SECRETARY OF PUBLIC SECURITY AND SOCIAL DEFENSE

MILITARY FIRE DEPARTMENT OF THE STATE OF CEARÁ

TECHNICAL STANDARD No. 49/2025

SAFETY IN STRUCTURES AND BUILDINGS AGAINST SUICIDE

SUMMARY

ATTACHED DATA

1 OBJECTIVE

1.1 This Technical Standard provides guidelines and recommendations for adopting structural and architectural measures aimed at suicide prevention in public and private access environments, emphasizing the prevention of intentional (suicide) or accidental falls.

2 APPLICATION

2.1 This Technical Standard applies to constructions, structures, and high-risk areas where structural preventive actions can reduce suicidal behavior, serving as a preventative and guiding instrument.

2.2 Compliance with ABNT NBR 17152-1:2024 and ABNT NBR 17152-2:2024 standards for safety nets is adopted where not in conflict with this Technical Standard.

3 NORMATIVE AND BIBLIOGRAPHIC REFERENCES

3.1 SOUSA, José Edir Paixão de, et al. Approach to Suicide Attempts: Theoretical and Practical Manual for Public Security Professionals. Fortaleza: INESP, 2018.

3.8 Reisch T1, Michel K. Securing a suicide hot spot: effects of a safety net at the Bern Muenster Terrace. Suicide Life Threat Behav. 2005

3.9 Gunnell D; Nowers M. Effect of barriers on the Clifton suspension bridge, England, on local patterns of suicide: implications for prevention for prevention Acta Psychiatr Scand 1997

3.10 Sinyo M. Effect of a barrier at Bloor Street Viaduct on suicide rates in Toronto: natural experiment BMJ 2010

3.11 Keren Skegg A; Peter Herbison. Effect of restricting access to a suicide jumping site. Department of Psychological Medicine, University of Otago, Dunedin, New Zealand b Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand Online Publication Date: 01 June 2009

3.12 BENNEWITH, O.; NOWERS, M.; GUNNELL, D. Effect of barriers on the Clifton suspension bridge, England, on local patterns of suicide: implications for prevention for prevention. Br J Psychiatry, 2007

3.13 GUNNELL, D; BOWERS, M. Suicide by jumping, 1997

3.17 SHNEIDMAN, EDWIN S. The Suicidal Mind. Nova York. Oxford University Press, 1996.

3.18 ABNT. NBR 14718:2019 – Guardrails for buildings – Requirements, procedures, and test methods. Rio de Janeiro: Brazilian Association of Technical Standards, 2019.

3.19 ABNT. NBR 7199:2016 – Glass in civil construction – Design, execution, and applications. Rio de Janeiro: Brazilian Association of Technical Standards, 2016.

3.20 ABNT. NBR 14697:2001 – Laminated glass – Requirements. Rio de Janeiro: Brazilian Association of Technical Standards, 2001.

3.21 ABNT. NBR NM 295:2004 – Wired glass – Requirements. Rio de Janeiro: Brazilian Association of Technical Standards, 2004.

3.22 ABNT. NBR 6120:2019 – Loads for calculating building structures. Rio de Janeiro: Brazilian Association of Technical Standards, 2019.

3.23 ABNT. NBR 6118:2023 – Design of concrete structures – Procedure. Rio de Janeiro: Brazilian Association of Technical Standards, 2023.

3.24 ABNT. NBR 5674:2012 – Building maintenance – Requirements for the maintenance management system. Rio de Janeiro: Brazilian Association of Technical Standards, 2012.

3.25 ABNT. NBR 15737:2007 – Structural bonding of glass – Procedure. Rio de Janeiro: Brazilian Association of Technical Standards, 2007.

3.26 ABNT. NBR 15919:2011 – Frames – Performance test for sealing and weatherstripping of bonded glass. Rio de Janeiro: Brazilian Association of Technical Standards, 2011.

3.27 ABNT. NBR 9077:2001 – Emergency exits in buildings. Rio de Janeiro: Brazilian Association of Technical Standards, 2001.

3.28 ABNT. NBR 16401-2:2008 – Air conditioning installations – Central and unitary systems – Part 2: Thermal comfort parameters. Rio de Janeiro: Brazilian Association of Technical Standards, 2008.

