BS EN 15221-6:2011

BSI Standards Publication

# Facility Management

## Part 6: Area and Space Measurement in Facility Management



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**National Foreword**

This British Standard is the UK implementation of EN 15221-6:2011. It partially supersedes BS 7641:1993 (ISO 9836:1992).

The UK participation in its preparation was entrusted to Technical Committee FMW/1, Facilities management.

This Standard has been drafted in the context of Facilities Management. However, to assist the user in understanding the differences between this standard and the Royal Institution of Chartered Surveyors' Code of Practice, guidance is provided in National Annex NA.

A list of organizations represented on this committee can be obtained on request to its secretary.

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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

# EN 15221-6

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English Version

# Facility Management - Part 6: Area and Space Measurement in Facility Management

Facilities management - Partie 6: Mesure des surfaces et de l'espace en facilities management

Facility Management - Teil 6: Flächenbemessung im Facility Management

This European Standard was approved by CEN on 8 July 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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# Foreword

This document (EN 15221-6:2011) has been prepared by Technical Committee CEN/TC 348 “Facility Management”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This European Standard is one of the series EN 15221 "*Facility Management*" which consists of the following parts:

— *Part 1: Terms and definitions*

— *Part 2: Guidance on how to prepare Facility Management agreements*

— *Part 3: Guidance on quality in Facility Management*

— *Part 4: Taxonomy, Classification and Structures in Facility Management*

— *Part 5: Guidance on Facility Management processes*

— *Part 6: Area and Space Measurement in Facility Management*

— *Part 7: Performance Benchmarking*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

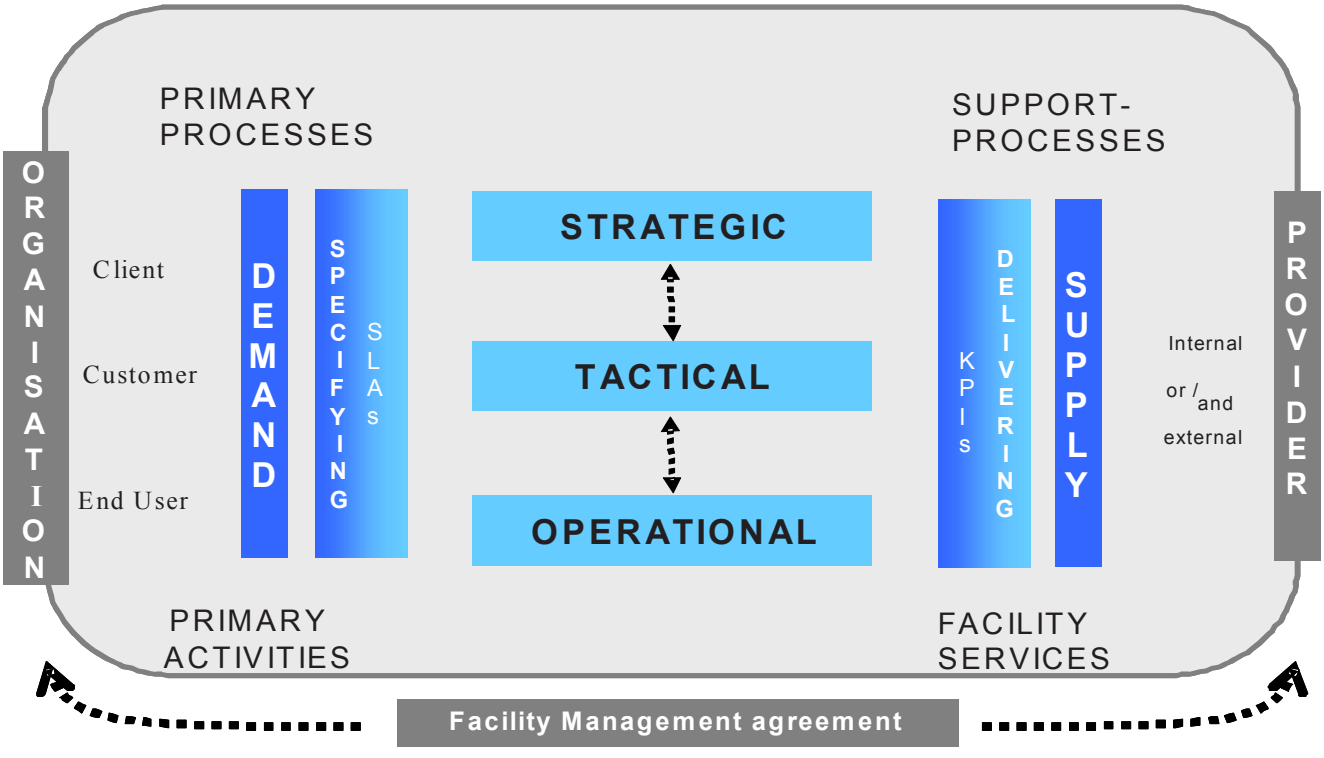
## Common Introduction for the European Standards EN 15221-3, EN 15221-4, EN 15221-5 and EN 15221-6

In 2002 the initiative was taken to establish a European Standard for Facility Management benchmarking purposes. It was soon recognized that to reach this objective, preliminary standards had to be elaborated and published. The first result of that process was the standards EN 15221-1:2006 and EN 15221-2:2006. Based on the discussions in the development of those two standards the decision was made to develop four new European Standards for Quality, Taxonomy, Processes and Measurement.

After the realization of those six standards it was possible to pursue developing a European Standard for Benchmarking prEN 15221-7.

The standards, EN 15221-3, EN 15221-4, EN 15221-5 and EN 15221-6 have been developed, adopted and agreed as a set of principles, underlying the Facility Management approach on EN 15221-1, to ensure consistency. These are incorporated in the basic principles of a process-based management system, upon which these standards are founded.

The FM-model of EN 15221-1 is shown below.




Model EN 15221-1:2006

These standards also build on widely accepted management principles, in particular value chain (Porter, M E, (1985), "Competitive Advantage: creating and sustaining superior performance", Free Press, New York) and quality control (PDCA (Plan, Do, Check, Act). Deming, W E (1986), "Out of the Crisis", MIT, Cambridge). Reference to ISO 10014:2006, *Quality management – Guidelines for realizing financial and economic benefits*.

The principles of the Deming cycle (PDCA) underpin all of the standards but are applied to a different extent and depth in each. In fact, there are different types of PDCA cycles depending of the term (e.g. long-term, short-term).

These standards align to EN ISO 9000 family of standards for Quality Management Systems and applies specific guidance on the concepts and use of a process-based approach to management systems to the field of Facility Management.

The term "facility services" is used as a generic description in the standards. The term "standardized facility products" refers to the "standardized facility services" defined and described in EN 15221-4, *Facility Management – Part 4: Taxonomy, Classification and Structures in Facility Management*.

Countries can decide to substitute the term "product" into "service", when they consider that it is important for a good acceptance and use of the standards in their own country.

The aim of all the standards is to provide guidance to Facility Management (FM) organizations on the development and improvement of their FM processes to support the primary activities. This will support organizational development, innovation and improvement and will form a foundation for the further professional development of FM and its advancement in Europe. Therefore, generic examples are provided in the standard to assist organizations.

These standards lay the foundation of the work that has to be done further more in developing Facility Management, for e.g. benchmark standards prEN 15221-7.

## Introduction to Area and Space Measurement in Facility Management

In order to support a consistent European approach to Facility Management, this document provides a constructive framework with clear terms, definitions and principles for measuring floor areas and spaces in buildings, not least a common language amongst all stakeholders in the entire construction industry.

The need for a harmonised European approach to "area and space measurement" is evidenced by the fact that many European countries currently use different rules and definitions for assessing building floor areas. Subsequently, space measurement data from different countries is difficult to interpret and data comparisons are most likely to be inaccurate. It is this comparability of data which is eminently important for a wide range of decision-makers, such as planners and architects, economists and investors, owners and tenants, politicians and administrators, etc.

Recent research by the European Committee of Construction Economists (CEEC) highlighted the fact that all European countries use similar elements for measuring floor areas in buildings. The way these components are grouped and coded, however, differs vastly between various countries. Subsequently, comparisons between the Net Internal Area of an UK building as measured by RICS with the Net Enclosed Area (Netto-Grundfläche) of a German building as measured by DIN or the Net Floor Area (Netto Vloeroppervlakte) of a Dutch building as measured by NEN are highly misleading as the floor areas are measured differently.

In short, the fact that measuring specific floor areas in one and the same building using different national standards result in variations up to 30 % clearly highlights the need for a harmonised European approach to "area and space measurement".

## 1 Scope

This European Standard establishes a common basis for planning and design, area and space management, financial assessment, as well as a tool for benchmarking in the field of Facility Management.

This standard covers area and space measurement for existing owned or leased buildings as well as buildings in state of planning or development.

This standard presents a framework for measuring floor areas within buildings and areas outside of buildings. In addition, it contains clear terms and definitions as well as methods for measuring horizontal areas and volumes in buildings and/or parts of buildings, independent of their function.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15221-1:2006, *Facility Management — Part 1: Terms and definitions*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15221-1:2006 and the following apply.

**3.1**
**distance**
numerical expression of a one-dimensional figure, measured along the shortest line linking two points

**3.2**
**area**
numerical expression of a two-dimensional surface, calculated mostly as the product of two distance measures

**3.3**
**volume**
numerical expression of a three-dimensional concept, calculated mostly as the product of all three distance measures

**3.4**
**space**
area or volume bounded actually or theoretically

[see ISO 6707-1]

**3.5**
**floor**
generally the lower horizontal structure of a room which constitutes the bounding element of a building or part thereof

**3.6**
**ceiling**
generally the upper horizontal surface of a room

**3.7**
**roof**
covering structure which constitutes the top level of a building or part thereof

**3.8**
**wall**
generally vertical structure which constitutes the bounding elements of a building or part thereof

NOTE It is distinguished between both structural walls and non-structural walls as well as exterior and interior walls (see B.5):

A Structural walls support floors or roofs and/or ensure structural integrity

B Non-structural walls are intended to divide/separate space only

1 Exterior walls divide/separate inside rooms from the outside

2 Interior walls divide/separate inside rooms only

Combinations of the above are possible (e.g. interior walls can be structural and exterior walls can be non-structural).

**3.9**
**room**
part of a building, entirely or partially bounded by dividing elements and whose floor and/or ceiling forms part of the construction of the building, accessible to people

**3.10**
**building**
undivided shelter comprising a space entirely or partially bounded by enclosing structures, intended for specific purposes for its occupants

# 4 Methods and units of measurement

## 4.1 Units

The units of measurement differ according to the type of calculation:

— distances are measures of one dimension and should be expressed in metres (m);

— areas are measures of two dimensions and should be expressed in square metres ($m^2$);

— volumes are measures of three dimensions and should be expressed in cubic metres ($m^3$).

NOTE Where other measurements are used, this can be transformed by using existing formulas e.g. square feet vs. square metre.

## 4.2 Distance

For distances, it is necessary to distinguish between length, width and height. The length is measured as linear extent from end to end (measurement of a horizontal distance). The width is measured as linear extent from side to side (measurement of a horizontal distance). The height is measured as linear extent from top to bottom (measurement of vertical distance).

NOTE 1 Width is equal to or smaller than length.

For lengths, widths and heights it is distinguished between gross and net distance:

— the gross length / width is measured as horizontal distance between the outer limiting faces of exterior walls or the horizontal distance between the centres of interior walls;

— the net length / width is measured as horizontal distance between the inner limiting faces of walls, whereby incidental structural components are not taken into consideration;

— the gross height is measured as vertical distance between the top of a finished floor or the adjoining land and the top of the finished floor of a room situated above it or the top of the roof structure;

NOTE 2 For the lowest storey in the building, gross height has to be measured to the bottom of the floor (up to the maximum of an ordinary floor).

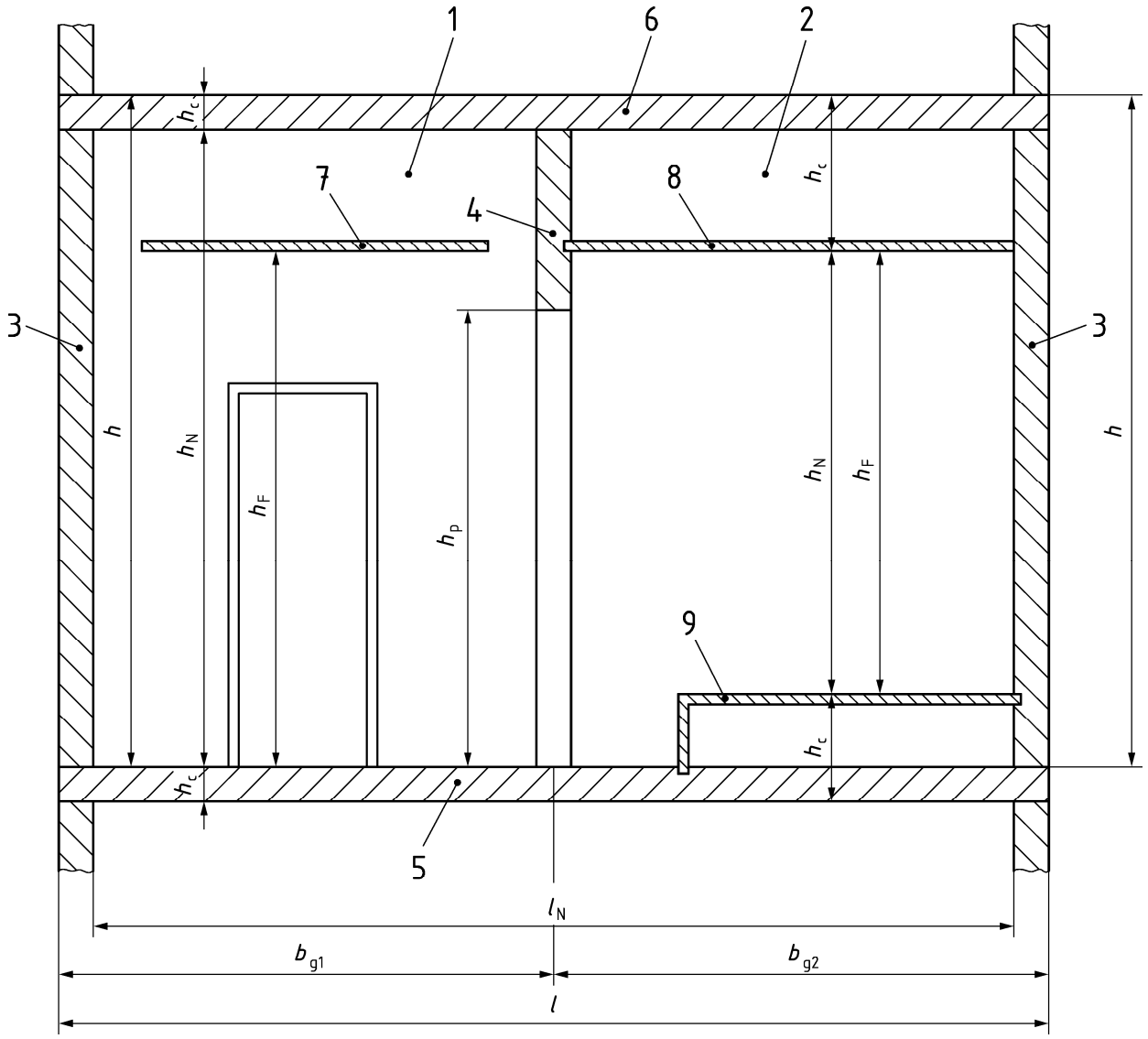
— the net height is measured as vertical distance between the top of a finished floor or the adjoining land and the bottom of a ceiling or roof situated above it, whereby incidental structural components are not taken into consideration;

— the free height is measured as vertical distance between the top of a finished floor or ground level and the underside of the suspended ceiling that is situated above it, whereby incidental structural components are not taken into consideration.

