

1. General

This norm describes technical and quality requirements of mechanical parts. Mechanical parts are panels, frames, sheet metals, glasses, PCB, etc.

2. Parameters of mechanical parts

2.1. Materials of mechanical parts

Mechanical part	standard material, unless otherwise mentioned
Aluminium front panel	AlMg3; Al99,5
Sheet metal	DX51D+Z275-MAC; DC01
Glass	float; white
PCB	FR4;

2.2. Surface finishing of parts

A surface of mechanical parts can be provided by additional surface treatment and passivation such as anodizing, powder and wet coating, galvanized, chromating etc.

The dimensions of mechanical parts shown on a drawing are including a surface treatment and passivation.

Anodizing of aluminum parts

Anodized parts are first pre-prepared (E6="pickling") and then anodized. A result is chemically matted surface.

Colors of anodizing are according to "EURAS standard" colors.

Common used color shades:

- C0 colorless
- C35 black
- C8 black/organic

An example of designation: "E6/C0".

Standard thickness of anodizing is $20 \pm 5 \mu\text{m}$, unless otherwise mentioned.

After anodizing must not be seen traces of milling, grinding and another machining. Panels, frames and etc. are supplied grease-free, clean and free of splinters.

Mounting holes or threads (M4) are necessary for fixing during anodized process. Positions of these holes or threads are free on invisible areas. Defects on visible areas are not allowed.

Wet and powder coating

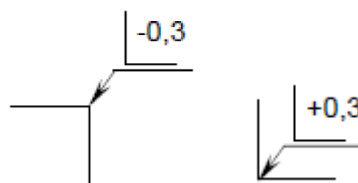
Standard thickness of a lacquer is $0,1 \pm 0,02 \text{mm}$, unless otherwise mentioned.

2.3. Direction of rolling

Direction of rolling is free, unless otherwise mentioned.

2.4. Edge processing (Edging)

Edges are free of burrs that can harm people. The following parameters are valid for machining of inner and outer edges:



2.5. Transitions between milling toolpaths

The maximum permitted transitions of the milling toolpaths are defined as the flatness between the "grooves" and the "protrusions (lands)" of the milling toolpaths (so-called stairs).

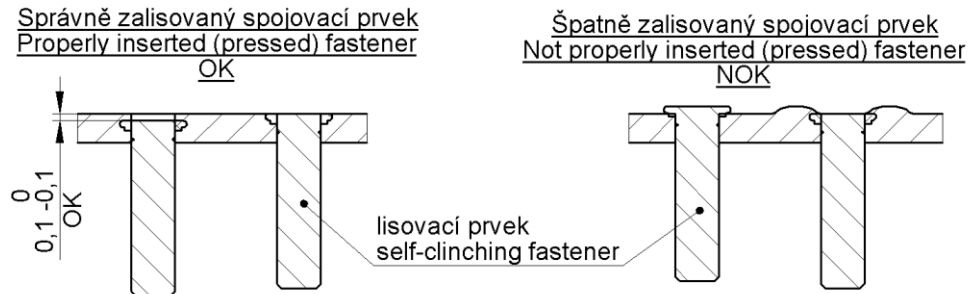
The maximum allowed flatness of these stairs for the front panels according to class 1 is 0.03 mm.

The maximum allowed flatness of these stairs for the front panels according to class 2 is 0.015 mm.

3. Fasteners inserting and welding

3.1. Surface flatness in an area of a fastener heads

Neither a hat of a fastener nor material of a mechanical part must overlap a surrounding material. An inserted (pressed) hat of a fastener can be max. 0,1mm below a level of a surrounding material.

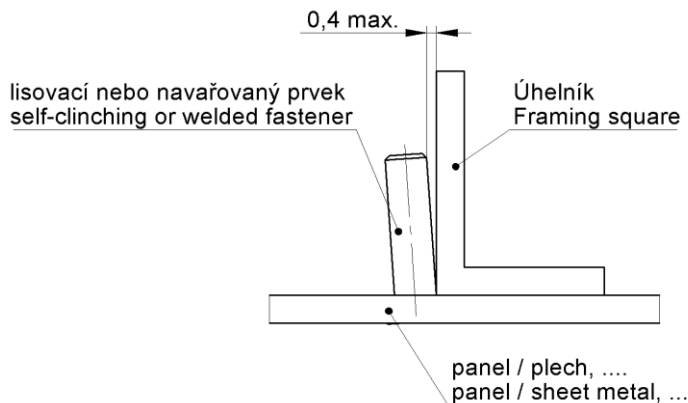


3.2. Flatness of mechanical parts

Mechanical parts have flatness 0,3mm even after inserted (pressed) or welded fasteners, unless otherwise mentioned.

