SKYLIGHTS AND DOME ROOFLIGHTS

Domes, skylights, coffers, smoke vents and louvres, as fixed or moving units, can be used for lighting and ventilation, and for clearing smoke from rooms, halls, stair wells etc. All these can be supplied in heat-reflecting Plexiglas if required.

By directing the dome towards the north (in the northern hemisphere), sunshine and glare are avoided. The use of high curb skylights will reduce glare because of the sharp angles of incidence of the sunlight. Dome rooflights used for ventilation should face into the prevailing wind in order to utilise the extraction capacity of the wind. The inlet aperture should be 20% smaller than the outlet aperture. Forced ventilation, with an air flow of 150–1000 m³/h, can be achieved by fitting a fan into the curb of a skylight. Dome rooflights can also be used for access to the roof.

Attention should be given to the aerodynamic extraction surfaces of smoke exhaust systems. Orientating each extraction unit at an angle of 90° from the adjacent one will allow for wind coming from all directions. Position to leeward/windward if pairs of extraction fans are to be mounted in line with or against the direction of the prevailing wind.

Smoke extraction vents are required for stair wells more than four complete storeys high. Variable skylight aperture widths up to 5.50m are available, as is a special version up to 7.50m wide which does not need extra support. Skylight systems offer diffuse room lighting which is free from glare. North-facing skylights with spun glass fibre inlays guarantee all the technically important advantages of a workshop illuminated by a north light. Traditional flat roofs can be modified to admit a north light by inserting skylights with curbs.

<table>
<thead>
<tr>
<th>Material</th>
<th>Heat Insulation (mm)</th>
<th>Heat Insulation in Area of Spin Glass Inlay (mm)</th>
<th>Heat Insulation in Area of Spin Glass Inlay (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>45.0</td>
<td>45.0</td>
<td>45.0</td>
<td>45.0</td>
</tr>
<tr>
<td>40.0</td>
<td>40.0</td>
<td>40.0</td>
<td>40.0</td>
</tr>
<tr>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
</tr>
<tr>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>25.0</td>
<td>25.0</td>
<td>25.0</td>
<td>25.0</td>
</tr>
<tr>
<td>20.0</td>
<td>20.0</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Double-skinned rooflight units
If daylight is considered to be essential for the use to which a room will be put, then windows are an unavoidable necessity. Simple apertures for daylight have developed into significant stylistic features, from Romanesque semi-circular arched windows to Baroque windows surrounded by rich, elaborate decoration. In the European cultural region lying north of the Alps, window forms reveal particularly strong features. In contrast to the climatically favoured cultural region of the Mediterranean, daily life here mainly had to be spent indoors. The people were thus dependent upon daylight because artificial light was expensive and good illumination of a room during the hours of darkness was beyond the means of most of the local population.

Every work area needs a window leading to the outside world. The window area which transmits light must be at least \( \frac{1}{10} \) of the surface area of the floor in the work space. The total width of all the windows must amount to at least \( \frac{1}{10} \) of the total width of all the walls, i.e. \( \frac{1}{10} (M + N + O + P) \rightarrow (1) \).

For workrooms which are 3.5 m or more high, the light transmission surface of the window must be at least 30% of the outside wall surface, i.e. \( \geq 0.3 \times B \rightarrow (2) \).

For workrooms with dimensions similar to those of a living room, the following rules should be applied.

Minimum height of the glass surface, 1.3 m \( \rightarrow (3) \).

Height of the window breast from the ground, \( \geq 0.9 \) m.

The total height of all windows must be 50% of the width of the workroom, i.e. \( Q = 0.5R \rightarrow (4) \).

When calculating the window size for a living room, both the floor area of the room and the angle of incidence of the light must be taken into account \( \rightarrow (5) \). Here, 'a' is the minimum window size for a living room as a percentage of the floor area of the room, 'b' is the minimum size for a kitchen window and 'c' is the minimum size for all other rooms. The angle of incidence of the light is 'd'. The larger the angle of incidence, the larger the windows need to be. This is because the closer the neighbouring houses are, and the higher they are, the greater the angle of incidence and the smaller the amount of light penetrating into the house. Larger windows will compensate for this smaller quantity of light.

