

ZOLLERN

Solid metals. Fine solutions.

Steel Profiles
Materials



The ZOLLERN-Group

With first-class products and customized solutions in the sectors drive technology, investment casting, sand casting and forging as well as steel profiles we are one of the leading manufacturers – worldwide.

As one of the oldest family-run businesses in Germany we are proud to look back on an impressive 300-year history during which we have merged tradition with innovation. Our main focus is on excellent quality and service.

Welcome to the world of ZOLLERN, where experience and progress go hand in hand to offer our customers the best solutions and products for their requirements in various industrial sectors.

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Huge range of materials for first-class steel profiles

ZOLLERN steel profiles are used for cutting, moving, guiding, transferring and driving. There are virtually no limits to the materials used. The experienced specialists at ZOLLERN select the ideal material from over 200 different steel alloys to create application-specific and hard-wearing profiles.

ZOLLERN produces hot-rolled, cold-rolled and cold-drawn steel profiles using flexible, state-of-the-art plant technology. Profile cross sections range from 5 to 6,000 mm². ZOLLERN delivers bars of up to 12 m in length and rings weighing up to 2 tonnes. We create customer specific special profiles in our 20,000 m² production hall. The profiles achieve their particular properties through the use of additional processes such as heat treatment, inductive hardening, mechanical processing and surface finishing.





Structural steels

Construction steels are used when cost-effective solutions are sought.
The focus here is frequently on weldability and the mechanical properties of the material.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated							
Material No.	EN / ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Al %	N %	Cu %
1.0122	S235JRC	1015	-	Q235B	0.17		1.40	0.040	0.040		0.012	0.55
1.0044	S275JR	1021	SS400	Q255A	0.21		1.50	0.035	0.035		0.012	0.55
1.0533	E295GC	GradeA	SS490	Q275B				0.045	0.045		0.012	
1.0579	S355J2C	GradeC	-	-	0.20	0.55	1.60	0.030	0.030	min. 0.02		0.55
1.0543	E335GC	Grade2	SM570	HRB 335				0.045	0.045		0.012	

Other materials upon request

Guideline mechanical values in the various treatment states

Designation		Similar materials			States				
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C			Hardness HB
						Rp0.2 MPa	Rm MPa	A5 %	
1.0122	S235JRC	1015	-	Q235B	<= 10	>355	470-840	>8	
					>10 <=16	>300	420-770	>9	
					>16 <=40	>260	390-730	>10	
					>40 <=63	>235	380-670	>11	
					>63 <=100	>215	340-640	>11	
1.0044	S275JR	1021	SS400	Q255A	<= 10			170-250	
					>10 <=16			170-250	
					>16 <=40			170-250	
					>40 <=63			170-250	
					>63 <=100			170-250	
1.0533	E295GC	GradeA	SS490	Q275B	<= 10	>510	650-950	>6	
					>10 <=16	>420	600-900	>7	
					>16 <=40	>320	550-850	>8	
					>40 <=63	>300	520-770	>9	
					>63 <=100	>255	470-740	>9	
1.0579	S355J2C	GradeC	-	-	<= 10	>250	630-950	>6	
					>10 <=16	>450	580-880	>7	
					>16 <=40	>350	530-850	>8	
					>40 <=63	>335	500-770	>9	
					>63 <=100	>315	470-740	>9	
1.0543	E335GC	Grade2	SM570	HRB 335	<= 10	>540	700-1,050	>5	
					>10 <=16	>480	680-970	>6	
					>16 <=40	>390	640-930	>7	
					>40 <=63	>340	620-870	>8	
					>63 <=100	>295	570-810	>8	

Other materials and treatment states on request



Free-cutting steels

Free-cutting steels are used wherever efficient machining is required. They achieve their outstanding machinability by the addition of sulphur and manganese to the alloy. Together, these form manganese sulphide which ensures optimum chip formation. Additives such as lead, bismuth and tellurium additionally increase the working life of tools. For high-strength components, heat-treatable material variants can be used.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated					
Material No.	EN / ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Pb %
1.0715	11SMn30	1213	SUM22		0.14	0.05	0.90-1.30	0.11	0.27-0.33	
1.0718	11SMnPb30	12L13	SUM22L		0.14	0.05	0.90-1.30	0.11	0.27-0.33	0.20-0.35
1.0736	11SMn37	1215	SUM25		0.14	0.05	1.00-1.50	0.11	0.34-0.40	
1.0737	11SMnPb37	12L14			0.14	0.05	1.00-1.50	0.11	0.34-0.40	0.20-0.35
1.0726	35S20	1140		Y35 (U70352)	0.32-0.39	0.40	0.70-1.10	0.06	0.15-0.25	
1.0756	35SPb20				0.32-0.39	0.40	0.70-1.10	0.06	0.15-0.25	0.15-0.35
1.0727	46S20	1146		Y45 (U70452)	0.42-0.50	0.40	0.70-1.10	0.06	0.15-0.25	
1.0757	46SPb20				0.42-0.50	0.40	0.70-1.10	0.06	0.15-0.25	0.15-0.35

