



## WORKING DRAFT EAST AFRICAN STANDARD

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### Brackets for eaves gutters — Requirements and test methods

EAST AFRICAN COMMUNITY

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East African Community  
P.O. Box 1096,  
Arusha  
Tanzania  
Tel: + 255 27 2162100  
Fax: + 255 27 2162190  
E-mail: [eac@eachq.org](mailto:eac@eachq.org)  
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DEAS 1250 PUBLIC REVIEW JAN 2025

## Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 047, *Plastic pipes, fittings, valves, piping systems and ducting systems*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights

## Brackets for eaves gutters — Requirements and test methods

### 1 Scope

This draft East African Standard specifies the requirements for rafter and fascia board brackets intended to support eaves gutters conforming to WD TC 047-02-2024.

### 2 Normative references

The following referenced documents are indispensable for the application 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:

ISO 6361-1 *Wrought aluminium and aluminium alloys — Sheets, strips and plates Part 1: Technical conditions for inspection and delivery*

ISO 6361-2 *Wrought aluminium and aluminium alloys — Sheets, strips and plates Part 2: Mechanical properties*

ISO 6361-3 *Wrought aluminium and aluminium alloys — Sheets, strips and plates Part 3: Strips: Tolerances on shape and dimensions*

ISO 6361-4 *Wrought aluminium and aluminium alloys — Sheets, strips and plates Part 4: Sheets and plates: Tolerances on shape and dimensions*

Wrought aluminium and aluminium alloys — Sheets, strips and plates Part 5: Chemical composition ISO 6361-5

WD TC 047 -02-2024 *Eaves gutters and fittings made of PVC-U — Requirements and test methods*

ISO 6363-1 *Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires Part 1: Technical conditions for inspection and delivery*

ISO 6362-1 *Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles — Part 1: Technical conditions for inspection and delivery*

EN 1652, *Copper and copper alloys — Plate, sheet, strip and circles for general purposes*

ISO 17615 *Aluminium and aluminium alloys — Alloyed ingots for remelting — Specifications*

ISO 3522 *Aluminium and aluminium alloys — Castings — Chemical composition and mechanical properties*

ISO 630-2 *Structural steels — Part 2: Technical delivery conditions for structural steels for general purposes*

ISO 4954-2 *Steels for cold heading and cold extruding — Technical delivery conditions — Part 2: Stainless steels*

EN 10111, *Continuously hot-rolled low carbon steel and strip for cold forming — Technical delivery conditions*

EN 10142, *Continuously hot-dip zinc coated low carbon sheets strip and sheet for cold forming — Technical delivery conditions*

EN 10215, *Continuously hot-dip aluminium-zinc (AZ) coated steel strip and sheet — Technical delivery conditions*

ISO 3575 *Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of commercial and drawing qualities*

ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

#### 3.1 bracket-

is a mechanical device used to support, secure and hold the gutter in position

#### 3.2 fascia

is a horizontal or sloping board attached to the rafter end to support the gutter system

#### 3.3 lugs/nibs

are small protruding metal or plastic pieces used to attach the gutter to the fascia board