Dutch regulations stipulate the sizes of windows in relation to the angle of incidence of the light.
WINDOWS: ARRANGEMENT

1. With stone walls
2. With brickwork
3. With half-timbered construction
4. With steel-frame structure with reinforced concrete
5. With scenic view and balcony
6. Rooms with a view
7. Normal window height
8. Office
9. Kitchen
10. Office (filing room)
11. Cloakroom
12. Skylight e.g. drawing office

VENTILATION

13. Cool air drawn into room, warm air extracted
14. Flap control: ventilation better

HEATING

15. Cold and warm air hitting the seated person (unhealthy)
16. Built-in radiators (conectors) require entry/exit for air

BLINDS AND CURTAIN

17. Allow sufficient wall space in corners for curtains
18. Vertical blinds, slatted curtains
19. Roller blinds of cloth or plastic
20. Venetian blind
WINDOWS: SHADING

Protection measures must prevent glare and regulate the inflow of heat from sunlight. In temperate climates, large window apertures with a high but diffuse incidence of light are preferred, whereas in hot climates, small window apertures still allow sufficient light to enter.

Venetian blinds (with flat slats of wood, aluminium or plastic), roller shutters, roller blinds and partially angled sun blinds are all useful and can be adjusted as required. Fixed external devices are clearly less flexible than retractable or adjustable ones. Vertical panel blinds (either fixed or pivoting around the axis of the slats) are also suitable for tall or angled window surfaces.

Heat rising up the face of a building should be able to escape, and not be blocked by external sun screens or allowed to enter the building via open skylights.

Internal shades are less effective than external ones for reducing solar heat gain because the heat they absorb is released into the room.
WAYS OF OPENING

1. Fixed light
2. Casement, side hung
3. Casement, top hung
4. Casement, bottom hung
5. Horizontally pivoted
6. Vertically pivoted
7. Vertically sliding
8. Horizontally sliding
9. Linked hopper
10. Projected, top hung
11. Louvred

COORDINATING SIZES

Note: BS and module 100 metric range includes doors & associated fixed lights (not shown). f = fixed lights

Ranges of steel windows to BS 990: Part 2 and to "Module 100 Metric Range" as given by Steel Window Association

Ranges of aluminium windows to BS 4873 - wide range of windows including vertically and horizontally sliding types

Note: This range also includes 1800 & 2100 h with fixed lights only. 2100 h include doors

Metric preferred range of W20 steel windows as specified by Steel Window Association

Dimensionally coordinated metric sizes for wood windows as recommended by British Wood-working Federation
LOFT WINDOWS

In planning the size of windows, the optimum daylight level relative to the purpose of the room must be the deciding factor. For instance, building regulations require a minimum window area of \( \frac{1}{8} \) of the floor surface area for living rooms.

Large windows make living rooms more comfortable. The window width in secondary rooms can be chosen according to the distance between the rafters. Generously wide windows in living rooms can be achieved by the inclusion of rafter trimmers. Steeper roofs need shorter windows, while flatter roofs require longer windows. Roof windows can be joined using purpose-made prefabricated flashing, and can be arranged in rows or in combinations next to or above one another.

### Window Sizes

<table>
<thead>
<tr>
<th>Window Size</th>
<th>Surface Area of Light Admission (m²)</th>
<th>Room Size (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>54/83</td>
<td>0.21</td>
<td>2</td>
</tr>
<tr>
<td>54/103</td>
<td>0.28</td>
<td>2.3</td>
</tr>
<tr>
<td>64/103</td>
<td>0.36</td>
<td>3.4</td>
</tr>
<tr>
<td>74/103</td>
<td>0.44</td>
<td>4.5</td>
</tr>
<tr>
<td>74/123</td>
<td>0.50</td>
<td>6.7</td>
</tr>
<tr>
<td>74/144</td>
<td>0.66</td>
<td>9</td>
</tr>
<tr>
<td>114/123</td>
<td>0.93</td>
<td>11</td>
</tr>
<tr>
<td>114/144</td>
<td>1.12</td>
<td>13</td>
</tr>
<tr>
<td>134/144</td>
<td>1.36</td>
<td></td>
</tr>
</tbody>
</table>

### Calculation of Window Size, in Relation to Floor Area

- **Steps:**
  1. Measure the floor area of the room.
  2. Calculate the minimum required window area as \( \frac{1}{8} \) of the floor area.
  3. Choose a window size that matches the desired daylight level.
  4. Adjust the window size according to the building regulations and local requirements.

