

Apex TV Enclosures

Premium OEM Manufacturing Specification - Dubai Grade

Version 2.0 | December 2025 | RFQ Ready

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)

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

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:

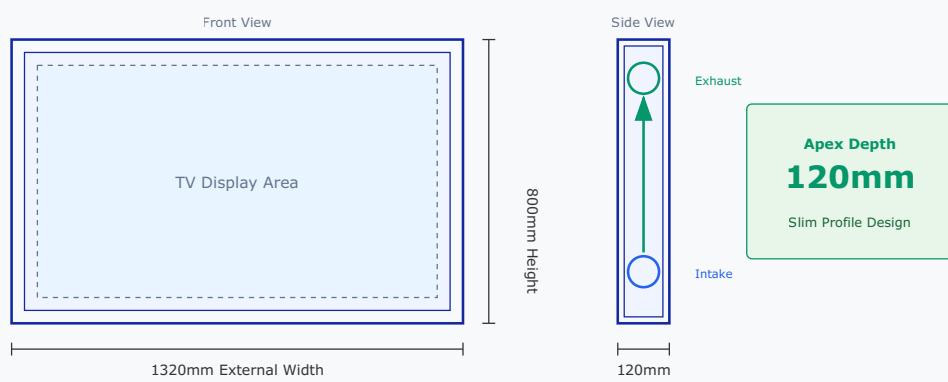
- **First digit (6):** Dust tight - no ingress of dust permitted
- **Second digit (6):** Protected against powerful water jets (12.5mm nozzle, 100L/min, 3m distance)
- Achieved through continuous EPDM channel gaskets, compression latches, and IP66-rated ventilation grilles with labyrinth baffles

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 achieved through optimized internal layout and efficient 140mm fan design.

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
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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

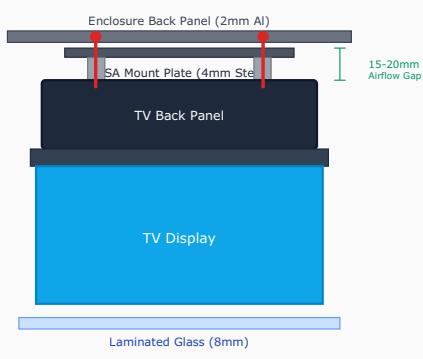
Full-Motion Arm (Included)

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

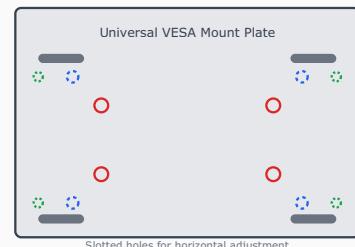
- **Wall bracket:** Heavy-duty steel wall plate with 316 SS hardware
- **Enclosure attachment:** Secure mounting points on rear panel
- **Cable routing:** Arm includes cable management channel

Figure 2: TV Mounting System Detail

Cross-Section View



VESA Plate Detail (Front View)



VESA Pattern Support:

- 200×200mm (small TVs)
- 400×400mm (medium TVs)
- 600×400mm (large 75"+ TVs)

Mounting Hardware (Included):

