
Draft

Jamaican Standard

Specification

for

Hot-dip zinc coated, hot-dip aluminium-zinc coated and hot-dip
zinc alloyed with aluminium and magnesium
coated, profiled and formed steel sheets and tiles for roofing



PUBLIC COMMENT PERIOD:

14 JANUARY 2024 – 14 MARCH 2024

Draft Jamaican Standard

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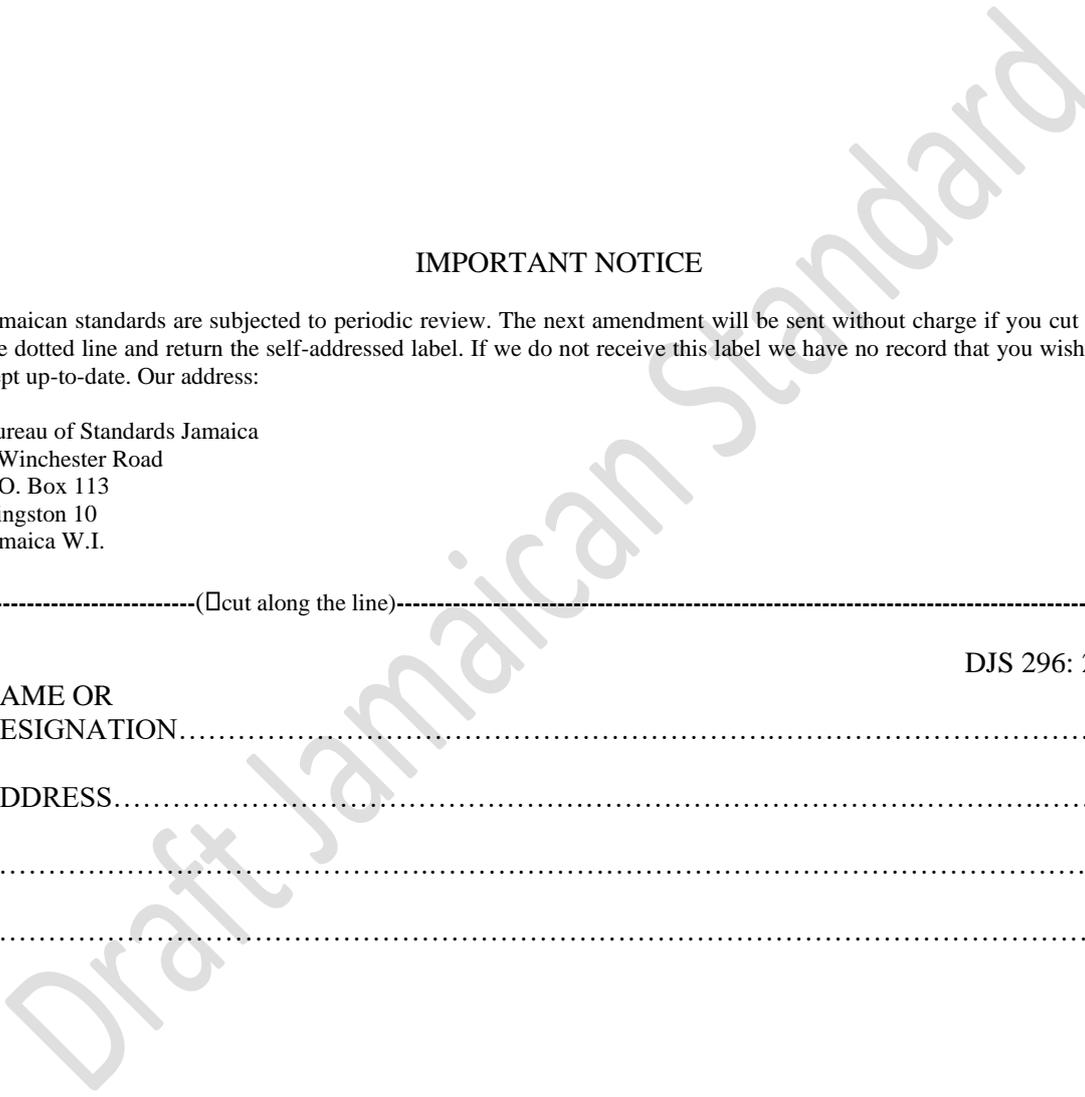
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**Draft
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and magnesium coated, profiled and formed steel sheets and tiles for roofing**

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ISBN XXX-XXX-XXX-X

Declared by the Bureau of Standards to be a standard specification pursuant to section 7 of the Standards Act 1969.

