

BALMORAL TANKS

# GLASS FUSED TO STEEL TANKS

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BALMORAL

## Balmoral Tanks

Balmoral Tanks is a leading design and manufacturing company that provides unique turnkey services spanning civils groundwork, tank design and manufacture, installation, pipework, commissioning and technical after sales services.

Producing what is believed to be the most comprehensive range of tank products from a single source, civil engineering, firefighting, potable/non-potable water, anaerobic digestion, wastewater, desalination and drainage are key sectors for the company.

### Trusted. Innovative. Collaborative.

Our decades-long global track record is built on outstanding levels of customer service. We continually drive efficiencies and add value to our valued client base through our end to end market offering from design to installation, commissioning and after sales care.

Since 2018 we have invested more than \$25m in our 150,000sqft (14,000sqm) state-of-the-art design and manufacturing facilities as well as in a continuous learning programme for all staff. We believe we have the most technically advanced production facilities in the industry supported by unrivalled levels of expertise across the whole operation.

Our longevity is proof of our success; we're here for the long term.

### Our promise

Balmoral Tanks benefits from being part of Balmoral Group Holdings Ltd and the huge support infrastructure that offers. It is this depth of expertise that differentiates us from any other tank manufacturer in the world.

With 40+ years' experience in managing the design, manufacture and installation of liquid storage and treatment products we will do all that is humanly possible to ensure delivery of your project on budget, on time with care and professionalism from enquiry to installation.

# TRUSTED INNOVATIVE COLLABORATIVE

Vitreous enamel coating, also known as glass fused to steel (GFS), is a silica-based fused coating that is widely used as a corrosion resistant protective coating in the water and wastewater industry.

The term vitreous enamel comes from the word vitrification describing the transition of a substance into a glass. At typical vitreous enamel firing temperatures, usually in the range of 830-850°C, the coating reaches full mobility and viscosity.

During this period, interaction between the glass and steel accelerates, an interfacial adhesion layer is formed and synthesis of the two materials takes place.

Balmoral's enamel system combines the strength of steel with the corrosion and scratch resistance of glass.

Compared to other spray application methods, which often use inorganic clays to suspend the particles in water, enamel powder coating provides the proven optimal purity. This technical advantage combined with Balmoral's process represents a new level of excellence in glass fused to steel tanks and silos.

**Balmoral's enamel system provides optimum purity**

**Tough resilient coating**

**A composite with the strength and flexibility of steel**

**Chemically inactive coating and unaffected by UV light**

## BALMORAL GFS TANKS

Balmoral's manufacturing process was designed to provide clients with a high performing, economical coating designed specifically for the containment of potable water and uncovered municipal wastewater tanks.

## BALMORAL GFS PREMIUM

The Premium option was developed to deliver heightened performance and long-term value to asset owners and users around the world in more demanding applications.



### Specification

Balmoral product	Coating applications	EN28765 Group	pH resistance	Test voltage (V)	Thickness (µm)
GFS	2 coat, 1 fire	2	3-9	700	200-360
GFS Premium	3 coat, 2 fire	3	2-11	1100	260-460
GFS Premium Plus	3 coat, 2 fire	4	1-14	1500	340-500

# FEATURES AND BENEFITS

Feature	Benefit
Unique and coveted glass formulation using bespoke ingredients	New level of excellence in glass enamel coating technology
Unique 'dry' electrostatic application	Optimal purity
Increased coating coverage	Less reliance on in-field solutions
Meets and exceeds coating requirements of EN ISO 28765	Confidence in coating quality and performance
Modular system	Fast, efficient construction
Factory applied coating under Balmoral's unique 6S quality system	Consistent and regulated quality wherever the tank is shipped and built
No re-coating requirement	Long life coating requiring minimum maintenance
Designed and specified not to corrode	Zero corrosion allowance required reducing unnecessary material and cost
High performing coating	UV stable, abrasion resistance increases life span and minimises through life maintenance

## APPLICATION GUIDE

Balmoral GFS tanks are suitable for many applications, including:

[Agricultural digesters](#)

[Borehole/brackish/seawater](#)

[Dry bulk solids](#)

[Fire water storage](#)

[Filter tanks](#)

[Industrial effluent/aeration processing](#)

[Liquid leachate](#)

[Municipal sludge storage](#)

[Municipal sludge treatment](#)