4 DEFINITIONS AND TERMINOLOGY

4.1 For the purposes of this Technical Standard, the definitions established in NT 03 – Terminology for Fire and Panic Safety apply, in addition to the following:

4.1.1 Bridges: Structures built to allow the crossing of natural or artificial obstacles, such as rivers, valleys, or other channels, typically used for vehicle and/or pedestrian traffic, supported by pillars or elevated frameworks.

4.1.2 Viaducts: Engineering works composed of elevated structures crossing urban areas or roadways, ensuring traffic continuity over roads, terrain, or constructions located at lower levels. They differ from bridges mainly in their location (urban) and purpose (vehicular or pedestrian overpasses).

4.1.3 Pedestrian Overpasses (Walkways): Elevated structures, often for exclusive pedestrian use, designed to allow safe passage over urban streets, highways, rivers, or other obstacles, with or without covering. They may be integrated into public or private buildings.

4.1.4 Life Valuation Center (CVV): A non-governmental, nonprofit organization that offers free, volunteer-based emotional support and suicide prevention through active, confidential, and anonymous listening. Available 24/7 via phone (188), online chat, or email. It is nationally recognized across Brazil.

4.1.5 Anchor Points: Fixed components installed in architectural or engineering structures, designed to securely fix ropes, cables, or fall-arrest systems used in rescue operations, high-altitude maintenance, or fall protection systems. They must meet mechanical resistance standards according to their purpose and applicable technical regulations.

4.1.6 Laminated Glass: A type of safety glass composed of two or more glass sheets bonded with one or more layers of polymeric interlayers (commonly PVB – polyvinyl butyral). In case of breakage, the fragments adhere to the interlayer, reducing the risk of injury and falls.

4.1.7 Tempered Glass: Safety glass subjected to thermal treatment to increase its mechanical and thermal strength. When broken, it shatters into small, rounded pieces with less cutting potential, reducing the likelihood of lacerations.

5 PROCEDURES

5.1 Bridges, Viaducts, and Walkways

5.1.1 On public bridges, viaducts, and pedestrian walkways, it is recommended that metal protective fencing be installed on both sides of the pathway. These barriers should consist of wire mesh or similar open structures that provide visibility and ventilation. The design may include inward-curving structures to deter climbing, and must fully extend to the ground to prevent any human passage underneath. See Appendix A for a mechanical protection model.

5.1.2 Bridges, viaducts, and walkways may combine physical barriers with signage displaying emergency contact numbers, including: Fire Department (193), Mobile Emergency Medical Service – SAMU (192), Ceará State Military Police (190 or 911), Municipal Guard of Fortaleza City, and Life Valuation Center – CVV (188) or www.cvv.org.br (live text chat).

5.1.3 Physical emergency phones with toll-free access may be installed at one or both ends of the structure or integrated along the bridge/viaduct, allowing direct calls to emergency services.

5.1.4 In addition to emergency contact signage, messages promoting psychosocial support may be displayed along the structure, such as those shown in Appendices B and C.

5.1.5 If technical conditions prevent the construction of fencing, it is recommended to install artificial or natural obstacles (e.g., landscaping) to impede access to high-risk zones on bridges, viaducts, or pedestrian walkways.

5.2 Telecommunication and Power Towers

5.2.1 It is recommended that telecommunication or power transmission towers be physically isolated through perimeter fencing with a minimum height of 2.10 meters (6.9 feet), using metal mesh, welded wire mesh, fencing, or equivalent resistance materials. The use of barbed wire or concertina wire is prohibited in areas accessible to the public.

5.2.1.1 Access to the fenced area must be made exclusively through a locked gate (with key or electronic system), under the responsibility of a security guard, watchman, or authorized technician.

5.2.2 These towers must feature highly visible and durable safety signage, including warnings of fall and electrocution hazards, using universal pictograms, in compliance with ABNT NBR 3864-1:2016 (Safety signage – General principles) and ABNT NBR 5444:1989 (Safety colors).

5.2.2.1 Emergency information signs are also recommended, including:

a) Psychosocial support hotline (e.g., CVV – 188);

b) Instructions for activating a technical emergency response if a person is seen in imminent danger.

5.2.3 Towers must display, in a visible and weather-protected location, a technical identification plate containing:

a) Name and business identification number (CNPJ equivalent) of the company responsible for operation and maintenance;

b) 24-hour emergency contact number for outages or incidents;

c) Tower identification (asset number, geolocation code, or internal ID);

d) Date of last and next scheduled preventive maintenance, as required by ABNT NBR 5674:2012 (Building maintenance – Requirements for maintenance management systems).

