KOCH
UHLMANN GROUP

Production guidelines

www.koch-pac-systeme.com

Table of contents

	Page
1 Application	**3**
2 Repair | deviation	**3**
3 Employee self-inspection	**3**
3.1 General tolerances	3
3.2 First production	3
3.3 Repeat parts	3
3.4 Deburring	5
3.5 Inspection tolerances	5
4 Surfaces	**6**
4.1 Aluminum parts without surface treatment	6
4.2 Aluminum parts with surface treatment	6
4.3 Sheet metal parts	7
4.4 Sheet metal parts made of stainless steel	7
4.5 Plastic parts	7
4.6 Vacuum hardening	7
4.7 Design surface | design part	7
5 Welded assemblies	**7**
6 Marking of production parts	**8**
6.1 Font size	8
6.2 Parts without marking	8
6.3 Round parts	8
6.4 Form of marking	8
6.5 With steel frames	9
6.6 Machine-made marking	9
7 Shipment of production parts and assemblies	**9**
8 Modification history	**10**

1 Application

The production guidelines are general rules for the production respectively for the suppliers of KOCH Pac-Systeme GmbH (hereinafter referred to as KOCH) to produce the parts according to the KOCH specifications. Drawing specifications take precedence over the provisions of these production guidelines.
The technical information by KOCH is binding on the suppliers. It takes precedence over universal specifications of the supplier. Please keep in mind, that these guidelines can be changed. Therefore, it is within the supplier's own responsibility to regularly check that that the directive at hand is the most current version. Guideline updates can be found on the KOCH website.

2 Repair | deviation

Quality deviations especially repair of defects may only be carried out after consultation with the production planning department.
The production parts must not be polished with non-woven abrasives (e.g. Scotch-Brite™, or similar) or must not be processed with an orbital sander.
Additionally, the production parts must not have scratches or grinding marks.
Components having a manufacturing defect must not be filled or welded.

3 Employee self-inspection

A substantial part of the KOCH quality assurance system is the employee self-inspection. The employee is responsible for the required dimensions and the required shape of the workpiece. The measuring and testing equipment is to be used according to its intended purpose. The measuring and testing equipment is subjected to the inspection equipment monitoring. Repairs and adjusting works have to be initiated via the inspection equipment monitoring.

3.1 General tolerances

Following general tolerances have to be observed for all assemblies and individual parts unless otherwise indicated on the drawings:

- all linear and angular dimensions: acc. to **DIN ISO 2768-1 m**
- all geometric tolerances: acc. to **DIN ISO 2768-2 K**
- all welded constructions: acc. to **DIN EN ISO 13920 A**

Deviations from these tolerances are not permitted or must be explicitly approved by KOCH.

3.2 First production

Check the whole part for completeness: fits, threads and thread depth, surface, deburring and numbering. Milling tools may only be used specific to material.
Milling cutters for steel must not be used for stainless steel to avoid ferrite carryover. Additionally, sharpened milling cutters must not be used.
The use of raw materials on the basis of the material specifications and compliance with all specifications is mandatory.

3.3 Repeat parts

Check the fits, threads and thread depth, surface, deburring and numbering modification. In addition, the modified drawing must be updated with regard to drawing number, date, editor and modification information in the customer file management system.
The date of issue is changed with modified KOCH drawings and also a modification history is maintained. Whereby

the modified positions are marked with the relevant character of the modification history.
A revision level is not maintained but with regard to drawings you always have to observe the date of issue.

3.4 Deburring

The components must be perfectly deburred. KOCH deburrs the outside of the components with a chamfer of 0.3 to 0.5 mm, the inside edge must not exceed 0.3 mm, see Image 1. All chamfers must be machined, manual deburring only takes place in exceptional cases.

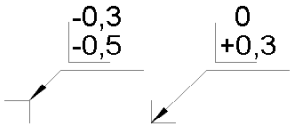


Image 1

3.5 Inspection tolerances

- **Linear dimensions, tolerance ≥ ± 1.0 mm**
  Steel rule, measuring tape (vernier caliper, micrometer, gauge blocks, altimeter)

- **Linear dimensions, tolerance ≥ ± 0.1 mm**
  Vernier caliper (micrometer, gauge blocks, altimeter, measuring machine)

- **Linear dimensions, tolerance ≤ ± 0.1 mm**
  Micrometer, gauge blocks, altimeter, measuring machine

- **Fits**
  Fits with gauges (plug gauge)
  special diameter with three-point micrometer, altimeter, measuring machine

- **Geometric tolerances**
  appropriate measurement setups, measuring machine, altimeter

- **Surface**
  With comparison standard, surface measuring instrument

- **Thread**
  With thread gauges, tolerance field: mandrels 6H rings 6g
  Thread depth via maximum possible insertion depth of the thread plug gauge

4 Surfaces

Aluminum parts of KOCH are available in a natural anodized finish as standard.
In the order of KOCH, it is clearly indicated whether the part is required with or without surface treatment.

