



भारतीय मानक ब्यूरो BUREAU OF INDIAN STANDARDS

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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 7/टी24-

31 03 2023

तकनीकी समिति : संरचनात्मक इंजीनियरिंग और संरचनात्मक अनुभाग विषय समिति सीईडी 7,

प्राप्तकर्ता:

- सिविल इंजीनियरी विभाग परिषद, सीईडीसी के सभी सदस्य
- सीईडी एवं 7इसके उपसमितियों के सभी सदस्य
- रुचि रखने वाले अन्य निकाय।

महोदय/महोदया,

निम्नलिखित मसौदा संलग्न है:

| प्रलेख संख्या | शीर्षक |
|-------------------|--|
| सीईडी 7 (22225)WC | एल्युमीनियम के समान किनारे वाले कोण - विशिष्ट का भारतीय मानक मसौदा [IS 3908 का दूसरा पुनरीक्षण] ICS 77.150.10 |

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इन पर अमल करने में आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयाँ आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: 15/05/2023

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को ई-मेल द्वारा abhishek.pal@bis.gov.in / ced7@bis.gov.in पर या उपरलिखित पते पर, संलग्न फॉर्मेट में भेजें। टिप्पणियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो उपरोक्त प्रलेख को यथावत अंतिम रूप दे दिया जाएगा। यदि सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रलेख को अंतिम रूप दे दिया जाएगा।

यह प्रलेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध है।

धन्यवाद।

भवदीय

ह-/

(अरुण कुमार एस.)

प्रमुख (सिविल इंजीनियरिंग)

संलग्न: उपरलिखित



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Our Ref: CED 7/T-24

31 March 2023

TECHNICAL COMMITTEE: Structural Engineering and Structural Sections Sectional Committee, CED 7

ADDRESSED TO:

- All Members of Civil Engineering Division Council, CEDC
- All Members of CED 7 and its Sub Committees
- All other interests

Dear Sir/Madam,

Please find enclosed the following draft:

| Doc. No. | Title |
|-------------------|---|
| CED 7 (22225) WC | Draft Indian Standard Aluminium Equal Leg Angles – Specification (<i>Second Revision of IS 3908</i>) ICS 77.150.10 |

Kindly examine the attached draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for Comments: 15/05/2023

Comments if any, may please be made in the enclosed format and emailed at abhishek.pal@bis.gov.in or sent at the above address. Additionally, comments may be sent online through the BIS e-governance portal, www.manakonline.in.

In case no comments are received or comments received are of editorial nature, you will kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,

Sd/-
(Arun Kumar S.)
Head (Civil Engineering)

Encl: As above

FORMAT FOR SENDING COMMENTS ON BIS DOCUMENTS

(Please use A-4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/table/fig etc. be started on a fresh box. Information in column 3 should include reasons for the comments and suggestions for modified working of the clauses when the existing text is found not acceptable. Adherence to this format facilitates Secretariat's work) {Please e-mail your comments to abhishek.pal@bis.gov.in}

DOC. NO. & TITLE: CED 7 (22225) WC

Draft Indian Standard Aluminium Equal Leg Angles – Specification

(Second Revision of IS 3908)

ICS 77.150.10

LAST DATE OF COMMENT : 15/05/2023

NAME OF THE COMMENTATOR/ORGANIZATION: _____

| Sl. No. | Clause/Para/Table/ Figure No. Commented | Comments/Modified Wordings | Justification of the Proposed Change |
|----------------|--|---------------------------------------|---|
| | | | |

BUREAU OF INDIAN STANDARDS**DRAFT FOR COMMENTS ONLY**

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Draft Indian Standard

Aluminium Equal Leg Angles – Specification

(Second Revision of IS 3908)

ICS 77.150.10

Structural Engineering and Structural
Sections Sectional Committee, CED 7

Last date for Comment:
15/05/2023

FOREWORD

(Formal clauses to be added later)

Aluminium, because of its lightness, strength and better resistance to atmospheric corrosion, has gained popularity in structures especially for use in hilly area and in defence establishments.

A large number of variety of Aluminium sections are being produced in the country. In order to standardize these sections for their economic production, the Committee had formulated Indian Standard series covering angles, channels, beams and tee sections for structural use and other applications.