Other materials upon request

Guideline mechanical values in the various treatment states

Designation		Similar materials			States										
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C			heat-treated and cold-drawn +QT+C			cold-drawn and heat-treated +C+QT			
						Rp0.2 MPa	Rm MPa	A5 %	Rp0.2 MPa	Rm MPa	A5 %	Rp0.2 MPa	Rm MPa	A5 %	
1.0715 1.0718	11SMn30 11SMnPb30	1213 12L13	SUM22 SUM22L		<= 10	>420	510-810	>6							
					>10 <=16	>410	490-760	>7							
					>16 <=40	>375	460-710	>8							
					>40 <=63	>305	400-650	>9							
					>63 <=100	>245	360-630	>9							
1.0736 1.0737	11SMn37 11SMnPb37	1215 12L14	SUM25		<= 10	>440	510-810	>6							
					>10 <=16	>410	490-760	>7							
					>16 <=40	>375	460-710	>8							
					>40 <=63	>305	400-650	>9							
					>63 <=100	>245	360-630	>9							
1.0726 1.0756	35S20 35SPb20	1140		Y35 (U70352)	<= 10	>480	640-880	>6	>490	700-900	>9	-	-	-	
					>10 <=16	>400	590-830	>7	>490	700-900	>11	-	-	-	
					>16 <=40	>360	560-800	>8	>455	650-850	>12	>380	600-750	>16	
					>40 <=63	>340	530-760	>9	>400	570-770	>13	>320	550-700	>17	
					>63 <=100	>300	510-680	>9	>385	550-750	>14	>320	550-700	>17	
1.0727 1.0757	46S20 46SPb20	1146		Y45 (U70452)	<= 10	>570	740-980	>5	>595	850-1,000	>8	-	-	-	
					>10 <=16	>470	690-930	>6	>560	800-950	>9	-	-	-	
					>16 <=40	>400	640-880	>7	>490	700-850	>10	>430	650-800	>13	
					>40 <=63	>380	610-850	>8	>490	700-850	>11	>370	630-780	>14	
					>63 <=100	>340	580-820	>8	>455	650-850	>11	>370	630-780	>14	

Other materials and treatment states on request

Tempered steels

Depending on the component requirements, these heat-treated steels are cold formed or heat-treated and cold formed for higher requirements. If the focus is on toughness, it is possible to heat-treat even the finished component at any time.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated								
Material No.	EN/ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	V %
1.0402	C22	1020	S20C		0.17-0.24	0.40	0.40-0.70	0.045	0.045	0.40	0.10	0.40	
1.1151	C22E	1023	S22C	20 (U20202)	0.17-0.24	0.40	0.40-0.70	0.030	0.035	0.40	0.10	0.40	
1.1149	C22R				0.17-0.24	0.40	0.40-0.70	0.030	0.02-0.04	0.40	0.10	0.40	
1.0501	C35	1035	S35C		0.32-0.39	0.40	0.50-0.80	0.045	0.045	0.40	0.10	0.40	
1.1181	C35E	1035	S35C	35 (U20352)	0.32-0.39	0.40	0.50-0.80	0.030	0.035	0.40	0.10	0.40	
1.1180	C35R	1035			0.32-0.39	0.40	0.50-0.80	0.030	0.02-0.04	0.40	0.10	0.40	
1.0503	C45	1045	S45C		0.42-0.50	0.40	0.50-0.80	0.045	0.045	0.40	0.10	0.40	
1.1191	C45E	1045	S45C	45 (U20452)	0.42-0.50	0.40	0.50-0.80	0.030	0.035	0.40	0.10	0.40	
1.1201	C45R	1045			0.42-0.50	0.40	0.50-0.80	0.030	0.02-0.04	0.40	0.10	0.40	
1.1213	C53G	1050	S50C		0.50-0.57	0.15-0.35	0.40-0.70	0.025	0.035				
1.0535	C55	1055	S55C		0.52-0.60	0.40	0.60-0.90	0.045	0.045	0.40	0.10	0.40	
1.1203	C55E	1055	S55C	55 (U20552)	0.52-0.60	0.40	0.60-0.90	0.030	0.035	0.40	0.10	0.40	
1.1209	C55R	1055			0.52-0.60	0.40	0.60-0.90	0.030	0.02-0.04	0.40	0.10	0.40	
1.0601	C60	1060	S65CM		0.57-0.65	0.40	0.60-0.90	0.045	0.045	0.40	0.10	0.40	
1.1221	C60E	1060		60 (U20602)	0.57-0.65	0.40	0.60-0.90	0.030	0.035	0.40	0.10	0.40	
1.1223	C60R	1060			0.57-0.65	0.40	0.60-0.90	0.030	0.02-0.04	0.40	0.10	0.40	
1.8159	51CrV4	6150	SUP10	50CrVA	0.47-0.55	0.40	0.70-1.10	0.025	0.025	0.90-1.20			0.10-0.25

