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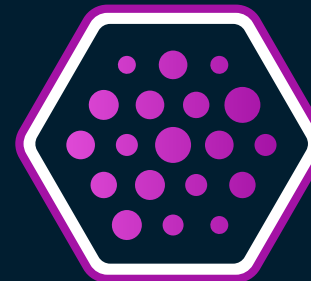
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CLEANROOM SOLUTIONS

ENQUIRY FORM

Name: _____ Company: _____ Position: _____
 Location: _____ Telephone: _____ Email address: _____

Installation address			
How did you hear about us?	Google: <input type="checkbox"/> Bing: <input type="checkbox"/> Email: <input type="checkbox"/> Word of mouth: <input type="checkbox"/> Facebook: <input type="checkbox"/> Twitter: <input type="checkbox"/> LinkedIn: <input type="checkbox"/> Magazine advert: <input type="checkbox"/> Event or exhibition: <input type="checkbox"/> Business directory: <input type="checkbox"/> Other: <input type="checkbox"/>		
Function	Cleanroom: <input type="checkbox"/> Laboratory: <input type="checkbox"/> Biosafety Lab: <input type="checkbox"/> Containment Suite: <input type="checkbox"/>		
Classification	ISO8: <input type="checkbox"/> ISO7: <input type="checkbox"/> ISO6: <input type="checkbox"/> ISO5: <input type="checkbox"/> Level One: <input type="checkbox"/> Level Two: <input type="checkbox"/> Level Three: <input type="checkbox"/> CNC (Unclassified): <input type="checkbox"/>		
External cleanroom dimensions	Length:	Width:	Height:
Personnel airlock (PAL)	Length:	Width:	Height:
Materials airlock (MAL)	N/A:	Length:	Width: Height:
Internal rooms (quantity)	<input type="text"/> rooms		
Panel system	Fully Flush: <input type="checkbox"/> Semi Flush: <input type="checkbox"/>		
Doors (quantity)	Rapid Roll: <input type="checkbox"/> Single Doors: <input type="checkbox"/> Double Doors: <input type="checkbox"/>		
Windows (quantity)	900 x 900mm: <input type="checkbox"/> 1500 x 900mm: <input type="checkbox"/>		
Flooring	N/A: <input type="checkbox"/> Vinyl: <input type="checkbox"/> ESD Vinyl: <input type="checkbox"/> Resin: <input type="checkbox"/>		
Temperature control	No: <input type="checkbox"/> Yes: <input type="checkbox"/> °C +/- °C		
Humidity control	No: <input type="checkbox"/> Yes: <input type="checkbox"/> °C +/- °C		
Heatload	Max Occupancy:	operators	Equipment: kW
Lighting	500 Lux: <input type="checkbox"/> 750 Lux: <input type="checkbox"/> 1000 Lux: <input type="checkbox"/> 1250 Lux: <input type="checkbox"/>		
13-amp sockets (quantity)	Flush mounted: <input type="checkbox"/> Three-compartment trunking mounted: <input type="checkbox"/>		
CAT6a data sockets (quantity)	Flush mounted: <input type="checkbox"/> Three-compartment trunking mounted: <input type="checkbox"/>		
3-phase power (quantity)	N/A: <input type="checkbox"/> 16-Amp: <input type="checkbox"/> 32-Amp: <input type="checkbox"/> 63-Amp: <input type="checkbox"/>		
Other mechanical requirements	Compressed Air: <input type="checkbox"/> Extraction: <input type="checkbox"/> Process Gases: <input type="checkbox"/> Central Vacuum: <input type="checkbox"/> Drainage: <input type="checkbox"/> Purified Water: <input type="checkbox"/> Town's Water Supply: <input type="checkbox"/>		
Environmental monitoring	Analogue - Pressure Only: <input type="checkbox"/> Digital - Temperature, Humidity & Pressure: <input type="checkbox"/> Full Environmental Monitoring System - With Sensors & Software: <input type="checkbox"/>		
Furniture (quantity)	Stepover Bench: <input type="checkbox"/> Trespa Work Bench: <input type="checkbox"/> Ergonomic Chairs: <input type="checkbox"/> Storage Cabinet: <input type="checkbox"/> Sink: <input type="checkbox"/> Garment Rail: <input type="checkbox"/> Coat Hooks: <input type="checkbox"/> Bin: <input type="checkbox"/>		
Equipment (quantity)	Laminar Flow Unit: <input type="checkbox"/> Biosafety Cabinet: <input type="checkbox"/> Transfer Hatch: <input type="checkbox"/> Trolley Hatch: <input type="checkbox"/> Autoclave: <input type="checkbox"/>		

CLICK HERE to download your Microsoft Excel enquiry form

Please email your completed enquiry form to sales@guardtech.com



-  BESPOKE DESIGN
-  RAPID TURNAROUND
-  FULLY VALIDATED TO ISO 16444-3



Cleanroom
solutions

TURNKEY CONSTRUCTION

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video content

THE GUARDTECH GROUP'S turnkey design & construction specialists Cleanroom Solutions are providers of bespoke controlled environments for large-scale manufacturing applications.

Installing expansive cleanrooms that balance the operational requirement for volume production with the compliance demands of high-specification controlled environments, Cleanroom Solutions have a legacy of delivering high-performance facilities for clients in a wide range of industries, including:

- Universities and R&D
- Pharmaceutical and Biotech
- Healthcare and Hospitals
- Aerospace and Automotive
- Semiconductor and Micro-electronics
- Optics and Microscopy
- Medical Device and Diagnostics
- Food and Cosmetics

Cleanroom Solutions is founded on the principles of detailed technical consultation; deeply understanding client requirement and challenges whilst presenting a range of options from best practice to value-engineered solutions.

A complete turnkey approach to delivery, with tight project management, detailed design and comprehensive documentation ensures that clients feel well supported, valued and empowered to construct facilities that will meet the demands of their process and stand the test of time. A truly collaborative experience which results in a mutually beneficial long-term partnership.



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- Enquiry form
- Design: Consultation, Laser Scan & Survey
- Design: RIBA Framework, 2D & 3D modelling
- Design: BIM, CFD, Documentation
- Project Management, CDM
- Materials: Structural
- Materials: Mechanical
- Materials: Electrical
- Install & Commissioning Services
- Case Studies



CONSULTATION

DURING an initial consultation with Cleanroom Solutions, you will be dealing with dedicated industry professionals who pride themselves on listening, understanding and unearthing your exact needs and requirements, prior to advising on and recommending a solution, or more commonly a variety of solutions.

Whether you have a fully developed brief, a URS (User Requirement Specification) or just a broad idea of what you need to achieve and the space available to you, Cleanroom Solutions support you to derive the best value solution for your application; balancing specification with budget whilst considering the restrictions imposed by the host building.

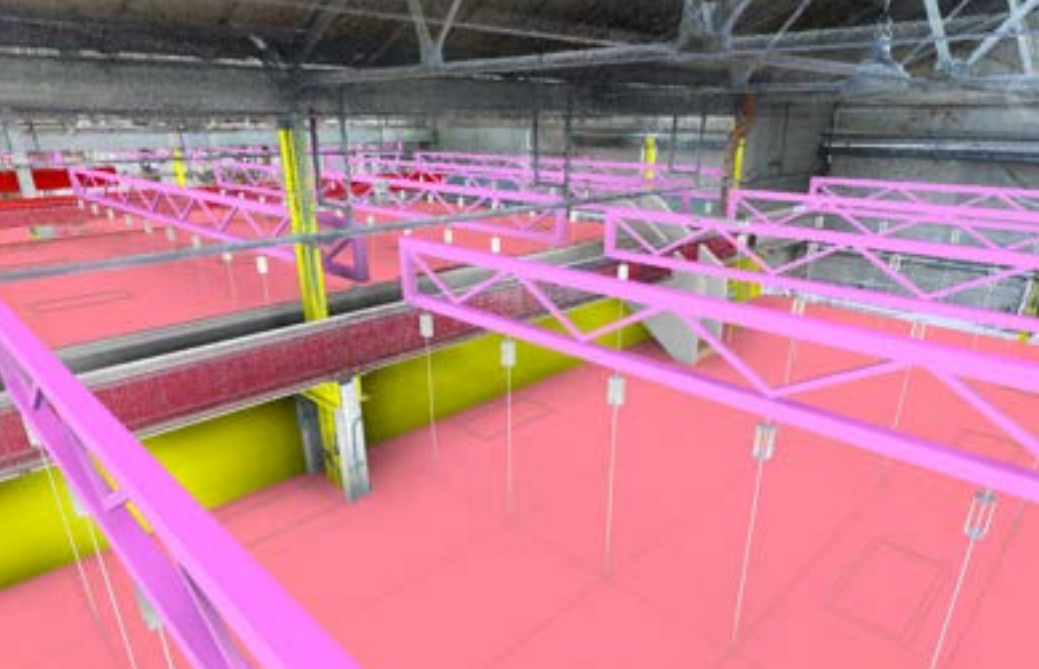
A comprehensive and in-depth needs analysis is initially conducted to determine the most appropriate process flow, classification and configuration of room layout. Understanding your process requirements, including equipment and supporting utilities is an essential part of the concept design process and early identification will ensure that the most appropriate choices are made.

Determining room performance specification is a vital part of consultation and balancing the needs of process, product and operators is a critical starting point, whilst considering ongoing running costs, maintenance and redundancy also form part of the assessment.

Cleanroom Solutions will support in the specifying, design and installation of all plant and process utilities, such as extraction, process gases, compressed air, drainage, purified water, vacuum and plumbing and can even supply all bespoke specialist furniture to facilitate a complete turnkey experience.

Understanding the future needs of the business and development plans will also factor into the conversation and influence the methodology of construction. Building Control, CDM and Fire Strategy are all important parts of consultation, and at the heart of all decision making will be compliance and adherence to ISO14644 and in some cases EU cGMP guidelines.

Following consultation, concept drawings will be produced with a fully detailed proposal for review and discussion.



LASER SCAN & SURVEY

CLEANROOM SOLUTIONS have embraced the next level of design technology by incorporating 3D laser scanning into the beginning of their process as a detailed room information data capture.

Using cutting-edge technology from industry leaders Leica, a full 680,000-point-per-second scan with spherical images can be captured within 20 seconds, incorporating a maximum scan distance of 60 metres at an accuracy of 4mm tolerance.

Entire facilities can be transferred into an accurate 3D model from a site survey that can be completed in as little as one hour.

The information that this provides is invaluable to the design process and enables for full clash detection to be initiated whilst always considering the exact confines and restrictions of the host building.

This detailed scan identifies issues far earlier in the process, prior to manufacturing of components or attendance on-site. The benefits to the client are cost assurance and time-frame confidence, as challenges are encountered and overcome at the design stage rather than disrupting construction.





RIBA FRAMEWORK

THE RIBA Plan of Work was initiated in 1963 to provide a framework for architects to use on projects with their clients, bringing greater clarity to the different stages of a project.

Cleanroom Solutions have developed their own framework that closely mirrors the stages of RIBA, as many of their construction projects will interface with commercial architects, M&E designers and main contractors.

This document outlines expected deliverables in line with the main construction project and provides a common language for this area of specialist subcontractor works.

Each individual stage details the exact design outputs that will be produced and the expected drawings or models, calculations and documents provided.

As the design progresses through each stage of development, the complexity becomes greater and the clarity of information improves, resulting in a final design pack that has identified and resolved clashes and facilitates an effective installation.

The Cleanroom Solutions RIBA Plan of Work includes the following:

0 – Strategic Definition

Client-provided drawings, URS, equipment & utilities register, process flow, enquiry checklist

1 – Preparation & Briefing

Concept layout sketch, area calculations, performance criteria, host building information

2 – Concept Design

Developed general arrangement – structural, mechanical, electrical, room data sheets

3 – Spatial Co-ordination

Dimensioned drawing pack with developed master specification and site plan

4 – Technical Design

Full 2D issued drawings for each specific area of construction, registers, calculations, schematics

5 – Manufacturing & Construction

Signed off approved drawings for installation

6 – Handover

O&M's, commissioning documentation reports

2D & 3D MODELLING

CLEANROOM SOLUTIONS' in-house Design team consists of specialist 2D (AutoCAD) and 3D (SolidWorks) Engineers; led by Directors with more than 100 years' combined experience in the sector, their comprehensive design offering includes:

- General arrangement layouts; structural, mechanical & electrical
- Process flow diagrams
- Elevations and sectional drawings
- HVAC P&ID, ductwork schematics, lighting layouts and wiring diagrams
- Pressure cascade diagrams
- Furniture & equipment layouts
- 3D models and animations
- Virtual reality facility walk-throughs

The Level of Design (LoD) and the software in which the design is developed will depend on the complexity of the detail required to inform the design in accordance with the budget allocated. LoD may also progress alongside the development of the project to deliver further clarity at future stages.

Panel Layout: All components fully dimensioned. Individual wall panels, glazing, single, double and rapid rise doors, return air columns and vents, wall-to-wall coving (if being used). Panel elevations included.

Ceiling Layout: Ceiling panels or grid, including points of suspension, LED lights, HEPA filters, smokeheads, CCTV cameras.

HVAC Layout: AHU(s), CRAC Unit(s), Fan Coil Unit(s) and/or Fan Filter Units detailed. Supply and return air ductwork in different colours with diameters shown, including heater batteries, VCDs and cleaning hatches. Filter size and positions, DOP ports and diffuser types outlined. Exhaust vents identified and dimensioned, power supplies shown for HVAC plant.

Electrical Layout: Distribution boards positioned, numbered and sized, 13-amp, 3-Ph and CAT6 sockets positioned, numbered and sized, containment runs identified, circuit logic detailed.

Lighting Layout: LEDs numbered relating to the lighting schedule in the MRS, Klik boxes positioned, wiring between LED and Kliks shown, emergency lights identified, PIR or switches shown.

Mechanical Layout: Compressed air, process gases, extraction, vacuum, purified water, town's water, drainage. All pipework runs displayed with diameters, termination points detailed including fitting type and size. Plant identified and dimensioned.

Furniture & Equipment Layout: Process equipment identified and dimensioned. Changing room furniture and transfer equipment, workbenches and furniture.

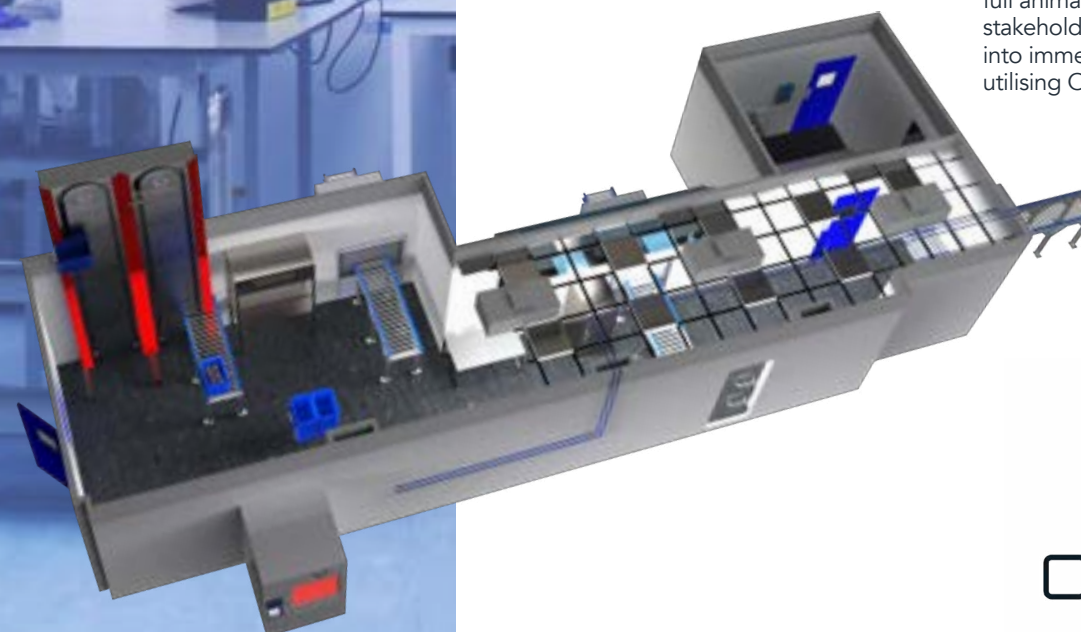
Flow Layout: Pressures in each room, flow (personnel, material, air, equipment), supply volume at each supply grille, exhaust volume at each return air grille.

Door Layout: Singles, doubles, rapid rise doors, emergency break-through panels, interlock logic, control panels or buttons for automatic openers, emergency break glasses and traffic light indicators shown.

Mezzanine Layout: Supporting steelwork columns, mezzanine deck layout, staircases, pallet gates, edge protection, fire boarding.

3D Models: Provide a detailed and spatially aware render of the facility, they can be particularly helpful when designing tight void spaces, plotting process equipment and illuminating abstract concepts such as plenum designs and complex utility integrations. These can be converted into full animation videos that can be used for stakeholder engagement and developed into immersive virtual reality experiences utilising Oculus VR headsets.

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BIM: BUILDING INFORMATION MODELLING

THE CLEANROOM SOLUTIONS team are heavily invested in introducing exciting new technology to support client outcomes with the most expansive design process possible.

This led to the recent investment and incorporation of Revit – a digital platform for Building Information Modelling (BIM), in which the building is a live element which contains intelligent information.

BIM lies on a database and therefore shouldn't be conceived as a simple 3D visualisation tool. From a single model, infinite numbers of sections, plans, elevations, 3D views, schedules and material lists can be extracted.

Any revision is reflected simultaneously to all the extracted data representations. This connection is bidirectional, which means any revision made on plan, view or schedule is directly reflected to the database. It leads to full automation while removing

the need for manual updates – which is the most time consuming operation of the traditional design and construction works.

Working alongside main contractors, BIM modelling provides a fast, effective and robust tool for managing multi-contractor projects, avoiding conflicts through clash detection of confederated models.

BIM also supports highly accurate Bill Of Materials (BOM) compilation, ensuring accuracy with on-site provisions and components, reducing waste and increasing productivity.

CFD: AIRFLOW SIMULATION

COMPUTATIONAL FLUID DYNAMICS (CFD) enables airflow within controlled environments to be simulated during the design phase, providing visualisation, insight and guidance into:

- Optimised airflow configuration, reducing dead spots and increasing uniformity and coverage
- Temperature and humidity mapping throughout the space, relating to heat sources within the room and their relation with conditioned supply air

- Reducing energy consumption by evaluating air changes required per hour
- Supply diffuser and exhaust vent positions
- Appropriate sensor positioning
- Comparative flow distribution for smoke test validation and room recovery testing

Air flow modelling acts as a virtual smoke test, enabling multiple configurations to be simulated, reducing costs and time whilst providing the most efficient design possible.

DOCUMENTATION

DETAILED and comprehensive documentation is produced to aid the design process and support cGMP compliance.

This information is compiled in response to the client brief and provides a contractual framework, a fully developed scope of works and a defined performance specification.

Master Room Specification: Excel documentation that captures specific parameters pertaining to the design – such as room data sheets, equipment and utilities register, schedules for panels, doors, glazing, furniture & equipment.

Functional Design Specification: Outline of the design concept for all structural, mechanical and electrical systems, a guide

to all material specifications selected for key components, with full list of appendices containing data sheets and performance data.

Design Qualification (DQ): For all cGMP projects a full design qualification can be produced in response to the URS outlining compliance to the brief whilst initiating a framework for the later commissioning stages of Installation Qualification (IQ) and Operational Qualification (OQ).

Stakeholder engagement is key to the success of the documentation phase, setting expectations early and involving the appropriate people from initiation ensures a smooth process and a project file that meets the needs of the business from a compliance and audit perspective.



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PROJECT MANAGEMENT

EACH AND EVERY Cleanroom Solutions project is assigned a dedicated Project Manager, skilled at transferring the fully worked up design into a complete project plan and schedule.

The Project Manager will be assigned after client Purchase Order placement. A comprehensive project handover meeting will take place with the Commercial Department to ensure that the full brief and scope of works are adequately outlined and understood by all internal project stakeholders.

The PM will co-ordinate the detailed design process to ensure approvals are in place before proceeding to project initiation, planning, purchasing and implementation; communicating with the client at all stages.

Co-ordinating all aspects of the project, from design to installation, commissioning to validation, supported by the Guardtech's Group Operations team, Cleanroom Solutions' Project Managers provide on-site presence and client co-ordination to assure your schedules are being met.

Cleanroom Solutions Project Management packages include:

- Weekly Programme Meetings and Project Reports including progress photos
- CDM & Building Control co-ordination
- Design process management
- Supervision and management of installation and commissioning resource
- Responsibility for site Health & Safety – including compilation of H&S Construction Plan
- RAMS provided for all significant activities

CDM: CONSTRUCTION, DESIGN & MANAGEMENT REGULATIONS

THE CONSTRUCTION (Design & Management) Regulations (CDM 2015) are the main set of regulations for managing the health, safety and welfare of construction projects.

CDM applies to all construction work and includes new-build controlled environments, as well as demolition, refurbishment, extensions, conversions, repair and maintenance of cleanrooms and laboratories.

The Construction Industry Training Board (CITB) has produced the industry guidance written by industry volunteers appointed via the Construction Industry Advisory Committee (CONIAC).

CDM aims to improve health and safety in the industry by helping construction companies like Cleanroom Solutions sensibly plan our work so the risks involved are managed from start to finish.

CDM ensure Cleanroom Solutions:

- Have the right people for the right job at the right time
- Co-operate and co-ordinate our work with other parties involved in the project
- Have the right information about the risks and how they are being managed
- Communicate this information effectively to those who need to know
- Consult and engage with workers about the risks and how they are being managed.

CDM is an inclusive duty-of-care process involving the client, Principal Designer and the Principal Contractor, as well as all Sub-Contractors and Operatives associated with the project.

Principal Designers and Contractors

It is the clients' duty to appoint a Principal Designer and Contractor – and it is advisable that the client appoints the Principal Designer role to protect both them and Cleanroom Solutions; to act as an intermediary between both parties.

The Principal Contractor (in most cases, Cleanroom Solutions) plan, manage and monitor throughout the process – the Principal Designers work to reduce risk, inform others and eliminate hazards.

The Principal Designer produces the PCI (Pre-Construction Information), which then allows Cleanroom Solutions, as Principal Contractor, to produce a Construction Phase Plan.

Co-ordination and communication between the Principal Contractor and Principal Designer is critical throughout the process. Cleanroom Solutions provide O&M (Operations and Maintenance) information to the Principal Designer who then compile a Health & Safety file for the client on completion of the project.



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DOORS

Cleanroom Solutions offer a comprehensive choice of cleanroom-grade doors to meet the needs of any application. From powder-coated steel or GRP single or double doors to motion sensor-activated rapid rise doors, all of the options in the range can be electronically interlocked and offer tight control against leakage and ingress/contamination.



RETURN AIR

The return air path is factored in to structural components, either via bespoke panels with hollowed channels to accommodate sufficient airflow or as columns produced from the same materials used for wall construction. These columns can also be used as service chases to conceal process and plant utilities.



GLAZING

Fully flush or semi flush glazing options available. A range of sizes from standard viewing panels to full height gallery windows. Fish tank glazing is also available in the Cleanroom Solutions range.



WALLS

Composite panel construction with different thicknesses and types of insulation, panel faces manufactured from powder-coated steel varying in coating application, dependent on chemical and scratch resistance required. Semi flush and fully flush systems available, wall-to-wall and wall-to-ceiling coving as standard.



GRADING SYSTEM

Cleanroom Solutions are focused on providing the best value solution for every project. To support this aim a grading system has been developed for each major component of construction. Rather than adopting a quality level across the board, a combination can be applied to ensure the correct level of material specification matches the application, industry, process and client. Important factors when designing this blend are: quality level, timeframe, budget and regulatory requirements.



● Elite level of components, adopting industry best practice, highest performance, usually combined with most significant cost.
Applications: Grade B Pharmaceuticals



● High-quality components offering a comparable level of performance to GT Max with specification compromises.
Applications: Semiconductor, Aerospace



● Mid-range product offering specifically suited for laboratory and biosafety applications and lower grade cleanrooms.
Applications: Medical Device, Diagnostics



● Entry-level components – ideal for applications where control requirements are less stringent and budget is the determining factor.
Applications: Automotive



● A range of components specifically designed to facilitate fire rating and fire safety systems.
Applications: Various



STRUCTURAL

CEILING

Depending on the level of control your operation needs, Cleanroom Solutions have every base covered, starting with ceiling grid & tile grid systems before moving into more robust alternatives including panelled ceilings and heavy-duty walk-on aluminium nodal grid layouts.



FLOORING

Cleanroom Solutions builds cater for all your flooring needs, beginning with homogeneous vinyl reinforced with cross-linked polyurethane that is UV-cured and features hot-welded joints, coved 100mm up the wall over underlay former and capped. Copper-grounded anti-static ESD vinyl is also available. Alternatively, a flexible epoxy resin or urethane floor screed can provide protection for more heavy-duty environments or clients can opt for raised access flooring – in the form of solid, grating or perforated panels.



ANCILLARIES



Mezzanine Floor

To optimise your available space and support the cleanroom structure, we offer full mezzanine design and installation, including edge protection, staircases and cat ladders.



Supporting Steelwork

For applications where the host building cannot be used to support the cleanroom structure, steelwork erections may be necessary – these can also be used to facilitate plant gantries and maintenance access.



Fire & ATEX Ratings

We are able to offer fire rated and ATEX rated components for all structural, electrical and mechanical parts of the build. These ratings are often dependant on review from insurers or building control.



AIR HANDLING UNITS (AHUs)

The heart of any controlled environment is its ventilation system.

Bespoke air handling units (AHUs) provide a central point for air supply and distribution ducted to terminal H14 HEPA filters.

In addition to powering the filtration system, heating and cooling can be provided by alternative utilities such as direct expansion (DX), chilled water (CHW) and low pressure hot water (LPHW).

