General Tolerances
DST 1.1.1

Introduction

This standard consists of three parts:

Part 1 - Defines for linear and angular dimensions

Part 2 - Defines geometrical tolerancing

Part 3 - Defines permissible deviations for profile features

References: *BS EN 22768 1 & 2* *1993*

BS ISO 2768 1 & 2 *1989*

Example ASM drawing tolerance box call out:

Figure 1 will be shown in the border of all ASM Mechanical Specifying Documents.
Figure 2 explains how the callout should be read in conjunction with DST 1.1.1.

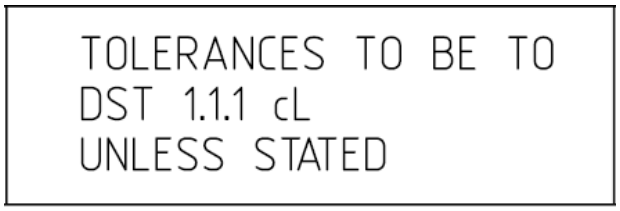


Figure 2. Drawing Frame Indication

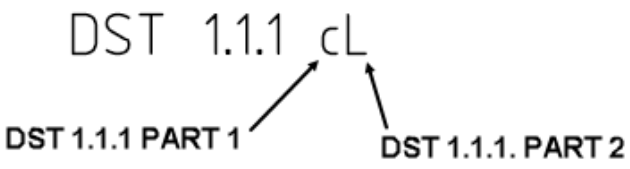


Figure 2. Callout Designations

Letters noted after DST 1.1.1 refer to the Tolerance Class Designations detailed in:

DST 1.1.1 Part 1 Tables 1 and 2 for Linear dimensions; Table 3 for Angular dimensions.

DST 1.1.1 Part 2 Tables 4,5,6 and 7.

DST 1.1.1 Part 3 Table 8 to be referred to when Profile of a surface with flag note is called.

Part 1 – Linear and Angular dimensions

DST 1.1.1 Part 1 only applies for the following dimensions which do not have an individual tolerance indication.

a) Linear dimensions e.g., external sizes, internal sizes step sizes diameters, radii, distances external radii and chamfer heights for broken edges.

b) Angular dimensions, including angular dimensions usually not indicated, e.g., right angles (90°) unless reference to DST 1.1.1 Part 2 is made, or angles of uniform polygons.

c) Linear and angular dimensions produced by machining assembled parts.

DST 1.1.1 does not apply to the following dimensions:

a) Linear and angular dimensions which are covered by reference to other standards on general tolerances.

b) Ancillary / Reference dimensions indicated in brackets.

c) Theoretically exact dimensions indicated in rectangular frames.

Permissible deviations for linear dimensions are shown in Tables 1 and 2.

Permissible deviations for angular dimensions are shown in Table 3.

Table 1 - Permissible deviations for linear dimensions except for broken edges

Tolerance Class		Permissible deviations for basic size range (mm)							
Designation	Description	0,5[1] up to 3	over 3 up to 6	over 6 up 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
f	fine	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	± 1
m	medium	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2
c	coarse	± 0,2	± 0,3	± 0,5	± 0,8	±1,2	± 2	± 3	± 4
v	very coarse	± 0,3	± 0,5	± 1	± 1,5	± 2,5	± 4	± 6	± 8
[1.] For nominal sizes below 0,5 mm the permissible deviation shall be ±10% of the indicated nominal size.									

Table 2 - Permissible deviations for External radii and chamfer heights

Tolerance Class		Permissible deviations for basic size range (mm)			
Designation	Description	0,1[1] up to 0,5	0,5 up to 3	over 3 up to 6	over 6
f	fine	± 0,05	± 0,2	± 0,5	± 1
m	medium	± 0,05	± 0,2	± 0,5	± 1
c	coarse	± 0,05	± 0,4	± 1	± 2
v	very coarse	± 0,05	± 0,4	± 1	± 2
[1.] For nominal sizes below 0,5 mm the permissible deviation shall be ±10% of the indicated nominal size.					

