

Data	Materials					Finish			
Wedge lock washers S	65Mn	S60C	SK5	60Si2mN	51CrV4	Plated Zinc	Black	Dacromet	Geomet
Wedge lock washers SS	SS304	SS316	A2	A4	Super stainless steel	Polishing	-	-	-
DIN6796	-	-	-	-	-	-	-	-	-
DIN6796SS	-	-	-	-	-	-	-	-	-
DIN2093	-	-	-	-	-	-	-	-	-
DIN9250 S	65MN	S60C	SK5	60Si2Mn	51CrV4	Plated Zinc	Black	Dacromet	Geomet
DIN9250 SS	SS304	SS316	A2	A4	-	Polishing	-	-	-
DIN9250 VS	65MN	S60C	SK5	60Si2Mn	51CrV4	Plated Zinc	Black	Dacromet	Geomet
DIN9250 VSS	SS304	SS316	A2	A4	-	Polishing	-	-	-
DIN471	65MN	S60C	SK5	60Si2Mn	51CrV4	Plated Zinc	Black	Mechanical galvanizing	Phosphating
DIN471 SS	SS304	SS316	SS420	A2	A4	Polishing	-	-	-
DIN472	65MN	S60C	SK5	60Si2Mn	51CrV4	Plated Zinc	Black	Mechanical galvanizing	Phosphating
DIN472 SS	SS304	SS316	SS420	A2	A4	Polishing	-	-	-
DIN6799	65MN	S60C	SK5	60Si2Mn	51CrV4	Plated Zinc	Black	Mechanical galvanizing	Phosphating
DIN6799 SS	SS304	SS316	SS420	A2	A4	Polishing	-	-	-
Satrlock	65MN	S60C	SK5	60Si2Mn	51CrV4	Plated Zinc	Black	Mechanical galvanizing	Phosphating

Surface treatments

TYPE OF SURFACE TREATMENT	WHITE CORROSION RESISTANCE	RED CORROSION RESISTANCE	ASPECT
White electrolytical zinc plating 2-3 my Cr VI-free	6[min.h]	12[min.h]	Brilliant
White electrolytical zinc plating 6-8 my Cr VI-free	24	72	gray with blue-colored reflexes
White electrolytical zinc plating 11-13 my Cr VI-free	24	96	reflexes
Yellow electrolytical zinc plating 3-4 my Cr VI-free	24	48	Iridescent yellow with red-colored reflexes
Yellow electrolytical zinc plating 6-8 my Cr VI-free	24	72	reflexes
Yellow electrolytical zinc plating 11-13 my Cr VI-free	24	96	reflexes
White mechanical zinc plating 11-13 my Cr VI-free	72	168	Gray with weak blue-colored reflexes
White mechanical zinc plating 20-25 my Cr VI-free	72	216	reflexes
White mechanical zinc plating 40-42 my Cr VI-free	72	288	reflexes
Yellow mechanical zinc plating 11-13 my Cr VI-free	72	168	Iridescent yellow
Yellow mechanical zinc plating 20-25 my Cr VI-free	72	216	Iridescent yellow
Yellow mechanical zinc plating 40-42 my Cr VI-free	72	288	Iridescent yellow
Geomet® 321 degree A 5-7 my Cr VI-free	—	600	Gray with satin surface
Geomet® 321 degree B 8-10 my Cr VI-free	—	1000	Gray with satin surface
Geomet® 500 degree A 5-7 my Cr VI-free	—	600	Gray with satin surface
Geomet® 500 degree B 8-10 my Cr VI-free	—	1000	Gray with satin surface
Phosphating zinc-iron 5-8 my	—	16	Matt black
Hot dip galvanising 50-60 my	—	—	Matt gray
Zinc-nickel 8 my + sealing	200	600	gray
Black zinc-nickel 8 my + sealing	120	720	Matt black
Delta Protekt® KL100	—	720	Gray with satin surface
Delta Protekt® KL105	—	720	Gray with satin surface
Delta Protekt® KL100 + VH301 GZ	—	720	Gray with satin surface
Delta Protekt® KL100 + VH302 GZ	—	720	Gray with satin surface
Delta Protekt® KL100 + VH315 GZ	—	720	Gray with satin surface
Nickel-Plating	—	—	Brilliant gray

