world cannot cope with the rapid rate of water contamination. The highly industrialized countries naturally suffer more than others. Certainly the conditions which existed only a century ago cannot be restored in present or future large cities. But we badly need to find new ways of using the water in industry and agriculture and of radically improving the technology of drainage purification.

Vocabulary Focus

Ex. 7. Complete the sentences using the words from the box below and translate them into Russian.

a) the purity of natural water reservoirs, b) the better local management of the metropolis, c) the chemical industry, d) a complete systematic sewerage system, e) using the water in industry and agriculture, f) Babylon, g) the rapid rate of water contamination

1) Explorations revealed sewers in _____ dating from the 7th century before our era.
2) In 1855 Parliament passed an act for _____ which laid the basis for the sanitation of London.
3) Hamburg was the first city which had _____ throughout built according to modern ideas.
4) At the present time the problem of good sanitation is closely connected with that of protecting _____.
5) The source of pollution lies largely in the effluents of industry, urban life, agricultural production and transport, the worst pollution being caused by _____.
6) Despite the growing improvement in water treatment methods many regions of the world cannot cope with _____.
7) We badly need to find new ways of _____ and of radically improving the technology of drainage purification.

Ex. 8. Find the English equivalents to the following words from the text given above.

1) сточные трубы,
2) прилегающие округа,
3) здравоохранение,

4) муниципальное имущество,
5) цокольный этаж,
6) подвал,
7) выгребная яма,
8) запах,
9) производственные помещения,
10) химические удобрения.

Ex. 9. Read the following sentences and write whether they are T (true) or F (false). Correct the wrong sentences. Translate them into Russian.

1) Man's sewerage practice has not been known since ancient times. T/F
2) As late as 1845 there was no survey of the metropolis adequate as a basis for planning sewers. T/F
3) After 12 outbreaks of cholera a royal commission was appointed to inquire into sanitary improvements of London. T/F
4) In 1855 The Queen passed an act for the better local management of the metropolis which laid the basis for the sanitation of London. T/F
5) As a result London was the first city which had a complete systematic sewerage system throughout built according to modern ideas. T/F
6) The least pollution is being caused by the chemical industry. T/F
7) Due to the growing improvement in water treatment methods many regions of the world can cope with the rapid rate of water contamination. T/F

Writing Focus

Ex. 10. Look through the text again and give its summary using the following phrases:

- The text is devoted to …
- The text is about …
- It puts forward the idea of …
- The main idea of the text is …
- It touches upon the problem of …

Ex. 11. Use the Internet or magazines to find out about modern kinds of drinking water purification in different countries. Do you drink water from your tap or do you buy it bottled?

UNIT 3. HEAT SUPPLY AND AIR-CONDITIONING

Before you start

Ex. 1. Read and translate the following key terms and concepts. Consult the vocabulary at the end of this book.

Key terms and concepts:

- ✓ heating
- ✓ heating plant
- ✓ central heating
- ✓ panel heating
- ✓ ventilation
- ✓ air-conditioning
- ✓ air-conditioning apparatus
- ✓ refrigerating equipment
- ✓ air valve
- ✓ boilers
- ✓ convectors
- ✓ ducts
- ✓ pipes
- ✓ pumps
- ✓ radiators
- ✓ registers
- ✓ fan
- ✓ filters
- ✓ furnace
- ✓ cool
- ✓ damp
- ✓ dry
- ✓ dusty
- ✓ stuffy
- ✓ stuffiness
- ✓ humidity
- ✓ condensate
- ✓ atmospheric environment
- ✓ supply and removal of air
- ✓ transmission of energy
- ✓ evaporation of moisture
- ✓ (to) disseminate

Reading Focus

Ex. 2. Read and translate the following text paying attention to the key terms and concepts given above.

Heating and air-conditioning

People are comfortable when they are neither too cold, nor too warm and when the air about them is neither too dry, nor too damp and is not stuffy or dusty.

To bring about these desirable conditions the heating or air-conditioning apparatus must be capable of maintaining the following conditions inside the house, whatever the conditions outside may be.

For adequate heating when it is cooled outside the heating plant, including the necessary ducts, registers, piping, radiators, etc., must be able to keep all the rooms at 70 ° Fahrenheit, even if it is 20 or 30 degrees below zero outside. To avoid stuffiness, the air should be given a certain amount of motion. Under winter conditions this must be sufficient to distribute the heat uniformly throughout the rooms. It must not be too cold at the floor, not too hot at the ceiling. A stove causes the hot air around it to rise up toward the ceiling and cooler air to flow toward the stove. A radiator acts in this respect like a stove. Warm-air registers bring heated air into a room with a certain motion or velocity, which imparts movement to the air already in the room. An outlet for this air should be provided in order to have good ventilation.

In summer time much greater air motion is needed. It is enough to change the air in a room completely from three to ten times-per hour. Sometimes a fan is placed in the attic to blow the warm air out and to cause the cooler night air to flow in through open windows. When this is done, air in the house can be expected to be changed completely every two or three minute. When air is brought into a house from outside, heated in a furnace and distributed through all the rooms, it ought to be cleaned by passing it through «filters» before it enters the furnace. These filters must be capable of straining out from the air all dust, soot, pollen and other impurities. Filters should be so installed that they can be easily replaced. Cleaning the air this way prevents the dirt from entering the house and soiling the walls and furniture.

In summer, or in hot climates, cooling of the air in a residence is desirable and is often done, special refrigerating equipment being installed to do the job. The air in the rooms should be maintained at a temperature not more than about fifteen degrees lower than the thermometer readings outside at all times, in order to prevent discomfort from too sudden a change for persons going into or leaving the house. This cooling must for comfort be accompanied by movement of the air and regulation of the humidity, so that a clammy feeling will-not be experienced.

Vocabulary Focus

Ex. 3. Look through the text again and choose the appropriate adjectives from the text to complete these terms. Translate them into Russian.

1) *adequate* heating – *отвечающее требованиям отопление*;
2) _____ conditions – _____;
3) _____ plant – _____;
4) _____ equipment – _____;
5) _____ feeling – _____.

Ex. 4. Complete the following sentences with the words from the text and translate them into Russian.

1) Under winter conditions this must be sufficient to *distribute the heat uniformly throughout the rooms*. – *В зимних условиях должно быть достаточно равномерно распределить тепло по всем комнатам.*
2) Warm-air registers bring heated air into a room with a certain motion or velocity, which _____.
3) Sometimes a fan is placed in the attic to blow the warm air out and to cause the cooler night air to _____.
4) These filters must be capable of _____.
5) Cleaning the air this way prevents the dirt from _____.

Writing Focus

Ex. 5. Read the text again and answer the following questions:

1) What temperature must the heating plant be able to keep for adequate heating?
2) What should be done to avoid stuffiness in the room?
3) What should be done to cool the air in a residence in summer time?
4) By what must the cooling be accompanied for comfort?

Reading Focus

Ex. 6. Study the following text and find the key terms and concepts from Ex.1. Translate the sentences with them into Russian.

Systems of heating

Heating and ventilation are two branches of engineering which are very closely connected. They are therefore treated as a dual subject. Both are concerned with providing a required atmospheric environment within a space, the former with respect to heat supply to produce a desired temperature for maintaining comfort, health or efficiency of the occupants, the latter with regard to supply and removal of air frequently with emphasis on contamination of the air. Air-conditioning is closely related to both heating and ventilation and will therefore be dealt with later.

It is for heating to prevent the too rapid loss of heat from the body. By heating, the ambient air of walls, a ceiling or a floor and the rate of heat loss from the body are controlled. Some old concepts of heating were gradually changed since engineers obtained more precise knowledge about how the body loses heat. Insufficient attention was paid formerly to loss by radiation, which is the transmission of energy in the form of waves from a body to surrounding bodies at a temperature. The human being also loses heat by conduction (through his clothes) and convection, the latter by air currents not only past his skin or outside clothing surface but also by evaporation of moisture from his skin (respiration). The determination of the capacity or size of the various components of the heating system is based on the fundamental concept that heat supplied to a space equals heat lost from the space. The most widely used system of heating is the central heating, where the fuel is burned in one place – the basement or a specially designed room and from which steam, hot water or warm air is distributed to adjacent and remote spaces to be heated.

There are two most common systems of heating – hot water and steam. Both systems are widely used nowadays. A hot-water system consists of the boilers and a system of pipes connected to radiators suitably located in rooms to be heated. The pipes, usually of steel or copper, feed hot water to radiators or convectors which give up their heat to the room. The water, now cooled, is returned to the boiler for reheating.

As for steam systems, steam is generated usually, at less than 5 pounds per square inch in the boiler and the steam is led to the radiators through or by means of steel or copper pipes. The steam gives up its heat to the radiators and the radiator to the room and the cooling of the steam condenses it to water. The condensate is returned to the boiler either by gravity or by a pump. The air valve on each radiator

is necessary for air to escape. Otherwise it would prevent steam from entering the radiator.

Recent efforts to completely conceal heating equipment have resulted in an arrangement whereby the fluid, whether it be hot water, steam, air, or electricity, is circulated through distribution units embedded in the building construction. Panel heating is a method of introducing heat to rooms in which the emitting surfaces are usually completely concealed in the floor, walls, or ceiling. The heat is disseminated from such panels partly by radiation and partly by convection, the relative amounts depending on the panel location.

Ceiling panels release the largest proportion of heat by radiation and floor panels – the smallest. The proportion of heat disseminated by radiation and convection is also dependent to some extent upon panel-surface temperatures. The basic advantage claimed for a panel heating system is that of comfort. Application of certain panels is frequently restricted by structural details. Other factors to be considered are type of occupancy, furniture or equipment location, large glass areas, heat-storing capacity of building construction, room height, possible change of wall partitions, climate, exposure and first cost.

