

The PAM logo consists of the letters 'PAM' in a bold, white, sans-serif font. Below the letters are three horizontal wavy lines, suggesting water or drainage.

Cast iron drainage  
systems for buildings

**SAINT GOBAIN PAM**  
*committed to*  
*Environment concerns*

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The logo features a stylized building icon above the text 'SAINT-GOBAIN' and 'PAM' separated by a horizontal line.

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## CAST IRON DRAINAGE SYSTEMS FOR BUILDINGS

# Product design, manufacture and service life



SAINT-GOBAIN PAM waste water drainage systems for buildings are made from natural materials based on flake graphite iron – cast iron – with additions of carbon and silicon.

### Cast iron is 100% recyclable without losing any of its properties

Ecological product, manufactured actually using 100% recycled raw materials - scrap steel and iron is re-melted -cast iron saves natural resources.



### Products designed to last

The longevity of cast iron products is well known, with their mechanical properties remaining stable indefinitely. Their service life is further extended by

continuously improving inner linings and external coatings.

The robustness of cast iron products limits breakage and damage before, during and after installation. It is currently considered that the life of cast iron drainage systems is twice that of alternative products made of plastic materials.

### Nothing is wasted: everything is recycled

Cast iron wastewater systems are based on the principle of modular ranges of removable components which are assembled mechanically or push fit together, without bonding or welding. When pipe systems are dismantled or modified, these components can be reused instead of being scrapped.



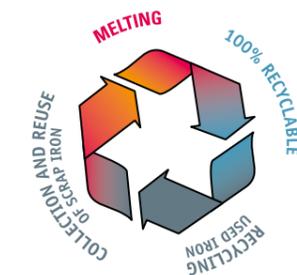
Their mechanical assembly ensures easy maintenance and provides the ability for removal and replacement of components. This is always possible thanks to the continued programme of

manufacturing compatible ranges constant in dimensions and shapes.



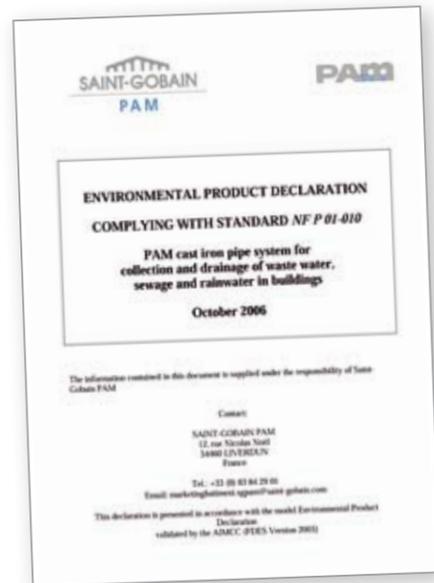
When cast iron wastewater drainage systems reach the end of their life, they are completely recyclable indefinitely. Recycling through a perfectly controlled, reliable process safeguards their properties so they can be reused for exactly the same purpose.

**In other words, a pipe can be recycled as a pipe!**



# CAST IRON DRAINAGE SYSTEMS FOR BUILDINGS

To be transparent and to help customers make an informed choice, SAINT-GOBAIN PAM has issued an update of its Environmental Product Declaration (Fiche de Déclaration Environnementale et Sanitaire. «FDES») which describes the life cycle of its wastewater drainage systems.



