

TECHNICAL DATA SHEET

GUARDRAIL
WITH
PATENTED JOINT

NT 042 - V04 GB – October 2012



1. INTRODUCTION

This guardrail has been specially designed for industrial buildings and industrial plant. It is rapidly mounted due to the small number of component parts. The “kit” design provides the guardrail with the ideal architecture to be mounted on STEEL or concrete surfaces and new or renovated buildings.

Complies with standard NF E 85-015.

1. STANDARDS

This technical data sheet certifies the specifications herein (inspection report n° 1732704_00042_00001_00002 of November 2010):

Compliance with standards NF E 85 015;

6.1 – Static testing



Static testing conducted pursuant to section 7.3.3.2 of standard NF E 85-015.



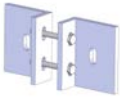
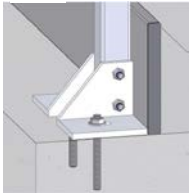
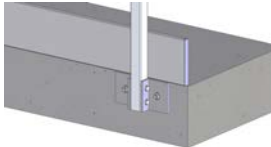
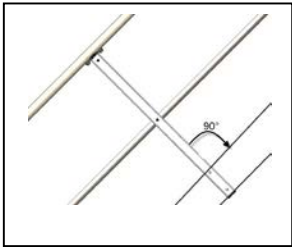

6.2 – Dynamic testing




Dynamic testing conducted pursuant to section 7.3.3.4 of standard NF E 85-015.

2. LIST OF COMPONENT PARTS

Reference	Part	Weight in kg	Diagram	Characteristics of guardrail components
A753000005	Pivoting end joint Ø40 RAL 7011	0.02		Polyamide pivoting joint for guardrail handrail (PA 6 Impact in compliance with NFT 47 001)
A753000006	Male pivoting joint RAL 7011	0.02		Male polyamide pivoting joint for guardrail hand-rail (PA 6 Impact in compliance with NFT 47 001)
A753000010	Pivoting joint Ø27 RAL 7011	0.015		Polyamide joint for lower rail (PA 6 Impact in compliance with NFT 47 001)
A753000015	Post/handrail connector RAL 7011	0.012		Dual-material polyamide connector (metal insert) to join handrail to post PA 6 Impact in compliance with NFT 47 001)
A750030025	Cap 320GL Ø25 Black	0.003		Black plastic cap Ø25
A750030028	Round cap Ø40 Black	0.004		Black plastic cap for handrail Ø40
A751100040	Cap 40X40 Black	0.006		Plastic cap 40x40for guardrail upright
A750030029	Toe board cap	0.03		HDPE toe board cap 150x17 in compliance with standard NFT 47 001
F191000020	Handrail endcap Ø 40			<p>Polyamide endcap for handrail</p> <p>ALU Cap ALU Ref A770150005 1* Steel countersunk hex screw 6x18 Ref A710390018 1 Steel hex nut M6 Ref A710890006 1* male pivoting joint Ø40 Ref A753000006</p> <p><i>Delivered with hardware</i></p>