NOTE 3 The minimum passage height can be less than the free height.

— The construction height is the difference between gross height and net height.

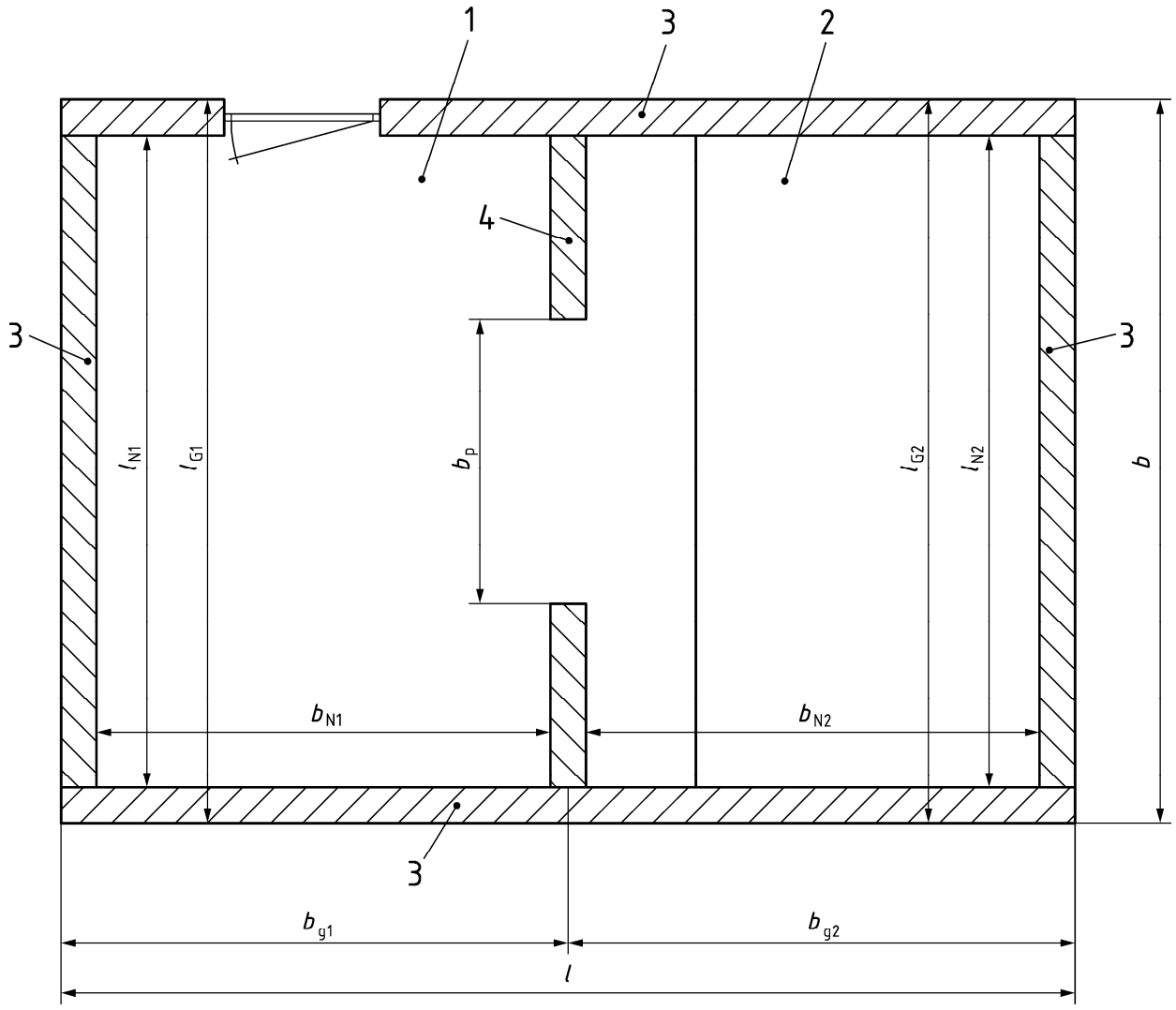
Examples are given in Figures 1 and 2.




**Key**

| | |
|---|---|
| 1 | room 1 |
| 2 | room 2 |
| 3 | exterior wall |
| 4 | interior wall |
| 5 | floor |
| 6 | floor or roof |
| 7 | suspended ceiling |
| 8 | ceiling |
| 9 | raised floor |
| $b_{g1}$ | gross width room 1 |
| $b_{g2}$ | gross width room 2 |
| $l$ | gross length |
| $l_N$ | net length |
| $h$ | gross height |
| $h_c$ | construction height |
| $h_p$ | passage height |
| $h_N$ | net height |
| $h_F$ | free height |

**a) – Measuring distances on a vertical plane**

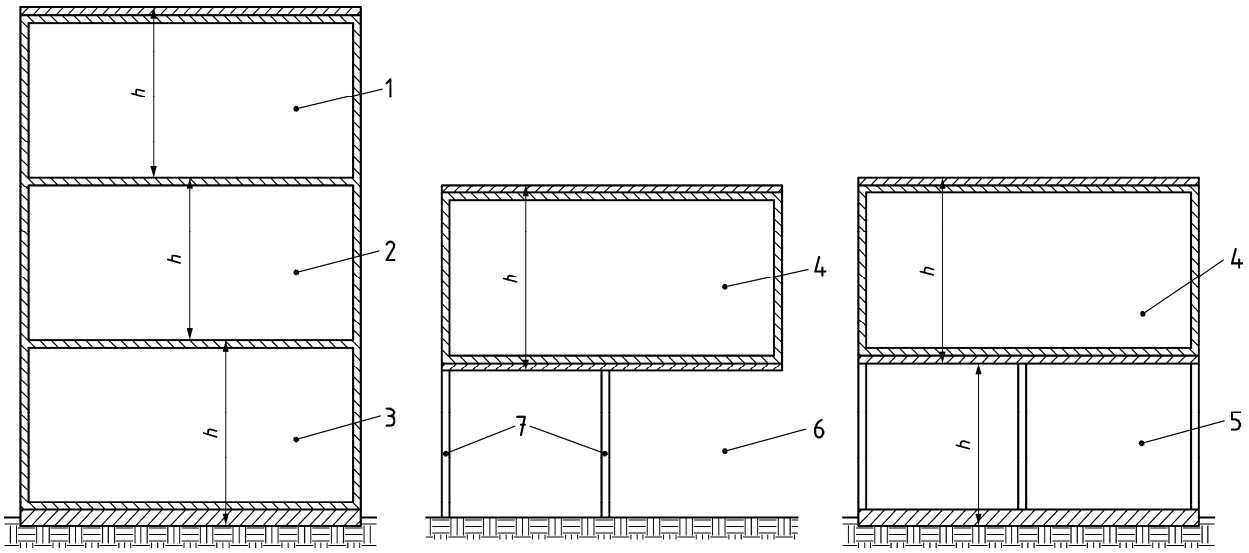



**Key**

| | |
|---|---|
| 1 | room 1 |
| 2 | room 2 |
| 3 | exterior wall |
| 4 | interior wall |
| $b$ | gross width |
| $b_{g1}$ | gross width room 1 |
| $b_{g2}$ | gross width room 2 |
| $b_p$ | passage width |
| $b_{N1}$ | net width 1 |
| $b_{N2}$ | net width 2 |
| $l$ | gross length |
| $l_{G1}$ | gross length 1 |
| $l_{G2}$ | gross length 2 |
| $l_{N1}$ | net length 1 |
| $l_{N2}$ | net length 2 |

**b) — Measuring distances on a horizontal plane seen from above**

**Figure 1 — Measuring Distances**



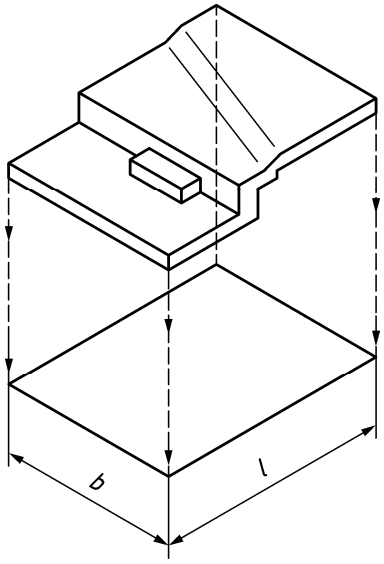

**Key**

1 highest floor level
2 intermediate floor level
3 lowest floor level
4 enclosed area
5 covered area
6 building area above ground
7 column
*h* gross height

**Figure 2 — Examples of measuring gross distances in different buildings with multiple levels**

### 4.3 Area

Both horizontal and vertical areas are measured by their actual dimensions. Inclined planes such as ramps are measured by their vertical projection onto an (imaginary) horizontal plane illustrated. Stair flights with a height difference <1,50 m are illustrated at the plane where they start, stair flights with a height difference ≥ 1,50 m are illustrated at the plane where they end (projected upward to the next plane).




**Key**
*b* width
*l* length

**Figure 3 — Vertical projection**

Gross areas are determined by the gross distances, net areas are determined by the net distances.

Areas which are solely needed for maintenance and emergency exits are not taken into account in this standard.

### 4.4 Volume

Volumes are measured by their actual dimensions. Inclined planes, whether floors or walls, define inclined bounds to the volume. Gross volumes are determined by the gross distances, net volumes are determined by the net distances. Note that Non-functional Level Area concepts such as voids do not apply here. When measuring volumes, a multi-level space is measured as a single volume.

## 5 Framework of area and space measurement of buildings

### 5.1 General

Buildings, rooms and floors shall be measured at the floor level (at the height level to the top of a finished floor). Every floor level shall be measured separately. Areas with varying net heights within one floor level may be calculated separately.

The area of a floor shall be determined as the area of the vertical projection onto the horizontal plane. Wall openings in interior and exterior walls are also measured by the vertical projection of their outer limits at floor level onto the horizontal plane and belong to the volume and area of exterior and interior walls.

See Annex B for further information.

For all categories of areas it is distinguished between:

A spaces which are entirely covered and enclosed on all sides up to their full height;

B spaces which are entirely covered, but not enclosed on all sides up to their full height (e.g. recessed balconies);

C spaces which are not covered, but contained within components (e.g. open balconies).

**Table 1 — Hierarchy of floor areas in the building**

| **Level Area (LA)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Gross Floor Area (GFA)** | | | | | | | | | | |
| | | **Internal Floor Area (IFA)** | | | | | | | | | |
| | | | **Net Floor Area (NFA)** | | | | | | | | |
| | | | | **Net Room Area (NRA)** | | | | | | | |
| | | | | **Technical Area (TA)** examples of subdivisions see annex C | | **Circulation Area (CA)** examples of subdivisions see annex C | | **Amenity Area (AA)** examples of subdivisions see annex C | | **Primary Area (PA)** examples of subdivisions see annex C | |
| **Non-functional Level Area (NLA)** | **Exterior Construction Area (ECA)** | **Interior Construction Area (ICA)** | **Partition Wall Area (PWA)** | **Unrestricted Technical Area (UTA)** | **Restricted Technical Area (RTA)** | **Unrestricted Circulation Area (UCA)** | **Restricted Circulation Area (RCA)** | **Unrestricted Amenity Area (UAA)** | **Restricted Amenity Area (RAA)** | **Unrestricted Primary Area (UPA)** | **Restricted Primary Area (RPA)** |

NOTE When defining the Rentable Floor Area it is strongly recommended to use one of the defined measurements of the table above.

The application of the framework given in Table 1 is illustrated in the following example.

A section of this building is being given in Figure 4. In the following figures, the grey coloured areas are showing in each case the area described in the subclause.

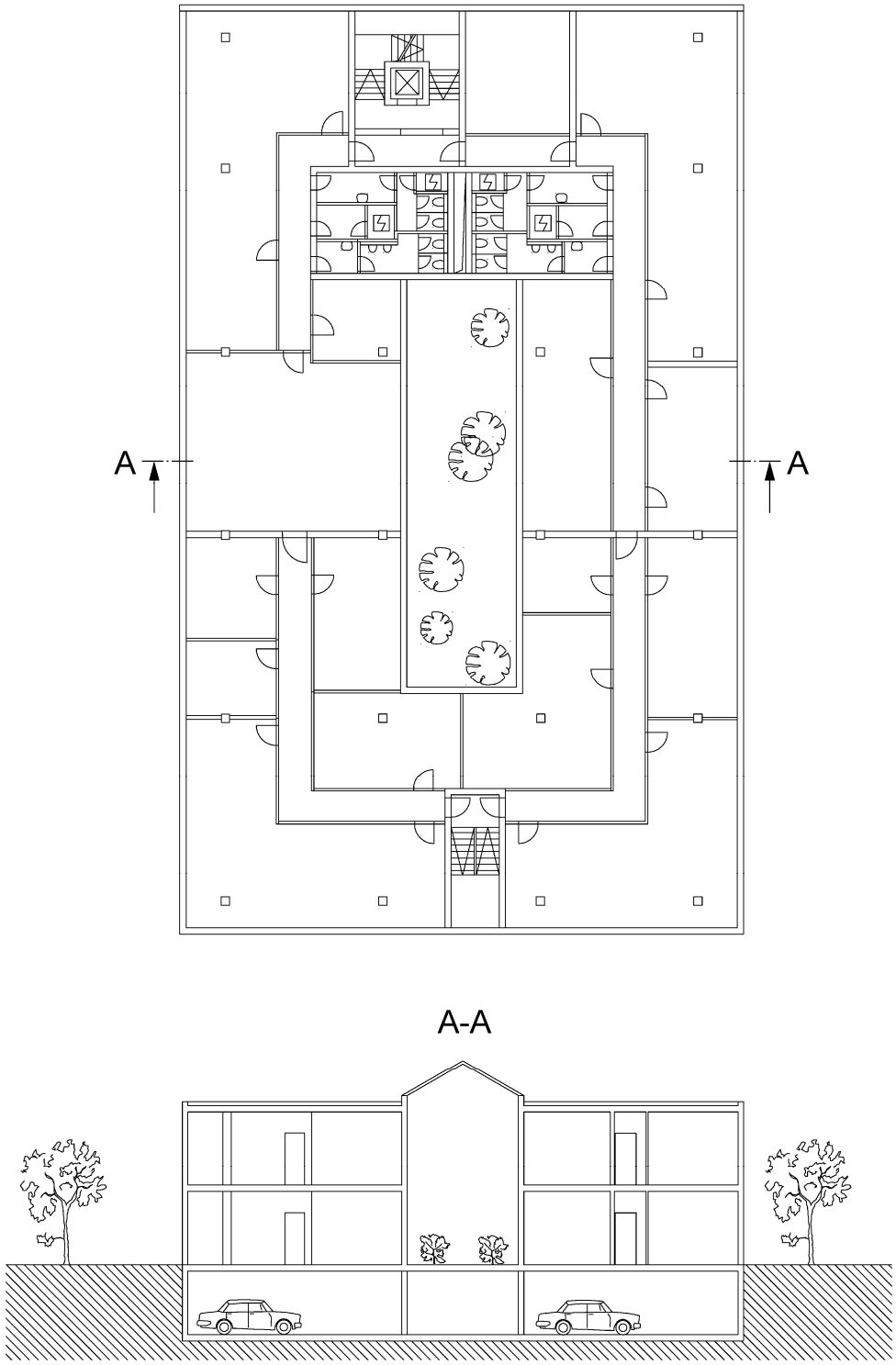



**Figure 4 — Floor plan of the upper floor of the building used as an example**

## 5.2 Level Area (LA)

Level Area is a measured area for one level, including all areas contained inside and measured to the outside permanent finished surface. This includes penthouses and mezzanines, basement and enclosed/covered connecting walkways and linkways.