Vocabulary Focus

Ex. 7. Complete the sentences using the words from the box below and translate them into Russian.

a) conduction and convection, b) hot water and steam, c) engineering, d) Ceiling panels, e) loss of heat, f) panel heating system, g) Panel heating

1) Heating and ventilation are two branches of _____ which are very closely connected.

2) It is for heating to prevent the too rapid _____ from the body.

3) The human being also loses heat by _____, the latter by air currents not only past his skin or outside clothing surface but also by evaporation of moisture from his skin (respiration).

4) There are two most common systems of heating – _____.

5) _____ is a method of introducing heat to rooms in which the emitting surfaces are usually completely concealed in the floor, walls, or ceiling.

6) _____ release the largest proportion of heat by radiation and floor panels – the smallest.

7) The basic advantage claimed for a _____ is that of comfort.

Ex. 8. Find the English equivalents to the following words from the text given above.

1) теплоснабжение,
2) работоспособность жильцов,
3) окружающий воздух,
4) топливо,
5) цокольный этаж,
6) соседний, смежный,
7) отдаленный,
8) сила тяжести,
9) разделительные перегородки,
10) местоположение.

Ex. 9. Read the following sentences and write whether they are T (true) or F (false). Correct the wrong sentences. Translate them into Russian.

1) Heating and ventilation are two branches of engineering which are very closely connected. T/F
2) Air-conditioning is not closely related to both heating and ventilation. T/F
3) Some new concepts of heating were gradually changed since engineers obtained more precise knowledge about how the body loses heat. T/F
4) The pipes, usually of plastic, feed hot water to radiators or convectors which give up their heat to the room. T/F
5) The air valve on each radiator is not necessary for air to escape. T/F
6) Ceiling panels release the smallest proportion of heat by radiation and floor panels – the largest. T/F
7) Application of certain panels is frequently restricted by structural details. T/F

Writing Focus

Ex. 10. Look through the text again and give its summary using the following phrases:

- The text is devoted to …
- The text is about …
- It puts forward the idea of …
- The main idea of the text is …

- It touches upon the problem of …

Ex. 11. Use the Internet or magazines to find out about modern types of building insulation. What materials are used for it? Does the manufacture or disposal cause environmental problems?

UNIT 4. AIR-CONDITIONING, VENTILATION AND GAS SUPPLY

Before you start

Ex. 1. Read and translate the following key terms and concepts. Consult the vocabulary at the end of this book.

Key terms and concepts:

- ✓ air-conditioning
- ✓ ventilation
- ✓ gas supply
- ✓ enclosure
- ✓ heating the air
- ✓ dehumidifying
- ✓ cooling
- ✓ cleaning
- ✓ circulating of air
- ✓ control of temperature
- ✓ humidity,
- ✓ purity
- ✓ motion of the air
- ✓ central air conditioners
- ✓ filters
- ✓ preheat coils
- ✓ humidifiers
- ✓ dehumidifiers
- ✓ reheat coils
- ✓ additional cooling coils
- ✓ fans
- ✓ controls
- ✓ electrostatic precipitator
- ✓ leakage of air
- ✓ contaminated air
- ✓ air-born dust
- ✓ fumes
- ✓ toxic vapours
- ✓ hazardous
- ✓ exhaust systems
- ✓ dilution systems
- ✓ (to) dilute
- ✓ natural gas supply
- ✓ air motion

- ✓ air distribution
- ✓ dust
- ✓ bacteria
- ✓ odour
- ✓ toxic gases
- ✓ carbon dioxide content
- ✓ oxygen content
- ✓ thermal environment
- ✓ effect on the lungs
- ✓ airtight chamber

Reading Focus

Ex. 2. Read and translate the following text paying attention to the key terms and concepts given above.

All-year air-conditioning, ventilation, gas supply

Air conditioning implies the control of temperature, humidity, purity and motion of the air in an enclosure. In our modern world of science and highly developed technology air conditioning is of a great significance for industrial processes as well as for human comfort. As an example it must be mentioned that during the manufacture of extremely delicate equipment such as inertial guidance systems for rockets, airplanes or submarines both temperature and humidity must be closely controlled and air purity provided at an extremely high level.

Air conditioning for human comfort is employed in both large and small installations, such as theatres, office buildings, department stores, residences, airplanes, railways, cars and submarines. According to their purpose air conditioning systems may be described as winter, summer and all-year systems. Considering their basic design they are called unit or central air conditioners.

All-year air-conditioning systems must provide means for performing all the processes required for winter and summer air conditioning. The basic pieces of equipment are the filters, preheat coils, humidifiers, dehumidifiers, reheat coils, additional cooling coils, fans and controls. The control of air purity can be achieved in various degrees. As a minimum control some sort of filtering must be done near the entrance of the air-conditioning system. Possibly the most efficient filtering device is the electrostatic precipitator.

In order to establish the size and operational requirements of an air-conditioning system, the maximum probable heating demands have to be calculated. The maximum probable heating demand is usually for winter air conditioning and it involves heating and humidifying.

The maximum probable cooling demand is generally for summer applications and requires cooling and dehumidifying.

The inside design conditions depend entirely upon the purpose for which air conditioning is used. Certain industrial process requirements and human comfort are the two major factors to be considered. With ever increasing tendencies to use air-conditioning a building engineer must have sound knowledge of the subject.

As far as ventilation is concerned the modern theory to this effect can be summed up in the statement that for places of general assembly the purpose of ventilation is to carry away excess heat and odours and that normally 10 cu. ft per minute of outside air per person is sufficient to accomplish this objective. In buildings such as homes, the leakage of air through cracks in doors and windows is usually sufficient to meet this requirement. Although ventilation was formerly concerned with the supply of fresh air to and the removal of hot and contaminated air from the space it gradually came to be associated with cleaning of air.

Industrial buildings often present special problems in ventilation. There are certain industrial processes that are accompanied by the production of air-born dust, fumes, toxic vapours and gases which are hazardous to the health of workers. Three types of ventilation are in use so that to control dangerous gases and dusts: exhaust systems, dilution systems and combinations of both. The contaminated air is exhausted at high velocity from hoods which have sufficient entrance velocity to pick up the contaminants.

Another indispensable part of modern amenities is gas supply. It has come now to be of a very wide use. With an intensive exploration of finding natural gas it has gradually replaced the manufacture in its utilization. At the present time natural gas is put to large-scale economic use. The principal utilization of natural gas is as a clean, convenient, economical source of heat. In homes it is used for cooking, water heating and refrigeration for food as well as for space heating. Nowadays most of the homes are heated by natural gas and the number of gas supplied homes was increasing at a rate limited chiefly by the ability of the steel industry to produce the pipe through which the gas is transported. Natural gas supply is used also as a heat source in commercial establishments such as restaurants and bakeries for cooking and in stores, offices and other commercial buildings for heating and comfort cooling.

Vocabulary Focus

Ex. 3. Look through the text again and choose the appropriate adjectives from the text to complete these terms. Translate them into Russian.

1) extremely delicate equipment – высокоточное оборудование;
2) _____ systems – _____;
3) _____ device – _____;
4) _____ precipitator – _____;
5) _____ use – _____.

Ex. 4. Complete the following sentences with the words from the text and translate them into Russian.

1) Air-conditioning implies the control of *temperature, humidity, purity and motion of the air in an enclosure*.
2) Air conditioning for human comfort is employed in _____.
3) All-year air-conditioning systems must provide means for _____.
4) The maximum probable heating demand is usually for winter air conditioning and it involves _____.
5) The contaminated air is exhausted at high velocity from hoods which have sufficient entrance velocity to _____.

Writing Focus

Ex. 5. Read the text again and answer the following questions:

1) Where is air-conditioning for human comfort employed?
2) On which does the inside design conditions depend?
3) Are there any special problems in ventilation in industrial buildings?
4) Where is natural gas supply also used as a heat source?

Reading Focus

Ex. 6. Study the following text and find the key terms and concepts from Ex.1. Translate the sentences with them into Russian.

Principles of air-conditioning

The term air-conditioning has been so widely and loosely used that the student should be careful in trying to understand its true meaning. For many years we have introduced air into buildings after heating, dehumidifying and, in some cases, cooling it, and we have called that process ventilation. In recent years much greater stress has been laid on the treatment of air as compared with circulating it merely through the building, and we now call the process air conditioning. Air-conditioning, then, may be said to be the treatment of the air in the building so as to make it more comfortable or healthful for human beings or more suitable for manufacturing processes.

The factors which are of importance in air-conditioning are many, and unfortunately the term is sometimes used to refer only to minor factors such as cleaning and circulating of air. It is important that the engineer should exactly realize what an air-conditioning system does and what it does not do, and that he should make clear to others what results can be expected from the system. Complete air-conditioning is known to involve the simultaneous control of the following factors: temperature, humidity, air motion, air distribution, dust, bacteria, odours, toxic gases. The first three of them, temperature, humidity and air motion, are the most important, and no air-conditioning system deserves the name unless it satisfactorily controls those three factors. Thus it follows that air-conditioning involves heating as well as cooling. The general problem of maintaining comfortable conditions in an occupied room has been the subject of study for many years. Early investigators believed the atmosphere of a crowded room to cause discomfort through its effect on the lungs, and carbon dioxide, being the principal product of respiration, was looked upon as the harmful element. Air-conditioning, or ventilation, as it was formerly called, was therefore considered for many years to be a problem of supplying sufficient fresh air to dilute the carbon dioxide content.

Experiments led engineers to give up this theory. Seven men were placed in an airtight chamber until the carbon dioxide content increased and the oxygen content decreased considerably. They suffered great discomfort; but when the air was set in motion by fans, the discomfort at once disappeared. Other men outside the chamber experienced no discomfort from breathing the air from the chamber through tubes, but those within the chamber experienced no relief from breathing outside air. This experiment demonstrated the concept of air-conditioning, namely, that the cooling effect of the atmosphere upon the skin is of great importance and that comfort depends upon maintaining

the proper thermal environment. The men within the test chamber were uncomfortable because their body heat was not being properly removed, and they became more comfortable as the fans increased the rate of heat removal.

