

INTERPRETATIVE DOCUMENT

Essential Requirement No. 6

"ENERGY ECONOMY AND HEAT RETENTION"

CONTENTS

- 1. GENERAL**
 - 1.1 Purpose and scope
 - 1.2 Levels or classes for essential requirements and for related product performances
 - 1.3 Meaning of general terms used in the Interpretative Documents
- 2. EXPLANATION OF THE ESSENTIAL REQUIREMENT "ENERGY ECONOMY AND HEAT RETENTION"**
 - 2.1 Energy uses considered by this Interpretative Document
 - 2.2 Specific Terminology
- 3. BASIS FOR VERIFICATION OF THE SATISFACTION OF THE ESSENTIAL REQUIREMENT "ENERGY ECONOMY AND HEAT RETENTION"**
 - 3.1 General
 - 3.2 Actions
 - 3.3 Verification of the satisfaction of the essential requirement
- 4. TECHNICAL SPECIFICATIONS AND GUIDELINES FOR EUROPEAN TECHNICAL APPROVAL**
 - 4.1 General
 - 4.2 Provisions concerning works or parts of them
 - 4.3 Provisions concerning products
- 5. WORKING LIFE, DURABILITY**
 - 5.1 Treatment of working life of construction works in relation to the essential requirement
 - 5.2 Treatment of working life of construction products in relation to the essential requirement

ESSENTIAL REQUIREMENT :
ENERGY ECONOMY AND HEAT RETENTION

1. GENERAL

1.1 Purpose and Scope

- (1) This Interpretative Document relates to Council Directive 89/106/EEC⁽¹⁵⁾ of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, hereinafter referred to as "the Directive".
- (2) Article 3 of the Directive stipulates that the purpose of the Interpretative Documents is to give concrete form to the essential requirements for the creation of the necessary links between the essential requirements set out in Annex I to the Directive and the mandates for the preparation of harmonized standards and guidelines for European technical approvals or the recognition of other technical specifications within the meaning of Articles 4 and 5 of the Directive.

Where considered necessary, the provisions of this Interpretative Document will be further specified in each particular mandate. In drafting the mandates, account will be taken, if necessary, of the other essential requirements of the Directive, as well as of other relevant Directives concerning construction products.

- (3) This Interpretative Document deals with the aspects of the works where "energy economy and heat retention" may be concerned. It identifies products or product families and characteristics relating to their satisfactory performance.

For each intended use of the product, the mandates will indicate in further detail which of those characteristics shall be dealt with in the harmonised specifications, using a step-by-step procedure with CEN/ CENELEC/ EOTA, which will allow the product characteristics to be modified or complemented, if necessary.

Annex 1 to the Directive gives the following definition of the essential requirement which is applicable when and where the works are subject to regulations containing such a requirement :

"The construction works and its heating, cooling and ventilation installations must be designed and built in such a way that the amount of energy required in use shall be low, having regard to the climatic conditions of the location and the occupants".

⁽¹⁵⁾ OJEC L40 of 11.2.1989

(4) In accordance with the Council Resolution of 7 May 1985 (New Approach) and the preamble to the Directive, this interpretation of the essential requirement is intended not to reduce the existing and justified levels of protection for works in the Member States.

1.2 Levels or classes for essential requirements and for related product performances

1.2.1 Where differences specified in Article 3(2) of the Directive are identified and justified in conformity to Community law, classes for essential requirements and for related product performances may be necessary. The purpose of such classes is to achieve the free circulation and free use of construction products.

In this case such classes shall be determined either in the interpretative document or according to the procedure provided for in Article 20(2)(a) of the Directive. Where through this procedure a classification of product performance is identified as the means of expressing the range of requirement levels of the work, the Commission will within the mandate request CEN, CENELEC or EOTA to make the appropriate proposal.

The range of requirement levels covered by the classes depends on the existing and justified levels encountered in Member States.

In cases where a Member State determines in conformity to Article 6(3) of the Directive among the classes only one or some classes to be observed in its territory (or part of it), it shall do so only on the basis of the differences specified in Article 3(2) of the Directive.

1.2.2 Where justified differences specified in Article 3(2) of the Directive are not identified, classes (or levels) of product performances may also be used by the standardizers as a means of convenience for specifiers, manufacturers and purchasers. For certain products, classes (or levels) make it easier to use the standard to relate product performance to its intended use.