This Indian Standard was first formulated in 1966 and subsequently revised in 1986. In this revision, the following modifications have been effected:

- a) Cross reference have been updated.
- b) Table for aluminium equal leg angles have been updated.

A code of practice for use of Aluminium alloys in structure namely IS 8147 : 1976 'Code of practice for use of aluminium alloys in structures' was published which covers provisions for the design of structures (except bridges and pressure vessels) using Aluminium alloys.

In the formulation of this standard, assistance has been derived from the following publications:

- 1) BS 1161 : 2017 Aluminium alloy sections for structural purposes

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Draft Indian Standard

Aluminium Equal Leg Angles – Specification

[*Second Revision of IS 3908*]

ICS 77.150.10

Structural Engineering and Structural
Sections Sectional Committee, CED 7

Last date for Comment:
15/05/2023

1 SCOPE

1.1 This standard covers the material, dimensions and sectional properties of aluminium equal leg angles for structural use and other applications.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| <i>IS No.</i> | <i>Title</i> |
|----------------|--|
| IS 733 : 1983 | Specification for wrought aluminium and aluminium alloy bars, rods and sections (for general engineering purposes) (<i>third revision</i>) |
| IS 3965 : 1981 | Dimensions for wrought aluminium and aluminium alloys, bar, rod and section (<i>first revision</i>) |

3 TERMINOLOGY

For the purpose of this standard the following definitions shall apply.

3.1 Y-Y Axis – A line parallel to the axis of the longer flange and passing through the centre of gravity of the profile of the section.

3.2 Z-Z Axis – A line passing through the centre of gravity of the profile of the section, and at right angles to the Y-Y axis.

3.3 U-U and V-V Axes – Lines passing through the centre of gravity of the profile of the section, representing the principal axis of angle sections.

4 SYMBOLS

4.1 Letter symbols used in this standard have been indicated in the fig. 1. The letter symbols used in Table 1 shall have the meaning indicated against each as given below:

a = Sectional area;

M = Mass of the section per unit length;

I_Z = Moment of inertia about the Z-Z axis;

I_Y = Moment of inertia about the Y-Y axis;

I_U = Movement of inertia (Max) about the U-U axis;

I_V = Movement of inertia (Min) about the V-V axis;

e_Z = Distance of extreme fibre from the Z-Z axis, $(A - C_Z)$;

e_Y = Distance of extreme fibre from the Y-Y axis, $(B - C_Y)$;

$Z_Z = \frac{I_Z}{e_Z}$ = Modulus of section about the Z-Z axis;

$Z_Y = \frac{I_Y}{e_Y}$ = Modulus of section about the Y-Y axis;

$r_Z = \sqrt{\frac{I_Z}{a}}$ = Radius of gyration about the Z-Z axis;

$r_Y = \sqrt{\frac{I_Y}{a}}$ = Radius of gyration about the Y-Y axis;

$r_U = \sqrt{\frac{I_U}{a}}$ = Radius of gyration about the U-U axis; and

$r_V = \sqrt{\frac{I_V}{a}}$ = Radius of gyration about the V-V axis.

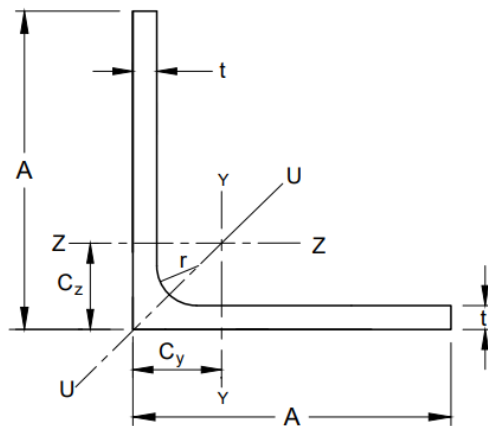


FIG. 1 SYMBOLS IN EQUAL LEG ANGLES

TABLE 1 INDIAN STANDARD ALUMINIUM EQUAL LEG ANGLES

(Clauses 4.1, 6.1 and 6.1.1)

