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Energy performance of buildings — Schedule and condition of building, zone and space usage for energy calculation —

Part 2: Residential buildings

Performance énergétique des bâtiments — Plan et conditions d'utilisation des espaces, zones et bâtiments pour le calcul d'énergie —

Partie 2: Bâtiments résidentiels

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*.

A list of all parts in the ISO 18523 series can be found on the ISO website.

Introduction

There is a strong need to improve the environment to make the evaluation of energy performance of buildings more reliable and practical, so that energy efficiency of buildings is improved by referring to the evaluation results. There have been no international standards prescribing building use in this area. This document prescribes the indispensable information on the conditions for zone and space usage in energy calculations for residential buildings.

Energy performance of buildings — Schedule and condition of building, zone and space usage for energy calculation —

Part 2: Residential buildings

1 Scope

This document specifies the formats to present the schedule and conditions of zone and space usage (referred to as input data of energy calculations) for residential buildings.

The schedule and conditions include schedules of occupancy, operation of technical building systems, ventilation rates, hot water usage, usage of appliances and internal heat gains due to occupancy, lighting and appliances. The schedule and conditions for lighting are applicable to fixed installed lighting fixtures.

This document also gives categories of residential building, zone and space according to differentiating schedule and condition. For residential buildings or its housing units which contain any category of space or zone of non-residential buildings, ISO 18523-1 applies.

Depending on necessary minuteness of the energy calculation, different levels of schedule and condition from the view point of time and space averaging are specified.

The values and categories for the schedule and condition are included informatively.

NOTE The schedule and condition in this document is basically different from assumptions in order to determine the size of technical building systems in the process of design, where possible largest or smallest values are assumed. Instead, most usual and average values, which are assumed for the building energy calculation, are dealt with in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 18523-1, *Energy performance of buildings — Schedule and condition of building, zone and space usage for energy calculation — Part 1: Non-residential buildings*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Space

3.1.1
apartment block
building (3.1.2), which contains multiple *housing units* (3.1.8)

3.1.2
building
construction as a whole, including its envelope and all *technical building systems* (3.3.13), where energy is used to condition the indoor environment, to provide domestic hot water and illumination and other services related to the use of the building

3.1.3
building zone
zone
part of a building consisting of (part of) one or more spaces with assumed uniform properties related to a specific service or service component, or (in absence of a service) assumed uniform indoor environmental conditions

3.1.4
common space
<apartment block>indoor or outdoor space, which is commonly used by residents

3.1.5
thermally conditioned space
thermally conditioned zone
heated and/or cooled space (zone)

3.1.6
elementary space
space
part of a room, a room or group of adjacent rooms with assumed uniform properties for all considered types of zones

3.1.7
habitable room
room that is continuously used for living, working, meeting, amusement and other purposes similar thereto

Note 1 to entry: Spaces such as bathroom, washroom, toilet, entrance hall or corridor are excluded.

3.1.8
housing unit
single-family house (3.1.9) or apartment (flat or maisonette) of *apartment blocks* (3.1.1)

3.1.9
single-family house
detached house
independent residential building, where a family lives

3.1.10
thermally unconditioned space
thermally unconditioned zone
space (zone) that is not heated nor cooled

3.2 Schedule

3.2.1
annual operation hours
operation hours
total length of hours in a *standard year* (3.2.11) when a *technical building system* (3.3.13) can be operated depending on necessity

3.2.2
annual schedule
allocation of *daily schedule(s)* (3.2.4) for one year

Note 1 to entry: Division of the year can be selected from 365 days, 53 weeks, 12 months, seasons or no division (a set of daily schedules is uniformly applied throughout the year).

3.2.3
daily operating hours
hours when a service system is operated, or the length of the hours

3.2.4
daily schedule
conditions of occupancy, service system operations, requirement for the functions of the service systems and internal heat gains at each time of a day

3.2.5
daily schedule with hourly conditions
set of hourly conditions of occupancy, service system operations, requirement for the functions of the service systems and internal heat gains in a day

3.2.6
monthly schedule
allocation of *daily schedule(s)* (3.2.4) for each month of the year

3.2.7
seasonal schedule
allocation of *daily schedule(s)* (3.2.4) to each season of the year

3.2.8
schedule
information on condition(s) of building, zone or space usage throughout a cycle of period, such as day, week, month, season and year

3.2.9
set of daily schedules
complete set of daily schedules representing usage of a category of building, zone or space in one year

3.2.10
standard year
selected year, of which the number of days has to be 365 and arrangement of weekdays, weekends and holidays are referred in weekly, monthly, seasonal and annual schedules

3.2.11
weekly schedule
allocation of *daily schedule(s)* (3.2.4) to each week of the year

3.2.12
whole set of annual schedules
complete set of *annual schedules* (3.2.2) representing usage of all types of building, zone and space, as objects of energy calculation

3.2.13
whole set of seasonal schedules
complete set of *seasonal schedules* (3.2.7) representing usage of all types of building, zone and space, as objects of energy calculation

3.2.14
whole set of monthly schedules
complete set of *monthly schedules* (3.2.6) representing usage of all types of building, zone and space, as objects of energy calculation

3.3 Parameters for conditions of building, zone and space usage

3.3.1
appliances
consumer electronics and machines for housekeeping

3.3.2
condition
status of *occupancy* (3.3.9), operation of service systems, requirement for the functions of the *technical building systems* (3.3.13) and internal heat gains

3.3.3
demand control ventilation
ventilation with a rate controlled according to the necessity of the ventilation, such as the emission rate of target pollutant

3.3.4
local exhaust ventilation
mechanical exhaust ventilation for eliminating contaminants, such as odour, combustion gases, water vapour and oil mist, from nearby sources

3.3.5
height of the working plane
height of the plane on which the assumed visual task is carried out, from the floor

Note 1 to entry: Height of the working plane is expressed in metres, m.

3.3.6
height of the specified surface
height of the plane on which the requirement for the ambient lighting is assumed, from the floor

Note 1 to entry: Height of the specified surface is expressed in metres, m.

3.3.7
luminaire
apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except the lamps themselves, all the parts necessary for fixing and protecting the lamps and, where necessary, circuit auxiliaries together with the means for connecting them to the electric supply

3.3.8
maintained average illuminance
value below which the average illuminance over the specified surface is not allowed to fall

Note 1 to entry: Maintained average illuminance is expressed in lux.

3.3.9
occupancy
presence of users in building, zone or space

3.3.10
occupancy density
number of present users in building, zone or room per unit floor area of the space

Note 1 to entry: Occupancy density is used mainly for the calculations for space heating/cooling and ventilation.

3.3.11
overall ventilation
ventilation for supplying outdoor air into indoor spaces to dilute general contaminants, such as formaldehyde, CO_2 and water vapour

3.3.12
simultaneous usage ratio
<set of spaces>ratio of the number of zones or spaces which belong to a group of zones and spaces and are occupied or used at the time, to the total number of zones or spaces in the group

Note 1 to entry: This concept is applied to a group of zones or spaces of the same category, such as a group of guest rooms in hotels, a series of personal office rooms in office buildings, etc.

3.3.13
technical building system
all energy-using or -distributing components in a building that are operated to support the occupant or process functions housed therein (including HVAC, domestic hot water, illumination, transportation, laundering or similar functions)

3.3.14
movable fitting
movable part of openings, which is used for the purposes of, for example, solar shading, adding insulation, ventilation and security

3.4 Descriptions for daily schedule

3.4.1
hourly ratio
ratio of hourly value of parameters to their reference value

Note 1 to entry: Multiplying hourly ratios by the reference value, hourly values of the parameter is calculated. This shall be calculated in accordance with ISO 18523-1.

