

# BUSINESS PLAN

## CEN/TC 228

### HEATING SYSTEMS AND WATER BASED COOLING SYSTEMS IN BUILDINGS

#### EXECUTIVE SUMMARY

##### **Business environment**

The market share for heating and water based cooling systems in buildings includes the following products and services:

- hardware products like heat generators, chillers, pipes, pumps, fittings, controls, insulation, heat emitters, chilled beams or ceilings, cogeneration units, district heating and cooling stations, etc.,
- methods for design of systems and for calculation of heat load, cooling needs, system energy requirements and system efficiencies,
- services for design, installation, commissioning, operation and maintenance of heating and water based cooling systems.

Under the assumption that heat emitters account for approx. 12,5 % of the total system costs, the total market share of heating systems in buildings should be approx. 20.000.000.000 EURO (2010).

##### **Benefits**

The benefits from European Standards developed by CEN/TC 228 are a.o.:

- contributions to providing the comfort for building users and residents by maintaining an acceptable indoor climate,
- incorporation of the different technical solutions for heating and water based cooling systems in buildings from country to country, a.o. due to available energy sources,
- contributions to dismantling of existing barriers to trade for services related to heating and water based cooling systems in buildings,
- contributions to the implementation of all concerned EC directives like the "Framework for the setting of Ecodesign requirements for Energy related Products Directive (ErP)" and the "Energy End-use Efficiency and Energy Services Directive",
- contributions to the implementation of all concerned EC directives like the "Energy Using Products Directive" and the "Energy End-use Efficiency and Energy Services Directive",
- contributions to reduction of CO<sub>2</sub> emissions and preservation of the environment by:
  - supporting appropriate design and accurate dimensioning of heating and water based cooling systems in buildings,
  - supporting rational use of energy resources for heating and water based cooling systems in buildings,
  - supporting development of renewable energy sources for heating and water based cooling systems in buildings.

##### **Priorities**

Identified priorities in CEN/TC 228 for the time being:

- the development of a design standard for sizing hot water production systems
- the development of a design standard for sizing heat emitters
- the development of design standards for simplified heat load calculation methods

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- the development of design standards for sizing cooling equipment as chilled beams or ceilings
- the development of design standards for calculation of cooling needs, as basis for sizing of cooling systems and chillers
- follow-up on the status of the implementation and revision of the EPBD-standards among the CEN member bodies and gathering of experience with their use
- revision of the previously developed CEN/TC 228 European Standards EN 12831 and EN 12828 and preparation of revised draft standards.
- considerations and decisions on development of possible additional standards in support of implementation of the EC Directive on Energy Performance of Buildings, e.g. a standard on air heating and overhead radiant heating systems
- considerations and decision on whether or not a common standard for definitions and nomenclature is needed,
- considerations and decisions on whether or not design standards for warm air heating systems should be developed.
- considerations and decisions on whether or not design standards dealing with the integration of renewable energy sources in heating systems should be developed.

## 1 BUSINESS ENVIRONMENT OF THE CEN/TC

### 1.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal, societal and/or international dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this CEN/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards.

#### 1.1.1 General information regarding market sector and products

Heating and water based cooling systems in buildings represent an important market sector in Europe and worldwide. Heating and water based cooling systems constitute a key element in providing a comfortable and healthy environment in buildings.

Heating of buildings is a major energy-consuming object and cooling in buildings is a growing energy-consuming object throughout Europe, respectively accounting for approx. 35 % of the total energy use per year.

Standardisation on single products and units used in heating and water based cooling systems is carried out by other TCs, e.g. CEN/TC 182. This provides the basis for individual testing of products and for introducing a free trade of products.

However, this does not guarantee that a heating or water based cooling system composed of several different products will work safely and efficiently. Not only hardware products are involved in the establishing of heating and water based cooling systems, also services (designers, installers, etc.) and calculation methods are involved.

The market requires system standards, which support:

- achieving an improvement of the quality of design, installation, commissioning and operation of heating and water based cooling systems, which leads to optimisation of the safety and energy efficiency and provides acceptable comfort conditions in heated or cooled spaces,
- application of common procedures for selection of proper combinations of products to constitute the heating or water based cooling system,
- application of common calculation methods for a free trade of services,
- achieving an improvement of co-operation and harmonisation between all parties involved in the planning, construction, operation and maintenance of heating and water based cooling systems in buildings.