First published July 2004

First revision March 2016

Second revision Month Year

This standard specification was circulated in draft form for comments under the reference DJS 296:2023

Jamaican Standards establish requirements in relation to commodities, processes and practices, but do not purport to include all the necessary provisions of a contract.

The attention of those using these standard specifications is called to the necessity of complying with any relevant legislation.

Amendments

No.	Date of Issue	Remarks	Entered by and date

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Foreword

This standard specifies both hot-dip zinc coated and hot-dip aluminium-zinc coated profiled and formed steel sheets and tiles in various lengths, widths, profiles and coating masses.

Two separate coating categories of zinc coated steel sheet and one coating category of aluminium-zinc coated steel sheet are specified. These are classified according to the mass per unit area of zinc or aluminium/zinc coating.

NOTE. It should be borne in mind that the corrosion resistance of zinc coated and aluminium/zinc coated sheets increases the more heavily they are coated.

This standard is compulsory.

Committee representation

The revision of this standard for the Standards Council, established under the Standards Act 1969, was carried out under the supervision of the Bureau's Building and Associated Materials Committee, which at the time comprised the following members:

Acknowledgment

Acknowledgement is made to the British Standards Institution (BSI) for permission to reproduce material from BS 3083.

Related documents

This standard makes reference to the following:

ASTM A 90/A90M	Standard Test Method for weight (mass) of coating on iron and steel articles with zinc or zinc-alloy coatings
AS 1397	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
BS 3083	Hot-dip coated and hot-dip aluminium/zinc coated corrugated steel sheets for general purposes
JS 175	Hot-dip zinc coated steel sheet, strip and plate

Jamaican Standard Specification for Hot-dip zinc coated, hot-dip aluminium-zinc coated and hot-dip zinc alloyed with aluminium and magnesium coated, profiled and formed steel sheets and tiles for roofing

1. Scope

This standard specifies the requirements for materials, profiles and dimensions of hot-dip zinc coated, hot-dip aluminium-zinc coated and zinc alloyed with aluminium and magnesium coated, profiled and formed steel sheets and tiles for roofing.

2. Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

JS 175, *Jamaican Standard Specification for Continuously Hot-Dip Zinc Coated Steel Sheet, Strip and Plate*

3. Definitions

For the purposes of this standard, the following definitions shall apply:

3.1

bare spot

ross uncoated areas

3.2

blisters

surface flaws caused by entrapped pickling acid, especially on steels that have surface defects

3.3

dross inclusion

pasty solid zinc-iron alloy or zinc oxide contamination on the coated surface

3.4

edge tail

final portion along the longitudinal edge of the sheet that does not terminate in a trough or a crown

3.5. sheet

a single continuous expanse which extends in single or multiple elements from the eave to the ridge of the roof, with a coverage that is normally more than 1 m² per element.

3.6. tile

metal tiles are individual overlapping elements. These elements are typically rectangular shapes laid in courses from the bottom edge of the roof up, with each successive course overlapping the joints below. Metal tiles typically cover less than 1 m² per element.

4. Information to be supplied by the purchaser

The following information shall be given at the enquiry and order stage, to enable the manufacturer to supply the material required:

(a) the number of this Jamaican Standard, i.e. JS 296,

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(b) type of profile,

(c) the number and pitch of corrugations,

(d) the coating designation (see Table 1) where 'Z' indicates zinc coating, 'AZ' indicates aluminum/zinc coating, 'AM' indicates a coating of zinc alloyed with aluminium and magnesium and the number denotes the coating mass (e.g. 150 denotes 150 g/m² total including both surfaces),

(e) type of finish: as-passivated or painted (colour) or stone-coated,

(f) the required dimensions: thickness (gauge) and length,

(g) a reference to JS 175 if material with specific mechanical properties is required (see 5),

(h) whether the purchaser is required to inspect the product at the manufacturer's work (see 10), and

(i) the packaging instructions: bundle masses, number of sheets per bundle.