Vocabulary Focus

Ex. 7. Complete the sentences using the words from the box below and translate them into Russian.

a) Complete air-conditioning, b) the carbon dioxide content, c) ventilation, d) the oxygen content, e) Air-conditioning, f) body heat, g) thermal environment

1) For many years we have introduced air into buildings after heating, dehumidifying and, in some cases, cooling it, and we have called that process_____.

2) _____ may be said to be the treatment of the air in the building so as to make it more comfortable or healthful for human beings or more suitable for manufacturing processes.

3) _____ is known to involve the simultaneous control of the following factors: temperature, humidity, air motion, air distribution, dust, bacteria, odours, toxic gases.

4) Air-conditioning, or ventilation, as it was formerly called, was therefore considered for many years to be a problem of supplying sufficient fresh air to dilute_____.

5) Seven men were placed in an airtight chamber until the carbon dioxide content increased and _____ decreased considerably.

6) This experiment demonstrated the concept of air-conditioning, namely, that the cooling effect of the atmosphere upon the skin is of great importance and that comfort depends upon maintaining the proper_____.

7) The men within the test chamber were uncomfortable because their _____ was not being properly removed.

Ex. 8. Find the English equivalents to the following words from the text given above.

1) осушение,
2) циркуляция воздуха,
3) запах,
4) влажность,
5) легкие,

6) вредный,
7) воздухонепроницаемая комната,
8) облегчение,
9) тепловая среда,
10) тепло тела.

Ex. 9. Read the following sentences and write whether they are T (true) or F (false). Correct the wrong sentences. Translate them into Russian.

1) The factors which are of importance in air-conditioning are few, and the term is sometimes used to refer only to minor factors such as cleaning and circulating of air. T/F
2) It is important that the engineer should exactly realize what an air-conditioning system does and what it does not do, and that he should make clear to others what results can be expected from the system. T/F
3) The first two of them, temperature and air motion, are the most important, and no air-conditioning system deserves the name unless it satisfactorily controls those two factors. T/F
4) Early investigators believed the atmosphere of a crowded room to cause discomfort through its effect on the lungs, and carbon dioxide, being the principal product of respiration, was looked upon as the harmful element. T/F
5) Seventeen men were placed in an airtight chamber until the carbon dioxide content increased and the oxygen content decreased considerably. T/F
6) Other men outside the chamber experienced discomfort from breathing the air from the chamber through tubes. T/F
7) This experiment demonstrated that the cooling effect of the atmosphere upon the skin is of great importance and that comfort depends upon maintaining the proper thermal environment.

Writing Focus

Ex. 10. Look through the text again and give its summary using the following phrases:

- The text is devoted to …
- The text is about …
- It puts forward the idea of …
- The main idea of the text is …

- It touches upon the problem of …

Ex. 11. Do you have a proper air-conditioning system in your house? Is it necessary to have? Why? Express your opinion about it in 100 words.

UNIT 5. BUILDING MATERIALS

Before you start

Ex. 1. Read and translate the following key terms and concepts. Consult the vocabulary at the end of this book.

Key terms and concepts:

- ✓ ferrous metals
- ✓ non-ferrous metals
- ✓ alloys
- ✓ iron
- ✓ cast iron
- ✓ white cast iron
- ✓ grey cast iron
- ✓ wrought iron
- ✓ rough iron
- ✓ steel
- ✓ copper
- ✓ tin
- ✓ ore
- ✓ bronze
- ✓ aluminum
- ✓ mercury
- ✓ carbon
- ✓ manganese
- ✓ Silicon
- ✓ silicate slag
- ✓ luster
- ✓ liquid
- ✓ pure
- ✓ fusible
- ✓ ductile
- ✓ strength
- ✓ tensile strength
- ✓ toughness
- ✓ ductility
- ✓ abrasion
- ✓ electric and heat conductivity
- ✓ corrosion resistance
- ✓ (to) forge the metal
- ✓ (to) roll
- ✓ (to) draw
- ✓ (to) weld

- ✓ (to) pull
- ✓ (to) melt
- ✓ (to) be a good conductor of electricity

Reading Focus

Ex. 2. Read and translate the following text paying attention to the key terms and concepts given above.

Metals

All metals are divided into ferrous metals and non-ferrous metals.

Ferrous metals are metals and alloys, the main component of which is iron. The classification of ferrous metals includes iron, steel and its alloys.

Metals, in general, and especially ferrous metals are of great importance in various constructions.

Non-ferrous metals are metals and alloys, the main component of which is not iron but some other element such as copper (Cu), aluminum (Al) and others. Copper, aluminum and some other metals are referred to as non-ferrous metals. The properties of ferrous metals:

a) all metals can be easily known by their specific metallic lustre;

b) metals can be forged;

c) metals can be pulled;

d) all metals, except mercury, are hard substances. However, hard metals can be reduced to liquid by heating;

e) being fusible metals can be melted;

i) in general, metals are good conductors of electricity.

These characteristics are possessed by all the metals, but the metals themselves differ from one another.

Steel and cast iron are referred to the group of ferrous metals. They are alloys of iron (Fe) with carbon (C), manganese (Mb), Silicon (Si) and other components. By the content of carbon in metals we distinguish cast iron, white cast iron, grey cast iron and wrought iron. The carbon content ranges from 0 to 4 %.

Cast iron is the cheapest of the ferrous metals. Cast iron contains 1.7 % carbon.

White cast iron is used in those machines which require some resistance to abrasion. The tensile strength of white cast iron is about 30,000 pounds per square inch, its hardness is about 400 to 500 Brinell.

Grey cast iron is an alloy of iron, and carbon in which some of the iron carbide is dissociated to form graphite carbon. Grey, cast iron has its term because of special colour of its fracture.

It is quite necessary to regulate the proportion of silicon in the melt and to control the temperature after the grey cast iron has been poured.

Wrought iron is a mixture of very pure iron and silicate slag. Properties of rough iron such as strength, toughness, ductility have more advantages than cast iron. Wrought iron is quite ductile and can be easily rolled, drawn, forged and welded.

Steel is an alloy consisting of iron and carbon in which the carbon content does not exceed 1.7 %. Steel is obtained from cast iron. Steel is hard and malleable. There are different kinds of steel, such as cast steel and forged steel.

Alloyed Steel (or Special Steel) is steel to which elements not present in carbon steel have been added, or in which the content of manganese or silicon is increased above that in carbon steel. This kind of steel is widely used in building.

Stainless Steel is corrosion resistant steel of a wide variety of compositions but always containing a high percentage of chromium (8–25 %). Stainless steel is used for cutlery, furnace parts, chemical plant equipment, valves, ball bearings, etc.

Non-ferrous metals:

Some of the characteristics of non-ferrous metals are: high electric and heat conductivity, high corrosion resistance, non-magnetic qualities, light weight and easiness to fabrication.

Aluminum is the oldest and best known light metal. An aluminum alloy containing about 8 per cent of copper is stronger than pure aluminum but it possesses less ductility.

Aluminum is a white silvery metal. It does not rust in the air. Aluminum like copper is a soft metal. That is why it is used only when alloyed with other metals. Aluminum alloys are liable to corrosion, particularly by salt water, or in salty atmosphere.

Copper is found in nature in the form of ores but it is sometimes found in pure state. Pure copper is of reddish colour and it has corrosion resistant qualities. Copper is the best conductor of electricity. There are many different alloys with copper. An alloy of copper and tin is called bronze.

Vocabulary Focus

Ex. 3. Look through the text again and choose the appropriate adjectives from the text to complete these terms. Translate them into Russian.

1) *ferrous* metals – черные металлы
2) _____ luster – _____;

3) _____ iron – _____;
4) _____ slag – _____;
5) _____ qualities – _____.

Ex. 4. Complete the following sentences with the words from the text and translate them into Russian.

1) All metals are divided into *ferrous metals and non-ferrous metals. – Все металлы делятся на черные и цветные.*
2) The classification of ferrous metals includes _____.
3) Steel and cast iron are referred to _____.
4) Grey, cast iron has its term because of _____.
5) Wrought iron is a mixture of _____.

Writing Focus

Ex. 5. Read the text again and answer the following questions:

1) Why are metals and especially ferrous metals of great importance in various constructions?
2) What are the properties of ferrous metals?
3) What kind of steel is widely used in building?
4) What colour is pure copper?

Reading Focus

Ex. 6. Study the following text and find the key terms and concepts from Ex.1. Translate the sentences with them into Russian.

Smart materials

Smart – or shape memory – materials are an invention that has changed the world of engineering. There are two types: metal alloys and plastic polymers. The metal alloys were made first and they are usually an expensive mixture of titanium and nickel.

Shape memory materials are called «smart» because they react to change in their environment, for example:

- Plastics that return to their original shape when the temperature changes. One use is in surgery where plastic threads «remember» the shape of a knot, react to the patient's body temperature and make themselves into stitches.
- Metal alloys that have a «memory» and can return to their original shape. They are used in medical implants that are

compressed so they can be put inside the patient's body through a small cut. The implant then expands back to its original shape. More everyday uses are for flexible spectacle frames and teeth braces.

- Solids that darken in sunlight, like the lenses in some sunglasses.
- Liquid crystals that change shape and colour. These have been used in climbing ropes that change colour if there is too much strain and weight on them.

The future of these materials and there possible uses is limited only by human imagination. One clever idea is that if cars were made of smart metal, a minor accident could be repaired by leaving the car in the sun!

