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NEMA STANDARDS PUBLICATION

NEMA VE 1

METAL CABLE TRAY SYSTEMS

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

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Third Edition

CSA INTERNATIONAL

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Setting Standards for Excellence

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METAL CABLE TRAY SYSTEMS

December 1998

Commitment for Amendments

This Standard is issued jointly by CSA International and the National Electrical Manufacturers Association (NEMA). New editions and amendments to this Standard will be made only according to the Standards development procedures of both CSA International and the National Electrical Manufacturers Association.

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PREFACE

This is the common CSA and NEMA Standard for Metal Cable Tray Systems. It is the first edition of C22.2 No. 126.1, superseding C22.2 No. 126, and the third edition of NEMA VE 1, superseding the latest edition published in 1996.

This common Standard was prepared by Canadian Standards Association and National Electrical Manufacturers Association, and the cable tray manufacturing industry. The efforts of the CANENA Technical Harmonization Committee for Metal Cable Tray Systems are gratefully acknowledged.

The main changes in this Standard are as follows:

a) A diagram illustrating the various components of a cable tray system is added.

b) Loading to destruction test is added as an alternative to residual deflection.

c) Typical dimensions of trays are added.

This Standard was prepared by the CSA Subcommittee on C22.2 No. 126 of the CSA Technical Committee on Wiring Products under the jurisdiction of the CSA Strategic Resource Group, and was approved by the Technical Committee. It was approved at NEMA by the Codes and Standards Committee. The following is a list of individuals responsible for its development:

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This Standard will be submitted to the Standards Council of Canada for approval as a National Standard of Canada, and to the American National Standards Institute (ANSI) for publication as an American National Standard.

December 1998

Note: Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

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NEMA Effective Date
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FOREWORD (CSA)

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CSA Certification for a number of products is provided in the interest of maintaining agreed-upon standards of quality, performance, interchangeability and/or safety, as appropriate. Where applicable, certification may form the basis for acceptance by inspection authorities responsible for enforcement of regulations. Where feasible, programs will be developed for additional products for which certification is desired by producers, consumers or other interests.

In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed.

Products in substantial accord with this Standard but which exhibit a minor difference or a new feature may be deemed to meet the Standard providing the feature or difference is found acceptable utilizing appropriate CSA Certification Division Operating Procedures. Products which comply with this Standard shall not be certified if they are found to have additional features which are inconsistent with the intent of this Standard. Products shall not be certifiable if they are discovered to contravene applicable Federal laws or regulations.

Testing techniques, test procedures and instrumentation frequently must be prescribed by the CSA Certification Division in addition to the technical requirements contained in Standards of CSA. In addition to markings specified in the Standard, the CSA Certification and Testing Division may require special cautions, markings and instructions that are not specified by the Standard.

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Manufacturers should note that, in the event of the failure of the CSA Certification and Testing Division to resolve an issue arising from the interpretation of requirements, there is an appeal procedure: the complainant should submit the matter, in writing, to the Secretary of the Canadian Standards Association.

If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments, Bulletins, Notices and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning details about CSA Certification please address your inquiry to the Applications and Records Section, Canadian Standards Association, 178 Rexdale Boulevard, Etobicoke, Ontario M9W 1R3.

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FOREWORD (NEMA)

This Standards Publication provides technical requirements concerning the construction, testing, and performance of metal cable tray systems. The development of this publication is the result of many years of research, investigation, and experience by the members of the Metal Cable Tray Section of NEMA. Throughout the development of this publication, test methods and performance values have been related as closely as possible to end-use applications. It has been developed through consultation among manufacturers, with users and engineering societies, to result in improved serviceability and safety of metal cable tray systems.

This publication reflects the study of applicable building codes and the National Electrical Code, and adheres to applicable national material and manufacturing standards, such as those of the American Society for Testing and Materials, the American Iron and Steel Institute, the Aluminum Association, and Underwriters Laboratories, Inc. This publication is periodically reviewed by the Metal Cable Tray Section of NEMA for any revisions necessary to keep it up to date with advancing technology.

