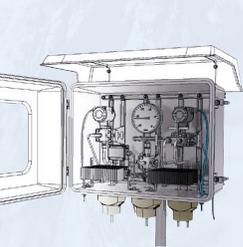


# Field Protection - Anywhere on Earth

Optimal protection for sensitive equipment operating in difficult outdoor environments



Protected operating conditions

**INTERTEC**



# 50 years' experience of protecting field-based equipment in harsh conditions!



INTERTEC was founded in 1965 by the former director of a petroleum refinery - Dr.-Ing. Joachim Hess - in response to the corrosion problems of sheet metal enclosures commonly used for field-based sensors. INTERTEC started making enclosures using long-fibre glass reinforced polyester (GRP) - with additional composite layers to add insulation and other protective properties.



The penguins in our logo symbolize INTERTEC's most important brand value: our enclosure technology will take care of your instrumentation in the harshest of conditions.

Dr Hess' ideas proved very successful, to the extent that some of INTERTEC's earliest enclosures remained in service for over 50 years! Today, INTERTEC is managed by the son of the founder, Martin Hess, who started his career as a process, instrumentation and analyzer engineer at a major EPC. He looks after a worldwide engineering and sales organization supported by two manufacturing plants and two system building centres located in Germany, Russia, Canada and the USA.

Since its foundation, the INTERTEC organization has shipped over a million field enclosures. More than half of INTERTEC's output is in the form of 'turnkey' enclosure solutions complete with the user's equipment - designed, assembled and shipped to the operating site, ready for use.



Risk of instrument failure and process downtime is increasing as operators work in ever more remote and hostile environments, and our climate becomes more chaotic.

INTERTEC has manufacturing plants in Germany and Canada, and system integration centres in the USA and Russia.



## Composite-GRP offers amazing protection possibilities

- Ingress protection (to IP68)
- Fire safety (to 120 minutes)
- Extreme thermal insulation (Arctic conditions)
- Heat resistance (to 160°C)
- Explosion proofing (Ex e, Ex p, CSA/NEMA 4X)
- Proof against wind, blast, earthquake
- Anti-static
- Corrosion resistance
- UV resistance
- Leak resistance
- Wireless friendly, or EMC shielded
- Frangibility

## Enclosures that are truly fit for purpose

INTERTEC started with the idea of employing superior structural materials in enclosures to avoid corrosion and optimize thermal performance - and extend the lifecycles of business-critical process control and instrumentation. This philosophy recognised that the purchase and installation costs of owning and operating a control and instrumentation network are only a fraction of total lifecycle costs - especially for instrumentation located in hazardous areas.

INTERTEC offers enclosure, cabinet and shelter products - plus all the heating, cooling and other accessories required to provide a solution. Over decades of involvement in the field, INTERTEC has developed many specialized and patented manufacturing techniques to optimize the performance and durability of its housings. It complements its products with custom design and assembly services. This high-level involvement in the application means that INTERTEC has developed an enormous degree of design and engineering know-how in protecting field instrumentation.

INTERTEC turnkey solutions are truly fit-for-purpose. Trouble-free instrument operation is the most important thing we deliver to clients. The reliability and dependability our products and services provide has led INTERTEC to do business with many of the world's foremost energy, oil and gas operators and engineering houses. Today our field protection enclosures can be found all over the world - from conventional industrial and manufacturing environments, to the most remote locations in Arctic and desert regions, and the harsh and corrosive environmental conditions found offshore.

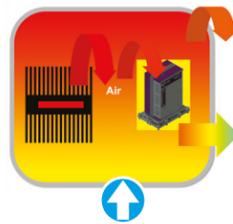


Ensuring fit-for-purpose field environmental protection is one of the most significant investment decisions that process plant owners can make, as total cost of ownership dwarfs initial purchase costs.

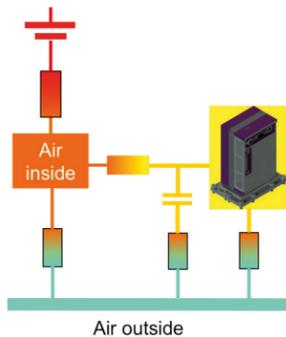


Efficient field instrumentation is critical to the operation of automated processes, plants, utility and transportation systems. INTERTEC's composite-GRP structural materials, customization capability, and application design expertise assures users of long and trouble-free service life in harsh operating conditions.

# GRP out-performs other materials for environmental protection

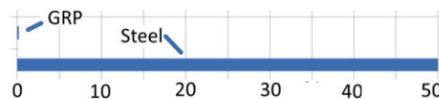


Heating (or cooling) an enclosure is a series of heat transfer processes. In this convection-heated example, thermal energy flows from heater, through the space to be heated, on to the external ambient environment through the enclosure fabric and any thermal short cuts. Optimizing enclosure materials has a highly beneficial effect.



Heat transfer is like laying out a circuit board with resistors, capacitors and active components.

INTERTEC's GRP sheet material has a much better thermal resistance that is ~1000 times better than metal.



Over 50 years, GRP (glass fiber reinforced polyester) has proven to be a highly superior structural material for building enclosures to protect field-based instrumentation and equipment.

The main competitive material used in this application sector is sheet metal. INTERTEC's GRP is produced using long-fiber glass strands which makes it almost as strong as stainless steel, yet some 75% lighter. In addition, GRP offers exceptional resistance to corrosion - it does not rust or degrade in any meaningful way. GRP is also an excellent insulator, and is intrinsically flexible. In its basic form, these properties make GRP a superb material for manufacturing robust outdoor enclosures - allowing maintenance-free lifecycles of 30 years and more.

INTERTEC has developed many processes to extend GRP's natural protective advantages, combining special grades of high-quality GRP with composite layers to achieve extra degrees of protection. The most common forms provide embedded insulation to optimize energy consumption and the efficiency of heating or cooling, anti-static properties, and protection against ultraviolet exposure and abrasion. Further composite techniques are used to meet more specialized application demands, including fire safety and EMC shielding. Different grades of GRP may also be used at different layers of a composite, to optimize the protective properties of interior and exterior faces.

## INTERTEC GRP production processes

	<b>Enclosures with fixed dimensions</b>	<b>Process:</b> SMC (sheet moulded compound) <b>Size:</b> Fixed by the mould
	<b>Modular cabinets and shelters</b>	<b>Process:</b> Vacuum moulding <b>Size:</b> Moulds produce wide range of panel sizes - which may be combined in modular fashion
	<b>Custom size/shape enclosures, cabinets, shelters</b>	<b>Process:</b> Sandwich panels from flat sheet material <b>Size:</b> Produces single-piece panels in custom sizes to 12m+ lengths

## GRP's thermal efficiency delivers stable environments, energy savings

Good insulation is critical to almost all outdoor protection applications. The basic GRP sheet material used in INTERTEC's enclosures has a very high thermal resistance compared to metal, with an efficiency that is around 1000 times better! GRP sheets are also fabricated easily in composite 'sandwich' forms, enclosing high performance insulation. As INTERTEC enclosures do not utilize any material with poor thermal conductivity, they achieve near-perfect insulation - with no thermal 'short cuts' between interior and exterior. INTERTEC even provides special accessories to ensure that process connections do not reduce insulation performance.

