



## THE NEW EUROPEAN STANDARD, EN-442, FOR HOT WATER RADIATORS

### European harmonisation for hot water radiators

Since the 1<sup>st</sup> July 1997, all European countries will apply a new reference system to measure heat output in hot water radiators.

A new standard was recently published, EN 442, which defines the system of "measurement-sampling" to be applied indifferently to all European countries.

The event constitutes an important step forward in the future development of hot water radiators, ensuring better system harmonisation and a healthy European level of competition.

For this reason, based on European standards, a chamber/test type was established to provide a standard test to evaluate radiator output in a competitive manner.

Un ulteriore interesse della normativa è rappresentato dalla diminuzione delle temperature dell'acqua calda per la determinazione delle potenze termiche di riferimento. Another interesting element of the standard is represented by the decrease in temperatures of the hot water to determine the reference heat output. In tal modo, le nuove potenze termiche di riferimento dei radiatori ad acqua calda corrispondono a impianti di maggiore confort, che sfruttano meglio l'energia e quindi più rispettosi dell'ambiente. By doing so, the new reference heat outputs for hot radiators correspond to systems of greater comfort, which are more energy-efficient and therefore more environment-friendly. Questi impianti sfruttano al meglio il miglioramento delle prestazioni dei generatori attuali, avvicinandosi in modo ottimale alle loro temperature di funzionamento ed offrendo al contempo una sicurezza sulla temperatura di contatto, stabilita più bassa, abbinata ad una riserva di potenza. These systems take best advantage of the improvement of performance for current generators, moving in an excellent manner towards their operating temperature and offering at the same time a safe contact temperature, established as being lower, combined with an output reserve.

### New test chambers

Measuring the heat coming from a water radiator occurs by putting the radiator in a normal closed chamber, called the test chamber.

The test chamber walls are cooled by a serpentine for water circulation. These pipes completely cross 5 room walls (the only non-cooled wall is where the radiator subject to testing is located) in order to keep a room temperature of 20° C.

The radiator is supplied with a standardised temperature at the water inlet and outlet. The heat output is therefore the result obtained in the test chamber.



**Comparing the old standard and EN 4421 standard test**

	<b>Old standard test chamber <math>\Delta T</math> 60 K</b>	<b>European EN 442 cell <math>\Delta T</math> 50 K</b>																								
Dimensions 4x4x3 m	4x4x3 m	4x4x3 m																								
Number of cooled walls	6	5 (not cooled wall behind the radiator)																								
Measurement of surface temperature on cooled walls	<ul style="list-style-type: none"> <li>▪ At the centre of every wall</li> <li>▪ 2 measurement points on the wall behind the radiator</li> </ul>	<ul style="list-style-type: none"> <li>▪ Calculated on the average of water temperatures at the inlet and outlet sides</li> <li>▪ 2 measurement points on the wall behind the radiator</li> </ul>																								
Air temperature measurement	<ul style="list-style-type: none"> <li>▪ 5 on central column</li> <li>▪ 8 on side columns</li> </ul>	<ul style="list-style-type: none"> <li>▪ 4 on central column</li> </ul>																								
Measurement conditions	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Water T</td> <td style="width: 50%;">Water T</td> </tr> <tr> <td>Air T</td> <td></td> </tr> <tr> <td>at the inlet of the radiator</td> <td>at the outlet of the radiator</td> </tr> <tr> <td>90°C</td> <td>70°C</td> </tr> <tr> <td>20°C</td> <td></td> </tr> <tr> <td colspan="2">Water flow to the radiator regulated for an inlet-outlet temperature difference of 20 K</td> </tr> </table>	Water T	Water T	Air T		at the inlet of the radiator	at the outlet of the radiator	90°C	70°C	20°C		Water flow to the radiator regulated for an inlet-outlet temperature difference of 20 K		<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Water T</td> <td style="width: 50%;">Water T</td> </tr> <tr> <td>Air T</td> <td></td> </tr> <tr> <td>at the inlet of the radiator</td> <td>at the outlet of the radiator</td> </tr> <tr> <td>75°C</td> <td>65°C</td> </tr> <tr> <td>20°C</td> <td></td> </tr> <tr> <td colspan="2">Water flow of radiator regulated for an inlet-outlet temperature difference of 20 K</td> </tr> </table>	Water T	Water T	Air T		at the inlet of the radiator	at the outlet of the radiator	75°C	65°C	20°C		Water flow of radiator regulated for an inlet-outlet temperature difference of 20 K	
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**Heating in Europe will be milder...**

Standard EN 442 will allow an evolution in water heating systems to move towards lower temperatures and therefore a type of milder heat.

The value of  $\Delta T$ , which is the difference between the average water temperature and room air temperature, will be decreased from 60K to 50K.  $\Delta T$  is calculated as the difference between the arithmetically averaged heating water temperature at the radiator inlet and outlet and room air temperature, estimated normally at 20°C.

Before:  $\Delta T$  60 K

Water temperature at the radiator inlet/outlet: 90°C/70°C

Average temperature:  $(90^\circ\text{C} + 70^\circ\text{C})/2 = 80^\circ\text{C}$

$\Delta T = 80^\circ\text{C} - 20^\circ\text{C} = 60^\circ\text{C} = 60\text{K}$

Today:  $\Delta T$  50 K

Water temperature at the radiator inlet/outlet: 75°C/65°C

Average temperature:  $(75^\circ\text{C} + 65^\circ\text{C})/2 = 70^\circ\text{C}$

$\Delta T = 70^\circ\text{C} - 20^\circ\text{C} = 50^\circ\text{C} = 50\text{K}$



### **Standard EN 442 and the “mild heat radiators”**

Standard EN 442 delivers the willingness of European manufacturers to promote a reduction in the operating temperature of hot water radiators to improve a status of well-being and better use energy. The use of these low temperatures was already expressed in the standard, which encouraged manufacturers to launch the concept of a “mild heat radiator”. The “mild heat radiator” goes beyond this by further decreasing the temperature couple to 55°C – 45°C.

Therefore **from 1<sup>st</sup> July 1997**, the applied temperature couples will be:

**\* 75°C - 65°C: EN 442 standard**

**\* 55°C - 45°C: mild heat radiators**

Convective exchanges are weaker for “mild heat” radiators, which limits air stratification. Therefore, the improved dimensioning of these radiators improves heat compensation of cold walls (glazed), reducing the development of descending air currents. These two effects generate a more uniform air temperature, producing a sensation of greater comfort to benefit anyone on the premises.

Low temperature systems, which are more effective compared to conventional radiators, allow greater energy savings and reduce the release of polluting substances, thus becoming more environment-friendly. Furthermore, they have an output reserve for the intense cold and allow quicker operation.

Per gli installatori, questa variazione di metodo di misura è anche l'occasione per valorizzare la loro professionalità ed adattare i metodi di dimensionamento che hanno finora utilizzato, nel senso di un funzionamento ottimale degli impianti e di una soddisfazione ancora maggiore da parte degli utilizzatori. For installers, this measurement method change is also an opportunity to increase the value of their professionalism and modify the dimensioning methods used up to now, in the sense of optimum system operation and even greater customer satisfaction.

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