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Input and method selection data sheet - Italian choices

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Sommario

Il presente documento costituisce l'appendice nazionale della UNI EN 16798-13.
Esso definisce le scelte tra i metodi, i dati di input richiesti e i riferimenti ad altre norme per la sua applicazione a livello nazionale.
L'aggiunta della presente appendice nazionale (normativa) costituisce l'unica modifica rispetto alla versione precedente della norma.

I destinatari di questo documento sono invitati a presentare, insieme ai loro commenti, la notifica di eventuali diritti di brevetto di cui sono a conoscenza e a fornire la relativa documentazione.

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2024-09-15

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Relazioni Nazionali

La presente norma sostituisce la UNI EN 16798-13:2018.

Relazioni Internazionali

Premessa

La presente norma è stata elaborata sotto la competenza dell'ente federato all'UNI CTI - Comitato Termotecnico Italiano

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Annex NA
(normative)

Input and method selection data sheet — Italian choices

NA.1 General

The template in Annex NA to this standard shall be used to specify the choices between methods, the required input data and references to other standards.

NOTE 1 Following this template is not enough to guarantee consistency of data.

NOTE 2 Informative default choices are provided in Annex B. Alternative values and choices can be imposed by national / regional regulations. If the default values and choices of Annex B are not adopted because of the national / regional regulations, policies or national traditions, it is expected that:

— national or regional authorities prepare data sheets containing the national or regional values and choices, in line with the template in Annex NA; or

— by default, the national standards body will add or include a national annex (Annex NA) to this standard, in line with the template in Annex NA, giving national or regional values and choices in accordance with their legal documents.

NOTE 3 The template in Annex NA is applicable to different applications (e.g. the design of a new building, certification of a new building, renovation of an existing building and certification of an existing building) and for different types of buildings (e.g. small or simple buildings and large or complex buildings). A distinction in values and choices for different applications or building types could be made:

— by adding columns or rows (one for each application), if the template allows;

— by including more than one version of a Table (one for each application), numbered consecutively as a, b, c, … For example: Table NA.3a, Table NA.3b.

— by developing different national / regional data sheets for the same standard. In case of a national annex to the standard these will be consecutively numbered (Annex NA, Annex NB, Annex NC, …).

NOTE 4 In the section "Introduction" of a national / regional data sheet information can be added, for example about the applicable national / regional regulations.

NOTE 5 For certain input values to be acquired by the user, a data sheet following the template of Annex NA, could contain a reference to national procedures for assessing the needed input data. For instance, reference to a national assessment protocol comprising decision trees, tables and pre-calculations.

The shaded fields in the tables are part of the template and consequently not open for input.

NA.2 References

The references, identified by the module code number, are given in Table NA.1.

Table NA.1 —References

Reference	Reference document [a]
M1–9	EN ISO 52000-1, *Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures (ISO 52000-1)*
M1–13	EN ISO 52010-1, *Energy performance of buildings — External climatic conditions — Part 1: Conversion of climatic for energy calculations (ISO 52010-1)*
M3–1	EN 15316-1, *Energy performance of buildings - Method for calculation of system energy requirements and system efficiencies - Part 1: General and Energy performance expression, Module M3-1, M3-4, M3-9, M8-1, M8-4*
M4–1	EN 16798–9, *Energy performance of buildings — Ventilation for buildings — Part 9: Calculation methods for energy requirements of cooling systems (Modules M4–1, M4-4, M4-9) — General*
M4–4	EN 16798–9, *Energy performance of buildings — Ventilation for buildings — Part 9: Calculation methods for energy requirements of cooling systems (Modules M4–1, M4-4, M4-9) — General (Clause 7)*
M4–6	EN 15316–3, *Energy performance of buildings, Method for calculation of system energy requirements and system efficiencies — Part 3: Space distribution systems (DHW, heating and cooling), Modules M3–6, M4–6, M8–6*
M4–7	EN 16798–15, *Energy performance of buildings — Ventilation for buildings — Part 15: Calculation of cooling systems (Module M4–7) — Storage*
M10–12	*UNI EN ISO 52120-1, Energy performance of buildings - Contribution of building automation, controls and building management - Part 1: General framework and procedures*

NA.3 Input data method 1

NA.3.1 Product description data

The product description data are given in Table NA.2.

