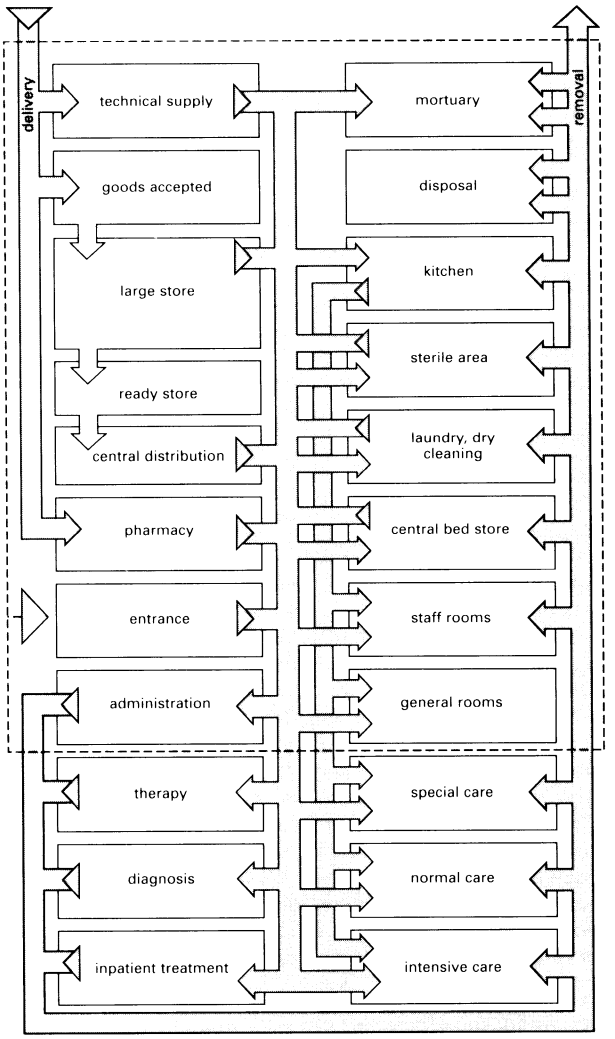
Supplies Areas



(1) **Supply and disposal area: route relationships**

The clinical, nursing and technical supply centre is located either in a separate supplies building or at a neutral supplies and disposal level under the main building. It is best to have a goods yard which is separated from the main and ambulance entrances. A north-facing orientation for this entrance is ideal. External and internal circulation routes must be co-ordinated so that overlaps with the routes used by the care and treatment areas are avoided.

During the design stage, it must be remembered that this area of the hospital can create a great deal of noise (goods vehicles and machinery) and smells (refuse containers, kitchen waste etc.) and so should not be situated close to the nursing wing. The planning of the supplies area is arranged according to the medical departments of the hospitals. A detailed specification can only be devised after the detailed design of the nursing and treatment wings has been established. The increasing use of automation demands co-operation between the architects, specialist engineers and manufacturers in the design stages. A tendency towards greater centralisation is noticeable, the incentive being to keep investment at a minimum and to produce economies in staffing. As a result of this, in the case of small clinics, an in-house main kitchen and laundry can be dispensed with: meals are delivered from a central kitchen and the laundry is managed by an external service organisation.

For goods and materials which are required only by one department it is economic to provide a decentralised preparation/disposal unit (e.g. for surgical instruments and substerilisation, or for developing X-ray film in the X-ray diagnostic department).

Means of transport

In addition to the organisation of stores and the preparation of delivered and reused goods, there is the question of transportation. Multipurpose trolleys are frequently used for distributing the required items to each point of consumption and these can be used at the same time for storing equipment. In medium-size and large hospitals a vertical conveyor, with selective automated discharge, for distribution to the various storeys and return of used goods to the non-clean preparation zone is necessary in order to relieve personnel. A dispatch system using pneumatic tubes, for example, should be provided for sending small items such as drugs and notes.

The scale of the transport system depends on the size of the institution: the supply and disposal requirement per bed per day is 30–35 kg. For large or heavy items (e.g. beds, respiration equipment, heart and lung machines) conventional bed elevators are available. A fully automatic conveyor system can be used for transporting medium-size items (e.g. food, laundry, refuse, consumer goods) in large hospitals.

Central supply

The advantages of collecting together all of the supplies functions on one supply/disposal level are uniform overall management, common stock control and the utilisation of the same transport systems. Centralisation also means there is a single point to which goods are delivered; from here, distribution and storage of goods can be controlled efficiently.

For hygiene reasons it is important to separate clean and non-clean goods. This is a primary consideration when designing transport systems.

Staff rooms

In the supplies area, changing and washrooms, WCs, cleaning rooms, storage rooms (for cleaning equipment) and rest rooms must be provided in the immediate vicinity of the goods inward/collection point.

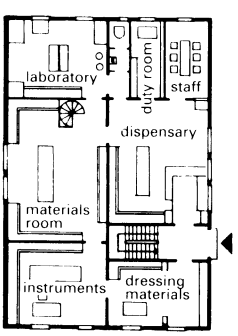
Sterilisation

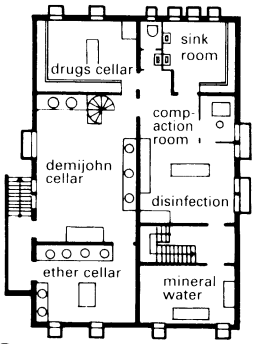
Since it is primarily items for the surgical department which are prepared in the central sterilisation unit, the two should be situated close together. However, to meet immediate needs, the surgical department will have its own substerilisation facilities. The central store for drugs and instruments must be closely linked to the central sterilisation unit.

Dispensary

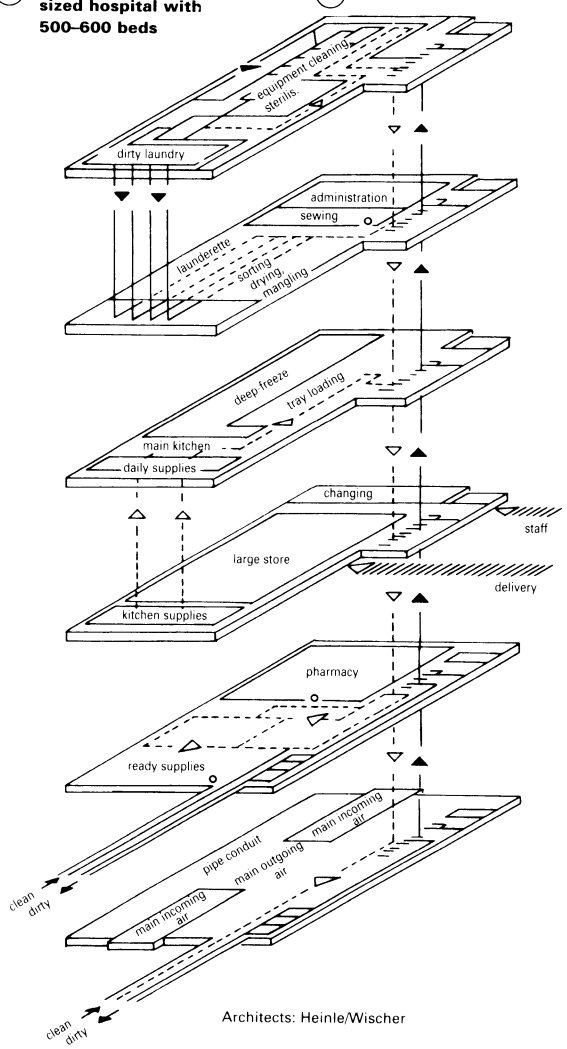
In institutions without a full pharmacy, medication requiring approval is distributed from the dispensary. This consists of a work and dispensing room (25 m^2) which is accessed directly from the main circulation corridor. It is fitted out with a desk, washing facility, sink, weighing station and lockable cupboards. Adjoining are a dry store and proprietary medicines store (15 m^2), a cold store (10 m^2) for hazardous substances, a dressing materials room and a damp store in accordance with fire regulations. When planning new buildings, it is recommended that a full pharmacy be included in the design.

Supplies Areas

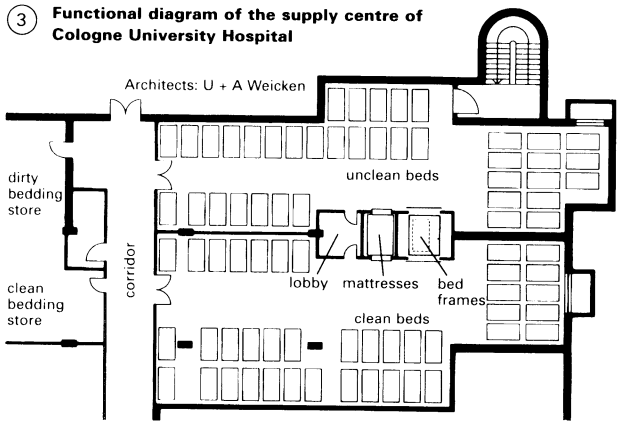




① ② **Pharmacy for a medium-sized hospital with 500–600 beds**



③ **Functional diagram of the supply centre of Cologne University Hospital**



④ **Central bed unit, St Elisabeth Hospital, Halle/S**

Pharmacy

In medium-size and large hospitals the pharmacy stocks prescriptions and carries out examinations under the management of an accredited pharmacist. In the design the following rooms are necessary: dispensary, materials room, drug store, laboratory and, possibly, an issue desk. If necessary, also include herb and dressing materials rooms, demijohn and acid cellar, and a room in which night duty personnel can sleep. The dispensary and laboratory should contain a prescription table, a work table, a packing table and a sink. The storage of inflammable liquids and acids, as well as various anaesthetics, means appropriate safety measures are stipulated for the walls, ceilings and doors.

The pharmacy must be close to lifts and the pneumatic tube dispatch system.

Central bed unit

From the point of view of hygiene and economy, every hospital should contain a bed unit, in which the appropriate staff strip down, clean, disinfect and make up the beds. A complete bed change is required for new admissions, patients after 14 days as an inpatient, after operations and deliveries, as well as after serious soiling. The size of the bed unit depends on the number of nursing beds in the hospital: for about 500 inpatients a bed unit for 70 beds should be provided. The functional demarcation requires a clean and non-clean side, separated by the bed cleaning room, mattress disinfecting room and staff lobby. For carrying out repairs, a special workshop, approximately 35 m^2, should be situated in the close vicinity, as should the laundry and store for clean bedding, mattresses etc. If machines are to be used to clean the bed frames and mattresses, the specific requirements of the equipment must be taken into account at an early stage (e.g. demands for floor recesses, clear heights).

Laundry provision

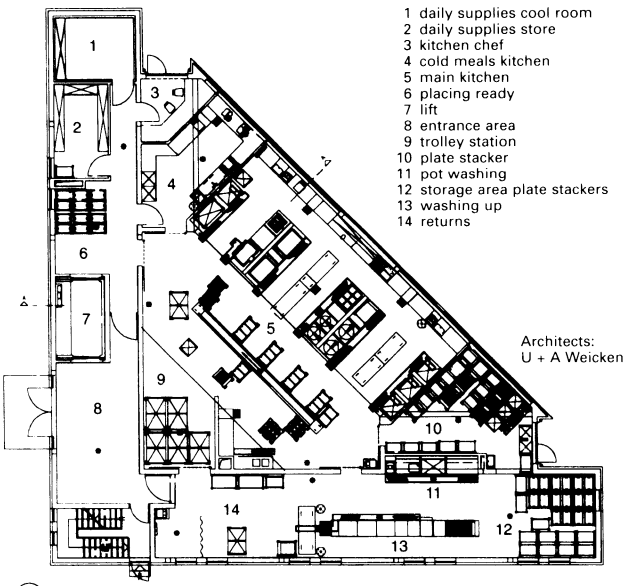
Figures for the amount of dirty dry washing generated per bed per day vary between 0.8 and 3.0 kg. The following sequence of work is preferred in the laundry: receipt, sorting, weighing, washing, spinning, beating out, mangling or drying (tumble dryer), pressing (if possible high pressure steam connection), ironing, sewing, storage, issue. The laundry hall consists of a sorting and weighing area (15 m^2), laundry collection room under laundry chutes from the wards, wet working area (50 m^2), dry working area (60 m^2), detergent store (10 m^2), sewing room (10 m^2) and laundry store (15 m^2).

Meal provision

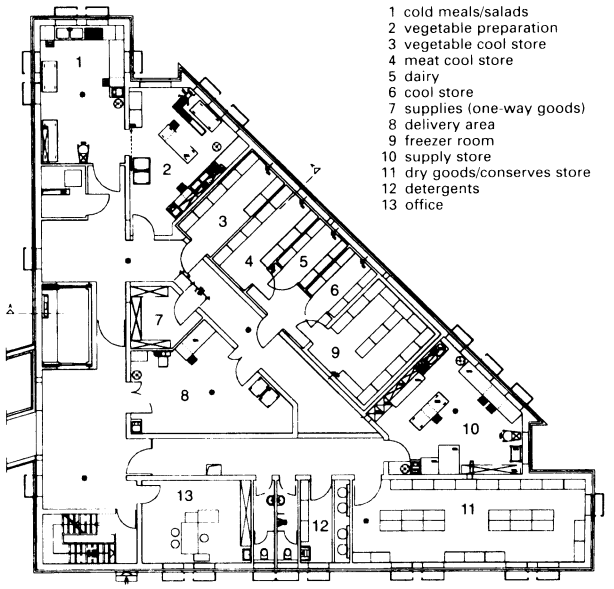
Providing the patients with proper nutrition places high demands on food preparation since the required amounts of protein, fat, carbohydrates, vitamins, minerals, fibre and flavourings often vary. The dominant food provision systems are those which rationalise the individual phases of conventional food preparation (preparatory work, making up, transporting, distribution). Preparation of normal food and special diets takes place separately. After preparation and cooking the meals are put together on the portioning line. The portioned trays are transported with the supply trolleys to the various stations for distribution. The same trolleys are used to transport the used crockery back to the central washing up and trolley cleaning unit.

Staff catering consists of about 40% of the total catering demand. The staff dining room should be close to the central kitchen. A division into separate rooms for domestic staff, nurses, clerical staff and doctors could be considered in a large hospital but, again, for economic reasons, these rooms must be near to the main kitchen. For small and medium-size hospitals this type of division is not recommended.

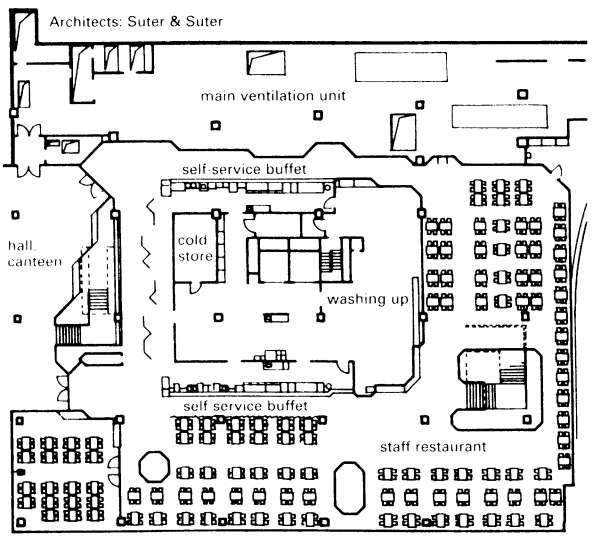
Supplies Areas



(1) **Kitchen building, ground floor**



(2) **Basement** ‣ (1)



(3) **Staff restaurant for 150 employees, Basel Cantonal Hospital**

Central kitchen: Historically, kitchens were on the top floor to reduce the smell and noise. Today they are positioned on the same level as supplies to give an efficient working process: delivery, storage, preparation, making up and dispatch. When deep-frozen food is used, the set-up of the kitchen changes. Here the architect and users must co-operate closely to optimise the meal preparation process and find an advantageous, space-saving solution. The clear height of the kitchen hall should be 4.00 m. The size of the kitchen depends on the requirements and number of patients in the hospital. In the main kitchen an area of 1.00 m^2 is needed per person. A special-diet kitchen (60 m^2 minimum) should also be planned, with a desk for the head chef, a 30 m^2 vegetable cleaning area and a 5 m^2 provision for waste disposal. In addition, the plan must include a daily supplies room (8 m^2), a cold store with compartments for meat, fish and dairy products (8 m^2 each) and a pre-cooling store (10 m^2) with a chest freezer and cooling unit. The goods delivery area should be connected to administration and have sufficient storage space (15–20 m^2). The main store should hold fruit and vegetables (20 m^2), dry goods (20 m^2) and tinned goods/preserves, and must be adjoining.

Central washing-up unit: The central washing-up unit, adjacent to the central kitchen, stores and cleans the staff and patients' dishes. The high level of automation makes it essential for the designer, at an early stage, to clarify and conform to the specific requirements of the individual pieces of equipment.

Technical supplies: The technical service is responsible for technical supplies and plays an increasingly important role as more automation is introduced. Tasks include building maintenance, domestic technology, medical technology, conveyor technology and administration.

It should be noted that sanitary installations are the subject of rapid technical development. It is advantageous to have ring circuits for the horizontal supplies on each storey and rising supplies in separate ducts for vertical connections. The horizontal supply pipes should be installed in the voids above suspended ceilings to make subsequent alterations easy. Water is treated centrally; only areas with higher quality requirements (pharmacy) have local water preparation (desalination, softening). Water consumption is calculated at 400–450 l of water per hospital bed per day, depending on the type and situation of the hospital. Note that waste water is subject to local regulations.

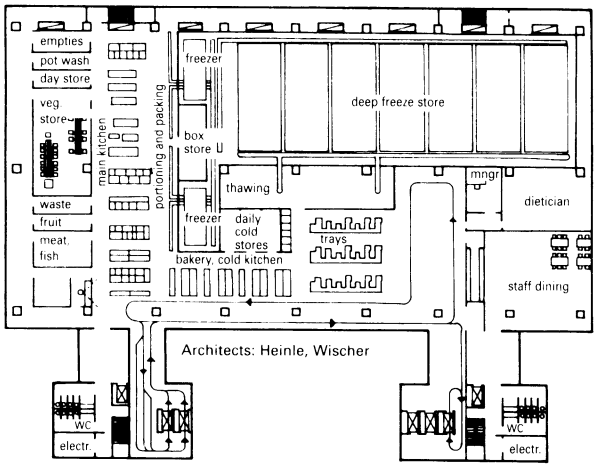
Ventilation and gases: The ventilation equipment is best situated near to the open air. During planning, the horizontal and vertical ventilation ducts should be tested against technical fire protection criteria.

It is necessary to provide medical gases for the surgical, intensive care and radiology departments, and special supply rooms are required. The pumps for oxygen, carbon dioxide, vacuum and compressed air should be duplicated so as to provide a backup in case of failure. An additional technical requirement is an emergency electrical supply system.

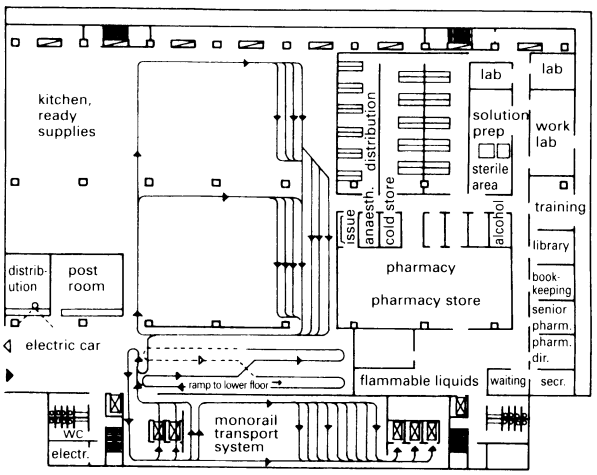
Central heating unit: Earlier systems, using a boiler room, required large basement areas (≥100 m^2), generally on two storeys. Current heating systems are less area-intensive and district heating is particularly advantageous. Note that the surgical and intensive care departments must have a continuous heat supply so emergency systems must therefore be planned. The heating system and medical services supply/emergency power unit may be accommodated in one large room. The layout requirements for services (water, electricity, gas etc.) and flues are laid down in regulations and these must be observed. Emergency escape doors must open outwards.

If possible, the 'heat store' (and entry to it) should be situated underground, outside the building. Note that there are building and heating room regulations which apply.

Supplies Areas

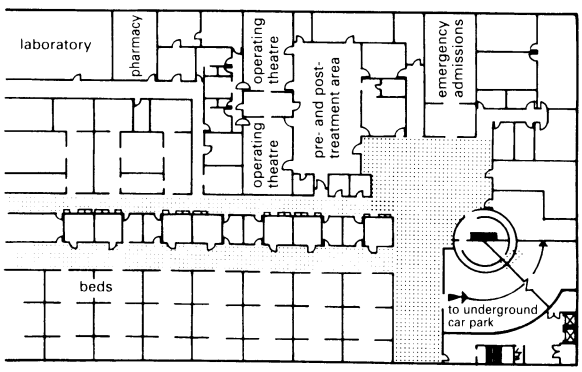


(1) **Kitchen area: Cologne University Hospital**



Architects: Heinle, Wischer

(2) **Supply centre: Cologne University Hospital**



Architects: Suter & Suter

(3) **Civil bunker with two operating theatres and recovery areas: Basel Cantonal Hospital**

In recent years increasing use has been made of modern organisational models. The central organisation of individual supply and disposal areas alleviates the problem of increasing staff shortages. Internal central supply routes are separated from the other traffic flows in the hospital and external disruption is avoided, allowing optimum use of the transport system's capacity. Computer simulation programs can show the architect efficient operational sequences (which can still be modified throughout the planning phase) and setting utilisation targets allows the space required in the supplies area to be minimised.

Electrical systems

The power supply is taken from the national grid: 220–240V standard voltage and 380V high voltage. The low voltage system is controlled from the distributor room which requires at least two free-standing transformer cell units. Sufficiently wide doors (at least 1.30m clear width) and good ventilation must be provided and all relevant VDE and professional association regulations must be complied with. The size and number of emergency power units depends on the size of the hospital and local plants for individual functional units (surgical/outpatients department, care areas, radiology) are preferable to a central emergency power system. Anti-vibration foundations should be used underneath these units to reduce noise. Additional batteries must be provided for lighting and emergency power in the surgical department.

Central gas supply

Oxygen and nitrogen lines are supplied from steel cylinders, alternating between operating and reserve batteries with an automatic changeover facility. To reduce the distance that these cylinders need to be transported, direct access to the goods yard is preferred. The cylinders may be stored with the medical services pumps (for vacuum and compressed air lines) at a central supply point (possibly computer-controlled). Gas cylinders are beginning to be replaced by 'cold gasifiers'. These must stand in the open air at least 5m from buildings.

Workshops

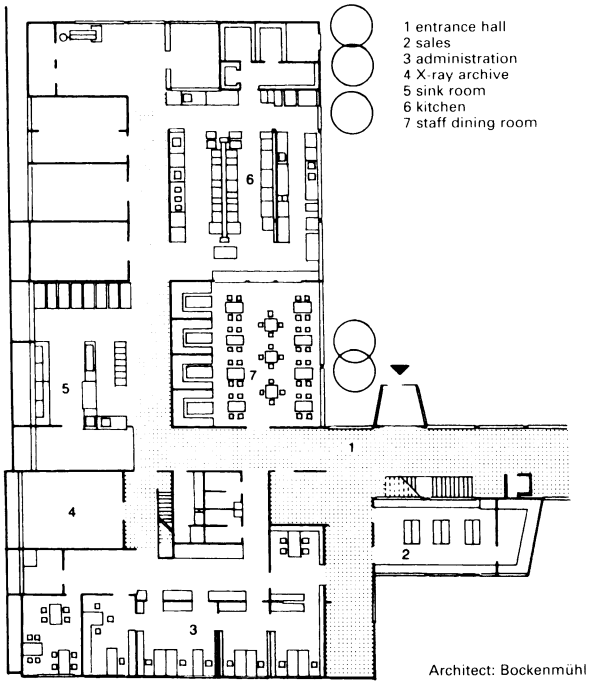
Connected to the goods yard are metalwork and electrical workshops ($40\,m^2$), with a materials store, spare parts store ($20\,m^2$), general store ($60\,m^2$) and standing area for transport equipment ($15\,m^2$). A water reservoir (emergency water tank) should be planned for, possibly at the elevator crossings over the top storey ($40\,m^3$). Water treatment plant for the general hospital and the sterilisation area must be separated.

Communications centre

The following information and communications media could be needed in the hospital: telephones and faxes, intercom systems, nurse call system, clocks, pagers, a PA system for music and announcements, television, telex, radio. For a better overview, a central point should be set up for co-ordinating these media (in the entrance hall or in a room off reception). Pagers are to be provided in parallel with the telephone network where it is not feasible to reach a telephone for time or operational reasons (e.g. surgical area, radiology). The nurse intercom system allows a voice link between individual nurses' workrooms and the patients' rooms. Several hundred clocks with a second hand can be controlled from a quartz battery clock via the telephone network. Patients' rooms are to be equipped with telephone, telephone paging and television. In teaching and research hospitals it is important to have closed-circuit television (monitoring). All buildings must be monitored by an automatic fire alarm system, supplemented with manual alarm switches. In the event of fire, the ventilation system, transport systems and elevators are controlled via the fire alarm system. Consultation with specialist engineers is essential.

