



DAMS AND RESERVOIRS



Glenfield
Invicta

Delivering Project Solutions





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WHO WE ARE



From ‘concept to completion’, Glenfield Invicta End to End Project Solutions provide market leading valve and penstock engineering excellence, across a multitude of water and non-water infrastructure projects.

Glenfield Invicta combines together the strength and unique proposition of Invicta’s site solutions, penstocks and environmental expertise, and Glenfield’s experience and expertise in specifying and managing the large Dams, Reservoirs and Hydropower schemes. Supported by the vast product portfolio from AVK UK and its sister businesses.

We are market leaders distinguished by our industry expertise, we have been designing and manufacturing specialist engineered valves and penstocks for more than 160 years and we stand behind every product we install for life, offering some of the best extended warranties in the industry.

Our experienced and multi-skilled project team work closely with our partners and key stakeholders to ensure your project is executed to exacting standards.

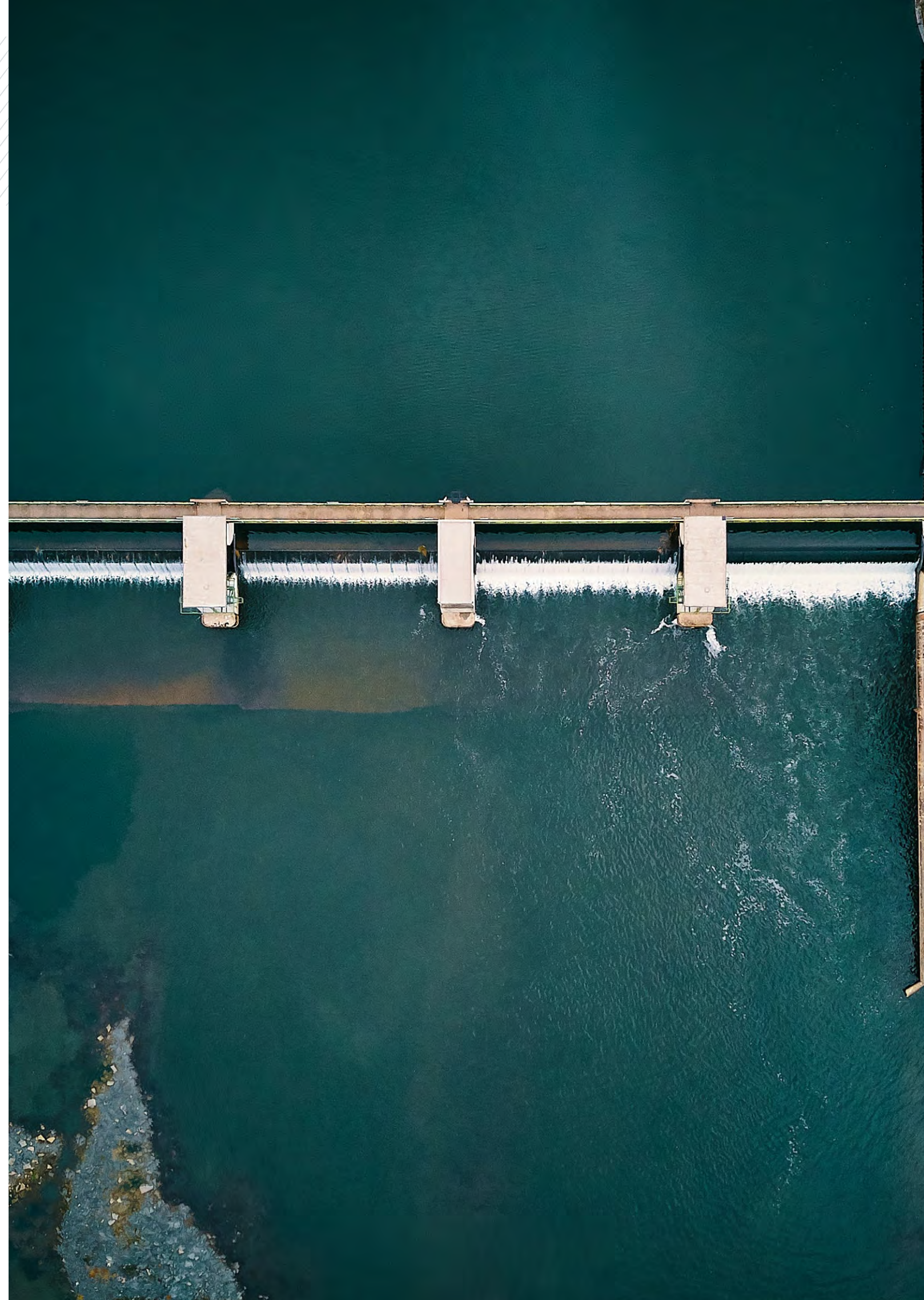
Our historical record for the design, supply and installation of engineered valves and pipeline equipment projects delivered safely, on time and to the highest standards, in arduous conditions, are what set us apart. This specialist capability has made the Glenfield Invicta and AVK brands synonymous with engineering excellence worldwide.

In addition to our proactive programme of strategic acquisitions, we continually invest in our product and service offering. Glenfield Invicta Project Solutions has the people, processes and systems to support optimised operational efficiency when meeting the needs of our partners.

All products and service solutions are provided in accordance with all the relevant UK, European and International standards.

Glenfield Invicta has a clear vision, ‘To provide market leading valve and penstock engineering excellence across water and non-utility infrastructure projects’





TECHNICAL CAPABILITIES GLOBAL LEADERSHIP & LOCAL COMMITMENT

WHATEVER YOU MAY NEED, WE CAN PROVIDE

GLENFIELD INVICTA is a leading supplier of large diameter valves for dams and reservoirs installations around the world.

Glenfield Invicta's product portfolio includes an extensive range of:

- Submerged discharge valves
- Free discharge valves
- Reservoir specification metal seated gate valves.
- Butterfly valves
- High performance recoil check valves
- Anti vacuum air valves
- Automatic pressure and level control valves
- Penstocks and sluice gates
- Roller gates
- Bulkheads

Within our vast range of capabilities Glenfield Invicta can provide a comprehensive range of engineering and site solution packages. Our specialist teams come to you to identify the perfect solution - from feasibility and site audit to installation and extended warranties.