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- **Diagram Notes:**
  1. Pivot windows
  2. Top-hung windows, sliding
  3. Sliding windows: escape
  4. Top-hung window with vertical unit
  5. Layout of roof windows
  6. At the eaves
  7. With vertical unit
  8. Section of built-in options
  9. Horizontal section
  10. Window sizes
  11. Calculation of window size, in relation to floor area
  12. Row of windows with vertical window units
  13. Adjacent to/above one another
Wooden sections for turning, turn and tilt, and tilting windows have been standardised. Windows are classified according to the type of casement - A - D - or the type of frame - E - H. The many demands made on windows (e.g. protection against heat and noise) have resulted in a vast range of window shapes and designs - I - N. Externally mounted windows and French windows must at the very least be fitted with insulation or double glazing. The coefficient of heat transfer of a window must not exceed 3.1 W/m²K.

### Window types

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>description of glazing</td>
<td>C&lt;sub&gt;u&lt;/sub&gt; for windows and French doors, including frames of material group &lt;br&gt; 1) 18 W/m²K</td>
<td>2) 1 2 3 4 5 6 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with use of normal glass</td>
<td>1) 2.1 2.2 2.3 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>single glazing</td>
<td>5.8</td>
<td>5.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>double glazing: 8mm gap &lt; 8mm</td>
<td>2</td>
<td>4</td>
<td>2.6</td>
<td>2.9</td>
<td>3.1</td>
<td>3.3</td>
</tr>
<tr>
<td>double glazing: 8mm gap &lt; 10mm</td>
<td>3</td>
<td>2.8</td>
<td>3.0</td>
<td>3.2</td>
<td>3.4</td>
<td>3.6</td>
</tr>
<tr>
<td>double glazing: 10mm gap &lt; 8mm</td>
<td>4</td>
<td>3.0</td>
<td>2.6</td>
<td>2.9</td>
<td>3.1</td>
<td>3.3</td>
</tr>
<tr>
<td>triple glazing: 6mm gap &lt; 8mm (x2)</td>
<td>5</td>
<td>2.4</td>
<td>2.2</td>
<td>2.5</td>
<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>triple glazing: 8mm gap &lt; 10mm (x2)</td>
<td>6</td>
<td>2.2</td>
<td>2.1</td>
<td>2.3</td>
<td>2.5</td>
<td>2.7</td>
</tr>
<tr>
<td>triple glazing: 10mm gap &lt; 16mm (x2)</td>
<td>7</td>
<td>2.1</td>
<td>2.0</td>
<td>2.3</td>
<td>2.4</td>
<td>2.7</td>
</tr>
<tr>
<td>double glazing with 20 to 100mm between panes</td>
<td>8</td>
<td>2.8</td>
<td>2.6</td>
<td>2.7</td>
<td>2.9</td>
<td>3.2</td>
</tr>
<tr>
<td>double glazing single glazing unit (normal glass; air gap 10 to 16mm) with 20 to 100mm between panes</td>
<td>9</td>
<td>2.2</td>
<td>2.4</td>
<td>2.6</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>double glazing with two double glazing units (air gap 5 to 10mm) with 20 to 100mm between the panes</td>
<td>10</td>
<td>1.4</td>
<td>1.5</td>
<td>1.8</td>
<td>1.9</td>
<td>2.2</td>
</tr>
<tr>
<td>glass brick wall with hollow glass bricks</td>
<td>11</td>
<td>3.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) for windows in which the proportion of frame makes up no more than 5% of the total area (e.g. shop window installations) the coefficient of thermal conductance C<sub>u</sub> can be substituted for the coefficient of thermal conductance C<sub>u</sub> in Group 1 to 3.
2) if the classification of window frames into frame material groups 1 to 3 is to be done as outlined below.

#### Group 1:
Windows with frames of timber, plastic and timber combinations (e.g. timber frame with aluminium cladding) without any particular identification or if the coefficient of thermal conductance of the frame is proved with test certificates to be C<sub>u</sub> < 2.0 W/m²K. N.B. Sections for plastic windows are only to be classified under Group 1 when the plastic design profile is clearly defined and any possible metal inserts serve only decorative purposes.