Table NA.2 — Product description data

GEN_TYPE	HEAT_REC_TYPE
from system design or inspection	from system design or inspection

NA.3.2 Product technical data tables

NA.3.2.1 Product technical data values

The compression chiller EER values must be taken from product data, available from the producer; only if not available, indicative average EER values are given in Table NA.3.

Table NA.3 — Compression chiller EER values

Nominal power, kW	EER_{nom}
12	2,9
100	3,1
300	3,2
600	3,4
> = 1000	3,5

NA.3.2.2 Product technical data values

The specific electrical power consumptions of the heat rejection system are given in Table NA.4, if not available from factory product data.

Table NA.4 — Specific electrical power consumption values

Symbol	Unit		HEAT_REC_TYPE				
			Air cooled	Water Cooled			
			AIR_C_COND	DRY	WET		HYBRID
					Open circuit	Closed circuit	
$p_{hr;el;dry}$	kW/kW		0	0,045	-	-	0,025
$p_{hr;el;wet}$	kW/kW	Without additional sound absorber (axial fans)	0	0	0,033	0,018	0,033
		With additional sound absorber (radial fans)	0	0	0,040	0,021	0,040

NA. 3.2.3 Control values

The electric power consumption of control devices, if product technical data values are not available from factory product data, are given in Table NA.5.

Table NA.5 — Control values

Symbol	Unit	Value
$P_{el;C;ctrl,i}$	kW	0,1

NA.3.3 System design data

NA.3.3.1 Qualitative process design data choices

The choice for the identifier FREE_COOL_OP is from system design or ispection.

NA.3.3.2 Quantitative process design data choices

The quantitative process design data are taken from system design or inspection; only if not available, they can be taken from the following Table NA.6.

Table NA.6 — Quantitative process design data

Symbol	unit	Value
n	—	from system design or inspection
$\vartheta_{lim;wet;hr}$	°C	22
$\Delta\vartheta_{fc}$	°C	4
$\Delta\vartheta_{hr}$	°C	4

NA.3.3.3 Process control options

The process control options are given in Table NA.7.

Table NA.7 — Process control options

HBRD_HEAT_REJ_CTRL
from system design or inspection

NA.4 Input data method 2

NA.4.1 Product description data

The product description data are given in Table NA.8.

Table NA.8 — Product description data

Type	Identifier
REFR_TYPE	from system design or inspection
GEN_TYPE	from system design or inspection
COMP_TYPE	from system design or inspection
HEAT_REJ_TYPE	from system design or inspection

NA.4.2 Product technical data

NA.4.2.1 Heat rejection values

The specific electrical power consumptions of the heat rejection system are given in Table NA.9, if not available from factory product data.

Table NA.9 — Values for specific electrical power consumption of heat rejection

Type of heat rejection system	Specific electrical power consumption $p_{hr;el}$ in kW/kW		
	If HEAT_REJ_TYPE = WET (including water spray pumps)		If HEAT_REJ_TYPE = DRY
	Open circuit	Closed circuit	
Without additional sound absorber (axial ventilators)	0,033	0,018	0,045
With additional sound absorber (radial ventilators)	0,040	0,021	-

NA.4.3 System design data

NA.4.3.1 Quantitative process design data choices

The quantitative process design data are given in Table NA.10, if not available from factory data.