3.4.2
reference domestic hot water usage
maximum hourly service hot water usage by users of the space or zone

Note 1 to entry: Measured in volume flow rate per person, in volume flow rate per unit floor area or in volume flow rate per bed.

Note 2 to entry: The volume flow rate is calculated with the assumption on hot water temperature.

3.4.3
reference heat gain due to appliances
maximum hourly total (sensible and latent) heat gain due to appliances inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratios, heat gain due to appliances at the time can be calculated.

3.4.4
reference heat gain due to person
maximum hourly total (sensible and latent) heat gain due to person inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratio, heat gain due to person at the time can be calculated.

3.4.5
reference heat gain due to lighting
maximum hourly sensible heat gain due to lighting inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratios, heat gain due to lighting at the time can be calculated.

3.4.6
reference latent heat gain due to appliances
maximum hourly latent heat gain due to appliances inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratios, latent heat gain due to appliances at the time can be calculated.

3.4.7
reference latent heat gain due to person
maximum hourly latent heat gain due to person inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratios, latent heat gain due to person at the time can be calculated.

3.4.8
reference occupancy density
maximum hourly occupancy density of the space or zone

Note 1 to entry: Measured in person per unit floor area.

Note 2 to entry: To be multiplied by hourly ratios, occupancy density at the time can be calculated.

3.4.9
reference sensible heat gain due to appliances
maximum hourly sensible heat gain due to appliances inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratios, sensible heat gain due to appliances at the time can be calculated.

3.4.10
reference sensible heat gain due to person
maximum hourly sensible heat gain due to person inside the room or zone

Note 1 to entry: Measured in watt per unit floor area.

Note 2 to entry: To be multiplied by hourly ratio, sensible heat gain due to person at the time can be calculated.

3.4.11
reference ventilation requirement
most probable estimation of outdoor air supply (in volume flow rate per unit floor area or in air change per hour) to the space or zone

3.4.12
total daily usage of domestic hot water
total volume of service hot water usage in one day

Note 1 to entry: Measured in volume per person, in volume per unit floor area, in volume per bed or in volume per household (housing unit).

Note 2 to entry: The volume is calculated with the assumption of hot water temperature.

4 Framework of the schedule and condition for building energy calculation

4.1 Indispensable schedules

The energy calculations for residential buildings are characterized by the division number of the year, the calculation period or the calculation interval. Each calculation method has its appropriate calculation interval according to characteristics of the target physical phenomenon (for example, unsteadiness) and minuteness of the calculation responding to changes of climatic condition, occupants' behaviour, status of service systems and so on.

Due to the variety of calculation method, there is a variety of form of the schedule and condition of zone and space usage. Nevertheless, there is a fundamental unit of form, daily schedule, which shall be included in forms for the schedule and condition. The daily schedule corresponds to the minimum cycle of zone and space usage, and also of climatic and solar condition.

Some nations adopt so called "monthly calculation" for space heating and cooling energy needs and uses, taking monthly variation of outdoor temperature and solar irradiance into consideration. One daily schedule for workday and the number of the workdays is given to each month for each type of zone and space. Monthly means of outdoor air condition (for example, temperature) and solar irradiance for different orientations and inclinations are given for the calculation. The expression of the daily schedule varies from detailed expression with hourly values to simplified expression such as daily mean values and the like. Additional schedule for holiday can be given in a simplified way such as only with daily mean values.

Similarly, in so called "seasonal calculation", one daily schedule for workday and the number of the workdays for each season are given to each season for each type of zone and room, and the calculation is done with seasonal mean values for climatic condition.

For the calculation of more steady phenomena, so called "annual calculation" can work if seasonal change of solar condition is integrated throughout the year and condensed in specific coefficients. Nevertheless, one daily schedule for a workday and the number of annual workdays are necessary. Additional daily schedules for holiday can be given.

For the calculation of lighting, monthly or yearly calculation is mainly used, even though unsteady aspects of lighting still have to be dealt with. In the calculation for lighting, when input parameters such as operating hours with and without daylight are prescribed, a daily schedule as described in column (2) of Table 1 and annual schedule by monthly allocation of daily schedules (Table 5) or annual schedule without division of the year (Table 7) should be explicitly given, so that the operating hours for light are well harmonized with those for other technical systems.

Therefore, for each category of zone and space, a necessary number of daily schedules (e.g., two daily schedules for workday and holiday), and one of annual, seasonal, monthly and weekly schedules shall be given in order that the daily schedules are allocated for the year.

4.2 Daily schedule

The daily schedule shall contain hourly values of conditions for one day, or shall contain condensed or simplified information on conditions for the day. With some assumptions, the hourly detailed values can be generated from the condensed or simplified information and used even for detailed calculation. If necessary, multiple daily schedules representing different daily patterns of usage should be given such as for workdays, holidays and going-out days. The number of daily schedules depends on minuteness of the schedule and conditions as well as on the category of zone and space under consideration.

The conditions described in the daily schedule are grouped into five categories:

a) General information on occupancy and usage of zone and space;

b) Operation of technical building systems and requirement for their services;

c) Usage of appliances;

d) Internal heat gains;

e) Operation of movable fittings.

The basic structure of a daily schedule is shown in Table 1.

Table 1 — Framework of daily schedule for zone and space

		(1) Description by hourly values for 0–24 h	(2) Condensed or simplified description
a) General information on occupancy and usage	Occupancy or occupancy density	Hourly occupancy or occupancy density	Times of start and end of occupancy or total hours of occupancy, and average occupancy or occupancy density during usage
	Simultaneous usage ratio of a set of rooms	Hourly simultaneous usage ratio	Mean simultaneous usage ratio during usage
b) Operation of technical building systems and requirement for their building services	Space heating and/or cooling	Hourly status of space heating and/or cooling system (in or out of operation)	Times of start and end of operation, or total hours of operation
		Hourly set-points of room temperature and/or humidity	Set-point temperature and/or humidity during operation, and/or information on set-back operation
	Ventilation for general contaminants (overall ventilation)	Hourly status of ventilation system (in or out of operation)	Times of start and end of operation, or total hours of operation
	Lighting	Hourly status of lighting system (in or out of operation)	Times of start and end of operation, or total hours of operation
		Maintained average illuminance and height of the specified surface	Maintained average illuminance and height of the specified surface
	Domestic hot water	Hourly status of domestic hot water system	Times of start and end of operation, or total hours of operation
		Hourly service hot water usage	Daily total hot water usage
	Ventilation for local contaminants (local exhaust ventilation)	Hourly usage duration	Times of start and end of operation, or total hours of operation
	Ventilation for unconditioned zone or space	Hourly ventilation requirement	Ventilation requirement
		Set-point of room temperature (upper limit)	Set-point of room temperature (upper limit)
c) Usage of appliances	Electric appliances and others	Hourly usage duration	Times of start and end of operation, or total hours of operation

Table 1 *(continued)*

		(1) Description by hourly values for 0–24 h	(2) Condensed or simplified description
d) Internal heat gains (sensible and/or latent)	Person (watt per person)	Hourly heat gains	Times of start and end of occupancy or total hours of occupancy
			Average heat gains during occupancy
	Lighting (watt per unit floor area)	Hourly heat gains	Times of start and end of lighting or total hours of lighting
			Average heat gain during operation
	Appliances (watt)	Hourly heat gains	Times of start and end of use of appliances or total hours of the usage
			Average heat gain during usage
e) Operation of movable fittings	Operation of designated shutters, blinds and windows	Hourly status of designated movable fittings	Time of start and end of using movable functions

4.3 Division of year and daily, weekly, monthly, seasonal and annual allocations of daily schedules

The standard year shall be the year 2015, which has 365 days. Since national holidays and workdays differ in nations and states, annual schedules can be determined on a national basis, even though there is a need for any common annual schedule patterns for research purposes. The annual schedule given in Annex B can be used as such a common annual schedule with daily 365 divisions. The basic structure of the annual schedule is shown in Table 2.