Engineering and Site Solutions:

- Valve, penstock and actuator: site surveys and health checks
- Valve supply, installation, refurbishment and replacement
- Design and manufacture of ancillary equipment
- All associated enabling, electrical and civil engineering services
- Equipment commissioning
- Scheduled maintenance and servicing contracts
- Extended warranties
- Post contract training
- UK coverage

WHEREVER YOU ARE, SO ARE WE

Our geographical presence and product range may be global, but our focus is local. We stay close to our customers throughout the entire process. The proximity allows us to better understand our customers' needs and tailor our solutions to fit them.

Being a global player, we are able to provide highly engineered products and service solutions approved to international standards whilst always understanding and adapting to local specifications and project requirements.



WE BUILD ON AND INVEST IN LONG-TERM PARTNERSHIPS, BECAUSE OUR CUSTOMERS ARE MUCH MORE VALUABLE THAN A SINGLE TRANSACTION.

TECHNICAL CAPABILITIES

CASE STUDIES

NAME: LLYN BRENIG RESERVOIR.



WORK

Replacement of existing bulkhead gate and primary gate and supply and installation of new secondary gate.

Project was 'gold alert' due to single point of isolation during repair works, the bulk head gate was holding back 250 tons of water! Ensuring the safety of the workforce and local population was paramount.

The gates were designed, manufactured and installed by Glenfield Invicta and our sister company Orbinox, in Spain. As well as the supply of gates our engineering support extended to the provision of CFD analysis.

WORK

The scour pipe capacity at Damflask required to be modified and upgraded to meet its 1 million litres per day draw-down target.

A standard gate valve of this size installed on its side would typically experience operational issues due to accelerated wear and tear between the body and the wedge. The design of Glenfield Invicta's reservoir specification gate valve, developed with input from Yorkshire Water, incorporates several features that overcome these challenges

Control of the valve was to be automated and Glenfield Invicta supplied the electrical actuator and designed a bespoke extension spindle to connect the bevel gearbox to the actuator. Both the actuator and extension spindle were fitted on site by Glenfield Invicta engineers.

NAME: DAMFLASK RESERVOIR.



NAME: YSTRADFELLTE DAM



WORK

The original spillway had suffered repeated damage due to several incidents of discharge overflow. It was discovered that the spillway had insufficient capacity by modern standards and required a major upgrade.

A Glenfield Invicta Series 857 free discharge valve (DN900) was selected by Dwr Cymru Welsh Water.

One of the key points in this project was to minimise the water jet spread exiting the valve. Glenfield Invicta designed and supplied a remote stainless steel hood which was installed at the downstream end of the discharge valve to contain the jet of water and avoid the conical spray pattern associated with this valve type.

TECHNICAL CAPABILITIES QUALITY & A LONG-TERM PARTNERSHIP

WHEN IT COMES TO VALVES, HYDRANTS, FITTINGS AND ACCESSORIES, OUR CUSTOMERS EXPECT LONG LASTING SOLUTIONS.

WE COMBINE THE PRODUCT PORTFOLIO AND ENGINEERING SERVICES OF A GLOBAL LEADER WITH THE SUPPORT OF OUR LOCAL TEAMS.

WHERE DO YOU GO FOR...

...TECHNICAL INFORMATION



ONLINE PRODUCT SELECTION



PDF BROCHURES



WEBSITES



VIDEO TUTORIALS



INTERACTIVE ANIMATIONS



2D DRAWINGS



3D DRAWINGS



TECHNICAL DOCUMENTS

...ENGINEERING



NETWORK MODELLING



CFD ANALYSIS



FE ANALYSIS

HYDRAULIC SYSTEM
CALCULATIONS

FLUID TEST LABORATORY

...SUPPORT



ENGINEERING AND SITE
SOLUTIONS

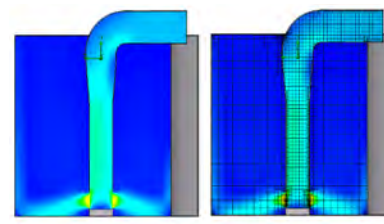
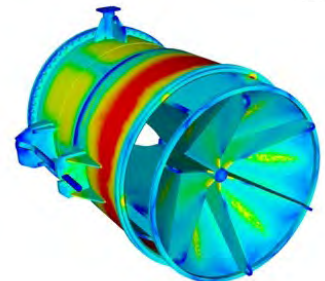
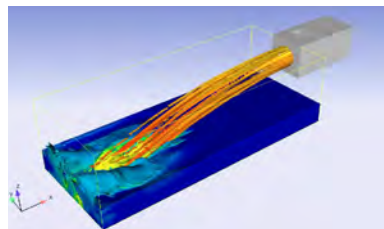


TECHNICAL PRODUCT TRAINING
AFTER SALES MAINTENANCE
AGREEMENTS

SOLVING REAL TECHNICAL ENGINEERING PROBLEMS USING FINITE ELEMENT ANALYSIS AND COMPUTATIONAL FLUID DYNAMICS.

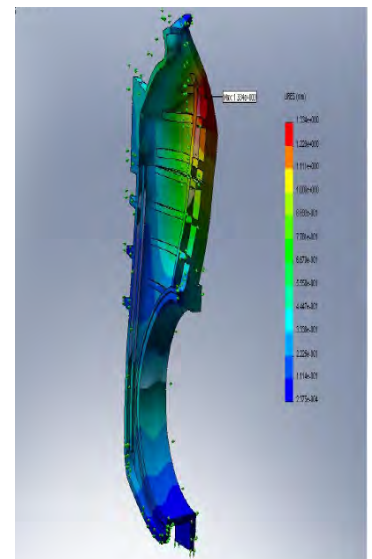
FINITE ELEMENT ANALYSIS

- Prove adequate strength for the design pressures.
- Highlight areas of high stress.



COMPUTATIONAL FLUID DYNAMICS (FE ANALYSIS)

- Verify the flow characteristics and determine the flow rate.
- Highlight areas of restriction and potential areas of cavitation.



...GLENFIELD INVICTA

TECHNICAL PRODUCT TRAINING

AS BUSINESS LEADERS, WE HAVE A COMMITMENT TO SERVICE THAT GOES ABOVE AND BEYOND THE DAY-TO-DAY ACTIVITY;

We have a responsibility to ensure customers receive the best from our products and as such we offer free training and insights into the manufacturing processes.

