

Silca Grate™ System Structural Specifications

APPLICATION

Silca System® is a structural sub-base for elevated decks that is connected to wood joists providing a strong substructure for heavy decking materials such as natural stone or manufactured concrete pavers up to 3" (76 mm) thickness. When building a new deck or retrofitting an existing deck, the Silca System® is engineered for strength, deflection, and easy installation to create an attractive, long-lasting, and low maintenance deck. **Silca Grate™** has made it possible for homeowners, deck architects, deck designers, and deck builders to be creative with new and exciting decking ideas that enhance the outdoor living experience. The Silca Grate product (see Figure 1) measures 16" wide by 18" long by 1.5" thick.



Figure 1

The Silca Grate™ is suitable for residential load-bearing deck applications, and conforms to the 2012 Ontario Building Code (Part 4, Subsection 9.4.2 – Specified Loads, and Article 9.4.3.1 – Deflections).

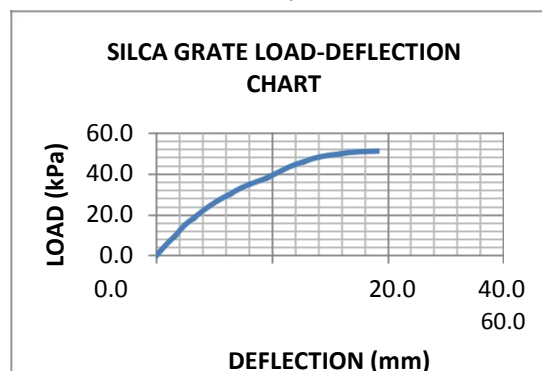
EVALUATION

The Silca Grate is recognized in ICC-ES master evaluation report ESR-3748 as being in compliance with the 2015 and 2012 International Building Code® (IBC), and 2015 and 2012 International Residential Code (IRC). The evaluation has been performed for structural properties, durability, and surface-burning characteristics. The structural properties have also been evaluated for compliance with the **2012 Ontario Building Code**.

TESTING

A full-scale independent structural testing has been completed by NAHB Research Center, Inc. per ASTM D7032-08, "Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guiderail Systems" and ASTM D6109-05, "Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products" (Report #4109-002-05042009 issued on May 4, 2009). Additional structural testing, including high temperature (49°C), low temperature (-29°C), UV exposure, and freeze-thaw cycles, has been completed by Home Innovation Research Labs™ per ICC-ES AC174 Modified (Report 4162-031-040416r1 issued on April 04, 2016).

The load-deflection testing has been performed up to the maximum load of 51.5 kPa, and corresponding deflection of 38.1 mm (see Load-Deflection Chart below).



The Silca grate remained linear-elastic up to the load of 14 kPa and corresponding deflection of 4.7 mm.



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VARIATIONS FROM SPECIFICATION

Any item not specifically addressed herein shall comply with the 2012 Ontario Building Code. For specific loading criteria or considerations, contact an Engineer licensed to practice in the province of Ontario.

REFERENCES

- CSA O86-14 Engineering Design in Wood
- AC257 Compliant Bronze Star ACQ Compatible #9 x 3” (76 mm) “Star Drive” Screws ICC-ES / ESR-2442 – RSS Structural Screws
- ASTM A-153 – Galvanized Nails Compatible with Pressure Treated Products

DELIVERY, STORAGE, AND HANDLING

Product may be stored outside, but should be protected from deformation and other damage during delivery, storage, and handling as required by standard practice. If the grates are stored outside for more than 90 days the manufacturer recommends that the product be covered for protection from exposure to UV rays.

STANDARD SPECIFICATION

The Silca Grate product is an injection molded plastic panel with a honeycomb structure (shown in Figure 1) that is intended to be screwed to deck joists. Standard properties are as follows:

- Flexural Strength 50 MPa
- Modulus of Elasticity 1950 MPa
- Effective Moment of Inertia (I_{xx}) 252,000 mm⁴
- Maximum Elastic Moment (M_{xx}) 0.1 kNm
- Maximum Allowable Design Stress 6.9 MPa

MAXIMUM LOADS – RESIDENTIAL

Silca Grate is suitable for total load combinations as per 2012 Ontario Building Code Part 4.

Clear Span (mm)	Max Load (kPa)	Service Deflection (L/N)
400	9.6	< L/360

STRUCTURAL COMPONENTS

- Silca Grate™ 16”x18”x1.5” (406 mm x 464 mm x 38 mm)
- P.T. Wood Joists SPF Grade No. 1/ No. 2 as per CSA O86-14
- P.T. Built-up Wood Beam SPF Grade No. 1/ No. 2 as per CSA O86-14
- 6x6 P.T. Wood Columns SPF Grade No. 1/ No. 2 as per CSA O86-14
- Foundations that must comply with the 2012 Ontario Building Code, and include the following:
 - (1) 214 mm (8.42 in.) dia., 255 mm (10.02 in.) dia., or 305 (12 in.) mm dia. concrete columns placed in sonotubes, and (2) concrete footing pads Bigfoot BF20, BF24, BF28, or BF36 or equivalent round pads (508 mm dia. x 200 mm thick), (610 mm dia. x 200 mm thick), (711 mm dia. x 250 mm thick), or (914 mm dia. x 300 mm thick). Concrete footing and sonotube may be substituted for appropriately sized steel helical pile. Soil capacity by others.



DEAD LOAD

Silca Grate™ system has a dead load ranging between 0.55 kN/m² and 1.9 kN/m². The grate itself has a dead load of 0.1 kN/m². The pavers apply additional dead load as follows: 0.45 kN/m² (for 3/4" thick pavers), 0.75 kN/m² (for 1-1/4" thick pavers), 1.2 kN/m² (for 2" thick pavers), 1.5 kN/m² (for 2-1/2" thick pavers), and 1.8 kN/m² (for 3" thick pavers).

MAX. SPAN BETWEEN GRATE SUPPORTS

Maximum span between grate supports shall be 406 mm (16 in.). Supports may be provided by the wood joists (new deck construction) or wood ledgers (deck retrofit construction).

MAX. CANTILEVER

The grate itself should not be cantilevered. The deck joists supporting Silca Grate and pavers may be cantilevered up to 305 mm (12 in.). Service deflection is less than L/360.

CONCENTRATED LOADS

Concentrated loads shall not exceed 4.5 kN over an area of 750 mm x 750 mm.

FASTENER CONNECTIONS

The Silca Grate™ system is assembled using #9 x 3" long Bronze Star ACQ Compatible "Star Drive" screws or equivalent drilled into the deck joists (new construction) or ledgers (retrofit construction). All deck fasteners shall comply with the 2012 Ontario Building Code. Post fastener shall be Simpson Strong-Tie WUB66HDG or equivalent.

FIELD ASSEMBLY

The Silca Grate™ panels shall be installed after deck structure (concrete footings, posts, beams, ledgers, deck joists) is complete. Panels are fastened to the joists or ledgers to achieve a complete diaphragm that will constitute structural sub-base for the natural stone or manufactured concrete pavers.

SURFACE FINISHES

Compatible surface finishes include stone or concrete pavers (0.75 in. to 3 in. thick), cast concrete (maximum 75 mm / 3 in. thick) stone decking aprons, porcelain tiles, natural stone tile, composite or plastic decking (subject to manufacturer's warranty), natural wood decking.

GUARDS

Guards shall comply with the 2012 Ontario Building Code, Subsection 9.8.8 – Guards, and Ontario Ministry of Municipal Affairs and Housing (MMAH) Supplementary Standard SB-7 – Guards for Housing and Small Buildings / September 14, 2012.