Comments or recommended revisions are welcomed and should be submitted to:

Vice-President, Engineering
National Electrical Manufacturers Association
1300 N. 17th Street, Suite 1847
Rosslyn, VA 22209

The primary purpose of this Standards Publication is to encourage the manufacture and utilization of standardized metal cable tray systems and to eliminate misunderstandings between manufacturers and users.

The cable tray system manufacturer has limited or no control over the following factors, which are vital to a safe installation:

a) Evironmental conditions;

b) System design;

c) Product selection and application;

d) Installation practices; and

e) Maintenance of the system.

This Standards Publication has been promulgated with a view towards promoting safety to persons and property by the proper selection and use of metal cable tray systems.

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C22.2 No. 126.1-98
Metal Cable Tray Systems

Section 1
SCOPE

1.1 This Standard specifies the requirements for metal cable trays and associated fittings for the support of cables, insulated conductors, and raceways designed for use in accordance with the rules of the *Canadian Electrical Code (CEC) Part I*, and the *National Electrical Code (NEC)*.

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Section 2
DEFINITIONS AND ABBREVIATIONS

2.1 DEFINITIONS

The following definitions apply in this Standard (see also Figure 1):

Accessory — a component that is used to supplement the function of a straight section or fitting. Examples include, but are not limited to, dropout, cover, conduit adapter, hold-down device, and divider.

Cable tray support span — the distance between the centerlines of supports.

Cable tray system — a unit or assembly of units or sections, and associated fittings, forming a mechanical system used to support cables and raceways.

Channel cable tray — a fabricated structure consisting of a one-piece ventilated-bottom or solid-bottom channel section, not exceeding 152 mm (6 in) in width.

Connector — a component that joins any combination of cable tray straight sections and fittings. The basic types of connectors include rigid, expansion, adjustable, and reducer.

Fitting — a component that is used to change the size or direction of a cable tray system.

Horizontal cross — a fitting that joins cable trays in four directions at 90° intervals in the same plane.

Horizontal elbow — a fitting that changes the direction of cable tray in the same plane.

Horizontal tee — a fitting that joins cable trays in three directions at 90° intervals in the same plane.

Horizontal wye — a fitting that joins cable trays in three directions at other than 90° intervals in the same plane.

Ladder cable tray — a fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

Reducer — a fitting that joins cable trays of different widths in the same plane.

Left-hand reducer — a reducer having, when viewed from the large end, a straight side on the left.

Right-hand reducer — a reducer having, when viewed from the large end, a straight side on the right.

Straight reducer — a reducer having two symmetrical offset sides.

Single-rail cable tray — a fabricated structure consisting of a longitudinal rail with transversely connected members (rungs) that project from one side (side-supported) or both sides (center-supported), which may be single- or multi-tier.

Solid-bottom or nonventilated cable tray — a fabricated structure consisting of a bottom without ventilation openings within integral or separate longitudinal side rails.

Straight section — a length of cable tray that has no change in direction or size.

Support — a component that provides a means for supporting a cable tray, including, but not limited to, cantilever bracket, trapeze, and individual rod suspension.

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Trough or ventilated cable tray — a fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and utilizing 75% or less of the plan area of the surface to support cables. The maximum open spacings between cable support surfaces of transverse elements do not exceed 102 mm (4 in) in the direction parallel to the tray side rails. (On horizontal bends only, the maximum distance between transverse elements is measured at the centerline of the bend.)

Vertical elbow — a fitting that changes the direction of cable tray to a different plane.

Inside vertical elbow — a fitting that changes the direction of cable tray upward from the horizontal plane.

Outside vertical elbow — a fitting that changes the direction of cable tray downward from the horizontal plane.

Vertical tee — a fitting that joins cable trays in three directions at 90° intervals in different planes.

