# Concept 5.2

## Rubber Bumper + Rigid Core

R6 | Rapid Product Solutions | Supplier brief

| WIDTH (mm) | HEIGHT (mm) | DEPTH (mm) |
|---|---|---|
| 88 | 136 | 27.2 |

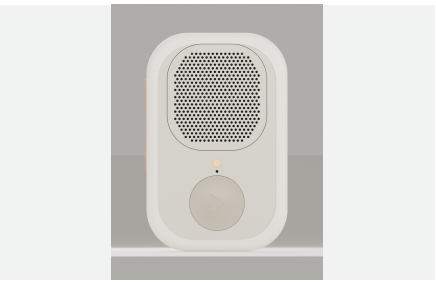
Modeled size dimensions.

## Inspiration photo

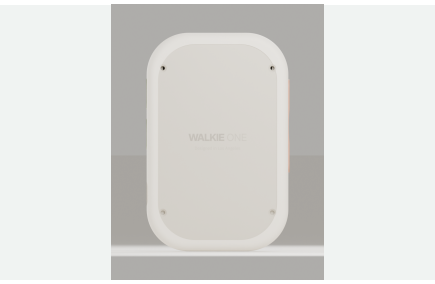
## CAD assembly / R6

Appearance intent; CAD shows the current engineering proposal. Views are not to scale.

CAD front



CAD rear



CAD exploded

02 Quote and materials / 03 Build and inspect / 04 Inputs and delivery

# Quote and materials

R6 | Rapid Product Solutions | Painted nylon body with cast urethane bumpers, an aluminum play key and a supported PMMA light guide.

Please review manufacturability and quote a staged enclosure prototype for Walkie One, a handheld push-to-talk voice device. We need to evaluate grip, button operation, speaker/microphone openings, status light, charging access and serviceability.

## What to quote first

One rigid fit set and F01/F04 grille, F02 optical, F03 gasket and F05 fastening samples; use F06 only as a cable gauge. Then one finished A01 front assembly and rear marking sample. Optical qualification uses at least three guides.

## Materials and processes

| | |
|---|---|
| Nylon body and grille | SLS nylon, exact powder to confirm; PA2200 is a requested candidate. Retain the nylon grille and its existing 473-aperture field. Use the part-by-part finish schedule. |
| Urethane bumpers | RPS Elastomer cast polyurethane, 40 +/-5 Shore A, matches Rapid's published material family. Confirm current formulation, pigmentation, thin-part cure and bond recipe before samples. |
| Key and optics | 6061-T6 key with proposed light-champagne anodize. Optical-clear PMMA guide with polished transport faces and diffused output only; supported machining and captive retention per drawing. |
| Cut materials | Real acoustic mesh, PET shims and silicone foam. Mic stack is 1.43 mm installed foam plus 0.14 mm tape. Use specified free stock and cut outlines; do not print these solid envelopes. |

Published capability is not acceptance of this specific geometry. Exact grades, fine tolerances, thin-section casting, specialty coatings/cutting and test services need Rapid confirmation. General website tolerances do not replace the finished drawing tolerances.

# Build and inspect

| | |
|---|---|
| Envelope and finish | 88 x 136 x 27.2 mm body; side keys extend width. P1 paint build 40-60 microns, key anodize 8-12 microns are proposed process limits. Approve champagne/ivory/metal together; keep running faces masked. |
| Guide and gasket | LED-to-guide measured air gap 0.05-0.20 mm; reject contact. Install mic seal with F03 before optic/mic. Never use the fixture against an installed MEMS element. |
| Play and closure | Play rest gap 0.10-0.14 mm; select actual seat/stop shims. Post-contact 0.02-0.04 mm is provisional pending load approval. Rear seam target 0.22-0.38 mm; establish screw torque with F05. |
| Battery and USB | The 0.50 mm speaker-to-cell nominal gap is fully consumed by the proposed tolerance budget. Route no wires there. The approximately 14.17 mm recessed socket needs a real cable reach/seating test. |

## Assembly order

1. Dry-fit and inspect nylon, grille and fastener coupons. Install mic seal with F03, remove fixture, then insert PMMA guide, pads, LED support and mic. Fit play key before its calibrated holder and all side controls before PCB/battery.

2. Fit actual speaker, porous backing and gasket; route the approved harness away from the cell gap and moving parts. Measure controls, guide light and cable seating before closure.

3. Approve full A01 front and rear print samples, then complete finishing. Check clear grille holes, seams, return and optical leakage; record resin/paint lots, shims and hand fitting.

## Keep separate

ALT1 direct-emitter optics is excluded. It requires a custom flex circuit and another electrical/optical review; it is not installed in the R6 base assembly.

Use the supplied artwork at its specified size and position. Approve physical color, texture and marking samples together; screen colors are visual intent. Keep finish and adhesive off guides, stops, acoustic openings, optical faces and service seams unless the drawing explicitly calls for them. Record any proposed substitution before using it.

# Inputs and delivery

Rapid is asked to make, finish, inspect and optionally assemble agreed parts using Walkie One-supplied hardware. Walkie One owns electrical design, firmware, battery/charging, RF and acoustic validation. Rapid may quote specialist support separately; these services are not assumed from its website.

| | | |
|---|---|---|
| Before optical/finish samples | Rapid proposes; Walkie One approves | Current RPS Elastomer/powder grades, matched finish samples, mesh and the supported PMMA machining route. |
| Before functional acceptance | Walkie One electrical/mechanical | Actual LED/circuit and optical targets, switch loading, mic/speaker test setup and real cable. |
| Before powered assembly | Walkie One electrical | Final battery expansion/retention limits, populated PCB and complete harness, charging/thermal and RF review. |

## Quote and return

Quote each concept separately: one unpowered fit set and the priority samples on page 2, followed by one finished appearance article after sample approval. This is a comparison basis, not an order for all concepts. Show any minimum quantity; confirm the selected concept, quantity, delivery date and ship-to with Walkie One before work starts.

Please itemize parts, fixtures/coupons, tooling, finishing, assembly, inspection and shipping; state lead time from receipt of approved inputs. Identify partner-made work, exclusions and tolerances you cannot hold. Quote a feasible alternative with its effect on fit/appearance rather than silently changing the design.

Return identified parts/samples, the material and finish selections, measured critical dimensions, assembly photos and the completed applicable inspection record. List hand fitting, deviations and unresolved items. Leave unperformed tests blank or NOT TESTED. Walkie One approves samples and engineering changes before repeat finished units.

## Use these files

This brief controls supplier scope and responsibilities. The current per-part STEP, BOM and finished-interface drawings retain the technical requirements. Stop and return a marked question if they disagree. Millimetres throughout. Assembly STEP is a reference, not a single part to print. Purchased hardware, foam, cloth and adhesive solids are not rigid-print instructions.

BOM: docs/BOM_R6.csv

Records: docs/Physical_Test_Record_Blank.csv; docs/Rapid_Open_Items.csv.

Use Material_Finish_Schedule_R6.csv, five critical drawing sheets and original detail pages 6-11 for grille, optics, mic, calibration and seams.

Supplier capabilities checked 06 Sep 2026. Source links and confirmation limits: docs/Rapid_Capabilities.md. https://www.rapid-products.com/

# Build files: start here

Read the four-page supplier brief first. The remaining pages consolidate the required engineering detail and drawings; use the PDF bookmarks to jump to an appendix. Original engineering page numbers are retained inside those appendices.