#### 3.4

##### rafter bracket

type of gutter bracket used for fixing a gutter to a rafter

#### 3.5

##### fascia bracket

type of gutter bracket used for fixing a gutter to a fascia

### 4 Materials

Gutter brackets shall be manufactured from one of the following materials

- a) mild steel conforming to ISO 630-2 or EN 10111;
- b) hot-dip zinc coated steel sheet with a minimum grade of DX 51 D and a minimum coating mass of 275 g/m, conforming to EN 10142;
- c) zinc-aluminium coated steel sheet with a minimum grade of DX 51 D+ZA and a minimum coating mass of 225 g/m<sup>2</sup>, conforming to ISO 3575;
- d) aluminium-zinc coated steel sheet with a minimum of DX 51 D+AZ and a minimum coating mass of 150 g/m<sup>2</sup>, conforming to EN 10215;
- e) stainless steel conforming to ISO 4954-2;
- f) copper conforming to EN 1652;
- g) aluminium or aluminium alloy for sheet rolled products conforming to ISO 6361-1, ISO 6361-2, ISO 6361-3 or ISO 6361-4 in any grade of the 1 000, 3 000, 5 000 and 6 000 series;
- h) aluminium or aluminium alloy for wrought products conforming to ISO 6363-1 or ISO 6362-1, and in composition conforming to ISO 6361-5 (with the exception of those alloys having a mass content of more than 0.3 % of copper or more than 3 % of magnesium);
- i) aluminium or aluminium alloy for castings conforming to ISO 17615 and ISO 17615;
- j) unplasticized polyvinyl chloride (PVC-U) conforming to the requirements given in KS 2198, for injection moulded fittings.

## 5 Resistance to corrosion

**5.1** Gutter brackets of mild steel conforming to *ISO 630-2* or *EN 10111* shall be protected from corrosion by one of the following means:

- a) hot-dip galvanizing conforming to *EN ISO 1461*. Zinc coatings shall conform to the minimum values given in Table 1;

flexible plastic coating,  $\geq 60\mu\text{m}$  thick, over a zinc coating with an average thickness of  $\geq 20\mu\text{m}$ ;

- b) flexible plastic coating,  $\geq 60\mu\text{m}$  thick, with a suitable substrate. When tested in accordance with Annex A, the plastic coated bracket shall not exhibit any signs of rust or loosening of the coating from the steel.

**Table 1 — Minimum zinc coating for mild steel brackets hot-dip galvanized after manufacture**

Steel thickness of bracket $\alpha$ (mm)	Thickness of coating	
	Minimum single value ( $\mu\text{m}$ )	Average value ( $\mu\text{m}$ )
$\alpha > 6$	70	85
$6 \geq \alpha > 3$	55	70
$3 \geq \alpha > 1.5$	45	55

**5.2** Gutter brackets of PVC –U shall meet the artificial ageing and colour-fastness requirements detailed in *KS 2198*.

**5.3** Gutter brackets shall be manufactured from corrosion-resistant materials according to whether they are intended for use in aggressive atmospheres (Class A — industrial pollution or maritime) or more benign conditions (Class B), as given in Table 2.

**Table 2 — Classes of resistance to corrosion**

Material of manufacture	Class of resistance to corrosion
Stainless steel, copper, rolled or wrought aluminium or mild steel coated in accordance with 5.1 a) or b)	A
Cast aluminium conforming to ISO 17615, with a corrosion resistance grading of A to C inclusive	A
Cast aluminium conforming to ISO 17615, corrosion resistance coated in accordance with 5.1 c)	A
PVC-U, conforming to KS 2198	A
Uncoated cast aluminium conforming to ISO 17615, with a corrosion resistance of grade D	B
Mild steel conforming to ISO 630-2 or EN 10111, coated in accordance with 5.1 c), or hot-dip coated mild steel conforming to EN 10142, ISO 3575, EN 10327 or EN 10215	B

## 6 Design

### 6.1 General

Gutter brackets shall be of such dimensions that the gutters of the shape and size for which they are designed can slide freely through them.

It shall not be possible for gutters to be lifted out of a bracket by strong wind. This shall be achieved either through the design of integral lugs or ribs on the bracket itself or by providing separate clips or springs to attach the gutter to the bracket. Clips and springs are not required to be of the same material as the bracket to which they are attached, but shall have a corrosion resistance of Class A, as given in Table 2, if attached to a gutter bracket of corrosion resistance Class A.

Clips and springs shall be manufactured from one of the following materials:

- a) any of the materials specified in Clause 4;
- b) polyamide plastic;
- c) galvanized and pre-painted steel sheet having an average coating mass of not less than 275 g/m<sup>2</sup>.

Where both the clip or spring and the gutter bracket are manufactured from metal, care shall be taken to avoid contact between incompatible metals, thereby reducing the risk of electrolytic corrosion.