Table 3 - Permissible deviations of angular dimensions

Tolerance Class		Permissible deviations for ranges of lengths, in millimetres of the shorter side of the angle concerned:				
Designation	Description	Up to 10	over 10 up to 50	over 50 up to 120	over 120 up to 400	over 400
f	fine	±1°	±0°30’	±0°20’	±0°10’	±0°5’
m	medium	±1°	±0°30’	±0°20’	±0°10’	±0°5’
c	coarse	±1°30’	±1°	±0°30’	±0°15’	±0°10’
v	very coarse	±3°	±2°	±1°	±0°30’	±0°20’

Part 2 – Geometrical Tolerances

Geometrical tolerances for features without individual tolerance indicates that general geometrical tolerances apply to all geometrical tolerance characteristics excluding cylindricity, profile of any line, profile of any surface, angularity, coaxiality, positional tolerances and total run-out.

TOLERANCE FOR SINGLE FEATURES

STRAIGHTNESS AND FLATNESS

The permissible deviations on straightness and flatness are given by Table 4

CIRCULARITY

The permissible deviations on circularity is equal to the numerical value of diameter tolerance but in no case shall it be greater than the respective tolerance value for radial run-out given by Table 7.

TOLERANCES FOR RELATED FEATURES

PARALLELISM

The permissible deviations on parallelism is equal to the numerical value of the size tolerance or the flatness/straightness tolerance, whichever is the greater. The longer of the two features shall be taken as the datum. If the features are of equal length, either may be taken as the datum.

PERPENDICULARITY

The permissible deviations on perpendicularity are given by Table 5. The longer of the two sides forming the right angle shall be taken as the datum.

SYMMETRY

The permissible deviations on symmetry are given by Table 6. The longer of the two features shall be taken as the datum.

CIRCULAR RUN-OUT

The permissible deviations on circular run-out and any surface of revolution are given by Table 7

Table 4 - Permissible deviations for Straightness and Flatness

Tolerance Class		Permissible deviations for basic size range (mm)					
Designation	Description	Up to 10	Over 10 up to 30	Over 30 up to 100	Over 100 up to 300	Over 300 up to 1000	Over 1000 up to 3000
H	fine	0,02	0,05	0,1	0,2	0,3	0,4
K	medium	0,05	0,1	0,2	0,4	0,6	0,8
L	coarse	0,1	0,2	0,4	0,8	1,2	1,6

Table 5 - Permissible deviations for perpendicularity

Tolerance Class		Permissible deviations for basic size range (mm)			
Designation	Description	Up to 100	Over 100 up to 300	Over 300 up to 1000	Over 1000 up to 3000
H	fine	0,2	0,3	0,4	0,5
K	medium	0,4	0,6	0,8	1
L	coarse	0,6	1	1,5	2

Table 6 - Permissible deviations for Symmetry

Tolerance Class		Permissible deviations for basic size range (mm)			
Designation	Description	Up to 100	Over 100 up to 300	Over 300 up to 1000	Over 1000 up to 3000
H	fine	0,5	0,5	0,5	0,5
K	medium	0,6	0,6	0,8	1
L	coarse	0,6	1	1,5	2

Table 7- Permissible deviations for Circular Run-out

Tolerance Class		Permissible deviations for basic size range (mm)
Designation	Description	
H	fine	0,1
K	medium	0,2
L	coarse	0,5

Part 3 – Tolerances for Profile Features

PROFILE OF A SURFACE

This Section is **ONLY** applicable if referenced by a Flag Note on the Specifying Document (*Figure 3.*).

When a profile of a surface is indicated by a flag note (*Figure 3.*) referring to DST 1.1.1 - Part 3 (*Figure 4.*), the profile tolerance will be as stated in Table 8.