Such performance classes (or levels) for products may with reference to Article 4(1) of the Directive therefore be established by the standardizers who will keep the Commission and the Standing Committee informed of the ongoing work on this matter in the framework of the execution of mandates.

1.2.3 Each time classes are defined for works or for products, it is necessary to set up a class called "no performance determined" when and where at least one Member State has no legal requirement at all in that field.

1.3 Meaning of general terms used in the Interpretative Documents

1.3.1 **Construction works**

"Construction works" means everything that is constructed or results from construction operations and is fixed to the ground. This term covers both **buildings** and **civil engineering** works. In the Interpretative Documents "construction works" are also referred to as the "works". Construction works include for example: dwellings; industrial, commercial, office, health, educational, recreational and agricultural buildings; bridges; roads and highways; railways; pipe networks; stadiums; swimming pools; wharfs; platforms; docks; locks; channels; dams; towers; tanks; tunnels; etc.

1.3.2 **Construction products**

- (1) This term refers to products which are produced for incorporation in a permanent manner in the works and placed as such on the market. The terms "construction products" or "products", where used in the Interpretative Documents, include materials, elements and components (single or in a kit) of prefabricated systems or installations which enable the works to meet the essential requirements.
- (2) Incorporation of a product in a permanent manner in the works means :
 - that its removal reduces the performance capabilities of the works; and
 - that the dismantling or the replacement of the product are operations which refer to construction activities.

1.3.3 **Normal maintenance**

- (1) Maintenance is a set of preventive and other measures which are applied to the works in order to enable the works to fulfil all their functions during its working life. These measures include cleaning, servicing, repainting, repairing, replacing parts of the works where needed, etc.
- (2) Normal maintenance generally includes inspections and occurs at a time when the costs of the intervention which has to be made are not disproportionate to the value of the part of the works concerned, consequential costs being taken into account.

1.3.4 **Intended use**

The intended use of a product refers to the role(s) that the product is intended to play in the fulfilment of the essential requirements.

1.3.5 **Economically reasonable working life**

- (1) The working life is the period of time during which the performance of the works will be maintained at a level compatible with the fulfilment of the essential requirements.
- (2) An economically reasonable working life presumes that all relevant aspects are taken into account, such as :
 - costs of design, construction and use;
 - costs arising from hindrance of use;
 - risks and consequences of failure of the works during its working life and costs of insurance covering these risks;
 - planned partial renewal;
 - costs of inspections, maintenance, care and repair;
 - costs of operation and administration;
 - disposal;
 - environmental aspects.

1.3.6 **Actions**

Actions which may affect the compliance of the works with the essential requirements are brought about by agents acting on the works or parts of the works. Such agents include mechanical, chemical, biological, thermal and electro-magnetic agents.

1.3.7 **Performance**

Performance is a quantitative expression (value, grade, class or level) of the behaviour of a works, part of the works or product for an action to which it is subject or which it generates under the intended service conditions (for the works or parts of works) or intended use conditions (for products).

2. EXPLANATION OF THE ESSENTIAL REQUIREMENT "ENERGY ECONOMY AND HEAT RETENTION"

2.1 Energy uses considered by this Interpretative Document

The interpretation of the essential requirement "ENERGY ECONOMY AND HEAT RETENTION" is that the works must be energy efficient in use having regard to the climatic conditions of the location and the intended use of the works. For that purpose energy economy provisions may be related to the following energy uses :

- Space heating;
- Space cooling;

- Humidity control;
- Sanitary hot water production;
- Ventilation.

These uses include achievement of environmental conditions required for the works to be used.

2.2 Specific Terminology

2.2.1 **Fabric**

Fabric is the construction work including external construction elements and internal partitions with their finishing but without the technical equipment.

2.2.2 **Fabric materials**

Fabric materials are homogeneous materials being either :

- bulk materials;
- homogeneous products with a simple shape (blocks, panels, sheets), which may be characterised through the properties of the constituent material and their dimensions.

2.2.3 **Fabric components**

Fabric components are products which are heterogeneous or have a complex shape, produced and put on the market to be used as part of the fabric. Fabric components are all those which form part or the whole of the roof, ceiling, floor, wall, door and window, façade and partition. Also chimneys and service ducts can, in some cases, be fabric components.

