

**A Grimwood Heating Pty Ltd  
White Paper**



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## **Domestic Water Heating Elements**

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## Introduction

Almost everyone who has an electric water heater at home has experienced the shock of stepping into a cold shower, or at least the disappointment of waiting for the water to run hot, and it not happening.

## Problem Statement

When a domestic water heater element fails, often the first you know about is when you have no hot water. If you have a single element off peak heater, then you have to wait until the next morning after getting the element replaced to get any hot water. There are a number of things you can do to extend the life of your water heater element so that this inconvenience is minimized.

## Previous Options

When there is a service call for “no hot water”, the biggest priority is to fix it quickly. The customer wants their heater fixed now, and they want to stop the family screaming about cold showers.

## The Grimwood Heating Pty Ltd Solution

Grimwood can offer a range of element types in a number of materials to suit differing applications. To prevent another element failure in a short time it is important to understand why this particular element failed in the first place.

There can be a number of reasons for elements failing, the most common being corrosion of the element sheath or overheating of the element.

The cause of corrosion can come from a number of sources.

If the sacrificial anode in the heater is depleted, this can result in increased corrosion of the element sheath.

If the water has a high salt or chloride content some metals will corrode quicker than others.



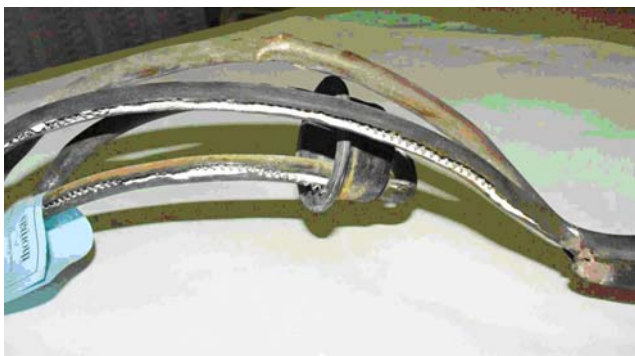
If the water has high dissolved solids in it, then scale build up can be a problem, resulting in the element overheating.

If the heater is right on the limit in capacity to supply the volume of water required in normal operation, this can result in the element operating for longer periods and give a shorter life.

### *Copper*

Copper elements are the bottom of the range and are best suited to very benign water conditions at low watts densities.

Some water heater manufacturers use these to keep costs down.



### *Alloy 800*

The composition of Alloy 800 is 32.5% Nickel, 21% Chromium. Alloy 800 is also commonly known as Incoloy<sup>1</sup>.

The high levels of nickel and chromium give superior corrosion resistance and high temperature strength compared to copper and ordinary austenitic stainless steels.

Alloy 800 elements are used for normal water conditions where the customer is requires good value for money and a well engineered product.

### *Alloy 825*

Alloy 825 comprises 42% Nickel, 21.5% Chromium, and 3% Molybdenum. Alloy 825 is particularly resistant to pitting and intergranular corrosion.

Alloy 825 elements are the top of the range elements for the most difficult water conditions. They are ideally suited for corrosive waters with high levels of chlorides.



<sup>1</sup> Incoloy is a trademark of Special Metals Corporation. Grimwood uses Nicrofer 3220, a product of ThyssenKrupp VDM of Germany.

## Watts density

Watts density is a measure of the intensity of the heat transfer from the element to the water and indicates how hot the element runs in the water. It is usually measured in watts per square meter ( $W/m^2$ ).

High watts density elements are more compact for a given wattage, but operate at a higher temperature and generate more noise than low watts density elements.

Low watts density elements will deliver longer life due to their lower operating temperature. The larger size may mean that they will not necessarily physically fit in all applications.

Low watts density elements are also used where quiet operation is required.

## Implementation

Before assuming that it is the element that has failed, don't forget to check the thermostat for proper operation. The solution could be as simple as pressing the reset button on the thermostat, but if you get repeated tripping of the reset button, replace the thermostat.



Always check the sacrificial anode every time you visit a domestic water heater and replace it if necessary. This will not only extend the life of the element, it will also extend the life of the heater tank.

Repeated calls to replace elements with short life are often attributed to a depleted anode. To ensure the warranty on the replacement element is not compromised, evidence of the anode being checked may be required.

Look at the failed element to determine the cause of failure, and select the appropriate replacement.

If a higher wattage element is installed to improve recovery time, always check to ensure that the electrical circuit is rated for the additional load and that the relief value on the water heater is rated for the additional wattage.

## Summary

The selection of the most appropriate replacement element will give longer life, a more satisfied customer and fewer cold showers.