3.3. Perpendicularity of inserted and welded fasteners

The perpendicular tolerance is according to ISO 2768-2, Tolerance class K. Maximal deviation for fasteners into a length 100mm is 0,4mm.

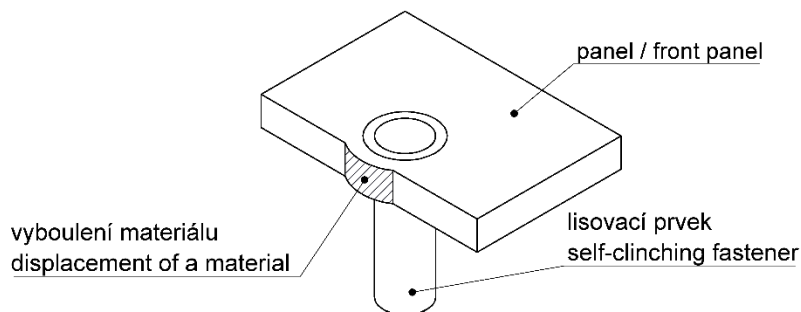


3.4. Damage of a visible surface of a mechanical part

Imprints (foots), cracks and similar defects are not allowed on visible areas or on areas with surface treatment of mechanical parts after inserting (pressing) or welding fasteners.

3.5. Displacement of a front panel edge after self-clinching fasteners pressing

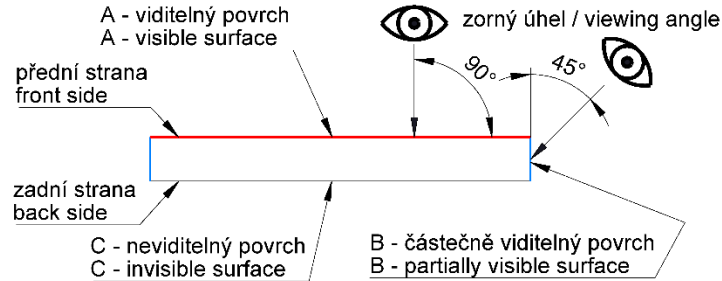
Material displacement is not allowed after self-clinching fasteners pressing neither on the outer nor on the inner edge of a front panel unless it is allowed in the drawing.



4. Optical quality of surfaces

4.1. Visible and invisible areas

Front face is a visible area (A), unless otherwise mentioned. Sides are partially visible areas (B) and a back side is invisible area (C).



Following defects are not allowed on invisible areas (C):

- Strong scratches that damage a lacquer, a powder and wet coating or an anodized surface of mechanical parts
- unevenness that can be seen after assembling
- pollution (debris residues, contamination)

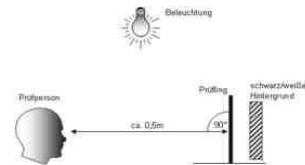
Viewing angle 45° is valid for partially visible areas (B) in relation to a visible area.

4.2. Test criteria

Inspection personnel trained, experienced, normally-sighted persons

Viewing distance (mm) 500

Viewing angle 90 °, mirroring not permitted
 (towards viewing direction)



Illumination

- » Impinging light 800-1000 lx normal light D50 or D65
- » Transmitted light Light table

Display window

Inspection against black/white background or upon customer agreement.

Quotation from FACHGEMEINSCHAFT EINGABESYSTEME (FT Quality Directive)

Glass is optically check against a bright and a dark background.