## FOCUS

### Environmental product declaration

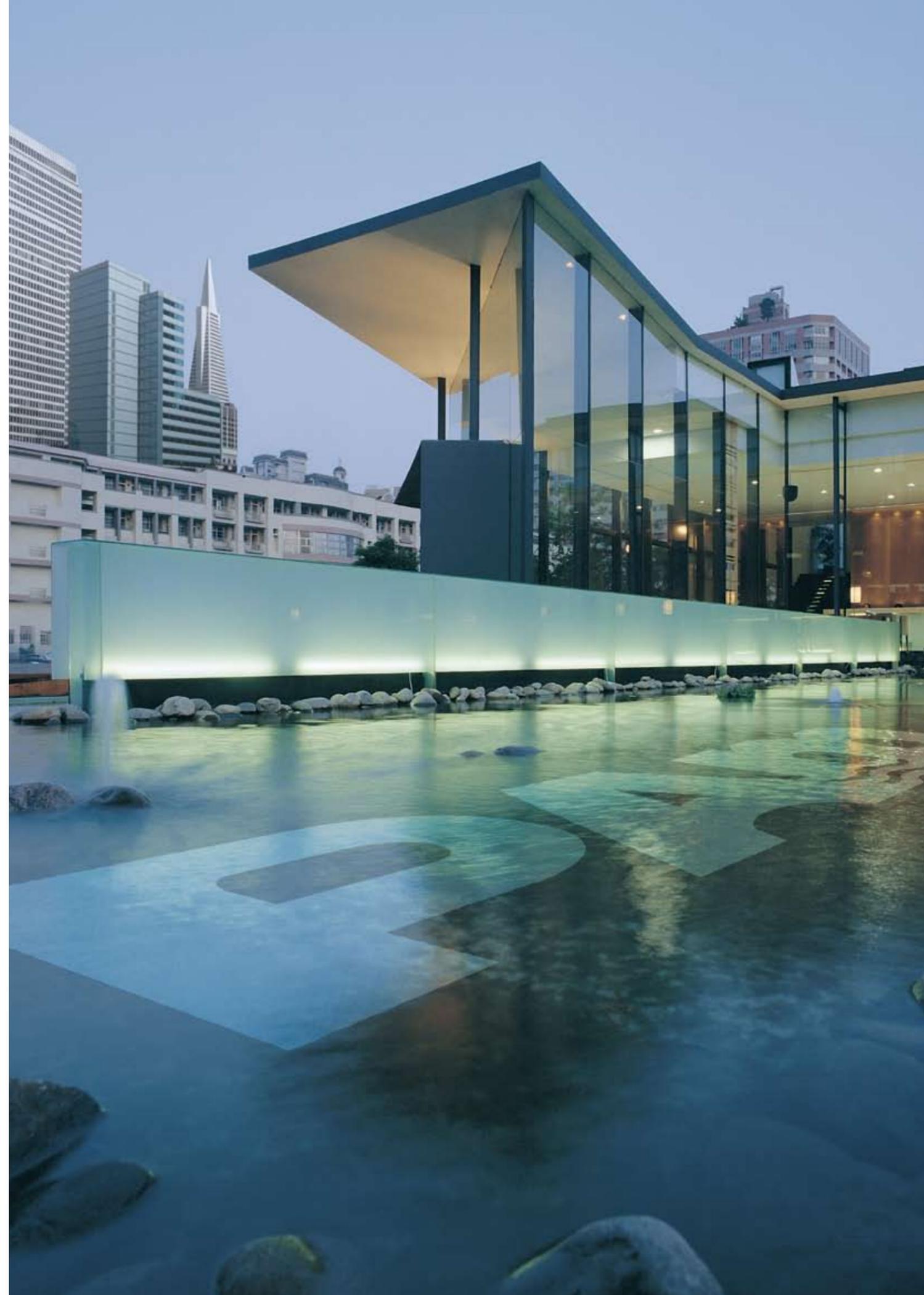
- In October 2006, SAINT-GOBAIN PAM published an Environment and health information declaration (Environmental Product Declaration).
- In accordance with the methods specified by French standard NF P 01 010: objective analysis of life cycle «from the cradle to the grave» and of energy consumption with reference to a functional unit (FU), that is: «1 linear meter of PAM cast iron pipe system\*» installed in accordance with good practice” to collect and drain waste waters in a 4-storey building over a period of one year”.

#### In figures:

At production stage, cast iron, supposedly energy-consuming, actually consumes:

- 1,94 Mj of total primary energy / FU  
Yearly energy consumption for a family of three living in a 65 sqm flat: Primary Energy= 62382.5 Mj
- 118 g of CO<sub>2</sub> / FU  
120 g CO<sub>2</sub> / km reference emission target adopted by the European Union for a new motor vehicle.
- 10 l total water/ FU  
Average daily individual water consumption in developed countries= 150 l  
Most of the water consumed is process cooling water which is discharged back into the natural environment without the requirement of being treated.

