TECHNICAL NOTES

Thermal resistance (TR) for each heat sink in this catalogue to a test piece of a given length L presented in the table of each profile are experimental data are confirmed by the test laboratory results.
The test conditions are those which guarantee maximum performance by the heat sink, and include:

1) natural ventilation
2) thermal load applied to the entire load surface
3) vertical position to take maximum advantage of the chimney effect on airflow
4) anodized black opaque surface to enhance thermal exchange through heat radiation as well through heat radiation as well
5) absence of objects near the tested heat sink to minimize environmental disturbances
6) temperature measured by means of a thermocouple inside the heat sink immediately below the load in the center area of the test piece.

The values indicated in the catalogue refer to a TR detected with a heat sink–ambient temperature difference of $\Delta T = 60°C$. This is effectively the maximum load for usage of the majority of solid layer devices. The logical consequence of the above is that the designer should use the TR values reported in the catalogue only as a starting point in selecting the most suitable heat sink for a given use. In order to reach a definitive result it is necessary to be aware that in reality the heat sink will be subject to worse conditions than those used in laboratory testing. A very simple example to clarify the concept: if the total power to dissipate is 35W and we determine that the device can reach a maximum temperature of 80°C with an ambient temperature of 30°C, we can use the following formula:

$$TR = \frac{\Delta T}{W}$$

Where:

TR = thermal resistance of the heat sink
ΔT = maximum temperature of the heat sink minus ambient temperature
W = maximum dissipated power

Substituting the project values in the formula we have:

$\Delta T = 80 - 30 = 50$ °C
W = 35 W

This theoretical result will be slightly reduced to make it more realistically applicable to the project. A starting point would be from 1.1 – 1.3 °C/W.

At this point the data indicated in the catalogue allow us a wide range of choice in identifying among many profiles of medium power the most suitable in terms of dimensions and ease of installation for our use.
It is unlikely to find the desired TR value directly in the tables as these indicated values regard predetermined lengths. As is evident, it is necessary to lengthen or shorten the profile to decrease or increase the TR.

CAUTION!

Since thermal conduction is involved the TR value does not chan
heat sink will not reduce its thermal resistance by one half! It is also important to bear in mind that the thermal load disposition has a determining effect on the effectiveness of the heat sink.

FORCED VENTILATION

When the design involves the use of forced ventilation it is still possible to use the catalogue data, bearing in mind that the TR measured in natural ventilation decreases proportionally with the air velocity. Table 1 shows the purely theoretical trend of this decrease. It is possible to approximately evaluate the decrease in TR with the increase in heat sink length. Table shows a typical trend.

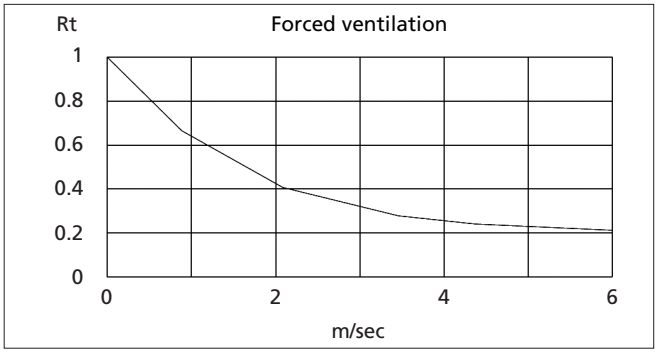

table 1

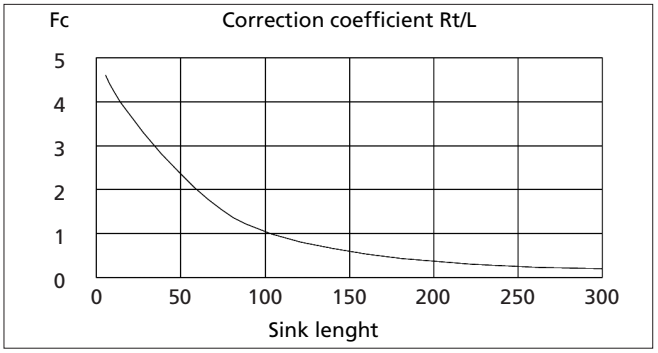

table 2

CAUTION!

Forced ventilation greatly amplifies all non–linear factors for heat sinks. Moreover, such factors as heats sinks' geometry, type and characteristics of fans, the placement different barriers for air flow, the possibility of vortexes, the disposition of thermal loads, etc gives very big influences on theoretical calculation and product design. In these cases only knowledge, experience and laboratory testing can help the designer. It is exactly in these situations that heat sinks' producer makes it laboratory available to quickly resolve client problems with the best solutions.

IMPORTANT

The data and information contained in this catalogue have been carefully compiled and are therefore reliable. However, the client still has the responsibility of ensuring the correct use of the devices. Because producer cannot know the specific use of customer product, he cannot be held responsible in any way for any incidents or damage that maybe during the using customer product. The company also reserves the right to modify its products without prior notice in order to improve their quality and efficiency. All aluminum profiles, produced by extruding method are complain to EN 755/9 standard regarding extrusion tolerances. Consequently, the indicated weights are theoretical average values and vary within the range of dimensional tolerances.