#### 1.1.2 Parties interested in the standardisation process

##### **Manufacturers / Associations / Institutions / Laboratories**

are heavily involved in the European standardisation on heating and water based cooling systems in buildings and see the main benefits of this standardisation as follows:

- abolition of technical obstacles to trade of systems solutions and calculation programs, which arise from mutually contradictory national standards, practices and user specifications,
- ability to offer systems and services more efficiently throughout Europe and, if appropriate, worldwide,
- improvement of the quality and compatibility of products, systems, processes and services,
- further enhancement of the industry's image.

### **Customers / Users / Private and public clients / Architects / Engineers**

share interests in the European standardisation on heating and water based cooling systems in buildings, due to a.o. the provision of methods and procedures for improvement of the quality, safety, comfort and reliability of the heating and water based cooling systems and due to a more efficient provision of these building services in the future through common and improved specifications throughout Europe.

Societal stakeholders, such as environmental and consumer NGOs are involved in standardisation processes with the view to ensure that environmental and consumers' considerations are taken into account, contributing to an energy efficient and sustainable economy.

### **National regulators and government agencies**

share interests in the European standardisation on heating and water based cooling systems in buildings, due to a.o. the provision of common European calculation methods, on which national requirements regarding energy use in buildings can be based, and the provision of European Standards in support of implementation of the EC Directive on Energy Performance of Buildings.

### **Product TCs**

are interested that the performance data of their products are being used in a consistent performance evaluation method for systems.

## **1.2 Quantitative Indicators of the Business Environment**

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the CEN /TC.

### **1.2.1 Structure of the market and market share**

The market share for heating and water based cooling systems in buildings is very difficult to evaluate. It includes the following products and services:

- hardware products like heat generators, chillers, pipes, pumps, fittings, controls, insulation, heat emitters, chilled beams or ceilings etc. The European market share for heat emitters (not including electrical heat emitters) is estimated to approx. 2.500.000.000 EURO (2010),
- software products for design of systems and for calculation of heat load, cooling needs and annual energy requirements,
- services for design, installation, commissioning, operation and maintenance of heating and water based cooling systems.

A significant part of the market share is accounted for by the products constituting the heating and water based cooling systems. This part is covered by several other TCs responsible for the product standardisation.

The remaining part of the market share refers to TC228 and is accounted for by the products and services related to the systems.

### **1.2.2 Type and size of companies**

Companies, which manufacture products or provide services for heating and water based cooling systems in buildings, can be divided into the following groups according to type and size of company:

- multinational manufacturers with a world wide distribution network, headquarter and main production in Europe (boilers, heat pumps, pumps, controls, heat emitters, chillers, cooling equipment, chilled beams and ceilings),

- national manufacturers with production and distribution facilities in one or more European countries (software programs, pipes, fittings),
- large engineering consultant companies, which design heating and water based cooling systems, with offices in several European countries,
- medium size engineering companies, which design and install heating and cooling systems, with offices in one or more European countries,
- small national companies, which design, install and/or operate heating and cooling systems in one European country or in a local area thereof.

## **2 BENEFITS EXPECTED FROM THE WORK OF THE CEN/TC**

Political, economical, environmental, social, technical, legal and international benefits related to some or all of the standardisation activities proposed by the CEN/TC, or significantly influence the way these activities are carried out are the following:

### **2.1 Political Benefits**

The realisation that resources shall be used rationally to preserve the environment has become widespread. Most countries in Europe are increasing their demands to lower energy consumption in buildings.

Heating and water based cooling systems in buildings constitute an important target in this respect, and thus increased efforts to reduce primary energy use and reduce energy consumption of products used in heating or water based cooling systems are set forth. In addition, these efforts support countries in the EU and the rest of the world to comply with still more strict limits on CO<sub>2</sub> emissions.

The EC Directive on Energy Performance of Buildings reflects a political decision to further enhance this development, implying a.o. provision of a comprehensive set of European Standards in support of its implementation, e.g. the series of standards on calculation method for system energy requirements and system efficiencies.

Further, general increased requirements on insulation of buildings also lead to reduced heat loads and thus a reduction in the required capacity of the heating systems. This is a political factor, which is very important for the manufacturers of heating systems.

There is also a great need and support in several European countries for modernisation and improvement of existing heating and water based cooling systems.

### **2.2 Economic Benefits**

Application of common European Standards is anticipated to lower costs for those manufacturers and service companies, which are active in several European countries. Through European standardisation, the same design procedures, calculation methods, installation procedures and instructions for operation and maintenance of heating and water based cooling systems can be applied throughout Europe.