\*1 ml= ration including all the necessary components to make the pipe system as described



# Installation and use of products: ergonomics and safety



## Health and safety of installers before and during installation

Cast iron is a natural and traditional material.

At design stage, the aims are to make the cast iron components lighter and easier to install on site and to improve installer safety.

### Continuous optimisation of product weight

Thanks to continued improvements in the spinning process and improved inspections, the weight of cast iron pipes has been optimised over the last 20 years, whilst still maintaining its mechanical properties and consistency.

### Weight in 1983 / Weight in 2008

(For pipes with a 100 and 150 mm nominal diameter) with unchanged outside diameter.

1983	DN 100 = 34 kg	DN 150 = 57 kg
2008	DN 100 = 24.3 kg	DN 150 = 40.9 kg

A 30% weight reduction has been achieved for pipes with identical dimensions.

**These weight reductions mean easier handling for installers: 10 kg less to be carried for a 100 mm diameter pipe.**

Improved heat treatment has enhanced pipe annealing process, making the pipes easier to cut on site

Weight optimisations achieved by the continuous improvement of our processes and increased level of productivity have enable us to manufacture more finished products whilst reducing the consumption of raw materials and energy.

**Brinell hardness as BH number  
SAINT-GOBAIN PAM pipes: 205  
Standard reference: 260 max.**



Cast iron wastewater systems are installed using simple tools eg ratchet, spanners and does not use glue or solvents, which could be harmful to installers' health.

The design of our products makes proper allowance for observations on work sites regarding installers' movements and postures. Our specifications for new products are focused on optimising ergonomics in order to make installation easier while improving health and safety aspects.



### Product handling and storage:

For optimum safety for personnel, stockists and users, special care is taken to improve pipes and fittings packs which are designed to remain stable even when they are partially unpacked.

At the same time, steps are taken to limit quantity of packaging materials used.

Installers have been consulted to ascertain their general working requirements and package sizes have been adapted accordingly. Smaller package sizes also help our partners by saving space during storage and transport.

The optimisation of package weights, the balancing of loads, the fitting of handling grips and the supply of kits have also made life easier for users in recent years.

## Safety and comfort in operation

### Safety for building occupants: fire protection

Cast iron is a non-combustible material that remains stable throughout its service life, and will not emit hazardous toxic fumes if exposed to fire.

Regulations regarding fire protection are based on reaction to fire, i.e. how products behave in case of fire, their ignitability and whether they feed the fire. This behaviour is assessed by standardised tests and is now covered by a harmonised European classification.

The cast iron material alone is classified at the highest possible level for reaction to fire: Euroclass A1 – without prior test- which is reserved for noncombustible materials.

SAINT-GOBAIN PAM has secured for its complete ranges an excellent level since the tests for "burning droplets" and "smokes" included elastomer gaskets and coatings, in the assembly.

**A2, s1-d0**

*In the building sector, choosing materials with low flammability characteristics means greater safety.*



### Acoustic properties

Noise has been considered, for some years now, to be a major problem for health and quality of life. Acoustic comfort is now an important criterion in establishing the quality of buildings.



Wastewater pipe systems are among the items of equipment that may cause noise in buildings. Most of this noise generated is vibratory and is transmitted to the building's structure.

Cast iron pipe systems have **intrinsic acoustic properties.**

When considering airborne and structure-borne noise: Saint-Gobain PAM cast iron systems, during series of tests carried out in an accredited Laboratory, have always provided a performance better than statutory requirements.

**PAM pipe installation fitted with acoustic dampener\***  
**Structure-borne noise: 2l/s = 5 dB - 4l/s = 11 dB**  
**Airborne noise: 2l/s = 45 dB - 4l/s = 48 dB**  
 \* IPB results, October 2008 for CEN/TC 126 installation

# Production plants and tools



## Protecting the environment, sparing natural resources.

For SAINT-GOBAIN manufacturing plants have to be in absolute compliance with regulations in force – ensuring total commitment to sustainable development.

At SAINT-GOBAIN PAM, the emphasis on protecting the environment is nothing new; the development teams continuously work to improve products, on this basis.