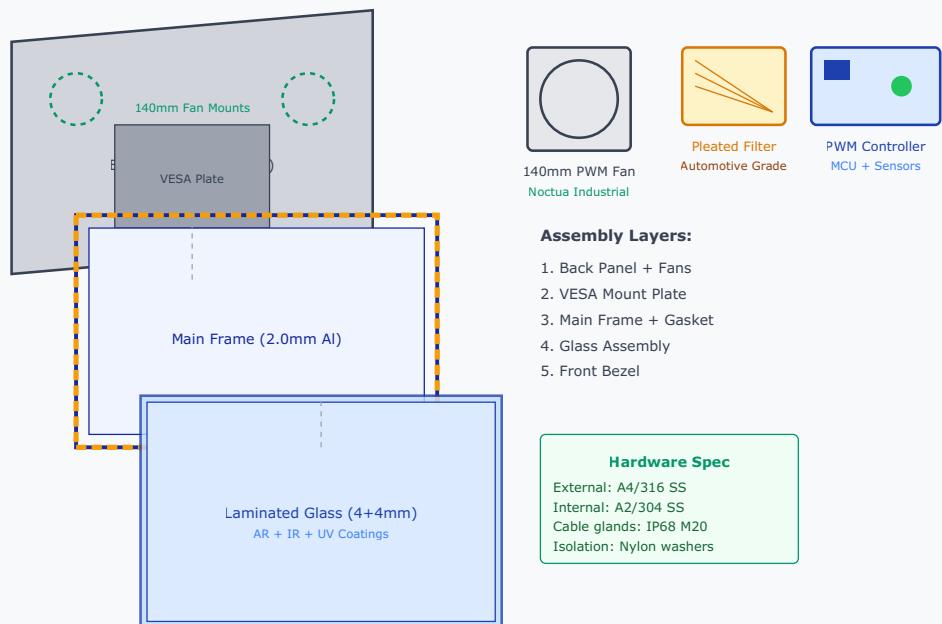
- M6 × 15mm bolts (x4) - for 200-400mm VESA
- M8 × 20mm bolts (x4) - for 600mm VESA
- Spacers (15, 20, 25mm) + Lock washers + Rubber pads

TV Security Features:

- 4-point VESA mount - TV cannot shift or rotate
- Lock washers prevent vibration loosening
- Plate rated 50kg (TV ~28kg = 1.8× safety factor)

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)