Ancillary components to be considered within the

air management system include trim heaters, volume control dampers, flow switches, fire dampers, insulation and pressure release valves.

Determining temperature and relative humidity are the deciding factor in not only plant selection but also controls philosophy, which may also include consideration for integration with a Building Management System (BMS).

Full psychometric charts and coil condition date is produced when determining the AHU and associated componentry.



FILTRATION

For ISO 14644 compliant environments, H14 HEPA filtration is required. This can be delivered via terminal filters connected to air handling units (AHUs) via ductwork or as individual Fan Filter Unit (FFU) modules directly ducted or drawing supply air from a shared plenum. HEPA filtration can also be placed on the exhaust via plenum boxes or specialist safe change units to facilitate containment or eliminate cross contamination.



PURIFIED WATER

For volume manufacturing of Pharmaceuticals and Semiconductor products, purified water is often required. We can install a variety of systems for process integration, including all plant, distribution systems, pipework and fixtures and fittings. Ranging from low grade DI water systems with localised distribution all the way through to US Pharmacopoeia compliant closed loop 316L stainless steel FWI systems.



EXTRACTION

Fumes such as solvents and acids, particulate – such as powders and fibres – and heat can all be directly extracted at source from the controlled environment. Extraction ductwork material is selected based on the characteristics of the by-product extracted, powered through fans and exhausted at a high level, in some cases via filtration media such as HEPA, ULPA or carbon. Alternatively, extract can be filtered via scrubbers and returned to the supply air stream.



MECHANICAL

UPFLOW UNITS

A popular alternative means of providing air conditioning to controlled environments is by using smaller package upflow/downflow units either directly ducted to Fan Filter Units (FFUs) or ducted to a plenum where FFUs draw a common supply.

This solution is highly efficient and provides a great level of redundancy as well as facilitating operation during maintenance. Typically used in applications where relative humidity demands are not as tightly controlled, these standardised units can be available ex-stock which make them an attractive solution for quick turnaround projects.



VACUUM

House vacuum for cleaning activities can be provided via a centralised vacuum system. This enables a number of rooms to have a wall-mounted connection to a central pump that is housed externally to the controlled environment with filtered exhaust. Vacuum pumps and pipework can also be provided for process applications.



FAN COIL UNITS

For smaller applications or support areas where humidity control is not required a cost effective and energy efficient solution can be provided via appropriately sized fan coil units. These can be ducted to Fan Filter Units (FFUs) or simply to diffusers in unclassified areas.



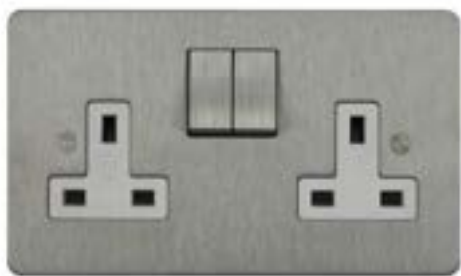
PROCESSED GAS DISTRIBUTION

Highly filtered compressed air can be provided with compressors, filtration, transair pipework and a range of fittings for process requirements. In addition, a vast range of gasses, either from cylinder or generator, can be integrated into the facility design with appropriate pipework, valves and manual or digital control systems with appropriate alarms where required.



WATER SUPPLY & DRAINAGE

Hot and cold water supply can be installed to handwash and utility sinks as well as process equipment that may have a demand. Drainage can be accommodated either via pump or gulleys – for Pharmaceutical applications 316 stainless steel drainage and traps can be provided.



SMALL POWER

Cleanroom Solutions are an NIC EIC accredited electrical contractor and conduct full electrical installations for all cleanroom plant, as well as providing power sockets for client equipment. Containment can be implemented simply with cleanroom compatible antimicrobial three-compartment trunking or with smarter integrated solutions such as concealed service channels and flush sockets.



CONTROL PANEL

Touchscreen HMI provides the interface for the controls and monitoring systems for your cleanroom. The EMS feeds back to give real-time data on temperature, humidity and pressure. The BMS can link back data concerning the operational status of all plant, including fan speeds, coil condition, run data and other connected utilities.



LIGHTING

Powder-coated steel light units, flush mounted into the ceiling panels with drop-down hinged diffuser. Also available as surface-mounted aluminium LED batten luminaires for laboratories. Activation by switch or PIR (passive infrared) sensor. Lights can be UV filtered for photo-sensitive processes.



NETWORK

CAT6, 6A or 6E data outlets flush mounted or installed within trunking, cabled back to network patch panel for client connection to host building server. Can also be incorporated into the EMS and BMS.



3-PHASE POWER

Often highly technical client process equipment requires a three-phase power supply, 16A, 32A or 63A outlets for this need to be factored in to the equipment layouts to establish best positioning and to accommodate concealed cable runs.



BACK-UP POWER

All cleanrooms require a power connection from an external source. The rating of this will depend on the power demand of each room. UPS (uninterruptible power supply) battery back-up can also be provided and a changeover switch can be installed to alternate between a mains and generator supply.



ELECTRICAL

ENVIRONMENTAL MONITORING SYSTEMS (EMS)

Cleanroom Solutions provide a fully integrated Environmental Monitoring System that can also be 21CFR Part 11 compliant.

With a range of high-performance multi-function sensors, temperature, humidity, pressure and particle monitoring can all be monitored in real time and recorded for an audit trail. Fully flush or semi flush LED display gives in-room feedback.



BUILDING MANAGEMENT SYSTEMS (BMS)

Full integration with client BMS or a separately commissioned Building Management System can be provided. Typical integration includes HVAC, filtration, lighting, power management, extraction and any other utilities associated with the cleanroom. Typical software application provided by Trend.



ELECTRICAL REGISTER

Determining electrical requirements of the cleanroom in conjunction with the diversified load of client process equipment is conducted at design stage via a detailed electrical register. This will identify a total load assessment for comparison against the incoming building supply as well as outlining estimated heat load to be factored in to the HVAC design.





Press play for
video content



INSTALLATION

INSTALLATION is performed by experienced Cleanroom Solutions engineers supported by approved, fully trained sub-contractors for specialist services.

The Installation Engineers are specially trained in controlled environment construction and have years of experience, not only installing critical environments but also servicing and operating within them. Cleanroom Solutions' building techniques benefit clients with quick, clean and consistent installations, conducted by a flexible and friendly team who thrive on problem solving, high-quality presentation and exceeding client expectations.

With in-house Structural and Electrical teams, backed up by the wider Guard-tech Group support team, Cleanroom

Solutions take tighter control of projects, with a quicker and more consistent installation which presents substantial cost savings. Cleanroom Solutions co-ordinate all aspects of every build they undertake, including:

- Electrical:** Lighting, small power & 3-phase, data, plant connections and door interlocks
- HVAC & filtration:** From full-scale, bespoke Air Handling Units (AHUs) to Upflow units and small split systems including all ductwork
- Gas services:** Process gasses, compressed air, extraction and vacuum including all pipe/ductwork and ring mains
- Monitoring:** Fully networked Environmental Monitoring System (EMS) with IT integration with 21 CFR Part 11 compliance, BMS
- Water:** Purified and process hot water, drainage, plumbing connections

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COMMISSIONING

THE COMMISSIONING phase begins post-construction and concentrates on qualifying all systems and their functionality.

For a Pharmaceutical application this will form part of the Installation (IQ) and Operational Qualification (OQ). For all other industries a standard commissioning plan will be drafted and test certificates will be produced alongside a detailed Operational & Maintenance (O&M) manual.

The commissioning plan will cover a series of verification checks on key components, systems and plant – such as HVAC, electrical, network, lighting, EMS, BMS and other critical utilities. The cleanroom performance will be verified through ISO 14644 validation and associated testing.

HVAC

- Airflow supply and velocities
- Chilled water flow rates, temperatures and valve set points
- Room temperature and humidity check
- Air on and air off coil temperatures
- Frost protection checks
- Heater loading tests
- Probe calibration, location and offset
- Fan speed, inverter and electrical checks
- System pressure testing

ELECTRICAL

- Continuity testing
- Insulation resistance testing
- Polarity
- Resistance testing (measuring Zs)
- RCD checks

NETWORK

- LAN continuity testing

BMS

- Software validation
- Hardware verification and calibration

EMS

- Transmitter/probe calibration (UKAS)
- CF21R Part 11 compliance (if required)

LIGHTING

- Lux level verification
- Emergency lighting testing

PLUMBING

- Pipework pressure & drainage testing

COMPRESSED AIR & GASSES

- Air purity & oil-free test ISO8573-1:2010
- Pressure, micro-organism, moisture testing

EXTRACTION

- Airflow & velocity measurements

SEPARATIVE DEVICES

- Particulate, airflow, filter integrity testing
- Optional: temperature, KI-discus, velocity

FIRE ALARM

- BS5839-1 operational testing



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solutions

DECONTAMINATION

THE GUARDTECH GROUP Decontamination Team are specialists in restoring control to critical environments and supporting clients in maintaining compliant facilities.

The Decontamination Team offer a comprehensive range of periodic deep clean contracts, and with more than 30 years of experience combined among our two most senior operatives alone, our hard-working team have the knowledge, skill and expertise to deliver high-performance cleans to ensure your operations are never compromised.

The Guardtech Decontamination Team work to GMP standards for Pharma and Medical Device facilities, ensuring the removal of gross and micro particles to maintain ISO standards as per agreed SOPs and good practice.

All cleans are supported by a pre-clean contamination assessment and a post-clean efficacy verification stage to demonstrate the effectiveness of the clean. All operators are specially trained and work to extensive SOPs and checklists.

Our packages include:

- Builders' cleans
- Pre-validation cleans

- Biocidal/sporicidal cleans
- Microbiological/bioburden testing with TSA & SDA plates
- Pre-clean and post-clean contact plate testing
- Certified to work at height (IPAF PAL card holders)
- Working to GMP standards
- Cleanliness verification tests conducted – with full reporting
- Bespoke cleaning programmes
- Comprehensive multi-stage cleaning as and when required
- Will follow client SOPs and use specific validated chemicals and equipment when required
- Two most senior cleaners boast 30 years' experience in decontamination.

Press play for video content

SERVICE & MAINTENANCE

THE ONGOING operation and maintenance of your controlled environment is of paramount importance, therefore ensuring a service plan is in place to adequately facilitate this should form part of the strategy of implementation.

Cleanroom Solutions can provide a full turnkey offering with their in-house Service Department, with CITB-trained engineers and mechanical and electrical specialists,



consolidating all utilities and plant maintenance to as few visits as possible. The selection of all plant and equipment will take into consideration the ongoing maintenance and associated costs as well as energy efficiency and warranty conditions, balancing these to achieve the best value solution for your application.

Service contracts can also include emergency call-out rates to ensure a rapid response for any potential future issues.

Press play for video content

VALIDATION & DOCUMENTATION

UPON CONCLUSION of all cleanroom builds an ISO 14644 validation is conducted to verify cleanroom performance and adherence to classification guidelines.

The critical testing point is to ensure that the airborne particle counts are in line with the allowable tolerances as set out in ISO 14644-1. All other testing is to provide supporting data to confirm the performance specification of the environment.

Validation testing could include any or all of the following:

- Air velocity and volumetric flow rate measurement
- Room differential pressure testing
- Airborne particle counting
- Temperature & humidity monitoring
- Light & sound level measurement
- Filter integrity testing
- Pressure & flow gauge calibration

- Room recovery rates
- Containment testing
- Airflow visualisation

DOCUMENTATION

For all non-cGMP-rated projects, standard commissioning documentation will apply (see Commissioning – page 19).

A far greater level of detail is required for qualification of cGMP facilities, following strict protocols and defined standards.

This portfolio of documentation includes the compilation and execution of a Design Qualification (DQ), Installation Qualification (IQ) and Operational Qualification (OQ).

These documents are produced as a call and response to the User Requirement Specification (URS) and aim to objectively answer all requests with supporting evidence.



GRAPHENE RESEARCH FACILITY

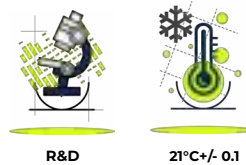
ISO
Class 5, 6 & 7

THE CLIENT

University of Cambridge – the Cambridge Graphene Centre investigates the science and technology of graphene, carbon allotropes, layered crystals and hybrid nanomaterials. The innovation centre allows partners to meet and establish joint industrial academic activities to promote innovative and adventurous research with an emphasis on applications.

THE BRIEF

Cleanroom Solutions were tasked with building a cleanroom facility split over two floors, incorporating a unique passenger lift between floors, air shower, specialist E-beam close control room (+/- 0.1 C), ISO5 & 6 areas, plus wet process benches with extract set back facility and localised ISO5.



“A very detailed design...”

Cleanroom Solutions Projects Director Sean Gaylard said: “This project was in a brand-new building, split over two floors. The first floor was offices and we had a lift shaft to take people between the two floors. When designing the cleanroom, [Cleanroom Solutions Director] Jan Pyrgies had to create a bespoke ‘clean shaft’ to ensure that the work being done in the cleanroom wasn’t compromised by people coming in from the other floor. “The E-Beam, which sits in the ISO5 room, is an expensive piece of equipment – and when it’s fully operational, it has to run at 0.1 of a degree. So to control that Jan had to come up with a unique design for controlling humidity and temperature. We did it through a combination of chilled and hot water and sensible cooling coils. It was a very intricate control system – AHUs on the roof, chillers, a very detailed design. “It was a complex project, which really challenged us, and we were delighted with the final result.”

Sean Gaylard
Projects Director


Cleanroom
solutions

THE TECH SPECS

Fresh air to the cleanroom(s) provided via a roof mounted Air Handling Unit (AHU) complete with frost coil, cooling coil and reheat coil, incorporating full Trend BMS controls. A specialist process gas system, complete with extract and abatement system, plus a monitored leak detection and O2 depletion monitoring, DI water system.

Electrical installation: Full installation, including sub main distribution, 230v sockets, 3-phase power, data cabling, CCTV, fire detection/aspirator and gas leak detection wiring.

ISO7 second floor areas: Conventional air flow design incorporating a plenum and FFUs, complete with sensible cooling coils utilising chilled water and trim heaters to provide more stable room temperatures. Conventional low level return air grills returning to the plenum areas via external service chase/corridor areas.

ISO5 ground floor areas: Full laminar flow design incorporating a plenum & FFUs, complete with sensible cooling coils utilising chilled water and trim heaters to provide more stable room temperatures. A raised access floor with air grills provided the air flow path back to the plenums via the service corridor areas and built-in room return air ducts. Access to the ground floor cleanrooms was provided by a passenger lift with HEPA filtration at high level, cleaning the sealed lift shaft, as well as an air shower prior to entering the ISO5 areas.

ISO5 area (E-Beam room): Ground floor area with full laminar flow design, incorporating a plenum & FFUs, complete with sensible cooling coils utilising chilled water and trim heaters to provide more stable room temperatures (+/-0.1 degree C). A raised access floor with air grills provided the air flow path back to the plenums via built-in room return air ducts.

THE RESULT

Cleanroom Solutions Projects Director Sean Gaylard said: “This project was in a brand-new building, split over two floors. The first floor was offices and we had a lift shaft to take people between the two floors. When designing the cleanroom, [Cleanroom Solutions Director] Jan Pyrgies had to create a bespoke ‘clean shaft’ to ensure that the work being done in the cleanroom wasn’t compromised by people coming in from the other floor.

“The E-Beam, which sits in the ISO5 room, is a very expensive piece of equipment – and when it’s fully operational, it has to run at 0.1 (achieving 0.05) of a degree. So to control that Jan had to come up with a unique design for controlling the humidity and temperature. We did it through a combination of chilled and hot water and sensible cooling coils. It was a very intricate control system – AHUs on the roof, chillers, a very detailed design.

“Using heating and cooling at the same time often surprises people, but it was critical to control the temperature in this way.

“It was a complex project, which really challenged us, and we were delighted with the final result.”

Guardtech
group

NANOFABRICATION FACILITY

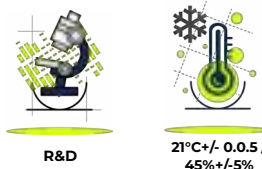


THE CLIENT

University of Glasgow – The James Watt Nanofabrication Centre undertakes fundamental, applied and commercial research, development and small-scale production using a vast array of developed process modules and background IP which can provide integrated processes to deliver circuits, devices, systems and solutions.

THE BRIEF

Cleanroom Solutions were asked to design and build a cleanroom facility for nanofabrication, comprising of an ISO4 E-Beam room with close temperature control to ± 0.05 degree C & humidity control 45%RH $\pm 5\%$, plus ISO6 service area & control room with temperature control to ± 1 degree C & humidity control 45% RH $\pm 5\%$.



“An interesting build to be part of...”

Cleanroom Solutions Projects Director Sean Gaylard said: “This was another cleanroom build that required us to ensure an E-Beam could function effectively – a similar build to the Cambridge Graphene Centre controlled environment we produced. “The team at Glasgow actually asked us to install a sophisticated noise cancellation system within the cleanroom – and that was really interesting to be a part of. “The facility had the Glasgow underground to contend with, too – so that equipment was vital to ensure the E-Beam functioned correctly in writing nano lines on wafers. It’s so sensitive to any noise or vibrations that any tiny change can make a big difference. To be responsible for ensuring the control in such extraordinary circumstances was really special for us.”

Sean Gaylard
Projects Director



THE TECH SPECS

ISO7 corridor: Built to link the existing cleanroom to the new E-Beam facility. The lighting comprised of LED panel lights complete with yellow filters (LY5). A full Spicer Consulting noise cancellation system was designed and installed to reduce airborne electrical & vibration noise within the E-Beam room.

E-Beam Room: An Astra T50 ceiling grid system complete with FFUs was installed throughout. All FFUs installed within the E-Beam room are EC Low noise fan type and are controlled from a local Untronics touch screen located in the service area. Nitrogen & CDA SS pipework and valves were installed throughout the cleanroom. A house vacuum system was designed and installed within the E-Beam room to provide localised house vacuum for cleanroom cleaning practices.

HVAC: The system was designed to provide very close control

temperature and humidity. Chilled water was used for cooling and hot water was used for heating. Sensible cooling coils were installed within the plenum areas connected to a chilled water and controls system providing control to ± 0.05 degree C – though it actually performed at ± 0.03 degree C.

Laminar flow: The ISO4 E-Beam room was designed to provide full laminar flow airflow via ceiling-mounted FFUs and passing through floor mounted grills and returning to the plenum via built-in room return air ducts. Fresh air was provided via a roof mounted Air Handling Unit (AHU) combining cooling coils, frost coils, reheat coils and full controls system. The fresh air was ducted into the independent plenum areas and incorporated inline electric trim heaters for close temperature and humidity control.

ISO 6&7 areas: Designed using conventional airflow with air provided into the areas using FFUs and low-level grills located within room built-in return air ducts returning to the localised plenums mixing with close controlled fresh air.

THE RESULT

Cleanroom Solutions Projects Director Sean Gaylard said: “This was another cleanroom build that required us to ensure an E-Beam could function effectively – a similar build to the Cambridge Graphene Centre controlled environment we produced.

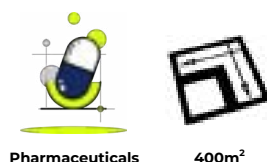
“The team at Glasgow actually asked us to install a sophisticated noise cancellation system within the cleanroom – and that was really interesting to be a part of. “The facility had the Glasgow underground to contend with, too – so that equipment was vital to ensure the E-Beam functioned correctly in writing nano lines on wafers. It’s so sensitive to any noise or vibrations that any tiny change can make a big difference. To be responsible for ensuring the control in such extraordinary circumstances was really special for us.”





THE CLIENT

Vectura – experts in formulation science, device technology and inhaled medicines. Since launch, they have generated \$11 billion in sales and in 2020 these products were used by 10 million patients worldwide.



THE STORY

This new facility was built in an existing building. The whole structure was totally self-supporting by using a specially designed steel mezzanine. The room fabric consisted of a cleanroom partition system, walk-on type ceiling with wall/ceiling and wall/wall coving, vinyl flooring, with a fully equipped changing room. The facility was designed as class C GMP turbulent flow with localised class A GMP powder control booths. The powder control booths were stainless steel.

Continued on page 28



From About on vectura.com...

Our partners have succeeded in bringing DPI, pMDI and nebuliser medicines to market with the help of our specialist capabilities. Our combination of formulation science, device technology and inhaled development expertise has contributed to the success of 13 inhaled medicines, launched by our partners and licensees. Since launch, they have generated \$11 billion in sales and in 2020 these products were used by 10 million patients worldwide.



The pressure regime was designed so that process rooms were kept at a negative pressure to the main corridor to help prevent cross contamination.

The whole facility was designed to save on running costs and therefore used re-circulated air. This air passes through a bank of safe change HEPA filters before it passed back to the

AHU for re-use. Services included a compressed air system c/w pipework, nitrogen pipework and DI water pipework.

Air conditioning consisted of an air handling unit, chiller, chilled water pipework, humidifiers and controls (to meet industry standard 21 CFR part 11) to achieve the design criteria. This was mounted on the mezzanine.



THE RESULT

From the customer's various user requirement documents, a detailed validation procedure was produced and agreed, including DQ, IQ, OQ. The room was approved by the MHRA. Cleanroom Solutions Director Jan Pyrgies said: "It was a pleasure to deliver such a complex build that was also economical – a huge well done to all the team for their efforts on this excellent project."





cleanCube
mobile cleanrooms



ENQUIRY FORM

Name:

Location:

Company:

Telephone:

Position:

Email address:

Base model	MINI <input type="checkbox"/>	MIDI <input type="checkbox"/>	MAXI <input type="checkbox"/>	MULTI <input type="checkbox"/>	MOBI <input type="checkbox"/>	MOBI+ <input type="checkbox"/>
Rooms	1: <input type="checkbox"/> 2: <input type="checkbox"/>	1: <input type="checkbox"/> 2: <input type="checkbox"/> 3: <input type="checkbox"/> 4: <input type="checkbox"/>	1: <input type="checkbox"/> 2: <input type="checkbox"/> 3: <input type="checkbox"/> 4: <input type="checkbox"/>	How many rooms? <input type="text"/>	1: <input type="checkbox"/> 2: <input type="checkbox"/>	1: <input type="checkbox"/> 2: <input type="checkbox"/>
Installation address						
How did you hear about us?	Google: <input type="checkbox"/> Bing: <input type="checkbox"/> Email: <input type="checkbox"/> Word of mouth: <input type="checkbox"/> Facebook: <input type="checkbox"/> Twitter: <input type="checkbox"/> LinkedIn: <input type="checkbox"/> Magazine advert: <input type="checkbox"/> Event or exhibition: <input type="checkbox"/> Business directory: <input type="checkbox"/> Other: <input type="checkbox"/>					
Function	Cleanroom: <input type="checkbox"/> Laboratory: <input type="checkbox"/> Biosafety Lab: <input type="checkbox"/> Containment Suite: <input type="checkbox"/>					
Classification	ISO8: <input type="checkbox"/> ISO7: <input type="checkbox"/> ISO6: <input type="checkbox"/> ISO5: <input type="checkbox"/> Level One: <input type="checkbox"/> Level Two: <input type="checkbox"/> Level Three: <input type="checkbox"/>					
Internal Height	2.1m: <input type="checkbox"/> 2.4m: <input type="checkbox"/> *For taller internal configuration horizontal airflow will be implemented					
Personnel airlock (PAL)	Length: <input type="text"/> Width: <input type="text"/> Height: <input type="text"/> Not Required: <input type="checkbox"/>					
Materials airlock (MAL)	Length: <input type="text"/> Width: <input type="text"/> Height: <input type="text"/> Not Required: <input type="checkbox"/>					
Panel system	Fully Flush: <input type="checkbox"/> Semi Flush: <input type="checkbox"/>					
Doors (quantity)	Rapid Roll: <input type="checkbox"/> Single Doors: <input type="checkbox"/> Double Doors: <input type="checkbox"/> Quantity: <input type="text"/>					
Windows (quantity)	900 x 900mm: <input type="text"/> windows 1500 x 900mm: <input type="text"/> windows					
Flooring	N/A: <input type="checkbox"/> Vinyl: <input type="checkbox"/> ESD Vinyl: <input type="checkbox"/>					
Temperature control	No: <input type="checkbox"/> Yes: <input type="checkbox"/> °C +/- °C					
Humidity control	No: <input type="checkbox"/> Yes: <input type="checkbox"/> °C +/- °C					
Heatload	Max Occupancy: <input type="text"/> operators Equipment: <input type="text"/> kW					
Lighting	500 Lux: <input type="checkbox"/> 750 Lux: <input type="checkbox"/> 1000 Lux: <input type="checkbox"/> 1250 Lux: <input type="checkbox"/>					
13-amp double sockets	N/A: <input type="checkbox"/> 2: <input type="checkbox"/> 4: <input type="checkbox"/> 6: <input type="checkbox"/> 8: <input type="checkbox"/> 10: <input type="checkbox"/> 15: <input type="checkbox"/> 20: <input type="checkbox"/> 25: <input type="checkbox"/> 30: <input type="checkbox"/> 35: <input type="checkbox"/> 40: <input type="checkbox"/>					
Network sockets	N/A: <input type="checkbox"/> 2: <input type="checkbox"/> 4: <input type="checkbox"/> 6: <input type="checkbox"/> 8: <input type="checkbox"/> 10: <input type="checkbox"/> 15: <input type="checkbox"/> 20: <input type="checkbox"/>					
3-phase power	N/A: <input type="checkbox"/> 16-Amp: <input type="text"/> outlets 32-Amp: <input type="text"/> outlets 63-Amp: <input type="text"/> outlets					
Other mechanical requirements	Compressed Air: <input type="checkbox"/> Extraction: <input type="checkbox"/> Process Gases: <input type="checkbox"/> Central Vacuum: <input type="checkbox"/> Drainage: <input type="checkbox"/> Purified Water: <input type="checkbox"/> Town's Water Supply: <input type="checkbox"/>					
Environmental monitoring	Analogue - Pressure Only: <input type="checkbox"/> Digital - Temperature, Humidity & Pressure: <input type="checkbox"/> Full EMS - With Sensors & Software/21 CFR Part 11 Compliant: <input type="checkbox"/>					
Furniture (quantity)	Stepover Bench: <input type="text"/> Trespa Work Bench: <input type="text"/> Ergonomic Chairs: <input type="text"/> Storage Cabinet: <input type="text"/> Sink: <input type="text"/> Garment Rail: <input type="text"/> Coat Hooks: <input type="text"/> Bin: <input type="text"/>					
Equipment (quantity)	Laminar Flow Unit: <input type="text"/> Biological Safety Cabinet: <input type="text"/> Transfer Hatch: <input type="text"/> Trolley Hatch: <input type="text"/> Autoclave: <input type="text"/>					

CLICK HERE to download your Microsoft Excel enquiry form

Please email your completed enquiry form to sales@guardtech.com



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video content



DOUBLE AWARD-WINNING SOLUTION

-  FULLY CUSTOMISABLE
-  RAPID TURNAROUND
-  SHIPPED WORLDWIDE
-  PLUG AND PLAY



MOBILE CLEANROOMS

CLEANCUBE: a comprehensive portfolio of plug & play portable controlled environment solutions.