The companion ZIP contains this same PDF. Parts_and_Process.csv maps every BOM entry to its exact delivered files. File_Manifest.csv maps original paths mentioned in retained drawings to their delivered locations.

01_Parts_to_Print: individual STEP and existing STL for the specified print process. 02_Other_Manufacturing: cast, machined, cut and artwork definitions. 03_Assembly_and_Drawings: assembly references and essential process / inspection records. 04_Required_Fit_Checks: staged coupon and fixture geometry.

STEP is the nominal geometry. STL is a mesh alternative for the same part, not an additional part or quantity. Millimetres throughout; import at 1:1. Quote quantities come from the brief and part schedule. Assembly, hardware, artwork and compliant installed envelopes are not rigid print instructions.

ALT1 direct-emitter optics is excluded. It requires a custom flex circuit and another electrical/optical review; it is not installed in the R6 base assembly.

The original engineering package, source code and historical alternatives remain available under Supporting engineering and archive on the concept page. The supplier brief controls scope; technical values remain unchanged. Resolve any conflict before the affected operation.

Required stages: One rigid fit set and F01/F04 grille, F02 optical, F03 gasket and F05 fastening samples; use F06 only as a cable gauge. Then one finished A01 front assembly and rear marking sample. Optical qualification uses at least three guides.

For exact tolerances, assembly order and inspection criteria, use the technical appendix and the corresponding records in 03_Assembly_and_Drawings.

# Parts and processes

Fabrication parts with individual files are listed below. Parts_and_Process.csv also contains every purchased item, reference, consumable and complete source note. Quantities describe the source assembly; the quote quantity is agreed separately.

| Part / quantity | Material / process | Delivered filenames |
|---|---|---|
| 01_front_structural_tub / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS; finish bores and tap M2.5 x 0.45, 7 mm deep | 01_front_structural_tub.step<br>01_front_structural_tub.stl |
| 02_rear_structural_cover / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 02_rear_structural_cover.step<br>02_rear_structural_cover.stl |
| 03_front_perimeter_bumper / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast from finished master | 03_front_perimeter_bumper.step |
| 04_rear_perimeter_bumper / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast from finished master | 04_rear_perimeter_bumper.step |
| 05_perforated_rigid_speaker_panel / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS; clear all apertures after finish | 05_perforated_rigid_speaker_panel.step<br>05_perforated_rigid_speaker_panel.stl |
| 07_speaker_edge_cradle / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 07_speaker_edge_cradle.step<br>07_speaker_edge_cradle.stl |
| 08_speaker_front_gasket / 1 | Closed-cell silicone foam, 1.5 mm free, 1.2 mm installed, adhesive one face<br>Die/laser cut | 08_speaker_front_gasket.step |
| 09_battery_tray / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 09_battery_tray.step<br>09_battery_tray.stl |
| 21_ptt_grip_pad / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast; bond to rigid key core | 21_ptt_grip_pad.step |
| 10_ptt_key / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 10_ptt_key.step<br>10_ptt_key.stl |
| 11_ptt_bumper_collar / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast; bond to perimeter bumper | 11_ptt_bumper_collar.step |
| 12_ptt_switch_cradle / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 12_ptt_switch_cradle.step<br>12_ptt_switch_cradle.stl |
| 21_volume_plus_grip_pad / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast; bond to rigid key core | 21_volume_plus_grip_pad.step |
| 10_volume_plus_key / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 10_volume_plus_key.step<br>10_volume_plus_key.stl |
| 11_volume_plus_bumper_collar / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast; bond to perimeter bumper | 11_volume_plus_bumper_collar.step |
| 12_volume_plus_switch_cradle / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 12_volume_plus_switch_cradle.step<br>12_volume_plus_switch_cradle.stl |
| 21_volume_minus_grip_pad / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast; bond to rigid key core | 21_volume_minus_grip_pad.step |

| Part / quantity | Material / process | Delivered filenames |
|---|---|---|
| 10_volume_minus_key / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 10_volume_minus_key.step<br>10_volume_minus_key.stl |
| 11_volume_minus_bumper_collar / 1 | RPS Elastomer cast polyurethane, 40 +/-5 Shore A<br>Cast; bond to perimeter bumper | 11_volume_minus_bumper_collar.step |
| 12_volume_minus_switch_cradle / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS | 12_volume_minus_switch_cradle.step<br>12_volume_minus_switch_cradle.stl |
| 13_circular_play_key / 1 | 6061-T6 aluminum<br>CNC6061-T6; fine bead blast; light champagne dyed sulfuric anodize, sealed | 13_circular_play_key.step |
| 15_front_switch_holder / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS; bond feet to inside front face | 15_front_switch_holder.step<br>15_front_switch_holder.stl |
| 16_rgb_led_support_ring / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS; bond top to inside front face | 16_rgb_led_support_ring.step<br>16_rgb_led_support_ring.stl |
| 17_microphone_cradle / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS; bond perimeter to front face | 17_microphone_cradle.step<br>17_microphone_cradle.stl |
| 18_microphone_acoustic_gasket / 1 | Rogers BISCO HT-800 silicone foam, 2.00 +/-0.10 free; screened converter stock<br>Matched-die kiss cut on liner, no laser | 18_microphone_acoustic_gasket.step |
| 19_lte_antenna_seat / 1 | RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS<br>SLS; bond to rear inner face | 19_lte_antenna_seat.step<br>19_lte_antenna_seat.stl |
| 27_offset_status_light_guide / 1 | Optical-clear PMMA acrylic<br>3-axis CNC PMMA with full backing fixture; optical polish | 27_offset_status_light_guide.step |
| 30_optical_support_pad_1 / 1 | Silicone foam; 0.25 free / 0.20 installed<br>Precision cut; compression fit | 30_optical_support_pad_1.step |
| 30_optical_support_pad_2 / 1 | Silicone foam; 0.25 free / 0.20 installed<br>Precision cut; compression fit | 30_optical_support_pad_2.step |
| 29_microphone_PSA / 1 | 3M 9731 silicone/acrylic transfer tape, 0.14 mm<br>Precision die cut with foam; silicone side to foam | 29_microphone_PSA.step |
| 31_play_seat_shim_1 / 1 | PET precision shim, nominal stack 0.28 mm<br>Cut measured matched pair; select 0.025 mm increments | 31_play_seat_shim_1.step |
| 31_play_seat_shim_2 / 1 | PET precision shim, nominal stack 0.28 mm<br>Cut measured matched pair; select 0.025 mm increments | 31_play_seat_shim_2.step |
| 32_play_stop_shim / 1 | PET precision shim, nominal stack 0.30 mm<br>Cut matched ring; set by measured electrical contact | 32_play_stop_shim.step |

# A coordinated, buildable front

Concept 5.2 - R6 engineering handoff. Body baseline remains **88 x 136 x 27.2 mm**; side keys extend overall width to about 89.16 mm. Prepared as a controlled prototype revision of the preserved R5 package.

**Build authorization:** geometry fit parts, process coupons and one instrumented front sample. Physical finish approval and optical, acoustic, control life and complete harness qualification are pending. This document does not declare production readiness.