Bunkers

The requirements of structures providing protection from radioactive fall-out and air attack vary from country to country so the local guidelines must be followed. In Switzerland, for example, an auxiliary operating theatre, wards, sterile goods store and emergency technical systems must be provided.



① **Entrance hall and administrative area of Herdecke Community Hospital in the Ruhr: 192 beds**

Archive and store rooms

A short route between archives and work areas is advantageous but generally difficult to provide. One possibility is to locate them in the basement and have a link by stairs. Distinctions should be made between store and archive rooms for files, documentation and film from administration, the X-ray department etc. and supplies (pharmacy, disinfection, kitchen etc.) and equipment (kitchen, administration, workshops etc.). The necessary depth of shelves and cupboards depends on the goods stored. For files, books and film, 250–400 mm is adequate; for equipment, china spare parts etc., 400–600 mm is needed. Mobile shelving systems are useful for reducing the floor area occupied. The high loads imposed by shelves (up to 1000 kg/m²) must be taken into account from an early stage.

Communal rooms

Dining rooms and cafeteria are best situated on the ground floor, or on the top floor to give a good view, must have a direct connection to the servery. The connection to the central kitchen is by goods lift, which is not accessible to visitors. Consider whether it is sensible to separate visitors, staff and patients. Nowadays, the dining areas are often run by external caterers and the self-service system (servery 6–8 m) has become generally accepted. Salad counters should stand independently.

Prayer rooms

These should, preferably, occupy a central location, at the intersection of internal and external circulation routes, but outside the care, treatment and supply areas. This allows access for employees, visitors and inpatients. The size of devotional rooms and the facilities they offer will vary according to faith, place and person, but they are often not oriented towards a particular faith. At least 40 m² should be allocated.

In large hospitals, it might possibly be desirable to include a chapel, in which case the relevant church authorities should be consulted. (See the section entitled Places of Worship for details of the requirements.)

When planning rooms to cater for spiritual needs in hospitals, it is essential to consider space requirements for wheelchair users and those who are bedridden.

Administration rooms

Rooms for administration should be connected by corridor to the entrance hall and be close to the main circulation routes. A suitable route to the supplies area must also be planned.

Staffing per 100 occupied beds and 1000 patients (Germany, 1980–1995)

	for each 100 beds					for each 1000 patients				
number per staff group	1980 West Germany	1985 West Germany	1990 West Germany	1991 Unified Germany	1995 Unified Germany	1980 West Germany	1985 West Germany	1990 West Germany	1991 Unified Germany	1995 Unified Germany
1 medical	11.7	13.6	15.7	17.1	20.4	5.4	6.0	5.9	6.8	6.8
2 nursing	44.8	48.8	55.2	58.5	70.4	20.6	21.4	20.9	23.4	23.4
3 medical technical	14.1	15.8	17.5	21.9	25.0	6.5	7.0	6.6	8.8	8.3
4 operational	9.4	11.0	12.9	14.1	16.3	4.3	4.8	4.9	5.7	5.4
groups 1–4	80.1	89.2	101.2	111.5	132.2	36.8	39.2	38.4	44.7	43.9
5 clinical domestic	10.2	8.2	7.0	7.6	6.8	4.7	3.6	2.7	3.0	2.2
6 managerial and supplies	18.1	17.0	17.1	17.2	17.2	8.3	7.5	6.5	6.9	5.7
7 technical	1.3	2.3	3.3	4.4	4.5	0.6	1.0	1.3	1.5	1.8
8 administration	7.5	8.0	8.8	10.9	12.1	3.5	3.5	3.3	4.4	4.0
9 specialist	1.4	1.5	1.7	2.0	1.6	0.7	0.6	0.7	0.8	0.5
10 other staff	3.4	3.4	3.9	3.5	3.9	1.6	1.5	1.5	1.4	1.3
11 total staff	122.1	129.6	143.0	157.0	178.3	56.2	57.0	54.3	62.9	59.2
without 'other' (10)	118.6	126.2	139.1	153.5	174.4	54.6	55.4	52.8	61.5	57.9

source: German Hospital Association (DKG), issued 1997

The following requirements are based on a one hundred-bed occupancy level. In the administrative area, 7–12 m² per member of staff should be planned. Rooms for dealings with patients and relatives need to be connected to reception (entrance hall), admissions and accounts (25 m²). Links to the casualty entrance are also important, and there should be at least two reception areas (each 5 m²) for demarcation before the main reception, the cash-desk (12 m²) and accounts (12 m²).

Additional rooms needed include: an office for the administrative director (20 m²), a secretarial room (10 m²), an administrators' office (15 m², possibly in the supply area), a nurses' office (20 m²), a personnel office (25 m²) and central archives (40 m², possibly in the basement with a link to the administration department via stairs).

According to requirements, the plan should also provide: duty rooms for matron and welfare workers, a doctors' staff room and consulting rooms, a messenger room, a medical records archive, specialist and patients' libraries, and a hairdresser's room (with two seats).

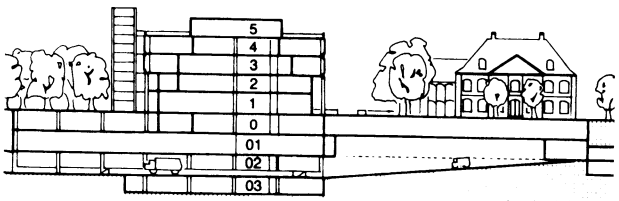
The increasing rationalisation of accounts and the use of electronic systems and computers should be taken into consideration during planning (e.g. cableways in floors – possibly, raised floors – central desk with tube post link etc.).

Main entrance

General traffic goes only to the main entrance; for hygiene reasons (e.g. risk of infection), special entrances are to be shown separately. The entrance hall, on the basis of the open-door principle, should be designed as a waiting room for visitors. Today's layouts are more like that of a modern hotel foyer, having moved away from the typical hospital character. The size of the hall depends on bed capacity and the expected number of visitors. Circulation routes for visitors, patients and staff are separated from the hall onwards. The reception and telephone switchboard (12 m²) are formed using counters, allowing staff to supervise more effectively. However, it must be possible to prevent public access from reception to inner areas and main staff circulation routes. The entrance hall should also contain pay phones and a kiosk selling tobacco, sweets, flowers and writing materials.

Casualty entrance

A covered access road or closed hall overlooked by the administration department, but not visible from the main entrance, is preferred for incoming casualty patients. Short routes to outpatients, the surgical/X-ray departments and the wards should be planned and these must be free of general traffic. An examination room for first aid (15 m²), a washroom (15 m²), an ante-room (10 m²), standing room for at least two stretchers, and a laundry store should be included in an area where they are accessible directly beyond the entrance.



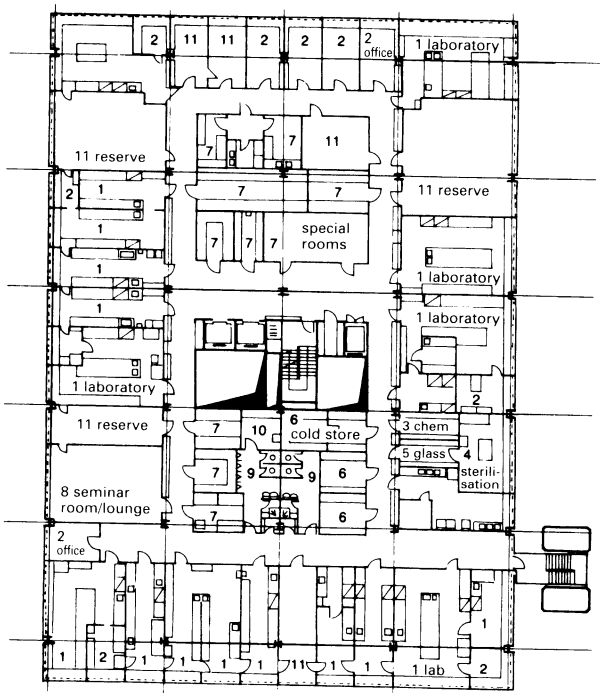
Architects: Suter & Suter

03 services
02 stores, laundry, pool
01 kitchen, workshops, experiment station

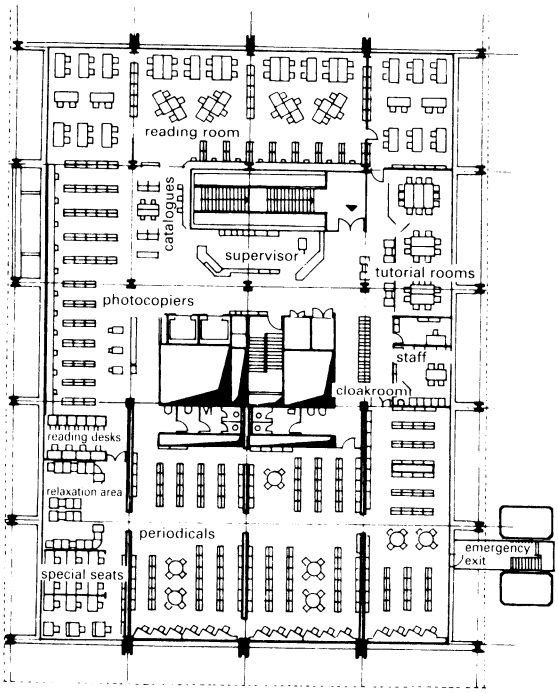
0 canteens, halls
1 cafeteria, lecture theatres
2 library

3 laboratories
4 training laboratory
5 plant

(1) **Teaching and research centre, Basel**



(2) **Level 3: research laboratory**



(3) **Level 2: library**

HOSPITALS

Teaching and Research

Residential area

The residential areas are, without exception, separated from the main hospital but reached via the access road for the entire site. The area is divided into residential homes, apartments and training schools. There must be sufficient parking spaces for vehicles belonging to the employees.

In addition to nurses, residential homes for female employees should also accommodate female doctors, assistant physicians, auxiliary staff and students, if necessary. Bedsitting rooms should be designed uniformly as single rooms with a cupboard and wash-basin (16 m²) or, preferably, with a separate WC/shower area. The usual dimensions of the rooms are approximately 4.60–4.75 m × 3.00–3.50 m. The storey height of standard residential buildings is adequate.

Opinions on the arrangement of kitchen units vary. Previously, the norm was 10–12 bedsitting rooms in a residential group sharing a kitchen (6 m²), lounge (20 m²), possibly a balcony, and a cleaning room (10 m²). Today bedsitting rooms with an integrated cooking area and en-suite facilities are usual (see the section covering student halls of residence). Common rooms for all employees are one lounge (1.0 m² per bedsitting room; 20 m² minimum), connecting with a multipurpose room (20 m²), a cloakroom, WCs, a laundry room (10 m²), a drying room (15 m²) and a storage room (30 m²). Similar residential homes for male employees should be in the design unless the size of the hospital necessitates a common residential home.

Apartments

Doctors should be housed in two-room apartments (40 m²) in separate male and female residential blocks. Three- and four-room apartments (70–90 m²) away from these blocks should also be planned for doctors, hospital administrators and house masters. Communal rooms may be arranged for doctors if necessary: library and reading room (25 m²), club room (35 m²). The proportion of apartments for doctors is currently growing smaller.

Training schools

To provide practical experience, a specific area in close contact with the hospital is required for training medical students, teaching and research. Increasing student numbers are making greater demands on training schools. The following must be provided: stores, workshops, experimental stations (pharmacy), audiovisual facilities for video transmissions from the surgical department, possibly a separate cafeteria, lecture theatres (150–500 seats), a library, research and teaching laboratories, practice rooms and office space. The number and size of all rooms depend on the scale and location of the institution.

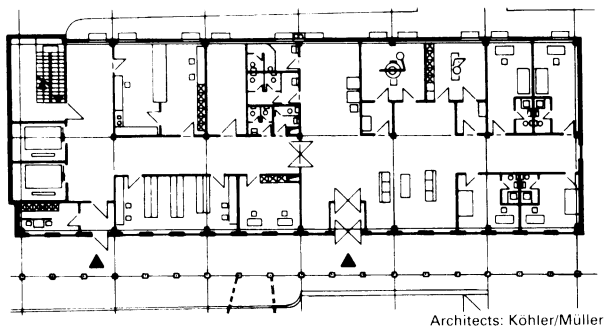
Experimental stations

This is where all laboratory animals are kept and is an area of particular importance in university hospitals. The experimental station is connected to other laboratory areas by passenger and goods lift. Large additional areas must be planned for the breeding and keeping of animals.

Library

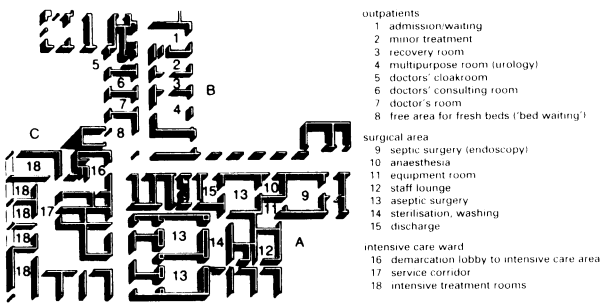
Medical libraries should be designed as open-shelf libraries, with no closed stores and no requirement for issuing books. A large part of the literature will be made up of periodicals. It is important to have an adequate number of reading tables with reading lamps, workstations with microfiche readers, slide viewers and typewriters. It is advantageous if the library is connected to the small or medium-size transportation systems of the hospital.

A&E AND OUTPATIENTS DEPARTMENT

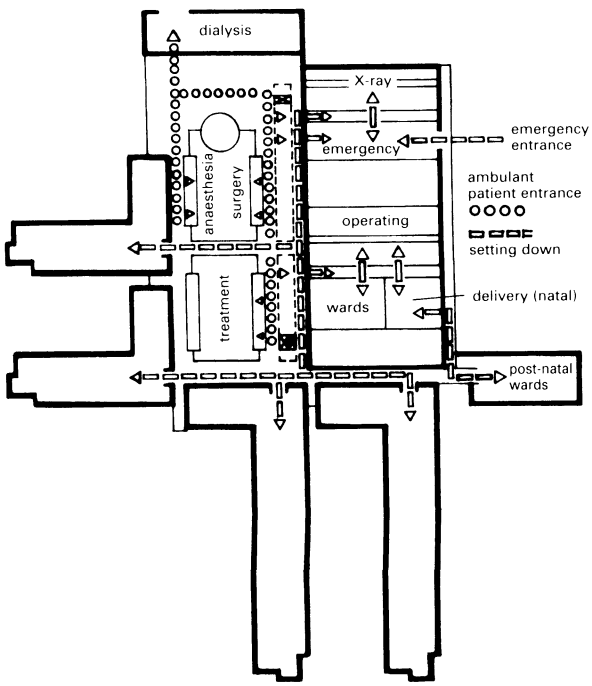


Architects: Köhler/Müller

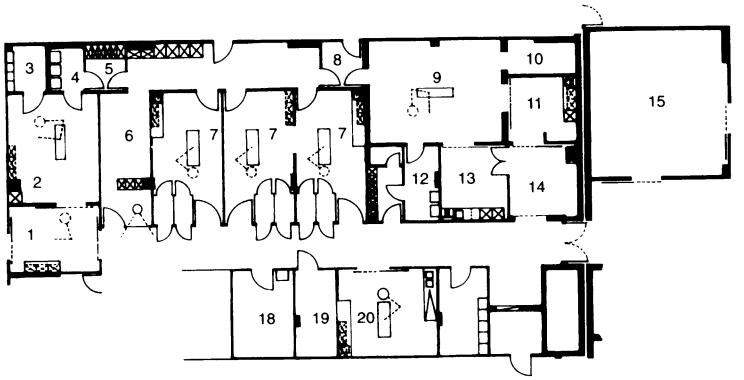
(1) **Accident and emergency department: duty doctors' rooms; central sterilisation**



(2) **Part-plan of the functional areas: A surgical, B outpatients, C intensive care**



(3) **Internal connections, Prignitz Hospital** Architects: B + C Lambart



Architects: U + A Weicken

(4) **Accident and emergency, St Elisabeth Hospital, Halle**

Accident and emergency (A&E)

The accident and emergency department is for ambulant and bedridden patients and is accessed via the emergency entrance (note that the minimum vehicle headroom is 3.50m). Clear signposting to the drive-in entrance is of life-saving importance for ambulance drivers. It is convenient to site this entrance on the opposite side of the building to the main entrance to avoid contact with the visitors and other patients.

The accident and emergency department consists of emergency treatment rooms (20–25m^2) equipped with operating tables, small operating lights, cupboard units with sinks, and patient cubicles. In addition, a plaster room with plastering bench and equipment and a shock treatment and recovery room must be available.

Proximity to the surgical department is essential, even if a special intervention room for emergencies is included in the plan, and surgery and anaesthesia services should also be grouped nearby.

Casualty hospitals

These are generally found only in cities and often also serve rehabilitation purposes. Such auxiliary hospitals, with a well-trained surgical department, are often accommodated in old general hospitals which have been moved to new buildings.

Public health offices

In Germany these generally perform the functions of an outpatients clinic; they provide the outlet for preventive measures and follow-up treatment of ambulant patients who have been discharged.

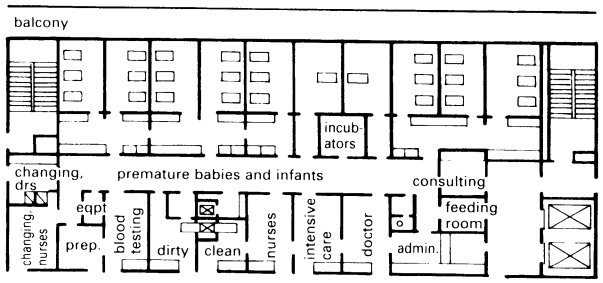
Typical facilities in an outpatient clinic are as follows:

- examination and treatment rooms are needed for initial diagnosis, preliminary treatment, follow-up treatment and consultations, etc., all with separate waiting rooms
- office rooms should be provided for doctors co-ordinating, for example, strategies for combating epidemics and these should have ante-rooms (e.g. for records, inoculations etc.) as well as a separate waiting room
- venereal disease treatment requires examination rooms (with WCs), ante-rooms for patient records and medication etc., and waiting rooms
- infant welfare services should have a waiting room, a nursing room and ample space for prams (at the entrance), materials and records

In addition, plans must include medical-technical rooms, X-ray departments, rooms for administrators and personnel, and rooms for storage and archiving.

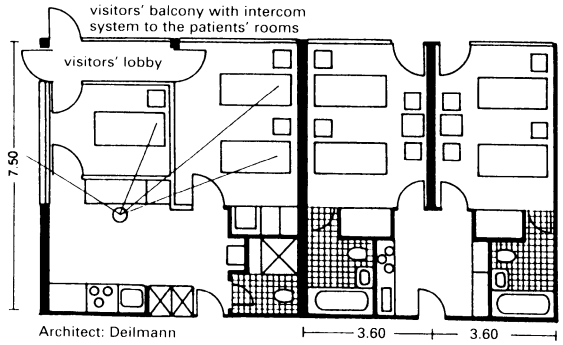
The size of all of these rooms varies and needs to be agreed between the planner and the users.

Maternity and Neonatal Care



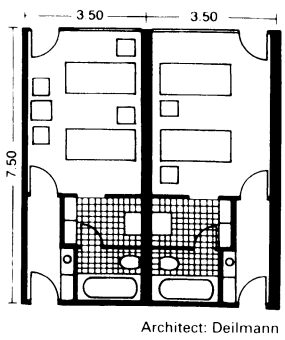
Architects: Köhler, Kässern

① **Premature baby and infant ward with 27 beds, Fulda**



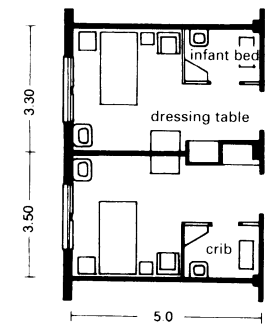
Architect: Deilmann

② **Care of infectious children: room variations** → ③–④



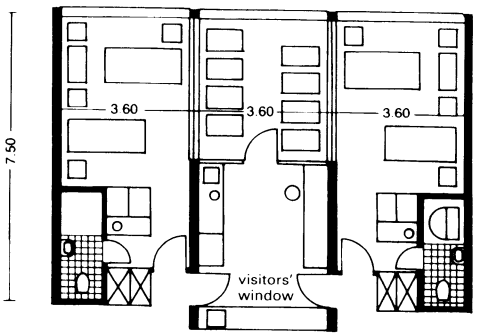
Architect: Deilmann

③ **room variations**

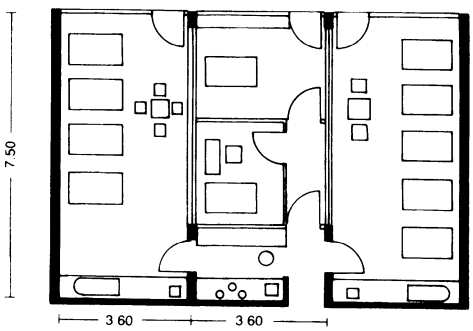


Architect: Deilmann

④ **room variations**



⑤ **One-bed room with separate infant room** Architect: Mayhew



⑥ **Neonatal and maternity care** Architect: Deilmann

The maternity and neonatal department provides continual physical, medical, psychological and social care for mothers and new babies following a hospital delivery. After uncomplicated births, the care of new mothers can be considered part of normal care. However, new mothers with highly infectious diseases, such as typhoid, TB and hepatitis, need to be housed in an isolation care ward. Where vital functions are disrupted, provision should be made for easy transfer to the intensive care ward. Neonates with infections or respiratory difficulties (e.g. premature babies) have to be transferred to special departments or the nearest children's hospital.

The division of maternity care is the same as for normal care: basic care, treatment care, patient care, administration and supply. Organisation of the processes with the options of ward care, group care or individual care are also the same as for normal care. With centralised neonatal provision, the care unit for neonates is located at the side of or within the maternity care unit. To reduce infection, the area is divided into small rooms or compartments. Neonates are carried into the mother's room on trolleys or by hand for breast feeding. This achieves more frequent and more intensive contact between mother and child than in previous designs with central feeding rooms. Accommodating mothers and neonates in one room ('rooming in') means the infants do not need to be moved, which thus relieves the staff, but requires uneconomic local neonatal provision. Despite this, it has become standard practice in some hospitals.

Facilities and size of care units

They are generally smaller than the units in normal care areas. Smaller wards are preferable because they are easier to control in terms of hygiene (less movement of staff and visitors) so it is advisable to limit the size per care unit to 10–14 bed spaces. The functions may be divided into: care of healthy mothers, care of healthy neonates, care of special neonates (e.g. premature babies) and incidental functions. For hygiene reasons, higher demands are to be made on maternal and neonatal care than on normal care. Therefore, a visitors' lobby and cloakroom area must be provided in addition to the usual system of demarcation. The bed space can be planned as in normal care but the bed spacing must be increased to allow space for a baby's crib next to the beds. Sit-bath/shower combinations and showers must be provided in the sanitary zones where mothers should not take full baths in tubs.

The neonatal care units comprise: bed spaces for neonates, undressing/dressing areas, baby bathing, weighing point, children's nurses' duty station and, possibly, a trolley standing area. A special neonatal care unit with isolated beds and care points should be provided for babies with pathogenic conditions. The following elements or rooms are also to be included in an incidental function area: duty station for the ward sister, nurses' lounge, kitchenette, doctors' offices, examination and treatment room, clean workroom, patient bathroom, day-rooms for patients and visitors, storage space for equipment and cleaning materials, staff and visitors' WCs, linen cupboards and a room for consultation with relatives.

Environment

To minimise the transfer of airborne germs, the ventilation system must process eight changes of air per hour. The room temperatures must be between 24°C and 26°C.

Position

The transport route for new mothers and neonates after delivery should be as short as possible and not cross any other busy corridors. Obstetrics and maternity care should preferably be on one level to avoid the need to use lifts.

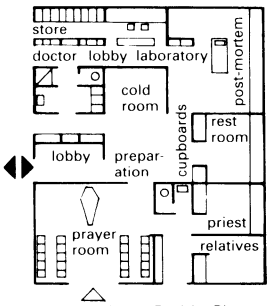
Mortuary, Pathology, Service Yard

Mortuary, pathology

The mortuary of a hospital contains storage rooms and post-mortem rooms. Specifically, there must be a coffin store, refrigerated storage for corpses, an area for laying out and undertakers, and changing facilities for pathologists. As an independent hospital department it should be so planned as to have access by a short route to a group of lifts (to the nursing stations). The entrance must be clearly marked for the relatives and there should be a short drive-in entry point for the undertakers. Depending on the size of the hospital, this area can be extended with the addition of a laboratory and an archive.