2.2 ABBREVIATIONS

The following abbreviations apply in this Standard:

A — ampere.
°C — degrees Celsius.
d.c. — direct current.
°F — degrees Fahrenheit.
ft — foot.
in — inch.
kg — kilogram.
lb — pound.
m — meter.
min — minute.
mm — millimeter.
Ω — ohm.

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Section 3
GENERAL

3.1 REFERENCE PUBLICATIONS

Where reference is made to other publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition up to the time when this Standard was approved.

CSA* Standards
C22.1-98,
Canadian Electrical Code, Part I;

C22.2 No. 0-M91,
General Requirements—Canadian Electrical Code, Part II;

CAN/CSA-G164-M92,
Hot Dip Galvanizing of Irregularly Shaped Articles.

NEMA† Standard
VE 2-1996,
Metal Cable Tray Installation Guidelines.

ANSI‡ Standard
ANSI/NFPA 70-1996,
National Electrical Code.

ASTM§ Standards
A 123/A 123M-97,
Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products;

A 653-94,
Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process;

B 633-85 (1994)e1,
Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

**Canadian Standards Association.*
†National Electrical Manufacturers Association.
‡American National Standards Institute.
§American Society for Testing and Materials.

3.2 MEASUREMENT UNITS

The measurements in this Standard are given in SI units and followed by yard-pound units in parentheses. Lengths are shown in millimeters or meters (inches or feet). Widths, deflections, and similar measurements are generally defined in millimeters (fractions of inches), and load-bearing capacity in kilograms/meter (pounds/foot).

Dimensions and measurements marked on the product shall include SI units when used in Canada and Mexico.

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Section 4
CONSTRUCTION

4.1 MATERIALS

Cable tray systems shall be made of either corrosion-resistant metal, such as aluminum or stainless steel, or metal with a corrosion-resistant finish.

4.2 FINISHES

4.2.1 Carbon steel used for cable trays shall be protected against corrosion by one of the following processes:

a) Type 1 — Hot-dip galvanizing after fabrication in accordance with CAN/CSA-G164 or ASTM A 123/A 123M;

Note: Fabricated products that are hot-dip galvanized are thoroughly cleaned, fluxed, and immersed in a bath of molten zinc, where they react to form a metallurgically bonded zinc coating. Normal oxidation of the galvanized surfaces will, in a short period of time, appear as a dull grey or white coating. Some degree of roughness and variations of thicknesses can be expected as a result of the hot-dipping process. Because the galvanizing process takes place at the low end of the stress-relieving temperature range, some stress relief occurs, and some distortion or warping may result.

b) Type 2 — Hot-dip mill galvanizing in accordance with ASTM A 653, coating designation G90; or

Note: Hot-dip mill galvanized coatings are produced by continuously rolling steel sheets or strips in coils through a bath of molten zinc. The process involves pretreating the steel to make the surface react readily with molten zinc as the strip moves through the bath at high speeds. During fabrication, where slitting, forming, cutting, or welding is performed, the cut edges and heat-affected zone of welding are subject to superficial oxidation. These areas are then protected through electrolytic action of the adjacent zinc surfaces. The coating is smooth, ductile, and adherent.

For corrosive or wet locations, other coatings may be more suitable.

c) Other coatings as appropriate for the application. Where a nationally recognized standard exists, the coating shall be applied in accordance with that standard.

4.2.2 For installations in highly corrosive environments, such as alkaline and acidic conditions, different or additional protective coatings may be provided, as agreed to between the end user and the manufacturer.

4.2.3 Carbon steel nuts and bolts shall be protected against corrosion by one of the following processes:

a) Zinc electroplating in accordance with ASTM B 633; or

b) Other coatings as appropriate for the application. Where a nationally recognized standard exists, the coating shall be applied in accordance with that standard.

4.3 TYPICAL DIMENSIONS

4.3.1 General

Clauses 4.3.2 to 4.3.7 provide the typical dimensions used in the industry. Other dimensions are also acceptable. Dimensions are based on rationalized conversions.