2.2.4 **Technical equipment systems**

Technical equipment systems include the components of the energy consuming systems which are needed for the construction works to be used, according to the different uses of energy listed in 2.1.

2.2.5 **Prefabricated works**

Prefabricated works, possibly transported completely finished or in three-dimensional modules, fitted or not with their technical equipment, are construction products.

2.2.6 **Reference value**

The reference value of a product characteristic is the value determined by a harmonized method, as representing the value during its lifetime, under reference conditions.

Remark : The reference value will form part of the attestation of conformity for a CE marking in accordance with the appropriate technical specification.

2.2.7 **Design value**

The design value of a product characteristic is the value determined for specific conditions of use and for the purpose of the calculations by harmonized methods, based among other things, on the reference value.

Remark : In the absence of reference values, generally accepted design values may be used based on harmonized tabulated data.

3. **BASIS FOR VERIFICATION OF THE SATISFACTION OF THE ESSENTIAL REQUIREMENT "ENERGY ECONOMY AND HEAT RETENTION"**

3.1 General

- (1) This chapter identifies basic principles prevailing in Member States for the verification of the satisfaction of the essential requirement "Energy economy and heat retention". These principles are currently complied with when and where the works are subject to regulations containing this essential requirement. Chapter 4 provides guidance on how to meet this essential requirement by compliance with the technical specifications referred to in Article 4 of the Directive.
- (2) The essential requirement, as far as applicable, is satisfied with acceptable probability during an economically reasonable working life of the works.
- (3) The satisfaction of the essential requirement is assured by a number of interrelated measures concerned in particular with :
 - the planning and design of the works, the execution of the works and necessary maintenance;
 - the properties, performances and use of the construction products.
- (4) It is up to the Member States when and where they feel it necessary to take measures concerning the supervision of planning, design and execution of the works, and concerning the qualifications of parties and persons involved. Where this supervision and this control of qualifications are directly connected with the characteristics of products, the relevant provisions shall be laid down in the context of the mandate for the preparation of the standards and guidelines for European technical approval related to the products concerned.

3.2 Actions

3.2.1 **General**

The energy needs of construction works are determined by a number of factors, and for each of them there are many influences including :

- the external environment;
- the internal environment, the use and operation of the work;
- the design of the work;
- the characteristics of its materials and components.

Also the type of energy, its cost, the time of use and peak value of the energy demand may be considered.

The following paragraphs give the main technical bases which may be referred to in regulations on energy economy.

3.2.2 **Space heating, space cooling and humidity control**

The amount of energy required for heating, cooling and humidity control results from :

- the internal conditions (comfort requirements and internal gains);
- the external environment conditions (temperature, humidity, radiation, wind, etc.);
- the specific heat transmission of the building, or the thermal insulation quality of the building;
- the water vapour transmission through the building fabric and the water vapour generation within the building;
- the air permeability of the building fabric;
- the minimum and maximum ventilation rates due to the natural or mechanical ventilation means;
- the area, orientation and solar factors of transparent elements and the effects of shading and solar protection;
- the dynamic thermal characteristics of the fabric and the heating/cooling installations;
- the efficiency and mode of operation and control of the heating/air-conditioning or humidification installation.

3.2.3 **Sanitary hot water production**

The important factors include :

- the amount of water used;
- the temperature increase required;

- the efficiency of heating and pumping devices;
- the power consumption of automatic controls, electromagnetic valves, etc.;
- the distribution and storage heat losses.

3.2.4 **Ventilation**

The required air change rate mainly derives from the essential requirement "Hygiene, health and the environment". In addition, wind and stack effects may cause undesired ventilation.

Ventilation results in a significant part of the heating and air-conditioning loads, which may be limited through :

- provisions on airtightness of buildings;
- appropriate design and sizing of the ventilation installations, in relation to air quality requirements;
- appropriate rules for ventilation systems control and operation;
- energy recovery devices.

The main relevant works' characteristics are :

- the design air change rate;
- the air permeability of the building envelope, characterizing filtration air flow in relation to the pressure difference between inside and outside;
- the openable area of windows, doors, etc.

Natural ventilation can in some cases meet comfort and air quality requirements without the need for mechanical ventilation systems or for air-conditioning. Appropriate design and specification of natural or mechanical ventilation systems (including motor-fan selection) can help limit heating or cooling needs and the energy consumption of fans.

