IAC Global Test & Aviation

Aero Engine Test Facilities
Airport Products

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making the world a quieter place

Contents

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Introducing IAC Aviation

IAC's World-Leading Aero-Engine Testing Solutions and Airport Products

As a world-leader in the diverse disciplines of aero-engine testing solutions, lAC provides standard and custom facilities for a wide range of civil and military aviation requirements.

IAC is among the world's foremost suppliers of turnkey, automated aero-engine/aircraft test facilities. For over 50 years we have been designing and building: multi-engine test cells; hush houses; ground run-up pens, mobile, 'propeller-on' and APU test facilities. We supply military and commercial aircraft operators, engine manufacturers and overhaul agents internationally.

Choosing IAC ensures cost effective, trusted, engineered engine test, airport noise and jet wake control solutions to suit your needs.

Capabilities

- **Total project management**
- **All civil, structural, acoustical mechanical and electrical design/ construction**
- **CFD, noise map and aerodynamic modelling**
- **Project integration**
- **Acoustic building systems**
- **Certified inlet and exhaust silencer systems**
- **Multi-engine testing**
- **Technical support**

Products

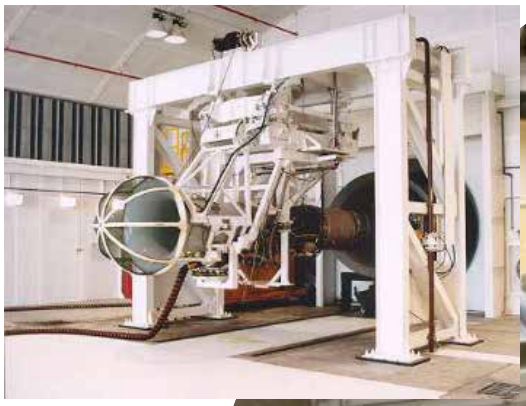
- **Turbo shaft/turbo prop test cell**
- **Turbo fan test cells**
- **Turbo jet test cells**
- **Hush Houses installed testing**
- **APU test cells**
- **Mobile test facilities**
- **Data acquisition systems**
- **In service support**
- **Ground Run-up Enclosures (GREs)**
- **Jet wake barriers**
- **Sound havens and control rooms**

Aero Engine Test Cells

- Certified by OEM's
- Civil design
- Full M & E package
- Multi-engine test stand with dedicated engine adaptors
- IAC data acquisition system
- Aero acoustic systems and engineering
- Integral fuel system
- Engine start system
- Quick turnaround - multi-engine test stands
- Hydraulic and pneumatic systems
- Fire suppression system
- Separate control and auxiliary rooms/crew quarters
- HVAC

IAC's World-Leading Aero-Engine Testing Solutions.