Updated: flat-underface PMMA guide and lowered LED seat; captive support pads; grille backing pocket and dark hidden-land finish; explicit microphone foam/PSA stack and placement tool; measured play-seat and stop shims; process-specific manufacturing folders and critical inspection budgets.

Geometry source: code/build_r6.py plus baseline_R5/parts. Neutral editable assembly: step/Walkie_One_5_2_R6_CASE_ONLY.step. All quantities and finish routes: docs/BOM_R6.csv and Material_Finish_Schedule_R6.csv.

# Build sequence and release gates

One matched assembly uses 34 modeled fabrication/cut envelopes: 15 nylon, 8 cast PU, 1 aluminum, 1 PMMA, 4 foam, 1 porous mesh, 1 PSA and 3 PET shim bodies. Exact sheet stock thickness and stack quantities are set on the build record. Ten purchased references and print artwork are excluded from fabrication.

1. Supplier makes F01/F04 grille coupons, F02 optical nest, F03 gasket locator, F05 screw coupon and F06 cable gauge. Condition and finish a dry-fit nylon set. Finish approval comes after the fit and optical checks.

2. Install the gasket using F03 from outside before the light guide or microphone board. Remove the fixture and inspect the clear bore. Insert guide from rear; fit pads and LED carrier, then microphone breakout. Install play key before its calibrated holder. Fit side controls before PCB/battery.

3. Assemble the actual speaker, breathable backing and gasket. Fit PCB, cell and antenna; route complete leads with photographs before closure. Keep the speaker-to-cell gap free of wires. Install rear cover only after control and optical measurements.

4. Make one fully finished A01 front assembly and a rear print sample. Record supplier substitutions, hand fitting, resin/paint batch, shim values, cable SKU and all measurements. Feed any accepted geometry adjustment back into CAD.

| Gate / owner | Required evidence |
|---|---|
| G1 - supplier + mechanical | Fit dimensions, valid cut coupons, stable switch calibration; no unrecorded material change. |
| G2 - electrical / acoustic | Guide optical measurements, speaker-on microphone isolation, real cable seating, complete harness and battery approval. |
| G3 - design owner + supplier | Signed P1/U1/K1/O1/M1 physical master set and assembled A01 sample; rear print/rub sample. |
| G4 - mechanical + electrical | Durability, retention, return, thermal and RF tests on final materials before repeat finished units. |

# Appearance: preserve the approved form

Left: supplied front-right inspiration. Right: R6 CAD from a comparable front-right angle. Perspective and scale are illustrative; dimensions govern. R6 preserves the current body, front layout and every R5 visible grille surface above Z11.91. The new pocket is hidden on the rear.

The source R5 pattern is a 473-aperture hex field. No separate W grille geometry was found in its editable source or manifest; R6 preserves that supplied field exactly and adds no solid badge. The user-requested W treatment has not been removed or redrawn.

Approved departures from inspiration remain: 34 mm raised key, 5 mm indicator at(0,-13), 1.8 mm microphone at(0,-18.25), side-control positions, side USB recess and four rear screws. Both mic-to-adjacent-edge gaps remain 1.85 mm. Rear artwork is byte-preserved.

Finish reduces the pieced-together appearance through consistent P1 color/gloss on all rigid A faces, common U1 grain across bumper/collars and controlled flushness. It does not invent a different face curvature.

# Material and finish authority

**Proposed combination:** warm satin champagne PA12 center and grille; lighter, matte ivory flexible polyurethane perimeter; light champagne anodized aluminum play key with restrained metallic contrast; clear diffused indicator. This explicitly replaces the ambiguous clear-anodize instruction.

Use a PA12 SLS powder grade confirmed by the supplier; EOS PA2200 is the proposed quotation baseline, subject to confirmation. Record actual powder, orientation, conditioning and batch. RPS Elastomer remains the cast polyurethane baseline at 40 +/-5 Shore A; exact resin and pigment system must be entered before the coupon run.

Full part-by-part instructions are in Material_Finish_Schedule_R6.csv (34 entries). The table below is a routing summary. No identical-hex match is assumed across metal, nylon or elastomer.

| Route / parts | Preparation, finish and controls |
|---|---|
| P1: 01, 02 | Depowder; dry; fine blast; fill/sand broad faces only. Adhesion promoter, thin epoxy sealer, nonconductive 2K PU satin.40..60 um total dry build; 15..25 GU at 60 deg. Mask all functional and bond lands. |
| P2: 05 | Same P1 face stack, no web-filling. Matte black concealed land/floors belowZ12.45, excluding underside seal land. Detailed bore masking and coupon requirements on next sheet. |
| N1: 07, 09, 10 s, 12 s, 15, 16, 17, 19 | Hidden PA12 normally uncoated. Machine functional datums. Nonconductive matte black only on optical baffle and speaker-facing surfaces. No paint in switch contact stacks. |
| U1/U2: 03, 04, 11 s, 21 s | Through-pigmented cast PU; no external paint. Ivory bumper/collars, orange PTT, sage volume. Mold grainRa 3..6 um trial and 3..8 GU. Gates/parting lines on hidden bonding edges. |
| K1: 13 / O1: 27 | K1: 6061-T6 fine bead blast, 8..12 um light champagne dyed anodize and seal. Mask actuator/flange contacts. O1: optical-clear PMMA, polished transport faces; diffuse output only. |
| F1/M1/S1: cut parts | Foam/PSA, breathable black mesh and PET shim stock; no coating. Stock thickness is separately controlled; installed-envelope STLs are not material recipes. |

# Physical appearance master A01


Assemble fixtures/A01_front_appearance_sample.step using the actual tub, full grille, ivory bumper, finished aluminum key, guide, speaker support, speaker and final mesh. It is a full-size front assembly, not a flat color chip. Add the calibrated play mechanism before judging seams.

Inspect P1, U1 and K1 together under D65 daylight and 3000K warm light, at 300 mm distance and at 0/30/60 deg viewing angles. Check dry and damp touch, dust pickup, fingerprint visibility, gloss, metallic flop, hole halos, key recess, seam steps and illuminated guide. Retain one signed assembly and supplier duplicate.

Screen references: P1#C6BEAD, U1#EDE5D5, K1#C1B5A0, orange#BE754E, sage#839078. These locate the design intent only. Set instrumental L*a*b* and gloss from each approved substrate sample; then use a within-material production target DeltaE00<=2 and gloss within+/-5 GU as a starting proposal. Visual agreement under both lights governs the boundary.

Rear: print the supplied outlined artwork on a fully P1-coated rear panel. WALKIE is#948D80 intent; ONE and Designed in Los Angeles are#AAA293 intent. Do not redraw the typography or add a W symbol. Wordmark 36 mm wide atY2.964; inscription 28 mm atY-4.036; registration+/-0.5 mm, size+/-0.2 mm.

Print test: confirm ink/primer compatibility and full cure. Trial 100 dry and 100 damp microfiber rubs with documented load and cleaner; inspect legibility, gloss halo and adhesion. This is a proposed prototype screen, not a claimed durability rating.

# Grille: make the full process repeatable

Keep PA12 nylon.473 face apertures nominal 1.6 mm on 2.6 mm hex pitch give 1.0 mm adjacent web and 34.3% theoretical lattice open area. The preserved internal sealing land partly backs 49 of 473 sampled aperture locations; 424 clear a 1.4 mm probe throughZ11.1..13.6. These are geometry counts, not measured acoustic area.