After coatings containing bitumen were stopped in wastewater systems, new improvements were recently developed on coatings again to further enhance reaction to fire. As a result of these developments, emissions of smoke and fumes in the case of fire were reduced to an absolute minimum.

New solvent-free paints are now being tested, which should have up to 15 times less impact on the environment, whilst offering equivalent performances.

Achieving levels of safety and health at work *higher than statutory requirements* is a top priority for SAINT-GOBAIN PAM. Processes in the metallurgical industry call for vigilance from all personnel and strict compliance with instructions as the risks of serious accidents are relatively high.



## Packaging

Wood for pallets and packaging, used in our plants at present, comply with phytosanitary requirements (standard NIMP15).

General targets for the improvement of packagings, including cutting down on the volume of materials used and promoting recyclable products, are included in our specifications as from the design phase.



## Environment Management System

Our European cast iron plants have introduced an Environment Management System.

Studies have been conducted to obtain more information on installations and the possibilities of optimising them, better knowledge of waste produced and its reclamation through specifically identified processes.

For example: reclamation of zinc particles contained in dusts from the hot blast cupola.



Since 2000, the optimisation of waste collection and a better knowledge of re-use processes have allowed SAINT-GOBAIN to reduce its waste treatment costs by 50%. This was achieved by training all personnel and securing their active commitment to the environmental approach initiated at the plant.



Environment-related investments over four years (Bayard plant)

Investments in K€	2004	2005	2006	2007
EHS	170	95	176	1 000
Environment	125	45	97	600

Through this global approach, it has been possible to identify and define guidelines for improvement, and set up action plans and better follow-up procedures.



As a result, the ISO 14001 certification was obtained in 2004 for the Telford plant, in the UK, and at the end of 2006 covering development by Bayard plant, in France.

# SAINT-GOBAIN, Environment: a committed industrial group



SAINT-GOBAIN, world leader in construction markets, aims to provide innovative solutions to take up the challenges for the future posed by environment protection and energy saving.

As buildings account for a quarter of all carbon emissions, SAINT-GOBAIN is committed to supplying the building sector with a wide range of products offering efficient energy-saving solutions.

Environmental requirements are now taken into account in the design of all its products, such as PAM cast iron pipes for water supply and sewage networks, solar panels, low-emission insulating glazing units to control the diffusion of heat and solar radiation, mineral wools and other increasingly efficient insulating materials integrated into plasterboard-based systems.

In the near future, SAINT-GOBAIN will produce new electronic lighting systems which will replace the conventional systems used today. It then plans to manufacture ceramic based fuel cells to heat water and generate some of the electricity consumed in homes.



