

### CSA A82 Fired masonry brick made from Clay or Shale

This specification covers brick intended for use in masonry, either as face brick or in structural applications. According to CSA A82, a cored brick can have core holes whose area is no more than 25% of the total bed surface of the brick. While 100% solid brick are normally available, most brick are manufactured with 25% core holes. CSA A82 covers hollow brick which have core holes whose area is more than 25% of the total bed surface of the brick. However, the building code requires that masonry veneer is of solid or cored brick (voids < 25%).

This profile covers many of the most important aspects of this specification. When a brick is specified by an architect, the specification identifies the brick's manufactured name, CSA specification number, the grade, the type and the brick's manufactured size. For example, a typical brick specification could be Meridian Brick Sundance Matt modular size which meets CSA A82, grade EG (previously SW), type S (previously FBS) whose size is 57mm x 90 mm x 190 mm (modular size.)

The "grade" classifies the brick's ability to resist damage by freezing when wet. If the moisture inside a brick freezes, the water expands. If there are many cycles of freeze/thaw, the face of the brick may crack and fall off. There are two grades, EG Exterior Grade (SW severe weathering) and IG Interior Grade (MW moderate weathering). Grade EG is the most stringent and is required in all parts of Canada.

There are two physical properties of brick that are good predictors of the brick's ability to resist spalling or cracking of the face. These are the 24-hour cold water absorption (C) of the brick and the saturation coefficient (C/B) which is the ratio of the amount of cold water a submerged brick will absorb in 24 hours (C) to the amount of boiling water a submerged brick will absorb in 5 hours (B).

The theory of the saturation coefficient is that if only part of the total pore space is occupied by water, there is room for expansion on freezing into the remaining pore space without disruption of the material. The lower the saturation coefficient, normally the more durable the brick.

Compressive strength is the maximum weight the brick can support without breaking.

For grade EG brick,

- the average compressive strength of 5 brick must exceed 20.7 MPa,
- and for each specimen,
  - the five hour boiling water absorption (B) must not exceed 17%, and
  - either the saturation coefficient (C/B ratio) is not greater than 0.78 or the 24h cold water absorption (C) is not greater than 8%.

Alternatively, the brick must withstand 50 cycles of no-dry freeze/thaw testing. The CSA A82 no-dry freeze-thaw test is more severe than the ASTM C67 test, which allows units to drain during period of no test.

A physical property of the brick which does not influence the durability of the brick but is measured is the initial rate of absorption, IRA. This property is measured to assist the mason in mortar selection and helps to determine if the brick require prewetting before installation to enhance the bond between the brick and the mortar. If the IRA of a brick exceeds 30 gm./min/20 000 mm<sup>2</sup>, then CSA A82 suggests that prewetting be done prior to installation. However, this is not a requirement.

The "type" of brick refers to the appearance. For CSA A82, there are three type classifications: X, where the most precision is required; S, where average precision is required; and A, where non-uniformity in size and texture is permitted. There are several variables that are covered.

Chippage is another factor that is controlled by CSA A82. The more restrictive the type, the smaller the allowable chip dimensions are permitted. Chips that are monitored can occur along the four edges or the corners. In addition, the more restrictive the type, the fewer the number of brick are allowed to have these defects and the smaller the allowable size of the chip. For Type S (textured), 85% to 100% of the brick can have chips that are measured from an edge that range between 0 to 8.0 mm and measured from a corner that range between 0 to 13.0 mm. No more than 15% of the brick can have chips that are measured from an edge that range between 8.0 to 11.0 mm and measured from a corner that range between 13.0 to 19.0 mm. The cumulative length of the chips around the perimeter edges of face cannot exceed 10% of the perimeter length. CSA A82 lists the allowable chippage size for all types.

Other than chips, the face or faces shall be free of cracks or imperfections when viewed from 4.5 m (15 feet) for Type X and 6.1 m (20 feet) for Type S and Type A. This implies that even if there are surface cracks, if the observer stands at 6.1m and the cracks are not visible then the brick is acceptable.

Size variations are also governed by CSA A82 with Type X permitting smaller dimensional tolerances. The specifications list the permissible variations. These variations are plus or minus the specified dimension and are applied to each of the brick's three dimensions. For example, a Type S brick that is specified as 190 mm long has a permissible variation of 6 mm, which implies that the brick can be as short as 184 mm and as long as 196 mm.

The CSA A82-2006 standard introduced a number of changes to terminology. Unfortunately, some of the old terminology still persists resulting in confusion in the industry. The following table is a comparison between the old and new terminology:

Table. CSA A82 Old and New terminology.

	<b>CSA A82 - Before 2006</b>	<b>CSA A82 - Since 2006</b>
<b>Grade</b>	Grade SW (severe weathering)	Grade EG (exterior grade)
	Grade MW (moderate weathering)	Grade IG (interior grade)
<b>Type</b>	Type FBX	Type X
	Type FBS	Type S
	Type FBA	Type A
<b>Percent solid</b>		
100% solid	Solid	Solid
75 - 100% solid	Solid	Cored
<75% solid	Hollow	Hollow