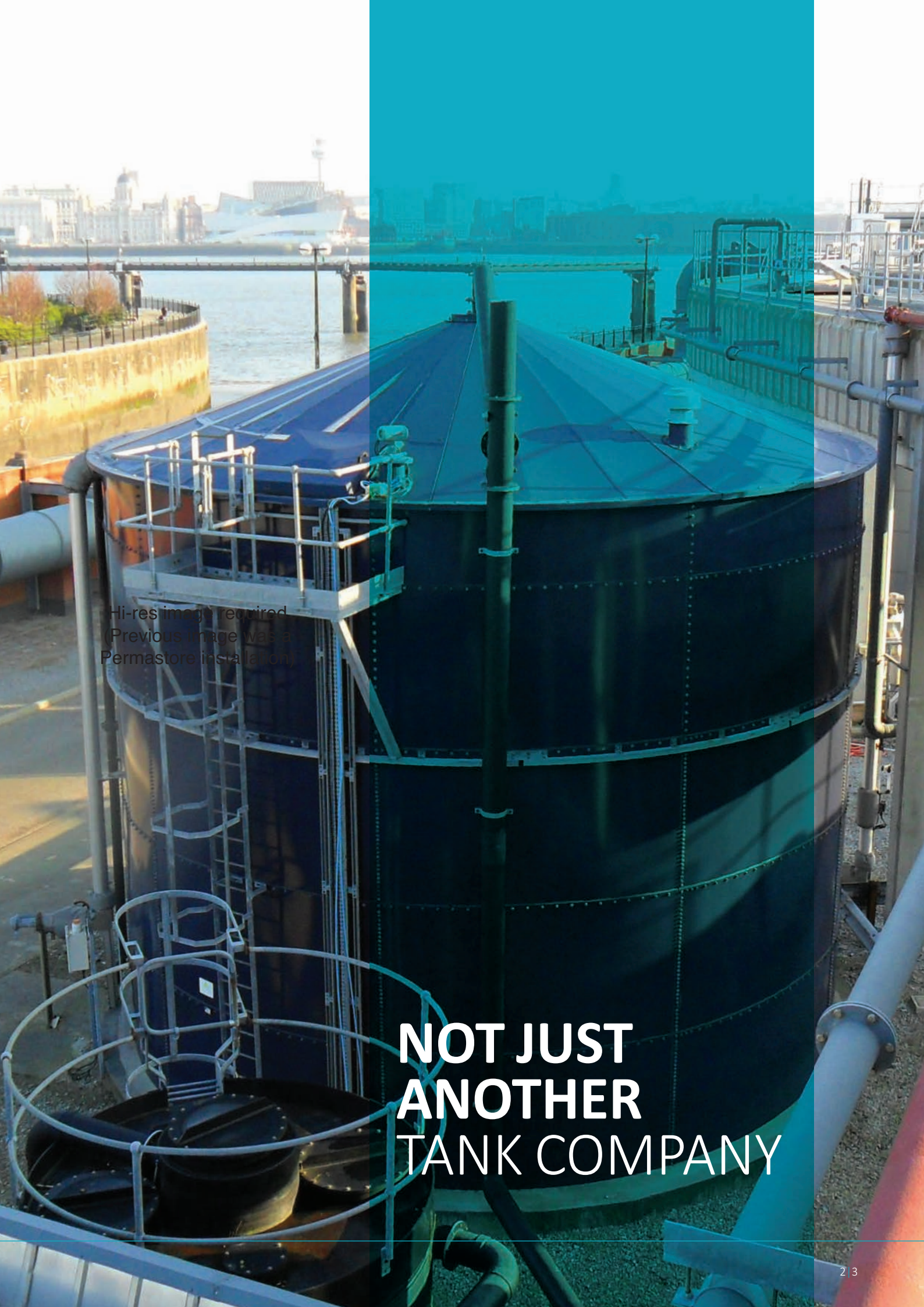
[Municipal mesophilic digesters](#)

[Municipal sludge cake storage](#)

[Potable drinking water](#)

[Storm water](#)

[Thermophilic digesters](#)



Hi-res image required  
(Previous image was a  
Permastore installation)

**NOT JUST  
ANOTHER  
TANK COMPANY**

A photograph of a large industrial manufacturing facility. The scene is dominated by a complex network of overhead metal beams and chains, likely part of a conveyor or lifting system. Large, perforated metal panels are suspended from these beams. The floor is a light-colored concrete with a prominent red safety line. The lighting is bright and even, highlighting the metallic surfaces. A teal-colored vertical bar is overlaid on the left side of the image, and a dark blue horizontal bar is overlaid at the bottom, both serving as design elements for the text.