## Chemical analysis of raw material

MATERIAL (材料)	REFERENCE	C	Si	Mn	P	S	Sn	Cr	Ni	Mo	Otherelements (其他元素)
STEEL C60	DIN 10132 N.1.1211	0.57-0.65	0.15-0.35	0.60-0.90	≤0.025	≤0.025			≤0.40	≤0.10	
STEEL 38S17	EN 1009 N. 1.5023	0.35-0.42	1.50-1.80	0.50-0.80	≤0.025	≤0.025					
STEEL 51 CrV4	DIN 10132-4 N.1.8150	0.47-0.55	≤0.40	0.70-1.10	≤0.025	≤0.025		0.90-1.20	≤0.40	≤0.10	V 0.10-0.25
STEEL 27MnCrB5-2	EN 10083 N. 1.7182	0.24-0.30	≤0.40	1.10-1.40	≤0.035	≤0.040		0.30-0.60			B 0.0008-0.0050
STAINLESS STEEL AISI 304 (A2)	EN 10088-2 N 1.4301	≤0.07	≤1.00	≤2.00	≤0.045	≤0.015		17.50-19.50	8.00-10.50		N ≤ 0.11
STAINLESS STEEL AISI 316L	EN 10088-2 N 1.4404	≤0.03	≤1.00	≤2.00	≤0.045	≤0.015		16.50-18.50	10.00-13.00	2.00-2.50	N ≤ 0.11
STAINLESS STEEL 254 SMO@	EN 10088-2 N 1.4547	≤0.02	≤0.70	≤1.00	≤0.030	≤0.010		19.50-20.50	17.50-18.50	6.00-7.00	0.18≤N≤0.25; 0.50≤Cu≤1.00
STAINLESS STEEL AISI 316 (A4)	EN 10088-2 N 1.4401	≤0.07	≤1.00	≤2.00	≤0.045	≤0.015		16.50-18.50	10.00-13.00	2.00-2.50	N ≤ 0.11
STAINLESS STEEL AISI 420	EN 10088-2 N 1.4028	0.26-0.35	≤1.00	≤1.50	≤0.040	≤0.015		12.00-14.00			
IRON DC01 C390	EN 10139	≤0.12		≤0.6	≤0.045	≤0.045					
IRON DC01 C490	EN 10139	≤0.12		≤0.6	≤0.045	≤0.045					
IRON DC01 C590	EN 10139	≤0.12		≤0.6	≤0.045	≤0.045					
IRON DC01 C690	EN 10139				≤0.045	≤0.045					
IRON FE 50	UNI 5961	≤0.05		≤0.20-0.45	≤0.35	≤0.35					
BRONZE Cu Sn8	EN 12166 N CW453K				0.01-0.40		7.50-8.50		≤0.20		Fe≤0.10; Pb≤0.02;
SILICON BRONZE	CDA 651 ASTM B96-93		0.80-2.00	≤0.70							Cu≥96.00; Fe≤0.80; Zn≤1.50;
INCONEL 718	DIN 1774 N 2.466	0.02-0.08	≤0.35	≤0.35	≤0.015	≤0.015		17.00-21.00	50.00-55.00	2.80-3.30	Pb≤0.005; Al≤0.070; Cu≤0.30; Nb 4.70-5.50; Ti 0.60-1.15
ALUMINUM AW-6082	EN 573-3		0.70-1.30	0.40-1.00							Mg 0.60-1.20
BRASS CuZn37	EN 1652								≤0.30		Fe≤0.10; Pb≤0.10; Cu 62.00-64.00;
COPPER CW024A	DIN EN 1652				0.015-0.040						Cu≥99.90

