



FEDERATION INTERNATIONALE DE L'AUTOMOBILE

SPECIFICATIONS OF CONCRETE WALLS FOR DRAG RACING STRIPS

V1.0 April 2022

1. FOREWORD

The aim of this standard is to define the specifications of concrete walls intended for use on drag racing strips in accordance with the Procedures for the Recognition of FIA International Drag Strips.

These specifications are intended to provide a reference for the assessment of the compliance of concrete walls by the FIA Circuits Commission and its inspectors, on drag strips intended for inclusion on the FIA calendar of international events.

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3. CONCRETE WALL SPECIFICATIONS

Two types of concrete walls may be used at FIA homologated tracks: Freestanding and Earth Backed.

- a. Freestanding concrete walls should meet either of the appropriate design specifications:
 - (Section 5.) Permanent Drag Strips - Free Standing concrete wall.
 - (Section 6.) Temporary Drag Strips - Free Standing concrete wall
- b. Earth backed concrete barriers may be constructed to the appropriate design specification in (section 4.) Earth Backed Concrete Walls.

All walls need to be certified by a structural engineer with relevant experience of concrete structures that the design of the walls meets the requirements in Section 4. to Section 7. below.

4. DESIGN

- a. The wall shall have a minimum height of 760 mm (30 inches), above track level, to a point 304 meters (1,000 ft) from the start line. Beyond that point the height must be a minimum of 990mm (39 inches) above track level.
- b. The side facing the track should have a smooth vertical ($\pm 2^\circ$) and continuous surface, such as is obtained by casting the concrete in suitable plywood, metal sheet or plastic forms.
- c. Joints, approximately 20 mm (0,8 inch) wide, may be provided at suitable intervals to prevent cracks from thermal expansion or shrinkage. These joints shall be designed such that there is no relative displacement each side of the joint under the design impact on one side and that the design forces (both lateral and longitudinal) are transmitted across the joint.
- d. Suitable holes may be made for drainage and timing equipment as necessary so long as the strength of the wall is not compromised.

5. PERMANENT DRAG STRIPS – FREE STANDING CONCRETE WALLS

- a. The wall should be designed to resist a lateral load of 500 kN, applied 400 mm (15,7 inches) above the verge on the track side and over a length of 1100 mm (43,3 inches).
- b. The minimum thickness of freestanding concrete walls should be 200 mm (7,88 inches).
- c. An adequate reinforcement in the wall and in the foundation plate along the entire length of the section shall be provided to ensure an effective distribution of the load.
- d. The wall ends at joints and terminals shall be suitably reinforced to compensate for the discontinuity of the structure. In planning the dimensions and calculation of the reinforcement of the foundation, particularly against overturning, the nature of the ground shall be taken into due consideration.
- e. A structural engineer with relevant experience of concrete structures, should certify that the design will meet the design requirements in Section 5.a.

6. TEMPORARY DRAG STRIPS – FREE STANDING CONCRETE WALLS

- a. When using portable concrete blocks as the first line of protection, the basic principle is to ensure that the linked blocks have sufficient mass to ensure the effectiveness of the wall while adequately dealing with the kinetic energy of the most severe impact anticipated and the safety of the driver.
- b. It is not necessary to ensure that the blocks will retain their position in the event of a collision; in fact, some movement reduces the peak deceleration of the impacting vehicle thus lessening the severity of the impact transmitted to the driver. Therefore, blocks positioned on a uniform, flat surface, not backed up by kerbs or other irregularities will reduce the peak deceleration.
- c. The positioning of the blocks for the temporary walls needs extensive engineering and design, to consider a range of possible vehicle trajectories and impacts, and their risk. The need to restrict the movement of the walls and to locate or “key” them into other features e.g. gutters or kerbs, should be evaluated through a risk assessment when designing.
- d. The individual blocks should be designed to resist the lateral impact loads specified in Section 6.a. The reinforcement must allow for the tensile forces to be transmitted from the external loop at one end to the external loop at the other end of the block. The connecting pin must not deform significantly under these tensile forces and the forces due to impacts.
- e. The wall segments and the connection details should be designed by a Chartered Professional Engineer with relevant experience of concrete structures, should certify that the design will meet the design requirements in Section 5.a.
- f. Dimensions for a typical block that has been successfully used at other motor racing facilities, are shown below.
 - Ideally the blocks should have a mass of at least 1000 kg per linear meter and a base width of at least 500 mm (19,7 inches).
 - All blocks should present a smooth, face perpendicular to the racing surface.
 - Minimum height should be 760 mm (29,9 inches) above track level, to a point 305 m (1001 ft) from the start line. Beyond that point the height must be a minimum of 39 inches (990mm) above track level.
 - The minimum length of each block is 4 m (13,1 ft).
 - Blocks should contain adequate steel reinforcing. Since the blocks may be subjected to repeated handling, it is recommended that the corners be protected by angle-section steel, securely anchored to the internal steel reinforcing. The reinforcement needs to be detailed in the design as outlined in Section 6.e.
 - If the method of mounting includes vertical holes cast in the blocks, a means of drainage should be provided to prevent water accumulation and to eliminate the risk of frost damage.
 - Suitable recesses should be cast in the base of each block to facilitate drainage and to accommodate the forks of a lift truck.
 - An acceptable method of connecting adjacent blocks is to cast two loops of 25 mm (1 inch) reinforcing steel bar into each end of each block, see APPENDIX A. The loops should be securely anchored to the internal reinforcing structure and vertically staggered at one end of each block relative to the other end, so as to permit overlap of the loops of adjacent blocks. Steel cables or wires should not be used, and the connection should be designed to limit rotation of one block against another.
 - The blocks should be connected by pins of heavy-wall steel tubing (min. 50 mm or 2 inches O.D.). The system of connecting the blocks should provide a certain degree of flexibility but should have sufficient strength to withstand the heaviest impact anticipated, so as to form an integrated structure by sharing the load with adjacent blocks.

- The blocks have ends that are perpendicular to the face as shown in APPENDIX A.

7. EARTH BACKED CONCRETE WALLS

- a. Earth backed concrete walls need to be continuous or segmented. Reinforcement must extend the length of the wall so that lateral and longitudinal loads can be effectively transmitted along the wall. If the wall is made from segments, then each segment needs to be attached to its neighbour to allow the lateral and longitudinal loads to be transmitted across the joint. A structural engineer with relevant experience of concrete structures, should certify that the design will meet the requirements in Section 5.
- b. The minimum thickness of earth backed concrete walls should be 120mm (4,7 inches). The grade of concrete used should not be less than 30 Mpa, although this should be established through an engineering design.
- c. The strength of these walls is governed by the mass of earth behind the barrier that will move on impact. Walls should be backed by compacted earth fill (free of tyres or other compressible debris) to no lower than 70 percent of the height from the top of the wall, for a lateral distance of at least 1000 mm (39 inches). Typically, a wall will need to be embedded in the ground below the track level to meet the design requirements in Section 5. The fill may then taper off gradually to ground level over at least another 2000 mm (79 inches), although this should be established through an engineering design.

APPENDIX A: WALL ELEMENT FOR TEMPORARY WALLS

- ELEMENT DE MUR POUR CIRCUIT TEMPORAIRE
 - WALL ELEMENT FOR TEMPORARY CIRCUIT

