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1 Executive summary
The Canadian National Master Construction Specification (NMS) consists of more than 770 individual work result sections and is managed and maintained by the National Research Council of Canada (NRC). The NMS review and update process is carried out on a continual basis. Sections are reviewed and updated by industry specialists from all across Canada in both public and private sectors.

NMS has adopted a philosophy of environmental responsibility and promotes the concepts of sustainable construction practices. However, specifiers, consultants and other users must understand that NMS is neither intended as a design tool nor an educational tool. NMS users are assumed to be, for the most part, experienced specification writers, capable of making the appropriate design and product decisions required to meet specific project requirements. This User's Guide is intended to assist the specification writer in the use of NMS and how to make appropriate choices through the use of tools built into the NMS system.

This guide is intended to give the specification writer basic information about NMS and its use by:
- giving background information and describing NMS
- explaining the different methods of specifying
- describing the NMS organizational structure
- explaining the tools within NMS for the specification writer's use
- showing examples of recommended language and style
- explaining the relationship between Division 01 sections and the rest of NMS
- explaining how NMS can be edited by the specification writer to produce construction project specifications and project manuals

1.1 National Research Council of Canada (NRC)
The National Research Council of Canada (NRC) is the Government of Canada's premier organization for research and development. NRC partners with Canadian industry to take research impacts from the lab to the marketplace, where people can experience the benefits. This market-driven focus delivers innovation faster, enhances people’s lives, and addresses some of the world's most pressing problems. We are responsive, creative and uniquely placed to partner with Canadian industry and to invest in strategic R&D programming that will address critical issues for our future.

NRC provides administrative support for the development and maintenance of NMS. Direction is given to NRC by the NMS National Advisory Board, comprised of the principal federal department funding partners. NMS follows the recommendations of: Construction Specifications Canada’s (CSC) Manual of Practice for the document format, numbering, language and style; and CSC/Construction Specifications Institute (CSI) which jointly developed MasterFormat® for Section names and numbers and SectionFormat™/PageFormat™ for article names & order and page layout conventions. These documents can be found on the SpeX website.

For contact information on the above, and other contact information related to NMS, refer to NRC’s NMS page.

2 Notice to NMS users
Canadian National Master Construction Specification (NMS) is a resource and reference tool for specification writers. Over the last 35 years, it has developed into a comprehensive database. It is the culmination of contributions from many professionals and industry specialists who are well recognized in their fields.
2.1 Copyright notice

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Permission is granted to the National Master Specification (NMS) User to store electronically and/or to print any information residing in NMS for internal use only and for the purpose of preparing proposals and project specifications. No part of NMS may be reproduced, modified, or redistributed in any form or by any means, for any purpose other than those noted above (including sales), without the prior written permission of the National Research Council of Canada. No guaranty or warranty, expressed or implied, is made about the value or stability of the information or links made herein.

2.3 Disclaimer and limitations of use

National Master Specification (NMS) or Canadian National Master Construction Specification (NMS) is not a substitute for project manual or contract specifications.

The master guide specification sections of NMS require selection, editing and adapting to suit the requirements of individual construction projects. Responsibility for determining the suitability of use and the selection of choices rests with the NMS user. The NMS user is expected to expand or redact content as necessary to describe the full extent of the work result requirement for individual projects.

NMS is based on the requirements of the National Building Code of Canada (NBC) and does not necessarily include all possible regional or municipal variations concerning products, methods, materials, systems, assemblies or accessories, their availability, or their method of construction. NMS is not structured to list or describe every product, material, system, assembly or accessory required for an individual project and does not provide details for the entire execution of the required work. Execution statements should be restricted to text that describes what is required to achieve the quality of workmanship rather than describing how to construct, which could be misinterpreted as providing installation instructions.

NRC makes no representation or warranties with respect to the accuracy or completeness of the data, and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. NRC shall not be liable for any loss of profit or any incidental, consequential, or other damages.

3 Description and background

3.1 Canadian National Master Construction Specification (NMS)

The Canadian National Master Construction Specification (NMS) is a comprehensive library of construction specification sections used by government and private industry. Available in English and French, NMS is a resource tool designed for Canadian building conditions, containing more than 770 specification sections comprising about 8000 hard copy pages in each official language of Canada.

NMS is supported by all major construction industry associations, and is updated regularly by industry specialists to incorporate changes in:

- technology
- environmentally responsible choices for materials, products and systems
- installation requirements and methods
- current industry practices

NMS is a resource tool and reference document. It is considered to be a delete master that is based on providing bracketed alternative text, blank spaces, or both, that require selection and editing by the project specification writer.

Reference to materials and methods in NMS does not necessarily preclude the use of other materials or methods suitable for the purpose.

NMS is divided into Divisions and Sections in accordance with MasterFormat™, the master list of titles.
and numbers for the construction industry. It is jointly produced by Construction Specifications Canada (CSC) and Construction Specifications Institute (CSI).

Sections are formatted in accordance with CSC/CSI SectionFormat™/PageFormat™—the recommended format of Construction Specifications 2008 for three-part structure and recommended page layouts, indentations and text alignment.

NMS text is available in various electronic formats through authorized publishers. Each publisher enhances the ease of use of the NMS through a variety of software applications.

3.2 History of NMS

NMS history is intrinsically linked to the history of specification writing in North America. Development of the CSI Format in 1962–63 marked the beginning of a uniform system for filing construction information and organizing specifications. The CSI Format’s 16 Divisions were adopted in Canada and integrated with an overall filing system called the Building Construction Index (BCI), issued in February 1966. In 1972, the BCI was superseded by the Uniform Construction Index (UCI). From the UCI in 1978, a subject-specific document for specifications was developed entitled MasterFormat.

NMS began as the Government Master Construction Specification (GMS) for use by government and private sector for federal government projects. In 1974, the mandate was shared by five federal government departments: National Defence, Public Works, Indian and Northern Affairs, Industry, Trade and Commerce, and Transport Canada.

In 1976, GMS became the Canadian National Master Construction Specification (now known as NMS) when CSC provided private sector input and made it a truly national master construction specification for use by both the public and private sectors.

The NMS data was converted to Standard Generalized Mark-up Language (SGML), an electronic tagging process that permits data to be viewed and manipulated through user-preferred word processing programs. As a result, the NMS data is in a neutral format, which is independent of computer platforms (operating systems) and word processing software.