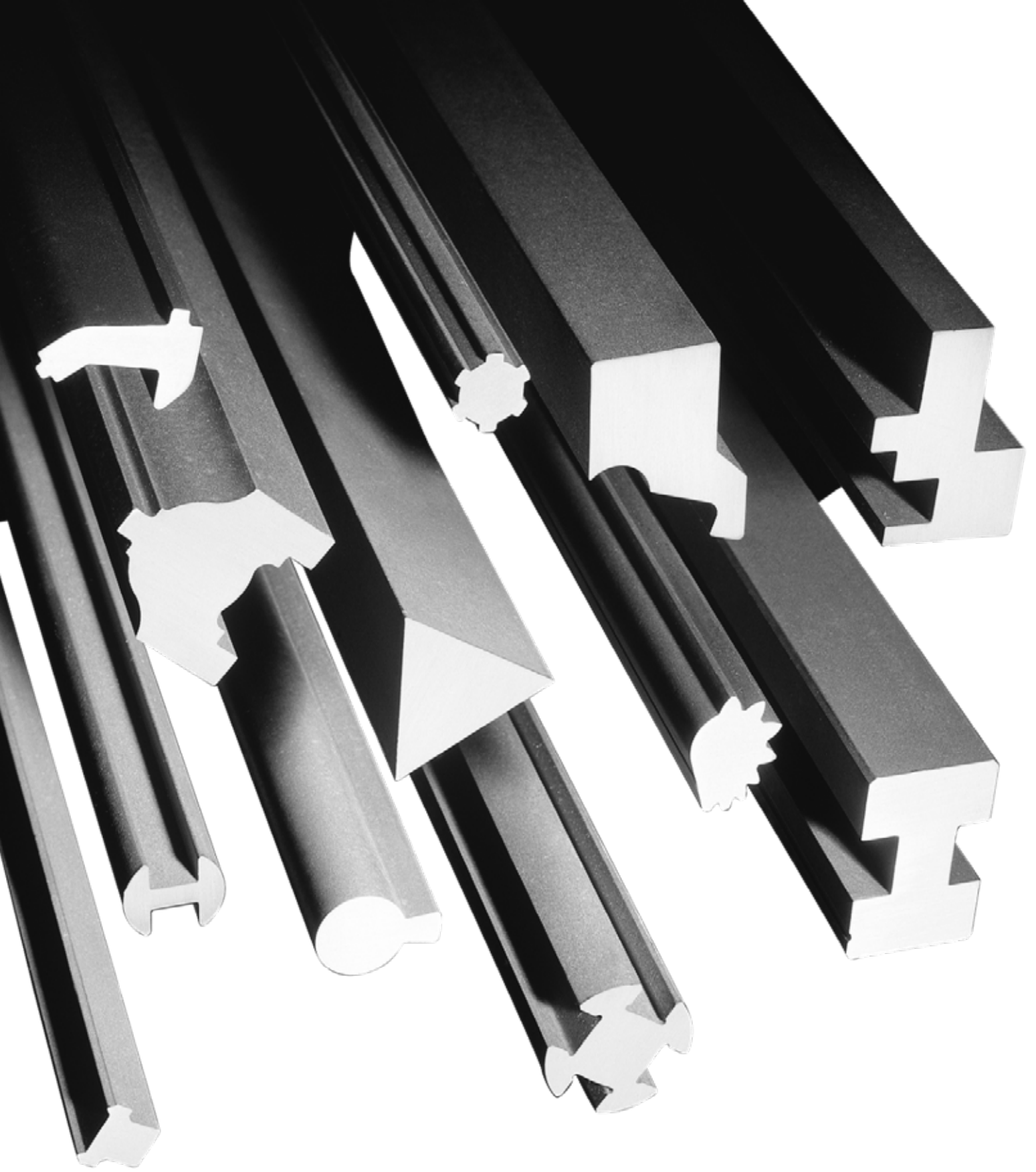
Other materials upon request



Guideline mechanical values in the various treatment states

Designation	Similar materials				States														
	EN/ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C				cold-drawn and annealed +C+A	cold-drawn and normalised +C+N			annealed and cold-drawn +QT+C			cold-drawn and annealed +C+QT		
Material No.						Rp0.2 MPa	Rm MPa	A5 %	Hardness HB	Hardness HB	Rp0.2 MPa	Rm MPa	A5 %	Rp0.2 MPa	Rm MPa	A5 %	Rp0.2 MPa	Rm MPa	A5 %
1.0402	C22	1020	S20C		<=16						>240	>430	>24						
1.1151	C22E	1023	S22C	20 (U20202)	16-100						>210	>410	>25						
1.1149	C22R																		
1.0501	C35	1035	S35C	35 (U20352)	<= 10	>510	650-1,000	>6						>525	750-950	>9	-	-	-
1.1181	C35E	1035	S35C		>10 <=16	>420	600-950	>7						>490	700-900	>9	-	-	-
1.1180	C35R	1035	S35C		>16 <=40	>320	580-880	>8						>455	650-850	>10	>370	600-750	>19
					>40 <=63	>300	550-840	>9						>400	570-770	>11	>320	550-700	>20
					>63 <=100	>270	520-800	>9						>385	550-750	>12	>320	550-700	>20
1.0503	C45	1045	S45C	45 (U20452)	<= 10	>565	750-1,050	>5						>595	850-1,050	>8	-	-	-
1.1191	C45E	1045	S45C		>10 <=16	>500	710-1,030	>6						>565	810-1,010	>8	-	-	-
1.1201	C45R	1045	S45C		>16 <=40	>410	650-1,000	>7						>525	750-950	>9	>430	650-800	>16
					>40 <=63	>360	630-900	>8						>455	650-850	>10	>370	630-780	>17
					>63 <=100	>310	580-850	>8						>455	650-850	>11	>370	630-780	>17
1.1213	C53G	1050	S50C		-					<223	>340	>610	>16						
1.0535	C55	1055	S55C	55 (U20552)	<= 10	>590	770-1,100	>5		<229	>370	>680	>11						
1.1203	C55E	1055	S55C		>10 <=16	>520	730-1,080	>6		<229	>370	>680	>11						
