

# Tender Specification

## ItuGraf® is a multifunctional panel system: heating, cooling and sound absorption in one system!

ItuGraf® -graphite panel has a 10 mm copper pipe meander embedded in a thermally conductive graphite layer. Panel's casing is formed from galvanized sheet steel 0.7 mm and is available with a smooth or a perforated surface. When the panel is perforated a nonwoven acoustic fabric is placed between the steel plate and the activation layer in order to get additional sound absorption effect. The air flow through has been structurally prevented in accordance with the EN 14037-1 standard. Panel can be painted in RAL colours (the standard colour is RAL 9016). Panels can also be fitted with insulation on the top surface in order to concentrate on the downward effect. ItuGraf standard insulation is made of glass wool with aluminium foil backing. Insulation material with thickness 20 mm is classified according to EN 14303, which thermal conductivity is  $\lambda$  (40°C) 0.040 W/(m•K) according to the standard EN 12667. Reaction to fire classification is A2 according to standard EN 13501-1.

The ItuGraf standard sail module in free hanging installation is the most efficient in spot heating and cooling cases. The standard panel with one copper meander can be used in combination with a change-over system using e.g. a 6-port valve to allow for heating or cooling. But Itula provides also panels in 2-circuit version, making it possible to connect the same panel to a four pipe net having so two totally independent cooling and heating networks working in parallel, without any risk of fluid mixing in the panel. The patented one layer graphite activation system makes sure that both circuits give the maximum possible output. The thermal transfer rate of ItuGraf panels is optimized to provide the maximum heating and/or cooling per unit:

ItuGraf® -graphite panel's cooling capacity (insulated) is 125 W/m<sup>2</sup> (160 W/m<sup>2</sup> non-insulated ) per active area (at  $\Delta T = 10$  K), which is in accordance with the EN 14240 standard. Cooling capacity is achieved with a turbulent flow in the panel's pipe meander, which leads in general to a temperature difference of 2-3 K on the water side.

ItuGraf® -graphite panel's heating output (insulated) is 182 W/m (305 W/m non-insulated) per active length of the panel (at  $\Delta T = 30$  K), which is in accordance with the EN14037 standard. Heating output is achieved with a turbulent flow in the panel's pipe meander, which leads in general to a temperature difference of 5-10 K on the water side. The surface temperature of the perforated panel should not exceed 55°C.

The standard widths of the ItuGraf® panels are 595 mm, 895 mm and 1190 mm. The standard lengths are 590 mm, 1190 mm, 1790 mm, 2390 mm, 2990 mm and 3590 mm. Panels can also be made to measure upon request.

The panels can be hung from the ceiling by using adjustable cable wire mounting sets. The cassette can be adapted to the various existing suspended ceiling models such as Saint-Gobain Ecophon and Rockfon. The panels can also be easily installed directly on the ceiling using our patented surface bracket. The ItuGraf panels are CE marked and a Declaration of Performance is available upon request.

ItuGraf® panels can be connected in series of 2 to 5 pieces in serial or in parallel depending on the pressure losses of the selected product types and their combinations. The flows of individual or parallel-mounted panels can be standardized with adjustable inserts and flow control valves. The room temperature can be controlled by a thermostat located in the premises that changes the temperature or flow rate of the supply water using an actuator. Connections between panels can be realized using oxygen diffusion resistant flexible hoses with DN10 push-fit connectors on both ends. The connection to the main pipe can be realized using the same flexible hose type or another with ½" external thread on one end.