Apex TV Enclosures

Premium OEM Manufacturing Specification - Dubai Grade

Version 2.0 | December 2025 | RFQ Ready

0. Apex Premium vs Nearest Competitor

Apex enclosures are engineered to exceed competitor specifications in every critical area:

Specification	Competitor (Standard)	Apex (Premium)	Advantage
Frame Thickness	1.5mm aluminum	**2.0mm aluminum**	33% stronger, no flex
Aluminum Grade	6063-T5 (standard)	**5052-H32 / 6061-T6**	Superior corrosion resistance
Max Operating Temp	50°C ambient	**55°C ambient**	+5°C headroom for Dubai
Glass Construction	4mm single tempered	**4+4mm laminated tempered**	Shatter-safe, better insulation
Glass Coatings	AR coating only	**AR + IR rejection + UV block**	Reduces solar heat gain 40%
Fan Control	On/off thermostat @ 30°C	**PWM microcontroller**	Smooth, quiet, intelligent
Fan Type	Generic 80mm DC	**Noctua/Sunon 120-140mm PWM**	50% quieter, 3x lifespan
Noise Level	~35-40 dBA	**<28 dBA normal**	Near-silent operation
Hardware		**316 Stainless (A4)**	

Specification	Competitor (Standard)	Apex (Premium)	Advantage
	Zinc-plated steel		No rust, coastal-proof
Filtration	Basic mesh	**Automotive-grade pleated**	10x finer dust capture
Pressure Design	Neutral	**Positive pressure**	Dust cannot enter
Failsafe	None	**Thermal cutoff + alarm**	Protects TV investment
Enclosure Depth	150mm	**120mm**	20% slimmer profile
Door System	Removable front panel	**Hinged + gas struts**	One-hand opening, stays open
Security	Padlock holes only	**Dual cam locks + padlock hasps**	Integrated keyed security
Latching	Basic friction latches	**Compression draw latches (4×)**	Better seal, adjustable
Mount Included	VESA plate only	**Full-motion articulating arm**	±90° swivel, 500mm extension

1. Scope & Design Priorities

> **Target Market:** Luxury residential and premium hospitality in UAE, Saudi Arabia, Qatar, Kuwait. Must accommodate standard consumer TVs while maintaining reliability in extreme conditions.

Design Priorities (Ranked)

1. **Thermal reliability** in 55°C ambient + solar load
2. **Low noise** (<28 dBA normal operation)
3. **Dust/sand ingress resistance** (positive pressure design)
4. **Corrosion resistance** (coastal UAE specification)
5. **Premium fit/finish** (luxury market positioning)
6. **Slim profile** (120mm depth vs 150mm competitors)

> **Non-Negotiable Requirements:**
> - NO on/off thermostats - PWM control only
> - NO unfiltered intakes - automotive-grade filtration required
> - NO consumer power strips - proper power distribution only

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2. Environmental Requirements

Temperature

- Operating: 0°C to **55°C** continuous
- Storage: -20°C to 70°C
- Internal target: <45°C at 55°C ambient

Moisture & Humidity

- Humidity: up to 95% RH non-condensing
- Rain: heavy/wind-driven (not submersible)
- Optional: ePTFE breather membrane

Dust & Sand

- Designed for sandstorms
- Positive pressure design
- Replaceable automotive-grade filters

Corrosion

- Salt fog: >500 hours
- UV stability: 5+ years
- 316 stainless hardware

IP Rating Target PREMIUM

IP66 rated - Dust tight + protected against powerful water jets. Suitable for direct rain, hose-down cleaning, and storm conditions.

IP66 Requirements:

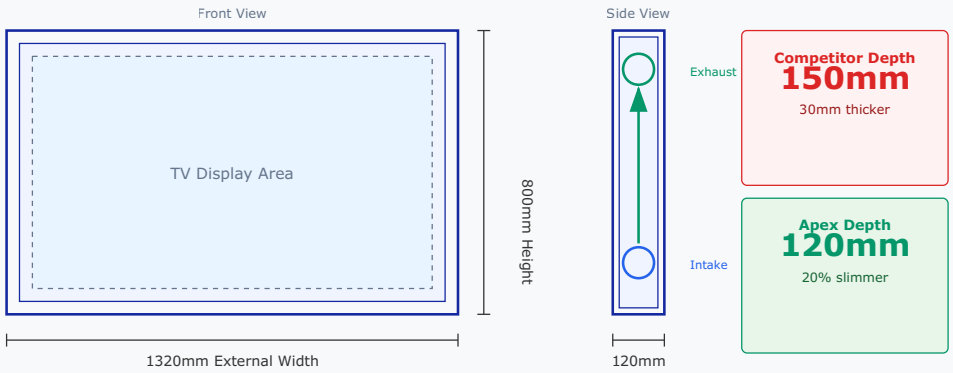
- **First digit (6):** Dust tight - no ingress of dust permitted
- **Second digit (6):** Protected against powerful water jets (12.5mm nozzle, 100L/min, 3m distance)
- Achieved through continuous EPDM channel gaskets, compression latches, and IP66-rated ventilation grilles with labyrinth baffles

3. Size Schedule

Model	Fits TV	Internal (W×H×D)	External (W×H×D)	VESA Support	Fan Count
ATE-43	39" - 43"	1000 × 600 × 80mm	1060 × 660 × 120mm	200×200, 300×300	2 × 120mm
ATE-55	49" - 55"	1260 × 740 × 80mm	1320 × 800 × 120mm	200-400×400	2 × 140mm
ATE-65	60" - 65"	1480 × 860 × 80mm	1540 × 920 × 120mm	300-600×400	3 × 140mm
ATE-75	70" - 75"	1700 × 1000 × 90mm	1760 × 1040 × 130mm	400-600×400	4 × 140mm
ATE-86	82" - 86"	1940 × 1120 × 100mm	2000 × 1180 × 140mm	600×400	4 × 140mm

Note: External depth of 120-140mm is 20-30mm slimmer than competitor's 150-170mm. Achieved through optimized internal layout and slimmer 140mm fans (vs stacked 80mm).

Figure 1: Enclosure Dimensions (ATE-55 shown)



All dimensions in millimeters. Internal clearance 20mm minimum on all sides.

4. Mechanical Construction

4.1 Enclosure Body

Material PREMIUM

- **Primary:** Aluminum 5052-H32
- **Alternative:** 6061-T6
- Superior corrosion resistance vs 6063-T5

Thickness

- Main shell: **2.0mm**
- Door/rear panel: **2.0mm**
- Mounting rails: **3.0mm**

4.2 Fabrication

- CNC laser cut + CNC press brake
- TIG welding where needed
- Integrated stiffening ribs (no oil-canning)
- All edges deburred, no sharp edges

4.3 Fasteners & Hardware PREMIUM

Location	Specification
External fasteners	**A4 / 316 Stainless Steel** (coastal grade)
Internal fasteners	A2 / 304 Stainless minimum
Thread treatment	Anti-galling compound or coated

Dissimilar metals	Nylon isolation washers required

4.4 Seals & Gasketing IP66

Component	Specification
Door Seal	EPDM continuous channel gasket, UV-stable, closed-cell Profile: 12×15mm with integrated channel for frame retention
Compression	Consistent 20-30% compression around full perimeter via compression latches
Cable Entry	IP68-rated cable glands (M16/M20), 316 stainless steel
Panel Joints	Overlapping seams with gasket backing, no exposed gaps
Ventilation Sealing	IP66 labyrinth grilles with internal baffles (see 6.6)

4.5 Door & Access System PREMIUM

Hinged Front Frame

- **Hinge type:** Concealed 3-knuckle stainless steel
- **Quantity:** 3 hinges (top edge)
- **Opening:** 110° minimum
- **Material:** 316 stainless steel

Gas Shock Struts

- **Quantity:** 2× gas struts per unit
- **Force:** Sized to hold door open at 90°
- **Rating:** Stainless steel, marine grade

- **Damping:** Soft-close action

- **Door hold-open:** Magnetic catch or hook system to secure door when accessing TV
- **Front panel:** Removable glass frame for TV installation/service
- **Tool-free access:** No tools required for routine TV access

