

**VENTILATION 2006,  
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**EUROPEAN ENERGY PERFORMANCE  
of  
BUILDINGS DIRECTIVE (EPBD).  
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# EPBD.

## EPBD 2002/91/EC.

The 23 Member States of the EU had to prepare their own Laws regarding the EPBD by January 2006 in order to meet the requirement of the Directive.

# A Tough Standard.1.

However, in the History of Standards, the code of Hammurabi.(1750 BC). is more severe stating:-

229. If a builder constructs a house for an equal, but did not make it strong enough & the house collapsed killing the owner, the builder shall be put to death.

## Tough Standard.2

- 230. If it caused the death of the Son of the owner of the house, the son of the builder shall be put to death.
- 231. If it caused the death of a slave of the house owner, the builder shall give slave for slave.

# REASONS FOR THE EPDB.

## 1.

- EU Energy consumption is estimated as being 20% greater than justified.
- Case studies show that potential savings of 15-35% are possible.
- Aims:- to save annually an energy equivalent of at least 1% of the previous years use.

# REASONS FOR THE EPDB.

## 2.

- By 2012 improved efficiency of 6% required.
- Reduction in CO<sub>2</sub>. emission.
- Sensible use of natural energy.
- Improved use of energy in existing and new buildings.

# REASONS FOR THE EPDB.

## 3.

- Application of minimum standards of building energy performance.
- Energy certification of buildings.

# DIRECTIVE:- 2002/91/EC.

## 1.

The E.U Mandate to CEN was to constitute a Methodology to:-

- Calculate energy performance of buildings & estimate its environmental impact.
- Requires Member States to introduce by the end of 2005:-

# DIRECTIVE:-2002/91/EC.

## 2.

- Inspection of HVAC Plant.
- Minimum performance standards, and an accepted methodology for calculating the energy performance of buildings (existing and new).
- Energy performance certificates to be displayed in public buildings.

# The Mandate: 1.

Consists of 17 Articles:-

1. Scope and objectives.
2. Definitions.
3. Calculation methods.
4. Energy performance requirements.
5. Energy saving measures.
6. Minimum energy requirements.

## The Mandate: 2.

7. Energy performance certificates.
8. Boiler inspection.
9. Inspection of ventilation and air conditioning systems.
10. Training of qualified inspectors.
11. Review of experience gained.

## The Mandate. 3.

12. Information by Member States on methods available.
13. Adaptation of framework.
14. Committee assistance.
15. Transportation.
16. Entry into force.
17. Address to member states.

# Description of Mandated Work.1.

- Heating and cooling energy demand of Buildings.
- Energy efficiency of HVAC systems.
- Lighting.
- Primary energy use.
- Environmental impact.

# Description of Mandated Work.2.

- Energy performance certificate.
- Full description of calculation methodology.

# Supporting Standards.1

CEN (Comite European de Normalisation).  
Existing HVAC standards have had to be upgraded these are:-

- CEN/TC. 89. Thermal performance of buildings.
- CEN/TC. 156. Ventilation.
- CEN/TC. 169. Lights and Lighting.

## Supporting standards.2.

- CEN/TC. 228. Heating systems.
- CEN/TC. 247. Building automatic controls and building management.

# CEN /TC 156 VENTILATION OF BUILDINGS. 1.

- WG 1. Terminology.
- WG 2. Natural & Mechanical Powered Residential Ventilation.
- WG 3. Ductwork.
- WG 4. Air Terminal Devices.
- WG 5. Air Handling Units.
- WG 6. Design Criteria.

# CEN /TC 156 VENTILATION OF BUILDINGS. 2.

- WG. 7. System Performance.
- WG. 8. Testing and Measuring.
- WG. 9. Fire Precautions.
- WG.10. Inspection of Air Conditioning.
- WG.11. Inspection of Ventilation.
- WG 12. Criteria for Indoor Environment.

# CEN /TC 156 VENTILATION OF BUILDINGS. 3.

- WG 13. Ventilation in Hospitals.
- WG 14. Ventilation of Commercial Kitchens.

# CEN /TC 156 New Work Items (WI) 1.

- Additional to WG 10,11 and 12. Inspection and Criteria are:-
- WG 7. WI. 12. Dynamic calculations of room temperatures.
- WG 7. WI. 18-19. Air flow Calculation
- WG 7. WI. 25. Performance Requirements.

# CEN /TC 156 New Work Items (WI). 2.

- TC 89. Thermal Performance.
- TC 169. Lights and Lighting.
- TC 228. Heating Systems in Buildings.
- TC 247. Controls and Building management.

# Building Certification Experts.1.

Article 10 requires inspection by independent and /or accredited experts.