4.1 Aluminum parts without surface treatment

Permissible roughness values Rz:

- Unprocessed surfaces (raw) max. Rz 12,5 µm
- Processed surface in accordance with the drawing specifications

4.2 Aluminum parts with surface treatment

The rolling skin on visible surfaces must be removed by machining when the parts are not machined on all sides. Machining is not necessary when the raw dimension corresponds to the manufacturing dimension (e.g. angle profiles).

Permissible roughness values Ra / Rz:

- Machined surfaces according to drawing specifications

Anodized production parts (natural and hard anodizing)**:**
The machined parts must have a uniform surface structure and must be free from steel parts (e.g. Ensat® bushes).

Method:
Eloxal stands for electrolytically oxidized aluminum. The Eloxal layer usually is a layer produced with direct current and anodic polarization. The Eloxal layer mainly consists of aluminum oxide. The layer characteristics and thickness can be controlled within limited bounds and therefore can be adapted to the most varied requirements. The Eloxal layer is not applied as a foreign layer onto the aluminum surface. It grows from the basic material by conversion of metallic aluminum into aluminum oxide. There are several types of Eloxal electrolytes. The so-called GS method on sulphuric acid-based working with or without additives is mainly used.

Coloring:
A specialty is the coloring of the Eloxal layer. For decorative purposes the porous structure of the freshly generated oxide surface is used to include colorings.

Following coloring is possible with KOCH: black, blue, gold-colored respectively nickel silver, red

Coating thicknesses:
In order to standardise our processes, the coating thicknesses of the anodised parts have been standardised.
The following coating thicknesses apply, irrespective of the drawing specification:
Natural and coloured anodised parts: 10µm ±3µm
Hard anodised parts: 30µm+5µmSchichtdicken:

4.3 Sheet metal parts

- External contours must not have sharp edges
- Round surrounding edges by **0.3 mm x 45°**
- Surface treatment in accordance with drawing
- KOCH sheet metal parts are constructed with a K factor of 0.35
- Ensure that the **micro-bridge** is removed when cutting respectively cutting out contours

4.4 Sheet metal parts made of stainless steel

- Surfaces in accordance with drawing specifications
- Parts with indication of the arrow direction (↔) must be carried out in brushed surface quality (max. Ra 0.5 µm).
- Weld seams must be pickled. The components must be cleaned inside and outside from pickling residues!

4.5 Plastic parts

Parts made of plastic must not be barrel finished (trowalized).

4.6 Vacuum hardening

The drawing indicates whether the production part must be hardened and which hardening method shall be used.

4.7 Design surface | design part

Design surfaces respectively design parts must be manufactured with the highest quality and must appear optically perfect.

5 Welded assemblies

Almost all necessary information for welding is on the drawing.
Additionally, following guidelines apply:

- Black material with scale layers must not be used
- Welding beads must be removed from the component
- All external weld seams must be evenly slurred
- The KOCH part number must be placed so that it is also visible after varnishing
- The components must be exactly filled and grinded. Special attention should be paid to ensure that the roughness values are smaller than Rz = 100
- **Stainless steel welded assemblies:** weld seams must be pickled. The components must be cleaned inside and outside from pickling residues!

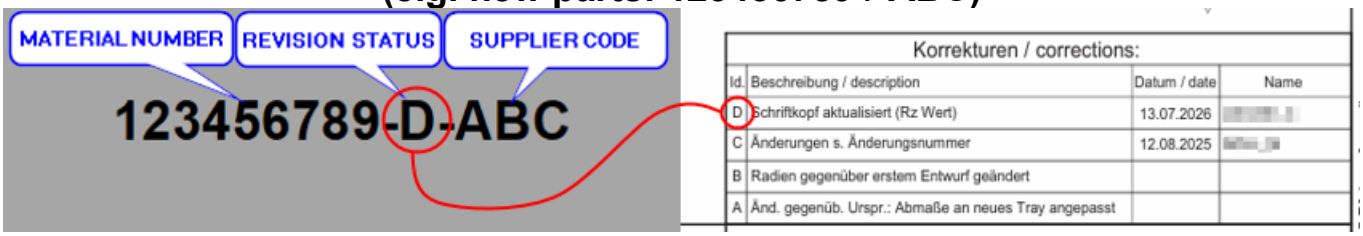
6 Marking of production parts

6.1 Font size

- Font size: **3 mm**
- Length of the nine-digit number + revision status (see drawing) + 3-digit supplier code: **60 mm** (standard) (e.g. K-0385182-D-ABC od.300004067-/-ABC)

All production parts must be marked with the m**aterial number** (drawing number), **revision status** and the **supplier code**, except if it is not possible due to the size and characteristics of the parts.
Orientation and position see drawing details, parts without revision status (e.g. new parts) use the sign "**/**".
If there is no positioning of the marking given in the drawing, it is freely selectable.