3.3 Verification of the satisfaction of the Essential Requirement

This review of the influencing factors (3.2) indicates that energy economy provisions may involve many factors including :

- the location, orientation and geometry of the construction work;
- the physical characteristics of the fabric materials and components;
- the design of their technical equipment systems;
- the performances of the components of these systems;
- the behaviour of the occupants;
- etc.

Energy economy may be regulated in a number of ways including separate provisions for individual factors, or by combinations of requirement levels for different factors, or by provisions covering overall energy requirements.

The following main options of expressing requirements, or a combination thereof, have been identified in the Member States :

Option No. 1

Provisions on the characteristics of fabric materials (e.g. thermal resistance of an insulating material, water vapour diffusion resistance of a vapour barrier, emissivity of an infrared reflecting layer).

Option No. 2

Provisions on the characteristics of the fabric and systems components (e.g. thermal transmittance of walls, roofs, floors, doors and windows; airtightness of doors and windows, efficiency of boilers, fans, cooling units).

Option No. 3

Provisions on performance characteristics which are specific to the construction works itself or of a technical equipment system considered as a whole (for instance specific transmission heat losses of a building, overall air permeability of a building, design air flow rate, heating or cooling system overall efficiency at design conditions).

Option No. 4

Provisions on the expected energy output required from the technical equipment system, based upon conventional data representative of the expected use and environment conditions of the construction work (e.g. annual thermal energy required in the premises for heating and/or cooling a building to a given indoor temperature, taking account of internal and solar gains).

Option No. 5

Provisions on the expected energy input to a technical equipment system to achieve a given performance in given conditions, taking account of the efficiency of the system (e.g. expected heating and/or cooling energy consumption); the relevant criteria may be weighted according to the nature or the cost of the energy source.

The Member States may use any of the various options for verifying that the Essential Requirement is satisfied. None of these methods shall create barriers to the use of products which comply with the relevant harmonized technical specifications.

4. TECHNICAL SPECIFICATIONS AND GUIDELINES FOR EUROPEAN TECHNICAL APPROVAL

4.1 General

- (1) "Technical specifications" means those referred to in Article 4 of the Directive. "Guidelines for European Technical Approval" of a product or family of products means those referred to in Article 11 of the Directive.
- (2) A general distinction is made between :
 - **Category A** : These are standards which concern the design and execution of buildings and civil engineering works and their parts, or particular aspects thereof, with a view to the fulfilment of the essential requirements as set out in Council Directive 89/106/EEC.

Category A standards should be taken into consideration within the scope of the Directive as far as the differences in laws, regulations and administrative provisions of Member States prevent the development of harmonised product standards.

 - **Category B** : These are technical specifications and guidelines for European technical approval which exclusively concern construction products subject to an attestation of conformity and marking according to Articles 13, 14 and 15 of Council Directive 89/106/EEC. They concern requirements with regard to performance and/or other properties including durability of those characteristics that may influence the fulfilment of the essential requirements, testing, compliance criteria of a product. Category B standards that concern a family of products, or several families of products, are of a different character and are called horizontal (category Bh) standards.
- (3) This distinction between Categories A and B is not intended to lay down different priorities for the work on the respective documents but to reflect the difference in the responsibilities of the authorities of Member States and in those of the Bodies for European Standardisation and Technical Approval in implementing Directive 89/106/EEC.
- (4) In order to ensure the quality of these documents with a view to the fulfilment of the essential requirement, the provisions of this Interpretative Document will result in specific conditions which will be included in the mandates for the preparation of the respective European standards and guidelines for the European technical approval.
- (5) The assumptions made in Category A standards on the one hand and those made in Category B specifications on the other hand shall be compatible with each other.

(6) Category B technical specifications and guidelines for European technical approval shall indicate the intended use(s) of the respective products.

4.2 Provisions concerning works or parts of them

4.2.1 **General**

In order to limit energy consumption, requirements can be expressed using different options referred to in clause 3.3. These requirements must be linked to harmonized product characteristics.

The energy consumption is related on the one hand to the works or to parts of them and on the other to the needs of the occupants.