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4.3.2 Lengths of straight sections

Typical lengths, not including connectors, are

a) 3000 ± 5 mm (10 ft ± 3/16 in);

b) 3660 ± 5 mm (12 ft ± 3/16 in);

c) 6000 ± 9 mm (20 ft ± 5/16 in); or

d) 7320 ± 9 mm (24 ft ± 5/16 in).

4.3.3 Widths

4.3.3.1 Typical widths for sections other than channel trays are

a) 150 mm (6 in);

b) 225 mm (9 in);

c) 300 mm (12 in);

d) 450 mm (18 in);

e) 600 mm (24 in);

f) 750 mm (30 in); or

g) 900 mm (36 in).

Note: The tolerance of the widths is within ±6 mm (1/4 in) for inside dimensions.

Overall width shall not exceed the inside width by more than 100 mm (4 in).

4.3.3.2 Typical widths for channel trays are

a) 75 mm (3 in);

b) 100 mm (4 in); or

c) 150 mm (6 in).

Note: The tolerance of the widths is within ±6 mm (1/4 in) for inside dimensions.

4.3.4 Depths

4.3.4.1 Typical depths for channel trays are 30 – 45 mm (1-1/4 – 1-3/4 in) outside dimensions.

4.3.4.2 Typical depths for single-rail trays are

a) 75 mm (3 in);

b) 100 mm (4 in);

c) 125 mm (5 in); or

d) 150 mm (6 in).

Note: The tolerance of the depths is within ±10 mm (3/8 in).

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The measurement shall be from the top of the cable support surface to the top of the upturn rung.

4.3.4.3 Typical depths for sections other than channel or single-rail trays are

a) 75 mm (3 in);

b) 100 mm (4 in);

c) 125 mm (5 in); or

d) 150 mm (6 in).

Note: The tolerance of the depths is within ±10 mm (3/8 in).

The measurement shall be from the top of the cable support surface to the top of the rail. Outside depths shall not exceed inside depths by more than 30 mm (1-1/4 in).

4.3.5 Nominal rung spacings on straight sections

Typical rung spacings are

a) 150 mm (6 in);

b) 225 mm (9 in);

c) 300 mm (12 in); or

d) 450 mm (18 in).

4.3.6 Inside radii

Typical inside radii of curved sections are

a) 300 mm (12 in);

b) 600 mm (24 in); or

c) 900 mm (36 in).

4.3.7 Degrees of arc for elbows

The typical degrees of arc for elbow sections are

a) 30°

b) 45°;

c) 60°; or

d) 90°.

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4.4 QUALITY OF WORK

Cable tray systems shall be free from burrs or other sharp projections that could cause damage to the cable jacket during installation.

4.5 FITTINGS

Fittings may not meet the strength requirements of straight sections unless supported as shown in NEMA VE 2 or in accordance with the manufacturer's instructions.

4.6 STRENGTH

Straight sections of cable tray shall meet the requirements of the tests specified in Clause 5.2.

4.7 BONDING

4.7.1 Cable tray systems shall be provided with connection means meeting the requirements of Clause 5.1.

4.7.2 Where paint or additional coatings are applied to components of the cable tray system, means shall be provided to ensure a measured resistance in accordance with Clause 5.1.

4.8 LOAD CAPACITY

4.8.1 The standard classes of cable trays, as related to their maximum design loads and to the associated design support spacing based on a simple beam span requirement, shall be designated in accordance with Table 1.

Note: The load ratings in Table 1 are those most commonly used. Other load ratings are also acceptable.

4.8.2 A concentrated static load is not included in Table 1. Some user applications may require that a given concentrated static load be imposed over and above the working load.

Such a concentrated static load represents a static weight applied on the centerline of the tray at midspan. When so specified, the concentrated static load may be converted to an equivalent uniform load (w_e) in kilograms/meter (pounds/linear foot), using the following formula, and added to the static weight of cables in the tray:

$$w_e = \frac{2 \times (\text{concentrated static load, kg (lb)})}{\text{Span length, m (ft)}}$$

This combined load may be used to select a suitable load/span designation (see Table 1). If the combined load exceeds the working load shown in Table 1, the manufacturer should be consulted.