4.6 Security & Locking PREMIUM

Feature	Specification
Primary Lock	Tubular cam lock, keyed alike option, 316 SS housing
Lock Quantity	2× locks standard (top and bottom of door)
Padlock Hasps	2× padlock holes (accepts up to 10mm shackle) for additional security
Keys	3× keys supplied per unit, keyed alike option for multi-unit installs
Anti-tamper	Security screws on external hinges (Torx or hex socket)

4.7 Latching System

- **Latch type:** Compression draw latches (not friction)
- **Quantity:** 4× latches (2 per side) for 55"+ models
- **Material:** 316 stainless steel body and keeper
- **Action:** Over-center compression for positive gasket seal
- **Adjustment:** Threaded keeper for seal adjustment

4.8 Mounting System

VESA Mount Plate (Included)

- **Pattern:** Universal 200×200 to 600×400mm

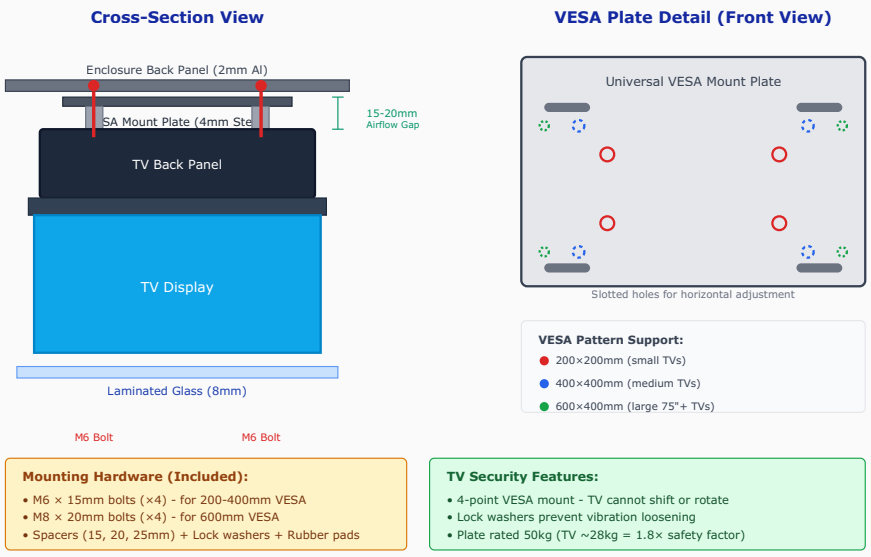
- **Material:** 4mm steel, powder coated
- **Hardware:** M6/M8 bolts, spacers, lock washers included
- **Adjustment:** Slotted holes for vertical/horizontal alignment

Full-Motion Arm (Included)

- **Type:** Articulating dual-arm mount
- **Extension:** Up to 500mm from wall
- **Swivel:** ±90° horizontal
- **Tilt:** +5° / -15°
- **Rating:** 50kg capacity minimum

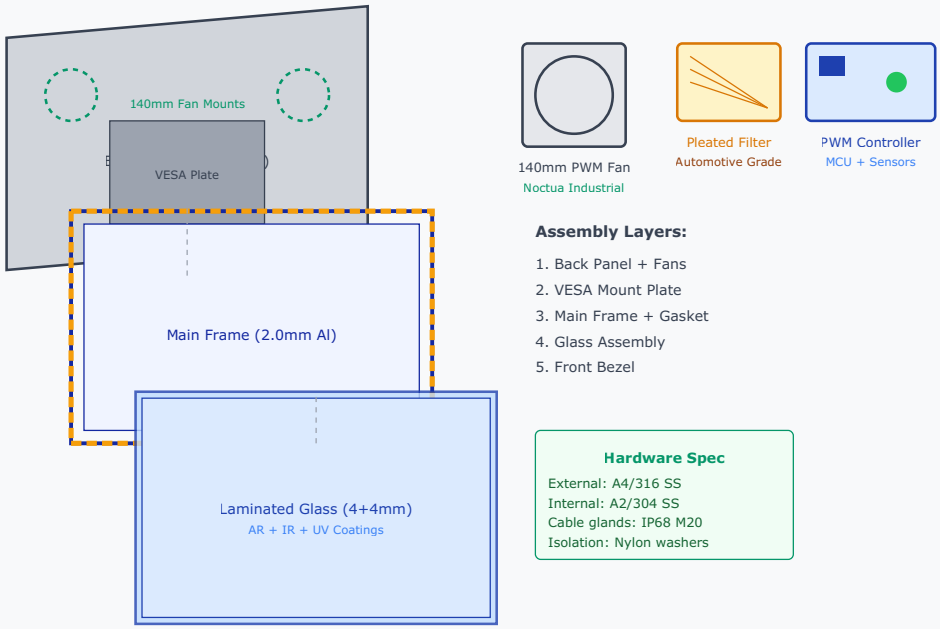
- **Wall bracket:** Heavy-duty steel wall plate with 316 SS hardware
- **Enclosure attachment:** Secure mounting points on rear panel
- **Cable routing:** Arm includes cable management channel