The relevant information shall be given in the sequence listed above; e.g. JS 296, rectangular narrow trough. 6/127mm corrugations, Z350 g/m², as-passivated, 0.6 mm x 2m, 2 tonne max bundles.

5. Method of manufacture

The processes used for making the steel and manufacturing the product are left to the discretion of the producer and the manufacturer.

6. Quality of hot-dip zinc, aluminium-zinc and zinc alloyed with aluminium and magnesium coated steel sheet

The profiled sheets or tiles shall be made in accordance with the accepted current practice and shall be manufactured from good quality hot dip zinc, aluminium-zinc and zinc alloyed with aluminium and magnesium coated steel sheet. For design purposes, it may be assumed that the minimum yield strength will be 220 N/mm².

If material with specified mechanical properties is required, reference shall be made to the appropriate quality in JS 175.

7. Freedom from defects

The coated surfaces shall be free from obvious harmful contamination and defects such as bare spots, dross inclusions and blisters.

8. Surface treatment

After coating, the material shall be subjected to a chemical passivation treatment, where the product will have a painted finish (see 8). See **NOTE**.

NOTE. Chemical passivation protects the surface against humidity and reduces the risk of formation of wet storage stains ('white rust' in the case of zinc coated products and 'black rust' in the case of aluminium-zinc coated products). However, the protection afforded is limited. This treatment may interfere with certain painting procedures. Chemical passivation may cause slight discoloration of the surface; however, this is not detrimental to the general performance of the product.

9. Finish

The profiled sheets or tiles shall be supplied in the as-passivated state or with a factory-applied finish coloured sheet (see 7). The finish shall be strongly adherent, free from any harmful defects/effects, and resistant to excessive fading, chalking, splitting and flaking within the first 5 years of installation.

10. Transportation and storage

Proper care shall be taken to prevent wet storage stains ('white rust' and 'black rust') during transportation and storage. In transit or storage, adequate ventilation shall be provided.

Prolonged contact with trapped moisture resulting from rainwater or high humidity between sheets or coils shall be avoided.

11. Coating mass determination

11.1 General.

The producer shall conduct such tests as deemed necessary to ensure that the material complies with the requirements of this Jamaican Standard. The purchaser may verify the mass (per unit area) of coating by the method described in 10.2.

Other methods of testing may be used for acceptance but not rejection.

11.2 Sampling and testing.

Sampling and testing shall be carried out as follows:

The test shall be performed on:

- (a) a sample of one sheet per 50 tonne lot, or fraction thereof, from the same source and of the same coating type, coating mass, nominal thickness and number of profiles.
- (b) on three specimens, one taken from the mid-width of the sheet and the other two taken from positions at least 25mm from each side edge. The test method shall be as given as in Appendix A. The result of the test shall be expressed as the:
 - (1) average of the three determinations ('triple spot test') and,
 - (2) the minimum coating mass found on any one of the three test specimens ('single spot test').

11.3 Re-tests

If a test sample fails to meet the coating mass requirements of this Jamaican Standard, two further test samples shall be taken from the lot of up to 50 tonnes represented and the test repeated. One of the samples shall be from the original bundle.

If either of these test samples fails to comply with the specified requirements, the material shall be deemed not to comply with the requirements of this Jamaican Standard.

The producer shall have the option to carry out rectification processing or sorting and resubmit the material for testing.

12. Inspection and acceptance

The purchaser or representative shall have reasonable access to the work of the manufacturer for the purpose of inspection. If such an inspection is to be carried out, this shall be stated when placing the order.

It is appropriate for an external inspector to use the manufacturer's records whenever possible; however, the inspector shall have reasonable facilities to determine that the product is being supplied in accordance with the requirements of this Jamaican Standard.

If the purchaser elects to test and inspect the product after delivery, any of the product that does not appear to comply with the requirements of this Jamaican Standard shall be set aside, be properly and correctly identified and adequately protected. The manufacturer shall be informed, so that investigations can be carried out.

13. Testing facilities

When tests are carried out on the premises, the manufacturer shall provide:

- (a) the material required for testing,
- (b) furnish and prepare the test samples, and
- (c) the labour and equipment for carrying out the tests.