Table NA.10 — Quantitative process design data

Symbol	Unit	Value	Condition
$\Delta\vartheta_{cond}$	K	4	REFR_TYPE = WTR_CLG_CHLL
$\Delta\vartheta_{cond}$	K	10	TYPE = (AIR_CLG_RAC or AIR_CLG_CHLL) and AIR_CLG_HEAT_REJ = EXTERNAL
$\Delta\vartheta_{evap}$	K	20	REFR_TYPE = AIR_CLG_CHLL and AIR_CLG_HEAT_REJ = INTERNAL
$\Delta\vartheta_{evap}$	K	6	REFR_TYPE = (AIR_CLG_CHLL or WTR_CLG_CHLL)

NA.4.3.2 Part-load value of absorption type chiller systems

The part-load value of absorption type chiller systems is PLV = 0,95, if not available from factory data PLV values as function of partial load ratio.

NA.4.3.3 Values for heat rejection system calculation

The values for heat rejection system calculation is given in Table NA.11, if not available from factory data.

Table NA.11 — Values for heat rejection system calculation

Parameter	Symbol	Value	Formula
If HEAT_REJ_TYPE = WET or (HEAT_REJ_TYPE = HBRD and HBRD_HEAT_REJ_CTRL = HBRD_WET):			
temperature ratio of evaporation	η_e	$0{,}0048 \cdot \vartheta_{e,wb} + 0{,}444$	(49)
If HEAT_REJ_TYPE = DRY or (HEAT_REJ_TYPE = HBRD and HBRD_HEAT_REJ_CTRL = HBRD_DRY):			
temperature ratio of evaporation	η_e	0,417	(50)
Herein, $\vartheta_{e,wb}$ is the wet-bulb temperature of the outdoor environmental air ($10°C \leq \vartheta_{e,wb} \leq 25°C$).			

NA.4.3.4 Process control options

The process control options are given in Table NA.12.

Table NA.12 — Process control options

Type	Identifier
CLG_GEN_TMP_CTRL	from system design or inspection
CLG_GEN_ARR	from system design or inspection
HBRD_HEAT_REJ_CTRL	from system design or inspection

NA.4.3.5 Part-load factors for air-cooled room conditioning systems

The part-load factors for air-cooled room conditioning systems are given in Table NA.13. For the sake of simplicity, the system combinations assigned to it are displayed in Table NA.14.

Table NA.13 — Part-load factors $f_{C;PL;k}$ for air-cooled room air-conditioning systems

System Identifier (see Table B.13)	Part-load stage k									
	0,1	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**
AIR_CLG_RAC_A	1,34	1,34	1,34	1,34	1,27	1,23	1,16	1,09	1,02	0,95
AIR_CLG_RAC_B	0,68	0,73	0,77	0,80	0,86	0,93	0,95	0,97	0,94	0,90
AIR_CLG_RAC_C	1,52	1,54	1,57	1,69	1,45	1,31	1,21	1,09	1,03	0,95
AIR_CLG_RAC_D	0,77	1,18	1,42	1,55	1,54	1,46	1,35	1,19	1,06	0,92

Table NA.14 — System combinations for air-cooled room air-conditioning systems

Code	Meaning
AIR_CLG_RAC_A	REFR_TYPE = AIR_CLG_RAC and COMP_CTRL_TYPE = FIXED and AIR_CLG_RAC_ZONE_TYPE = SINGLE *(i.e. split system)*
AIR_CLG_RAC_B	REFR_TYPE = AIR_CLG_RAC and COMP_CTRL_TYPE = FIXED and AIR_CLG_RAC_ZONE_TYPE = MULTIPLE *(i.e. multi-split system, if applicable with exhaust chamber connection or cylinder disconnection)*
AIR_CLG_RAC_C	REFR_TYPE = AIR_CLG_RAC and COMP_CTRL_TYPE = VARIABLE_INVERTER and AIR_CLG_RAC_ZONE_TYPE = SINGLE *(i.e. split system)*
AIR_CLG_RAC_D	REFR_TYPE = AIR_CLG_RAC and COMP_CTRL_TYPE = VARIABLE_INVERTER and AIR_CLG_RAC_ZONE_TYPE = MULTIPLE (*i.e. multi-split* or *variable-refrigerant flow system)*

NA.4.3.6 Part-load factors for air-cooled chiller systems

The part-load factors for air-cooled chiller systems are given in Table NA.15.

