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GI 1.0  GIRAD RADIATING BELTS

GI 1.1  OPERATING PRINCIPLE
The Girad Radiating Belt is an overhead radiation heating unit suitable for use in medium to large areas.

The system essentially consists of a heat production unit with thermal power in the range 35 to 300 kW, a system of air heating tubes which, from now on, we shall call the Radiating Belt and an automatic control system.

The heat production unit (or combustion unit) consists of a combustion chamber in special enameled steel, an "ECOMIX" gas burner complete with a full set of safety and control components, a turbine ventilator, an exhaustion/safety tube and an electronic control panel. The Radiating Belt, which is a closed-circuit at lower than ambient pressure, consists of a galvanized steel frame containing one tube or two parallel tubes in galvanized steel or aluminum coated steel, treated with ultra red paint, which make up the actual radiating body of the system. The tubes, of 200 and 300 mm diameter, are closed on top and the sides by a very thick insulation panel - only the lower part of the tubes is un-insulated and is the system’s radiating section.

The Radiating Belts, of variable length and shape, consists of standard elements used to build Radiating Belts of a shape and length suitable for the characteristics of the building being heated and for the specific thermal project. The maximum temperature of the Radiating Belts is controlled by an adjustable thermostat, with a setting range of 100°C to 300°C according to need.

The GIRAD control system can be either continuous computerised modulation or two-stage. Both types of control are able to adapt the system’s power according to the momentary heating load of the room and/or to the air being heated. The system’s electric ventilator, or turbine, creates lower pressure in the radiating tubes with respect to ambient atmosphere. This pressure varies from a minimum of -1 mbar on delivery to the circuit to a maximum of -5/7 mbar on return and absolutely prevents the carrying fluid from being emitted into the environment in which the Radiating Belt is installed. It is controlled by two differential pressure switches acting on the combustion unit’s electrically controlled fuel supply system. If a radiating tube breaks or leaks due to accidental impact or for any other reason, the burner and electric ventilator are immediately switched off. Gas is ignited by a high voltage electrode, while the flame is controlled by an ionising detection probe, which controls the Class A gas double solenoid-valve, which is shut (at rest) in the absence of energy. These devices are a standard supply of the sucked air gas burner provided with the GIRAD combustion unit. The GIRAD system adapts itself in terms of shape and power to the characteristics of the building being heated. The elements of the GIRAD system must be assembled and installed observing the project and instructions supplied, time by time, by the producer and the system design technician. After installation, the Radiating Belt and GIRAD combustion unit make up a closed circuit system, at lower pressure with respect to the environment. A ventilator on the heat production unit causes the carrying fluid to circulate at high speed within the closed circuit. The fluid consists of a mixture of hot air and burned gases. When the system is operating, air circulating in the system heats up, reaching the combustion chamber and mixing with the burned gases produced by the gas burner. The excess volume of air produced by the burner emitting combustion air into the circuit, is exhausted by the flue on the heat production unit. The operating temperature of the carrying fluid and consequently of the Radiating Belt, is indicated in the project and set according to parameters depending on the type of use of the building to be heated and the system installation height, etc., and may vary in the range of 100° to 300°C. When the set temperature is reached, the burner is switched off while the combustion unit turbine continues operating until the radiating circuit reaches the minimum temperature set on the minimum level thermostat (80°C). As we mentioned previously, the shape and, consequently, the length of the Radiating Belt varies according to requirements. The maximum length permitted by the system is 282 meters, with maximum power of 300 kW.
Of course, several Radiating Belts may be installed in the same room. Contrary to other gas fuelled radiation systems (radiating tube modules, incandescent emitters, etc.), the GIRAD system is installed with the heat production unit and burner located outside the room. The gas supply lines too, are of course situated outside.

GI 2.0 GIRAD GENERATOR

GI 2.1 CONSTRUCTION ASPECTS OF THE GIRAD GENERATOR

GIRAD was designed and built for use mainly outdoors and, consequently, all engineering characteristics had to take into account this specific requirement:

- **Design:** Inspired by highly efficient sheet steel machining to provide adequate accommodation for the appliances.
- **Flexibility:** The same model can be used with the burner sited at either left or right.
- **Adaptability:** Can be installed on all types of walls, using suitable accessories.
- **Material:** Use of construction materials most suitable for utilising the machine at often very low external temperatures and under very wide ranging weather conditions.

- Combustion chamber: in enameled steel
- Recirculation chamber: in enameled steel
- Smoke exhaust union: in enameled steel
- Ecomix burner: in enameled steel
- Turbine: with inverted blades
- Outer casing: in sheet steel pre-painted with powder paints and oven dried
- Internal insulation: High density, highly insulating fibreglass
- Electrical appliances box: Pull-out box, easy to access and maintain
- External, protective casing: Pre-painted aluminium

GI 2.2 "ECOMIX" BURNER

The "ECOMIX" air-stream gas burner is suitable for operating in an outflowing air-stream, usually at high speed (7-15 m/s in most cases).

The burner has gas trains with Venturi tubes and can be fed both by partially premixed gas+air fuel or with pure gas.

The "ECOMIX" burner has special characteristics compared to traditional blown air burners as follows:

- Highly reliable: no moving parts.
- High control flexibility: can reach 1:10 ratio.
- Combustion is very environmentally friendly: the "ECOMIX" burner operates efficiently even in the event of substantial falls in pressure; this is essential for correct circulation of carrying fluid (air+burned gases) inside the Radiating Belts.

Thanks to the optimum air and gas mixture produced by the "ECOMIX" burner, it can be regarded as hyper-stoichiometric.
Control of emissions into atmosphere

"ECOMIX" BURNER

INSIDE VIEW
**GI 2.3 RANGE AND PERFORMANCE**

**Girad Radiating Belts**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>POWER</th>
<th>OPERATION</th>
<th>NUMBER OF VENTURI</th>
<th>POWER SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSR50</td>
<td>35 - 50 kW</td>
<td>2 Stage</td>
<td>4</td>
<td>230 V - 50 Hz</td>
</tr>
<tr>
<td>GSR100.1</td>
<td>70 - 100 kW</td>
<td>2 Stage</td>
<td>7</td>
<td>230V - 50 Hz</td>
</tr>
<tr>
<td>GSR100</td>
<td>70 - 100 kW</td>
<td>2 Stage</td>
<td>7</td>
<td>400 V - 50 Hz</td>
</tr>
<tr>
<td>GSR200</td>
<td>100 - 200 kW</td>
<td>2-3 Stage</td>
<td>14</td>
<td>400 V - 50 Hz</td>
</tr>
<tr>
<td>GSR300</td>
<td>100 - 300 kW</td>
<td>2-3 Stage</td>
<td>21</td>
<td>400 V - 50 Hz</td>
</tr>
</tbody>
</table>