Table 8 – Permissible deviations for a Surface

	Permissible deviations for feature size range (mm)						
	Up to 400	Over 400 up to 800	Over 800 up to 1200	Over 1200 up to 1600	Over 1600 up to 2000	Over 2000 up to 2400	Over 2400
Profile Tolerance	0,2	0,3	0,4	0,5	0,6	0,7	0,8

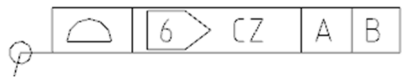


Figure 3. Geometric Tolerance Example

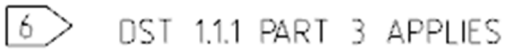


Figure 4. Drawing Note Example

Note: The example above uses flag note number 6; This flag note number will vary dependant on the number of flag notes called up in the document.

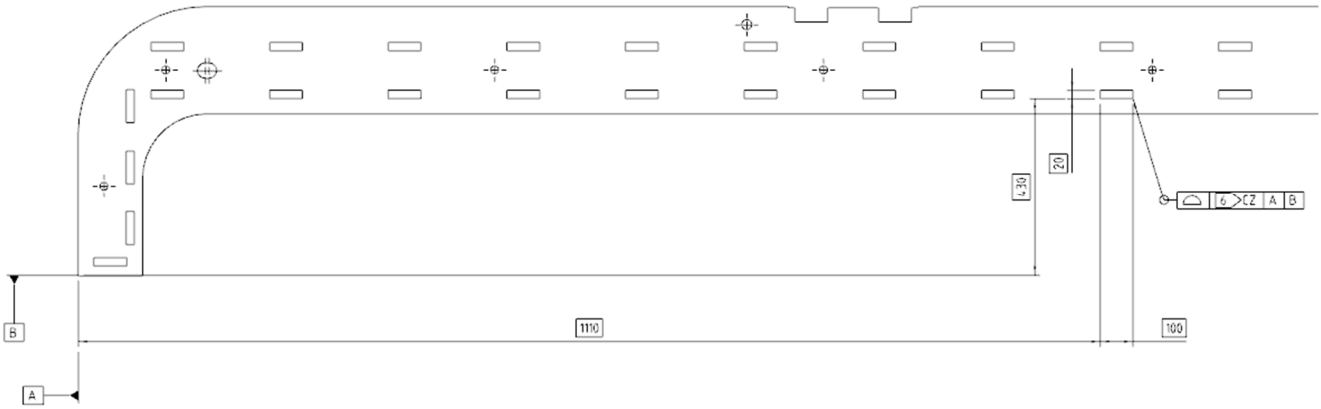
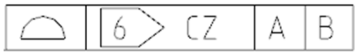


Figure 5. Deviation Example (NOT TO SCALE)



The profile tolerance in *Figure 5.* results in the following permissible deviations:

Controls Positional X Dimension (1100mm) with a Profile Tolerance of **0.4** (Over 800 up to 1200)

Controls Positional Y Dimension (430mm) with a Profile Tolerance of **0.3** (Over 400 up to 800)

Controls Feature Size X Dimension (100mm) with a Profile Tolerance of **0.2** (Up to 400)

Controls Feature Size Y Dimension (20mm) with a Profile Tolerance of **0.2** (Up to 400)

Revision History

Revision	Change Details	Date
3.0	**New Section** – Introduction Outline of document contents and references. Example of DST 1.1.1 Drawing Frame Callout. **Updated Section** – Part 1 Table 1. Added Very Coarse 0.5 to 3mm deviation. Table 1 & 2. Basic size ranges below 0.5mm now have a ±10% tolerance applied to them (Previously deviation was to be indicated on drawing). Table 3. Removed Note 1 defining deviations below 0.5mm as it was not applicable. **Updated Section** – Part 2 Section renamed to Part 2 (Previously named Part 1 in error). Table 3. Reformatted to show repeated deviations. **New Section** – Part 3 Defining new practice for deviation control of Profile Of A Surface.	01/02/2022