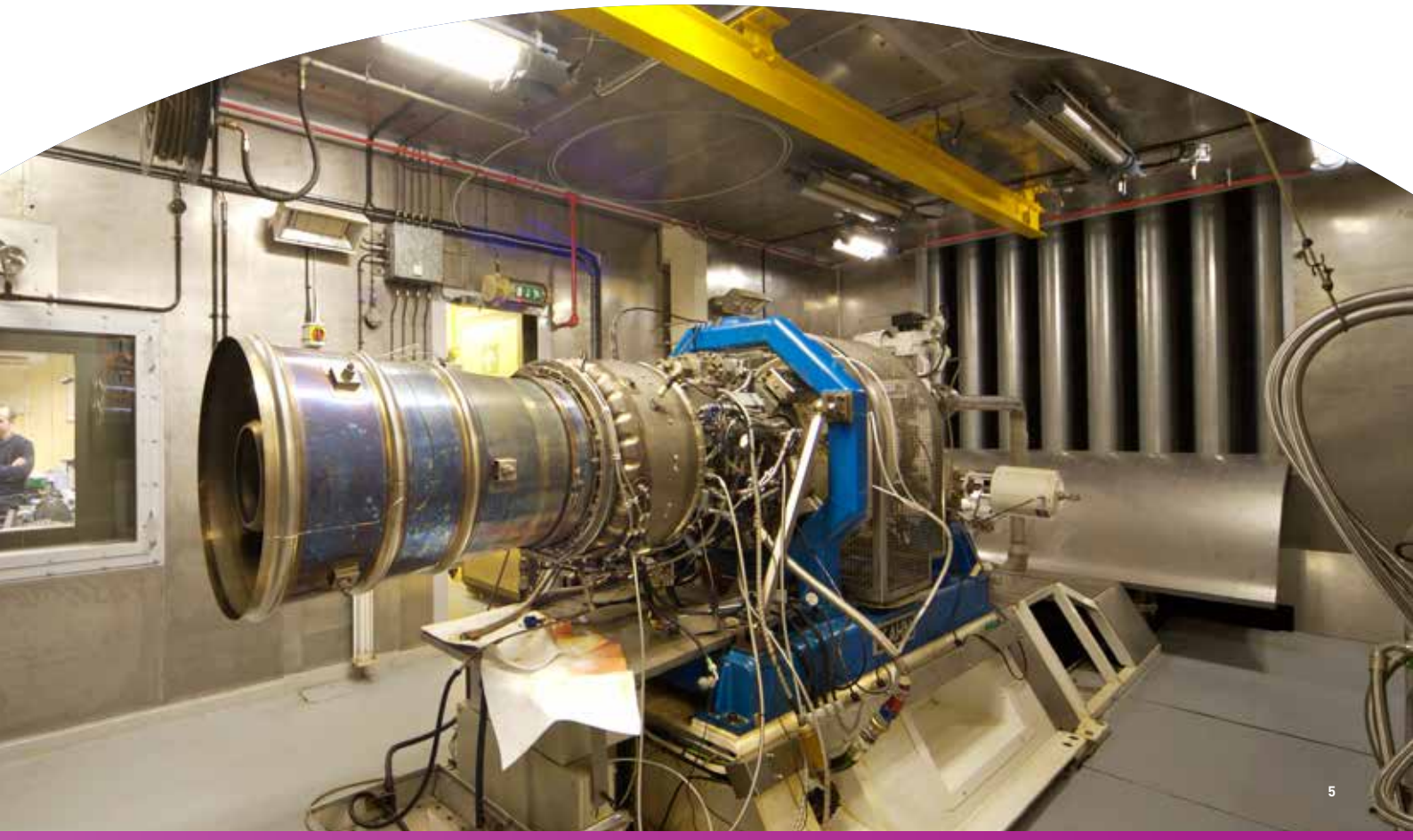
For over 50 years, IAC remains a forerunner in the design and manufacture of aero engine testing facilities. IAC test cells have been used to support a wide variety of engines from the worlds leading engine manufacturers. All IAC test cells are modelled in 3D, acoustic mapping and CFD software to ensure aero dynamic, thermal, structural and acoustic performance is guaranteed. This ensures that OEM qualified cross calibration pass off testing is easily attained and that consistent performance results are maintained throughout the life of the facility.



Turboshaft/Prop Test Facilities

Testing accuracy, efficiency and return on investment are critical to the aero engine testing industry. Incorporation of multiple models with high speed control and data acquisition systems to maximise operational efficiency.

- **24/7 Operational Capability**
- **Multiple engine types and variants**
- **Changeover carts minimise TRT**
- **FADEC, ARINC, ECU interfacing**
- **Excellent aerodynamic performance assures cross-calibration and attainment of local noise restrictions**
- **Integration of multiple systems provides central control, monitoring and safety systems**
- **Centralised engine and facility control**
- **IAC Data Acquisition System**
- **Noise Impact Assessment and Environmental Impact Assessment assistance**
- **Conversion of existing facilities or design and build of new**



Turbofan Test Facilities

Civil operators demand minimum turnaround time to meet their increasing operational pressures. IAC turbofan facilities offer an efficient test solution to optomise return on investment. IAC specialise in providing high capability, low cost, small to medium size turbofan engine test cells. Our turnkey facilities are typically rated up to 70,000lbs thrust, whilst we are also able to provide aero acoustic packages to 150,000lbs. All IAC test cells are designed to provide an efficient, low maintenance engine testing solution that provides repeatable results time and time again. Benefiting from state of the art and best practice technology, IAC test cells are designed to accommodate a range of engines within a single test cell.