Table NA.15 — Part-load factors $f_{C;PL;k}$ for air-cooled chiller systems

COMP_CTRL_TYPE Identifier	**Part-load stage** k									
	0,1	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**
COMP_TYPE = PSTN (piston compressor)										
FIXED	0,83	0,87	0,92	0,95	0,98	1,00	1,01	1,02	1,01	1,00
STAGED	0,87	1,03	1,05	1,06	1,03	1,08	1,09	1,07	1,03	1,00
VARIABLE_INVERTER	Currently no data available									
VARIABLE_OTHER	See accompanying TR for examples									
COMP_TYPE = SCRL (scroll compressor)										
FIXED	0,83	0,87	0,92	0,95	0,98	1,00	1,01	1,02	1,01	1,00
STAGED	0,87	1,03	1,05	1,06	1,03	1,08	1,09	1,07	1,03	1,00
VARIABLE_INVERTER	0,43	0,54	0,65	0,75	0,84	0,91	0,97	1,01	1,02	1,00
VARIABLE_OTHER	See accompanying TR for examples									
COMP_TYPE = SCRW (screw compressor)										
FIXED	Not appropriate									
STAGED	Currently no data available									
VARIABLE_INVERTER	1,19	1,19	1,13	1,08	1,05	1,04	1,03	1,03	1,02	1,00
VARIABLE_OTHER	See accompanying TR for examples									
COMP_TYPE = CTRF (centrifugal compressor)										
FIXED	Not appropriate									
STAGED	Currently no data available									
VARIABLE_INVERTER	1,40	1,40	1,32	1,24	1,18	1,13	1,09	1,06	1,03	1,00
VARIABLE_OTHER	See accompanying TR for examples									

NA.4.3.7 Part-load factors for water-cooled chiller systems

The part-load factors for water-cooled chiller systems are given in Table NA.16.

Table NA.16 — Part-load factors $f_{C;PL;k}$ for water-cooled chiller systems

COMP_CTRL_TYPE Identifier	**Part-load stage** k									
	0,1	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**
COMP_TYPE = PSTN (piston compressor)										
FIXED	0,96	0,94	0,92	0,90	0,90	0,90	0,92	0,94	0,96	1,00
STAGED	1,14	1,17	1,19	1,20	1,18	1,16	1,13	1,10	1,05	1,00
VARIABLE_INVERTER	Currently no data available									
VARIABLE_OTHER	See accompanying TR for examples									
COMP_TYPE = SCRL (scroll compressor)										
FIXED	0,96	0,94	0,92	0,90	0,90	0,90	0,92	0,94	0,96	1,00
STAGED	1,14	1,17	1,19	1,20	1,18	1,16	1,13	1,10	1,05	1,00
VARIABLE_INVERTER	Currently no data available									
VARIABLE_OTHER	See accompanying TR for examples									
COMP_TYPE = SCRW (screw compressor)										
FIXED	Not appropriate									
STAGED	Currently no data available									
VARIABLE_INVERTER	0,62	0,77	0,88	0,95	0,98	1,00	1,00	0,99	0,99	1,00
VARIABLE_OTHER	See accompanying TR for examples									
COMP_TYPE = CTRF (centrifugal compressor)										
FIXED	Not appropriate									
STAGED	Currently no data available									
VARIABLE_INVERTER	1,42	1,41	1,38	1,34	1,29	1,24	1,18	1,12	1,06	1,00
VARIABLE_OTHER	See accompanying TR for examples									

NA.4.3.8 Heat rejection part-load factors

The heat rejection part-load factors are given in Table NA.17.

Table NA.17 — Electrical heat rejection part-load factors $f_{hr;PL;el}$

HEAT_REJ_CTRL	HEAT_REJ_TYPE or HBRD_HEAT_REJ_CTRL	
	DRY or HBRD_DRY	WET or HBRD_WET
NO_CTRL	1	1
CNST_ TEMP	0,1	0,1
VAR_ TEMP	0,45	0,8

NA.4.3.9 Heat rejection part-load coefficients and temperature

The reference temperatures of the heat rejection system are provided in Table NA.18. The coefficients and temperature of heat rejection system part-load factor formula are given in Table NA.19.