Separate buildings have to be measured independently.

Here follows an exhaustive list of the elements contained within this term:

a) voids, atriums and cavities;

b) perimeter wall thickness;

c) external columns and piers;

d) structural walls and partitions;

e) internal columns and piers;

f) non-structural walls;

g) flexible and movable partitions;

h) rooms for mechanical services installations (e.g. lift rooms and boiler rooms as well as heating and cooling apparatus);

i) rooms for electrical services installations (e.g. conductors and generators as well as mains communication rooms);

j) rooms for other services installations (e.g. waste management installations and facilities maintenance stores);

k) stairwells, lift-wells and escalators;

l) corridors and other circulation areas;

m) amenities include all sanitary areas (e.g. toilets, showers and changing rooms as well as cleaners' rooms);

n) central support spaces (e.g. entrance halls and catering spaces as well as social and recreational spaces);

o) local support spaces (e.g. meeting spaces, filing and storage space as well as print and copy areas);

p) work spaces (e.g. cellular offices, laboratories, shop floors, teaching areas or operating theatres).

An example of the Level Area is shown in Figure 5.

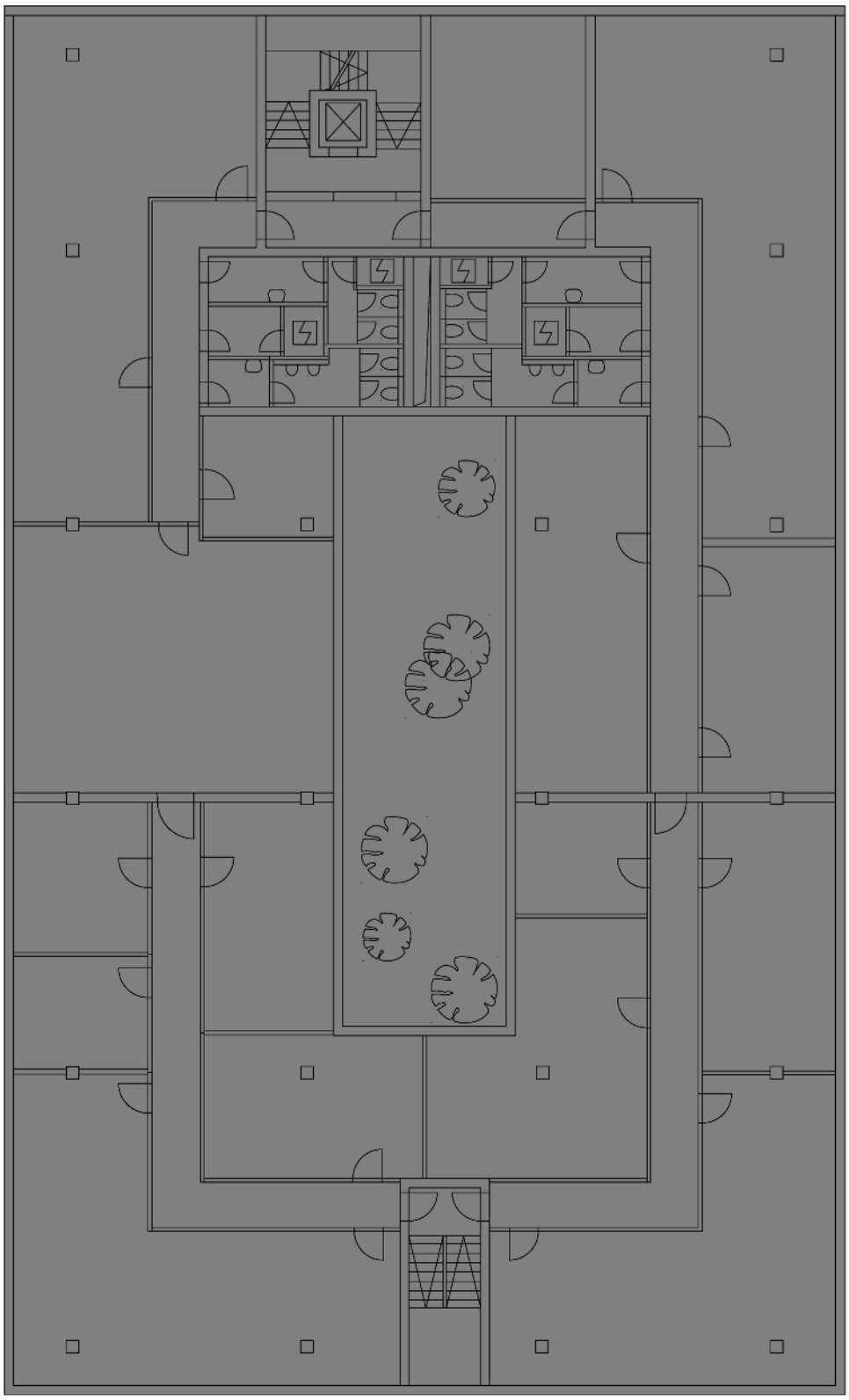


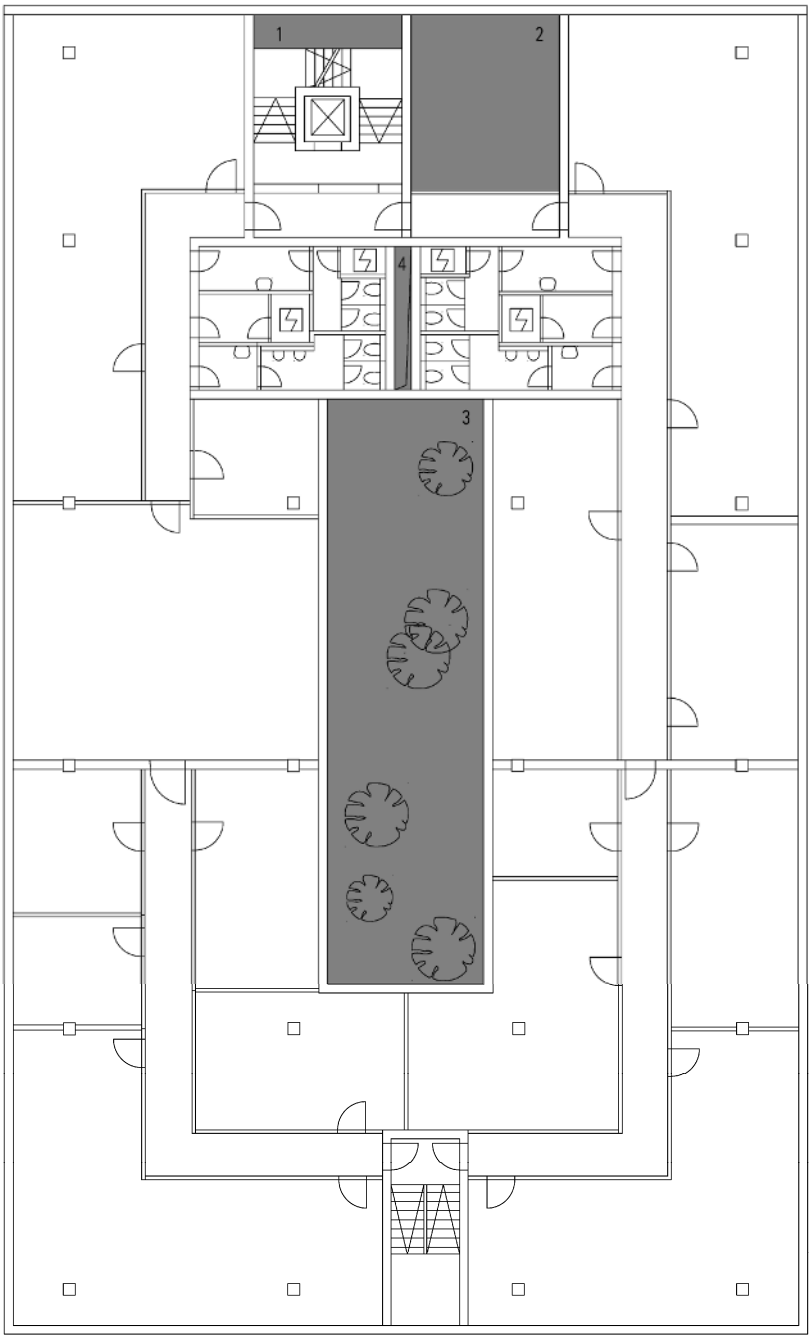
**Figure 5 — Measuring Level Area**

The Level Area is then broken down into Non-functional Level Area and Gross Floor Area.

### 5.3 Non-functional Level Area (NLA)

Non-functional Level Area is a measured area, consisting of voids, atriums and cavities.

An example of the Non-functional Level Area is shown in Figure 6.




**Key**
1 atrium above stair room on ground floor
2 atrium above entrance area
3 atrium above internal yard
4 void above technical area on ground floor

**Figure 6 — Measuring Non-functional Level Area**

## 5.4 Gross Floor Area (GFA)

Gross Floor Area is the calculated area of Level Area (LA) excluding the Non-Functional Level Area (NLA).

LA-NLA=GFA

To differentiate the term, the areas included in it are being given in the following list:

a) perimeter wall thickness;

b) external columns and piers;

c) structural walls and partitions;

d) internal columns and piers;

e) non-structural walls;

f) flexible and movable partitions;

g) rooms for mechanical services installations (e.g. lift rooms and boiler rooms as well as heating and cooling apparatus);

h) rooms for electrical services installations (e.g. conductors and generators as well as mains communication rooms);

i) rooms for other services installations (e.g. waste management installations and facilities maintenance stores);

j) stairwells, lift-wells and escalators;

k) corridors and other circulation areas;

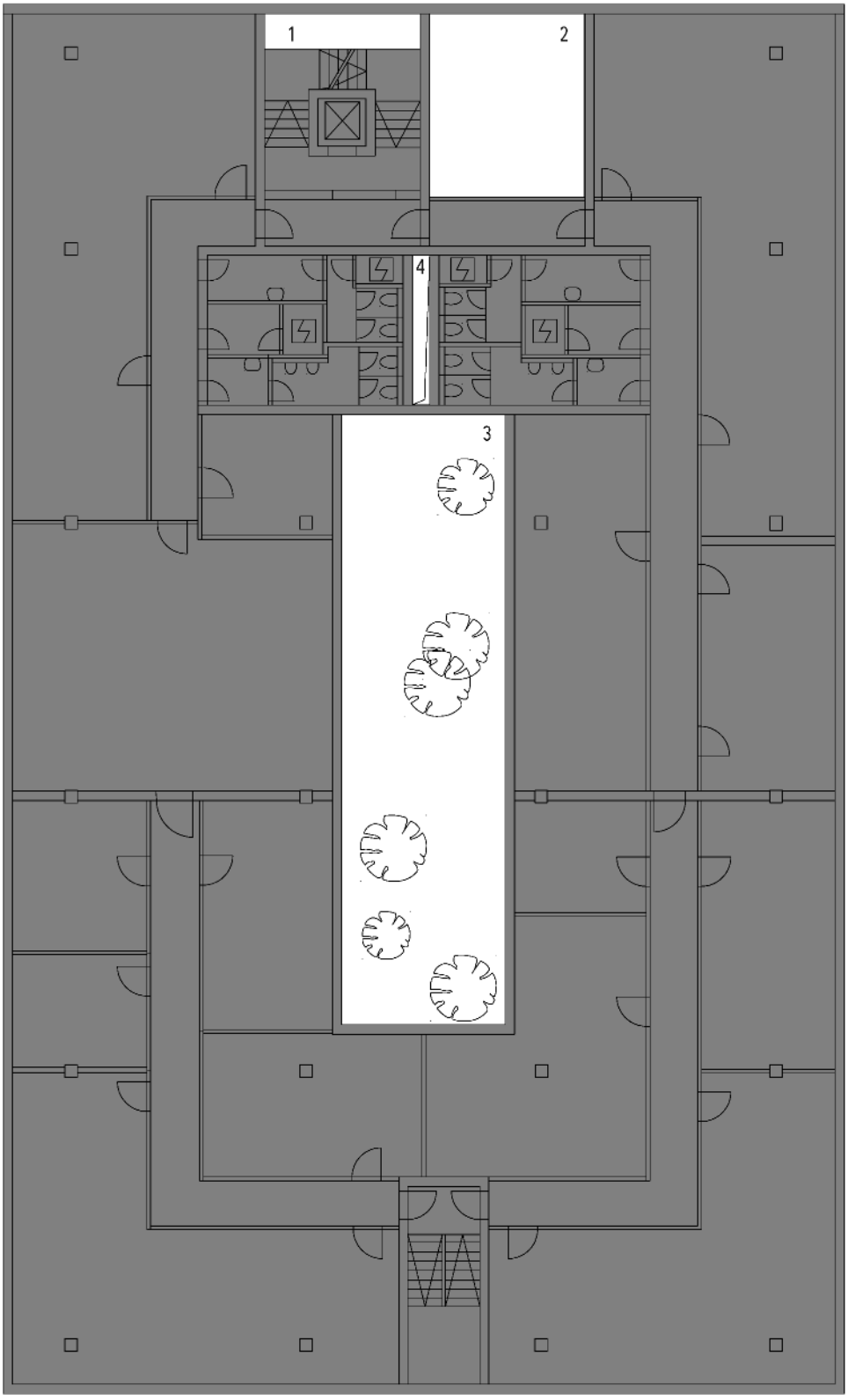
l) amenities include all sanitary areas (e.g. toilets, showers and changing rooms as well as cleaners' rooms);

m) central support spaces (e.g. entrance halls and catering spaces as well as social and recreational spaces);

n) local support spaces (e.g. meetings spaces, filing and storage space as well as print and copy areas);

o) work spaces (e.g. cellular offices, laboratories, shop floors, teaching areas or operating theatres).