In 2015, NRC assumed administration and control of NMS from Public Services and Procurement Canada (formerly Public Works and Government Services Canada).

NMS has become one of the largest performance- and work results-based guide specifications of its kind in North America, and is the only master specification available in both French and English.

3.3 Administration of NMS

NRC is responsible for: managing and maintaining NMS; developing work plans for the maintenance and update of the NMS database; administering the NMS technical review process; and, maintaining the integrity, style and format of the NMS document.

With regard to specific documents, NRC coordinates the continued development, maintenance and update of:
- entire construction master specification sections
- historic structures and conservation specification sections for use by and for Parks Canada Canadian Heritage, and Environment and Climate Change Canada
- specialty sections for PWGSC, National Defence (DND) and the private sector
- reference library

**NMS Update Process**

NRC is responsible for ensuring that the document is current, concise, and practical. NMS is reviewed and updated on an ongoing basis.

**NMS National Advisory Board**

The NMS National Advisory Board is responsible for providing overall direction by establishing NMS goals and direction, as well as reviewing and approving NMS work plans.
NMS National Technical Committee
The NMS National Technical Committee is comprised of representatives from major stakeholders and professional associations.

NMS Technical Review Groups are comprised of specialists from a range of stakeholders, private sector professionals, trade, and manufacturer associations. They are responsible for the technical integrity, content, and relevancy of the sections that they review, and the relevancy to the discipline they represent.

3.4 Use of NMS
In the past, the NMS and its accompanying User Guide was written with the intent that the documents were used to obtain construction work for Federal Public Sector owners such as Public Services and Procurement Canada or the Department of National Defence. This did not recognize that the Canadian National Master Construction Specification has always had a wider audience with usage by other Provincial and Municipal Government owners, and has been successfully adapted for use by Private Sector Owners through modifications to the technical content and presentation style to suit the type of work being procured.

Use in Federal Public Sector:
It is the policy of the Real Property Branch (RPB) of Public Works and Government Services Canada (PWGSC)—renamed Public Services and Procurement Canada (PSPC) in late 2015—to use NMS for the preparation of specifications for new construction, renovation, restoration and repair of federal government architectural, landscape, marine, structural and heavy civil engineering facilities, whether designed in-house, by private consultants or as projects done through the department’s Alternate Forms of Delivery (AFD) service provider. For the RPB policy, please refer to Policy on the Use of the National Master Specification (NMS). Department of National Defence (DND) and Defence Construction Canada (DCC) have a similar policy to use NMS for their projects.

Use in Provincial or Municipal Public Sector:
Provincial and Municipal governments often mandate the use of the NMS for preparation of construction and demolition procurement documents. As with the Federal government, maintaining a performance based approach to preparing project specifications is deemed important to the formation of contracts when expenditures are made against the public purse – and where any perception of favouritism within the documents through naming or single sourcing without extensive research is discouraged. As with the Federal Public Sector approach to managing technical content, most Provincial or Municipal governments will expect project specific requirements to be incorporated where such information is missing or is incomplete within the content of the NMS.

Use in Private Sector:
The NMS has been used for decades as the basis for most private sector specifications. Content and layout of the NMS is used as a framework to build in-house specifications for many design professionals and commercial corporations. The NMS can be modified to include proprietary descriptions relying on user created listings of Acceptable Products or Basis of Design Products depending on whether there are multiple listings of potential materials or a single source material, as is common practice for repeat buildings or renovations that require a more predictable source of construction components.

Branding the NMS (Inclusion of Company Logos, Names and Addresses):
Branding the specification is not generally required for any specification, and can detract from the intent of preparing easy to read and interpret specifications. Identification of project numbers and names, and dates to indicate most recent version of the specification are typically all that is required to create a legally binding specification when it is listed as a part of the contract documentation.

When using the NMS within the Federal Public Sector, there are guidelines for maintaining presentation style, generic appearance and page layout (Refer to Use in Federal Public Sector above for additional information). This means that adding company logos, custom footers and other identifiers to brand or customize the specification output are not permitted within this project type. The language and responsibilities defined in the contract means that identification of any individual consultant or professional entity is not required.
Provincial and Municipal Government owners typically have their own style guides and may change the meanings of the nouns used to define participants under the contract, but essentially follow the same restrictions on identifying individual contributors to the project specification as the with the Federal Public Sector; however it is always advisable to confirm this requirement with those owners, since requirements for preparation of project specifications based on the NMS may differ from those of the Federal Public Sector.

Private Sector owners and users adapt the NMS to better reflect their project requirements, and will often include branding in the form of company logos, and company names and addresses to differentiate the modified content as being specific to their organization or firm. This differentiation can also include changes to the way the page is laid out, the arrangement of headers and footers, and can include for content that is more brand specific than required for Public Sector owners. Again, the language of most private sector contracts means that branding is not strictly necessary for application of the project specifications where project name and number, and date of issue are the only modifications necessary to make the document applicable to the contract.

It is the policy of the Real Property Branch (RPB) of Public Works and Government Services Canada (PWGSC)—renamed Public Services and Procurement Canada (PSPC) in late 2015—to use NMS for the preparation of specifications for new construction, renovation, restoration and repair of federal government architectural, landscape, marine, structural and heavy civil engineering facilities, whether designed in-house, by private consultants or as projects done through the department’s Alternate Forms of Delivery (AFD) service provider. For the RPB policy, please refer to Policy on the Use of the National Master Specification (NMS). Department of National Defence (DND) and Defence Construction Canada (DCC) have a similar policy to use NMS for their projects.

3.5 Referenced Standards

NMS uses reference standards to establish levels of quality for both materials and work practices. This is done through reference to documents issued by standards development organizations (SDO), construction industry professional associations, trade associations, and manufacturers’ associations. Most of the standards referenced are consensus standards. Although emphasis is placed on Canadian reference standards, there are many foreign standards referenced, particularly standards from the USA. There are an increasing number of ISO standards being referenced as Canadian, American and international standards are being harmonized. Referenced standards are specific to the work result, and may contain additional nested standards that NMS users should make themselves aware of to gain a thorough understanding of choices applicable to the project. Nested standards are not listed, because the primary reference standard is dependent on fulfilment of requirements referenced within the body of the standard.