MATERIALNUMBER-REVISION STATUS-SUPPLIERCODE
(e.g. 123456789-D-ABC)
(e.g. new parts: 123456789-/-ABC)



6.2 Parts without marking

- Plexiglass parts, thin-walled tubes, pre-machined parts must be marked with adhesive labels.
  Small parts can be packed in labeled bags. Long, thin parts gathered in bundles (if possible) and mark bundles.

6.3 Round parts

Observe diameter:

- The product number or drawing number can be engraved on the lateral surfaces from a diameter of 10 mm. Front side marking of round parts is possible from a diameter of 20 mm

6.4 Form of marking

- Serial parts must be marked with the material number, revision status and the supplier code (e.g. K-0385182-D-ABC od.300004067-/-ABC)
- The marking must be carried out without blanks

If further code letters or numbers must be engraved on a part, they must not be used in connection with the drawing number.

General marking methods:

- Machine-made marking with full radius milling cutter (r = 1mm) or Laser (**NO** raised areas!)
- Marking with engraving device (needle or graver)
- Marking by etching
- Adhesive labels with printing or manual marking (adhesive labels must be removed residue-free)

- Equip bags with printed adhesive tapes or bags with manual marking
- Markings with electric engraver, letter/number punches and waterproof pens are not permitted

For sheet metal parts the following must be observed:

Sheet metal parts are equipped with drawing numbers by laser. The general marking methods are valid in special cases.

6.5 With steel frames

With marking of steel frames, it must be ensured that the drawing number is always in the vicinity of the leveling foot and clearly legible on the outside.

6.6 Machine-made marking

- Font size: **3 mm**
- Depth: **0.15 +/- 0.05 mm**
- Font: **Arial**

7 Shipment of production parts and assemblies

With shipment of production parts, it is preconditioned that they are:

- free from dirt
- wrapped in paper, cardboard or air bubble film
- not wrapped in stretch film
- well packed

8 Modification history

Version	Initials	Date	Description of modification
001	AED	09.10.2014	Item 4 and 5 added
002	AED	14.10.2014	Completely revised
003	AED	23.10.2014	Welding assemblies added
004	AED	30.10.2014	Labeling of steel frames added
005	AED	03.11.2014	General tolerances added
006	AED	10.11.2014	Adaptation to Corporate Design
007	KHA	26.02.2015	Conversion of roughness values from Ra to Rz
008	KHA	11.03.2015	Entry of correction factor with sheet metal parts 0.35
009	KHA	24.08.2015	Sheet metal deburring converted to 0.3 mm
010	KHA	12.11.2015	Sheet metal deburring converted from 0.3 to 0.5 mm
011	KHA	25.01.2016	Modification in area 3.1 m / K tolerances modified
012	KAN	18.04.2016	Modification in area 4.3 / micro-bridge removal
013	KHA	21.11.2016	Removal of pickling residues on stainless steel parts (chapter 4.4/5)
014	KHA	20.12.2016	Sheet metal deburring converted to 0.3 mm
015	URO	11.05.2017	Chapter 3.3 Repeat parts: version check only via issue date of the drawing
016	KHA	27.07.2017	Chapter 3.4 conversion of deburring from 0.3 to 0.5 mm
017	HJ2	15.06.2019	Chapter 3.4 Deburring changed from outer edge 0.5 to 0.3 - 0.5mm and inner edge guideline from 0 - 0.3mm created
018	KHA	21.01.2022	Chapter 4.1 from Rz 6,3 to Rz 12,5 µm
019	KHA	26.01.2022	Chapter 6 Drawing Numbers Adjustment SAP
020	KHA	29.08.2022	Header entry / Chapter 1 Note end.
021	KHA	17.01.2023	Chapter 6.1 Article number changed to material number. Chapter 4.2 Layer thicknesses
022	LIM	08.06.2026	Chapter 6.1 Length of marking changed from 36mm to 52mm, added additional marking fort the supplier code, added a marking example Chapter 6.4 added additional marking fort the supplier code, added machine marking by Laser
023	LIM	07.08.2026	Chapter 6.1 Length of marking changed from 52mm to 60mm, added additional marking fort the revision status, added a marking example + schematic diagram Chapter 6.4 added additional marking fort the revision status