CleanCube Mobile Cleanrooms ship worldwide and are ideal for quick turnaround projects, space utilisation and temporary applications.

A full range of customisation allows users to configure these mobile formats to best suit process requirements.

With a wide range of internal finishes and structural, mechanical and electrical specification choices, CleanCube can be rapidly designed and manufactured to meet User Requirement Specification (URS) significantly quicker than conventional builds with the added benefit that offsite construction offers.

CleanCube Containers

Available in three standard sizes: Mini (20ft – 15m² area), Midi (40ft – 30m² area) and Maxi (40ft double – 60m² area). Shipped globally as stackable modules via highly economical standard shipping channels.

CleanCube Multi

Utilising 40ft shipping containers joined side by side, CleanCube Multi can create facilities with an unlimited footprint.

CleanCube Vehicle Conversions

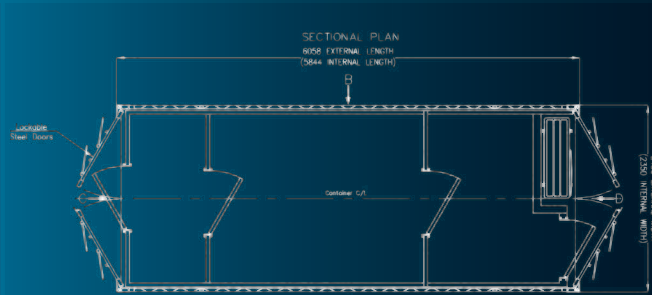
3.5 and 7.5-ton vehicles internally fitted out to function as fully operational plug & play mobile cleanrooms and labs.

CONTENTS

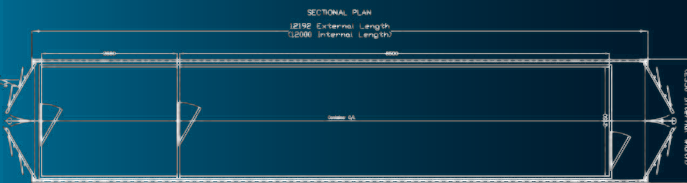
- Enquiry Form
- CleanCube Introduction
- Container Fit-Out
- CleanCube Multi
- Installation Guidelines
- Mechanical & Electrical
- Internal Specifications
- Vehicle Conversions
- Furniture & Equipment
- Rental Options

LAYOUT OPTIONS

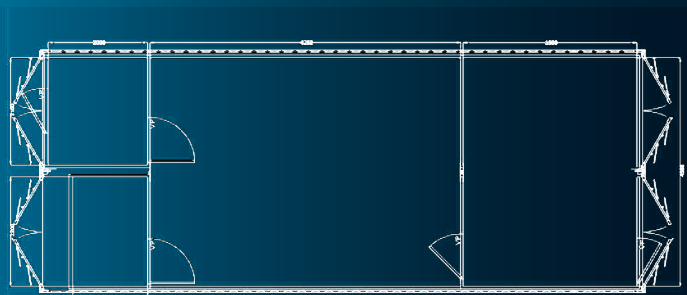
CleanCube MINI 15m²



CleanCube MIDI 30m²



CleanCube MAXI 60m²



COVING

Wall-to-wall and wall-to-ceiling coving available. Fully flush panel system provides flush floor connection as per photo.



DOORS

Choice of doors available: rapid rise doors – PVC curtain with stainless frame and GRP or powder-coated steel personnel doors with stainless steel push plate, kick plate and handle with 400mm x 400mm vision panel. All Guardtech doors can be electromagnetically interlocked. Also available as a fully flush system with recessed base for flooring to cove into.



GLAZING

Fully-flush or semi-flush glazing between rooms. Doubled-glazed units can also be installed in the container shell but these are only for UK applications.



WALLS

Powder-coated CR4 mild steel panels with polyisocyanurate (PIR) insulated core and interlocking joints. The panels feature a 50mm thickness to form walls and ceiling. Highly durable, cleanable and chemically resistant, the walls are silicon sealed.



STRUCTURAL



Press play for video content

CEILING

Panelled ceiling with thermal insulation core provides a flush surface. Lighting and filtration modules are recessed into apertures or surface mounted for laboratory applications.



FLOORING

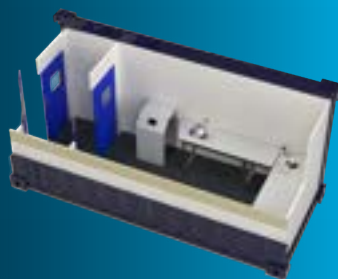
Homogenous vinyl floor reinforced with cross-linked polyurethane, UV-cured, hot-welded joints. Coved 100mm up the wall over underlay former and capped. Copper-grounded anti-static vinyl also available.



BASE MODEL SIZES

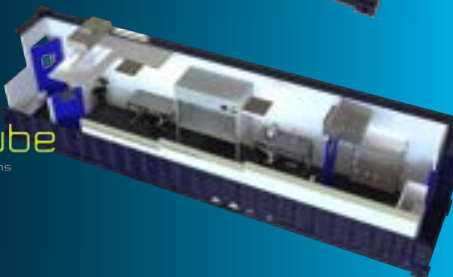
CleanCube mobile cleanrooms

MINI



CleanCube mobile cleanrooms

MIDI



CleanCube mobile cleanrooms

MAXI



MULTI



CONNECTION

CleanCube Multi utilises open-sided 40ft shipping containers joined along their longest edge. This enables unlimited connection of modules in 12 metre bays to provide an open plan or divided facility layout. Modules are manufactured as independent units that connect on site – this allows for quick installation, easy relocation and the potential for facility expansion by adding an infinite number of units. Connection is made with a proprietary system that ensures water tightness and building integrity whilst also allowing seamless connection of internal components, utilities and plant.

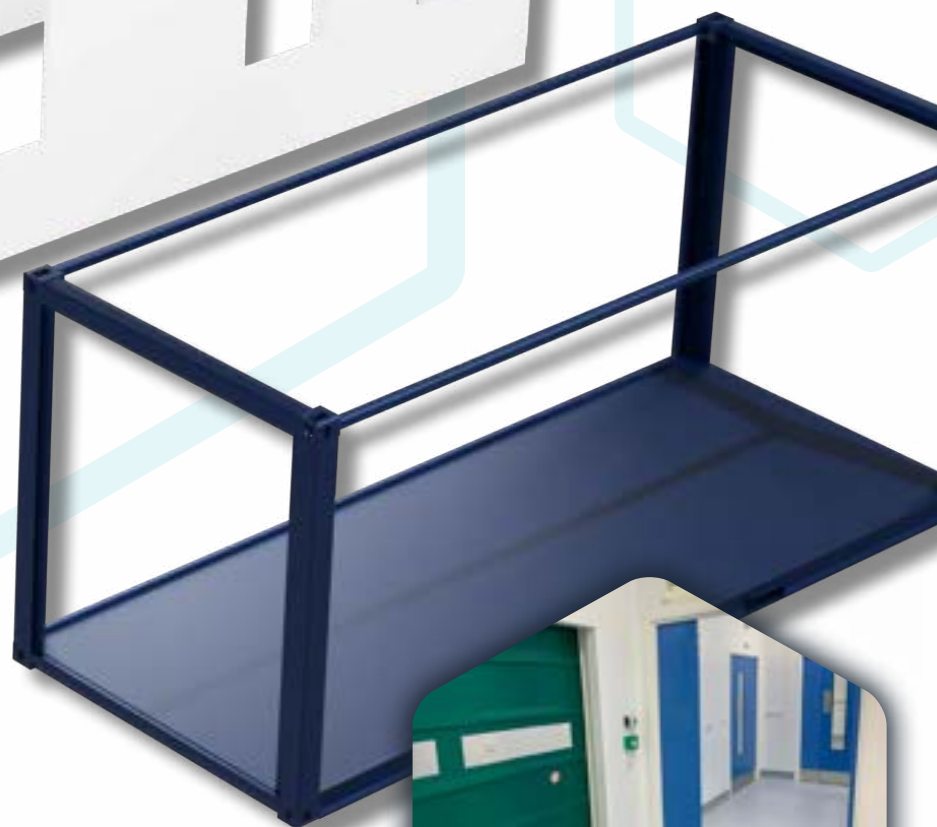
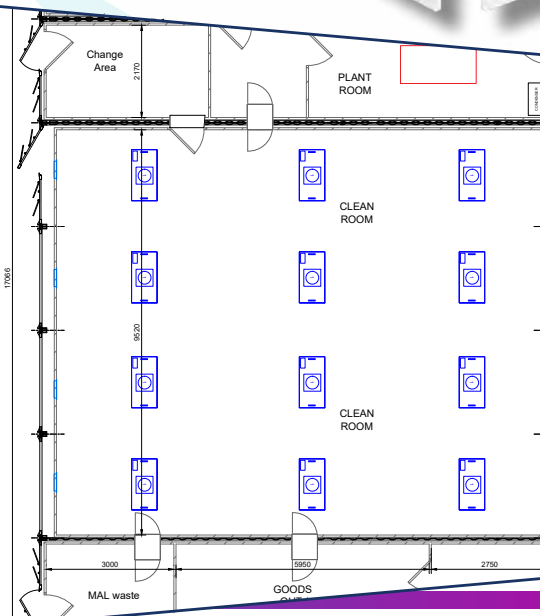


MULTI CONFIGURATION

12-metre (40ft) or 6-metre (20ft) bays of 2.5m width can be linked continuously to create the desired facility footprint.

Internally, these facilities can be configured as per any traditional modular cleanroom build. The flexibility that this provides enables clients to create unrestricted configurations for scale applications without

the time and inconvenience of standard on-site construction. The CleanCube Design team will work with you to create cleanroom layouts that meet your process demands whilst also ensuring the principles of interconnectivity for each module are well considered and allow each bay to be independently constructed, facilitating rapid installation and future expansion.



CleanCube Multi

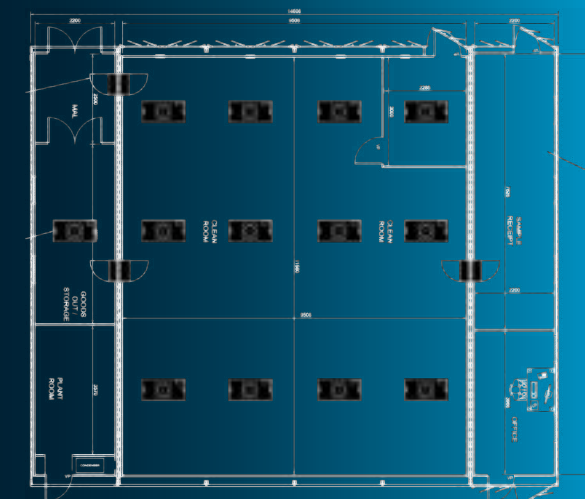
CleanCube Multi has been designed as an innovative way to create large-scale cleanroom facilities off site, shipped globally to serve the worldwide STEM industries.

Offering clients high-quality internal fit-outs built to the same specification as the rest of the Guardtech Group's range of cleanroom solutions, with all plant and utilities fully incorporated.

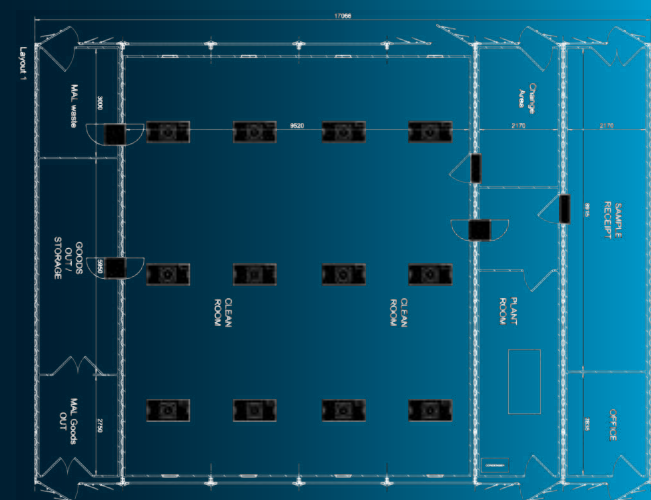
CleanCube clients benefit from the ability to conduct a full-scale FAT (Factory Acceptance Test) of their constructed, validated, operational facility, at the UK CleanCube manufacturing facility prior to shipping and rapid on-site installation.

LAYOUT EXAMPLES

CleanCube 6-BAY 180m²



CleanCube 7-BAY 210m²





MULTI

CleanCube
mobile cleanrooms

Standard Models

MULTI 3



KEY INFORMATION

External Shell 3 x 40ft high cube steel containers (conjoined)
External Dimensions 12,192mm (L) x 7,314mm (W) x 2,896mm (H)
Number Of Rooms 5
Total Weight Approximately 18,000kg
Power & Network 28 x 13-amp double sockets and 15 x CAT6 data outlets

MULTI 4



KEY INFORMATION

External Shell 4 x 40ft high cube steel containers (conjoined)
External Dimensions 12,192mm (L) x 9,752 (W) x 2,896mm (H)
Number Of Rooms 5
Total Weight Approximately 24,000kg
Power & Network 32 x 13-amp double sockets and 15 x CAT6 data outlets

MULTI 6



KEY INFORMATION

External Shell 6 x 40ft high cube steel containers (conjoined)
External Dimensions 12,192mm (L) x 14,628mm (W) x 2,896mm (H)
Number Of Rooms 7
Total Weight Approximately 36,000kg
Power & Network 39 x 13-amp double sockets and 20 x CAT6 data outlets

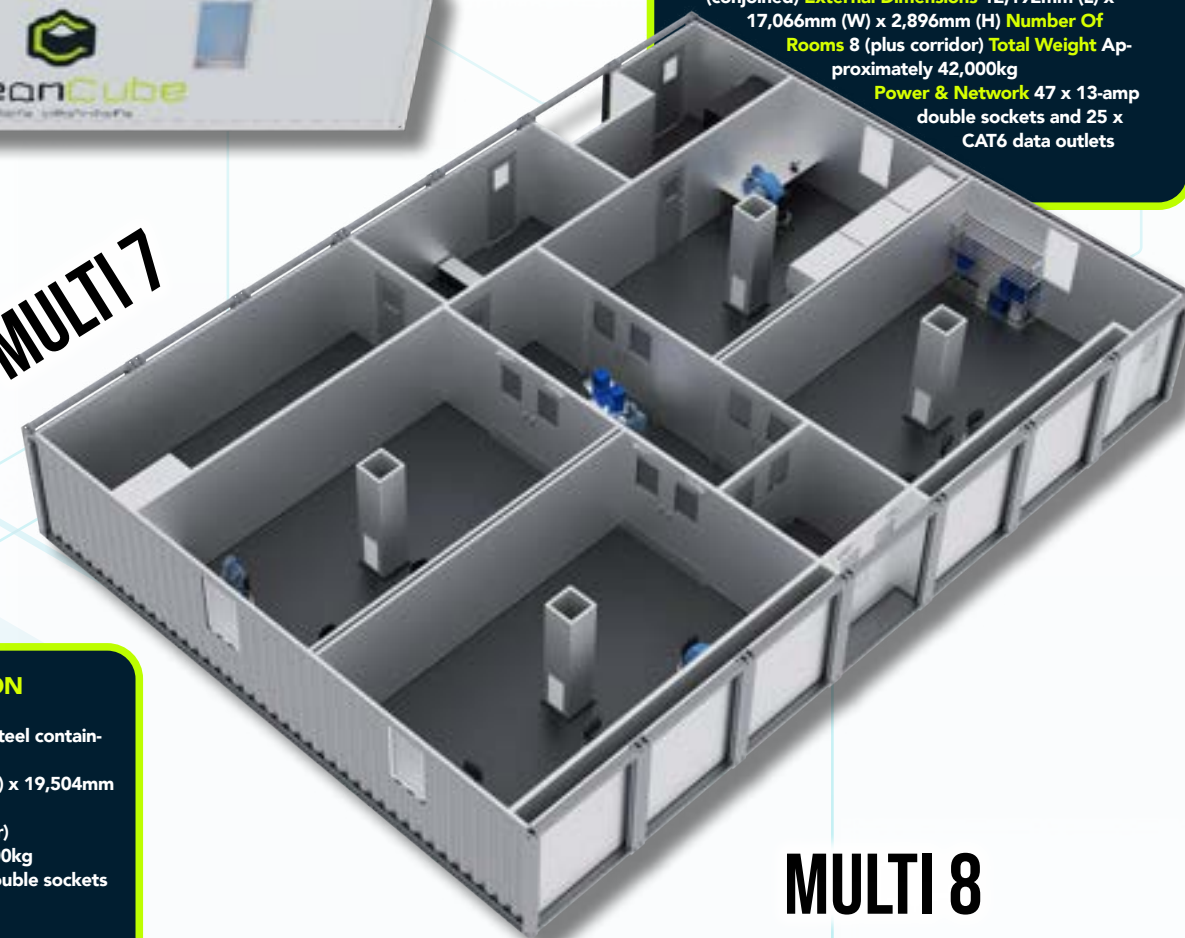
MULTI 5



KEY INFORMATION

External Shell 5 x 40ft high cube steel containers (conjoined)
External Dimensions 12,192mm (L) x 12,190 (W) x 2,896mm (H)
Number Of Rooms 6
Total Weight Approximately 30,000kg
Power & Network 28 x 13-amp double sockets

MULTI 7



KEY INFORMATION

External Shell 7 x 40ft high cube steel containers (conjoined)
External Dimensions 12,192mm (L) x 17,066mm (W) x 2,896mm (H)
Number Of Rooms 8 (plus corridor)
Total Weight Approximately 42,000kg
Power & Network 47 x 13-amp double sockets and 25 x CAT6 data outlets

MULTI 8



KEY INFORMATION

External Shell 8 x 40ft high cube steel containers (conjoined)
External Dimensions 12,192mm (L) x 19,504mm (W) x 2,896mm (H)
Number Of Rooms 9 (plus corridor)
Total Weight Approximately 48,000kg
Power & Network 29 x 13-amp double sockets and 14 x CAT6 data outlets



MULTI INSTALL GUIDELINES

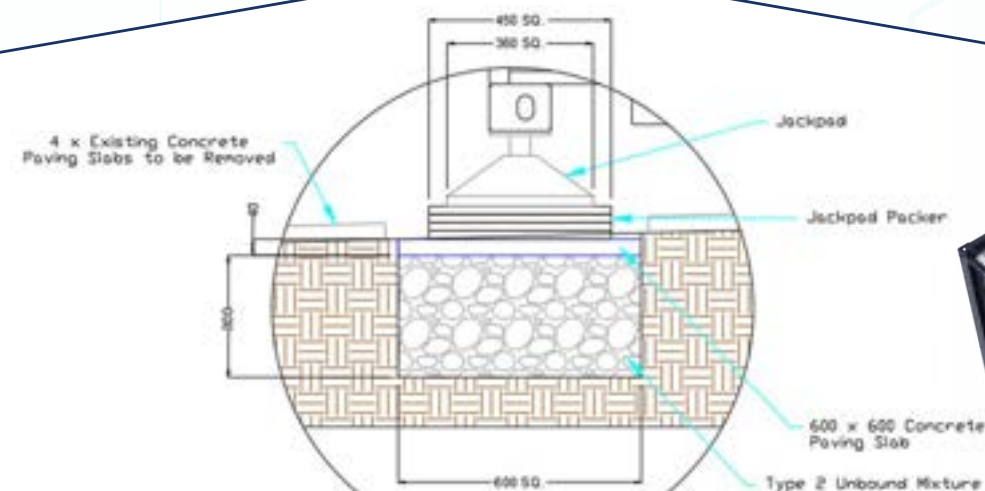


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STACKING

All Multi units are designed and factory assembled to meet the individual requirements of customers. The units can be stacked to create a two-floor system, with an adjoining staircase connecting the ground and first floors. The CleanCube team will be more than happy to discuss any particular configuration requirements you have.



SITE PREPARATION GUIDANCE

CleanCube utilises shipping containers as the outer shell so modules are ideally sited on flat, level solid substrate bases such as concrete, tarmac, gravel or hardcore, capable of supporting the spread and point load imposed by the total weight once installed.

Guardtech calculate the total weight of the constructed unit and provide the details – this will only be completed once the full drawing pack has been approved and signed off by the

client and all equipment, furniture and maximum occupancy has been determined.

In areas where a flat, level concrete surface doesn't already exist, we typically see clients adopt one of three strategies: 1. Install a complete flat, level substrate of concrete, tarmac, gravel or hardcore. 2. Install a number of concrete foundation pads, dependent on the total module size. 3. Implement the Jackpad system. See Levelling below for more information.

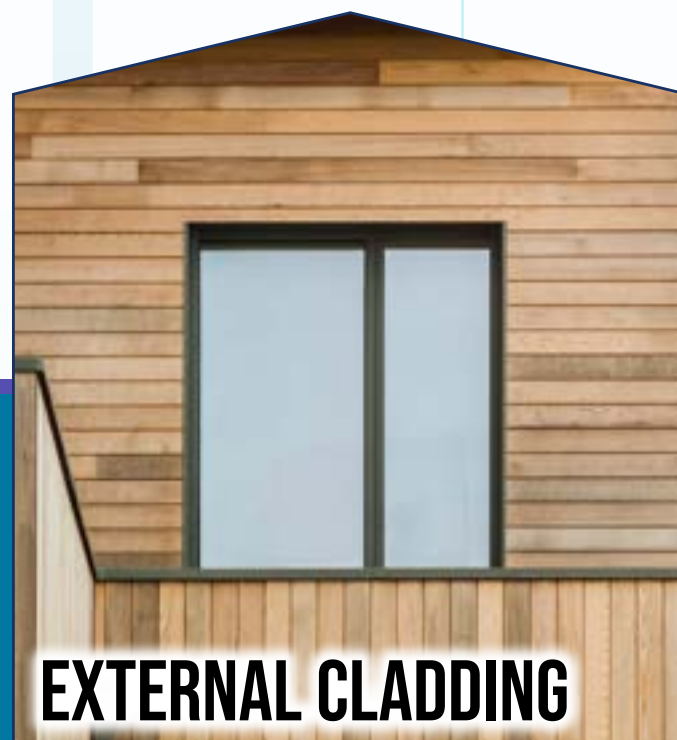


CleanCube
mobile cleanrooms



UTILITY CONNECTION

Mains power is brought to the CleanCube via the client facility or from dedicated generators. Electrical load will be determined during the design phase and a full register will be assembled. This will dictate the size of the supply required – typically this is likely to be a 63-amp 3-phase supply. Multi features a wide array of utilities options for the end user, including compressed air, extraction, vacuum, nitrogen and purified water hook-ups and services, as well as full drainage and connection to the town's water supply.



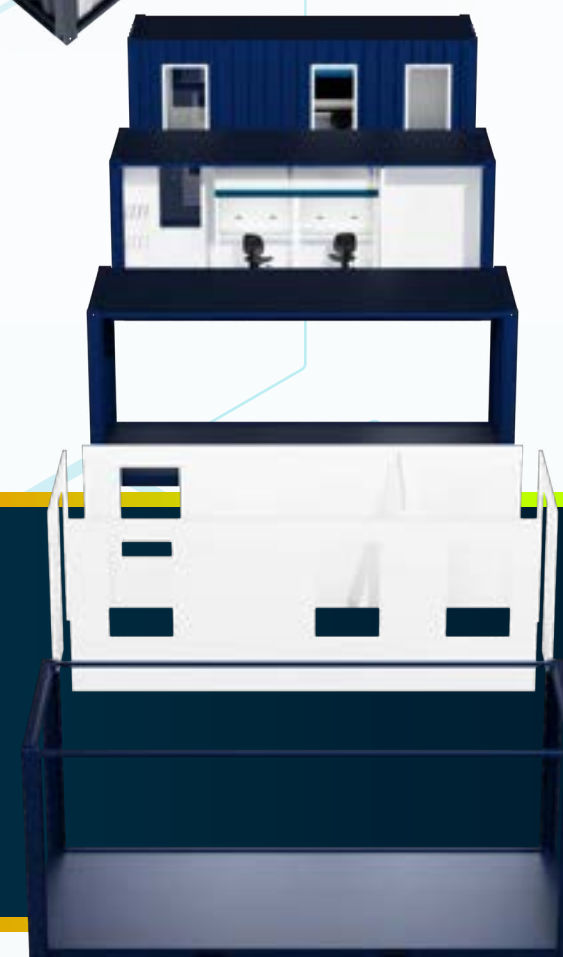
EXTERNAL CLADDING

CleanCube Multi units can be externally clad with decorative larch or oak slats or fully vinyl wrapped with client branding or decorative design. Ask a CleanCube rep for more details.