**How this is used in NMS**

Reference standards are listed in PART 1 by number, date and title under the Referenced Standards article and repeated within the text of the section by reference to the number only.

In a project specification, only standards found in the text of the section after editing should be listed in the Referenced Standards article in PART 1 of the section.

3.6 Relating Drawings and Specifications

Drawings and specifications are complementary. Drawings show the form of construction; they illustrate extent, location in the project, and quantity. Specifications establish quality of materials and quality of work and installation. Specifications should supplement, but not repeat, information shown on drawings. Duplication of information can lead to differing interpretations. It is important that drawings and specifications use the same terminology and that the drawings do not include information that belongs in the specifications and vice versa. Basing drawing notes and tags on the generic descriptions used in the specifications greatly reduces the chances of creating disconnections and also has potential to reduce drawing note content through proper coordination of work result descriptions in the specification.

The general conditions of typical construction contracts normally indicate that, in a situation of conflict
between drawings and specifications, specifications take precedence. This should be confirmed when non-standard forms of construction contracts are used for the project. Refer to the CSC *Manual of Practice* for definitions of drawings and specifications.

### How this is used in NMS

NMS provides opportunities for cross-referencing project specifications with drawings by including, where appropriate, the words “...as indicated.” This means that the item is shown on the plans, supplemental drawings, or standard drawing sheets included in the project documentation.

Avoid general references to ‘see drawings’ or ‘refer to <discipline specific> drawing’. When such a reference adds clarity to the interpretation of the documents, drawing references should include a specific reference to the sheet number, and detail if that is appropriate. Generalized references can lead to confusion and differing interpretations when they are not fully coordinated and updated as a part of document preparation. The decision to include specific references to drawing numbers, titles and other identifiers with individual specifications is left to the discretion of the design professional. When used, it must be closely coordinated to avoid creating a disconnect within the documents. Coordination of information between drawings and specifications is supported in NMS through consistency of nomenclature and construction terminology. That consistency must extend to the drawing information.

NMS follows the recommendations for the CSC *Manual of Practice* for the terminology used.

### 3.7 Methods of Specifying

In NMS, there are two basic or fundamental methods used in specifying work results; **prescriptive** specifications and **performance** specifications, using CSC/CSI *MasterFormat™* or *UniFormat™*.

- **Prescriptive specifications**: require more knowledge driven content and contributors; that can represent higher risk to the design professional and tend to limit the contractor’s innovative solutions, but provides the owner with a known set of requirements to establish a more accurate bid price by reducing the contractors risk.

- **Performance specifications**: require more the contractor to contribute their experience to interpreting the project deliverables; that can represent higher risk to the contractor where the consultant provides an insufficient range of expected performance, but provides the owner with a more innovative construction solution.

- In either case, use of prescriptive and performance based specification requirements within the NMS is designed to allow the user a more efficient approach to project documentation that allocates risk to the party best suited to manage those risks in an open and transparent communication strategy.

*MasterFormat™* presents information based components of the building and provides descriptions of work results and construction practices that convey design intent and quality requirements. Work results based specifications can use either prescriptive or performance driven information, or a combination of both to describe building components.

*UniFormat™* presents information in an elemental approach to specifications and provides descriptions of the work based on whole systems and assemblies characterized by their function rather than required work results. As with the approach to work results driven specification production, elemental specifications can use prescriptive or performance driven information to the building elements. The elemental approach can be used to convey early project information to contractors in a format similar to that used to list assembly types on the drawings. Elemental specifications can also flag or identify specific components for later incorporation into a work results based specification used for bidding.

**Prescriptive Specifications:**

**Descriptive specifications**

Descriptive specifications define exact materials or systems and the detailed fabrication and installation processes to be executed, without stating individual trade or manufacturer’s names required to achieve the desired work result.
A descriptive specification is best suited for describing properties of complicated components or systems that cannot adequately be shown on drawings, notably for mechanical and electrical equipment. Do not use manufacturers’ specifications without modifications. Deleting the manufacturers’ name and product descriptions makes for a proprietary specification that cannot be achieved except by the single manufacturer whose specification was used, and can create disconnects and potential claims to the project where differences between the specification and the actual installed product occur.

**Consensus standards**
A consensus standard is a written accord or agreement on certain materials, testing procedures, or processes that conform to criteria developed and accepted by a recognized public or private authority or agency. When referenced, the standard in its entirety becomes a part of the specification. NMS supports the use of consensus standards, and they are included as references where appropriate.

**Proprietary specifications**
Proprietary specifications identify products by the manufacturer’s trade name and model number. Every effort should be used to expand product selections in proprietary specifications to include multiple listings of products that meet the performance requirements described by products used to establish details. When proprietary products are listed, they must reflect the key performance requirements required for the project.

When listing proprietary solutions, it is advisable to include additional solutions provided by procurement participants and allow for the submission of substitutions within the bid period, or in some instances within the construction period. When multiple proprietary solutions exist, list the manufacturer, trade name and model numbers as ‘Acceptable Products’. When only one product is available, list the manufacturer, trade name and model number as ‘Basis of Design Product’.

Listings of products should not be representative of a shopping list approach to creating specifications – proprietary specifications should not be seen as a ‘shortcut’ to creating project specifications. A manufacturers’ specification should never be used in an unaltered form to establish a proprietary specification. Manufacturers’ specifications are specific to a single product solution and often contain content that limits inclusion or conflicts with competitive products that could potentially form a part of the project solution. Proprietary specifications control product selection and are deemed desirable only in those instances where there is no practical way to specify a unique product by performance or consensus standard. Where proprietary specifications are necessary, it is appropriate to use a minimum of three brand or trade names of comparable quality or utility. An acceptable substitutions clause requires the appropriate Division 01 documentation to describe the process for submission, review and acceptance of contractor proposed substitutes.

It is critical to the project deliverables and to maintain a competitive bid when creating a proprietary specification, that the performance requirements describing materials can be met by the listed acceptable or basis-of-design products. The listed products must be representative of the performance requirements for the project. Additionally, naming products in the specification provides certainty to those that are required to bid and provide products to the project, but represent an increase in risk to the owner and specifier where the products are not well researched or where there is a simple ‘shopping list’ of products that contain no performance requirements.

