	Surfaces Metallic Coatings		Doc. Type		ATE	
			Doc. Num.		N 106 61.00	
			Doc. Part	000	Doc. Ver.	31
			Date: 2015-11-25		Page 1 of 21	
<div>CONTENTS</div> <div><div>1</div><div>SCOPE</div><div>2</div></div> <div><div>2</div><div>REFERENCES</div><div>2</div></div> <div><div>3</div><div>MANUFACTURER'S RESPONSIBILITY</div><div>3</div></div> <div><div>4</div><div>GENERAL HINTS AND DEFINITIONS</div><div>4</div></div> <div><div>5</div><div>COATING GROUPS</div><div>7</div></div> <div><div>5.1</div><div>Ob 1000 to 1999 Zinc and zinc alloy coatings for protection against corrosion, mainly for parts made of ferrous materials</div><div>7</div></div> <div><div>5.1.1</div><div>Ob 1000 to 1099 Zinc coatings – electroplated</div><div>7</div></div> <div><div>5.1.2</div><div>Ob 1100 bis 1399 Zinc alloy coatings – electroplated</div><div>9</div></div> <div><div>5.1.3</div><div>Ob 1500 to 1749 Zinc flake coatings with and without organic top coating; dip or spray-coated</div><div>11</div></div> <div><div>5.1.4</div><div>Ob 1750 through 1849 Zinc and zinc alloy coatings - deposited by the hot dip method (hot dip galvanizing)</div><div>13</div></div> <div><div>5.1.5</div><div>Ob 1850 through 1999 Zinc and zinc alloy coatings - mechanically coated</div><div>14</div></div> <div><div>5.2</div><div>Ob 2000 through 2499 Chromium coatings – electroplated</div><div>14</div></div> <div><div>5.3</div><div>Ob 2500 through 2999 Tin and tin alloy coatings as protection against corrosion, mainly for electric connectors and soldering terminals</div><div>15</div></div> <div><div>5.3.1</div><div>Ob 2500 through 2699 Tin and tin alloy coatings - electroplated</div><div>15</div></div> <div><div>5.3.2</div><div>Ob 2700 through 2999 Tin and tin alloy coatings - deposited by the hot dip method (hot-dip galvanizing)</div><div>15</div></div> <div><div>5.4</div><div>Ob 3000 through 3499 Nickel and nickel alloy coatings</div><div>16</div></div> <div><div>5.4.1</div><div>Ob 3000 through 3249 Nickel coatings - electroplated</div><div>16</div></div> <div><div>5.4.2</div><div>Ob 3250 through 3499 Nickel-phosphorus coatings; autocatalytically deposited</div><div>16</div></div> <div><div>5.4.2.1</div><div>Coatings mainly used for protection against corrosion</div><div>17</div></div> <div><div>5.4.2.2</div><div>Coatings mainly used for protection against abrasive wear</div><div>17</div></div> <div><div>5.5</div><div>Ob 3500 through 3999 Copper and copper alloy coatings - electroplated</div><div>18</div></div> <div><div>5.6</div><div>Ob 4000 through 4999 Silver and silver alloy coatings - electroplated</div><div>18</div></div> <div><div>5.7</div><div>Ob 4500 through 4999 Gold and gold alloy coatings - electroplated</div><div>18</div></div> <div><div>5.8</div><div>Ob 4700 through 4799 Aluminum and aluminum alloy coatings - electroplated</div><div>18</div></div> <div><div>5.9</div><div>Ob 400 through 4899 DLC wear protection coating</div><div>18</div></div> <div><div>6</div><div>ANNEXES</div><div>20</div></div> <div><div>6.1</div><div>Overview of old and new surface treatment (Ob) designations for electroplated zinc coatings</div><div>20</div></div> <div><div>6.2</div><div>Overview of old and new surface treatment (Ob) designations for electroplated zinc alloy coatings</div><div>21</div></div>						
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Changes

Paragraphs marked with [31] have been changed.

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1 SCOPE

This specification contains metallic coatings used for protection against corrosion and/or abrasive wear and/or for decorative reasons.

The corresponding Ob (surface treatment) number and the code designation permit an accurate definition of the respective coating in engineering drawings and documents.

This standard partially supersedes ATE N 106 36.11 and ATE N 106 36.31 whose usefulness as a ready reference has progressively deteriorated as a result of the continual addition of new coatings. Moreover, the coating thickness tolerances defined there in some instances no longer reflect recent practice.

2 REFERENCES

DIN 50960 Part 2	Electroplated and Chemical Coatings; Indications on Drawings
DIN 50965	Electroplated Coatings; Tin Coatings on Iron and Copper Materials
DIN EN ISO 4527	Autocatalytic (electroless) nickel-phosphorus alloy coatings
DIN EN ISO 9227	Salt Spray Fog Testing
DIN EN 13148	Copper and Copper Alloys - Hot-dip tinned Strip
DIN EN ISO 4042	Connecting Elements - Electroplated Coatings
JIS H 8617	Electroplated coatings of nickel and chromium
JIS H 8619	Electroplated coatings of tin
ATE N 106 36.11	Surfaces - Metallic Coatings
ATE N 106 36.31	Surfaces - Protected with Paint or Lacquer
ATE N 106 61.01	Metallic Coatings - Substitution of Cr(VI)-free Surface Coatings for Surface Coatings containing Cr(VI) in the Wheel Brake Division
ATE N 522 61.04	Process Specification - Galvanizing of Cast Iron and Steel
ATE N 553 81.03	Test Specification - Zinc Coatings on Cast Iron and Steel
ATE N 553 81.04	Test Specification - Zinc/Nickel - Zinc/Iron - Zinc/ Cobalt on Cast Iron and Steel
ATE N 553 81.07	Test Specification - Brake Caliper Housings and Holders of Cast Iron electroplated with Zinc or Zinc Alloys
ATE N 522 61.07	Process Specification - Chrome
ATE N 553 81.05	Test Specification - Chromium-Plated Brake Pistons made of Cast Iron and Steel.
ATE N 553 81.06	Test Specification - Disc Brake Pistons made of Steel with Nickel-Chromium Coating
ATE N 553 81.09	Product Specification - Silicate Sealing for Electroplated Zinc or Zinc Alloy Coatings
ATE N 553 81.10	Zinc Flake Coatings
ATE N 553 81.11	Product Specification - Surface Treatment for Housing Retaining Clips made of Sheet Metal

3 MANUFACTURER'S RESPONSIBILITY

Every manufacturer of parts, components or raw materials is responsible for the quality of the products it supplies.