**\$25M**  
INVESTMENT IN  
MANUFACTURING  
FACILITIES

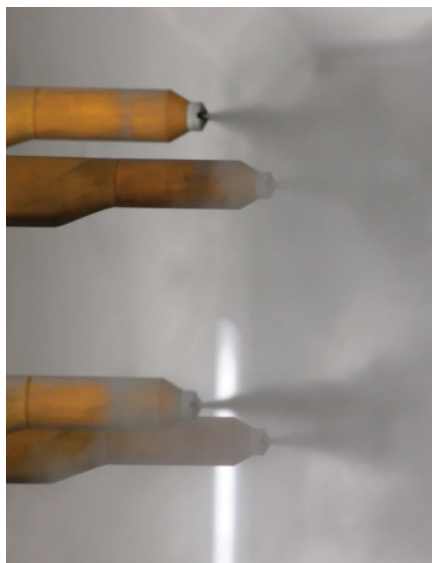
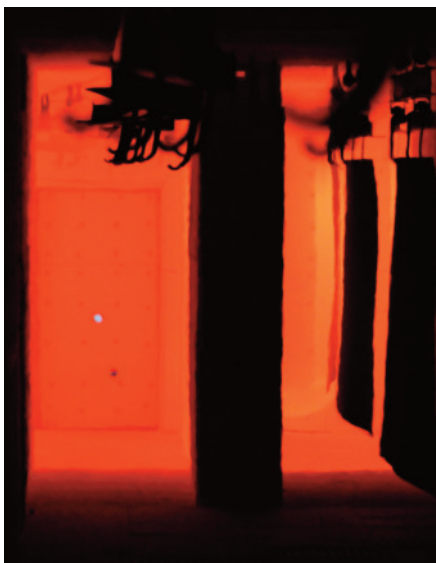
# COATING PERFORMANCE AND QUALITY STANDARDS

