UNIVERSITÀ DEGLI STUDI DI TRIESTE

Regulatory Framework and Building Energy Design

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Italian interministerial Decree 26 June 2015 – Annex I

General requirements for new buildings and major first level renovations

In case of heating systems serving multiple real estate units, the installation of an accounting system is mandatory for heating, cooling and domestic hot water

To optimize the use of energy in buildings, for non-residential buildings it is mandatory to adopt Building Automation and Control Systems (BACS)

Systems to monitor and automatically adjust the energy usage while guaranteeing a comfortable environment

Italian interministerial Decree 26 June 2015 – Annex I

General requirements for new buildings and major first level renovations

In case of presence, at less than 1 km from the building considered in the project, of:

- district heating networks
- district cooling networks
- district heating projects approved by planning tools

in the presence of favorable technical-economic assessments, the preparation of the masonry and plant works necessary for connection to the aforementioned networks is mandatory

The service provider, upon request of the interested party, is required to declare the annual cost, including taxes and fixed quotas, of the supply of thermal energy required for standard use of the building

The service provider are required to provide certifications to validate the conversion factors into primary energy of the thermal energy supplied to the building delivery point

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

During the design stage shall be determined the parameters, the energy performance indices, expressed in kWh/(m^{2}year), and plant efficiencies of the analyzed building

The aforementioned values should be compared with the thresholds defined through the **REFERENCE BUILDING**

A building that is identical to the analyzed/real one in terms of:

- geometry (shape, volumes, walkable surfaces, surfaces of construction elements and components)
- orientation
- territorial location
- intended use
- boundary conditions

And having thermal characteristics and energy parameters determined in accordance with this Appendix

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

Why it is important to have a reference building?

⇩

Because it's a building having an envelope and a plant defined in their characteristics by the present regulation

⇩

It gives a reference value of how the real building would energetically perform if it was realized following all the requirements of the regulation

⇩

By comparing the performance output of the real and of the reference building it makes possible to evaluate more appropriately the performance of the real building depending on the aspects depicted in the previous slide (location, geometry, etc.)

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

H't parameter must be lower than the values of Table 10 of Appendix A *for new buildings and demolition and reconstruction*

H't = Global average heat transfer coefficient for transmission per unit of dispersing surface

Shape value (S/V)*	Climatic zone				
	A and B	C	D	E	F
S/V ≥ 0,7	0,58	0,55	0,53	0,50	0,48
0,7 > S/V ≥ 0,4	0,63	0,60	0,58	0,55	0,53
0,4 > S/V	0,80	0,80	0,80	0,75	0,70

$$H't = \frac{H_{tr,adj}}{\sum_k A_k} \left[\frac{W}{m^2 K}\right]$$

Overall heat exchange coefficient for transmission of the envelope computed as stated by the UNI/TS 11300-1 regulation [W/K]

Surface area of the k-th component (opaque or transparent) of the envelope [m2]

Accounts for heat transfer by transmission towards outside environment, ground, unheated spaces and other spaces heated with different temperatures

* Expresses the compactness of a building and is obtained from the ratio between the heat-dissipating surface and the air-conditioned volume

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

H't parameter must be lower than the values of Table 11 of Appendix A for major first level renovations

Climatic zone	EX ANTE ratio between the surface area of the glazed components and the surface area of all components (glazed and/or opaque) of the building undergoing intervention																		
	≤ 9 %	≤ 14 %	≤ 19 %	≤ 24 %	≤ 28 %	≤ 33 %	≤ 38 %	≤ 43 %	≤ 47 %	≤ 52 %	≤ 57 %	≤ 62 %	≤ 67 %	≤ 71 %	≤ 76 %	≤ 81 %	≤ 86 %	≤ 90 %	≤ 95 %	≤100%
A, B	0,72	0,82	0,92	1,01	1,10	1,18	1,26	1,34	1,41	1,47	1,53	1,59	1,64	1,68	1,72	1,76	1,79	1,82	1,84	1,86
C	0,60	0,64	0,71	0,78	0,85	0,91	0,97	1,03	1,08	1,14	1,18	1,23	1,27	1,31	1,35	1,38	1,42	1,44	1,47	1,49
D	0,58	0,58	0,59	0,65	0,70	0,75	0,81	0,86	0,90	0,95	0,99	1,03	1,07	1,11	1,14	1,18	1,21	1,24	1,26	1,29
E	0,55	0,55	0,55	0,55	0,58	0,62	0,66	0,70	0,74	0,78	0,82	0,85	0,89	0,92	0,95	0,99	1,02	1,04	1,07	1,10
F	0,53	0,53	0,53	0,53	0,53	0,53	0,56	0,60	0,63	0,66	0,69	0,72	0,75	0,79	0,82	0,85	0,87	0,90	0,93	0,96