Table 2 — Annual schedules with different divisions of the year

(1) Daily 365 divisions

The standard year																
1	2	3	4	5	6	7	8	…	358	359	360	361	362	363	364	365

(2) Weekly 53 divisions

The standard year								
1	2	3	4	…	50	51	52	53

(3) Monthly 12 divisions

The standard year						
January	February	March	…	October	November	December

(4) Seasonal 5 divisions

The standard year				
Winter	Medium	Summer	Medium	Winter

(5) No division of the year

The standard year
Common set of daily schedules throughout the year

The annual schedule shall be made by allocating one daily schedule to each day or a set of daily schedules to each week, month or season. Each week, month and season can contain different daily schedules such as for weekdays, holidays for going-out and holidays for staying at home. If there is no need to divide the year, a set of daily schedules shall be allocated to the whole year without division. For example, for an indoor parking garage of apartment blocks, a set of daily schedules of ventilation and lighting for each of the weekdays and holidays is specified with the numbers of days as the annual schedule. Structures of the annual schedules by daily, weekly, monthly, seasonal and yearly allocation are prescribed in Tables 3, 4, 5, 6 and 7 respectively.

Table 3 — Annual schedule by daily allocation of daily schedules (daily schedule allocation is exemplified)

Row: date	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	…
	January														
	1st Th.	2nd Fr.	3rd Sa.	4th Su.	5th Mo.	6th Tu.	7th We.	8th Th.	9th Fr.	10th Sa.	11th Su.	12th Mo.	13th Tu.	14th We.	…
Daily schedule[1]	*c*	*c*	*b*	*c*	*a*	*a*	*a*	*a*	*a*	*c*	*c*	*c*	*a*	*a*	…

[1] The daily schedules *a*, *b* and *c* are allocated to workdays, day off for going out and day off for staying at home, respectively.

Table 4 — Annual schedule by weekly allocation of daily schedules (daily schedule allocation is exemplified)

Row: Week **Column: Daily schedule**[1]	#1 Jan. 1st-4th	#2 5th-11th	#3 12th-18th	#4 19th-25th	#5 26th-Feb. 1st	#6 2nd-8th	#7 9th-15th	#8 16th-22nd	#9 23rd-Mar. 1st	#10 2nd-8th	#11 9th-15th	#12 16th-22nd	…
a	*0*	*5*	*4*	*5*	*5*	*5*	*4*	*5*	*5*	*5*	*5*	*5*	…
b	*1*	*0*	*1*	*1*	*0*	*1*	*0*	*1*	*1*	*1*	*0*	*1*	…
c	*3*	*2*	*2*	*1*	*2*	*1*	*3*	*1*	*1*	*1*	*2*	*1*	…
Total number of days	4	7	7	7	7	7	7	7	7	7	7	7	…

[1] The daily schedules *a*, *b* and *c* are allocated to workdays, day off for going out and day off for staying at home, respectively.

Table 5 — Annual schedule by monthly allocation of daily schedules (daily schedule allocation is exemplified)

Row: Month **Column: Daily schedule**[1]	Jan.	Feb	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
a	*19*	*19*	*22*	*21*	*18*	*22*	*22*	*16*	*19*	*21*	*20*	*19*	*238*
b	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*36*
c	*9*	*6*	*6*	*6*	*10*	*5*	*6*	*12*	*8*	*7*	*7*	*9*	*91*
Total number of days	31	28	31	30	31	30	31	31	30	31	30	31	365

[1] The daily schedules *a*, *b* and *c* are allocated to workdays, day off for going out and day off for staying at home, respectively.

Table 6 — Annual schedule by seasonal allocation of daily schedules (daily schedule allocation is exemplified)

Row: Season **Column: Daily schedule**[1]	winter	intermediate	summer	Total
a	n_{W1}	n_{M1}	n_{S1}	*238* ($=n_{W1} + n_{M1} + n_{S1}$)
b	n_{W2}	n_{M2}	n_{S2}	*36* ($=n_{W2} + n_{M2} + n_{S2}$)
c	n_{W3}	n_{M3}	n_{S3}	*91* ($=n_{W2} + n_{M2} + n_{S2}$)
Total number of days	$n_{W1} + n_{W2} + n_{W3}$	$n_{M1} + n_{M2} + n_{M3}$	$n_{S1} + n_{S2} + n_{S3}$	365

[1] The daily schedules *a*, *b* and *c* are allocated to workdays, day off for going out and day off for staying at home, respectively.

Table 7 — Annual schedule without division of the year (daily schedule allocation is exemplified)

Daily schedule[1]	Total
a	*238*
b	*36*
c	*91*
Total number of days	365

1 The daily schedules *a*, *b* and *c* are allocated to workdays, day off for going out and day off for staying at home, respectively.

5 Conditions for energy calculation included in the schedule and condition of zone and space usage

5.1 Energy needs and uses

In this document, input parameters for the calculation of the following energy needs and uses are dealt with:

a) Energy need and use for space heating and cooling;

b) Energy need and use for ventilation for outdoor air supply for conditioned and unconditioned zone or space;

c) Energy use for lighting;

d) Energy need and use for domestic hot water;

e) Energy use for appliances;

f) Energy use for transportation (e.g. elevators of apartment blocks).

5.2 Condition

5.2.1 Occupancy or occupancy density

The occupancy or occupancy density is directly or indirectly related to energy uses of technical building systems, such as, space heating and cooling, ventilation, lighting, domestic hot water and transportation in the residential building, as well as energy uses of home appliances. It also represents the unused status of the space by zero occupancy or occupancy density. The total number of occupants can be directly given or calculated by multiplying the occupancy density by the floor area of the space, using calculation methods given in other standards.

The occupancy or occupancy density shall be given by taking the correlation with relevant conditions, such as, hours of space heating and cooling if intermittent operation is assumed, internal heat gain due to persons, ventilation rate if occupancy-dependent demand control is adopted, domestic hot water usage and demand for transportation, into consideration.

5.2.1.1 Simultaneous usage ratio of a set of zones or spaces

This parameter is not always necessary, but is useful when there is a group of zones or spaces of the same category and characteristics and the utilization rate of the group is not always full. Demands for technical building systems are to be reduced by the simultaneous usage ratio.

5.2.2 Operation of technical building systems and requirement for their services

5.2.2.1 Space heating and cooling

Operational conditions for space heating and cooling, 1) status of the space heating and/or cooling system (in or out of operation) and 2) indoor environmental set-points (temperature and/or humidity) shall be given.

There can be different indoor environmental set-points for zones and spaces. They differentiate according to 1) seasons (heating, cooling, intermediate, and so on) and 2) set-back operation such as for during going-out and night. The condition for the set-point shall be given in a schedule by referring to the table for the set-point patterns, as shown in Table 8. If the set-point pattern can be allocated to any part of the year without calculations, periods shall be determined and specified in the table for each set-point pattern. If the set-point patterns depend on climatic condition in each day, week and month, determination of the set-point patterns shall be done as a part of the energy calculation.

