



QUALITY SYSTEM DOCUMENT

QUALITY PROCEDURE

<p>TITLE</p> <p>General Machining Specification</p>

AUTHORISATION			
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1.0 Purpose

1.1 The purpose of this document is to provide a general machining specification, taking into consideration any specific material properties or component features. This document will provide guidance relating to minor finishing defects, such as chips or pullouts, whilst also looking at general tolerances that will apply where none are specified by the customer.

2.0 Scope

2.1 This process deals with the following issues:

- Chips and pull outs on parts
- Sharp edges
- Surface finish
- Standard tolerances including:
 - Dimensional tolerances, flatness, parallelism, and squareness
- Cracks

3.0 Responsibility

It is the responsibility of the Production Manager to ensure that this procedure implemented, reviewed, and updated.

4.0 Chips and pull outs

4.1 Chips or pull outs of up to 0.5mm are acceptable but will be dressed if necessary, to avoid crack propagation.

4.2 Chips measuring 0.5mm – 1.0mm will be inspected and a concession will be requested from the customer.

4.3 Any parts with chips over 1.0mm will be rejected. .(Unless agreed otherwise with the customer)

5.0 Sharp edges

5.1 Sharp edges will be dressed as necessary with a break edge, radius of up to 0.5mm.

6.0 Surface Finish (Ra)

6.1 Unless specified otherwise, the surface finish of all hard machined faces will be 0.8 μm Ra or better.

7.0 Standard tolerances

7.1 We will conform to DIN ISO 2768 (Part 1 and 2) designation m (medium) for **LINEAR DIMENSIONS**.

7.2 We will conform to DIN ISO 2768 (Part 1 and 2) designation m (medium) for **EXTERNAL RADIUS and CHAMFER HEIGHTS**.

7.3 We will conform to DIN ISO 2768 (Part 1 and 2) designation m (medium) for **ANGULAR DIMENSIONS**.

7.4 We will conform to DIN ISO 2768 (Part 1 and 2) designation class K for **STRAIGHTNESS AND FLATNESS**.

7.5 We will conform to DIN ISO 2768 (Part 1 and 2) designation class K for **PERPENDICULARITY**.

7.6 We will conform to DIN ISO 2768 (Part 1 and 2) designation class K for **SYMMETRY and RUN OUT**.

8.0 Positional Tolerance

8.1 We will conform to 0.1mm positional tolerance unless otherwise specified.

9.0 Cracks

9.1 All parts will be supplied free from cracks, parts will typically be inspected by the following methods:

9.1.1 Visual inspection

9.1.2 Light penetration: Bright light will be used to inspect parts for cracks. Cracks can be identified by shining a light through the wall thickness of the part. We can also use a UV lamp for crack detection.

9.1.3 Dye penetration: A red dye can be used on parts where light penetration is not able to pick up cracks. This will need to be agreed with the customer.

HISTORY SHEET

ISSUE	COMMENT	DATE
1	First Issue	12/08/2020
2	Added section 8.0 Positional Tolerance	15/10/2020
3	General update (7.0) and sales manager change	24/06/2024

General Tolerances to DIN ISO 2768

- The latest DIN standard sheet version applies to all parts made to DIN standards.
- Variations on dimensions without tolerance values are according to "DIN ISO 2768- mk".

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 RADIUS AND CHAMFER HEIGHTS

Permissible deviations in mm for ranges in nominal lengths	f (fine)	Tolerance class designation (description)		v (very coarse)
		m (middle)	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 (middle)	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'

Figure 1:Appendix A

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