Material	Material Designation	W.- No.	Standard	Operating Temp. (°C)	Modulus of Elasticity (N/Sq mm)	Applications			
Quality Steel	C60	1.0601	DIN 17222	-20 / +100	206,000	General Engineering			
	Cs70		BS 1449						
	C75	1.0605							
Refined Steel	Ck67	1.1231	DIN 17222				-20 / +100	206,000	General Engineering
	Ck75	1.1248							
	Ck85	1.1269							
	50CrV4	1.8159			-50 / +200				
Corrosion Resistant Steel	X 12 CrNi 17 7	1.431	DIN 17224	-200 / +200	190,000	Oil Industry, Petrochemical, Food Processing			
	X 7 CrNiAl 17 7	1.4568		-200 / +300	195,000				
	X 5 CrNiMo 17 12 2	1.4401		-200 / +200	185,000				
	FV520B		BS S145	-90 / +300	185,000				
Heat Resistant Steel	X 22 CrMoV 12 1	1.4923	DIN 17240	-50 / +500	209,000	Heat Exchangers, Boilers, Furnaces, Chemical			
	X 35 CrMo 17	1.4122	SEW 400	-50 / +400	209,000				
	X 30 WCrV 5 3	1.2567		-50 / +450	206,000				
	A286	1.498	AISI 660B	-200 / +700	199,000				
Copper Alloys	CuSn 8	2.103	DIN 17670	-50 / +100	115,000	Low Temp Applications, Electrical			
	CuBe 2	2.1247	DIN 17670	-260 / +200	135,000				
Nickel & Cobalt Alloys	Nimonic 90	2.4632 (LW)		-200 / +700	220,000	Heat Exchangers, Boilers, Furnaces, Chemical			
	Inconel X 750	2.4669		-200 / +600	214,000				
	Inconel X 718	2.4668			199,000				

Conversion Hrc-Hv-Hrb-N/mm2 - Kg/mm2

N/mm <sup>2</sup>	Kgf/mm <sup>2</sup>	HV	HRC	HRB	N/mm <sup>2</sup>	Kgf/mm <sup>2</sup>	HV	HRC	HRB
255	26	80	—	—	900	91.8	280	27.1	—
270	27.5	85	—	1	915	93.3	285	27.8	—
285	29.1	90	—	48	930	94.9	290	28.5	—
305	31.1	95	—	52	950	96.9	295	29.2	—
320	32.6	100	—	56	965	98.4	300	29.8	—
335	34.2	105	—	59	995	101.5	310	31	—
350	35.7	110	—	62	1030	105.1	320	32.2	—
370	37.7	115	—	65	1060	108.1	330	33.3	—
385	39.3	120	—	67	1095	111.7	340	34.4	—
400	40.8	125	—	70	1125	114.8	350	35.5	—
415	42.3	130	—	71	1155	117.8	360	36.6	—
430	43.9	135	—	73	1190	121.4	370	37.7	—
450	45.9	140	—	75	1220	124.4	380	38.8	—
465	47.4	145	—	77	1255	128	390	39.8	—
480	49	150	—	79	1290	131.6	400	40.8	—
495	50.5	155	—	80	1320	134.1	410	41.8	—
510	52	160	—	82	1350	137.1	420	42.7	—
530	54.1	165	—	83	1385	141.3	430	43.6	—
545	55.6	170	—	85	1420	144.9	440	44.5	—
561	57.1	175	—	86	1455	148.4	450	45.3	—
575	58.7	180	—	87	1485	151.5	460	46.1	—
595	60.7	185	—	88	1520	155.1	470	46.9	—
610	62.2	190	—	90	1555	158.6	480	47.7	—
625	68.8	195	—	91	1595	162.7	490	48.4	—
640	65.3	200	—	92	1630	166.3	500	49.1	—
660	67.3	205	—	93	1665	169.9	510	49.8	—
675	68.9	210	—	94	1700	173.4	520	50.5	—
690	70.4	215	—	94	1740	177.5	530	51.1	—
705	71.9	225	—	95	1775	181.1	540	51.7	—
720	73.5	230	—	96	1810	184.7	550	52.3	—
740	75.5	235	—	97	1845	188.2	560	53	—
755	77	240	—	97	1880	191.8	570	53.6	—
770	78.6	240	20.3	98	1920	195.9	580	54.1	—
785	80.1	245	21.3	99	1955	199.4	590	54.7	—