Table 8 — Set-point patterns (symbols, values and notes are exemplified)

Symbol of set-point pattern	During normal operation		During Set-back operation		Note for set-back operation
	Indoor set-point temperature	Indoor set-point relative humidity	Indoor set-point temperature	Indoor set-point relative humidity	
w_1	*22 °C*	*40 %*	—	—	—
w_2	*22 °C*	—	—	—	—
s_1	*26 °C*	*50 %*	—	—	—
m_1	*24 °C*	*50 %*	—	—	—

5.2.2.2 Ventilation for conditioned zone or space

The ventilation (outdoor air supply) for conditioned zones or spaces has an influence on the energy needs for space heating and cooling as well as the energy use for mechanical ventilation. Status of the ventilation system (in or out of service) shall be given in the schedule, or it shall be assumed to be the same as space heating and/or cooling system operation. As for ventilation rate during the operation, there are two ways how to estimate the amount of outdoor air supply.

1) Estimation by regulated ventilation requirement of the zone and space, which can be defined as per unit floor area or per occupant. This requirement can also be described by acceptable concentration of target gas. If the requirement per occupant or by the acceptable concentration of the target gas is adopted, capacity of occupants of the zone or space, which has to be equal to or larger than the reference occupancy density, shall be assumed. This way is possible even before fixing detailed specifications of the ventilation system of the space.

2) Estimation by designed air flow rate of the target zone and space, which is to be confirmed by design calculation based on the specifications of adopted ventilation components. The design value of the ventilation rate can be used, if the value shall be confirmed later in more detailed design stage of the building and technical building system.

In the energy calculation, when demand control ventilation or any other techniques to control ventilation rate are considered, the estimated amount of outdoor air can be adjusted by taking relevant parameters (e.g., schedule of occupancy density, outdoor temperature and/or humidity) into consideration.

In the calculation of energy use of the ventilation system, the electric power of the designed system is used, or assumptions on the efficiency of the system, such as, a specific fan power, are used with the ventilation rate.

5.2.2.3 Lighting

The status of fixed lighting installation (in or out of operation) shall be given in the schedule. The status shall be coordinated with the occupancy of the zone or space, but they are not necessarily the same.

In the schedule and condition for the lighting, only fixed lighting installation shall be dealt with. Movable luminaires and lamps can be dealt with in the schedule and condition for appliances (5.2.2.7). The maintained average illuminance and the height of the specified surface are determined mainly for ambient lighting. Other types of fixed lighting installation, such as, decorative and accent lighting, can be considered in the schedule and condition for the lighting, but the maintained average illuminance shall not be applied.

If the effect of dimming control for daylight utilization or any other lighting control methods are considered, the operation and electric power is adjusted by taking the specification of the control system and space configuration into consideration.

The energy use for ambient lighting can be estimated by using the duration of the operation and the electric power for luminaires and lamps, which can be determined in two ways.

1) In the simplified utilization factor method, the installed lighting power density can be calculated by using maintained average illuminance, luminaire and lamp performance, and utilization factor as a function of the luminaire, space reflectance and room index. More detailed methods can also be used for the calculation of installed lighting power.

2) Total assumed electric power of designed luminaires and lamps for the zone or space, or the aimed electric power for lighting.

NOTE Calculation methods for energy performance of lighting are provided in other standards, such as ISO 20086[1)].

If the effects of daylight utilization or any other lighting control methods are considered, the operation and electric power is adjusted by taking the specification of the control system and space configuration into consideration.

The electric power of the lighting system shall coordinate with internal heat gain due to lighting.

5.2.2.4 Domestic hot water

The amount of domestic hot water usage shall be given as a realistic usage pattern, hourly volume, or as total volume used during the specified period. In addition, assumed hot water temperature and type of faucet or shower nozzle shall be specified for the calculation of energy need. The saving of service hot water usage by energy-saving faucets or shower nozzles shall be evaluated by comparing with the performance of the assumed type of those in the schedule and condition. Supplied water temperature shall be given in the calculation methods.

In the realistic usage pattern of domestic hot water, the time in a day and the volume of each usage shall be given. Such a detailed pattern of hot water usage is essential when considering the influence of intermittent use of hot water heaters on energy efficiency. Daily variation of hot water usage shall be assumed when evaluating the effectiveness of special control of target water temperature for hot water storage during night.

5.2.2.5 Ventilation for local contaminants

The schedule and condition for usage of mechanical ventilation for local contaminants, such as in the kitchen, bathroom and toilet, shall be given. If those contaminants are exhausted by overall mechanical ventilation for conditioned zone or space, it is not necessary to give such an additional schedule and condition.

1) Under preparation.

5.2.2.6 Ventilation for unconditioned zone or space

Unconditioned zones or spaces, such as, an indoor parking garage, machine room, electric room, etc. are dealt with. The ventilation (outdoor air supply) for an unconditioned zone or space has an influence on the energy use for mechanical ventilation. The status of the ventilation system (in or out of service) shall be given in the schedule. As with the ventilation rate in the operation, there are two ways to estimate the amount of outdoor air supply.

1) Estimation by regulated ventilation requirement of the unconditioned zone or space, which can be defined as per unit floor area or air change rate. The requirement can also be described by allowable concentration of target gas such as CO for an indoor parking garage or allowable temperature for a machine and electric room with assumptions on internal heat gain in those spaces. This way is possible even before fixing detailed specifications of the ventilation system of the space, but the schedule of ventilation target such as pollutant gas by cars and heat from contained equipment is necessary.

2) Estimation by designed air flow rate of the target zone and space, which is to be confirmed by design calculation based on the specifications of adopted ventilation components. The design value of the ventilation rate can be used, as long as the value shall be confirmed later in the more detailed design stage of the building and technical building system.

In the energy calculation, when demand control ventilation or any other techniques to control ventilation rate are considered, the estimated amount of outdoor air can be adjusted by taking relevant parameters (e.g., schedule of pollutant source or heat source, outdoor temperature) into consideration.

In the calculation of energy use of the ventilation system, electric power of the designed system is used, or assumptions on the efficiency of the system, such as a specific fan power, are used with the ventilation rate.

5.2.2.7 Usage of appliances

Energy use for appliances cannot be neglected in the trial to reduce real energy use in buildings. Depending on the definition of the zero energy house, the energy for appliances, such as a TV and refrigerator, is included. Non-electric appliances such as a gas oven for cooking may be included depending on energy calculations for residential buildings.

The movable luminaires and their lamps, which are not dealt with by the schedule and condition for lighting, can be included as appliances.

5.2.3 Internal heat gains

Internal heat gains due to persons, lighting and other appliances used in building, zone and space also affect energy needs for space heating and cooling. The schedule of the heat gains shall be given.

5.2.3.1 Person

The amount of internal heat gain due to person per unit floor area is the product of heat dissipation per person and occupancy density.

5.2.3.1.1 Heat gains per person

Heat gains per person (occupant) in watt per person depends on his/her activity level and other physiological conditions. Therefore, they shall be given, taking human activity in the zone or room into consideration. Values for the heat dissipation are given in Annex F. The heat dissipation from the human body consists of sensible and latent heats, but it is possible to assume only the sensible heat, such as when calculating only energy need for sensible heat.

5.2.3.1.2 Occupancy density

The occupancy density is described in 5.2.1.1.

5.2.3.2 Lighting

For the energy calculation of lighting by fixed lighting installations, conditions other than the status of the lighting system (in or out of operation) and the lighting requirement (maintained average illuminance on height of the specified surface) can be determined in calculation methods with input data of target building, zone and space. The result of the energy calculation of lighting by fixed lighting installations can be used as the basis of heat gain due to lighting.

When rough estimation on the heat gain due to lighting is needed before the lighting design and energy calculation of lighting, the target installed power for lighting can be used.

5.2.3.3 Appliances

The appliances include electric appliances and other machines or instruments dissipating heat, which can consist of sensible and latent heats. The electric appliances, such as a computer, television, copy machine, refrigerator and movable luminaires and lamps, can be taken into consideration when determining internal heat gain due to appliances.