This holistic approach to enclosure design has particular benefits in avoiding the 'cold-spots' (or 'hot-spots') that lead to problems. It delivers extremely stable operating environments, which can be crucial in many process control applications - such as process analyzers. Naturally, this construction technique also

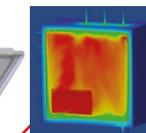
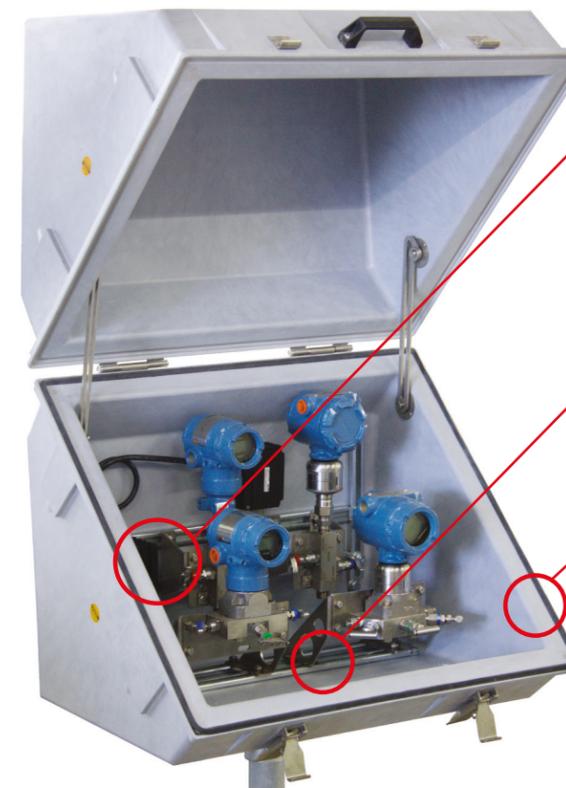
greatly reduces the energy required to heat or cool electronic equipment.

### Building the perfect enclosure

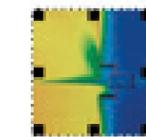
An enclosure transfers heat to the atmosphere (or gains heat, if its function is cooling) in two main ways. First, by gradual transfer through the structural fabric. Second, by conduction through any hardware or structural components that hold the enclosure together, and the necessary access holes for tubing, cabling etc. These conductive points create 'thermal short-cuts'. These short cuts typically account for the majority of losses: around 75% or more in most instances.

INTERTEC's GRP construction techniques have been refined over 50 years to create enclosures with *near perfect* thermal performance. The GRP structural material employed is a very good insulator. Insulation is added as an integral part of the structural material, so it gives *uniform* protection over the whole enclosure. It is also bonded or injected into place. This eliminates interior-to-exterior hardware or components that create thermal short cuts.

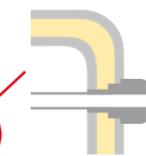
## INTERTEC exploits GRP's intrinsic efficiency to design highly-optimized solutions



Good thermal efficiency relies on enclosure structural materials, and the positioning of internal elements.



'Thermal short cuts caused by insulation gaps joints or connections such as this cable gland in a steel cabinet, can dramatically decrease thermal efficiency, leading to cold spots and condensation.



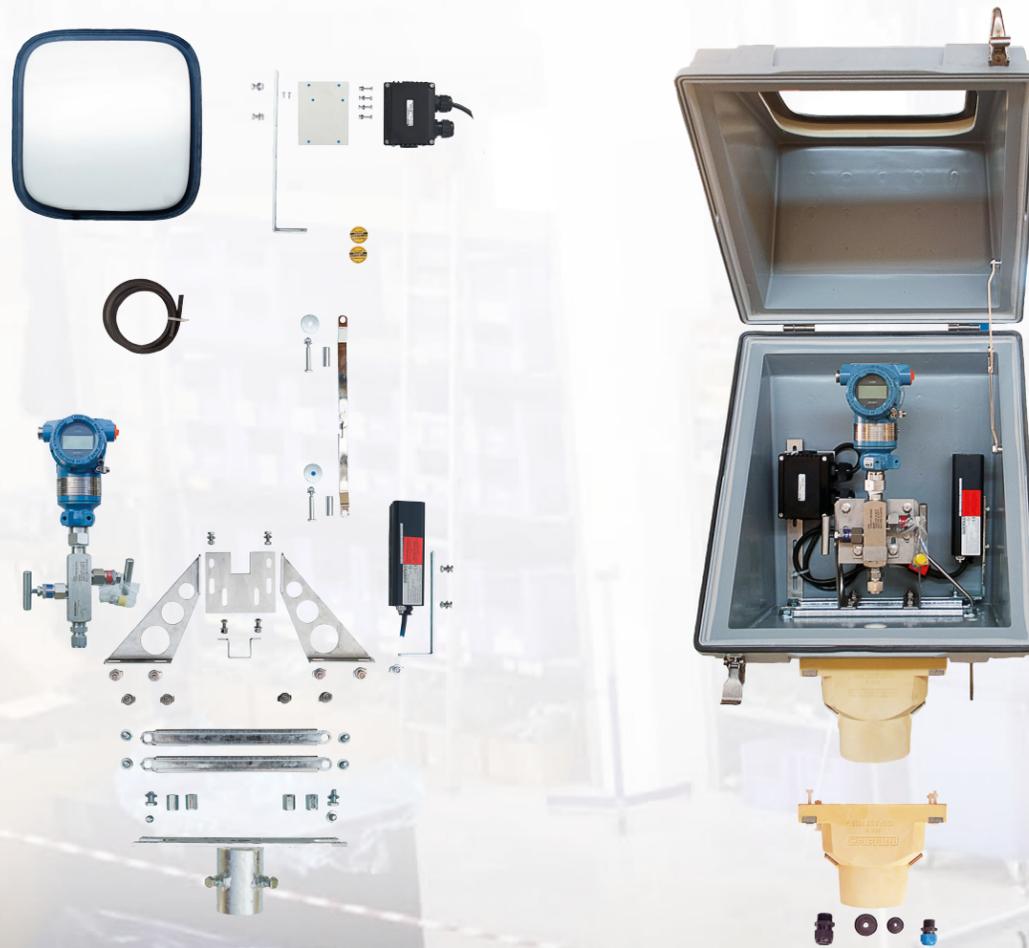
Perfectly uniform insulation - with no thermal short cuts from gaps, joints or fixings - is achieved by INTERTEC's 'embedded' insulation technique - as connections - such as a tube - are made with purpose-designed components to ensure insulation efficiency.