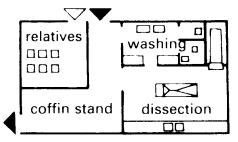
Service yard

Hospital logistics should be centred in one place. A service yard, conveniently situated in a low-level supplies and disposal area, makes this possible. The supply and disposal of all hospital goods and materials is conducted via a separate road connection, segregated from the main and emergency entrances. During planning, consideration must be given not just to the parking and manoeuvring area for goods vehicles, but also to the wide variety of waste to be managed (kitchen, septic, metal, glass, paper, chemicals etc.) and the necessary storage requirements. In addition, service yard auxiliary rooms house emergency electricity generators, the sprinkler control room, the oxygen distribution system, and other services. As a result of the many different functions and the different types of supply vehicles which will have to be accommodated, it is not possible to specify the space needed for this area; at an early stage, the designer and users need to agree on the requirements. Given that the basement is the most suitable location for the service yard, it will only be accessible via a ramp; the slope must be less than 15°. Where the yard is built over, regulations regarding ventilation must be followed.



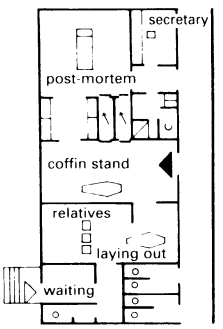
Architects: Poelzig, Biermann

① **Soltau Hospital: 354 beds**



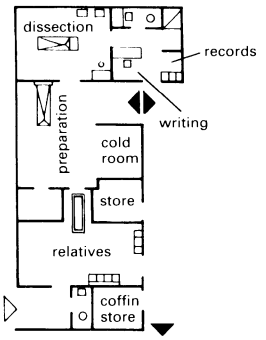
Architects: Köhler, Helfrich

② **Mortuary, St Joseph's Hospital, Wipperfürth (372 beds)**



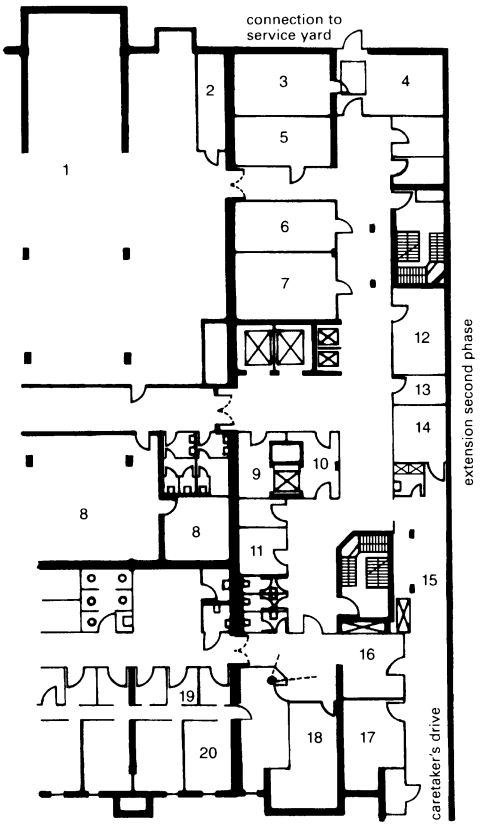
Architect: Poelzig

③ **Mortuary, St Clemens Hospital, Geldern (480 beds)**



Architects: Krüger, Krüger, Rieger

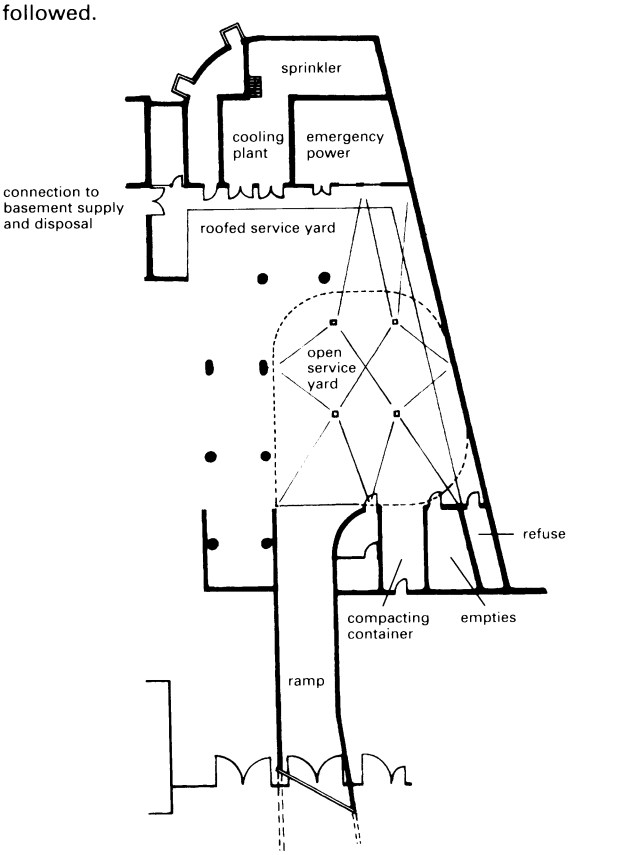
④ **Mortuary, Municipal Hospital, Verbert (444 beds)**



1 heating/services
2 electrical switchgear
3 water/gas feeds
4 store room
5 oxygen
6 electrical controls
7 data handling
8 store
9 supplies
10 disposals
11 laundry
12 store room
13 relatives
14 laying out
15 coffin standing
16 dissection
17 equipment
18 records
19 rest room
20 hydro-massage

Architects: U + A Weicken

⑤ **Basement floor with supply and disposal provision, mortuary, physical therapy**



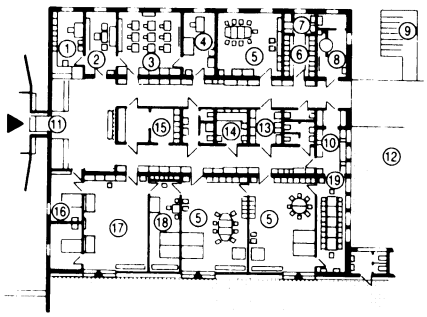
Architects: U + A Weicken

⑥ **Service yard/ramp**

SPECIAL HOSPITALS

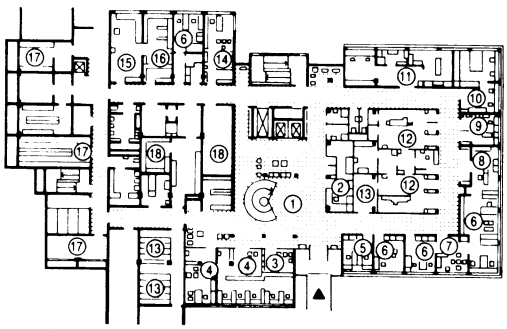
Hospitals specialising in specific medical fields are becoming increasingly important. They require a far more space-intensive general arrangement and this leaves the planner facing extra demands. It is vital to have ongoing co-operation between the architect, medical engineers and the doctors/nurses who will be working in the hospital.

Special hospitals cover medical disciplines such as specific surgical procedures, a range of therapies, psychiatry and paediatrics. There has been a proportionate increase in the number of clinics for treating allergies, skin complaints and lung diseases.



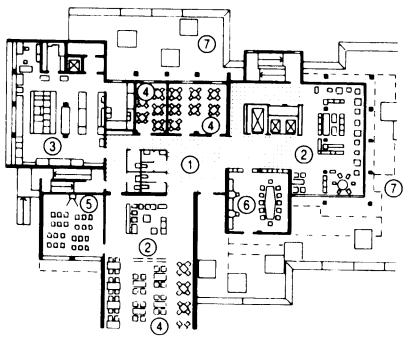
① office
② consulting
③ lectures
④ tuition
⑤ kindergarten
⑥ staff cloakroom
⑦ staff bathroom
⑧ heating
⑨ bicycles
⑩ kitchen
⑪ entrance
⑫ goods yard
⑬ washing room
⑭ baby changing
⑮ equipment
⑯ treatment
⑰ gymnasium
⑱ occup. therapy
⑲ staff lounge

① **Göggingen Spastics Centre**



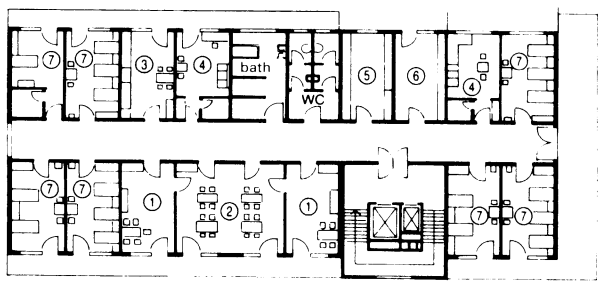
① hall
② porter
③ registration
④ administration
⑤ office
⑥ doctor
⑦ waiting room
⑧ examination
⑨ ECG
⑩ laboratory
⑪ endoscopy
⑫ X-ray exam.
⑬ files
⑭ nurse
⑮ laundry
⑯ sewing/ironing
⑰ kitchen suppl.
⑱ stores

② **Wildbad Rheumatism Hospital (100 beds): ground floor**



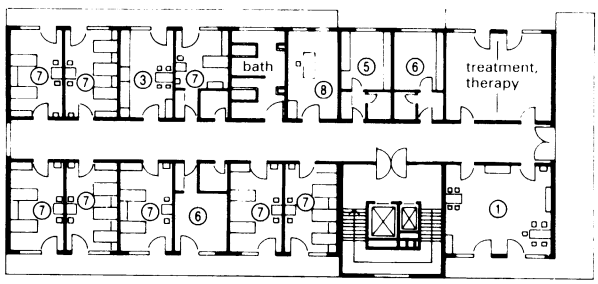
① hall
② day room
③ kitchen
④ dining
⑤ TV room
⑥ consulting, library
⑦ terrace

③ **Wildbad Rheumatism Hospital: first floor**

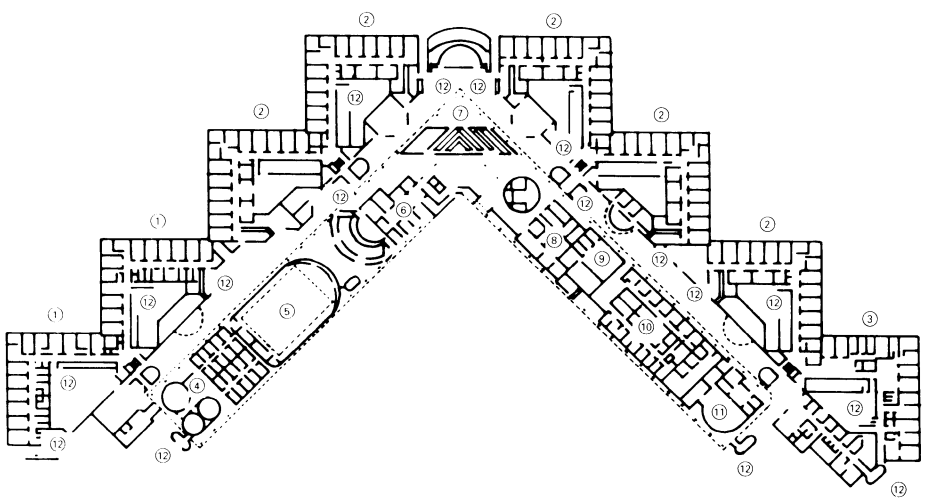


④ **Munich Rehabilitation Centre (72 beds): floor 1/2**

① living
② dining
③ kitchenette
④ lecturer, duty staff
⑤ cleaning
⑥ store
⑦ sleeping
⑧ duty doctor



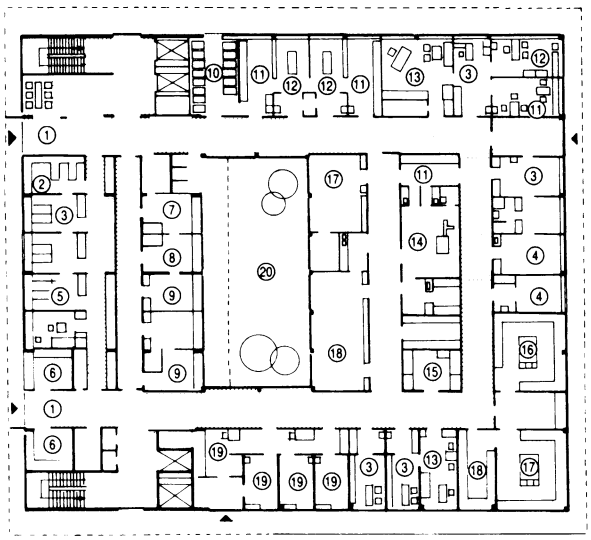
⑤ **Munich Rehabilitation Centre: fourth floor**

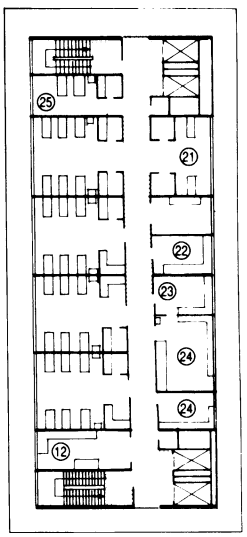


① geriatric unit
② adult unit
③ pediatric units
④ psychiatric outpatient clinics
⑤ consulting area
⑥ volunteer workers
⑦ dining area
⑧ admissions
⑨ medical records
⑩ emergency clinics
⑪ business area
⑫ free-standing colour-coded stairs in mall each serve four residential units; supplemented by elevators for disabled

Architects: Todd Wheeler & Perkins & Will Partnership

⑥ **Capital District Psychiatric Center, Albany, New York accommodates 400 inpatients in 16 residential units, each of which serves 25 day patients**



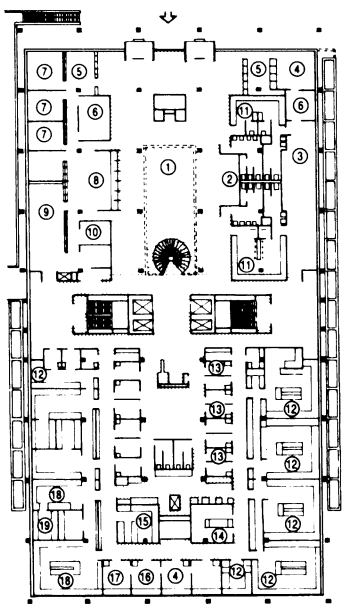


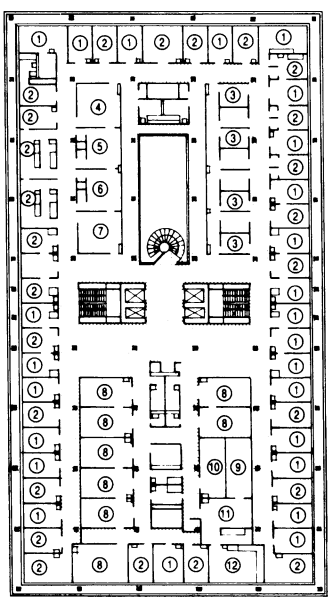
Architects: Amon, Häckl, Kochta

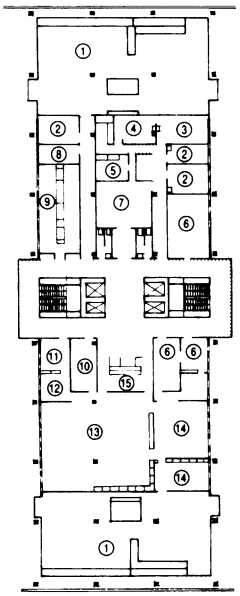
① entrance hall
② porter
③ secretarial area
④ administration
⑤ matron
⑥ admission
⑦ ENT
⑧ eyes
⑨ EEG
⑩ pram
⑪ waiting room
⑫ examination
⑬ doctor
⑭ X-ray
⑮ ECG
⑯ clinical lab
⑰ serology lab
⑱ bacteriology lab
⑲ infection records
⑳ courtyard
㉑ isolation room
㉒ kitchen
㉓ nurse
㉔ care work
㉕ parents

① 200-bed Fürth Municipal Children's Hospital: ground floor

② upper floor







Architects: Braun/Schlockermann/Braun-Krebs

ground floor
① hall
② cloakroom
③ lounge
④ doctor's room
⑤ anteroom
⑥ consultation
⑦ administration
⑧ admissions
⑨ main office
⑩ switchboard
⑪ changing
⑫ laboratory
⑬ blood sampling
⑭ sink room
⑮ auto-analysis
⑯ secretarial
⑰ chemist
⑱ biochemistry
⑲ physics/chemistry

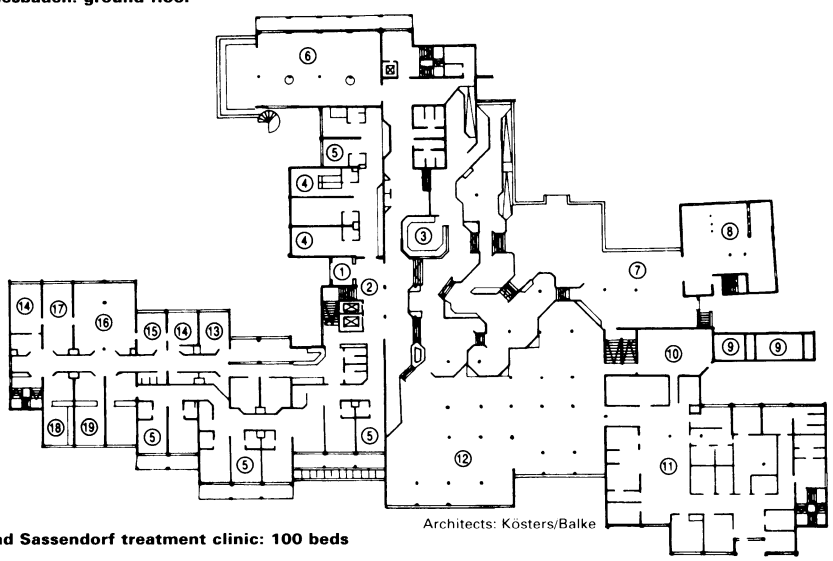
first floor
① ventilation centre
② doctor's room
③ nystagmography
④ myography
⑤ dark room
⑥ files
⑦ studio
⑧ gas sterilisation
⑨ central sterilisation
⑩ waiting
⑪ manager
⑫ secretarial
⑬ plant room
⑭ programmer
⑮ operator

second floor
① doctor's room
② examination
③ measuring centre
④ gas analyses
⑤ ergo-spirometry
⑥ ergometry
⑦ dye testing
⑧ pathology measuring
⑨ strong room
⑩ dose admin.
⑪ radioactivity lab
⑫ sample measuring

③ German Clinic for Diagnostics, Wiesbaden: ground floor

④ first floor

⑤ second floor

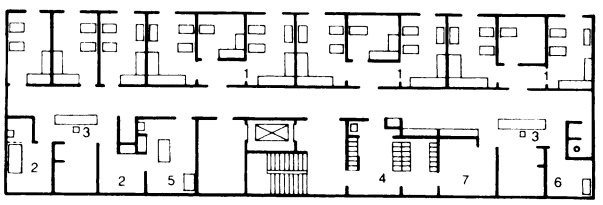


Architects: Kösters/Balke

① porter
② entrance hall
③ reception
④ double room
⑤ single room
⑥ conference
⑦ hall
⑧ lounge
⑨ electric plant
⑩ staff dining
⑪ kitchen
⑫ dining room
⑬ laboratory
⑭ senior physician
⑮ examination
⑯ chief physician
⑰ secretarial area
⑱ staff nurse
⑲ ECG

⑥ Bad Sassendorf treatment clinic: 100 beds

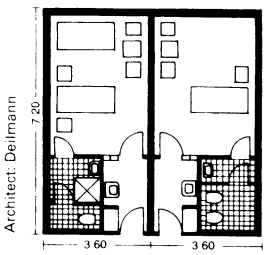
SPECIAL CARE AREA SAFETY



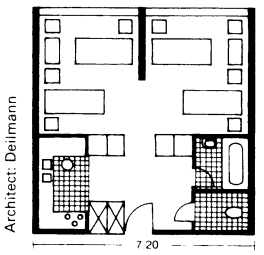
1 bedroom
2 doctor
3 nurse's duty station
4 staff cloakroom
5 treatment
6 breast-feeding room
7 nurses' lounge

Architects: Krüger, Krüger, Rieger

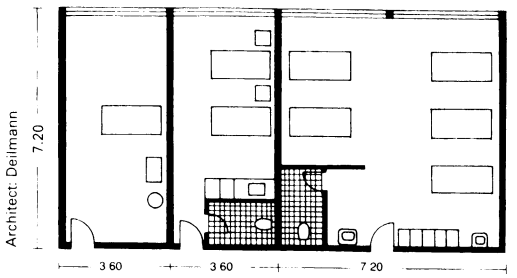
① **Children's ward with 28 beds, Velbert Municipal Hospital**



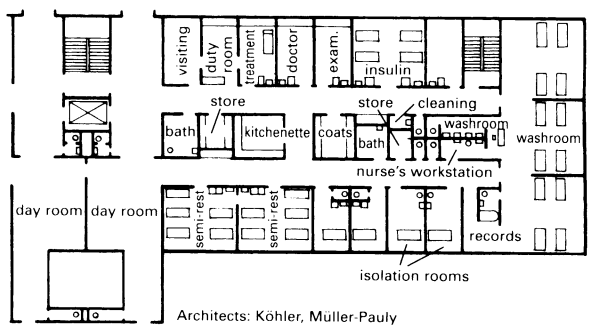
② **Single/two-bed room in control area; high radiation protection**



③ **Four-bed room; all facilities for basic care (long-term patients)**

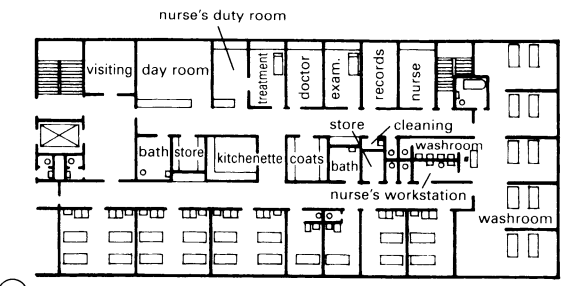


④ **Room unit for people with slight mental illness and for those requiring care**

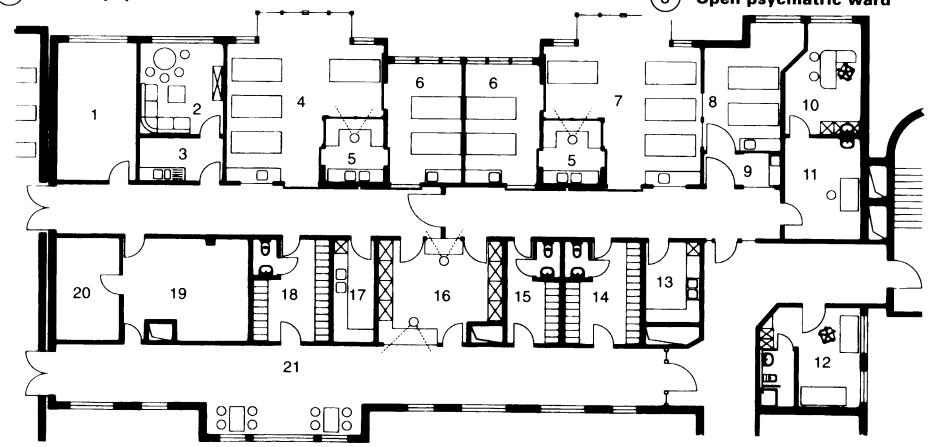


Architects: Köhler, Müller-Pauly

⑤ **Closed psychiatric ward**



⑥ **Open psychiatric ward**



1 service room/equipment
2 staff rest room
3 kitchenette
4 four spaces (white)
5 supervision point
6 two spaces
7 four spaces (yellow)
8 two spaces (emergency)
9 lobby
10 doctor
11 examination
12 doctor/preparation
13 materials store unclean (yellow)
14 patient changing (yellow)
15 staff changing
16 nurses' workstation/records
17 materials store unclean (white)
18 patient changing (white)
19 central concentrate supply/dilution
20 store
21 waiting

⑦ **Dialysis station for 12 places**

Architects: U + A Weicken

Infants and children

The patients generally found in special children's hospitals may be categorised as follows: infants (35%) and premature babies (13%), small children and schoolchildren up to the age of 14 (22%), and groups of all ages with infectious diseases (22%). In such areas, contact between the patients and other patients/staff should be avoided as far as possible.

Windows, heaters and electrical apparatus must be secured in such a way that children cannot be put at risk. Rooms for teaching, entertainment and play should be similarly fitted out.

Isolation wards must be provided for measles, chickenpox, diphtheria, scarlet fever and TB. The walls must withstand washing and disinfecting below a height of 1.50m and the design should as far as possible resemble a kindergarten rather than a clinical area.