## Internal coating

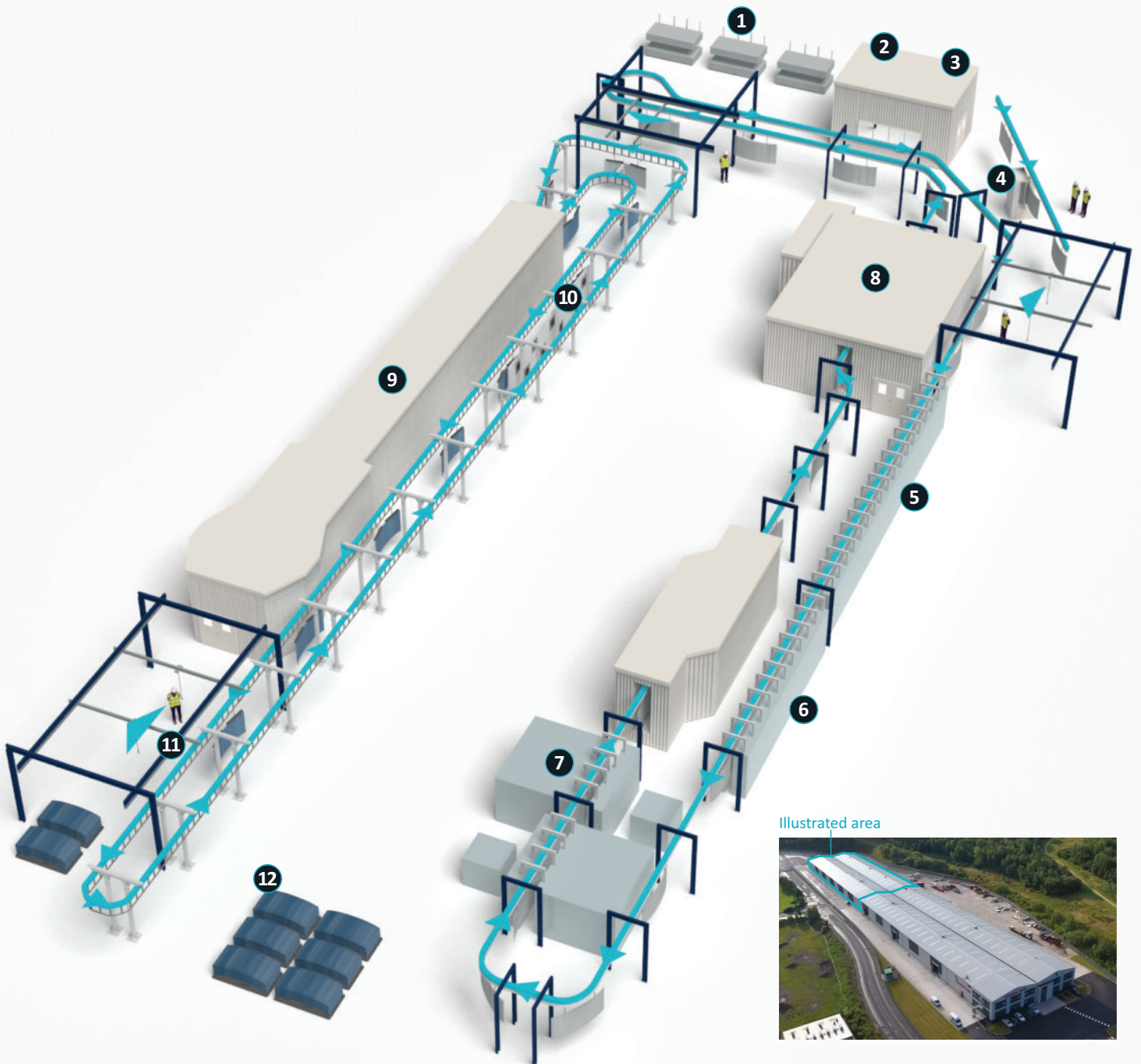
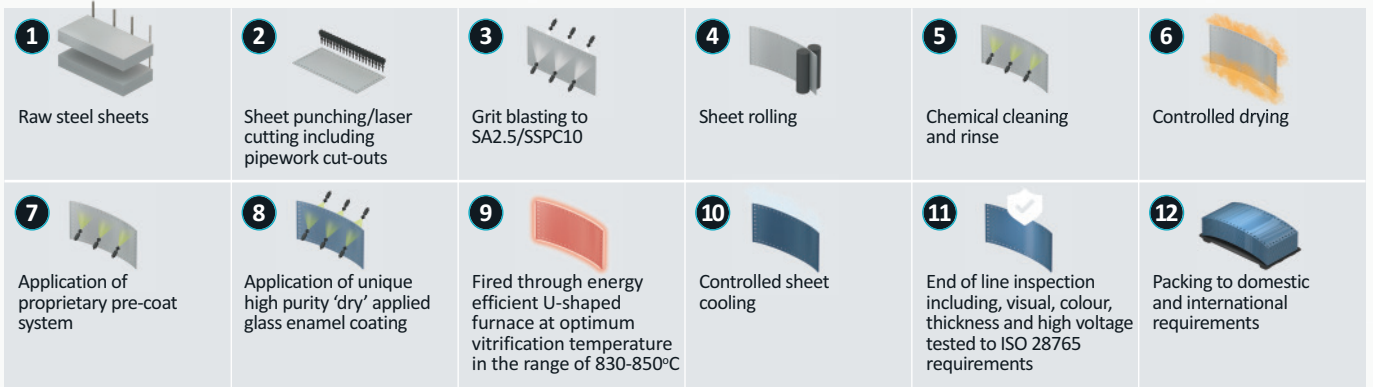
Description	Test standard	Test type	Result
Dry Film Thickness	ISO 2178	Coating Thickness	260µm – 460µm (10-18mils)
Citric Acid / Sulphuric Acid / Hydrochloric Acid	ISO 28706-1 Clause 9 / 10 / 11	Chemical Resistance	Min. Class AA
Boiling Citric Acid	ISO 28706-2 Clause 10	Accelerated Chemical – Non-Linear	Max. 0.75 g/m <sup>2</sup>
Boiling Water – Liquid Phase	ISO 28706-2 Clause 13	Accelerated Chemical – Non-Linear	Max. 2.5 g/m <sup>2</sup>
Detergent Solutions	ISO 28706-3 Clause 9	Accelerated Chemical – Non-Linear	Max. 2.5 g/m <sup>2</sup>
Hot Sodium Hydroxide	ISO 28706-4 Clause 9	Accelerated Chemical - Linear	Max. 0.876 mm/a
Boiling Water – Vapour Phase	ISO 28706-2 Clause 13	Accelerated Chemical –Linear	Max. 0.328 mm/a
Boiling Hydrochloric Acid Vapour Phase	ISO 28706-2 Clause 12	Accelerated Chemical - Linear	Max. 0.146 mm/a
Thermal Shock	ISO 28763 Annex A	Physical Properties	No Damage at 350c
Adhesion	EN10209 Annex C	Physical Properties	Min. Class 2
Impact Resistance	ISO 4532	Physical Properties	Min. 40N
Abrasion Resistance	ISO 6370-2	Physical Properties	Max. 45g/m <sup>2</sup>
Scratch Hardness	EN 15771	Physical Properties	Min. Mohs 5
Holiday Test	ISO 2746 – Test A	Coating Porosity	100% discontinuity free at test voltage