Since heating of buildings is required in almost all European countries and because requirements for the highest level of comfort prevail in Europe, Europe constitutes the world's largest market for heating systems. Also, some of the world's largest manufacturers of heating systems are European.

Furthermore the need of cooling in buildings is also increasing in almost all European countries because of the comfort prevail, and therefore causes a growing market in Europe.

Heating and water based cooling systems in buildings constitute a significant economical factor, not only on the construction costs of buildings but also on the running costs of buildings.

### **2.3 Environmental benefits**

As it is said above, heating and water based cooling systems in buildings represent a significant part of the total amount of energy consumed in European countries and contribute therefore strongly to CO<sub>2</sub> emissions.

Reduction of primary energy demand for heating and water based cooling systems in buildings requires an appropriate design and an accurate dimensioning of the heating and water based cooling systems.

Further, reduction of CO<sub>2</sub> emissions from heating systems in buildings can be achieved through developing the use of renewable energy sources, and it may be the aim of European Standards to favour the spreading of such technologies (e.g. heat pumps, solar collectors).

### **2.4 Social benefits**

Heating and water based cooling systems together with ventilation systems are the most important installations for providing the comfort for building users and residents by maintaining an acceptable indoor climate.

### **2.5 Technical benefits**

The technical level of heating systems is well advanced in Europe. Due to increasing requirements on insulation and thus decreasing heat loads for buildings, heating systems are designed for lower medium temperature (water based systems) or smaller heat emitters.

The technical solutions may vary from country to country depending on the energy sources available. While the market for electrical systems for heating is very large in France and Norway, the water based systems using oil or gas as fuel are the most common systems in most other European countries.

There is an increasing interest for using renewable energy sources for heating (e.g. heat pumps, solar collectors).

The technical level of cooling systems is also well advanced in Europe. Due to increasing needs of cooling and requirements for decreasing energy consumption cooling systems are designed for higher cooling temperatures and more effective cooling equipment.

The standards developed by TC228 take into account these technical differences and the expected future developments in energy sources and heating and cooling media.

### **2.6 Legal benefits**

For the realisation of a common European market, it is essential that existing obstacles to free trade are dismantled not only for products, which indeed are particularly suitable for cross-border commerce, but also for services.

The European standardisation process is regarded an important means of dismantling existing barriers to trade. At a first stage, only mandates for standardisation of products were issued, but now also mandates for standardisation of services and systems are being issued.

Basic political requirements on the European standardisation related to heating and water based cooling systems in buildings and products being part thereof, are given in the Construction Products Directive (CPD). The CPD refers to the most essential primary requirements and one of the targets is, that the standardisation should take these requirements fully into account.

Regarding heating and water based cooling systems in buildings, the most essential primary requirements relate to the following areas:

- hygiene, health and environmental protection,
- energy saving and heat retention.

Implementation of the EC Directive on Energy Performance of Buildings involves 18 mandated work items of CEN/TC 228 according to M/343 issued in 2004 with the objective of establishing approved European Standards in this field at the earliest possible in 2007 – a task which as of 2009-08 has been fulfilled to the extent that 18 European Standards have been approved at Formal Vote and published.

Further, the requirements given in the Public Procurement Directive (PPD) also apply to heating and water based cooling systems in buildings and shall be taken into account by the standardisation.

Several national standards related to heating and water based cooling systems in buildings are part of the legal requirements in the individual countries. This indicates the importance of standards for heating and water based cooling systems, but at the same time it indicates possible difficulties to obtain general European acceptance.

### **3 PARTICIPATION IN THE CEN/TC**

All the CEN national members are entitled to nominate delegates to CEN Technical Committees and experts to Working Groups, ensuring a balance of all interested parties. Participation as observers of recognized European or international organizations is also possible under certain conditions. To participate in the activities of this CEN/TC, please contact the national standards organization in your country.