Our training sessions are tailored to your requirements and held at any of our offices across the UK, or, at your convenience, at your site. Any number of delegates can be catered for and training is suited to the various levels of experience and product knowledge – from new employees through to refresher courses for advanced engineers.



VALVE SELECTION AND SIZING

WE ASSIST IN THE EARLY STAGES OF PROJECTS TO PROVIDE TECHNICAL SUPPORT AND ENDEAVOUR TO ENSURE THAT THE OPTIMAL VALVE AND SYSTEM SOLUTION IS USED.

Key information required to determine the correct valve includes:

- Application (isolation, flow control, terminal discharge etc)
- Flow rates (minimum, normal and maximum)
- Pressure heads (static, transient, net)
- Medium (raw water, screened, unscreened)
- Valve material trim
- Actuation (manual, electrical, hydraulic, pneumatic)
- Civil structure / system design

YOUR TRUSTED ADVISOR

OUR MISSION IS TO DELIVER A FRAMEWORK IN A SMOOTH AND EFFICIENT WAY, UTILISING OUR TECHNICAL EXPERTISE AND GROUP SPECIALISTS.

Adopting a collaborative and integrated approach Glenfield Invicta aspire to collaborate with you and be a key part in project delivery and design, enabling all dams and reservoir projects to be delivered on time, in full and to budget, offering ongoing support and additional services throughout.

INCORRECT VALVE SELECTION AND SIZING IMPLICATIONS. POTENTIAL PITFALLS OF USING THE WRONG VALVE.

If the wrong valve is used for a particular application, the results can be disastrous!

Apart from valve failures, civil damage, nearby surrounding damage can occur as well as various health and safety issues!

Also, incorrect system information and poor quality products can be equally problematic.

PLEASE CONTACT GLENFIELD INVICTA FOR YOUR PROJECT REQUIREMENTS



ENGINEERING AND SITE SOLUTIONS

ENGINEERING AND SITE SOLUTIONS:
INSPECTION / MAINTENANCE / REPAIR OR REPLACE

**WITH OVER 160 YEARS' EXPERIENCE WE CAN
CONFIDENTLY CLAIM "THERE'S A GLENFIELD INVICTA
VALVE IN EVERY CONTINENT IN THE WORLD"**

Our team of highly qualified engineers and project managers are available to support in the design, procurement, installation and planned maintenance of the complete range of AVK Group products.

From our comprehensive database and archive library we can provide drawings, design calculations, bills of material and operating and maintenance instructions for valves supplied by Glenfield Invicta dating back to circa 1900...120 years of documented supply records so far!



DAMS AND RESERVOIRS

With increasing pressure on the supply and demand of water both in the UK and globally, it has become increasingly necessary to capture and store more water.

Our skilled and experienced engineers can advise on valve specification and design working closely with clients to ensure that the optimal valve type, size and operation is chosen for each application. We can also supply site solution teams to install and commission products and also to repair, refurbish and maintain valves previously installed.

Glenfield Invicta has the capability to offer a wide variety of valves for all types of dams and reservoir projects.





PROJECT MANAGEMENT AND ENGINEERING SUPPORT

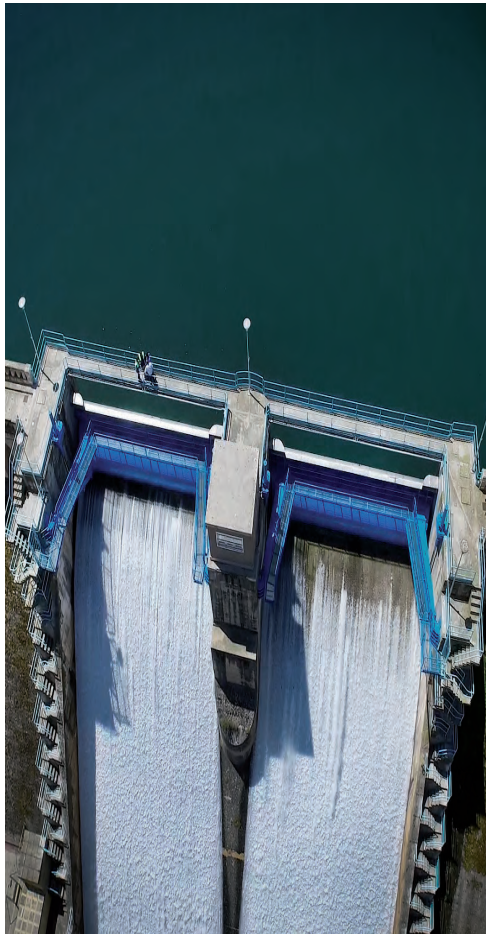
A complete supply and installation service offer for AVK group products.

This provides our customers with a single source solution that offers many benefits such as:

- Considerable cost savings
- Minimal plant shutdowns
- Reductions in site programmes
- Long term solutions
- Extended warranties

The valve supply and installation service offer includes;

- **Project engineering and management**
- **Valve application selection**
- **Site audit, identification of valve type, size, quantity and condition**
- **CFD analysis**
- **Hydraulic calculations**
- **3D design**
- **Supply and fit under pressure connections/hot tapping**
- **Supply and fit repair fittings**
- **Surge analysis**



ENGINEERING AND SITE SOLUTIONS



VALVE REPAIR, REFURBISHMENT AND REPLACEMENT

Glenfield Invicta has successfully repaired and refurbished valves on numerous projects in the past 160 years and our reputation is such that we are considered 'specialists' by our customers and their delivery partners.

We are frequently called upon to inspect and recommend a resolution for a whole range of valve related issues including:

- Defective installation
- Operational failure
- Frost damage
- Leakage

We often find that repair and refurbishment solutions are more cost effective for our clients than replacement and we can provide these either in-house or on-site depending upon the prevailing circumstances.

The valve repair, refurbishment and replacement service also offers:

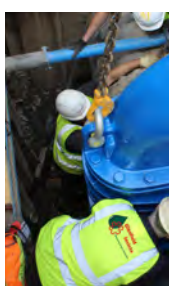
- **Valve replacement and refurbishment**
- **Valve/pump chamber refurbishment**
- **Supply, install, replace and refurbishment of penstocks**
- **Feasibility studies**
- **Design input**
- **Bespoke pipework and actuation**
- **Ancillaries**
- **In-house or on-site servicing**

VALVE SUPPLY AND INSTALLATION

Glenfield Invicta has established a reputation within the dams and reservoir industries of being a solution provider for valve supply and installation.