| DESIGNATION AND SIZE (A × B × t, in mm) | MASS* PER METRE | SECTIONAL AREA | RADIUS AT ROOT | CENTRE OF GRAVITY | MOMENT OF INERTIA | | | RADIUS OF GYRATION | | | MODULUS OF SECTION |
|---|-----------------------|-------------------|----------------------|-------------------------|-------------------|----------------|----------------|-----------------------|----------------|----------------|-----------------------|
| | | | | | $I_z = I_y$ | I_u (Min) | I_v (Min) | $r_z = r_y$ | r_u (Min) | r_v (Min) | $Z_z = Z_y$ |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| ALE10×10×1.5 | 0.08 | 0.30 | 3.0 | 0.30 | 0.03 | 0.04 | 0.01 | 0.29 | 0.37 | 0.19 | 0.04 |
| ALE10×10×2.0 | 0.10 | 0.38 | 3.0 | 0.32 | 0.03 | 0.05 | 0.01 | 0.29 | 0.36 | 0.19 | 0.05 |
| ALE15×15×1.5 | 0.12 | 0.45 | 3.0 | 0.42 | 0.09 | 0.15 | 0.04 | 0.45 | 0.57 | 0.29 | 0.09 |
| ALE15×15×2.0 | 0.16 | 0.58 | 3.0 | 0.44 | 0.12 | 0.18 | 0.05 | 0.45 | 0.56 | 0.29 | 0.11 |
| ALE15×15×3.0 | 0.22 | 0.83 | 3.0 | 0.48 | 0.16 | 0.25 | 0.07 | 0.44 | 0.55 | 0.29 | 0.16 |
| ALE20×20×2.0 | 0.21 | 0.79 | 4.0 | 0.56 | 0.29 | 0.46 | 0.12 | 0.61 | 0.76 | 0.39 | 0.20 |
| ALE20×20×3.0 | 0.31 | 1.14 | 4.0 | 0.60 | 0.40 | 0.64 | 0.17 | 0.59 | 0.75 | 0.39 | 0.29 |
| ALE25×25×2.0 | 0.27 | 0.99 | 4.0 | 0.68 | 0.58 | 0.92 | 0.24 | 0.77 | 0.96 | 0.50 | 0.32 |
| ALE25×25×3.0 | 0.39 | 1.44 | 4.0 | 0.73 | 0.82 | 1.31 | 0.34 | 0.76 | 0.95 | 0.49 | 0.47 |
| ALE25×25×4.0 | 0.51 | 1.87 | 4.0 | 0.77 | 1.04 | 1.64 | 0.44 | 0.74 | 0.93 | 0.48 | 0.60 |
| ALE30×30×2.5 | 0.40 | 1.49 | 5.0 | 0.82 | 1.26 | 1.98 | 0.53 | 0.92 | 1.15 | 0.6 | 0.578 |
| ALE30×30×3.0 | 0.48 | 1.76 | 5.0 | 0.85 | 1.47 | 2.33 | 0.61 | 0.91 | 1.15 | 0.59 | 0.68 |
| ALE30×30×3.0 | 0.62 | 2.29 | 5.0 | 0.89 | 1.86 | 2.95 | 0.78 | 0.90 | 1.13 | 0.58 | 0.88 |
| ALE30×30×5.0 | 0.76 | 2.80 | 5.0 | 0.93 | 2.22 | 3.50 | 0.94 | 0.89 | 1.12 | 0.58 | 1.07 |
| ALE35×35×3.0 | 0.56 | 2.06 | 5.0 | 0.97 | 2.38 | 3.77 | 0.99 | 1.07 | 1.35 | 0.69 | 0.94 |