### **4 OBJECTIVES OF THE CEN/TC AND STRATEGIES FOR THEIR ACHIEVEMENT**

CEN/TC 228 is a system oriented TC and will, where appropriate, refer to relevant product standards provided that the product standards deliver the information required by the systems. Based on the considerations above, the CEN/TC pursues the following objectives and strategic directions for its future work:

#### **4.1 Defined objectives of the CEN/TC**

- the development of design standards for sizing domestic hot water and heating systems, e.g. heat generators, distribution systems, storage and heat emitters
- the development of design standards for simplified heat load calculation methods
- the development of design standards for sizing cooling equipment as chilled beams or ceilings

- the development of design standards for calculation of cooling needs, as basis for sizing of water based cooling systems and chillers
- follow-up on the status of the implementation of the EPBD-standards among the CEN member bodies and gathering of experience with their use
- considerations and decisions on development of possible additional standards in support of implementation of the EC Directive on Energy Performance of Buildings, e.g. a standard on air heating and overhead radiant heating systems
- revision of previously the developed CEN/TC 228 European Standards on heat load calculation and the design of heating systems (including domestic hot water systems) and preparation of revised draft standards
- considerations and decision on whether or not a common standard for definitions and nomenclature is needed,
- considerations and decisions on whether or not design standards for warm air heating systems should be developed. This work item was earlier part of the work programme, but has been removed due to lack of required resources.
- considerations and decisions on developing standards dealing with the calculation, design and performance of heating systems integrating renewable energy sources.

#### **4.2 Identified strategies to achieve the defined objectives of the CEN/TC**

CEN/TC 228 has approved a work programme for the standardisation of heating and water based cooling systems in buildings.

The standards of CEN/TC 228 are system standards, i.e. they are based on requirements addressed to the system as a whole and not dealing with requirements to the products within the system.

In accordance with the work programme of CEN/TC228, five working groups (see Fig. 1) have been created for the main areas design, installation and commissioning, instructions for operation, maintenance and use, calculation methods and system performance and evaluation, hydraulic surface heating and cooling systems. The subdivision into these five areas is based on the market structure for heating and water based cooling systems in buildings and allows for each of the work items envisaged for the TC to be allocated to a specific WG.

For special issues, Ad-Hoc groups or Task- groups have been and will be formed.

The TC is responsible for ensuring that the national standpoints communicated by delegations from different countries are taken into consideration. It endeavours to reach consensus where viewpoints differ. Wherever possible, national deviations should be avoided.

The active participants of CEN/TC228 are delegates and experts from AT, BE, CH, CZ, DE, DK, FI, FR, IT, NL, NO, PL, RO, SE, SK and UK. A plenary meeting of the TC normally takes place once a year. Further voting and exchange of information within the TC takes place by e-mail. Distribution of documents is administered through Livelink. All meetings and correspondence are conducted in English.



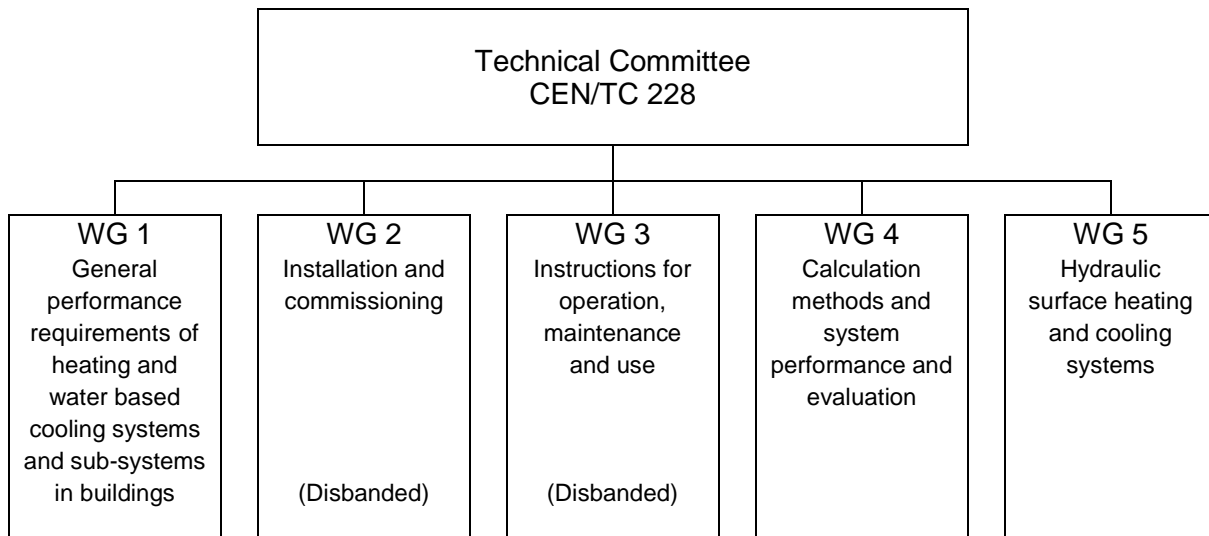


Fig. 1

The WGs are responsible for preparing the draft standards for their defined area and for presenting the results to the TC for approval. The WGs organise their work and the necessary meetings themselves. The WGs normally meet 2-4 times a year. Also on this level, distribution of documents is administered through Livelink and e-mail. All meetings and correspondence are conducted in English.