#### Group 2:
Windows in frames of thermally insulated metal or concrete sections.

- **Group 2.1:** Windows in frames of thermally insulated metal or concrete sections provided with test certificates to be C<sub>u</sub> < 2.0 W/m²K.
- **Group 2.2:** Windows in frames of thermally insulated metal or concrete sections provided with test certificates to be C<sub>u</sub> < 2.8 W/m²K.

### Values of thermal conductance for glazing and for windows and French doors including the frames

[Values of thermal conductance for glazing and for windows and French doors including the frames]
Any window design must satisfy the technical requirements of the relevant parts of the building. The main considerations are the size, format, divisions, way of opening, frame material and surface treatment. Ventilation, thermal and sound insulation, fire resistance and general safety issues, including the use of security glazing, must also be taken into account. The design of the sections and the location and type of sealing are of great importance in guaranteeing a long-lasting water- and draught-proof seal. Built-in components such as roller shutter boxes, window sills and vents must match the noise insulation of the windows → 10 - 11 as well as other technical specifications.

### Window Classification for Sound Insulation

<table>
<thead>
<tr>
<th>Noise Insulation Class</th>
<th>Noise Insulation Value (dB)</th>
<th>Guiding Remarks for Design Characteristics of Windows and Ventilation Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>50</td>
<td>Box windows with separate recessed frames specially sealed and very large gap between the panes, glazed with thick glass.</td>
</tr>
<tr>
<td>5</td>
<td>45-49</td>
<td>Box windows with special sealing, large gap between frames and glazed with thick glass. Double glazed composite casement windows with isolated casement frames. Special sealing, more than 100 mm between panes and glazed with thick glass.</td>
</tr>
<tr>
<td>4</td>
<td>40-44</td>
<td>Box windows with extra sealing and average density glazing. Double glazed composite casement windows with special sealing, over 60 mm between panes and glazed with thick glass.</td>
</tr>
<tr>
<td>3</td>
<td>35-39</td>
<td>Box windows without extra sealing and with average density glazing, double glassed composite casement windows with extra sealing, normal distance between panes and glazed with thick glass. Double glazed double profile glazing units. 12 mm glass in fixed or well sealed opening windows.</td>
</tr>
<tr>
<td>2</td>
<td>30-34</td>
<td>Composite casement windows with extra sealing and average density glazing, thick double glazing units, in fixed or well sealed opening windows.</td>
</tr>
<tr>
<td>1</td>
<td>25-29</td>
<td>Double glazed composite casement windows with extra sealing and average density glazing, thin double glazing units in windows without extra sealing.</td>
</tr>
<tr>
<td>0</td>
<td>20-24</td>
<td>Unsealed windows with single glazing or double glazing units.</td>
</tr>
</tbody>
</table>
WINDOWS: CLEANING

Safety belts with straps, safety cables or safety apparatus for working at heights should be used as a protection against falls → 1.

Façade hoists and mobile equipment (allowing access to fixed glazing) for cleaning windows and façades → 2 - 11 are available to carry out maintenance and repair work (thus saving the cost of scaffolding). If fitted at the right time, they can be used to carry out minor building work (such as fixing blinds, installing windows etc.). With slight modifications, façade hoists and access equipment can be used as rescue apparatus in the event of a fire. The options available include mobile suspended ladders mounted on rails, trackless roof gantry equipment with a cradle, and a rail-mounted roof gantry with a cradle and attached to the roof deck or the balustrade.

Suspended aluminium ladder equipment (for façade access) → 2 consists of a suspended mobile ladder on rails. The width of the ladder is 724 mm or 840 mm, and the total overall length is 25 m maximum, depending on the shape of the building. The maximum safe working load (S.W.L.) is 200 kg (i.e. two men and the apparatus itself). Alternatives are available, such as maintenance gangways → 5 and cleaning balconies → 6.