The specifier must be open to reviewing substitutions when using a proprietary approach to specification production. Reviewing substitutions protects the owner’s program, protects the specifying authority’s responsibility to the project, and protects the contractor.

- The owner’s program is established from a set of design requirements that are represented by the products listed in the specification, and substitute must be compared to and meet the design requirements before acceptance can be provided.
- The specifying authority; the design professional, accepts responsibility for named products and essentially warrants that they meet the design requirements established by the owner’s program. Changes to the products without appropriate review can decrease the serviceability or durability of the building.
• The contractor is protected through a formal substitution process, since responsibility for confirming that products comply with design requirements rests with the design professional, making substitutions to the project without the specifier authority’s knowledge will mean an increase in risk associated with the substitution back to the contractor.

**Performance Specifications:**

Performance specifications describe work results, products and workmanship by listing required performance results including criteria that describe measures for verifying compliance without stating the actual procedure or methodology for achieving the required results.

• The owner’s program requirements are captured in the performance based descriptions within the specifications, and will require submissions from the contractor to confirm that design requirements have been achieved.

• The specifying authority is responsible to confirm that the range of performance properties listed in the NMS is appropriate and complete, and should be willing to modify or add content where necessary to customize content to meet individual project requirements.

• The contractor can be subjected to elevated risk when the design professional provides an incomplete or minimally researched product solution, but is able to make more innovative solutions to reduce that risk through appropriate submissions confirming conformance with the specifications during the construction period.

Refer to the CSC, *Manual of Practice* for further discussion on prescriptive and performance specifications, work results and elemental classification, as well as other methods of specifying construction.

### 3.8 Specification organization

Work Results specifications in NMS are based on the organizational structure of CSC/CSI *MasterFormat™*—including contract forms found in Division 00 of the Project Manual. For the latest version of CSC/CSI *MasterFormat™*, visit the SpeX website.

Elemental Specifications in NMS are numbered and titled alphanumerically as recommended by CSC/CSI UniFormat. UniFormat is a method of arranging construction information based on functional elements, or parts of a facility characterized by their functions, without regard to the materials and methods used to accomplish them. These elements are often referred to as systems or assemblies. UniFormat breaks a facility into systems and assemblies that perform a predominating function, such as substructure, shell, interiors, and services, without defining the technical solutions to provide these functions.

#### How UniFormat is used in NMS

The organizing structure of NMS offers considerable flexibility through its expandable and contractible number of sections, within a rigid framework of the 50 Divisions of the CSC/CSI *MasterFormat™*.

Each Division is composed of multiple sections expanding each subject category or group.

The numbering system for each section can be 6 or 8 digits depending on the depth or scope of information or the recommendations of *MasterFormat™*.

In most cases, it is not expected that many 8-digit numbers will appear in a project section since you would seldom have a “broadscope” section and a “narrowscope” section in the same project. If a “narrowscope” section is used in a project, the chance of a broader section being used in the same project is really unlikely, so we would expect that the last two digits of the section number would be dropped. There will be some cases when a mixture of 6 and 8 digit numbers will occur in the same Project Manual.

*UniFormat™* listings start with a letter for level 1 categories followed by numbering system.

The section itself is then subdivided into a simple and logical sequence of information arranged to follow the
recommendations of CSC/CSI *SectionFormat™*. This means that each section is divided into three basic parts.

As a further measure of organizational consistency, NMS also follows the recommendations of CSC/CSI *PageFormat™* for how each page in the Project Manual is laid out and for how the articles and paragraphs are numbered.

The organizational structure of NMS enables consistent organization of information and enhances cross-referencing which is critical to fully describe certain work results.

For more detailed descriptions of CSC/CSI’s standard construction document formatting documents, refer to the CSC *Manual of Practice*.

## 4 Application and use

### 4.1 Introduction

For language and style, NMS follows the recommendations of the CSC *Manual of Practice*.

Effective communication through construction specifications is achieved by following five fundamental and long-standing principles:

- **Be clear**: Organize sentence structure and use correct grammar, without ambiguity
- **Be concise**: Use language that eliminates unnecessary words without compromising clarity or correctness
- **Be complete**: Present exact and detailed ideas and explanations
- **Be correct**: Use words that accurately establish exact meaning
- **Be consistent**: Maintain consistent spelling, language and format throughout the document

The NMS style and format have been developed to assist the specification writer in fulfilling these basic principles of effective specification writing.

### 4.2 Notes to specification writer

SPEC NOTES are located throughout NMS text and are addressed to the specification writer to assist in the development of the project specification by providing additional information and guidance. With the exception of SPEC NOTES that occur before Part 1—General, SPEC NOTES always occur directly in front of the article, paragraph or sub-paragraph to which they are referring.

**SPEC NOTE: DESCRIPTION** (about general information on the description of a section) is located at the top of the first page before Part 1 of the section and serves to introduce the section and provide a brief overview of the content and recommended usage. It is intended not only to let the user know what is in...
the section, but also to advise on items that are not in the section but that the section title may lead you to believe would be included. It is intended that this SPEC NOTE DESCRIPTION should only be used when the title of the section does not clearly represent the section’s content. The following example shows:

Example 4.2.1 (from NMS Section 08 14 16 – FLUSH WOOD DOORS):

SPEC NOTE DESCRIPTION: This Section specifies hollow and solid wood and plastic veneer wood doors and is based on CAN/CSA-O132.2 Series for Wood Flush Doors and AWMAC standard for Stile and Rail Doors. Pre-hung doors are available but are not specified in this section.

SPEC NOTE: SUPPORT acknowledges construction industry organizations that have assisted in the review or development of the NMS Section. These acknowledgements are located at the top of the first page of written text, directly below the SPEC NOTE: DESCRIPTION describing the content, if it were needed.

Example 4.2.2 (from NMS Section 08 14 16 – FLUSH WOOD DOORS):

SPEC NOTE SUPPORT: This Section has been reviewed and updated with the assistance of Door and Hardware Institute.

SPEC NOTES advising on other section information, or that may assist the specification writer in completing a section in general terms as shown in the example below, are located before Part 1 of the section. SPEC NOTES within the text offer information on the subject and guidance to the specification writer on the choices to be made or on the use of the information.