# Turnkey enclosure solutions - the SAFE LINK service

Much of INTERTEC's output is in the form of turnkey systems, supplied complete with process equipment, ready for connection to the process. The service is called SAFE LINK. Enclosure configuration and layout can be specified by the user. More commonly, INTERTEC uses or adapts a proven configuration from its design library to meet a client's application.

Designing your own environmental protection system is a complex task. Ensuring a stable and safe operating environment for your equipment requires a complex system of outer and inner protection - with carefully selected structural materials, layout and heating/cooling processes. Many different regulations (such as explosion protection rules, the Pressure Equipment Directive) and material characteristics must be considered and documented. It is easy to make mistakes due to the many small details involved, such as correctly specifying interfaces, threads, cable gland diameters, nuts and bolts, etc. At a remote site, any oversight can lead to major costs and delay!

INTERTEC's experts allow engineering companies and users to concentrate on their core competence. Our turnkey solutions substantially reduce the front-end engineering, procurement and installation costs of process instrumentation - providing an immediate payback. SAFE LINK also significantly reduces overall total cost of ownership (TCO), providing payback throughout the plant's lifecycle.



## Adaptability holds the key to optimized protection

SAFE LINK enclosure solutions are available for the spectrum of applications - such as protecting against freezing and condensation, corrosion or dust, temperature maintenance, explosion protection etc - for every world climate. INTERTEC has several thousand field-proven design templates in its library that can either be applied directly or adapted for specific applications. They cover all our enclosure styles, as well as different operating environments and climates.

A major advantage of INTERTEC's unparalleled applications experience is that our design teams are always at the leading edge of solving emerging problems. Among many current trends for instance are demands for extended longevity, increased energy efficiency, blast proofing, corrosion resistance, surviving ultra-low temperatures, fugitive emissions control, and wireless friendly operation.

For larger-scale installations, INTERTEC will also create a site standard for end users - standardizing components such as manifolds, valves and fittings - to simplify maintenance and spare parts holdings.



INTERTEC's unique enclosure manufacturing capability provides optimal solutions for the most complex of shapes. Window cut outs, holes, cable glands etc can all be CNC machined with superb quality and precision - using composite GRP structural materials that are optimized for the target environment.

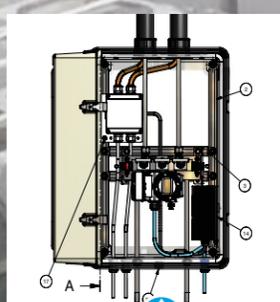


INTERTEC has a very large team of field environmental protection specialists - many engineers have more than a decade of design experience.

Assembling instrumentation systems using skilled technicians in a factory environment costs a fraction of the equivalent on-site installation assembly - especially for equipment destined for remote environments.



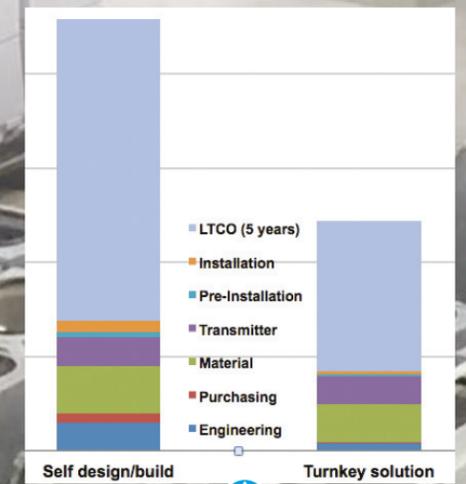
TCO savings come from increased reliability, reduced field visits due to field proven designs, expert application know-how, and reduced maintenance due to accessibility and ergonomics of layout.



The SAFE LINK process: specifying a turnkey solution is made simple by dedicated software, or questionnaire. Users are provided with a proposal including CAD drawing and bill of materials. Once approved, INTERTEC produces the system.



INTERTEC has a vast library of field-proven ready-to-use or -adaptable application designs, each of which are available in variants for different housing styles and different climates.



INTERTEC's design and materials technology recognises that the initial costs of a field-based processed instrumentation network are only a small fraction of total lifecycle costs. This is especially true for safety-critical installations.

# Enclosures - broad choice *and* adaptability

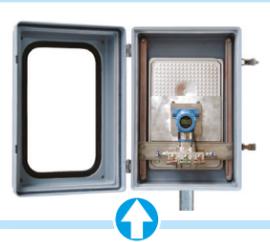
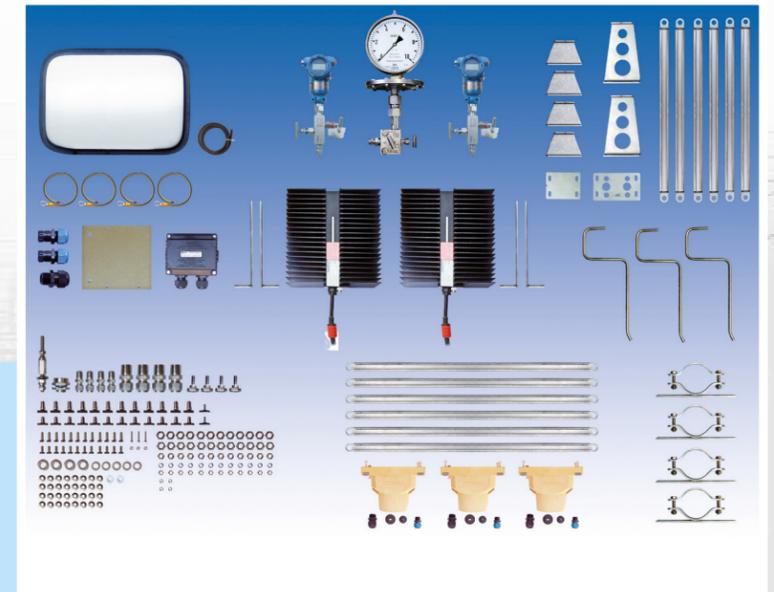
INTERTEC offers a wide choice of GRP enclosure styles and sizes with seven standard designs - offering an extremely broad range of shapes, volumes, opening styles, mounting and process connection possibilities. We can also create a custom shape/size enclosure to meet your specific application needs.