LEVELLING

Jackpad is a reusable foundation system with the ability to support modular buildings in various single, double and treble storey configurations. The Jackpad system can be used for fine level tuning as well as full CleanCube support. Jackpads must be installed on a solid substrate – however, for installations on less stable surfaces, these can be installed in targeted positions, supported by hardcore pits and slab coverings, minimising the extent of site preparation.





MECHANICAL & ELECTRICAL

FILTRATION

For ISO 14644 compliant environments Fan Filter Units (FFU) with H14 HEPA filters and G4 pre-filters, provide 1,000m³/hour of filtered air. HEPA filtration can also be placed on the exhaust to provide BSL-3 compliance. For ceiling heights of 2.1m slimline FFUs are installed in the ceiling to provide vertical laminar flow. For ceiling heights of between 2.1m and 2.5m cleanrooms are horizontal flow.



HVAC

Temperature control via FCU (fan coil unit) serving a plenum for cleanrooms or wall-mounted recirculating units for labs. Humidity control also provided via upflow units or separate desiccant wheels. External condensers can be contained in attached plant rooms or mounted on CleanCube exterior.



EMS

Guardtech provide a fully integrated Environmental Monitoring System that can also be 21CFR Part 11 compliant. With a range of high-performance multifunction sensors, temperature, humidity and pressure can all be monitored in real time and recorded for an audit trail. Fully flush or semi flush LED display gives in-room feedback.



POWER MANAGEMENT

All models require a power connection from an external source. The rating of this will depend on the power demand of each module. UPS (uninterruptible power supply) battery back-up can also be provided and a changeover switch can be installed to alternate between a mains and generator supply.



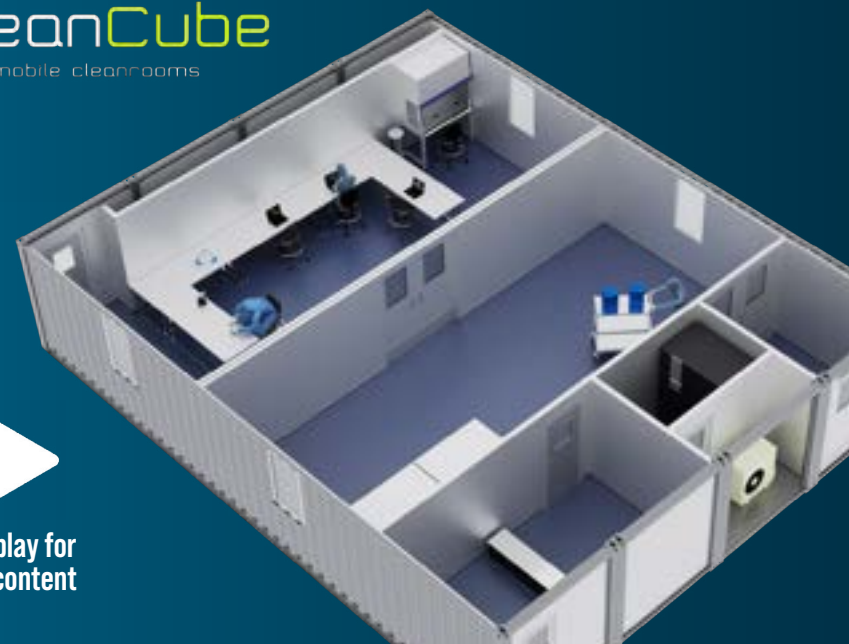
FIRE ALARM

In-room smoke detectors and audible and visual alarm beacons can be installed and linked back to a centralised fire alarm panel. This can be connected back to the main facility fire panel board if required.



GAS SERVICES

Compressed air and other specialist gasses such as N₂ and CO₂ can be installed, with pipework in stainless 316 or Transair and connection to dedicated compressors, generators or cylinders.



Press play for
video content

CONTROL PANEL

15.7" touchscreen HMI+PLC provides a full control and monitoring system for the CleanCube. Environmental Monitoring System feeds back to give real time data on temperature, humidity and pressure. Fan speeds and HVAC systems can be controlled as well as other compatible equipment.



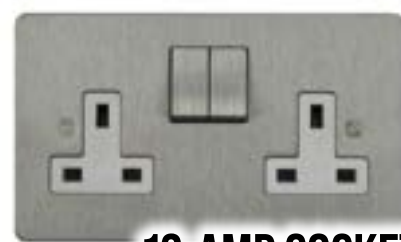
GAS

Compressed air and nitrogen via compressors and generators housed directly within the cleanroom or lab – or in an enclosed plantroom. Pipework, point-of-use fittings, regulators and hook-up connections can also be put in place.



EXTRACTION

Chemicals, airborne particulate and heat can all be extracted to a localised filtration unit for scrubbing. Safe change modules can also be placed on the exhaust system to mitigate the risk of cross-contamination.



13-AMP SOCKET

All CleanCube models can include stainless steel or white plastic 13-amp sockets mounted flush. CAT6 network sockets and 16amp or 32amp three-phase options are also available in the range.



LIGHTING

Powder-coated steel light units, flush mounted into the ceiling panels with drop-down hinged diffuser. Also available as surface-mounted aluminium LED batten luminaires for laboratories. Activation by switch or PIR (passive infrared) sensor. Lights can be UV filtered for photo sensitive processes.



CONTAINMENT

For cleanrooms Guardtech install sockets and services flush to the panel system with containment embedded within the panel core. For laboratories, three-compartment PVC trunking is used for flexibility of socket positioning and cost effectiveness.



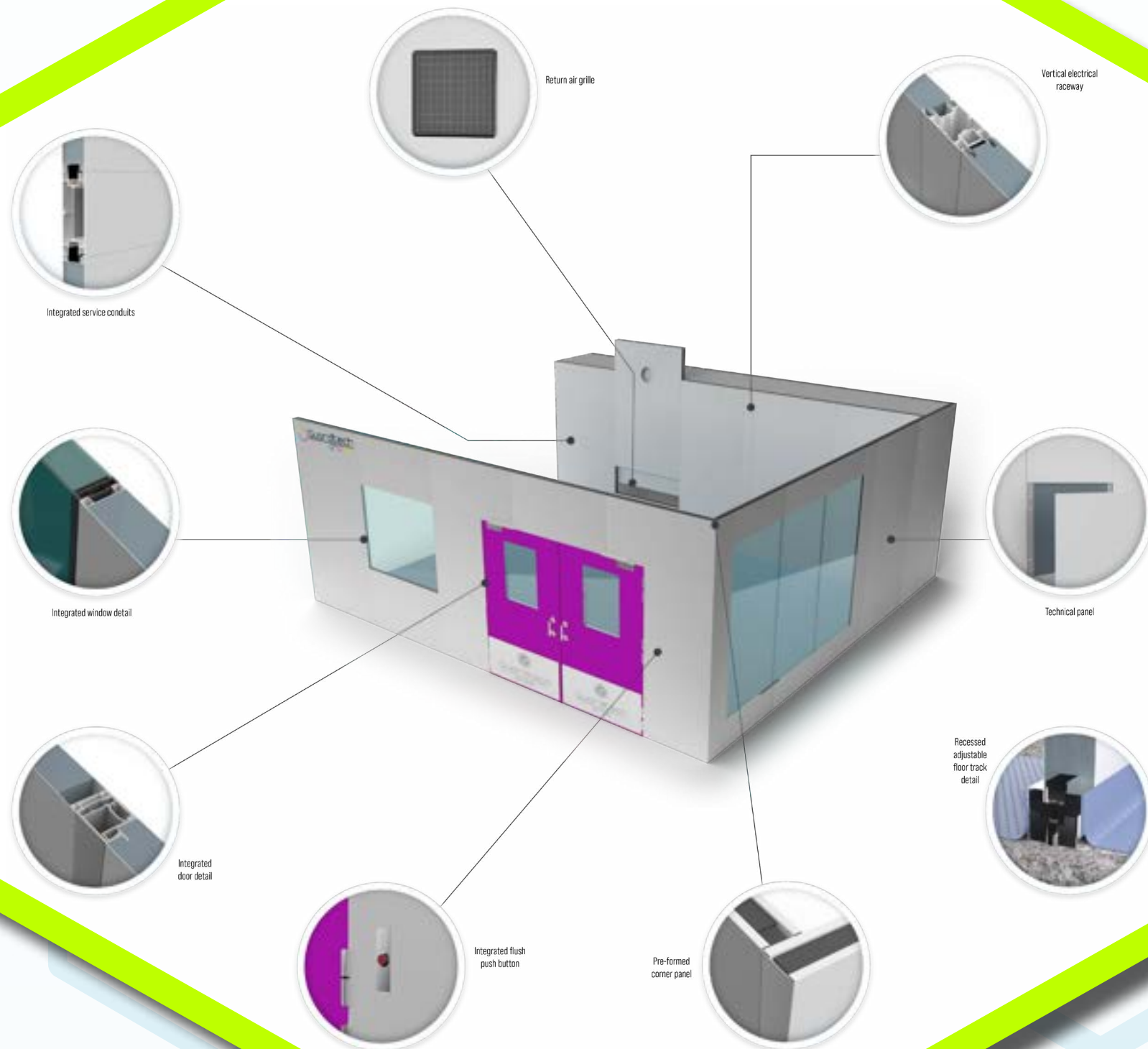
INTERNAL SPECIFICATION LEVELS



CleanCube
mobile cleanrooms

GMP

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video content



The GMP Specification is the highest grade of internal fit-out that can be selected for any CleanCube model. All internal components selected in this CleanCube Specification are suitable for high grade Pharmaceutical and clinical environments where attention to detail, quality

of finish and reduction of ledges is critical. The essential elements of this elite internal level of specification relate to a bespoke panel system with specific connection to flooring and ceiling materials with special consideration to environmental monitoring and CFR21R

Part 11 compliance. Attention to utility integration is also a key part of the GMP Specification, with specially designed raceways and conduits that are embedded within the panel system to eliminate any surface mounted wiring or pipework and containment, also facilitating flush inte-

grated sockets. The CleanCube GMP Specification adopts best practice throughout and will aid your business' compliance to EU GMP Annex 1, ISO 14644-1 and US FS209E, with full qualification processes including Design (DQ), Installation (IQ) and Operational (OQ).



CleanCube
mobile cleanrooms

GMP COMPONENTS



Classifications Available
Grade B, Grade C,
Grade D



WALLS: GT SHELL MAX: Composite wall panels manufactured from CR4 mild steel with a 120 micron CLEANsafe powder coating, all connections and joints are fully flush and finished with a feathered bead of silicon sealant, wall-to-wall panel joints have integrated coved corner connection.



LIGHTING: GT LUX PLUS: Recessed LED, 4k colour temperature, 5,200 lumens per light fitting providing 1,000 lux at bench level. Roomside access diffuser for clean LED change. PIR motion sensor activated.



DOORS: GT ACCESS MAX: cGMP compliant doors featuring QuadCore technology, offering superior fire protection, thermal and environmental performance and CLEANsafe coating. This ultra-airtight system adopts an integrated envelope solution to ensure a fully flush finish.



HVAC & FILTRATION: GT AIR PRO: Full function upflow CRAC unit providing temperature and humidity control, utilising direct expansion (DX) to provide cooling and dehumidifying with internal steam boiler for humidifying. AHU ducted to plenum in the ceiling void to provide air distribution to Fan Filter Units (FFUs).



GLAZING: GT VISION MAX: Fully flush mounted glazed units consisting of aluminium frame and two panes of 6mm thick laminated glass, glued and silicone sealed on both sides to the frame. Frame features moisture-free silica gel. Glazing slots into integrated envelope solution via extruded aluminium interface profiles.



ENVIRONMENTAL MONITORING: GT SCAN MAX: In-room LED displays illustrating pressure, temperature and humidity, feeding back to centralised computer screen with GT Scan Max EMS software for alarms and data storage. Alarms are also provided via text, email or phone call as well as in-room beacons.



CEILING: GT LID PRO: A 45mm radius coving is applied to bridge the 90-degree join between wall and ceiling panel. Panels use the same airtight integrated envelope system, utilising extruded aluminium interface connection profiles to ensure fully flush detail. Pre-formed corner panels provide a flush finished corner detail.



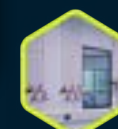
CONTROLS & BMS: All plant is controlled with a centralised Graphical User Interface (GUI) via a touchscreen display housed in the change area. This receives a signal from the AHU, FFUs, lighting, door interlocks and provides control functionality as well as centralised data that can be fed back to the main building BMS.



FLOORING: GT DECK PLUS: ESD vinyl, hot-welded and coved 100mm from floor level with a fully flush connection to wall via intelligent recessed floor track detail which vinyl lays under with silicone sealed finish.



FURNITURE: Standard units include: workbenches, stepover benches, cabinets, racking and dispensers manufactured from grade 304 stainless steel frames and Trespa TopLab work surfaces. However, full fit-out is available upon request. For more information and to the full range, visit www.guardtech.com.



UTILITIES INTEGRATION: Extruded aluminium service conduit provides flush interface between GT Shell Max wall panels. A range of utilities can run through these specially engineered cavity sections, delivering an aesthetically pleasing cGMP solution that is easily cleaned and includes a removable face section for easy access.



EQUIPMENT: Standard units do not incorporate equipment. However, full fit-out is available upon request. For more information and to the full range, visit www.guardtech.com.

The CleanCube ISO Specification is the most appropriate combination of components to achieve an ISO 14644 classified environment. Balancing a high-quality, clean finish with a cost competitive Specification

enables CleanCube ISO to meet the full spectrum of ISO 5 to 8 classification whilst ensuring value for money and time to build remain the critical factors. ISO utilises a composite panel system for the main structural elements, such as walls and ceilings, and en-

sures that interfacing components including doors, glazing, flooring, lighting, filtration, grilles and accessories are manufactured from high quality materials and intelligently incorporated into the installation. The CleanCube ISO Specification also logically

incorporates and conceals all utilities by taking advantage of the channel behind the wall panels – which also serves as a return air void. This feature reduces ledges and crevices to aid cleaning, support compliance and improve overall facility aesthetic.

INTERNAL SPECIFICATION LEVELS



CleanCube
mobile cleanrooms

ISO

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CleanCube
mobile cleanrooms

ISO COMPONENTS



Classifications Available
ISO 5, 6, 7, 8
& BSL 3



WALLS: GT SHELL PRO: 60mm or 80mm thick Quad-core panels with a CLEANsafe coating that fit together via a unique de-ended solution, fitted into a base channel with integrated semi-flush doors and windows. An aluminium top hat profile is placed into the de-ended panel with the panel face folded around.



LIGHTING: GT LUX PLUS: Recessed LED, 4k colour temperature, 5,200 lumens per light fitting providing 1,000 lux at bench level. Roomside access diffuser for clean LED change. PIR motion sensor activated.



DOORS: GT ACCESS PRO: Semi flush hinged door leafs constructed from two facings 0.63mm thick hot-dip zinc coated metal to EN 10147, folded to form a 40mm thick door leaf. The edges of the two skins are pressed to create a monobloc cassette construction with smooth folded edges. 6mm laminated safety glass panels.



HVAC & FILTRATION: GT AIR PRO: Full function upflow CRAC unit providing temperature and humidity control, utilising direct expansion (DX) to provide cooling and dehumidifying with internal steam boiler for humidifying. AHU ducted to plenum in the ceiling void to provide air distribution to Fan Filter Units (FFUs).



GLAZING: GT VISION PRO: Designed as semi flush mounted glazed frame for the GT Shell Pro de-ended panel system. The glazing units consist of two aluminium frames (frame and counterframe) on which 6mm laminated glass is glued and siliconed on both sides. Aluminium frame available in RAL 9002 or RAL 9010 colours.



ENVIRONMENTAL MONITORING: GT SCAN MAX: In-room LED displays illustrating pressure, temperature and humidity, feeding back to centralised computer screen with GT Scan Max EMS software for alarms and data storage. Alarms are also provided via text, email or phone call as well as in-room beacons.



CEILING: GT LID PRO: A 45mm radius coving is applied to bridge the 90-degree join between wall and ceiling panel. Panels use the same airtight integrated envelope system, utilising extruded aluminium interface connection profiles to ensure fully flush detail. Pre-formed corner panels provide a flush finished corner detail.



CONTROLS & BMS: All plant is controlled with a centralised Graphical User Interface (GUI) via a touchscreen display housed in the change area. This receives a signal from the AHU, FFUs, lighting, door interlocks and provides control functionality as well as centralised data that can be fed back to the main building BMS.



FLOORING: GT DECK PLUS: ESD vinyl, hot-welded and coved 100mm from floor level with a fully flush connection to wall via intelligent recessed floor track detail which vinyl lays under with silicone sealed finish.



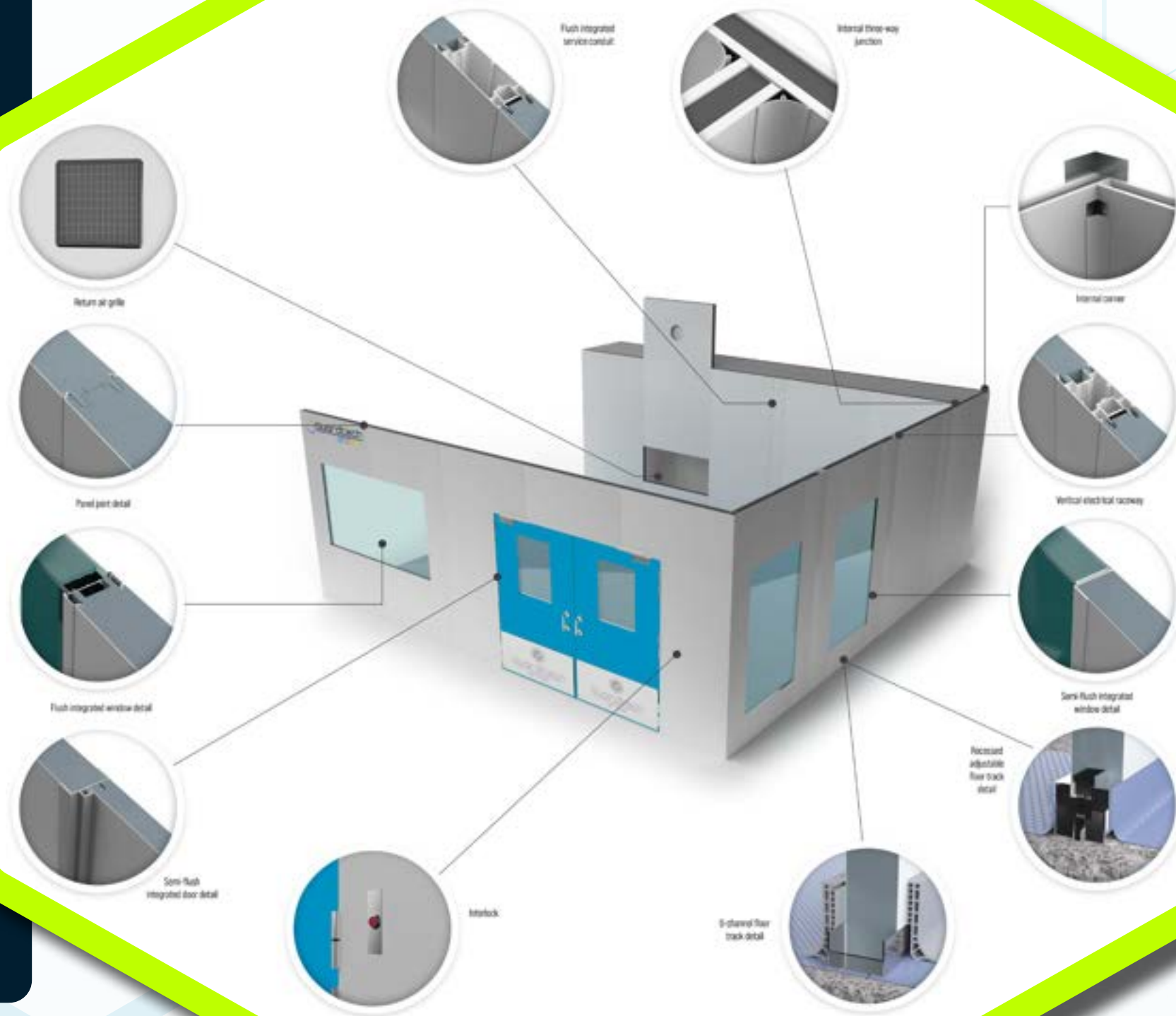
FURNITURE: Standard units include: workbenches, stepover benches, cabinets, racking and dispensers manufactured from grade 304 stainless steel frames and Trespa TopLab work surfaces. However, full fit-out is available upon request. For more information and to the full range, visit www.guardtech.com.



UTILITIES INTEGRATION: Most utilities will be terminated with wall mounted sockets/outlets with wiring, pipework and containment concealed behind the wall panel within the return air plenum. All penetrations will be silicone sealed, small power and data sockets will be flush mounted.



EQUIPMENT: Standard units do not incorporate equipment. However, full fit-out is available upon request. For more information and to the full range, visit www.guardtech.com.





INTERNAL SPECIFICATION LEVELS



CleanCube
mobile cleanrooms

CNC

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video content



Internal corner



Return air grille



Internal three-way junction



Panel joint detail



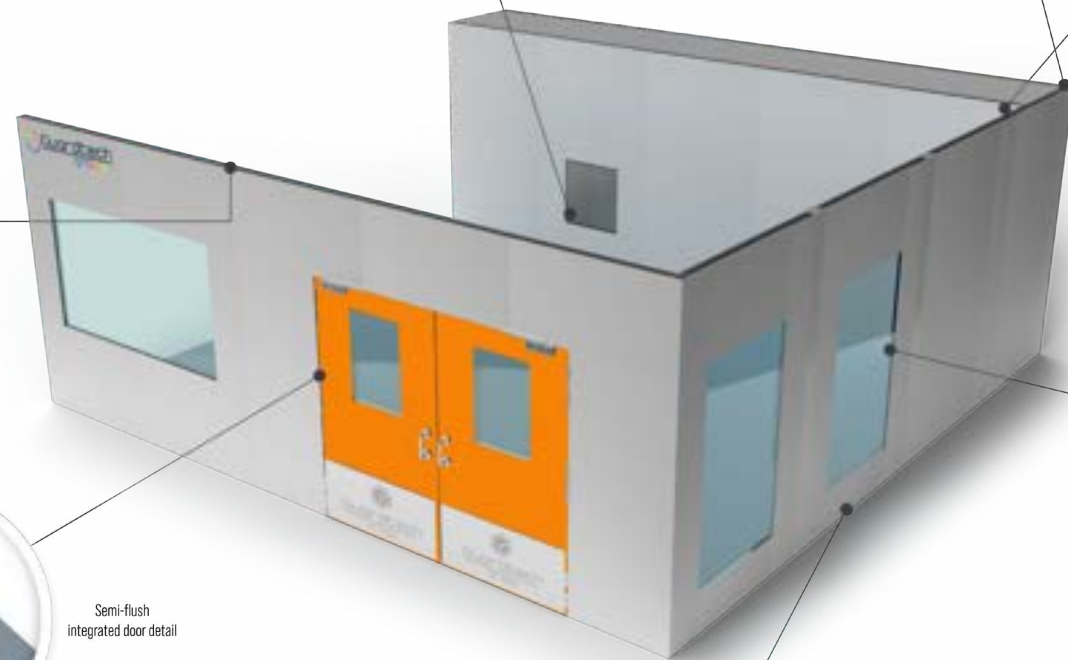
Semi-flush integrated
window detail



Semi-flush
integrated door detail



U-channel floor
track detail



The CleanCube CNC Specification is designed to provide a quality, cost-effective balance of components that will best suit an unclassified controlled environment. CNC utilises materials that are specified for low-

er-grade cleanroom builds whilst downgrading some of the mechanical & electrical interfaces typically excluded from cleanrooms, thus providing a high-grade laboratory finish whilst utilising off-the-shelf components and plant. Utilising a composite

panel system for the main structural elements, such as walls and ceilings, and ensuring that supporting components including doors, glazing, flooring, lighting and accessories are manufactured from laboratory quality materials, whilst also considering furniture &

equipment layouts to best utilise space. The CleanCube CNC Specification also logically incorporates and conceals all utilities by utilising the channel behind the wall panels, eliminating surface-mounted pipework, cabling and service conduits.



CleanCube
mobile cleanrooms

CNC COMPONENTS



Classifications Available
Controlled Not Classified



WALLS: GT SHELL PLUS: CLEANsafe insulated panels incorporating a panel joint that achieves excellent thermal performance and can accommodate vapour and hygiene safe seals. GT Shell Plus panels achieve low air leakage and resist moisture ingress and any risk of toxic mould and bacterial growth.



LIGHTING: GT LUX PLUS: Recessed LED, 4k colour temperature, 5,200 lumens per light fitting providing 1,000 lux at bench level. Roomside access diffuser for clean LED change. PIR motion sensor activated.



DOORS: GT ACCESS LITE: Powder-coated steel door with a standard anodised aluminium frame, featuring ECOSafe PIR insulation core and a clear opening width of 1100mm (single) or 2200mm (double). 40mm door leaf thickness – includes vision panels and aluminium kickplates as standard.



HVAC & FILTRATION: GT AIR LITE: Wall-mounted cassettes providing air conditioning via recirculated air matched with external condensers sized to overcome room heat gains and provide stable temperature control.



GLAZING: GT VISION PLUS: Fully flush mounted glazed units consisting of aluminium frame and two panes of 6mm thick laminated glass, glued and silicone sealed on both sides to the frame. Glazing panels slot into the holistic integrated envelope solution via extruded aluminium interface connection profiles.



ENVIRONMENTAL MONITORING: GT SCAN PLUS: In-room LED displays illustrating pressure, temperature and humidity, feeding back to centralised computer screen with GT Scan Plus EMS software for alarms and data storage.



CEILING: GT LID PRO: A 45mm radius coving is applied to bridge the 90-degree join between wall and ceiling panel. Panels use the same airtight integrated envelope system, utilising extruded aluminium interface connection profiles to ensure fully flush detail. Pre-formed corner panels provide a flush finished corner detail.