### 6.2 Load bearing capacity

Gutter brackets shall be divided into three classes according to their load bearing capacity. When tested in accordance with Annex B, brackets of 80 mm or greater top opening width (i.e brackets of Classes H and L) shall support the loads given in Table 3 without collapse and without causing permanent deflection exceeding 5 mm at the outer end of the bracket.

**Table 3 — Load bearing classes**

<b>Application</b>	<b>Test load (N)</b>	<b>Load bearing Class</b>
Brackets for heavy duty	750	H
Brackets for light duty	500	L
Brackets for gutters below 80 mm top opening width	—	O O

### 6.3 Holes for fastening

Rafter brackets shall have not less than two holes for fastenings. Where these brackets are designed to be fixed either by nails or screws, the holes shall not be less than twelve times the hole diameter. Where the bracket is designed to be fixed only by screws, the holes shall not be less than seven times the hole diameters apart and the bracket shall be marked “S”.

Fascia brackets of the heavy-duty load-bearing Class H shall have not less than two holes for fastenings. When these holes are one above the other on the vertical centre line of the bracket, they shall be not less than four times the hole diameters apart. When the holes are on each side of the centre line and in the same horizontal plane, they shall be not less than seven times hole diameters apart. When the holes are on each side of the centre line but at different levels, they shall be not less than five diameters apart.

Fascia brackets of the light duty load-bearing Class L shall either have a single hole on the vertical centre line of the bracket or have the arrangement and spacing of holes for fastenings as for fascia brackets of load-bearing Class H.

All holes shall have a minimum diameter of 5 mm, after application of any corrosion resistance coating.

Minimum diameter spacing between holes shall be measured from centre to centre. Where more than two holes for fastening are to be provided, the minimum diameter spacing shall be taken as that between the two holes which are furthest apart.

## 7 Designation of gutter brackets for ordering purposes

For ordering purposes, gutter brackets conforming to this standard shall be designated by:

- number of this standard ( WD TC 047-03-2024);
- corrosion resistance Class A or B in accordance with Table 2;
- load bearing Class H, L or O in accordance with Table 3;
- size of the gutter for which the brackets are intended (i.e. the top opening width for plastic gutters conforming to WD TC 047 -02-2024).

## 8 Marking

Gutter brackets conforming to this standard shall be marked with the following, minimum information:

- name or logo of the manufacturer;
- load bearing Class H, L or O, in accordance with Table 3;
- corrosion resistance Class A or B (for brackets of mild steel only) in accordance with Table 2;
- letter “S”, indicating suitability for screw fixing (for rafter brackets only, see 6.3);

- e) material of the bracket, as given in Clause 4

Example:

A rafter bracket of mild steel with plastic coating without undercoating of zinc, capable of supporting a load of 750 N and having two holes of 5-mm diameter greater than 35 mm apart should be marked:

Manufacturer's name or logo HBS

NOTE: The packaging for the gutter bracket should also indicate which gutter the bracket is designed to fit.

## **9 Production control**

Gutter brackets shall be controlled by the manufacturer during their production process at their place of production. This control based on appropriate sampling rules shall demonstrate the compliance of products with the requirements of this standard.

## Annex A (normative)

### Determining of corrosion resistance of plastic-coated gutter brackets

#### A.1 Principle

The plastic coating of a test piece of gutter bracket is cut through to produce a number of isolated small squares of coating, and is put in tension by bending the test piece. After soaking for a week in salt water, the test piece is examined for rust and loss of adhesion between coating and steel.

NOTE This test is intended as a type or audit test and is not intended for use as a batch release test.

#### A.2 Apparatus

- a) three complete, plastic-coated gutter brackets without undercoat of zinc;
- b) fine, sharp cutting tool such as a small scalpel;
- c) steel ruler or other suitable guide for cutting;
- d) round steel bar of  $(50 \pm 0.5)$  mm diameter with a length greater than the width of the bracket to be tested;
- e) non-metallic tank, of sufficient dimensions to contain three gutter brackets, fully immersed in saltwater solution;
- f) common salt (NaCl);
- g) purified water.

NOTE Softened water, motor battery quality distilled or de-mineralized water are all suitable.