Figure 2: TV Mounting System Detail



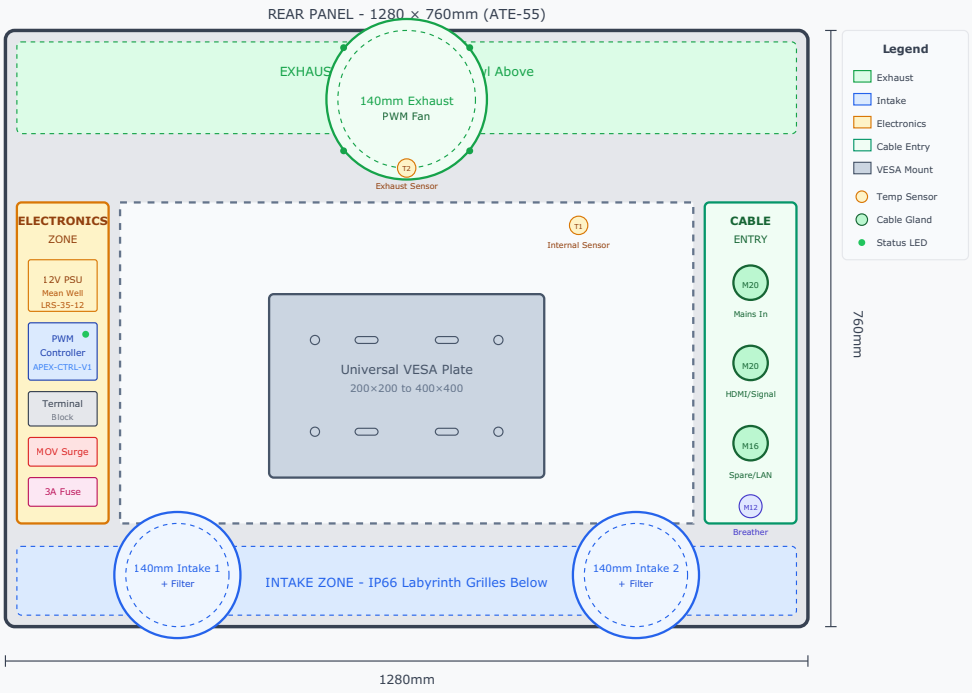
TV mounting system showing cross-section (left) and VESA plate hole patterns (right). Universal plate supports all standard VESA patterns from 200×200 to 600×400mm.

Figure 3: Exploded Assembly View



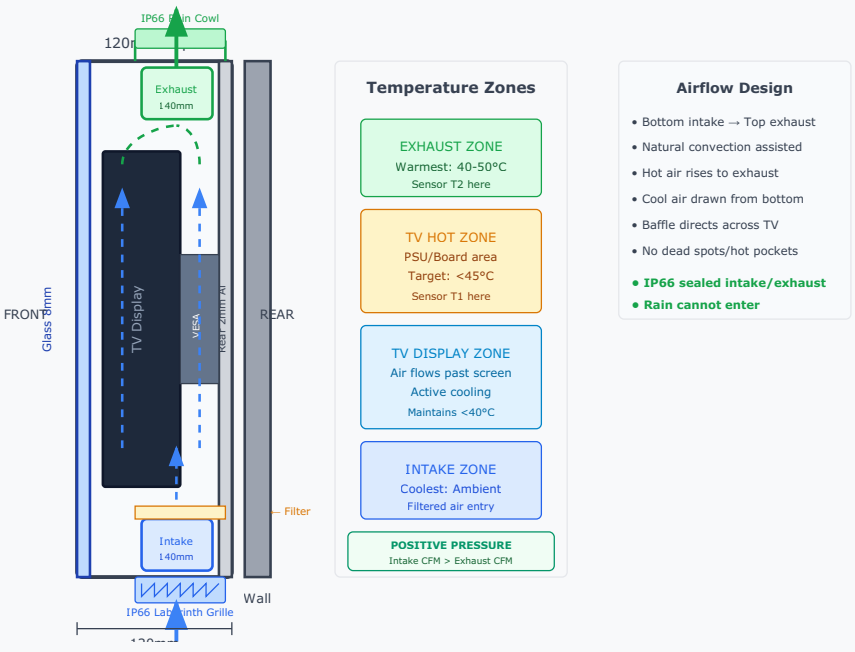
Exploded view showing main components and assembly sequence.