1.1209	C55R	1055	S55C		>16 <=40	>440	690-1,050	>7		<229	>330	>640	>12						
					>40 <=63	>390	650-1,030	>8		<229	>330	>640	>12						
					>63 <=100	-	-	-		-	>330	>640	>12						
1.0601	C60	1060	S65CM	60 (U20602)	<= 10	>630	800-1,150	>5						>630	900-1,000	>6	-	-	-
1.1221	C60E	1060	S65CM		>10 <=16	>550	780-1,130	>5						>615	880-1,080	>6	-	-	-
1.1223	C60R	1060	S65CM		>16 <=40	>480	730-1,100	>6						>580	830-1,030	>7	>520	800-950	>13
					>40 <=63	-	-	-						>545	780-980	>8	>450	750-900	>14
					>63 <=100	-	-	-						>525	750-950	>8	>450	750-900	>14
1.8159	51CrV4	6150	SUP10	50CrVA	<= 10				<311								>900	1,100-1,300	>9
					>10 <=16				<311								>900	1,000-1,200	>9
					>16 <=40				<293								>800	1,000-1,200	>10
					>40 <=63				<287								>700	900-1,100	>12
					>63 <=100				<287								>700	900-1,100	>12

Other materials and treatment states on request



Case-hardening steels – unalloyed

Case-hardening steels are used for components requiring a high degree of toughness at their core and a high degree of wear resistance at the surface. These properties are achieved and adjusted by case hardening or carbonitriding the outer layer.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated				
Material No.	EN / ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %
1.0301	C10	1010	S10C	DX1 (U59110)	0.07-0.13	0.40	0.30-0.60	0.045	0.045
1.1121	C10E	1010	S10C	DX1 (U59110)	0.07-0.13	0.40	0.30-0.60	0.035	0.035
1.1207	C10R	1010	S10C	DX1 (U59110)	0.07-0.13	0.40	0.30-0.60	0.035	0.02-0.04
1.0401	C15	1015	S15C		0.12-0.18	0.40	0.30-0.80	0.045	0.045
1.1141	C15E	1015	S15C	15 (U20152)	0.12-0.18	0.40	0.30-0.80	0.035	0.035
1.1140	C15R	1015			0.12-0.18	0.40	0.30-0.80	0.035	0.02-0.04