Table NA.18 — Reference temperatures of the heat rejection system

Case	System	$\vartheta_{C;gen:hr;req;in;ref}$	$\vartheta_{C;gen:hr;req;out;ref}$
If REFR_TYPE = AIR_**CLG**_RAC or **CLG_GEN_TMP_CTRL** = FALS E		32	n/a
REFR_TYPE = AIR_CLG_CHLL and CLG_GEN_TMP_CTRL = TRUE **a**	GEN_TYPE = COMP and (COMP_TYPE = PSTN or COMP_TYPE = SCRL)	32	n/a
	GEN_TYPE = COMP and (COMP_TYPE = SCRW or COMP_TYPE = CTRF)	32	n/a
REFR_TYPE = WTR_CLG_CHL L and CLG_GEN_TMP_CTRL = TRUE **b**	GEN_TYPE = COMP and HEAT_REJ_TYPE = WET (33/27°C)	$\vartheta_{C;wat:hr;in;ref}$ = 33	$\vartheta_{C;wat:hr;in;ref}$ = 27
	GEN_TYPE = COMP and (COMP_TYPE = PSTN or COMP_TYPE = CTRF) and HEAT_REJ_TYPE = DRY (45/40°C, 30 % glycol)	$\vartheta_{C;wat:hr;in;ref}$ = 45	$\vartheta_{C;wat:hr;in;ref}$ = 40
	GEN_TYPE = COMP and COMP_TYPE = SCRW and HEAT_REJ_TYPE = DRY (45/40°C, 30 % glycol)	$\vartheta_{C;wat:hr;in;ref}$ = 45	$\vartheta_{C;wat:hr;in;ref}$ = 40

Table NA.19 — Coefficients and temperature of heat rejection system part-load factor formula

Case	System	ϑ	a_2	a_1	a_0	Validity
If REFR_TYPE = AIR_CLG_RAC or CLG_GEN_TMP_CTRL = FALSE		—	0	0	1	always
REFR_TYPE = AIR_CLG_CHLL and CLG_GEN_TMP_CTRL = TRUE[a]	GEN_TYPE = COMP and (COMP_TYPE = PSTN or COMP_TYPE = SCRL)	ϑ_e	0,00083	−0,07753	2,64	12°C ≤ ϑ_e ≤ 35°C
	GEN_TYPE = COMP and (COMP_TYPE = SCRW or COMP_TYPE = CTRF)	ϑ_e	0,00071	−0,08224	2,91	12°C ≤ ϑ_e ≤ 35°C
REFR_TYPE = WTR_CLG_CHLL and CLG_GEN_TMP_CTRL = TRUE[b]	GEN_TYPE = COMP and HEAT_REJ_TYPE = WET (33°C/27°C)	$\vartheta_{C;wat:hr;in}$	0	−0,0307	2,0164	12°C ≤ $\vartheta_{C;wat:hr;in}$ ≤ 40°C
	GEN_TYPE = COMP and (COMP_TYPE = PSTN or COMP_TYPE = CTRF) and HEAT_REJ_TYPE = DRY (45/40°C, 30 % glycol)	$\vartheta_{C;wat:hr;in}$	0	−0,0249	2,1181	15°C ≤ $\vartheta_{C;wat:hr;in}$ ≤ 50°C
	GEN_TYPE = COMP and COMP_TYPE = SCRW and HEAT_REJ_TYPE = DRY (45/40°C, 30 % glycol)	$\vartheta_{C;wat:hr;in}$	0	−0,0486	3,1851	15°C ≤ $\vartheta_{C;wat:hr;in}$ ≤ 50°C

[a] For cases of lower ambient temperatures, a lower limit is defined to be ϑ_e = 12 °C.
[b] Temperatures of $\vartheta_{C;wat:hr;in} \geq \vartheta_{C;wat:hr;in;limit}$ with $\vartheta_{C;wat:hr;in;limit}$ = 20 °C are suggested to be employed for calculation, since lower temperatures yield an extraordinary energy consumption for cooling, which compensates the increase of energy efficiency.

