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12 June 2026

To the Consultant of Record / Dubai Development Authority Review

Project: , Dubai, UAE

Subject: Code Compliance Assessment - Helical Staircase - Dubai Building Code 2021 (Part K: Villas) — Rev C

Dear Sir/Madam,

Revision C — supersedes Rev B of 12 June 2026. Adds Section 6 (code recommendations distinguished from requirements, including the K.5.5.2.4 intermediate-landing recommendation for flights exceeding 4 m, and the non-applicability of the 3,660 mm between-landings limit of DBC Part B / UAE FLSC); and records the confirmed stair handing under K.5.5.2.8 h) as non-compliant as designed, with mitigation (Section 7). Rev B corrected the tread-band geometry of Rev A.

1. Purpose and Scope

This document records a clause-by-clause compliance assessment of the helical staircase designed and detailed by CAworks Designer Glass Trading LLC for , Dubai, against the applicable provisions of the Dubai Building Code 2021 (DBC). The staircase serves the villa above ground level; the governing provisions are therefore those of DBC Part K (Villas), Section K.5.5 (Circulation and egress). Extracts of every clause relied upon are reproduced in Appendix A.

This assessment is issued by CAworks as specialist staircase contractor for review, counter-signature and submission by the project Consultant of Record. It does not replace the consultant's statutory design review, nor Dubai Civil Defence review of the villa's overall life-safety strategy.

2. Reference Documents

Reference	Document	Date / Revision
Drawing	— Helical stairs assembly, sheets 1–2 of 2, scale 1:25 (CAworks)	24.04.2026
3D model	— Helical stairs assembly.STEP (SolidWorks 2021, AP214)	31.05.2026
Code	Dubai Building Code, 2021 edition — Parts K (Villas) and B (Architecture, for reference)	2021

Dimensional values quoted as “measured” were extracted analytically from the STEP solid model: tread corner vertex coordinates referenced to the column axis ($X=0, Z=0$), cross-checked against drawing . Each tread presents four inner corners at $r \approx 990\text{--}1,033$ mm and four outer corners at $r \approx 2,355\text{--}2,399$ mm at common azimuths, confirming the tread band location.

3. Stair Classification and Governing Provisions

The staircase is a helical stair whose treads span between an inner helical stringer at $R \approx 990$ mm and an outer helical stringer at $R \approx 2,356$ mm, giving a constant clear walking width of approximately 1,357 mm between stringer faces (1,366–1,375 mm between tread corner vertices in the model). The flight is carried by a central structural mast $\varnothing 610 \times 14.3$ mm CHS via radial support arms, with the outer stringer additionally anchored to the stairwell wall. A curved laminated-glass balustrade (17.5 mm) follows the inner stringer at R980.

Under the DBC this configuration is assessed under clause K.5.5.2.8 (Spiral or curved stairs and winders). With its tread band remote from a central pole and a mean radius of ≈ 1.67 m, the stair answers the description of a curved stair; the assessment in Section 5 nevertheless tests it against both the curved-stair and the spiral-stair thresholds, and it satisfies both, so the classification question does not affect the outcome. The general stair provisions of K.5.5.2.1–K.5.5.2.6 and K.5.5.2.9–K.5.5.2.10 apply in parallel.

DBC K.5.5.2.1 expressly permits spiral stairs, winders and open stairs in villas for all uses other than access to and exit from basements. The staircase serves ground and upper floors only; no basement storey is served, and no fire-rated enclosure of the stair is required by Part K. (Refer Sections 6 and 8.)

4. Design Geometry (as modelled and drawn)

Parameter	Value
Overall mast height	16,400 mm ($\varnothing 610 \times 14.3$ CHS, base plate to top)
Storey rises served	3,575 mm / 5,133 mm / 4,526 mm (landing at each storey)
Riser height — Flight 1	153.2 mm (uniform; measured tread-to-tread)
Riser height — Flights 2–3	163.4 mm (uniform; measured tread-to-tread)
Angular pitch per tread	Flight 1: 13.3°; Flights 2–3: 12.3°
Tread band	Inner (narrow) edge $R \approx 990$ –1,033 mm; outer edge $R \approx 2,355$ –2,399 mm
Clear walking width	$\approx 1,357$ mm between stringer faces (constant along all flights)
Tread depth at 305 mm from narrow edge ($r \approx 1,295$ –1,301 mm)	Flight 1: ≈ 302 mm; Flights 2–3: ≈ 278 mm (arc length)
Tread depth at walkline (mid-width, $r \approx 1,670$ mm)	≈ 359 –389 mm
Headroom	2,300 mm (noted on drawing per DBC K.5.5.2.8 b))
Landing width	1,200 mm (drawing)
Stair handing	Helix descends with the outer edge at the user's LEFT (confirmed by CAworks engineering, 12.06.2026)
Inner balustrade	Curved laminated glass, 17.5 mm, R980, following inner stringer
Outer edge	Outer stringer wall-anchored (drawing detail H)