<table>
<thead>
<tr>
<th>type of building</th>
<th>outside window</th>
<th>roof window</th>
</tr>
</thead>
<tbody>
<tr>
<td>offices</td>
<td>every 3 months*</td>
<td>every 12 months</td>
</tr>
<tr>
<td>public offices</td>
<td>every 2 weeks</td>
<td>3 months</td>
</tr>
<tr>
<td>shops</td>
<td>every week (inside, 2 weeks)</td>
<td>6 months</td>
</tr>
<tr>
<td>shops (high street)</td>
<td>daily</td>
<td>3 months</td>
</tr>
<tr>
<td>hospitals</td>
<td>3 months</td>
<td>6 months</td>
</tr>
<tr>
<td>schools</td>
<td>3-4 months</td>
<td>12 months</td>
</tr>
<tr>
<td>hotels (first class)</td>
<td>2 weeks</td>
<td>3 months</td>
</tr>
<tr>
<td>factories (precision work)</td>
<td>4 weeks</td>
<td>3 months</td>
</tr>
<tr>
<td>factories (heavy industry)</td>
<td>2 months</td>
<td>6 months</td>
</tr>
<tr>
<td>private house</td>
<td>4-6 weeks</td>
<td>-</td>
</tr>
</tbody>
</table>

* ground floor windows must be cleaned more frequently
Internal doors must be positioned in order to maximise the usable room space. It is necessary to decide whether a door should open inwards or outwards. Normally doors open into the room. Door types are named according to their construction, position and purpose. A balanced door requires little strength to open it, and is suitable for corridors.

The width of a door is determined by its use and the room into which it leads. The minimum inside width of a door opening is 55cm. In residential buildings the standard door opening widths are as follows. Single-panel doors: main rooms approx. 80cm; auxiliary rooms approx. 70cm; front doors to flats approx. 90cm; front doors to houses up to 115cm. Double doors: main rooms approx. 170cm; front doors 140-225cm. Door opening height at least 185cm, but normally 195-200cm. Sliding and revolving doors are not permitted for escape or exit doors, as they could block the route in an emergency.

Disabled persons have special requirements. The minimum convenient door width for the ambulant disabled is 80cm. This is too narrow for wheelchair users, but 90cm is usually adequate. There should be adequate space to position a wheelchair beside the door. Corridors should be not less than 120cm wide so that wheelchair users can position themselves to open a door in the end wall of a corridor or at the side. An end door should be offset to give maximum space beside the handle. Similarly, when a door is located in the corner of a room, it should be hinged at the side nearer the corner.
DOORS: SIZES AND FRAMES

The sizes of wall apertures for doors are nominal standard building sizes. If, in exceptional cases, other sizes are necessary, the building standard size for them must be whole number multiples of 125mm (100mm according to British Standards). Steel frames can be used as left- as well as right-hand frames.

1 Typical structural opening sizes to DIN 4172

2 Width of the door

3 Height of the door

4 Width of the door (UK)

5 Height of the door (UK)

6 Recessed door frame

7 Full lining door frame (UK)

8 Standard rebated door panels and door frames

9 Sizes of internal and external doors to BS 4787: Part 1

10 Standard steel frame types

11 Architrave frame

12 Combined lining and architrave frame

13 Full lining frame
REVOLVING AND SLIDING DOORS

Revolving doors are made in several different designs - (1) - (6). Some are adjustable, e.g. when the number of users is large, particularly in the summer, the panels can be folded into the middle to allow people to go in on one side and out on the other at the same time. Some designs have panels which can be pushed to the side if traffic is only in one direction (e.g. when business closes for the day).

Actuating devices for automatic doors can be controlled by radar, electric contact mats - (7) - (9) or pneumatic floor contacts. Unidirectional or reflecting light barriers controlling automatic sliding doors with six panels up to 8 m wide are ideal for installation on emergency escape routes in office blocks, public buildings and supermarkets. Air curtain doors - (10) can be shut off at night by a raised door - (11).

Room dividers can be provided by the use of folding doors, guided from the side - (12). Concertina doors are centrally hung - (13) for closing off wide openings. A revolving movement can be combined with a sliding movement. Accordion doors can be made of plywood, artificial leather or cloth - (14).

Telescopic doors have several panels joined by engagers. Externally guided telescopic doors are single-skinned - (15), those with internal guides are double-skinned - (16). These doors can move alongside each other - (17) or retract inside each other - (18). Sliding wall doors, suspended from above, can be guided round corners - (19) or can be used as flexible enclosures - (20).