Motor vehicle components are safety items. As a result, special quality assurance measures must be observed and the documentation requirements in the quality assurance specifications apply.

All parts must correspond to the specified technical requirements in the performance specification, drawings and specifications and other relevant internal specifications and applicable standards.

Production supplies of these parts shall only be permitted after completion of the internal release process and unrestricted First Article release. Before First Article release, supplied parts must be clearly designated and labeled as preproduction or prototype parts.

Prior to making any change to a product, its chemical composition, the production method or production location, identification or packaging, the supplier shall advise Continental Automotive in writing and must obtain prior permission for the change. The supplier shall advise Continental Automotive in writing early enough to allow a new sampling procedure to take place through to production release if necessary due to the change. The obligation to notify Continental Automotive shall also apply to changes which have no effect on compliance with the agreed technical specifications.

Modified products may not be supplied as series production parts without written approval from Continental Automotive.

Every change carried out after this must be fully documented, including at least the type of change and the date when the change was introduced as well as the date of the first production delivery to Continental Automotive.

4 GENERAL HINTS AND DEFINITIONS

Process specifications exclusively apply to in-house productions of CAS and are not intended for suppliers.

Depending on the type of coating, coatings shall be applied by one of the following methods:

Electroplating (electrodeposition) or autocatalytic deposition (chemical, electroless) in special aqueous metallic salt solutions.

Dipping in, or spraying with, lacquer-type metal pigment formulations.

Dipping in molten-metal baths (hot dip coating), such as hot-dip galvanizing.

Mechanical coating by blasting with covered particles.

In order to obtain good coatings, the parts to be coated must be suitably designed. In particular, sharp edges, corners, gaps and blind holes should be avoided.

In view of the risk of hydrogen-induced delayed brittle fracture ("hydrogen embrittlement"), parts made of heavily strain-hardened, heat treated or surface-hardened steels with a total or local tensile strength of more than 1000 N/mm² or a corresponding hardness¹ may only be pickled or electroplated in exceptional cases and in agreement with the customer. If a hydrogen-producing treatment of such steel parts cannot be avoided, then the following precautions shall be taken:

Parts which have been machined (e.g. ground) after massive forming or heat treatment must be tempered (stress-relieved) prior to electroplating for 0.5 h at 200 ±10°C / min. 1 h at 150 ±10°C.

All high-strength steel parts must be subjected to a heat treatment for effusion of hydrogen starting as soon as possible, but not later than 4 h after electroplating. Provided this has no adverse effect on the corrosion properties, the heat treatment may also take place after a chemical after-treatment (passivation, sealing), if any. The conditions to be observed are as follows: Min. 6 h at 220 ±10°C object temperature. If the steel parts must be expected to change their hardness at this temperature, the heat treatment shall be carried out at 150 ±10°C, but then for 24 h.

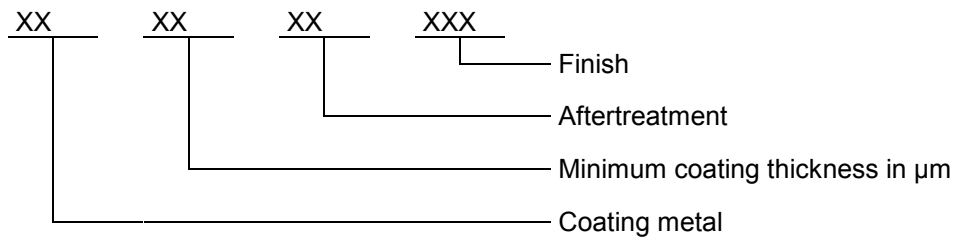
As proof of the successful completion of debrittlement, a minimum of 10 galvanized initial samples shall be subjected to a bracing test. To this end, the parts shall be permanently preloaded in installation position with the aid of suitable tools simulating the maximum forces and/or torques occurring in use and stored at room temperature for 48 h without a single failure.

¹ Local maximum hardness for locally strain-hardened or hardened parts, surface zone hardness for surface-hardened parts.

The system is structured as follows:

Ob number groups	Coating groups
Ob 1000 through 1999	Zinc and zinc alloys
Ob 2000 through 2499	Chromium and chromium applied over an intermediate coating
Ob 2500 through 2999	Tin and tin alloys
Ob 3000 through 3499	Nickel and nickel alloys
Ob 3500 through 3999	Copper and copper alloys
Ob 4000 through 4499	Silver and silver alloys
Ob 4500 through 4999	Gold and gold alloys

Code designation for electroplated coatings



Finish:

gl	=	glänzend (bright)
mt	=	matt (matte)
ht	=	hart (hard)
hg	=	halbglänzend (semi-bright)
we	=	weich (soft)
t	=	deposited by the hot dip galvanizing method
m	=	mechanically coated
vs	=	versiegelt (bremsflüssigkeitsbeständig) (sealed (brake-fluid-resistant))
vs2	=	versiegelt (höhere Qualität; bremsfl.beständig) (sealed (higher quality; brake-fluid-resistant))
sc	=	dyed sealing (brake-fluid-resistant)
oc	=	dyed organic sealing (not brake-fluid-resistant)
os	=	sealed with organic admixtures (not brake-fluid-resistant)
ol	=	geölt (oiled)
nt	=	nachgetaucht (post-dipping)

Post-treatment:

- Passivations:

f	farblos passiviert, Cr(VI)-frei (colorless passivated, free from Cr(VI))
y	metallisch irisierend passiviert, Cr(VI)-frei, "Dickschichtpassivierung" (metallic iridescent passivated, free from Cr(VI), "thick film passivation")
yc	dyed thick film passivation - color to be defined on the drawing
bp	black passivated

- Chromatings:

s	schwarz chromatiert, Cr(VI)-haltig (black chromated, containing Cr(VI))
g	gelb chromatiert, Cr(VI)-haltig (yellow chromated, containing Cr(VI))
o	oliv chromatiert, Cr(VI)-haltig (olive chromated, containing Cr(VI))

Under EU Directive 2000/53/CE, products containing Cr(VI) may no longer be put into circulation as of July 1, 2007!