Example 4.2.3 (from NMS Section 26 27 26 – WIRING DEVICES):

SPEC NOTE SUSTAINABILITY: This Section specifies environmentally responsible material choices, utilizing the three Rs (reduce, reuse and recycle) whenever possible, and providing generally available disposal options. For construction and demolition waste management practices in Federal Government projects refer to PWGSC’s Sustainable Development Strategy (SDS - 2007-2009), where these requirements have been specifically targeted.

SPEC NOTE: This Section includes general requirements and procedures for compliance with the Canada Green Building Council’s (CaGBC) LEED Program. Coordinate with Section 01 35 21—LEED Requirements.

Refer to the Canada Green Building Council (CaGBC) for more information on LEED. Visit the CaGBC website for further information.

Example 4.2.4 (from NMS Section 26 27 26 – WIRING DEVICES):

SPEC NOTE: This Section is based on the assumption that wiring devices will be indicated including legend covering CSA identification numbers for receptacles (i.e., CSA type L5-15R corresponds to a locking type 125 V, 15 A, 2 pole, 3 wire grounding receptacle). Switches are to be indicated and identified by legend (i.e., 15 A, single pole, 125 V). This specification is set up to include 15 A, 120 V, single and duplex receptacles, and 120 V switches.

SPEC NOTE: Manually operated general purpose AC switches are based on CSA C22.2 No.111. Snap switches are based on CSA C22.2 No.55. Receptacles, plugs and similar wiring devices are based on CSA C22.2 No. 42.

In some cases, the general SPEC NOTE may deal with items that are general in nature, but in other instances they may focus on more narrow aspects of the construction such as environmental responsibility, sustainability or even criteria for LEED™ criteria submittals.

4.3 Options

Options are located throughout NMS text and are addressed to the specification writer to assist in the
development of the project specification by indicating the need for action. These options are typically presented as square brackets if NMS is obtained in a word processor compatible file format. Some software applications present a drop-down type list to the user. Whenever the specification writers see the square brackets it means that they have to make a decision.

**How this is used in NMS**

Square brackets enclose alternative words, phrases, numerical values or blank spaces. They are intended as direction for the specification writer and should be deleted through the editing process, leaving only those options that are required for the completion of the project.

Generally, every option within a set of square brackets should be followed with a set of square brackets enclosing blank spaces for the specification writer to fill in further information.

Where square brackets indicate several alternatives, they are generally limited to four choices or left blank. The order in which choices are listed should not be assumed to be an order of preference.

Square brackets with a blank space are immediately preceded or followed by words or symbols that clarify the intent of the blank space, such as units of measurement. The specification writer is required to fill the blank.

**Example 4.3.1 (from NMS Section 09 66 23 – Resinous Matrix Terrazzo Flooring):**

1.7  MOCK-UPS

- Construct mock-ups in accordance with Section [01 45 00 – Quality Control].
- Construct mock-up [10] m² of [each type of] plastic matrix terrazzo including [one inside corner,] [one outside corner,] [change of material,] [door threshold,] [stair tread] [and] [riser].

4.4  Rules of language

4.4.1  Use Imperative mood

Write new sections in the imperative mood of the English language, addressing the Contractor. While the National Building Code indicates requirements as shall be, these types of phrases are not acceptable in any NMS Sections. NMS avoids indicative mood statements.

**Examples:**

✓ Spread adhesive with notched trowel.
X Adhesive shall be spread with notched trowel.
✓ Install equipment plumb and level.
X Equipment shall be installed plum and level.
✓ Apply two coats of paint to exposed surface.
X Two coats of paint shall be applied to each exposed surface.

Refer to the CSC *Manual of Practice* for further information on specification language.

4.4.2  Do not use negative statements

**Example:**

✓ Install wall mounted equipment on wall surfaces free of built-in furniture or other equipment.
X Do not install wall mounted equipment at locations where built-in furniture or other equipment is to be installed.
4.4.3 Streamlining
Use streamlined language as demonstrated in existing NMS Sections. The streamlining effect should not lose the intent or force of the statement. When listing products, materials and reference standards, use:
- a colon (:) instead of “to be”
- “in accordance with” when the action is implied
- “to” when referencing

Examples:
- Softwood lumber: to CSA-O141 and National Lumber Grades Authority
- Separate and recycle waste materials in accordance with Section [01355 – Waste Management and Disposal].
- Stone Tile [Type D]: slate, to ASTM C629, as follows:
- Underlay: in accordance with Section [06 10 10 – Rough Carpentry].

4.4.4 Punctuation
NMS uses correct punctuation and follows each comma, semi-colon and colon with one space. Punctuation ending a sentence is also followed by one space except at the end of a paragraph. Colons at the end of a paragraph that precede a list of requirements should use a keep-with-next formatting option within the word processing software to prevent orphans (technical listings splitting pages).

NMS strives to construct sentences so that misplacing or eliminating a punctuation mark will NOT change the intended meaning. The serial (penultimate) comma is often used to ensure clear and unmistakable separation of statements.

Example:
…flexible, black and continuous [the serial (penultimate) comma]

Lists should always be predicated by the use of a colon, which makes isolation and creation of document flow much easier to achieve.

4.4.5 Vocabulary
Words are the essence of NMS. They are selected and used in context with their precise meanings. NMS attempts to use each word with only one meaning. The same word is used whenever that particular meaning is intended.

NMS avoids the use of the following words and phrases:
shall should wherein
all must etc.
any the herein
and/or to be hereinbefore
as per to the satisfaction of hereinafter
workmanship owner architect
in workmanlike manner in lieu of in situ

4.4.6 Generic specification
NMS promotes the use of GENERIC names in referencing construction materials, and follows the recommendations of the CSC Manual of Practice.

Examples of commonly misused trade names:
- Drywall—a slang term, the preferred generic term is “gypsum board”
- Firecode C or Type X—both are trade names; the preferred generic term is “fire-rated gypsum board”
- Styrofoam—the preferred generic term is “rigid extruded foam insulation”

### 4.4.7 Spelling

NMS spelling is consistent and is based on the *Concise Oxford Dictionary of Current English* which is considered common use in Canada. NMS avoids the use of “Americanisms” such as “thru” instead of “through” and “lite” instead of “light”.