*Tab. 1*

*Fig. 3*

Key:
1. Burner with gas train
2. Combustion air intake
3. Heat exchange and combustion chamber
4. Electric control panel
5. Electric motor for fan rotation
6. Smoke exhaust port
7. Air flow control gate
8. Safety control gate
9. Control thermostat
10. Manually reset safety thermostat
11. Air and exhaust fumes recirculation chamber in enameled steel

**DIAGRAM OF GIRAD PATENTED GENERATOR**

- **INSULATION**
- **RETURN**
- **DELIVERY**
- **0** Burner with gas train
- **1** Combustion air intake
- **2** Heat exchange and combustion chamber
- **3** Electric control panel
- **4** Electric motor for fan rotation
- **5** Smoke exhaust port
- **6** Air flow control gate
- **7** Safety control gate
- **8** Control thermostat
- **9** Manually reset safety thermostat
- **10** Air and exhaust fumes recirculation chamber in enameled steel

**Return delivery**

**Insulation**

**Fig. 3**

*GIRAD Generator Frontal View*

*Electrical control panel in totally enclosed compartment, protection degree IP55*

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**FRACCARO Officine Termodinamiche**

Via Sile 32, 31033 Castelfranco Veneto (TV) - ITALY

Tel. +39/0423/721003 - Fax +39/0423/493223

www.fraccaro.it - E-mail: technical@fraccaro.it

March 01
CONSTRUCTION CHARACTERISTICS OF GENERATOR MODEL GSR50 - GSR100.1

Key:
1. External, protective housing
2. Air return tube port
3. Delivery air tube port
4. Burned gases exhaust port
5. Gas union 1/2"
6. Combustion air suction tube port

EXTERNAL DIMENSIONS OF GENERATOR MODEL GSR50 - GSR100.1

<table>
<thead>
<tr>
<th></th>
<th>GSR50 [mm]</th>
<th>GSR100.1 [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>505</td>
<td>745</td>
</tr>
<tr>
<td>B</td>
<td>1.025</td>
<td>1.125</td>
</tr>
<tr>
<td>C</td>
<td>915</td>
<td>915</td>
</tr>
<tr>
<td>D</td>
<td>230</td>
<td>270</td>
</tr>
<tr>
<td>E</td>
<td>105</td>
<td>100</td>
</tr>
<tr>
<td>F</td>
<td>797</td>
<td>815</td>
</tr>
<tr>
<td>G</td>
<td>260</td>
<td>330</td>
</tr>
<tr>
<td>H</td>
<td>107</td>
<td>140</td>
</tr>
<tr>
<td>I</td>
<td>470</td>
<td>480</td>
</tr>
<tr>
<td>L</td>
<td>570</td>
<td>745</td>
</tr>
<tr>
<td>M</td>
<td>310</td>
<td>310</td>
</tr>
<tr>
<td>N</td>
<td>246</td>
<td>380</td>
</tr>
</tbody>
</table>

Tab. 2
CONSTRUCTION CHARACTERISTICS OF GENERATOR MODELS GSR100 - GSR200 - GSR300.

**Key:**
1. Electrical panel
2. "ASC": Gate for automatic control of flue diameter
3. Burned gases exhaust port
4. Delivery air tube port
5. Air return tube port
6. External, protective housing
7. 400V/50Hz motor
8. Gas pressure switch
9. 1" gas union (GSR100); 1" 1/4 (GSR200); 1" 1/2 (GSR300)
10. 1st and 2nd stage solenoid-valve
11. Burner casing

**EXTERNAL DIMENSIONS OF GENERATOR MODEL GSR100 - GSR200 - GSR300**

<table>
<thead>
<tr>
<th></th>
<th>GSR100 [mm]</th>
<th>GSR200 [mm]</th>
<th>GSR300 [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>580</td>
<td>650</td>
<td>787</td>
</tr>
<tr>
<td>B</td>
<td>1.113</td>
<td>1.250</td>
<td>1.468</td>
</tr>
<tr>
<td>C</td>
<td>762</td>
<td>942</td>
<td>1.130</td>
</tr>
<tr>
<td>D</td>
<td>245</td>
<td>276</td>
<td>333</td>
</tr>
<tr>
<td>E</td>
<td>200</td>
<td>216</td>
<td>250</td>
</tr>
<tr>
<td>F</td>
<td>197</td>
<td>297</td>
<td>297</td>
</tr>
<tr>
<td>G</td>
<td>260</td>
<td>330</td>
<td>330</td>
</tr>
<tr>
<td>H</td>
<td>140</td>
<td>200</td>
<td>250</td>
</tr>
</tbody>
</table>

Tab. 3
GI 2.4 TECHNICAL CHARACTERISTICS AND SAFETY DEVICES OF GIRAD

GIARAD mod. GSR50 35 to 50 kW "CE" approval under n. 49AQ833 (rév. 3)

Combustion unit
Thermal power of furnace: \( \Phi_{cn} \) 35 - 50 kW (30.100 - 43.000 kcal/h)
Available thermal power: \( \Phi_{un} \) 32,2 - 46,0 kW (27.692 - 39.560 kcal/h)
Available thermal performance: \( \eta_u \) 92%
Thermal loss in flue: \( P_f \) 7%
Thermal loss in casing: \( P_d \) 1%
Gas burner: Multi Venturi tubes at lower pressure
Number of separate Venturi tubes: 4
Type of gas: Multigas
Gas supply: 1/2” gas
Gas intake pressure with G20 \( P_i \) 20 mbar
Gas intake pressure with G30 \( P_i \) 29 mbar
Consumption with G20(methane) min÷max 3,2 + 4,5 m³/h
Consumption with G25(methane-nitrogen)min÷max 3,7 + 5,2 m³/h
Consumption with G30 (butane) min÷max 2,5 + 3,6 kg/h
Consumption with G31 (propane) min÷max 2,5 + 3,6 kg/h
Diameter of smoke exhaust union: 100 mm
Electrical power supply: single-phase/230 V - 50Hz
Electrical consumption: 0,4 A
Electrical consumption: 240 W
Weight of generator: 77 kg
Generator dimensions: 816,5x1.025x486 mm (WxLxH)
Operating temperature: -20° ÷ 60°C
Identification plate: as per 90/396/EU Directive

