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TOLERANCES AND MACHINING ALLOWANCES FOR FLAME CUTTING

1.0 SCOPE

This standard lays down the tolerances, machining allowances and the surface finish to be obtained for steel plates and rolled products, flame cut by hand or by machine.

2.0 FINISH OF CUT SURFACES

2.1 Surface finish to be obtained on cut surfaces for various methods of cutting is given in table 1.

TABLE 1: FINISH OF CUT SURFACE

(CLAUSE 2.1)

Methods of Cutting	Plate Thickness mm	Finish in Microns
Automatic Gas cutting	5 to 10	320 to 800
	11 to 40	160 to 500
	41 to 100	320 to 800
	above 100	500 to 1200
Semi-Automatic Gas cutting	5 to 10	500 to 1200
	11 to 40	320 to 800
	41 to 100	500 to 1200
	above 100	800 to 2000
Manual Gas cutting	5 to 10	800 to 2000
	11 to 40	800 to 2000
	41 to 100	800 to 2000
	above 100	1200 to 3000
	Rolled Sections	1200 to 2000
	Pipes	1200 to 2000

2.2 NOTES

2.2.1 Local notches on the gas cut surface having depth upto twice the highest roughness value as per the above table are permissible in case their number does not exceed 4 per metre length of cut. In case the gas cut surface is to be subsequently machined, the allowable depth of local notches may be increased to 70% of the machining allowance on side.

2.2.2 The roughness of gas cut surface for scrap cutting of risers giving allowances for bending and other such rough jobs is not covered in this standard.

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2.2.3 The total length of deviated cuts on the gas cut surface shall not exceed 20% of the actual length of cut and length of maximum deviated cut should not be more than 150 mm.

2.2.4 The deviated cuts shall have smooth transitions.

3.0 TOLERANCE AND ALLOWANCES

3.1 TOLERANCES AND ALLOWANCES SCHEME

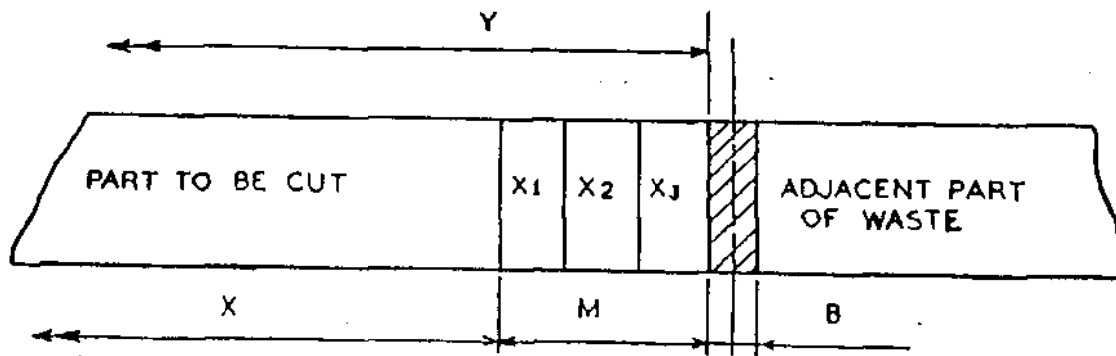


FIG. 1

X = Nominal size of part

Y = Nominal size of blank for the part

M = Machining allowance

B = Width of cut

X₁ = Allowance, considering the local unevenness during culling

X₂ = Allowance, considering violation of dimensions of parts to be cut as a result of inaccurate placement of plates on tables, inaccuracy of setting of cutting torch in relation to the plate to be cut.

X₃ = Allowance, considering inaccuracy of marking (error in making of templates) depending upon the overall dimensions of parts to be cut.



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- 3.2 Value of machining allowance along the periphery of parts depends upon the thickness of metal to be cut & the equipment used for flame cutting according to table 2A.

TABLE 2A

MACHINING ALLOWANCE (IN mm) ON EACH SIDE OR RADIUS ON GAS CUT EDGES WHICH ARE TO BE MACHINED SUBSEQUENTLY (KERF ALLOWANCE i.e. WIDTH OF CUT NOT INCLUDED)

PROCESS/ MACHINE	THICKNESS OF PLATES IN mm					
	UPTO 25 mm	ABOVE 25 mm UPTO 50 mm	ABOVE 50 mm UPTO 100 mm	ABOVE 100 mm UPTO 150 mm	ABOVE 150 mm UPTO 250 mm	ABOVE 250 mm
CNC F/C	04	05	05	06	08	10
PANTOGRAPH F/C	05	06	07	08	10	12
ELETRONIC F/C	04	06	-	-	-	-
PORTABLE F/C	05	07	08 UPTO 75 mm THICKNESS	-	-	-
PLASMA CUTTING	06	08 UPTO 50 mm THICKNESS	-	-	-	-

- 3.3** Value of machining allowances on the surface of an item (which is flame cut) depends upon its, out of flatness and hence shall be governed by its largest dimension. As such the plate thickness shall be selected by adding machining allowance on each face being machined vide table 2B.

TABLE 2B

MACHINING ALLOWANCES (IN mm) ON EACH FACE (SURFACE) ON GAS CUT PLATES WHICH ARE TO BE MACHINED SUBSEQUENTLY

NOMINAL SIZE OF THE PART (IN mm)	MACHINING ALLOWANCE ON EACH FACE (SURFACE) IN mm
UPTO 500	03
MORE THAN 500 AND UPTO 1000	05
MORE THAN 1000 AND UPTO 2000	06
MORE THAN 2000 AND UPTO 4000	08
MORE THAN 4000 AND UPTO 6000	10
MORE THAN 6000 AND UPTO 10000	12
MORE THAN 10000 AND UPTO 15000	15
MORE THAN 15000	18

- 3.4 The tolerances on dimensions of parts gas cut and finished without further machining are given in table 3

TABLE 3: TOLERANCES ON GAS CUT (SURFACES) WHICH ARE NOT TO BE MACHINED SUBSEQUENTLY (CLAUSE 3.3.)

Nominal size of parts of blanks including allowances	Value of tolerance in mm ($\pm$) Thickness of metal to be cut in mm							
	Upto 25 Auto	Manual	26-50 Auto	Manual	51-100 Auto	Manual	101-200 Auto	Manual
More than 40 upto 250	1.5	2.5	2.0	3.0	2.5	4.0	3.0	5.0
251-500	2.0	3.0	2.5	3.5	3.0	4.5	3.5	5.5
501-1000	2.5	3.5	3.0	4.0	3.5	5.0	4.0	6.0
1001-2000	3.0	4.0	3.5	4.5	4.0	5.5	4.5	6.5
2001-3000	3.5	4.5	4.0	5.0	4.5	6.0	5.0	7.0
3001-5000	4.0	5.0	4.5	5.5	5.0	6.5	5.5	8.0
5001-10000	4.5	5.5	5.0	6.0	5.5	7.0	6.0	9.0

- 3.5 The cut shall be square and out of squareness due to the cut shall be limited to 5% of thickness if cut by hand and 3% of thickness if cut by machines.