We can offer supply and installation on a wide range of valves including:

- Free discharge valves
- Submerged discharge valves
- Gate valves
- Needle valves
- Butterfly valves
- Check valves
- Knife gate valves
- Plug valves
- Control valves
- Air valves
- Penstocks





EXPECT... QUALITY IN EVERY STEP

The valve supply and installation service offer includes:

- Design input
- Site audit
- Product selection
- Associated ancillaries
- Installation and actuation
- Commissioning
- Testing
- Maintenance
- Extended warranties

ACCREDITATIONS

The AVK UK Group holds the following Accreditations:



PROJECT DOCUMENTATION

For all projects we prepare:

- Risk Assessments and Method Statements (RAMS)
- Lift plans
- Inspection Test Plans (ITP) / quality plans and inspection checklists
- Project plan
- COSHH assessments
- Employee training records
- Calibration certificate for lifting equipment
- Portable Appliance Test certificate
- Commissioning procedure and site acceptance test certificate

QUALITY, HEALTH AND SAFETY AND ENVIRONMENT

Our quality ethos from project inception to completion is not limited to the service or product itself, we embrace the entire process, from the early specification to the implementation and after-sales. Quality is not the result of a single link in the chain – it is the sum of all steps. One of our customer promises is to expect quality in every step.

The group has ISO 9001:2008 accreditation

The business is committed to providing environmentally sustainable solutions. We endeavour to reduce our impact on the environment at all times, by conducting risk assessments and monitoring our performance.

The group has ISO 14001:2004 accreditation.

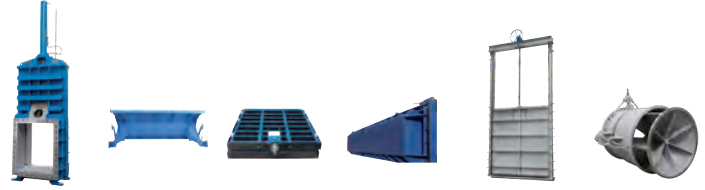
The health and safety of our people, visitors to our projects and all stakeholders are paramount to us. We have established robust procedures and processes that minimize risk and ensure that everyone recognizes their responsibility for safe working practices at all times.

The group has OHSAS 18001:2007 accreditation.



APPLICATION MATRIX

VALVE TYPE



Bonneted Gate

Radial Gate

Roller Gate

Stop Gate

Penstock /
Sluice Gate

Free
Discharge

Bottom Outlets

Intake Gate

Guard Valve

Discharge Valve

Intermediate Outlets

Intake Tower

Intake

Intermediate Outlet

Intake Gate

Guard Valve

Control / Discharge Valve

Spillways & Canals

Spillway

Gate

Canal

Gate

Reverse Pumped Storage

Reverse Pumped Storage

	Bonneted Gate	Radial Gate	Roller Gate	Stop Gate	Penstock / Sluice Gate	Free Discharge
Bottom Outlets						
Intake Gate			●			
Guard Valve	●					
Discharge Valve		●				●
Intermediate Outlets						
Intake Tower						
Intake			●			
Intermediate Outlet						
Intake Gate			●			
Guard Valve	●					
Control / Discharge Valve		●				●
Spillways & Canals						
Spillway						
Gate		●	●	●	●	
Canal						
Gate		●	●	●	●	
Reverse Pumped Storage						
Reverse Pumped Storage	●					