F01 is a 36x 30 mm crop of the actual grille including curved boundary/flange/land transitions. F04 is a flat hole witness. Print at the same orientation, powder/refresh ratio and wall thickness as the complete part. Run the entire cleaning, primer, color, dark-land treatment and backing process. The full A01 grille proves visual consistency across the speaker region.

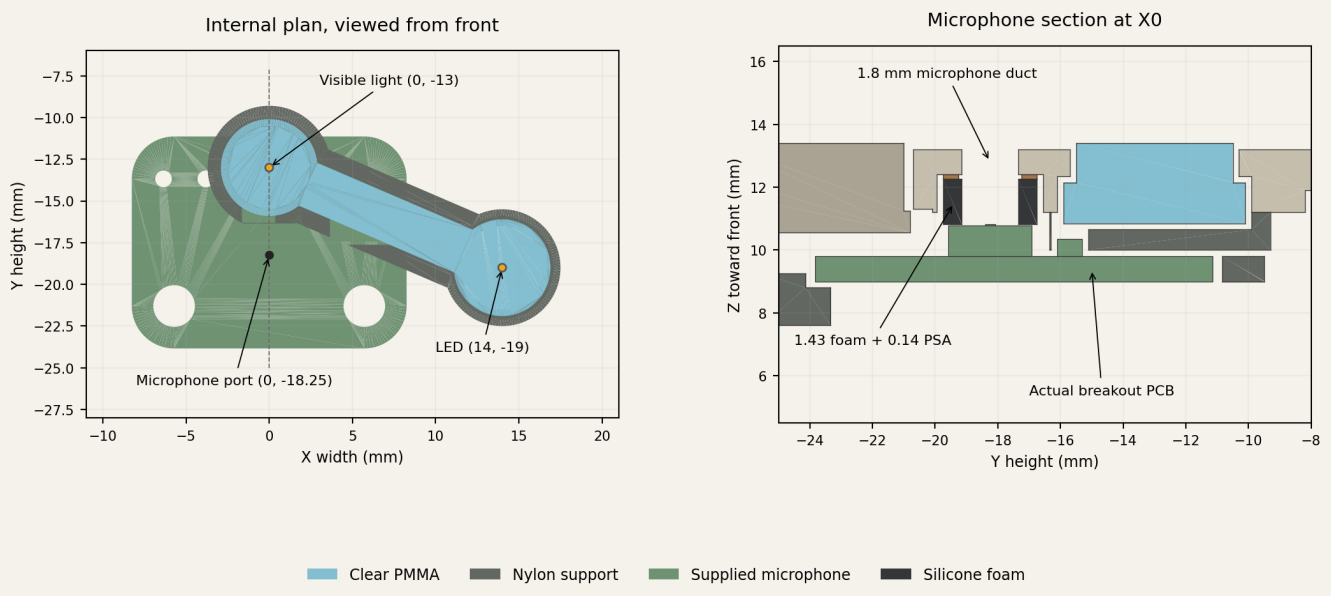
Process targets: before coating diameter 1.60 +/-0.05, edge break 0.05..0.10 max, no sharp powder nodules. Mask bores with removable silicone pins during front sealer/color; mask the rear adhesive/seal lands. Keep paint build inside a bore <=0.03 per wall. Finished unobstructed diameter target 1.49..1.65; inspect all holes with transmitted light and 10x images. Do not drill through the intentional rear sealing land.

Remove masks before paint bridges lock them; clean with nylon bristle and filtered air. Ream only confirmed through bores when needed; avoid metal picking that chips the edge. Reject clogged webs, lifted coating, visible bore halos and loose particles. Measure coupon loss/gain; never sand thin webs to hide a failed paint process.

P2 dark treatment covers the concealed nylon floors seen through backed apertures. It must be nonconductive and matte<=5 GU. The 0.10 mm porous mesh sits in the added 0.15 mm rear pocket atZ11.78..11.88; bond only outside active apertures. Candidate: black SAATI Acoustex, thickness<=0.10 mm, acoustic impedance target<=50 Pa*s/m for screening. Exact grade/color/impedance require supplier data and audio sample.

Grille retention keeps the original rear flange and 0.20 mm nominal pocket allowance. Use a supplier-qualified PA adhesive on the flange only, with 0.10..0.20 mm cured bondline and 0.5 mm setback from holes. Acoustic test compares bare speaker, grille alone, grille+mesh and complete shell at equal electrical drive; proposed added mesh loss<=1dB averaged500Hz..4kHz, with no new peak/dip>3 dB. No metal grille substitution is included.

# Optical route: flat, supported PMMA




R6 removes the original inlet counterbore that left an approximately 0.45 mm cap above the LED. The unchanged purchased Kingbright WP154A4SUREQBFZGW moves rearward 0.75 mm tobaseZ2.15. Its nominal dome top isZ10.75; guide undersideZ10.85 gives 0.10 mm air gap. The visible 5 mm output stays at(0,-13), topZ13.4.

Bridge remains 15.2315 mm in plan, 2.8 mm wide and 1.3 mm thick, with 5.8 mm end pads. The guide now has a uniform, flat underside: 3-axis machining from optical PMMA with full support is possible without a tiny blind inlet pocket. F02 supports the bridge while the second face/contour is machined. Use small sharp polished cutters, air cooling and sacrificial holding tabs outside final contour; finish tabs while nested. Do not laser-cut or flame-polish the finished optical piece.

Polish transport faces toRa<=0.05 um trial; leave only the 5 mm output lightly diffused. R0.1 max edge breaks keep sections intact. No solvent cement or cyanoacrylate near PMMA. Check polarized stress, haze and chips at 10x before assembly.

The original opaque carrier supports the guide from behind; shell pocket captures its flange from the front. Two 0.25 mm-free pads occupy 0.20 mm installed gaps at non-optical lands. Bond the carrier perimeter to the shell after a dry fit, using a qualified adhesive and 0.20 mm cured gap. Do not glue the optical surfaces. Retention therefore depends on the carrier bond and captive flange, not a fragile PMMA glue joint.

Local unmodified roofs remain 0.85 mm above guide and 0.80 mm above microphone. Do not sand these areas unsupported or drill through them. Finished guide/pocket minimum nominal clearance is 0.20 mm. Gauge actual LED-to-guide gap 0.05..0.20; reject contact. LED height variation requires measured seating, not an assumption from the mesh.

# Optical and retention test plan

Run at least 3 guides from the complete machining/finishing route, then one A01 front assembly. Use the actual LED, drive circuit and firmware; record current per RGB die and supply voltage. Confirm datasheet limits with the electrical owner. No brightness or RGB mixing performance is inferred from the render.

Fixture: dark box, fixed camera exposure, photometer atnormal incidence and +/-45 deg, device at 300 mm. Test R/G/B, white, amber and commanded low/high brightness. Also inspect under 500 lux indoor light and 10000 lux daylight simulation. Proposed indoor output target>=50 cd/m 2 at nominal brightness; set final target from the approved sample and intended power budget.

Uniformity: compare 9 equal output regions; trial minimum/maximum luminance>=0.5. For white and mixed colors, trial chromaticity spread Delta u*v*<=0.02 across output; inspect visible color fringes by eye. Adjust diffuser recipe or drive balance only after recording baseline. Emission in renders is illustrative.

