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CSA S413:21
National Standard of Canada

Parking structures

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Preface

This is the fifth edition of CSA S413, *Parking structures*. It supersedes the previous editions published in 2014, 2007, 1994, and 1987.

This Standard differs from the previous edition as follows:

a) added clarification in Scope regarding considerations for structures or portions of structures which are designed for the storage and/or repair of vehicles;
b) requirements for fibre-reinforced polymer reinforcement have been added;
c) updates to requirements for surface preparation, installation, testing, and performance of protection systems;
d) updated requirements for placement and design of expansion joints near columns, spandrels, walls, and other vertical elements;
e) revisions to clarify concrete types for perimeter basement walls;
f) revision to requirements and suggested details for parking structure drains;
g) added requirements for cast-in services placed in proximity to parking structure drains;
h) revision to requirements for core testing;
i) added requirements for protection of reinforcement at precast joint ends and expansion joints;
j) clarification for water supply for periodic washdowns;
k) clarifications for concrete requirements to harmonize with CSA A23.1;
l) added requirements for crack treatment;
m) added requirements for footing protection from chloride contamination;
n) revisions to requirements for concrete moisture testing and calcium chloride testing;
o) added requirement for consideration of alternate access/egress pathways in parking structures in cases of repair;
p) revisions to requirements for tooled or soft cut joints;
q) recommended minimum work procedures have been moved from Annex D into the main body of the Standard;
r) Annexes A, D, and H have been revised; and
s) all references, including those for the annexes, have been updated where applicable.

This Standard has been adopted by the Canadian Commission on Building and Fire Codes as the reference standard for parking structures in Section 4 of the *National Building Code of Canada*.

This Standard was prepared by the Technical Committee on Parking Structures, under the jurisdiction of the Strategic Steering Committee on Structures (Design), and has been formally approved by the Technical Committee.

This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
3) *This Standard was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*

4) *To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include "Request for interpretation" in the subject line:*
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   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

CSA S413:21
Parking structures

0 Introduction

0.1

This Standard specifies the minimum design, construction, and maintenance requirements necessary for the structural durability of new parking structures, storage garages, parts of buildings subject to vehicular traffic or used for parking, and pedestrian areas adjoining to or contained within parking structures.

The provisions of this Standard are intended to address both ultimate and serviceability limit states, and more specifically, to

a) protect against the deterioration of concrete and metal elements caused by de-icing chemicals alone or by de-icing chemicals in combination with the effects of freeze-thaw cycling;
b) protect against damage to vehicles caused by leakage through floors; and
c) control the flow of water and avoid ponding.

The structural design methods, loadings, and limit states referenced and specified in this Standard are those set forth in the *National Building Code of Canada (NBCC)*.

0.2

The requirements of this Standard are applicable to all parking structures susceptible to corrosion, whether the corrosion is caused by atmospheric conditions or de-icing chemicals. In geographic areas where de-icing chemicals are not used and are not expected to be used in the foreseeable future, some of the corrosion protection provisions in this Standard do not apply.

0.3

Acceptable protection systems are specified in Table 1. The provision of multiple protection systems is a fundamental principle of this Standard. The appropriate choices should be made by the designer and specified in the drawings and related documents. Some parking structures, or portions of parking structures, require more than the minimum protection required by this Standard because of factors such as environmental conditions, the extent of utilization of salt by the municipality, the number of daily vehicle in-and-out trips, the difficulty of access for repairs, or the desire to minimize maintenance.

For types of construction or construction details not covered by this Standard, the same principles of protection required by this Standard apply.

0.4

To obtain the intended durability, parking structures designed and constructed in conformance with this Standard need to be regularly maintained by the owner in accordance with a comprehensive regularly scheduled inspection and maintenance program. Maintenance information is provided in Annex E and Table E.1.