Submerged Discharge

Fabricated Butterfly

Butterfly

High Performance Butterfly

Knife Gate

Wedge Gate

Reservoir Specification Gate

Needle Control

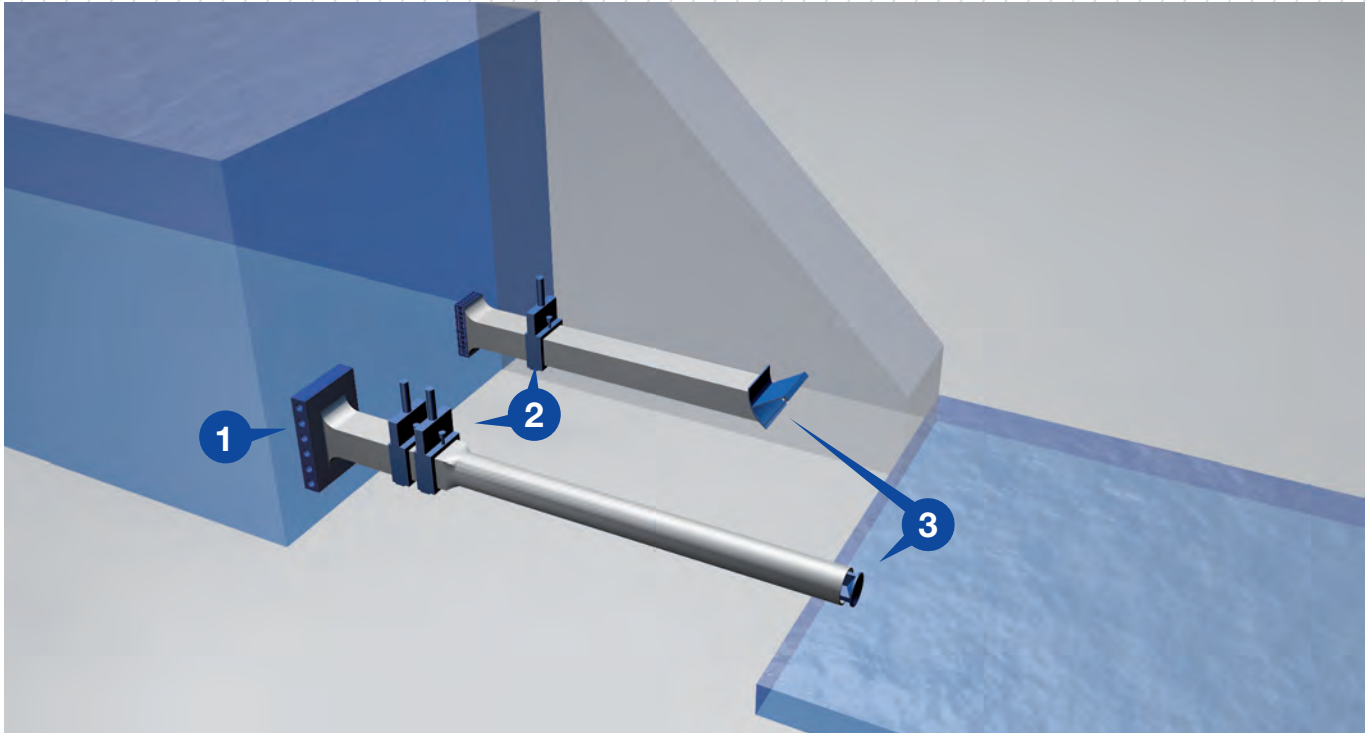
Automatic Control

Air












Spherical

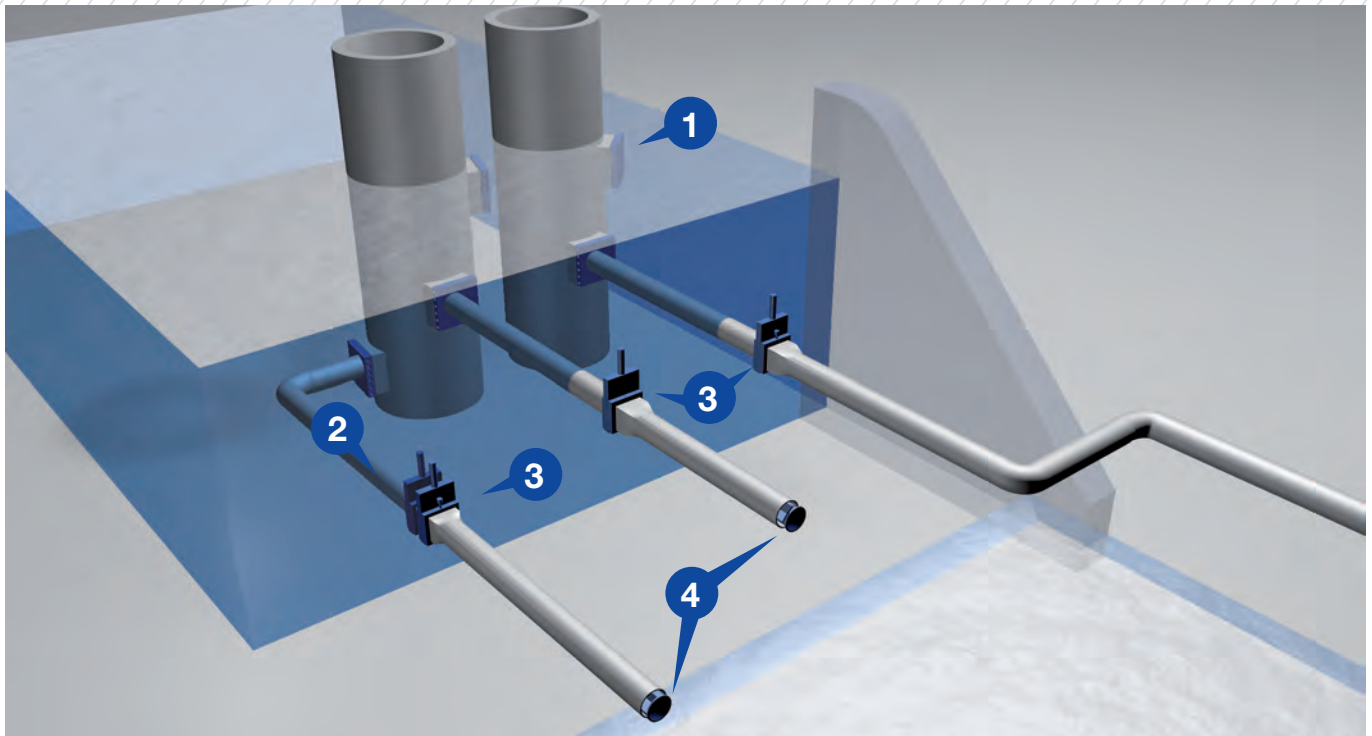
Ball Float

			●	●	●			●	●		
●							●				
			●	●	●			●	●		
●		●	●		●	●	●	●	●		●
	●	●	●	●	●			●	●	●	●