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|----------------|------|-------|-----|------|--------|--------|-------|------|------|------|-------|
| ALE35x35x4.0 | 0.73 | 2.69 | 5.0 | 1.01 | 3.04 | 4.81 | 1.26 | 1.06 | 1.34 | 0.69 | 1.22 |
| ALE35x35x5.0 | 0.89 | 3.30 | 5.0 | 1.05 | 3.66 | 5.76 | 1.53 | 1.05 | 1.32 | 0.68 | 1.49 |
| ALE40x40x3.0 | 0.64 | 2.36 | 5.0 | 1.10 | 3.61 | 5.72 | 1.50 | 1.24 | 1.56 | 0.80 | 1.24 |
| ALE40x40x4.0 | 0.84 | 3.09 | 5.0 | 1.14 | 4.63 | 7.34 | 1.92 | 1.22 | 1.54 | 0.79 | 1.62 |
| ALE40x40x5.0 | 1.03 | 3.80 | 5.0 | 1.18 | 5.58 | 8.84 | 2.32 | 1.21 | 1.52 | 0.78 | 1.98 |
| ALE45x45x3.0 | 0.73 | 2.69 | 6.0 | 1.21 | 5.21 | 8.22 | 2.20 | 1.39 | 1.75 | 0.90 | 1.58 |
| ALE45x45x4.0 | 0.95 | 3.52 | 6.0 | 1.26 | 6.66 | 10.61 | 2.71 | 1.38 | 1.74 | 0.88 | 2.06 |
| ALE45x45x5.0 | 1.17 | 4.33 | 6.0 | 1.30 | 8.06 | 12.83 | 3.29 | 1.36 | 1.72 | 0.87 | 2.52 |
| ALE50x50x3.0 | 0.81 | 2.99 | 6.0 | 1.34 | 7.22 | 11.43 | 3.00 | 1.55 | 1.96 | 1.00 | 1.97 |
| ALE50x50x4.0 | 0.06 | 3.92 | 6.0 | 1.38 | 9.32 | 14.78 | 3.86 | 1.54 | 1.94 | 0.99 | 2.57 |
| ALE50x50x5.0 | 1.30 | 4.83 | 6.0 | 1.42 | 11.30 | 17.92 | 4.68 | 1.53 | 1.93 | 0.98 | 3.16 |
| ALE50x50x6.0 | 1.54 | 5.72 | 6.0 | 1.46 | 13.17 | 20.86 | 5.47 | 1.52 | 1.91 | 0.98 | 3.72 |
| ALE60x60x3.5 | 1.17 | 4.31 | 7.0 | 1.57 | 14.7 | 23.1 | 6.31 | 1.85 | 2.31 | 1.21 | 3.32 |
| ALE60x60x4.0 | 1.28 | 4.75 | 7.0 | 1.62 | 16.44 | 26.06 | 6.81 | 1.86 | 2.34 | 1.20 | 3.76 |
| ALE60x60x5.0 | 1.58 | 5.86 | 7.0 | 1.67 | 20.02 | 31.76 | 8.27 | 1.85 | 2.33 | 1.19 | 4.62 |
| ALE60x60x6.0 | 1.88 | 6.95 | 7.0 | 1.71 | 23.43 | 37.16 | 9.69 | 1.84 | 2.31 | 1.18 | 5.46 |
| ALE70x70x5.0 | 1.86 | 6.89 | 8.0 | 1.91 | 32.35 | 51.31 | 13.39 | 2.17 | 2.73 | 1.39 | 6.36 |
| ALE70x70x6.0 | 2.21 | 8.18 | 8.0 | 1.95 | 38.03 | 60.26 | 15.80 | 2.16 | 2.71 | 1.39 | 7.53 |
| ALE70x70x7.0 | 2.55 | 9.45 | 8.0 | 1.99 | 43.43 | 68.80 | 18.06 | 2.14 | 2.70 | 1.38 | 8.67 |
| ALE80x80x5.0 | 2.23 | 8.23 | 8.0 | 2.11 | 49.5 | 77.7 | 21.3 | 2.45 | 3.07 | 1.61 | 8.40 |
| ALE80x80x6.0 | 2.53 | 9.38 | 8.0 | 2.20 | 57.59 | 91.48 | 23.71 | 2.48 | 3.12 | 1.59 | 9.93 |
| ALE80x80x8.0 | 3.32 | 12.30 | 8.0 | 2.28 | 73.97 | 117.43 | 30.50 | 2.45 | 3.09 | 1.57 | 12.93 |
| ALE80x80x10.0 | 4.09 | 15.14 | 8.0 | 2.36 | 89.18 | 141.32 | 37.04 | 2.43 | 3.06 | 1.56 | 15.80 |
| ALE100x100x6.0 | 3.17 | 11.81 | 9.0 | 2.72 | 115.15 | 182.92 | 47.42 | 3.10 | 3.92 | 1.99 | 15.78 |
| ALE100x100x8.0 | 4.19 | 15.53 | 9.0 | 2.78 | 148.73 | 236.41 | 61.06 | 3.09 | 3.92 | 1.98 | 20.59 |