In the following a review is given of the methods prevailing in the Member States as they relate to :

- the expression of the occupants' needs (*clause 4.2.2*)
- the expression of the energy requirements and their link to the product characteristics (*clause 4.2.3*)

4.2.2 **Expression of the occupants' needs**

The following items are identified :

- 1° Evaluation of the thermal comfort in rooms or spaces, taking into account all the relevant parameters in winter as well as in summer conditions;
- 2° Evaluation of the likely use of hot water for sanitary purposes;
- 3° Expression of the indoor air quality or the ventilation needs.

4.2.3 **Expression of the energy requirements and their relation to the product characteristics**

4.2.3.1 Options Nos. 1 and 2 of expressing requirements

Options No.1 and No.2 of expressing the energy economy requirement are directly linked to the product characteristics. These are listed in Chapter 4.3 concerning the provisions for products.

When expressing the energy economy requirements through Options No.1 and No.2 account shall be taken of the provisions of *clause 1.2.1* above.

4.2.3.2 Option No.3 of expressing requirements

Option No.3 requires procedures using input data which are specific to the construction works itself, including product characteristics and design data. The main methods concern:

- 1° Calculation of the specific transmission heat losses or thermal insulation level of a building envelope taking account of the 2 and 3 dimensional heat flow through the fabric and heat transfer through the ground and unheated spaces;
- 2° Assessment of the overall air permeability of a building from the individual permeability of the components of the envelope (doors, windows, etc.) and from assembly tightness characteristics taking account of workmanship conditions;
- 3° Measurement of the overall air permeability of a building;
- 4° Calculation of the design air flow rate of mechanical ventilation systems, based upon the flow-pressure characteristics of ventilation components (fans, ducts, air inlets and outlets);
- 5° Calculation of the design efficiency of heating and cooling systems, based upon the full load efficiency and sizing ratio of the generator, and the amount and rate of recovery of the various heat losses of the system at design conditions.

4.2.3.3 Option No.4 of expressing requirements

Option No.4 uses the same product and workmanship characteristics as Option No.3 and also needs data on expected use and environment conditions.

The main methods concern :

- 1° Definition of climatic data to be used for energy using systems;
- 2° Estimation of the ventilation energy loads (including infiltration as well as deliberate ventilation);
- 3° Calculation of the heating and cooling loads under design conditions in order to define the capacities of the cooling and or heating system;
- 4° Calculation of the internal temperature with no or limited heating or cooling under given winter or summer conditions;
- 5° Estimation of the effect of variable internal condition requirements, control systems and control strategies;
- 6° Estimation of the seasonal solar gains through glazed areas, taking account of latitude, climate and orientation as well as product characteristics;
- 7° Estimation of the magnitude of internal energy gains (metabolism and various energy uses);

- 8° Estimation of the usefulness of solar and internal energy gains;
- 9° Estimation of the energy needed to operate pumps, fans, refrigeration equipment and auxiliaries, when installed, taking into account of the efficiency of the motive power system;
- 10° Measurement of air infiltration of works and relating to the results of the measurements to the actual temperature and wind conditions.

4.2.3.4 Option No.5 of expressing requirements

Option No.5 is based on the knowledge of the required energy output from the systems (Option No.4) and of the overall efficiency of the systems and leads to the expected energy consumption of the systems.

Procedures can evaluate :

- the average efficiency of heating and cooling generators;
- the energy input (expected gross energy consumption) of all the energy consuming systems based on the required energy output (Option No.4) and average efficiencies of these systems.

4.3 Provisions concerning products

4.3.1 **General requirements**

The characteristics of the products in use may be determined by either :

- a) the use of generally accepted design values which are safe estimates of the characteristics of the construction products in use (in most countries data lists giving this information already exist)
- b) the calculation of the design values
- c) the measurement of the design values
- d) the determination of the design values from the reference values.

Remark : Design values allow for typical conditions and ageing effects for the products in use.

Conventional simplified calculation methods must indicate the resolution of the input and output values, taking account of their likely accuracy. Measurements and measurement evaluation procedures must indicate their accuracy and define the resolution.