Curtain partitions can be folded down from above - (21), or can move horizontally with guides above - (22). They allow large rooms to be divided up into sections.

1 Revolving door, two panels
2 With three panels
3 With four panels
4 Four panels, folded back
5 Door assembly pushed to side
6 Revolving door with extra emergency exits
7 Automatic hinged doors
8 Automatic sliding doors
9 Drop gate installation
10 Folding door with side guides
11 Folding door with central guides (concertina door)
12 Accordion door; wood panels or flexible material
13 Telescopic door
14 Telescopic door
15 Sliding hinged door, going round a corner
16 Roller wall
17 Partition curtain
18 Variable sliding doors
19 Air curtain installation
GARAGE/WAREHOUSE DOORS

Up and over doors can be used for garages and similar installations →①. They can be folding doors, or doors with a spring counterbalance or a counterbalance weight. They can have a single or a double skin, and be solid, partially glazed or fully glazed. They can have wooden panels, or be made of plastic, aluminium or galvanised sheet steel. The largest available dimensions for access purposes are 4.82m × 1.96m, and the maximum panel area is approx. 10m². Up and over doors are also available in arched segments. They are easy to operate since the door drive is mounted on the ceiling and controlled by radio.

Also available are lifting folding doors →②, sectional doors →③, telescopic lifting doors →④ and roller shutter doors made of aluminum →⑤ which are completely cut out of the way when open. Single- or multiple-skin doors can be used for industrial, transport and workshop buildings. The maximum available size is 18m wide and 8m high. These doors can be activated by a ceiling pull switch, a light barrier, an induction loop or remote control (either electric or pneumatic), or contact pads.

Drive-through doors should be power-operated for speed →⑥. Rubber swing doors →⑦ and single-layer clear PVC are resistant to abrasion and impact, and PVC strip curtains are also available →⑧. Rubber sections which serve as door seals and rubber cushion seals are available for loading and unloading from docks and in and out of heated storage depots. They give protection from the effects of the weather during these operations →⑨, ⑩.

Fire protection doors T30–T90 can be single- or double-leaf →⑪. Sliding fire protection doors are also available →⑫. Any movable fire-resistant barrier, such as sliding, lifting or swing doors, must be able to operate independently of the mains electricity supply. In the event of fire, they must close automatically. (See also p. 130.)

① Up and over doors
② Folding, lift door
③ Linked up and over door (sectional)
④ Telescopic lifting door
⑤ Roller shutter door (in steel or aluminium)
⑥ Drop door
⑦ Sliding door (steel T30–T90)
⑧ Power operated folding door (quick operation)
⑨ Rubber swing door
⑩ PVC strip curtains for large drive-through passages
⑪ Rubber segment door seal
⑫ Rubber cushion door seal
⑬ Fire doors T30–T90
⑭ Sliding fire doors T30–T90
LOCKING SYSTEMS

Cylinder locks offer the greatest security, for it is virtually impossible to open them with tools. The cylinder lock developed by Linus Yale is very different from other locking systems. There are profile, oval, round and half cylinder locks. Cylinder locks are supplied with extensions as necessary on one or both sides, increasing in increments of 5mm, to suit the thickness of the door → ④.

During the planning and ordering phase for a locking system, a locking plan is drawn up which includes a unique security certificate. Replacement keys are only supplied after production of this document.

Combination key systems

With a combination key system, the key of the entrance door to each flat also opens all doors to shared facilities as well as shared access doors, e.g. courtyard, basement or main front door. This is suitable for houses with multiple family occupancy or estate houses → ①.

Master key systems

In a master key system, a principal pass key opens all locks throughout the complete system. This is suitable for single family occupancy houses, schools and restaurants.

Central key systems

With a central key system, several combination key systems are combined. This is suitable for blocks of flats ①. Separate keys unlock the front door to each flat and to all shared facilities. In addition, there is a master key which unlocks all the shared doors in the blocks.

General master key systems

A general master key system consists of multiple master key systems. The general master key allows one person access to all rooms. It is possible to subdivide areas by using main and group keys. Each cylinder has its own individual lock and, with the exception of the correct master (or pass) key, can only be opened with its own key.