5. Compliance Matrix — DBC 2021 Part K

Clause	Requirement	Design value	Status
K.5.5.2.1	Spiral / open stairs permitted in villas except serving basements; basement requires enclosed 1,000 mm exit stair	Stair serves ground + upper floors only; no basement served	COMPLIANT
K.5.5.2.8 a)	Clear width of spiral or curved stairs $\geq 1,000$ mm	$\approx 1,357$ mm	COMPLIANT
K.5.5.2.8 b)	Headroom: curved $\geq 2,300$ mm; spiral $\geq 2,030$ mm	2,300 mm	COMPLIANT
K.5.5.2.8 c) / d)	Tread depth at a point 305 mm from the narrower edge: spiral ≥ 190 mm; curved ≥ 255 mm (Figures K.32 / K.33)	≈ 278 mm (Flights 2–3); ≈ 302 mm (Flight 1) — satisfies both thresholds	COMPLIANT
K.5.5.2.8 e)	Riser height ≤ 240 mm	153.2 / 163.4 mm	COMPLIANT
K.5.5.2.3	Riser 100–180 mm; ≤ 10 mm riser and tread variation within a flight	153.2 / 163.4 mm; uniform within each flight	COMPLIANT
K.5.5.2.8 f)	All treads identical	Identical within each flight (uniform pitch and plan form)	COMPLIANT
K.5.5.2.2	Stairway clear width $\geq 1,000$ mm; handrail may project ≤ 100 mm each side at 865–965 mm	$\approx 1,357$ mm	COMPLIANT
K.5.5.2.8 g) / K.5.5.2.5	Handrails: 865–965 mm above tread nosing; continuous for full flight; grip $\varnothing 32$ –51 mm (or 100–160 mm perimeter)	Dual handrails proposed (inner glass-mounted + outer wall-mounted) — per handrail shop drawing	TO BE VERIFIED
K.5.5.2.8 h)	Turn of stairway such that outer handrail is at the right side of descending users	Outer edge at descending user's LEFT as designed	NON-COMPLIANT — see §7
K.5.5.2.6	Guardrail $\geq 1,200$ mm (1,065 mm where handrail forms part of guard); 100 mm sphere rule; 150 mm tread-triangle rule	Inner curved glass guard R980, 17.5 mm laminated; heights and gaps per balustrade shop drawing	TO BE VERIFIED
K.5.5.2.4	Landing width $\geq 1,000$ mm; slope $\leq 2\%$; no width decrease in egress direction; intermediate landings not required in villas	Storey landings provided; width 1,200 mm. Recommendation for flights > 4 m — see §6.1	COMPLIANT
K.5.5.2.9	Treads and landings free of trip projections; consistent surface traction	Timber tread finish — anti-slip specification to be stated on finish schedule	TO BE VERIFIED
K.5.5.2.10	Headroom in stairways ≥ 2.3 m above tread nosing plane	2,300 mm	COMPLIANT

6. Code Recommendations Distinguished from Requirements

For the avoidance of doubt by the Consultant of Record and the reviewing authority, this section addresses three provisions that are sometimes raised against helical villa stairs. Each is either a recommendation (not a mandatory requirement) or a provision that does not apply to this stair. None constitutes a non-compliance.

6.1 Intermediate landings — K.5.5.2.4 (recommendation only)

K.5.5.2.4 states: “An intermediate landing is not required on stairways in villas regardless of the floor to floor height. Intermediate landings are recommended if the floor to floor height exceeds typical practice (e.g. > 4 m).” (Extract in Appendix A.) The first sentence is the mandatory provision; the second is expressly a recommendation. Flights 2 and 3 of this stair rise 5,133 mm and 4,526 mm respectively and therefore fall within the recommendation, while remaining fully compliant with the requirement.