An example of the Gross Floor Area is shown in Figure 7.




**Key**
1 atrium above stair room on ground floor
2 atrium above entrance area
3 atrium above internal yard

**Figure 7 — Measuring Gross Floor Area**

The Gross Floor Area is then broken down into Exterior Construction Area and Internal Floor Area.

## 5.5 Exterior Construction Area (ECA)

Exterior Construction Area is a measured area consisting of the exterior walls of a building envelope finished surface. This also includes additional bracing for exterior walls, for example flying buttresses and seismic supports.

An example of the Exterior Construction Area is shown in Figure 8.

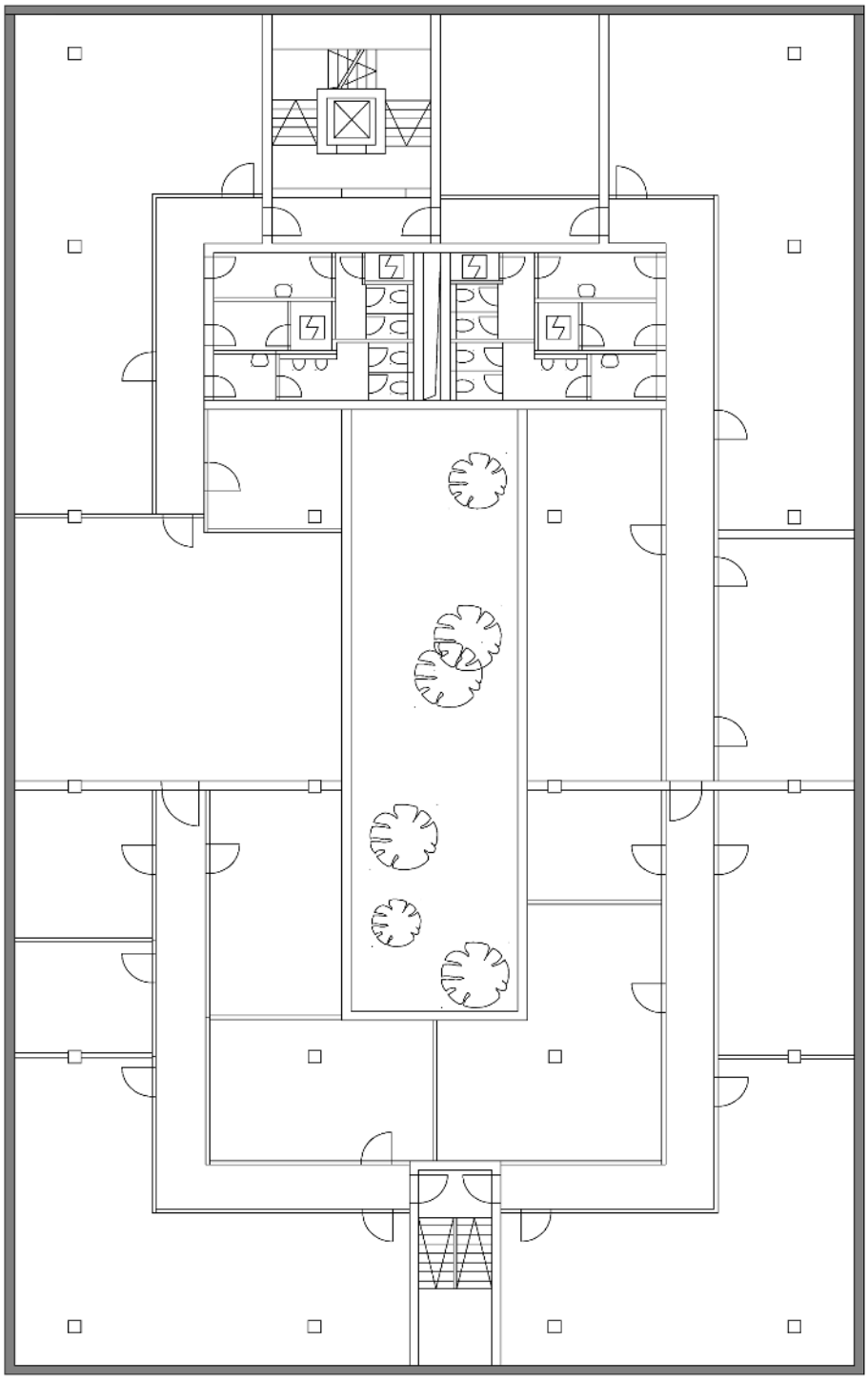


**Figure 8 — Measuring Exterior Construction Area**

## 5.6 Internal Floor Area (IFA)

Internal Floor Area is the calculated area of Gross Floor Area (GFA) excluding the Exterior Construction Area (ECA).

GFA-ECA=IFA

To differentiate the term, the areas included in it are being given in the following list:

a) structural walls and partitions;

b) internal columns and piers;

c) non-structural walls;

d) flexible and movable partitions;

e) rooms for mechanical services installations (e.g. lift rooms and boiler rooms as well as heating and cooling apparatus);

f) rooms for electrical services installations (e.g. conductors and generators as well as mains communication rooms);

g) rooms for other services installations (e.g. waste management installations and facilities maintenance stores);

h) stairwells, lift-wells and escalators;

i) corridors and other circulation areas;

j) amenities include all sanitary areas (e.g. toilets, showers and changing rooms as well as cleaners' rooms);

k) central support spaces (e.g. entrance halls and catering spaces as well as social and recreational spaces);

l) local support spaces (e.g. meetings spaces, filing and storage space as well as print and copy areas);

m) work spaces (e.g. cellular offices, laboratories, shop floors, teaching areas or operating theatres).

An example of the Internal Floor Area is shown in Figure 9.

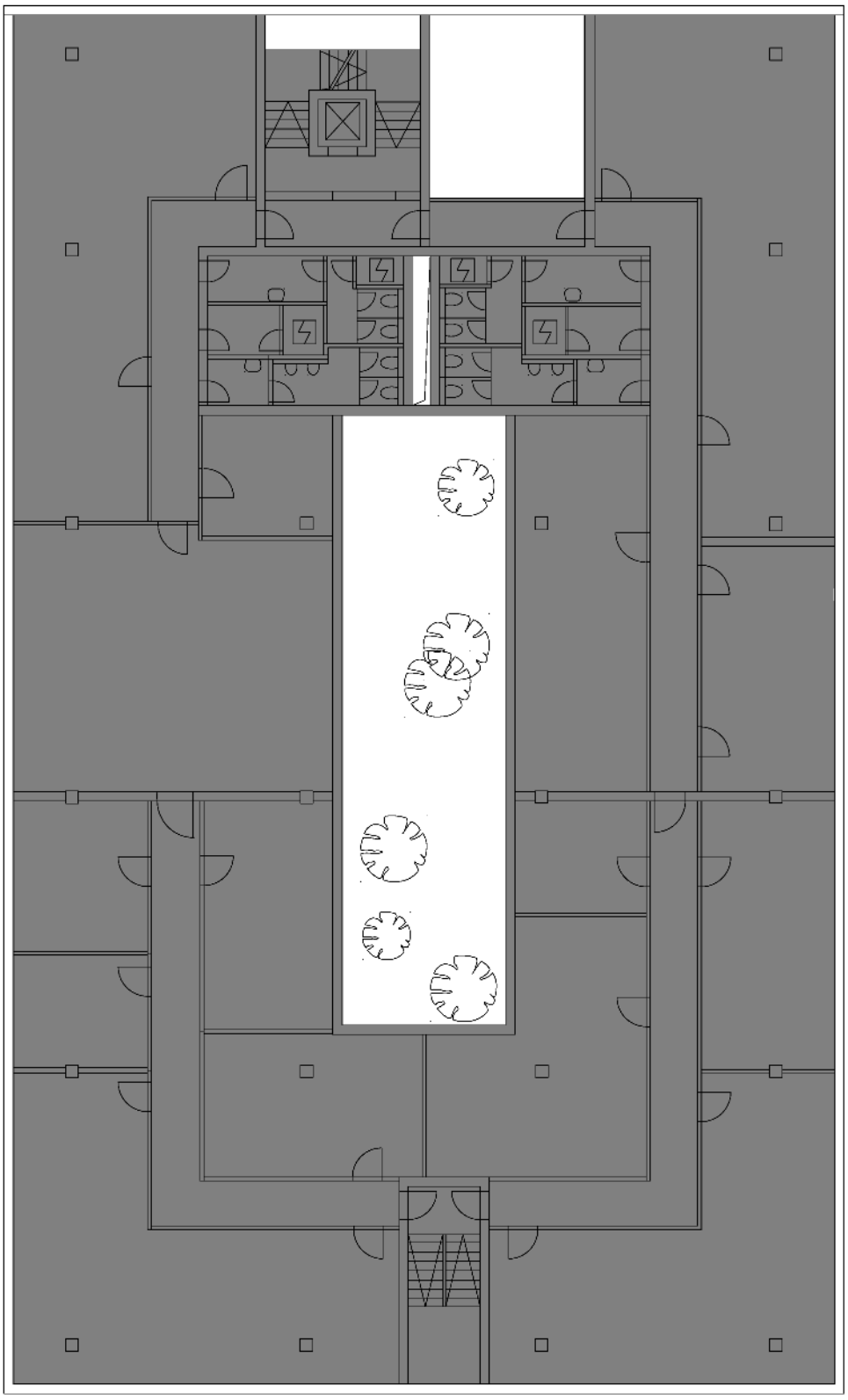


**Figure 9 — Measuring Internal Floor Area**

The Internal Floor Area is then broken down into Interior Construction Area and Net Floor Area.

## 5.7 Interior Construction Area (ICA)

Interior Construction Area is a measured area, consisting of the internal structure of the building (e.g. columns and supporting walls).

An example of the Interior Construction Area is shown in Figure 10.

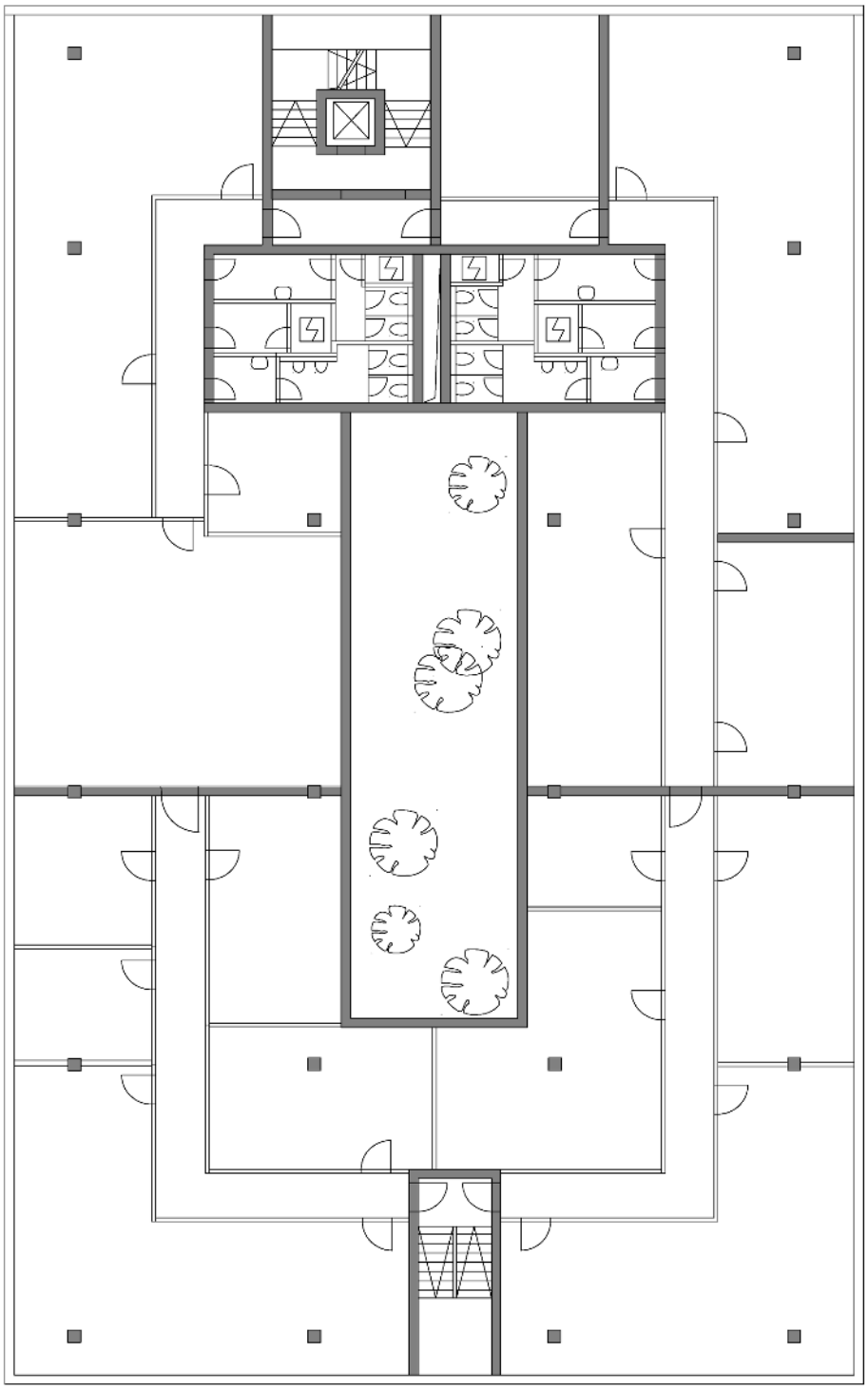


**Figure 10 — Measuring Interior Construction Area**

## 5.8 Net Floor Area (NFA)

Net Floor Area is the calculated area of Internal Floor Area (IFA) excluding the Interior Construction Area (ICA).

IFA-ICA=NFA.

To differentiate the term, the areas included in it are being given in the following list:

a) non-structural walls;

b) flexible and movable partitions;

c) rooms for mechanical services installations (e.g. lift rooms and boiler rooms as well as heating and cooling apparatus);

d) rooms for electrical services installations (e.g. conductors and generators as well as mains communication rooms);

e) rooms for other services installations (e.g. waste management installations and facilities maintenance stores);

f) stairwells, lift-wells and escalators;

g) corridors and other circulation areas;

h) amenities include all sanitary areas (e.g. toilets, showers and changing rooms as well as cleaners' rooms);

i) central support spaces (e.g. entrance halls and catering spaces as well as social and recreational spaces);

j) local support spaces (e.g. meetings spaces, filing and storage space as well as print and copy areas);

k) work spaces (e.g. cellular offices, laboratories, shop floors, teaching areas or operating theatres).

An example of the Net Floor Area is shown in Figure 11.