Vocabulary Focus

Ex. 7. Complete the sentences using the words from the box below. Translate them into Russian.

a) smart, b) colour, c) medical implants, d) sunlight, e) original shape, f) human imagination, g) metal alloys

1) There are two types:_____ and plastic polymers.
2) Shape memory materials are called «_____» because they react to change in their environment.
3) Plastics that return to their _____ when the temperature changes.
4) They are used in _____ that are compressed so they can be put inside the patient's body through a small cut.
5) Solids that darken in _____, like the lenses in some sunglasses.
6) Liquid crystals that change shape and _____.
7) The future of these materials and there possible uses is limited only by _____.

Ex. 8. Find the English equivalents to the following words from the text given above.

1) черные металлы,
2) цветные металлы,
3) сплавы,
4) металлический блеск,
5) легкоплавкий металл,
6) кованое железо,
7) силикатный шлак,

8) делать сварку,
9) руда,
10) олово.

Ex. 9. Read these sentences and write whether they are T (true) or F (false). Correct the wrong sentences. Translate them into Russian.

1) Smart – or shape memory – materials are an invention that hasn't changed the world of engineering. T/F
2) The metal alloys were made second and they are usually an expensive mixture of titanium and nickel. T/F
3) Shape memory materials are called «smart» because they react to change in their environment. T/F
4) Plastics return to their original shape when the temperature rises. T/F
5) Metal alloys have a «memory» but they cannot return to their original shape. T/F
6) Liquid crystals are used in climbing ropes that change colour if there is too much strain and weight on them. T/F
7) One clever idea is that if cars were made of smart metal, a minor accident could be repaired by leaving the car in the water! T/F

Writing Focus

Ex. 10. Look through the text again and give its summary using the following phrases:

- The text is devoted to …
- The text is about …
- It puts forward the idea of …
- The main idea of the text is …
- It touches upon the problem of …

Ex. 11. Read the information in the table and find out which material (1–10) is best for:

a) water pipes,
b) a knife for cutting a microscope lens,
c) a bicycle frame,
d) window sills,
e) television casing.

№ п/п	**Material**	**Properties**	**Uses**
1.	aluminium	light, easy to shape	aircraft, window and door frames, cooking foil
2.	brass (copper and zinc)	doesn't rust in contact with air and water, strong	valves, taps
3.	cement	mixed with water it dries to a hard material	pre-made building blocks, to hold bricks together
4.	copper	easily made into wire, carries electricity well	electrical wire, tubing
5.	diamond	hardest natural material, can cut glass and metal	industrial cutting and grinding
6.	glass	clear, hard, breaks easily	windows, bottles
7.	iron	hard	engineering
8.	mild steel (iron + 0.15–0.3 % carbon)	hard, strong, quite easy to shape	bridges, ships, cars
9.	optical fiber	carries light and coded messages	lighting, cable TV, telecommunications
10.	plastic	light, strong, easy to shape	hard hats, telephones, boats, computer casing

SUPPLEMENTARY READING

1. Comfort criteria

The main comfort criteria for sedentary occupants in buildings in climates similar to that of the British Isles are as follows:

1) The dry resultant temperature should be in the range 19–23 °C depending on room use.

2) A feeling of freshness is produced when the mean radiant temperature is slightly above air temperature. A significant amount of radiant heating is needed in order to achieve this.

3) The air temperature and the mean radiant temperature should be approximately the same. Large differences cause either radiant overheating or excessive heat loss from the body to the environment, as would be experienced during occupation of a glasshouse through seasonal variations.

4) Percentage saturation should be in the range 40–70 %.

5) Maximum air velocity at the neck should be 0.1 m/s for a moving-air temperature of 20 °C. Both hot and cold draughts are to be avoided. Data are available for other temperature and velocity combinations.

6) Variable air velocity and direction are preferable to unchanging values of these variables. This is achieved by changes in natural ventilation from prevailing wind, movement of people around the building, on-off or high-low thermostatic operation of fan-assisted heaters or variable-volume air-conditioning systems.

7) The minimum quantity of fresh air for room use that will remove probable contamination from smoking, for example, is 10.41/s per person.

8) Mechanical ventilation systems should provide at least four air changes per hour to avoid stagnant pockets and ensure good circulation.

9) Incoming fresh air can be filtered to maintain a clean dust-free internal environment.

10) The difference between room air temperatures at head and foot levels should be no more than 1 °C.

11) Ventilation air quantity can be determined by some other controlling parameter: removal of smoke, fumes or dust, solar or other heat gains and dilution of noxious fumes.

2. Boilers

The boiler may be one of a number of types. It may be a solid one-piece casting, rectangular in form; it may be sectional; or it may

be conical in shape and wrought or cast iron. For smaller systems, the first and last-named types are both cheap and suitable. The sectional boiler has the advantage of the possibility of added sections should more heat be needed subsequent to initial installation. Sectional and shell type boilers are almost invariably used for bigger installations. The former are cast iron and can be built up in site, whilst the latter are usually of the "packaged" type, having all auxiliary components together with the boiler assembled as one unit ready for erection.

In general, a heating system should be designed so that the water will circulate by gravity. In some installations, circumstances are such that a pump or accelerator must be used to achieve a satisfactory circulation. This should be avoided if possible.

When designing a heating system for a large building, it is usual – in the interests of economy and to ensure efficient heating – to first calculate how much heat will be needed to maintain the building at the desired temperature. Then the size of the boiler and the amount of pipe and radiator heating surface required to give out this heat will be estimated. For small systems, «rule-of-thumb» methods and past experience are generally a sufficient guide.

The overhead drop-feed system shows how the hot water from the boiler is carried as high as possible in the building, from where it falls in cooling, through the various branch pipes and radiators, back to the boiler. In this type of system, the maximum amount of «circulating head» or pressure would be obtained.

3. Plumbing

For many centuries plumbing was unknown, except in the places and houses of the great wealthy. Amid the rums of some cities of ancient Roman times evidences have been found of the use of piping systems to a very limited extent in private houses and to a much greater extent in connection with public bath houses. Step by step during a long period of years modern plumbing has been evolved. Water is brought into house from the street mains (water pipes), through pipes. The branch pipes supplying water to a bathroom and lavatory will be 1/4 inch for both cold and hot water. A branch which supplies a kitchen sink and laundry tub will be 3/4 inch for either cold or hot water. Water-supply pipes inside houses are made of galvanized iron, wrought iron and of brass.

Drainage pipes outside of the house itself, that is, between the house the sewer in the street, are called the house sewer. They are usually of glazed vitrified tile, but if the ground on which the sewer is laid is not absolutely firm and solid, cast-iron pipe should be used, as it

is much stronger than tile, which is liable to be broken by any settlement. Drainage pipes inside the house in the basement or underneath the basement floor are called the house drain. Drainage pipes should be of cast iron.

4. Sanitary fitting

Sanitary fittings are those appliances used in the collection and disposal of human and domestic waste products.

They comprise commonly: water-closets, lavatory basins, baths, sinks, and urinals.

Most baths are of vitreous-enameled cast-iron; they have a square top and are fitted with panels on any exposed sides. There is a growing tendency to use pillar taps instead of the lately common globe-type taps, fixed on the vertical end of the bath. By using pillar taps, the bib or outlet can be, raised above the flood rim of the bath, and any danger of water pollution in the service pipes – due to back siphonage – is made less possible. The taps are secured as in a lavatory basin, It is important that before any tap is fixed, the tap top should be removed and reassembled. It often happens that tap tops are abnormally tight, and a lavatory basin or any other fitment might be damaged.

When the tap end of a bath is close to a wall, it is necessary to couple up the farthest tap first, then the overflow, and finally the near tap. Here again a cranked spanner is useful.

The bath waste should be fitted before the bath is lifted into position, and the waste pipe should be in place and complete with trap, so that only a horizontal nut remains to be tightened.

As sinks are heavy and are often well loaded, they need good support. In the old days brick pillars were often used, but they are to be deprecated. The support should be such that there is no difficulty in cleaning the wall and floor. For this reason cantilever brackets' should be used. Special brackets can be bought, but two pieces of angle- or tee-iron, will do admirably; they should be well fastened in the brickwork preferably by building in. For neatness, the brackets should finish about 75nut from the front of the sink and be cut diagonally. For the same reason, they should be well away from the ends.

5. Waste pipes

Waste pipes from lavatory basins, baths, and sinks may be executed in lead (traditional), copper, and cast-iron. Individual waste pipes should take the shortest path, sharp bends should be avoided, and they should be of such size that they will generally run fairly full and thereby be self-cleaning. Lead waste pipes are joined by means of

wiped joints. Whenever lead pipe is used, it should be property supported to avoid sagging. Copper waste pipes, being more rigid than lead, require less support. Copper tube can be bent to requirement. Cast-iron, pipes are sometimes used. They should be of heavy-quality, treated inside and out with a special, bituminous solution. The joints should be caulked with tow and lead-wool or molten lead. Waste pipes should be laid to proper falls, and access should be provided in order that each length of pipe can be rodded. Soil pipes are those which convey the contents of water-closets and urinals to the drains. The vent-stack which is normally carried above the roof is also included in any discussion of soil pipes.

In the «one-pipe system» all sanitary fittings discharge into the same soil pipes with an economy of pipe work, and a simplification of layout. A few precautions need to be taken. All lavatory basins, baths, and sinks must be fitted with deep-seal traps or with anti-siphonage pipes. The anti-siphonage pipe can be returned into the vent shaft at a point not less than 1 m above the highest soil pipe junction. The main anti-siphonage pipe must, in certain circumstances, be carried down and connected into the main soil stack below the lowest inlet branch. This precaution is necessary where fittings are situated on two or more floors and discharge into a common stack.