## External coating

Description	Test standard	Test type	Result
Dry Film Thickness	ISO 2178	Physical Properties	160µm – 500µm (6-19mils)
Colour	L.a.b. Colour Space	Spectrophotometry	Min. EN ISO 28765
Adhesion	EN10209 Annex C	Physical Properties	Min. Class 2
Scratch Hardness	EN 15771	Physical Properties	Min. Mohs 5
Impact Resistance	ISO 4532	Physical Properties	Min. 40N



# GFS COATING PROCESS



Illustrated area





**UNRIVALLED  
COATING PURITY**

# TANK INSTALLATION

Balmoral operates via a network of distributors worldwide that are trained in all areas of tank construction. Experienced Balmoral service engineers are available if additional support is required.

There are two main methods of building modular tanks:



## Scaffolding

Scaffold building suits open top tanks and tanks in areas of the world where the importation of jacks is difficult or restricted by customs laws.

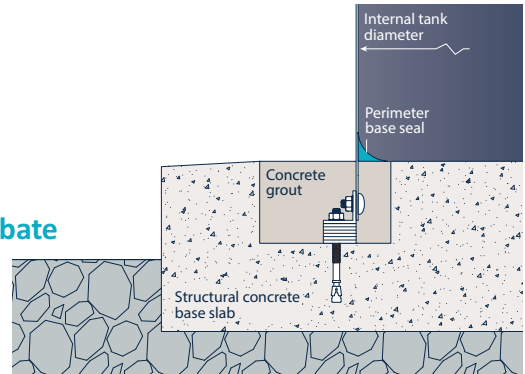


## Jacking

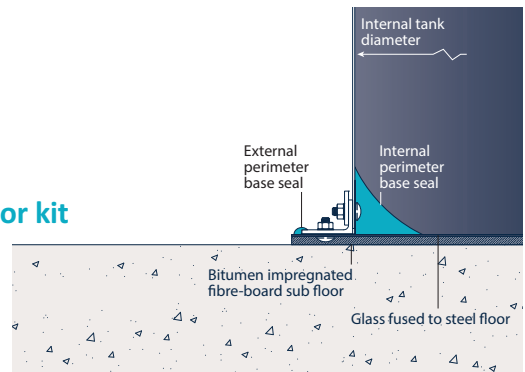
Jack building suits tanks with covers, tall tanks, and project sites where working at height is restricted or perilous. The jacks are normally shipped with the tank kit and allow for the majority of works to be completed within 2.4m of ground level.

