

बी एच ई एल BHEL	CORPORATE STANDARD	AA0621104 Rev. No. 01 PAGE 1 of 6		
GENERAL TOLERANCES FOR WELDING CONSTRUCTIONS FOR LENGTHS AND ANGLES				
1.0 GENERAL 1.1 General tolerances are permissible variations corresponding to the degrees of accuracy normally observed in workshops where details of tolerances are not provided in the drawings. 1.2 The general tolerances specified in this standard apply to dimensions for which the tolerances are indicated on the nominal dimensions for welded components, welded assemblies and welded structures. 1.3 The variations apply to linear dimensions such as outside dimensions, inside dimensions, stepped dimensions, widths, Centre-to-Centre distances and also angles. 1.4 Special rulings may be stated for linear dimensions of welded structures consisting of several assemblies. 1.5 This standard is based on BS EN ISO 13920-1997 1.6 General tolerances for machined components are covered in Corporate Standard AA0230208. 1.7 Refer Corporate Standard AA0621105 for general tolerances for welded structures - Form and Position. 2.0 SCOPE 2.1 This standard prescribes four degrees of accuracy based on differences arising out of function and manufacture of welded components, assemblies and structures. 2.2 For technical and economic reasons other degrees of accuracy may be appropriate which have to be specifically stated. 3.0 GENERAL TOLERANCES 3.1 Tolerances for linear dimensions are given in Table 1. 3.2 Table 2, for the tolerances on angular dimensions. 4.0 REPRESENTATION ON DRAWINGS 4.1 The required degree of accuracy shall be specified in all fabrication drawings. For example class 'B' of AA0621104 (BS EN ISO 13920)				
Revisions: Clause 1.5, 3, 4.1, Table 1 & 2		APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (W)		
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4.2 Figures 1 to 5 give examples of how dimensions (linear & angular) are to be indicated on the drawings. (Refer page 6 of 6 of this standard)

5.0 TESTING

5.1 The actual size of an angular structural component is determined by placing suitable measuring instruments tangentially on the welded part so that the zone affected by the weld is eliminated. The variation is obtained from the difference between the dimension in the drawing and the actual size.

TABLE-1 TOLERANCE FOR LINEAR DIMENSIONS

Range of nominal sizes l in mm											
Tolerance Class	2 to 30	Over 30 up to 120	Over 120 up to 400	Over 400 up to 1000	Over 1000 up to 2000	Over 2000 up to 4000	Over 4000 up to 8000	Over 8000 up to 12000	Over 12000 up to 16000	Over 16000 up to 20000	Over 20000
Tolerances t in mm											
A	± 1	± 1	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 9
B		± 2	± 2	± 3	± 4	± 6	± 8	± 10	± 12	± 14	± 16
C		± 3	± 4	± 6	± 8	± 11	± 14	± 18	± 21	± 24	± 27
D		± 4	± 7	± 9	± 12	± 16	± 21	± 27	± 32	± 36	± 40

TABLE-2 TOLERANCES FOR ANGULAR DIMENSIONS

Tolerance Class	Range of Nominal sizes l in mm (Length of shorter leg)		
	Up to 400	Over 400 upto 1000	Over 1000
	Tolerance Δα (In degrees and minutes)		
A	± 20'	± 15'	± 10'
B	± 45'	± 30'	± 20'
C	± 1°	± 45'	± 30'
D	± 1°30'	± 1°15'	± 1°
Calculated and rounded tolerances t, in mm/m ^a			
A	± 6	± 4.5	± 3
B	± 13	± 9	± 6
C	± 18	± 13	± 9
D	± 26	± 22	± 18
^a The value indicated in mm/m correspond to the tangent value of the general tolerance. It is to be multiplied by the length, in m, of the shorter leg.			

NOTE:

- 1) The permissible variations also apply to unmarked angles of 90° and 180°.
- 2) The shorter side of the angle is specified as the reference side.
- 3) Its length can also be taken from a specially indicated reference point to be shown in the drawings.
- 4) If the drawing contains no angle data, but only linear dimensions, then the permissible variations are to be taken in mm/m.