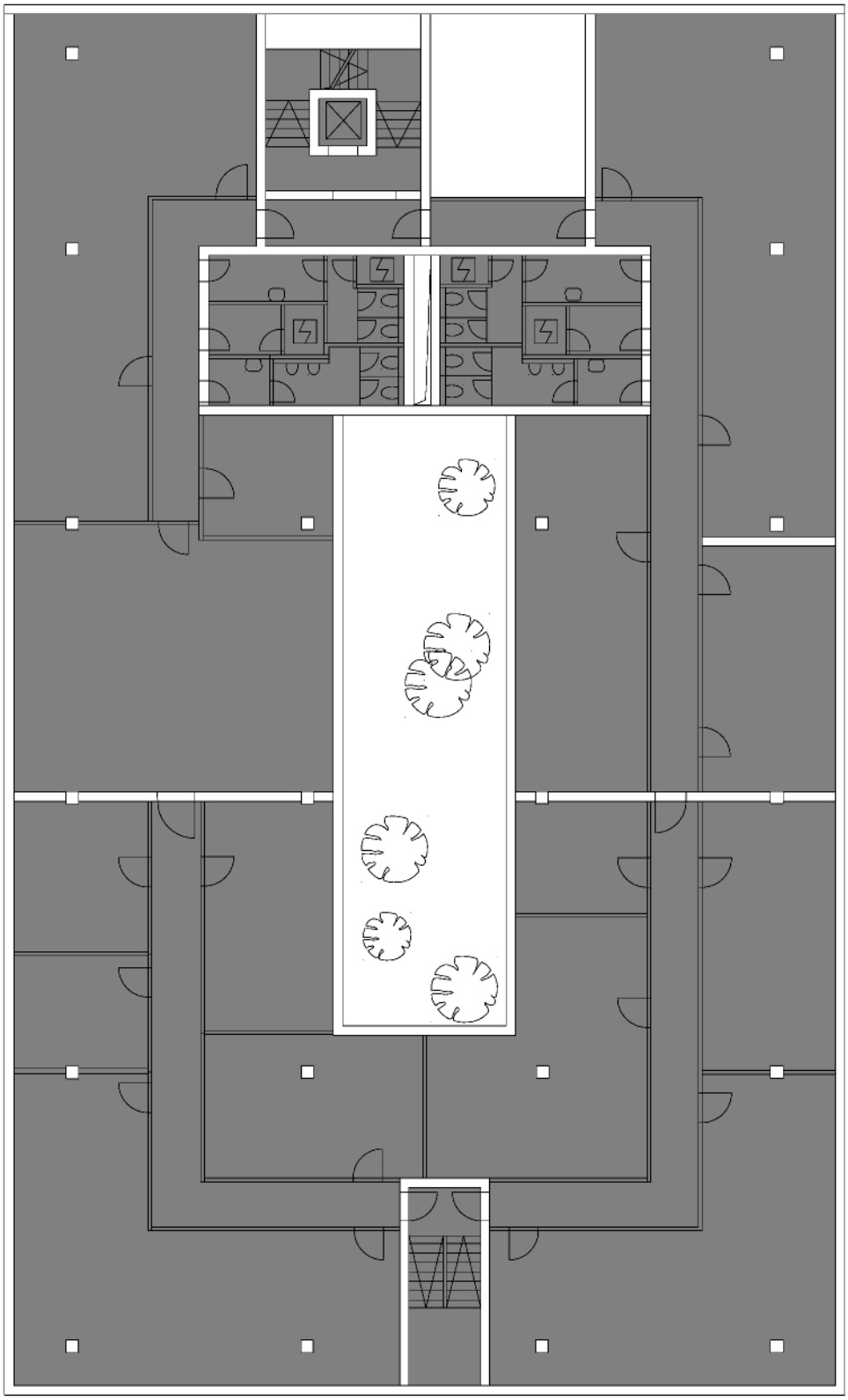


**Figure 11 — Measuring Net Floor Area**

The Net Floor Area is then broken down into Partition Wall Area and Net Room Area.

## 5.9 Partition Wall Area (PWA)

Partition Wall Area is a measured area, consisting of non-structural walls as well as flexible and movable partitions.

If there is any doubt about the quality of a wall, it shall be counted as an interior construction area.

An example of the Partition Wall Area is shown in Figure 12.

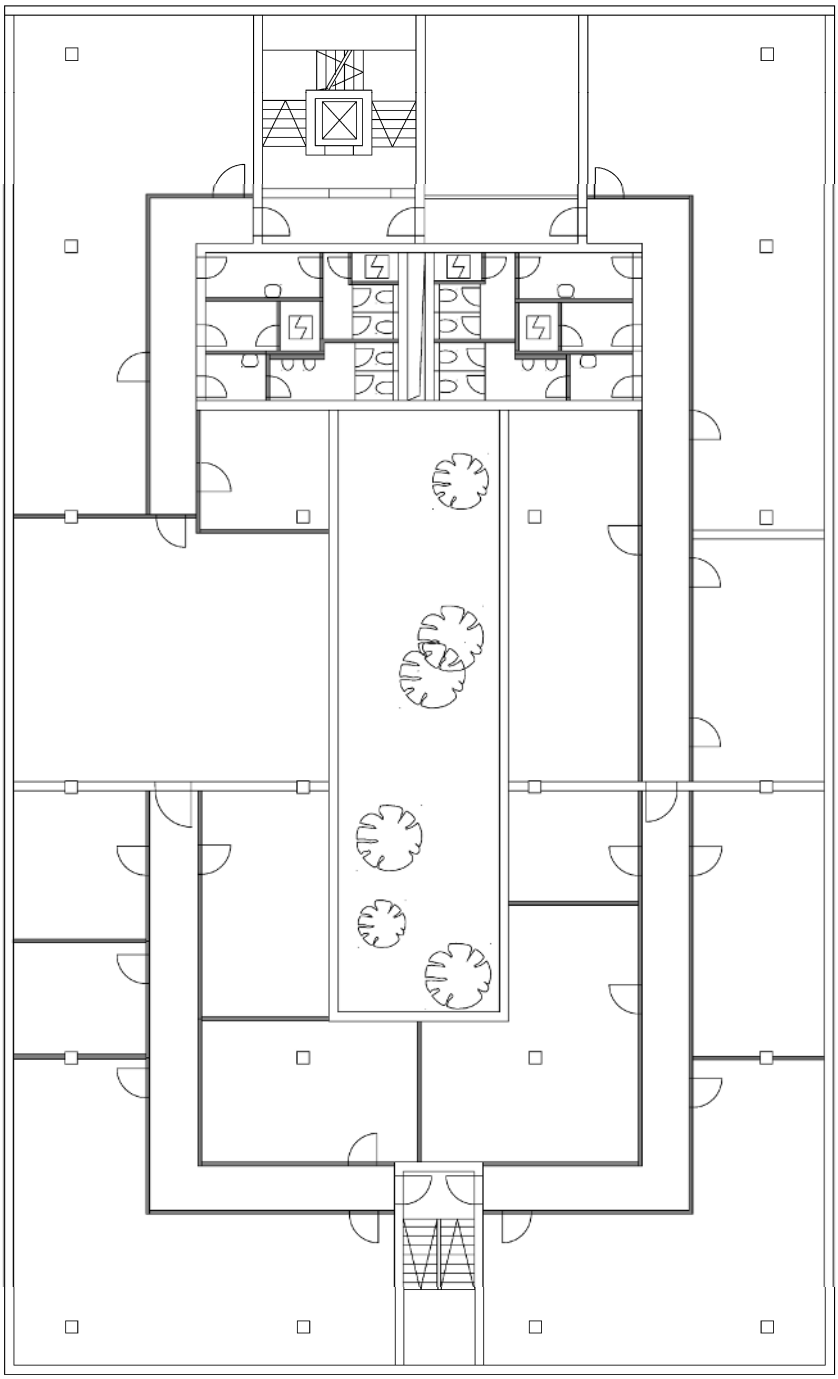


**Figure 12 — Measuring Partition Wall Area**

### 5.10 Net Room Area (NRA)

Net Room Area is the sum of all floor areas measured to the internal surface of each room. It is the calculated area of Net Floor Area (NFA) excluding the Partition Wall Area (PWA).

NFA-PWA=NRA

To differentiate the term, the areas included in it are being given in the following list:

a) rooms for mechanical services installations (e.g. lift rooms and boiler rooms as well as heating and cooling apparatus);

b) rooms for electrical services installations (e.g. conductors and generators as well as mains communication rooms);

c) rooms for other services installations (e.g. waste management installations and facilities maintenance stores);

d) stairwells, lift-wells and escalators;

e) corridors and other circulation areas;

f) amenities include all sanitary areas (e.g. toilets, showers and changing rooms as well as cleaners' rooms);

g) central support spaces (e.g. entrance halls and catering spaces as well as social and recreational spaces);

h) local support spaces (e.g. meetings spaces, filing and storage space as well as print and copy areas);

i) work spaces (e.g. cellular offices, laboratories, shop floors, teaching areas or operating theatres).

An example of the Net Room Area is shown in Figure 13.

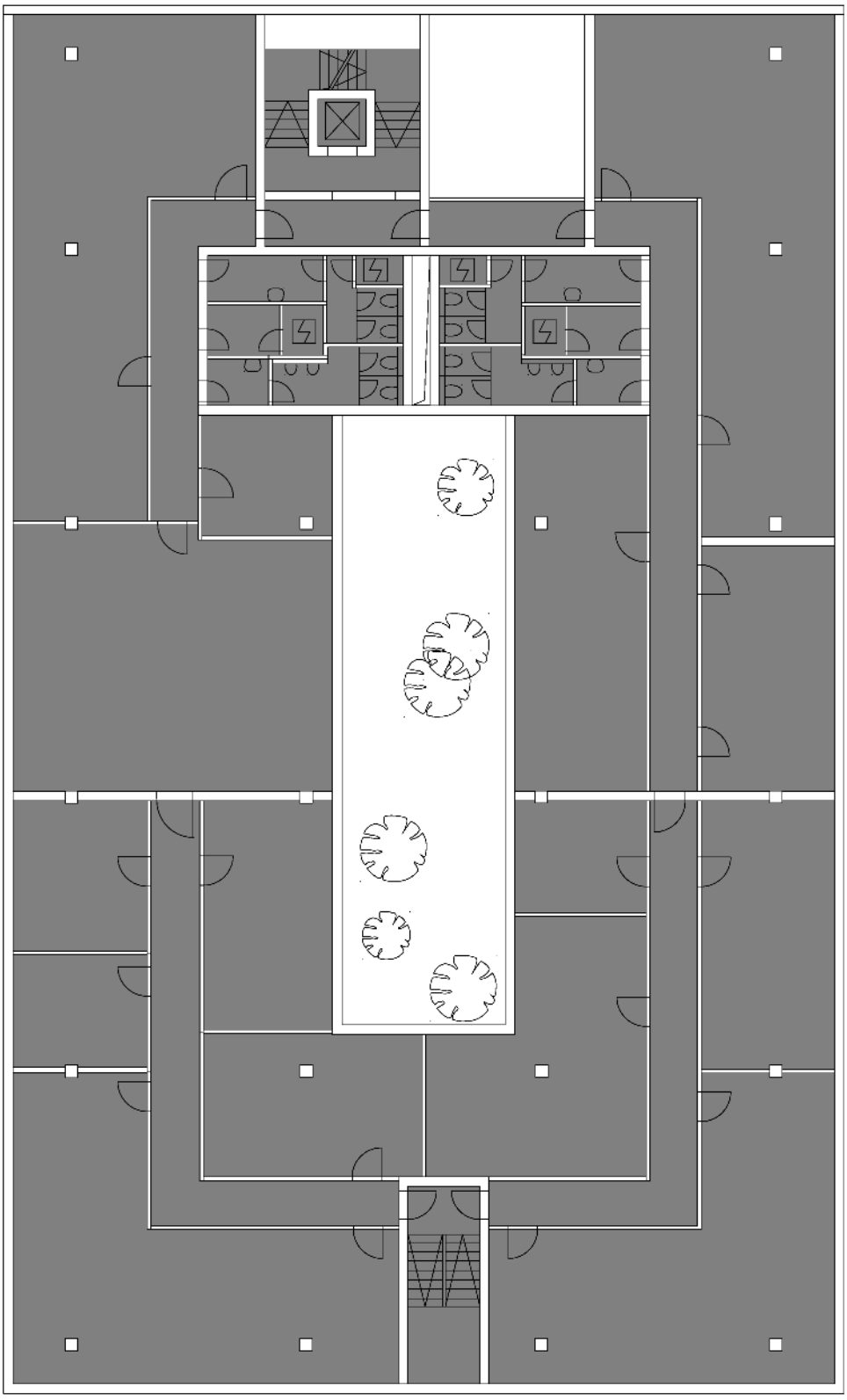


**Figure 13 — Measuring Net Room Area**

The Net Room Area is then broken down into the following categories:

— Technical Area (TA);

— Circulation Area (CA);

— Amenity Area (AA);

— Primary Area (PA).

NRA=TA+CA+AA+PA.

Each of these categories may be subdivided into Unrestricted and Restricted Areas. The restrictions may be caused by organizational and/or national regulations concerning functional, technical and economic constraints.

A minimum height requirement of 1,5 m, 1,6 m or 1,9 m are examples of a rule which may often be used. It should be noted that Restricted Areas are measured areas subtracted from NRA. To maintain comparability across organisations with differing Restricted Area rules, the full NRA shall always be available.

From 5.11 to 5.14, where there is any doubt as to the categorisation of space, the primary use of the room shall be selected.

### 5.11 Technical Area (TA)

The Technical Area is the portion of the Net Room Area taken up by the rooms for all mechanical installations (including lift rooms and plant rooms, ventilation, air-conditioning and cooling systems, and vertical ducts and pipes) and electrical installations (including electrical conductors, fittings and fixtures for lighting and power purposes).

For a list of typical examples see Annex C.

An example of the Technical Area is shown in Figure 14.

As mentioned in 5.10, the Technical Area may be subdivided into Unrestricted and Restricted Technical Areas. The restrictions may be caused by organizational and/or national regulations concerning functional, technical and economic constraints.