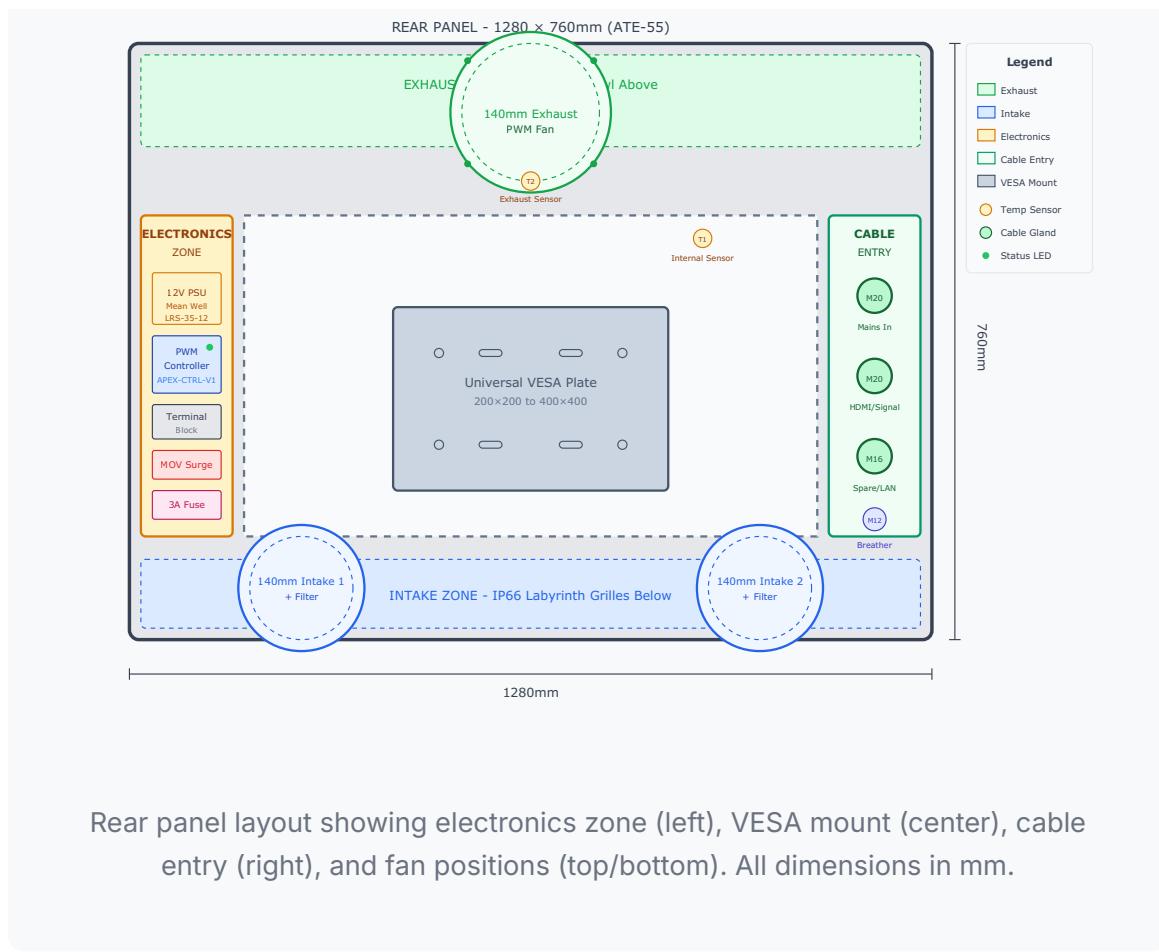
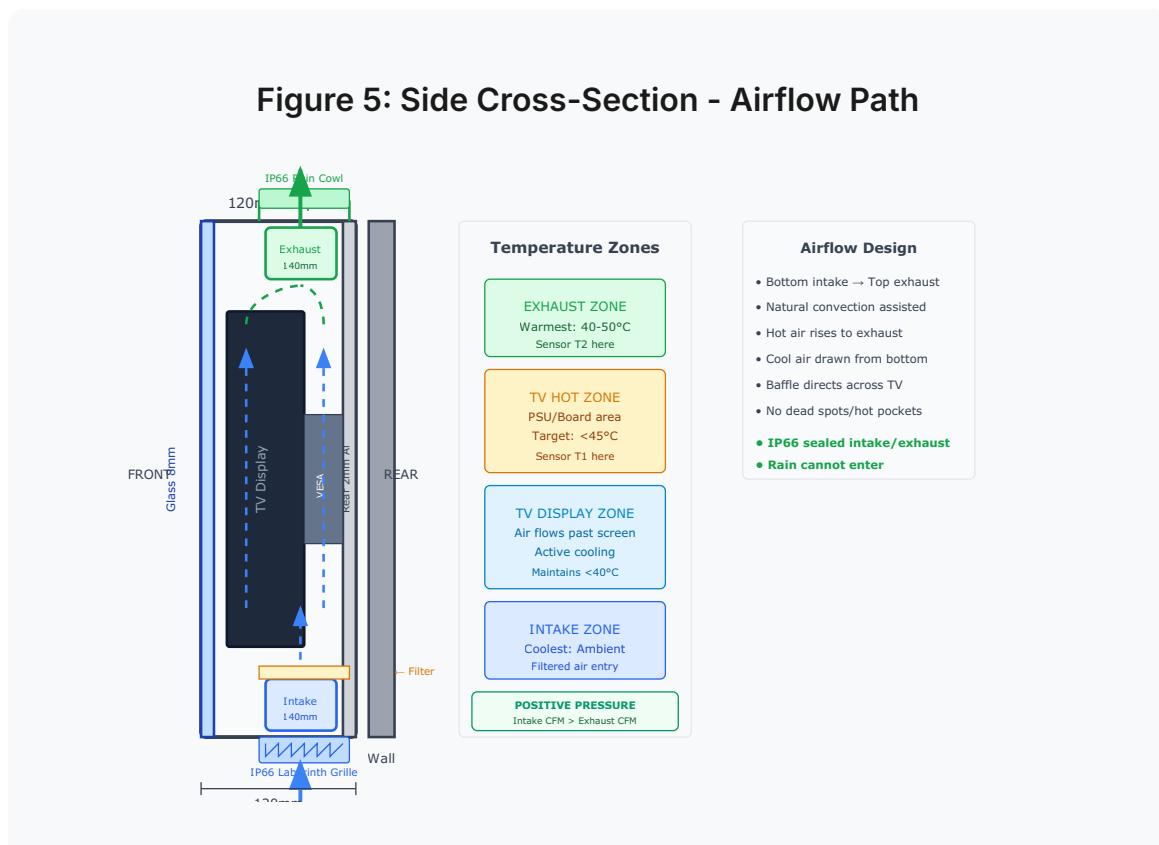
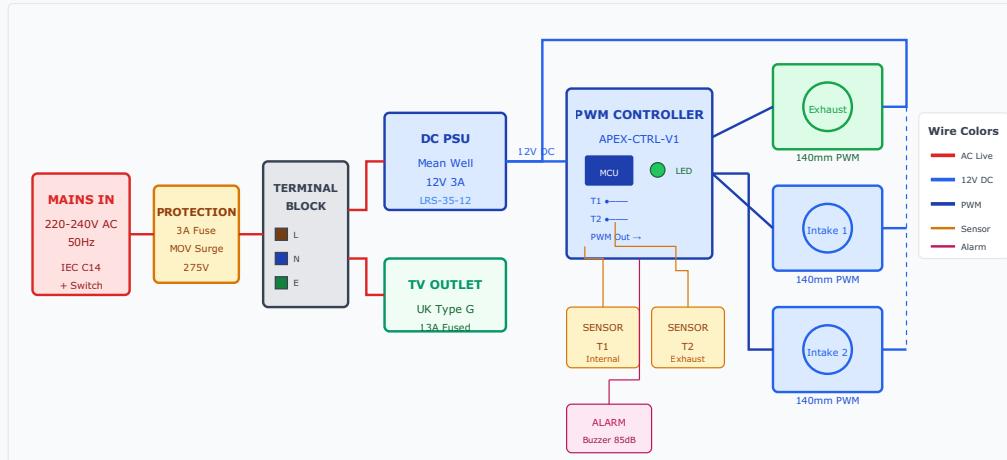


