Seventh Canadian Masonry Symposium
McMaster University
Hamilton, Ontario
June 4-7, 1995

THE MASONRY CONSTRUCTION STANDARD - WHAT'S NEW?

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ABSTRACT

The 1994 edition of CSA Standard A371, *Masonry Construction for Buildings,* is the third edition of this document since its introduction in 1980.

The Technical Committee on Masonry Construction thoroughly reviewed the content of the Standard in close collaboration with the Committees on Masonry Design and Masonry Connectors (CSA Standards S304 and A370, respectively). Revisions were made where any provisions were felt to be unclear and to ensure compatibility of requirements with the other Standards. In addition, new provisions were incorporated to expand the scope, to improve the Standard and the quality of masonry construction in general.

New or revised provisions address the following:

- Temporary bracing
- Tolerances in construction
- Reinforcement
- Anchorage, tying and bonding
- Lateral support
- Thin masonry veneers
- Grouting

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- Pointing and repointing
- Support of masonry by wood
- Glass block masonry
- Environmental separation
- Air space in cavity walls
- Parapets and corbels

This paper discusses each of these changes in detail and explains how this edition of the Standard goes a long way to ensure satisfactory, long lasting masonry construction in Canada.

INTRODUCTION

The third edition of CSA Standard A371, *Masonry Construction for Buildings,* was published in 1994. It results from a major review of the contents of the previous edition of the Standard which was issued a full ten years earlier.

There were five main reasons why it was felt that the Standard needed to be reviewed. These are listed as follows:

- clarification
- revision
- expansion
- addition
- format

In the past instance, a small number of provisions had been shown to impart a degree of ambiguity, implying that clarification was required. Although the second point, revision, could be considered to apply to the entire process of updating the Standard, in this instance, I am referring to the re-wording of certain Clauses in order to bring them into line with current practice. Expansion was the inevitable result of increased knowledge applying to existing requirements. Beyond such expansion, there is much new material which has been added in the form of additional requirements or recommendations. Finally, the format of the Standard has been improved mainly through the application of helpful sub-headings within each section.

With the exception of this latter improvement, this paper will present a detailed account of the more important changes under each of the other four review categories.

CLARIFICATION

The Clauses that were rewritten in order to remove perceived ambiguity covered:

- Pointing and Repointing
- Anchorage to Structural Frame
- Parapet Walls
- Corbelling

Pointing and Repointing
A minor change was made to more clearly define the preparation of the joint prior to pointing or repointing.

Anchorage to Structural Frame
Regarding anchorage of masonry to the structure, a clarification has been made to ensure that any specified space between the masonry and rigid structural members be constructed free of rigid material to allow differential movement to occur without incurring internal stresses.

Parapet Walls
The Clause relating to parapet walls has been rewritten to clarify that the construction shall be of solid units or of hollow units that are filled solid. An Appendix G has been included which provides two diagrams reproduced from the CMHC document NHA 5450-1991, *Exterior Wall Construction in High-Rise Buildings.* These show examples of construction details for insulated and solid grouted parapets and their roof connections.

Corbelling
Minor rewording was made to the provisions covering corbelling to more clearly define the allowable amount of projection.

REVISION

The entire process of updating and rewriting a Standard is revision. However, for the purpose of categorizing the series of changes that were incorporated into the CSA A371-94, this group of changes refers to the rewording of certain Clauses in order to bring them into line with current practice or to make their content compatible with revised Clauses of other related Standards on masonry. The revisions affected the following items:

- Definitions
- Reference Publications
- Joint Reinforcement

- Lateral Support
- Tying or Bonding of Wythes
- Thin Masonry Veneers
- Grouting
- Support of Masonry by Wood
- Environmental Separation
- Chimneys and Fireplaces

Definitions
This lengthy section was pared down to include only those terms that appear in the text of the Standard. A few definitions were rewritten so as to agree with the CSA Special Publication A443, *Terms and Definitions for Use in CSA Masonry Standards.*

Reference Publications
This list was updated to refer to current documents.

Joint Reinforcement
Revisions were made to the provisions dealing with the positioning of joint reinforcement with respect to the centre of solid units in double wythe walls within a tolerance of ± 13 mm. In the previous edition, a continuous tie could be used when one rod was positioned between the middle of a solid unit and 16 mm from the outside face of the wall. In a further change, the upper limit of vertical spacing of continuous ties acting as joint reinforcement has been increased from 400 mm to 600 mm.

Lateral Support
Provisions have been included governing the spacing of anchors or clip angles where lateral support at the top of a wall is required.

Tying or Bonding of Wythes
Most of the revisions in this section reflect conformance with CSA A370-94, *Connectors for Masonry.* In general, any references to ties and anchors reflect this compatibility in terms of nomenclature, spacing and specified level of corrosion protection. Maximum spacings for ties as well as masonry bonding units have been revised to conform to masonry coursing and unit dimensions.