5.2.4 Operation of movable fittings

In residential buildings, the occupants' reactions by operating movable fittings, such as a shutter, blind and window, in order to change their own conditions, are influential especially on the thermal environment and space heating and cooling loads. Any fixed schedule of open and closed status or an hourly possibility of operation depending on environmental condition at each time can be given. For example, if there are shutters, which are closed only during the night, schedules for those shutters can be given. If there are blinds, which are operated depending on solar radiation or on their direction and time of the day, schedules for those blinds can be given. If there are windows, which are operated depending on indoor temperature and status of space cooling system, schedules of possibility for opening those windows can be given. When only possibility is scheduled, additional mathematical models of occupants' reactions, which determine the status of movable fittings depending on parameters including environmental factors, should be given in the calculation method. Furthermore, different schedules for the operation of the movable fittings can be given according to seasons.

5.3 Process for determining schedule and condition in housing units

5.3.1 Family structure

The schedule and condition for each housing unit is influenced by the structure of family occupying the housing unit. The family structure is represented by the following items:

1) Number of people in family (size of family);

2) Attribute of family member(s), such as age, sex, occupation, school and relationship in the family.

Energy use by the family is influenced by the type of family structure, even though the minuteness of the description of the family depends on the purpose of the analysis and calculation. Since there is a relationship between sizes of the housing unit and the family, the size of the family shall be taken into consideration when heat demand for domestic hot water, energy use for appliances and internal heat gains are estimated as input data for energy calculations.

5.3.2 Time use of daily life of family member(s)

The basis for determining the schedule and condition in housing units is the time use in daily life of the family member(s), which contains the information on what kind(s) of activity occurs in which space of the housing unit at what time of the day. In order to obtain such information, a time use survey, which

is conducted broadly in the world, is useful. In the time use survey[20], activities of each subject are recorded at least during one day according to the classification of activities for time-use statistics. The minuteness of the classification varies, but there have been international trials to harmonize surveys to be comparable to each other. Even though the space in the housing unit where each activity is done is usually not recorded, it is possible to guess in which space in the housing unit each activity is done. When determining daily schedules of members of the target type of family, the most typical time use of daily life shall be determined for each member by referring to the statistics of time use for the corresponding attribute, such as "employed male aged in the forties", "unemployed female aged in the thirties", "female high school student", etc. After obtaining all necessary statistics data of the family members, they shall be adjusted for coordinated activities among family members, such as having breakfast together, taking a bath in turn, etc.

NOTE Examples of a set of time use as daily life of family are given in Annex A.

NOTE An example of daily allocation of daily schedules is given in Annex B.

5.3.3 Schedule and area for space heating and cooling

The duration and the area in the housing unit of space heating and cooling varies depending on the climate, the type of technical building system and the culture of nations. If intermittent and/or partial space heating and cooling is dominant in a circumstance, the schedule of space heating and cooling shall be determined according to the time use of daily life of the family and to the assumed spaces where the occupants stay at the time. The following categories exist as the schedule and area for space heating and cooling.

1) Continuous overall space heating and/or cooling.

   All spaces in the housing unit are continuously heated and/or cooled including non-habitable spaces such as the bathroom, washroom, toilet, entrance hall and corridor.

2) Continuous space heating and/or cooling only for all habitable rooms.

   All habitable rooms in the housing unit are continuously heated and/or cooled, and non-habitable rooms are not heated or cooled.

3) Continuous space heating and/or cooling only for the main habitable space(s) and intermittent partial space heating and/or cooling for other habitable rooms.

   The main habitable space(s) including the living room, dining room and kitchen are continuously heated and/or cooled, while other habitable spaces are intermittently heated and/or cooled.

4) Intermittent space heating and/or cooling for all of or part of habitable spaces.

   All or part of the habitable spaces are intermittently heated and/or cooled.

In the calculation of more realistic space cooling energy for a sort of lifestyle, there is an effect of natural ventilation by open windows, which contributes to the heat removal from indoor spaces to reduce the cooling load. Even though the considerations of such effect and occupants' behaviour depend on the principle of the energy calculation, it shall be noted that especially in residential buildings occupants' active responses to their environment have impacts on their environment and energy uses. For such considerations, any mathematical models on the relationship between the behaviour and the environment shall be prepared for energy calculations on the basis of the field surveys. The schedule of the operation of movable fittings including windows can be given (5.2.4).

NOTE Examples of schedule for space heating and cooling are given in Annex C.

5.3.4 Schedule and area of overall ventilation

The overall ventilation is for maintaining acceptable concentrations of pollutants emitted from materials of the building, furniture and living goods. Water vapour is also included as target pollutants. The overall ventilation is usually supposed to be continuous, but its target area depends upon

regulations. If a regulation needs overall ventilation only in habitable rooms and not in other spaces such as the toilet and corridor, ventilation shall be assumed only in the habitable rooms. If a regulation needs overall ventilation for all spaces in the housing unit, such as by air change per hour, ventilation shall be assumed in all spaces of the housing unit.

5.3.5 Schedule and area of local exhaust ventilation

The local ventilation is for exhausting locally produced contaminants, such as odour in the toilet, combustion gases and oil mist in the kitchen, and water vapour in the bathroom, shower room and washroom. The necessity of the local ventilation depends upon lifestyle of occupants.

NOTE An example of the schedule and area of local ventilation is given in Annex D.

5.3.6 Amount of domestic hot water usage

Any result of field survey on the amount of domestic hot water usage in housing units shall be used when determining the amount of the domestic hot water as a condition, as well as the daily variation of the amount. Uses of the domestic hot water in different spaces and purposes, such as in the kitchen for cooking, in the bathroom for filling bathtub and showering, in the washroom for personal care, etc., shall be quantified. Once the amount of domestic hot water usage by family members for different purposes is assumed, the amount of domestic hot water usage for different size of the family can be generated taking the result of the field survey for families of different sizes into consideration.

NOTE When the application(s) of a hot water saving faucet is to be evaluated more carefully, the relationship between the place of its installation and the each amount of domestic hot water usage for the place needs to be known.

NOTE An example of the result of the field survey on the usage of domestic hot water is given in Annex E.

5.3.7 Possession and usage of appliances

Energy use for appliances influences the total energy use of housing units, internal heat gains and exported electricity, which is produced by photovoltaic cells and other generators. When a detailed prediction of achievement of zero energy buildings is necessary, assumptions on the use of appliances becomes critical.

NOTE Depending on the definition of the zero energy building, energy uses for appliances can be excluded in energy calculations. However, electricity consumption noticed on the bill is usually total one including the energy use for appliances, and there is a necessity of any methods to estimate the energy use for appliances.

The possession of energy using appliances shall be estimated by referring to national statistics on the possession of durable goods. The typical specification of each appliance, such as size and heat source, shall be determined by referring to industrial statistics on goods shipments and to manufacturers' brochures of each appliance.

NOTE Examples of the national statistics on the possession of durable goods are given in Annex F.

6 Category of residential building, zone and space

6.1 General

Residential buildings are categorized into a single-family house and an apartment block.

The single-family house varies in number of stories and with non-residential spaces attached to the housing unit, such as an office or shop below.

The apartment block also varies in number of stories and rows and with attached spaces to the housing units, such as a common corridor, entrance, machine/electric room, indoor parking garage and non-residential spaces.

NOTE Examples of categories of space and zone of residential buildings are given in Annex G.

6.2 Category of space or zone

Categories of space or zone shall be made of an inside as well as an outside housing unit.

6.2.1 Categories of space or zone inside housing unit

Categories of space and zone inside the housing unit are given in Table G.1.