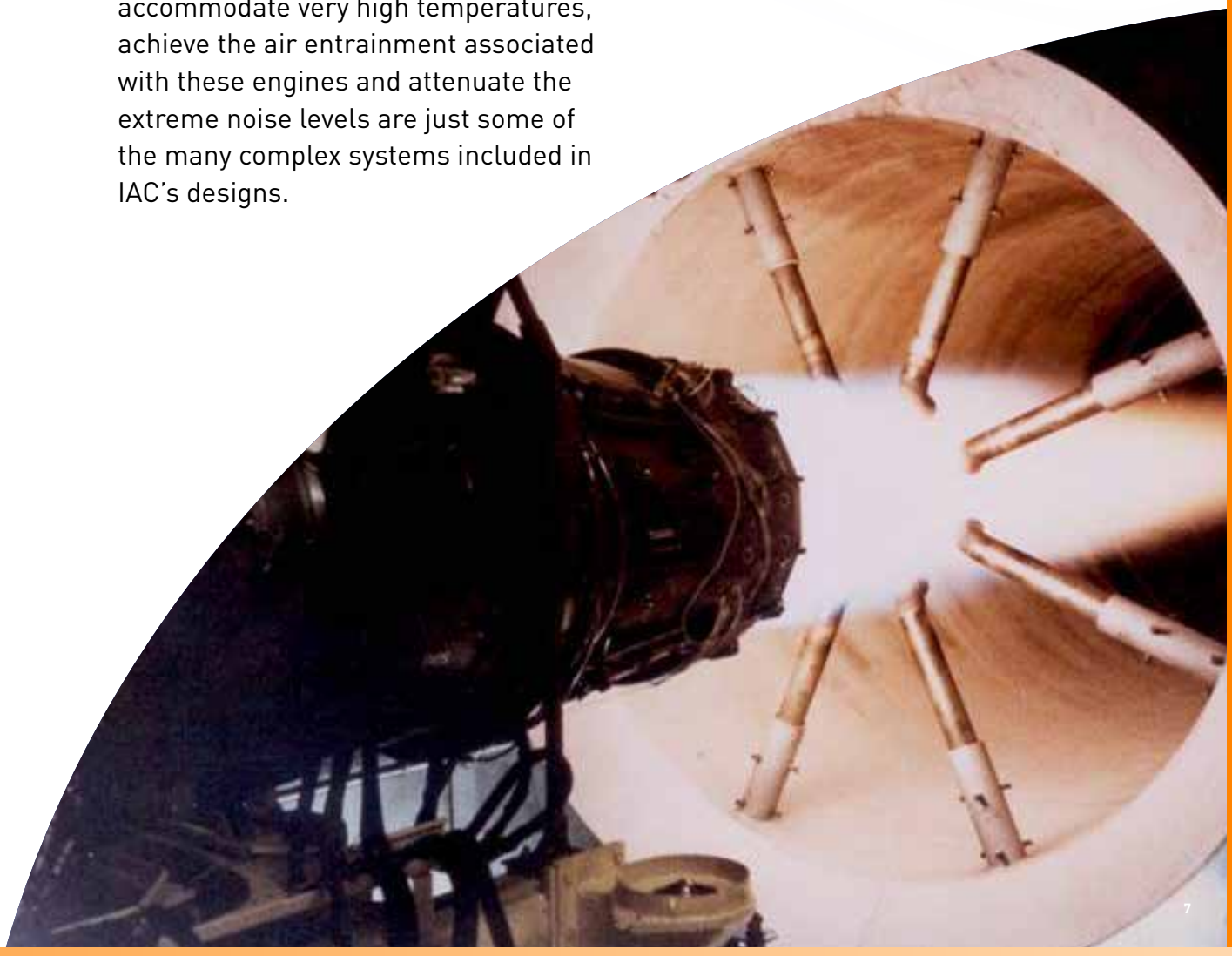
IAC test cells are provided complete with all necessary safety and support systems.