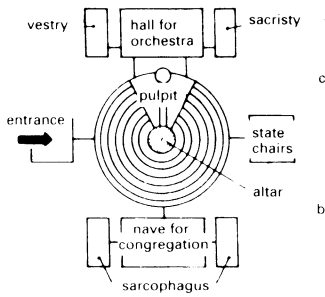
Care of patients receiving radiotherapy

When planning a care area using nuclear medicine for patients needing radiotherapy, the provisions of radiation protection regulations must be observed. The size of such care groups should be similar to that of a normal care group. The operations centre is divided into a control area and a supervision area. In this way, patients whose bodies have received the greatest radiation doses are separated from those who have received less. Patients should therefore be accommodated primarily in one-bed rooms.

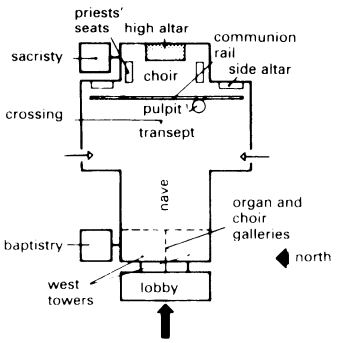
Care of the mentally ill

The variable nature of mental illness results in a requirement for open and closed wards (for those in need of slight care and those who are seriously ill and possibly violent). The two types need to be accommodated when planning and setting up care units. Large areas are required for day-rooms, dining rooms and rooms for occupational and group therapy, because patients are not confined to bed. Small care units (up to 25 patients) should have short circulation routes and provide good observation points for nursing staff. A homely design should always be used to give patients a feeling of well-being. There is a trend towards integrating wards for the mentally ill into general hospitals to prevent these patients becoming institutionalised.

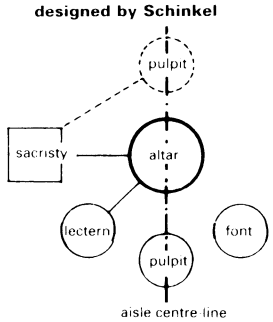
CHURCHES



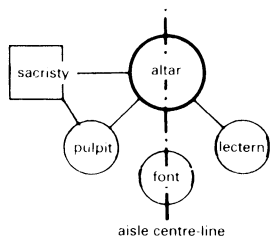
(1) **Layout of the Berlin Dom (Protestant cathedral) designed by Schinkel**



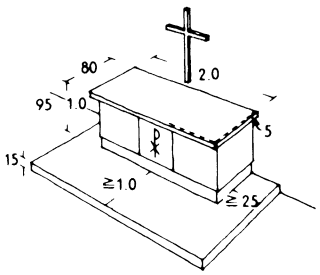
(2) **Layout of typical Roman Catholic church**



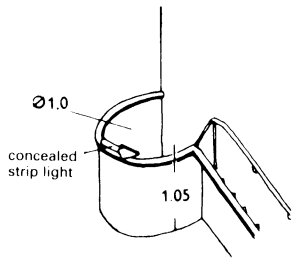
(3) **Pulpit and altar on same axis**



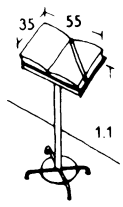
(4) **Pulpit off the altar axis**



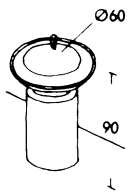
(5) **Protestant altar table. Similar dimensions for side altars in Roman Catholic churches; main altars 3.00 length · 1.00 depth including tabernacle**



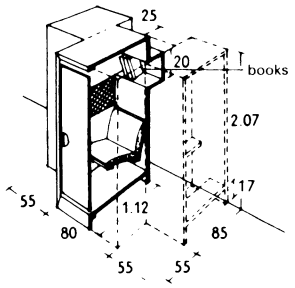
(6) **Pulpit without sounding board (microphones have made sounding boards unnecessary)**



(7) **Lectern (typical dimensions)**

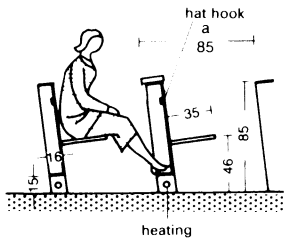


(8) **Font (typical dimensions)**



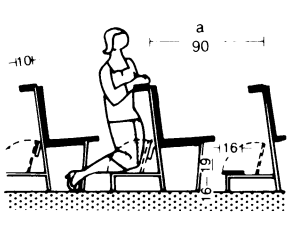
(9) **Confessional for Roman Catholic church**

a = 80–90 (av. 85 cm)
seat width = 50–55 (norm. 50 cm)



(10) **Seating in Protestant church (without kneeler)**

a = 85–95 (av. 90 cm)
b = 5–14 cm
seat width = 50–55 (norm. 50 cm)



(11) **Seating in Roman Catholic church (with kneeler)**

Since churches are places of worship, the form of the building should be derived from the worship and the liturgy. Each individual diocese or sect has guidelines for its own churches, but local regulations on places of assembly should also be observed.

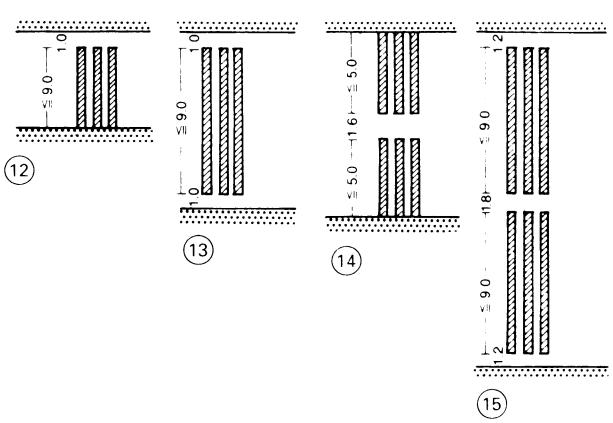
Once, all Christian churches were Catholic. They were places for the 'servants of God' to worship. The common people often had to remain outside in the courtyard, in 'paradise'. The church was a sacred building, profoundly symbolic in its plan (cruciform), direction (choir in the east) and dimensions, and in all liturgical details. Later the whole congregation was admitted into the nave. The choir, with the high altar (a tomb with relics of saints), was separated by a grille, and in larger churches the central area, the 'heart of the church', was reserved for the clergy.

The space requirements are 0.4–0.5 m² per seat without a kneeler bench (Protestant) · 10, and 0.43–0.52 m² per seat with a kneeler bench (Catholic) · 11, not including aisles. The arrangement and form of seating is of great importance for the spatial effect, audibility and visibility. For smaller churches (or chapels), one side aisle, 1 m wide, with benches for six to ten people, is sufficient · 12, or one central aisle, 1.50 m wide, with seating on either side · 14. However, external walls can feel very cold, so two side aisles with benches between for 12–18 people are better · 13. Wider churches will need correspondingly more aisles · 15.

The total area required for standing room varies between 0.63 and 1 m². A large area of the aisle space, particularly along the back wall, is commonly used for standing. The width of the exit doors and stairs must comply with the same regulations as for other places of assembly (e.g. theatres and cinemas). The central aisle on the axis of the altar is useful for funerals, processions etc. · 3, but is a disadvantage to the preacher if the lectern is on the same axis, as is often required in Protestant churches.

Churches should always have a clergy house attached to them. Where appropriate, the advice of the Diocesan Commission should be sought for new buildings, conversions and refurbishments. In certain cases, approval must be given by the Bishop's representative. Vatican II has brought in a new orientation in Catholic church building.

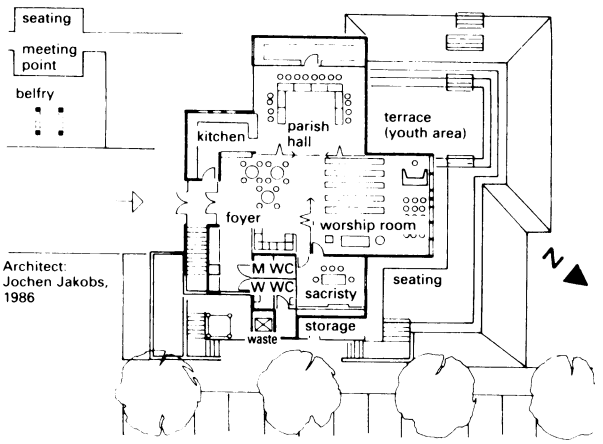
The altar is the Lord's table (the communion table), the centre of the celebration of the Eucharist and often the focal point of the building. In churches, altars must have a top (mensa) of natural stone, but the support (stipes) can be of any material provided it is durable and worthy. In other places of worship, portable altars of a worthy material may be used. The altar should be 95 cm high, and free standing so that it is possible to walk around it easily · 5. The priest celebrates behind the altar facing the congregation. Relics of martyrs or saints may be set into the altar or sunk into the ground beneath it.



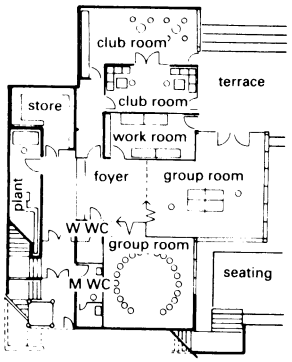
(12) (13) (14) (15)

(12) – (15) **Minimum width of churches depending on aisle arrangements**

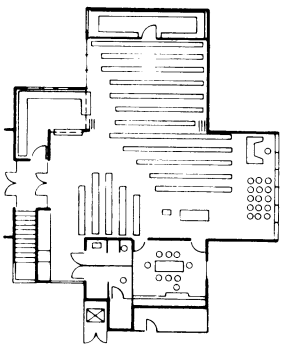
CHURCHES



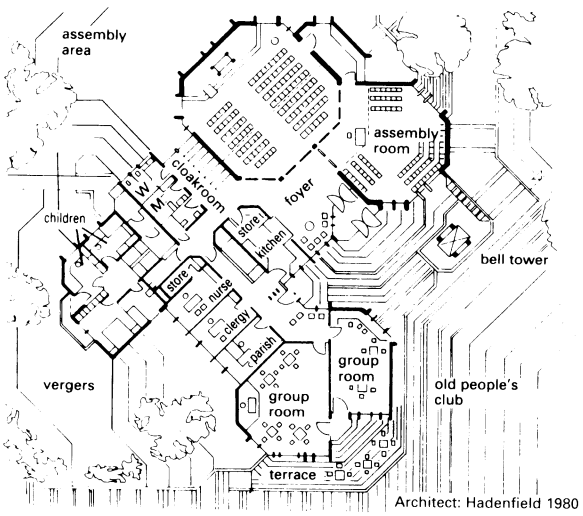
(1) **Ground floor of parish centre in Widdersdorf, Cologne** → (2) – (3)



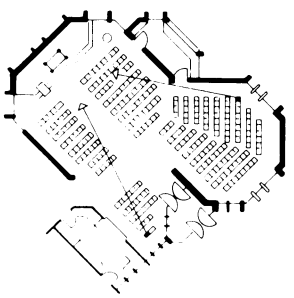
(2) **First floor** → (1)



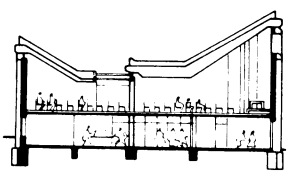
(3) **Ground floor: multi-use, 180 seats** → (1)



(4) **Ground floor of the Hoffnungskirche in Porz, Cologne**



(5) **Service seating 254** → (6)

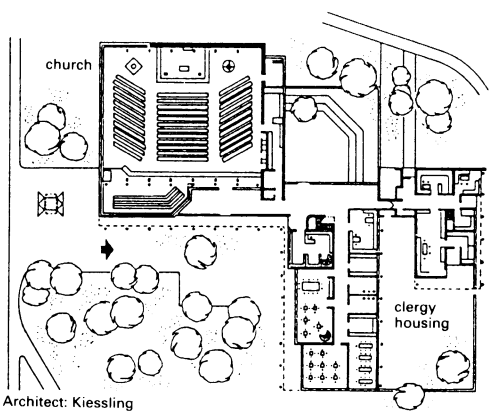


(6) **Section** → (5)

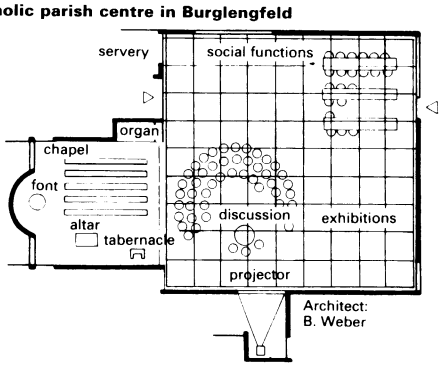
In larger churches or cathedrals (the seat of the bishop), side chapels with ancillary altars may be built. The chancel should be slightly raised for good visibility, and suitably set off from other areas. As well as the altar, a table is required for the missal (Gospels) and the vessels, and also a seat for the priest and servers (not a throne), usually at the vertex of the altar facing the congregation. A fixed lectern (ambo) is also necessary. The sermon (homily) and intercessions should be given from the right as seen by the congregation. Communion benches are no longer obligatory. Side altars in Roman Catholic churches are movable or in lockable recesses ≥2.00 m wide and 3 m deep.

The nave should have benches for worshippers to sit and kneel (and in France, also low chairs with high backs). If absolutely necessary, install an amplifier system with microphones at the altar, the priest's chair and the lectern. Locate seats for the choir and musicians near the organist; galleries are not usually suitable. The organ loft needs expert acoustic and spatial planning in advance, as does the bell tower (see following pages). The Blessed Sacrament is kept in a secure tabernacle at a place marked by the sanctuary lamp. In front of the tabernacle place a table for the vessels and kneelers for private prayer. The 14 stations of the Way of the Cross, with symbolic, artistic depictions and the crosses of the 12 apostles, are distributed evenly for people to walk around. A baptistery with the font can be in the nave or in a side chapel. Confessionals in Roman Catholic churches are next to the choir or in the side aisles, and if possible can be entered from two sides.

The sacristy is used to keep robes and vessels and to prepare the services, and should be situated near the altar. Ventilation, heating, toilets, disabled access and seats for people with impaired hearing, as well as sufficient parking space, complete the brief.



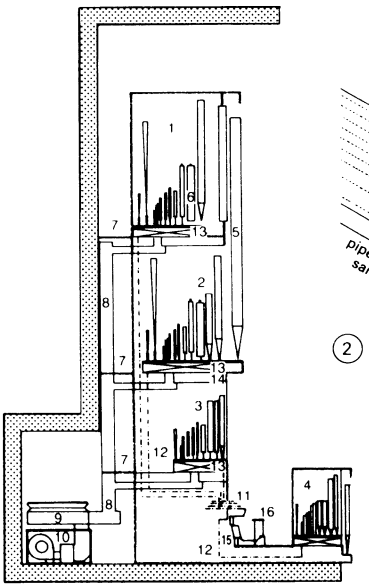
(7) **Catholic parish centre in Burglengfeld**



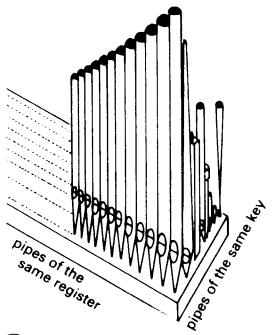
(8) **Possible different usage of space**

CHURCH ORGANS

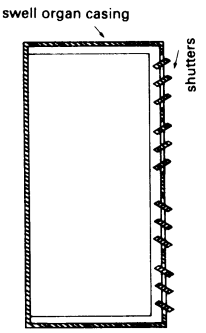
The organ in a church or concert hall is a work of art incorporating musical, architectural and technical aspects. There is no fixed form. The design is based on the technical requirements of the organ, and each organ is unique. The organ is an integral part of a space and of the architecture. The space and the organ must be planned together. At the beginning of the planning process, the architect and the organ builder should work together. The problems are complex and cannot be solved by the architect alone. The external appearance of the organ should match its inner structure. The factors affecting this are the volume of the space, the acoustics of the space, the position within the space, the number of seats and the musical requirements (solo instrument, accompaniment). The better the acoustics and the better the positioning of the organ, the smaller the organ needs to be. The optimum reverberation time is 3–4 seconds in a full space with high diffusion and good reflection from the rear wall, the side walls and the ceiling. The frequency range of an organ is between 16 Hz and over 10000 Hz. The sound is better in front of, rather than behind, the organ. The sound in any space is best on the main/longitudinal axis. The units for determining musical capacity are register and number of stops → ⑫. In small spaces, one register requires 60 m^3, medium-sized spaces require 100 m^3 per register and larger spaces 150 m^3. If the acoustics for the organ are not good (reverberation time under 3.5 seconds), 10% must be added to these figures. Organs actually consist of a number of different organs which are normally contained in a wooden frame or filled structure. Rough guidelines for the proportions are shallow rather than deep, and high rather than wide. Ensure that the space is sufficiently high. The casing is open at the front near the prospect pipes. These may only begin at head height (approx. 2 m). The rear wall has many doors to allow the organ to be tuned and maintained → ①. Tuning boards are 50–80 cm wide. The face of the organ is known as the prospect and holds the prospect pipes, which are made of a tin/lead alloy and are visible from the front. The prospect should preferably match the structure of the organ(s). The pipes produce the sound. Their shape (cylindrical, conical, open, covered), dimensions (narrow/wide) and material (tin/lead alloy, wood) determine the tone colour. For technical reasons, wind chests are always rectangular in plan. Organs with a round plan form should be large enough to house a rectangular wind chest.



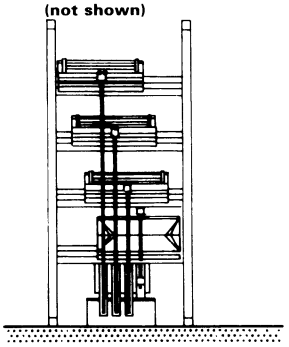
① **Section through organ, four manuals; pedal to the side (not shown)**



② **Pipe arrangement on wind chest**



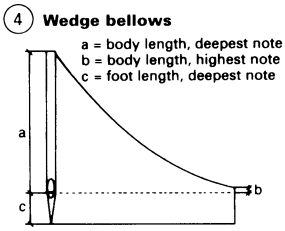
③ **Swell organ**



④ **Wedge bellows**

blower (incl. motor casing) registers (no.):	10	20	30	40
length (cm)	85	85	120	150
width (cm)	65	75	110	120
height (cm)	60	60	110	135
reservoirs: no. of organs	1	2	3	4 5
length (cm)	70	110	160	200 300
width (cm)	50	60	80	100 130
height (cm)	20	30	30	35 40
varying blown pressure may necessitate wedge bellows (to side/behind organ), in housing to following dimensions:	length	300–400 cm		
	width	110–150 cm		
	height	130–390 cm		

⑤ **Dimensions of blower and reservoirs**

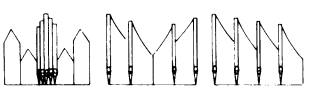


⑥ **Rank of pipes of an open B flat register**

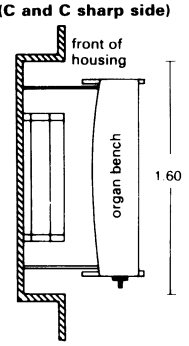
		32′	16′	8′	4′
manual	a	1000	488	240	119
56 notes	b	38	19	9.5	4.8
C-9″	c	90	50	30	18
pedal	a	1000	488	240	min
30 notes	b	159	78	38.6	dimen-
C-9″	c	90	500	30	sions

⑦ **Table with pipe bodies**

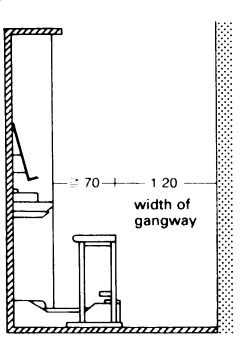
⑧ **Diatonic pipe arrangement (C and C sharp side)**



⑨ **Tierce position**



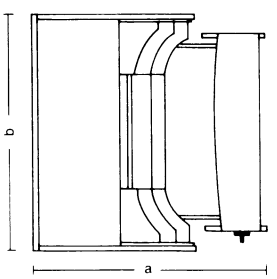
⑩ **Plan of manual console**



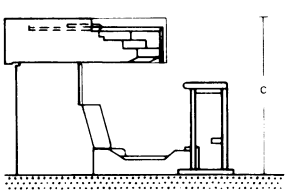
⑪ **Section** → ⑩

seats	registers	no. of organs incl. pedal boards	lowest main register		type of organ
			great organ	pedal board	
100	3–7	1	2′	none	A chest/positive
200	8–12	2	4′	8′	B positive
300	12–20	2	4′–8′	8′	C small
400	20–30	3	8′	8′	D
500	25–35	3–4	8′	16′	E
600	30–40	4	8′	16′	F
700	35–45	4	8′	16′	
800	40–50	4	8′–16′	16′	
900	45–55	4	16′	16′	G
1000	50–60	4–5	16′	16′	
1250	60–70	4–5	16′	16′–32′	H
1500	70–80	5	16′	16′–32′	
1750	75–85	6	16′	32′	I
2000	80–90	6	16′	32′	
2500	90–100	6	16′	32′	

⑫ **Formula for determining number of registers (according to H.G. Klais)**

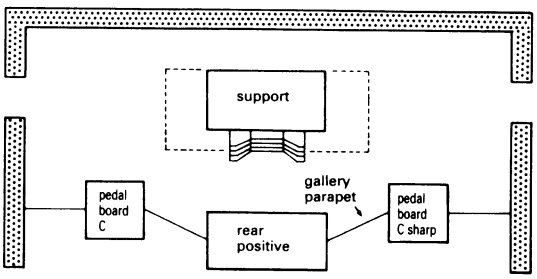


⑬ **Plan of free-standing console**



⑭ **Section** → ⑬

CHURCH ORGANS

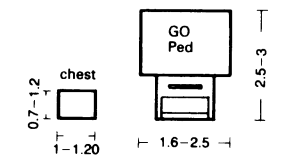


① **Plan of pedal towers on the parapet**

type	height (m)	width (m)	depth (flat prospect) (without tuning board)	
③ - ④	0.6 - 0.8	1 - 1.2	0.7 - 1.2	chest h = 0.6–0.8 m
⑤	2.5 - 3	1.6 - 2.5	0.8 - 1.6	positive
⑥	4 - 6	3 - 3.5	1.2 - 1.8	small organ
⑦	6 - 7	5.5 - 6.5	1.2 - 2	II manuals/GO 8'/Ped 8'
⑧	6.5 - 9	4.5 - 7	1.5 - 2.5	II manuals/GO 8'/Ped 16'
⑨ - ⑩	7.5 - 10	7 - 9	2 - 3	III man./GO 8'–16'/Ped 16'
⑪ - ⑫	9 - 13	8 - 12	2 - 4	IV–V man./GO 16'/Ped 16'–32'

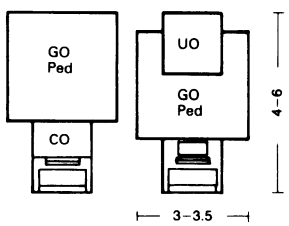
dimensions given for the depth of the organ casing are meant solely as a guideline; if the organs are arranged one behind the other with a projecting prospect the organ will require more space

② **Summary of casing sizes** → ③ - ⑫

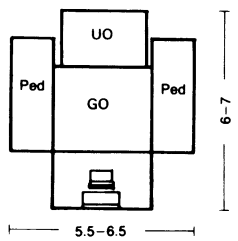


GO great organ
ChO chair organ
CO choir organ
SO swell organ
UO upper organ
Ped pedal organ

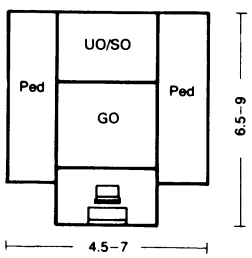
③ - ④ → ②



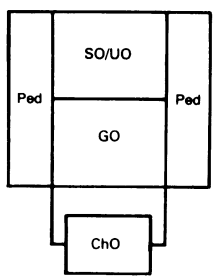
⑤ - ⑥ → ②



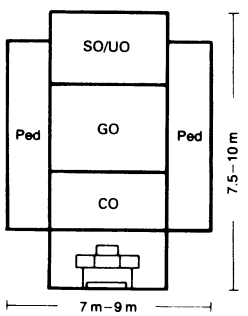
⑦ → ②



⑧ → ②



⑨ → ②



⑩ → ②

The console should be firmly connected to the organ when using a mechanical action. This is the only way to ensure short actions and an optimum touch. Electric actions (direct electric and electro-pneumatic) allow the console to be placed as far from the pipes as required, but normally the console is built into the front of the organ. In the case of a prospect organ, the console can be positioned to the side, but only rarely behind the organ.

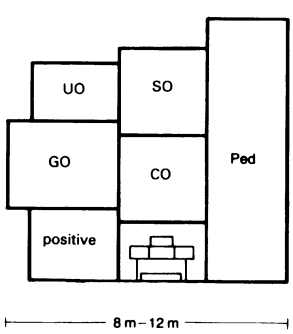
A free-standing console must be in a central position in front of the organ, at a maximum distance of 2.00 m. The organist should be facing the instrument (→ 570 ⑬ - ⑭). The mechanical devices connecting the console to the wind chest of the organ are called actions. They should be short and simple. The bellows consist of a blower, reservoirs and wind ducts leading from the bellows to the wind chests. Bellows are normally in the base of the organ, but can also be behind or to the side. Large bellows systems are in separate bellows chambers, particularly in concert halls.