However, obtaining the 'perfect' field enclosure relies on more than such choices alone. Configuring the optimal solution is made easy by the additional adaptability that may be applied. INTERTEC makes all

of its own enclosures and our manufacturing system is geared to meeting customer demands. So, there is a great deal of freedom to optimize enclosures for specific challenges including varying levels of thermal insulation:

- the natural insulation of GRP
- an inner mirror surface to reflect radiated heat
- 'sandwich' structure of GRP with embedded insulation
- purpose-designed insulation for tubes/cables

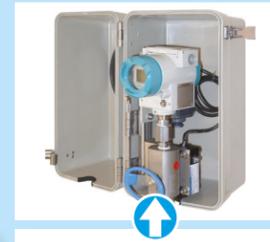
Further adaptability comes in the form of an unparalleled range of accessories to optimize performance, ergonomics and operation. Hundreds of choices include: windows, sunshades, drains, vents, heating, cooling, electrical switches/lights, mounting hardware, security, etc. INTERTEC even offers accessories to allow 19-inch racks to be mounted inside 2-part enclosures (or cabinets - see overleaf).



Two-part enclosures are easy to panel mount, with tube entry via top or base. MULTIBOX has thick and shallow sections, either of which can be used as the door. 12 sizes.



Diagonally opening enclosures give clear access to field equipment, and may be installed vertically or horizontally. DIABOX allows tube entry via rear or base. Five sizes.



MINIBOX is sized to provide cost-effective housing to protect close-coupled single-transmitter installations.



UNIBOX enclosures swing open for easy access to all four faces of field equipment. They are ideal where tube entry is made via the base. Four sizes.



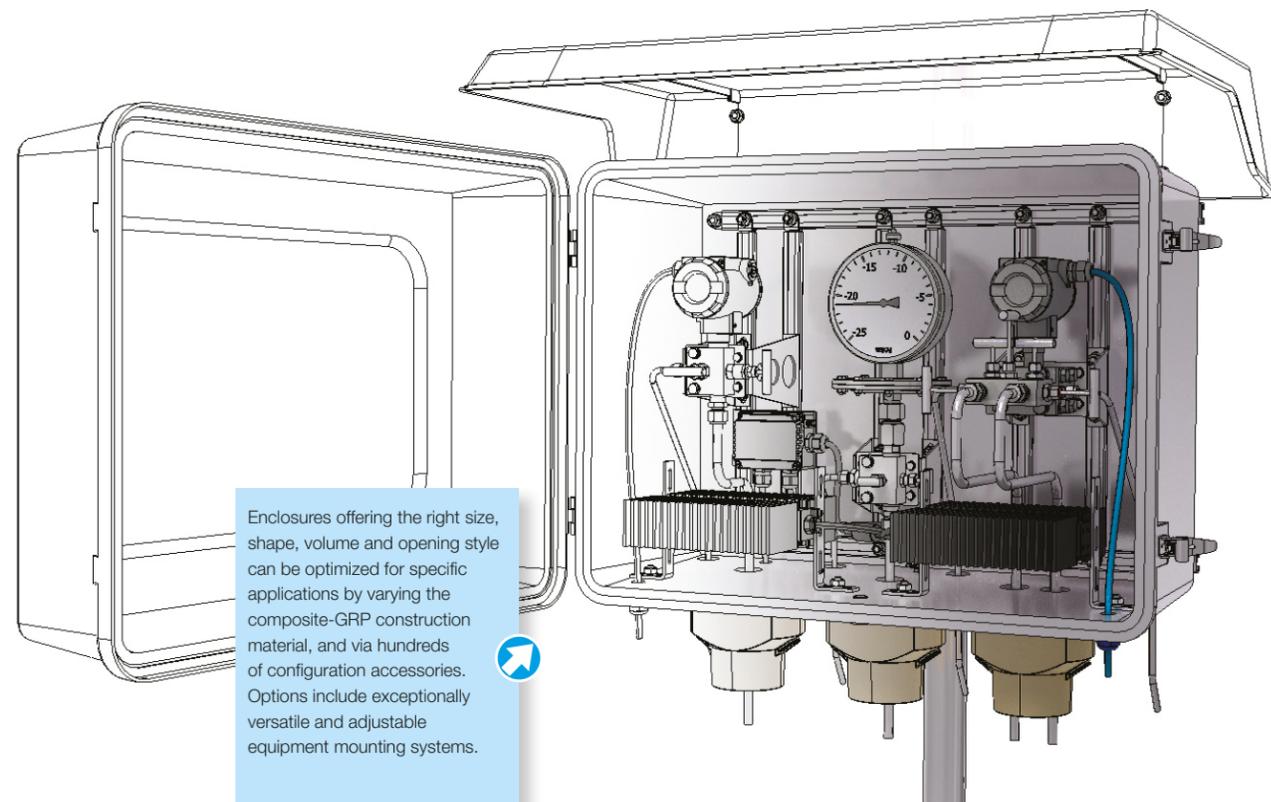
Two-part MESC enclosure meeting Shell standards, with flaps for manifold operation.



MULTIBOX VARIO wall/floor/pole-mounting enclosures offer volumes that sit between the upper limits of many field instrument enclosures and smaller cabinets. Flat exterior surfaces allow enclosures to be installed closer together. Custom DIABOX enclosures also available.

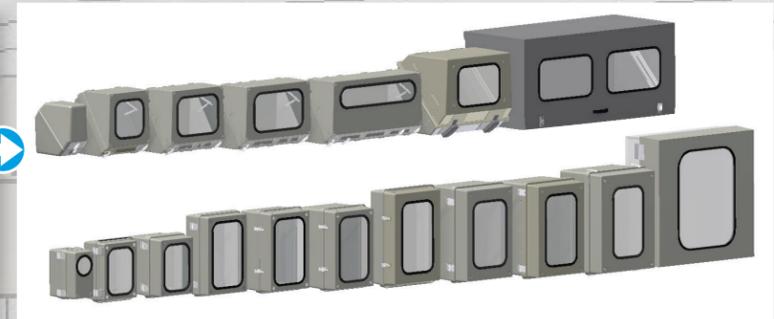


The WEB2BOX service allows users to create MULTIBOX or DIABOX style enclosures in custom sizes - and with user-specified wall materials (from single layer GRP to sandwich panels) and accessories. Interactive software makes specification easy.



Enclosures offering the right size, shape, volume and opening style can be optimized for specific applications by varying the composite-GRP construction material, and via hundreds of configuration accessories. Options include exceptionally versatile and adjustable equipment mounting systems.

INTERTEC offers the world's broadest range and most flexible service for outdoor two-part GRP enclosures. Standard styles of enclosures include diagonally opening DIABOX enclosures (top) and MULTIBOX or MINIBOX enclosures (bottom - MINIBOX shown at left end).



# Cabinets - modular designs deliver versatility



Custom design capability can provide ideal easy-access cabinet solutions for almost any application - with the perfect size, shape and protection.