#### A.3 Procedure

On the straight part of each bracket, clear of edges and fastening holes, cut 11 parallel lines at approximately  $45^\circ$  to the axis of the bracket and 1 mm to 2 mm apart through the complete thickness of the coating. Across these lines cut another set of 11 lines at right angles to the first set, forming a grid of 100 squares – see Figure A.1. If the bracket is not wide enough to contain this grid, cut two separate grids each of 8 lines x 8 lines, forming a total of 98 squares. Hone the cutting tool as soon as it shows signs of becoming blunt. When using a scalpel with removable blades, use at least one new blade for each test piece.

Bend each bracket over the  $(50 \pm 5)$  mm diameter steel bar through  $(180 \pm 5)^\circ$  with the grid of cut lines on the outside surface of the bend, creating a total of three test pieces.

Mix a 30 g/L solution of salt in water sufficient to totally immerse the three test pieces when put into non-metallic tank.

Mark or record the liquid level in the tank and leave for 7 days at a temperature of  $(23 \pm 2)^\circ\text{C}$  without further disturbance.

After 7 days, examine the test pieces for and record any signs of rust and loss of adhesion between the plastic coating and the steel.

The solution may be re-used for up to 10 test procedures, provided it remains clear. Any loss of solution due to evaporation shall be replaced with water only (not salt solution) in order to restore the original concentration.

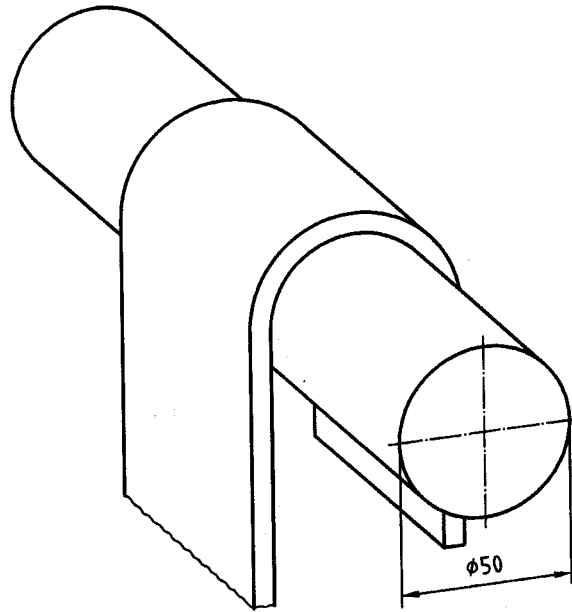


Figure A.1 — Testing and plastic coating

## Annex B (normative)

### Determination of load-bearing capacity of gutter brackets

#### B.1 Principle

A bracket holding a gutter is subjected to a known load and any permanent deflection after removal of the load is measured.

NOTE This test is intended as a type test.

#### B.2 Apparatus

- Rigid supporting structure carrying a fixed datum from which measurements can be taken and either three rafters or a fascia board, depending upon the type of bracket to be tested;
- Roller and linkage as shown in Figure B.3;
- Supply of weights sufficient to create a maximum test load of 750 N;
- Length of gutter compatible with the bracket to be tested, at least 2.2 m long;
- Three gutter brackets, one to be subjected to the test load and two additional brackets to support the gutter.

#### B.3 Procedure

Cut two holes of 35 mm to 40 mm diameter and  $(150 \pm 3)$  mm apart in the sole of the gutter. Fix the three brackets to the rafters or to the fascia board with the bracket under test in the centre, and assemble the gutter in the brackets so that it is held level by the two brackets either side of the test bracket, which shall be located sufficiently far from the test bracket that no significant part of the test load is transferred to them see Figures B.1 and B.2. Measure the vertical distance from the datum point to the outer tip of the bracket under test.

Fit the linkage and hang from it sufficient weights so that, together with the mass of the roller and the linkage, the gutter and the bracket is subjected to the test load given in Table 3, according to the type of bracket under test.