Organs need not necessarily be housed in a gallery. They can also be located in the sanctuary or in a 'swallow's nest'. Avoid fitting them in towers, in deep recesses or in front of large windows (cooling surfaces). Do not impede the sound reflection with timbers or arches. In a concert hall, the organ should be positioned close to the stage.

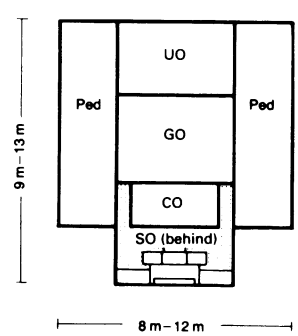
In any building housing an organ, the humidity should be even throughout the year (optimum 60%) if possible. The limits are between 45% and 80% air humidity, with no draughts or rapid variations in temperature. Allow the organ 10 hours to warm up and to cool down. There should be no windows near the organ, and none behind it. If possible, install heat-insulated walls behind and to the sides of the organ, with hard, reflective surfaces. Do not place the display pipes in direct sunlight, and avoid floodlights.

Organs need regular maintenance. Leave tuning gangways behind the organ 50–80 cm wide. Projecting organs should be accessible from below. Rostra for the choir and orchestra should be in front of organ.

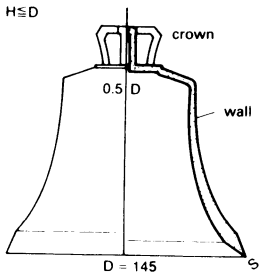
The weight of an organ can range from 100 kg per register for choir organs to 600 kg per register for pedal organ bases, including frames and casework. Free-standing consoles with two keyboards weigh up to 250 kg, and those with three manuals up to 300 kg. The preponderance of point loads means that it may be necessary to fit load distributors.



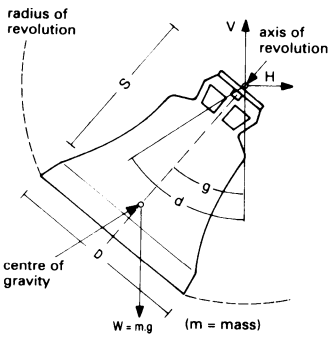
⑪ → ②



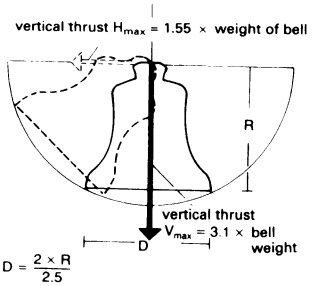
⑫ → ②



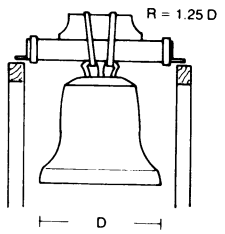
① **Bell proportions**



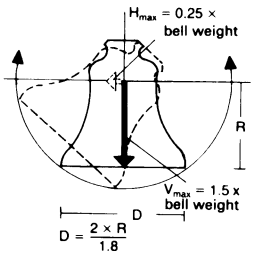
② **Specifications**



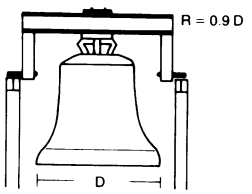
③ **Horizontal thrust**



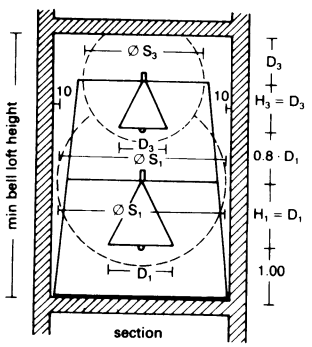
④ **Straight yoke**



⑤ **Suspension near the centre of gravity**

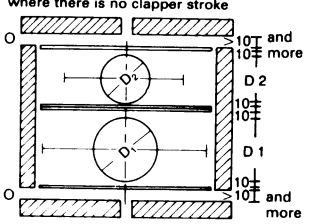


⑥ **Returned steel yoke**

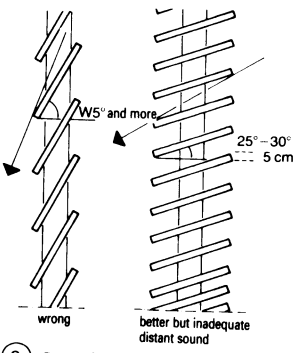


⑦ **Dimensions of bell chamber (minimum)**

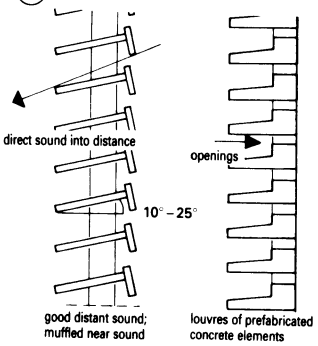
length of panels
Ø S_3 = swing diameter, bell 3 = 2.6 × D_3
Ø S_1 = of bell 1 = 2.6 × D_1
sound openings O in places where there is no clapper stroke



⑧ **Plan** → ⑦



⑨ **Sound shutters**



⑩ **Sound shutters**

Before planning, consult a bell specialist about the size and pitch of the bells, and their acoustics and weights. The foundryman designs the bell frame as the basis for the dimensions of the bell chamber and sound openings. He also provides the expected loads for the structural engineer. The structural engineer must take both static and dynamic loads into consideration. The inherent frequency of the tower must not resonate with the frequency of the bells.

The weight, alloy and thickness of the bell walls determine the volume of sound. Today, electric ringing machines are often used. Steel bells are about 15% larger in diameter and about 25% lighter than bronze bells, but are rarely manufactured nowadays → ①.

The bell tower is, by definition, a solo musical instrument and forms an orchestra with neighbouring bell towers. The desired hearing distance determines the height of the bell loft in the tower, which should be above surrounding buildings. The quality of the bell tone depends on the material and acoustic design of the building. The tower is insulated against structure-borne sound. In this respect, free-standing towers have advantages such as access hatches for installing and changing bells, and accident-proof access to the bell loft for maintenance (stairs instead of a ladder).

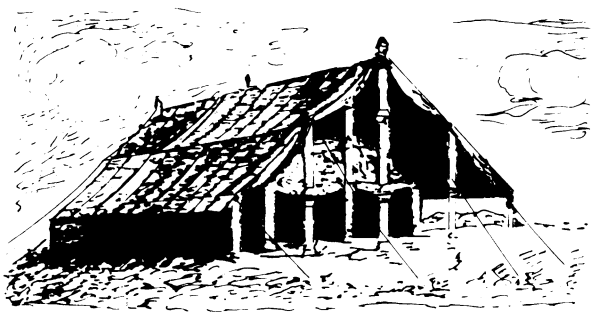
The bell loft is a resonance and mixing chamber and determines the musical quality of the radiated sound. The loft is completely closed apart from the sound openings → ⑦ + ⑧.

The sound openings are at right angles to the direction of the bell swing. A lot of small openings are better than a few large ones. The sound radiation angle should not be more than 30° from the horizontal to protect the neighbourhood. The striking of the clapper should not radiate. This should be taken into account when positioning the sound shutters. The total openings should be a maximum of 5% of the interior walls of the bell loft if the walls have a smooth surface, and a maximum of 10% if they have a rough surface. Concrete floors and ceilings can be covered with wood → ⑨ + ⑩.

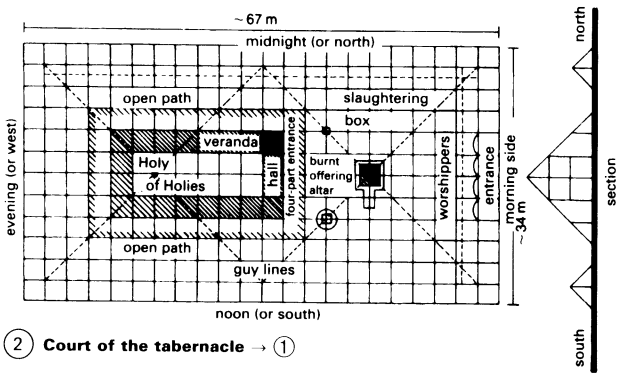
	bell diameter d (mm)	bell weight W (kN)	bell diameter d (mm)	bell weight W (kN)	bell diameter d (mm)	bell weight W (kN)
	walls					
pitch	light		medium		heavy	
F°	2250	58	2320	71		
F° sh.	2120	48	2220	59		
G°	2000	40	2100	50		
G° sh. A° fl.	1880	34	2000	41		
A°	1780	28	1880	35		
A° sh. B°	1680	24	1760	29		
B°	1580	20	1660	24		
c'	1480	16	1570	20	1680	31
c' sh. d' fl.	1400	14	1475	17	1580	25
d'	1325	11	1390	14	1500	21
d' sh. e' fl.	1240	10	1310	12	1410	17
e'	1170	8.0	1240	10	1330	15
f'	1110	7.0	1170	8.0	1250	13
f' sh. g' fl.	1035	5.5	1100	7.2	1175	11
g'	980	4.6	1040	6.0	1110	9.0
g' sh. a' fl.	930	4.0	980	5.0	1040	7.2
a'	875	3.2	925	4.3	985	6.2
a' sh. b'	830	2.8	870	3.5	930	5.3
b'	780	2.3	820	3.0	880	4.3
c"	740	2.0	775	2.5	830	3.7
c" sh. d" fl.	690	1.6	730	2.1	780	3.2
d"	650	1.4	690	1.7	735	2.6
d" sh. e" fl.	600	1.1	645	1.5	690	2.1
e"	575	0.90	610	1.2	650	1.7
f"	550	0.80	580	1.0	620	1.5
f" sh. g" fl.	510	0.65	545	0.80	595	1.2
g"	480	0.55	510	0.70	550	1.0
g" sh. a" fl.	450	0.45	480	0.59	525	0.90
a"	425	0.38	455	0.50	495	0.75
a" sh. b"	390	0.32	430	0.40	465	0.65
b"	370	0.25	405	0.35	440	0.50
c"'	350	0.20	380	0.30	415	0.43

⑪ **Characteristic values of bells**

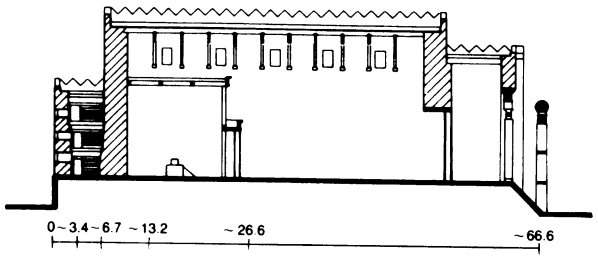
SYNAGOGUES



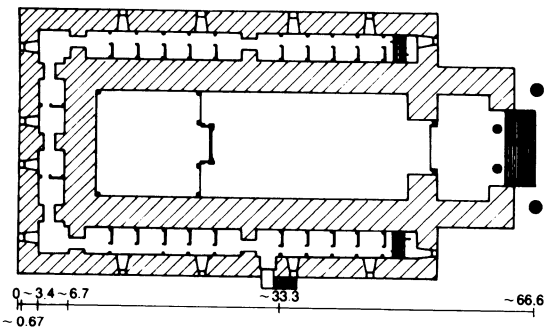
(1) **Meeting tent (tabernacle): Jews' first place of worship**



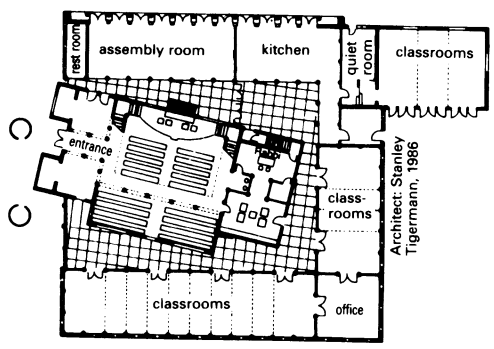
(2) **Court of the tabernacle** → (1)



(3) **Temple of Solomon, Jerusalem: longitudinal section** → (4)



(4) **Plan of the Temple**



(5) **Or Shalom Synagogue, Chicago: plan**

God's first commission for a sacred building, with exact technical and design specifications, can be found in the passage in the Bible describing the construction of the Tabernacle (Exodus 25–27).

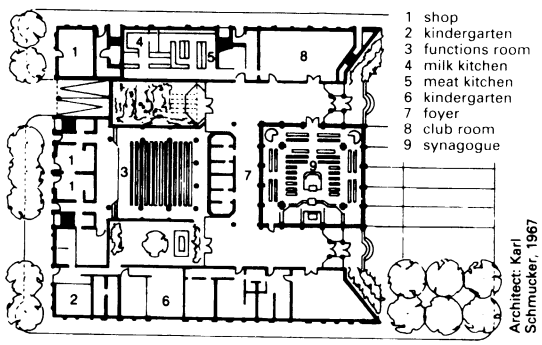
The focal point in a synagogue is not an altar but a raised preaching rostrum (almemor) with seats for the rabbi and the cantor. Extracts from the Torah are read from here. The synagogue is sited to face Jerusalem. On the front wall is an ark in which the Torah scrolls are kept (Aron Hakodesh). The ark and its contents are the holiest features in the synagogue. It is in one single section in the 'Askenasi' part of the world (European Jews), and in three sections in Sephardic areas (oriental Jews). Between the almemor and the Aron Hakodesh is an aisle used for the ceremonial procession preceding the reading from the scrolls.

The plan of every new synagogue is an attempt to solve anew the problems of the locations of the spiritual focal point, which is the almemor (i.e. a more orthodox, centralised building), and the spatial focal point, which is the Aron Hakodesh (i.e. a more modern long hall). The symbolic elements of the star of David, the seven-branched candelabrum and the Decalogue given to Moses are also essential.

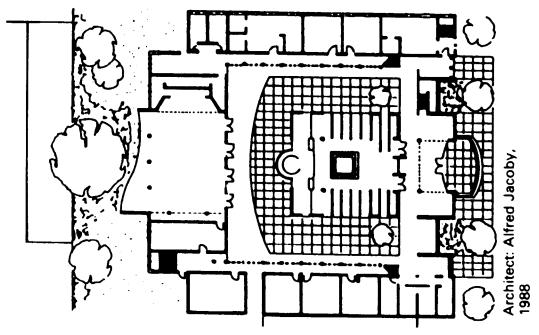
A pulpit has been included in some synagogue interiors since at least the fifth or sixth century, but they were not commonplace until the eighth century. It is used for reading texts less holy than those read at the bimah table, and for offering prayers. It is likely to be a modest piece of furniture with only occasional ornamentation.

A synagogue may be surrounded by other annexes and buildings. It may even be part of a multi-synagogue complex, as at the Great Synagogue courtyard in Vilnius. The synagogue is often part of a community centre, thus combining spaces for assembly and prayer. There is usually (at least symbolically) a separate space for women out of view of the men, often in a gallery. At the entrance there is a fountain or washstand for hand washing. The ritual bath (mikva), with immersion for women, is usually in the cellar. It should have natural running water which has not passed through metal pipes. Some liberal synagogues and Reform temples have organs, but they are never show-pieces.

The decorations in a synagogue may not contain depictions of human beings; only plants or geometrical or calligraphic ornamentation is allowed.

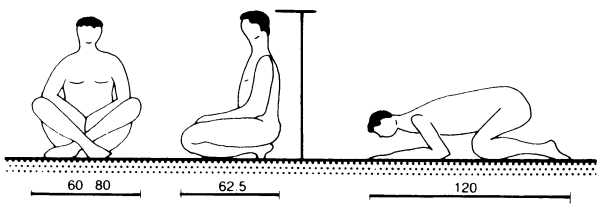


(6) **Mannheim, synagogue and community centre: plan**

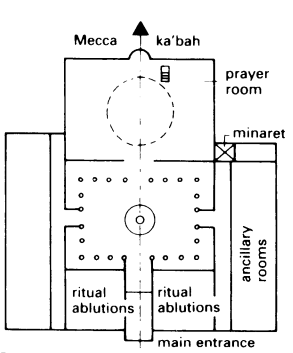


(7) **Darmstadt, synagogue and community centre: ground floor plan**

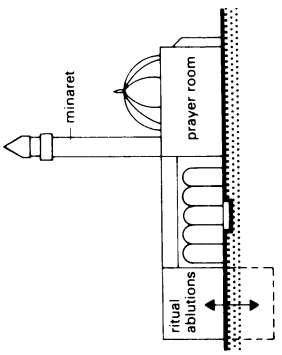
MOSQUES



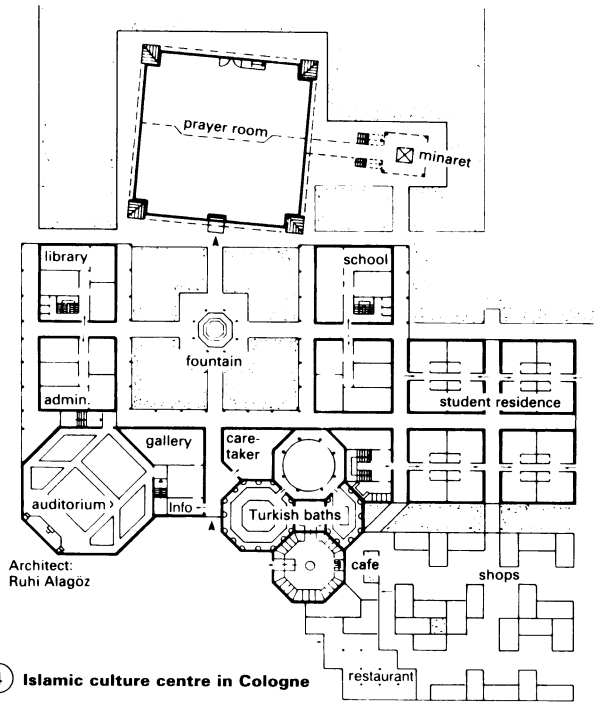
(1) **People at prayer**



(2) **Historical arrangement**



(3) **Section** → (2)



(4) **Islamic culture centre in Cologne**

The five basic categories of mosque design occur in seven distinctive regional styles. In the Arabian heartland, Spain and North Africa there is a hypostyle hall and an open courtyard. In sub-Saharan West Africa the hypostyle hall is of mud-brick or rammed-earth construction. Iran and Central Asia have a bi-axial four-iwan style. On the Indian subcontinent there are triple domes and an extensive courtyard. In Anatolia there is always a massive central dome. The Chinese style has detached pavilions within a walled garden enclosure, and South-East Asia has a central pyramidal roof construction.

The mosque (masjid or jamih) is a house of prayer, a cultural centre, a place for social gatherings, a courthouse, a school and a university. (In Islam, the Quran is the central source of all rules for living and teaching, and for the pronouncements of law, religion etc.)

In Islamic countries the mosque is in the bazaar (souk), and thus in the centre of public life. In countries where the amenities of the bazaar (hairdressers, shops selling permitted foods, cafés etc.) do not exist, they should be included in the planning of the mosque.

Smaller mosques (masjid) rarely have a minaret (minare), whereas larger mosques (jamih) always do. There are neither bells nor organs in Islam. The muezzin's call to prayer can be heard five times a day resounding from the minaret, which has stairs or a lift leading to the upper ambulatory, which is usually covered. Nowadays the call to prayer is virtually always relayed by loudspeakers, although this is not permitted in some countries.

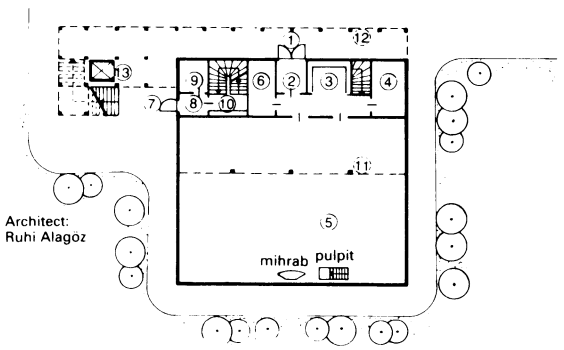
The size of the prayer hall is based on 0.85 m^2 praying space per person. It is usually rectangular or square, often with a central dome, and faces Mecca, the direction in which people pray (kibla). The prayer niche (mihrab) is set in the front wall (kibla) and next to it is the minbar (pulpit), which must always have an odd number of stairs. This is used by the prayer leader of the mosque (the Imam) in the Friday prayers. Men and women are segregated, sometimes purely symbolically, sometimes with the women in a gallery.

The entrance area has shelves for the school, and rooms for ritual ablutions and showers which must always have a flowing water supply. The WCs are usually squatting closets at right angles to the direction of Mecca. All these facilities often have separate entrances for men and women, including the stairs to the women's gallery.

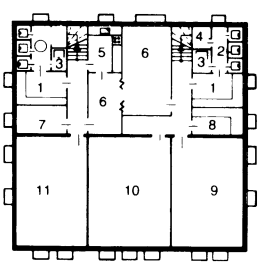
Many mosques have a central courtyard the same size as the prayer hall, which can be used on holy days as an extension. It has a decorative fountain (tscheschme) for ritual ablutions. In hot countries, trees are planted in the courtyard in a geometrical pattern to provide shade.

Offices, a library, a lecture hall and classrooms, storerooms and apartments, at least for the imam and the muezzin, complete the accommodation.

Representational depictions of humans and animals is not allowed. Plants and geometrical ornamentation (arabesque), and verses from the Quran in Arabic calligraphy, are very popular and have been developed into a form of high culture.



(5) **Islamic culture centre in Frankfurt**



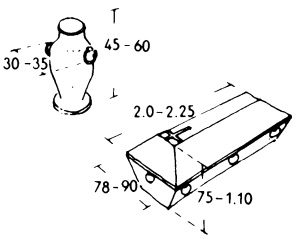
(6) **Basement** → (5)

Ground floor
1 entrance/men
2 draught lobby
3 shoe racks
4 office/hodca
5 prayer room ground floor/ men
6 information/ men
7 women's entrance
8 draught lobby
9 information/ women
10 shoe racks
11 prayer room gallery/ women
12 balcony
13 minaret with lift

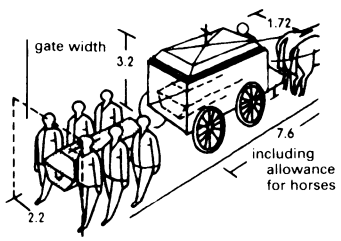
Basement
1 rows of wash basins
2 WCs
3 shower
4 hoist
5 kitchen
6 dining room
7 heating
8 hairdresser
9 classroom/ men
10 library and lecture room
11 classroom/ women

(7) **Key** → (5)(6)

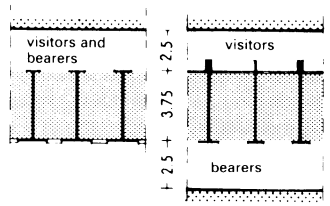
CEMETERIES AND CREMATORIA



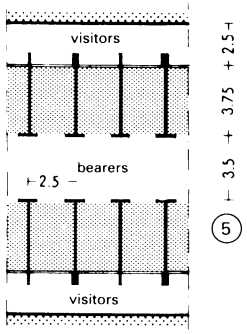
① **Urn and coffin: usual dimensions**



② **Transporting the coffin: dimensions of hearse and min width required by bearers**

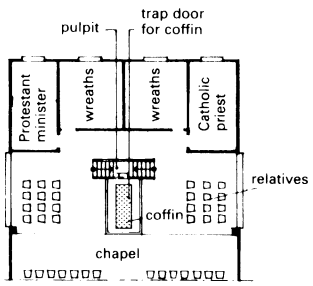


③ ④

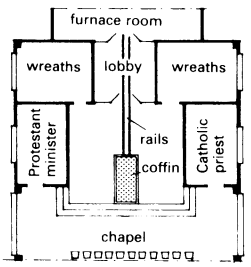


⑤

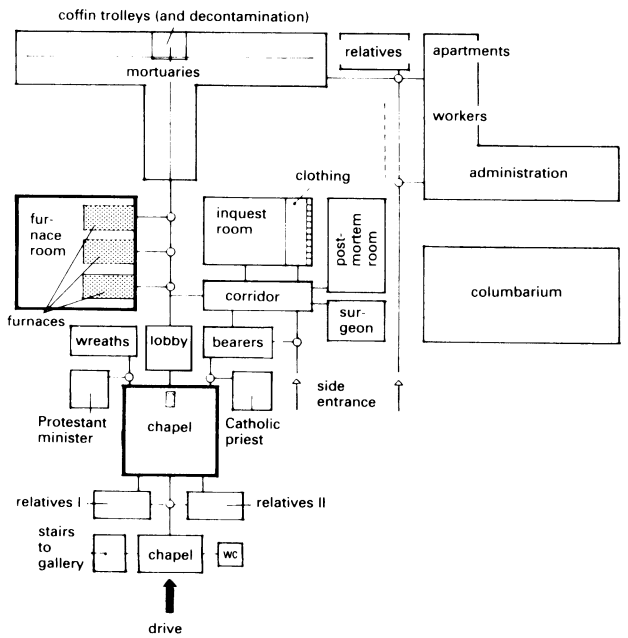
③ – ⑤ **Optional mortuary layouts (scale 1:400)**



⑥ **Layout with furnace room beneath the chapel**



⑦ **Furnace room behind the chapel, separated by a lobby**



⑧ **Spatial relationship in a mortuary with crematorium and ancillary rooms for a large cemetery**

Corpses are initially laid out in cubicles in a mortuary. These cubicles are separated by partitions to ensure privacy for mourning relatives, who can view the body through airtight glass panes up until the funeral. The linking gangway is generally for use by both the mourners and the bearers although in larger mortuaries separate gangways may be used → ③ – ⑤. Usual dimensions of cubicles are 2.20 × 3.50, 2.50 × 3.75 and 3.00 × 3.50 m.