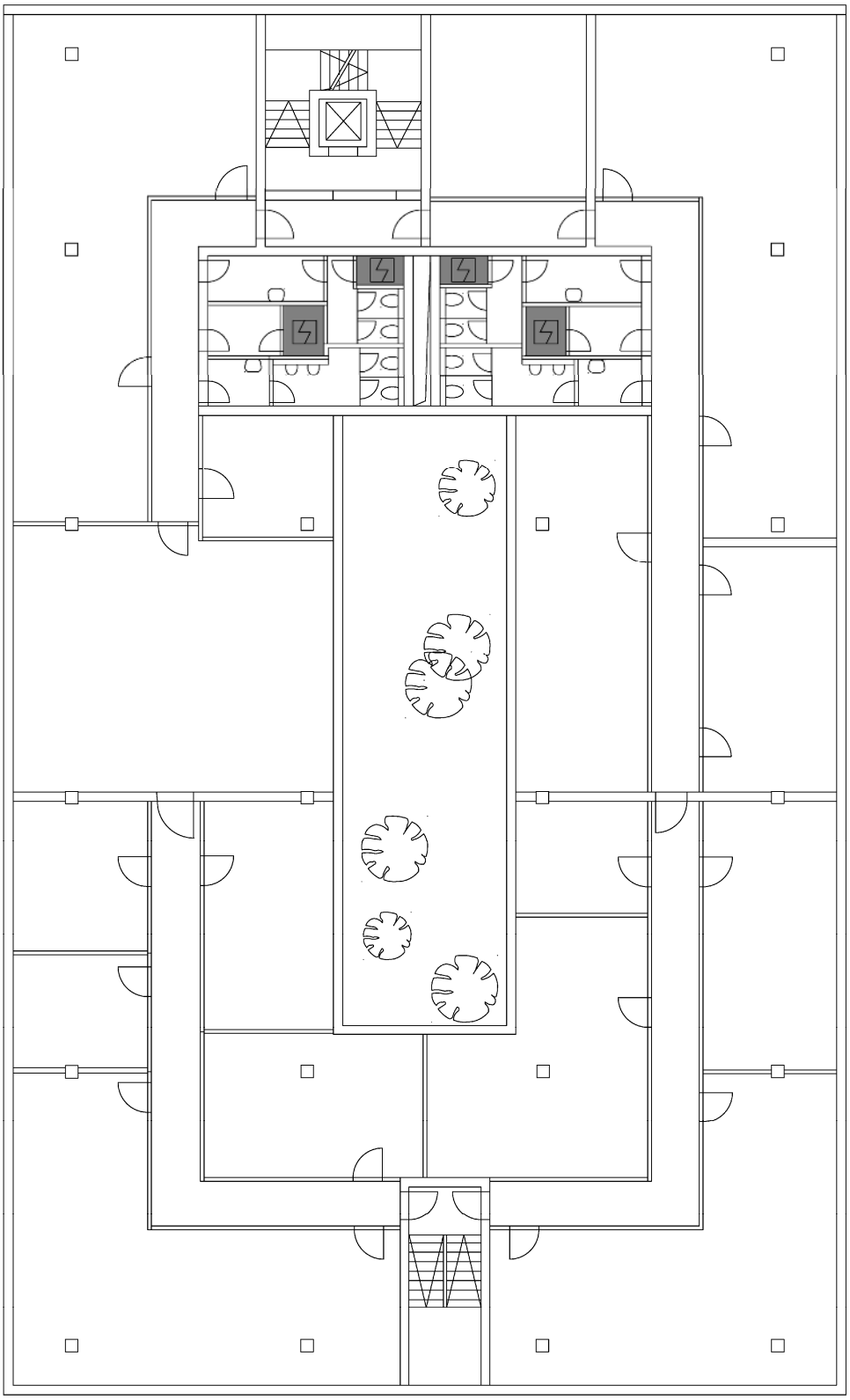


**Figure 14 — Measuring Technical Area**

### 5.12 Circulation Area (CA)

The Circulation Area is the portion of the Net Room Area taken up for vertical and horizontal circulation.

For a list of typical examples see Annex C.

An example of the Circulation Area is shown in Figure 15.

As mentioned in 5.10, the Circulation Area may be subdivided into Unrestricted and Restricted Circulation Areas. The restrictions may be caused by organizational and/or national regulations concerning functional, technical and economic constraints.

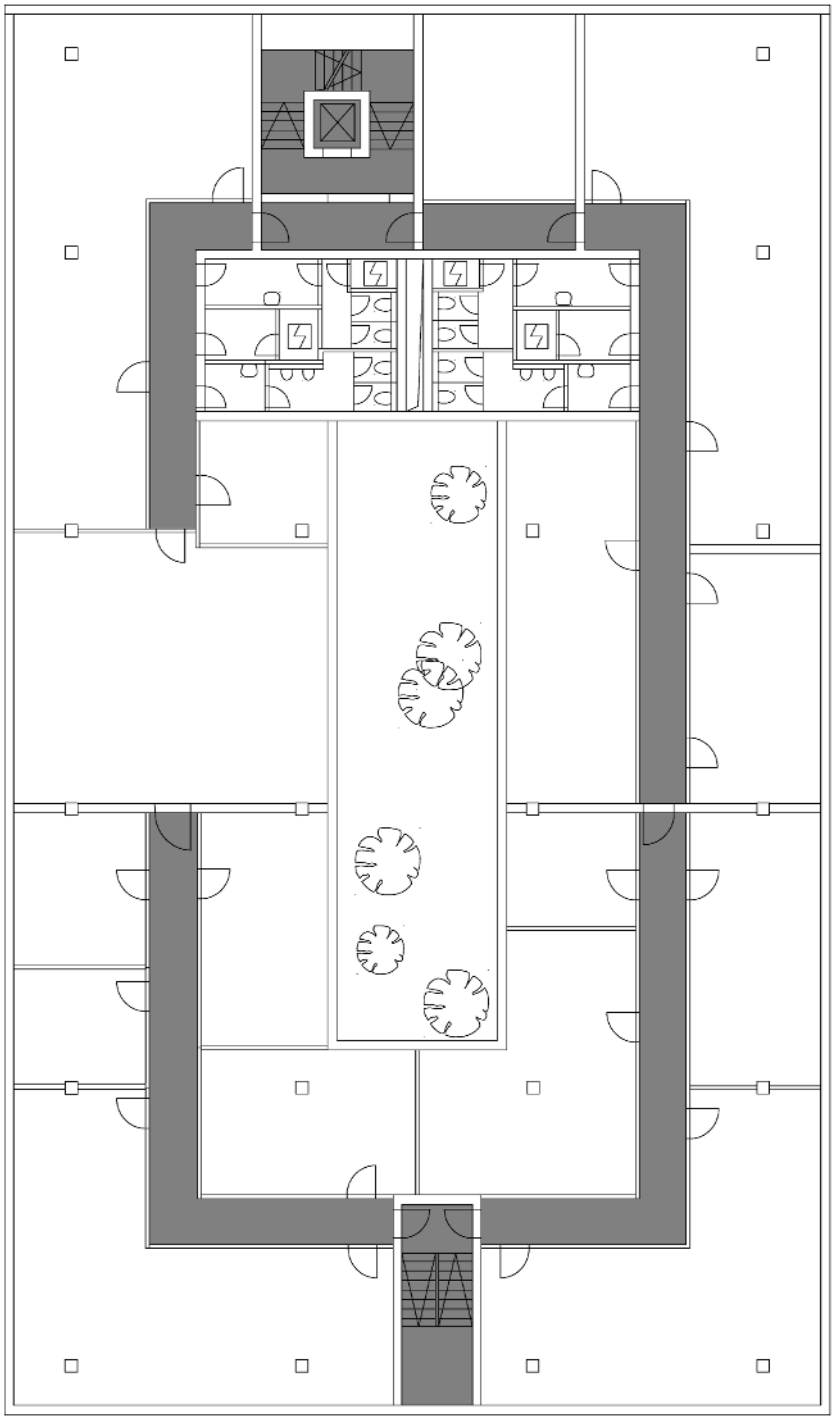


**Figure 15 — Measuring Circulation Area**

### 5.13 Amenity Area (AA)

The Amenity Area is the portion of the Net Room Area taken up for amenities.

For a list of typical examples see Annex C.

An example of the Amenity Area is shown in Figure 16.

As mentioned in 5.10, the Amenity Area may be subdivided into Unrestricted and Restricted Amenity Areas. The restrictions may be caused by organizational and/or national regulations concerning functional, technical and economic constraints.

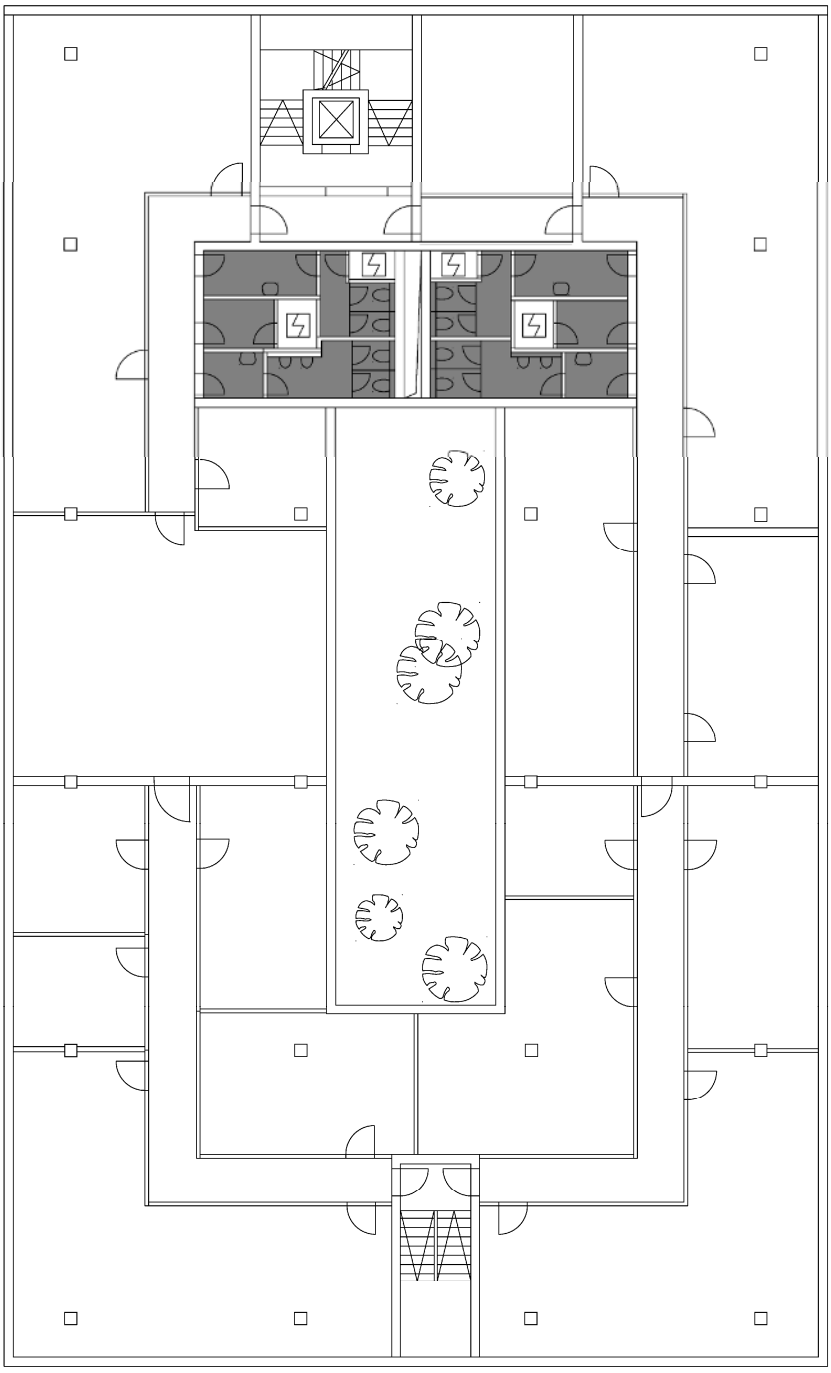


**Figure 16 — Measuring Amenity Area**

## 5.14 Primary Area (PA)

The Primary Area is the portion of the Net Room Area used for supporting the core business needs, and work processes (including central support, local support and workstations).

For a list of typical examples see Annex C.

An example of the Primary Area is shown in Figure 17.

As mentioned in 5.10, the Primary Area may be subdivided into Unrestricted and Restricted Primary Areas. The restrictions may be caused by organizational and/or national regulations concerning functional, technical and economic constraints.

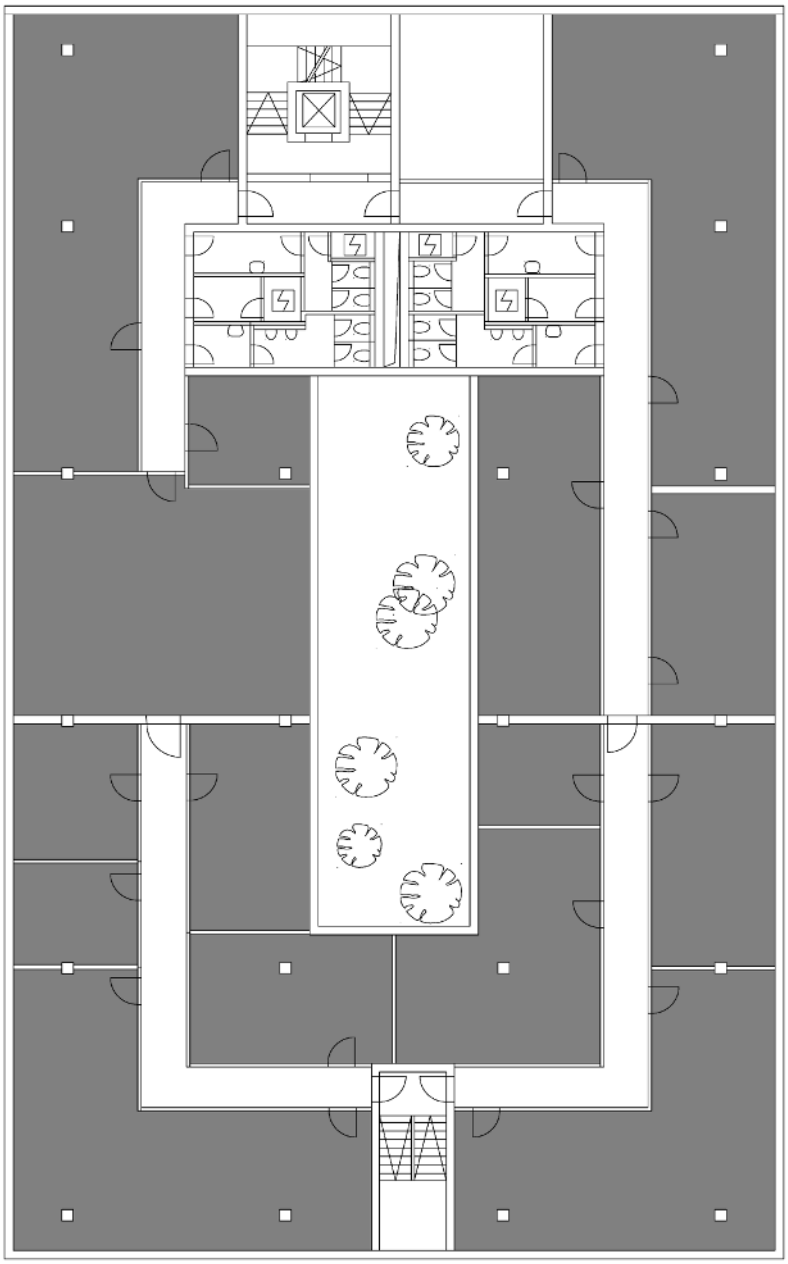


**Figure 17 — Measuring Primary Area**

# 6 Area and space measurement outside of buildings

## 6.1 Additional terminology

All areas defined below are measured directly on a horizontal plane or by vertical projection on a horizontal plane.

**6.1.1**
**plot area**
area of land delineated by its boundaries, which may be referenced by authorities (e.g. Land Registry, Cadastral or local authorities)

NOTE Figure 18 gives an example of the measurement of plot area.