This system is suitable for factories, commercial premises, airports and hotels → ④. Vulnerable points which should be taken into account during the planning stage are set out in → ⑤.

| filing cabinets, bath cubicles, letter boxes, access doors, emergency exit doors, cloakrooms, locks for boxes, cold stores, furniture doors, tubular framed doors, roller shutter doors, cupboard doors, writing desks, sliding bolts, changing cubicles | at risk |
| lift machinery room, lift switch box, electricity rooms, garage access doors, garage-up and over doors, lattice gates, boiler room doors, basement doors, oil filler pipes, distribution boxes | strongly at risk |
| main office doors, skylights, lift and turn windows, computer rooms, main entrance doors, gratings, front entrance doors to blocks of flats, trap doors, basement windows, fan lights, switch boxes | very strongly at risk |

Check list

Cylinder lock: profile, half, round

Dimensions in mm

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SECURITY OF BUILDINGS AND GROUNDS

The term security technology is used to describe the systems and devices employed to protect buildings and their occupants from threats such as theft, vandalism, and criminal activity. These systems typically involve electronic, mechanical, and environmental monitoring to ensure the safety and security of the property.

1. Burglar alarm systems: These are designed to detect unauthorized entry and activate an alarm. They can be triggered by various sensors, including motion detectors, door sensors, and window sensors. Burglar alarm systems are an essential component of any comprehensive security plan.

2. Fire alarm systems: These systems are designed to detect smoke or heat and activate an alarm in the event of a fire. Fire alarm systems are critical for detecting fires early and alerting occupants to evacuate the building safely.

3. Video surveillance systems: These systems use cameras to monitor activity within and around the building. Video surveillance is useful for identifying potential threats and for assisting law enforcement in investigating incidents.

4. Access control systems: These systems control access to specific areas of the building. They use a variety of methods, such as cards, passwords, or biometric identification, to grant access only to authorized personnel.

5. Intruder detection systems: These systems use sensors to detect the presence of intruders and activate an alarm. Intruder detection systems can be used to protect both residential and commercial properties.

6. Emergency notification systems: These systems are designed to alert occupants and emergency services in the event of an emergency. They can be activated by a variety of methods, including phone calls, text messages, and public address systems.

7. Security personnel: Security personnel are responsible for patrolling the building and ensuring that all security systems are functioning properly. They are trained to identify and respond to potential threats.

8. Security software: This includes software for monitoring and managing security systems, as well as software for managing access control and intrusion detection.

9. Perimeter security systems: These systems are designed to protect the perimeter of the building. They can include fences, gates, and barriers, as well as video surveillance and access control systems.

10. Security in the community and industry: Security in the community and industry involves protecting people and property from threats such as crime and terrorism. This can include the use of security personnel, security technology, and community engagement.

Mechanical protection devices are constructional measures which provide mechanical resistance to an intruder. These can only be overcome by force of a building. Reinforced concrete, even all parts of a building can be reinforced, even all parts of the reinforcing and the restraining of the arm. Reinforcement and the restraining of the arm as well as the legal objects of value security needs and emergency alarm calls. Fire alarm systems give an early warning of smoke fire, and may also alert the emergency services. Fire alarm systems are critical for detecting fires early and alerting occupants to evacuate the building safely.

Security in the community and industry involves protecting people and property from threats such as crime and terrorism. This can include the use of security personnel, security technology, and community engagement.
### SECURITY OF BUILDINGS AND GROUNDS

<table>
<thead>
<tr>
<th>parts of building and equipment to be protected</th>
<th>front doors, external doors</th>
<th>internal security doors</th>
<th>room doors</th>
<th>internal sliding doors</th>
<th>garage up and over doors</th>
<th>windows with casements</th>
<th>glass doors, lifting doors</th>
<th>external glass sliding doors</th>
<th>dome lights</th>
<th>roof windows</th>
<th>glass block walls</th>
<th>display windows, large fixed glazing</th>
<th>heavy walls and ceilings</th>
<th>light walls and ceilings</th>
<th>lift ladders - retractable</th>
<th>individual objects</th>
<th>internal floor surfaces</th>
<th>safes</th>
<th>cupboards for apparatus</th>
<th>conduits, ventilation shafts, service installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>special types</td>
<td>•</td>
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</tbody>
</table>