The temperature in the mortuary should be maintained between 2° to 12°C and it must not be allowed to fall below the minimum figure because freezing would result in expansion of the internal moisture, possibly causing the corpses to burst. This temperature range must be maintained by central heating and cooling and constant ventilation, particularly in summer. Floors must be impervious, smooth and easy to clean; walls are best lime-washed and should be re-coated frequently.

Larger mortuaries also need a room for attendants and bearers (roughly 15–20 m^2 in size, including toilets and washing facilities) and space for the coffin trolleys should also be provided. Coffin sizes are variable, depending on the size of the corpse → ①, but the trolleys are generally 2.20×1.08 to 3.00×1.10 m in size. In city mortuaries a special room may be set aside for unidentified bodies, with storage for their clothing and an adjacent post-mortem room and doctor's surgery → ⑧.

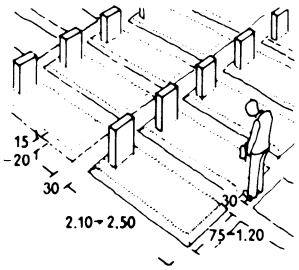
The furnace room should either be on a floor below the chapel, with lift for coffins → ⑥ or behind the chapel and separated from it by a lobby → ⑦ + ⑧. Horizontal movement of coffins can easily be done by hand-operated winches. The door to the lobby or the floor trap should close slowly as the coffin gradually disappears through the opening.

In the furnace room the coffin is transferred from a trolley to the chamotte grating inside the furnace. A two-storey furnace is roughly 4.30 m high and may use either electricity (approximately 45 kW per cremation), coke or gas to carry out the combustion. Cremation is a completely dust-free and odourless process achieved by surrounding the body with dry air at 900–1000°C dry; flames do not touch the body. After the furnace has been pre-heated for 2–3 hours in advance, the cremation itself takes 1¼ to 1½ hours and is monitored through peep-holes. The ashes are collected in an iron box before being transferred to an urn. The size of urns is often limited by cemetery regulations. Wall niches in columbaria are usually 38–40 cm wide and deep and 50–60 cm high.

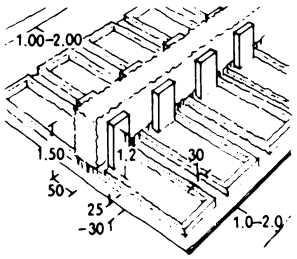
These installations should if possible be behind the cemetery chapel, which is non-denominational. For this reason there are two rooms for clergy. The size of the chapel varies, but should seat at least 100 people and have standing room for a further 100. Around the chapel there will be a need for waiting rooms for relatives, administration rooms, coffin and equipment stores and, possibly, flats for the cemetery keeper and caretaker.

In Britain, crematoria are now being built by the private sector. They are always surrounded by a garden for the dispersal of ashes. Urns, niches and miniature graves are often available in a compact memorial garden to provide a temporary memorial (5–10 years).

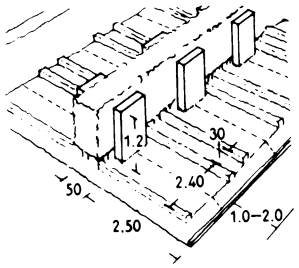
CEMETERIES AND GRAVEYARDS



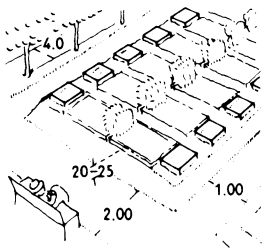
① **Grave arrangement head to foot in sections of 200–300 graves**



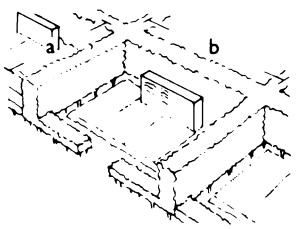
② **Head to head arrangement in narrow cemetery; separated by hedges; sunken path**



③ **Double graves; separated by hedges; uniform sunken path**

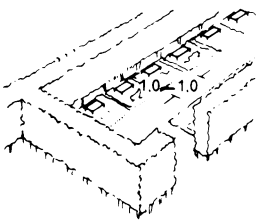


④ **Simple rows of graves with prescribed planting (proposed by H. Hartwig)**

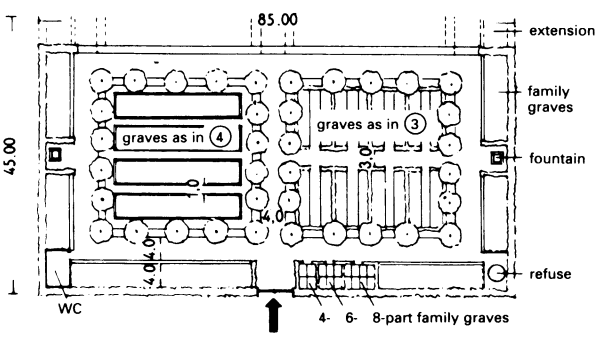


size	a	b	two behind each other a	b
2 part	2.50	2.40	2.50	1.50
4 part	2.50	4.80	2.50	2.50
6 part	2.50	7.20	2.50	3.90

⑤ **Family graves**



⑥ **Section for urns between hedges or in areas surrounded by trees, similar to ④**



⑦ **Cemeteries for larger villages or land near a church, i.e. without cemetery chapel (proposed by H. Hartwig)**

There is a distinction between churchyards and cemeteries. In Britain, for example, the growth of churchyards was slow and gradual; each year the graves of a few parishioners were added until the churchyard was exhausted. Burials were then made using old graves. Cemeteries, on the other hand, came into existence during the nineteenth century with the aim of solving problems caused by large numbers of people coming into towns and cities to find work. The need for new cemeteries is always dealt with by local authorities rather than the church and kept extremely simple for maintenance reasons.

The site should have soil that is easy to dig (clay or sandy) and be well drained, with a ground water level ≥2.50–3.00 m deep. If necessary, drainage should be provided. Attractive surroundings are preferable.

The space requirement is approximately 40 hectares, including paths and open spaces, per 100000 inhabitants although many existing cemeteries are smaller than this, particularly in cities. Of this 50–65% is purely for graves and urns, the rest for buildings, paths and gardens. In Britain, roughly 70% of dead bodies are cremated; the rest are buried in graveyards. The size and length of use of graves as specified in cemetery regulations vary greatly.

Type of grave	size (cm)	space between graves (cm)	decomposition time/period of use (years)
1) row, for adults	210 × 75 – 250 × 120	30	20 – 25
2) row, for children up to 10 yrs	150 × 60 – 150 × 75	30	20
3) row, for children up to 3 yrs	100 × 60	30	15
purchased grave with hedges	300 × 150 – 350 × 150		40 – 100
crypt places	300 × 120 – 350 × 150		50 – 100
urn places	100 × 100 – 150 × 100	60	10 – 100
main places	150 × 150	100	30 – 100

Military or war cemeteries and memorials

These are usually reserved for the burial of servicemen and soldiers who die during the wars, and for their commemoration. Two examples of well-maintained military cemeteries in Britain are at Cambridge and Aldershot. At Cambridge, the American Government established its own cemetery for its servicemen who died in Europe during and after the Second World War. At Aldershot, British Soldiers have been buried since the middle of last century. The American cemetery is on flat ground, whereas Aldershot is on hilly ground, which gives it the look of a pleasant park.

Graveyards as parks

Many village churchyards and a few churchyards in the centres of towns have become small parks. They have benches, lawns and established trees to provide shade and a relaxing environment.

Gravestones

In any section of graves surrounded by a hedge the gravestones should all be flat or standing and as far as possible of uniform colour and size (see examples below).

Type of grave	height	width	thickness
simple	100 – 105	40 – 45	9 – 10
double with plants to rear	120 – 125	50 – 55	10 – 12
triple, at appropriate places	120	150	13 – 15

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(With BS EN ISO 3766: 1999, supersedes BS 1192-3: 1987)

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(Partially supersedes BS 1192-1: 1984)

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Control
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EN 474-2 1996
Requirements for tractor-dozers
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BS EN 1554 1999
Conveyor belts – Drum friction testing
(Supersedes BS 490: Section 11.3: 1991)

BS EN 1570 1999
Safety requirements for lifting tables
(Supersedes BS 5323: 1980)
BS EN 1870
Safety of woodworking machines – Circular sawing machines
EN 1870-1 1999
Circular saw benches (with and without sliding table) and dimension saws
(Incorporating Corrigendum No.1)
EN 1870-2 1999
Horizontal beam panel saws and vertical panel saws
BS ISO 2328 1993
Fork lift trucks – Hook-on type fork arms and fork arm carriages – Mounting dimensions
BS ISO 2330 1995
Fork-lift trucks – Fork arms – Technical characteristics and testing
(Supersedes BS 5639: Part 4: 1978)
BS ISO 8566
Cranes – Cabins
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Jib cranes
BS ISO 10972
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ISO 10972-1 1998
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BS ISO 11994 1997
Cranes – Availability – Vocabulary
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EN 60417-2 1999
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BS EN 61010
Safety requirements for electrical equipment for measurement, control and laboratory use

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BS EN 196
Methods of testing cement
EN 196-5 1995
Pozzolanicity test for pozzolanic cements
(Supersedes BS 4550: Part 2: 1970)
EN 196-6 1992
Determination of fineness
(Supersedes BS 4550: Sections 3.2 and 3.3: 1978)
EN 196-7 1992
Methods of taking and preparing samples of cement
(Supersedes BS 4550: Part 1: 1978)
EN 196-21 1992
Determination of the chloride, carbon dioxide and alkali content of cement
BS EN 233 1999
Wallcoverings in roll form – Specification for finished wallpapers, wall vinyls and plastics wallcoverings
BS EN 234 1997
Wallcoverings in roll form – Specification for wallcoverings for subsequent decoration
(Supersedes BS 1248: Part 3: 1990)
BS EN 253 1995
Preinsulated bonded pipe systems for underground hot water networks – pipe assembly of steel service pipes, polyurethane thermal insulation and outer casing of polyethylene
(Supersedes BS 4508: Part 3: 1977)
BS EN 259 1997
Wallcoverings in roll form – Specification for heavy duty wallcoverings
(Supersedes BS EN 259: 1992)
BS EN 266 1992
Textile wallcoverings
BS EN 295
Vitrified clay pipes and fittings and pipe joints for drains and sewers
EN 295-5 1994 [AMD 1]
Requirements for perforated vitrified clay pipes and fittings
EN 295-6 1996
Requirements for vitrified clay manholes
EN 295-7 1996
Requirements for vitrified clay pipes and joints for pipe jacking
BS EN 300 1997
Oriented Strand Boards (OSB) – Definitions, classification and specifications
(Supersedes BS 5669: Part 3 which remains current)
BS EN 309 1992
Wood particleboards – Definition and classification
BS EN 310 1993
Wood based panels – Determination of modulus of elasticity in bending and of bending strength
BS EN 311 1992
Particleboards – Surface soundness of particleboards, test method
BS EN 312
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EN 312-1 1997
General requirements for all board types
(With BS EN 312-2, 3, 4, 5, 6, 7, supersedes BS 5669: Parts 1 and 2: 1989)
EN 312-2 1997
Requirements for general purpose boards for use in dry conditions
(With BS EN 312-1, 3, 4, 5, 6, 7, supersedes BS 5669: Parts 1 and 2: 1989)
EN 312-3 1997
Requirements for boards for interior fitments (including furniture) for use in dry conditions
(With BS EN 312-1, 2, 4, 5, 6, 7, supersedes BS 5669: Parts 1 and 2: 1989)
EN 312-4 1997
Requirements for load-bearing boards for use in dry conditions
(With BS EN 312-1, 2, 3, 5, 6, 7, supersedes BS 5669: Parts 1 and 2: 1989)
EN 312-5 1997
Requirements for load-bearing boards for use in humid conditions
(With BS EN 312-1 to -4 and -6, will supersede BS 5669: Part 2: 1989)
EN 312-6 1997
Requirements for heavy duty load-bearing boards for use in dry conditions
(With BS EN 312-1, 2, 3, 4, 5, 7 will supersede BS 5669: Parts 1 and 2: 1989)
EN 312-7 1997
Requirements for heavy-duty load-bearing boards for use in humid conditions
(With BS EN 312-1 to -6 will supersede BS 5669: Part 2: 1989)
BS EN 313
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EN 313-2 1995
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BS EN 314
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Wood fibreboards – Definition, classification and symbols
BS EN 317 1993
Particleboards and fibreboards – Determination of swelling in thickness after immersion in water
BS EN 318 1993
Fibreboards – Determination of dimensional changes associated with changes in relative humidity
BS EN 319 1993
Particleboards and fibreboards – Determination of tensile strength perpendicular to the plane of the board
BS EN 320 1993
Fibreboards – Determination of resistance to axial withdrawal of screws
BS EN 321 1993 [AMD 1]
Fibreboards – Cyclic tests in

humid conditions
BS EN 322 1993
Wood based panels – Determination of moisture content
BS EN 323 1993
Wood based panels – Determination of density
BS EN 324
Wood based panels – Determination of dimensions of boards
EN 324-1 1993
Determination of thickness, width and length
EN 324-2 1993
Determination of squareness and edge straightness
BS EN 325 1993
Wood based panels – Determination of dimensions of test pieces
BS EN 326
Wood based panels – Sampling, cutting and inspection
EN 326-1 1994
Sampling and cutting of test pieces and expression of test results
EN 326-3 1998
Inspection of a consignment of panels
BS EN 336 1995 [AMD 1]
Structural timber – Coniferous and poplar – Sizes – Permissible deviations
BS EN 338 1995
Structural timber – Strength classes
BS EN 380 1993
Timber structures – Test methods – General principles for static load testing
BS EN 382
Fibreboards – Determination of surface absorption
EN 382-1 1993
Test method for dry process fibreboards
EN 382-2 1994
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BS EN 383 1993
Timber structures – Test methods – Determination of embedding strength and foundation values for dowel type fasteners
BS EN 384 1995
Structural timber – Determination of characteristic properties and density
BS EN 385 1995
Finger jointed structural timber – Performance requirements and minimum production requirements
(Supersedes BS 5291: 1984)
BS EN 386 1995
Glue laminated timber – Performance requirements and minimum production requirements
(Partially supersedes BS 4169: 1988)
BS EN 390 1995
Glued laminated timber – Sizes – Permissible deviations
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Glued laminated timber – Delamination test of glue lines
(Partially supersedes BS 4169: 1988)
BS EN 392 1995
Glued laminated timber – Shear test of glue lines
(Partially supersedes BS 4169: 1988)
BS EN 408 1995
Timber structures – Structural timber and glued laminated timber – Determination of some physical and mechanical properties
(Supersedes BS 5820: 1979)
BS EN 409 1993
Timber structures – Test methods – Determination of the yield moment of dowel-type fasteners – Nails
BS EN 413
Masonry cement
EN 413-2 1995
Test methods
BS EN 423 1993
Resilient floor coverings – Determination of the effect of stains
BS EN 424 1993
Resilient floor coverings – Determination of the effect of the simulated movement of a furniture leg
BS EN 425 1994
Resilient floor coverings – Determination of the effect of a castor chair
BS EN 426 1993
Resilient floor coverings – Determination of width, length, straightness and flatness of sheet material
BS EN 427 1994
Resilient floor coverings – Determination of the side length, squareness and straightness of tiles
BS EN 428 1993
Resilient floor coverings – Determination of overall thickness
BS EN 429 1993
Resilient floor coverings – Determination of the thickness of layers
BS EN 430 1994
Resilient floor coverings – Determination of mass per unit area
BS EN 431 1994
Resilient floor coverings – Determination of peel resistance
BS EN 432 1994
Resilient floor coverings – Determination of shear force
BS EN 433 1994
Resilient floor coverings – Determination of residual indentation after static loading
BS EN 434 1994
Resilient floor coverings – Determination of dimensional stability and curling after exposure to heat
BS EN 435 1994
Resilient floor coverings – Determination of flexibility
BS EN 436 1994
Resilient floor coverings – Determination of density
BS EN 459
Building lime
EN 459-2 1995
Test methods
BS EN 460 1994
Durability of wood and wood based products – Natural durability of solid wood – Guide to the durability requirements for wood to be used in hazard classes
BS EN 480
Admixtures for concrete, mortar and grout – Test methods
EN 480-1 1998
Reference concrete and reference mortar for testing
EN 480-2 1997
Determination of setting time
EN 480-4 1997
Determination of bleeding of concrete
EN 480-5 1997
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EN 480-6 1997
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Determination of the conventional dry material content
EN 480-10 1997
Determination of water soluble chloride content
EN 480-11 1999
Determination of air void characteristics in hardened concrete
EN 480-12 1998
Determination of the alkali content of admixtures
BS EN 490 1994
Concrete roofing tiles and fittings – Product specifications
(Supersedes BS 473, 550: 1990)
BS EN 491 1994
Concrete roofing tiles and fittings – Test methods
(Supersedes BS 473, 550: 1990)
BS EN 492 1994 [AMD 3]
Fibre-cement slates and their fittings for roofing – Product specification and test methods
(Supersedes BS 690: Part 4: 1974)
BS EN 494 1994 [AMD 3]
Fibre-cement profiled sheets and

fittings for roofing – Product specification and test methods
(Supersedes BS 690: Part 3: 1973, Part 6, 1976 and BS 4624: Section 2: 1981)

BS EN 501 1994
Roofing products from metal sheet – Specification for fully supported roofing products of zinc sheet

BS EN 516 1995
Prefabricated accessories for roofing – Installations for roof access – Walkways, treads and steps

BS EN 517 1995
Prefabricated accessories for roofing – Roof safety hooks

BS EN 518 1995
Structural timber – Grading – Requirements for visual strength grading standards

BS EN 519 1995
Structural timber – Grading – Requirements for machine strength graded timber and grading machines

BS EN 538 1994
Clay roofing tiles for discontinuous laying – Flexural strength test

BS EN 539
Clay roofing tiles for discontinuous laying – Determination of physical characteristics
EN 539-1 1994
Impermeability test
EN 539-2 1998
Test for frost resistance

BS EN 548 1997
Resilient floor coverings – Specification for plain and decorative linoleum

BS EN 588
Fibre-cement pipes for sewers and drains
EN 588-1 1997
Pipes, joints and fittings for gravity systems
(Supersedes BS 3656: 1981)

BS EN 594 1996
Timber structures – Test methods – Racking strength and stiffness of timber frame wall panels

BS EN 595 1995
Timber structures – Test methods – Test trusses for the determination of strength and deformation behaviour
EN ISO 595-2 1995
Design performance requirements and tests
(Previously known as BS 1263: Part 2: 1989)

BS EN 596 1995
Timber structures – Test methods – Soft body impact test of timber framed walls

BS EN 598 1995
Ductile iron pipes, fittings, accessories and their joints for sewerage applications – Requirements and test methods

BS EN 607 1996
Eaves gutters and fittings made of PVC-U – Definitions, requirements and testing
(Partially supersedes BS 4576: Part 1: 1989)

BS EN 612 1996 [AMD 1]
Eaves gutters and rainwater downpipes of metal sheet – Definitions, classifications and requirements
(Supersedes BS 1431: 1969, BS 1091: Section 1:1: 1963, BS 2997: Sections C and D:1958)

BS EN 622
Fibreboards – Specifications
EN 622-1 1997
General requirements
(Together with BS EN 622-2 to -5 partially supersedes BS 1142: 1989)
EN 622-2 1997
Requirements for hardboards
(With BS EN 622-1, -3 to -5, will supersede BS 1142: 1989)
EN 622-3 1997
Requirements for medium boards
(With BS EN 622-1 and 2, and -4 to -5 partially supersedes BS 1142: 1989)
EN 622-4 1997
Requirements for softboards
(With BS EN 622-1 to -3 and -5 partially supersedes BS 1142: 1989)
EN 622-5 1997
Requirements for dry process boards (MDF)
(With BS EN 622-1 to -4 partially supersedes BS 1142: 1989)

BS EN 633 1994
Cement-bonded particleboards – Definition and classification

BS EN 634
Cement-bonded particle-boards – Specification
EN 634-1 1995
General requirements
EN 634-2 1997
Requirements for OPC bonded particleboards for use in dry, humid and exterior conditions
(Partially supersedes BS 5669: Part 4: 1989)

BS EN 635
Plywood – Classification by surface appearance
EN 635-1 1995
General
EN 635-2 1995 [AMD 1]
Hardwood
(Partially supersedes BS 6566: Part 6: 1985)
EN 635-3 1995 [AMD 1]
Softwood
(Partially supersedes BS 6566: Part 6: 1985)
EN 635-5 1999
Methods of measuring and expressing characteristics and defects

BS EN 636
Plywood – Specifications
EN 636-1 1997
Requirements for plywood for use in dry conditions
EN 636-2 1997
Requirements for plywood for use in humid conditions
EN 636-3 1997
Requirements for plywood for use in exterior conditions

BS EN 637 1995
Plastics piping systems – Glass-reinforced plastics components – Determination of the amounts of constituents using the gravimetric method
(Incorporated in BS 2782: Part 12: Method 1205A: 1995)

BS EN 649 1997
Resilient floor coverings – Homogeneous and heterogeneous polyvinyl chloride floor coverings – Specification
(Supersedes BS 2592: 1973 and BS 3261: Part 1: 1973)

BS EN 650 1997
Resilient floor coverings – Polyvinyl chloride floor coverings on jute backing or on polyester felt backing or on polyester felt with polyvinyl chloride backing – Specification
(Supersedes BS 5085: Part 1: 1974)

BS EN 651 1997 [AMD 1]
Resilient floor coverings – Polyvinyl chloride floor coverings with foam layer – Specification
(Supersedes BS 5085: Part 2: 1976)

BS EN 652 1997
Resilient floor coverings – Polyvinyl chloride floor coverings with cork-based backing – Specification

BS EN 653 1997
Resilient floor coverings – Expanded (cushioned) polyvinyl chloride floor coverings – Specification

BS EN 654 1997
Resilient floor coverings – Semi-flexible polyvinyl chloride tiles – Specification
(Supersedes BS 3260:1969)

BS EN 655 1997
Resilient floor coverings – Tiles of agglomerated composition cork with polyvinyl chloride wear layer – Specification

BS EN 660
Resilient floor coverings – Determination of wear resistance
EN 660-1 1999
Stuttgart test