Leakage: measure the microphone port, key seam and bumper boundary with output atmaximum planned brightness. Trial leakage luminance<1% of output and no visible colored hotspot at 300 mm in a dark room. Check the backed aperture floors and opaque pocket walls after coating.

Retention: on a sacrificial front sample apply 2 N axial inward/outward load to output for 10 s and inspect for motion>0.10 mm, carrier peel or cracks. Then 10000 control operations, 10 cycles 5..45C and 10 service openings as prototype screens; repeat optical readings. Proposed brightness drift<=10%. These targets require engineering agreement before qualification.

Route decision: the revised flat-underface guide is a concrete manufacturable candidate and passes the digital packaging screen. Its 15 mm lateral transport remains an optical experiment. If the test fails, use the separate ALT1 direct-emitter mechanical demonstrator in alternates/ALT1_direct_emitter. It has a 2x 2x 0.65 Inolux LED envelope on 0.15 mm custom flex and a short PMMA diffuser cup at the same visible output. Its mechanical fit screen passes; electrical layout, real lead routing and optical tests remain required. See its README and editable geometry. It is not installed in baseline R6.

# Microphone: locate the seal and count adhesive

Foam footprint stays 4x 3 mm, R0.4 with 1.8 mm bore. Nominal narrow-side ligament is 0.60 mm. Candidate stock isRogers BISCO HT-800 medium cellular silicone, 2.00 +/-0.10 mm converter-screened thickness. Exact stock, cut process and acoustic seal must be demonstrated; the original generic foam instruction was insufficient.

R6 explicitly allocates 0.14 mm to 3M9731 tape (silicone adhesive to foam; acrylic side to clean qualified panel). The installed foam becomes 1.43 mm, maintaining the original total 1.57 mm stack from microphone faceZ10.83 to pocket roofZ12.40. Nominal foam compression becomes 28.5%, not 21.5%. With 1.50..1.64 installed total, 0.12..0.16 tape and 1.90..2.10 free foam, the conservative compression screen is 20.0..36.2%.

Cut foam and PSA on release liner using matched precision tools; PSA opening 2.0 mm gives 0.1 mm radial setback. No heat/laser seal around the acoustic bore. Inspect every piece at 10x for torn webs, partial cuts, shifted liner and adhesive intrusion. Reject off-center cuts that leave any ligament<0.45 mm.

F03 registers to the existing indicator opening with a 5.10 mm pin and microphone passage with a 1.60 mm pin. Place from outside while guide/microphone are absent; from inside, slide the liner-backed seal over the mic pin, seat against pocket and press only around the foam perimeter. Withdraw fixture, inspect passage, then install guide and microphone board. The fixture must never contact a powered/installed MEMS element.

Seal test: same microphone/firmware/gain, external speech or calibrated source at 60 and 75 dBA at 1m; compare against open-port reference. Proposed response deviation<=3dB across300Hz..4kHz. With no external source, run speaker speech/pink noise atintended maximum playback, log mic spectrum and clipping. Compare correctly sealed and deliberately unsealed assembly; target>=10 dB reduction in internal playback coupling. Evaluate echo-cancellation performance separately.

Inspect compression with a sacrificial section or witness film around the seal, never over the MEMS port. Repeat after 20 disassemblies and temperature cycling. Acoustic acceptance requires the assembled speaker-on result, not merely a clear-looking hole.

# Play control: calibrated freeplay and stop

Omron B3F-4000 specifies pretravel 0.3 +0.2/-0.1 mm (0.20..0.50), plunger height 4.3 +/-0.2 mm, operating force 1.27 +/-0.49 N and release force>=0.29 N. The datasheet does not establish an allowable housing-imposed overtravel. Original 0.75-0.20 gave 0.55 mm nominal switch motion and only 0.05 mm beyond maximum pretravel.

R6 lowers the carrier seat fromZ3.70 toZ3.50 and provides paired PET seat shims plus an independent stop ring. Finished tip/seat differential is controlled to 4.70 +/-0.025 mm by machining and measurement. For switch height 4.10..4.50 and freeplay 0.10..0.14, calculated seat shims span 0.035..0.525 mm, within the selected 0.025..0.525 mm stack family. Use 0.025 increments, measure actual freeplay and select the nearest acceptable pair. Out-of-range parts are reworked/rejected, never preloaded.

Calibration formula: **s = measured key-tip Z - measured seat Z - measured switch height - g**. Nominal s=8.20-3.50-4.30-0.12=0.28 mm. The CAD illustrates 0.28; fabricate a measured stack rather than a printed thin shim. Match left/right stack within 0.01 and seat flatness<=0.03.

Measure first electrical contact C from the resting key. Trial hard-stop travel T=C+0.03 mm; verify post-contact 0.02..0.04 after cure. Required T across g/pretravel ranges is 0.32..0.68 mm, below the 0.75 raw limit. Stop ring is measured raw travel minusT; the 0.05..0.525 available ring family covers the calculated 0.07..0.43 requirement. Nominal exampleT0.45 uses 0.30 ring. Post-contact target is a qualification proposal, not a manufacturer safe-overtravel rating.

Inspect freeplay 0.10..0.14 and electrical release atrest after cure. Use force/displacement gauge atcenter and eight evenly spaced edge points at 14 mm radius; 10 operations each, then 10000-cycle prototype screen. No binding or missed contact; freeplay remains positive; rest return within 0.5 s. Confirm hard-stop load is carried by the flange/ring, not the plunger. Reject excessive lateral switch load or creep.

Side B3F-3150 controls retain approved geometry and 0.8 mm raw stop. Apply the same measurement procedure; 0.15..0.45 mm switch pretravel and 0.15..0.20 freeplay leave trial stop 0.32..0.69, within raw travel. Set carrier and stop with measured shims before bonding; side endurance remains physical.

# Hardware, seams and finished fit

The 0.50 mm speaker-to-cell gap is unchanged. A provisional +/-0.15 speaker edge, +/-0.20 cell edge and 0.15 placement budget consumes it entirely. It is not a qualified wiring space or battery swelling provision. No leads, solder tabs, tape folds or strap edges may be routed in this gap. Use the speaker ear-side spaces and existing tray exits, photograph actual bends/insulation and secure wires away from moving keys and the diaphragm.

Battery owner must confirm actual pack/protection dimensions, manufacturer swelling/thermal requirements and non-preloading retention. Keep removable PET straps and 0.20 mm insulating support; do not compress the pouch to make the closure fit. The 1.10 mm nominal protection-to-front headroom remains unqualified for swelling.

USB: candidate StarTech USB2CC1M has supplier-listed 6x 12 mm overall cross-section. F06 sweeps a 6.5x 12.5 mm gauge through the side passage with zero nominal shell/bumper overlap. It does not prove the 14.17 mm recessed mating face is reachable: measure cable tip exposure, overmold length/shoulder and strain-relief transition. Test full seating in both orientations, cable pull and charging/data with actual hardware. The approved socket remainsY-32.139, Z-4.740.

Screws: select AccuSPK-M2.5-10-A2, DIN965Z, PZ1, 90 deg, head 4.4..4.7 mm. Select incoming heads 4.65..4.70 to keep all four seats visually alike. In the original 5.00 mm countersink the expected recess from a 40..60 um finished panel is 0.19..0.24 mm. A uniformly recessed screw is the intentional proposal; do not tighten until it falsely appears flush. Typical ISO10642 heads can exceed the 5 mm seat.