Figure 4: Rear Panel Internal Layout (View from Inside)



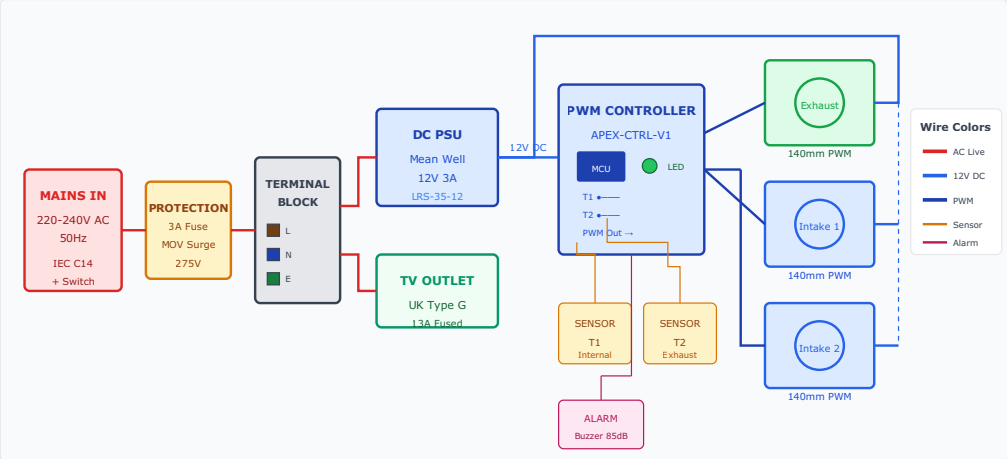
Rear panel layout showing electronics zone (left), VESA mount (center), cable entry (right), and fan positions (top/bottom). All dimensions in mm.

Figure 5: Side Cross-Section - Airflow Path



Side cross-section showing vertical airflow path from bottom intake through TV zone to top exhaust. IP66 labyrinth grille at intake, rain cowl at exhaust.

Figure 6: Electronics Block Diagram



Electronics block diagram showing power distribution, PWM controller, temperature sensors, and fan connections.

5. Front Glass / Optical Stack PREMIUM

> **Key Differentiator:** Laminated glass with IR rejection reduces solar heat gain by up to 40%, significantly reducing cooling requirements and fan noise.

5.1 Glass Construction

Layer	Specification
Outer pane	**4mm low-iron tempered glass**
Interlayer	**PVB (polyvinyl butyral)** - shatter retention
Inner pane	**4mm low-iron tempered glass**
Total thickness	~8.8mm (vs Apollo 4mm single)

5.2 Coatings & Films

Coating	Purpose	Performance
AR Coating (both sides)	Reduce reflections	<1% reflection
IR Rejection Film	Block infrared heat	90% IR rejection (3M Prestige 90 or equiv)
UV Block	Protect TV from UV	≥99% UV rejection

5.3 Optical Requirements

- Visible light transmission: manufacturer standard (provide measured values)
- Haze: low - no distortion, no waves

- Edge finish: polished
- Glass retention: mechanical frame + gasket (not adhesive-only)