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| | | | | | | | | | | | |
|-----------------|-------|-------|------|------|---------|---------|---------|------|------|------|--------|
| ALE100×100×10.0 | 5.18 | 19.17 | 9.0 | 2.85 | 180.49 | 286.67 | 74.30 | 3.07 | 3.87 | 1.97 | 25.23 |
| ALE120×120×12.0 | 6.14 | 22.73 | 9.0 | 2.93 | 210.43 | 333.70 | 87.15 | 3.04 | 3.83 | 1.96 | 29.76 |
| ALE120×120×7.0 | 4.68 | 17.3 | 10.0 | 3.14 | 235 | 370 | 110 | 3.69 | 4.63 | 2.42 | 26.6 |
| ALE120×120×10.0 | 6.27 | 23.21 | 10.0 | 3.35 | 319.51 | 508.04 | 130.99 | 3.71 | 4.68 | 2.38 | 36.94 |
| ALE120×120×12.0 | 7.45 | 27.57 | 10.0 | 3.43 | 374.13 | 594.41 | 153.85 | 3.68 | 4.64 | 2.36 | 43.64 |
| ALE120×120×16.0 | 9.73 | 36.05 | 10.0 | 3.58 | 475.66 | 753.35 | 191.97 | 3.63 | 4.57 | 2.34 | 56.43 |
| ALE150×150×10.0 | 7.91 | 29.31 | 12.0 | 4.09 | 639.75 | 1017.61 | 261.88 | 4.67 | 5.89 | 2.99 | 58.64 |
| ALE150×150×12.0 | 9.41 | 34.87 | 12.0 | 4.17 | 752.41 | 1196.72 | 308.11 | 4.65 | 5.86 | 2.97 | 69.47 |
| ALE150×150×16.0 | 12.35 | 45.75 | 12.0 | 4.32 | 964.79 | 1532.30 | 397.29 | 4.59 | 5.79 | 2.95 | 90.35 |
| ALE200×200×12.0 | 12.72 | 47.11 | 16.0 | 5.40 | 1838.49 | 2923.90 | 753.08 | 6.25 | 7.88 | 4.00 | 125.92 |
| ALE200×200×16.0 | 16.74 | 61.99 | 16.0 | 5.56 | 2782.00 | 3782.21 | 973.79 | 6.19 | 7.81 | 3.96 | 164.68 |
| ALE200×200×20.0 | 20.67 | 76.55 | 16.0 | 5.71 | 2886.35 | 4586.40 | 1186.30 | 6.14 | 7.74 | 3.94 | 202.02 |

*Based on density of 2.7 gm/cm².

5 DESIGNATION

5.1 Aluminium equal leg angles sections shall be designated as ALE followed by lengths of legs and thickness of the section in mm.

For example: ALE 80x80x6

6 DIMENSIONS AND SECTIONAL PROPERTIES

6.1 Dimensions and mass of Indian Standard aluminium equal leg angles shall be as given in Table 1. For convenience of reference sectional properties are also given in Table 1.

6.1.1 Sections of dimensions other than those included in Table 1 may also be manufactured subject to the agreement between the purchaser and the manufacturer.

6.1.2 Sections without root radius (square fillet) may also be manufactured subject to the agreement between the purchaser and the manufacturer.

6.2 Dimensional tolerances for the sections shall be as specified in IS 3965.

7 MATERIALS

7.1 Aluminium sections covered in this standard shall be manufactured from the following alloys in appropriate temper: 19000, 24345, 24534, 52000, 53000, 54300, 63400, 64423, 64430, 65032 and 74530.

7.1.1 Aluminium alloys and temper selected shall conform to the provisions of IS 733.

7.2 Other alloys and temper as per IS 733, as mutually agreed between purchaser and manufacturer, may also be used.

8 PACKING

8.1 Equal leg angle sections shall be securely bundled and wrapped in bituminised hessian cloth or in wooden boxes or as mutually agreed. Weight of each bundle may be as agreed to between the purchaser and the manufacturer.

9 MARKING

9.1 Each lot/bundle of aluminium equal leg angles shall be clearly marked with designation, alloy and temper, manufacturer's name and lot number/year of manufacture.

9.2 BIS Certification Marking

9.2.1 The manufacturer may also use the Standard Mark.

9.2.2 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be

granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.