NA.4.3.10 Free cooling factors

The free cooling factors are given in Table NA.20.

Table NA.20 — Free cooling factors

Free cooling factor	Value
$f_{hr,fc}$	1,0
$f_{hr,fc,el}$	1,0

NA.4.3.11 Multiple cooling generator factors

The multiple cooling generator factors are given in Table NA.21. For the sake of simplicity, four part-load control classes are introduced and system combinations assigned to it are displayed in Table NA.22.

Table NA.21— Multiple cooling generator factors $f_{C;mult}$ for various part-load control classes

CLG_GEN_ARR	Number of generators	Part-load control class (see Table NA.22 for system identifiers)			
		A[a]	B[a]	C[b]	D
SINGLE	1	1,0			
SEQUENTIAL	2	1,31	1,14	1,03	0,93
	≥ 3	1,38	1,16	1,03	0,91
PARALLEL [c]	≥ 2, if $\frac{\Phi_{C,gen,n,min}}{\Phi_{C,gen,n,max}} \geq 0{,}25$	1,10	1,07	1,01	0,96
	≥ 2, if $\frac{\Phi_{C,gen,n,min}}{\Phi_{C,gen,n,max}} \leq 0{,}25$	1,28	1,12	1,02	0,94

[a] For cases of unequal load distribution it is assumed that the smallest machine is the master machine.
[b] For cases of unequal load distribution it is assumed that the largest machine is the master machine.
[c] If all generators are loaded equally, $f_{c;mult} = 1{,}0$.
[d] This is the default for unknown nominal power ratios.

Table NA.22— System identifiers assigned to part-load control classes

Part-load control class	System identifiers
A	REFR_TYPE = AIR_CLG_RAC and COMP_CTRL_TYPE = (FIXED or STAGED) REFR_TYPE = AIR_CLG_CHLL and COMP_TYPE = SCRL and COMP_CTRL_TYPE = VARIABLE_INVERTER REFR_TYPE = AIR_CLG_CHLL and COMP_TYPE = SCRW and COMP_CTRL_TYPE = VARIABLE_OTHER[a] REFR_TYPE = WTR_CLG_CHLL and COMP_TYPE = PSTN and COMP_CTRL_TYPE = STAGED[b] REFR_TYPE = WTR_CLG_CHLL and COMP_TYPE = (PSTN or SCRL) and COMP_CTRL_TYPE = VARIABLE_OTHER[c]
B	REFR_TYPE = WTR_CLG_CHLL and COMP_TYPE = (SCRW [a] or CTRF[d]) and COMP_CTRL_TYPE = VARIABLE_OTHER REFR_TYPE = WTR_CLG_CHLL and COMP_TYPE = SCRW and COMP_CTRL_TYPE = VARIABLE_INVERTER
C	REFR_TYPE = AIR_CLG_CHLL and COMP_TYPE = (PSTN or SCRL) and COMP_CTRL_TYPE = (FIXED or STAGED) REFR_TYPE = WTR_CLG_CHLL and COMP_TYPE = (PSTN or SCRL) and COMP_CTRL_TYPE = FIXED
D	REFR_TYPE = WTR_CLG_CHLL and COMP_TYPE = (PSTN or SCRL) and COMP_CTRL_TYPE = STAGED REFR_TYPE = (AIR_CLG_CHLL or WTR_CLG_CHLL) and COMP_TYPE = (CTRF or SCRW) and COMP_CTRL_TYPE = VARIABLE_INVERTER

[a] If distributor valve control is employed for part-load control.
[b] If cylinder disconnection is employed for part-load control.
[c] If hot-gas by-pass is employed for part-load control.
[d] If an inlet throttle is employed for part-load control.
[e] If an inverter control is employed for part-load control.