Special composite construction principles and insulation allow INTERTEC cabinets to keep critical equipment below 60°C for periods up to 120 minutes - to protect equipment such as emergency shut down valves.

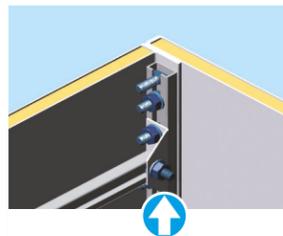


The combination of a standard cabinet and custom noise-reducing covers provide an ideal solution for this pump system.

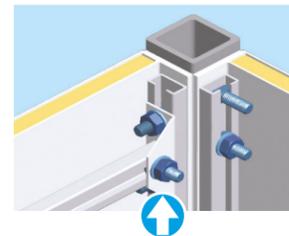
INTERTEC cabinets are built from modular components: cabinet dimensions, volumes, the position and number of doors and windows, can all be configured to fit the application.

Three basic construction principles are employed, depending on the application and operating environment. Further adaptability comes in the form of an unparalleled range of accessories to optimize performance, ergonomics and operation. Hundreds of choices include: windows, sunshades, drains, vents, heating, cooling, electrical switches/lights, mounting hardware, security, etc.

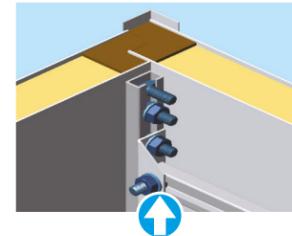
## Cabinet construction possibilities



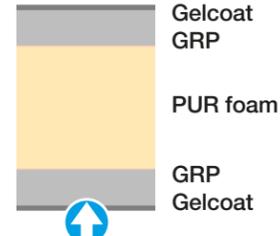
**BASIC cabinets**  
For lighter-duty applications, BASIC free-standing or wall-mounting cabinets provide economic solutions - with excellent environmental and thermal performance provided by 'sandwich' GRP/insulation/GRP walls.



**CLASSIC cabinets**  
For heavier loads, CLASSIC combines 'sandwich' GRP walls with pultruded-GRP corner posts. This greatly increases load-bearing capability - transferring the weight of equipment to the posts via mounting rails.



**VARIO custom cabinets**  
VARIO service can create BASIC or CLASSIC style cabinets (or shelters) of almost unlimited size and shape using single-piece GRP walls with an advanced 'sandwich' combination of materials.



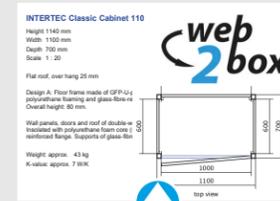
**Composite-GRP options**  
INTERTEC can vary the 'sandwich' structure and layer materials to meet challenges, including: thermal insulation for fire resistance or high temperatures, the grades of GRP to optimize protective qualities such as heat and corrosion resistance, thick gelcoats or topcoats to protect against UV/abrasion, etc.



The combination of a standard cabinet and custom noise-reducing covers provide an ideal solution for this pump system.



Modular sizes and construction principles, plus flexibility of door/window positions, and our accessory range ensure optimal solutions for protection applications whatever the need - from extreme environmental protection to the ultimate ergonomic layout.



The WEB2BOX service allows users to create BASIC or CLASSIC style cabinets in custom sizes - with user-specified wall materials and accessories. Interactive WEB2BOX software makes specification easy.



# Walk-in shelters - for large scale protection applications



INTERTEC operates two of the most sophisticated factories for building field protection shelters in the world today.



INTERTEC has the most sophisticated GRP manufacturing automation - including CNC machinery that can fabricate custom sizes in quantities as small as one, and in single-piece shapes to >12 m. This gives a major advantage in design flexibility - especially for larger shelters.

INTERTEC offers a design and construction service for 'walk-in' field equipment protection shelters that is unparalleled in its flexibility. Shelters of almost unlimited size and shape can be produced using high-integrity single-piece composite-GRP walls.

The manufacturing process is ideal for meeting demanding specifications and challenging environmental conditions. Composite GRP materials may be varied easily for individual applications - by changing the thickness of insulation core(s), or making the walls fire resistant, for instance.

Application-specific size, shape and protection characteristics can greatly reduce process design and lifecycle costs. Among many challenges that can be met are shelters for remote locations without grid-supplied power, shelters for extremely cold or extremely hot climates, lightweight and corrosion-resistant shelters for offshore applications, and custom size/shape shelters for skid-mounted packages.

INTERTEC's processes make it possible to produce optimal shelters for any application - from standard analyzer houses for temperate climates, to passively-cooled shelters for remote desert environments, ultra-insulated shelters for Arctic conditions, and lightweight blast/corrosion-proof shelters for offshore.

## Manufacturing flexibility and configuration options

Shelters are produced using the same construction technique as INTERTEC's heavy-duty CLASSIC family of cabinets (see earlier), or by a full-custom manufacturing process using the advanced manufacturing machinery at INTERTEC's disposal including very large presses and large-bed CNC-controlled cutting, routing and drilling automation. These processes allow the grade and make-up of the composite GRP materials to be adapted and varied to optimize protective qualities.

Thermal insulation choices include 'sandwich' constructions with outer layers of GRP enclosing insulation foam, or mineral wool for fire resistance.



- Shelter customization possibilities:**
- Corrosion resistance
  - UV resistance
  - IP65 to IP68 ingress protection
  - Fire safety to REH120, F120, UL1709
  - Extreme thermal insulation
  - Heat resistance
  - Mechanical protection against wind/storm/typhoon, blast/earthquake
  - Safety according to IEC 61285
  - Explosion protection:
    - antistatic
    - gas and dust tight
    - TVR, purged, Ex p (to IEC 60079-13 or NFPA496)
  - HVAC and air conditioning: natural or forced ventilation active-, passive- or hybrid-cooling
  - Frangibility for airport applications (to ICAO standards)
  - Leak-resistant floors