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Section 5
TESTS

5.1 ELECTRICAL CONTINUITY OF CONNECTIONS

5.1.1 Each specimen shall consist of two 600 mm (24 in) minimum lengths of rail plus mechanical connecting means.

5.1.2 A current of 30 A d.c. shall be passed through the specimen and the resistance measured between two points located 1.5 mm (1/16 in) from each side of the connector. The net resistance of the connection shall be not more than 0.00033 W as computed from the measured voltage drop and current passing through the specimen, at an ambient temperature of 15–35°C (60–95°F).

5.2 LOAD TESTING

5.2.1 General

Either loading to destruction (Method A), specified in Clause 5.2.8, or loading to residual deflection (Method B), specified in Clause 5.2.9, shall be used.

5.2.2 Test specimen

For each design of cable tray, two specimens shall be tested. An unspliced straight section of the greatest width shall be used in each test.

For trays with rungs, rung spacings shall be the largest in a particular class.

Differences in gauge, height of rail(s), rung design, rung spacings greater than the tested spacings, bottom to rail connection, or in the configuration of any part shall constitute a different design.

Coated trays need not be tested, provided that bare or pregalvanized trays of the same class have been tested.

5.2.3 Type and length of span

The test specimen shall be a simple beam span, with free unrestrained ends. Trays shall not have side restraints. Span lengths shall be as specified, with a tolerance of ±40 mm (±1-1/2 in).

Side-mounted single-rail cable trays shall be permitted to have fixed beam spans with restrained ends.

5.2.4 Orientation of specimen

Specimens shall be tested in the horizontal position. The total length of the test specimen shall be not more than the specified span length + 20%. Any overhang shall be equal.

5.2.5 Supports

Each end of the specimen shall be supported by a steel bar(s) of 30 mm (1-1/8 in) width and 20 mm (3/4 in) height, with a 120° V-notch cut in its bottom to a depth of 5 mm (3/16 in). The V-notch shall rest on a 25 mm (1 in) solid round steel bar fastened to a rigid base, or the specimen shall be supported directly on a 65 mm (2-1/2 in) diameter round steel bar or heavy wall steel tube fastened to a rigid base.

At the supports, single-rail trays may have side restraints that do not constrain vertical movement.

Side-mounted single-rail cable tray specimens shall be supported to the wall as recommended by the manufacturer.

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5.2.6 Loading material

Loading material shall be steel strips, lead ingots, or other loading materials meeting the following requirements:

a) Individual steel strips shall have rounded or deburred edges, a maximum thickness of 3 mm (1/8 in), a maximum width of 100 mm (4 in), and a maximum length of 6000 mm (20 ft).

b) Five lead ingots, each weighing approximately 2.3 kg (5 lb) shall be interconnected across corners into a string of five ingots approximately 560 mm (22 in) long. Individual ingots shall be hexagonal, approximately 76 mm (3 in) in diameter, and 38 mm (1-1/2 in) deep.

c) Other loading materials shall have a maximum weight of 4.5 kg (10 lb), a maximum width of 125 mm (5 in), and a maximum length of 300 mm (12 in).

5.2.7 Load application

The load shall be applied in at least 10 increments that are approximately equal.

Loading shall be uniformly distributed for the length and breadth of the specimen, except that the loading material shall not be closer than 13 mm (1/2 in) nor further than 25 mm (1 in) from the innermost elements of the sides. It shall be arranged across the tray with a minimum of 10 mm (3/8 in) between stacks so that the loading material does not bridge transversely. All loading materials shall be placed between supports without overhanging. In multi-tier cable trays, the loading shall be uniformly distributed among the tiers.