CEN/TC228 sets up a dedicated editing committee, if considered appropriate and required, for any work item. The editing committee normally consists of experts from D, F and UK of the WG, which has developed the standard. These members are also obligated to keep close contact with the translation of the documents at AFNOR, DIN and BSI, respectively. In case of questions regarding the translations, these will be solved by correspondence within the editing committee or through a meeting of the editing committee. The secretary of the TC is member of each editing committee.

CEN/TC 228 has members in CEN/TC 371 Project Committee EPBD. This is to co-ordinate the standardisation work and the definitions, terms, parameters, etc. used in the standards for building, ventilation and heating systems related to the EPBD.

For calculation of annual energy consumption of buildings and systems, several national methods exist and many activities under the request of national legal authorities have been initiated. With an objective of establishing consistency with the work on the European level in TC228/WG4, a meeting has been held between responsible national legal authorities and members of the working group.

On the international level, calculation of heating systems for annual energy consumption is related to the Work program of ISO/TC 205 and ISO/TC 163. For the energy performance of buildings using holistic approach, a Joint Working Group was established between ISO/TC 205 *Building environment design* and ISO/TC 163 *Thermal performance and energy use in the built environment (ISO/TC 163/WG 4 "Joint between ISO/TC 163 and ISO/TC 205: Energy performance of buildings using holistic approach")*. Official liaisons with both ISO/TC have been established.

### 4.3 Environmental aspects

see clause 2.3 "*Environmental benefits*"

#### **4.4 Liaisons**

At present CEN/TC 228 maintains liaisons with the following Technical committees:

- CEN/TC 57 - Central heating boilers
- CEN/TC 69 - Industrial valves
- CEN/TC 89 - Thermal performance of buildings and building components
- CEN/TC 109 - Central heating boilers using gaseous fuels
- CEN/TC 113 - Heat pumps and air conditioning units
- CEN/TC 126 - Acoustic properties of building products and of buildings
- CEN/TC 130 - Space heating appliances without integral heat sources
- CEN/TC 156 - Ventilation for buildings
- CEN/TC 180 - Non-domestic gas-fired overhead radiant heaters
- CEN/TC 182 - Refrigerating systems, safety and environmental requirements
- CEN/TC 197 - Pumps
- CEN/TC 247 - Building automation controls and building management
- CEN/TC 295 - Residential solid fuel burning appliances
- CEN/TC 312 - Thermal solar systems and components
- CEN/TC 371 - Project Committee EPBD
- ISO/TC 163 - Thermal performance and energy use in the built environment
- ISO/TC 205 - Building environment design

Other liaisons:

- AQUA Europa
- EC
- ECOS
- EURAY – European Association of Surface Heating and Cooling
- EUROHEAT & POWER
- REHVA

Affiliate participation:

- BELST
- DPS
- INS
- ISME

## **5 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE CEN/TC WORK PROGRAMME**

The stakeholders of CEN/TC228 should be convinced of the necessity and benefits of European Standards on heating and water based cooling systems in buildings and be motivated to implement such standardisation.

Some stakeholders are, however, of the opinion that there already exist sufficient national standards related to heating and water based cooling systems in buildings, and thus that there is no need for European Standards.

The existence of national standards is an indication that standards in this field are needed and the task is to develop common European Standards.

Some of the existing national standards form part of national legislation. Therefore some stakeholders can not support the European Standards if they are not exactly like the national standards.

It would be very helpful if the stakeholders, at the national level, could work on harmonisation issues with National regulators.

In some countries, especially on calculation methods for the annual energy use, there has been an increased pressure from the National regulators on the national standardisation bodies to establish relevant national standards. This has led to increased activities on the national level, which has made it more difficult to progress the work on the European level. By the mandate for standards related to the EC Directive on Energy Performance of Buildings, the efforts have for some time now been directed at establishing common European Standards in this field.

CEN/TC228 is aiming at preparing performance based system standards with functional requirements. For some countries, this approach is in contradiction to existing national standards, which are much more prescriptive and standardise specific solutions. Accordingly, some stakeholders are concerned about the consequences of more performance based standards, while other stakeholders welcome this prospect.