GIARAD Model GSR 100.1 70 to 100 kW "CE" approved

Combustion unit
Thermal power of furnace: \( \Phi_{cn} \) 70 - 100 kW (60.340 - 86.200 kcal/h)
Available thermal power: \( \Phi_{un} \) 64,4 - 92,0 kW (55.512,8 - 79.304 kcal/h)
Available thermal performance: \( \eta_u \) 92%
Thermal loss in flue: \( P_f \) 7%
Thermal loss in casing: \( P_d \) 1%
Gas burner: Multi Venturi tubes at lower pressure
Number of separate Venturi tubes: 4
Type of gas: Multigas
Gas supply: 1/2” gas
Gas intake pressure with G20 \( P_i \) 20 mbar
Gas intake pressure with G30 \( P_i \) 29 mbar
Consumption with G20(methane) min÷max 3,2 + 4,5 m³/h
Consumption with G25(methane-nitrogen)min÷max 3,7 + 5,2 m³/h
Consumption with G30 (butane) min÷max 2,5 + 3,6 kg/h
Consumption with G31 (propane) min÷max 2,5 + 3,6 kg/h
Diameter of smoke exhaust union: 140 mm
Electrical power supply: single-phase/230 V - 50Hz
Electrical consumption: 0,4 A
Electrical consumption: 240 W
Weight of generator: 77 kg
Generator dimensions: 816,5x1.025x486 mm (WxLxH)
Operating temperature: -20° ÷ 60°C
Identification plate: as per 90/396/EU Directive
## TECHNICAL CHARACTERISTICS OF GIRAD

### GIRAD Model GSR100 70 to 100 kW "CE" approval under nr. 49AQ833 (rèv. 3)

**Combustion unit**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal power of furnace:</td>
<td>$[\Phi_{cn}] = 70 - 100\ kW (60.340 - 86.200\ kcal/h)$</td>
</tr>
<tr>
<td>Available thermal power:</td>
<td>$[\Phi_{un}] = 64.4 - 92.0\ kW (55.512.8 - 79.304\ kcal/h)$</td>
</tr>
<tr>
<td>Available thermal performance:</td>
<td>$[\eta_{u}] = 92%$</td>
</tr>
<tr>
<td>Thermal loss in flue:</td>
<td>$[P_f] = 7%$</td>
</tr>
<tr>
<td>Thermal loss in casing:</td>
<td>$[P_d] = 1%$</td>
</tr>
<tr>
<td>Gas burner:</td>
<td>Multi Venturi tubes at lower pressure</td>
</tr>
<tr>
<td>Number of separate Venturi tubes:</td>
<td>7</td>
</tr>
<tr>
<td>Type of gas:</td>
<td>Multigas</td>
</tr>
<tr>
<td>Gas supply:</td>
<td>1&quot; gas</td>
</tr>
<tr>
<td>Gas intake pressure with G20</td>
<td>$[P_i] = 20\ mbar$</td>
</tr>
<tr>
<td>Gas intake pressure with G30</td>
<td>$[P_i] = 29\ mbar$</td>
</tr>
<tr>
<td>Consumption with G20 (methane) min+max</td>
<td>$6.3 \div 9.0\ m^3/h$</td>
</tr>
<tr>
<td>Consumption with G25 (methane-nitrogen) min+max</td>
<td>$7.7 \div 11.1\ m^3/h$</td>
</tr>
<tr>
<td>Consumption with G30 (butane) min+max</td>
<td>$5.0 \div 7.2\ kg/h$</td>
</tr>
<tr>
<td>Consumption with G31 (propane) min+max</td>
<td>$5.0 \div 7.2\ kg/h$</td>
</tr>
<tr>
<td>Diameter of smoke exhaust union:</td>
<td>140 mm</td>
</tr>
<tr>
<td>Electrical power supply:</td>
<td>three-phase/400 V - 50Hz</td>
</tr>
<tr>
<td>Electrical consumption:</td>
<td>0.4 A</td>
</tr>
<tr>
<td>Electrical consumption:</td>
<td>240 W</td>
</tr>
<tr>
<td>Weight of generator:</td>
<td>91 kg</td>
</tr>
<tr>
<td>Generator dimensions:</td>
<td>762x1.113x780 mm (WxLxH)</td>
</tr>
<tr>
<td>Operating temperature:</td>
<td>-20° - 60°C</td>
</tr>
<tr>
<td>Identification plate:</td>
<td>as per 90/396/EU Directive</td>
</tr>
</tbody>
</table>

### GIRAD mod. GSR200 100 to 200 kW - "CE" approval under n. 49AQ834 (rèv. 2)

**Combustion unit**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal power of furnace:</td>
<td>$[\Phi_{cn}] = 100 - 200\ kW (86.000 - 172.000\ kcal/h)$</td>
</tr>
<tr>
<td>Available thermal power:</td>
<td>$[\Phi_{un}] = 138.0 - 184.0\ kW (79.120 - 158.240\ kcal/h)$</td>
</tr>
<tr>
<td>Available thermal performance:</td>
<td>$[\eta_{u}] = 92%$</td>
</tr>
<tr>
<td>Thermal loss in flue:</td>
<td>$[P_f] = 7%$</td>
</tr>
<tr>
<td>Thermal loss in casing:</td>
<td>$[P_d] = 1%$</td>
</tr>
<tr>
<td>Gas burner:</td>
<td>Multi Venturi tubes at lower pressure</td>
</tr>
<tr>
<td>Number of separate Venturi tubes:</td>
<td>14</td>
</tr>
<tr>
<td>Type of gas:</td>
<td>Multigas</td>
</tr>
<tr>
<td>Gas supply:</td>
<td>1 1/4&quot; gas</td>
</tr>
<tr>
<td>Gas intake pressure with G20</td>
<td>$[P_i] = 20\ mbar$</td>
</tr>
<tr>
<td>Gas intake pressure with G30</td>
<td>$[P_i] = 29\ mbar$</td>
</tr>
<tr>
<td>Consumption with G20 (methane) min+max</td>
<td>$9.0 \div 18.0\ m^3/h$</td>
</tr>
<tr>
<td>Consumption with G25 (methane-nitrogen) min+max</td>
<td>$7.2 \div 14.4\ kg/h$</td>
</tr>
<tr>
<td>Consumption with G30 (butane) min+max</td>
<td>$7.2 \div 14.4\ kg/h$</td>
</tr>
<tr>
<td>Consumption with G31 (propane) min+max</td>
<td>$200\ mm$</td>
</tr>
<tr>
<td>Diameter of smoke exhaust union:</td>
<td>200 mm</td>
</tr>
<tr>
<td>Electrical power supply:</td>
<td>3/400 V - 50Hz</td>
</tr>
<tr>
<td>Electrical consumption:</td>
<td>1.7 A</td>
</tr>
<tr>
<td>Electrical consumption:</td>
<td>1.100 W</td>
</tr>
<tr>
<td>Weight of generator:</td>
<td>130 kg</td>
</tr>
<tr>
<td>Generator dimensions:</td>
<td>942x1.250x866 mm (WxLxH)</td>
</tr>
<tr>
<td>Operating temperature:</td>
<td>-20° - 60°C</td>
</tr>
<tr>
<td>Identification plate:</td>
<td>as per 90/396/EU Directive</td>
</tr>
</tbody>
</table>
GIRAD mod. GSR300  100 to 300 kW - "CE" approval under n. 49AQ834 (rèv. 2)