For loading weight in trays with rungs, it shall be permissible to cover the bottom of the tray between supports with a flat sheet of No. 9 gauge, flattened expanded material not more than 910 mm (3 ft) long and with a wire hole size of 20 mm (3/4 in), or a flat sheet of No. 16 gauge sheet steel not more than 910 mm (3 ft) long. The expanded metal or sheet steel shall not be fastened to the tray and shall be no closer than 13 mm (1/2 in) to the side rails. The lengths shall not overlap by more than 50 mm (2 in). The weight of expanded metal or sheet steel shall be added to the total weight of the loading material.

5.2.8 Loading to destruction (Method A)

The total weight of the loading material on the cable tray, prior to addition of the incremental weight that causes the destruction, shall be considered to be the destruction load. The rated load capacity of the cable tray shall be the destruction load divided by a safety factor of 1.5. For multi-tier trays, failure of any of the tiers shall be considered as failure of the whole tray.

5.2.9 Loading to residual deflection (Method B)

5.2.9.1 Minimum test load

The minimum test load to be applied shall be determined in accordance with the following formula:

$$\text{Total minimum test load} = 1.5 \times L \times w$$

Where:

1.5 is a safety factor
w = rated load, kg/m (lb/ft)
L = span length, m (ft)

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5.2.9.2 Load application

Each specimen shall first be loaded to 10% of the minimum test load. The vertical deflection of the tray shall be measured at three points along the line midway between the supports and at right angles to the longitudinal axis of the tray. The three points of measurement shall be under each side rail and at the center of the tray. In trays where there are no side rails, the three points of measurement shall be under the outer edges and under the center. This measurement shall be known as the initial deflection. The loading shall then be continued until all of the rated load is applied. The deflection shall be measured in the same manner as the initial deflection. The loading shall then be continued until the total minimum test load has been applied. The total load shall then be removed from the tray. After 15 min the vertical deflection shall be measured in the same manner as previously used. This measurement shall be known as the residual deflection. The specimen may then be reloaded until it collapses, and the values of the load at collapse shall be recorded. This information concerning the load at collapse point is optional, but some users may require it to obtain product acceptance.

5.2.9.3 Measurement of residual deflection

The residual deflection at each point of measurement of the two specimens shall be averaged. Where a residual deflection for either specimen is equal to or exceeds 80% of the initial deflection and, in addition, deviates from the average by more than 10%, two more specimens shall be tested. The average of the three highest values at the point of measurement of the four specimens shall be regarded as the final result. In multi-tier trays, the maximum deflection in any of the tiers shall be considered the maximum deflection of the whole tray.

5.3 INTERPOLATION OF TEST DATA

When allowable load and deflection data are determined by the load test, destruction load capacity for span lengths less than the tested span shall be interpolated with the following formula:

$$w_1 L_1^2 = w_2 L_2^2$$

Where:

w_2 = tested load, kg/m (lb/ft)
L_2 = span length, m (ft)

5.4 RUNG LOAD CAPACITY (OPTIONAL)

5.4.1 General

If rung load capacity is published in the manufacturer's catalogue, the capacity shall be determined in accordance with Clauses 5.4.2 to 5.4.6.

5.4.2 Test specimen

For each rung design, two separate tests of the greatest rung length shall be made.

5.4.3 Span length and supports

Test spans shall be simple beam spans with free, unrestrained ends. Rungs shall not have side restraints. Each end of the specimen shall be supported by a flat steel bar at a span length as specified ±38 mm (±1.5 in).

5.4.4 Orientation of specimens

Specimens shall be tested in the horizontal position. The total length of the test specimen shall be the specified span length + 150 mm (6 in) maximum. Any overhang shall be equal.

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5.4.5 Loading

All specimens shall be loaded to destruction. The loading shall be a concentrated load, applied to the 25 mm (1 in) central length of the span.

5.4.6 Load capacity

The maximum load applied to the rung shall be considered the destruction load capacity of the rung. The rated load capacity shall be the destruction load divided by a safety factor of 1.5. The allowable load may be expressed as a uniform load by multiplying the concentrated load by a factor of two.