4.3.2 **Characteristics of Products which may be relevant to the essential requirement**

4.3.2.1 Fabric materials

- (1) The relevant fabric materials are identified in most national standards, which define the way of calculating heat losses. An example is the following non-exhaustive list of the materials concerned:
 - finishing layers materials;
 - mortars, plasters and renderings;
 - all kinds of concrete;
 - timber, wood materials, boards, natural stones, bricks, blocks;
 - gravel, sand, soil;
 - glass, plastics, metals;
 - thermal insulation materials;
- (2) For these products a range of generally accepted design values shall be defined for various sets of conditions, which can be used by designers without further measurements. The characteristics to be considered, where appropriate for the material concerned, are listed in Table 4.1.
- (3) For materials for which better design values for a characteristic than those indicated in the list of generally accepted values (*see 1°*) are claimed or in cases where the user asks for confirmation of a given value, harmonized determination methods are required so that the claimed better design values can be verified.

Remark :In most cases these harmonized determination methods will define :

- the measuring method and the reference test conditions leading to reference values;
- the procedure for arriving at the design values on the basis of the reference value and the specific use conditions.

Table 4.1 : Characteristics of Fabric Materials to be considered where appropriate

No	Characteristics
1	Density, geometry, dimensional stability
2	Thermal conductivity or thermal resistance for several humidities
3	Specific heat capacity
4	Thermal expansion coefficient
5	Water vapour diffusion resistance
6	Hygrometric expansion coefficient
7	Hygroscopic humidity content for several relative humidities
8	Liquid water absorption
9	Air permeability
10	Mechanical characteristics, for example : compression resistance; tensile strength; modulus of elasticity; Poisson ratio
11	Emissivity for long wave radiation
12	Transmissivity for long wave radiation
13	Transmissivity and absorptivity for solar radiation

4.3.2.2 Fabric Components

For these components, the characteristics listed in Table 4.2 have to be considered when appropriate. For their evaluation it is necessary to establish :

- generally accepted design values;
- common, simple, manual calculation methods;
- harmonized precise calculation methods;
- harmonized determination methods, based on measurements.

One of the last three procedures must be used when better values are claimed than those obtained following the first procedure.

Remark : The last method will define :

- the test method and the reference conditions leading to the reference value;
- the procedure for arriving at the design value on the basis of the reference value, and the specific use conditions.

Table 4.2 Characteristics of fabric components to be considered where appropriate

N°	Component characteristics
1	Transmittance ^(*) or thermal resistance ^(*) [one dimensional heat flux ^(**) two or three dimensional heat flux]
2	Equivalent conductivity or thermal resistance for all kinds of masonry
3	Moisture transfer
4	Driving rain resistance
5	Air permeability ^(*) , ^(**)
6	Thermal inertia characteristics
7	Solar energy transmission ^(*) , ^(**)
8	Effective areas and flow characteristics of openings for ventilation purposes ^(**)

4.3.2.3 System Components

- (1) This category includes all the components of the technical equipment systems referred to in 2.2.4, the characteristics of which have an influence on the energy consumption. Examples include :
- Heating and cooling generators;
 - Atmospheric and solar collectors and water heaters;
 - Energy storage devices;
 - Heat exchangers;
 - Heating and cooling emitters;
 - Air inlets and outlets;
 - Air and water distribution network elements;
 - Pumps and fans;
 - Passive stack ventilators;
 - Valves and dampers;
 - Filters;
 - Relevant control devices.

(*) Effects of shutters and blinds should be considered.

(**) Includes an agreed way of interpolating for different sizes.

- (2) In general, harmonized technical specifications for reference values shall provide all the product-related information needed for :
 - Performance comparison of similar components at unified reference conditions;
 - Energy consumption and peak load assessment, taking account of in-use performances including part-load operating conditions;
 - Adequate design and sizing of installations;
 - Appropriate operation, control and maintenance.
- (3) Harmonized determination procedures are required and must include methods of measurement and methods for estimating design values for both full- and part-load operation.
- (4) No need for generally accepted design values for these systems components characteristics has been identified.
- (5) Where relevant, harmonized procedures should be defined for :
 - Deriving the characteristics of all the devices of the same type in a range of sizes, from measurements made on a limited number of them in this range;
 - Using on-site measurements in order to verify the claimed characteristics of components which cannot be tested in a laboratory, for reasons of size or limited production.
- (6) Table 4.3 indicates, for each of the main families of systems' components, the characteristics to be defined in a common European way where appropriate.