The design proceeds without intermediate landings on the following considered basis: the continuous helical form is the architectural intent of the stair; the clear walking width ($\approx 1,357$ mm) is more than double the minimum and permits a user to pause or two users to pass at any point; riser heights of 153–164 mm sit at the gentle end of the permitted 100–180 mm range; tread depths of 359–389 mm at the walkline substantially exceed the 280 mm general minimum; continuous guarding and (proposed) dual continuous handrails are provided throughout; and storey landings of 1,200 mm width are provided at every floor. The safety considerations underlying the recommendation are accordingly addressed by the geometry itself.

6.2 Maximum height between landings (3,660 mm) — DBC Part B / UAE FLSC (not applicable)

DBC Part B clause B.6.4.1.5 (“The height between landings shall be not more than 3,660 mm”) and the corresponding UAE Fire and Life Safety Code of Practice provisions for exit stairs apply to required means-of-egress stairs in buildings assessed under the general provisions of Part B. Villas are governed by the self-contained stair regime of Part K, in which K.5.5.2.4 expressly disappplies any intermediate-landing requirement “regardless of the floor to floor height.” The specific villa provision prevails over the general provision; the 3,660 mm limit is therefore not an applicable test for this stair. A Part B extract is included at Appendix A for reference, marked accordingly.

Conditional note: should Dubai Civil Defence, in reviewing the villa’s overall means-of-escape strategy, designate this stair as a required exit stair within the meaning of the UAE FLSC (not the normal position for a private single-family villa), the FLSC Chapter 3 provisions — including the 3,660 mm rise between landings — would then be engaged and flights 2 and 3 would require reassessment. The Consultant of Record should close this point with DCD at design-NOC stage.

6.3 Spiral stairs as main villa stairway — K.5.5.2.8 closing note (advisory only)

K.5.5.2.8 closes: “Spiral stairs have limited capacity for circulation and movement and are not recommended to be utilized as the main stairway of the villa.” This is guidance addressed to tight, pole-wound spiral stairs of minimal width; it is not a prohibition. At $\approx 1,357$ mm clear width with 359–389 mm walkline treads, this stair does not present the capacity limitation the note contemplates.

7. Stair Handing — K.5.5.2.8 h): Non-Compliance and Mitigation

K.5.5.2.8 h) requires the turn of the stairway to be such that the outer handrail is at the right side of descending users. CAworks engineering has confirmed that, as designed, the helix places the outer edge at the descending user’s LEFT. The handing of a helical stair is a property of its turn direction: it cannot be altered by handrail arrangement, finishes or fittings, and can only be literally remedied by mirroring the helix — a change excluded by the architectural setting-out. The item is therefore reported as non-compliant as designed.

Proposed mitigation, for the Consultant of Record to put to DDA as an engineering-judgment request: (1) continuous handrails on BOTH sides of the flight — inner rail mounted to the glass balustrade and outer rail wall-mounted at 865–965 mm per K.5.5.2.5 — so that every descending user has a graspable rail at the right hand for the full length of every flight; (2) the protective intent of clause h) is to steer descending users, right hand on rail, toward the deeper outer portion of wedge treads — a hazard characteristic of narrow spiral stairs; on this stair the tread depth at the inner measurement point is already 278–302 mm (exceeding even the 255 mm curved-stair threshold and comparable to the 280 mm straight-flight minimum), so the differential-depth hazard the clause addresses is substantially absent; (3) riser heights (153–164 mm), clear width ($\approx 1,357$ mm) and continuous

guarding further reduce descent risk. CAworks recommends this request is made at design-NOC stage and resolved in writing before fabrication release.

8. Fire and Life-Safety Statement

Under DBC K.5.5.2.1, spiral, winder and open stairs are permitted for all uses within a villa other than basement access/egress; this stair serves no basement, and the clause's enclosed-stair requirement is not engaged. No fire-resistance rating is imposed on the stair structure itself by Part K for this configuration. The applicability of UAE FLSC exit-stair provisions is addressed at Section 6.2; the Consultant of Record should confirm the villa's overall means-of-escape strategy with Dubai Civil Defence as part of the standard DCD design review.

9. Conclusion and Recommended Actions

Of the fourteen applicable DBC Part K checks, ten are compliant as designed, three are standard verifications to be closed at shop-drawing stage (handrail geometry, guardrail heights and gaps, tread surface traction), and one — the stair handing under K.5.5.2.8 h) — is non-compliant as designed and is the subject of the mitigation and engineering-judgment request set out in Section 7. The intermediate-landing recommendation of K.5.5.2.4 and the advisory note to K.5.5.2.8 are addressed at Section 6 and constitute recommendations, not requirements; the 3,660 mm between-landings limit of DBC Part B / UAE FLSC does not apply to this villa stair.