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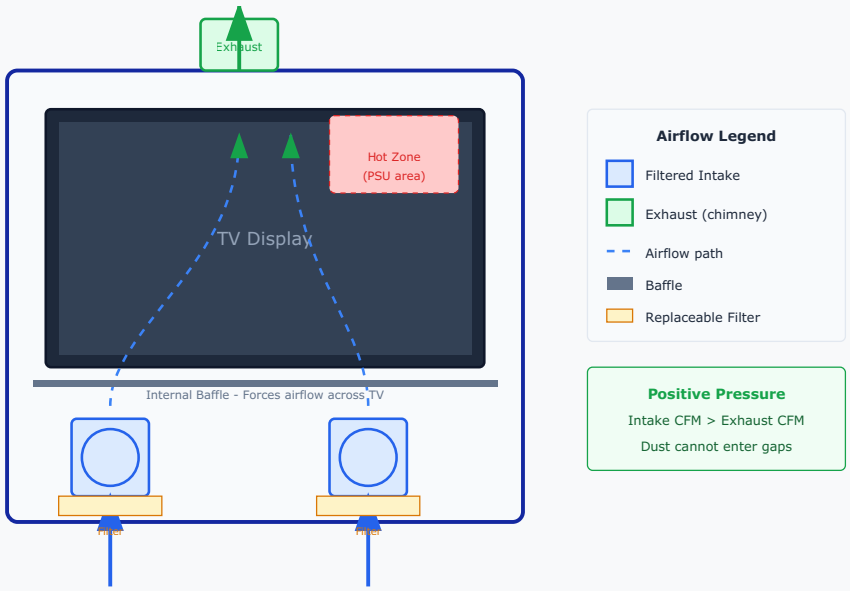
6. Thermal Management System CRITICAL

6.1 Architecture - Zoned Airflow

Figure 7: Thermal Airflow Design



Cross-section showing zoned airflow with positive pressure design. Airflow forced across TV hot zones.

6.2 Fan Specification PREMIUM

Parameter	Competitor (Standard)	Apex (Premium)
Fan Size	80mm × 80mm × 25mm	**140mm × 140mm × 25mm**
Fan Type	Generic DC, 2-wire	**Noctua Industrial PPC / Sunon MagLev**
Control	On/Off thermostat @ 30°C	**PWM (4-wire), 30-50°C curve**
Bearing	Sleeve bearing	**SSO2 / Fluid Dynamic**

MTBF	~30,000 hours	**>150,000 hours**
IP Rating	None	**IP67 rated**
Mounting	Direct screw	**Rubber isolators + anti-vibe grommets**

6.3 Noise Targets

Mode	PWM Duty	Noise Target (1m)
Normal operation	≤40%	**≤28 dBA** (near silent)
High cooling	≤70%	**≤35 dBA**
Emergency	100%	Higher allowed, time-limited

6.4 Control System NEW

NO on/off thermostats. PWM microcontroller control is mandatory.

Controller

- MCU-based PWM fan controller
- Smooth fan ramp (no sudden start)
- Pre-cool option (user selectable)
- Post-run cooldown after TV power-off

Sensors

- Internal air temp (NTC/DS18B20)
- Exhaust air temp
- Optional: TV rear panel probe

- Optional: Ambient intake sensor

Failsafe REQUIRED

- If internal >65°C for >5 min:
- → Alarm output trigger
- → Full fan speed
- → Optional: TV power cut

6.5 Filtration

- **Media:** Automotive-grade pleated synthetic or foam
- **Access:** Tool-less serviceable
- **Spares:** 1 extra filter included per unit
- **Design:** Slight positive pressure to prevent dust ingress

6.6 IP66 Ventilation System IP66

Critical for IP66: Standard mesh grilles are NOT IP66 rated. Labyrinth-style grilles with internal baffles are required.

Intake Grilles (Bottom)

- **Type:** IP66 labyrinth vent with internal baffles
- **Material:** UV-stable ABS or 316 stainless
- **Design:** Downward-facing louvers + internal maze
- **Filter:** Behind grille, tool-free access
- **Quantity:** 2× per unit (one per intake fan)

Exhaust System (Top)

- **Type:** Rain cowl/hood with labyrinth exit
- **Material:** Powder-coated aluminum
- **Design:** Chimney effect, water cannot enter even in heavy rain
- **Mesh:** 316 SS insect screen behind cowl
- **Overhang:** Minimum 40mm projection

Ventilation Component	IP Rating	Notes
Intake labyrinth grille	**IP66**	Tested to IEC 60529
Exhaust rain cowl	**IP66**	No direct path for water entry
Cable glands	**IP68**	Exceeds requirement
Breather vents	**IP68**	ePTFE membrane

7. Electrical System

> **Do NOT use consumer power strips.** Purpose-built power distribution module required.