Reference	Part	Weight in kg	Diagram	Characteristics of guardrail components
F191000005	Elbow-connector 90°			Joins handrails together 1*Steel socket head cap screw 6x30 Ref A711600030 2* Steel socket head cap screw 6x20 Ref A711600020 3*Steel hex nuts M6 Ref A710890006 2 Self-drilling screws Ref A710104822 2* Male pivoting joints Ref A753000006 2* Pivoting joints Ø40 Ref A753000005 <i>Delivered with hardware</i>
F191000010	Handrail joint connector Ø 40			Joins handrail sections 2* Steel socket head cap screws 6x30 Ref A711600030 1*Socket set screw Zn M6x30 Ref A710470030 2*Hex nuts Ref A710740005 2* Male pivoting joints Ref A753000006 <i>Delivered with hardware</i>
F191000015	Lower rail joint connector Ø 27			Joins lower rails 2*Self-drilling screws 4.8x22. Ref A710104822 1* Steel socket head cap screw 6x20 Ref A711600020 1*Steel hex nut M6 Ref A710890006 2* Pivoting joints Ø27 Ref A753000010 <i>Delivered with hardware</i>
F191000008	Handrail/post connector			2*Button head screws M8x20 Ref A710980020 2*Bevelled nuts GEOMETM8 26x12 Ref A710740026 <i>Delivered with hardware</i>
A852214780	Single-groove handrail Ø40 UNTREATED	0.86 kg/m		UNTREATED handrail for guardrail
A862214780	Single-groove handrail Ø40 ANODIZED	0.86 kg/m		ANODIZED handrail for guardrail Neutral 15 microns
A872214780-1023	Single-groove handrail Ø40 RAL 1023 (yellow)	0.86 kg/m		LACQUERED handrail for guardrail (RAL1023) 15 microns
A872214780-3000	Single-groove handrail Ø40 RAL 3000 (red)	0.86 kg/m		LACQUERED handrail for guardrail (RAL3000) 15 microns
A850795710	Bendable round section 26.8x2.8 1 5710	0.57 kg/m		UNTREATED lower guardrail rail

Reference	Part	Weight in kg	Diagram	Characteristics of guardrail components
A851276020	Toe board	1.208 kg/m		Toe board profile 150x17
F191000041	Angle brackets for mounting on slab			<p>2*Steel hex screws M8x70 Ref A710880070 2*Steel hex nuts M8 Ref A710890008</p> <p>2 washers M8 Ref A710910008</p> <p><i>Delivered with hardware without dowels</i></p>
F191000042	Angle brackets for front mounting			<p>2*Steel hex screws M8x70 Ref A710880070 2*Steel hex nuts M8 Ref A710890008 2 washers M8 Ref A710910008* L 80x40x8 for/ GR post Ref R770510047</p> <p><i>Delivered with hardware without dowels</i></p>
F191000025	Complete post for mounting on slab	2.45		<p>Slab mounting with 2 brackets</p> <p>2*Steel hex screws M8x70 Ref A710880070 2*Steel hex nuts M8 Ref A710890008 2 washers M8 Ref A710910008 1* L 80x80x8 LEFT for/GR post Ref R770510045 1* L 80x80x8 RIGHT for / GR post Ref R770510046</p> <p><i>Delivered with hardware without dowels</i></p>
F191000026	Complete post for front mounting on slab			<p>Slab mounting with 2 brackets</p> <p>2*Steel hex screws M8x70 Ref A710880070 2*Steel hex nuts M8 Ref A710890008 2 washers M8 Ref A710910008 2* L 80x40x8 for/ GR post Ref R770510047 1* post Ref R674010011</p> <p><i>Delivered with hardware without dowels</i></p>
F191000031-038 F191000031-045 F191000031-060	Post for stair stringer mounting 38° or 45° or 60°			<p>ALU profile guardrail post 40x40x4 with rounded corners – mounted on stair stringer</p> <p>2*Hex screws 8x20 Geomet 500 Gr B Ref A710920020 2*Square nuts M8 13x6 Ref A710740013 2*caps Ø25 Black Ref A750030025 1 * cap 40x40 Black Ref A751100040 1* Post R6704010050 (stair angle 38°) 1* Post R6704010051 (stair angle 45°) 1* Post R6704010052 (stair angle 60°) 1* lower rail mounting Ref A711040014</p>
F191000030	Post for frontal mounting on SP100	1.82		<p>ALU profile guardrail for frontal mounting 40x40x4 with rounded corners</p> <p>2*Hex screws 8x20 Geomet 500 Gr B Ref A710920020 2*Square nuts M8 13x6 Ref A710740013 2 caps Ø25 Black Ref A750030025 1 * cap 40x40 Black Ref A751100040 1* post Ref R674010006 2* toe board mounting rivets Ref A711050035 1*lower rail mounting rivet ref A711030014</p>