Table 4.3 : Characteristics of Systems Components to be considered where appropriate

No	Component	Characteristics
1	Heating and cooling generators including boilers, air heaters, cooling units, heat pumps, water heaters, etc. using fuels or electricity, taking account of consumptions of all integrated auxiliary equipment	Reference output ^(*) ----- Standing consumption ^(*) ----- Full-load efficiency ^(*) ----- Part-load efficiency ^(*) (e.g. 20, 40, 60, 80 %) ----- Thermal inertia ----- Internal air and water pressure drop characteristics ----- Integral pump and fan characteristics for flow and pressure drop ----- Pump and fan motor efficiencies and power -----
2	Atmospheric and solar collectors, solar water heaters	Idem for heating and cooling generators ----- Optical and thermal characteristics ^(*) -----
3	Energy storage systems	Capacity of storage vessel ----- Heat loss characteristics for the full range of operating conditions -----

(*) Includes an agreed way of interpolating for different sizes.

4	Heat exchangers	Rated output(*) ----- Effectiveness(*) ----- Heat losses(*) ----- Flow-pressure characteristics(*) ----- Integrated auxiliary equipment power and efficiency(*)
5	Heating and cooling emitters	Rated output for different operating conditions(*) ----- Radiant and convective components of the output for a range of operating conditions(*) ----- Thermal inertia
6	Heat emitters incorporated within the structure (cables, pipes, sheets, etc.)	Rated emission ----- Full- & part-load surface temperature and emission rates ----- Thermal inertia
7	Valves and dampers	Flow-pressure drop characteristics
8	Pipes & ductwork elements including flow meters etc.	Flow-pressure drop characteristics
9	Filters	Filter efficiency ----- Flow-pressure drop characteristics ----- Dust-holding capacity
10	Air inlets and outlets	Flow-pressure drop characteristics(*) ----- Induced airflow characteristics(*)

11	Pipe and duct insulation	Thermal resistance ----- Water vapour diffusion resistance
12	Trace heaters	Power rating
13	Control equipment (for space and sanitary water heating, humidity, ventilation, air-conditioning) for example: control devices for boilers, control devices for the room temperature, thermostatic valves, digital automation devices, central units and data transmission systems for the relevant systems installed in the building	Accuracy of sensors ----- Proportional range ----- Differential ----- Deadband ----- Time constants ----- Part-load characteristics
14	Fans & pumps	Flow-pressure curves(*) ----- Power and efficiency curves(*)

4.3.2.4 Supplementary Considerations or Remarks

Tables 4.1, 4.2, 4.3 are not exhaustive and are indicative of the types of characteristics which need to be taken into account in the preparation of the mandates for European standards and guidelines for European technical approval relevant to the essential requirement. The interrelationship of these characteristics may also need to be taken into account.

4.3.3 **Performance_s of Products**

- (1) As far as practicable the characteristics of products should be described in performance terms in the technical specifications and guidelines for European technical approval. Methods of calculation, measurement, and testing (where possible), together with compliance criteria, shall be given either in the relevant technical specifications or in references called up in such specifications.
- (2) The expression of the product performances should be compatible with the basis for the verification of the essential requirement as currently in use in Member States and referred to in Chapter 3 and as provided in the European Category A standards referred to in 4.1(2), taking into account the actual implementation of these documents.

4.3.4 **Attestation of Conformity of Products**

- (1) "Attestation of conformity" of products means that the provisions and procedures laid down in Articles 13, 14 and 15 of Annex III to the Directive are followed. These provisions aim to ensure that, with acceptable probability, the performance of a product will be achieved as specified in the relevant technical specification.
- (2) The mandates will include indications concerning the conformity attestation procedures within the framework of Annex III to the Directive and related provisions to be indicated in the technical specifications and guidelines for European technical approval.

5. WORKING LIFE, DURABILITY

5.1 Treatment of working life of construction works in relation to the essential requirement

- (1) It is up to the Member States, when and where they feel it necessary, to take measures concerning the working life which can be considered reasonable for each type of works, or for some of them, or for parts of the works, in relation to the satisfaction of the essential requirements.
- (2) Where provisions concerning the durability of works in relation to the essential requirement are connected with the characteristics of products, the mandates for the preparation of the European standards and guidelines for European technical approvals, related to these products, will also cover durability aspects.

5.2 Treatment of working life of construction products in relation to the essential requirement

- (1) Category B specifications and guidelines for European technical approval should include indications concerning the working life of the products in relation to the intended uses and the methods for its assessment.
- (2) The indications given on the working life of a product cannot be interpreted as a guarantee given by the producer, but are regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.