7.1 Power Input

Parameter	Specification
Voltage	220-240V AC, 50Hz (Gulf standard)
Entry	IEC inlet OR hardwired gland + terminal block
Protection	Fused + MOV/TVS surge protection
Earth bonding	Proper bonding to enclosure required

7.2 Internal Distribution

- Fused distribution: TV + fans + accessory circuits
- 1-2 accessory outlets (UK/GCC type or IEC)
- All cabling: heat-rated, neatly loomed
- Cable management: high-temp 3M VHB adhesive mounts

7.3 Compliance

- Build to IEC/UL 62368-1 principles
- Hi-pot / earth continuity test per batch
- CE marking required
- RoHS compliant

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8. Finish & Cosmetics

8.1 Powder Coating

Parameter	Specification
Type	Architectural-grade polyester
Thickness	**70-100 µm** (vs competitor 60-80µm)
Finish	Semi-gloss, 30-50 gloss units
UV Resistance	5+ years outdoor stability
Salt Spray	**>500 hours**

8.2 Color Options

Color	RAL Code	Notes
Sand/Off-White	RAL 1013	**Recommended** - reduces solar heat
Anthracite Grey	RAL 7016	Premium option
Jet Black	RAL 9005	On request (higher heat absorption)

8.3 Internal Surfaces

- Matte black or dark neutral (reduce reflections)
- Avoid heat traps near electronics
- OEM to propose balanced approach

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9. Testing & QA Requirements

Manufacturer must propose and price the following tests:

Test	Method	Pass Criteria
Thermal Chamber	55°C ambient, TV running, sealed	Internal air <45°C, TV back <50°C
Dust Ingress	Dust exposure + filter evaluation	No dust penetration past filter
Water Jet Test (IP66)	IEC 60529 - 12.5mm nozzle, 100L/min, 3m distance, all angles	No water ingress
Noise Test	dBA at 1m at 40/70/100% PWM	28/35/45 dBA max
Salt Spray	ASTM B117	>500 hours, no corrosion
Burn-in	24-hour electronics run	No failures

10. Bill of Materials (ATE-55)

Item	Description	Qty	Est. Cost (USD)
Frame Assembly	5052-H32 Al, 2.0mm, powder coated	1 set	$55
Back Panel	2.0mm aluminum, powder coated	1	$30
Front Glass	4+4mm laminated, AR+IR+UV	1	$85
Gaskets	EPDM closed-cell seal kit	1 set	$12
Fans	140mm PWM industrial (Noctua/ equiv)	2	$45
Fan Controller	MCU PWM board + sensors	1	$25
Power Module	Fused distribution + surge	1	$18
Cable Glands	IP68 M20, 316 SS	3	$8
Filters	Automotive pleated (+ 1 spare)	2	$8
Hardware	316 SS fasteners, brackets, clips	1 set	$18
VESA Mount	Universal adjustable plate	1	$18
Packaging	Engineered foam, manual, gauge	1 set	$15
TOTAL ESTIMATED			**~$337**

Target Pricing:

- FOB Price (55"): $380-450 per unit
- Quote requested at: 100 / 500 / 1,000 quantity
- Premium positioning justifies higher cost vs competitors ($250-300)

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11. RFQ Response Requirements

Factory must respond with:

1. Proposed fan model + datasheet + noise curve
2. Proposed controller design + failsafe behaviour
3. Aluminium grade certification and thickness proof
4. Glass supplier + coating spec + IR/UV performance sheet
5. Estimated unit cost at 100 / 500 / 1,000 qty
6. Lead time for EVT/DVT/PVT builds

Documentation Deliverables

- 2D drawings (DXF/PDF) + 3D CAD (STEP)
- BOM with part numbers and supplier info
- Wiring diagram
- Firmware/control logic description
- QC checklist and test report template