- 6.0** Tolerances on dimensions of welded assemblies, the part of which are machined preliminarily and the assembly after welding as per given size not subjected to machining are set 50% lower than the tolerances on dimensions requiring a given accuracy.
- 7.0** In case of necessity, it is allowed to set as symmetrical tolerances in relation to nominal, but in this case the sum total of the value of the tolerance is to be preserved as per table 1.
- 8.0** Deformation of welded constructions (not in contact with floor plate) is allowed up to limits given in table 3.

Remarks:

- 1) The local convexities and concavities of the sheathing surface having smooth transition are allowed up to 4 mm.
- 2) General bend along the whole length of the sheathing should not exceed W mm per running metre.
- 3) Bends in the thin walled construction of the type of branch pipes, baffles of air draft hydro-generators are considered separately in every particular case.

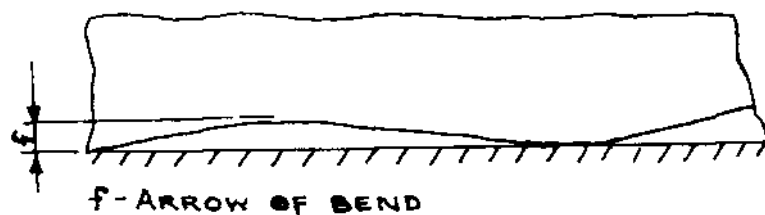


TABLE-3

Type of Construction	Length in mm						
	10000 to 15000	5000 to 10000	3000 to 5000	1500 to 3000	1000 to 1500	500 to 1000	Upto 500
Beams, spokes, stands, guards and similar parts	Allowable bend in mm						
	10.0	8.0	6.0	4.5	3.0	2.5	2.0
Frames, Floor plates dished parts, boxes External covers, bearings and Similar parts.	12.0	10.0	8.0	6.0	4.0	3.0	2.0

9.0 Allowance for machining of welded construction is determined as per table 5.

Remarks:

- 1) In case of machining of diameters and constructions from two sides the allowance is doubled.
- 2) For "Dimension as per drawing" is taken the dimension for which the allowance is meant.

10.0 Tolerances on bend "C" shall be as per table 4.

TABLE – 4

Width of flange "b" in mm	Thickness of flange "s" in mm	Tolerance "c" in mm
400-201	60-41	3.0
	40-31	3.5
	30-21	4.0
	20-11	4.5
	10 and lower	5.0
200-150	40-31	3.0
	30-21	3.5
	20-11	4.0
	10 and lower	5.0
149-100	40-31	2.5
	30-21	3.0
	20-11	3.5
	10	4.5
99-50	30-21	2.0
	20-11	2.5
	10	3.0
50 and lower	30-21	1.5
	20-11	2.0
	10	2.5