Common spelling inconsistencies include:

<table>
<thead>
<tr>
<th>Error</th>
<th>Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>advice</td>
<td>is used in Canada as a noun</td>
</tr>
<tr>
<td>advise</td>
<td>is used in Canada as a verb</td>
</tr>
<tr>
<td>centre</td>
<td>is a noun</td>
</tr>
<tr>
<td>center</td>
<td>is a verb</td>
</tr>
<tr>
<td>metre</td>
<td>is a unit of measurement</td>
</tr>
<tr>
<td>meter</td>
<td>is a gauge or measuring device</td>
</tr>
<tr>
<td>practice</td>
<td>is used in Canada as a noun</td>
</tr>
<tr>
<td>practise</td>
<td>is used in Canada as a verb</td>
</tr>
<tr>
<td>caulk</td>
<td>instead of calk</td>
</tr>
<tr>
<td>catalogue</td>
<td>instead of catalog</td>
</tr>
<tr>
<td>colour</td>
<td>instead of color</td>
</tr>
<tr>
<td>defence</td>
<td>instead of defense</td>
</tr>
<tr>
<td>fascia</td>
<td>instead of facia</td>
</tr>
<tr>
<td>labour</td>
<td>instead of labor</td>
</tr>
<tr>
<td>gauge</td>
<td>instead of gage</td>
</tr>
<tr>
<td>moulding</td>
<td>instead of molding</td>
</tr>
<tr>
<td>moulding</td>
<td>instead of molding</td>
</tr>
<tr>
<td>night</td>
<td>instead of nite</td>
</tr>
<tr>
<td>storey</td>
<td>instead of story</td>
</tr>
<tr>
<td>through</td>
<td>instead of thru</td>
</tr>
</tbody>
</table>

### 4.5 Abbreviations, acronyms and symbols

NMS makes extensive use of acronyms (words formed from the first, or first few, letters of a series of words). Industry-accepted acronyms often increase understanding and speed up comprehension. However, NMS always writes the full explanation of each acronym used the first time it is referenced in each section.

Abbreviations and acronyms are avoided where doubt exists. Comprehension is only realized if the abbreviation or acronym is readily recognizable. Abbreviations such as those used for dimensions and standard references appear on one line, not separated onto two lines. This is done by the use of a “hard” space when information is originally incorporated into an NMS section.

The full description of an acronym should be provided in its first occurrence in a document. Following are a few acronyms used by NMS:

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
</tbody>
</table>
Like abbreviations and acronyms, symbols are avoided unless they are readily recognized. The use of symbols is limited by the availability of symbols in word processing software and computer-aided drafting programs.

(See CSC Manual of Practice Chapter 13 - Specification Language - "Symbols and Expressions")

### How this is used in NMS

Abbreviations in text are stated in lower case letters, except when the abbreviation represents a proper noun or nouns.

Abbreviations in the title of a section are stated in upper case letters.

Abbreviations do not use periods.

NMS avoids the use of parentheses and quotation marks.

NMS has access to the full ASCII Character Set (See Appendix A).

Like abbreviations and acronyms, symbols are avoided unless they are readily recognized.

Dimensions and standard references appear on one line, not separated onto two lines. This is done by the use of a “hard” space when information is originally incorporated into an NMS section.

### 4.6 Capital letters

NMS follows the recommendations for capitalization of the CSC Manual of Practice. NMS uses capital letters in a consistent manner, in addition to specific capitalization of certain words, to provide clarity to the intent of the document.

Capitalization should be consistent within documents and match the capitalization used in the General and Supplementary Conditions. In contract documents, the following words might be capitalized:

- Agreement
- Architect
- Consultant
- Contract
- Contracting Officer
- Contractor
- Division
- Engineer
- General Conditions
- Government
- Owner
- Part
- Place of Work
- Project
- Province
- Room names such as Library, Laboratory
- Section
- Shop Drawings, Project Data, Samples
- Sub-consultant
- Work

### How this is used in NMS

Initial capitals are used to refer to specific nouns and proper names. Capital letters are used for section titles in section headers and for article titles in the sections themselves as recommended by CSC PageFormat™.

Capitals are used as the first letter of certain words defined in the General Conditions of the CCDC and federal government contracts. These same words used in the general sense need not be capitalized.
4.7 Metric in NMS

All measurement-sensitive descriptions—volume, weight, height, length, pressure—are based on the International System of Units (SI), generally referred to as metric units. NMS does not use centimetres as a unit of measurement.

Similar to the Building Codes, not all metric measurements stated in NMS are exact conversions. For example, while the dimensions given for a wood-framing member are the exact dimensions of the milled product (i.e., what is commonly referred to as a “2x4” is actually 1.5 in x 3.5 in, which is 38 x 89 mm), the metric dimensions given for spacing between framing elements are actually soft conversions, so 24 in on-center is soft converted to 600 mm rather than the exact conversion to 610 mm.

4.8 Reference standards

NMS contains references to standards such as the Bureau de normalisation du Québec (BNQ), Canadian General Standards Board (CGSB), Canadian Standards Association (CSA International), American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), Underwriters’ Laboratories of Canada (ULC) and others. These consensus standards are written accord or agreements on certain materials, testing procedures, or processes that conform to criteria developed and accepted by a recognized public or private authority or agency. The term "consensus standard" means that those documents or publications were developed by these agencies, often with public input. They are referred to in a uniform manner. References to these standards are indicated within the text of a section.

How this is used in NMS

Reference Standards in NMS text are identified by the initials or acronym of the standards writing organization that has published the particular standard.

Standards referenced in the text of a section must be listed under the “Reference Standards” article and further identified with the applicable heading for the standards writing organization. The specification writer needs to confirm content of the technical specification and delete any Reference Standards that are not contained within the text of the Section.

The specification writer can also add Reference Standards when new references provide clearer direction to a performance requirement specific to the individual project.

NMS identifies by acronym the standards agency, number, title and date, with the date enclosed in square brackets. The date and title are included only in the “Reference Standards” article; they are not included when referencing a standard in the section’s text. For instance, Reference Standards includes the full description ASTM C448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction, and the subsequent reference in the body of the Section will only reference ASTM C448.

As standards are continually being reviewed and updated, the specification writer must check NMS text to establish if the updated standard applies. If the standard still applies, the specification writer must change the publication date. The specification writer must also refer to the text of the revised standard to determine the effect of the information in the standard on the technical text in the section.