Combustion unit

Thermal power of furnace: \( \Phi_{cn} \) 100 - 300 kW (86,000 - 258,000 kcal/h)
Available thermal power: \( \Phi_{un} \) 92,0 - 276,0 kW (79,120 - 237,360 kcal/h)
Available thermal performance: \( \eta_u \) 92%
Thermal loss in flue: \( P_f \) 7%
Thermal loss in casing: \( P_d \) 1%
Gas burner: Multi Venturi tubes at lower pressure
Number of separate Venturi: 21
Type of gas: Multigas
Gas supply: 1 1/2" gas
Gas intake pressure with G20 \( P_i \) 20 mbar
Gas intake pressure with G30 \( P_i \) 29 mbar
Consumption with G20(methane) min-max 9,0 ÷ 27,0 m³/h
Consumption with G25(methane-nitrogen) min-max 10,4 ÷ 33,2 m³/h
Consumption with G30 (butane) min-max 7,2 ÷ 21,6 kg/h
Consumption with G31 (propane) min-max 7,2 ÷ 21,6 kg/h
Diameter of smoke exhaust union: 250 mm
Electrical power supply: Three-phase/400 V - 50Hz
Electrical consumption: 3,5 A
Electrical consumption: 2,300 W
Weight of generator: 210 kg
Generator dimensions: 1.130x1.468x1.037 mm (WxLxH)
Operating temperature: -20° ÷ 60°C
Identification plate: as per 90/396/EU Directive

SAFETY DEVICES OF GIRAD GENERATORS:

GIRAD combustion unit mod. GSR50:
Gas solenoid-valve: made by: SIT Controls Mod. 826 - class B-D complete with pressure stabiliser;
Electronic Equipment: Fabrikat: BRAHMA  Model CE 391.4

GIRAD combustion unit Mod. GSR100.1:
Gas solenoid-valve: made by: SIT Controls Mod. 826 or HONEYWELL VR 460C- class B-D complete with pressure stabiliser;
Electronic Equipment: made by: BRAHMA  Model CM 381.2 CE 391

GIRAD combustion unit Mod. GSR100:
Gas solenoid-valve: made by: SIT Controls Mod. 826 - class B-D complete with pressure stabiliser;
Electronic Equipment: made by: BRAHMA  Model SM 192.2 SM 592

GIRAD combustion unit Mod. GSR200:
Gas solenoid-valve: 2 x made by: SIT Controls Mod. 822 - class B-D complete with pressure stabiliser;
Electronic Equipment: made by: BRAHMA  Model SM 192.2 SM 592

GIRAD combustion unit Mod. GSR300:
Gas solenoid-valve: 3 x made by: SIT Controls Mod. 822 - class B-D complete with pressure stabiliser;
Electronic Equipment: made by: BRAHMA  Model SM 192.2 SM 592

Safety devices common to models GSR50, GSR100.1:
Electronic equipment: by: BRAHMA Model CE 391.4
Ionising electrode
Gas pressure switch: by: SIT Controls Mod. 901/Dungs GW 50
Circuit air pressure switches: by: DUNGS Mod. LGW/Uba Control 20
Safety thermostat: by: Termix 50/350°C 3x102
Steady state operation thermostat: by: Jumo Mod. KMF-70/ONU

Safety devices common to models GSR100, GSR200, GSR300:
Electronic equipment: by: BRAHMA Model SM 192.2 SM 592
Ionising electrode
Gas pressure switch: by: SIT Controls Mod. 901/Prescal/Dungs GW 50
Circuit air pressure switches: by: DUNGS Mod. LGW/Uba Control 20
Safety thermostat: by: Termix 32/210°C 3x102
Steady state operation thermostat: by: Jumo Mod. KMF-70/ONU

Minimum level thermostat: by: Termix 32/210°C 3x102
"GQTV" VALVE TIGHTNESS CONTROL DEVICE (optional)

The GQTV valve tightness control device is a compact valve tightness control system installed between the class A line valve and the stabilising solenoid-valve group. GQTV operates according to the pressure creation principle. The valve tightness control test is performed at every burner start. GQTV operates independently of delivered gas pressure (in terms of maximum permissible pressure) and is self-controlling during the entire cycle.

OPERATION

If the gas circuit is not tight, with the gas leak causing a drop in pressure, if pressure does not increase by 20 mbar during the test (max 26 seconds), the GQTV system signals a fault. A red indicator-light illuminates, cutting power to the burner, and remains on until the contact is manually reset.

In the event of a brief power failure during the tightness test or while the burner is operating, the GQTV is automatically restarted.
GI 3.0  RADIATING BELT

GI 3.1 CONSTRUCTION CHARACTERISTICS OF THE RADIATING BELT

The Girad Radiating Belt consists of 1 or 2 emitting tubes in aluminised steel, a sturdy frame in galvanised steel profiles, 2 lateral flashing strips in pre-painted steel sheet, two mattresses in high density fibreglass and a reflecting surface in mirror finish aluminium sheet. These components are assembled at our plant in 6 m. modules to ensure optimal construction of the Radiating Belt. The 200 or 300 mm diameter emitter tubes are washed, de-greased and treated with a special undercoat to ensure that the paints sets properly and resists for at least 15 years. This very delicate, highly important operation is the reason for the success of our Radiating Belt. The lateral flashing strips in pre-painted steel sheet are a pleasing styling feature - they are usually in light grey, whereas the tubes are red painted. Furthermore, green is available for the flashing strips, black and dark blue for the emitter tubes, plus colour combinations meeting all aesthetic requirements. The modules are connected with male-female unions, a sealing compound suitable for high temperature is applied and self perforating securing screws are used to ensure the entire circuit is thoroughly tight. We should underline the fact that the Radiating Belts are fitted to the ceiling with chains or steel ropes that withstand expansion of tubes due to increased temperature. Moreover, to ensure parallel alignment with respect to the walls and floor, tensioning devices are installed for each securing point.