5.4.7 Interpolation of rung load test data

When the rated load data are determined by Clause 5.4.6, the rated load capacity for span lengths less than the tested span shall be interpolated with the following formula:

$$w_1 L_1 = w_2 L_2$$

Where:

w_2 = tested load, kg (lb)
L_2 = span length, m (ft)

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Section 6
MARKINGS AND PRODUCT INFORMATION

Advisory note: In Canada, there are two official languages, English and French. Appendix A lists acceptable French translations of the markings specified in this Standard.

6.1 MARKING ON PRODUCT

Each straight section of cable tray and each fitting shall be marked in a permanent and readily visible manner with the following:

a) The manufacturer's name, trademark, or other recognized symbol of identification;

b) The words "Ventilated" or "Nonventilated", as applicable;

c) Load class and/or the rated load/span;

d) Type of material, such as stainless steel (including the type), aluminum, etc; and if carbon steel, Type 1 (hot-dip galvanized) or Type 2 (mill galvanized) as applicable. If the manufacturer's catalogue number marked on the product would readily lead the user to the required information published by the manufacturer, this marking is not mandatory;

e) When steel or aluminum cable tray systems are used as equipment grounding (or bonding) conductors, cable tray sections and fittings shall be marked to show the minimum cross-sectional area in accordance with the *CEC* and *NEC*; and

f) A warning label to read, "WARNING! DO NOT USE AS A WALKWAY, LADDER, OR SUPPORT FOR PERSONNEL. USE ONLY AS A MECHANICAL SUPPORT FOR CABLES, TUBING, AND RACEWAYS".

6.2 PRODUCT INFORMATION

The manufacturer shall provide, in a readily available form or with each shipment of cable tray, product information that shall include the following:

a) A table or chart clearly indicating the maximum rated simple beam loading in kilograms/linear meter and/or pounds/linear foot, and the maximum recommended distance in meters and/or feet between supports for each loading;

b) Information on the alloys of aluminum or stainless steel, if such alloys are used; and

c) Installation guidelines.

6.3 CABLE TRAY INSTALLATION

Cable tray shall be installed in accordance with NEMA VE 2 or as recommended by the manufacturer.

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Table 1
LOAD/SPAN CLASS DESIGNATION
(See Clause 4.8.)

Load kg/m (lb/ft)	Span, m (ft)				
	2.4 (8)	3.0 (10)	3.7 (12)	4.9 (16)	6.0 (20)
37 (25)	—	A	—	—	—
67 (45)	—	—	—	—	D
74 (50)	8A	—	12A	16A	20A
97 (65)	—	C	—	—	—
112 (75)	8B	—	12B	16B	E or 20B
149 (100)	8C	—	12C	16C	20C
179 (120)	—	D	—	—	—
299 (200)	—	E	—	—	—

Note: 8A/B/C, 12A/B/C, 16A/B/C, and 20A/B/C are the traditional NEMA designations. A, C, D, and E are the conventional CSA designations.