Where the standard has changed significantly, the specification writer must modify NMS text as required to suit revised standards as well as the specific Project Manual being developed.

Applicable standards writing organization headings are listed in NMS alphabetically.
Example 4.8.1 (from NMS Section 08 36 19.02 – Multi-Leaf Vertical Lift Metal Doors):

1.2 REFERENCE STANDARDS

SPEC NOTE: Edit the following paragraphs for this specific project.

.1 Aluminum Association (AA)
   .1 AA DAF 45-[03(R2009)], Designation System for Aluminum Finishes.

.2 ASTM International (ASTM)

   .2 ASTM A1008/A1008M-[11], Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

   .3 ASTM D523-[08], Standard Test Method for Specular Gloss.


.3 Canada Green Building Council (CaGBC)
   .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum [2007]).


.4 CSA Group (CSA)
   .1 CAN/CSA-Z809-[08], Sustainable Forest Management.

.5 Forest Stewardship Council (FSC)
   .1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.

Standards are identified here and are referenced in other articles of the section by their acronym and alpha/numeric designation only. The name of the standards organization is listed in its full iteration followed by its commonly used abbreviation in brackets and a colon. There is no need to add a period to the end of each of the subparagraphs since the colon is indicative of a list, with the associated standards not being a proper sentence.

This continues further into Section 08 36 19.02 – Multi-Leaf Vertical Lift Metal Doors, showing how standards are referenced within the body of a section as either initials or acronyms:

2.02 MATERIALS

SPEC NOTE: Z275 designation specified in the following paragraph is standard sheet metal used.

.2 Steel sheet: commercial quality to ASTM A 1008, [unexposed (U)], [exposed (E)], with [______] finish.

.3 Aluminum sheet: mill finish [plain] [embossed [______] pattern] utility sheet.

.4 Anodized aluminum sheet: [plain] [embossed [______] pattern] anodizing quality aluminum sheet.

.5 Aluminum extrusions: Aluminum Association alloy AA 6063-T5.

.6 Primer: to [MPI #80] [MPI #18].
   .1 VOC limit [250] g/L maximum to [GS-11] [SCAQMD Rule 1113].

4.9 Division 01 – Section referencing

The content of Division 01 sections interrelate directly with the content of all other documents and specification sections. Division 01 sections are unique in their multilateral relationship to all the other documents.

How this is used in NMS

Section references to Division 01 [General Requirements] will include, in square brackets, both the Section number and the full Section title.

Division 01 listings should not form a part of the RELATED REQUIREMENTS, because Division 01 applies equally to all Technical Specification sections. Although by this premise; it should not be necessary to include the Division 01 number and title within the body of the Technical Specifications; however common practice and courtesy to the end user (the person reading the document), makes including this content within the body of the Technical Specifications appropriate to complete the communication necessary to describe the complete Work Result.

Example 4.9.1 (from typical NMS Sections):

1.4 SUBMITTALS
   .1 Submit in accordance with Section [01 33 00 - Submittal Procedures].
   
   SPEC NOTE: Include requests for relevant data to be furnished by the Contractor, before, during or after construction.

   .2 Product Data:
      .1 Submit manufacturer's instructions, printed product literature and data sheets for [doors, hardware, and accessories] and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 CLOSEOUT SUBMITTALS
   .1 Submit in accordance with Section [01 78 00 - Closeout Submittals].

   .2 Operation and Maintenance Data: submit operation and maintenance data for [overhead door hardware] for incorporation into manual.

1.6 QUALITY ASSURANCE
   .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 WASTE MANAGEMENT
   .1 Deliver, store and handle materials in accordance with Section [01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions].
.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
   .1 Store materials [off ground] [indoors] [in dry location] and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
   .2 Store and protect [multi-leaf vertical lift metal doors, hardware and accessories] from [nicks, scratches, and blemishes].
   .3 Replace defective or damaged materials with new.

**SPEC NOTE:** Coordinate the following paragraph with Section 01 35 21 – LEED Requirements.

.4 Develop [Construction Waste Management Plan] [Waste Reduction Workplan] related to Work of this Section and in accordance with Section [01 35 21 - LEED Requirements].

.5 Packaging Waste Management: remove for reuse [and return] [by manufacturer] of [pallets,] [crates,] [padding,] [and] [packaging materials] as specified in [Construction Waste Management Plan] [Waste Reduction Workplan] in accordance with Section [01 74 21 - Construction/Demolition Waste Management and Disposal] [and] [Section 01 35 21 - LEED Requirements].

### 4.10 Related requirements

Formerly called “RELATED SECTIONS” in the 2008 version of SectionFormat™, this Article title is used to briefly list other documents or sections in the Project manual that are related to, and/or dependent on, the work results or information specified elsewhere.

For ease of use and comprehension, NMS follows SectionFormat™ / PageFormat™ to consistently locate similar information in the same place in each section. These contain products or activities that have a direct effect on the Work of the section. These listings help the specification writer to find the proper location of subjects and items that might require coordination and cross-reference.

#### How this is used in NMS

The RELATED REQUIREMENTS article should be used to list other documents or sections dealing with work that is directly related to the section being developed for a specific project. The list should be limited to documents or sections with specific information that the reader might expect to find in this section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance section, a cross-reference would be appropriate in the finish hardware section. Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple sections and which must meet certain performance requirements as an assembly or system.

Do not include Division 01 sections in the RELATED REQUIREMENTS article. Division 01 sections are listed directly in the technical content with their full number and title description as a part of the technical content they related to within the section.

NMS does not currently list documents or related sections in the RELATED REQUIREMENTS article but leaves it blank for the specification writer to fill in, the intent of the NMS for future updates is to have the original guide specification author complete the listings of RELATED REQUIREMENTS forming a directly related component or closely associated component that form a part of the technical content of the specification so that a full work result is described.

Identify other sections within the Project Manual that affect or are affected by the work of the section. Do not use this paragraph to delineate trade responsibility. The intent is to provide the specification editor to make educated connections to those components of the work results and describe an accurate relationship that has potential to
reduce gaps within the documentation that have potential to create additional administration, and aiding in the reduction of costly changes resulting from poorly coordinated documentation during the construction phase of the project.