CAworks recommends: (1) the Consultant of Record submits the K.5.5.2.8 h) engineering-judgment request (Section 7) to DDA at design-NOC stage and obtains a written determination before fabrication release; (2) the dual-handrail arrangement is incorporated into the balustrade and handrail shop drawings, closing the K.5.5.2.5 verification at the same time; (3) the Section 6 justifications accompany the submission to pre-empt reviewer queries on landings and stair classification; (4) this assessment, the GA drawing , the structural calculation pack and the glass specification are issued together to the Consultant of Record for counter-signature and submission via the DDA portal. This document is not itself a statutory submission.

Appendix A — Dubai Building Code 2021 Extracts

Full-page extracts of the clauses relied upon, reproduced from the Dubai Building Code 2021. Page references are the code's internal pagination.

Dubai Building Code
Part K: Villas

K.5.5.2.7 Exterior stairways
 Outside stairs more than 11 m above the finished ground level, shall be provided with an opaque visual obstruction not less than 1,200 mm in height.

K.5.5.2.8 Spiral or curved stairs and winders
 Spiral or curved stairs (see Figure K.31) shall meet the following requirements.

- a) The clear width of the stairs shall be not less than 1,000 mm.
- b) Curved stair headroom shall be not less than 2,300 mm and spiral stair headroom shall be not less than 2,030 mm.
- c) Spiral stairs shall have a tread depth not less than 190 mm at a point 305 mm from the narrowest edge (see Figure K.32).
- d) Curved stairs shall have tread depth of not less than 255 mm at a point 305 mm from the narrowest edge (see Figure K.33).
- e) The height of risers shall not exceed 240 mm.
- f) All treads shall be identical.
- g) Handrails shall be provided in accordance with K.5.5.2.5.
- h) The turn of the stairway shall be such that the outer handrail is at the right side of descending users.
- i) Winders (see Figure K.31) shall have a tread depth of not less than 150 mm at their narrowest, and a tread depth of not less than 280 mm when measured at a point 305 mm from narrowest edge.

Spiral stairs have limited capacity for circulation and movement and are not recommended to be utilized as the main stairway of the villa.

Figure K.31 Examples of curved stairs, spiral stairs and winders

Figure K.32 Spiral stairs

K 45

DBC 2021, Part K p. K 45 — K.5.5.2.8 Spiral or curved stairs and winders, incl. clause h) (handing) and Figure K.32.

Dubai Building Code Part K: Villas

Figure K.33 Curved stairs

K.5.5.2.9 Surfaces
 Stair treads and landings shall be free of projections or lips that could trip stair users. Stair treads and landings within the same stairway shall have consistent surface traction.

K.5.5.2.10 Minimum headroom
 Head room in stairways shall be not less than 2.3 m, measured vertically above a plane, parallel to the most forward projection of the stair tread (see Figure K.34).

Figure K.34 Staircase arrangement

Key
 01: 1 tread depth extension for handrail
 02: Handrail

K 46 ⏪ ⏩ ⏴ ⏵

DBC 2021, Part K p. K 46 — Figure K.33 (curved stairs: ≥ 255 mm at 305 mm), K.5.5.2.9 Surfaces, K.5.5.2.10 Minimum headroom (≥ 2.3 m).

Dubai Building Code Part K: Villas

K.5.5 Circulation and egress

K.5.5.1 Hallways and corridors
 Hallways and corridors shall have a minimum clear width of 1.0 m and a clear headroom of 2.3 m without obstructions (see Figure K.23).

Figure K.23 Corridor example

Key
 01: Bedroom
 02: Ensuite toilet
 03: Internal corridor

K.5.5.2 Stairs

K.5.5.2.1 General
 Spiral stairs, winders and open stairs are permitted for all uses other than access and exit from basements. Basements shall have standard enclosed exit stair of 1,000 mm clear width leading to discharge level.

K.5.5.2.2 Stairway width
 All stairways shall have at least 1,000 mm clear width.

The required width of a stairway shall be measured from wall to the clear available width of the step (see Figure K.24). The maximum projections of handrails allowed in the required width is 100 mm on each side, at a height of 865 mm to 965 mm (see Figure K.24).

Figure K.24 Handrail encroachment

Key
 01: Handrail
 02: Dual guardrail
 03: Wall
 04: Handrail
 05: Tread
 06: Open side
 07: Stair

K 40 ⏪ ⏩ ⏴ ⏵

DBC 2021, Part K p. K 40 — K.5.5.2.1 General (spiral stairs permitted; basement exception) and K.5.5.2.2 Stairway width.