CONTROLS & BMS: Lights are controlled via PIR motion detection sensor, air conditioning controlled via wall-mounted digital display.



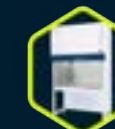
FLOORING: GT DECK LITE: Vinyl, hot-welded and coved 100mm from floor level, connection to wall via overlay onto the panel and finished with a rubber capping strip and silicone seal.



FURNITURE: Standard units include: workbenches, stepover benches, cabinets, racking and dispensers manufactured from grade 304 stainless steel frames and Trespa TopLab work surfaces. However, full fit-out is available upon request. For more information and to the full range, visit www.guardtech.com.



UTILITIES INTEGRATION: Most utilities will be terminated with wall mounted sockets/outlets with wiring, pipework and containment concealed behind the wall panel within the return air plenum. All penetrations will be silicone sealed, small power and data sockets will be flush mounted.



EQUIPMENT: Standard units do not incorporate equipment. However, full fit-out is available upon request. For more information and to the full range, visit www.guardtech.com.

VEHICULAR CONVERSIONS



MOBI 3.5-TON



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video content



COVING

Wall-to-wall and wall-to-ceiling coving available. Fully flush panel system provides flush floor connection as per photo.



FLOORING

Homogenous vinyl floor reinforced with cross-linked polyurethane, UV-cured, hot-welded joints. Coved 100mm up the wall over underlay former and capped. Copper-grounded anti-static vinyl also available.



WALLS

Powder-coated CR4 mild steel panels with polyisocyanurate (PIR) insulated core and interlocking joints. The panels feature a 50mm thickness to form walls and ceiling. Highly durable, cleanable and chemically resistant – silicon sealed.

MOBI+ 7.5-TON

IMPORTANT INFORMATION TO NOTE:
Guardtech's 3.5-ton Mobi can be driven on a standard UK licence. The 7.5-ton Mobi+ version requires a specialist licence and a tachograph will also need to be installed and operated.

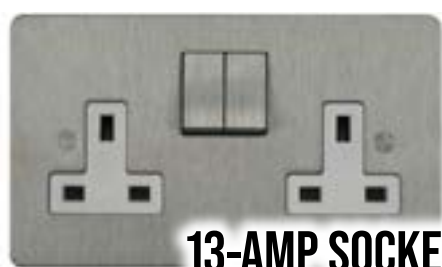
All CleanCube vehicles are fully RAC checked. Internal weight restrictions will apply. Leasing options available. Vehicle owner will be responsible for road tax, MOT and insurance.

FILTRATION

For ISO 14644 compliant environments Fan Filter Units (FFU) with H14 HEPA filters and G4 pre-filters, provide 1,000m³/hour of filtered air. HEPA filtration can also be placed on the exhaust to provide BSL-3 compliance. For ceiling heights of 2.1m FFL slimline FFUs are installed in the ceiling to provide vertical laminar flow. For ceiling heights of between 2.1m and 2.5m cleanrooms are horizontal flow.

DOORS

Choice of doors available: rapid rise doors – PVC curtain with stainless frame and GRP or powder-coated steel personall doors with stainless steel push plate, kick plate and handle with 400mm x 400mm vision panel. All Guardtech doors can be electromagnetically interlocked. Also available as a fully flush system with recessed base for flooring to cove into.



13-AMP SOCKET

All CleanCube models can include stainless steel or white plastic 13-amp sockets mounted flush. CAT6 network sockets and 16amp or 32amp three-phase options are also available in the range.



SINK

Self-contained stainless steel sinks with container-fed hot & cold water supply and separate drainage vessel. Motion sensor-activated tap, soap & towel dispenser attached.



POWER SOURCE

Safety isolation transformers on all CleanCubes provide the mobile unit with independent grounding from the connected power source. 32amp male hardwired plug exterior-mounted.



LIGHTING

Powder-coated steel light units, flush mounted into the ceiling panels with drop-down hinged diffuser. Also available as surface-mounted aluminium LED batten luminaires for laboratories. Activation by switch or PIR (passive infrared) sensor. Lights can be UV filtered for photo sensitive processes.



AIR CONDITIONING

Temperature control via VRF split system serving a plenum for cleanrooms or wall-mounted recirculating units for labs. Humidity control also provided via upflow units or separate desiccant wheels. External condensers can be contained in attached plant rooms or mounted on CleanCube exterior.



FURNITURE & EQUIPMENT

CHAIRS

Our MVMT Pro chairs are designed for critical environments, including static-sensitive and particle/microbe-controlled areas. The MVMT Pro offers weight-activated control, meaning an individual user's weight sets the tension, which alleviates resetting controls in multi-user shift workplaces.



TRANSFER HATCHES

These hatches provide a controlled air-tight zone for the transfer of products on trolleys, eliminating unnecessary traffic from the cleanroom, reducing particle ingress and decreasing the risk of cross-contamination.



LAMINAR FLOW UNIT

Guardtech have partnered with Esco to bring you an extensive, exciting range of equipment solutions for your CleanCube, with an array of models to meet your laminar flow clean bench needs. Esco's new generation Airstream® laminar flow units offer a wide range of options in terms of material specs, width and height.



ACCESSORIES

Guardtech can offer a number of cleanroom accessories with their range of CleanCubes, including Dyson Airblade hand dryers, various dispensers and stainless steel coat hooks.



Press play for video content

BIOSAFETY CABINET

Guardtech are delighted to offer the full range of Esco biosafety cabinets in all of our CleanCube models. This includes delivery, fitting and commissioning – if required. Popular installations feature the Airstream Class II

Biosafety Cabinet – AC2-4E8 4ft model, but we can adapt the layout to meet your operational requirements.



SHELVING UNIT



SINK



WORK BENCH



CABINET



STEPOVER BENCH

Stainless steel shelving units available in a range of sizes and shelf configurations. These units are resistant to harsher cleaning products and are specially designed to be easy to clean, durable and functional.

Self-contained stainless steel sinks with container-fed hot & cold water supply and separate drainage vessel. Motion sensor-activated tap, soap & towel dispenser attached.

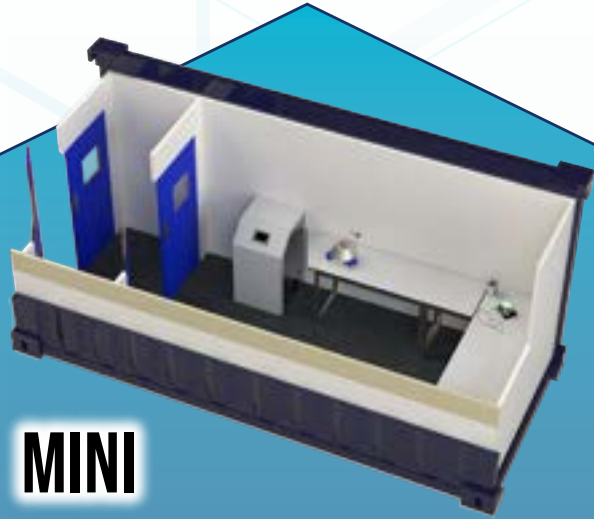
Whether it's chemical-resistant Trespa TopLab or simply a stainless steel surface you require, we can fit out your CleanCube with high-spec workbenches to ensure the quality of what you do isn't compromised.

Guardtech's CleanCube cabinets are manufactured from either Trespa or grade 304/316L stainless steel. The units are available with a range of door and drawer configurations, stainless fixtures and fittings and can be arranged as mobile units on casters or static cabinets on solid levelling legs.

CleanCube stepover benches come as standard seating benches on levelling legs or with storage compartments underneath for shoes, garments, PPE and consumables. Manufactured from Trespa or grade 304/316L stainless steel, Guardtech's stepover benches are durable and easy to clean.

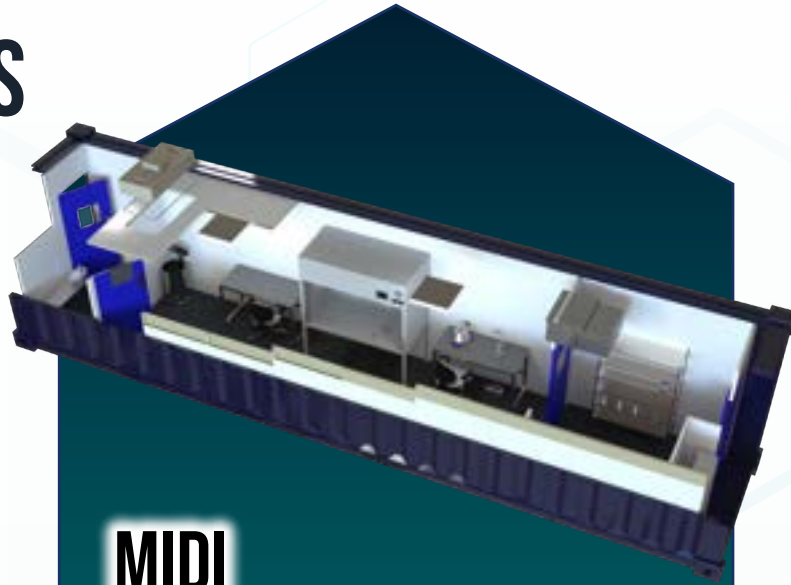


RENTAL OPTIONS



MINI

Total Area	15m ²
Cleanroom Area	10m ²
PAL/MAL Area	2.5m ² /0m ²
Plant Area	2.5m ²
Internal Height	2.1m
Classification	ISO6
Temperature	21+/- 2°C
Humidity	30-60% typically
Lux Level	500
Wall & Ceiling Panels	GT Shell Pro
Flooring	GT Deck Plus
Doors	2 no. GT Access Plus
13amp Double Sockets	8 no. flush mounted PVC
CAT6A Data Points	4 no. flush mounted PVC
Furniture	1 no. stainless steel stepover 4 no. Trespa workbenches 1 no. stainless steel racking unit 1 no. mobile sink unit 1 no. Trespa under bench cabinet 1 no. 3-compartment dispenser 1 no. stainless steel coat hooks 1 no. stainless full-length mirror
EMS	GT Scan Pro temperature, humidity & pressure sensors, LED wall display
Weekly Rental Price	POA
Minimum Hire Period	3 months



MIDI

Total Area	30m ²
Cleanroom Area	Room 1:12.5m ² / Room 2: 10m ²
PAL/MAL Area	5m ² /0m ²
Plant Area	2.5m ²
Internal Height	2.1m
Classification	ISO6
Temperature	21+/- 2°C
Humidity	30-60% typically
Lux Level	500
Wall & Ceiling Panels	GT Shell Pro
Flooring	GT Deck Plus
Doors	3 no. GT Access Plus
13amp Double Sockets	16 no. flush mounted PVC
CAT6A Data Points	8 no. flush mounted PVC
Furniture	1 no. stainless steel stepover 6 no. Trespa workbenches 2 no. stainless steel racking unit 1 no. mobile sink unit 2 no. Trespa under bench cabinet 1 no. 3-compartment dispenser 1 no. stainless steel coat hooks 1 no. stainless full-length mirror
Equipment	2 no. transfer hatches 1 no. biosafety cabinet or 1 no. laminar flow units
EMS	GT Scan Pro temperature, humidity & pressure sensors, LED wall display
Weekly Rental Price	POA
Minimum Hire Period	3 months



MAXI

Total Area	60m ²
Cleanroom Area	50m ²
PAL/MAL Area	5m ² /2.5m ²
Plant Area	2.5m ²
Internal Height	2.4m
Classification	ISO6
Temperature	21+/- 2°C
Humidity	40-60%
Lux Level	500
Wall & Ceiling Panels	GT Shell Pro
Flooring	GT Deck Plus
Single/Double Doors	2 no./2 no. GT Access Plus
13amp Double Sockets	20 no. flush mounted PVC
CAT6A Data Points	12 no. flush mounted PVC
Furniture	1 no. stainless steel stepover 10 no. Trespa workbenches 4 no. stainless steel racking unit 1 no. mobile sink unit 4 no. Trespa under bench cabinet 1 no. 3-compartment dispenser 1 no. stainless steel coat hooks 1 no. stainless full-length mirror
Equipment	2 no. transfer hatches 1 no. biosafety cabinet or 1 no. laminar flow units
EMS	GT Scan Pro temperature, humidity & pressure sensors, LED wall display
Weekly Rental Price	POA
Minimum Hire Period	3 months



MOBI

Total Area	12m ²
Laboratory Area	10m ²
PAL/MAL Area	N/A
Plant Area	2m ²
Internal Height	2.3m
Classification	BSL2
Temperature	21+/- 2°C
Humidity	Uncontrolled
Lux Level	500
Wall & Ceiling Panels	GT Shell Pro
Flooring	GT Deck Plus
Single Doors	1 no. GT Access Lite
13amp Double Sockets	8 no. flush mounted PVC
CAT6A Data Points	4 no. flush mounted PVC
Furniture	3 no. Trespa workbenches 1 no. stainless steel racking unit 1 no. mobile sink unit 2 no. Trespa under bench cabinet 1 no. 3-compartment dispenser 1 no. stainless steel coat hooks 1 no. stainless full-length mirror
EMS	GT Scan Pro temperature, humidity & pressure sensors, LED wall display
Weekly Rental Price	POA
Minimum Hire Period	3 months



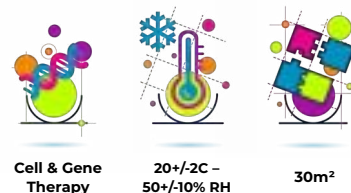


THE CLIENT

Oxford University Hospitals NHS Foundation Trust – an English teaching hospital and part of the Shelford Group, a collaboration of ten of the largest teaching and research NHS hospital trusts in England. OUH is one of the UK's largest teaching hospitals and one of the largest hospitals in Europe. The trust is made up of four hospitals – the John Radcliffe Hospital (which includes the Children's Hospital, West Wing, Eye Hospital, Heart Centre and Women's Centre), the Churchill Hospital and the Nuffield Orthopaedic Centre, all located in Oxford, and the Horton General Hospital in Banbury, north Oxfordshire.

THE BRIEF

Oxford University Hospitals' Pharmacy Department required a temporary cleanroom facility to facilitate the aseptic production of medicinal products – including Advanced Therapy Medicinal Products (ATMPs) for clinical trials – whilst they construct a new fully scoped-out manufacturing facility in their main building.



Press play for
video content



“An interesting CleanCube with challenging modifications...”

Guardtech Group Commercial Director Mark Wheeler said: “It was great to produce such an interesting CleanCube GMP with some really challenging modifications.

“The lessons we learnt in designing and building this model will serve us well in the future as we continue to provide more and more exciting, bespoke units for clients doing revolutionary work in the fields of Science, Engineering and beyond.”

Mark Wheeler
Guardtech Group
Commercial Director

NHS
Oxford University Hospitals
NHS Foundation Trust

CleanCube
mobile cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

◆ **Structural:** GT Shell Pro wall panels, GT Lid Pro panelled ceiling, GT Access Plus semi flush single doors, GT Deck Plus flooring capped & coved, emergency break out perspex panel in stainless frame with rubber gasket seal.

◆ **Electrical:** GT Lux Lite lighting providing 750 lux at bench level, 13-amp sockets flush mounted in classified areas, double CAT6a data sockets, uninterrupted power supply (UPS) with touchscreen interface, electromagnetic door interlocks.

◆ **Mechanical:** GT Air Slim H14 HEPA slimline Fan Filter Units with G4 Pre-Filters, 3.6kW and 7.1kW air condition fan coil units suspended within the ceiling void above the panelled ceiling, providing temperature control within three separated plenums matched to three external condensers.

◆ **Monitoring:** GT Scan Pro environmental

monitoring system (EMS) featuring in-room stainless steel LCD transmitters displaying temperature, humidity & pressure, with information fed back to desktop PC control system.

◆ **Furniture & Equipment:** Trespa TopLab workbenches with stainless steel frames, Trespa stepover bench with compartments, stainless steel mobile sink, Trespa under bench cabinets, stainless steel transfer hatches with mechanical interlocks and thermoplastic door vision panels, stainless steel wire racking, stainless steel 3-compartment dispenser, stainless steel coat hooks, full-length stainless steel mirror.

THE CHALLENGES

Individualised temperature zones: This was essentially a CleanCube GMP at heart, but there were still a number of major modifications to challenge both Guardtech's Design and Installation teams. The design had to accommodate a significant amount of utilities in a minimised footprint – with an individualised temperature zone for each room in the container. Guardtech needed to accommodate

three separate fan coil units across the entire unit within a very restricted 500mm ceiling void/plenum.

Battery back-up: It was essential that this unit had a critical emergency power supply support solution in place, and so the CleanCube team created a dedicated plant cupboard to house an Uninterrupted Power Supply (UPS) to give complete battery back-up for the CleanCube.

Isolating the issue: The client needed the 40ft unit to not only include both primary and secondary change areas, but also space to house a very large isolator. This was not something we'd tackled before in a CleanCube, but it was a challenge we were more than ready for – and duly surmounted.



 Press play for
video content

Sweden

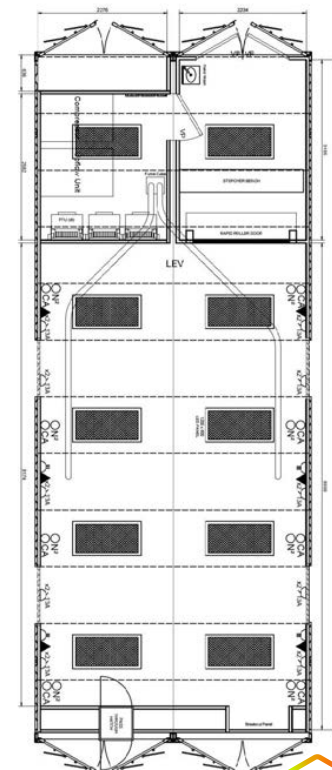
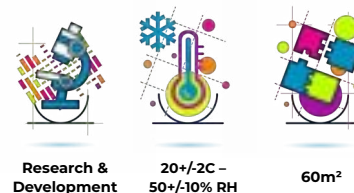
Guardtech
group
International
Case Study

THE CLIENT

A global provider of technologies and services that advance and accelerate the development, manufacture and delivery of therapeutics. Our client's customers undertake life-saving activities ranging from biological research to developing innovative vaccines, biologic drugs and novel cell and gene therapies. The client supplies the tools and services their customers need to work better, faster and safer, leading to better patient outcomes.

THE BRIEF

The client needed some additional space for their Life Science Research & Development activities – primarily gene therapy testing which allowed critical final tweaks to their product prior to mass production. The client required the Maxi to be shipped to their base in Sweden – a facility where customers are able to experience the entire production process, from design to R&D (in our CleanCube Maxi), to production (the building next door) through to seeing the final product.



"We can't wait to see how it performs..."

Guardtech Group Commercial Director Mark Wheeler said: "It was such a pleasure to take on this exciting project for such a distinguished client. "The Design and Install teams worked so well with the Project Manager and Commercial department to ensure all the complexities of this Maxi unit worked in perfect harmony. "We're so proud to see another amazing CleanCube shipped overseas and can't wait to hear the results of how it performs in such challenging conditions over in Sweden."

Mark Wheeler
Guardtech Group
Commercial Director

Guardtech
groupCleanCube
mobile cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

◆ **Structural:** GT Shell Pro semi-flush de-ended wall panel system, GT Lid Pro de-ended ceiling panel system, GT Access Plus semi-flush single doors, GT Access Lite powder-coated steel double doors, GT Rise Pro rapid roll door with electromagnetic interlocks and status indicators, GT Vision Plus vision 1,000 x 1,000mm panels with internal vents, emergency escape breakout panel, GT Deck Plus ESD vinyl flooring with white rubber capping in Sapphire Blue.

◆ **Electrical:** European small power sockets, 63amp 3-phase power, CAT6 data sockets, conduit in panel void for containment, GT Lux Lite luminaires providing 1250 lux levels with PIR sensors, electromagnetic interlocks, smoke detection heads & panel fire alarm system.

◆ **Mechanical:** GT Flow Max Fan Filter Units

with H14 HEPA & G4 Filters providing 50 air changes per hour, GT Air Pro 19.7kW Upflow CRAC Unit ducted to plenum, LEV extraction arms connected to Purex FumeCube extracting 360m³/hr, compressed air system, nitrogen system, dessicant dryer, vertical air receiver.

◆ **Monitoring:** GT Scan Pro Environmental Monitoring System with Oncall Finestra Software measuring temperature, humidity, pressure via in-room LED displays and PC with wall-mounted monitor. Includes in-room alarm beacons.

◆ **Furniture & Equipment:** Stainless steel stepover bench, full-length stainless steel mirror, stainless steel sink with motion sensor taps, mechanically interlocked stainless steel transfer hatches.

THE CHALLENGES

Timescale and complexity: The Maxi was built in a rapid timescale, particularly given the complexity of the unit. Manufacturing Manager Michael Burton remarked that it was the "most sophisticated CleanCube" that he'd worked on to date, with LEV arm extraction, nitrogen, compressed air, three-phase elec-

trics and a hefty HVAC system. "We got so much into such a relatively small space," says Mr Burton. "Roller shutter doors, sinks, environmental monitoring, all the Fan Filter Units, LEV arms, all the different utilities, three-phase sockets – it was a fantastic effort from the team."

Bracing for the cold: This project was hampered by troublesome conditions here in the UK, with a series of icy mornings, snowfall and heavy rain playing havoc with the manufacturing schedule and presenting plenty of on-going installation challenges.

However, that's nothing compared to the -25C extreme cold weather the unit will be facing in its final destination in Sweden – and with the internal temperature set at 20C, that presented the team with more potential issues. The Design and Install teams fashioned a creative solution with air vents in the windows, ensuring there wouldn't any condensation and that the unit could handle the 45C disparity from outside to inside.

Big fans: The Install team had to devise an intelligent 'stepped ceiling' inside the container, as the stacked wall of Fan Filter Units required to deliver an ISO7 room, as well as the frame to hold them, was higher than initially planned.

Continued on next page

CLEANCUBE MAXI

Contact Us
Guardtech
group



By eating into the plenum space at the top of the container, this also meant that some of the critical pipework had to be cleverly re-routed. Some seriously creative layout work ensued and some excellent solutions were achieved.

Reinforcement: Because of the nature of the CleanCube Maxi design, where the central walls of each container are removed prior to connection, plus the fact that this particular project required some heavy duty transportation and lifting, the containers needed to be adequately re-enforced.

The Design and Install teams worked together to ensure a solution was devised which meant the structural integrity of the finished product would not be compromised in transport.

Heating up: Upon arrival in Sweden, the weather proved challenging, with heavy snowfall and extreme cold. Fortunately,

this had been accounted for in the design phase and so the Air Handling Unit (AHU) and heaters installed in the CleanCube were oversized accordingly.

Squeezy does it: A notable feature of this particular CleanCube project was the high

number of critical systems that had to be squeezed into a relatively tight space.

As well as small power, data connectivity and 3-phase power there was compressed air, nitrogen, LEV extraction, a rapid roller door, a fire alarm system and a comprehensive environmental monitoring system (EMS), all resulting in a beautifully designed, robust, high-performance portable clean-room solution.



THE RESULT

Guardtech Group Commercial Director Mark Wheeler said: "It was such a pleasure to take on this exciting project for such a distinguished client.

"The Design and Install teams worked so well with the Project Manager and Commercial department to ensure all the complexities of this Maxi unit worked in perfect harmony.

"We're so proud to see another amazing CleanCube shipped overseas and can't wait to hear the results of how it performs in such challenging conditions over in Sweden."



Cignpost
diagnostics

THE CLIENT

Cignpost Diagnostics – providers of COVID-19 screening and other healthcare services. They combine operational agility with leading gold standard test technologies. Cignpost Diagnostics provide healthcare services to a range of industries including media and sport.

THE BRIEF

Develop rapid response units for the COVID-19 pandemic. CleanCube shipping containers and modular buildings created for oil and gas industries were developed quickly with Cignpost Diagnostics to find COVID-19 solutions. From conception to delivery, the first Luton Box Van mobile cleanroom was produced in three weeks. As of June 2021, we'd produced one tour bus conversion, seven vans, three modular buildings and 18 shipping containers, as well as two permanent laboratories.

Analysis/
Diagnostics

21°C +/-3

Numerous
units

“Guardtech made a complicated process very easy...”

“We started working with Guardtech soon after the pandemic hit in the UK. Cignpost Diagnostics was focused on providing screening services to allow people to get back to work safely and securely.

“To enable this, we needed mobile laboratories manufactured to BSL2 safety standards.

“We engaged with Guardtech and they made what could have been a complicated process very easy. We can recommend Guardtech unequivocally.”

Cignpost
diagnosticsCleanCube
mobile cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech, built to the following specification:

◆ **Structural:** [GT Shell Plus](#), [PIR Wall Panels](#), [GT Lid Max](#), [PIR Ceiling Panels](#), [GT Shell Lite Wall Cladding](#), [GT Access](#), [Lite GRP Doors](#), [GT Deck Plus](#), [Vinyl Floor Capped & Coved](#).

◆ **Electrical:** 13amp double sockets contained in three-compartment PVC trunking ran around all perimeter walls. Safety isolation transformer provides earthing for all units. 32amp single phase hook-up.

◆ **Mechanical:** Filtration provided by H14 HEPA filters powered by fan filter units, recirculating wall-mounted air conditioning cassettes, mobile sinks with self-contained supply and effluent containers.

◆ **Monitoring:** Magnehelic pressure gauges.

◆ **Furniture:** Bespoke Trespa workbenches on grade 304 stainless steel frames, Trespa seating benches, stainless steel coat hooks.