14. Marking

The following information shall be suitably and clearly printed on each sheet/tile of the material:

- (a) name of the manufacturer,
- (b) country of origin,
- (c) thickness of the base metal (see **16**),
- (d) coating mass per unit area, (see **14**), and
- (e) the words '**ROOFING QUALITY**'.

15. Coating mass per unit area

The coating masses per unit area (in gram per square metre) shall be as detailed in Table 1.

Table 1 - Coating mass per unit area

Coating designation	Minimum coating mass per unit area (including both sides)	
	Triple spot test (g/m ²)	Single spot test (g/m ²)
Z350	350	300
Z450	450	385
Z600	600	510
AZ150	150	135
AM100	100	90
AM125	125	115
AM150	150	135
AM175	175	160
AM200	200	180
AM225	225	205

NOTE 1. The mass of coating is not always evenly divided between the two surfaces of the sheet or from edge to edge. However, it can normally be expected that not less than 40% of the specified minimum single spot test limit will be found on either surface.

NOTE 2. A zinc coating mass of 100 g/m², including both surfaces, corresponds to a coating thickness of approximately 7 µm on each surface. This relationship should be used for guidance only.

NOTE 3. An aluminium-zinc coating may be calculated from the following: an aluminium-zinc coating mass of 100 g/m², including both surfaces, corresponds to a coating thickness of 13.5 µm on each surface. This relationship should be for guidance only.

NOTE 4. The atmospheric corrosion resistance of zinc coated and aluminium-zinc coated steel, increases with increasing coating mass per unit area. For marine and industrial environments, sheets or tiles with higher coating mass per unit area than 350 g/m² are recommended.

16. Coating adherence

The coating adherence shall be such that there is no flaking or curving of the coating after corrugating the sheets.

17. Sheet thickness

The thickness (excluding the coating) of the sheets or tiles shall be specified in millimeters. The steel base of the sheet shall have a minimum thickness of 0.35 mm (28 gauge, SWG).

NOTE 1. Thickness may be measured at any point on the material not less than 40 mm from one edge.

NOTE 2. Thickness shall be an average of three determinations.

18. Profiles

The sheets shall be in any of the profiles shown in figure 1 to figure 3 (see appendix B to appendix D). Other profiles are permissible but subject to the approval of the Bureau of Standards Jamaica.

The corrugations and troughs shall be parallel with the sides.

19. Widths of sheets

The specified widths of sheets shall be as shown in figure 1 to figure 3 (See appendix B to appendix D).

20. Dimensions and tolerances

20.1 Tolerances on pitch - accumulative pitch

Rectangular profiles	±6.0 mm
Circular (sinusoidal) profiles up to and including 10 corrugations x 76 mm	±5.0 mm
Circular (sinusoidal) profiles with over 10 corrugations x 76mm	±6.0 mm

20.2 Edge tail (see 2)

For rectangular profiles only	12 mm minimum
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20.3 Depth of profile

For all sheets	± 1.6 mm
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20.4 Radii of bends

The radii of bends forming the troughs for rectangular profiles shall not be more than 9.00 mm

20.5 Tolerances on length

Length up to and including 3500 mm: ± 7.0 mm.

For longer lengths: the tolerance changes by ± 0.5 mm for each additional 1000 mm or part of 1000 mm.

20.6 Tolerance on squareness

The length of the diagonals between opposite corners of any sheet shall not differ by more than 20.0 mm.

21. Equivalent coating thickness

21.1 The equivalent coating thickness on each surface, for each of the zinc coating masses per unit area specified in **Table 1** shall be as detailed in table 2A.

Table 2A - Equivalent thickness of zinc coating

Nominal mass of zinc coating (g/m ²)	350	450	600
Equivalent thickness of coating (mm)	0.025	0.032	0.042

21.2 The equivalent coating thickness on each surface for the aluminium-zinc coating mass per unit area specified in **Table 1** shall be as detailed in table 2B.

Table 2B - Equivalent thickness of aluminium/zinc coating

Nominal mass of aluminium/zinc coating (g/m ²)	150
Equivalent thickness of coating (mm)	0.025

21.3 The equivalent coating thickness on each surface for the zinc alloyed with aluminium and magnesium coating mass per unit area specified in **Table 1** shall be as detailed in table 2C.