Other materials upon request

Guideline mechanical values in the various treatment states

Designation		Similar materials			States					
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C			cold-drawn and normalised +C+N	
						Rp0.2 MPa	Rm MPa	A5 %	Hardness HB	Hardness HB
1.0301 1.1121 1.1207	C10 C10E C10R	1010 1010 1010	S10C S10C S10C	DX1 (U59110) DX1 (U59110) DX1 (U59110)	<= 10	>350	460-760	>8	<225	85-140
					>10 <=16	>300	430-730	>9	<216	85-140
					>16 <=40	>250	400-700	>10	<207	85-140
					>40 <=63	>200	350-640	>12	<190	85-140
					>63 <=100	>180	320-580	>12	<172	85-140
1.0401 1.1141 1.1140	C15 C15E C15R	1015 1015 1015	S15C S15C	15 (U20152)	<= 10	>380	500-800	>7	<238	95-150
					>10 <=16	>340	480-780	>8	<231	95-150
					>16 <=40	>280	430-730	>9	<216	95-150
					>40 <=63	>240	380-670	>11	<219	95-150
					>63 <=100	>215	340-600	>12	<178	95-150

Other materials and treatment states on request

Case-hardening steels – alloyed

Case-hardening steels are used for components requiring a high degree of toughness at their core and a high degree of wear resistance at the surface. These properties are achieved and adjusted by case hardening or carbonitriding the outer layer.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated											
Material No.	EN / ISO	AISI	JIS	GB	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Al %	N %	Cu %	
		ASTM														
1.7131	16MnCr5	5117		20CrMn	0.14-0.19	0.40	1.00-1.30	0.025	0.035	0.80-1.10						
1.7139	16MnCr5S				0.14-0.19	0.40	1.00-1.30	0.025	0.02-0.04	0.80-1.10						
1.7147	20MnCr5	5120	SMnC420H	20CrMn	0.17-0.22	0.40	1.10-1.40	0.025	0.035	1.00-1.30						
1.7149	20MnCr5S				0.17-0.22	0.40	1.10-1.40	0.025	0.02-0.04	1.00-1.30						
1.5918	17CrNi6-6				0.14-0.20	0.40	0.50-0.90	0.025	0.035	1.40-1.70		1.40-1.70				
1.5919	15CrNi6	4320			0.12-0.18	0.25	0.40-0.70	0.020	0.015	1.35-1.65		1.35-1.65	0.025-0.05	0.012	0.20	
1.5920	18CrNi8				0.15-0.20	0.15-0.40	0.40-0.60	0.035	0.035	1.80-2.10		1.80-2.10				
1.5715	16NiCrS4				0.13-0.19	0.40	0.70-1.00	0.025	0.02-0.04	0.60-1.00		0.80-1.10				
1.6523	20NiCrMo2-2	8620	SNCM220	20CrNiMo	0.17-0.23	0.40	0.65-0.95	0.025	0.035	0.35-0.70	0.15-0.25	0.40-0.70				
1.6526	20NiCrMoS2-2	8620			0.17-0.23	0.40	0.65-0.95	0.025	0.02-0.04	0.35-0.70	0.15-0.25	0.40-0.70				
1.5752	15NiCr16	3312	SNC815		0.14-0.20	0.40	0.40-0.70	0.025	0.035	0.60-0.90		3.00-3.50				

Other materials upon request



Guideline mechanical values in the various treatment states

Designation		Similar materials			States			
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C	cold-drawn and annealed +C+A	cold-drawn and normalised +C+N
						Hardness HB	Hardness HB	Hardness HB
1.7131 1.7139	16MnCr5 16MnCrS5	5117		20CrMn	<= 10	<260	<207	140-187
					>10 <=16	<250	<207	140-187
					>16 <=40	<245	<207	140-187
					>40 <=63	<240	<207	140-187
1.7147 1.7149	20MnCr5 20MnCrS5	5120	SMnC420H	20CrMn	>63 <=100	<240	<207	140-187
					<= 10	<270	<217	152-201
					>10 <=16	<260	<217	152-201
					>16 <=40	<255	<217	152-201
1.5918	17CrNi6-6				>40 <=63	<250	<217	152-201
					>63 <=100	<250	<217	152-201
					<= 10		<229	175-229
					>10 <=16		<229	175-229
1.5919	15CrNi6	4320			>16 <=40		<229	175-229
					>40 <=63		<229	175-229
					>63 <=100		<229	175-229
					<= 10		<229	
1.5920	18CrNi8				>10 <=16			
					>16 <=40			
					>40 <=63			
					>63 <=100			
1.5715	16NiCrS4				<= 10	<270		
					>10 <=16	<260		
					>16 <=40	<255		156-207
					>40 <=63	<255		156-207
1.6523	20NiCrMo2-2	8620	SNM220	20CrNiMo	>63 <=100	<255		156-207
					<= 10		<212	161-212
					>10 <=16		<212	161-212
					>16 <=40		<212	161-212
1.6526	20NiCrMoS2-2	8620			>40 <=63		<212	161-212
					>63 <=100		<212	161-212
					<= 10	<270		149-194
					>10 <=16	<260		149-194
1.5752	15NiCr13	3312	SNC815		>16 <=40	<255		149-194
					>40 <=63	<255		149-194
					>63 <=100	<255		149-194
					<= 10		<229	179-229
1.5752	15NiCr13	3312	SNC815		>10 <=16		<229	179-229
					>16 <=40		<229	179-229
					>40 <=63		<229	179-229
					>63 <=100		<229	179-229