THE CHALLENGES

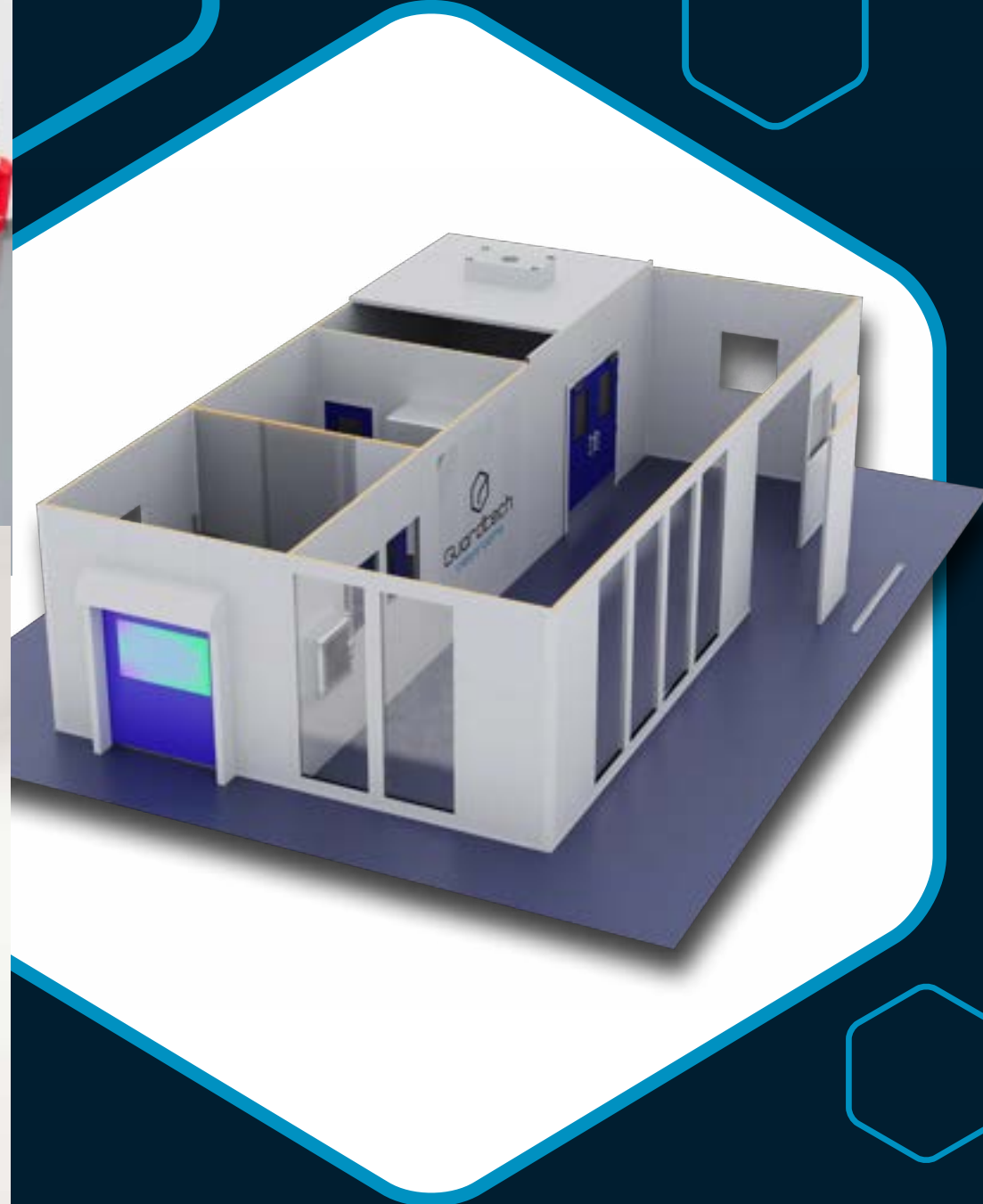
Timeframe: A rapid turnaround was required to protect both potential COVID-19 sufferers and staff working in the units. Guardtech managed to produce fully fitted-out Biosafety Level 2 labs in just two weeks per CleanCube. Sourcing vehicles, finding appropriate materials and factoring in installation time presented numerous challenges. The Guardtech team worked around the clock to fulfil orders for these vital CleanCubes.

Space optimisation: The benefit of being able to have compact BSL2 labs in places where space was at a premium was crucial for firms tussling with the COVID-19 pandemic. But this also meant that the footprint in each unit was severely restricted. In fact, the biggest footprint in some labs was just 4.5m x 2.5m – but Guardtech engineers somehow managed to fit an entire lab in

that space, including external plant equipment such as air con condensers. The team were tasked with fitting the units with bespoke Trespa workbenches, which lined the perimeter, that couldn't be as deep as standard benches. Attention to detail was key – every millimetre needed to be diligently planned out.

Electrical connection: Our skilled technicians installed safety isolation transformers to give the units independent earthing points – ensuring the supply was safe. The initial design featured the use of a standard 32amp single phase supply, but we have since developed an alternative domestic connections solution using two 13amp plug sockets.

Fitting in: In one tricky case, the client wished to add a Bio Safety Cabinet to their unit after it had been sent into the field. The BSC might have been too tall to fit, but a restrictive ceiling is not the kind of thing that derails Guardtech – and so with some inspired tinkering from our Installation experts, the van's plenum was cut into and totally reworked so the tall standing unit could be included.



Guarotech
cleanrooms



MODULAR CLEANROOM

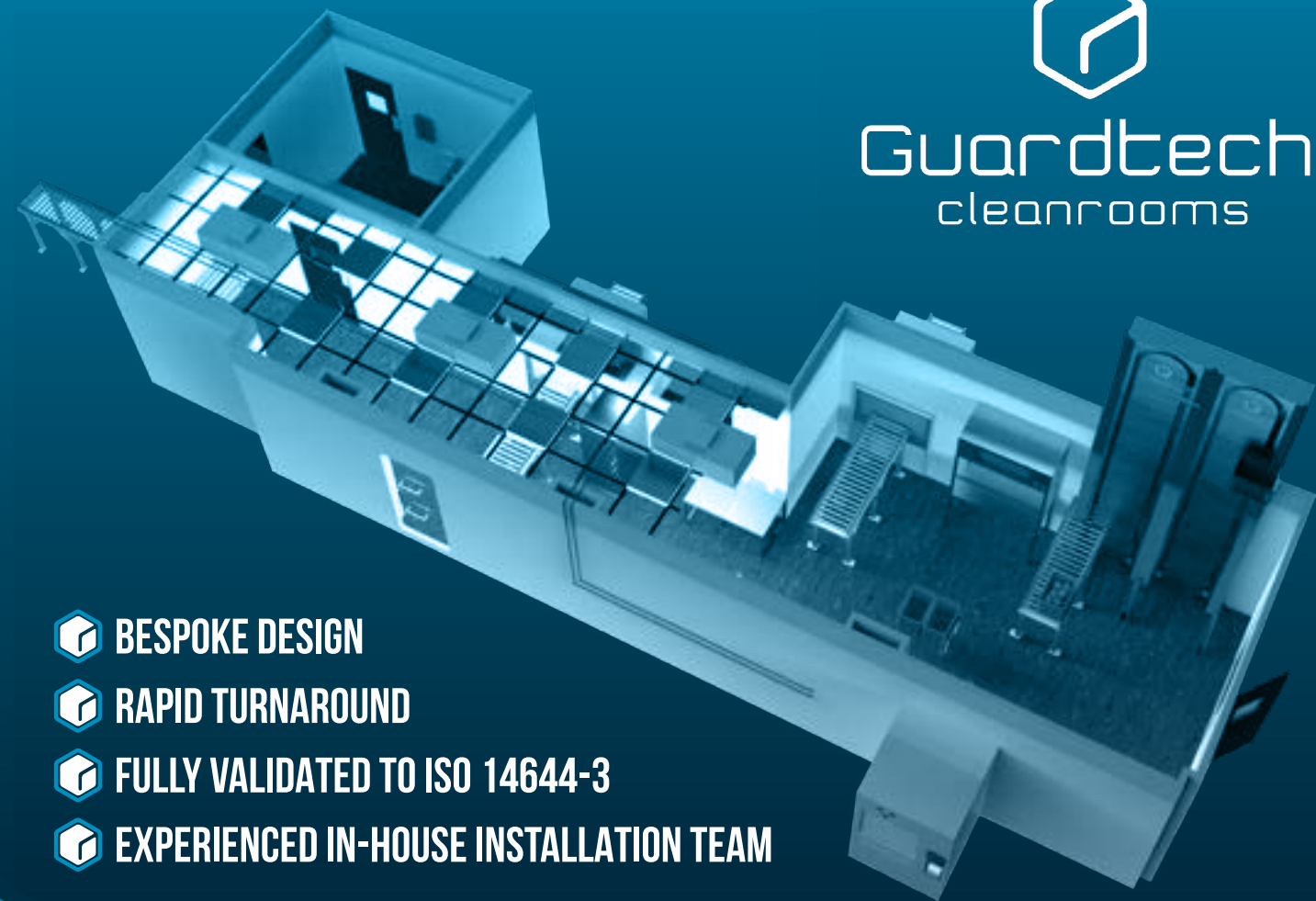
ENQUIRY FORM





Name:
Location:

Company:
Telephone:

Position:
Email address:

Installation address																
How did you hear about us?	Google: Magazine advert:		Bing:	Email: Event or exhibition:	Word of mouth: Business directory:	Facebook:	Twitter: Other:	LinkedIn:								
Function	Cleanroom:		Laboratory:		Biosafety Lab:		Containment Suite:									
Classification	ISO8:	ISO7:	ISO6:	ISO5:	Level One:	Level Two:	Level Three:									
External cleanroom dimensions	Length:		Width:		Height:											
Personnel airlock (PAL)	Length:		Width:		Height:											
Materials airlock (MAL)	N/A:	Length:		Width:		Height:										
Internal rooms	One:	Two:	Three:	Four:	Five:	Six:										
Panel system	Fully Flush:		Semi Flush:													
Doors	Rapid Roll:		Single Doors:		Double Doors:		Quantity:									
Windows (quantity)	900 x 900mm:		windows		1500 x 900mm:		windows									
Flooring	N/A:	Vinyl:		ESD Vinyl:		Resin:										
Temperature control	No:	Yes:	°C +/-		°C											
Humidity control	No:	Yes:	°C +/-		°C											
Heatload	Max Occupancy:		operators		Equipment:		kW									
Lighting	500 Lux:		750 Lux:		1250 Lux:											
13-amp double sockets	N/A:	2:	4:	6:	8:	10:	15:	20:	25:	30:	35:	40:				
Network sockets	N/A:	2:	4:	6:	8:	10:	15:	20:								
3-phase power	N/A:	16-Amp:		outlets		32-Amp:		outlets		63-Amp:		outlets				
Other mechanical requirements	Compressed Air: Purified Water:		Extraction: Town's Water Supply:		Process Gases:		Central Vacuum:		Drainage:							
Environmental monitoring	Analogue – Pressure Only:				Digital – Temperature, Humidity & Pressure: Full Environmental Monitoring System – With Sensors & Software:											
Furniture (quantity)	Stepover Bench: Sink:		Trespa Work Bench: Garment Rail:		Ergonomic Chairs: Bin:		Storage Cabinet:									
Equipment (quantity)	Laminar Flow Unit:		Biological Safety Cabinet:		Transfer Hatch:		Trolley Hatch:		Autoclave:							



-  BESPOKE DESIGN
-  RAPID TURNAROUND
-  FULLY VALIDATED TO ISO 14644-3
-  EXPERIENCED IN-HOUSE INSTALLATION TEAM

MODULAR CLEANROOMS

GUARDTECH CLEANROOMS are a specialist design & build company, constructing custom cleanrooms, controlled environments, containment suites and laboratories.

Guardtech modular cleanrooms are a flexible and affordable way to create versatile controlled environments – completely scalable, from 20m² to 2,000m². Modular cleanrooms can be altered, expanded, upgraded and relocated, ensuring your environment continues to meet the demands of your business and your future growth.

Guardtech offer a variety of materials to complete your modular cleanroom, and a tiered product range helps you to align specification with budget.

A specialist in-house Design Team, with decades of cleanroom experience, focus on delivering concepts that

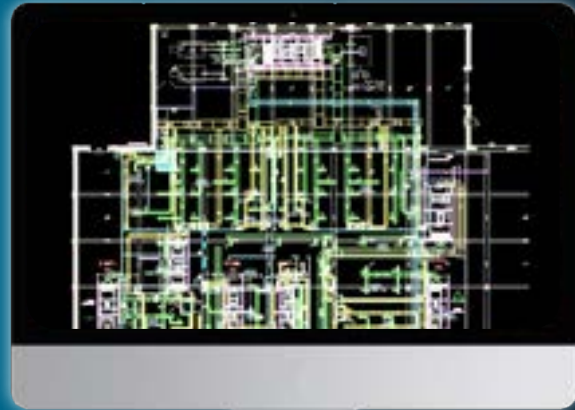
facilitate client application and process, whilst optimising the host building and incorporating process utilities.

Guardtech create bespoke classified environments, fully customised to suit a range of industries and applications. Turnkey installations are project managed and delivered by Guardtech's dedicated structural, mechanical & electrical Installation Engineers.

All projects are commissioned and validated by the Guardtech Group Decontamination & Validation Team and supported with detailed, quality assured technical documentation providing full compliance to standards.

Press play for video content

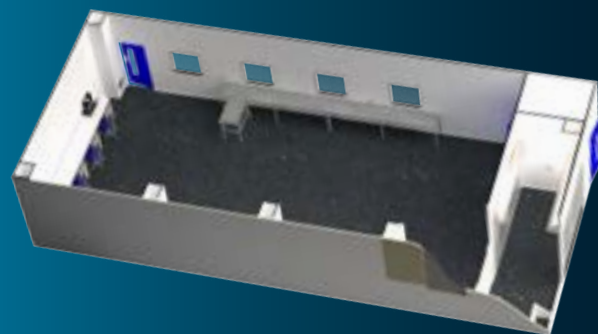
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Organogram	
Case Studies	



DESIGN

Guardtech employ their own in-house Design Team for 2D drafting, 3D & BIM modelling and mechanical and electrical design, working with AutoCAD, SolidWorks and Revit. Guardtech can also produce 3D virtual walk-through tours of your facility supported by virtual reality (VR) headsets to allow an interactive experience with your cleanroom design.

For more information about our wider services, see page 10



COVING

Wall-to-wall and wall-to-ceiling coving available. Fully flush panel system provides flush floor connection as per photo.



DOORS

- Rapid rise doors: PVC curtain door with 304 stainless steel frame and housing, motion-sensor activation.
- GRP or powder-coated steel personnel doors: single or double, stainless steel handle, push and kick plates, 400mm x 400mm vision panel.
- All door options can be electronically interlocked.



GLAZING

Fully-flush or semi-flush glazing options available. A range of sizes from standard viewing panels to full height gallery windows. Fish tank glazing also available.



WALLS

Powder-coated mild steel structural panels with interlocking joints come with a range of insulation cores and thicknesses, can be FR30 and FR60 fire-rated and have a range of coatings applied. Highly durable, cleanable and chemically resistant, the walls are silicon sealed between joints to provide a crevice-free installation.



Press play for video content



CEILING

Panelled ceilings specifications are as per the cleanroom wall system – alternatively, ceiling grid and tiles can be utilised. Considerations for walk-on applications can be accommodated by both of these ceiling types.



FLOORING

Vinyl: homogenous vinyl floor reinforced with cross-linked polyurethane, UV-cured, hot-welded joints. Coved 100mm up the wall over underlay former and capped. Copper-grounded anti-static vinyl also available.

Resin: flexible epoxy or urethane floor screed that provides protection for heavy-duty environments whilst also being highly chemically resistant, slip resistant and cleanable.



ANCILLARIES



Mezzanine Floor

To optimise your available space and support the cleanroom structure, we offer full mezzanine design and installation, including edge protection, staircases and cat ladders.



Supporting Steelwork

For applications where the host building cannot be used to support the cleanroom structure, steelwork erections may be necessary – these can also be used to facilitate plant gantries and maintenance access.



Fire & ATEX Ratings

We are able to offer fire rated and ATEX rated components for all structural, electrical and mechanical parts of the build. These ratings are often dependant on review from insurers or building control.



MECHANICAL & ELECTRICAL

FILTRATION

For ISO14644 compliant environments, H14 HEPA filtration is required. This can be delivered in the form of terminal filters connected to air handling units (AHUs) via ductwork or as individual fan filter unit modules powered by fan speed controllers. HEPA filtration can also be placed on the exhaust via plenum boxes or specialist safe change units to facilitate containment or eliminate cross contamination.



HVAC

Temperature and humidity control can be provided by bespoke air handling units (AHUs) or standard packaged CRAC units. Fan coil units (FCUs) are a cost-effective way of maintaining temperature conditions in applications where humidity control is not specifically required. Air distribution can be conducted via ductwork or plenum and will be design dependent.



EMS

Guardtech provide a fully integrated Environmental Monitoring System that can also be 21CFR Part 11 compliant. With a range of high-performance multifunction sensors, temperature, humidity and pressure can all be monitored in real time and recorded for an audit trail. Fully flush or semi flush LED display gives in-room feedback.



POWER MANAGEMENT

All cleanrooms require a power connection from an external source. The rating of this will depend on the power demand of each room. UPS (uninterruptible power supply) battery back-up can also be provided and a changeover switch can be installed to alternate between a mains and generator supply.

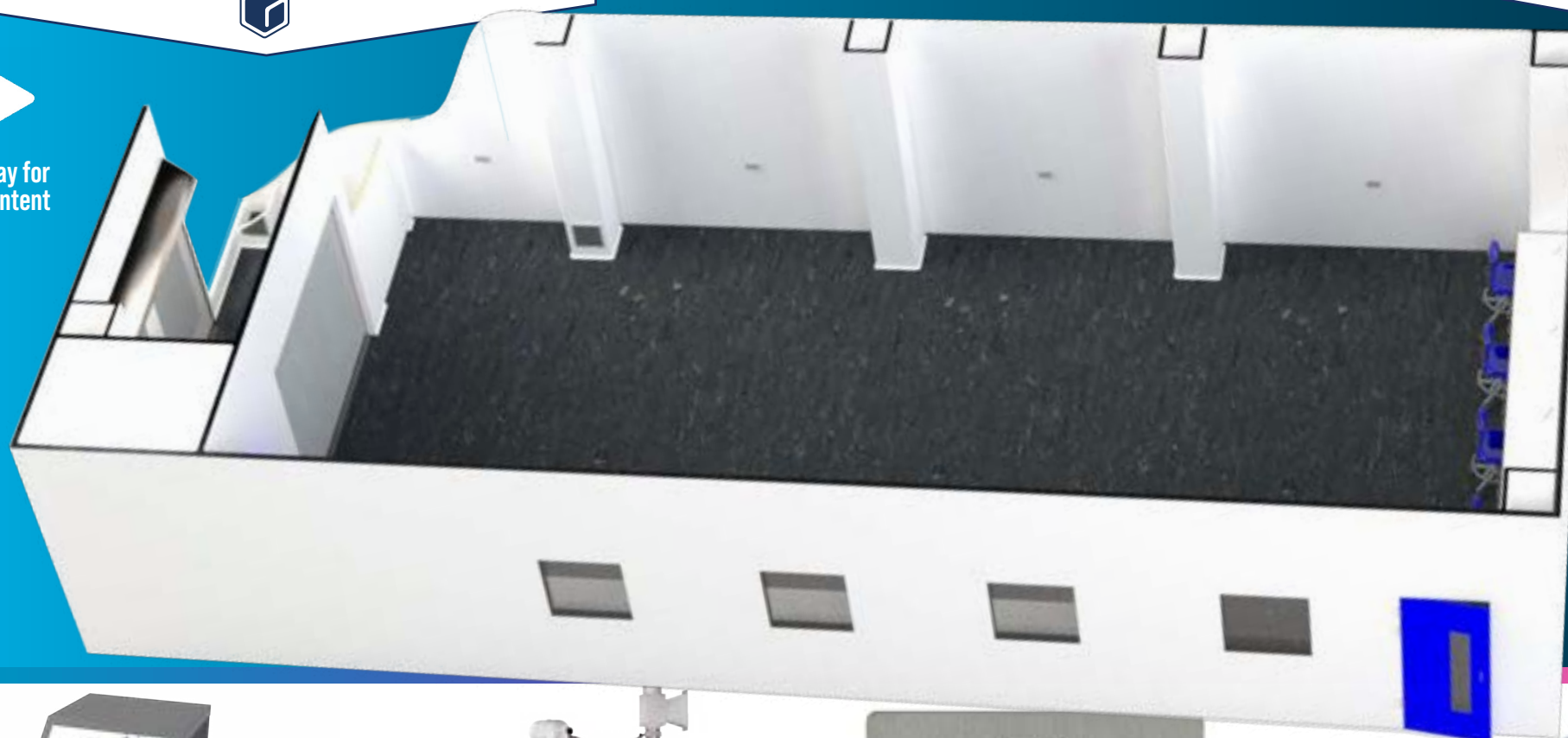


CONTROL PANEL

15.7" touchscreen HMI+PLC provides a full control and monitoring system for your modular cleanroom. Environmental Monitoring System feeds back to give real-time data on temperature, humidity and pressure. Fan speeds and HVAC systems can be controlled as well as other compatible equipment.



Press play for video content



GAS

Compressed air and nitrogen via compressors and generators housed directly within the cleanroom or lab – or in an enclosed plantroom. Pipework, point-of-use fittings, regulators and hook-up connections can also be put in place.

EXTRACTION

Chemicals, airborne particulate and heat can all be extracted to a localised filtration unit for scrubbing. Safe change modules can also be placed on the exhaust system to mitigate the risk of cross-contamination.

13-AMP SOCKET

All modular cleanrooms can include stainless steel or white antimicrobial plastic 13-amp sockets. CAT6 network points and 16, 32 and 63amp three-phase outlets are also available. NIC EIC registered.

LIGHTING

Powder-coated steel light units, flush mounted into the ceiling panels with drop-down hinged diffuser. Also available as surface-mounted aluminium LED batten luminaires for laboratories. Activation by switch or PIR (passive infrared) sensor. Lights can be UV filtered for photo sensitive processes.

CONTAINMENT

Guardtech install sockets and services flush to the panel system with containment embedded within the panel core. For laboratories, three-compartment PVC trunking is used for flexibility of socket positioning and cost effectiveness.



FURNITURE & EQUIPMENT

ACCESSORIES

Guardtech can offer a number of accessories with their range of modular cleanrooms, including Dyson Airblade hand dryers, various dispensers and stainless steel coat hooks.

Press play for video content

BIOSAFETY CABINET

Guardtech are delighted to offer the full range of Esco biosafety cabinets in all of our modular builds. This includes delivery, fitting and commissioning – if required. Popular installations feature the Airstream Class II Biosafety Cabinet – AC2-4E8 4ft model, but we can adapt the layout to meet your operational requirements.

LAMINAR FLOW UNIT

Guardtech have partnered with Esco to bring you an extensive, exciting range of equipment solutions for your cleanroom, with an array of models to meet your laminar flow clean bench needs. Esco's new generation Airstream® laminar flow units offer a wide range of options in terms of material specs, width and height.

TRANSFER HATCHES

These hatches provide a controlled air-tight zone for the transfer of products on trolleys, eliminating unnecessary traffic from the cleanroom, reducing particle ingress and decreasing the risk of cross-contamination.

CHAIRS

Our MVMT Pro chairs are designed for critical environments, including static-sensitive and particle/microbe-controlled areas. The MVMT Pro offers weight-activated control, meaning an individual user's weight sets the tension, which alleviates resetting controls in multi-user shift workplaces.

SHELVING UNIT

Stainless steel shelving units available in a range of sizes and shelf configurations. These units are resistant to harsher cleaning products and are specially designed to be easy to clean, durable and functional.

SINK

Stainless steel sinks can be plumbed in to hot & cold supplies or provided with a point-of-use heater, drainage connection gravity-fed to mains or via Saniflo pump, range of taps available including motion sensor activated.

WORK BENCH

Whether it's chemical-resistant Trespa TopLab or simply a stainless steel surface you require, we can fit out your cleanroom with high quality workbenches to ensure the work you do isn't compromised.

CABINET

Guardtech's high-quality cabinets are manufactured from either Trespa or grade 304/316L stainless steel. The units are available with a range of door and drawer configurations, stainless fixtures and fittings and can be arranged as mobile units on casters or static cabinets on solid levelling legs.

STEPOVER BENCH

Guardtech stepover benches come as standard seating benches on levelling legs or with storage compartments underneath for shoes, garments, PPE and consumables. Manufactured from Trespa or grade 304/316L stainless steel, Guardtech's stepover benches are durable and easy to clean.



MODULAR CLEANROOMS

THE COMPLETE PACKAGE



SERVICING

From commissioning new-build controlled environments to service, maintenance, testing and validation of existing cleanrooms, the Guardtech Service Department support ongoing compliance in all cGMP & ISO14644 classified cleanrooms. Guardtech offer three or five-year Service Agreements with two visits per year from Guardtech engineers as standard, but our dedicated Services team is happy to discuss the particular needs of your business to ensure you receive the appropriate level of support.



MAINTENANCE

Carrying out routine maintenance and repairs nationwide, the Guardtech Service Department support clients with HEPA filter replacements, HVAC maintenance, repairs and upgrades, maintenance and repair of air compressors and gas generators – as well as taking care of separate devices including laminar flow hoods, LAF workbenches and LAF cabinets, air showers, downflow booths, fume hoods and cupboards and garment stockers.



VALIDATION

Guardtech conduct full, comprehensive cleanroom Validations, which include air velocity and volumetric flow rate measurement, room differential pressure testing, airborne particle counting, temperature and humidity monitoring, light and sound level measurement, filter integrity testing, pressure and flow gauge calibration, ISO certification and feature full Validation reports.



DECONTAMINATION

Offering a range of one-off post-build or pre-validation cleans, to quarterly, monthly, weekly or daily cleans, the Guardtech Decontamination Team are specialists in restoring control to critical environments and supporting clients in maintaining compliant facilities, with post-construction builders' cleans often preceded by our high-performance deep clean programme.



