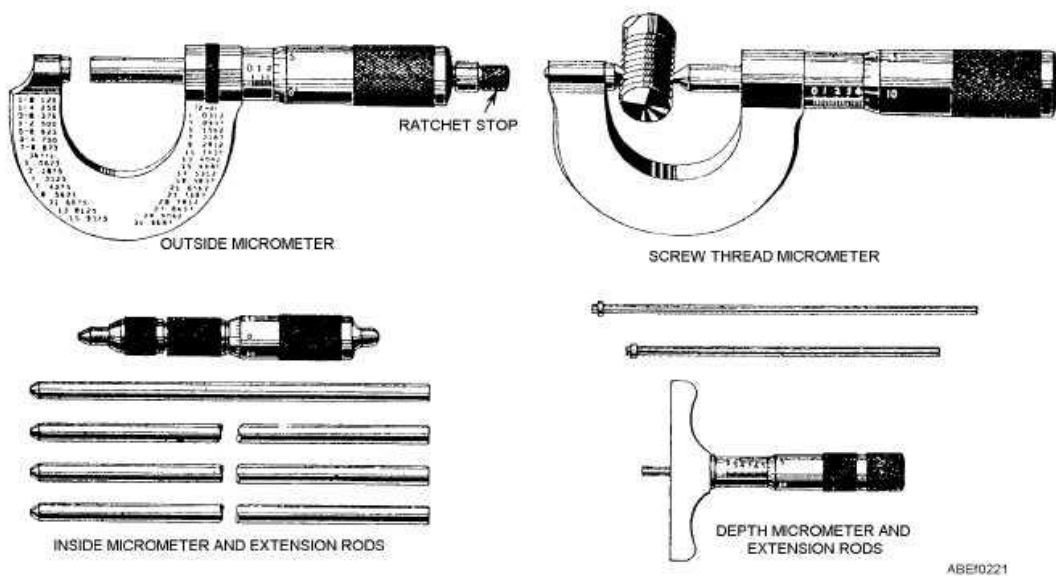


## Specification

# Dimension and Tolerances

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## Contents

<b><u>CONTENTS</u></b>	<b><u>2</u></b>
<b><u>1 INTRODUCTION</u></b>	<b><u>3</u></b>
<b><u>2 UNITS</u></b>	<b><u>3</u></b>
<b><u>3 GENERAL REQUIREMENTS</u></b>	<b><u>3</u></b>
3.1 Machined parts	3
3.2 Welded assemblies	3
<b><u>4 DECIMALS</u></b>	<b><u>4</u></b>
4.1 Machined parts	4
4.2 Welded assemblies	6

## 1 Introduction

This specification specifies requirements for dimensions and tolerances unless otherwise specified on drawings or other production related documents.

Unless specified otherwise, all dimensions are as machined and/or welded.

## 2 Units

All dimensions are in millimetres.

## 3 General requirements

### 3.1 Machined parts

**Linear dimension, External radius and chamfer, Angular dimensions:**  
ISO 2768-1M

**Form and Position:**  
ISO 2768-2K

**Surface Texture:**  
 $\sqrt{3,2}$

**Sharp Edges**  
Break all sharp edges

### 3.2 Welded assemblies

**Linear dimension & Angular dimensions:**  
ISO 13920-B

**Straightness, flatness, and parallelism:**  
ISO 13920-F

## 4 Decimals

Excerpts of the relevant tables from the standards are given in the following sections.

### 4.1 Machined parts

#### GENERAL TOLERANCES FOR LINEAR AND ANGULAR DIMENSIONS (DIN ISO 2768 T1)

##### LINEAR DIMENSIONS

Permissible deviations in mm for ranges in nominal lengths	f (fine)	Tolerance class designation (description)		v (very coarse)
		m (medium)	c (coarse)	
0.5 up to 3	±0.05	±0.1	±0.2	-
over 3 up to 6	±0.05	±0.1	±0.3	±0.5
over 6 up to 30	±0.1	±0.2	±0.5	±1.0
over 30 up to 120	±0.15	±0.3	±0.8	±1.5
over 120 up to 400	±0.2	±0.5	±1.2	±2.5
over 400 up to 1000	±0.3	±0.8	±2.0	±4.0
over 1000 up to 2000	±0.5	±1.2	±3.0	±6.0
over 2000 up to 4000	-	±2.0	±4.0	±8.0