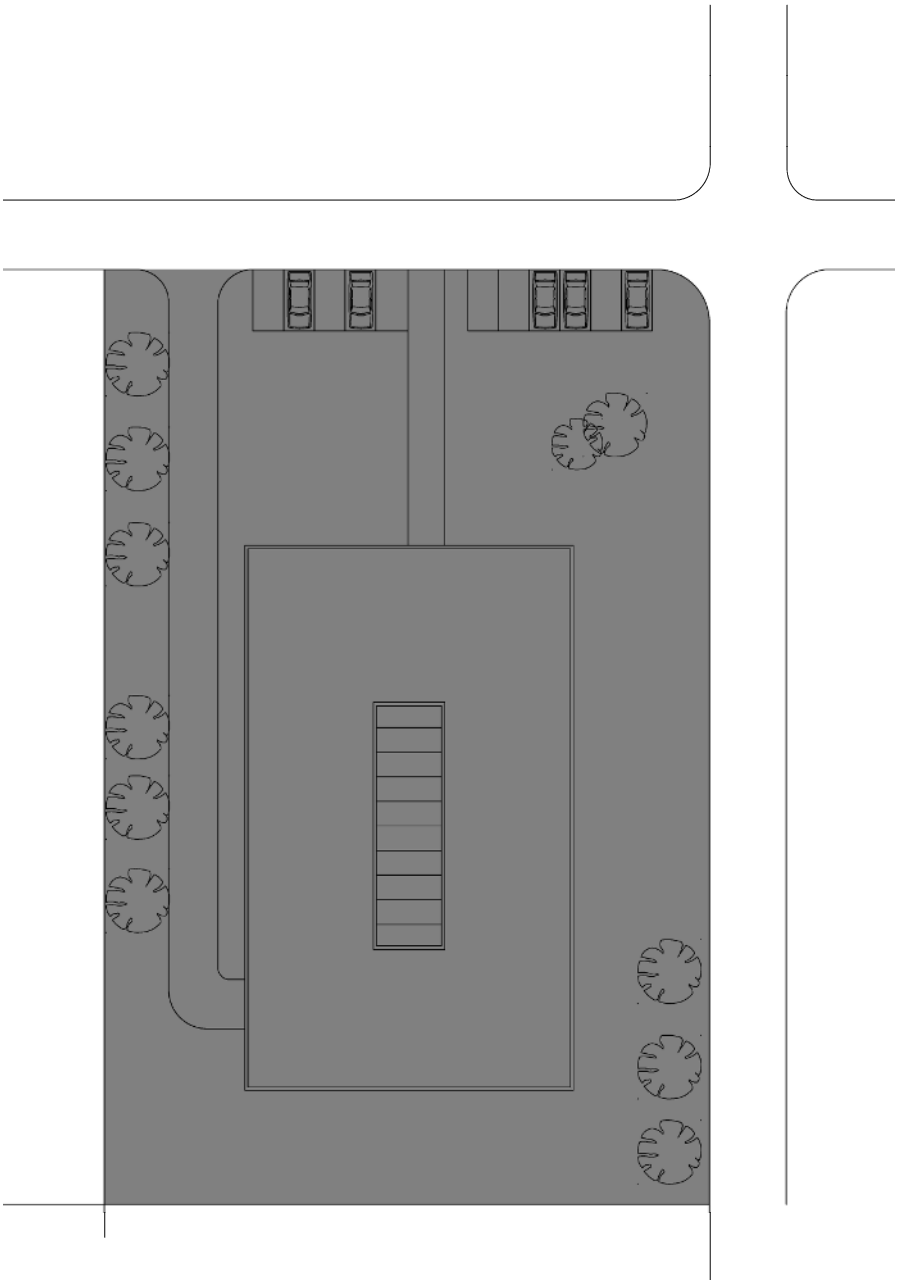


**Figure 18 — Example of plot area**

**6.1.2**
**built area**
part of the plot area which is covered by buildings both above and below ground

NOTE Built area is equivalent to the union of all building envelopes within the plot area.

**6.1.3**
**un-built area**
part of the plot area which is not classified as built area

**6.1.4**
**building footprint**
area of those parts of a building which are at ground level, when projected on a horizontal plane

**6.1.5**
**building area above ground**
area of those parts of a building which are above ground level, when projected on a horizontal plane

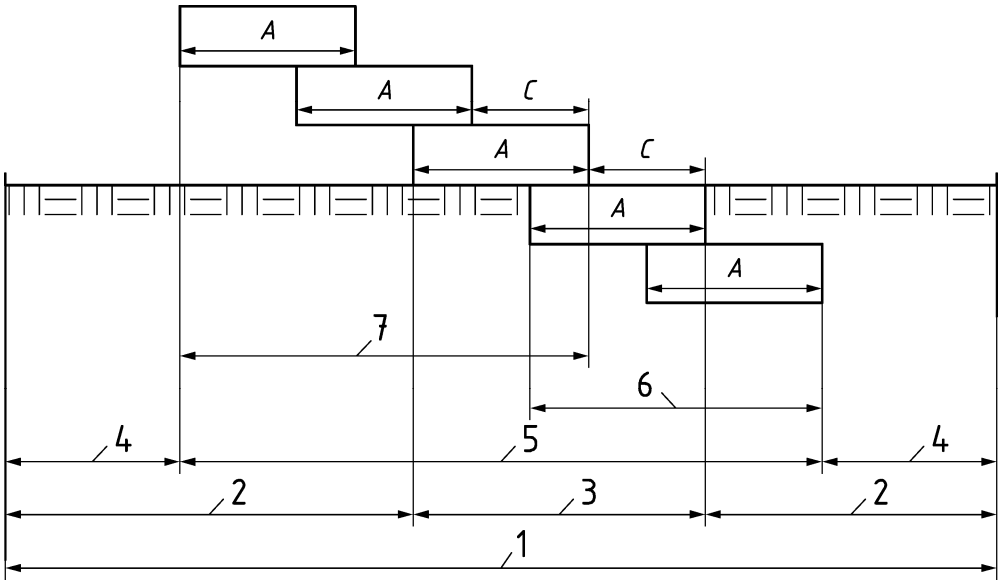
**6.1.6**
**building area below ground**
area of those parts of a building which are below ground level, when projected on a horizontal plane

**6.1.7**
**building envelope**
area of the building in its largest horizontal dimensions, both above and below ground, when projected on a horizontal plane

NOTE Building Envelope is equivalent to the union of the building footprint and the building areas above and below ground.

**6.1.8**
**external area**
part of the plot area which is not covered with buildings according to their footprint (6.1.4)

NOTE Figure 19 gives an example of the measurement of the external area.




**Key**

1 plot area
2 external area
3 building footprint
4 un-built area
5 building envelope=built area
6 building area below ground
7 building area above ground
A spaces which are entirely covered and enclosed on all sides up to their full height
C spaces which are not covered, but contained within components

**Figure 19 — Measurement of areas outside of buildings**

## 6.2 Classification

External areas are classified e.g. as:

a) natural landscape:

- greens including individual plants;
- planted areas;
- natural expanses of water;
- other natural landscapes (sand, rocks);

b) paved areas:

- kerbs which are necessary or built;
- paths for pedestrians or bikers;
- roads for light and heavy vehicles;
- parking areas including internal roads;
- sport fields and playgrounds including sport greens and swimming pools;

- railway constructions;

c) structural units:

- fencings, walls;
- protection systems (against noise and light);
- ramps, stairs, steps;
- tribunes;
- bridges, catwalks;
- canopies, shelters, pergolas;
- water basins, fountains;

d) technical units:

- water supply;
- wastewater;
- gas supply and deposit;
- heating and cooling supply;
- earth heat exchanger;
- other technical units.

# Annex A
(normative)

# Area Matrix

The Framework of area and space measurement as given in Clause 5 is being given in Table A.1 in form of a matrix.

**Table A.1 — Area and space measurement matrix**

| **Space measure** | **Level Area** | Non-f. Level Area | **Gross Floor Area** | Exterior Constr. Area | **Internal Floor Area** | Interior Constr. Area | **Net Floor Area** | Partit. Wall Area | **Net Room Area** | Tech-nical Area | Circu-lation Area | Amenity Area | Primary Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Space component** | **LA** | NLA | **GFA** | ECA | **IFA** | ICA | **NFA** | PWA | **NRA** | TA | CA | AA | PA |
| Voids, atriums and cavities | ✓ | ✓ | | | | | | | | | | | |
| Perimeter wall thickness | ✓ | | ✓ | ✓ | | | | | | | | | |
| External columns and piers | ✓ | | ✓ | ✓ | | | | | | | | | |
| Structural walls and partitions | ✓ | | ✓ | | ✓ | ✓ | | | | | | | |
| Internal columns and piers | ✓ | | ✓ | | ✓ | ✓ | | | | | | | |
| Non-structural walls | ✓ | | ✓ | | ✓ | | ✓ | ✓ | | | | | |
| Flexible & movable partitions | ✓ | | ✓ | | ✓ | | ✓ | ✓ | | | | | |
| Rooms for mechanical services installations (e.g. lift rooms and boiler rooms as well as heating and cooling apparatus) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | ✓ | | | |

**Table A.1** *(continued)*

| **Space measure** | **Level Area** | Non-f. Level Area | **Gross Floor Area** | Exterior Constr. Area | **Internal Floor Area** | Interior Constr. Area | **Net Floor Area** | Partit. Wall Area | **Net Room Area** | Tech-nical Area | Circu-lation Area | Amenity Area | Primary Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Space component** | **LA** | NLA | **GFA** | ECA | **IFA** | ICA | **NFA** | PWA | **NRA** | TA | CA | AA | PA |
| Rooms for electrical services installations (e.g. conductors and generators as well as mains communication rooms) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | ✓ | | | |
| Rooms for other services installations (e.g. waste management installations and facilities maintenance stores) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | ✓ | | | |
| Stairwells, lift-wells & escalators | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | |
| Corridors and other circulation areas | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | |
| Amenities include all sanitary areas (e.g. toilets, showers and changing rooms as well as cleaners' rooms) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | | ✓ | |
| Central support spaces (e.g. entrance halls and catering spaces as well as social and recreational spaces) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | | | ✓ |
| Local support spaces (e.g. meeting spaces, filling and storage space as well as print and copy areas) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | | | ✓ |
| Work spaces (e.g. cellular offices, laboratories, shop floors, teaching areas or operating theatres) | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | | | ✓ |

# Annex B
(normative)

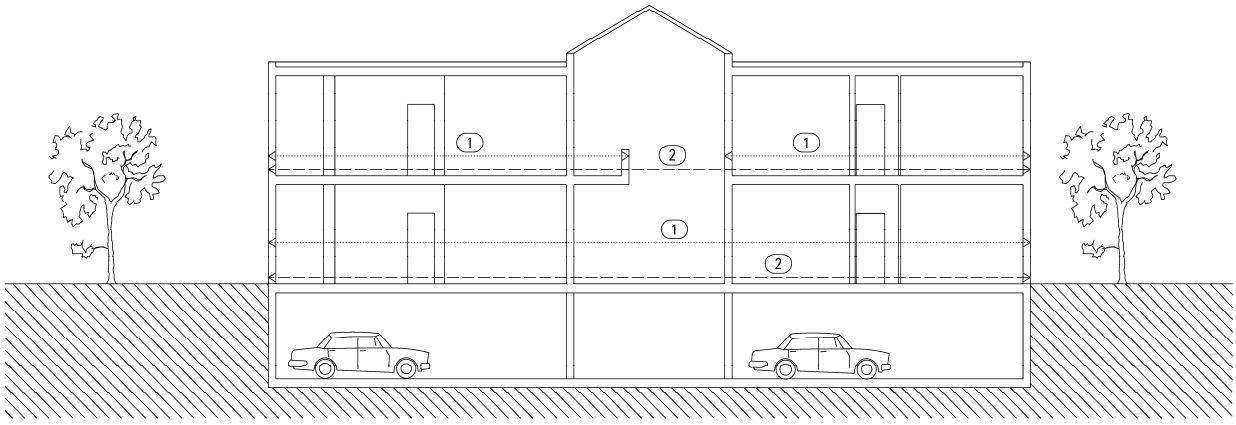
# Further illustrations

## B.1 Further illustrations for atria

An atrium is an open space, several stories high and covered by a roof.

Only the lowest level of the atrium is counted as a part of the Gross Floor Area (the square meters of the floor beneath the atrium roof are only counted once as Gross Floor Area).

An example of the Level Area (LA) and of Gross Floor Area (GFA) including an atrium is given in Figure B.1




**Key**
1 GFA
2 LA

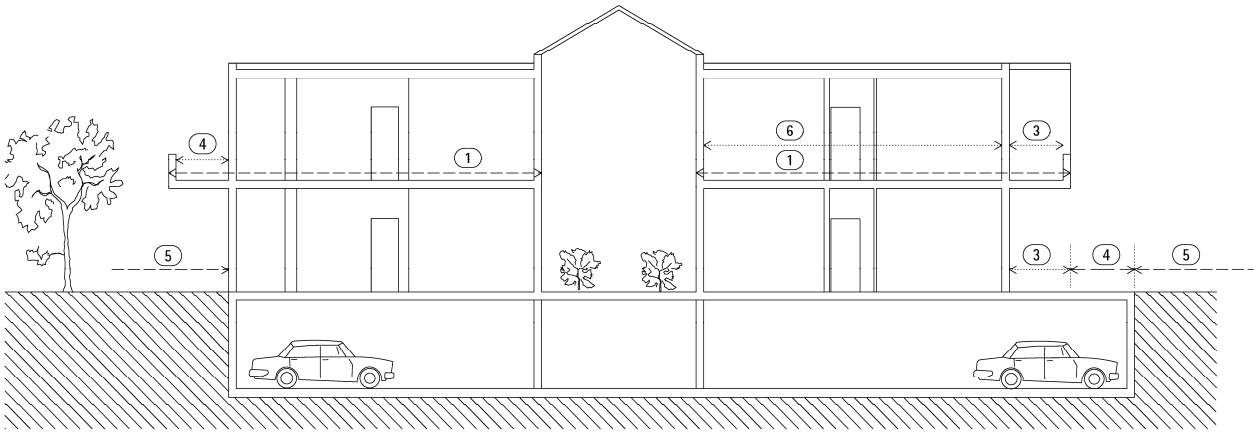
**Figure B.1 — Example of LA and of GFA including an atrium**

## B.2 Further illustrations for covered areas and uncovered areas

On the outside of the building, floors can be part of the building, with another floor, roof or canopy above. Such areas are "covered" areas. The covered area is the area of ground covered by buildings in their finished state. The covered area is determined by the vertical projection of the external dimensions of the building onto the ground. An area is a covered area when it is covered by a part of the building in the next level above.

Uncovered areas are areas with no floor or roof above.

Uncovered balconies for example are part of construction of the building. These balconies are therefore part of the uncovered net floor area. Examples are given in Figure B.2.




**Key**
1 GFA
3 $NFA_{,B}$
4 $NFA_{,C}$
5 un-built area
6 $NFA_{,A}$

NOTE The indices are referring to the note in 5.1.