Table 2C - Equivalent thickness of coating of zinc alloyed with aluminium and magnesium (Zn-Al-Mg)

Nominal mass of Zn-Al-Mg coating (g/m ²)	100	125	150	175	200	225
Equivalent thickness of coating (mm)	0.015	0.020	0.024	0.026	0.030	0.035

Appendix A

Test for determining mass per unit area of coating

A.1 Principle. Using a test specimen with a surface area of 5000 mm² the loss of mass, in grams, when the coating is dissolved multiplied by 200, represents the mass in grams per square metre of sheet, including both sides.

A.2 Stripping solution. Dissolve approximately 3.2 grams antimony trichloride (SbCl₃) or 2 grams of antimony trioxide (Sb₂O₃) in 500 mL of concentrated Hydrochloric acid (HCl) (relative density, p,1.19).

A.3 Test procedure. Where necessary, the sample should be degreased with an organic solvent that does not attack the coating, and then dried.

- (a) Before stripping, determine the mass of the sample to an accuracy better than 1% of the presumed mass per unit area of the coating.
- (b) Measure the quantity of solution so that at least 10 mL of solution are available for 100 mm² of the surface of the sample.
- (c) Immerse the sample completely in the solution at room temperature and leave until the coating has completely dissolved.

NOTE. The end of the dissolution process can be recognized by the cessation of the original brisk evolution of hydrogen.

- (d) Rinse the sample in running water and, if necessary, brush to remove any loose substance that may be adhering to the surface.
- (e) Dip in alcohol, quickly dry and again determine the mass to the previously stated accuracy.

A.4 Calculation for coating mass g/m²

When the area of the sheet is determined, calculate the weight (mass) of the coating as follows:

$C = [(W_1 - W_2)/A] \times K$ where:

C = weight (mass) of coating, g/m² of sheet,
 W₁ = original weight (mass) of specimen, g,
 W₂ = weight (mass) of stripped specimen, g,
 A = area of sheet, mm², and
 K = (a constant) = 10 x 10⁶.
 or:

When area of sheet is not measured, the following equation may be used to calculate the weight (mass) of coating:

$C = [(W_1 - W_2)/W_2] \times T \times K$ where:

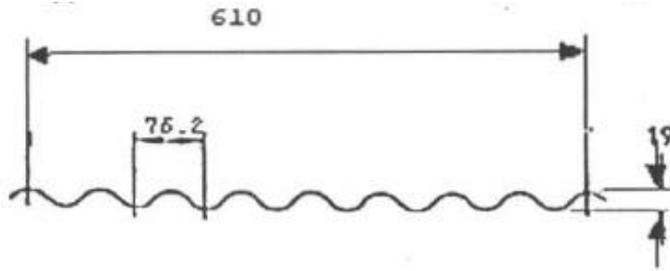
C = weight (mass) of coating, g/m² of sheet,
 W₁ = original weight (mass) of specimen, g,
 W₂ = weight (mass) of stripped specimen, g,
 T = thickness of stripped sheet, mm, and

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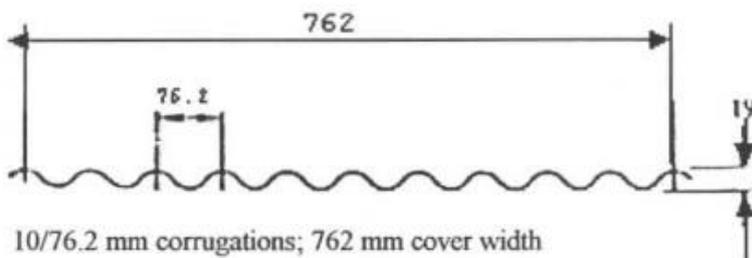
$K = (\text{a constant}) = 7.83 \times 10^3$ **WARNING.** Small amounts of the poisonous gas antimony hydride (SbH_3) will be given off during the dissolution of the zinc and it is essential that stripping be carried out using adequate fume extraction.