Examples: Zn5y hg

Coating metal:	zinc
Minimum coating thickness:	5 µm
Aftertreatment:	thick film passivation
Finish:	semi-bright

Zn + ZnNi8f vs

Coating metal:	zinc-nickel with zinc flash
Minimum coating thickness:	8 µm (Zn + ZnNi total)
Aftertreatment:	clear passivation
Finish:	sealed

Zn8yc "yellow"

Coating metal:	zinc
Minimum coating thickness:	8 µm
Aftertreatment:	thick film passivation dyed yellow

In the following tables, the various coatings are listed according to Ob numbers together with their most important quality features.

The footnotes are explained on page 16/17.

5 COATING GROUPS

5.1 Ob 1000 to 1999 Zinc and zinc alloy coatings for protection against corrosion, mainly for parts made of ferrous materials

5.1.1 Ob 1000 to 1099 Zinc coatings – electroplated

Ob No. 1)	Code designation 2) 3) 7)	Color 4)	Coating thickness [μm] 5)	Corrosion-resistance [h] 6)	Remarks
1001	Zn2f	silver	≥2	no requirement	Only for protection in storage and transit or for identification
1002	Zn2g - contains Cr(VI)*	yellow			
1003	Zn2g hg - contains Cr(VI)*	yellow			
1004	Zn2y	metallic iridescent			
1005	Zn2y hg	metallic iridescent			
1011	Zn5f	silver	≥5	48	Protection against corrosion for parts made of iron, mainly in protected installation position
1012	Zn5s - contains Cr(VI)*	black		72	
1013	Zn5g - contains Cr(VI)* 8)	yellow		144	
1014	Zn5g hg - contains Cr(VI)*	yellow		144	
1015	Zn5o - contains Cr(VI)*	olive		144	
1016	Zn5y	metallic iridescent		144	
1017	Zn5y hg	metallic iridescent		144	
1020	Zn8	silver-gray	≥8	--	Protection against corrosion in conjunction with paint coatings
1021	Zn8f	silver		72	Protection against corrosion, mainly for externals intended for light duty
1022	Zn8s - contains Cr(VI)*	black		96	
1023	Zn8g - contains Cr(VI)* 8)	yellow		168	Protection against corrosion, mainly for externals
1024	Zn8g hg - contains Cr(VI)*	yellow		168	
1025	Zn8o - contains Cr(VI)*	olive		168	
1026	Zn8y	metallic iridescent		168	
1026.1	Zn8y	metallic iridescent		168	
1027	Zn8y hg	metallic iridescent		168	
1028	Zn8y vs	metallic iridescent		240	Be sure to refer to ATE N 553 81.09 / ATE N 553 81.07 for the selection of suitable sealings!
1029	Zn8y vs2	metallic iridescent		480	
1031	Zn12f	silver	≥12	120	Protection against corrosion, mainly for externals intended for heavy duty
1032	Zn12s - contains Cr(VI)*	black		144	
1033	Zn12g - contains Cr(VI)* 8)	yellow		216	
1034	Zn12o - contains Cr(VI)*	olive		216	
1035	Zn12y	metallic iridescent		216	
1035.1	Zn12y	metallic iridescent		240	
1038	Zn12yvs	metallic iridescent		480	
1041	Zn16f	silver	≥16	144	Protection against corrosion, mainly for externals intended for very heavy duty
1042	Zn16s - contains Cr(VI)*	black		168	
1043	Zn16g - contains Cr(VI)*	yellow		240	
1044	Zn16o - contains Cr(VI)*	olive		240	
1045	Zn16y	metallic iridescent		240	

References:

Process Specification	ATE N 522 61.04
Test Specification	ATE N 553 81.03
Product Specification	ATE N 553 81.07
Product Specification	ATE N 553 81.09
Product Specification	ATE N 553 81.11
Cr(VI)-free Substitute Surface Coatings (Wheel Brake)	ATE N 106 61.01

* Not for new designs

Ob No. 1)	Code designation 2) 3) 7)	Color 4)	Coating thickness [µm] 5)	Corrosion-resistant [h] 6)	Remarks
1053	Zn2yc	see drawing	≥ 2	no requirement	Only for protection in storage and transit or for identification
1063	Zn5yc	see drawing	≥ 5	144	Protection against corrosion for parts made of iron, mainly in protected installation position (dyed surface)
1073	Zn8yc	see drawing	≥ 8	168	Protection against corrosion, mainly for externals (dyed surface)
1083	Zn8yos	metallic iridescent	≥ 8	240	Protection against corrosion, mainly for externals Not permanently resistant to brake fluid Note ATE N 553 81.03 / 553 81.09 !