5.2.4 It is recommended to install physical anti-climb barriers directly onto the tower structure, encircling its entire base at a height of 4.0 meters (13.1 feet) from ground level, to prevent unauthorized climbing (see Figure 01).

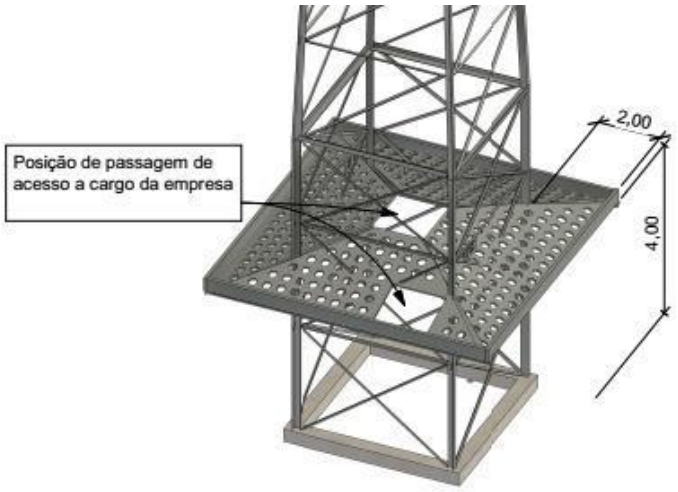

Figure 01 - Example of a physical anti-climbing barrier.

5.2.4.1 The barrier must be constructed from weather-resistant and durable materials that are difficult to grip. Acceptable options include perforated metal panels, smooth galvanized steel sheets, or curved elements that prevent hand/foot support. The barrier must extend at least 2.0 meters (6.6 feet) outward from the outer edge of the tower on each side.

5.2.4.2 The structure must be securely fastened to the tower without compromising its stability or interfering with technical components such as cables, insulators, and antennas.

5.2.4.3 There must be a secure technical access hatch to the tower, restricted to authorized maintenance personnel, and equipped with a lock or controlled access system under the operator's responsibility.

5.3 Roofs, Terraces, and Openings

5.3.1 It is recommended to install safety nets on windows, balconies, staircases, and mezzanines to prevent accidental falls and suicide attempts in areas with fall risk, in accordance with standard ABNT NBR 16046.

5.3. On building rooftops and other elevated structures, it is recommended to have at least one (01) anchor point on each horizontal projection of the façade for the attachment of rescue ropes for use by the Fire Department. Each anchor point must:

a) Allow for anchoring without causing abrasion or shear stress on the ropes;

b) Be made of a material capable of withstanding tensile forces, such as a solid bar or steel tube with equivalent section that can support a 30 kN load (approximately 3,000 kgf);

c) Be resistant to weather exposure;

d) Be located at a minimum distance of 1 meter (3.3 feet) from the façade projection it is intended to serve;

e) Be centrally aligned with the façades it is meant to assist.

5.3.2.1 Anchor points must be inspected regularly according to the manufacturer's instructions, at least once every 12 months.

5.3.3 Guardrails (balustrades) with a minimum height of 1.80 meters (5.9 feet) are recommended for rooftops and terraces, to prevent accidental or intentional falls.

5.3.4 The use of glass as a fall protection element in high-risk areas must fully comply with ABNT NBR 14718:2019 requirements, as well as technical guidelines from ABNT NBR 7199:2016 and ABNT NBR

14697:2001, regarding the specification, installation, and resistance of laminated safety glass.

5.3.5 Emergency exits in buildings must never be obstructed and must comply with all parameters established by the Fire Department's technical standard for emergency exits. To detect human presence on rooftops, it is recommended to use video surveillance systems integrated with loudspeakers or similar alert systems, such as human body sensors linked to alarms or access door modules, enabling building staff (e.g., doormen or security guards) to notify emergency services in case of suicide attempts.

5.4 Commercial Spaces

5.4.1 In commercial spaces located in elevated areas or with drop zones exceeding 3.0 meters (9.8 feet)—such as shopping centers, mezzanines, internal walkways, gyms, atriums, or uneven circulation zones—it is recommended to install guardrails (balustrades) with a minimum height of 1.80 meters (5.9 feet), especially in places with potential risk of accidental or intentional falls.