- **Certified by OEM's**
- **Civil design**
- **Full M & E package**
- **Multi-engine test stand with dedicated engine adaptors**
- **IAC Data Acquisition System**
- **Integral fuel system**
- **Engine start system**
- **Quick turnaround - multi-engine test stands**
- **Fluidic and pneumatic systems**
- **Fire suppression system**
- **Separate control and auxiliary rooms/ crew quarters**
- **HVAC**

Turbojet Test Facilities

Modern military engines are hotter more powerful and more complex than ever before. IAC delivers reliable engine test solutions to fulfill their stringent test requirements. IAC's experienced team of engineers, designers and acousticians have specialised for over 40 years in the various disciplines required to provide full military turbojet test facilities. Our extensive knowledge in this highly specialised field makes us a world leader in afterburning engine test cells. Acoustic systems including highly reliable fully air cooled intake and exhaust silencers, designed to accommodate very high temperatures, achieve the air entrainment associated with these engines and attenuate the extreme noise levels are just some of the many complex systems included in IAC's designs.

- **High reliability**
- **Certified by OEM's**
- **Full M & E package**
- **Multi-engine capability**
- **IAC Data Acquisition System**
- **Integral fuel system**
- **Engine start system**
- **Quick engine turnaround**
- **Fluidic and pneumatic systems**
- **Fire suppression system**



Hush Houses

- 24/7 engine test capability
- The ultimate engine testing solution
- Typical noise reduction 70dB(A)
- Able to accept a variety of aircraft
- Stable aero acoustic conditions
- Optional uninstalled testing capability
- Excellent noise attenuation
- Totally air-cooled exhaust system - low maintenance
- Suitable for use in a wide range of climatic conditions - from arctic to desert

Providing the ultimate engine testing solution are Hush Houses. IAC manufacture a variety of hush houses to suit different customer requirements and noise attenuation criteria. Each is designed to accommodate a variety of aircraft within a single facility. They are suitable for installed engine testing and are also able to accept an engine test stand for uninstalled testing. Hush Houses provide a round-theclock, all-weather, aero-engine test capability in an aerodynamically stable and acoustically attenuated environment. IAC Hush Houses are used widely and effectively support many of the world's military and civil aviation operations.

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APU Test Facilities

Reduced turnaround times and costs are key to the MRO business.

The APU market is tough so keeping ahead of the competition is paramount.

IAC APU test facilities offer fast, efficient and automated testing.

- **Multiple model capability**
- **Changeover frames to minimise TRT**
- **Scaleable for additional models in future**
- **APU and facility control integrated system**
- **IAC Data Acquisition System**
- **Bleed air measurement**
- **Electrical load bank**
- **Dynamometer**
- **APSCU, FADEC, ARINC interface**

Mobile Test Cells

IAC manufactures a range of mobile and demountable engine test facilities. One example of our mobile test facilities is the award-winning Mobile Test Facility (MTF). This fully mobile, stand alone unit was developed to meet and exceed a requirement of the UK Ministry of Defence. Air, land and sea-transportable. IAC facilities of this type require only minimal external services and can be installed and commissioned in a very short time. Designed to accommodate a variety of engine types, they provide many years of serviceability and can be easily relocated to accommodate future operational requirements.

- Plug & Play
- Minimal site establishment requirements
- Fully transportable
- Adaptable for various engine types
- Self-sufficient, stand alone
- IAC Data Acquisition System
- On-board fuel system
- Autonomous power generation
- Local power feed option
- Commercial off-the-shelf equipment
- Excellent noise attenuation
- Custom engineered

IAC Data Acquisition System

Testing accuracy, efficiency and return on investment are critical to the aero engine testing industry.

Integrated, centralised control, monitoring and safety system.

Commercial-off-the–shelf hardware and software based around National Instruments® systems.

Microsoft Windows® style layouts provide familiar interface and logic.