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

$A_{sol,est}/A_{sup,utile}$ parameter must be lower than the values of Table ~~11~~ *12* of Appendix A

Equivalent summer solar area per unit of usable surface area [-]

Building category	All climatic zones
Category E.1 with the exception of colleges, convents, prisons, barracks, and category E.1(3)	0,030
All other buildings	0,040

$$A_{sol,est} = \Sigma_k \, F_{sh,ob} \times g_{gl+sh} \times (1 - F_F) \times A_{w,p} \times F_{sol,est} \quad [m^2]$$

$F_{sh,ob}$ = reduction factor for shading related to external elements for the effective solar collection area of the k-th glazed surface, referred to the month of July

g_{gl+sh} = total solar energy transmittance of the window calculated in the month of July, when the solar shading is used

F_F = ratio between the projected area of the frame and the total projected area of the window component

$A_{w,p}$ = the total projected area of the glazed component (window compartment area)

$F_{sol,est}$ = correction factor for incident solar radiation

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

$EP_{H,nd}$, $EP_{C,nd}$ and $EP_{gl,tot}$ parameters must be lower than the values computed for the reference building for which energy parameters, thermal and generation characteristics are given in the relevant tables of Chapter 1, of Appendix A **(*)**

$EP_{H,nd}$ = heating thermal performance index [kWh/m^2] → indicates the energy requirement of a building's envelope for heating in standard winter conditions

$EP_{C,nd}$ = cooling thermal performance index [kWh/m^2] → indicates the energy requirement of a building's envelope for cooling in standard summer conditions

$EP_{gl,tot}$ = total global energy performance index of the building [kWh/m^2] → indicates the energy requirement of a building for heating, cooling, domestic hot water production, ventilation, lighting and transport

(*) Tables of Chapter 1, Appendix A can be found in the slides describing energy requalification

Italian interministerial Decree 26 June 2015 – Annex I ↔Appendix A

Technical requirements for new buildings and major first level renovations

η_H, η_C and η_w parameters must be higher than the values computed for the reference building for which energy parameters and thermal characteristics are given in Tables 7 and 8 of Appendix A

Efficiency of utilizazion subsystems	H	C	W
Hydronic distribution	0,81	0,81	0,70
Aeraulic distribution	0,83	0,83	\
Mixed distribution	0,82	0,82	\

Generation subsystems	Thermal energy production			On-site electric energy production
	H	C	W	
Liquid fuel generator	0,82	\	0,80	\
Gas fuel generator	0,95	\	0,85	\
…	…	…	…	…
Heat-pump	3,00	2,50	2,50	\
…	…	…	…	…
District heating	0,97	\	\	\
…	…	…	…	…

η_H = heating service efficiency [-]

η_C = cooling service efficiency [-]

η_w = domestic hot water production service efficiency [-]

All efficiencies are calculated as the ratio between the useful thermal energy requirement of the service and the corresponding total primary energy requirement

Italian interministerial Decree 26 June 2015 – Annex I

Technical requirements for new buildings and major first level renovations

In order to limit energy requirements for summer air conditioning and maintain indoor temperatures, the designer:

- carefully assesses and documents the effectiveness of shading systems on external or internal glass surfaces, in order to reduce solar heat gains
- carries out, with the exception of buildings classified in categories E.6 and E.8, in all climate zones except F, for locations where the average monthly horizontal irradiance value in the month of maximum summer sunshine is ≥ 290 W/m^2:
  - at least one of the following checks, for all opaque vertical walls with the exception of those included in the NW/N/NE quadrant:
    - that the surface mass is ≥ 230 kg/m^2;
    - that the periodic thermal transmittance module is < 0.10 W/(m^2 K)
  - verification, for all horizontal and inclined opaque walls, that the periodic thermal transmittance module is < 0.18 W/(m^2 K)

Italian interministerial Decree 26 June 2015 – Annex I

Technical requirements for new buildings and major first level renovations

With the exception of category E.8, in the case of:

- new construction or demolitions and reconstructions to be carried out in climate zones C, D, E, F
- construction of internal walls to separate real estate units

The transmittance value of:

- the building structures separating adjacent buildings
- the building structures separating real estate units

Without prejudice to compliance with the passive acoustic requirements of buildings, must be:

≤ 0.8 W/(m^2 K) in the case of vertical and horizontal dividing walls

The same limit must be respected for all opaque vertical, horizontal and inclined structures, which delimit from the outside the rooms not equipped with air conditioning systems adjacent to the air-conditioned rooms *if subject to intervention*