5.4.2 The use of transparent guardrails is permitted, provided that the materials offer adequate mechanical strength and comply with normative requirements for horizontal load and impact resistance, as specified in ABNT NBR 14718.

5.4.2.1 In these cases, the use of laminated safety glass is mandatory, as required by ABNT NBR 7199 and ABNT NBR 14697. The use of standalone tempered glass is prohibited.

5.4.3 In commercial spaces with three or more parallel (side-by-side) escalators, it is recommended that the center escalator be configured for downward movement (descent), as illustrated in Figure 02.

5.4.3. In cases with only two parallel escalators, if one is adjacent to a wall or physical lateral barrier, the descending escalator should be placed on the side of the wall or mechanical barrier. This prevents direct lateral access to drop zones, as shown in Figure 02.

5.4.3.2 Escalator flow direction (upward/downward) must be clearly indicated using standardized and visually accessible pictograms, following applicable accessibility and safety standards.

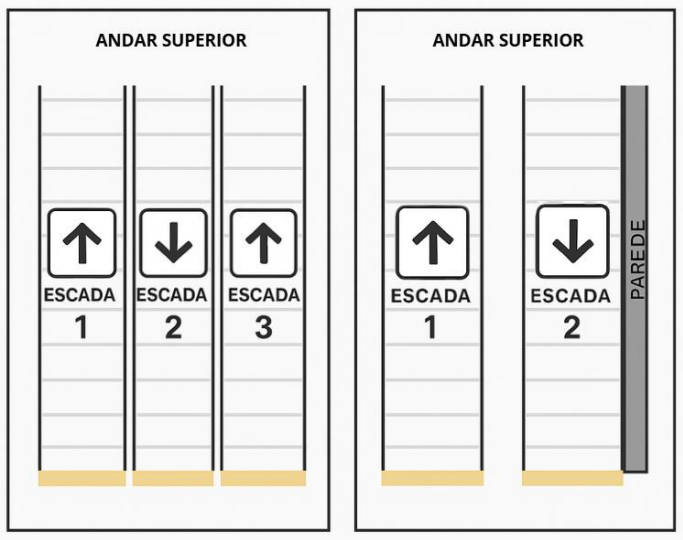

Figure 02 - Recommended configuration of mechanical scales.

5.4.4 Glass used in public-access commercial environments—such as bathrooms, partitions, doors, and other glazed components—must be either tempered or laminated safety glass, to prevent sharp or piercing fragments in case of breakage, in accordance with ABNT NBR 7199 and NBR 14697.

5.4.4.1 The use of untreated float glass (non-tempered, non-laminated) is not recommended in public circulation areas prone to impact.

5.4.5 In above-ground vehicle parking areas, it is recommended to install safety nets near open edges, ventilation gaps, and elevated ramps with fall risk—especially in outermost regions or zones with heavy pedestrian and vehicle traffic. These nets must comply with ABNT NBR 16046-1:2022 (Safety nets for buildings – Part 1: Requirements and testing methods) and ABNT NBR 16046-2:2022 (Part 2: Installation and maintenance).

5.4.5.1 Minimum tensile resistance (net + fixation system) must be 500 N per anchor point, as per performance testing standards.

5.4.5.2 Mesh openings must not exceed 50 mm (1.97 inches) to prevent human body parts or dangerous objects from passing through.

5.4.5.3 Safety nets must be tightly installed without excessive slack, and anchored to structurally stable elements such as beams, columns, or purpose-sized metal railings.

5.4.5.4 On ramps with significant elevation and intense vehicle traffic, vertical safety nets should be installed along sides or below open gaps as additional fall protection.

5.4.5.5 Safety nets must be periodically inspected, tested, and replaced if needed, in accordance with the building's preventive maintenance plan and ABNT NBR 5674:2012 (Building maintenance – Maintenance management requirements).

5.5 Hospitals

5.5.1 In hospitals, staircases or ramps with open central spaces or vertical gaps greater than 3.0 meters (9.8 feet) must undergo a risk assessment for accidental or intentional falls. If risk is identified, continuous physical protection structures should be installed to prevent falls.