References:

Process Specification	ATE N 522 61.04
Test Specification	ATE N 553 81.03
Product Specification	ATE N 553 81.07
Product Specification	ATE N 553 81.09
Product Specification	ATE N 553 81.11
Cr(VI)-free Substitute Surface Coatings (Wheel Brake)	ATE N 106 61.01

* Not for new designs

5.1.2 Ob 1100 bis 1399 Zinc alloy coatings – electroplated

Ob No. 1)	Code designation 2) 3) 7)	Color 4)	Coating thickness [µm] 5)	Corrosion- resistant [h] 6)	Remarks
1111 1112 1113	ZnFe5f ZnFe5s - contains Cr(VI)* ZnFe5g - contains Cr(VI)*	silver black yellow	≥5	480	Protection against corrosion, mainly for externals intended for heavy duty, with minimum throwing power in bores
1121 1122	ZnFe8f ZnFe8s - contains Cr(VI)*	silver black	≥8		Protection against corrosion, mainly for externals intended for heavy duty
1123	ZnFe8g - contains Cr(VI)*	yellow			
1125	ZnFe8y vs	metallic iridescent		≥400	Be sure to refer to ATE N 553 81.09 for the selection of suitable sealings!
1211 1212 1213	ZnCo5f ZnCo5s - contains Cr(VI)* ZnCo5g - contains Cr(VI)*	silver black yellow	≥5	480	Protection against corrosion, mainly for externals intended for heavy duty, with minimum throwing power in bores
1221 1222 1223	ZnCo8f ZnCo8s - contains Cr(VI)* ZnCo8g - contains Cr(VI)*	silver black yellow	≥8		Protection against corrosion, mainly for externals intended for heavy duty
1311 1312 1313	ZnNi5f ZnNi5s - contains Cr(VI)* ZnNi5g - contains Cr(VI)*	silver black yellow	≥5		720
1320	ZnNi8	silver	≥8	600	ZnNi coating without passivation, e.g. for parts where passivation would adversely affect further processing (such as welding)
1321 1322 1323	ZnNi8f ZnNi8s - contains Cr(VI)* ZnNi8g - contains Cr(VI)*	silver black yellow	≥8	720	Protection against corrosion, mainly for externals intended for heavy duty For components for the VW Group additional, correspondingly marked requirements listed in standards ATE N 55381.04 and ATE N 55381.07 must be fulfilled.
1325	ZnNi8f vs	silver	≥8	720	Protection against corrosion for externals intended for heavy duty, mainly for brake calipers without prior Zn-flash, Cr(VI) - free. Be sure to refer to ATE N 553 81.09 and ATE N 553 81.07 for the selection of suitable sealings! For components for the VW Group additional, correspondingly marked requirements listed in standards ATE N 55381.04 and ATE N 55381.07 must be fulfilled.
1326	ZnNi8f os	silver	≥8	720	Protection against corrosion for externals intended for heavy duty, not permanently brake-fluid-resistant . See ATE N 55381.04 and ATE N 55381.09.
1327	ZnNi 12 bp nt	black	≥ 12	720	Protection against corrosion for externals intended for heavy duty; e.g. brake calipers without prior Zn-flash, Cr(VI) - free.
1331	Zn+ZnNi8g contains Cr(VI)*	yellow	(Zn) ≥3 + (ZnNi) ≥5	720	Protection against corrosion with prior Zn-flash for externals intended for heavy duty made of cast iron, especially for brake caliper holders
1332	Zn+ZnNi8g ol contains Cr(VI)*				Same as Ob 1331, but oiled as specified in the drawing to reduce friction. Not for parts which are in contact with rubber parts or brake fluid.

References:
Test Specification
Product Specification
Product Specification
Cr(VI)-free Substitute Surface Coatings (Wheel Brake)

ATE N 553 81.04
ATE N 553 81.07
ATE N 553 81.09
ATE N 106 61.01

* Not for new designs

Ob No. 1)	Code designation 2) 3) 7)	Color 4)	Coating thickness [µm] 5)	Corrosion-resistant [h] 6)	Remarks
1333	Zn+ZnNi8f vs	silver	(Zn) ≥3 + (ZnNi) ≥5	720	Anticorrosive ZnNi coating with prior Zn-flash and sealing for externals intended for heavy duty, e.g. brake calipers, Cr(VI) - free. Be sure to refer to ATE N 553 81.09 / ATE N 553 81.07 for the selection of suitable sealings!
1336	ZnNi8 yc sc	black	≥8	720	Protection against corrosion for externals intended for heavy duty, Cr(VI) - free, dyed with dyed silicate sealing. Be sure to refer to ATE N 553 81.09 for the selection of suitable sealings!

References:

Test Specification

Product Specification

Product Specification

Cr(VI)-free Substitute Surface Coatings (Wheel Brake)

ATE N 553 81.04

ATE N 553 81.07

ATE N 553 81.09

ATE N 106 61.01

* Not for new designs

5.1.3 Ob 1500 to 1749 Zinc flake coatings with and without organic top coating; dip or spray-coated

Protection against corrosion for parts intended for very heavy duty and parts which must not be electroplated because there is a risk of hydrogen embrittlement

Ob No. 1)	Code designation 2)	Color	Coating thickness (recommenda- tions) [µm] 5)	Requirements according to ATE N 553 81.10 6)	Remarks 7)
1501	Dacromet 320	silver	≥ 5	480	containing Cr(VI) - Not for new designs
1502			≥ 8	720	
1511	Dacromet 500		≥ 5	480	containing Cr(VI) - with lubricant, mainly for threaded parts - Not for new designs
1512			≥ 8	720	
1521	Geomet D		≥ 5	ZL1	free from Cr(VI) - protection against corrosion, e.g. for brake discs
1522	Geomet 321 Plus VL		≥ 8 + ≥ 2	ZL5	with silicate sealant with lubricant, resistant to chemicals
1523	JMTG - 300 (Geomet)		≥ 5	ZL1	free from Cr(VI) - protection against corrosion, e.g. for brake discs
1551	MagniFlake		silver	≥ 8	ZL4
1552	MagniTop	silver or black	≥ 2	--	organic top coat
1553	Magni 565 = MagniFlake + MagniTop	silver or black	approx. 9 + approx. 5	ZL6	free from Cr(VI); zinc flake coating with organic top coat corresponding to ZL6 - ATE N 553 81.10
1570	Weco - Alutherm 80 Weckerle	silver	≥ 15	≥ 96h	Coating containing Al for brake disks
1601	Delta Seal	to drawing	≥ 8	120	organic top coat
1602	Delta Seal GZ	silver or black			organic top coat with lubricant
1611	Delta Tone	silver			ZL2
1613	Delta Tone + Delta Seal	to drawing	approx. 8 + approx. 6	two coats, but requirement ZL3	
1614	Delta Tone + Delta Seal GZ	silver or black		ZL3	
1621	Delta Tone	silver	≥ 12	ZL3	
1623	Delta Tone + Delta Seal	to drawing	approx. 10 + approx. 8	ZL8	
1624	Delta Tone + Delta Seal GZ	silver or black			