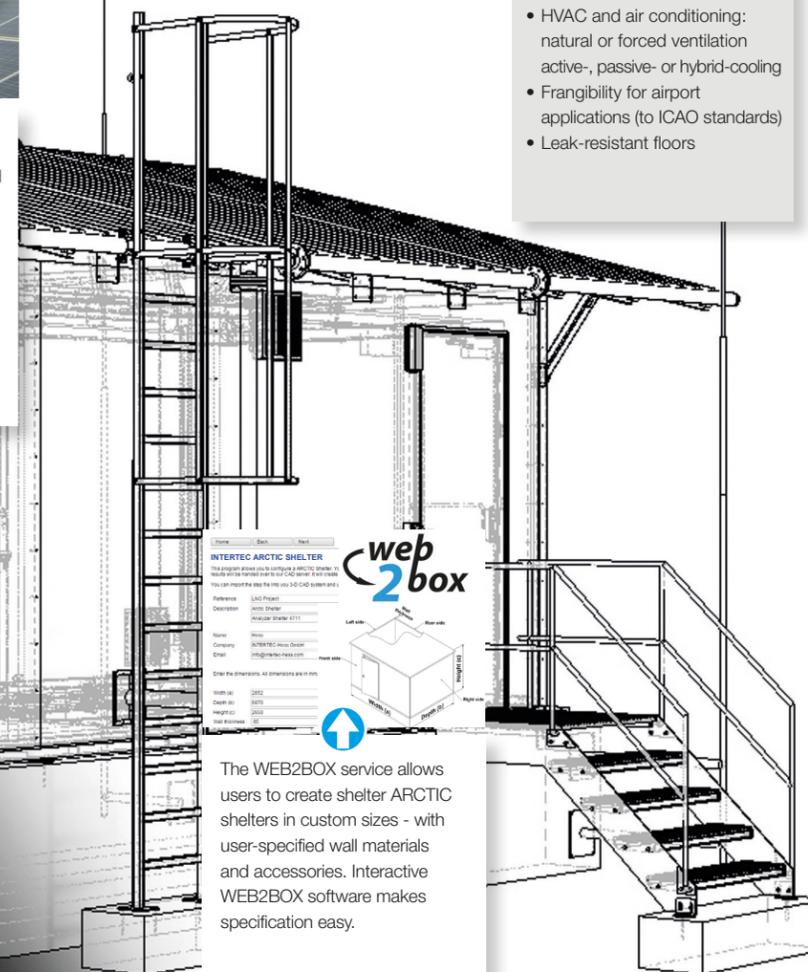
Customization possibilities are extensive - this shelter features separated compartments for electronics and 'wet' pumping equipment, as well as decorative cladding.



One of the largest passively-cooled shelters ever constructed - with a volume of 142 m<sup>3</sup> - for a Middle East pipeline project; 4 mm thick GRP sheets enclose 77 mm of insulating foam. The all-passive cooling shaves up to 20°C off peak daytime temperatures.



INTERTEC's turnkey service can greatly simplify projects - in this case an analyzer shelter for a Saudi Arabian plant was designed, manufactured and fully assembled at INTERTEC's factory - before shipping in one piece to the plant for rapid installation.



The WEB2BOX service allows users to create shelter ARCTIC shelters in custom sizes - with user-specified wall materials and accessories. Interactive WEB2BOX software makes specification easy.

# Heating solutions - for hazardous areas

Heaters are important for a large proportion of field instrumentation and electronic equipment enclosures, for freeze/corrosion protection, protecting against condensation, and temperature regulation. Many outdoor applications will require heaters because of the large variations in temperature that can be experienced, and because of humidity.

INTERTEC's broad selection of finned profile electric convection heaters, as well as many styles of conduction electric heaters - with block shapes to suit common process instrumentation applications, provides the means to closely match the heater to the application. Users can choose the most efficient heat transfer method, the best form factor, and the optimal mounting position and arrangement for any housing layout. There is also a wide choice of steam or glycol heating elements.

INTERTEC offers a complete range of temperature control options - from simple thermostats to digital PID controllers. Heaters with application-specific form factors are also available. Choices include conduction heaters designed to bring sample or gas cylinders up to operation temperature rapidly, a ready-engineered design for heating liquids or gases in hazardous areas, and dedicated heaters for modular analytical instrumentation substrates.



↑ This unique, ready-engineered fluid heater, uses conduction heat exchange to bring fluid samples up to precise controlled temperatures for analysis.



↑ Steam heaters are available in vertical, horizontal and panel mounting styles, and in convection or conduction forms.



↑ INTERTEC can offer advice on enclosure layout to optimize heater performance, or design a solution with optimal heat transfer, component layout and enclosure construction to suit the environmental conditions and instrumentation.

## Explosion-proof heaters

INTERTEC offers the most comprehensive selection of explosion-proof heaters for enclosures on the market today, backed by an exceptional range of approvals for different world regions including IECEx, ATEX, CSA C US, TR CU (formerly GOST) and PESO.

INTERTEC heaters are designed for system building flexibility. Heaters are qualified to multiple world standards, allowing one heater or enclosure configuration to be used worldwide - greatly reducing design, system building and maintenance costs. Heater operation has also been independently verified for extremely cold environments - down to -60°C rather than the normal -20°C. This makes it much simpler to design equipment for Arctic environments.

If simple protection against freezing is all that's required, INTERTEC offers heaters with a TS thermostat fitted into the power supply cable - a cost-effective standalone solution that needs no controller.

If temperature level needs to be accurate, and/or the heater needs to be continually switched on and off, contact thermostats are capable of regulating to approximately 2 degrees C, working more efficiently than sensing air temperature. Alarms can also be generated.



↑ INTERTEC produces several application-specific heaters such as this conduction heater for SP76 instrumentation substrates (mounted behind substrate).



↑ A broad selection of heater types and sizes including finned profile electric convection heaters, conduction electric heaters, steam heaters, allow optimum choices to be made for process instrumentation.



↑ GRP's excellent thermal characteristics and ability to be fabricated with embedded insulation makes it easy to incorporate highly efficient freeze protection or temperature control into housings.

Fully-sealed solid-state modules with sophisticated PID (proportional, integral, derivative) control, intrinsically safe sensor, and Modbus RTU networking capability provide precise regulation of temperatures.



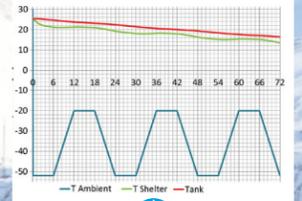
# Protecting instrumentation in Arctic climates

Thermal efficiency is a paramount consideration when choosing enclosures to protect equipment in Arctic locations. GRP's much higher thermal resistance than metal, and the ease of embedding thick high-performance insulation, means that housings can be configured easily to cope with the temperature extremes.

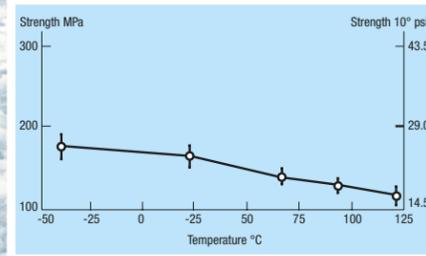
A key aspect of GRP's suitability for Arctic environments is the elimination of thermal 'short cuts' from interior to exterior - because of the embedded and uniform nature of the insulation, and purpose-made accessories to insulate connections. This ensures there are no 'cold spots' to start condensation, and simplifies the regulation of the internal operating environment. GRP materials also remain stable down to  $-100^{\circ}\text{C}$ , a temperature level that can change the properties of some other enclosure construction materials.