6.2.2 Categories of space or zone outside housing unit

Categories of space and zone outside the housing unit are given in Table G.2.

Annex A
(informative)

Examples of time use as daily life of family

It is not easy to determine one typical family as a basis for the schedule and condition for energy calculation in residential buildings. However, for practicality, it is indispensable to assume any type of family, by which a consensus can be built with minimum discrepancy from common sense.

Statistics on the size of families and the age of householders are worth referring to. One way is to choose the family size and the age category of the householder of highest frequency. It is preferable to assume plural types of family with different numbers of family member.

The example in Figures A.1, A.2 and A.3 is for a four-member family, whose householder is a 46 year-old company employee with a 44 year-old unpaid housewife, a 16 year-old high school girl and a 14 year-old junior high school boy[21][22]. The time for sleeping, going-out, watching television, eating, bathing and so on is based on the existing survey carried out by a public broadcasting organization. In this example, there are three patterns of time use for 1) weekday, 2) holiday for going out and 3) holiday for staying at home.

The size of family has a relationship with the size of housing unit. When calculating the energy use for smaller housing units, schedule and condition for families of smaller size.

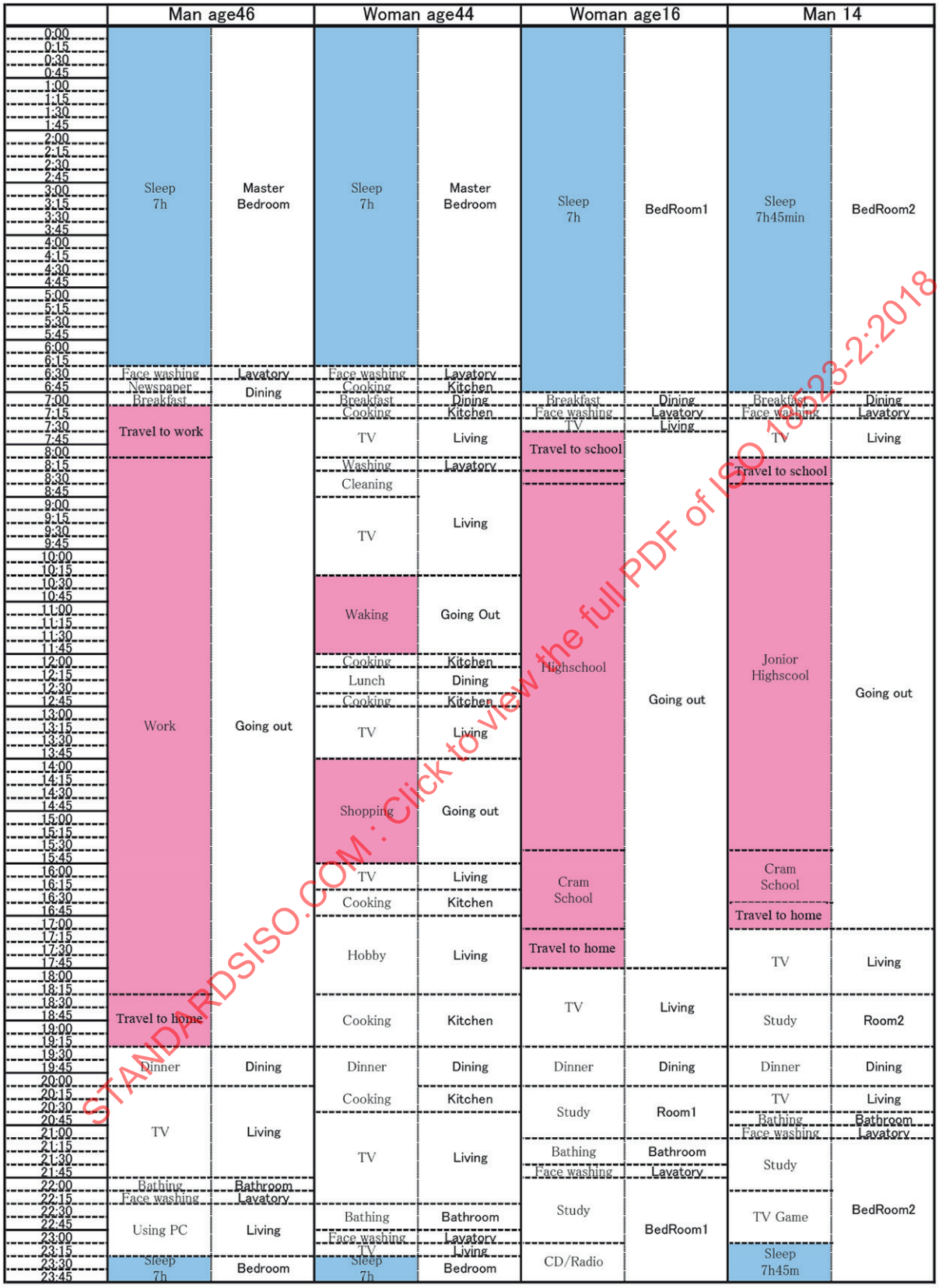

Figure A.1 — Time use for weekday (four-member family with 46 year-old male householder)