DESIGN

Guardtech's in-house Design team consists of specialist 2D (AutoCAD) and 3D (Solidworks) Engineers, specialists in transforming your concept into a fully working design, as well our experienced Directors, who have more than 50 years' combined experience in the sector. Our comprehensive design offering includes:

- Functional Design Specification (FDS) & URS Compilation
- 2D Floorplans, Elevations & Detail
- HVAC P&ID, Ductwork Schematics, Lighting Layouts
- Lighting & Airflow Calculations, Pressure Cascade Diagrams
- 3D Models and Animations/Walk-throughs
- DQ/IQ/OQ Documentation.



PROJECT MANAGEMENT

Each and every project is assigned a dedicated Project Manager, skilled at transferring the fully worked up design into a complete project plan and schedule. Co-ordinating all aspects of the project, from design to installation to Validation, supported by Guardtech's Operations team, our Project Managers provide

onsite presence and client co-ordination to assure your schedules are being met. Our Project Management packages include:

- Weekly Progress Meetings and Online Photo Journals
- CDM & Building Control co-ordination
- Onsite a minimum of two days per week.



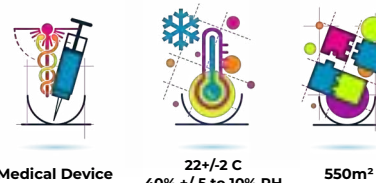
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THE CLIENT

Sense – developers of unconstrained, instrument-free molecular diagnostic technologies that allow caregivers to open the care pathway to everyone. Delivering incredibly fast and accurate results, Sense's diagnostic medical devices are easy for clinicians to master so testing can be performed almost anywhere by anyone, reducing overall costs while driving more efficient care.

THE BRIEF

Guardtech Cleanrooms were engaged by Principle Contractors COEL, the office interior design & fit-out specialists, to deliver the controlled environment elements of a major build which would give Sense more capacity to manufacture their industry-leading biodetection products – which help to detect potential illnesses such as COVID-19.



“We enjoyed working with COEL to deliver this project...”

Guardtech Group Operations Director Conor Barwise added: “Myself and the other Guardtech Group Directors are delighted with the outcome of this stunning project. We’ve all really enjoyed working with COEL to deliver this aesthetically pleasing high-performance controlled environment for such an interesting and important application. Congratulations to all involved and thanks to the Guardtech Cleanrooms team for producing such a brilliant build on time and on budget.”

Conor Barwise
Guardtech Group
Operations Director

coel

Guardtech
cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

◆ **Structural:** GT Shell Pro wall panelling system, GT Lid Pro panelled ceiling system, 12 x GT Access Plus powder-coated steel single doors, 11 x GT Access Plus powder-coated steel double doors, 11 x GT Vision Plus panels with 4 x additional fish tank glazing units, 2 x GT Rise Max rapid roll doors, GT Deck Plus vinyl flooring capped & coved in Sapphire Blue, Edge Protection for boundary of panelled ceiling, steel framework.

◆ **Electrical:** GT Lux Extra LED lighting units providing 500 lux at bench level and motion sensor activation, electromagnetic door interlocks with status indicators, 92 x 13amp sockets and 32 x CAT6a in three-compartment PVC trunking.

◆ **Mechanical:** GT Flow Plus H14 HEPA Fan Filter Units with G4 filters providing

20 air changes per hour, 2 x GT Air Pro Upflow CRAC Air Handling Units (AHUs), Desiccant Dryer, Post Dryer, DX Cooling Fan Coil Unit, extraction provided by LEV arms.

◆ **Monitoring:** GT Scan Pro Environmental Monitoring System (EMS) operated by Oncall Finestra software – measuring temperature, humidity & pressure via in-room LED displays, in-room alarm beacons.

◆ **Furniture:** 26 x Trespa TopLab workbenches, 2 x stainless steel stepover benches with compartments, stainless steel transfer hatch with mechanical interlock, 5 x stainless steel single operator sinks with seamless basin, splash back and shroud and motion-sensor operated tap, 2 x stainless steel three-compartment wall dispensers, 2 x stainless steel coat hooks, 8 x 4 nest laminate lockers, 2 x full-length stainless steel mirrors.

THE CHALLENGES

Engaging with multiple contractors: This was a major project involving several significant stakeholders, which meant our Project Manager Craig Druce and his team had to

communicate effectively, schedule regular meetings and maintain a consistent dialogue with multiple contractors, both internally and with external parties. As Guardtech were not the Principal Contractor for this build, we were one of a number of contractors on site, all vying for their own space.

Things had to be done in a certain order to ensure CDM regulations were adhered to and the Guardtech Installation team had to work effectively with other parties to make the build as hassle free as possible. The end result was a stunning cleanroom build – which is testament to the hard work of PM Craig, Service Manager Chris McGinn and all the Guardtech crew involved.

Wealth of services: This project included the installation of a number of different provisions, such as compressed air and argon gasses, deionised water, comprehensive electrics and a CCTV system, which all had to be integrated smoothly with our set-up for cleanroom construction.

This often meant sharing our space with third parties and having to be flexible and malleable when being challenged by their own practices and expectations. But Craig and the



MEDICAL DEVICE



team worked hard to maintain a high level of discipline across the board – being respectful towards others and working together effectively in the shared space.

Qualification of room: The nature of this project meant that there was a rigorous level of testing required – alongside the standard Design Qualification, Installation Qualification and Operational Qualification there was also DOP and recovery testing. With this higher level of standard commissioning, Guardtech staff needed to be more diligent to ensure the rooms achieved the standards required.

Anti-slip floor amendment: There was a change of plan midway through construction which meant the flooring had to be altered in the deionised water room – helping to ensure compliance with health & safety regulations. The original flooring had to be removed and drainage and sump-pumps were then installed before a new anti-slip floor was finally laid.

This had a knock-on effect in terms of the overall schedule, but the Guardtech team worked tirelessly to ensure the quality of the overall project was in no way compromised and no deadlines were missed.



THE RESULT

Guardtech Group Project Manager Craig Druce, who steered the Guardtech Cleanrooms team on this project, said: "This was my first major project at Guardtech and it was certainly a challenge, but what the team have produced is brilliant – I'm so proud of their efforts. It was a real pleasure working with COEL and I hope we get the chance to collaborate again soon."

Guardtech Group Operations Director Conor Barwise added: "Myself and the other Guardtech Group Directors are delighted with the outcome of this stunning project.

"We've all really enjoyed working with COEL to deliver this aesthetically pleasing high-performance controlled environment for such an interesting and important application.

"Congratulations to all involved and thanks to the Guardtech Cleanrooms team for producing such a brilliant build on time and on budget."





THE CLIENT

One of the leading suppliers and system integrators of support equipment for military and commercial electro-optical sensors in the world. With decades of experience in their focus markets, the client brings real world experience to assist customers in meeting the demands of today's military and security equipment programs.

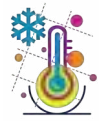
THE BRIEF

The Kent-based client wanted to adopt a new production process within their facility, which is best suited to controlled and classified conditions.

After successfully working with Guardtech on a previous cleanroom build, the client asked Guardtech to consult on the design and to formulate a proposal for the new cleanroom.



Defence & Aerospace



21+/-2C
40-55% RH



140m²



"A pleasure for us to return to a great client..."

Guardtech Cleanrooms Project Manager Craig Druce said: "Thanks to everyone involved in this project – the Design and Installation teams worked seamlessly to deliver a great build."

"We had to rework some of the plans due to an issue with extraction, but all of the parties involved came together brilliantly to devise a winning solution. I wish the client well in their future endeavours and hope they continue to go from strength to strength."

"It was a pleasure for Guardtech to return to a place where we've previously installed a modular cleanroom and I hope we get the chance to return one day in the future."

Craig Druce
Guardtech Cleanrooms
Project Manager

Guardtech
cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specifications:

◆ **Structural:** GT Shell Pro de-ended wall panel system, GT Lid Pro de-ended ceiling panel system, GT Access Plus semi-flush single and double doors with electro-magnetic interlocks and status indicators, GT Deck Plus vinyl flooring capped & coved in Sapphire Blue swatch.

◆ **Mechanical:** GT Flow Plus Fan Filter Units (FFUs) with H14 HEPA filters achieving 35 air changes per hour, HVAC provided by GT Air Pro 25kW CRAC Air Handling Units (AHUs), gas services: compressed air, nitrogen, vacuum pumps, heat extraction in plant room, equipment extraction, FumeCube in plant room, exhaust recirculated to AHU.

◆ **Electrical:** 13amp sockets in panel core,

CAT6 data outlets, electro-magnetic interlocks door and status indicators, GT Lux Pro LED switch activation lighting achieving 1200 lux/12,800 lumens.

◆ **Environmental Monitoring:** GT Scan Pro Environmental Monitoring System (EMS) with Stainless Steel Panel LED Displays measuring Temperature, Humidity, Pressure, fed back to client PC. In-room alarm beacons.

◆ **Furniture & Equipment:** Ducted fume cupboard, 5 x H14 HEPA filter laminar flow workstations, 5 x Trespa benches with grade 304 stainless steel support stands, contamination control mat.

THE CHALLENGES

Making space: This project included a sizeable collection of critical components and utilities that had to be carefully condensed into a tight plant room. As well as a relatively large CRAC upflow Air Handling Unit (AHU), the plant room also had to cater for the Uninterrupted Power Supply (UPS), compressors, patch panels and the distribution board, therefore

requiring some skilful plotting from Guardtech's Design and Install teams.

Scrubbing up: Because of the nature of the work involved with the client's application, there was a potentially harmful chemical that needed to be extracted from the process space. However, as per our original plans, we couldn't house a Pure scrubber to deal with the chemical in question. The room had to be equalised and re-balanced and there was some significant post-HVAC design work to ensure a ducted fume could be accommodated to solve the issue.

Great integrating: There were often a number of different trades on site at once – from HVAC and ducting operatives to flooring specialists, panel installers and electrical engineers to utilities such as nitrogen gas, compressed air and vacuum. The Guardtech Cleanrooms team were able to cater to everyone's needs and ensure a harmonious and efficient working environment. There were also some new faces involved in this project who had to embrace the Guardtech way quickly – but they did this with aplomb, showing a great degree skill to install our intelligent ceiling grid system.

PRECISION SYSTEMS



THE 2019 MODULAR



Guardtech Cleanrooms installed this stunning modular cleanroom at the same site back in 2019. Guardtech Group Commercial Director Mark Wheeler said: "We enjoyed working on our original project with this client so much that we were delighted to take on the latest build. We wish them well with what is pioneering manufacturing for their sector."

THE RESULT

Guardtech Cleanrooms Project Manager Craig Druce said: "Thanks to everyone involved in this project – the Design and Installation teams worked seamlessly to deliver a great build. "We had to rework some of the plans due to an issue with extraction, but all of the parties involved came together brilliantly to devise a winning solution. "I wish the client well in their future endeavours and hope they continue to go from strength to strength. "It was a pleasure for Guardtech to return to a place where we've previously installed a modular cleanroom and I hope we get the chance to return one day in the future."



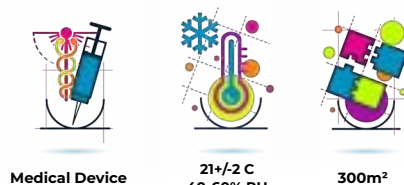

Press play for
video content

THE CLIENT

JEB Technologies Ltd – experts in the design, development, assembly and manufacturing of a diverse range of medical and industrial products. JEB provide an end-to-end product development service. With extensive medical and industrial experience of manufacturing, JEB offer the best solution from early design and concept development through to commercialisation.

THE BRIEF

The client wanted to introduce new manufacturing and packaging cleanrooms in a warehouse space on their existing site in Suffolk. Guardtech were commissioned to design and construct a suite of modular cleanrooms which included a medical cleandown area.



THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

◆ **Structural:** GT Shell Plus PIR wall panels, GT Shell Lite PVC ?wall cladding, GT Lid Lite power-coated aluminium ceiling tiles, GT Access Plus semi flush powder-coated steel single and double doors, GT Deck Plus sapphire blue flooring capped & coved.

◆ **Electrical:** Electromagnetic door interlocks with status indicator and break light, 13-amp double sockets and CAT6A data sockets in 3-compartment PVC trunking, GT Lux Lite LED lighting panels providing 800 lux on average and 5,800 lumens per LED.

“Exceeded our expectations for quality and delivery...”

Sean Licence, Head of Medical at JEB Technologies Ltd, said: “The cleanroom that Guardtech have built for us has exceeded our expectations for quality and time to delivery. From the first engagement with the sales team, right through to the team building and installing the cleanroom, Guardtech as a company have been thoroughly professional and really easy to work with. We will definitely be using them again in the future, and I would highly recommend Guardtech to others looking to have cleanrooms installed.”

Sean Licence
Head of Medical at
JEB Technologies



◆ **Mechanical:** GT Flow Plus H14 HEPA Fan Filter Units with G4 Pre-Filters providing air change rates of 35 per hour, GT Air Pro Upflow Unit ducted to plenum.

◆ **Monitoring:** GT Scan Pro Digital LED Environmental Monitoring panels displaying temperature, humidity and pressure reading from in-room installed probes. All fed back to a centralised 15.9” touchscreen controller located in Change Area.

◆ **Furniture & Equipment:** Grade 304 stainless steel transfer hatch with mechanical interlock and perspex vision panels, grade 304 stainless steel stepover benches with shoe compartments on levelling feet, two-bank three-tier lockers in grade 304 stainless steel on feet with sloping top.

THE CHALLENGES

Filtration puzzler: Because of the layout of the host building, we needed to be creative with our placement of the Fan Filter Units in certain places to run alongside ductwork in the cleanrooms. It was

like an intricate puzzle – where every millimetre had to be accounted for and treated with the greatest care.

The FFU-to-ceiling clearance was as limited as 10mm in some spots and so the Guardtech Cleanrooms Installation team were required to put the pieces together in the GT Lite ceiling tile arrangement in such a manner that one tiny error would’ve caused major issues.

Fortunately, this kind of challenge is our bread and butter, and Project Manager Michael Burton oversaw a flawless ceiling/FFU arrangement.

Large scale issues: This three-room layout featured one of the biggest PALs (Personnel Airlocks) that Guardtech Cleanrooms’ ModSquad had ever done, with some huge, heavy glass transfer hatches proving particularly challenging to move around and install safely.

Everything in this build was on a grander scale than the ModSquad are usually accustomed to – with the biggest processing room measuring up at 26.5m x 8m, alongside a smaller room for packaging and then the aforementioned L-shape PAL for change and storage.

Dastardly ductwork:

Despite having a lot of space to work with in many ways, there were limitations – the ceiling grid had to be carefully cut around the significant amount of ductwork serving the cleanroom, while the client also wanted us to deliver a 3.5m high ceiling.

Because of these two factors, the internal height space above the ceiling was extremely tight in places.

THE RESULT

Sean Licence, Head of Medical at JEB Technologies Ltd, said: “The cleanroom that Guardtech have built for us has exceeded our expectations for quality and time to delivery.

“From the first engagement with the sales team, right through to the team building and installing the cleanroom, Guardtech as a company have been thoroughly professional and really easy to work with. “We will definitely be using them again in the future, and I would highly recommend Guardtech to others looking to have cleanrooms installed.”



ISOPOD

rapid cleanrooms



ENQUIRY CHECKLIST



Name: _____
Location: _____

Company: _____
Telephone: _____

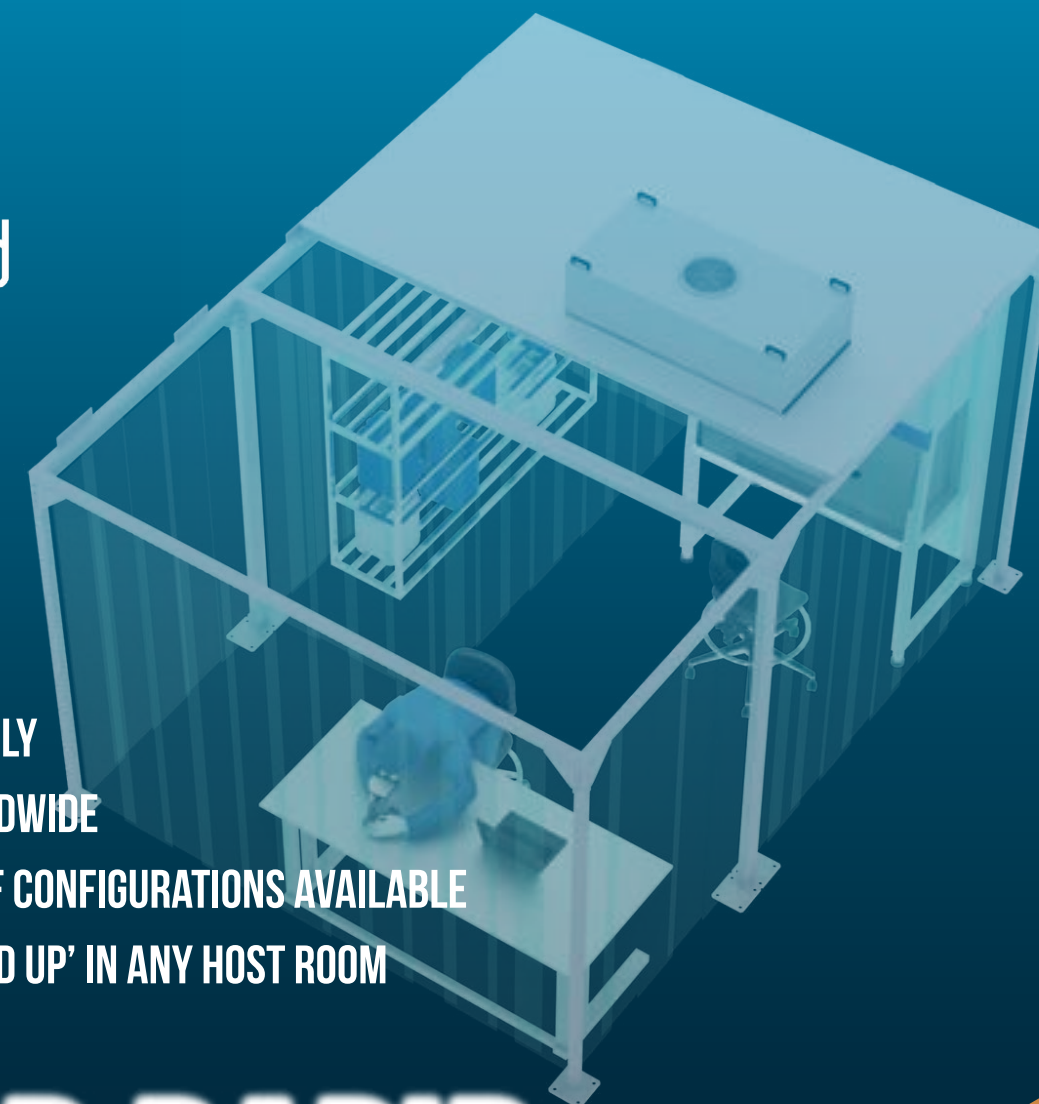
Position: _____
Email address: _____

Site address				
Project target completion date				
Quotation required by (date)				
Cleanroom length (mm)				
Cleanroom width (mm)				
Cleanroom height (mm)				
Personnel Airlock (PAL) (mm)				
Materials Airlock (MAL) (mm)				
Framework	Grade 304 stainless steel:	Aluminium:	GRP:	
Walls	Hardwall – composite modular panels:		Softwall – PVC Curtain:	Softwall – ESD Curtain:
Windows required	Size – 900mm x 900mm:	Size – 900mm x 1500mm:	Quantity:	
Doors required	Strip curtain:	Steel doors:	Quantity:	
Vinyl floor	Yes:	No:		
Classification	ISO8:	ISO7:	ISO6:	ISO5:
Temperature control	N/A:	Yes – temperature:	°C	+/- °C
Lighting (lux level)	500 – standard:	1000 – inspection:		
13-amp double sockets	N/A:	Yes – quantity:		
Castors	Castors:	Levelling castors:	Levelling legs:	
Assembly	Self-assembly:	Guardtech installation:		
Furniture (quantity)	Stepover Bench:	Trespa Work Bench:	Ergonomic Chairs:	Storage Cabinet:
	Sink:	Garment Rail:	Coat Hooks:	Bin:
Equipment (quantity)	Laminar Flow Unit:	Biological Safety Cabinet:	Transfer Hatch:	Trolley Hatch:
Host room information				
Other important information				

Please email your completed enquiry form to sales@guardtech.com



Isopod
rapid cleanrooms



- QUICK-ASSEMBLY
- SHIPPED WORLDWIDE
- WIDE RANGE OF CONFIGURATIONS AVAILABLE
- CAN BE 'POPPED UP' IN ANY HOST ROOM

ISOPOD RAPID CLEANROOMS

Press play for
video content

ISOPOD is a revolutionary concept in modular cleanroom design & build. Isopods are high-performance controlled environments which can be rapidly self-assembled and are fully customisable to best utilise the host room they are installed within.

Combining high-quality construction materials with state-of-the-art cleanroom technology, Isopods are the perfect solution to upgrading Production environments, R&D applications, Education or Healthcare facilities in a sustainable, practical and cost-effective way.

Isopods can be reconfigured, relocated, extended and upgraded – growing alongside your business, evolving with your needs. Shipped worldwide ready for quick and simple self-assembly, supported by full installation instructions and demo

movies.

Alternatively these can be delivered & installed quickly by Guardtech's experienced Isopod engineers.

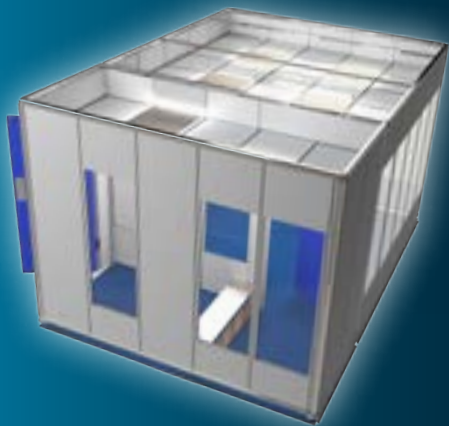
- Ships worldwide for self-assembly
- Can be reconfigured, relocated and extended
- Available as hardwall, softwall or hybrid cleanroom
- Changing room/materials interlock modules
- Can be static or mobile on casters
- Can be upgraded or modified as your business grows
- Energy efficient – only control the area that requires it
- Can be branded in corporate colours, logo, graphics
- Removable panels for equipment transfer
- Glazing can be added to hardwall



CONTENTS

- Enquiry form
- Isopod introduction
- Structural
- Mechanical & Electrical
- Furniture & Equipment
- Materials list
- Configurations
- Case Studies

BASE MODEL TYPES



HARDWALL



Isopod
rapid cleanrooms

SOFTWALL



Isopod
rapid cleanrooms

HYBRID



COVING

Wall-to-wall and wall-to-ceiling coving available. Fully flush panel system provides flush floor connection as per photo.



DOORS

Choice of doors available: rapid rise doors – PVC curtain with stainless frame and GRP or powder-coated steel personnel doors with stainless steel push plate, kick plate and handle with 400mm x 400mm vision panel. All Guardtech doors can be electromagnetically interlocked. Also available as a fully flush system with recessed base for flooring to cove into.



Press play for
video content

GLAZING

Isopod glazing panels are available in two standard sizes for the Hardwall and Hybrid models – 900x900mm or 1500x900mm. Custom arrangements may be possible – please speak to a member of the Isopod team about your requirements so we can help find the best solution.



WALLS

Powder-coated CR4 mild steel panels with polyisocyanurate (PIR) insulated core and interlocking joints. The panels feature a 50mm thickness to form walls and ceiling. Highly durable, cleanable and chemically resistant, the walls are silicon sealed.



FRAME

All three versions of the Isopod come with a more lightweight aluminium frame as standard, but there is the option to upgrade to a grade 304 stainless steel frame. The framework is held together by specially made connectors, designed solely for these products and tested rigorously by experience Guardtech's in-house engineers.



FLOORING

Homogenous vinyl floor reinforced with cross-linked polyurethane, UV-cured, hot-welded joints. Coved 100mm up the wall over underlay former and capped. Copper-grounded anti-static vinyl also available.



CEILING

Panelled ceiling with thermal insulation core provides a flush surface. Lighting and filtration modules are recessed into apertures or surface mounted for laboratory applications.



STRIP CURTAIN

Guardtech's Softwall and Hybrid Isopods feature a strip curtain, designed to overlap and create a flexible wall for cleanroom applications. This lightweight PVC curtain is suspended by a stainless steel plate and attached to a stainless steel hanging rail. Available in the following thicknesses and widths: 2mm thickness x 200mm width or 3mm thickness x 300mm width.





MECHANICAL & ELECTRICAL



CONTROL PANEL

15.7" touchscreen HMI+PLC provides a full control and monitoring system for your Isopod Rapid Cleanroom. Environmental Monitoring System feeds back to give real time data on temperature, humidity and pressure. Fan speeds and HVAC systems can be controlled as well as other compatible equipment.

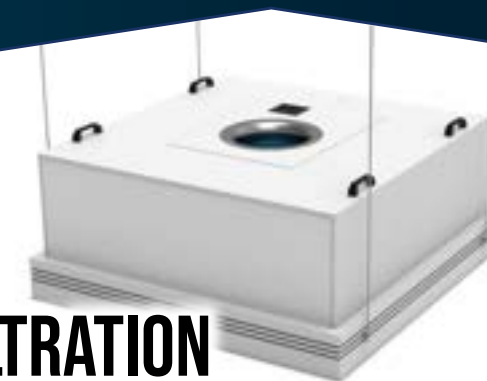


HVAC

Temperature control via VRF (variable refrigerant flow) split system. Humidity control also provided via upflow units or separate desiccant wheels. External condensers can be contained in attached plant rooms or mounted on Isopod exterior.