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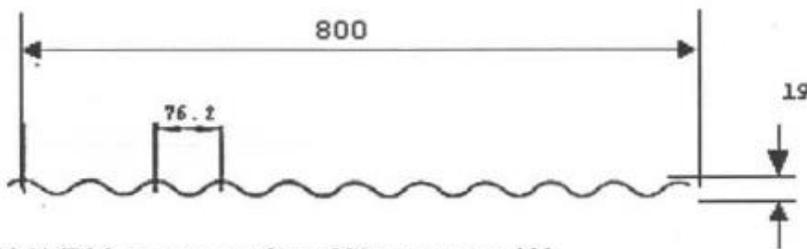
Appendix B Dimensions for circular (sinusoidal) profiles



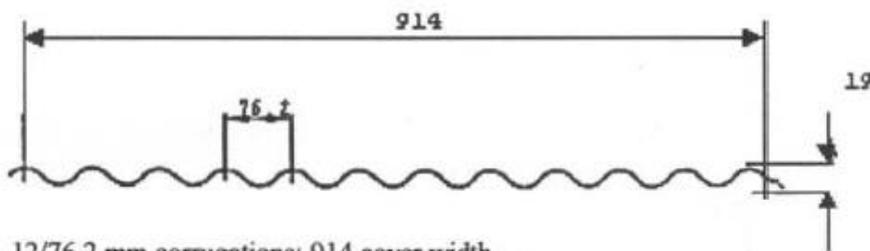
8/76.2 mm corrugations; 609.6 mm cover width



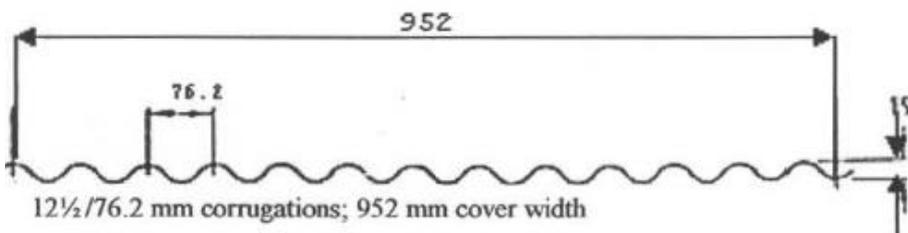
10/76.2 mm corrugations; 762 mm cover width