EN 660-2 1999
Frick-Taber test
BS EN 661 1995
Resilient floor coverings – Determination of the spreading of water
BS EN 662 1995
Resilient floor coverings – Determination of curling on exposure to moisture
BS EN 663 1995
Resilient floor coverings – Determination of conventional pattern depth
BS EN 664 1995
Resilient floor coverings – Determination of volatile loss
BS EN 665 1995
Resilient floor coverings – Determination of exudation of plasticizers
BS EN 666 1995
Resilient floor coverings – Determination of gelling
BS EN 669 1998
Resilient floor coverings – Determination of dimensional stability of linoleum tiles caused by changes in atmospheric humidity
BS EN 670 1998
Resilient floor coverings – Identification of linoleum and determination of cement content and ash residue
BS EN 672 1997
Resilient floor coverings – Determination of apparent density of agglomerated cork
BS EN 678 1994
Determination of the dry density of autoclaved aerated concrete
BS EN 679 1994
Determination of the compressive strength of autoclaved aerated concrete
BS EN 680 1994
Determination of the drying shrinkage of autoclaved aerated concrete
BS EN 685 1996
Resilient floor coverings – Classification
BS EN 686 1997
Resilient floor coverings – Specification for plain and decorative linoleum on a foam backing
BS EN 687 1997 [AMD 1]
Resilient floor coverings – Specification for plain and decorative linoleum on a corkment backing
BS EN 688 1997
Resilient floor coverings – Specification for cork linoleum
BS EN 695 1997
Kitchen sinks – Connecting dimensions
BS EN 712 1995
Thermoplastics piping systems – End load bearing mechanical joints between pressure pipes and fittings – Test method for resistance to pull-out under constant longitudinal force
(Also known as BS 2782: Method 112311: 1995)
BS EN 713 1995 [AMD 1]
Plastics piping systems – Mechanical joints between fittings and polyolefin pressure pipes – Test method for leak tightness under internal pressure of assemblies subjected to bending
(Also known as BS 2782: Method 1123B: 1995)
BS EN 714 1995
Thermoplastics piping systems – Non-end load bearing elastomeric sealing ring type joints between pressure pipes and moulded fittings – Test method for leak tightness under internal hydrostatic pressure without end thrust
(Also known as BS 2782: Method 1123F: 1995)
BS EN 715 1995
Thermoplastics piping systems – End load bearing joints between small diameter pressure pipes and fittings – Test method for leak tightness under internal water pressure, including end thrust
(Also known as BS 2782: Method 1123G: 1995)
BS EN 752
Drains and sewer systems outside buildings
EN 752-1 1996
Generalities and definitions
(Supersedes BS 8005: Part 0: 1987 and clause 4 of BS 8301: 1985)
EN 752-2 1997
Performance requirements
EN 752-3 1997
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EN 752-4 1998
Hydraulic design and environmental considerations
(Supersedes BS 8005-1-5 and BS 8301: 1985)
EN 752-5 1998
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EN 752-6 1998
Pumping installations
EN 752-7 1998
Maintenance and operations
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BS EN 772
Methods of test for masonry units
EN 772-2 1998
Determination of percentage area of voids in aggregate concrete masonry units (by paper indentation)
EN 772-3 1998
Determination of net volume and percentage of voids of clay masonry units by hydrostatic weighing
EN 772-4 1998
Determination of real and bulk density and of total and open porosity for natural stone masonry units
EN 772-7 1998
Determination of water absorption of clay masonry damp proof course units by boiling in water
(Will partially supersede BS 3921: 1985)
EN 772-9 1998
Determination of volume and percentage of voids and net volume of calcium silicate masonry units by sand filling
EN 772-10 1999
Determination of moisture content of calcium silicate and autoclaved aerated concrete units
BS EN 789 1996
Timber structures – Test methods – Determination of mechanical properties of wood-based panels
BS EN 877 1999
Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings – Requirements, test methods and quality assurance
(Supersedes BS 416-2: 1990)
BS EN 911 1996
Plastics piping systems – Elastomeric sealing ring type joints and mechanical joints for thermoplastics pressure piping – Test method for leak tightness under external hydrostatic pressure
(Also known as BS 2782: Part 11: Method 1123W: 1996)
BS EN 942 1996
Timber in joinery – General classification of timber quality
(Supersedes BS 1186: Part 1: 1991)
BS EN 971
Paints and varnishes – Terms and definitions for coating materials
EN 971-1 1996
General terms
(Supersedes some terms in BS 2015: 1992)
BS EN 975
Sawn timber – Appearance grading of hardwoods
BS EN 989 1996
Determination of the bond behaviour between reinforcing bars and autoclaved aerated concrete by the 'push-out' test
BS EN 990 1996
Test methods for verification of corrosion protection of reinforcement in autoclaved aerated concrete and lightweight

aggregate concrete with open structure

BS EN 991 1996
Determination of the dimensions of prefabricated reinforced components made of autoclaved aerated concrete, or lightweight aggregate concrete with open structure

BS EN 1015
Methods of test for mortar for masonry
EN 1015-1 1999
Determination of particle size distribution (by sieve analysis)
(Will partially supersede BS 4551-1: 1998)
EN 1015-2 1999
Bulk sampling of mortars and preparation of test mortars
(Will partially supersede BS 4551-1: 1998)
EN 1015-3 1999
Determination of consistence of fresh mortar (by flow table)
EN 1015-4 1999
Determination of consistence of fresh mortar (by plunger penetration)
(Will partially supersede BS 4551-1: 1998)
EN 1015-6 1999
Determination of bulk density of fresh mortar
(Will partially supersede BS 4551-1: 1998)
EN 1015-7 1999
Determination of air content of fresh mortar
(Will partially supersede BS 4551-1: 1998)
EN 1015-9 1999
Determination of workable life and correction time of fresh mortar
EN 1015-10 1999
Determination of dry bulk density of hardened mortar
EN 1015-11 1999
Determination of flexural and compressive strength of hardened mortar
EN 1015-19 1999
Determination of water vapour permeability of hardened rendering and plastering mortars
(Partially supersedes BS 4551-1: 1998)

BS EN 1024 1997
Clay roofing tiles for discontinuous laying – Determination of geometric characteristics

BS EN 1036 1999
Glass in building – Mirrors from silver-coated float glass for internal use

BS EN ISO 1043
Plastics – Symbols and abbreviated terms

BS EN 1052
Methods of test for masonry
EN 1052-1 1999
Determination of compressive strength
(Partially supersedes BS 5628-1: 1992)
EN 1052-2 1999
Determination of flexural strength

BS EN 1053 1996
Plastics piping systems – Thermoplastics piping systems for non-pressure applications – Test method for watertightness
(Also known as BS 2782: Method 1112B: 1996, supersedes BS 2782: Method 1112A: 1989)

BS EN 1054 1996
Plastics piping systems – Thermoplastics piping systems for soil and waste discharge – Test method for airtightness of joints
(Also known as BS 2782: Method 1112C: 1996)

BS EN 1055 1996
Plastics piping systems – Thermoplastics piping systems for soil and waste discharge inside buildings – Test method for resistance to elevated temperature cycling
(Also known as BS 2782: Method 1111A: 1996)

BS EN 1056 1996
Plastics piping and ducting systems – Plastics pipes and fittings – Method for exposure to direct (natural) weathering
(Also known as BS 2782: Method 1107A: 1996)

BS EN 1058 1996
Wood-based panels – Determination of characteristic values of mechanical properties and density

BS EN 1059 1999
Timber structures – Product requirements for prefabricated trusses using punched metal plate fasteners

BS EN 1072 1995
Plywood – Description of bending properties for structural plywood

BS EN 1091 1997
Vacuum sewerage systems outside buildings

BS EN 1125 1997
Building hardware – Panic exit devices operated by a horizontal bar – Requirements and test methods
(Replaces BS 5725: Part 1: 1981)

BS EN 1128 1996
Cement-bonded particleboards – Determination of hard body impact resistance

BS EN 1169 1999
Precast concrete products – General rules for factory production control of glass-fibre reinforced cement

BS EN 1170
Precast concrete products – Test method for glass-fibre reinforced cement
EN 1170-1 1998
Measuring the consistency of the matrix – 'Slump test' method
(With BS EN 1170: Parts 2-7 supersede BS 6432: 1984)
EN 1170-2 1998
Measuring the fibre content in fresh GRC, 'Wash out test'
EN 1170-3 1998
Measuring the fibre content of sprayed GRC
(With BS EN 1170: Parts 1, 2 and 4 to 7 supersedes BS 6432: 1984)

BS EN 1193 1998
Timber structures – Structural timber and glued laminated timber – Determination of shear strength and mechanical properties perpendicular to the grain

BS EN 1194 1999
Timber structures – Glued laminated timber – Strength classes and determination of characteristic values

BS EN 1195 1998 [AMD 1]
Timber structures – Test methods – Performance of structural floor decking

BS EN 1253
Gullies for buildings
EN 1253-1 1999
Requirements
EN 1253-2 1999
Test methods
EN 1253-3
Quality control

BS EN 1295
Structural design of buried pipelines under various conditions of loading
EN 1295-1 1998
General requirements

BS EN 1304 1998
Clay roofing tiles for discontinuous laying – Products definitions and specifications
(Supersedes BS 402-1: 1990)

BS EN 1307 1997
Textile floor coverings – Classification of pile carpets
(Supersedes BS 7131: Part 1: 1989)

BS EN 1309
Round and sawn timber – Method of measurement of dimensions
EN 1309-1 1997
Sawn timber

BS EN 1310 1997
Round and sawn timber – Method of measurement of features

BS EN 1311 1997
Round and sawn timber – Method

of measurement of biological degrade

BS EN 1312 1997
Round and sawn timber – Determination of the batch volume of sawn timber

BS EN 1313
Round and sawn timber – Permitted deviations and preferred sizes
EN 1313-1 1997
Softwood sawn timber
(Supersedes BS 4471: 1987)
EN 1313-2 1999
Hardwood sawn timber
(Supersedes BS 5450: 1977)

BS EN 1315
Dimensional classification
EN 1315-1 1997
Hardwood round timber
EN 1315-2 1997
Softwood round timber

BS EN 1316
Hardwood round timber – Qualitative classification
EN 1316-1 1997
Oak and beech
EN 1316-2 1997
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EN 1316-3 1998
Ash and maples and sycamore

BS EN 1356 1997
Performance test for prefabricated reinforced components of autoclaved aerated concrete or lightweight aggregate concrete with open structure under transverse load

BS EN 1380 1999
Timber structures – Test methods – Load bearing nailed joints
(Together with BS EN 1381, 1382 and 1383: 1999, partially supersedes BS 6948: 1989)

BS EN 1381 1999
Timber structures – Test methods – Load bearing stapled joints
(Together with BS EN 1380, 1382 and 1383: 1999, partially supersedes BS 6948: 1989)

BS EN 1383 1999
Timber structures – Test methods – Pull-through resistance of timber fasteners
(Together with BS EN 1380, 1381 and 1382: 1999, supersedes BS 6948: 1989)

BS EN 1399 1998
Resilient floor coverings – Determination of resistance to stubbed and burning cigarettes

BS EN 1401
Plastics piping systems for non-pressure underground drainage and sewerage – Unplasticized poly(vinyl chloride) (PVC-U)
EN 1401-1 1998
Specifications for pipes, fittings and the system
(Supersedes BS 5481: 1977 and partially supersedes BS 4660: 1989)

BS EN 1438 1998
Symbols for timber and wood-based products

BS EN 1443 1999
Chimneys – General requirements

BS EN 1457 1999
Chimneys – Clay/ceramic flue liners – Requirements and test methods
(Supersedes BS 1181: 1989, which remains current)

BS EN 1470 1998
Textile floor coverings – Classification of needled floor coverings except for needled pile floor coverings

BS EN 1504
Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity
EN 1504-1 1998
Definitions

BS EN 1508 1999
Water supply – Requirements for systems and components for the storage of water

BS EN ISO 1513 1995
Paints and varnishes – Examination and preparation of samples testing
(Also known as BS 3900: Part A2: 1993)

BS EN ISO 1517 1995 [AMD 1]
Paints and varnishes – Surface-drying test – Ballotini method
(Also known as BS 3900: Part C2: 1994)

BS EN 1521 1997
Determination of flexural strength of lightweight aggregate concrete with open structure

BS EN 1524
Copper and copper alloys – Plumbing fittings

BS EN 1542 1999
Products and systems for the protection and repair of concrete structures – Test methods – Measurement of bond strength by pull-off

BS EN 1543 1998
Products and systems for the protection and repair of concrete structures – Test methods – Determination of tensile strength development for polymers

BS EN 1610 1998
Construction and testing of drains and sewers

BS EN 1671 1997
Pressure sewerage systems outside buildings

BS EN 1767 1999
Products and systems for the protection and repair of concrete structures – Test methods – Infrared analysis

BS EN 1770 1998
Products and systems for the protection and repair of concrete structures – Test methods – Determination of the coefficient of thermal expansion

BS EN 1775 1998
Gas supply – Gas pipework in buildings – Maximum operating pressure ≤ 5 bar – Functional recommendations

BS EN 1776 1999
Gas supply – Natural gas measuring stations – Functional requirements

BS EN 1799 1999
Products and systems for the protection and repair of concrete structures – Test methods – Tests to measure the suitability of structural bonding agents for application to concrete surface

BS ISO 1803 1997
Building construction – Tolerances – Expression of dimensional accuracy – Principles and terminology

BS EN 1818 1999
Resilient floor coverings – Determination of the effect of loaded heavy duty castors

BS EN 1852
Plastics piping systems for non-pressure underground drainage and sewerage – Polypropylene
EN 1852-1 1998
Specifications for pipes, fittings and the system

BS EN 1925 1999
Natural stone test methods – Determination of water absorption coefficient by capillarity

BS EN 1926 1999
Natural stone test methods – Determination of compressive strength

BS EN 1936 1999
Natural stone test methods – Determination of real density and apparent density, and of total and open porosity

BS EN ISO 2812
Paints and varnishes – Determination of resistance to liquids
EN ISO 2812-1 1995 [AMD 1]
General methods
(Also known as BS 3900: Part G5: 1993)
EN ISO 2812-2 1995 [AMD 1]
Water immersion method
(Also known as BS 3900: Part G8: 1993)

BS EN ISO 2815 1998
Paints and varnishes – Buchholz indentation test
(Also known as BS 3900: Part E9: 1976 (AMD 10176 October 1998))

BS EN ISO 3231 1998
Paints and varnishes – Determination of resistance to humid atmosphere containing sulphur dioxide
(Also known as BS 3900: Part F8: 1993)

BS EN ISO 6708 1996
Pipework components – Definition and selection of DN (nominal size)

BS EN ISO 6946 1997
Building components and building elements – Thermal resistance and thermal transmittance – Calculation method

BS ISO 9047 1989 [AMD 1]
Building construction – Sealants – Determination of adhesion/ cohesion properties at variable temperatures
(Withdrawn, now known as BS EN ISO 9074: 1998 (9870))

BS EN ISO 9047 1998
Building construction – Sealants – Determination of adhesion/ cohesion properties at variable temperatures
(Previously known as BS ISO 9047: 1989 (AMD 9870))

BS EN 10020 1991
Definition and classification of grades of steel
(Supersedes BS 6562: Part 3: 1990)

BS EN 10027
Designation systems for steels
EN 10027-1 1992
Steel names, principal symbols
EN 10027-2 1992
Steel numbers

BS EN 10034 1993
Structural steel I and H sections – Tolerances on shape and dimensions
(Supersedes BS 4: Part 1: 1980)

BS EN 10056
Structural steel equal and unequal angles
EN 10056-1 1999
Dimensions
(Supersedes BS 4848-4: 1972)
EN 10056-2 1993
Tolerances on shape and dimensions

BS EN 10079 1993
Definition of steel products
(Supersedes BS 6562: Part 2: 1986)

BS EN 10088
Stainless steels
EN 10088-1 1995
List of stainless steels
(With BS EN 10088-2 and 3: 1995, partially supersedes BS 970: Part 1: 1991)

BS EN 10155 1993
Structural steels with improved atmospheric corrosion resistance. Technical delivery conditions
(Partially supersedes BS 4360: 1990)

BS EN 10164 1993
Steel products with improved deformation properties perpendicular to the surface of the product – Technical delivery conditions
(Supersedes BS 6780: 1986)

BS EN 10208
Steel pipes for pipelines for combustible fluids – Technical delivery conditions
EN 10208-1 1998
Pipes of requirement class A
EN 10208-2 1997
Pipes of requirement class B

BS EN 10277
Bright steel products – Technical delivery conditions
EN 10277-2 1999
Steels for general engineering purposes

BS EN ISO 10545
Ceramic tiles
EN ISO 10545-1 1997
Sampling and basis for acceptance
(Supersedes BS 6431: Part 23: 1986)
EN ISO 10545-2 1997
Determinations of dimensions and surface quality
(Supersedes BS 6431: Part 10: 1984)

BS ISO 10563 1991
Building construction – Sealants for joints – Determination of change in mass and volume
(Withdrawn, now known as BS EN ISO 10563: 1998)

BS EN ISO 10563 1998
Building construction – Sealants for joints – Determination of change in mass and volume
(Previously known as BS ISO 10563: 1991)

BS ISO 10590 1991
Building construction – Sealants – Determination of adhesion/ cohesion properties at maintained extension after immersion in water
(Withdrawn, now known as BS EN ISO 10590: 1998)

BS EN ISO 10590 1998
Building construction – Sealants – Determination of adhesion/ cohesion properties at maintained extension after immersion in water
(Previously known as BS ISO 10590: 1991)

BS ISO 10591 [AMD 1]
Building construction – Sealants – Determination of adhesion/ cohesion properties after immersion in water
(Withdrawn, now known as BS EN ISO 10591: 1998)

BS EN ISO 10591 1998
Building construction – Sealants – Determination of adhesion/ cohesion properties after immersion in water
(Previously known as BS ISO 10591: 1991 (AMD 9867))

BS ISO 11431 1993
Building construction – Sealants – Determination of adhesion/ cohesion properties after exposure to artificial light through glass

BS ISO 11432 [AMD 1]
Building construction – Sealants – Determination of resistance to compression
(Withdrawn, now known as BS EN ISO 11432: 1998)

BS EN ISO 11432 1998
Building construction – Sealants – Determination of resistance to compression
(Previously known as BS ISO 11432: 1993 (9866))

BS ISO 11600 1993
Building construction – Sealants – Classification and requirements

BS EN 12103 1999
Resilient floor coverings – Agglomerated cork underlays – Specification

BS EN 12105 1998
Resilient floor coverings – Determination of moisture content of agglomerated composition cork

BS EN 12199 1998
Resilient floor coverings – Specifications for homogeneous and heterogeneous relief rubber floor coverings

BS EN 12588 1999
Lead and lead alloys – Rolled lead sheet for building purposes
(Supersedes BS 1178: 1982)

BS EN 12615 1999
Products and systems for the protection and repair of concrete structures – Test methods – Determination of slant shear strength
(Supersedes BS 6319-4: 1984)

BS EN ISO 12944
Paints and varnishes – Corrosion protection of steel structures by protective paint systems

BS EN 26927 1991
Building construction – Jointing products – Sealants – Vocabulary

BS EN 27389 1991
Building construction – Jointing products – Determination of elastic recovery

BS EN 27390 1991
Building construction – Jointing products – Determination of resistance to flow

BS EN 28339 1991
Building construction – Jointing

products – Sealants – Determination of tensile properties
BS EN 28340 1991
Building construction – Jointing products – Sealants – Determination of tensile properties at maintained extension
BS EN 28394 1991
Building construction – Jointing products – Determination of extrudability of one-component sealants
BS EN 29046 1991
Building construction – Sealants – Determination of adhesion/cohesion properties at constant temperature
BS EN 29048 1991
Building construction – Jointing products – Determination of extrudability of sealants using standardized apparatus
BS EN 61277 1998
Terrestrial photovoltaic (PV) power generating systems – General and guide

HEATING AND VENTILATION

BS EN 215
Thermostatic radiator valves
EN 215-1 1991
Requirements and test methods
BS EN 247 1997
Heat exchangers – Terminology
BS EN 255
Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors – Heating mode
EN 255-1 1997
Terms, definitions and designations
EN 255-2 1997
Testing and requirements for marking for space heating units
EN 255-3 1997
Testing and requirements for marking for sanitary hot water units
EN 255-4 1997
Requirements for space heating and sanitary hot water units
BS EN 297 1994 [AMD 3]
Gas-fired central heating boilers – Type B_{11} and B_{11BS} boilers fitted with atmospheric burners of nominal heat input not exceeding 70 kW
BS EN 303
Heating boilers
EN 303-1 1999
Heating boilers with forced draught burners – Terminology, general requirements, testing and marking
EN 303-2 1999
Heating boilers with forced draught burners – Special requirements for boilers with atomizing oil burners
EN 303-3 1999
Gas-fired central heating boilers – Assembly comprising a boiler body and a forced draught burner
EN 303-4 1999
Heating boilers with forced draught burners – Special requirements for boilers with forced draught oil burners with outputs up to 70 kW and a maximum operating pressure of 3 bar – Terminology, special requirements, testing and marking
(Partially supersedes BS 779: 1989 and BS 855: 1990)
EN 303-5 1999
Heating boilers for solid fuels, hand and automatically fired, nominal heat output of up to 300 kW – Terminology, requirements, testing and marking
BS EN 304 1992 [AMD 1]
Heating boilers – Test code for heating boilers for atomizing oil burners
BS EN 442
Specification for radiators and convectors
EN 442-1 1996
Technical specifications and requirements
(With BS EN 442-2 will supersede BS 3528: 1977)
EN 442-2 1997
Test methods and rating
EN 442-3 1997
Evaluation of conformity
(With BS EN 442-1 and -2 supersedes BS 3528: 1977)
BS EN 625 1996
Gas-fired central heating boilers – Specific requirements for the domestic hot water operation of combination boilers of nominal heat input not exceeding 70 kW
BS EN 778 1998
Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products
(Supersedes BS 5258-4: 1987 and BS 6332-5: 1986)
BS EN 779 1993 [AMD 1]
Particulate air filters for general ventilation – Requirements, testing, marking
(Supersedes BS 6540: Part 1: 1985)
BS EN 814
Air conditioners and heat pumps with electrically driven compressors – Cooling mode
EN 814-1 1997
Terms, definitions and designations
EN 814-2 1997
Testing requirements for marking
EN 814-3 1997
Requirements
BS EN 834 1995
Heat cost allocators for the determination of the consumption of room heating radiators – Appliances with electrical energy supply
BS EN 835 1995
Heat cost allocators for the determination of the consumption of room heating radiators – Appliances without an electrical energy supply, based on the evaporation principle
BS EN 1264
Floor heating – Systems and components
EN 1264-1 1998
Definitions and symbols
EN 1264-2 1998
Determination of the thermal output
EN 1264-3 1998
Dimensioning
BS EN 1505 1998
Ventilation for buildings – Sheet metal air ducts and fittings with rectangular cross-section – Dimensions
BS EN 1506 1998
Ventilation for buildings – Sheet metal air ducts and fittings with circular cross-section – Dimensions
BS EN 1751 1999
Ventilation for buildings – Air terminal devices – Aerodynamic testing of dampers and valves
(Supersedes BS 6821: 1988)
BS EN 1886 1998
Ventilation for buildings – Air handling units – Mechanical performance
BS EN 12220 1998
Ventilation for buildings – Ductwork – Dimensions of circular flanges for general ventilation

THERMAL AND SOUND INSULATION

BS EN ISO 140
Acoustics – Measurement of sound insulation in buildings and of building elements
EN ISO 140-1 1998
Requirements for laboratory test facilities with suppressed flanking transmission
(Supersedes BS 2750: Part 1: 1980)
EN ISO 140-3 1995
Laboratory measurement of airborne sound insulation of building elements
(Supersedes BS 2750: Part 3:

1980. Also known as BS 2750: Part 3: 1995)
EN ISO 140-4 1998
Field measurements of airborne sound insulation between rooms
(Supersedes BS 2750-4: 1980)
EN ISO 140-5 1998
Field measurements of airborne sound insulation of façade elements and façades
(Supersedes BS 2750-5: 1980)
EN ISO 140-6 1998
Laboratory measurements of impact sound insulation of floors
(Supersedes BS 2750-6: 1980)
EN ISO 140-7 1998
Field measurements of impact sound insulation of floors
(Supersedes BS 2750-7: 1980)
EN ISO 140-8 1998
Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor
(Supersedes BS 2750: Part 8: 1980)

BS EN ISO 266 1997
Acoustics – Preferred frequencies
(Supersedes BS 3593: 1963)

BS EN ISO 717
Acoustics – Rating of sound insulation in buildings and of building elements
EN ISO 717-1 1997
Airborne sound insulation
EN 717-2 1995
Formaldehyde release by the gas analysis method
EN ISO 717-2 1997
Impact sound insulation
EN 717-3 1996
Formaldehyde release by the flask method

BS EN 822 1995
Thermal insulating products for building applications – Determination of length and width

BS EN 823 1995
Thermal insulating products for building applications – Determination of thickness

BS EN 824 1995
Thermal insulating products for building applications – Determination of squareness

BS EN 825 1995
Thermal insulating products for building applications – Determination of flatness

BS EN 826 1996
Thermal insulating products for building applications – Determination of compression behaviour

BS EN 832 1999
Thermal performance of buildings – Calculation of energy use for heating – Residential buildings

BS EN 1602 1997 [AMD 1]
Thermal insulating products for building applications – Determination of the apparent destiny

BS EN 1603 1997
Thermal insulating products for building applications – Determination of dimensional stability under constant normal laboratory conditions (23°C/50% relative humidity)

BS EN 1604 1997 [AMD 1]
Thermal insulating products for building applications – Determination of dimensional stability under specified temperature and humidity conditions

BS EN 1605 1997 [AMD 1]
Thermal insulating products for building applications – Determination of deformation under specified compressive load and temperature conditions

BS EN 1606 1997 [AMD 1]
Thermal insulating products for building applications – Determination of compressive creep

BS EN 1607 1997 [AMD 1]
Thermal insulating products for building applications – Determination of tensile strength perpendicular to faces

BS EN 1608 1997 [AMD 1]
Thermal insulating products for building applications – Determination of tensile strength parallel to faces

BS EN 1609 1997 [AMD 1]
Thermal insulating products for building applications – Determination of short term water absorption by partial immersion

BS EN 1934 1998
Thermal performance of buildings – Determination of thermal resistance by hot box method using heat flow meter – Masonry

BS EN 1946
Thermal performance of building products and components – Specific criteria for the assessment of laboratories measuring heat transfer properties
EN 1946-1 1999
Common criteria
EN 1946-2 1999
Measurements by guarded hot plate method
EN 1946-3 1999
Measurements by heat flow meter method

BS ISO 3743
Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields
ISO 3743-2 1994 [AMD 1]
Methods for special reverberation test rooms
(Now known as BS EN ISO 3743-2: 1997 (AMD 9426))