After  $(310 \pm 10)$  s remove the weights, then remove the roller, the linkage and the gutter. At  $(310 \pm 10)$  s after the removal of the weights, measure the vertical distance from the datum point to the outer tip of the bracket under test. Record the difference between the measurements taken before and after application of the load as the residual deflection.

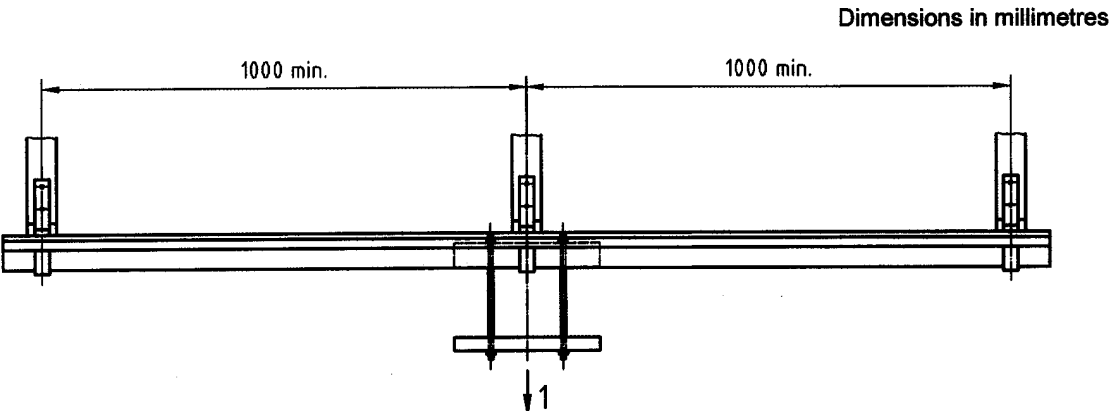
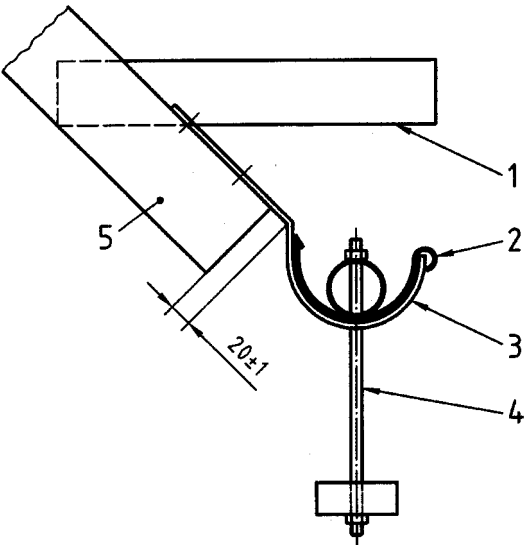


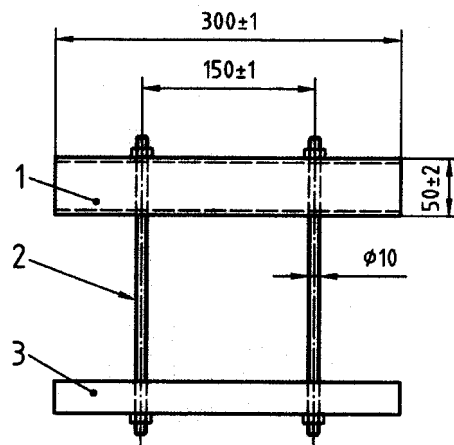
Figure B.1 — View of test arrangement (arrow indicates load direction)



Key

- 1 Datum point
- 2 Gutter
- 3 Gutter bracket
- 4 Linkage and roller
- 5 Rafter

Figure B.2 — Arrangement of rafter brackets



Key

- 1 Steel tube ( $50 \pm 2$ ) mm outer diameter
- 2 Rod, 10-mm diameter
- 3 Steel bar for fastening the test load

Figure B.3 — Linkage and roller

**Bibliography**

- [1] BS EN 1462: 2004 Brackets for eaves, gutters — Requirements and testing.  
2 KS 2197:2009 Brackets for eaves gutters — Requirements and testing

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