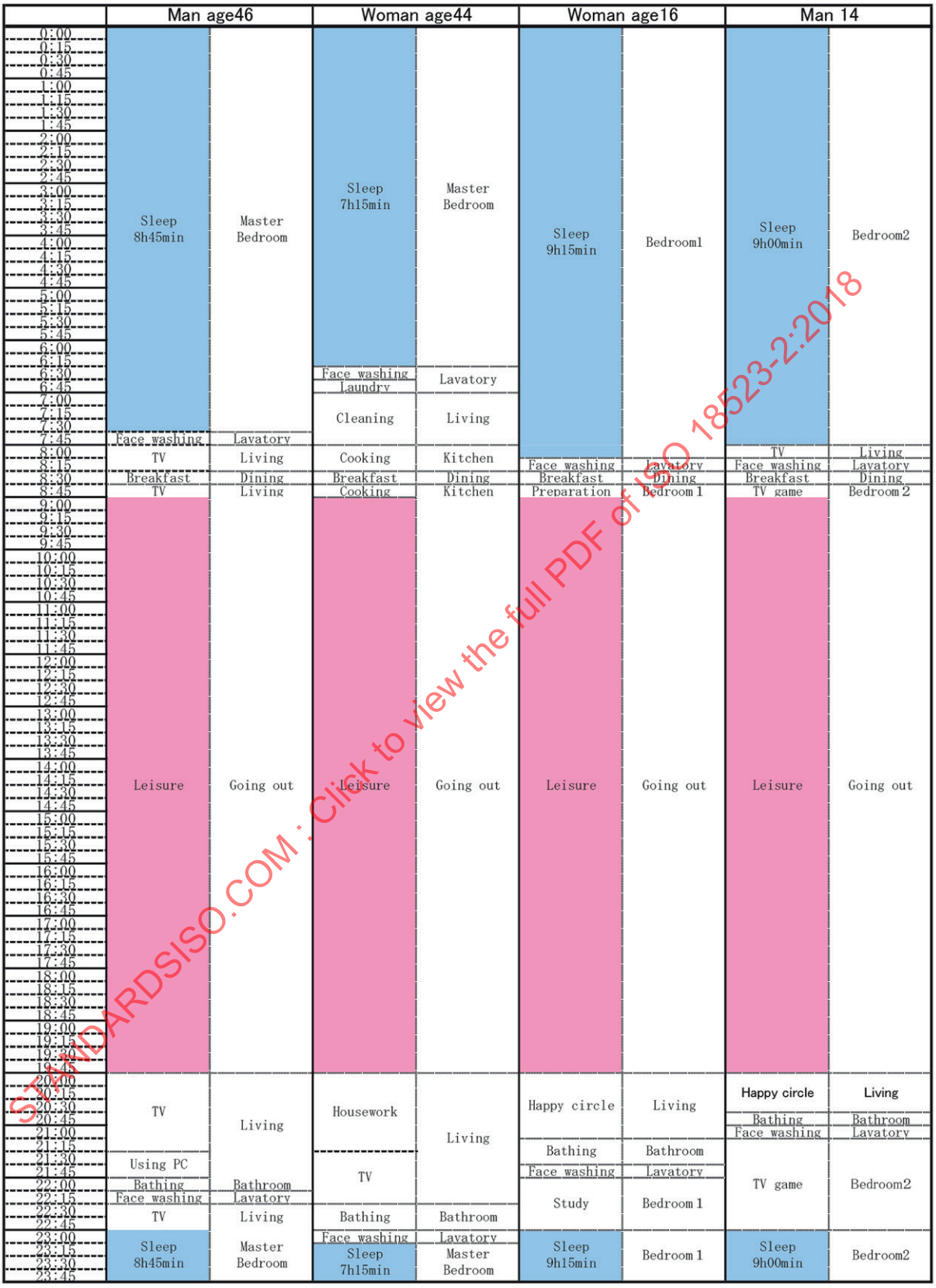

Figure A.2 — Time use for holiday for going out (four-member family with 46 year-old male householder)

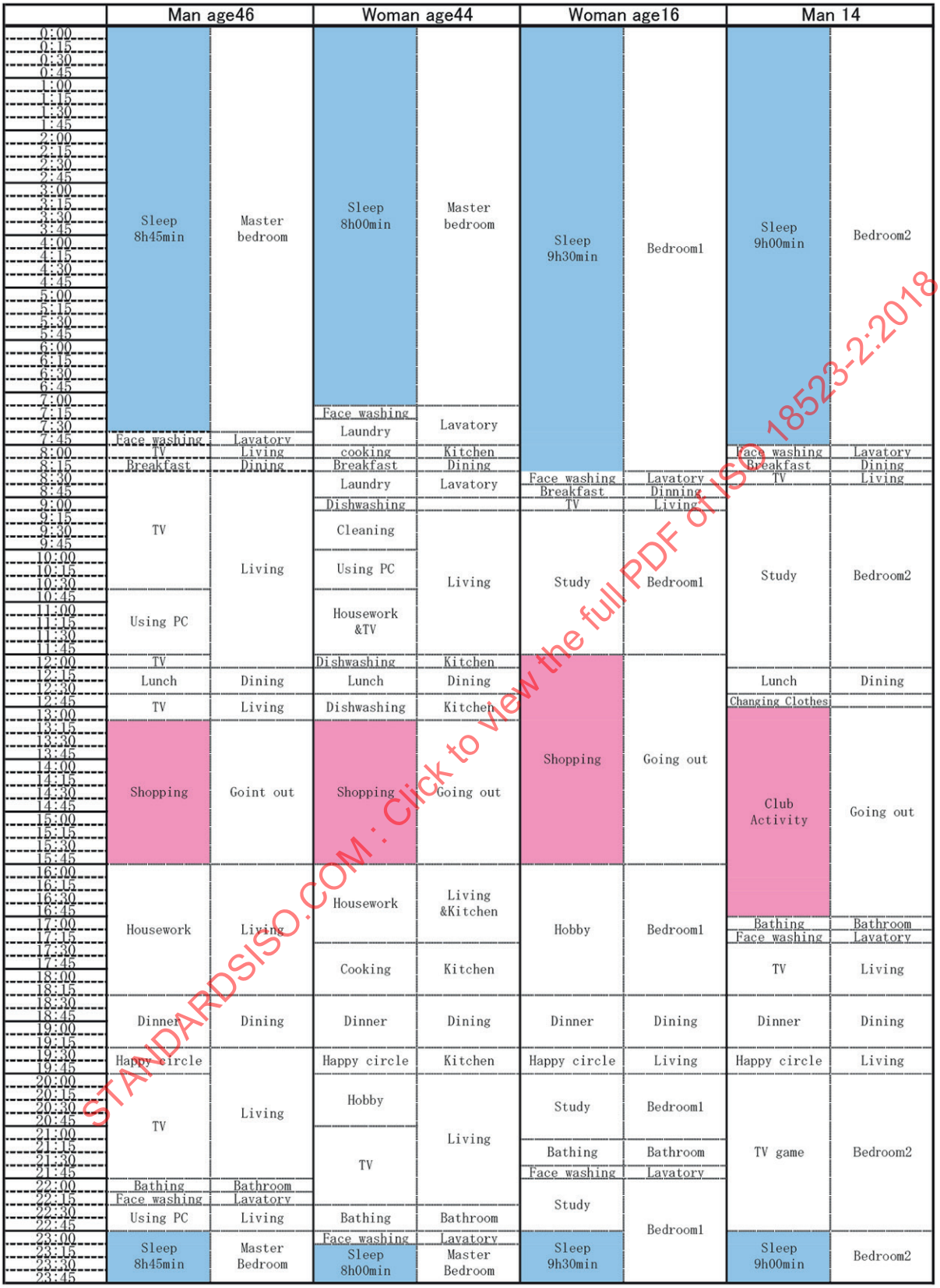

Figure A.3 — Time use for holiday for staying at home (four-member family with 46 year-old male householder)

Annex B
(informative)

Format of annual schedule by daily allocation of daily schedules

An example of format of the annual schedule by daily allocation of daily schedules is given in Table B.1. The daily allocation is for the minutest division of the year as prescribed in 4.3.

Table B.1 — Format of annual schedule by daily allocation of daily schedules

			Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.
January			Date					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Daily schedule					c	c	b	c	a	a	a	a	a	c	c	c	a	a	a	a	b
a	b	c	Date	18	19	20	21	22	23	24	25	26	27	28	29	30	31							
19	4	8	Daily schedule	c	a	a	a	a	a	b	c	a	a	a	a	a	c							
February			Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
			Daily schedule	c	a	a	a	a	a	b	c	a	a	c	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	22	23	24	25	26	27	28														
19	4	5	Daily schedule	c	a	a	a	a	a	b														
March			Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
			Daily schedule	c	a	a	a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	22	23	24	25	26	27	28	29	30	31											
22	3	6	Daily schedule	c	a	a	a	a	a	b	c	a	a											
April			Date				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			Daily schedule				a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	19	20	21	22	23	24	25	26	27	28	29	30									
21	4	5	Daily schedule	c	a	a	a	a	a	b	c	a	a	c	a									
May			Date						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			Daily schedule						a	b	c	c	c	c	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31						
19	4	8	Daily schedule	c	a	a	a	a	a	b	c	a	a	a	a	a	c	c						
June			Date		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			Daily schedule		a	a	a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	21	22	23	24	25	26	27	28	29	30											
22	4	4	Daily schedule	c	a	a	a	a	a	b	c	a	a											
July			Date				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			Daily schedule				a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	19	20	21	22	23	24	25	26	27	28	29	30	31								
22	4	5	Daily schedule	c	c	a	a	a	a	b	c	a	a	a	a	a								
August			Date							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			Daily schedule							b	c	a	a	a	a	a	c	c	c	c	c	c	c	b
a	b	c	Date	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					
21	5	5	Daily schedule	c	a	a	a	a	a	b	c	a	a	a	a	a	c	c	a					
September			Date			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			Daily schedule			a	a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	20	21	22	23	24	25	26	27	28	29	30										
19	4	7	Daily schedule	c	c	c	c	a	a	b	c	a	a	a										
October			Date					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Daily schedule					a	a	b	c	a	a	a	a	a	c	c	c	a	a	a	a	b
a	b	c	Date	18	19	20	21	22	23	24	25	26	27	28	29	30	31							
21	5	5	Daily schedule	c	a	a	a	a	a	b	c	a	a	a	a	a	c							
November			Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
			Daily schedule	c	a	a	a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	22	23	24	25	26	27	28	29	30												
20	4	6	Daily schedule	c	c	a	a	a	a	b	c	a												
December			Date			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			Daily schedule			a	a	a	a	b	c	a	a	a	a	a	c	c	a	a	a	a	a	b
a	b	c	Date	20	21	22	23	24	25	26	27	28	29	30	31									
19	4	8	Daily schedule	c	a	a	c	a	a	b	c	a	c	c	c									