6. Water main

Water mains are those pipes, which distribute the water from the reservoir. They vary in size from huge conduits of many feet diameter to fractions of an inch. Those of concern to the plumber are generally of cast-iron; asbestos-cement, lead, or copper, cast-iron pipes of 100, 75 and 500 mm (4, 3 and 2 in) diameter should be considered. They may be had in lengths varying from 2 to 4 m (6 to 12 ft) and conform to a British Standard specification. A protective coating of a bituminous kind, which is applied whilst the casting is hot, is applied inside and out. Suitable fittings such as bends and junctions are available for use where there is a change of direction or branch to be made are lighter than cast-iron and can be had in correspondingly longer lengths. Like cast-iron, they are treated with a protective coating to prevent the development of vegetal growths. Such growths would by their roughness increase the friction between water and pipe, producing a loss of pressure. Specially designed joints are used on these pipes, which have spigots at both ends and loose collars with rubber rings. A special tool is used to fit the collar and rings in position. Immediately inside the house, or any building, a consumer's stop tap should be fitted, so that all cold-water pipes in the building are under quick and

easy control. This tap must be of the screw down type, as must every other hand-operated tap on town's water. It might be mentioned here that all taps, valves, and cisterns used on water services, including hot-water services and services on meter, must be tested and stamped by the water authorities. Most water authorities provide a constant supply of water, but some few find it necessary to intermit supply for various reasons such as inadequacy of mains, capacity and demand at peak periods. This system is known as intermittent supply and for its operation householders have to have a large storage cistern to cover their needs in periods when, the supply stops.

7. Air-conditioning refrigerant

Refrigerant is a substance used in refrigeration to make or keep cold or cool. All air-conditioning systems must have air-conditioning refrigerant in its system in order to absorb excess heat and result in cool air blowing through the air filters in your home, office or building. A chemical refrigerant is placed inside the air-conditioning system to absorb the unwanted heat which in turn is pumped through an outside unit that will blow the heat to the outside and transfer the outside air to cool air inside your home. Chlorofluorocarbon, a colorless, nearly odorless liquid is what comprises the refrigerant, also referred to as R-11. When it's placed at room temperature, the liquid starts to boil and can be used in air-conditioning systems to assist with heating and air-conditioning. If your air-conditioning system is low on air-conditioning refrigerant, you might need to contact an air-conditioning company or an air-conditioning contractor. Often times, the air-conditioning refrigerant can be undercharged during the time of an air-conditioning installation or there might be a refrigerant leak. Adding more refrigerant will not solve the leak. A reliable air-conditioning company will test to see where the leak is coming from and repair the air-conditioning part and change the air-conditioning to its proper level. This is essential for the very best in air-conditioning and refrigeration. If you live in hot zones, replacing your air-conditioning filters on a monthly or bi-monthly basis gives all air-conditioning parts the very best in functionality and performance, including the air-conditioning refrigerant. Just like your car, the more you use air-conditioning in your home, the more often you will need to replace the refrigerant. Normally, a technician will set the air-conditioning to its proper level and add to the air-conditioning refrigerant if needed.

8. Air-conditioning filter

The air-conditioning filter is one of the most important air-conditioning parts in the air-conditioning system. Without it, your air-conditioning system would be dirty and the air you breathe would be filled with pollutants. All air-conditioning parts, from the ductwork to the air-conditioning refrigerant, need the air-conditioning filter to be clean and replaced to ensure you're getting the very best in central air-conditioning. If an air-conditioning filter is left dirty, over time, it can lead to higher energy costs and short equipment life due to all the air-conditioning parts relying on each other. One cannot work without the other. Overall, your heating and cooling will not be as effective and you will need to invest in more air-conditioning repair and air-conditioning maintenance.

An air-conditioning filter should be changed every month or every two months for home air-conditioning systems and every couple of weeks for certain commercial or industrial air-conditioning since it's running almost 24 hours a day, 7 days a week. Doing this as a routine in your monthly chores and not waiting until you see dust matted on the air-conditioning filter will ensure you and your family the very best health as well as a smooth running air-conditioning system. Dust particles cannot always be seen so even if you see a little dust on the air filter, clean it as you normally would.

Since there are a variety of air-conditioning filters, how quickly one gets blocked versus another depends on the brand – most air-conditioning filters are sized 1 ½ to 2 square feet for each ton of capacity for a home or commercial property.

You can judge a filter's ability to clean by using MERV ratings – Mini – mum Efficiency Reporting Value – which is a rating of how efficient an air-conditioning filter is from 1–12. The higher the rating, the more effective it is at removing particles such as animal dander, pollen, dust, mold and other allergens, and the better the protection for your air-conditioning equipment.

Most air-conditioning filters screen out particles measuring from 3 to 10 microns (μm) in size.

The common types of air-conditioning filters are:

- Conventional fiberglass disposable filters (1 μm and 2 μm): These are common in most homes and small industrial air-conditioners and commercial air-conditioning systems. Since they are disposable and have an adhesive coating that traps the dust, you should not clean the filters. This may damage the filter's ability to remove particles by damaging the adhesive coating and/or the underlying mesh work. They are both not as effective as other types of filters even though they are lower in cost.

- Pleated fiberglass disposable filters (1 μm and 2 μm): The 1 μm are generally used in many residential and commercial settings and are made of materials that can vary in the effectiveness. Usually, they are more densely woven to increase the efficiency of removing dirt. These have a larger surface area to lead to increased trapping of particles as compared to conventional filters. They must be specified for your air-conditioning system or this can lead to increased demand on your air-conditioning components. Thereby, a mismatch can be counterproductive on the health of the air-conditioning system and possibly lead to higher air-conditioning maintenance and service cost. You should check with the air-conditioning manufacturer as to the appropriate type of pleated filter for your system. A filter spray can also be applied after the cleaning and drying of the air-conditioning air filter.
- Electrostatic filters: Different in design and performance, since there are so many varieties, it is rather difficult to determine which is the most efficient. They are commonly advertised as allergy-free air-conditioning filters. These filters also come in the 1μm and 2μm sizes. Air that moves through the filter creates a static charge that collects any dust in the filter. They may require more cleaning and more blower power.
- Electronic filters: Connected to an electrical power source and usually wall mounted, electronic filters come with a pre-filter that can collect larger particles and only need to be cleaned every six months.
- Carbon filters: These filters contain carbon that can control any odor problems you might have within the air-conditioning system. They can also be useful in homes with pets.

9. Portable air-conditioning

Whether you're at home, in the office or renting an apartment, portable air-conditioning could be the answer to your air-conditioning and air circulation needs. Easy to move around, portable air-conditioning can be transported room to room with hardly any effort. It's also ideal for those oddly shaped windows your spouse was so crazy about when you built your house.

A portable air-conditioning unit provides the same heating and air-conditioning as an air-conditioning system, however, the quantity or the area it cools/heats is smaller and targeted. These rooms could be converted office space (ideal for keeping computer hardware cooler), attics and basements or even a garage.

Portable air-conditioners are also recommended for people with allergies because of the easy-to- replace carbon air condition filters.

These filters help to remove pollen, bacteria, animal dander and dust. Portable air-conditioners are not to be confused with a portable air cooler. The portable air cooler uses water and evaporation to cool, the same as an evaporative swamp cooler – so only the outside air is used to cool the room. Portable air-conditioners actually use Freon to cool and are more effective in their ability to cool rooms while keeping the humidity at a low level. Although more expensive than evaporative swamp coolers or a window fan, portable air-conditioning gives you the feel of central air-conditioning with the advantage of generally low air-conditioning maintenance. There are no air-condition parts to worry about or any air-conditioning repair needed. Cleaning the air-condition filter is very hands-on and easy to manage – just wipe the air-condition filter clean with a soft, damp cloth about every two weeks.

Most portable air-conditioners range from 29μm to 36μm and weigh no more than 85 pounds. Prices usually range from a little under $300 and can go up to $700.

Portable air-conditioning is the perfect solution for:

Those that are renting an apartment and need more of a concentrated cooling system.

- For a house or apartment that you don't want to put nails or holes in as you would with an outside air-conditioning unit.
- For senior citizens or the physically challenged who want a simple solution to their air-conditioning and central air-conditioning needs.
- Oddly shaped windows or areas that are not receiving enough air circulation.
- Industrial or commercial air-conditioning needs, in specific areas (such as computer rooms, etc.).

10. Heat pump

A heat pump is simply an air-conditioner that contains a valve allowing it to let you decide whether you want heat or cool air to circulate throughout your home. The heat pump valve can be adjusted based on your specific needs – providing you with a cool breeze or reversing its flow of Freon, located in the air-conditioning refrigerant, and delivering a toasty feel to the room. The heat pump is an electric component that has come a long way from the proprietary gas furnace.

Most people are at least familiar with heat pumps and how it can be a cost-effective way to provide the very best in central air-conditioning. Depending on your climate and your heating and air-conditioning needs, choosing an advanced heat pump system can range anywhere from $2,000 up to a top-of-the-line, more popular

brand that is around $8,000. Some of the best heat pumps can be very expensive but are very quiet and are sure to give you more «bang for your buck».

Maintaining your heat pump system so it can last you years, comes from taking care of the entire air-conditioning system and air-conditioning parts. Cleaning the air-conditioning air filter at least once a month properly (some air-conditioning systems now even have disposable air-conditioning filters), doing an annual air-conditioning inspection with a creditable air-conditioning company, and simply paying attention to the heat pump thermostat are all ways to make your heat pump air-conditioner last.

If you are shopping around for a new heat pump thermostat, look for one that has a variety of features to deliver an overall performance that will give you the best in temperature control. There are two main types of heat pump thermostats and the options are simply based on preference. There are electromechanical and electronic heat pump thermostats, used for residential purposes. The electronic heat pump thermostats can provide any temperature you'd like and are entirely programmable, where you can set it to 60 degrees at night and then have it programmed to be at a comfortable 70 degrees when you wake up in the morning. Electro-mechanical thermostats contain a bi-metal coil or strip that are two different types of metals, which expand and contract at different rates. When this takes place, the coil or strip moves and connects to a device that will provide the electrical circuit. They are set at standard temperatures and you adjust them with a little switch to the appropriate temperature.