Dubai Building Code Part K: Villas

K.5.5.2.3 Stair risers and treads

Stair riser height as measured in Figure K.25 shall be in the range 100 mm to 180 mm.

Riser heights shall be as uniform as possible throughout each stair flight between landings.

Where riser heights are adjusted to meet acceptable stair treads, flights and arrangements, there shall be no more than 10 mm difference in riser height within a single flight.

Minimum stair tread depth shall be not less than 280 mm (see Figure K.26).
 The tread slope shall not exceed 21 mm/m (2% slope).
 Tread depth shall be as uniform as possible throughout the stair. There shall be no more than 10 mm difference in tread depth within a single flight.

Figure K.25 Stair risers

Figure K.26 Step dimensions

K 41

DBC 2021, Part K p. K 41 — K.5.5.2.3 Stair risers and treads (100–180 mm risers; ≤10 mm variation).

Dubai Building Code Part K: Villas

K.5.5.2.4 Landings

An intermediate landing is not required on stairways in villas regardless of the floor to floor height. Intermediate landings are recommended if the floor to floor height exceeds typical practice (e.g. > 4m).

For enclosed staircases, the stair shall have a landing at the door opening and the landing width shall be not less than the required stairway width.

The maximum landing area that a door can encroach in its swing is one half of the required landing width.

Landing width shall not decrease in width along the direction of egress travel, as shown in Figure K.27.

The landing width shall be not less than 1,000 mm. The landing width is not required to exceed 1,000 mm in the direction of travel, provided that the stairway has a straight run.

The landing slope shall not exceed 21 mm/m (2% slope).

Figure K.27 Example of a villa stair

K 42

DBC 2021, Part K p. K 42 — K.5.5.2.4 Landings: intermediate landings NOT REQUIRED in villas regardless of floor-to-floor height; recommended only where floor-to-floor exceeds e.g. 4 m.

Dubai Building Code Part K: Villas

K.5.5.2.5 Handrails
 Stairs shall have handrails on the open side of the stair as shown in Figure K.28.

Handrails on stairs shall be located between 865 mm and 965 mm above the surface of the tread, measured vertically to the top of the rail from the leading edge of the tread.

The height of required handrails that form part of a guardrail (see Figure K.24) can exceed 965 mm, but shall not exceed 1,065 mm, measured vertically to the top of the rail from the leading edge of the tread.

Handrails shall be installed to provide a clearance of not less than 57 mm between the handrail and the wall to which it is fastened.

Handrails shall continue for the full length of each flight of stair.

Inside handrails shall be continuous and graspable between flights at landings.

Handrails shall have circular cross-section with an outside diameter of not less than 32 mm and not more than 51 mm.

Handrail shape that is other than circular (see Figure K.29) shall be with a perimeter dimension of not less than 100 mm, but not more than 160 mm, and with the largest cross-sectional dimension not more than 57 mm, provided that graspable edges are rounded so as to provide a radius of not less than 3.2 mm.

Handrail brackets shall not project horizontally beyond the sides of the handrail within 38 mm of the bottom of the handrail. For each additional 13 mm of handrail perimeter dimension above 100 mm, the vertical clearance dimension of 38 mm may be reduced by 3.2 mm.

Handrail brackets shall have edges with radius not less than 0.25 mm.

Figure K.28 Handrail specifications

Key
 01: One tread depth handrail extension
 02: Return of handrail to wall required
 03: Handrail turn required

K 43 ⏪ ⏩ ⏴ ⏵ ⏶ ⏷ ⏸

DBC 2021, Part K p. K 43 — K.5.5.2.5 Handrails (865–965 mm; continuity; grip dimensions).

Dubai Building Code Part K: Villas

K.5.5.2.6 Guardrails
 Guardrails as shown in Figure K.30 shall be provided for every stairway where the elevated surface is more than 760 mm from finished ground level.

Such guardrails shall not encroach on the required clear width of the stairway.

The height of guardrails shall be measured vertically to the top of the guardrail from the surface adjacent thereto.

Guardrails shall be a minimum of 1,200 mm high. In case of stairway or ramp handrails that form part of a guardrail, the height of the guardrail can be reduced to 1,065 mm.

Figure K.29 Cross-sections of handrails

Key
 01: 100 mm to 160 mm perimeter

Open guardrails, shall have intermediate rails or an ornamental pattern up to a height of 865 mm, such that a sphere 100 mm in diameter is not able to pass through any opening.