Yearly total		
a	b	c
238	36	91

a: workday
b: day off for going out
c: day off for staying at home

Annex C
(informative)

Examples of schedules for space heating and cooling

The duration and the area of space heating and cooling influences their heat load and energy uses. For situations where most technical systems for space heating are any central types such as in North America and in Europe, it may not be necessary to consider an intermittent schedule for space heating. On the contrary, where space heating and/or cooling systems with distributed heat sources are popular, it is indispensable to prepare a schedule for intermittent and partial space heating and/or cooling, such as the one shown in Figure C.1. This schedule is prepared for the four-member family in Annex A.

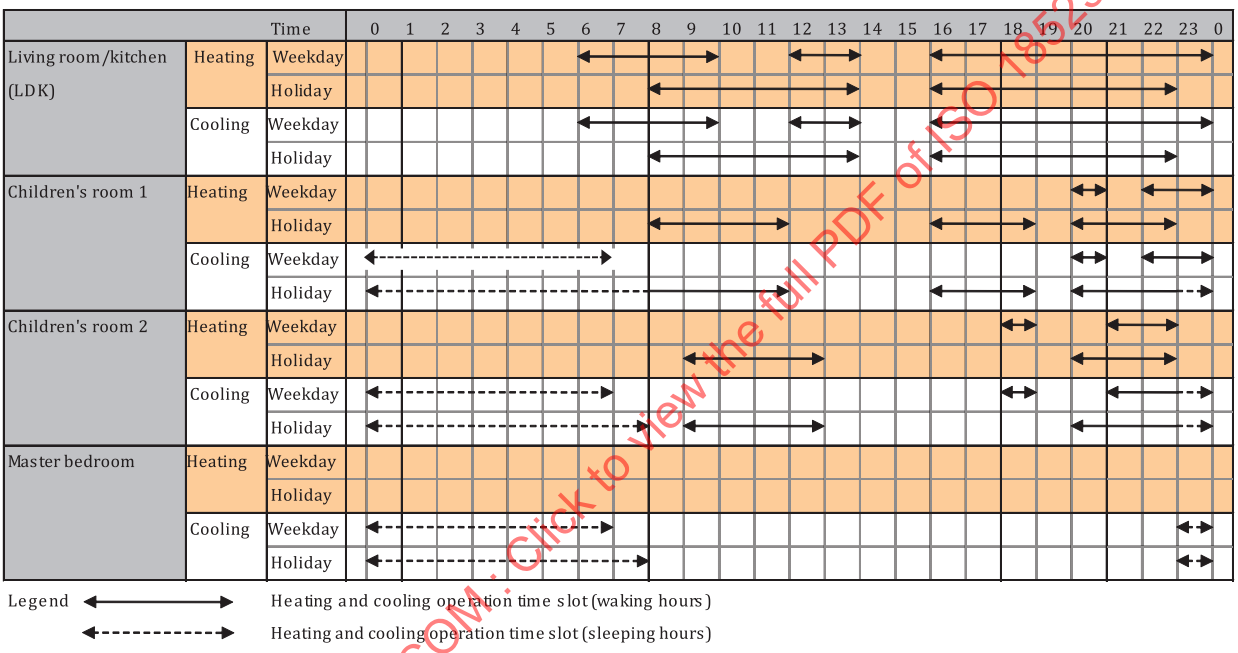

Figure C.1 — Schedule of space heating and cooling for partial and intermittent operation[12]

Annex D
(informative)

Example of schedule and area for local ventilation

The local ventilation causes the energy use for fan operation and affects the heat load for space heating and/or cooling. The frequency and the duration of local ventilation depends on the culture of living, and can vary among countries. Table D.1 gives an example of the schedule and area for local ventilation, in which three spaces (kitchen, bathroom and toilet) are assumed to have local ventilation[12].

Table D.1 — Schedule and area for local ventilation

Space	Weekday	Holiday for going out	Holiday for staying at home
Kitchen	1) 6:45-7:00 2) 12:00-12:15 3) 18:30–19:30 Total 90 min	1) 8:00-8:30 Total 30 min	1) 8:00-8:15 2) 12:00-12:15 3) 17:30–18:30 Total 90 min
Bathroom	1) 23:00-1:00 Total 120 min	1) 23:00-1:45 Total 165 min	1) 23:00-0:15 Total 75 min
Toilet	1) 6:15 2) 6:30 3) 6:45 4) 7:00 5) 9:30 6) 12:30 7) 16:00 8) 17:15 9) 18:30 10) 19:30 11) 20:30 12) 21:00 13) 21:30 14) 21:45 15) 23:00 16) 23:15 17) 23:30 18) 23:45 Total 90 min (5 min × 18)	1) 6:30 2) 7:45 3) 8:00 4) 8:15 5) 20:00 6) 20:15 7) 20:30 8) 20:45 9) 22:30 10) 22:45 11) 23:00 12) 23:15 Total 60 min (5 min × 12)	1) 7:15 2) 7:45 3) 8:00 4) 8:30 5) 10:15 6) 10:45 7) 11:00 8) 11:30 9) 16:00 10) 16:15 11) 16:30 12) 16:45 13) 19:00 14) 19:15 15) 19:30 16) 19:45 17) 22:00 18) 22:15 19) 22:30 20) 22:45 Total 100 min (5 min × 20)

Annex E
(informative)

Examples of schedule and condition for domestic hot water

The amount of hot water usage in housing unit shall be assumed on the basis of field surveys for hot water usage. In the surveys, hot water usage and temperature should be recorded in as many families as possible. Table E.1 gives an example of the assumption on the amount of domestic hot water usage for each daily schedule with variations. The condition of hot water usage is based on the result of field surveys for four-member families, in which the average daily usage in terms of 40 °C hot water (μ) was 450 l/day/family with standard deviation (σ) of 100 l/day/family. The total amounts of daily usage have been determined by either μ, μ ± σ or μ ± 2σ. The breakdown of the daily totals by purpose or space has also been determined on the basis of field surveys. The amount of each purpose or space can be reduced when authorized hot water saving faucets or shower nozzles are installed.

The assumption with daily variation is meaningful in the energy calculation for domestic hot water systems with predictive control of hot water temperature at the end of night storage, as well as for co-generation systems whose effectiveness in saving energy depend on the amounts of heat and electricity usage.

Table E.1 — Amount of hot water usage for four-member family (litres/day/family in terms of 40°C hot water)

Daily schedule with variation of total hot water usage	Number of days in year	Purpose or space for using hot water				Total
		Shower	Kitchen	Washroom	Bathtub	
Weekday (large)	31	200	136	34	180	550
Weekday (medium)	135	150	92	28	180	450
Weekday (small)	72	100	62	8	180	350
Holiday for staying at home (large)	31	240	184	46	180	650
Holiday for staying at home (small)	60	200	140	30	180	550
Holiday for going out	36	190	14	46	0	250