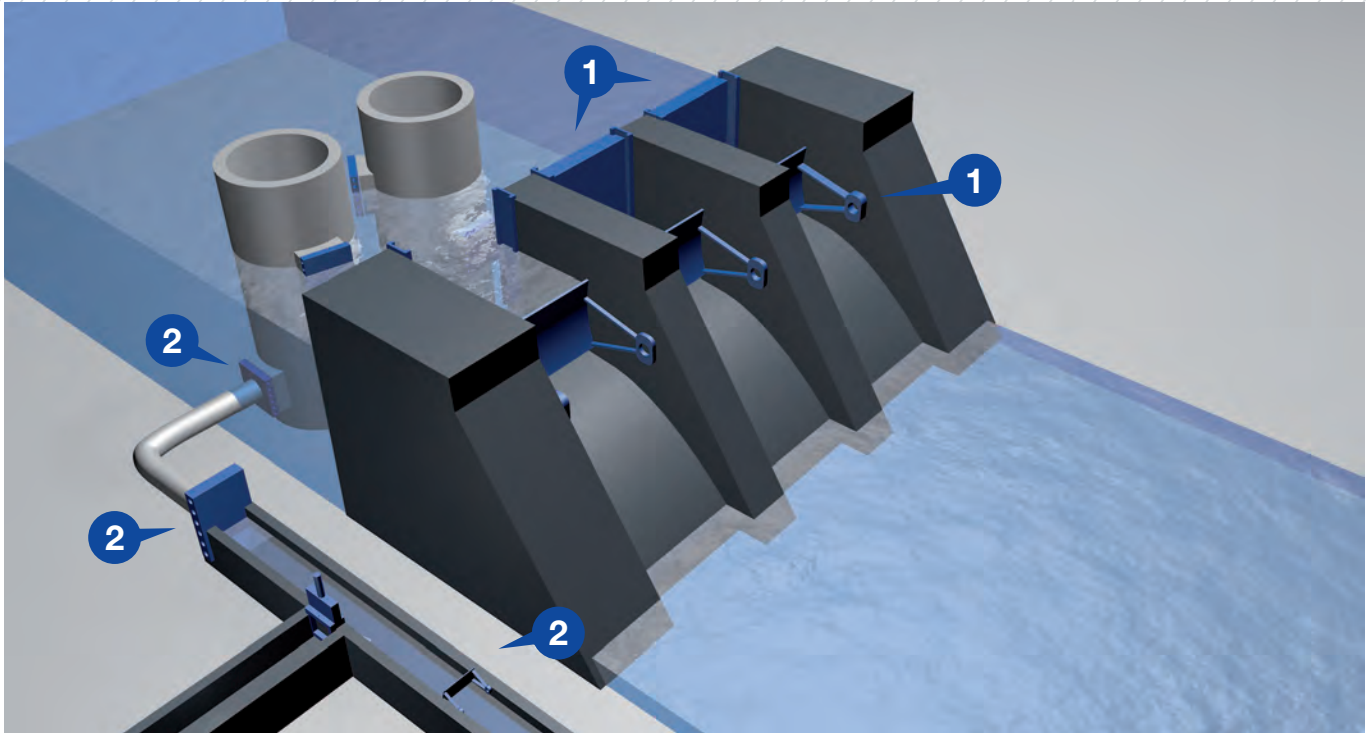
BOTTOM OUTLETS

	Bonneted Gate	Radial Gate	Roller Gate	Free Discharge	Submerged Discharge	High Performance Butterfly	Knife Gate	Reservoir Specification Gate	Needle Control	Automatic Control	Air
1 Intake Gate											
2 Guard Valve											
3 Discharge Valve											







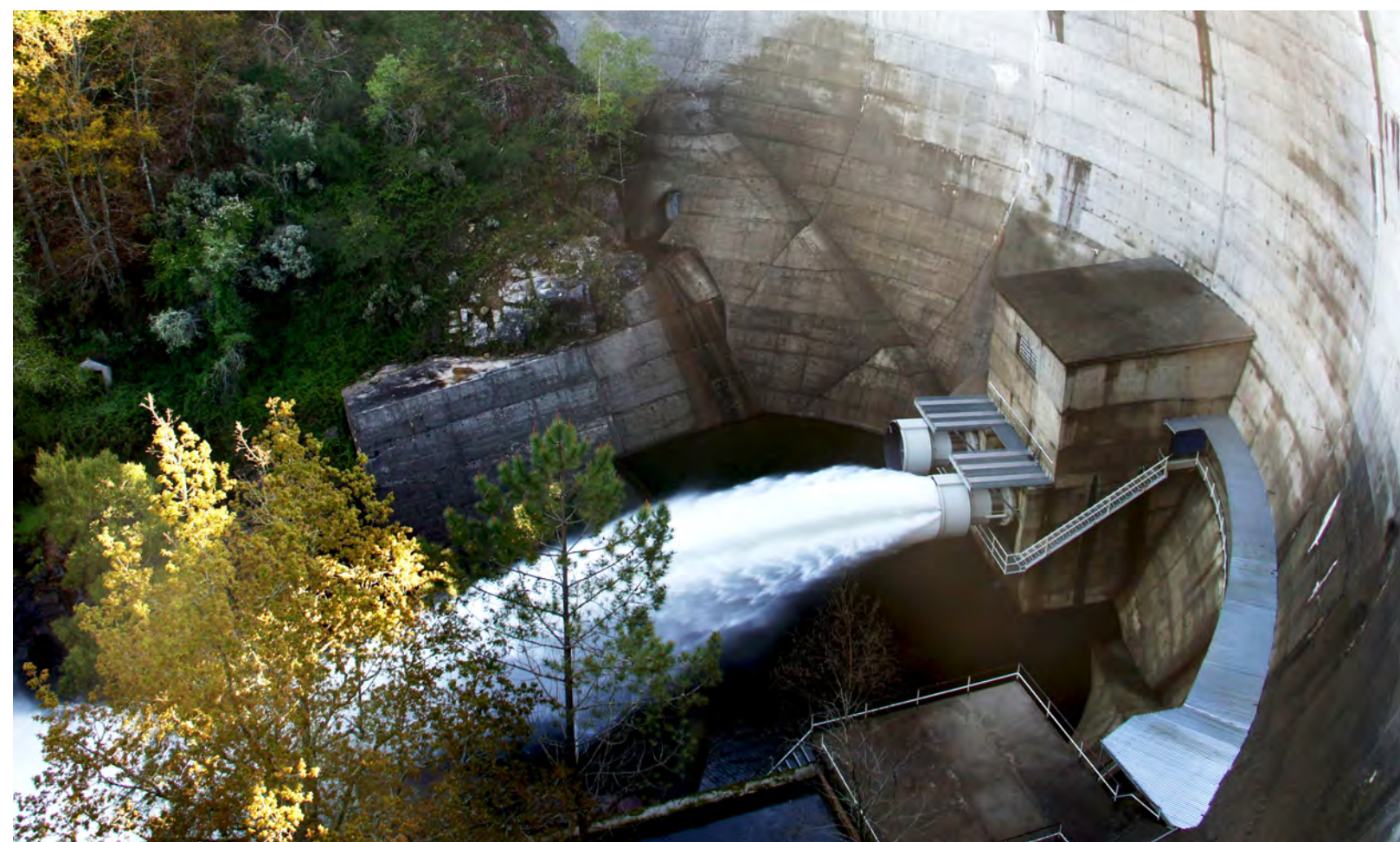
INTERMEDIATE OUTLETS

	Bonneted Gate	Radial Gate	Roller Gate	Free Discharge	Submerged Discharge	Butterfly	High Performance Butterfly	Knife Gate	Wedge Gate	Reservoir Specification Gate	Ball Float	Needle Control	Automatic Control	Air
Intake Tower														
1 Intake Gate														
Intermediate Outlet														
2 Intake Gate														
3 Guard Valve														
4 Control / Discharge Valve														



SPILLWAYS & CANALS

	Radial Gate	Roller Gate	Stop Gate	Penstock / Sluice Gate
Spillways & Canals				
1, 2 Gate				



PRODUCT RANGE



Bonneted Gate

Carbon or stainless steel fabricated body and gate, bronze seat and hydraulic or electric actuation.

Specifics:

Size:
Up to 2500 x 3500 mm

Pressure:
Up to 20 bar



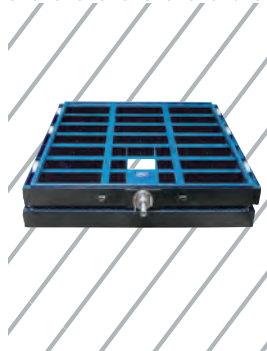
Radial Gate

Carbon or stainless steel fabricated gate, three or four side sealing with elastomer seals and hydraulic or electric actuation.