- Centralised engine and facility control, monitoring and safety systems reduces test time and protects assets
- FADEC, ARINC, ECU interrogation
- Integration and output to Performance Software (OEM supplied or otherwise)
- ‘Black box’ feature allows replay of events
- Watchdog monitors computer status
- Trending for Calibration Monitoring
- Archiving of Data
- Modular and scaleable
- for incorporation of additional models and hardware in the future
- Model selection automatically configures controls and equipment e.g. throttle, dyno modes, parameter limits

Support & Service

IAC understands that operational serviceability of a facility is key and downtime must be kept to an absolute minimum. IAC has a dedicated department specialising in supporting our customers and their facilities in the field. Support & Service contracts are tailored to meet each particular customers' needs but typically include sourcing and supply of spare parts, scheduled and unscheduled maintenance, calibration, software and hardware support, technical publications, design studies for modification and upgrades. Services include a 24/7 helpline and a dedicated field team of engineers. IAC supports a variety of commercial and military customers in various locations worldwide and IAC's experienced team of engineers will get your facility fully operational again in the minimum possible time.

Having Aero Engine Test Facility Support minimises facility downtime allowing maximum utilisation.

Our Aviation Product Support portfolio includes the following services:

- **Calibration Services**
- **Dynamometer Services**
- **Maintenance Services**
- **Technical Support**
- **Upgrade/Refurbishment**
- **Technical Manuals**
- **Training**

Sound Havens and Control Rooms

A world class sound-controlled people environment bringing ground operations together at Head of Stand. Fli-Pod heralds a step-change in turnaround time.

- Speeds dispatcher decisions
- Pre-wired for network data and comms
- Makes better use of infrastructure
- Air-side swipe-card access
- Exceeds EU and Environmental standards
- Acoustic construction protects users from external aero engine noise
- Over 60 Fli-Pods are facilitating turnaround at London's Heathrow Airport

Providing up to 58dBA noise reduction, IAC Noishelters™ provide the prefect solution for Engine Test Control Rooms.

- Modular and available in almost any size/shape
- Single wall acoustic panel construction 40dB
- Double wall acoustic panel construction 58dB
- Pre-engineered cable entries
- Compatible noise-lock door and window systems
- Ventilation or air-conditioning
- Finished and equipped to your requirements

Ground Run-up Enclosure/Pen

Airport noise emissions are increasingly restricting the operational flexibility of many airports.

IAC's GRE offers market leading noise reduction and aerodynamic performance to maximise operational availability.

- Field proven GREs in use since the mid-1980s
- Cost effective design minimises total project costs
- Minimum footprint maximises space utilisation
- Jetshield™ and Aerowall™ aero acoustic optimisation enhance crosswind and tailwind operation
- Scaleable and modular construction allows tailoring to meet site specific benefits
- Civil and Military (including afterburner) versions available
- Silenced, vertical air intakes greatly improve air flow quality
- Range of sizes up to 747-8 and A380
- Aerodynamic design promotes laminar air flow and mitigates risk of re-ingestion, vortices and turbulence
- Specialist assessment of site noise performance requirement
- Noise Impact Assessment and Environmental Impact Assessment assistance
- Implementation as part of an airport noise mitigation scheme

Standard GRE sizes to meet Civil Aircraft fleet requirements

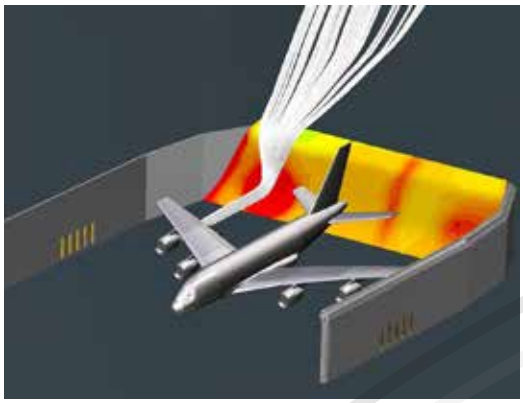
ICAO/CAA	FAA	Typical Aircraft	Standard sizes, m			
			Internal Width	External Width	Length	Height
Code F	Classe VI	A380, B747-8	90	100	101	16
Code E	Classe V	B747, B777, A340	75	84	101	14
Code D	Classe IV	B767, A300	62	71	86	12
Code C	Classe III	B737, A320	46	55	62	10

Features:

- Jetshield™ single construction rear wall aerodynamically shaped to deflect and eject exhaust gases to minimise re-ingestion and maximising crosswind/tailwind performance
- Aerowall™ silenced air intakes maintain acoustic performance whilst promoting high quality, laminar air flow through the facility minimising vortices, turbulence, re-ingestion and maximising crosswind/tailwind performance
- Hot dipped galvanised structural steel with design life of >50 years
- Galvanised Noiseshield™ panels with certified and field proven acoustic performance
- Galvanised Power-flow™ silencers with certified and field proven acoustic performance
- Concrete deflector panels offer ‘zero’ maintenance

Options:

- High level lighting
- Low level lighting (increased underwing visibility for maintenance works)
- Control and observation cabin
- Weather station: wind direction, speed, temperature
- Wind sock
- Personnel escape doors
- Fire protection hardware cupboards



Jet Wake/Blast Barrier

Airfield safety, operational efficiency and maximisation of asset usage are paramount to every airport.

Airports have a duty to protect people, vehicles, aircraft and buildings from the dangerous high velocity thrust from aircraft: ICAO, FAA and CAA guidelines.

Financial benefit is being generated by reducing distances between aircraft, ground services and terminal, greater use of space and by releasing areas that were previously off limits.

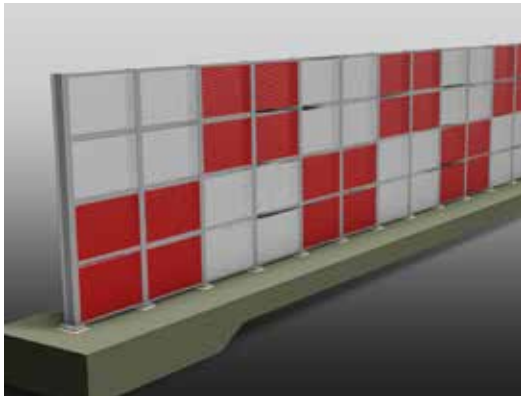
IAC barriers are cost-effective, aesthetic, long life solutions that safely deflect and/or diffuse the high velocity wake from aircraft, whether jet, prop or helicopter if taxiing, taking off or carrying out power assurance checks.

Curved Solid

- Full height protection
- Deflects jet wake safely upwards
- Rated for:
  - Full power
  - Take off power
  - Taxi / breakaway
- Acoustic upgrade offers 10-15 dB(A) noise reduction behind barrier
- Mobile version on concrete pallets

Vertical Mesh

- 'Line of sight' through barrier promotes safety, visibility and aesthetics
- Deflects jet wake upwards at ~60°
- Minimum footprint maximises space utilisation
- Rated for taxi / breakaway thrust
- Mobile version on concrete pallets



Angled Mesh

- 'Line of Sight' through barrier promotes safety, visibility and aesthetics
- Deflects jet wake upwards at ~85°
- Rated for taxi / breakaway thrust
- Mobile version on concrete pallets

Vertical Acoustic Barrier

- High noise redution 10-15dB(A)
- Full height protection
- Blocks jet wash
- Rated for taxi / breakaway thrust
- Can be painted or clad as a feature or to match other buildings, terminals and hangars
- Mobile version on concrete pallets

Options

- Red/white panels (ICAO Annex 14, CAP 168 Ch4)
- Obstruction lights
- Linlaner marker posts
- Palletised 'mobile' barrier options up to 3.5m high
- Acoustic upgrade to curved solid

Main Features

- Hot dip galvanised structural steel
- Anti-FoD shake proof fasteners
- Hot dip galvanised panels
- Hot dip galvanised fasteners and fixings
- Hot dip galvanised ground anchors

IAC Airport barrier range standard height table

Description	Hauteurs standard, m				Catégorie de poussée en champ proche
Curved solid	2.1	3.2	4.3	6.0	Full Power & Taxi / Breakaway
Vertical Mesh	2.2	3.3	4.3	5.4	Taxi / Breakaway
Angled Mesh	2.7	3.5	4.3	5.2	Taxi / Breakaway
Vertical Acoustic	2.0	3.0	4.0	5.0	Taxi / Breakaway

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