Reference	Part	Weight in kg	Diagram	Characteristics of guardrail components
T672214780-1023	Curved handrail section	0.86 kg/m		Handrail Ø40 RAL 1023 (safety yellow) Overall length 4600 mm Overall height 267 mm Curved section radius 125 mm
T672214780-3000	Curved handrail section	0.86 kg/m		Handrail Ø40 RAL 1023 (red) Overall length 4600 mm Overall height 267 mm Curved section radius 125 mm
T672214780	Curved handrail section	0.86 kg/m		Handrail Ø40 RAL 1023 (anodized) Overall length 4600 mm Overall height 267 mm Curved section radius 125 mm

3. CHARACTERISTICS

4.1 – Characteristics of the aluminium used

All the guardrail components are made from “6000” series aluminium alloy.

Designated aluminium alloy in compliance with standard NF EN 573-3.

Mechanical characteristics in compliance with standard NF EN 755-2.

Handrail and post: Alloy used 6106 T6 R24.

%	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti
Min	0.3 0			0.0 5	0.4 0			
Max	0.6 0	0.3 5	0.2 5	0.2 0	0.8 0	0.2 0	0.1 0	-
+/-	0.2 0	0.0 3	0.0 1	0.0 1	0.0 2	0.0 1	0.2 0	-

Mechanical properties of alloy

→ Yield strength R0.2% [N/mm²] 195 min

→ Fracture resistance [N/mm²] 240 min

→ Elongation [min] 10 min

This alloy has been selected for the following technical capacities:

Weldability: very good;

T5 type stamping: very good;

Natural reaction: to atmospheric agents: very good;

In a marine environment: good;

Anodizing: very good;

Fire resistance:

Aluminium alloys are classified “MO”, which means that in fire conditions, these materials are not combustible.

Aluminium and aluminium alloys behave as follows in fire situations:

The metal warps under the stress due to dilations caused by the rise in temperature.

The metal melts from 650°C, without ignition.

It has been demonstrated that liquid aluminium does not ignite even at very high temperatures and under oxygen pressure. It therefore does not contribute to “fire loading”.

As the modulus of elasticity falls when the temperature rises, 70,000 MPa at 20°C, 40,000 MPa at 400°C, the yield strength of aluminium alloys is halved at temperatures over 250°C.