Problems:-

- Training and qualifications.
- Quality assurance.
- Policing requirements.

# Building Certification Experts. 2.

- Professional indemnity.
- Risk assessment.

# Inspection Methodology.1.

Inspection of Vent and Air Conditioning Plant Commences with:-

- Examination of all Documents.
- Any missing and any with errors should be made good.
- Comment on Standard of Maintenance.
- Compare Plant sizes with Loads.

# Inspection Methodology.2.

- Assess the Specific Fan Power.
- Compare with the original design figures.
- Compare the internal and external design temperatures.
- Inspector to agree operating periods.
- Inspector to suggest a suitable approach to documentation.

# Inspection Methodology 3.

**Provide the Following Information:-**

- **Type and Nature of system installed.**
- **Its Cooling, heating and heat rejection capacity.**
- **Methods of control.**
- **Operating Spares & Documentation.**
- **Building and HVAC log books.**

# Inspection Methodology.4

- **Ensure air flow rates agree with standards.**
- **Consider Open Windows.**
- **Consider Heat Recovery & DCV.**
- **Consider Solar Shading.**
- **Improve Operating Efficiency.**
- **Reduce Infiltration/Exfiltration.**

# Inspection Methodology.5.

- Consider use of un-tempered outdoor air.
- Cooling Load reduction by increasing Ventilation Rate.
- A comprehensive approach is given to all the issues to be considered.

# Inspection Methodology.6.

- Consider energy saving techniques.
- Inspect distribution and discharge.
- Inspect control systems.
- Energy metering.
- Standard of reporting.
- Documentation.
- Frequency & duration of inspection.

# Inspection Methodology.6.

- Problems of training suitably qualified engineers to meet the requirements.
- Estimated that 20 000 inspectors for the commercial sector and 7000 for the domestic sector.

# **Informative Annex.**

**Since the preparation of this paper in March 2006, a meeting in Paris in April, changed the format of the annex.**

**The approach is similar, but covers the issues in more detail. So the Annex on the CD does not fully reflect the latest ideas.**

# **ANNEX. A & B. (informative ).**

## **Annex A . Subsystems of air conditioning systems.**

- **A.1      General.**
- **A.2      Indication for subsystems.**
- **A.3      Examples for classification of complete air conditioning systems.**
  
- **Annex B. Default values, specification of air conditioning systems.**

# **ANNEX. C- E. ( informative ).**

- **Annex C. Features affecting the frequency and duration of inspection.**
- **Annex D. Checklist of pre–inspection information.**
- **Annex E. Recommendations for the extent of the inspection.**
- **E.1.General. E.2.List of items for inspection in each class (1, 2, 3).**

# **ANNEX. F- G. ( informative ).**

- **Annex F. Checklists indicating observations and appropriate actions taken and advice.**
- **Annex G. Example of categories of documentation and information about the system.**

# **ANNEX. H-I. ( informative ).**

- **Annex H. Inspection reports.**
- **Annex I. Energy impacts of air conditioning, justification of inspection and improvements.**
  - **I.1.General.**
  - **I.2.Reduce building cooling load.**
  - **I.3.Improve system efficiency.**

# TYPICAL ANNEX.

## Heat exchanger for ventilation systems

- Documentation No             non complete  complete
- Missing parts Type /specification.....
- Primary side ( liquid medium )type medium: water  refrigerant
- Medium flow rate calculated..... m<sup>3</sup>/s            measured..... m<sup>3</sup>/s
- Control System No             Yes  type .....
- Settingsatisfied             non satisfied
- Secondary side air flow Medium flow rate calculated...m<sup>3</sup>/s....  
measured..... m<sup>3</sup>/s
- Control system No  Yes  type .....Setting satisfied  non satisfied
- Total fan power..... kW
- Specific fan power.....kW/m<sup>3</sup>/s
- Running time estimated..... h/a                            measured..... h/a
- Cooling capacity ..... kW
- Maintenance state                            regular  on demand  No
- State of operation                            satisfied  non satisfied
- Optional Air filter Documentation Yes  No  necessary
- Missing parts Type / specification..... class .....
- Maintenance frequency regular  on demand  No
- Maintenance state                            regular  on demand  No
- State of operation                            satisfied  non satisfied
- Differential Gauge                            satisfied  non satisfied

# **CONCLUSIONS. Major problems in implementing.**

- **My old Tutor Confucius said:-**
- **I hear, and I forget....**
- **I see, and I remember....**
- **I do, and I understand...**

**Only when the last item has been performed many times will the problems be fully understood.**

**END.**

**THANK YOU FOR LISTENING**

Eric Curd