1. Contact and surface monitoring – appropriate use of burglar alarms

<table>
<thead>
<tr>
<th>comparative criteria</th>
<th>ultrasonic room protectors</th>
<th>ultrasonic doorbell</th>
<th>high-frequency dipper</th>
<th>infra-red alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>monitoring feature provided, duration of movement triggering</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>monitoring range and recommended values and range</td>
<td>when mounted on ceiling 80–150 cm, wall mounted ≤ 40 m² up to 9 m</td>
<td>depending on unit 36–56 m² up to 14 m</td>
<td>depending on unit 150–300 m² up to 21 m</td>
<td>depending on unit 80–200 m², rooms up to 10 m, corridors up to 10 m</td>
</tr>
<tr>
<td>surveillance of entire room area of 80 m² (the room monitored)</td>
<td>guaranteed</td>
<td>not guaranteed</td>
<td>not guaranteed</td>
<td>guaranteed</td>
</tr>
<tr>
<td>typical application</td>
<td>small to large rooms - corridor; complete and part room monitoring</td>
<td>small to large rooms - monitoring part of rooms - security (high)</td>
<td>large rooms - monitoring part of rooms - security (high); large spaces - security (high)</td>
<td>small to large rooms - complete and part room monitoring - security (high); small to large rooms - same time for all</td>
</tr>
<tr>
<td>permissible problem temperature under 0°C</td>
<td>conditionally permissible permissible</td>
<td>conditionally permissible permissible</td>
<td>permissible permissible</td>
<td>permissible permissible</td>
</tr>
<tr>
<td>conditionally permissible impermissible</td>
<td>impermissible</td>
<td>impermissible</td>
<td>impermissible</td>
<td>impermissible</td>
</tr>
<tr>
<td>are several alarms possible in the same room?</td>
<td>no problem</td>
<td>with care</td>
<td>with care</td>
<td>no problem</td>
</tr>
<tr>
<td>influences from adjacent rooms of nearby road traffic</td>
<td>no problem</td>
<td>no problem</td>
<td>no problem</td>
<td>no problem</td>
</tr>
<tr>
<td>possible cause of false alarms</td>
<td>loud noises in ultrasonic frequency band - moving near the alarm - wrong turbulence - unstable walls</td>
<td>loud noises in ultrasonic frequency band - air turbulence - unstable walls - moving objects (e.g. small animals, birds)</td>
<td>loud noises in ultrasonic frequency band - air turbulence - unstable walls - moving objects (e.g. small animals, birds)</td>
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</tr>
</tbody>
</table>

1. Various alarms only to be used with reservations (e.g., not on wired, laminated or toughened glass).
2. Primarily as a security device.
3. If there is rapid switching on this door.
4. If only the internal security door is to be protected (e.g., door interlock with alarm).
5. Designed for security trips.
6. Magnetic contact - special type for floor mounting.
7. Not to be used where it can be touched by hand, if panels are unstable or there are vibration sources nearby.
8. There are dome lights with built-in alarm protection.
9. Note reservations concerning the weight of glass.
10. Individual protection is recommended for very valuable furnishings or those with very valuable contents.
11. Capacitive field alarms are the recommended protection.
12. And/or included in the room surveillance.

(4) Access control systems are devices which, in combination with a mechanical barrier, only allow free access to any area by means of an identity check. Access is only granted after electronic or personal authorisation. A combination of access control and a time-recording device is technically feasible.

(5) Remote control systems or data transfer/exchange over the public telephone network facilitates monitoring at a distance. Such systems can be used for measurement, control, diagnosis, adjustments, remote questioning, controlling the flow of information, and assessing the position of one object in relation to another.

(6) Monitoring systems observe or control the sequence of events by means of a camera and a monitor which are operated either manually and/or automatically. They can be installed either inside or outside, and can operate both day and night throughout the year.

(7) Lift emergency systems are used in personnel and goods lifts. Lift emergency call systems ensure the safety of the users. They are designed first and foremost to free people who are trapped inside. Anyone who is trapped can talk directly to someone in a control centre which is constantly manned, and who will alert the rescue services.

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