Specifics:

Size:
Up to 20000 x 7000 mm

Pressure:
Gate height



Roller Gate

Carbon steel fabricated gate, roller system for guiding purposes, elastomer seals and hydraulic or electric actuation.

Specifics:

Size:
Up to 6000 x 8000 mm

Pressure:
Up to 10 bar



Stop Gate

Carbon steel fabricated gate, elastomer seals, normally operated with auxiliary lifting equipment / crane.

Specifics:

Size:
Up to 20000 x 7000 mm

Pressure:
Gate height



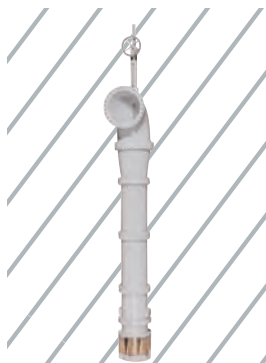
Penstock / Sluice Gate

Three and four side sealing. Stainless steel full frame and gate, EPDM seals, HMWPE guides and various actuation solutions (manual, pneumatic, electric etc).

Specifics:

Size:
Up to 4000 x 4000 mm

Pressure:
4-side: 1 bar on / 0,6 bar off
3-side: Gate height



Submerged Discharge Valve

Terminal discharge valve providing submerged energy dissipation and flow control. Type – End of line single flanged. Manual, electrical or hydraulic actuation.

Specifics:

Size:
DN200 – 1800

Pressure:
10 & 16 bar



Fabricated Butterfly Valve

Carbon or stainless steel fabricated body and disc, elastomer seal and hydraulic or electric actuator.

Specifics:

Size:
Up to DN3500

Pressure:
Up to 10 bar (DN3500)
Up to 16 bar (DN2000)
Up to 25 bar (DN1000)



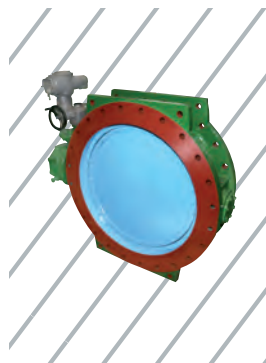
Butterfly Valve

Double eccentric butterfly valve with seal on disc design. Fully bi-directional with drop tight shut off and double flanged connection.

Specifics:

Size:
DN200 – 2800

Pressure:
PN10, 16 & 25 bar



High Performance Butterfly Valve

Boving type double eccentric resilient seal on disk and stainless steel body seat. Drop tight shut off in preferred direction and double flanged connection.

Specifics:

Size:
DN100 – 3000

Pressure:
PN10, 16, 25 & 40 bar



Needle Control Valve

Flow, level and pressure control valve used for in-line and terminal applications.

Specifics:

Size:
DN80 – 2000

Pressure:
PN10, 16, 25, 40, 64 & 100



Knife Gate Valve

Bonneted valve, carbon or stainless steel fabricated body bonnet and gate, elastomer or bronze seat and hydraulic or electric actuation.

Specifics:

Size:
Up to DN3500

Pressure:
Up to 20 bar



Wedge Gate Valve

Metal seated valve for standard isolation applications. Manual, electrical and hydraulic actuation options available.

Specifics:

Size:
DN50 – 2400

Pressure:
PN10, 16 & 25 bar



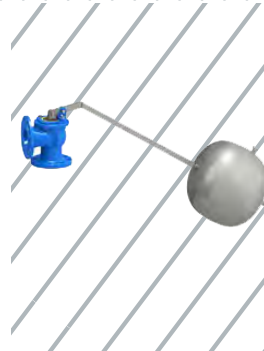
Reservoir Specification Gate Valve

Heavy duty ductile iron cast valve with shoes, channel guides, pinned rings, jacking screw and increased corrosion protection. Suitable for or higher flow velocities. Manual, electrical and hydraulic actuation options available.

Specifics:

Size:
DN350 – 1800

Pressure:
PN10, 16 & 25 bar



Ball Float Valve

Balanced equilibrium float valve is designed to be fitted in the top of a tank or reservoir to automatically control the rate of filling and shut off completely when a predetermined level is reached.

Specifics:

Size:
DN50 – 300

Pressure:
PN10 & 16 bar



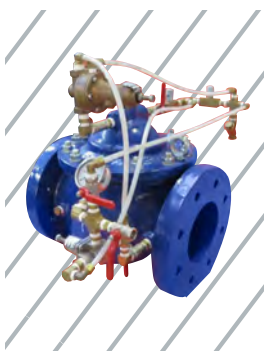
Free Discharge Valve

Cast body or carbon steel / stainless steel fabricated body, elastomer seat and hydraulic or electric actuator.

Specifics:

Size:
Up to DN3000

Pressure:
Up to 20 bar



Automatic Control Valve

Ductile iron body/bonnet and stainless steel body seat globe/diaphragm type valve. Large passageways for higher flow rates and greater cavitation resistance.

Specifics:

Size:
DN50 – 500

Pressure:
PN10, 16, 25 & 40



Air Valve

Triple function ventilation air valves with aerokinetic performance. Large discharge capacities and drop tight shut off for full pressure range. Anti-vacuum air valves also available

Specifics:

Size:
DN25 – 250

Pressure:
PN10, 16 & 25



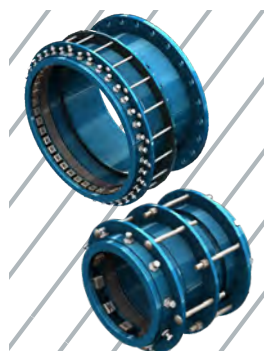
Spherical Valve

Cast or fabricated, metallic/soft designs, with movable service seal. Counterweight/hydraulically operated with digital instrumentation systems.

Specifics:

Size:
DN300 - 2000

Pressure:
PN10, 16, 25, 40 & 64



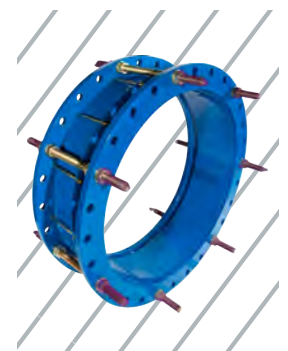
Fabricated Fittings

Series 258 couplings and Series 260 flange adaptors can be universal or tensile resistant. Tested and approved in accordance with BS 8561 Type 1 compliant for PE DN350 to DN630, Type 2 compliant for all ferrous pipes DN350 - DN1200 embodied carbon data available upon request.

