



MASONRY PRODUCTS



TECHNICAL MANUAL

Physical Properties Of Standard 10 cm units

ACTUAL DIMENSIONS (mm)			STANDARD CONFIGURATION
STD	HALF	HALF HIGH	
Width: 90 Height: 190 Length: 390	Width: 90 Height: 190 Length: 190	Width: 90 Height: 90 Length: 390	
AVAILABLE TYPES	STANDARD METRIC CONFIGURATIONS		
CSA Designation	"Four-Facet" System		H/15/A,B,C or D/O or M
Dimensions (mm)	Min. Face Shell Thickness Min. Web Thickness Equivalent Thickness		20 20 66
Area (mm ²)	Gross Area Net Area		35,100 25,600
Volume (mm ³)	Gross Volume Net Volume		6.669 x 10 ⁶ 4.868 x 10 ⁶
Percent Solid (%)	Net Volume/Gross Volume		73
Unit Mass (kg)	Standard Weight Semi Light Weight Light Weight	CSA "A" CSA "B" CSA "D"	11.0 10.0 8.3
Wall Mass (kg/m ²)	Standard Weight Semi Light Weight Light Weight	CSA "A" CSA "B" CSA "D"	162 150 129
Compressive Strength -Minimum (MPa)	Based on Net Area		15.0
Fire Performance Rating (Hours, NBC-2005)	Standard Weight Semi Light Weight Light Weight L ₂ 20S	CSA "A" CSA "B" CSA "D"	0.87 0.87 1.1



Explanatory Notes

Physical properties of standard metric concrete sheets
To be used in conjunction with the unit data sheets

NOTE: COMMENT

1. The four facet system of description is in accordance with CSA.A165.1-04. See Notes 6, 7, 8 and 9 regarding compressive strength and concrete densities.
2. Gross area means the area parallel to the bearing surface of the unit including voids. (1).
3. Net area means the gross area cross sectional area minus the area of the voids. (1).
4. Gross volume of the unit is equal to $L \times H \times W$ using actual dimensions. (2).
5. Net volume of the unit is the gross volume less the volume of all core spaces and voids created by set backs and indentations in the outer surface of the unit. (2).
6. Standard weight units ("A") are defined as having an oven dry density of concrete of over 2000 kg/m^3 . (1). The aggregate incorporated is 100% sand and gravel. In these Tables a density of 2100 kg/m^3 has been used.
7. Medium weight units ("B") are defined as having an oven dry density of concrete of between $1800\text{-}2000 \text{ kg/m}^3$. (1). The aggregate combination is 50% natural sand and 50% light weight material (pumice). A density of 1800 kg/m^3 has been used in these tables.
8. Light weight units ("D") have an oven dry density of concrete of less than 1700 kg/m^3 . (1). The aggregate can be 100% light weight material of expanded slag, expanded clay, expanded shale or pumice. Light weight units are also produced with aggregates being 20% natural sand and 80% light weight material. In these Tables a density of 1700 kg/m^3 has been used.
9. Wall mass totals are estimated and do not include an allowance for grout or reinforcing steel, vertical or horizontal.
10. Minimum compressive strength requirements are based on net area. (1).
11. Fire ratings are based on type of concrete and unit equivalent thickness (3). Higher ratings held under certification from the Underwriters Laboratories of Canada. For details please refer to the section entitled FIRE/SOUND/THERMAL; in this manual. Units designated L₂20S have an expanded shale with no greater than 20% sand. Units designated L₂20S have either expanded slag, expanded clay, or pumice aggregate with no greater than 20% sand.
12. S.T.C. data are estimated from N.C.M.A. Tek C13-1B for more detailed information refer to section on 'Sound Properties' in this manual.
13. For more detailed information on RSI values refer to section on 'Thermal Properties' in this manual.

(1) CSA.A165-1-04

(2) D-1.6.1.5 Volume 2

National Building Code Canada 2005

(3) Section 2, D-1.6.1.3 Volume 2

National Building Code Canada 2005

(4) Subsection 1.4 Supplement No 2

National Building Code Canada 2005



Commentary on the Specification for Concrete Block

The basic physical properties of concrete masonry units are described by means of the CSA Standard A 165.1-04 – Table 1, system.

Each facet represents a specific physical property and is maintained in a left to right designation.

The first facet indicates the block to be Hollow (H), Semi-solid (SS), or Full Solid (SF).

The second facet indicates the minimum compressive strength based on an average of five units and calculated on the **net area**.