5.5.1.2 Protection structures may consist of fixed vertical barriers, such as metal railings, structural polycarbonate, laminated glass, or other high-strength materials that comply with ABNT NBR 14718. Vertical or horizontal safety nets may also be used when technically or aesthetically viable, manufactured in accordance with ABNT NBR 16046-1:2022 (Part 1: Requirements and test methods) and ABNT NBR 16046-2:2022 (Part 2: Installation and maintenance). The minimum required tensile strength (net + anchoring system) must be 500 N per anchor point, as per the standard.

5.5.1.2.1 The nets must be tightly installed, with no free openings greater than 50 mm (1.97 inches), and must follow a regular inspection and maintenance plan recorded in the building's technical maintenance log.

5.5.2 In hospital areas with public or controlled access—such as bathrooms, partitions, internal windows, and glazed doors—it is recommended that only tempered or laminated safety glass be used, as specified by ABNT NBR 7199.

5.5.3 Hospital windows, terraces, rooftops, and other elevated areas must include passive protective devices such as vertical safety nets, metal mesh, or high laminated glass panels with a minimum height of 1.80 meters (5.9 feet), in accordance with ABNT NBR 14718.

5.6 Rooftops (Usabel Roof Terraces)

5.6.1 For the purposes of this standard, a *rooftop* is defined as an accessible area located on the upper deck or roof slab of a building, with a flat surface, designed or adapted for collective or restricted use, intended for activities such as social gatherings, leisure, events, dining, or similar purposes.

5.6.1.1 These areas may or may not include partial roofing and must be integrated with the main building with restricted access. They are subject to fall protection requirements applicable to mezzanines, terraces, or technical roofs, in accordance with ABNT NBR 14718:2019, NBR 9077:2001, and complementary safety regulations.

5.6.2 It is recommended to install guardrails (balustrades) around rooftop perimeters with a minimum height of 1.80 meters (5.9 feet) measured from the finished floor level, to reduce the risk of accidental falls and suicide attempts.

5.6.3 Guardrails may be made of continuous panels of laminated safety glass in accordance with ABNT NBR 7199:2016. The glass must be laminated (at least two bonded sheets using PVB or equivalent). The use of standalone tempered glass is prohibited.

5.6.3.1 The system must comply with minimum structural safety requirements regarding horizontal and vertical forces and dynamic impacts, as per ABNT NBR 14718.

5.6.3.2 The use of intermediate handrails, horizontal crossbars, or any element that facilitates climbing is prohibited. If glass panels are used, they must be continuous up to the minimum required height specified in item 5.6.2.

5.6.3.4 Guardrail systems must take natural rooftop ventilation into account. The use of fixed or pivoting upper louvers with controlled opening angles, rotating upper panels with limited swing range, or forced ventilation systems is permitted.

5.6.3.4.1 Ventilation elements must not compromise the integrity of the fall protection system or allow them to be used as climbing support.

5.6.4 A technical study must be conducted to assess the structural load capacity of the rooftop or parapet before installing any guardrail system. This study must be performed by a legally qualified professional and must include formal technical responsibility documentation. It must comply with the requirements of applicable safety standards, including NBR 6120, NBR 6118, and NBR 5674.

5.6.4.1 The structural calculation must consider dead loads, live loads in accordance with NBR 14718, the weight of fixings and metallic components, and environmental actions including wind forces and thermal expansion. Exposure factors for the rooftop must also be considered.

5.6.4.2 Guardrail installation shall only be authorized upon favorable technical opinion by a qualified professional who has verified the capacity of the existing structure and determined that additional structural reinforcement is not necessary—or has been completed, if required.

5.6.5 A minimum clearance of 1.20 meters (3.9 feet) must be maintained next to guardrails, free of any objects or furnishings that could be used as climbing aids (e.g., furniture, pots, technical equipment, etc.).

5.6.6 Tables, chairs, planters, benches, and other furnishings placed in rooftop areas should preferably be anchored to the floor or structurally fixed to prevent movement or misuse as climbing aids over the guardrails or perimeter protection elements.

5.6.6.1 Fixation must be done using weather-resistant materials, and installation must be compatible with the roof covering. It must not obstruct drainage systems or pedestrian circulation routes.

ATTACHED A

Viaduct - Bridge (mechanical protection model)

ATTACHED B

Model I of Poster to contact the Public Emergency Service and Psychosocial Connection

Translation: Chatting can be a relief. Seek help! Call 188.

ATTACHED C

Model II of Poster to contact the Public Emergency Service and Psychosocial Connection

Translation: Talking is the best solution. Seek help! Call 188.