Detail of the male-female union for the radiating belts

Detail of radiating belts ready for shipment
GI 3.2  DIMENSIONS OF RADIATING BELT

1-TUBE RADIATING BELT

ø 200 - Weight 16 Kg/m

ø 300 - Weight 18 Kg/m

2-TUBE RADIATING BELT

ø 200 - Weight 19 Kg/m

ø 300 - Weight 25 Kg/m

Key:
1  1-Tube or 2-Tube circular radiating element, ø200 mm and ø300 mm
2  Lateral flashing strip
3  Insulation panel with reflecting surface in aluminium
4  Frame in steel profile
5  Tensioning device
6  Support chain
7  Drillable profiles for further attachment points
GI 3.3   DESIGN OF HEATING SYSTEMS WITH RADIATING BELTS

The important factors to be considered when designing heating system using radiating belts, are: maximum power of the generator, maximum length of circuits, operating temperature, and thermal output per linear meter of Radiating Belt.

Radiating Belts with a single emitter tube are used for distributing heat in large rooms with limited dispersion, whereas belts with two tubes are used if extra thermal power rating is required in smaller areas.

Consequently, the length of Girad Radiating Belts must be in proportion to the quantity of heat the belts have to deliver to the room.

As we shall see in the following pages, the Radiating Belts cannot exceed given lengths because, due to the characteristics of the ventilator, with greater lengths, correct heat uniformity in the tubes can no longer be obtained. Furthermore, one ought to take into account that each 90° curve is equal to 3 linear meters of Radiating Belt in terms of load loss. Therefore, the Radiant Belt circuit must be suitably shortened according to the number of curves.

In specific cases (e.g. ground or roof installations), consult the appropriate section of these technical specifications or call our Technical Department.

SYSTEM SIZING

The designer of these systems must consider three factors:
- Thermal dispersion of the room;
- Type and number of generators;
- The length of the radiating circuits according to the heating requirements of the room.

Some examples of correct design are shown below. By consulting the THERMAL EMISSION UNITS, you can obtain the thermal emission values of the Radiating Belts at different temperatures.

The reference ambient temperature can be subdivided as follows:

10° C   for very heavy carpentry
15° C   for mechanical assembly and work requiring medium mobility
20° C   for sedentary work at a high degree of comfort

TEMPERATURE OF EMITTING BODY

The temperature of the emitting body is considered a very important value in the design of GIRAD radiation systems.

In actual fact, depending on the type of work carried out in the room and the resulting particles suspended in the air (dust produced by woodworking, paint fumes, fumes from special processes), the temperature of the emitting body must be suitable for the self igniting temperature of the above substances in order to prevent any conflict with Fire Prevention laws. The standard temperature of 200°C is the most appropriate and is acceptable for many types of industrial processes.

Obviously, the higher the room, the higher the design value for the temperature of the emitting body.
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<th>Temperature of emitting body [°C]</th>
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<th>Heat emitted per linear meter [kW/m]</th>
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**Tab. 4**
**Thermal emission of a 2-tube Radiating Belt at ambient temperature of 15°C**

![Graph showing thermal emission](image)

N.B.: Thermal emissions at ambient temperature of 10°C and 20°C are almost equal to the above graph because, according to ambient temperature, heat emitted per linear meter differs by only a few hundredths of kW/m.

**VIRTUAL LENGTH**

After we have defined the minimum length of Radiating Belt to emit the required quantity of heat, this length of belt must be uniformly distributed along the surface being heated.

The geometric configuration of the belt, as shown in Figure 11 for example, shows the need also to take into account heat loss on the 90° and 180° curves - to this end, **VIRTUAL LENGTH** must be determined.

In the case of Fig. 11:
- Geometric length: n.7 6-meter elements + n.2 3-meter elements = 48 m of double tube.
- Virtual length: n.7 6-meter elements + n.2 3-meter elements + 3 curves = 57 m of double tube.
- The equivalent length of the final 180° curve still corresponds to 3 m of double tube. The maximum virtual length of the 100-200 kW generator is respected (90 m of ø300 mm double tube).
If instead we were dealing with a circuit like the one in fig. 12:

Geometric length: n.10 6-meter elements + n.4 3-meter elements = 72 m of single tube.
Virtual length: n.10 6-meter elements + n.4 3-meter elements + 4 curves = 84 m of single tube.
The maximum virtual length of the 70-100 kW generator is respected (102 m of ø300 mm single tube).

EXPANDERS

When radiating belts heat up, they are subjected to linear expansion leading to an increase of their length.
To cope with this, we install units equipped with suitable expanders, of a quantity in proportion to the length of the circuit, as shown below.
The first expander is installed on the third section of the Radiating Belt, starting from the generator.
The second expander is located on the 6th section, the third on the 10th section and so on, placing an expander every 5 belts.

EXAMPLES OF EXPANDER INSTALLATION
"GSR" generators are equipped with fans having fixed having fixed flow and head values. The characteristics of the fans are adapted to the circuit by means of the air flow control gate to ensure constant minimum negative pressure of approximately - 1,5 mbar on the air delivery tube.

Therefore, according to head and flow, we shall indicate the maximum virtual length (subject to a tolerance of 5%) for each generator.

In regard to the length of the radiating circuits, it is necessary to distinguish between geometric and virtual length - geometric length is the effective measured length (indicated as "L" in the figure below). To obtain the virtual length of a radiating circuit, it is necessary to add to geometric length, the equivalent length of each 90° curve (which is equal to approximately 3 m of linear tube) as indicated in the examples under 4.2.

In order to obtain optimum heating comfort at the height of a person, center-to-center distance (I) in relation to installation height (H) should not exceed the distances shown in the table, to ensure best heating uniformity.
The GQK electric control panel is the result of in-depth studies aimed at obtaining control of systems giving priority to comfort and energy saving parameters. The panel controls GIRAD system with Radiating Belts coupled to an "ECOMIX" burner, and consists of:

- Switch cutting power to the instruments.
- Manual switch enabling you to start the system without interfering with clock programming.
- Weekly programming clock with lead battery to maintain stored data even in the event of long power cuts.
- 2-stage globe-thermostat with microprocessor, 3-digit display with 1/10th of a degree resolution, three-key keyboard for controlling operating temperature, and further setting parameters accessed with a password.
- Indicator-lights reporting power required by the generator.
- Control module indicating when the GSR is in operation, flame presence signal, signal reporting tripping of the fan thermal-breaker, signal reporting insufficient gas pressure coupled to lock-out of GSR, signal reporting burner shut-down and including a built-in reset push-button.
- Container in ABS with transparent door to protection grade IP55.