F05 coupon: run 10 actual screws in representative tapped nylon bosses plus finished cover coupon. Start 0.03 Nm, increase 0.01 Nm until seated; measure head recess, seam closure, witness marks and thread condition. Establish allowable torque from observed seating and destructive strip samples; production trial torque must remain below 50% of the minimum measured strip torque. No final torque value is released before this test.

| Finished feature | Proposed inspection requirement |
|---|---|
| Rear closure | 0.30 nominal; 0.22..0.38 gap. Adjacent surface step<=0.10; four quadrants measured without squeezing bumper. |
| Bumper / panel | Bumper proud 0.25..0.45 of coated panel. Continuous radius, no adhesive squeeze-out. Exterior side bumper stays 88x 136x 27.2 baseline. |
| Grille / panel | Grille proud 0.22..0.38; finished seam 0.16..0.34 per side after position error. Flange bond 0.10..0.20. |
| Play radial clearance | Opening 34.60 +/-0.05; key 34.00 +/-0.04; bore coating<=0.015/side; concentricity offset<=0.05. Minimum clearance 0.19/side; inspect 360 deg. |

# Digital evidence and outstanding tests

Digital evidence is produced from R6 geometry, not copied R5 pass labels. All 34 exported parts reopen as valid single solids; their STL meshes are watertight. Static fabricated-part overlaps: 0 above 0.005 mm 3. Sampled play/side motion overlaps: 0 above 0.005 mm 3. Purchased-hardware/case and hardware-pair conservative screens: 0 above 0.02 mm 3.

Body bounds 88x 136x 27.2 within CAD kernel tolerance. Four exterior body shells unchanged by exact solid difference. Visible grille aboveZ11.91 has zero symmetric difference. Guide-to-shell minimum 0.20; mic foam-to-guide 0.85; mesh-to-speaker-gasket 0.18 nominal. Seven rear-approach samples for guide, play key, holder and LED support clear the bare front tub; these do not prove cable insertion or adhesive-tool access in a fully assembled device.

All original purchased files and rear artwork are preserved. LED and play switch use rigid translations only; rotation matrices remain orthonormal. Thin optical/foam parts have process-specific instructions; validity does not certify machining quality, strength or acoustic transparency.

Physical work still required: exact powder/resin/mesh selection, finish and artwork samples, optical efficiency/RGB/leakage, gasket conversion and speaker-on isolation, calibrated contact/return/overtravel force, screw torque, real cable/harness fit, battery retention/swelling/thermal review, final RF and durability. Assign an owner and record results before repeat finished parts.

Editable delivery includes Python/CadQuery revision source, immutable R5 BRep dependencies, per-part and assembly STEP, OpenCascade XML assembly and Blender appearance scene. No new Fusion native archive or parametric Fusion timeline is claimed. STEP and source are editable in compatible CAD workflows.

| Files | Authority / use |
|---|---|
| step / code | R6 installed-geometry BReps and rebuild source. baseline_R5 is a dependency only, never fabricate it. |
| manufacturing | Only SLS and cast-master routes contain fabrication/master STLs. CNC STEP and cut-sheet DXFs control their processes. |
| fixtures | F01..F09 STEP/STL plusA01 sample assembly. F06 is a cable gauge, not a purchased cable model. |
| validation / docs | Raw reports, dimensional budgets, source hashes, BOM, finish schedule and proposed test records. |
| previews / artwork | Geometry-derived render scene/views; original actual-size print SVGs and display-only glyph geometry. |

# Sources and change record

R6 was derived only from Walkie_One_5_2_Rapid_R5 and the general/5.2 findings of CAD_Expert_Review_2026-09-06/Expert_Review.md. R5 and shared website/Git content are preserved. Current digital checks supersede source validation only for this new revision.

**Geometry changes:**05 hidden mesh pocket; 15 lowered switch seat; 16 lowered LED flange seat; 18 split foam/adhesive thickness; 27 uniform underside guide. Added 28 mesh, 29 PSA, 30 support pads x 2, 31 seat shims x 2 and 32 stop ring. All visible control centers remain unchanged. No purchased component was resized.

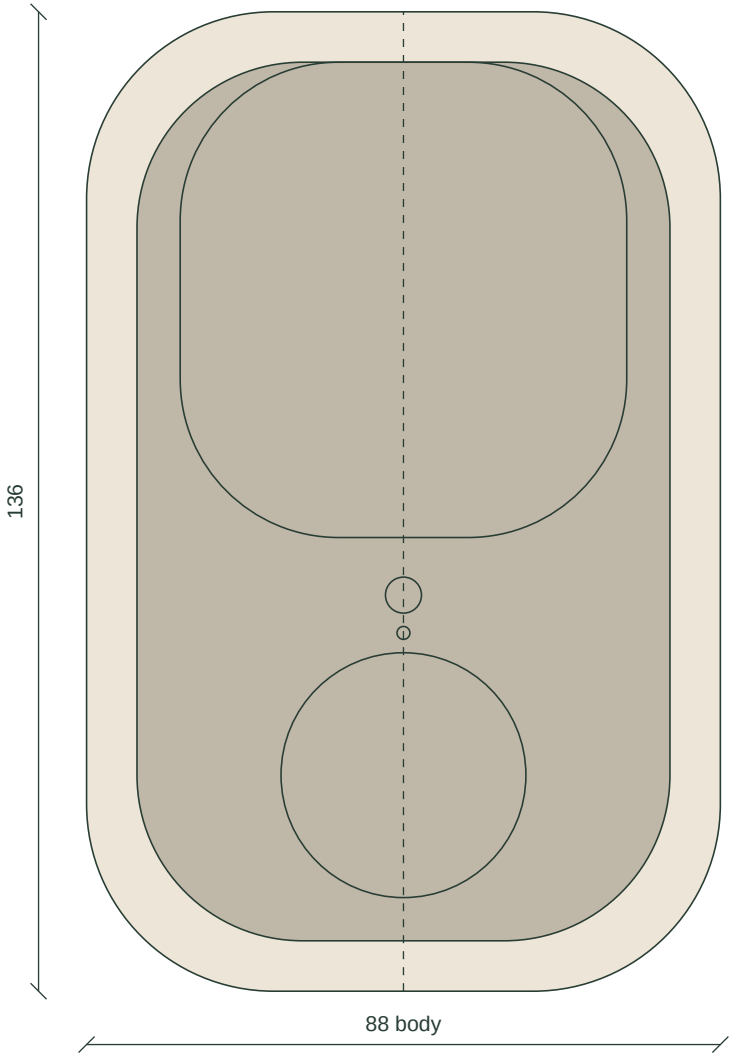
**New process controls:** explicit dyed-anodized key, coordinated physical sample, dark grille support treatment, coupon/fixture set, calibrated control and screw procedures, cut-stock separation, finished seams and documented battery/cable limits.

**Primary component/process sources, checked 06 Sep 2026:**
Omron B3F datasheet: B3F operating characteristics and dimensions.
Kingbright: WP154A4SUREQBFZGW.
Rogers: BISCO HT-800.
3M: 9731 silicone/acrylic tape, 0.14 mm.
Accu: SPK-M2.5-10-A2 head geometry.
StarTech: USB2CC1M dimensions.
SAATI: Acoustex material family.