Ob No. 1)	Code designation 2)	Color	Coating thickness (recommenda- tions) [µm] 5)	Requirements according to ATE N 553 81.10 6)	Remarks 7)
1631	Delta Protekt KL 100	silver	≥ 8	ZL4	provides higher temperature resistance than Delta Tone
1633	Delta Protekt KL 100 + Delta Seal	silver	≥ 8 + ≥ 6	ZL6	with organic sealant
1634	Delta Protekt KL 100 + Delta Seal	black	≥ 8 + ≥ 6	ZL6	with black organic sealant
1635	Delta Protekt KL 100 + Delta Seal GZ	silver	≥ 8 + ≥ 6	ZL6	with organic sealant and additional lubricant content
1636	Delta Protekt KL 100 + Delta Seal GZ	black	≥ 8 + ≥ 6	ZL6	with organic sealant and additional lubricant content
1641	Delta Protekt KL 100 + Delta Protekt VH 300	silver	≥ 8 + ≥ 2	ZL5	with silicate sealant without lubricant, resistant to chemicals
1642	Delta Protekt KL 100 + Delta Protekt VH 301	silver	≥ 8 + ≥ 2	ZL5	with silicate sealant with lubricant, resistant to chemicals
1643	Delta Protekt KH 250	silver-grey	≥ 8	ZL1*	free from Cr(VI) - protection against corrosion, e.g. for brake discs
1644	Delta Protekt KL100 + Delta Protekt VH 315	silver	≥ 8 + ≥ 2	ZL5	with silicate sealing with lubricant, resistant to chemicals, for joining elements, in combination with castings coated with ZnNi from an acid electrolyte

* to aim at

Ob No. 1)	Code designation 2)	Color	Coating thickness (recommenda- tions) [µm] 5)	Requirements according to ATE N 553 81.10 6)	Remarks 7)
1711	Zintek	silver	≥ 7	ZL4	Cr(VI)-free zinc flake system
1712	Zintek + Techseal	silver	≥ 8	ZL6	Cr(VI)-free zinc flake system with organic top coat
1713	Zintek + Techseal	black	≥ 9	ZL6	Cr(VI)-free zinc flake system with organic top coat
1714	Zintek + Techseal WL	silver	≥ 8	ZL6	Cr(VI)-free zinc flake system with organic top coat and lubricant
1715	Zintek + Techseal WL	black	≥ 9	ZL6	Cr(VI)-free zinc flake system with organic top coat and lubricant
1716	Zintek + Techseal	silver	≥ 10	ZL7	Cr(VI)-free zinc flake system with organic top coat
1717	Zintek + Techseal WL	silver	≥ 10	ZL7	Cr(VI)-free zinc flake system with organic top coat and lubricant
1721	Zintek 500	silver	≥ 8	ZL1	Cr(VI)-free zinc flake system Protection against corrosion, e.g. for brake discs
1732	Zintek + Zintek Top	silver	≥ 8	ZL6	Cr(VI)-free zinc flake system with inorganic top coat protection against corrosion, e.g. for brake discs
1734	Zintek + Zintek Top L	silver	≥ 8	ZL6	Cr(VI)-free zinc flake system with inorganic top coat and wax-based lubricant

References:

Product Specification

ATE N 553 81.10

Product Specification

ATE N 553 81.11


Cr(VI)-free Substitute Surface Coatings (Wheel Brake)

ATE N 106 61.01

5.1.4 Ob 1750 through 1849 Zinc and zinc alloy coatings - deposited by the hot dip method (hot dip galvanizing)

Protection against corrosion for parts intended for heavy duty and parts which must not be electroplated because there is a risk of hydrogen embrittlement. Protection against corrosion may be enhanced by subsequent passivation.

Ob No. 1)	Code designation 2)	Color	Coating thickness [µm] 5)	Corrosion- resistant [h] 6)	Remarks
1801	Bezinal		approx. 9	200	95% Zn 5% Al weight of coating approx. 60 g / m ² e.g. for housing retaining clips
1802	ZAM	grey	approx. 15 (10 -20)	600	91%Zn 6%Al3%Mg weight of coating approx. 65g / m ² e.g. for motor housings

	Surfaces Metallic Coatings	Doc. Type	ATE		
		Doc. Num.	N 106 61.00		
		Doc. Part	000	Doc. Ver.	31
		Date:	2015-11-25	Page 14 of 21	

5.1.5 Ob 1850 through 1999 Zinc and zinc alloy coatings - mechanically coated

Ob No. 1)	Code designation	Color	Coating thickness [µm] 5)	Corrosion- resistant [h] 6)	Remarks
1901	Zn m	silver	≥10 µm	>72h	Mechanical zinc for high-strength joining elements with low corrosion protection requirements. Cu is used for adhesion.