10 ½ /76.2 mm corrugations; 800 mm cover width



12/76.2 mm corrugations; 914 cover width

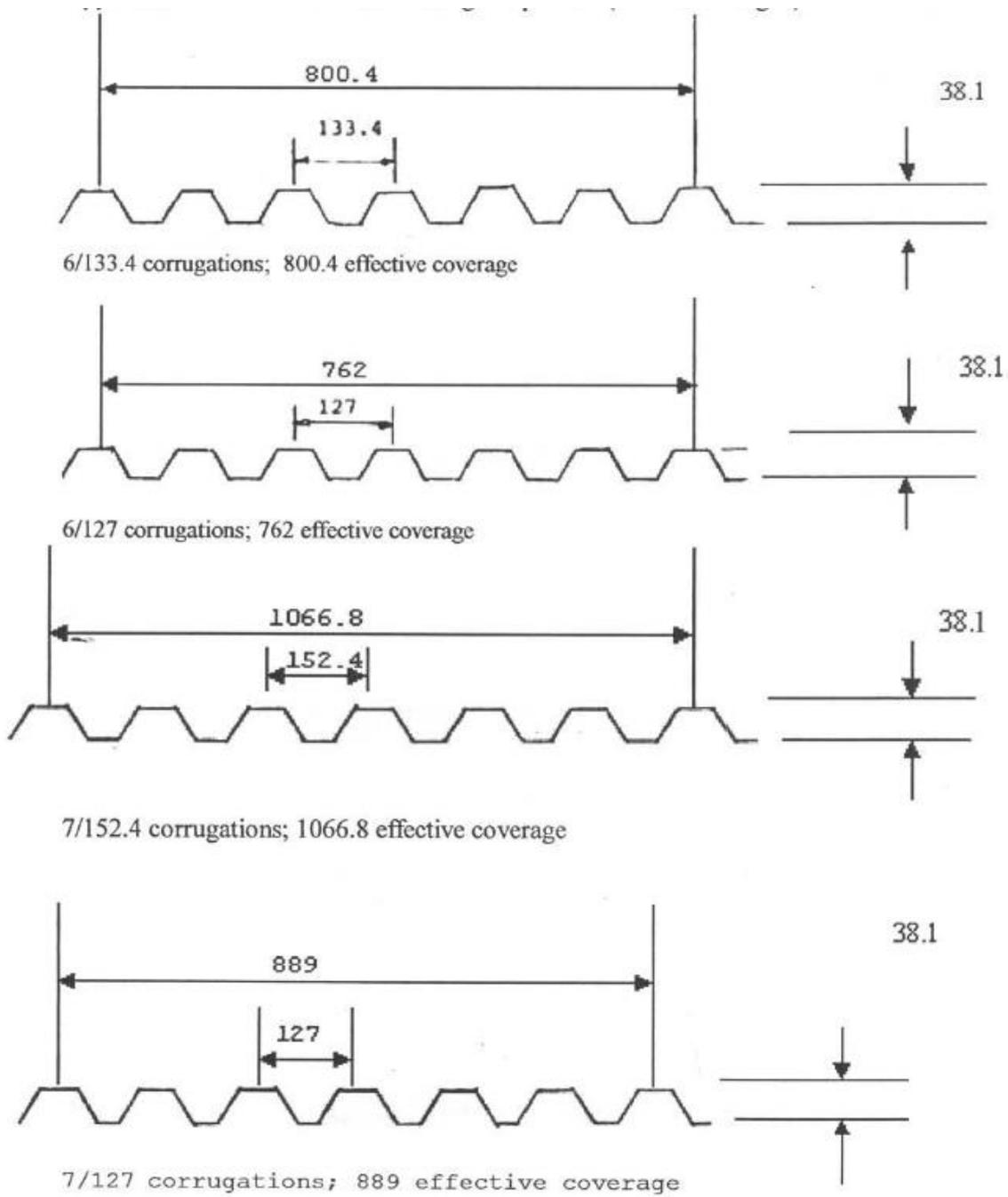


12½/76.2 mm corrugations; 952 mm cover width

Dimensions in drawings are in millimetres.