4.2 – Characteristics of the plastics used

PA6 impact N°1261-sg06

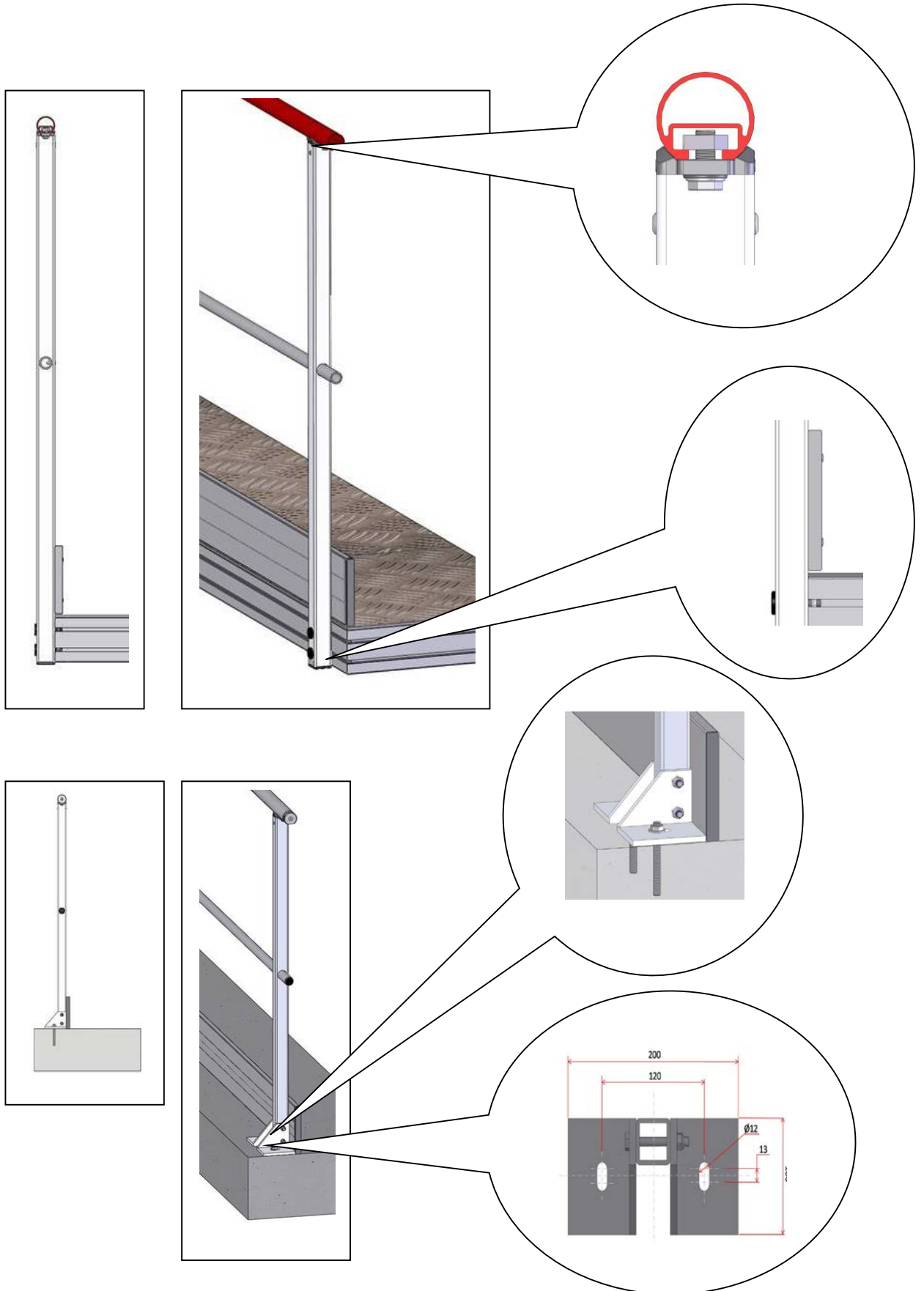
Characteristics	Standards	Values	UNIT/conditions
- Tensile strength	527	40+/-5	MPa
- Tensile modulus	527	1 050+/-50	MPa
- Density	53479	1.10+/-0.05	g/cm3
Tensile elongation (dry/cond.)	527	5.0%/18.0%+/-2%	%
Charpy impact strength			
Notched test piece (dry/cond.)	179/1eA	19/- kJ/m2	+ 23°C
Notched test-piece (dry/cond.)	179/1eA	13/- kJ/m2	- 30°C
- Temperature of use			
peaking		175 +/-5	°C
continuous		75 +/-5	°C
Flammability rating	UL 94	HB	0.8mm
	UL 94	HB	1.6 mm