The third facet describes the density (oven dry) and water absorption capacity of the concrete.

The fourth facet represents the maximum moisture content at time of shipment, expressed as a percentage of total absorption the

climatic relative humidity and the linear shrinkage properties of the block.

Example: H/15/A/M – a hollow load bearing masonry unit with a minimum compressive strength of 15 MPa, (Net area) a density of over 2000 kg/m³. and a known moisture content at time of shipment.

Note: The design of the structural masonry is based on the net area compressive strength of the unit.

PHYSICAL PROPERTIES CONCRETE MASONRY UNITS

Excerpt from CSA A165.1-04

Facet	Symbol	Property		
First		Solid Content		
	H	Hollow		
	SS	Semi-solid		
	SF	Full-solid		
		Minimum Specified Compressive Strength Calculated on net Area, MPa		
		Calculation Based on 5 Units Tested	Individual Unit	
Second	10.0	10.0	The compressive strength of any individual unit shall not be less than 85% of the specified average strength	
	15.0	15.0		
	20.0	20.0		
	30.0	30.0		
Third		Oven Dry Mass Density of concrete kg/m ³	Maximum Water Absorption kg/m ³	
	A	Over 2000	175	
	B	1800-2000	200	
	C	1700-1800	225	
	D	Less than 1700	300	
	N	No limits	no limits	
		Maximum Moisture Content, Percent of Total Absorption – Average of 5 Units		
Fourth	M	Linear Shrinkage	Moisture	
			R.H. Over 75 Percent	R.H. Under 75 Percent
		Less than 0.03	45	40
		0.03 to 0.045	40	35
	Over 0.045	35	30	
	O	(no limits where drying shrinkage is not of importance)		

When a particular surface texture, finish, colour, uniformity of colour, or other special feature is desired, these features should be specified separately. This Standard sets out no requirements for fire resistance, thermal transmission, or acoustical properties. The authority should specify definite values for any such properties when required.



Commentary on the Specification for Concrete Block

SOLID CONTENT

The net cross sectional area, expressed as a percentage of the gross cross sectional area, determines the unit to be either Hollow, Semi-solid, or Full- solid.

A hollow load bearing unit has a net cross sectional area in any horizontal plane of less than 75 percent of its gross cross sectional area.

A semi-solid load bearing unit, is defined in CSA Standard A165.1-04, as having a net cross sectional area greater than 75 percent in any horizontal plane.

A full-solid load bearing unit, is defined in CSA Standard A165.1-04, as having a net cross sectional area of at least 100 percent in any horizontal plane.

COMPRESSIVE STRENGTH

The standard inventory unit has compressive strength of 15 MPa on the **net area**. Higher strengths are available as custom units.

AGGREGATES

The terms standard weight, semi lightweight and full lightweight are derived from the density of the aggregate used in manufacture.

Nationally, the aggregates used range from gravel, to expanded clay, shale, and pumice.

The selection of the aggregate or weight class of the unit is of consequence and should be given full consideration by the specifying authority. Each aggregate or weight class has particular features. The final selection can have a direct bearing on weight, absorption, texture, colour, sealing, sound transmission, fire rating, thermal value and in some instances, compressive strength.

In the CSA A165.1-04 identification system, the density of the standard weight concrete block (sand and gravel aggregate) is covered by the "A" category, over 2000 kg/m³. Semi lightweight concrete block (50% sand and 50% pumice) is covered by the "B" and "C" categories, between 1700-2000 kg/m³. Lightweight concrete block where the aggregate is expanded shale, or pumice such units fall into the "D" category, less than 1700m³.

COLOUR

The use of integrally coloured concrete masonry units is becoming increasingly popular.

Single tone refers to one colour within the unit and consequently the completed wall.

Twin Tone[®] is the combining of two complimentary colours blended throughout the unit. A smooth texture produces a discreet range to a base colour. The same blend/range is stronger and much more alive in the split units.

Where the designer has incorporated an integral colour and/or profile unit, the unit and/or colour, should be identified by name and manufacturer. Aggregate, compressive strength and moisture control requisites as above.

Concrete masonry is manufactured from natural sources: cement, sand and aggregates, which by their very nature have slight colour variance. When smooth coloured masonry is requested the colour variances may be more noticeable than on a textured block profile. When colour block is being designed with, we recommend a small sample panel to be approved prior to construction.

MORTAR, GROUT, FIRE RATINGS, THERMAL VALUES, SOUND TRANSMISSION
See respective section.