Figure 5: Side Cross-Section - Airflow Path



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 laminated

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

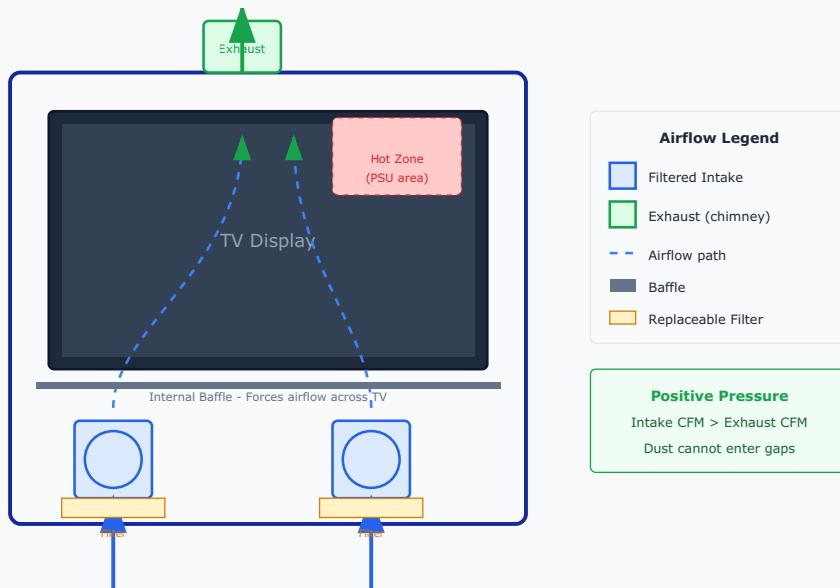
- Edge finish: polished
 - Glass retention: mechanical frame + gasket (not adhesive-only)
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6. Thermal Management System

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

Parameter	Specification
Fan Size	140mm × 140mm × 25mm
Fan Type	Noctua Industrial PPC / Sunon MagLev
Control	PWM (4-wire), 30-50°C curve
Bearing	SSO2 / Fluid Dynamic
MTBF	>150,000 hours

IP Rating	IP67 rated
Mounting	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

8. Finish & Cosmetics

8.1 Powder Coating

Parameter	Specification
Type	Architectural-grade polyester
Thickness	70-100 µm
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

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
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Apex TV Enclosures
Dubai, United Arab Emirates
Premium Outdoor TV Protection

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