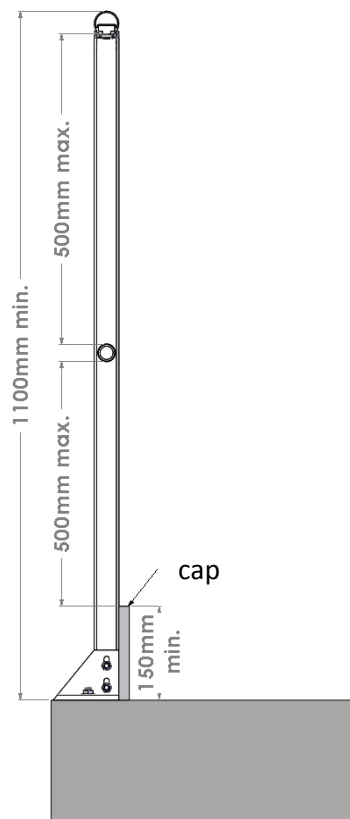
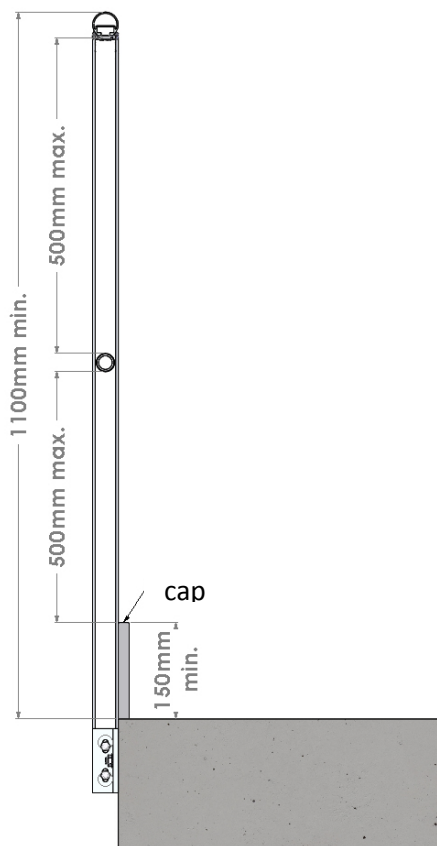
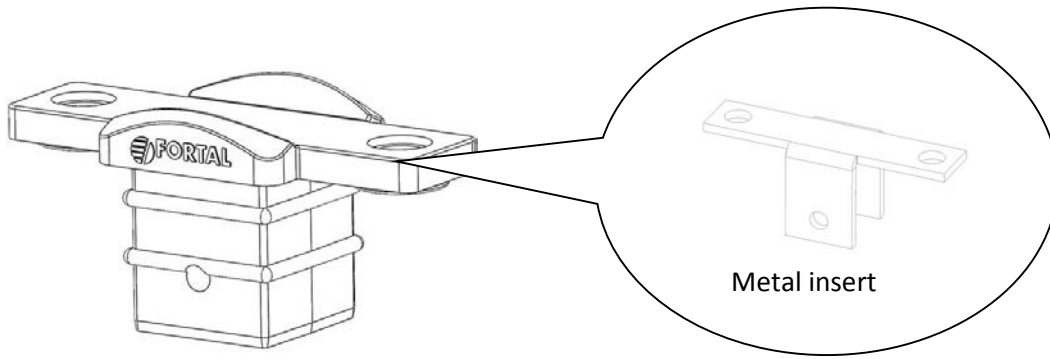
4.3 – Guardrail aesthetics

Handrail shades for aluminium colour guardrail in following RAL:

- ➔ ANODISE Neutral
- ➔ LACQUERED RED (RAL 3000)
- ➔ LACQUERED YELLOW (safety yellow RAL 1023)

4. TECHNICAL DATA





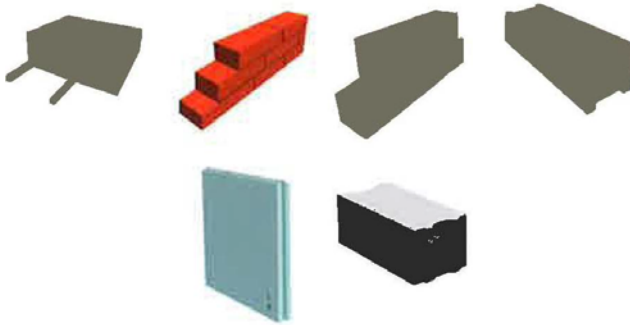
5. ASSEMBLY INSTRUCTIONS

8.1 Making the right choice

→ TYPE, STATE AND FUNCTION OF SUPPORT BASE

Dowels must be selected according to the type and state of the support base in order to ensure sufficient anchorage:

- Solid units: concrete blocks (compressed areas; non-cracked concrete/stressed areas; cracked concrete), bricks, stone and breeze-blocks, plaster tiles and cellular concrete.