Press play for video content



FILTRATION

For ISO 14644 compliant environments, Fan Filter Units (FFU) with H14 HEPA filters and G4 pre-filters provide 1,000m³/hour of filtered air. For ceiling heights of 2.1m slimline FFUs are installed in the ceiling to provide vertical laminar flow. Depending on the specifications of your chosen model, Isopods can achieve a classification up to ISO5.



ENVIRONMENTAL MONITORING

Guardtech provide a fully integrated Environmental Monitoring System that can also be 21CFR Part 11 compliant. With a range of high-performance multifunction sensors, temperature, humidity and pressure can all be monitored in real time and recorded for an audit trail. Fully flush or semi flush LED display gives in-room feedback



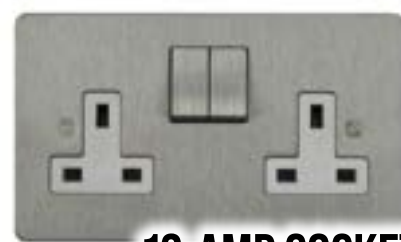
GAS

Compressed air and nitrogen via compressors and generators housed directly within the cleanroom or lab – or in an enclosed plantroom. Pipework, point of use fittings, regulators and hook-up connections can also be put in place.



EXTRACTION

Chemicals, airborne particulate and heat can all be extracted to a localised filtration unit for scrubbing. Safe change modules can also be placed on the exhaust system to mitigate the risk of cross-contamination.



13-AMP SOCKET

All Isopod Rapid Cleanrooms can include stainless steel or white plastic 13-amp sockets mounted flush. CAT6 network sockets and 16amp or 32amp three-phase outlets are also available in the range.



LIGHTING

Powder-coated steel light units, flush mounted into the ceiling panels with drop-down hinged diffuser. Also available as surface-mounted aluminium LED batten luminaires for laboratories. Activation by switch or PIR (passive infrared) sensor. Lights can be UV filtered for photo sensitive processes.



CONTAINMENT

For cleanrooms Guardtech install sockets and services flush to the panel system with containment embedded within the panel core. For laboratories, three-compartment PVC trunking is used for flexibility of socket positioning and cost effectiveness.



FURNITURE & EQUIPMENT



Isopod
rapid cleanrooms



LAMINAR FLOW UNIT

Guardtech have partnered with Esco to bring you an extensive, exciting range of equipment solutions for your Isopod, with an array of models to meet your laminar flow clean bench needs. Esco's new generation Airstream® laminar flow units offer a wide range of options in terms of material specs, width and height.



ACCESSORIES

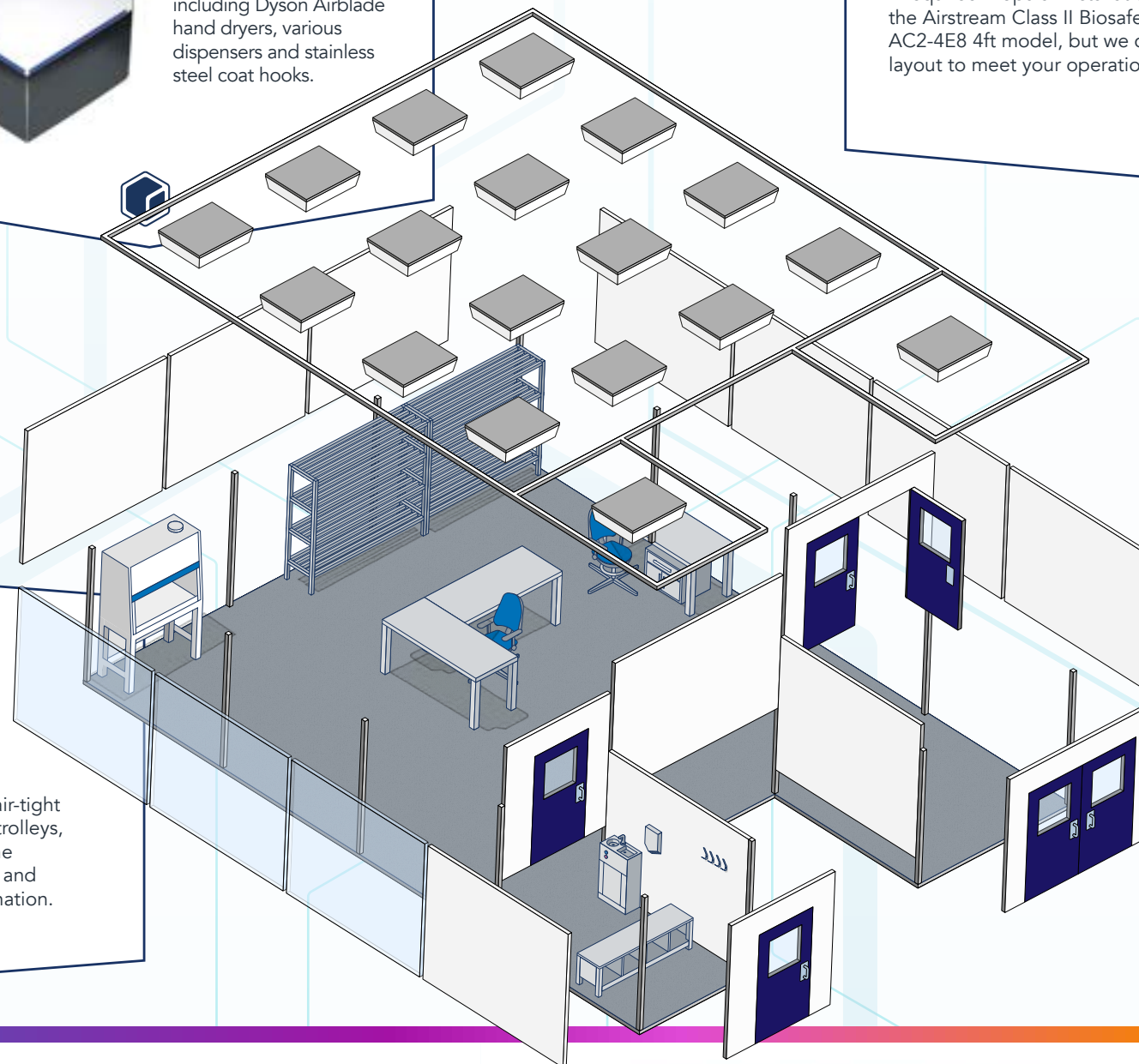


Guardtech can offer a number of controlled environment accessories with their range of Isopod Rapid Cleanrooms, including Dyson Airblade hand dryers, various dispensers and stainless steel coat hooks.

Press play to build your own Isopod

BIOSAFETY CABINET

Guardtech are delighted to offer the full range of Esco biosafety cabinets with all of our Isopod models. This includes delivery, fitting and commissioning – if required. Popular installations feature the Airstream Class II Biosafety Cabinet – AC2-4E8 4ft model, but we can adapt the layout to meet your operational requirements.



TRANSFER HATCHES

These hatches provide a controlled air-tight zone for the transfer of products on trolleys, eliminating unnecessary traffic from the cleanroom, reducing particle ingress and decreasing the risk of cross-contamination.



CHAIRS

Our MVMT Pro chairs are designed for critical environments, including static-sensitive and particle/microbe-controlled areas. The MVMT Pro offers weight-activated control, meaning an individual user's weight sets the tension, which alleviates resetting controls in multi-user shift workplaces.



SHELVING UNIT



SINK



WORK BENCH



CABINET



STEPOVER BENCH

Stainless steel shelving units available in a range of sizes and shelf configurations. These units are resistant to harsher cleaning products and are specially designed to be easy to clean, durable and functional.

Self-contained stainless steel sinks with container-fed hot & cold water supply and separate drainage vessel. Motion sensor-activated tap, soap & towel dispenser attached.

Whether it's chemical-resistant Trespa TopLab or simply a stainless steel surface you require, we can fit out your cleanroom with high quality workbenches to ensure the quality of what you do isn't compromised.

Guardtech's high-quality cabinets are manufactured from either Trespa or grade 304/316L stainless steel. The units are available with a range of door and drawer configurations, stainless fixtures and fittings and can be arranged as mobile units on casters or static cabinets on solid levelling legs.

Guardtech stepover benches come as standard seating benches on levelling legs or with storage compartments underneath for shoes, garments, PPE and consumables. Manufactured from Trespa or grade 304/316L stainless steel, Guardtech's stepover benches are durable and easy to clean.

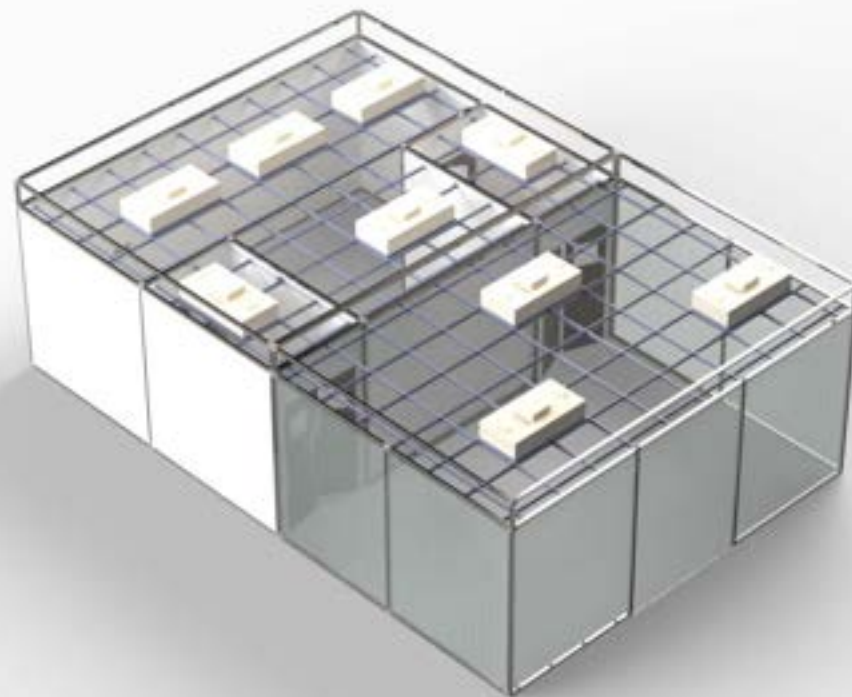
MATERIALS & CONFIGURATIONS



Isopod
rapid cleanrooms

COMPONENTS

- Stainless Steel Frame
- Aluminium Composite Roof Tiles
- Vinyl Floor
- PIR Wall Panels & Door
- LED Light Panels
- Stainless Steel Ceiling Grid
- Fan Filter Units
- Flush Fit Glazing



ISOPOD CONFIGURATOR

Build your own cleanroom with the Guardtech Group's revolutionary online Configurator tool. Simply head to www.iso-pod.co.uk and select the different structural, mechanical, electrical, furniture and equipment options you want in your Isopod Rapid Cleanroom.

Visit www.iso-pod.co.uk to build your own cleanroom now



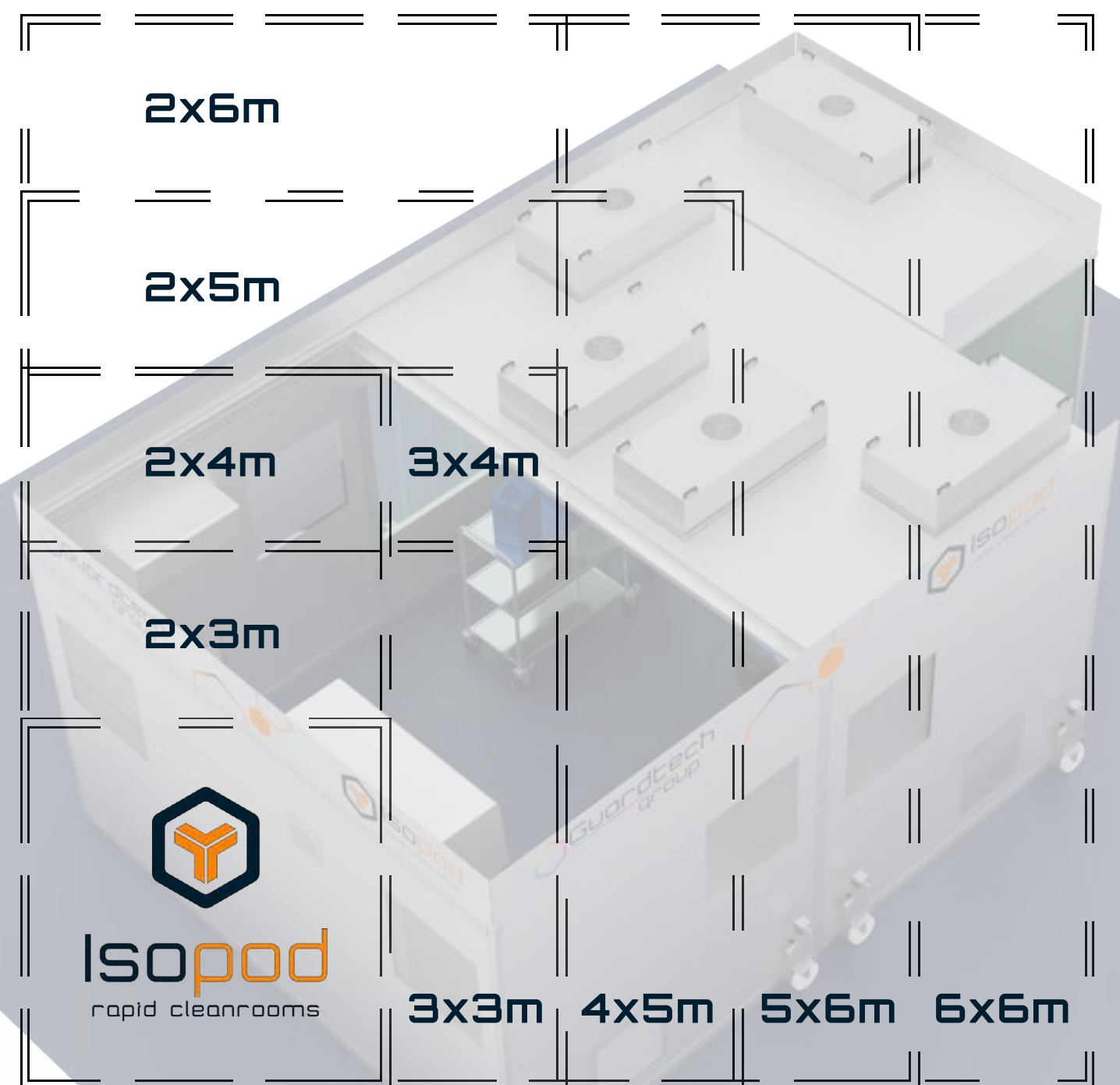
Isopod
rapid cleanrooms

CONFIGURATIONS

There are 15 Isopod size variations in the range

Isopod Rapid Cleanrooms are available in 15 different size configurations. Choose either one or more of the following standard-sized pods that best suit your application, then configure the internal fit-out to meet your needs. Finally, either construct the Isopod yourself or book in our Install team to do it for you. Join as many units together as you require to construct your perfect rapid-assembly controlled environment.

			2x4m	3x5m	3x6m
2x2m	3x4m	4x5m	4x6m		
2x3m	4x4m	5x5m	5x6m		
3x3m	2x5m	2x6m	6x6m		



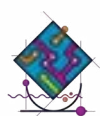
KLA+

THE CLIENT

KLA – whether it's a driverless car, VR experience, or factory robotics, KLA help turn theory into possibility, helping to create technological devices and ideas that transform the future and shape our current life. KLA are often part of the most significant technological breakthroughs. Virtually no laptop, smartphone, wearable device, voice-controlled gadget, flexible screen, VR device or smart car would have made it into your hands without KLA's input.

THE BRIEF

KLA originally requested a proposal for 2 x ISO7 Softwall cleanrooms for installation at one of their sites in Denmark. After further scrutiny of the brief and consultation, Guardtech proposed an upgraded solution that utilised more robust components to allow some pressurisation in the room, more in line with Isopod Hardwall modules.



Electronics



21+/-3



30m² & 45m²



“Full credit to the Design and Install teams...”

Isopod Rapid Cleanrooms Project Manager Elliott Pearce said: “It was such a pleasure to be involved in leading this fantastic project for a client conducting pioneering work in their field.

“Full credit must go to the Guardtech Group Design and Install teams for working so well together to firstly plan these amazing bespoke Isopods back at our Suffolk HQ before the installation in Denmark.

“We were really pleased with the way everything went and wish the client well with their future endeavours.”

Elliott Pearce
Isopod Rapid Cleanrooms
Project Manager

KLA+

Isopod
rapid cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

◆ **Structural:** GT Strip Max PVC strip curtain – 300mm wide/3mm gauge with an internal height of 2.5m, GT Lid Pro panelled ceiling, Aluminium 50 x 50 x 3mm Box Section frame with Grade 304 stainless steel connectors.

◆ **Mechanical:** GT Flow Plus Fan Filter Units (FFUs) with H14 HEPA and G4 Filters achieving 70 air changes per hour, GT Air Lite condenser-free wall-mounted HVAC unit.

THE CHALLENGES

The host room: One of the biggest challenges upon arriving at the premises in Denmark was attempting to maximise the Isopod size within the room.

THE RESULT

Isopod Rapid Cleanrooms Project Manager Elliott Pearce said: “It was such a pleasure to be involved in leading this fantastic project for a client conducting pioneering work in their field. “Full credit must go to the Guardtech Group Design and

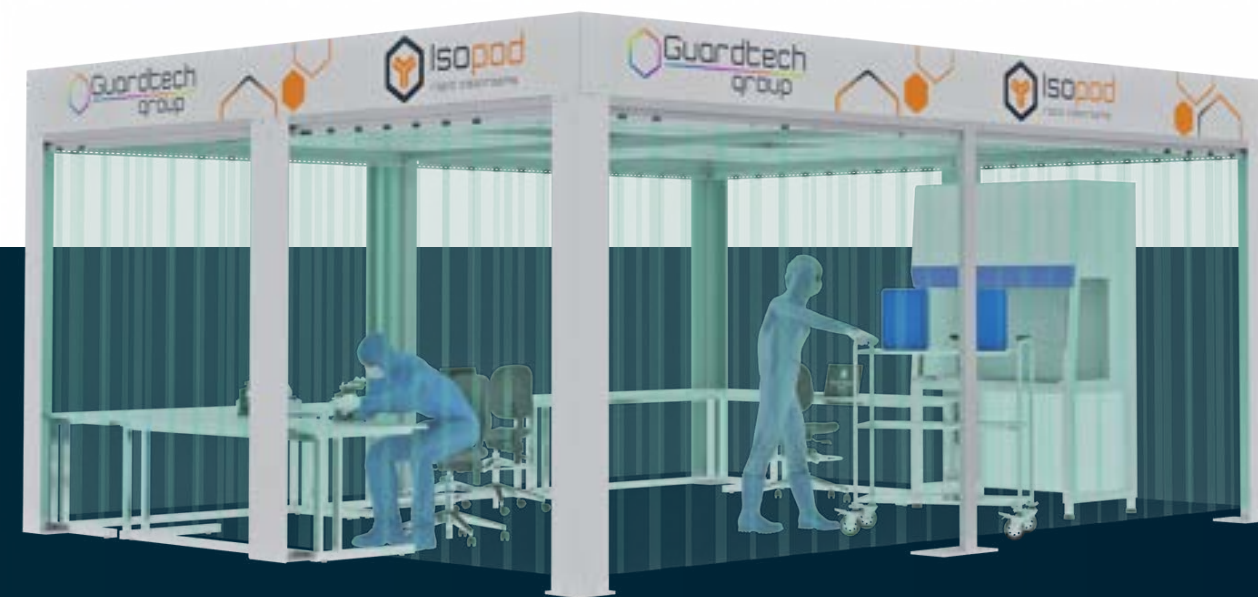
Because the Isopods were so close to the walls of the host room, the Guardtech Group Installation team had to ensure all fixings could be accessed from inside the room.

Notch your usual ceiling: Because of the limitations of the tight host room and the restricted access to ceiling supports, the Guardtech Installation team had to be creative, implementing a ‘notch’ in some of the stainless steel to ensure the panelled ceiling construction was not compromised in any way.

Transport trouble: The delivery of the two Softwall Isopods from Suffolk to Denmark was delayed a few days due to transport issues, meaning the Guardtech Installation Engineers had to work diligently to pull the schedule back in line with expectations.



Install teams for working so well together to firstly plan these amazing bespoke Isopods back at our Suffolk HQ before the installation in Denmark. “We were really pleased with the way everything went and wish the client well with their future endeavours.”



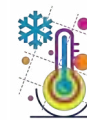


THE CLIENT

Oval Medical Technologies Ltd – a world class drug delivery business specialising in the development of autoinjector platforms with a strong patient focus. Oval designs, develops and industrialises autoinjectors that include integrated, customised primary drug containers. Oval's enabling autoinjector technology provides consistent delivery performance for a wide range of formulation viscosities.



Medical Device



No temperature control required



12m²

THE BRIEF

Oval were looking to enhance the capability of their development lab to incorporate a new upgraded part of their process, opting for two conjoined 6m² Softwall Isopods. Oval had specific challenges within the room that precluded them from opting for a standard Isopod, therefore we were charged with designing two bespoke connected units.



Truly patient centric autoinjector platforms

From About on www.ovalmedical.com

"Oval aims to bring truly patient-centric autoinjector platforms to market. Founded in 2009 by Matthew Young, Oval takes a different approach, designing from the outside in, ensuring that all patient needs are met. Our team has a wide range of expertise allowing us to deliver the best solutions to partners and patients."

OVAl
MEDICAL TECHNOLOGIES
An SMC Ltd. Company

CAMBRIDGE PHARMA

Isopod
rapid cleanrooms

THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

- ◆ **Structural:** Grade 304 stainless steel frame with anti-static PVC strip curtain.
- ◆ **Electrical:** LED lighting panels to provide an average of 500 lux at bench level.
- ◆ **Mechanical:** Filtration provided by H14 HEPA filters powered by Fan Filter Units.
- ◆ **Monitoring:** Pressure monitoring from magnehelic gauges.

THE CHALLENGES

Internal ceiling height: Space may have been at a premium – but this wasn't a major obstacle for Guardtech. The team opted to use slimline Fan Filter Units in order to create the tallest internal ceiling that could be achieved for the Isopods.



Structural: The client wanted the units to be mobile, and so wheels were fitted. As a result, we needed to put structural reinforcement in place to reduce the risk of splay. Structural calculations were made to ensure the outward force was offset by adequate bracing.

Equipment transfer: The client needed to move equipment between the two Isopods, which meant the installation team needed to incorporate a removable bar at the bottom of the Isopods. This enabled us to retain the structural bracing while

accommodating the need for equipment transfer.

THE RESULT

Guardtech Commercial Director Mark Wheeler said: "The team enjoyed tackling the various challenges that this bespoke Isopod build presented.

"Many of the lessons we learned on this project, and the new ideas we implemented for these bespoke Isopod models, have been incorporated into our ongoing development plans for the standard product range. This should prove to be extremely valuable in helping us to develop the best possible product for the widest range of future users."





OXFORD PACKAGING
SOLUTIONS

THE CLIENT

Oxford Packaging Solutions Ltd – packaging specialists based in Oxfordshire, built on a heritage of producing high-quality plastic containers for the Food & Drink, Personal Care, Household and Medical sectors. The company specialises in precision blow moulding and works in PET, RPET, PP and HDPE materials.



THE BRIEF

Guardtech were charged with providing a relatively small-sized modular cleanroom solution for use within a warehouse space. The controlled environment needed to be not just mobile, but easily moved. This led to the development of a bespoke Isopod Rapid Cleanroom on pump-action castors.

The Isopod would be used mainly for the client's injection moulding process, producing bottles to be used for liquid filling for food, medical use and beyond. The client required a rapid solution because of a spike in demand that they needed to capitalise on.

“We learned a lot about new effective practices with this project...”

Commercial Director Mark Wheeler said: “This was a challenging bespoke Isopod build which had to be put together in a busy facility for a client whose services were in high demand. “We learned a lot about new effective practices with this project, which will certainly stand us in good stead for future bespoke Isopod projects.”

Mark Wheeler
Guardtech Group
Commercial Director



THE TECH SPECS

A controlled environment designed, installed, cleaned and commissioned by Guardtech built to the following specification:

- ◆ **Structural:** GT Shell Plus PIR wall panels, GT Strip Lite PVC curtain, GT Lid Plus PIR suspended ceiling panel system, grade 304 stainless steel framework, 12 x jacking legs with castors, Melaphone speech panels.
- ◆ **Electrical:** GT Lux Lite LED lighting panels, 13amp plug sockets flush mounted.
- ◆ **Mechanical:** GT Flow Plus H14 HEPA Fan Filter Units with G4 pre-filters providing 200 air changes per hour.
- ◆ **Monitoring:** GT Scan Lite magnetic gauge environmental monitoring system (EMS).

THE CHALLENGES

Bridging a gap: The Design team were tasked with developing a Hybrid Isopod featuring both cleanroom panels

and a softwall section as the client needed the cleanroom to incorporate a conveyor to bridge the outside of the room with the inside of the Isopod. With this bespoke design, the Isopod needed to be designed with careful consideration regarding the equipment it would be serving.

Level best: The entire structure was built on 12 levelling castors to ensure the Isopod could be jacked up and down to move it around effectively. The Isopod team therefore needed to consider the impact that the moving parts would have on the design of the room.

Working warehouse: The Install team had to build the Isopod within the confines of a busy working environment – an operational warehouse with all the rigorous staff and safety precautions and expectations of a highly professional outfit. The Guardtech team had to be professional, diligent and understanding of the clients' process flow – with an extra consideration on being as tidy as possible in an operational production environment.

THE RESULTS

Commercial Director Mark Wheeler said: “This was a challenging

bespoke Isopod build which had to be put together in a busy facility for a client whose services were in high demand.

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