Other materials and treatment states on request

Roller bearing steels

Roller bearing steels are frequently used for the production of parts for the linear and roller bearing industry. Since roller bearings are subject to heavy stresses, high-strength steels of great purity are required. These steels achieve their wear resistance through the hardening or surface layer hardening of the areas exposed to high loads. This combination of properties provides advantages in particular in the linear and automation fields.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated											
Material No.	EN/ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	V %	Al %	Cu %	
1.1213	C53G	1050	S50C		0.50-0.57	0.15-0.35	0.40-0.70	0.025	0.035							
1.1219	C56E2		S55C		0.52-0.60	0.40	0.60-0.90	0.025	0.015					0.050	0.30	
1.3505	100Cr6		SUJ2	GCr15	0.93-1.05	0.15-0.35	0.25-0.45	0.025	0.015	1.35-1.60	0.10			0.050	0.30	
1.3536	100CrMo7-3	K19965			0.93-1.05	0.15-0.35	0.60-0.80	0.025	0.015	1.65-1.95	0.20-0.35			0.050	0.30	
1.3541	X47Cr14				0.43-0.50	1.00	1.00	0.04	0.015	12.5-14.5						
1.3542	X65Cr14				0.60-0.70	1.00	1.00	0.04	0.015	12.5-14.5	0.75					
1.3567	20CrMo4				0.17-0.23	0.040	0.60-0.80	0.025	0.015	0.90-1.20	0.15-0.25			0.050	0.30	
1.6587	18CrNiMo7-6	4320H			0.17-0.23	0.15-0.35	0.40-0.70	0.035	0.040	0.35-0.65	0.20-0.30	1.4-1.7				0.30
1.7792	58CrMoV4				0.58-0.62	0.20-0.30	0.80-0.95	0.020	0.010	0.90-1.05	0.15-0.20	0.10-0.15	0.14			

Other materials upon request



Guideline mechanical values in the various treatment states

Designation		Similar materials			States			
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C	cold-drawn and annealed +C+AC	cold-drawn and normalised +C+N
						Hardness HB	Hardness HB	Hardness HB
1.1213	C53G	1,050	S50C		-			<223
					<= 10	<260	<230	
1.1219	C56E2		S55C		>10 <=16	<260	<230	
					>16 <=40	<260	<230	
					>40 <=63	<260	<230	
					>63 <=100	<260	<230	
1.3505	100Cr6		SUJ2	GCr15	<= 10	<240		
					>10 <=16	<240		
					>16 <=40	<240		
					>40 <=63	<240		
1.3536	100CrMo7-3	K19965			<= 10		<230	
					>10 <=16		<230	
					>16 <=40		<230	
					>40 <=63		<230	
					>63 <=100		<230	
1.3541	X47Cr14				<= 10	<298	<248	
					>10 <=16	<298	<248	
					>16 <=40	<298	<248	
					>40 <=63	<298	<248	
					>63 <=100	<298	<248	
1.3542	X65Cr14				<= 10	<305	<255	
					>10 <=16	<305	<255	
					>16 <=40	<305	<255	
					>40 <=63	<305	<255	
					>63 <=100	<305	<255	
1.3567	20CrMo4				<= 10	<255	<207	<195
					>10 <=16	<255	<207	<195
					>16 <=40	<255	<207	<195
					>40 <=63	<255	<207	<195
					>63 <=100	<255	<207	<195
1.6587	18CrNiMo7-6	4320H			<= 10	<255	<179	<210
					>10 <=16	<255	<179	<210
					>16 <=40	<255	<179	<210
					>40 <=63	<255	<179	<210
1.7792	58CrMoV4				>63 <=100	<255	<179	<210
					<= 10	<295	<230	
					>10 <=16	<295	<230	
					>16 <=40	<295	<230	
					>40 <=63	<295	<230	
>63 <=100	<295	<230						

Other materials and treatment states on request



Tool steels

Tool steels are high-grade steels suitable for the processing and finishing of materials, for handling equipment and for the measuring of workpieces. They demonstrate the high degree of hardness required for the application plus great wear resistance and toughness.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated								
Material No.	EN/ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	V %
1.2067	102Cr6	L3	SUJ2	Cr2 (T30201)	0.95-1.10	0.15-0.35	0.25-0.45	0.030	0.030	1.35-1.65			
1.2210	115CrV3	L2			1.10-1.25	0.15-0.30	0.20-0.40	0.030	0.030	0.50-0.80			0.07-0.12
1.2242	59CrV4				0.55-0.62	0.15-0.35	0.80-1.10	0.035	0.035	0.90-1.20			0.07-0.12
1.2764	X19NiCrMo4				0.16-0.22	0.10-0.40	0.15-0.45	0.030	0.030	1.10-1.40	0.15-0.25	3.80-4.30	