4.11 Standard paragraphs

Standard paragraphs are used in NMS when quality of work and installation are specified in another Section, but are essential for execution of work under the Section being developed. NMS provides for cross-referencing to the respective Section. Standard paragraphs may be similarly referenced for extended warranties. They are also used to provide consistency throughout NMS.

How this is used in NMS

Quality of work and installation may be specified elsewhere, but are essential for work in another section. Warranties may be similarly referenced.

5 The contract

5.1 Introduction

As a contract document, the specification refers to other documents, which affect the legal and administrative aspects of the project. The contract documents normally consist of the Agreement, Definitions, General Conditions of the Contract, Supplementary Conditions, Division 01—General Requirements, technical specifications, drawings and schedules.

NOTE: The complete Project Manual may include bidding or tendering requirements but exclude the drawings.

NMS makes provision for the referencing of other documents such as geotechnical or hazardous materials reports—existing documents that do not form a part of the Contract Documents.

5.2 Warranties and guaranties

A warranty is defined as a two-party Agreement which provides an undertaking by a seller of goods and services (Warrantor), to a purchaser (Warrantee), that a Warrantor will assume stipulated responsibilities for correction of Defects in the Goods and services within a stated period of time.

A guaranty is defined as to undertake collaterally to answer for the payment of another’s debt or the performance of another’s duty, liability, or obligation; to assume the obligation of a Guarantor; to warrant.

How this is used in NMS

NMS generally assumes that the warranty period with regard to the Contract is one year from the date of Substantial Performance of the Work or those periods specified in the Contract Documents for certain portions of the Work or Products.

NMS avoids naming specific defects as it is inconsistent with CCDC and the federal government’s General Conditions contract documents which require the contractor to rectify and make good “any defect or fault.”

NMS provides, in a limited number of sections, text for extending the defined warranties. Extended warranties should only be used where experience has shown that serious defects are likely to appear after expiry of the standard one-year warranty period.
Trade practice should be considered when requesting extended warranties. Extended warranties are generally limited to items affecting the building envelope such as roofing, air barriers and glazing systems.

Example 5.2.1 (from NMS Section 07 52 00 – Modified Bituminous Membrane Roofing):

1.13 WARRANTY

.1 For Work of this Section [07 52 00 – Modified Bituminous Membrane Roofing], 12-month warranty period is extended to [5 years (or some other period of time not forming a part of the standard 1-year construction warranty)].

5.3 Division 01 - General Requirements

Part 2 - Products
Not Used

Part 3 - Execution
Not Used

Division 01 takes precedence over any contradictory statements made within any of the technical specification sections. This tenet is supported in all CCDC contracts, which specifically indicate that if there is a conflict within Contract Documents:

.1 order of priority of documents, from highest to lowest, shall be:
   i. Agreement between the Owner and the Contractor
   ii. Definitions
   iii. Supplementary Conditions
   iv. General Conditions
   v. Division 01 of the specifications
   vi. Division 02 through 49 of the specifications
   vii. Material and finishing schedules, drawings

.2 drawings of larger scale will govern over those of smaller scale of the same date.

.3 dimensions shown on drawings will govern over dimensions scaled from drawings.

.4 later dated documents will govern over earlier documents of the same type."

NOTE: The order of preference in the federal government's General Conditions does not include Division 01 specification sections over the other technical sections, but this is covered by a statement in some NMS Division 01 sections.

5.4 Regulatory requirements

Construction law legislation is the responsibility of the provinces. The provinces, in turn, delegate a rigidly controlled portion to the municipalities. The National Building Code (NBC) and the National Fire Code (NFC) are applicable to most construction in Canada. British Columbia, Alberta and Ontario adopt the National Building Code with specific modifications associated with the local Authorities Having Jurisdiction. Additionally, there are several municipal districts deemed as having their own Authorities Having Jurisdiction such as the City of Vancouver, which enacted the Vancouver Building By-Law and contains additional content to the BC Building Code, or many universities and colleges that use the National Building Code.

How this is used in NMS

NMS is based on the NBC and other NRC-related documents.

Although some provincial enactments expressly require use of the NBC, the Canadian Electrical Code and other Codes, adoption of the NBC by provincial and territorial governments is not universal. Some provinces and territories adapt the National Codes for their specific needs. The specification writer must refer to provincial and
municipal regulations to assure compliance with governing legislation.

“Senior” legislation takes precedence over “junior”. The same principle applies to overlapping regulations at the same level; the more stringent applies.

The primary codified law of Quebec differs with regard to the basics of contract law and as such may impact on certain NMS references.

The federal government as a facility owner does not have to comply with junior legislation but generally does so voluntarily. It is the policy of the federal government to always comply with the more stringent legislation or regulation.

Planning and zoning matters are generally municipally controlled.
APPENDIX A

Symbols

There are limiting factors on the availability of symbols for use in developing NMS section text. NMS has access to the full ASCII Character Set (i.e., IBM PC/windows/MAC characters 32 to 127). Also, special language symbol characters are available as a condition of the NMS Distributor Agreement.

NMS data offered to publishers includes support for Unicode character sets, which include the more common ASCII and Extended ASCII characters. In published NMS text, sometimes unusual characters are not supported by fonts. For maximum compatibility, NMS uses only common ASCII characters and standard French Unicode characters.

The following are the Hexadecimal Character Codes for NMS files in Machine Readable Format. The combination of characters on the outside of the chart below represents the hexadecimal code of the equivalent print character. The hexadecimal code is the top character followed by the side character, e.g., HEX 61 = the character ‘a’.

| 0 1 2 3 4 5 6 7 8 9 | a b c d e f |
|---------------------|--|------------------|
| 0 0 0 & _ - 0 0 | 1 1 1 a j 0 1 A J 1 |
| 2 2 2 b k s 2 2 | 3 3 3 c l t 3 3 |
| 4 4 4 d m u 4 4 | 5 5 5 e n v 5 5 |
| 6 6 6 f o w 6 6 | 7 7 7 g p x 7 7 |
| 8 8 8 h q y 8 8 | 9 9 9 i r z 9 9 |
| a a | b b |
| c c | d d |
| e e | f f |
| 0 1 2 3 4 5 6 7 8 9 a b c d e f |