##### EXTERNAL RADII AND CHAMFER HEIGHTS

Permissible deviations in mm for ranges in nominal lengths	f (fine)	Tolerance class designation (description)		v (very coarse)
		m (medium)	c (coarse)	
0.5 up to 3	±0.2	±0.2	±0.4	±0.4
over 3 up to 6	±0.5	±0.5	±1.0	±1.0
over 6	±1.0	±1.0	±2.0	±2.0

##### ANGULAR DIMENSIONS

Permissible deviations in degrees and minutes for ranges in nominal lengths	f (fine)	Tolerance class designation (description)		v (very coarse)
		m (medium)	c (coarse)	
up to 10	±1°	±1°	±1°30'	±3°
over 10 up to 50	±0°30'	±0°30'	±1°	±2°
over 50 up to 120	±0°20'	±0°20'	±0°30'	±1°
over 120 up to 400	±0°10'	±0°10'	±0°15'	±0°30'
over 400	±0°5'	±0°5'	±0°10'	±0°20'

**GENERAL TOLERANCES FOR FORM AND POSITION (DIN ISO 2768 T2)**
**STRAIGHTNESS AND FLATNESS**

Ranges in nominal lengths in mm	Tolerance class		
	H	K	L
up to 10	0.02	0.05	0.1
over 10 up to 30	0.05	0.1	0.2
over 30 up to 100	0.1	0.2	0.4
over 100 up to 300	0.2	0.4	0.8
over 300 up to 1000	0.3	0.6	1.2
over 1000 up to 3000	0.4	0.8	1.6

**PERPENDICULARITY**

Ranges in nominal lengths in mm	Tolerance class		
	H	K	L
up to 100	0.2	0.4	0.6
over 100 up to 300	0.3	0.6	1
over 300 up to 1000	0.4	0.8	1.5
over 1000 up to 3000	0.5	0.8	2

**SYMMETRY**

Ranges in nominal lengths in mm	Tolerance class		
	H	K	L
up to 100	0.5	0.6	0.6
over 100 up to 300	0.5	0.6	1
over 300 up to 1000	0.5	0.8	1.5
over 1000 up to 3000	0.5	1	2

**RUN-OUT**

Tolerance class		
H	K	L
0.1	0.2	0.5

## 4.2 Welded assemblies

### GENERAL TOLERANCES FOR LINEAR DIMENSIONS

Excerpt from ISO 13920:1997 Table 1 – Tolerances for linear dimensions

Tolerance class	Range of nominal size										
	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										
<b>A</b>	± 1	± 1	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 9
<b>B</b>		± 2	± 2	± 3	± 4	± 6	± 8	± 10	± 12	± 14	± 16
<b>C</b>		± 3	± 4	± 6	± 8	± 11	± 14	± 18	± 21	± 24	± 27
<b>D</b>		± 4	± 7	± 9	± 12	± 16	± 21	± 27	± 32	± 36	± 40

### GENERAL TOLERANCES FOR ANGULAR DIMENSIONS

Excerpt from ISO 1390:1997 Table 2 – Tolerances for angular dimensions

Tolerance class	Range of nominal sizes in mm (length or shorter leg)		
	Up to 400	Over 400 up to 1000	Over 1000
	Tolerances in Δα (in degrees and minutes)		
<b>A</b>	± 20'	± 15'	± 10'
<b>B</b>	± 45'	± 30'	± 20'
<b>C</b>	± 1	± 45'	± 30'
<b>D</b>	± 1° 30'	± 1° 15'	± 1°
	Calculated and rounded tolerances t, in mm/m <sup>1</sup>		
<b>A</b>	± 6	± 4,5	± 3
<b>B</b>	± 13	± 9	± 6
<b>C</b>	± 18	± 13	± 9
<b>D</b>	± 26	± 22	± 18

<sup>1)</sup> The value indicated in mm/m corresponds to the tangent value of the general tolerances. It is to be multiplied by length, in m, of the shorter leg.

### GENERAL TOLERANCES FOR STRAIGHTNESS, FLATNESS AND PARALLISM

Excerpt from ISO 13920:1997 Table 3 – Straightness, flatness and parallelism tolerances

Tolerance class	Range of nominal size									
	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									
<b>E</b>	0,5	1	1,5	2	3	4	5	6	7	8
<b>F</b>	1	1,5	3	4,5	6	8	10	12	14	16
<b>G</b>	1,5	3	5,5	9	11	16	20	22	25	25
<b>H</b>	2,5	5	9	14	18	26	32	36	40	40