Heating the interiors of enclosures in Arctic regions is a further key challenge. INTERTEC greatly simplifies the design of enclosure solutions by verifying the performance of its explosion-proof heaters and controllers at ambient temperature of minus  $60^{\circ}\text{C}$ , in addition to qualifying them to worldwide standards.

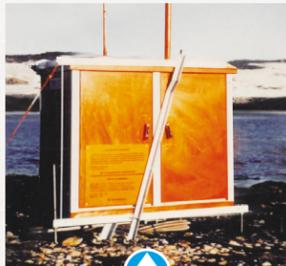
Melkoya LNG terminal (photo courtesy of The Linde Group).



For remote environments, INTERTEC can provide passive heating elements. Media - such as water - is kept at temperature while power is available. If power fails, it can maintain warmth for days. Fully passive heating solutions that exploit daytime sun/temperatures and protect equipment at night - are also possible.



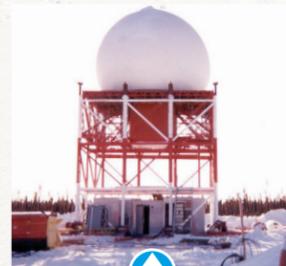
Unlike thermoplastics and metals, the strength and modulus of the GRP improves at very low temperatures.



INTERTEC has been making Arctic-grade enclosure solutions since 1984. The very first project provided a highly-insulated cabinet for a Greenland research station - with an integrated shovel to remove snow, and a polar bear shelter seat!



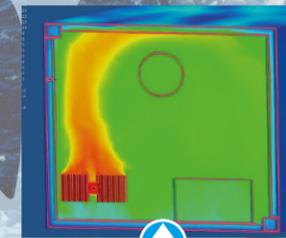
Highly insulated and heated enclosures allow explosion-proof equipment, rated for temperatures from  $-20$  to  $+40^{\circ}\text{C}$ , to be used in extremely cold environments - such as this design for a Siberian plant where the ambient temperature was below  $-50^{\circ}\text{C}$ .



The excellent thermal insulation of INTERTEC cabinets and shelters - plus custom sizes and shapes - provided optimized solutions for this remote radar tower.



For outside temperatures less than  $-20^{\circ}\text{C}$ , equipment that would normally be installed in the open often has to be protected with a highly insulated and heated enclosure.



INTERTEC's advanced insulation performance greatly reduces heat losses, and the cooling effects of wind, allowing much smaller heating elements to be used. This saves energy, and delivers a slow-changing and stable internal operating environment for equipment - with no 'cold spots'.



Enclosures are often one of the last things to be thought about. INTERTEC's processes will ensure the optimal solution - even if that means special shapes, openings etc. 'Normal' Ex-certified equipment has an ambient temperature range of  $-20$  to  $+40^{\circ}\text{C}$ . If temperatures are not mentioned on the type certificate, INTERTEC can produce enclosures to allow it to be used anywhere: down to  $-60^{\circ}\text{C}$  (or  $+80^{\circ}\text{C}$ ) ambient temperatures.

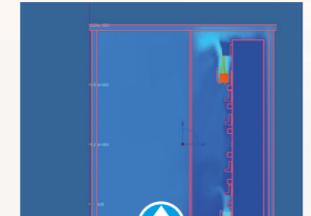


The superb thermal insulation properties of layered composite GRP makes it easy to design 'hot boxes' - to maintain elevated temperatures and prevent condensation or crystallization. INTERTEC can deliver optimized solutions with the right insulation, best form of heat transfer, equipment layout and control algorithm to ensure accurate, reliable performance.

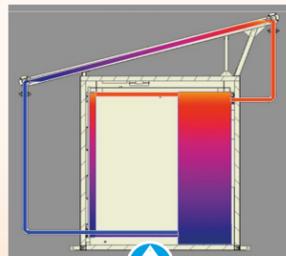
# Project-enabling solutions for hot and harsh environments

Regions with extremely hot climates often pose severe environmental protection challenges, which can increase project costs dramatically. The most significant of these is usually cooling. The problem is often made worse by remote locations, and lack of a reliable power supply.

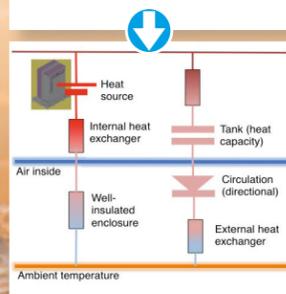
INTERTEC has pioneered specialized techniques that can be applied singly or in combination to meet such challenges. In addition to cooling via conventional air conditioning, INTERTEC offers innovative passive cooling technologies that can operate either without power, or with only tiny amounts of electricity from small solar power installations. This eliminates fan cooling - which can be problematic in regions prone to dust/sand storms. These technologies are helping to make many of today's most innovative projects possible, from desert locations and arid climates such as the Middle East, to difficult offshore applications in equatorial regions. Of course, such environments also pose other protection challenges, such as very high levels of UV, abrasion from dust, and high humidity. INTERTEC's composite-GRP construction possibilities meet these challenges with ease.



INTERTEC's advanced design capability - and library of field-proven passively cooled cabinet/shelter designs - can quickly quantify the performance and cost savings of proposed protection solutions.



Thermal siphoning of water through external and internal heat exchangers makes passive cooling possible.



## Passive cooling extends potential to many regions

Traditionally, passive cooling technology has been restricted to arid regions. INTERTEC's technology extends its potential to other parts of the world. Usually, water is used as the media to store and release differences in day/night temperatures to reduce shelter temperatures. In addition, INTERTEC can supply 'hybrid passive' cooling systems which employ technologies such as solar-powered micro pumps or chilled water, to enhance cooling performance - techniques which extend the applications potential to equatorial regions.

Composite-GRP cabinets on the world's largest offshore vessel employ passive cooling to cool without explosion-proof air conditioning. They can also withstand tropical cyclones, and resist corrosion caused by the saline environment and sour or acid gas.



INTERTEC has developed purpose-designed air conditioning systems for hazardous areas. Unlike conventional compact systems, there is no air flow interface between conditioned and unconditioned sections, so that it can be integrated in a housing that is explosion protected by pressurization.



HVAC units provide heating/cooling and ventilation to make hazardous area shelter interiors safe.



Sunshades provide a high degree of protection at very low cost, and offer all the environmental protection required in some applications. INTERTEC's broad range - and custom options - ensures optimal solutions.



This passively cooled shelter for the Middle East reduces interior temperatures by some 20°C - to enable instrumentation to operate in a remote location.



Passively-cooled cabinets can be combined with a water chiller to create a hybrid cooling system and extend the range of the technology from arid regions to many other parts of the world.