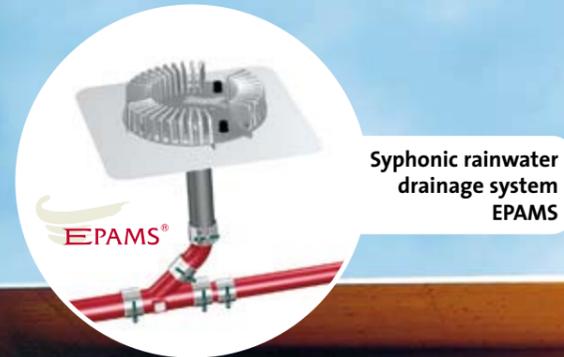
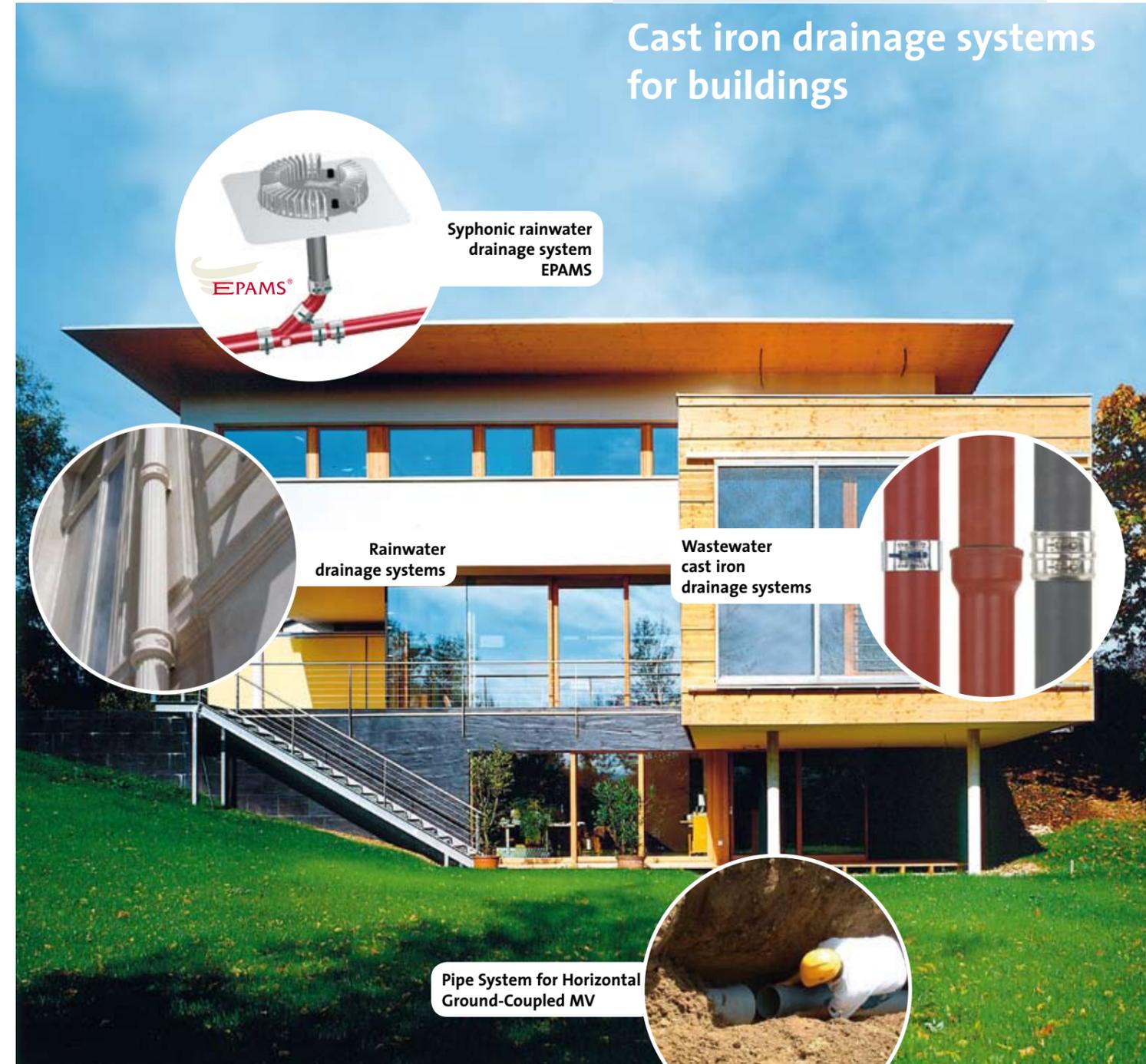
WE SUPPORT

Improving the energy efficiency of buildings is at the very heart of SAINT-GOBAIN's strategy to take up the enormous challenge of developing new materials for homes of the future.

The Group's strategic positioning as leader in the construction sector calls for a determined policy to go further than meeting statutory requirements. The Group is committed to protecting the health and safety of its employees, preventing its processes from having any environmental consequences, and integrating all the social and societal issues connected with its operations into the everyday management of its business. This approach is in keeping with the Group's Principles of Conduct and Action, drawn up in 2003 to set down the values which have guided and inspired the conducting of business activities within the Group over the years. The Group's adoption of the United Nations' World Pact that year confirmed its commitment to responsible and sustainable development, as SAINT-GOBAIN undertook to implement the pact's 10 principles as part of its strategy and its everyday actions.

## FOCUS

### Cast iron drainage systems for buildings



Syphonic rainwater drainage system EPAMS



Rainwater drainage systems



Wastewater cast iron drainage systems



Pipe System for Horizontal Ground-Coupled MV