

HEAT EXCHANGE EFFICIENCY

WHITE PAPER

The transfer of heat in engineering systems requires robust, carefully-designed components that can be easily installed and maintain their performance over a long operating lifespan.

Ormiston Wire has used its considerable expertise in the manufacture of wire to produce wire turbulators that have maximised the effectiveness of heat transfer for all kinds of customers.

Heat exchangers have been at the heart of many, if not most, industrial and petrochemical processes since the beginning of the industrial revolution and many investigators have searched for ways and means of improving performance to reduce size, weight and cost. Many ideas have been proposed, some have prospered, and others have not.

One successful development has been the removable spiral wire-wound turbulator for heat transfer enhancement in round tubes. Ormiston has been a driving force in progressing these devices since



1968 and now offers a wide range of turbulators to suit many diverse applications.

An application that we have served successfully for many years is air cooled industrial oil cooling, in which robust, round tube exchangers are used to assist power generation, transformer oil cooling, gas compression and pumping applications.

A new customer who was seeking to solve a particular heat transfer problem required a solution outside our normal size range. However, drawing on our extensive expertise and experience enabled us to develop a low density turbulator with a diameter of 3mm.

This miniature spiral wire wound turbulator performed well in initial trials and has since undergone further series of evaluation tests. When fluid flows through a tube

frictional drag creates a slower moving boundary layer at the tube wall, which is limited by shear resistance.

‘Ormiston Wire turbulators have proved to be a valuable tool in many applications...’

When the tube wall is cooler than the fluid flowing through the tube then viscosity at the wall is greater than that at the centre of the tube. This reinforces the boundary layer, which then provides a resistance to heat transfer, thus restricting performance.

Ormiston spiral wire wound turbulators are designed to frequently disrupt this cool boundary layer and to re-mix the disrupted fluid with the warmer bulk fluid at the centre of the tube, reducing the temperature difference across the tube bore and minimising the boundary layer resistance.



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‘Ormiston can vary the density of its wire turbulators to suit the flow of liquid or gas...’

15cm up to 3 metres can be provided in diameters that vary between 6.35mm and 32mm.

Ormiston Wire continues to use its depth of expertise to develop new solutions in heat exchange technology. Ormiston never stands still. Even now, we are still finding new opportunities for engineers to exploit our tried and proven technology in novel ways.

Ormiston spiral wire wound turbulators have proved their value in many applications over the past 50 years due to their versatility.

They can be varied in loop density (to optimise heat transfer and pressure drop), diameter and length (up to 3m) and for longer tube lengths individual turbulators can be simply and quickly joined together. Because of this flexibility, system designers can reduce the length, diameter and/or number of tubes required per unit, while flow pumps can also be kept to a minimum size.

The efficiency of the turbulators is further enhanced by the fact that they do not need to be fixed in the tubes as the wires grip quite tightly and rarely move with a normal flow of liquid or gas.

Ormiston Wire turbulators have proved to be a valuable tool in many applications because they

can be custom-built to so many specifications. Turbulators can be supplied in a range of metals to suit the application, including galvanized mild steel, stainless steel, copper and monel metal, while lengths from