As the GQK control panel consists of pull-out modules, replacing components is inexpensive in case of faults or during maintenance.

THE 3C COMPUTERISED NETWORK - DIGITAL CONTROL COMPUTER COMFORT

FRACCARO S.r.l. designed the 3C network to manage and control system up to a maximum of 60 Radiating Belts. This technology enables one significantly to simplify the eletrical system, as just one 2 x 1,5 mm shielded cable is sufficient to control and manage these systems, contrary to normal GQK system which require a 12x1,5 mm cable for each Radiating Belt.

The network controlled by COMPUTER COMFORT CONTROL 3C has the following functions:

- Data acquisition from probes inside and outside the building.
- Outputs to command relays.
- Control of ambient temperature with resolution to 1/10th of °C.
- Facility to program ignition and shut-down times of burners according to customer's requirements.
- Real-time, complete control of the system situation, with facility to modify programming at any time.
- Assignment to authorised personnel only of passwords enabling access to functions of unit 3C.
- Burners status check.
- System overview control on panel.
- Subdivision of system into units and sub-units, enabling zonal control.
- Facility for management and control from PC or via modem/internet.
Electrical connection of the 3C network
The 3C network consists of the following units:

1) 3C digital logic control unit for data control and management (see photo 1)
2) 3ST data acquisition card (one for each Radiating Belt up to a maximum of 60, see photo 2) complete with globe-thermostat (see photo 3) with the function of data acquisition and transmission to and from the 3C digital logic control unit.

The 3C network is the best equipment available on the market for optimising thermal capacity of single Radiating Belts according to variations inside and outside the building.

Key:
1. Globe-Thermostat
2. ST Card
3. External Ambient Probe
4. 3C digital logic control unit
5. Facility for managing 3C unit from a personal computer
6. Remote Control of 3C unit via Modem/Internet
The electrical power supply wires must be connected to the terminals of the generator panel:
- terminals L1, L2 and L3 = power phases
- terminal N = power neutral wire
- terminal PE = ground wire

N.B. If the following cables are placed inside raceways together with other power cables: control cable 12 x 1,5 mm² connecting the generator to the GQK panel and the 2 x 1,5 mm² connecting the globe thermostat to the GKQ panel, the cables must be shielded as induced currents could be produced causing inefficient operating of the generator.

**GI 4.2 EXAMPLES OF DESIGN AND INSTALLATION**

**EXAMPLE 1**
The room shown here has an area of 1000 m², height of 6 m, mean transmission coefficient of 1,4 , air exchange of 1 vol./h and Δt of 20 K.
After careful calculation, we obtained a thermal power value of 174 kW. We selected a tube surface temperature of 180°C, with emission of 1,72 kW/m at 15°C. Therefore, by dividing the power of the system by the unit power value, we obtain the length of GIRAD Radiating Belts of 102 m. The belt route is shown in the diagram below.
We used four 90° curves for this system, corresponding to a virtual length of 12 m. So by adding to this, the length of 102 m, we obtain a total virtual length of 114 m. In this case, GIRAD Radiating Belts circuit is compatible with a GSR 300 generator.
The power of the burner is obtained by dividing the system's thermal power rating by the performance of the burner: 174/0,92=189 kW.
Mean transmission coefficient (K medium) = 1,4
$\Delta T = 20K \ (-5 \div +15 \, ^\circ C)$
Air exchange = 1 vol/h
Height = 8,00 m
$Q_{\text{installed}} = 140 \, kW$
$Q_{\text{performance}} = 129 \, kW$
Length of Radiating Belt = 126 m
Virtual length of Radiating Belt = 138 mt
We therefore recommend installing: 1 GIRAD GSR200

**EXAMPLE 2**

![Diagram](image)

Mean transmission coefficient (K medium) = 1,4
$\Delta T = 20K \ (-5 \div +15 \, ^\circ C)$
Air exchange = 0.5 vol/h
Height = 6,00 m
$Q_{\text{installed}} = 189 \, kW$
$Q_{\text{performance}} = 174 \, kW$
Length of Radiating Belt = 102 m
Virtual length of Radiating Belt = 114 m
We therefore recommend installing: 1 GIRAD GSR300
ROOM A = ROOM D

Mean transmission coefficient (K medium) = 1,2

\( \Delta T = 23 \text{ K (-5 ÷ +18 °C)} \)

Air exchange = 1 vol/h

Height = 6,00 m

Q installed = 175 kW

Q performance = 160 kW

Length of Radiating Belt = 84 m

Virtual length of Radiating Belt = 96 m

We therefore recommend installing: 2 GIRAD GSR200
EXAMPLES OF INSTALLATION

GIRAD generators are highly compact, quiet, modern design, high-tech appliances. Thanks to their compact design, they can be installed anywhere.

WALL INSTALLATION

The wall installation is certainly the most popular for two reasons: it is very easy to install and reasonably priced. The wall attachment brackets are galvanised steel profiles secured with through screws ensuring good tightness. Sturdy anchoring is therefore required, as, at least in the case of model GSR300, the projecting weight of 210 Kg (especially in the case of sheds with prefabricated reinforced concrete sections) could require further anchoring to the roof beam. The casing (in sheet steel) to protect against atmospheric agents is modular, and therefore easy to install.

ROOM B = ROOM C
Mean transmission coefficient (K medium) = 1,2
\( \Delta T = 23K \ (-5 \div +18 ^\circ C) \)
Air exchange = 1 vol/h
Height = 6,00 m
Q installed = 100 kW
Q performance= 92 kW
Length of Radiating Belt = 96 m
Virtual length of Radiating Belt = 108 m

We therefore recommend installing:
2 GIRAD GSR200

ROOM E
Mean transmission coefficient (K medium) = 1,4
\( \Delta T = 20K \ (-5 \div +15 ^\circ C) \)
Air exchange = 0,5 vol/h
Height = 10,00 m
Q installed= 2x180 kW
Q performance= 2x164 kW
Length of Radiating Belt = 2 x 78 m
Virtual length of Radiating Belt= 2 x 81 m

We therefore recommend installing: 2 GIRAD GSR200

Key:
1 Radiating Belt
2 Smoke flue
3 GIRAD external wall mounted generator
4 ECOMIX hyper-stoichiometric burner
5 Globe-thermostat
6 GQK electric control panel
7 External, protective casing against atmospheric agents
The roof version also requires an initial section in enameled steel for the reasons we mentioned. This solution is particularly interesting especially as absolutely no floor space is required and because of the purely aesthetic advantage of a concealed generator.