4.3. Optical parameters

Dirt and dust inclusions spots/fluff/score marks/ scratches	Touch (TS / PCT) Class T	standard optical requirements class 1	increased optical requirements class 2
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» max. size (mm ²)	0.32	0.25	0.16
» Weak color contrast (max. size v mm ²)	0.5	0.4	0.25
» Max. no. / 100 cm ²	3	2	1
» Minimum clearance (mm)	50	50	80

With windows smaller than 100 cm², the max. no. of defects applies for the entire window area and as minimum clearance:
 Diagonal length (mm) / 2.

» Lower tolerance (mm ²)	0.063
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Quotation from FACHGEMEINSCHAFT EINGABESYSTEME (FT Quality Directive)

Scratches

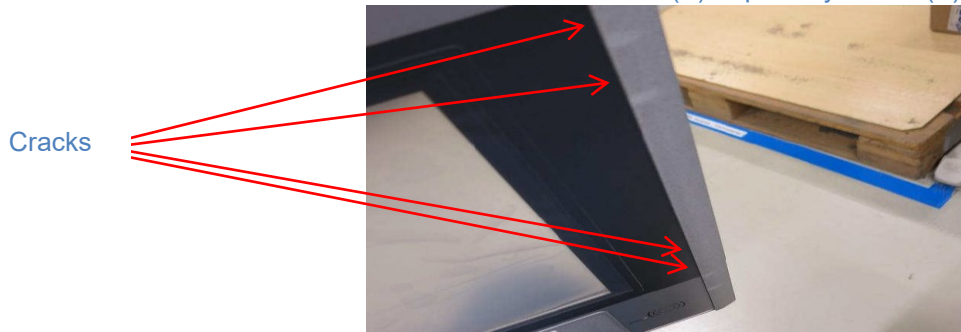
Optical requirements of the scratches

- max. scratch: width ≤ 0.05 mm and any length: ignore
- width ≤ 0.1 mm and length < 10 mm: ignore
- width ≤ 0.1 mm and length ≥ 10 mm: not allowed
- width > 0.1 mm: not allowed

Quotation from SECZ norm PN7-0001_10

4.4. Cracks in an anodized surface

Cracks in an anodized surface are not allowed for a visible (A) or partially visible (B) surfaces.



Quotation from SGBMH norm 0150.9301e

4.5. Painted surfaces – Powder coating / Wet coating

The minimum adhesion of the paint must be guaranteed according to ISO 2409:2020 (Cross-cut test). Reworking / correction of the paint is allowed but must not be visible according to the specification defined in item 4.2.

Dusting from the surface finishing on invisible surfaces (C) is allowed, unless otherwise mentioned. Streaks in the painted surface and accumulation (pilling) of the paint is not allowed.

Type of defect	Maximum allowed defect size	Maximum number of defects according to the surface defined in item 4.1			Notes
		A	B	C	
Point defects, inclusions, structural defects	$< 0.15\text{mm}^2$	allowed*			of the same color contrast
	$\leq 0.2\text{mm}^2$	2	2	4	
	$\leq 0.4\text{mm}^2$	1	1	1	
	$\leq 0.8\text{mm}^2$	0	0	1	
Imprints, pressure points	$< 0.2\text{mm}^2$	2	allowed *		
	$\leq 0.8\text{mm}^2$	1	1	allowed *	
Lines, scratches	$< 0,1 \text{ mm}^2$ (line)	allowed*	allowed*	$\leq 0,8 \text{ mm}^2$ allowed*	
	$\leq L*B 6\text{mm}*0,05\text{mm}$	1	1		
	$\leq L*B 6\text{mm}*0,1\text{mm}$	0	1		
	$\leq L*B 3\text{mm}*0,1 \text{ mm}$	1	2		
	$\leq L*B 10\text{mm}*0,05\text{mm}$	1	2		
	$\leq L*B 20\text{mm}*0,1 \text{ mm}$	0	1		
The description and the number of defects only apply to painted surfaces.					
Maximum allowed number of defects on the visible surface (A) -> 2					
Total number of allowed defects -> 8					
* Minimum distance between defects 20mm					

Quotation from SGBMH norm 0150.9301e

Release:	Date:	Change description:
00	30.1.2018	First edition
01	-	-
02	22.7.2021	Steps in milling 2.5, cracks 4.4, visible areas 4.1, displacement 3.5, painted surfaces 4.5, optical parameters 4.3

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