ENGLISH-RUSSIAN VOCABULARY

A

abrasion – износ
accuracy – точность, правильность
acoustic environment – акустическая среда
(to) activate powerful cooling or heating – активизировать режим мощного охлаждения или подогрева
actual value – действительная величина
adaptive control – настройка
additional cooling coils – дополнительный охлаждающие змеевики
additive – добавка, примесь
air block – воздушная пробка в трубопроводе
air blower (plenum fan) – нагнетательный вентилятор
air-born dust – пыль в воздухе
air cleaning equipment – оборудование для очистки воздуха
air compressed water tank – гидрофор
air-conditioning – кондиционирование воздуха
air-conditioning apparatus – устройство для кондиционирования воздуха
air-conditioning supply duct – канал подачи кондиционирования воздуха
air cooler – воздухоохладитель
air-cooler battery – батарея воздухоохладителя
air-conditioning coil – батарея кондиционера (теплообменник)
air distribution – распределение воздуха
air distribution apparatus – воздухораспределительный агрегат
air flow angle – угол отклонения воздушного потока
air heater – воздушно-отопительный агрегат
air injection – инжекция воздуха (нагнетание)
air intake blank – заглушка воздухозаборного устройства
air motion – движение воздуха
air pocket – воздушный затвор
air power – полезная мощность для перемещения воздуха
airstreams – воздушные потоки
air slot – щель для прохода воздуха
air splitter – дроссельное устройство
air suction – всасывание воздуха
airtight chamber – герметичная камера
air valve – воздушный клапан

alkaline – щелочной
alloy – сплав
aluminium – алюминий
amplification – усиление
anti-rust – коррозионно-стойкий
antirusting paint (protective coating) – антикоррозийная окраска
anti-siphon valve – вакуумный вентиль
application part-load value – величина нагрузки
appurtenances – запасные части
arc welding – дуговая сварка
arc-welding machine – генератор дуговой сварки
ash – зола
assembly room – сборочный цех
assisted circulation – принудительная циркуляция воды
atmospheric dust spot efficiency – эффективность поглощения пыли
atmospheric environment – атмосферная среда
atmospheric pollutants – загрязняющие вещества в атмосфере
attic – чердак, мансарда
autogenous welding apparatus – газосварочный аппарат
automatic ventilation valve – автоматический клапан для спуска воздуха
average specific infiltration – средняя величина инфильтрации

B

backfill – забутовка, засыпка
bacteria – бактерия
bank of tubes – ряд труб
basement – подвал
batt insulation – обертывающая теплоизоляция
battery pressure drop – перепад давления в батарее
(to) be a good conductor of electricity – быть хорошим проводником электричества
beading of the tube end – отбортовка кромки трубы
bellows valve – сильфонный вентиль
bend – колено трубопровода
bending – изгиб
bent pipe – поворот трубы
bid security – залоговая гарантия тендерного предложения
binder – вяжущее вещество

biological effluent pollution – загрязнение сточными биоотходами
bituminous felt – битуминизированный войлок
block-type thermal insulation – теплоизоляционный блок
blowpipe – газовая горелка с дутьем
blowing-off pressure – продувочное давление
boiling – кипение
boiler – котел
boiler house – котельная
bonding (grounding) – заземление
bore hole – буровая скважина
bore of pipe – внутренний диаметр трубы
box-nut – гайка-заглушка
branch duct – ответвление воздуховода
braze-welding – пайка-сварка
brazing flux – флюс для пайки (твердым припоем)
breather hole – люк вентиляционный (отдушина)
brine head tank – расширительный рассольный бак
broken coke – коксовый щебень
bronze – бронза
buffer tank – регулирующая емкость
building services engineer – инженер строительных услуг
bundle – связка
bunker – ящик угольный
burner – горелка
butt-welding – стыковая сварка
butterfly valve – дроссельный вентиль
by-pass valve – обводной вентиль

C

calcium carbonate – карбонат кальция
calcium sulphate – сульфат кальция
cap nut – гайка-колпачок
carbon – углерод
carbon dioxide content – содержание углекислого газа
cas – ящик
cast iron – чугун
catchment – дренаж
caulking of the lead – зачеканка свинцом
(to) cause corrosion – вызывать коррозию
cell – ячейка
central air-conditioners – центральные кондиционеры

central-fan air conditioning – центральный вентилятор системы кондиционирования воздуха
central heating – центральное отопление
cesspool – выгребная яма
change of wall partitions – перенос стеновых перегородок
(to) charge – заправлять
charge bogie –загрузочная вагонетка
check dam – защитная дамба
check up inspection – инспекция строений
chemical fertilizers – минеральные удобрения
chimney – дымовая труба
chisel – зубило
chlorination – хлорирование
(to) choke – заглушать
choke (muffler) – глушитель
choking of the filter – загрязнение фильтра
circulation of air – циркуляция воздуха
clamp – зажим
clamp bracket – зажим обоймы
clamping screw – натяжной болт
clarifying efficiency – эффективность очистки
cleaning – очистка
cleaning door – лаз для очистки
(to) clear an emergency – ликвидировать аварию
clearance – зазор
(to) clog – засорять
close nipple – сгон
collecting of samples – отбор проб
colorimeter – калориметр (для измерения теплоты)
combined cooling-heating equipment – комбинированное оборудование для охлаждения и нагрева
combustible – горючее
combustible tank – топливный бак
combustion medium – горючее вещество
companion valve – парный вентиль (для наполнения и опорожнения системы)
(to) compress – уплотнять
compressed gas – сжатый газ
compression release valve – вентиль для сброса давления
condensate – конденсат
condensation – конденсация
condensation core – ядро конденсации

condensing section – блок конденсации
conduction – теплопроводность
conduit – трубопровод
connecting clamp – зажим соединения
connecting-piece – соединительная деталь
constant-pressure cycle – цикл постоянного давления
contact-closure input – контактно-замыкающий ввод
(to) contaminate – загрязнять
contamination – загрязнение
contaminated air – загрязненный воздух
control detecting element – контрольно-измерительный элемент
contour line – контурная линия, линия уровня
convection – конвекция
convectors – конвекторы
cool – прохладный, свежий (воздух)
coolant – хладагент
cooling – охлаждение
cooling tank – охладительный бак
copper – медь
core – кабельная жила
corrodibility – коррозийность
corrosion protection – защита от коррозии
corrosion resistance – устойчивость к коррозии
corrugated pipe – гофрированная труба
corrugated sheet – гофрированная жесть
cracking – образование трещин
crankshaft – коленчатый вал
cross-flow fan – тангенциальный вентилятор
cross-section of pipe – поперечное сечение трубы
crude gas – неочищенный газ
cut-in – врезка
cut-in point –начальная величина

D

dam – дамба, плотина
damp – сырость, сырой, влажный
data bank – банк данных
decipol – децип ол (внесистемная единица загрязнения воздуха кондиционируемого помещения)
default value – недостаточная величина
deficiency of air – недостаток воздуха

degree of hardness – градус жесткости
dehumidifiers – осушители
dehumidification – обезвоживание
dehumidifying – осушение
demand limit tripping – отключение по лимиту потребления
demand-limited storage – аккумулятор с ограничением по энергопотреблению
design-engineer – инженер-проектировщик
design heating load – расчетная отопительная нагрузка
design working pressure – расчетное рабочее давление
deterioration – брак
(to) dilute – разбавлять
dilution – разбавление, растворение, разведение
dimensioned drawing – чертеж с размерами
direct flow valve – клапан без изменения направления течения
dirt – шлам
discharge cycle – цикл нагнетания
discharge line valve – запорный вентиль нагнетательного трубопровода
dished end plate of heat exchanger – доска трубная в теплообменнике
diversion pipe fitting – фасонная часть на трубопроводе с регулированием потока по ответвлениям
double-wall water heater – водонагреватель с двойным корпусом
(to) disseminate – распространять, рассеивать, разносить
(to) distribute air / water – распределять воздух / воду
double-suction fan – вентилятор с двухсторонним всасыванием
down riser – стояк
Draeger-CO-measuring apparatus – газоанализатор Дрэгера
draft – чертеж
drain baffle – труба водосточная
(to) drain away – стекать
drainage – дренаж, канализация
draught intensity – интенсивность тяги (сила тяги)
draught of chimney – тяга дымовой трубы
dried matter – вещество сухое
(to) drill – сверлить
drive shaft – карданный вал
dry – сухой

dry air-conditioning battery – батарея осушения кондиционера
duct – трубопровод
duct section – отрезок трубопровода
duct sizing – расчет воздуховодов
duct sizing chart – график для определения размеров трубопроводов
ductile – пластичный, гибкий
ductility – тягучесть, эластичность
dummy product – заменитель
dust – пыль
dust separation equipment – пылеочистное оборудование
dusty – пыльный

E

eddy current test – испытание индуктивным методом
effect on the lungs – воздействие на легкие
E-glass – борат (стекло)
electric and heat conductivity – электро- и теплопроводимость
electrical fault – короткое замыкание
electrostatic precipitator – электростатический фильтр
elevation drawing – чертеж в двух проекциях
emergency-relief valve – аварийный предохранительный клапан
emergency water supply – аварийное водоснабжение
environment – окружающая среда
environment pollution – загрязнение окружающей среды
environmental conditions – условия окружающей среды
environmental test chamber – климатическая исследовательская камера
enclosure – огороженное место
energy conservation law – закон сохранения энергии
energy consumption – потребление энергии
energy value target – требуемая величина энергии
equalizing line – уравнительная линия (трубопровод)
equivalence principle – первый закон термодинамики
estimate – смета
evaporation – выпаривание, испарение
evaporation of moisture – испарение влаги
(to) evaporate – испаряться, выпаривать
excess – избыток
exhaust chamber – вытяжная камера
exhaust fan – вытяжной вентилятор

exhaust grille – вытяжная решетка
exhaust hood – вытяжной зонт
exhaust systems – выхлопные системы