5.2 Ob 2000 through 2499 Chromium coatings – electroplated

Ob No. 1)	Code designation	Color	Coating thickness µm] 5)	Corrosion- resistant [h] 6)	Remarks
2011	Cr8 we	silver	≥ 8	≥ 6	Soft chromium plate, 550 to 800 HV 0.015, protection against corrosion and abrasive wear, mainly for brake pistons. Process Specification: ATE N 522 61.07 (internal) Test Specification: ATE N 553 81.05
2021	Cr4 ht		≥ 4	---	Hard chrome HV ≥ 800, (in case of doubt, refer to test or product specification) protection against corrosion and abrasive wear, e.g. for piston rods Brake pistons shall meet the requirements of test specifications ATE N 553 81.06; ATE N 553 81.05
2023	Cr10 ht		≥ 10	---	
2024	Cr15 ht		≥ 15	---	
2027	Cr50 ht		≥ 50	---	Hard chrome HRC 64 + 4, protection against corrosion and abrasive wear, e.g. bore for hand brake lever
2035	Cr300 ht		≥ 300	---	

5.3 Ob 2500 through 2999 Tin and tin alloy coatings as protection against corrosion, mainly for electric connectors and soldering terminals

5.3.1 Ob 2500 through 2699 Tin and tin alloy coatings - electroplated

[30]


Do not deposit on brass without copper or nickel flash (solderability!).

Ob No. 1)	Code designation	Color	Coating thickness [μm] 5)	Remarks
2501	Sn2 gl	silver	≥ 2	in accordance with DIN 50965 / JIS H 8619 for protection against corrosion or as soldering aid, e.g. for connecting lugs. Caution: Tends to form whiskers
2502	Sn5 gl	silver	≥ 6	
2503	SnPb	silver	1 - 3	Electrotinned with max. 7% Pb
2504	SnPb	silver	≥ 5	Electrotinned with max. 5% Pb.
2553	SnZn 8f	silver	≥ 8	TinZinc-alloy with 30% Zn; coating thickness ≥ 8 μm, transparent passivated; Requirement A : PS-8956 [2013-06-12]; PS-8956E Code 30
2580 [30]	Sn1 mt	dull silver	≥ 0,3	Tolerances see drawing Only low whisker formation tendency with a copper or nickel undercoating
2601	Sn4 mt	dull silver	≥ 4	in accordance with DIN 50965 / JIS H 8619 for protection against corrosion or as soldering aid, e.g. for connecting lugs. Only low whisker formation tendency with a copper or nickel undercoating
2602	Sn8 mt	dull silver	≥ 8	
2603	Sn12 mt	dull silver	≥ 12	

5.3.2 Ob 2700 through 2999 Tin and tin alloy coatings - deposited by the hot dip method (hot-dip galvanizing)

Do not deposit on brass without copper or nickel flash (solderability!).

Ob No. 1)	Code designation	Color	Coating thickness [μm] 5)	Remarks
2704	Sn2 t	silver	≥ 2	Protection against corrosion in accordance with DIN EN 13148
2706	Sn3 t	silver	≥ 3	Improved shelf life in accordance with DIN EN 13148
2708	Sn5 t	silver	≥ 5	Good protection against corrosion and/or soldering aid (with no whisker formation tendency) e.g. for connecting lugs in accordance with DIN EN 13148
2710	Sn8 t	silver	≥ 8	

	Surfaces Metallic Coatings	Doc. Type	ATE		
		Doc. Num.	N 106 61.00		
		Doc. Part	000	Doc. Ver.	31
		Date:	2015-11-25	Page 16 of 21	

5.4 Ob 3000 through 3499 Nickel and nickel alloy coatings

5.4.1 Ob 3000 through 3249 Nickel coatings - electroplated

Ob No. 1)	Code designation	Color	Coating thickness [μm] 5)	Corrosion-resistant [h]	Remarks
3001	Ni 1	silver	≥ 0.5	---	e.g. as diffusion barrier on copper and copper alloys prior to tin, silver or gold plating; also as nickel undercoating of pure tin to reduce the risk of whisker formation
3003	Ni 3	silver	≥ 3	24	
3005	Ni 5	silver	≥ 5	24	e.g. on copper for protection against corrosion in accordance with JIS H 8617

5.4.2 Ob 3250 through 3499 Nickel-phosphorus coatings; autocatalytically deposited

Autocatalytically deposited nickel-phosphorus coatings (electroless nickel) in accordance with DIN EN ISO 4527 are normally plated with a phosphorus content of 2 to 13% and a hardness of 500 HV to 800 HV.

They are mainly used for protection against corrosion and/or abrasive wear. Unlike electrochemically deposited nickel coatings, they are characterized by a particularly uniform distribution of coating thickness on the component.

Adhesion and ductility of the coatings can be improved by an additional heat treatment (2h/200°C +10°C). Heat treatment at 300°C to 400°C permits the hardness to be increased to max. 1000 HV. For some applications, this may, however, reduce the resistance to corrosion.

The additional inclusion of silicon carbide or PTFE has a positive effect on the wear and friction behavior of coatings with particularly high requirements in this respect.

In view of the great variety of process variants and influencing parameters, the coating process must be designed to suit the component if special requirements must be met with respect to protection against abrasive wear or corrosion.

Generally, it is safe to assume that the protection against corrosion and/or abrasive wear of a coating can be improved by increasing the coating thickness.

In the code designation, the letters "K" and "V" stand for "Korrosionsschutz" (protection against corrosion) and "Verschleißschutz" (protection against abrasive wear) respectively.

This classification distinguishes between:

5.4.2.1 Coatings mainly used for protection against corrosion

Coatings with a hardness of 400 HV to 800 HV (depending on the coating process).

Ob No. 1)	Code designation	Color	Coating thickness [μm] 5)	Corrosion-resistant [h] 6)	Remarks
3251	NiPK2	silver	≥ 0.5	---	Light protection against corrosion in transit and storage
3252	NiPK5		≥ 5	12	Protection against corrosion and abrasive wear for mild exposure
3253	NiPK10		≥ 10	192	Protection against corrosion and abrasive wear for moderate exposure
3254	NiPK25		≥ 25	240	Protection against corrosion and abrasive wear for heavy exposure
3255	NiPK50		> 50	480	Protection against corrosion and abrasive wear for very heavy exposure
3352	NiPK5P		3+2	---	Friction-reducing protection against wear. NiPK2 surface containing 20 - 30% PTFE. The coat must be applied on a NiPK5 or thicker NiP coating.
3354	NiPK20P		≥ 10 +10	---	Friction - reducing protection against wear. NiPK10 Surface containing 20-30% PTFE. The coat must be applied on a NiPK10 or thicker NiP coating

- For optimum adhesion, parts with coating thicknesses > 2 μm must be heat treated at 200°C ±10°C for 2 h.
- Corrosion resistance heavily depends on the surface finish of the basis material.

