



University Hospital Heidelberg

University Hospital Heidelberg | INF 324 | 69120 Heidelberg

RETTIG BELGIUM NV
Vogelsancklaan 250
3520 Zonhoven

Centre for Infectious Diseases

U. Frank MD

Professor of Clinical Microbiology and
Infectious Diseases
Head, Division of Hospital Hygiene
Infection Control Practitioner
Specialist in Hospital Hygiene and
Environmental Medicine

Telephone 06221 / 56-4589
Fax 06221 / 56-5627
uwe.frank@med.uni-heidelberg.de

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Hygienic assessment

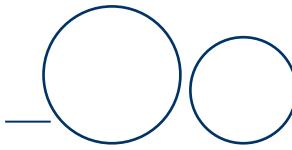
**of RADSON Integra, RADSON Parada “flat front”, multifunction and T6 type 10, 20 and 30
flat radiators, in each case, with and without covers or side panels**

for Rettig Belgium NV
(- in compliance with the identical product range sold under the COSMO trademark -)

Special criteria have to be met for radiators that are used in institutions with high hygienic demands (e.g. in hospitals, medical practices, laboratories, etc.). These are:

1. Easy mounting and dismounting of cladding components
2. Surfaces as smooth as possible, with no surfaces at which impurities can accumulate
3. Resistance to cleaners and disinfectants
4. Easy access to the radiator for cleaning and disinfecting

Two sample radiators representative of the profiled flat compact, multi-function and T6 type 10, 20 and 30 flat radiators from RADSON were tested with these points in mind.



Ad1: Both model radiators, which were provided for the examination, are easy-to-assemble and -dismantle compact radiators either with a profile (type 1) or planar (type 2) frontage without inlying convection sheets (type 1 design height: 500mm, design length: 450 mm, overall depth: 70 mm; type 2 design height: 400mm, design length: 450 mm, overall depth: 70 mm;). The covering and side panels are easily removable by lifting the plastic clamps.

Ad2: The heating devices have a sufficient gap between the sheets, what facilitates visual inspection and manual purification. Depending on the type, the front surface is either with a profile (type 1) or planar (Type 2). The inlying surface is flat profiled, as well. Corners and edges are rounded. As a consequence, there is no risk of injury when cleansing.

When mounted, the heater only shows few horizontal surfaces. Sedimentation of dust particles of the air is limited to an unavoidable minimum.

All of the heater's surface areas have a smooth, not porous surface. The inlying surfaces are sleek and do not own any seams or fugues, either. The sleek surface hardly allows adhesion of hard particles resp. contaminations of particle carried microorganisms from the air.

Ad 3: The surface coating of the examined radiators is made of epoxy-resin-powder-coating according to the type DIN 55900 on an eco-friendly, cathodic dip painting basis.

This form of coating creates a non-porous, sleek surface, which enables an easy removal of contaminations including dried-up, albuminous liquids. Furthermore, the surface hardly provides the capability of adhesion of hard particles, what minimizes the contamination by particle carried microorganisms as well as the formation of devolatilization products.

Hygiene heating devices that are used in medical facilities are to be cleaned resp. disinfected wetly. This is appointed by the authorities of the Robert Koch Institute, Berlin, Germany, in affiliation with the European Centre for Disease Control and Prevention, Stockholm, Sweden. For this reason, resistance to cleaning and disinfecting agents is essential. The factual epoxy-resin-powder-coating is known to be resistant to custom concentrations of customary cleaners and disinfectants used in medical facilities and consequently fulfills the high



expectations concerning the resistance of the coating towards aggressive cleaning and disinfecting agents.

Ad 4: Soiling attempts of the heater's surface with hospital germs such as *Staphylococcus aureus* ($1,5 \times 10^9$ KBE/ml), *Enterococcus hirae* ($1,5 \times 10^9$ KBE/ml) or *Pseudomonas aeruginosa* ($3,3 \times 10^9$ KBE/ml) lead to a reduction by 8 log-steps after cleansing with a custom cleanser (Tana Tawip) and to a complete eradication of the bacteria after the usage of disinfectants (Incidin2,5%; Perform 2%). Besides the accessibility for cleaning and disinfecting another aspect must be regarded. Heaters that operate on the principle of radiant heat cause less current velocity of the air than heaters that are equipped with convectors.

For the purpose of the turbulent mixing of the air to be as low as possible, heating devices that work with radiant heat are privileged in medical facilities with high hygienic expectations.



Summary:

Regarding the mentioned aspects, the described profiled, flat RADSON compact, multifunction and T6 type 10, 20 and 30 flat radiators, either with or without covers or side panels fulfill the high expectations for the installation in rooms with high hygienic demands (e.g., risk areas B and C according to the German recommendations of the commission for hospital hygiene and infection prevention at the Robert-Koch Institute, Berlin, Germany; Bundesgesundheitsbl. 2009; 52: 951-962).

Dr. U. Frank

Uwe Frank, MD

Professor of Clinical Microbiology and Infectious Diseases

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