BS EN ISO 3743
Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields
EN ISO 3743-1 1995 [AMD 1]
Comparison for hard-walled test rooms
(Previously known as BS ISO 3743-1: 1994)
EN ISO 3743-2 1997
Methods for special reverberation test rooms
(Previously known as BS ISO 3743-2: 1994 (AMD 9426))

BS EN ISO 3744 1995 [AMD 1]
Acoustics – Determination of sound levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane
(Previously known as BS ISO 3744: 1994)

BS EN ISO 3746 1996
Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane
(Supersedes BS 4196: Part 5: 1981)

BS EN ISO 5135 1999
Acoustics – Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation room
(Supersedes BS 4773-2: 1989)

BS EN ISO 7345 1996
Thermal insulation – Physical quantities and definitions

BS EN ISO 9251 1996
Thermal insulation – Heat transfer conditions and properties of materials – Vocabulary

BS EN ISO 9288 1996
Thermal insulation – Heat transfer by radiation – Physical quantities and definitions

BS EN ISO 9346 1996
Thermal insulation – Mass transfer – Physical quantities and definitions

BS ISO 9611 1996
Acoustics – Characterization of sources of structure-borne sound with respect to sound radiation from connected structures –

Measurement of velocity at the contact points of machinery when resiliently mounted

BS EN ISO 10211
Thermal bridges in building construction – Heat flows and surface temperatures

BS ISO 10551 1995
Ergonomics of the thermal environment – Assessment of the influence of the thermal environment using subjective judgement scales

BS ISO 11399 1995
Ergonomics of the thermal environment – Principles and application of relevant International Standards

BS EN ISO 11546
Acoustics – Determination of sound insulation performances of enclosures
EN ISO 11546-1 1996
Measurements under laboratory conditions (for declaration purposes)
EN ISO 11546-2 1996
Measurements in situ (for acceptance and verification purposes)

BS EN ISO 11654 1997
Acoustics – Sound absorbers for use in buildings – Rating of sound absorption

BS EN 12085 1997
Thermal insulating products for building applications – Determination of linear dimensions of test specimens

BS EN 12086 1997
Thermal insulating products for building applications – Determination of water vapour transmission properties

BS EN 12087 1997
Thermal insulating products for building applications – Determination of long term water absorption by immersion

BS EN 12088 1997
Thermal insulating products for building applications – Determination of long term water absorption diffusion

BS EN 12089 1997
Thermal insulating products for building applications – Determination of bending behaviour

BS EN 12090 1997
Thermal insulating products for building applications – Determination of shear behaviour

BS EN 12091 1997
Thermal insulating products for building applications – Determination of freeze-thaw resistance

BS EN 12429 1998
Thermal insulating products for building applications – Conditioning to moisture equilibrium under specified temperature and humidity conditions

BS EN 12430 1998
Thermal insulating products for building applications – Determination of behaviour under point load

BS EN 12431 1998
Thermal insulating products for building applications – Determination of thickness for floating floor insulating products

BS EN 13187 1999
Thermal performance of buildings – Qualitative detection of thermal irregularities in building envelopes – Infrared method

BS EN ISO 13370 1998
Thermal performance of buildings – Heat transfer via the ground – Calculation methods

BS EN ISO 13786 1999
Thermal performance of building components – Dynamic thermal characteristics – Calculation methods

BS EN ISO 13789 1999
Thermal performance of buildings – Transmission heat loss coefficient – Calculation method

BS EN ISO 14683 1999
Thermal bridges in building construction – Linear thermal transmittance – Simplified methods and default values

BS EN 20140
Acoustics – Measurement of sound insulation in buildings and of building elements
EN 20140-2 1993
Determination, verification and application of precision data
(Also known as BS 2750: Part 2: 1993. Supersedes BS 2750: Part 2: 1980)
EN 20140-9 1994
Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it
(Also known as BS 2750: Part 9: 1987)
EN 20140-10 1992
Laboratory measurement of airborne sound insulation of small building elements

BS EN 20354 1993 [AMD 2]
Acoustics – Measurement of sound absorption in a reverberation room
(Previously known as BS 3638: 1987)

BS EN 21683 1994
Acoustics – Preferred reference quantities for acoustic levels

BS EN 29052
Acoustics – Method for the determination of dynamic stiffness
EN 29052-1 1992
Materials used under floating floors in dwellings

BS EN 29053 1993
Acoustics – Materials for acoustical applications – Determination of airflow resistance

FIRE PROTECTION AND MEANS OF ESCAPE

BS EN 54
Fire detection and fire alarm systems
EN 54-1 1996
Introduction
(Supersedes BS 5445: Part 1: 1977)
EN 54-2 1998
Control and indicating equipment
(With BS EN 54-4: 1997 supersedes BS 5839: Part 4: 1998 which remains current)
EN 54-4 1998
Power supply equipment
(With BS EN-54-2: 1997 supersedes BS 5839: Part 4: 1988 which remains current)

BS EN 179 1998
Building hardware – Emergency exit devices operated by a lever handle or push pad – Requirements and test methods

BS EN 615 1995
Fire protection – Fire extinguishing media – Specifications for powders (other than class D powders)
(Supersedes BS 6535: Part 3: 1989)

BS EN 1363
Fire resistance tests
EN 1363-1 1999
General requirements
EN 1363-2 1999
Alternative and additional procedures

BS EN 1364
Fire resistance tests for non-loadbearing elements
EN 1364-1 1999
Walls
EN 1364-2 1999
Ceilings

BS EN 1365
Fire resistance tests for loadbearing elements
EN 1365-1 1999
Walls
EN 1365-4 1999
Columns

BS EN 1366
Fire resistance tests for service installations
EN 1366-1 1999
Ducts

EN 1366-2 1999
Fire dampers
BS ISO TR 5925
Fire tests – Smoke control door and shutter assemblies
ISO TR 5925-2 1997
Commentary on test method and test data application
BS ISO 7203
Fire extinguishing media – Foam concentrates
ISO 7203-1 1995
Specification for low expansion foam concentrates for top application to water-immiscible liquids
ISO 7203-2 1995
Specification for medium and high expansion foam concentrates for top application to water-immiscible liquids
BS ISO 10294
Fire resistance tests – Fire dampers for air distribution systems
ISO 10294-1 1996
Test method
ISO 10294-2 1999
Classification, criteria and field of application of test results
ISO 10294-3 1999
Guidance on the test method
BS ISO 11925
Reaction to fire tests – Ignitability of building products subjected to direct impingement of flame
BS ISO TR 11925
Reaction to fire tests – Ignitability of building products subjected to direct impingement of flame
ISO TR 11925-1 1999
Guidance on ignitability
ISO 11925-2 1997 [AMD 1]
Single flame source test
ISO 11925-3 1997 [AMD 1]
Multi-source test
BS EN 12094
Fixed firefighting systems – Components for gas extinguishing systems
EN 12094-8 1998
Requirements and test methods for flexible connectors for CO_2 systems
BS EN 12259
Fixed fire fighting systems – Components for sprinkler and water spray systems
EN 12259-1 1999
Sprinklers
EN 12259-2 1999
Wet alarm valve assemblies
BS ISO/TR 12470 1998
Fire resistance tests – Guidance on the application and extenuation of results
BS ISO TR 14697 1997
Fire tests – Guidance on the choice of substrates for building products
BS EN 25923 1994
Fire protection – Fire extinguishing media – Carbon dioxide
(Previously known as BS 6535: Part 1: 1990)
BS EN 27201
Fire protection – Fire extinguishing media – Halogenated hydrocarbons
EN 27201-1 1994
Halon 1211 and halon 1301
(Previously known as BS 6535: Section 2.1: 1990)
EN 27201-2 1994
Code of practice for safe handling and transfer procedures
(Supersedes BS 6535: Section 2.2: 1989)
BS EN 50130
Alarm systems
EN 50130-4 1996 [AMD 1]
Electromagnetic compatibility – Product family standard: Immunity requirements for components of fire, intruder and social alarm systems
EN 50130-5 1999
Environmental test methods
BS EN 50131
Alarm systems – Intrusion systems
EN 50131-1 1997 [AMD 1]
General requirements
EN 50131-6 1998 [AMD 1]
Power supplies
BS EN 50134
Alarm systems – Social alarm systems
EN 50134-7 1996
Application guidelines
(Supersedes BS 6084: 1986)

ARTIFICIAL LIGHTING AND DAYLIGHT

BS EN 40
Lighting columns
EN 40-1 1992
Definitions and terms
(Supersedes BS 5649: Part 1: 1978)
BS EN 410 1998
Glass in building – Determination of luminous and solar characteristics of glazing
BS EN 572
Glass in building – Basic soda lime silicate glass products
EN 572-1 1995
Definitions and general physical and mechanical properties
EN 572-2 1995
Float glass
EN 572-3 1995
Polished wired glass
EN 572-4 1995
Drawn sheet glass
EN 572-5 1995
Patterned glass
EN 572-6 1995
Wired patterned glass
EN 572-7 1995
Wired or unwired channel shaped glass
BS EN 673 1998
Glass in building – Determination of thermal transmittance (U value) – Calculation method
BS EN 674 1998
Glass in building – Determination of thermal transmittance (U value) – Guarded hot plate method
BS EN 675 1998
Glass in building – Determination of thermal transmittance (U value) – Heat flow meter method
BS EN 1096
Glass in building – Coated glass
EN 1096-1 1999
Definitions and classification
BS EN 1748
Glass in building – Special basic products
EN 1748-1 1998
Borosilicate glasses
EN 1748-2 1998
Glass ceramics
BS EN ISO 12543
Glass in building – Laminated glass and laminated safety glass
BS ISO 15469 1997
Spatial distribution of daylight – CIE standard overcast sky and clear sky
BS EN 60064 1996
Tungsten filament lamps for domestic and similar general lighting purposes – Performance requirements
(Supersedes BS 161: 1990)
BS EN 60081 1998
Double-capped fluorescent lamps – Performance specifications
BS EN 60432
Safety specification for incandescent lamps
EN 60432-1 1995 [AMD 1]
Tungsten filament lamps for domestic and similar general lighting purposes
EN 60432-2 1995 [AMD 2]
Tungsten halogen lamps for domestic and similar general lighting purposes
BS EN 60598
Luminaires
EN 60598-1 1997 [AMD 1]
General requirements and tests
EN 60598-2
Particular requirements
EN 60598-2-2 1997
Recessed luminaires
(Supersedes BS 4533: Section 102.2: 1990 which remains current)
EN 60598-2-3 1994 [AMD 2]
Luminaires for road and street

lighting
(Supersedes BS 4533: Section 102.3: 1990
EN 60598-2-4 1998
Portable general purpose luminaires
(Supersedes BS 4533: Section 102.4: 1990)
EN 60598-2-5 1998
Floodlights
(Incorporating Corrigendum No.1, supersedes BS 4533-102.5: 1990 which remains current)
EN 60598-2-6 1995 [AMD 1]
Luminaires with built-in transformers or converters for filament lamps
EN 60598-2-7 1997 [AMD 1]
Portable luminaires for garden use
(Incorporating Corrigendum No.1 (10563) Previously known as BS 4533: Section 102.7: 1990 (including AMD 1-3))
EN 60598-2-8 1997
Headlamps
EN 60598-2-18 1994 [AMD 1]
Luminaires for swimming pools and similar applications
(Supersedes BS 4533: Section 102.18: 1990)
EN 60598-2-20 1998 [AMD 1]
Lighting chains
(Incorporating Corrigendum No.1 (AMD 10561))
EN 60598-2-22 1999
Particular requirements – Luminaires for emergency lighting
(Incorporating Corrigendum No.1 supersedes BS 4533: Section 102.22: 1990, which remains current)
EN 60598-2-23 1997
Extra low voltage lighting systems for filament lamps
EN 60598-2-24 1999
Luminaires with limited surface temperatures
EN 60598-2-25 1995
Luminaires for use in clinical areas of hospitals and health care buildings
BS EN 60630 1999
Maximum lamp outlines for incandescent lamps
BS EN 61195 1994 [AMD 1]
Double-capped fluorescent lamps – Safety specifications
BS EN 61199 1994 [AMD 2]
Single-capped fluorescent lamps – Safety specifications
BS EN 61725 1997
Analytical expression for daily solar profiles

WINDOWS AND DOORS

BS EN 477 1999
Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors – Determination of the resistance to impact of main profiles by falling mass
BS EN 478 1999
Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors – Appearance after exposure at 150 degrees centegrade – Test method
BS EN 479 1999
Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors – Determination of heat reversion
BS EN 513 1999
Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors – Determination of the resistance to artificial weathering
BS EN 947 1999
Hinged or pivoted doors – Determination of the resistance to vertical load
BS EN 948 1999
Hinged or pivoted doors – Determination of the resistance to static torsion
BS EN 949 1999
Windows and curtain walling, doors, blinds and shutters – Determination of the resistance to soft and heavy body impact for doors
BS EN 950 1999
Door leaves – Determination of the resistance to hard body impact
BS EN 951 1999
Door leaves – Method for measurement of height, width, thickness and squareness
BS EN 952 1999
Door leaves – General and local flatness – Measurement method
BS EN 1154 1997
Building hardware – Controlled door closing devices – Requirements and test methods
(Supersedes BS 6459: Part 1: 1984)
BS EN 1155 1997
Building hardware – Electrically powered hold-open devices for swing doors – Requirements and test methods
BS EN 1158 1997
Building hardware – Door coordinator devices – Requirements and test methods
BS EN 1522 1999
Windows, doors, shutters and blinds – Bullet resistance – Requirements and classification
BS EN 1523 1999
Windows, doors, shutters and blinds – Bullet resistance – Test method
BS EN 1527 1998
Building hardware – Hardware for sliding doors and folding doors – Requirements and test methods

STAIRS, ESCALATORS AND LIFTS

BS EN 81
Safety rules for the construction and installation of lifts
EN 81-1 1998
Electric lifts
(Supersedes BS 5655-1: 1986)
EN 81-2 1998
Hydraulic lifts ((29))
(Supersedes BS 5655-2: 1988)
BS EN 115 1995 [AMD 1]
Safety rules for the construction and installation of escalators and passenger conveyors
(Supersedes BS 5656: 1983)
BS 5395:
Stairs, Ladders and Walkways
BS 5395: Part 1: 1977 [AMD 2]
Code of practice for the design of straight stairs
BS 5395: Part 2: 1984 [AMD 1]
Code of practice for the design of helical and spiral stairs
BS 5395: Part 3: 1985
Code of Practice for the design of industrial type stairs, permanent ladders and walkways
BS 5655:
Lifts and Service Lifts
BS 5655: Part 1: 1979 [AMD 2]
Safety rules for the construction and installation of electric lifts
(Remains current)
BS 5655: Part 1: 1986 [AMD 1]
Safety rules for the construction and installation of electric lifts
(Superseded by BS EN 81-1: 1998 but remains current)
PD 6500: 1986
Explanatory supplement to BS 5655: Part 1 Safety rules for the construction and installation of electric lifts (EN 81 Part 1)
(Withdrawn)
BS 5655: Part 2: 1988 [AMD 1]
Hydraulic lifts
(Withdrawn, superseded by BS EN 81-2: 1998 but remains current)
BS 5655: Part 3: 1989 [AMD 1]
Electric service lifts
BS 5655: Part 5: 1989
Dimensions of standard lift arrangement
BS 5655: Part 6: 1990
Code of practice for selection and installation
(Supersedes BS 2655: Part 2: 1959)
BS 5655: Part 7: 1983 [AMD 1]
Manual control devices, indicators and additional fittings

BS 5655: Part 8: 1983
Eyebolts for lift suspension
BS 5655: Part 9: 1985 [AMD 2]
Guide rails
BS 5655: Part 10: 1986
Testing and inspection of electric and hydraulic lifts
(Revised and replaces BS 2655: Part 7: 1970)
BS 5655: Subsection 10.1.1: 1995
Commissioning tests for new lifts
BS 5655: Subsection 10.2.1: 1995
Commissioning tests for new lifts
BS 5655: Part 11: 1989 [AMD 1]
Recommendations for the installation of new, and the modernization of, electric lifts in existing buildings
BS 5655: Part 12: 1989 [AMD 2]
Recommendations for the installation of new, and the modernization of, electric lifts in existing buildings
BS 5655: Part 13: 1995
Recommendations for vandal resistant lifts
(Supersedes DD 197:1990)
BS 5655: Part 14: 1995
Specification for hand-powered service lifts and platform hoists

BS EN 115: 1995
Safety rules for the construction and installation of escalators and passenger conveyors

BS 5776: 1996
Powered stairlifts

BS 5900: 1999
Specification for powered domestic lifts with partially enclosed cars and no lift-well enclosures

HOUSES AND RESIDENTIAL BUILDINGS

BS EN 1116 1996
Kitchen furniture – Co-ordinating sizes for kitchen furniture and kitchen appliances
(Supersedes BS 6222: Part 1: 1982)

BS EN 1153 1996
Kitchen furniture – Safety requirements and test methods for built-in and free standing kitchen cabinets and worktops
(Partially supersedes BS 6222: Part 2: 1992)

BS EN 12182 1999
Technical aids for disabled persons – General requirements and test methods

EDUCATIONAL AND RESEARCH FACILITIES

BS EN 1176
Playground equipment
EN 1176-1 1998
General safety requirements and test methods
(Incorporating Corrigendum No.1. Partially supersedes BS 5696-1: 1997 and BS 5696-1 and 2: 1986)
EN 1176-7 1997
Guidance on installation, inspection, maintenance and operation
(Partially supersedes BS 5696: Part 3: 1979)

BS EN 1177 1998
Impact absorbing playground surfacing – Safety requirements and test
(Partially supersedes BS 7188: 1989)

OFFICE BUILDINGS

BS EN 1023
Office furniture – Screens
EN 1023-1 1997
Dimensions

BS EN ISO 9241
Ergonomic requirements for office work with visual display terminals (VDTs)
EN ISO 9241-1 1997
General introduction
EN ISO 9241-4 1998
Keyboard requirements
(Supersedes BS 7179-4: 1990)
EN ISO 9241-5 1999
Workstation layout and postural requirements
(Supersedes BS 7179-5: 1990)
EN ISO 9241-7 1998
Requirements for display with reflections
EN ISO 9241-8 1998
Requirements for displayed colours
EN ISO 9241-10 1996
Dialogue principles
EN ISO 9241-11 1998 [AMD 1]
Guidance on usability
EN ISO 9241-12 1999
Presentation of information
EN ISO 9241-13 1999
User guidance
EN ISO 9241-15 1998
Command dialogues
EN ISO 9241-16 1999
Direct manipulation dialogues
EN ISO 9241-17 1998 [AMD 1]
Form-filling dialogues

BS ISO 9241
Ergonomic requirements for office work with visual display terminals (VDTs)
ISO 9241-14 1997
Menu dialogues

BS EN 29241
Ergonomic requirements for office work with visual display terminals (VDTs)
EN 29241-1 1993
General introduction
(Withdrawn, superseded by BS EN ISO 9241-1: 1997)
EN 29241-2 1993
Guidance on task requirements
(Supersedes BS 7179: Part 2: 1990)
EN 29241-3 1993
Visual display requirements
(Supersedes BS 7179: Part 3: 1990)

SANITARY AND WASHING FACILITIES

BS EN 31 1999
Pedestal wash basins – Connecting dimensions
(Supersedes BS 5506-1:1977

BS EN 32 1999
Wall-hung wash basins – Connecting dimensions
(Supersedes BS 5506-2:1977 which is withdrawn)

BS EN 33 1999
Pedestal WC pans with close-coupled flushing cistern – Connecting dimensions
(With BS EN 37:1999 supersedes BS 5503-1:1977)

BS EN 36 1999
Wall-hung bidets with over-rim supply – Connecting dimensions
(Supersedes BS 5505-2:1977)

BS EN 37 1999
Pedestal WC pans with independent water supply – Connecting dimensions
(With BS EN 33-1999 supersedes BS 5503-1:1977)

BS EN 111 1999
Wall-hung hand rinse basins – Connecting dimensions
(Supersedes BS 6731-1: 1988)

BS EN 200 1992
Sanitary tapware: General technical specifications for single taps and mixer taps (nominal size 1/2) PN 10: Minimum flow pressure of 0.05 Mpa (0.5 bar)

BS EN 232 1992
Baths – connecting dimensions

BS EN 246 1992
Sanitary tapware: General specifications for flow rate regulators

BS EN 251 1992
Shower trays – Connecting dimensions

BS EN 274 1993
Sanitary tapware – Waste fittings for basins, bidets and baths – General technical specifications

BS EN 329 1997
Sanitary tapware – Waste fittings for shower trays – general technical specifications

BS EN 411 1995
Sanitary tapware – Waste fittings for sinks – General technical specifications

PUBLIC TRANSPORT

BS EN 50125
Railway applications – Environmental conditions for equipment
EN 50125-1 1999
Equipment on board rolling stock

BS EN 50126 1999
Railway applications – The specification and demonstration of Reliability, Availability, Maintain-ability and Safety (RAMS)

RESTAURANTS

BS EN 203
Gas heated catering equipment
EN 203-1 1993 [AMD 2]
Safety requirements
(Supersedes BS 5314: Parts 1, 2, 3, 4, 5, 6, 7: 1976, 8, 9, 11, 12: 1979, 10, 13: 1982)
EN 203-1 1993 [AMD 1]
Specification for gas heated catering equipment
EN 203-2 1995
Rational use of energy

SPORT AND RECREATION

BS EN 748 1996 [AMD 2]
Playing field equipment – Football goals – Functional and safety requirements, test methods

BS EN 749 1996 [AMD 1]
Playing field equipment – Handball goals – Functional and safety requirements, test methods

BS EN 750 1996 [AMD 1]
Playing field equipment – Hockey goals – Functional and safety requirements, test methods

BS EN 913 1996
Gymnastic equipment – General safety requirements and test methods
(Supersedes BS 1892: Part 1: 1986)

BS EN 914 1996
Gymnastic equipment – Parallel bars and combination asymmetric /parallel bars – Functional and safety requirements, test methods

BS EN 915 1996
Gymnastic equipment – Asymmetric bars – Functional and safety requirements, test methods
(Supplement the general standard BS EN 913: 1996)

BS EN 916 1996
Gymnastic equipment – Vaulting boxes – Functional and safety requirements, test methods
(Supersedes BS 1892: Section 2.3: 1986)

BS EN 1270 1998
Playing field equipment – Basketball equipment – Functional and safety requirements, test methods
(Supersedes BS 1892-2.7: 1986)

BS EN 1271 1998
Playing field equipment – Volleyball equipment – Functional and safety requirements, test methods

BS EN 1509 1997
Playing field equipment – Badminton equipment – Functional and safety requirements, test methods

BS EN 1510 1997
Playing field equipment – Tennis equipment – Functional and safety requirements, test methods

BS EN 1516 1999
Surfaces for sports areas – Determination of resistance to indentation
(Incorporating Corrigendum No.1)

BS EN 1569 1999
Surfaces for sports areas – Determination of the behaviour under a rolling load

BS EN 12193 1999
Light and lighting – Sports lighting

BS EN 12196 1997
Gymnastics equipment – Horses and bucks – Functional and safety requirements, test methods

BS EN 12197 1997
Gymnastics equipment – Horizontal bars – Safety requirements and test methods

BS EN 12346 1999
Gymnastic equipment – Wall bars, lattice ladders and climbing frames – Safety requirements and test methods

BS EN 12432 1998
Gymnastic equipment – Balancing beams – Functional and safety requirements, test methods

BS EN 12655 1998
Gymnastic equipment – Hanging rings – Functional and safety requirements, test methods

CONVERSION OF UNITS (pp. 611–27)

Conversion factors
Conversion tables

1 millimetres to inches
2 decimals of inch to millimetres
3 inches and fractions of inch to millimetres
4 feet and inches to metres
5 metres to feet
6 feet to metres
7 metres to yards
8 yards to metres
9 kilometres to miles
10 miles to kilometres
11 square centimetres to square inches
12 square inches to square centimetres
13 square metres to square feet
14 square feet to square metres
15 square metres to square yards
16 square yards to square metres
17 hectares to acres
18 acres to hectares
19 cubic centimetres to cubic inches
20 cubic inches to cubic centimetres
21 cubic metres to cubic feet
22 cubic feet to cubic metres
23 litres to cubic feet
24 cubic feet to litres
25 litres to imperial gallons
26 imperial gallons to litres
27 litres to US gallons
28 US gallons to litres
29 kilograms to pounds
30 pounds to kilograms
31 kilograms per cubic metre to pounds per cubic foot
32 pounds per cubic foot to kilograms per cubic metre
33 metres per second to miles per hour
34 miles per hour to metres per second
35 kilograms force per square centimetre to pounds force per square inch
36 pounds force per square inch to kilograms force per square centimetre
37 kilonewtons per square metre to pounds force per square inch
38 pounds force per square inch to kilonewtons per square metre
39 watts to British thermal units per hour
40 British thermal units per hour to watts
41 watts per square metre kelvin to British thermal units per square foot hour degree F
42 British thermal units per square foot hour degree F to watts per square metre kelvin