Specifics:

Size:
DN350 - 1200

Pressure:
PN10, 16



Dismantling Joint

Series 265 dismantling joints provide easy installation and disassembly of flanged pipework and fittings, or flanged equipment such as valves, meters and pumps. The dismantling joints compensate for axial displacement of the pipe during installation.

Specifics:

Size:
DN300 - 1200

Pressure:
PN10

INTERNATIONAL SUPPLY SOLUTION PROVIDER



WORKING WITH OUR
INTERNATIONAL SUPPLY CHAIN
PARTNERS WE CAN SUPPORT
YOUR PROJECTS WHEREVER
THEY ARE IN THE WORLD



Glenfield Invicta



Orbinox



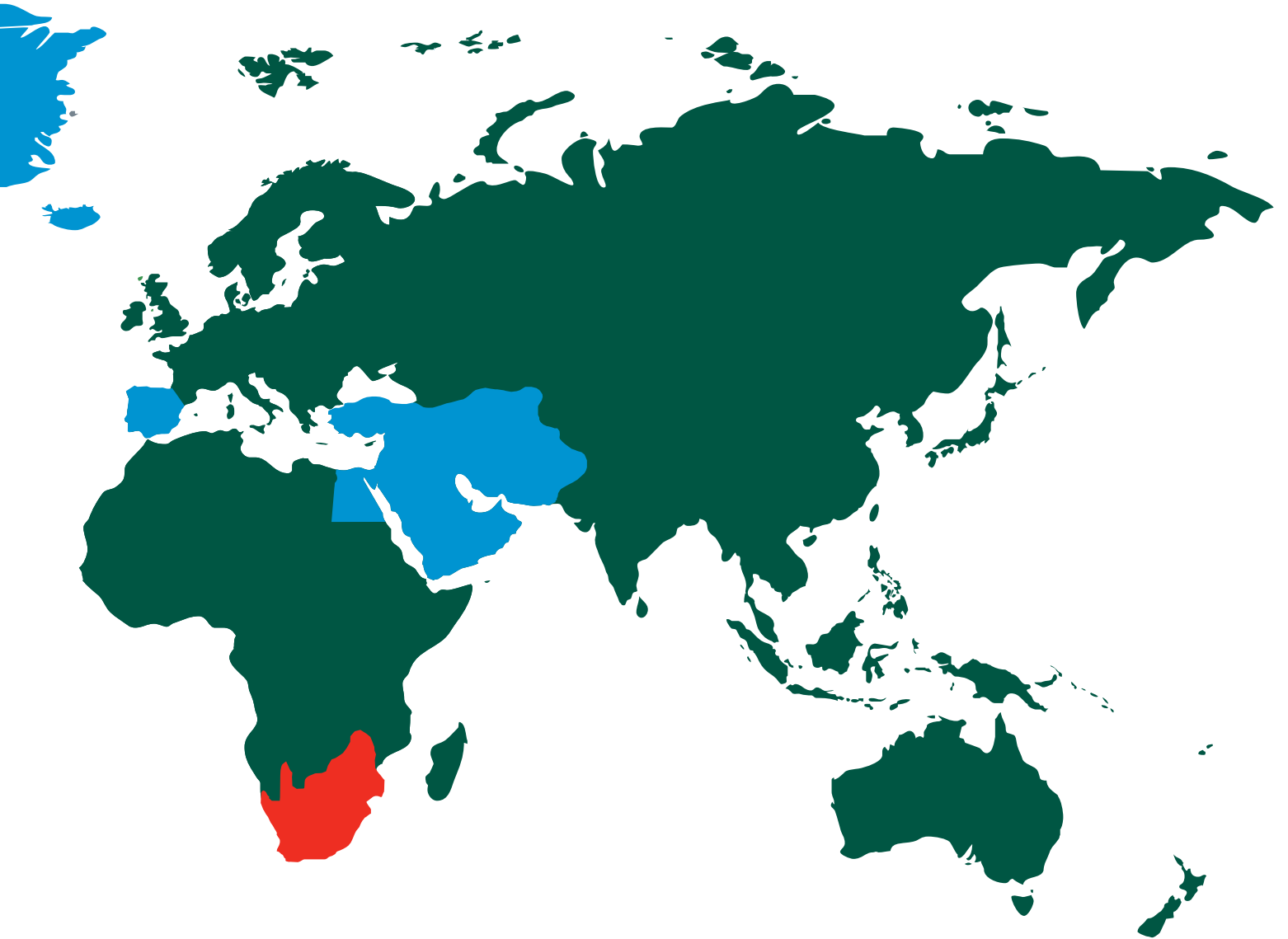
Premier Valves



Glenfield Invicta have been designing and manufacturing specialist engineered valves for more than 160 years.

Our products are installed worldwide in dams and reservoir applications.

Providing engineered valve solutions ranging from 50mm to 3000mm according to the worlds international design standards has made the Glenfield Invicta name synonymous with engineering excellence worldwide. Our team of highly qualified engineers and project managers are available to assist in the design, procurement, installation and planned maintenance of the complete range of AVK Group products.



ORBINOX is present in more than 70 countries with over 50 years of experience designing, manufacturing and marketing knife gate valves, penstocks, dampers and valves for hydraulic works.

Product quality and customer satisfaction are our goals. We have a highly qualified and experienced team providing the best solutions to suit the needs of our customers.

Our global presence enables us to be close to our customers in order to offer technical advice and respond to their requirements. We think globally, whilst applying local expertise.



The **Premier Brand Products (PBP)** is one of Africa's largest and longest established valve Brands, that specialises in the manufacture of large bore, high pressure, engineered valve products for both bulk water supply & power/industrial applications.

PBP range includes butterfly valves up to DN3000, metal seated wedge gate, check, sleeve and spherical valves up to DN2000, and Baker Control Valves (BCV) up to DN500 and up to PN40. PBP is manufactured at AVK Southern Africa's own 46,000 sqm factory facility outside Johannesburg, and also offers valve factory repair and refurbishment services, as well as on site installation through 3rd parties, commissioning and preventative maintenance services.



Glenfield Invicta

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