5.4.2.2 Coatings mainly used for protection against abrasive wear

[31]

Coatings with a hardness of 800 HV to 1000 HV (depending on the coating process).
Heat treatment at 300°C to 400°C required.

Ob No. 1)	Code designation	Color	Coating thickness [μm] and Tolerance width R 5)	Corrosion-resistant [h] 6)	Remarks
3272	NiPV5	silver	≥ 5	12	Protection against corrosion and abrasive wear for mild exposure
3273	NiPV10		≥ 10	192	Protection against corrosion and abrasive wear for moderate exposure
3276 [31]	NiPV20		≥ 20	216	Protection against corrosion and abrasive wear for moderate exposure
3274	NiPV25		≥ 25	240	Protection against corrosion and abrasive wear for heavy exposure
3275	NiPV50		> 50 R=12%	480	Protection against corrosion and abrasive wear for very heavy exposure

- Corrosion resistance heavily depends on the surface finish of the basis material.

5.5 Ob 3500 through 3999 Copper and copper alloy coatings - electroplated

Ob No. 1)	Code designation	Color	Coating thickness [µm] 5)	Corrosion- resistant [h]	Remarks
3501	Cu5	red	≥ 5	---	as precoating, e.g. for nickel platings
3502	Cu1	red	≥ 0.5	---	e.g. as diffusion barrier between brass and pretinning if Ni is not possible; also as copper undercoating of pure tin to reduce the risk of whisker formation
3503	Cu3	red	≥ 3	---	

5.6 Ob 4000 through 4999 Silver and silver alloy coatings - electroplated Fehler! Textmarke nicht definiert.

Ob No. 1)	Code designation	Color	Coating thickness [µm] 5)	Corrosion- resistant [h]	Remarks
4001	Ag 5	silver	≥5	---	Contact layer for electric contacts of fluid level warning indicators, for example

5.7 Ob 4500 through 4999 Gold and gold alloy coatings - electroplated

Ob No. 1)	Code designation	Color	Coating thickness [µm]	Corrosion- resistant [h]	Remarks
4501	Au	yellow	to drawing	---	Protection against corrosion and/or contact layer for electric contacts, such as warning switches for brake fluid reservoirs. Contains up to 0.5% Co, Ni or Fe as alloying elements.
4511	Au ht			---	
4521	Au ht			---	

5.8 Ob 4700 through 4799 Aluminum and aluminum alloy coatings - electroplated

Ob No. 1)	Code designation	Color	Coating thickness [µm]	Corrosion resistant [h]	Remarks
4701	Al 7 p	silver	≥ 7	96h	Al coating passivated - suitable for high-strength steels because does not produce hydrogen during electroplating

5.9 Ob 400 through 4899 DLC wear protection coating

Ob No. 1)	Code designation	Color	Coating thickness [µm]	Corrosion resistant [h]	Remarks
4801	DLC (Cr/CrN/DLC)	anthracite / black	1,5 - 3 (Cr: >0,2; CrN: >0,8; DLC: >0,5	-	Wear protection coating e.g. for valve pistons. Hardness HVpl.>1600; Balinit DLC-Star; Balzers/Oerlikon

Footnotes in the above tables

- 1) In the drawing, the coating shall be defined by its Ob number, the number of this standard and the code designation in parentheses, e. g.: Ob 1023 ATE N 106 61 (Zn8g).
- 2) For parts which move against each other or which must maintain their dimensional accuracy, the formation of white, hardening zinc corrosion products must be taken into account.
- 3) Parts with female or male threads must be aftertreated with friction-influencing agents, such as
 - Gleitmo 605 (Ob 494)
 - 1186 Torque'n Tension Control Fluid from Mac Dermid (Ob 453, Ob 493)
 or an equivalent other agent.
 This requirement does not apply to parts for which proof has been furnished that this treatment is not necessary and parts which must not be treated with friction-influencing agents, such as hose end fittings and bleeder screws. The latter must also not be aftertreated with silicate sealants containing lubricants in accordance with ATE N 553 81.09.
- 4) All electrodeposited zinc and zinc alloy coatings must generally receive a passivating aftertreatment for additional protection against corrosion.
 This aftertreatment must always be a process step integrated into the coating process. Passive coatings produced in this manner which contain chromium (VI) are described as chromate coatings or chromating.
 All colorless and bright yellow passivations must be free from Cr(VI)! Passive / chromate coatings break down into the following color groups:
 - Colorless: Silver gray to bluish lustrous
 - Metallic iridescent: Silver to bright yellow, occasionally slightly iridescent
 - Yellow: Light yellow to golden-yellow reddish to bluish iridescent
 - Black: Jet black, partially slightly reddish to bluish iridescent
 - Olive: Olive green to dark green
 If sealing is required as aftertreatment, the drawing must additionally show Ob 258 / Ob 260 including the exact product name if no appropriate surface treatment with sealing (vs) is available. More exacting corrosion protection requirements which can be met by sealing shall be defined in the drawing or product specification, identifying the type of sealing.
- 5) The specified coating thickness refers to the defined measuring point.
 If one of the generally used coating methods is employed, the coating thickness at the specified measuring point may be several times as high as the specified minimum coating thickness. The value obtained depends, among other things, on the type of the coating process and the coating technique as well as the shape of the component.
 For components for which the coating thickness variation must be limited for functional reasons, the permissible tolerance for the corresponding areas shall be indicated in the drawing or product specification.
 In defining this tolerance, its maintainability under regular production conditions and the suitability of the corresponding testing means (measuring means capability) must be taken into account. The requirements of DIN ISO 4042 shall be mandatory for the definition of coating thicknesses on threaded parts. Tolerance position "e" shall only be permitted in exceptional cases.
- 6) Approximate values for the test duration up to the start of base metal corrosion in the salt spray fog test to DIN EN ISO 9227. For more accurate information reference should be made to the applicable test specification and/or product specification or drawing.
- 7) Under EU Directive 2000/53/CE, chromatings (code letters s, g, o) and Dacromet may no longer be put into circulation as of July 1, 2007!
- 8) The ban of surfaces containing Cr(VI) also applies to existing components of the wheel brake division as of December 31, 2006. For surfaces produced after December 31, 2006, the surface (Ob) specified on the drawing / master data sheet must be replaced by a Cr(VI)-free substitute surface in accordance with ATE N 106 61.01.