# TANK FOUNDATIONS

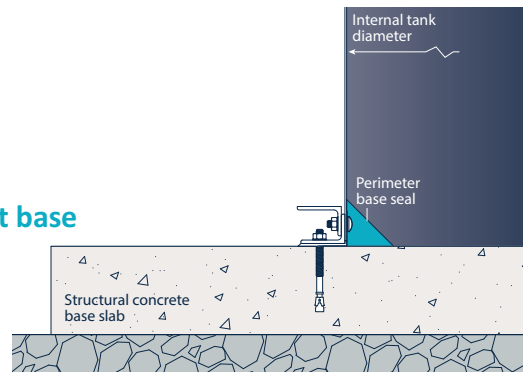
## Rebate



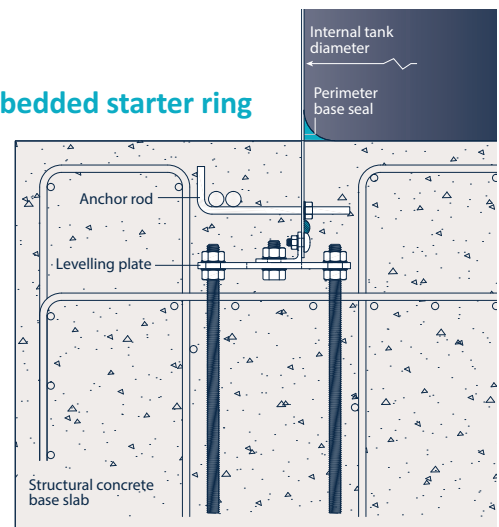
## Floor kit



## Flat base



## Embedded starter ring



*Note: Bases may vary to suit individual site requirements*

## Hybrid tanks

We offer a range of different tank materials which allows us to design and engineer tanks with multiple grades of material for different areas of the tank.

By offering a combination of glass fused to steel grades, fusion bonded epoxy coated steel, stainless steel or a combination of all materials, this allows the most cost effective combination of materials to meet storage requirements based on the process design.



## Stainless steel tanks

In addition to glass fused to steel tanks, we offer a full range of stainless steel tanks, roofs and ancillaries for use in the water, wastewater and anaerobic digestion industries.

These tanks are available as a complete tank kit in grade 304 and 316 stainless steel, in a combination of grades or as a hybrid tank with glass fused to steel or fusion bonded epoxy coated steel in the lower rings and stainless steel in the upper rings.

## Roof systems

Balmoral Tanks provides a full range of tank cover solutions with the specific design being based on project requirements. Options range from simple debris covers through to pressurised, gas tight, load bearing covers.

Our options include:

- Glass fused to steel and fusion bonded epoxy coated external beam roofs (for large diameters and anaerobic digesters)
- 304L and 316L stainless steel external beam roofs (for large diameters and anaerobic digesters)
- Aluminium geodesic dome roofs
- Free-spanning 5 degree glass fused to steel and fusion bonded epoxy coated roofs (for drinking water and wastewater)
- Tank mounted double membrane roofs
- Tank mounted single membrane roofs
- Glass reinforced plastic (GRP)
- Trough deck (free spanning and column supported options)

## Pipework

We design, fabricate, install and test pipework systems and associated mechanical equipment, including:

- A comprehensive range of stainless, carbon and coated steel, ductile iron and plastics pipework systems
- Design and site survey services
- Off-site fabrication
- Pipe supports and bridges
- Bespoke fabrications
- Mechanical installation
- Skid units
- Modular build

## Ancillaries

Balmoral Tanks' ancillary options include:

- Ladders and platforms
- Staircases
- Roof walkways / interconnecting bridges
- Manways / hatches
- Connections
- Floor kits
- Specialised items including baffles, internals, bespoke design

## Balmoral Group

Established in 1980, Balmoral is a diverse privately owned Group. Balmoral Tanks specialises in civil and environmental engineering liquid storage/treatment solutions while Balmoral Comtec provides buoyancy, protection and insulation product solutions to the offshore energy markets. Balmoral Park is the property development division of the Group.

At Group HQ in Aberdeen the company has invested in a pioneering design and manufacturing facility that includes laboratory, design engineering, toolmaking, production, project management and testing facilities.

Balmoral Tanks' Thurnscoe facility designs and produces the company's glass fused to steel, epoxy coated and stainless steel tanks as well as concrete tanks for the water, wastewater, processing and anaerobic digestion sectors.

In Llantrisant, South Wales, Balmoral Tanks runs a specialised design and manufacturing operation providing hot press GRP and steel sectional tanks as well as cylindrical steel tanks for the global water storage and fire-fighting sectors.

The Group is dedicated to a policy of continuous improvement and consistently providing the highest quality of products on a global basis.



Balmoral Group HQ, Aberdeen, Scotland

# BALMORAL TANKS

## NOT JUST ANOTHER TANK COMPANY

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GLOBAL WATER, WASTEWATER AND PROCESSING STORAGE SOLUTIONS