- hollow material: bricks, breeze-blocks, cellular slabs, hollow core slabs, plaster board, cellular partitions and plaster boards.



The function of the support base: make sure that the choice of dowel does not impact on the expected performance of the support base.

EXAMPLE: Fire protection, thermal, acoustic and water-resistant properties etc.



TAKE PARTICULAR CARE WITH SUPPORT BASES WHERE THE MECHANICAL PROPERTIES MAY BE ALTERED (E.G. HUMIDITY RATING).

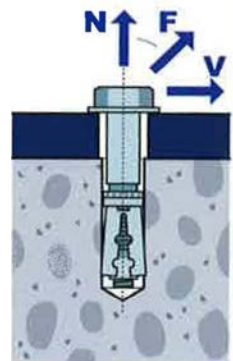
→ STRESS

There are three types of load:

N: tensile stress for $0^\circ \leq \alpha < 30^\circ$

F: oblique tensile stress for $30^\circ \leq \alpha < 60^\circ$

V: shear force for $60^\circ \leq \alpha \leq 90^\circ$



The direction of the force is defined by the angle α formed by the dowel axis and the direction of the load applied.

The dowel type should be chosen according to the types of stress the mounted unit will be subjected.

8.2 Installation requirements

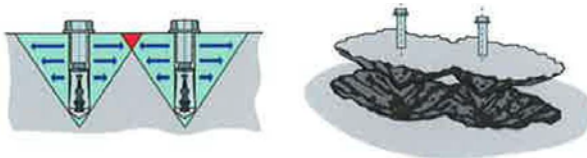


CARE SHOULD BE TAKEN WHEN ASSEMBLING METAL ITEMS. CORROSION MAY ARISE IF THE MATERIAL THE DOWEL IS MADE OF AND THE ITEM YOU ARE FITTING ARE NOT CORRECTLY MATCHED (LEADING ELECTROLYTIC COUPLING).

→ **SPECIFIC INSTALLATION REQUIREMENTS** : the specific installation requirements must be fulfilled to ensure the anchorage characteristics (resistance to pulling out, shearing etc.) match those given by the supplier. You must therefore take particular care to check that the specifications for the following are respected in order to guarantee anchorage quality:

- distance :

- the distance between the dowels



- the distance to the free edges



- support base :
 - the state and quality of the base
 - the thickness of the base

6. RECOMMENDATIONS

The guardrail's compliance with the requirements of standards NF E 85 015 and NF E 14 122 can only be guaranteed if all the component parts of the guardrail have been supplied by FORTAL and if the installation instructions have been duly respected. In cases to the contrary, FORTAL's liability cannot not be incurred in the event of an acknowledged case of non-compliance.

7. WARRANTY

FORTAL guarantees its own manufactured products (excepting specific clauses accepted by the customer and FORTAL) for a period of 2 years from the date of delivery (date given on the delivery slip) against all manufacturing defects, with the exception of:

- Labour costs and travelling costs,
- Wear and tear due to impacts, a lack of maintenance etc.,
- Use in inappropriate conditions or conditions that do not comply with those defined herein or installations that do not comply with the user installation instructions.

Any other compensation is formally excluded from the warranty, including operating loss, damage incurred and any prejudice whatsoever subsequent to using our manufactured products.

Any modification, repair or replacement of parts during the warranty period does extend the period of cover.

Should our manufactured products be modified outside our production site without our prior written agreement, FORTAL's liability cannot be incurred.