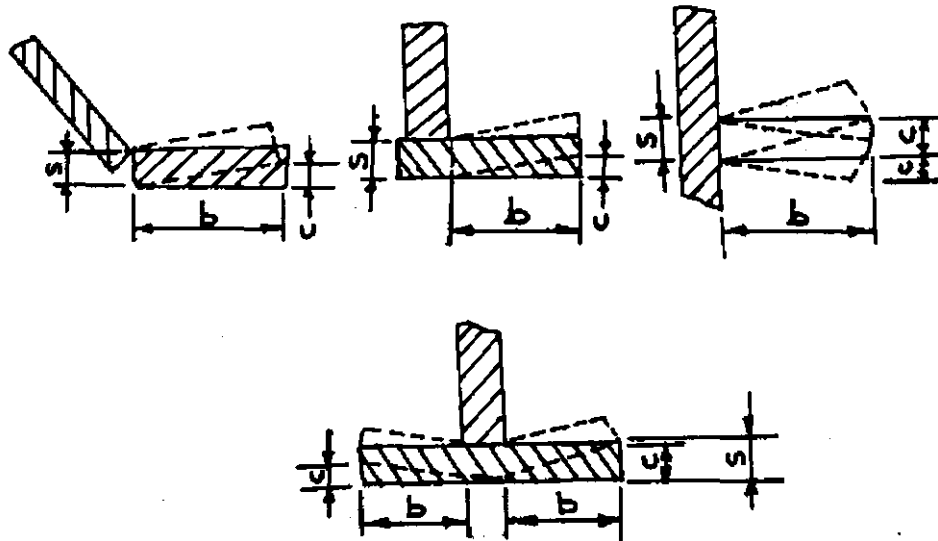


TABLE-5

Dimension as per Drawing (mm)	Machining Allowance per side (mm)
Upto 500	6
More than 500 & upto 1000	8
More than 1000 & upto 2000	10
More than 2000 & upto 4000	12
More than 4000 & upto 6000	14
More than 6000 & upto 10000	18
More than 10000 & upto 15000	22
More than 15000	24

11.0 REFERRED STANDARDS (Latest publications including amendment)

- 1) AA0230208
- 2) AA0621105

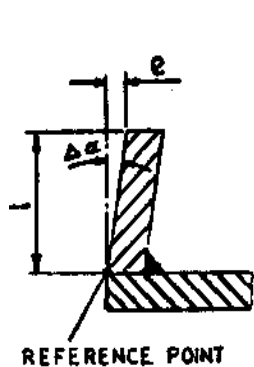


FIG. 1

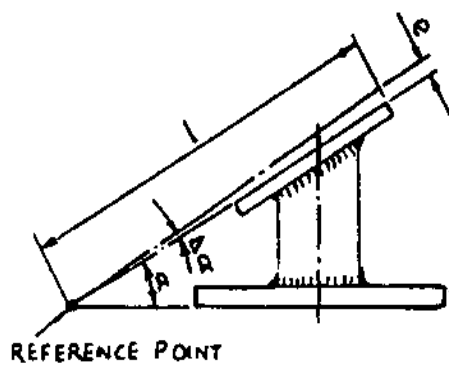


FIG. 2

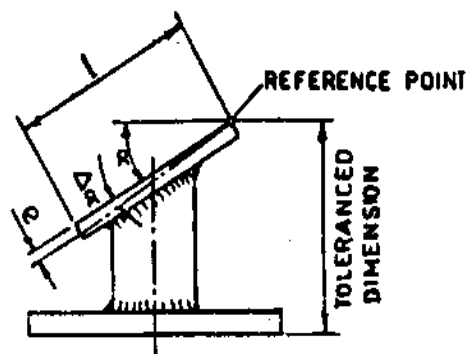


FIG. 3

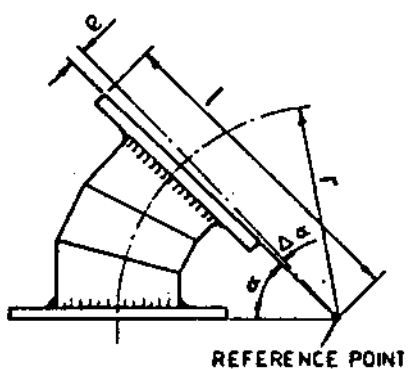


FIG. 4

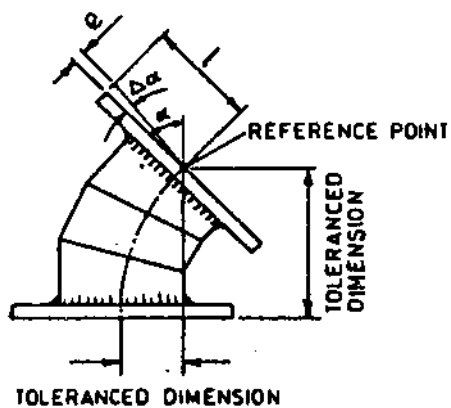


FIG. 5