Acceptance ranges not explicitly attributed to a component datasheet are proposed R6 engineering targets. Material supplier capability and physical testing must confirm them. Do not treat a rendering, nominal mesh or spreadsheet budget as a signed physical approval.

# External datums and finished interfaces

WALKIE ONE 5.2 / R6 / mm / CAD substrate geometry unless marked FINISHED / 06 SEP 2026




FRONT +Z / B: X0 center / C: Y0 center

A: uncoated front inner broad plane Z11.20; B: X0; C: Y0. Dimensions originate at body center. Positive Z faces front.

Body 88 x 136 x 27.2, R26 plan / R5 perimeter edge. Side keys extend total width to 89.16. Four body shells unchanged from R5.

Play 34 at(0,-38); indicator 5 at(0,-13); microphone 1.8 at(0,-18.25). Microphone edge gaps 1.85 to both adjacent visible features.

FINISHED play opening 34.60 +/-0.05; key 34.00 +/-0.04; opening coating <=0.015/side; center offset <=0.05. Per-side minimum 0.19.

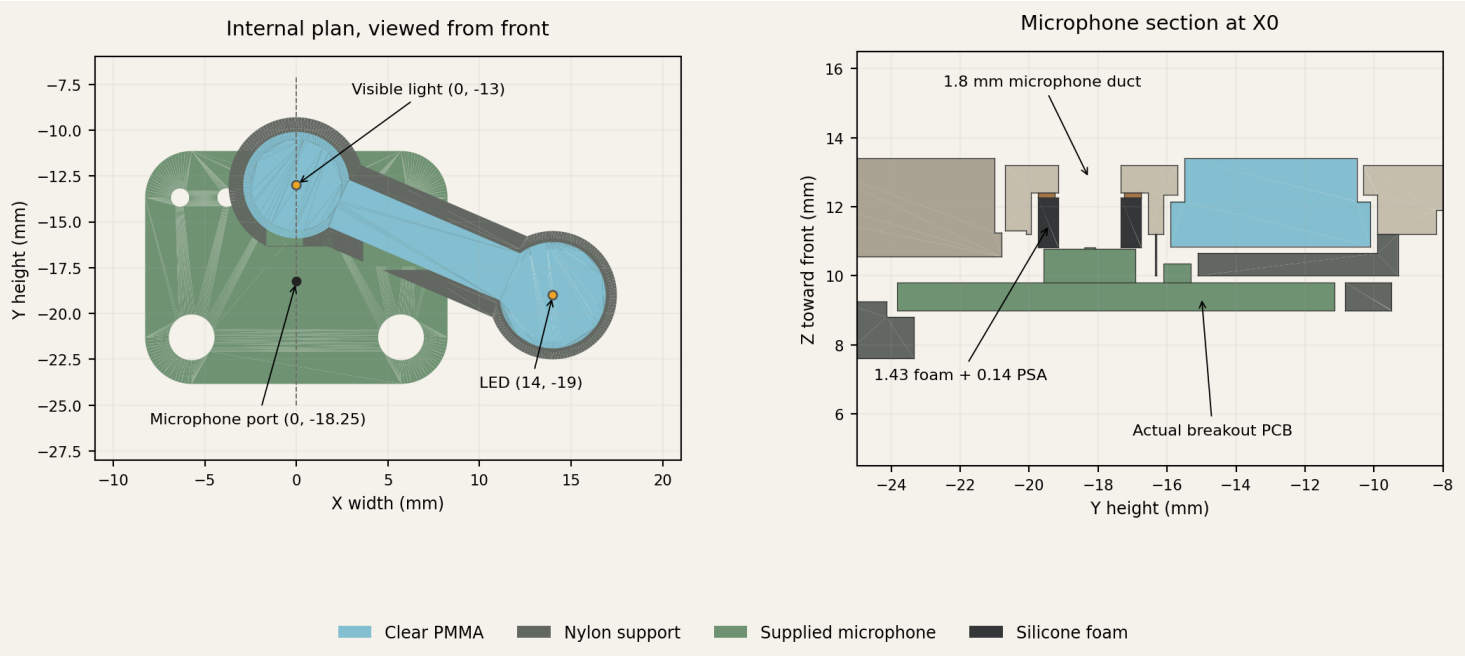
FINISHED grille opening-minus-face seam 0.16..0.34/side, target 0.25. Center within 0.025 after bonding. Face proud 0.22..0.38 relative to coated center.

FINISHED bumper proud 0.25..0.45 over rigid center; no local lip or flash >0.05. Closure gap 0.22..0.38; adjacent side step <=0.10.

PTT Y10 height 58; volumeY30 andY5 height 19. USBY-32.139, Z-4.740: 15Y x 10Z passage; 17Y x 12Z mouth.

# Optical guide and microphone sealing section

WALKIE ONE 5.2 / R6 / mm / CAD substrate geometry unless marked FINISHED / 06 SEP 2026




GUIDE: flat undersideZ10.85; bridge 2.8 wide x 1.3 thick; end pads 5.8 diameter. Plan center span 15.2315. Visible output 5 diameter at(0,-13), topZ13.40. Retaining shell pocket roofZ12.35; guide shoulderZ12.15 ->0.20 clearance.

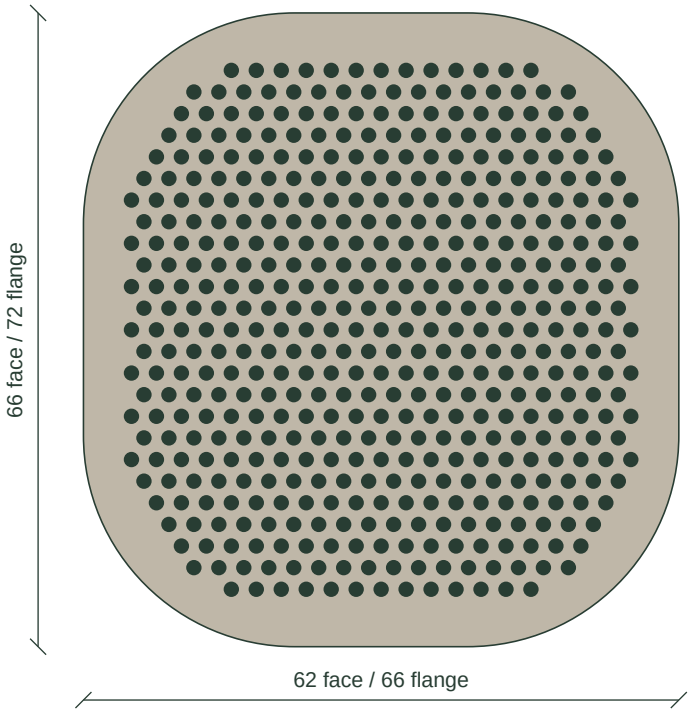
LED: unchanged WP154A4SUREQBFZGW rigidly lowered 0.75 tobaseZ2.15; nominal top 10.75. Gauge actual optical gap 0.05..0.20, nominal 0.10. Upper carrier supportZ10.65. Two 0.25-free foam pads 0.20 installed; pads are off optical inlet.

MIC SEAL: roof 12.40 | PSA12.26..12.40 (0.14) | foam 10.83..12.26 (1.43) | microphone acoustic face 10.83. Total installed 1.57. Free foam 2.00 +/-0.10. Foam outline 4x 3, R0.4; bore 1.8; PSA bore 2.0.