Key:
1. Smoke flue
2. ECOMIX hyper-stoichiometric burner
3. Heating control compartment
4. GIRAD generator
5. Tube in enameled insulated steel
6. Radiating Belt
7. Globe-thermostat
8. GQK electric control panel

The floor mounted version is possible by using connection tubing, in enameled steel, between the GIRAD generator and the Radiating Belt. The enamel coating serves to prevent the first section of tubing from overheating. If the generator is situated within the perimeter of the building, it can be installed in a suitable room (e.g. in the heating control compartment). The external flue dimensions should be according to relevant standards and current technical expertise.

Key:
1. Radiating belt
2. Smoke flue
3. GIRAD generator
4. ECOMIX hyper-stoichiometric burner
5. Globe-thermostat
6. GQK electric control panel
7. Heating control compartment
8. Tube in enameled insulated steel
RULES FOR CORRECT INSTALLATION OF GIRAD RADIATING BELTS

Installation with spirit level of Belts and Generators

After the Radiating Belt is installed, the generator must also be installed, using a spirit level, both longitudinally and transversally. To check correct level, place the instrument on the two tubes coming out of the generator (3).

The Radiating Belt units must be installed using a spirit level, both longitudinally (1) and transversally (2).

The joints between generator and radiating belt must be sealed and secured with 4 self-tapping screws. Another very important factor to be taken into account when installing: the generator must be axially in line with the Radiating Belts.

Important:
The generator, solenoid-valve included, must be adequately protected against atmospheric agents, on all sides and at the top. Install a flue with the same diameter as the flue union located above the generator.
Joining of the Radiating Belt units.

Before making the joint, apply sealing compound on both ends as shown in Fig. 27

Fig. 27

Slowly offer the two units to one another inserting the tubes to a depth. Insert male into the female located on the other unit checking that the two units are perfectly joined. Screw the screws with the corresponding nuts (Fig. 28).

Fig. 28

Next, secure the tubes with self-tapping screws as shown in Fig. 29 (normally 3 screws are needed: 2 on sides and 1 below).

Fig. 29

Examples of incorrect installation

Generator does not fit the Radiating Belt.  

Fig. 30

Belt not perpendicular with respect to the perimeter wall.  

Fig. 31

Generator not correctly levelled.  

Fig. 32

Belt not correctly levelled.  

Fig. 33
GENERATOR EXTERNAL PROTECTIVE CASINGS AND BRACKETS:

WALL

Sturdy mounting bracket in galvanised steel, supporting the generator on the wall.

Fig. 34

EXTERNAL PROTECTIVE CASING

Fig. 35

ROOF

Sturdy mounting bracket in galvanised steel, supporting the generator on the wall.

GI 4.3 GAS SUPPLY CONNECTIONS

Fig. 36

Equipment according to 1-2-3-4 are in charge to the installing company

Key:
1 Main gas pipe
2 Ball-Valve
3 Pressure gauge
4 Flexible tube in stainless steel
5 Generator solenoid-valve unit with filter and stabilizer

The gas supply system must be installed by professionally qualified personnel and comply with the current laws of the country of installation. Size the gas supply tubes to the required flow and pressure, fitting safety and control devices as specified by current standards.
Outside roof installation

Inside Radiating Belt
ADVANTAGES OF GIRAD RADIATING BELTS

- Excellent thermal emission generated by the large radiating surface
- Highly ecological, due to the absence of moving air causing suspended dust particles typical of all industrial processes.
- Top level environmental comfort, since GIRAD Radiating Belts create a natural environment providing maximum well-being, by integrating bodily heat by radiation.
- Easy, rapid installation on the ceiling with single chains.
- No floor or wall space is required, as our GIRAD Radiating Belts is installed on the ceiling.
- No danger of frost, as the lack of carrying fluids, such as hot water or steam, makes it possible to shut down the system for long periods without any unfortunate consequences.
- Uniformity of temperature: the heat produced through radiation by our Radiating Belts creates uniform temperature horizontally through the building, better than with any type of traditional heating.
- Ecological
- Expandable
- Modular design
- Negative thermal gradient
- Minimum maintenance through the reliability of all components and exacting tests to European standards both on the assembly line and at the in-house laboratory. All this ensures high reliability and safety long-term.
- Rapid warm-up due to lack of intermediate fluids requiring heating.
- Conform to current standards. Our long experience stretching back over thirty years of activity, added to our participation in work groups specifying standards for products, make Fraccaro an ideal partner in this specific sector of heating technology.

In "radiating tube modules", the flames develops inside the delivery radiating tube, which should thus be considered as a combustion chamber. In the GIRAD Radiating Belt, the flame develops in the combustion chamber of the GIRAD unit. Only burned gases flow through the radiating circuit and such gases cannot be emitted into the atmosphere because the radiating circuit is sealed and at lower pressure with respect to the atmosphere.

GIRAD radiating belts are installed with the combustion unit (or heat generator), burner and gas supply tubes located outside the room being heated. Consequently, in regard to the presence of gas or burners in the room, exchange of air or ventilation openings are not required in the room being heated.

At every re-ignition, GIRAD Radiating Belts include a 55 second prewashing of the circuit. In view of the turbine capacity (from 1500 to 3500 m³/h), in maximum length circuits, the prewashing time may be insufficient to effect exchange equal to 4 volumes of the entire circuit.
To compensate for this, the GIRAD combustion unit is equipped with a flue for forced exhaustion of burned gases. The flue is sized and positioned so that it also performs as a safety outlet in the unlikely event of micro-explosions or "gusts" that could occur inside the circuit. Further, the radiating aerothermal tubes of GIRAD belts, in order to prevent faulty expansion, are equipped with expanding joints in class 1 silicone material, located every 15 +/-18 meters. The joints, which are 150 mm long and 300 mm wide, are an extra safety element, as they act as a "fuses" in the radiating circuit. If they break, pressure decreases inside the radiating circuit thus tripping the air pressure switch, which in turn shuts down the entire GIRAD system.