F

factory mounted – заводская сборка
fan – вентилятор
fan chamber – вентиляционная камера
fan unit – вентиляторный агрегат
(to) fasten – закреплять
feed water tank – подпитывающий бак с водой
ferrous metals – черные металлы
non-ferrous metals – цветные металлы
field engineer – инженер-инспектор
filter – фильтр
filter bank – блок фильтров
filter bed – загрузка фильтра
filter drum – барабан фильтра
filter filling – зарядка фильтра
finned length – длина оребрения трубы
finned-tube radiator – радиатор из ребристых труб
firing valve – пробковый клапан отопительной системы
first cost – накладные расходы
fitter – слесарь-монтажник
fixing bolt – закрепляющий болт
flange connection – фланцевое соединение
flange tap – фланцевый кран
flared joint – раструбное соединение
flexible blade – лопасть вентилятора
flexible coupling – соединение гибкое
float gauge – поплавковый указатель уровня
float high (low) pressure valve – поплавковый клапан высокого (низкого) давления
float-valve – плавающий вентиль
floating control – астатическое регулирование
flocculator – бассейн для коагулирования
fluid – жидкость
(to) foam – вспенивать
(to) forge – ковать, выковывать
foul water sewer – канал для сточных вод
fracture – излом
fuel – топливо, горючее

fuel gas – горючий газ
fuel gas analysis – анализ горючих газов
fuel input rate – норма теплопотребления
fuel oil – мазут
fuel supply – поставка топлива
full scale – натуральная величина (масштаб 1:1)
fumes – чад, дым
furnace – печь
furnace room – котельная
fusible – легкоплавкий
fusion welding – сварка плавлением

G

gage – измерительный инструмент
(to) galvanize – оцинковывать
galvanized sheet – оцинкованное железо
gas baking oven – газовая духовка
gas blower – газодувка
gas bottle (cylinder) – газовый баллон
gas conduit – газопровод
gas container (tank) – газгольдер
gas counter – газовый счетчик
gas faucet – газовый кран
gas generator (producer) – газогенератор
gas leakage – утечка газа
gas load – нагрузка по газу
gas main – магистральный газопровод
gas network – газовая сеть
gas radiator – газовый радиатор
gas supply – газоснабжение
gas-tap – газовый кран
gas yield – добыча газа
gasoline soldering – бензиновая паяльная лампа
gauge – измерительный прибор
gear pump – шестеренчатый насос
getonating gas – гремучий газ
glow filament – нить накаливания
(to) graph – чертить график
greenhouse effect – парниковый эффект
ground water level – уровень грунтовых вод
guide vane assembly – направляющий аппарат (вентилятора)
grey cast iron – серый чугун

grooved joint piping – резьбовое соединение воздухопроводов

H

hazardous – опасный
hazardous substances – опасные вещества
hazardous waste – опасные отходы
head pressure – давление на выходе (из устройства)
head tank – напорный бак
heat capacity – теплоемкость
heat engineer – инженер-теплотехник
heat flow meter – тепломер
heat gain – поступление теплоты
heat losses – потери тепла
heat proofness – жаростойкость
heat recovery ventilator – вентилятор теплоутилизационной системы
heat supply – теплоснабжение
heat transfer – теплоотдача
heated space – отапливаемый объем
heating – отопление
heating curve – отопительный график
heating element – нагревательный элемент
heating flue – отопительный канал
heating grid – отопительная батарея
heating mountings – отопительная арматура
heating oil – отопительное масло
heating period – отопительный период
heating plant – теплоцентраль, отопительная установка
heating seasonal performance factor (HSPF) – фактор производительности отопительного сезона
heating steam pressure – давление пара для отопления
height of hydrostatic – величина гидростатического давления
helical fan – пропеллерный осевой вентилятор
hemp – пенька
HEPA filter – аэрозольный воздушный высокоэффективный фильтр
high-capacity boiler – котел большой производительности
high-pressure cylinder gas – баллонный газ высокого давления
horse – каркас
hose – шланг
hot gas line – линия выбросная (горячая) в холодной системе
house chimney – домовой дымоход
house installation – домовое оборудование

hub and spigot joint – муфтовое соединение
humidistat – влагорегулятор
humidifier – увлажнитель
humidity – влажность
humidity control – контроль за влажностью
hydraulic test (water test) – гидравлическое испытание
hydrometric wing – гидрометрическая вертушка
hypothermia – гипотермия

I

idling – ход холостой
ignition – зажигание
(to) improve quietness – обеспечивать бесшумность
inaccuracy – погрешность, неточность, ошибка
induced draft fan – дымосос
initial design data base – исходные данные для конструирования
initial pressure – давление на входе (в систему)
installation of pipe – прокладка трубопровода
integrated thermal storage capacity – емкость теплового аккумулятора
internal environment – внутренняя обстановка
iron – железо

J

jet range – дальнобойность струи
joint soldering – соединение пайкой
joint valve – комбинированный вентиль

K

key valve – задвижка клиновая

L

land-surveyor – геодезист
lap-welding – сварка внахлестку
leakage of gas – утечка газа
leakage point – место утечки
leveling staff – нивелирная рейка
liquid – жидкость, жидкий, водянистый
liquefied gas – сжиженный газ
liquefied natural gas (LNG) – жидкий природный газ
limestone – известняк
limit temperature – предельная температура

load variation – изменение нагрузки
loss of heat – потеря тепла
lubricant – смазка
luster – блеск

M

machinist's kit – набор слесарно-монтажных инструментов
main stop valve – главный запорный вентиль
maintenance – обслуживание и профилактический ремонт, эксплуатация
maintenance access – доступ для технического обслуживания
make-up water – подпиточная вода
male connection – соединение типа «труба в трубе»
malfunction – неисправность
manganese – марганец
manhole cover – крышка лаза колодца
manifold drying apparatus – сублимационный коллекторный аппарат
manual welding – ручная сварка
manway – смотровой люк
mark of quality – знак качества
measuring bin – дозатор
measuring range – область измерения
(to) melt – плавиться, расплавиться, таять
mercury – ртуть
metal sheet – жесть
mineral (slag) wool – минеральная вата
mixing tap set – смесительная аппаратура
moisture barrier – влагоизоляция (гидроизоляция)
monoblock compressor – компрессор-моноблок
multitubular – многотрубный

N

nipple – ниппель
nozzle – сопло
nuclear resonance thermometer – ядерно-магнитный резонансный термометр
nucleation – образование пузырьков пара
nut – гайка

O

oakum tow – пакля

occupational safety and health – охрана труда
odour – запах
oil burner nozzle – мазутная форсунка
oil drain valve – вентиль для спуска масла
olf – олф (интенсивность выделения вредностей стандартным человеком в условиях теплового комфорта)
operating life – время использования устройства (системы)
operating pressure – давление при расчетном режиме
operating range – область работы
operating temperature – рабочая температура
O-ring – эластичная деталь
ore – руда
outdoor environment – открытая среда
outlet – сток
outlet piece – вытяжной штуцер
output rating – мощность отопительной установки
overall length – строительная длина
overheating – перегрев, перегревание
overload – перегрузка
own water supply – автономное водоснабжение
owing cost (prime cost) – себестоимость
oxygen content – содержание кислорода

P

panel heating – обогрев нагревательной панелью
part-load value – величина частичной (неполной) нагрузки
patch – заплатка
performance data – основные характеристики
performance factor – коэффициент полезного действия
performance test – эксплуатационное испытание
pipe – труба, трубопровод
pipe coil – змеевик
pipe bend – колено трубы
pipe burst control – предотвращение разрыва трубы
pipe clip – хомут для труб
pipe coupling – муфта трубопровода на стыке
pipe-expanding machine – станок для развальцовки труб
pipe gallery – канал для прокладки труб
pipe grids – трубные решетки
pipe hanger – крюк для трубы
pipe network – сеть трубопроводов
pipe plug – заглушка трубы

pipe run – ветвь трубопровода
pipe sizing – измерение трубы
pipe thread – трубная резьба
pipe-threating machine – трубонарезной станок
pipe wrapping – бандаж трубы
piping accessories – трубопроводная арматура
piping diagram – схема трубопроводов
piping tract – участок трубы
pipeline bed – ложе (основание) трубопровода
pipeline section – звено трубопровода
pitch – шаг резьбы
(to) plug – закупоривать
poisonous – ядовитый
pollutant – загрязняющий
pollution – загрязнение
pop valve – защитный клапан
power ventilator – приточный вентилятор (в крыше или стене)
precipitator – аппарат для осаждения (коагулянт)
predicated mean vote – допустимый индекс отклонения (качества воздушной среды)
(to) preheat – предварительно нагреть, разогреть
preliminary drawing – предварительный чертеж (эскиз)
preset – заданный
pressure controlled condensing unit – компрессорно-конденсаторный агрегат с регулированием давления
pressure differential cut-out – отключение по разности давления
pressure-operated cooling water valve – водорегулирующий вентиль
pressure test of piping – испытание трубопроводов под давлением
pressure unit – единица давления
pressure-volume chart (p-v diagram) – диаграмма «давление – расход»
pressure water – вода под давлением
pressurization – герметизация
prime coat – грунтовка
probe – зонд
producer gas – генераторный газ
project engineer – инженер-проектировщик
properties of the building envelope – свойства ограждающей конструкции здания

(to) pull – тянуть, вытягивать
pump – насос
pump shaft – вал насоса
pure – чистый
purge valve – продувочный вентиль
purification – очистка, очищение
purity – чистота
putty – замазка

Q

quality assessment – оценка качества
quality assurance – гарантия качества
quench – закаливать
quiet-running fan – бесшумный вентилятор
quick-release coupling – быстроразъемное соединение