6 ANNEXES

6.1 Overview of old and new surface treatment (Ob) designations for electroplated zinc coatings

Old designation in accordance ATE 106 36.11 Not for new designs		New designation in accordance with ATE N 106 61.00				
		Containing Cr(VI)		Alternative coating free of Cr(VI)		Coating thickness
Drawing entry	Coating thickness 4)µm	Ob No:	Code designation	Ob No:	Code designation	µm
Zn2f (Ob109 ATE N 106 36)	2 + 3	-	-	1001	Zn2f	≥2
Zn2fy (Ob109+251.2 ATE N 106 36)		-	-	1004	Zn2f	
Zn2g (Ob110 ATE N 106 36)		1002	Zn2g	1004	Zn2y	
Zn5f (Ob112 +251 ATE N 106 36)	5 + 3	-	-	1011	Zn5f	≥5
Zn5fy (Ob112+251.2 ATE N 106 36)		-	-	1011	Zn5f	
Zn5g (Ob112 ATE N 106 36)		1019	Zn5g	1016	Zn5y	
Zn5o (Ob112 +254 ATE N 106 36)		1015	Zn5o	-	-	
Zn5s (Ob119 ATE N 106 36)		1012	Zn5s	-	-	
Zn8f (Ob111 +251 ATE N 106 36)	8 + 4	-	-	1021	Zn8f	≥8
Zn8fy (Ob111+251.2 ATE N 106 36)		-	-	1026	Zn8f	
Zn8fr (Ob111+251/1 ATE N 106 36)		-	-	-	-	
Zn8g (Ob111 ATE N 106 36)		1023	Zn8g	1026	Zn8y	
Zn8o (Ob116 ATE N 106 36)		1025	Zn8o	-	-	
Zn8s (Ob117 ATE N 106 36)		1022	Zn8s	-	-	
Zn8g (Ob118 ATE N 106 36)		-	-	-	-	
Zn12f (Ob113 ATE N 106 36)	12 + 4	-	-	1031	Zn12f	≥12
Zn12fy (Ob113+251.2 ATE N 106 36)		-	-	1035	Zn12f	
Zn12g (Ob113 +253 ATE N 106 36)		1033	Zn12g	1035	Zn12y	
Zn12o (Ob113 +254 ATE N 106 36)		1034	Zn12o	-	-	
Zn12s (Ob115 ATE N 106 36)		1032	Zn12s	-	-	
Zn16f (Ob114 +251 ATE N 106 36)	16 + 4	-	-	1041	Zn16f	≥16
Zn16fy (Ob114+251.2 ATE N 106 36)		-	-	1045	Zn16f	
Zn16g (Ob114 ATE N 106 36)		1043	Zn16g	1045	Zn16y	
Zn16o (Ob114 +254 ATE N 106 36)		1044	Zn16o	-	-	
Zn16s (Ob114 +263 ATE N 106 36)		1042	Zn16o	-	-	

The Cr(VI)-free alternative surface coatings specified above are only examples with no binding effect. For the wheel brake division, Cr(VI)-free substitute surface coatings have been defined in ATE N 106 61.01.

6.2 Overview of old and new surface treatment (Ob) designations for electroplated zinc alloy coatings

Old designation in accordance with ATE 106 36.11 Not for new designs		New designation in accordance with ATE N 106 61.00				
		Containing Cr(VI)		Alternative coating free of Cr(VI)		Coating thickness
Drawing entry	Coating thickness 4) μm	Ob No:	Code designation	Ob No:	Code designation	μm
ZnNi5f (Ob189 ATE N 106 36)	5 + 4	-	-	1311	ZnNi5f	≥ 5
ZnNi5g (Ob180 ATE N 106 36)		1313	ZnNi5g	-	-	
ZnNi5s (Ob181 ATE N 106 36)		1312	ZnNi5s	-	-	
ZnNi8f (Ob184 ATE N 106 36)	8 + 4	-	-	1321	ZnNi8f	≥ 8
ZnNi8g (Ob120 ATE N 106 36)		1323	ZnNi8g	-	-	
ZnNi8s (Ob182 ATE N 106 36)		1322	ZnNi8s	-	-	
ZnFe5g (Ob185 ATE N 106 36)	5 + 4	1113	ZnFe5g	-	-	≥ 5
ZnFe5s (Ob186 ATE N 106 36)		1112	ZnFe5s	-	-	
ZnFe8g (Ob187 ATE N 106 36)	8 + 4	1123	ZnFe8g	-	-	≥ 8
ZnFe8s (Ob188 ATE N 106 36)		1122	ZnFe8s	-	-	
ZnCo5g (Ob195 ATE N 106 36)	5 + 4	1213	ZnCo5g	-	-	≥ 5
ZnCo5s (Ob190 ATE N 106 36)		1212	ZnCo5s	-	-	
ZnCo8g (Ob192 ATE N 106 36)	8 + 4	1223	ZnCo8g	-	-	≥ 8
ZnCo8s (Ob193 ATE N 106 36)		1222	ZnCo8s	-	-	
ZnCo12g (Ob194 ATE N 106 36)	12 + 4	-	-	-	-	
ZnCo12s (Ob191 ATE N 106 36)		-	-	-	-	