Thin Masonry Veneers
The allowable height above the foundation wall for thin masonry veneers secured by mortar adhesion has been reduced from 11 m to 3 m. For thin veneers secured by metal anchors, some minor changes have been made in consideration of current practice.

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Grouting
High lift grouting in reinforced hollow masonry previously suffered from the following strange restriction. Although individual lifts could be made up to 3 m, a total grout pour exceeding 3 m in height had to be carried out in lifts of not more than 1.5 m. Thus, a 3 m high wall could be grouted in one lift, but a 3.1 m wall required the grouting to be carried out in three lifts! A revision to increase the allowable single lift to 2 m in height eases this difficulty.

Support of Masonry by Wood
A major revision to the clause prohibiting the support of masonry by wood has been deemed acceptable by the technical committee. This revision now permits such support provided that the assemblage is designed in conformance with Part 4 of the National Building Code of Canada.

Environmental Separation
This Appendix C covering guidance for Wind, Water, Thermal and Vapour Protection has undergone a thorough review in relation to Part 5 of the National Building Code of Canada.

It was hoped that a separate CSA Standard dealing with Building Science issues concerning masonry buildings could be prepared. This important subject is beyond the scope of pure construction being, as it is, of a design nature. Yet it has no place in the Masonry Design Standards, S304 and S304.1, as these relate to structural considerations. However, the possibility of creating a separate Building Science Standard could not be realized for financial reasons, so that much of the content prepared by a dedicated interest group was placed in the Masonry Construction Standard as a revised Appendix C.

The changes to the Appendix of the previous edition cover an update of the reference Standards for materials, a rewritten section on wall flashings, additional recommendations concerning the installation of insulation and a revision to the measures to prevent condensation and the penetration of moisture. Much of the measures relate to construction practices to make the builder aware of the possibility of water travelling along inward sloping ties or ponding on tilted shelf angles.

While the Appendix is not a mandatory part of the Standard, the material it contains is in agreement with Part 5 of the National Building Code of Canada.

Finally, regarding revisions, a deletion was made. The Appendix covering Chimneys and Fireplaces has been taken out. A reference is made in the Standard to CAN/CSA A405 for the installation of these specialty masonry items.

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EXPANSION

There are two important sections which have received extensive expansion. These are:

- Tolerances
- Fabrication and Placing Reinforcement

For each of these subjects, significant improvements were incorporated making the provisions much more comprehensive.

Tolerances
This section has been greatly expanded and numerical limits have been tabulated covering levelness, verticality, cross-sectional dimensions and relative alignment. The tolerances given are intended to be compatible with those for other construction materials. A new Appendix F has been included which gives six comprehensive diagrams illustrating the allowable limits.

Fabrication and Placement of Reinforcement
Also greatly expanded, this section includes provisions relating to the construction aspects of reinforcing, ie. from the point of view of the mason contractor. The placing requirements are compatible with the provisions of the Masonry Design Standards, S304 and S304.1. The concerns that are addressed include spacing, bundling, tolerances and mortar or grout cover.

ADDITIONS

Certain additions have been made in the course of updating existing requirements. Most of these relate to material specifications such as elastomer wall flashings, PVC coated metal and others. An additional clause has been inserted concerning hot weather requirements.

There are three significant issues whose addition to the Standard make the document much more comprehensive. These are:

- Temporary Bracing
- Glass Block
- Minimum Air Space

Temporary Bracing
A new Appendix H has been included to give guidance on temporary wind bracing for masonry during construction. The appendix includes provisions to ensure that an adequate system of temporary bracing is implemented, that this system will be securely

attached to the masonry and be capable of transferring the anticipated loads to the ground. This Appendix is a very worthwhile addition to the Standard.

Glass Block
A new section dealing with the construction of glass block masonry has been inserted. This covers mortar types and joints, reinforcing, panel framing and anchoring, movement joints and general construction procedures.

Minimum Air Space
Last, but certainly not least, is a new requirement for the minimum air space in cavity walls and veneer walls. More time was spent by the technical committee over the intent and wording of this important feature than any other single issue in the review of the Standard. It is recognized that an adequate air space is vital in ensuring satisfactory weather resistance of masonry walls. The provisions require that the design width of the included air space in cavity and veneer walls, and the permissible variation in the constructed width of this space, shall be as specified by the designer. A minimum width of 25 mm is recommended where the air space is relied upon to provide resistance to the ingress of precipitation and not less than 40 mm where increased reliance is anticipated.

CONCLUSIONS

This paper has discussed the changes that have been incorporated into the CSA Standard A371-94, *Masonry Construction for Buildings*. The changes consist of several levels of improvement which provide clarification of certain ambiguous requirements, a general updating of entrenched construction procedures and material specifications, an expansion of existing provisions and several important new requirements and procedures. Highlighting the changes are expanded tolerance requirements, reinforcement provisions, temporary bracing procedures and minimum air space requirements for cavity and veneer walls.

The many changes discussed in the paper make the Standard a comprehensive and essential document for the masonry builder and will help to ensure satisfactory, long lasting masonry construction in Canada.