**Figure B.2 — Example of a balcony**

## B.3 Vehicle parking area

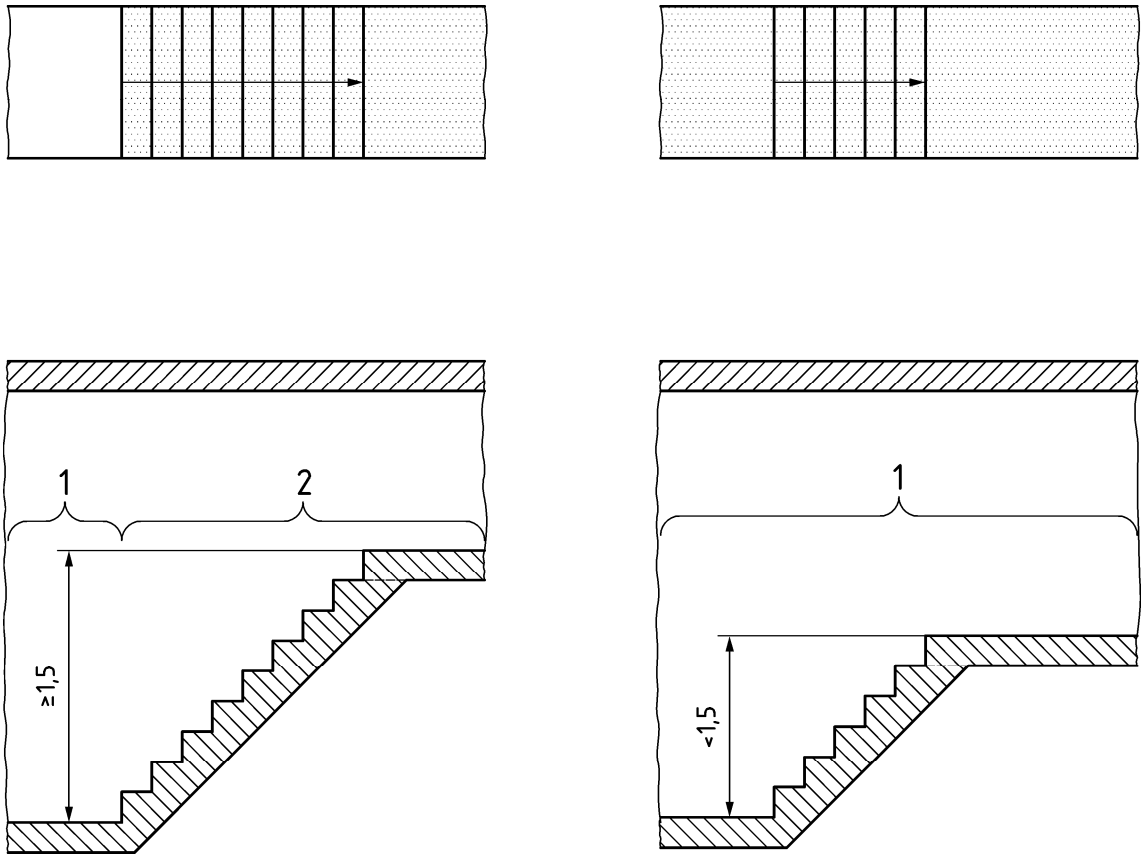
Whether parking areas are inclusive, attached to or separated from the main building, it is recommended to measure these areas separately, as they will significantly influence fair comparisons.

Where the parking is part of the building it is categorised as Primary Area; where it is not part of the building, it is categorised as plot area.

## B.4 Further illustrations for staircases and stairwells

Staircases and stairwells make it possible to go from one floor to another floor. When the floors differ less than 1,50 m in height, these different floors are said to belong on the same level. When these floors differ at least 1,50 m in height they belong to different levels. The measures should be taken as shown in Figures B.3 and B.4.

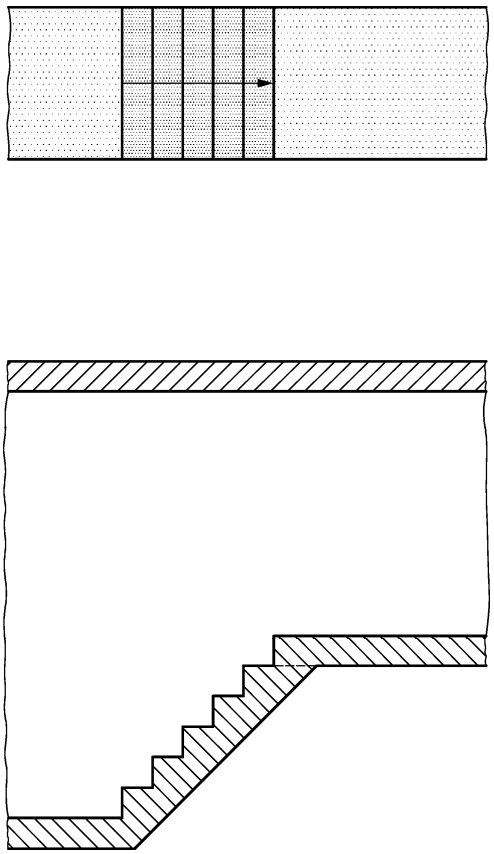
Dimensions in m




**Key**
1 floor level 1
2 floor level 2

area belonging to the same floor level

**Figure B.3 — Example of floor levels**



**Key**

Primary area or horizontal circulation area

Vertical circulation area

**Figure B.4 — Staircases**

The above figure show, that staircases lead to the level above and that the stairwell in the floor should be counted as floor.

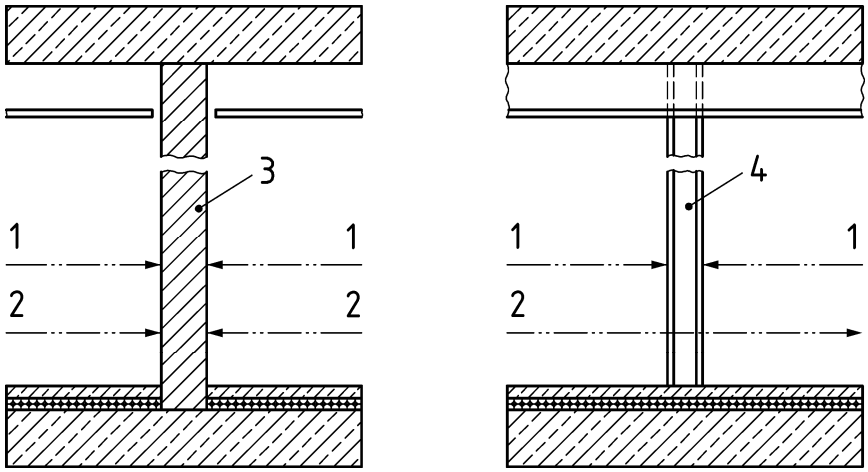
In bigger "voids" where a staircases appears, the part of the projected stairwell should be counted as floor area. The rest of the void is part of the Non-functional Level Area.

## B.5 Walls

Interior Construction Walls are supporting and bracing interior construction walls between the constructive surface of a floor and the constructive lower surface of the upper floor.

Partition Walls are (non-load bearing/non structural) interior walls separating rooms from floor covering to the ready lower surface of the upper ceiling or floor.

Examples are given in Figure B.5.




**Key**
1 net-room area
2 net-floor-area
3 structural interior wall
4 non-structural interior wall

**Figure B.5 — Walls**

# Annex C
(informative)

# Examples for subcategories to Technical Areas, Circulation Areas, Amenity Areas and Primary Areas

Examples of Technical Areas are shown below in Table C.1.

**Table C.1 — Examples of subdivision of Technical Area**

| **Technical Area** | |
|---|---|
| Mechanical | Lift rooms and plant rooms |
| | Water supply and disposal |
| | Gasses and liquids |
| | Heating and cooling apparatus |
| | Air handling units |
| | … … … |
| Electrical | Electrical conductors and generators |
| | Fittings and fixtures for lighting and power purposes |
| | Photovoltaic, fuel cell and wind power generation systems |
| | HV / LV Switch rooms |
| | Mains communication rooms |
| | … … … |
| Other | Man-sized supply shafts and ducts as well as service tunnels |
| | Waste management installations such as trash collectors and waste compactors |
| | Facilities maintenance stores / workshops |
| | … … … |

Examples of Circulation Areas are shown below in Table C.2.

**Table C.2 — Examples of subdivision of Circulation Area**

| **Circulation Area** | |
|---|---|
| Horizontal | Primary corridors and conveyors |
| | Entrance halls and lift lobbies |
| | Fire corridors and escape routes |
| | … … … |
| Vertical | Stairwells |
| | Lift wells and escalators |
| | Ramps and lift platforms |
| | … … … |

Examples of Amenity Areas are shown below in Table C.3.

**Table C.3 — Examples of subdivision of Amenity Area**

| **Amenity Area** | |
|---|---|
| | Showers |
| | Changing rooms |
| | Toilets |
| | Cleaners' rooms |
| | … … … |

Examples of Primary Areas are shown below in Table C.4.

**Table C.4 —Examples of subdivision of Primary Area**

| **Primary Area** | | |
|---|---|---|
| | | Reception areas and waiting areas |
| | | Restaurants and cafeterias |
| | | Central meeting spaces (e.g. auditoriums) |
| | | Social and recreational spaces (e.g. gymnasiums) |
| | | Reprographics |
| | | Archive areas |
| | | Communication rooms (e.g. telephone and switchgear rooms) |
| | | Security rooms (e.g. security control rooms) |
| | | Local meeting rooms |
| | | Filing and storage areas |
| | | Print, copy and mail areas |
| | | Pantry and break areas |
| | Offices | Open offices, team spaces and cubicles |
| | | Cellular offices, shared offices and team rooms |
| | | Study booths, work lounges and touch downs |
| | | … … … |
| | Production | Production halls |
| | | Laboratories |
| | | Refineries |
| | | … … … |
| | Retail | Shop floors |
| | | Showrooms |
| | | Warehouses |
| | | … … … |
| | Education | Teaching areas |
| | | Libraries and study rooms |
| | | Exhibition areas |
| | | … … … |
| | Hospitals | Medical areas |
| | | Operating theatres |
| | | Diagnosis rooms |
| | | … … … |
| | Residence | Housing and apartments areas |
| | | Hotel areas |
| | | Student's hall |
| | | Prison cell |
| | | Retirement home |
| | | … … … |

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# National Annex NA (informative) EN 15221-6 and RICS Code of Practice – Comparing conceptual frameworks

## NA.1 General

This National Annex will assist the user in understanding the differences between this standard and the Royal Institution of Chartered Surveyors' Code of Practice, by demonstrating the key similarities and key differences between the two.

## NA.2 Key similarities

'Total Level Area' as defined in EN 15221-6 is similar to 'Gross External Area' as defined by RICS.

'Primary Area' as defined in EN 15221-6 is similar to 'Net Internal Area' as defined by RICS.

## NA.3 Key differences

**NA.3.1** 'Gross Floor Area' as defined in EN 15221-6 is different from 'Gross Internal Area' as defined by RICS:

– 'Gross Floor Area as defined in EN 15221-6 equals 'Total Level Area' minus 'Non-functional Level Area', whereas

– 'Gross Internal Area' as defined by RICS equals 'Gross External Area' minus 'Perimeter wall thickness and external projections'

**NA.3.2** 'Internal Floor Area' as defined in EN 15221-6 is different from 'Gross Internal Area' as defined by RICS:

– 'Internal Floor Area' as defined in EN 15221-6 does not include 'Non-functional Level Area', whereas

– 'Gross Internal Area' as defined by RICS does include 'Service voids and areas with a height < 1.5m'

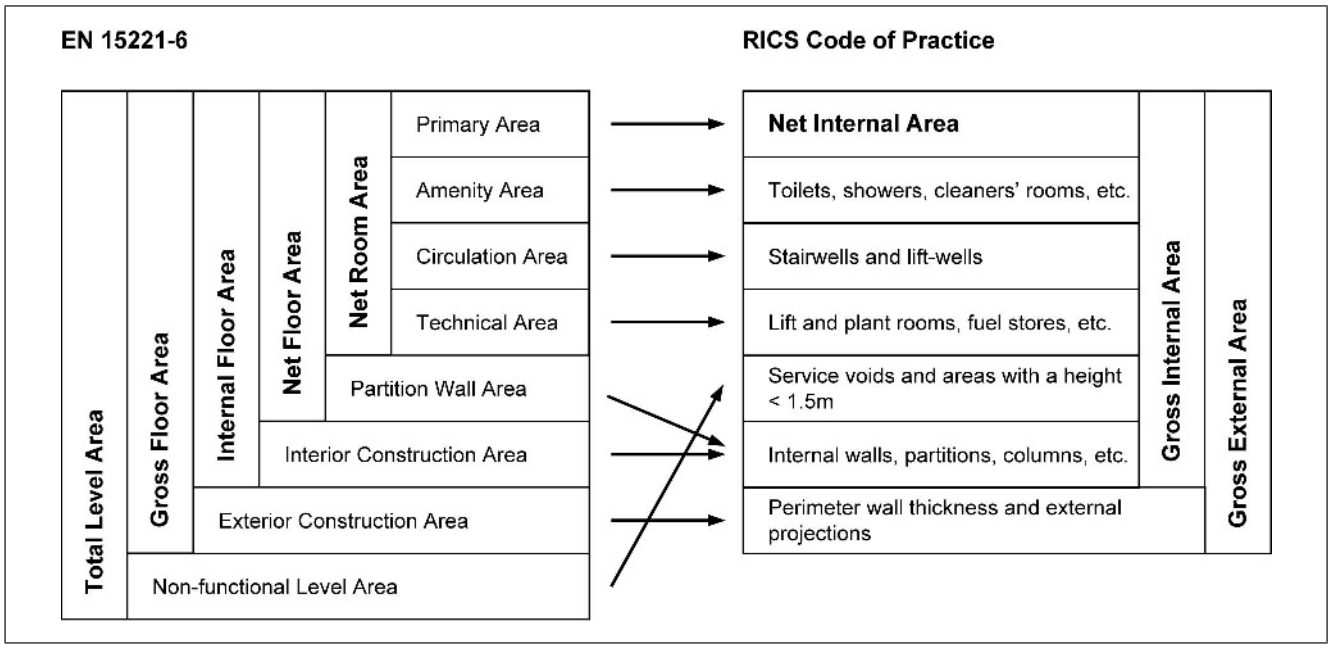
**NA.3.3** 'Net Room Area' as defined in EN 15221-6 is different from 'Net Internal Area' as defined by RICS:

– 'Net Room Area' as defined in EN 15221-6 does include 'Technical Area', 'Circulation Area' and 'Amenity Area' as defined in EN 15221-6, whereas

– 'Net Internal Area' as defined by RICS does not include 'Technical Area', 'Circulation Area' and 'Amenity Area' as defined in EN 15221-6

Figure NA.1 provides a comparison between the EN 15221-6 and the RICS Code of Practice.

Figure NA.1 **EN 15221-6 and RICS Code of Practice – Comparing conceptual frameworks**



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