LOCAL ROOFS: guide 0.85, microphone 0.80 substrate. Preserve these minima during sanding; back the roofs in a nest. Pin-gauge bores and measure depth with non-marring probe. See F03 for temporary placement; remove it before microphone installation.

# Grille, backing and complete-process coupons

WALKIE ONE 5.2 / R6 / mm / CAD substrate geometry unless marked FINISHED / 06 SEP 2026




Front pattern is unchanged; diagram is vector geometry from original pitch.

473 preserved face apertures, diameter 1.60 +/-0.05, 2.60 hex pitch, 1.00 nominal web. Finished open bore 1.49..1.65 with <=0.03 coating per bore wall; edge break 0.05..0.10.

49 sampled locations encounter hidden nylon sealing land; 424 pass a 1.4 mm probe from 11.1..13.6. This is a geometry screen only. Do not ream blind/backed apertures through the sealing land.

Face substrateZ11.90..13.50, nominal 1.60. Rear flangeZ10.90..11.90. Mesh pocket 57.1x 61.1, R19.55, Z11.75..11.90. Porous mesh 57x 61, R19.5, Z11.78..11.88; its solid CAD is only a bounding envelope.

P1 satin front topcoat; P2 matte black hidden floors belowZ12.45. Mask original gasket undersideZ11.60 and all flange bond lands. Mesh and black treatment must be sampled with the actual speaker/support.

F01: actual 36x 30 crop centered at originalX16, Y47; includes curved edge and actual raised seal/flange. F04: 30x 20x 1.6 witness. Print same orientation, finish complete recipe, inspect all bores at 10x and by backlighting.

MOUNT: pocket 66.4x 72.4 around flange 66x 72 gives 0.20 nominal per side. Fit with 0.10..0.20 controlled cured flange bond, 0.5 setback from active holes. Bond/cradle tabs must be inspected for access before closing the shell.

# Play stack calibration and rear screw section

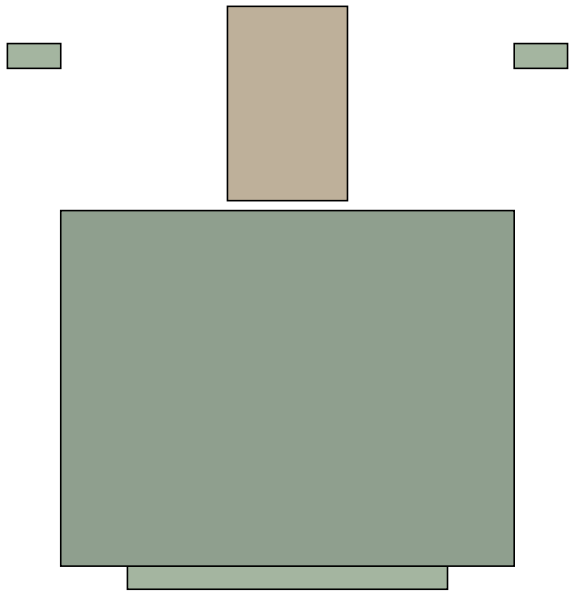
WALKIE ONE 5.2 / R6 / mm / CAD substrate geometry unless marked FINISHED / 06 SEP 2026

PET seat pair: 0.28 example

Switch: actual H = 4.30 example

Key tip Z8.20 / freeplay 0.12

Stop ring 0.30 / travel 0.45 example



Illustrative stack / numbers control / selected PET stock

SEAT: nominalZ3.50; key-tip Z8.20; finished differential 4.70 +/-0.025. Freeplayg 0.10..0.14 measured after coating and adhesive cure. Switch height 4.30 +/-0.20; select paired shims 0.025..0.525.

s = key-tip Z - seat Z - measured switch height - g. Nominal 0.28 is a calibration example. Match pair within 0.01; seat flatness <=0.03; shim widths 1.0, length 9.8. No adhesive under bearing area unless counted.

Raw stop 0.75; contactC measured from rest. TrialT=C+0.03 and verify 0.02..0.04 post-contact. RequiredT0.32..0.68. Ring selection 0.05..0.525 covers required 0.07..0.43. Nominal ring 0.30 givesT0.45.

CAUTION: post-contact trial is not an Omron overtravel rating. Record force/displacement and positive release atcenter and 8 edge locations before endurance or repeat fabrication.

SCREW: four seatsX +/-34, Y-44/+46. Original 90 deg coneD5.00 atrearZ-13.20 toD2.80 atZ-12.10. AccuDIN965Z headD4.4..4.7; select 4.65..4.70.40..60 um surface coating gives 0.19..0.24 visible recess.

F05: 20x 20x 3 cover coupon; D2.8 through, 90 deg cone 5.0 top. Pair with representative tapped PA boss. Start 0.03 Nm in 0.01 steps; inspect finish/seat/thread. Release torque only from measured seating and strip results; <=50% minimum measured strip torque.

# Fixtures, cable access and dimensional budgets

WALKIE ONE 5.2 / R6 / mm / CAD substrate geometry unless marked FINISHED / 06 SEP 2026

F02 PMMA nest: 30x 18x 5, R2. One-mm-deep, open-top pocket for the flat guide underside, end pads and bridge supported. Machine POM/aluminum; finish pocket to actual guide with 0.05..0.10 lateral clearance. Not a casting mold.

F03 mic locator: 10x 14x 2, R1 plate, seated against external rigid faceZ13.20.5.10 mm indicator locating pin at(0,-13); 1.60 mm mic mandrel at(0,-18.25), extends toZ10.80. Pins polished, no sharp tip. Use with guide and board absent. 3D print for fit; final POM body with smooth reamed/machined pins.

F06 selected cable gauge: 6.5Z x 12.5Y, R1, 30 mm alongX from 29.83. Selected cable supplier cross-section 6x 12, with 0.25 added per side. Gauge clears tub/rear/bumpers digitally. It is not a cable tip model; verify actual 14.17 mm recess reach and neck transition in both orientations.

F07 stop ring outline: 17.8 squareR1.9 outside; 12.8 squareR1.1 inside. F08/F09 microphone foam/PSA outlines 4x 3 R0.4 with 1.8/2.0 bores. Use supplied exact DXFs and measured stock; do not print installed envelopes as foam.

FINISHED PLAY RADIAL BUDGET: (34.55 - 34.04)/2 -0.015 coating -0.05 position =0.190 minimum. Max clearance (34.65 -33.96)/2 +0.05 =0.395 if both parts fall at opposite extremes; inspect uniformity around 360 deg.

GRILLE PER-SIDE BUDGET: nominal 0.30 -0.05 size stack -0.06 edge coating -0.025 location =0.165 minimum; maximum 0.30+0.05-0.04+0.025=0.335. Gauge assembled reveal 0.16..0.34. Finish faces and edges separately; mask lands.

MIC COMPRESSION BUDGET: total 1.50..1.64; tape 0.12..0.16; freefoam 1.90..2.10 ->20.0..36.2%. Seat and free-stock measurement determine actual compression. This is a conditional tolerance calculation, not material capability.

SPEAKER/CELL BUDGET: 0.50 -0.15 speaker edge -0.20 cell edge -0.15 placement =0.00. No allowance remains for leads, tabs, tape folds or swelling. Actual harness and cell supplier review remain mandatory before a functional complete article.