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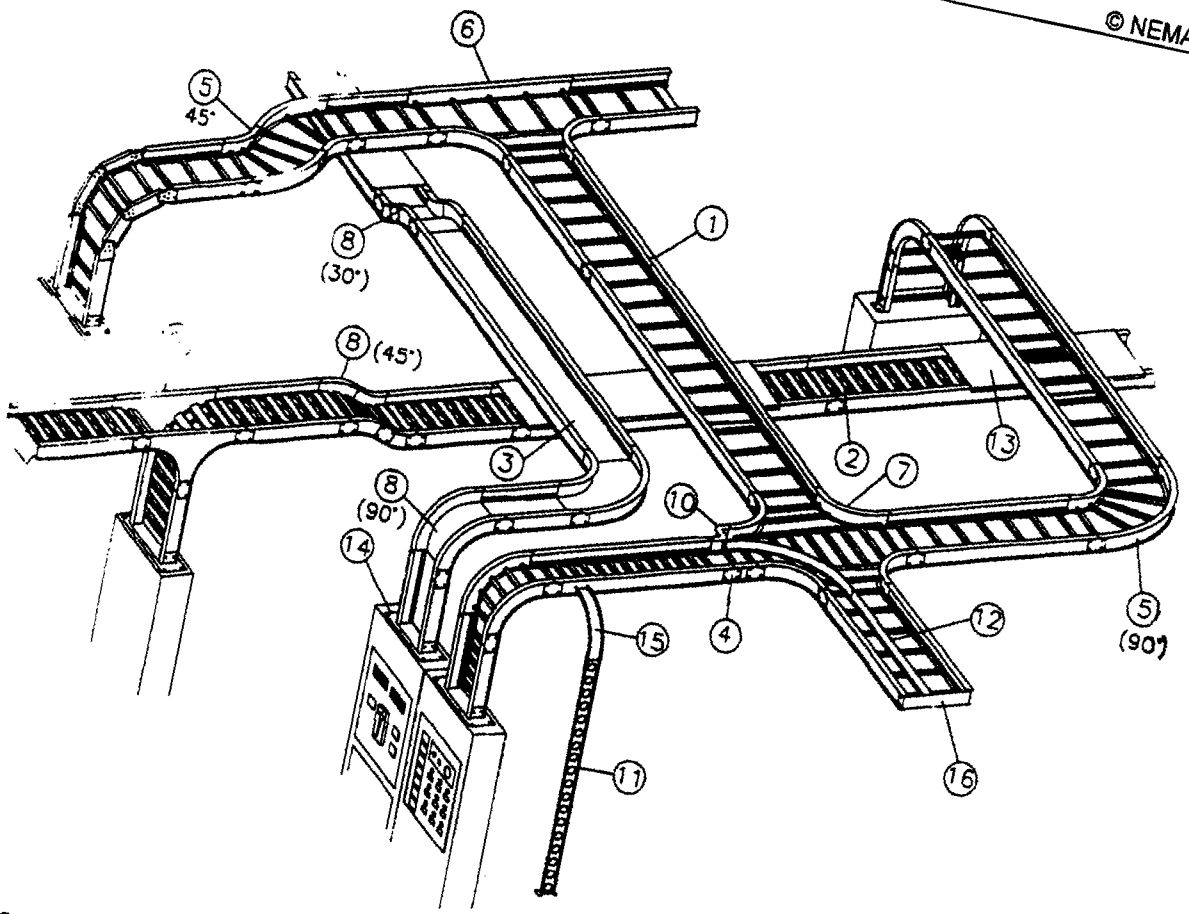

1 Ladder cable tray
2 Trough cable tray
3 Solid-bottom cable tray
4 Rigid connector
5 Horizontal elbow
6 Horizontal tee
7 Horizontal cross
8 Vertical elbow
9 Vertical tee
10 Reducer
11 Channel cable tray
12 Divider
13 Cover
14 Tray to box connector
15 Channel vertical elbow
16 Blind end

Figure 1
ILLUSTRATION OF DEFINITIONS
(See Clause 2)

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Appendix A
MARKING — FRENCH TRANSLATIONS

Note: This appendix is not a mandatory part of this Standard.

A.1 The following are acceptable French translations of required markings:

Clause	English	French
6.1 b)	Ventilated	Ajourés
6.1 b)	Nonventilated	Non ajourés
6.1 f)	WARNING! DO NOT USE AS A WALKWAY, LADDER, OR SUPPORT FOR PERSONNEL. USE ONLY AS A MECHANICAL SUPPORT FOR CABLES, TUBING, AND RACEWAYS.	AVERTISSEMENT! CECI N'EST PAS UNE PASSERELLE, NI UNE ÉCHELLE, NI UNE APPUI POUR LE PERSONNEL. UTILISER UNIQUEMENT POUR SUPPORTER DES CÂBLES, DES TUBES ET DES CANALISATIONS.

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