Advanced insulation is a key aspect of these shelters for the instrumentation/SCADA stations on a Middle East water pipeline, allowing totally passive cooling to limit the extremes of day and night temperatures.

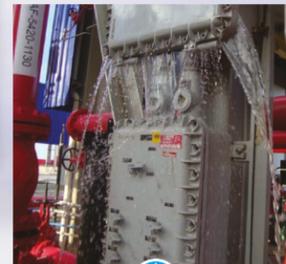
# Upstream - offshore platforms and plants

Offshore installations are perhaps the most difficult environment for field enclosures today. Among many challenges that must be overcome are the enormous threat of corrosion, a need for lightweight equipment, and the requirement for very long lifecycles with minimal maintenance - as labour costs can be immense. Many hazardous area applications may also require additional characteristics including fire resistance and blast protection.

Enclosure material is the most crucial decision. Traditional metal enclosures, even stainless steel types, can be susceptible to the accelerated corrosion mechanisms found offshore. By contrast, GRP offers exceptional resistance - it does not rust or degrade in any meaningful way, allowing maintenance-free lifecycles of 30 years or more. Another benefit is the thick protective surface gelcoats that can be applied. INTERTEC has documented examples of enclosures and cabinets that have survived over periods of 30-40 years in petrochemical environments - with local atmospheres containing corrosive chemicals such as sulphuric acid.



Composite-GRP cabinets for the world's largest offshore vessel employ passive cooling - eliminating the need for explosion-proof air conditioning. The cabinets can also withstand tropical cyclones, and resist corrosion caused by the saline environment and sour or acid gas.



Traditional metal Ex d enclosures can be prone to moisture build-up and corrosion. Alternative Ex e and Ex p enclosures are easily made in GRP - materials that can radically improve corrosion resistance and reliability.



GRP allows housing structures to be strengthened easily to absorb blast pressure waves - with minimal additional weight - by varying composite characteristics.



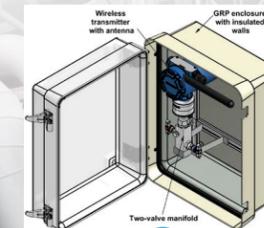
A GRP fitness/changing room retrofit for an offshore platform - which is almost four times lighter than stainless steel. INTERTEC's process allows such structures to be made in unusual shapes to avoid pipes, beams, etc.

# Downstream - petrochemical/chemical plants

Protecting field equipment at refineries and gas plants is a serious challenge. Much of the media - such as sour crude and acid gas - is corrosive. Coastal locations can increase the problem because of exposure to chlorine and harsh weather. In addition, reliability and durability is typically critical. Plants are highly automated and failure of an instrument or housing can have serious economic or safety consequences.

GRP offers exceptional resistance to corrosion - it does not rust or degrade in any meaningful way. It is immune to the corrosive effects of most petrochemical media. Advanced insulation - combined with composite adaptations - mean that INTERTEC enclosures providing stable internal environments to ensure reliable operation, with protection optimized for specific locations. Other special needs, such as blast proofing or fire resistance, can be handled by further adaptation.

For many enclosures there are additional requirements. Shelters where personnel regularly visit may need to be able to survive a blast. Elements of the emergency shutdown system - such as remotely-actuated valves - may need to be protected against fire.



GRP structures provide benign environments for wireless-enabled instruments - extending applications potential in highly automated processing plants. They allow antennas to remain inside the enclosure.



Analyzers are critical to oil and gas plants - and many new forms of smaller and online analyzers are being installed - often in inaccessible areas. Custom enclosures simplify such applications. This small-footprint and light 'hot box' maintains 140°C and was designed for easy retrofit on a process column.



Unique composite GRP construction techniques allow INTERTEC to make lightweight shelters meeting stringent fire protection and safety requirements for offshore (or onshore) facilities - including EN 13 501-2 REI 120, UL1709 H90/H120 BS476, DIN 4102 F120. Fire resistant ceramic inner cores (below) can maintain internal temperatures below 60°C for up to 2 hours - even in hydrocarbon fires.



Compact field enclosure with three separate analyzers and sample conditioning (from Astute).



A special gas-tight shelter for a toxic gas plant.



# Extending lifecycles of utility and transportation equipment

Weather is becoming more extreme and unpredictable, and in many regions this is leading to significant change over the annual cycle - in terms of increased rain, snow, wind, extremes of temperature, etc. INTERTEC's long experience in processing applications - and the enormous challenges this industry continually faces as it extends operations into more remote areas - has led to innovative solutions for long-lifecycle field protection. This technology offers innovative alternatives to the traditional outdoor enclosure materials and construction techniques used by many national utility services and organizations providing road, rail and air transportation.

## Adaptable material for different challenges

The intrinsic adaptability of INTERTEC's composite-GRP material allows it to optimize the protection of any enclosure to meet specific individual or multiple environmental challenges. Advanced insulation performance is critical to almost every application scenario, whether the housing must protect against very low or high temperatures. The lack of thermal short cuts in INTERTEC's housings, and the ability to customize the level of insulation - of any housing size from small enclosures to cabinets or shelters - provides a major advantage.

Another key aspect for utility applications is INTERTEC's ability to produce cabinets and shelters with compartments providing differing levels of protection for different sorts of equipment - from temperature regulated areas for computer equipment to compartments that might house water or hydraulic equipment.

## Gas, electricity, telecommunications



Lightweight cabinets and shelters for mobile communication sites, simplifying transportation to remote or difficult locations, such as by helicopter to building rooftop installations.



Equipment shelter above a gas cavern storage facility.



## Roads, railways, airports



Sandwich construction with thick foam insulation provides stable operating environments for these above-ground metro equipment cabinets.



GRP cabinets for high current switches feature a metal-free exterior surface to eliminate eddy current losses.



Roadside cabinets for tram and street lighting control equipment.

## Water industry



Sandwich construction cabinets with thick embedded insulation minimize heat losses - requiring only a small heater to protect against freezing.



Multi-compartment cabinet houses the electronics and hydraulic systems controlling a waterway lock. Decorative cladding makes the structure an attractive asset to support leisure use.



Extreme insulation and passive cooling allow this pump control and instrumentation shelter on a desalinated seawater pipeline network to operate by solar power alone. GRP with gelcoat surface provides durability for the harsh Middle East coastal location with chlorine, UV and dust/sand.

GRP cabinets using special construction principles to provide frangibility for equipment situated close to runways. 100% metal free construction additionally eliminates the danger of sparks on a collision and minimizes interference with radar/radio. GRP is also extremely light and fire retardant.



GRP cabinets for this tunnel's control equipment are optimized for long life in a humid and corrosive environment, and are fabricated using a low smoke producing resin.



Protected operating conditions

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