R

radiation – радиация
radiator – радиатор, батарея
rail tanker – вагон-цистерна
rain cycle – дождевой цикл
raised-face flange – трубная фланцевая решетка
ratio of components – соотношение компонентов смеси
receiver – ресивер
recovery – утилизация
refractory lining – огнеупорная облицовка
refrigeration equipment – холодильное оборудование
registers – реестры, запись
regularity – закономерность
removal – устранение
rendering – обмазка
renewal – обновление
rep pen – единица сопротивления водопроницаемости через материалы
reserves – запасы
resistance welding – сварка контактная
ratio – мера чувствительности устройства (прибора)
retrofit – модернизация
return air plenum – воздухозаборник
(to) rivet – заклепывать
riveted joint – заклепочное соединение
review – экспертиза

rotary pump – циркуляционный насос
rubber collar – резиновая манжета
run cycle – рабочий цикл
running ability – эксплуатационные свойства

S

sack-pipe – тупик трубы
safety cylinder head – обеспечение постоянного давления компрессора
safety cut-out – предохранительный выключатель
(the) salts of lime – соли извести
sanitation – водопровод и канализация, улучшение санитарных условий, санитария
sanitary engineer – инженер-сантехник
sanitary installation – санитарно-техническое оборудование
scale formation – образование накипи в котле
screw – винт, шуруп
(to) screw – завинчивать
(to) screw in – затягивать
screw key – гаечный ключ
screwed joint – винтовое соединение
sealing putty (stopper, mastic) – уплотняющая замазка
seamless – бесшовный
seamless tube – бесшовная труба
seepage water – просачивающаяся вода
self-contained air cooler – автономный агрегат для охлаждения воздуха
self-contained water chilling – автономный водоохладитель
sensor – датчик
service connection – домовой ввод
service reservoir – обслуживающий резервуар
set value – заданная величина
setting-up – ручная сборка
sewer – сточная труба, канализационная труба, коллектор
sewerage – канализация, канализационная система
shock absorber – амортизатор
shop assembly – монтаж (сборка в цехе)
shop drawing – проектная документация
shrink disassembly – демонтаж с сокращением объема оборудования
shunt – шунт
shut-off slide valve – запорная задвижка

shutting clap – запорная заслонка
silicon – кремний
silicate slag – силикатный шлак
siltation – заиливание
sink – слив
siphon (trap) – сифон
site agent – инспектор по охране труда
slag – шлак
sleeve cock – муфтовый кран
sleeve valve – муфтовый вентиль
slide damper – заслонка-движок
slot – паз
smoke (noise) abatement – борьба с задымлением (с шумом)
smuts – сажа
snap action – быстродействие
socket slide valve – муфтовая задвижка
softening – размягчение
solder – пайка
soldering flux – флюс для пайки (мягким припоем)
soldering solution – жидкость паяльная
solids – твердые вещества
solute – растворенное вещество
spanner – разводной ключ
specification form client-contract – техническая документация между заказчиком и подрядчиком
spigot – втулка, гладкий конец трубы при раструбном соединении
spoilage – ущерб
spot welding – точечная сварка
spring – пружина, источник, родник
stand – кронштейн
steam (vapor) – пар
steam condenser – конденсатор пара
steel – сталь
stop cock (faucet) – заборный кран
suction box – всасывающая камера
superleak – сверхпроводимость
supply – снабжение, поставка
supply-demand balance – топливно-энергетический баланс
surety bond – гарантийное обязательство
suspended channel – водосточный подвесной желоб
stand-by indicator – индикатор готовности

(to) stoke – загружать топливо в топку
strength – сила, прочность
stuffy – душный, спертый (воздух)
stuffiness – духота, спертость воздуха
stuffing-box – сальник
sublimation front – фронт сублимации
suction line – всасывающая линия
suction line valve – запорный вентиль всасывающего трубопровода
synthetic fibre – пластмассовое волокно
sweating – запотевание
switchboard – распределительный щит

T

temperature deviation – отклонение температуры
temperature expansion valve – терморегулирующий вентиль
tensile strength – предел прочности
thermal control – термоконтроль
thermal environment – тепловая среда
thermo-hydrograph – терморегулятор
thermal input – теплопотребление
thermal insulation – теплоизоляция
thermal load – тепловая нагрузка
thermal storage vessel – аккумулятор теплоты
thick sheet iron – толстолистовая жесть
threshold limit value – пороговая предельная величина
throat – горловина
tin – олово
tinning – лужение
tinsmith (tinman) – жестянщик
tolerance – допуск
tongs – грейфер
topographic survey – топографический чертеж
torsion – закручивание
toughness – прочность, вязкость, плотность
toxic vapours – токсичные испарения
toxic gases – токсичные газы
transmission of energy – подача энергии
threaded joint – резьбовое соединение
threaded sleeve – муфта с резьбой
(to) throttle – дросселировать
trunk – воздуховод

two-way valve – двухходовой вентиль

U

underground basin – подземный бассейн
underheating – недостаточное нагревание
unit of measurement – единица измерения
outbreaks of cholera – вспышки холеры

V

vacuum pipe – вакуум-провод
validity – обоснованность
valve plug – заглушка клапана
valve seat – седло клапана
valve spindle – шпиндель клапана
valve stem – шток клапана
vapour – испарение
ventilating fan – вентилятор в системе вентиляции
ventilating louver – жалюзи вентиляционные
ventilation – вентиляция
ventilation shaft – вентиляционная шахта
vitreous enamel – глазурованная эмаль

W

washer – шайба
water-cooled unit – водоохлаждаемый агрегат
water cycle – круговорот воды
water hardness – жесткость воды
water retarder – парозадерживающее вещество
water-vapor permeable – паронепроницаемый
weather conditions – погодные условия
(to) weld – сваривать, заваривать
well – скважина, колодец
waste water – сточная вода
waste of water – перерасход воды
water cooling tower – градирня
water leak – течь воды
water pocket – водяной мешок в трубопроводе
water softening – умягчение воды
water tap – водопроводный кран
water treatment – обработка (очистка) воды
water vacuum refrigerating system – водяная вакуумная холодильная система

water works – водопроводная насосная станция
welded socket – сварная муфта
welding (hammer-welding) – сварка (кузнечная)
welding without preheating – холодная сварка
white cast iron – белый чугун
working charge – затраты на работу
working fluid – рабочая жидкость
working stroke – рабочий ход
wrought iron – кованое железо, сварочное железо, сварочная сталь

APPENDIX.
IRREGULAR VERBS

(Таблица неправильных глаголов)

№	Infinitive	Past Simple	Participle II	Translation
1.	be	was, were	been	быть, являться
2.	become	became	become	становиться
3.	begin	began	begun	начинать(ся)
4.	bend	bent	bent	гнуть
5	bind	bound	bound	связывать
6.	bite	bit	bitten	кусать(ся)
7.	bleed	bled	bled	истекать кровью
8.	blow	blew	blown	дуть
9.	break	broke	broken	ломать(ся)
10.	bring	brought	brought	приносить
11.	build	built	built	строить
12.	burn	burnt	burnt	гореть, жечь
13.	buy	bought	bought	покупать
14.	catch	caught	caught	ловить, хватать
15.	choose	chose	chosen	выбирать
16.	come	came	come	приходить
17.	cost	cost	cost	стоить
18.	cut	cut	cut	резать
19.	dig	dug	dug	рыть, копать
20.	do	did	done	делать
21.	draw	drew	drawn	рисовать
22.	dream	dreamt	dreamt	мечтать; видеть во сне
23.	drink	drank	drunk	пить
24.	drive	drove	driven	вести, гнать
25.	eat	ate	eaten	есть, кушать
26.	fall	fell	fallen	падать
27.	feed	fed	fed	кормить
28.	feel	felt	felt	чувствовать
29.	fight	fought	fought	бороться, сражаться
30.	find	found	found	находить
31.	fly	flew	flown	летать
32.	forget	forgot	forgotten	забывать
33.	get	got	got	получать
34.	give	gave	given	давать

35.	go	went	gone	идти, ходить
36.	grow	grew	grown	расти, становиться
37.	have	had	had	иметь
38.	hear	heard	heard	слышать
39.	hide	hid	hidden	прятать
40.	hold	held	held	держать
41.	keep	kept	kept	держать, хранить
42.	know	knew	known	знать
43.	lead	led	led	вести
44.	learn	learnt	learnt	учить(ся)
45.	leave	left	left	оставлять, покидать
46.	lend	lent	lent	давать взаймы
47.	lose	lost	lost	терять, проигрывать
48.	make	made	made	делать
49.	mean	meant	meant	значить
50.	meet	met	met	встречать
51.	put	put	put	класть
52.	read	read	read	читать
53.	ride	rode	ridden	ездить верхом
54.	ring	rang	rung	звонить, звенеть
55.	rise	rose	risen	подниматься
56.	run	ran	run	бежать
57.	say	said	said	сказать
58.	see	saw	seen	видеть
59.	sell	sold	sold	продавать
60.	send	sent	sent	посылать
61.	shake	shook	shaken	трясти
62.	shine	shone	shone	сиять, блестеть
63.	shoot	shot	shot	стрелять
64.	sing	sang	sung	петь
65.	sink	sank	sunk	погружаться
66.	sit	sat	sat	сидеть
67.	sleep	slept	slept	спать
68.	smell	smelt	smelt	нюхать, пахнуть
69.	speak	spoke	spoken	говорить
70.	spend	spent	spent	тратить, проводить
71.	spoil	spoilt	spoilt	портить
72.	stand	stood	stood	стоять
73.	steal	stole	stolen	красть; похищать
74.	swear	swore	sworn	клясться
75.	swim	swam	swum	плавать

76.	take	took	taken	брать
77.	teach	taught	taught	обучать
78.	tear	tore	torn	разрывать, рвать
79.	tell	told	told	сказать
80.	think	thought	thought	думать
81.	throw	threw	thrown	бросать
82.	understand	understood	understood	понимать
83.	wake	woke	woken	просыпаться, будить
84.	wear	wore	worn	носить, изнашивать
85.	win	won	won	выигрывать,
86.	write	wrote	written	писать

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