800	81.6	250	22.2	100	1995	203.5	600	55.2	—
820	83.7	255	23.1	—	2030	207.1	610	55.7	—
835	85.2	260	24	—	2070	211.2	620	56.3	—
850	86.7	265	24.8	—	2105	214.8	630	56.8	—
865	88.2	270	25.6	—	2145	218.8	640	57.3	—
880	89.8	275	26.4	—	2180	222.4	650	57.8	—

BOLT RANGE IN CONFORMITY WITH UNI 3740-ISO 898 THICK PITCH				
	8.8 (8G)		10.9 (10K)	
	Preload	Tightening couples	Preload	Tightening couples
Screw of	[N]	[Nm]	[N]	[Nm]
M4	3830	3.07	5386	4.32
M5	6269	6.03	8816	8.49
M6	8844	10.38	12438	14.59
M7	12941	17.1	18198	24.05
M8	16234	25.16	22829	35.38
M10	25850	50.53	36352	71.06
M12	37693	87.08	53006	122.5
M14	51763	138.5	72792	195
M16	71253	212	100199	298.3
M18	86582	291.7	121756	410.3
M20	111333	413	156562	581
M22	139187	558	195731	784
M24	160319	710	225449	999
M27	211155	1053	296936	1481
M30	256587	1429	360826	2010
M33	319967	1939	449954	2726
M36	375386	2491	527887	3503
M39	451310	3233	634655	4547
M42	516715	4002	726630	5628

## Lock Washers & Fasteners Q&A Summary

**Q: What material options are available for Wedge Lock Washers to ensure high-strength performance?**

**A:** CHANNOV offers two primary material categories for Wedge Lock Washers: carbon/alloy steel options such as 65Mn, S60C, SK5, 60Si2Mn, and 51CrV4,

as well as stainless steel options including SS304, SS316, A2, A4, and Super Stainless Steel.

**Q: Which surface treatment provides the highest corrosion resistance for steel DIN9250 washers?**

**A:** While standard options like Plated Zinc and Black Oxide are available, Geomet® 500 Grade B offers the most robust protection, providing up to 1000 hours

of red corrosion resistance. This is significantly higher than white mechanical zinc plating, which typically offers 168 to 288 hours of resistance depending on the coating thickness.

**Q: How do the finishing requirements differ between carbon steel and stainless steel DIN471 retaining rings?**

**A:** Carbon steel DIN471 rings are typically finished with Plated Zinc, Black Oxide, Mechanical Galvanizing, or Phosphating to prevent rust.

In contrast, stainless steel versions (SS304, SS316, SS420) usually undergo Polishing to maintain their natural corrosion resistance and provide a clean aesthetic finish.

**Q: What is the benefit of using Geomet® or Delta Protekt® coatings over traditional zinc plating for industrial fasteners?**

**A:** Advanced coatings like Geomet® 321 and Delta Protekt® KL100 provide superior red corrosion resistance, ranging from 600 to 1000 hours,

whereas standard white electrolytical zinc plating may only offer 12 to 96 hours of protection. These high-performance finishes also offer a gray satin aspect,

which is preferred for heavy-duty industrial environments.

**Q: Which materials are used for specialized spring components like DIN6796 and DIN2093?**

**A:** These high-performance washers and disc springs are manufactured using specialized spring steels such as 60Si2Mn and 51CrV4,

or stainless steel variants like SS304 and SS316 to ensure consistent tension and durability under load.

**CHANNOV AUTO PARTS** is a leading manufacturer in the production Oilless Bush, Marginal Lubricating Bush, Bimetal bushing, Bronze Bush, Solid Lubricant Embedded Bush,

Cast bronze bearing, Teflon bushing, FR bearing, Door hinge bushing. If you want to know more about material or get a free inquiry, please contact us: [info@channovprecision.com](mailto:info@channovprecision.com) ,

we will reply to you within 2 hours.