

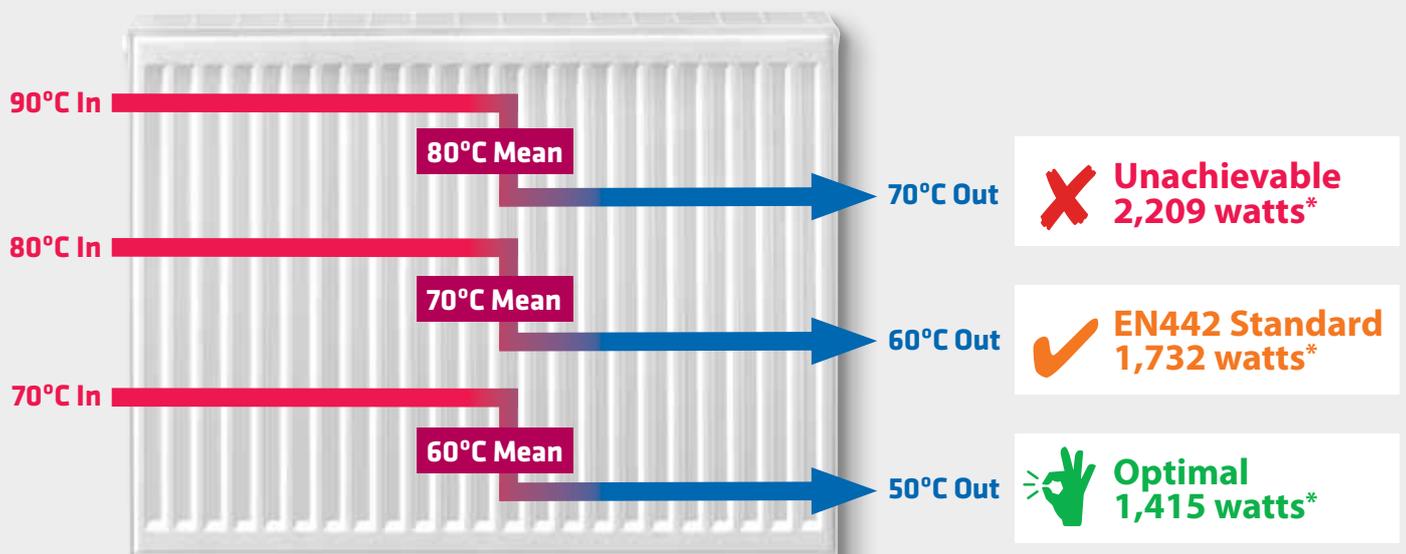
# Radiator Heat Outputs Explained

## Calculating correct radiator panel heat output is dependent on using industry standard inlet and outlet temperatures

Modern boilers operate more efficiently at lower temperatures. By modulating their output they achieve optimum efficiency at a lower max temperature than older style boilers. Hence when a panel is being sized up to meet a room's heating requirements the mean temperature used in calculations is of significant importance.

Old atmospheric type boilers heated water to a high temperature as they were unable to self modulate and constantly needed to on-off cycle. Calculating with a high average 'mean' temperature only applies to these older, inefficient type boilers, giving a false impression of heat outputs; both unachievable and undesirable using today's boiler technology.

**The EN442 industry standard of 70°C mean (80°C inlet and 60°C outlet temperature) should be used to calculate heat outputs, with even lower temperatures more desirable in application.**



\*Based on Type 22 1000 x 600mm Compact

Outputs calculated on 80°C mean claim up to 40% greater output than 60°C mean.

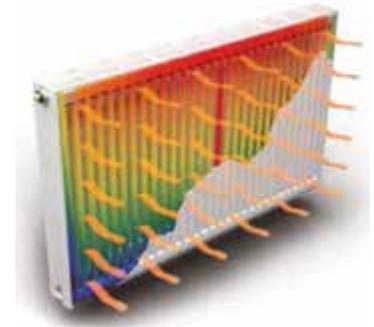
## The Anatomy of Heat Output

- ▶ The **mean** temperature is the average water temperature within the radiator, based on the inflow and outflow water temps. The **output** of the radiator is the amount of heat emitted in Watts (W)
- ▶ If radiator sizing is based on a high inlet temperature, modern day boilers will not supply water at that temperature and the radiators won't provide enough heat for the room areas
- ▶ The kW output of the boiler should be matched to the system requirements
- ▶ Using an oversized boiler does not improve heating, it simply results in the boiler constantly on-off cycling as its output is too great for the size of the system
- ▶ A correctly sized boiler maximises its modulation 'turn down' capacity to maintain constant temperature without off cycling, thus consuming less energy and providing more efficient heating
- ▶ Optimal heating is achieved at the lowest possible temperature. Using constant modulated heat, condensing boilers provide the most effective heating at a low mean temp of 60°C

## Different Panel Size Outputs

Convection fins in a radiator act as the heat dissipating mechanism, with each layer of fins being connected to a panel through which hot water flows. Heat is transferred from the panel to the fins and then into the air, known as 'thermal convection' heating. Single panel radiators are ideal for heating small spaces or rooms, Double and Triple panel types have greater heat output to suit larger rooms or areas with high ceilings.

<b>Single Panel Type 11</b> 1 Radiator Panel + 1 Convection Fin	
<b>Double Panel Type 21</b> 2 Radiator Panels + 1 Convection Fin	
<b>Double Panel Type 22</b> 2 Radiator Panels + 2 Convection Fins	
<b>Triple Panel Type 33</b> 3 Radiator Panels + 3 Convection Fins	



### Heat Loss = Efficiency

As hot water passes through the radiator it's heat is emitted through convector fins. The greater the efficiency of the fins and panels the greater the radiator heat loss or 'output'.

## Output Calculators

A heat load calculator is used to assess heat output requirements. By inputting the panel type and correct inlet/outlet temperatures the output calculator displays the corresponding radiator heat output to suit room size.

## System Components

System components such as well insulated pipe, correct pipe diameter, correctly sized modulating pumps and external temperature sensor to compensate boiler operation for ambient temperature also play a role in heat output.

## Heat Pump Systems

If you intend to use a heat pump instead of a boiler as the heat source, note that heat pumps typically only achieve a maximum water temperature of 55°C. This is ideal for low temperature systems such as floor heating but is not suited to high temp panel radiator systems. Heat pump boosters or oversized radiators can be used to achieve the required temperature but consume greater energy resource and additional cost.

## Summary

Always use heat outputs calculated at the **EN442 standard of 70°C** mean water temperature (80°C inlet, 60°C outlet, 20°C room). Outputs based on higher mean temperatures of **80°C or more artificially creates** higher output figures that are typically unattainable in real world installations. Distorted heat outputs give a false impression of radiator sizing for room areas and can lead to incorrect installation and radiators that do not adequately heat rooms. Different boiler types, radiator panel types and other system components also greatly impact heat output.

### Australian Approvals

Radiators need to be certified with Australian regulatory bodies to be legally compliant for use in Australia. Check for these standards:

- ▶ Australian Standard (AS)
- ▶ Australian Gas Association (AGA)
- ▶ C Tick



AS 3498 / AS 4552



AGA 7023



C Tick N28384