Other materials upon request

Guideline mechanical values in the various treatment states

Designation		Similar materials			States				
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C	cold-drawn and annealed +C+A		
						Hardness HB	Rm MPa	Hardness HB	
1.2067	102Cr6		L3	SUJ2	Cr2 (T30201)	<= 10	<245		<225
						>10 <=16	<245		<225
						>16 <=40	<245		<225
						>40 <=63	<245		<225
						>63 <=100	<245		<225
1.2210	115CrV3		L2			<= 10		<710	<210
						>10 <=16		<710	<210
						>16 <=40		<710	<210
						>40 <=63		<710	<210
						>63 <=100		<710	<210
1.2242	59CrV4					<= 10		<760	<225
						>10 <=16		<760	<225
						>16 <=40		<760	<225
						>40 <=63		<760	<225
						>63 <=100		<760	<225
1.2764	X19NiCrMo4					<= 10		<710	<230
						>10 <=16		<710	<230
						>16 <=40		<710	<230
						>40 <=63		<710	<230
						>63 <=100		<710	<230

Other materials and treatment states on request

Stainless steels – ferritic and martensitic steels

Their resistance to corrosion sets stainless steels apart from other variants. They have a chrome content of at least 10.5 percent. These steels are selected specifically for the application and to suit the aggressive environment.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated							
Material No.	EN/ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
1.4000	X6Cr13	403	SUS403	0Cr13	0.08	1.00	1.00	0.040	0.015	12.0-14.0		
1.4006	X12Cr13	410	SUS410	12Cr12	0.08-0.15	1.00	1.50	0.040	0.015	11.5-13.5		0.75
1.4021	X20Cr13	420	SUS420J1	2Cr13	0.16-0.25	1.00	1.50	0.040	0.015	12.0-14.0		
1.4024	X15Cr13	Grade410	SUS410J1	1Cr13	0.12-0.17	1.00	1.00	0.040	0.015	12.0-14.0		
1.4034	X46Cr13				0.43-0.50	1.00	1.00	0.040	0.015	12.0-14.5		
1.4037	X65Cr13				0.58-0.70	1.00	1.00	0.040	0.015	12.5-14.5		
1.4057	X17CrNi16-2	431	SUS431	1Cr17Ni2	0.12-0.22	1.00	1.50	0.040	0.015	15.0-17.0		1.50-2.50
1.4104	X14CrMoS17	430F	SUS430F	Y1Cr17	0.10-0.17	1.00	1.50	0.040	0.15-0.35	15.5-17.5	0.20-0.60	
1.4113	X6CrMo17-1	434	SUS434	10Cr17Mo	0.08	1.00	1.00	0.040	0.015	16.0-18.0	0.90-1.40	