The triangular openings formed by the riser, tread, and bottom element of a guardrail at the open side of a stair shall be of such size that a sphere 150 mm in diameter is not able to pass through the triangular opening.

Guardrails at landings or balconies over stairways shall also conform to K.5.2.5.2.

Figure K.30 Guardrail example

K 44 ⏪ ⏩ ⏴ ⏵ ⏶ ⏷ ⏸

DBC 2021, Part K p. K 44 — K.5.5.2.6 Guardrails (≥1,200 mm / 1,065 mm; 100 mm sphere; 150 mm triangle).

Dubai Building Code Part B: Architecture

B.6.4.1.5 Landings
 The height between landings shall be not more than 3,660 mm.
 Every stair shall have a landing at the door opening. The landing width shall be not less than the required stairway width.
 A staircase door shall not encroach in its swing into more than one half of the landing width (see Figure B.30).
 The landing width shall not decrease in width along the direction of egress travel.
 The landing width is not required to exceed 1,200 mm in the direction of travel, provided that the stairway has a straight run.
 The landing slope shall not exceed 21 mm/m 2% slope.

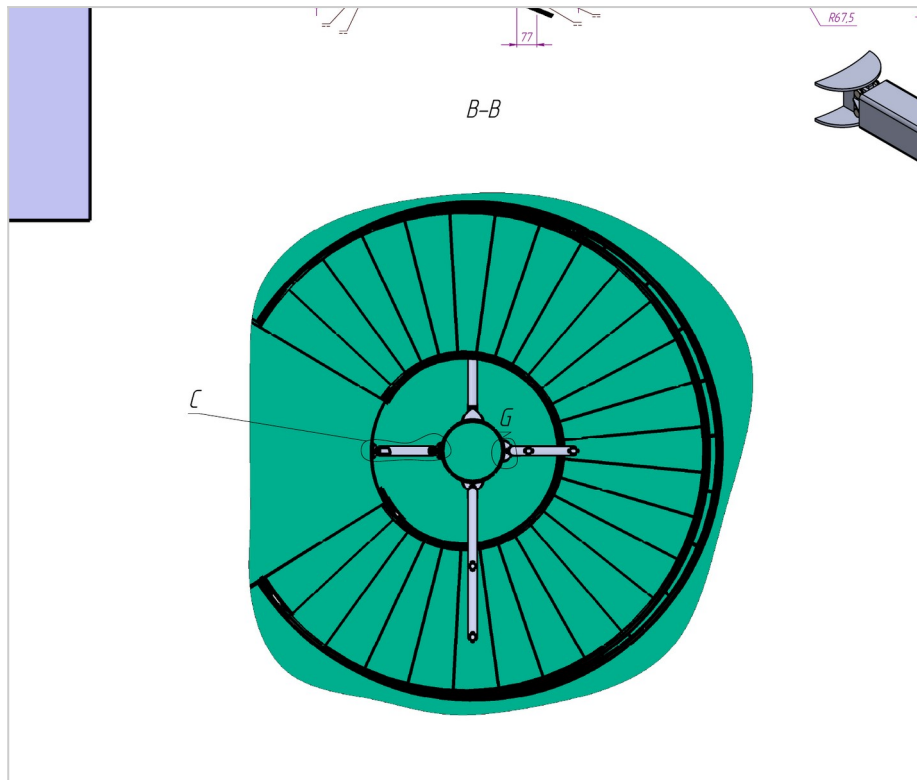
Figure B.30 Door opening and landing measurements

Key
 01: Greater than or equal to tread depth
 02: Finish wall
 03: Intermediate landing
 04: Dual guardrail
 05: Continuous handrail
 06: Top landing
 07: Return of handrail to wall required
 A: Minimum stairway width

B 45 ⏪ ⏩ ⏴ ⏵

DBC 2021, Part B p. B 45 — B.6.4.1.5 Landings (3,660 mm maximum height between landings). Included FOR REFERENCE ONLY: this Part B general-buildings provision is disapplied for villa stairways by Part K clause K.5.5.2.4 — see Section 6.2.

Appendix B — Design Reference Extract





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Plan section B–B from drawing — tread band between inner stringer ($R=990$; glass $R980$) and outer stringer ($R=2,356$), carried off the $\varnothing610$ mast by radial arms; landing wedge at left.

Yours faithfully,

Eng Evgeny Chernikov,
Director
CAworks Designer Glass Trading LLC