In any event, the "radiating module" or the "module with radiating tubes" on the market for about 20 years, and to which all European standards refer, is a clearly defined appliance which consists of a pair of steel tubes (diameter varying form 48,3 to 114,3 mm), with length of 6, 9 or 12 meters, connected at one end by a "U" curve creating a continuous route between the tubes. At the other end of one of the tubes, there is a box or metal case containing a torch type gas burner plus the relevant control and safety equipment. At the other end of the tube, there is an electrical suction device of sufficient capacity to handle the combustion products. A steel or aluminium reflector with mirror finish is situated above the radiating tubes. Single tube " radiating tube modules" are available on the market. On these tubes, a burner-box is placed on one side and a suction device on the other.

However, in terms of thermal power and operating principle, these are identical to classic modules. In radiating modules, the flame of the atmospheric burner is "sucked" into the delivery radiating tube by the fan and the surface temperature of the tube can vary in the range 450 to 550°C, according to manufacturer and to the power of the modules.

In view of the above, two conclusion can clearly be drawn:
1. GIRAD radiating belts cannot be defined as "modules" or as "modules with radiating tubes" and the above mentioned standards cannot be applied to this type of system.
2. Even if we attempt to assimilate the GIRAD Radiating Belt among radiating modules, by virtue of its specific technical characteristics and its safety devices, the GIRAD belt is a much safer and more modern technological system compared to modules with radiating tubes.
CERTIFICAT D’EXAMEN CE DE TYPE

EC TYPE EXAMINATION CERTIFICATE

(Directive 90/396/CEE Appareils à gaz)
(Gas appliances directive 90/396/EEC)

Numéro : 49AQ833 (rév.3)

L’AFNOR, après examen et vérifications, certifie que l’appareil :
AFNOR, after examination and verifications, certifies that the appliance:

- Fabriqué par :
  Manufactured by

  OFFICINE TERMOTECNICHE FRACCARO s.r.l.
  Viale Sile Z.I. 32
  I-31033 CASTELFRANCO VENETO (TV)

- Marque commerciale et modèle(s) :
  Trade mark and model(s) :

  NASTRI RADIANTI GIRAD mod.GSR 100
  NASTRI RADIANTI GIRAD mod.GSR 50

- Genre de l’appareil :
  Kind of the appliance :

  SYSTEME DE CHAUFFAGE RADIANT DE
  GRANDE LONGUEUR, A TEMPERATURE
  VARIABLE, A USAGE NON DOMESTIQUE
  LARGE LENGTH RADIANT HEATING SYSTEM, WITH
  VARIABLE TEMPERATURE, FOR NON DOMESTIC USE

- Désignation du type :
  Type designation:

  GSR 100

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est conforme aux exigences essentielles de la directive "Appareils à gaz" 90/396/CEE (29/06/1990).
is in conformity with the essential requirements of the "Gas appliances" directive 90/396/EEC (29/06/1990).

AFNOR CERTIFICATION
Le Directeur
Jacques BESLIN

Rév. 3 : 49AQ833 du 95/08/09
le : 98/07/20

FRACCARO
Officine Termotecniche
L'AFNOR, après examen et vérifications, certifie que l'appareil:
AFNOR, after examination and verifications, certifies that the appliance:

- Fabriqué par :
  Manufactured by
  OFFICINE TERMOTECNICHE FRACCARO s.r.l.
  Viale Sile 21, 32
  I-31033 CASTELFRANCO VENETO (TV)

- Marque commerciale et modèle(s) :
  Trade mark and model(s) :
  NASTRI RADIANTI GIRAD mod. GSR 200
  NASTRI RADIANTI GIRAD mod. GSR 300

- Genre de l'appareil :
  Kind of the appliance :
  SYSTEME DE CHAUDAGE RADIANT DE
  GRANDE LONGUEUR, A TEMPERATURE
  VARIABLE, A USAGE NON DOMESTIQUE
  LARGE LENGTH RADIANT HEATING SYSTEM, WITH
  VARIABLE TEMPERATURE, FOR NON DOMESTIC USE

- Désignation du type :
  Type designation :
  GSR 300

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Ce document est conforme aux exigences essentielles de la directive "Appareils à gaz" 90/396/CEE (29/06/1990).
This document is in conformity with the essential requirements of the "Gas appliances" directive 90/396/EC (29/06/1990).

AFNOR CERTIFICATION
Le Directeur
Jacques BESSIN
Federazione - Federation

CERTIFICAZIONE ITALIANA DEI SISTEMI QUALITÀ AZIENDALI
ITALIAN CERTIFICATION OF COMPANY QUALITY SYSTEMS

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a member of IQNet

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FRACCARO OFFICINE TERMOTECNICHE S.r.l.

UNITÀ OPERATIVE
OPERATIVE UNITS

Via Sile, 32 – 31033 CASTELFRANCO V.TO (TV)
Operazioni esterne

E CONFORME ALLA NORMA
IS IN COMPLIANCE WITH THE STANDARD

UNI EN ISO 9002
PER LE SEGUENTI ATTIVITÀ
CONCERNING THE FOLLOWING ACTIVITIES

Produzione, vendita, assistenza ed installazione di apparecchiature di riscaldamento civili ed industriali ad irrigazione
Production, sale, service and installation of domestic and industrial radiant heating appliances

IL PRESENTE CERTIFICATO È SOGGETTO AL RISPETTO DEL REGOLAMENTO
PER LA CERTIFICAZIONE DEI SISTEMI QUALITÀ DELLE AZIENDE
THE USE AND THE VALIDITY OF THE CERTIFICATE SHALL SATISFY THE REQUIREMENTS
OF THE RULES FOR THE CERTIFICATION OF COMPANY QUALITY SYSTEMS

14 Febbraio 2001

La validità del presente certificato è subordinata a sorveglianza annuale e al rispetto completo del sistema di qualità con periodicità triennale secondo la procedura dell’IMO.
The validity of the certificate is subject to annual audit and compliance of the quality system within three years according to IMO rules.

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IMQ - VIA QUINTIANO, 45 - 20138 MILANO

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CERTIFICATE

IQNet and
CISO/IMQ-CSQ
hereby certify that the organization

FRACCARO OFFICINE TERMOTECNICHE S.r.l.
Via Sile, 32
I – 31033 CASTELFRANCO V.TO (TV)
for the following field of activities

Production, sale, service and installation of domestic and industrial radiant heating appliances

has implemented and maintains a
Quality Management System
which fulfills the requirements of the following standard

ISO 9002

Issued on: 2001 - 02 - 14
Registration Number: IT - 18070

Fabio Roverisi
President of IQNet

Gianrenzo Frati
President of CISO

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