Corrosion protection: Electroplated coatings

The technical conditions of delivery ISO 4042 apply to electroplated coatings on standard and non-standard fasteners.

Example for a short description of the desired electroplated coatings:

Description according to ISO 4042 – attachment B
(e.g. ISO 4014 – M16 x 60 – 8.8 Fe/Zn5c Bk)

Fe/Zn	5	c	Bk
			Type of chromation Bk = Black
		Chromation	
	Minimum coat thickness of the coating metal 5 = 5 µm (eff. detail!)		
Type of application of the coating material, whereby Fe = iron/steel describes the basic material and Zn = Zinc, the coating material			

Description according to ISO 4042 – attachment E
(e.g. ISO 4014 – M16 x 60 – 8.8 A2S)

A	2	S
		Degree of gloss and post-processing of the chromation S = black
	Code number for the minimum layer thickness and layer composition 2 = 5 µm (encrypted detail)	
Code letter for coating metal A = zinc		

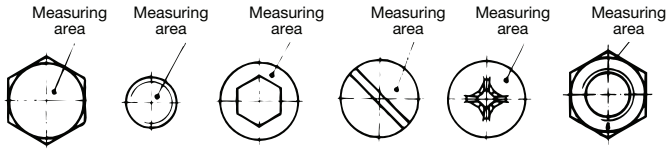
a) Coating metal

A	= Zn	= Zinc
B	= Cd	= Cadmium
C	= Cu	= Copper
D	= CuZn	= Brass
E	= Ni	= Nickel
F	= NiCr	= Nickel-Chrome
G	= CuNi	= Copper-Nickel
H	= CuNiCr	= Copper-Nickel-Chrome
J	= Sn	= Tin

b) Layer thickness/µm
(2 coating metals)

1 =	3 –
2 =	5 (2 + 3)
3 =	8 (3 + 5)
9 =	10 (4 + 6)
4 =	12 (4 + 8)
5 =	15 (5 + 10)
6 =	20 (8 + 12)
7 =	25 (10 + 15)
8 =	30 (12 + 18)

When testing, the layer thickness at the measuring point applies.



c) Postprocessing (passivation/chromation)

	Degree of gloss	Types of process	Colour
A =		A	colourless
B =	mt	B	bluish
C =	(matt)	C	yellowish*
D =		D	olive*
E =		A	colourless
F =	bk	B	bluish
G =	(blank)	C	yellowish*
H =		D	olive*
J =		A	colourless
K =	gl	B	bluish
L =	(glossy)	C	yellowish*
M =		D	olive*
P/U =	any	like B, C or D	
R =	mt (matt)	F/Bk	black*
S =	bk (blank)	F/Bk	
T =	gl (glossy)	F/Bk	

*** Attention: Contains chrome VI**

Normal storage:

ZP = zinc plated	Layer thickness = Type (≧ M 5)
YZP = zinc plated yellow	approx. 5 µm = A2A/A2B/A2E/A2F
ZPTLP = zinc plated 8 TLP	approx. 5 µm = A2C/A2G/A2L
	approx. 8 µm with thick layer passivation

The thread tolerances apply **before** the coatings are plated (when coating, the zero line may not be exceeded with screw threads or come up short with nut threads). Thus the screw thread with coating can be positioned between the upper size of the tolerance field and the zero line.

In the interest of threadability, the layer thickness for thread parts with a normal degree of tolerance of 6g/6H is logically limited. The empirically recommended limit values possible according to ISO 4042 can be found in Table 8. Thicker coatings require different tolerance zones with larger sizes according to DIN 13-14 (custom-made).

When inspecting the threadability, ISO 6157-1 (DIN 267-19, Section 2.7) needs to be observed.

For electroplated coatings on high-strength fasteners with tensile strengths from approx. 1000 N/mm² (e.g. 10.9 ... 12.9) and hardened fasteners with hardnesses of approx. 320 HV or more, the danger of hydrogen embrittlement cannot be ruled out with any certainty, even with well-known methods. (ISO 4042 Abs. 6 / attachment A / ISO 15330).

For this reason, these fasteners are only electroplated coated when explicitly requested to do so and on the orderer's own responsibility.
(Alternative coatings ➜ Tab. 3)

Table 8: Maximum layer thicknesses for outer threads with thread tolerance group g

Thread ∅ M	Pitch	Max. coat thickness [µm] according to ISO 4042 ① Screw length			Practice values ② Screw length	
		< 5d	5d – 10d	10d – 15d	< 5d	5d – 15d
1 – 2	0.2 – 0.4	3	3	3	-	-
2.5 – 7	0.45 – 1	5	3	3	3	(3)
8	1.25	5	5	3	5	3
10 – 16	1.5 – 2	8	5	5	5	3
18 - 22	2.5	10	8	5	(8)	5
24 – 27	3	12	8	8	8	5
30 – 33	3.5	12	10	8	8	8
36 – 52	4 – 5	15	12	10	10	8
56 – 60	5.5	15	15	12	12	10
64	6	20	15	12	12	10

① mathematical limiting value according to ISO 4042, Tab. 2
② recommended limiting value from practice in due consideration of manufacturing and procedural faults according to ISO 6157-1, -2