Figure 1. Circular (sinusoidal) profiles

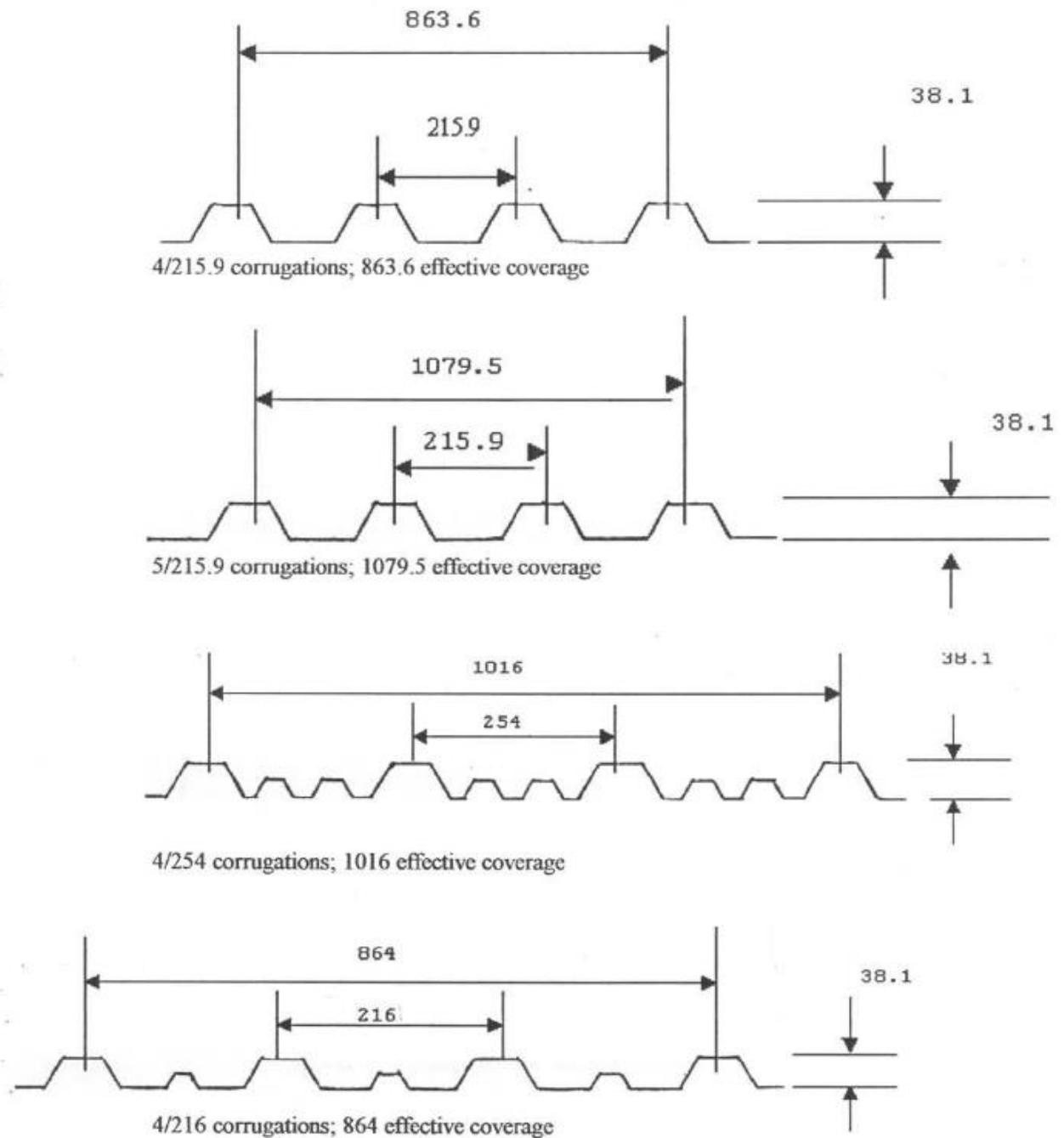
Appendix C Dimensions for rectangular profiles (Narrow troughs)



Dimensions in drawings are in millimetres

Figure 2. Rectangular profiles (Narrow trough)

Appendix D
Dimensions for rectangular profiles (wide trough)



Dimensions in drawings are in millimetres

Figure 3. Rectangular profiles (Wide trough)

Standards Council

The Standards Council is the controlling body of the Bureau of Standards Jamaica and is responsible for the policy and general administration of the Bureau.

The Council is appointed by the Minister in the manner provided for in the Standards Act, 1969. Using its powers in the Standards Act, the Council appoints committees for specified purposes.

The Standards Act, 1969 sets out the duties of the Council and the steps to be followed for the formulation of a standard.

Preparation of standards documents

The following is an outline of the procedure which must be followed in the preparation of documents:

1. The preparation of standards documents is undertaken upon the Standard Council's authorisation. This may arise out of representation from national organisations or existing Bureau of Standards' Committees of Bureau staff. If the project is approved it is referred to the appropriate sectional committee or if none exists a new committee is formed, or the project is allotted to the Bureau's staff.
2. If necessary, when the final draft of a standard is ready, the Council authorises an approach to the Minister in order to obtain the formal concurrence of any other Minister who may be responsible for any area which the standard may affect.
3. The draft document is made available to the general public for comments. All interested parties, by means of a notice in the Press, are invited to comment. In addition, copies are forwarded to those known, interested in the subject.
4. The Committee considers all the comments received and recommends a final document to the Standards Council
5. The Standards Council recommends the document to the Minister for publication.
6. The Minister approves the recommendation of the Standards Council.
7. The declaration of the standard is gazetted and copies placed on sale.
8. On the recommendation of the Standards Council the Minister may declare a standard compulsory.
9. Amendments to and revisions of standards normally require the same procedure as is applied to the preparation of the original standard.

Overseas standards documents

The Bureau of Standards Jamaica maintains a reference library which includes the standards of many overseas standards organisations. These standards can be inspected upon request.

The Bureau can supply on demand copies of standards produced by some national standards bodies and is the agency for the sale of standards produced by the International Organization for Standardization (ISO) members.

Application to use the reference library and to purchase Jamaican and other standards documents should be addressed to:

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