Other materials upon request



Guideline mechanical values in the various treatment states

Designation		Similar materials			States														
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C			cold-drawn and annealed +C+A or +C+AT					cold-drawn and heat-treated +C+QT					
						Rp0.2 MPa	Rm MPa	A5 %	Thickness mm	Rp0.2 MPa	Rm MPa	A5 %	Hardness HB	Rp0.2 MPa	Rm MPa	A5 %			
1.4000	X6Cr13	403	SUS403	0Cr13	<25				<25	>230	400-630	>20	<200	>400	550-700	>18			
					<= 10				<= 10				<880		<280	>450	650-850	>15	
					>10 <=16				>10 <=16				<880		<280				
					>16 <=40				>16 <=40				<800		<250				
					>40 <=63				>40 <=63				<760		<230				
1.4006	X12Cr13	410	SUS410	12Cr12	>63 <=100				>63 <=100				<730		<220				
					<= 10				<= 10				<910		<290	>600	750-1,000	>8	
					>10 <=16				>10 <=16				<910		<290	>550	750-1,000	>8	
					>16 <=40				>16 <=40				<850		<260	>500	700-950	>10	
					>40 <=63				>40 <=63				<800		<250	>500	700-900	>12	
1.4021	X20Cr13	420	SUS420J1	2Cr13	>63 <=100				>63 <=100				<760		<230	>500	700-850	>13	
					<= 10				<= 10				<950		<305	>700	900-1,150	>7	
					>10 <=16				>10 <=16				<950		<305	>700	900-1,150	>7	
					>16 <=40				>16 <=40				<900		<280	>650	850-1,100	>8	
					>40 <=63				>40 <=63				<840		<260	>650	850-1,000	>8	
1.4034	X46Cr13				>63 <=100				>63 <=100				<800		<245	>650	850-1,000	>10	
					<= 10				<= 10				<840		<265				
					>10 <=16				>10 <=16				<840		<265				
					>16 <=40				>16 <=40				<840		<265				
					>40 <=63				>40 <=63				<840		<265				
1.4037	X65Cr13				>63 <=100				>63 <=100				<840		<265				
					<= 10				<= 10				<840		<265				
					>10 <=16				>10 <=16				<840		<265				
					>16 <=40				>16 <=40				<840		<265				
					>40 <=63				>40 <=63				<840		<265				
1.4057	X17CrNi16-2	431	SUS431	1Cr17Ni2	>63 <=100				>63 <=100				<840		<265				
					<= 10				<= 10				<840		<265				
					>10 <=16				>10 <=16				<840		<265				
					>16 <=40				>16 <=40				<840		<265				
					>40 <=63				>40 <=63				<840		<265				
1.4104	X14CrMoS17	430F	SUS430F	Y1Cr17	>63 <=100				>63 <=100				<840		<265				
					<= 10				<= 10				<880		<280	>580	700-980	>7	
					>10 <=16				>10 <=16				<880		<280	>530	700-980	>7	
					Tensile strength grade +C550	>440	550-750	>15	>16 <=40				<800		<250	>500	650-930	>9	
					>40 <=63				>40 <=63				<760		<230	>500	650-880	>10	
1.4113	X6CrMo17-1	434	SUS434	10Cr17Mo	>63 <=100				>63 <=100				<730		<220	>500	650-850	>10	
					<= 10	>340	540-700	>8	<100	<280	440-660	<18	<200						
					>10 <=16	>320	500-700	>12											
					>16 <=40	>280	440-700	>15											
					>40 <=63	>280	440-700	>15											

Other materials and treatment states on request

Stainless steels – austenitic steels

Stainless steels are very corrosion resistant. They have a chrome content of at least 10.5 percent. These steels are selected specifically for the application and to suit the aggressive environment.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated									
Material No.	EN/ISO	AISI	JIS	GB	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Ti
		ASTM			%	%	%	%	%	%	%	%	%	%
1.4301	X5CrNi18-10	304	SUS304	06Cr19Ni10	0.07	1.00	2.00	0.045	0.030	17.5-19.5		8.00-10.5		
1.4305	X8CrNiS18-9	303	SUS303	Y12Cr18Ni9	0.10	1.00	2.00	0.045	0.15-0.35	17.0-19.0		8.00-10.0	1.00	
1.4401	X5CrNiMo17-12-2	316	SUS316	06Cr17Ni12Mo2	0.07	1.00	2.00	0.045	0.015	16.5-18.5	2.00-2.50	10.0-13.0		
1.4404	X2CrNiMo17-12-2				0.03	1.00	2.00	0.045	0.030	16.5-18.5	2.00-2.50	10.0-13.0		
1.4541	X6CrNiTi18-10	321	SUS321	0Cr18Ni10Ti	0.08	1.00	2.00	0.045	0.015	17.0-19.0		9.00-12.0		0.700

Other materials upon request

Guideline mechanical values in the various treatment states

Designation		Similar materials			States									
Material No.	EN / ISO	ASTM	JIS	GB	Thickness mm	cold-drawn +C			cold-drawn and annealed +C+A or +C+AT					
						Rp0.2 MPa	Rm MPa	A5 %	Thickness mm	Rp0.2 MPa	Rm MPa	A5 %	Hardness HB	
1.4301	X5CrNi18-10	304	SUS304	06Cr19Ni10		+C700	>350	700-850	>20	<160	>190	500-700	>45	<215
						+C800	>500	800-1,000	>12					
1.4305	X8CrNiS18-9	303	SUS303	Y12Cr18Ni9		+C700	>350	700-850	>20	<160	>190	500-750	>35	<230
						+C800	>20	800-1,000	>12					
1.4401	X5CrNiMo17-12-2	316	SUS316	06Cr17Ni12Mo2		+C700	>350	700-850	>20	<160	>200	500-700	>40	<215
						+C800	>500	800-1,000	>12					
1.4404	X2CrNiMo17-12-2					+C700	>350	700-850	>20	<160	>200	500-700	>40	<215
						+C800	>500	800-1,000	>12					
1.4541	X6CrNiTi18-10	321	SUS321	0Cr18Ni10Ti		+C700	>350	700-850	>20	<160	>190	500-700	>40	<215
						+C800	>500	800-1,000	>12					

Other materials and treatment states on request

Heat-resistant steels

Heat-resistant steels retain their properties at temperatures of up to 580° C.
Highly heat-resistant steels remain stable up to approximate 800° C.

Chemical composition

Designation		Similar materials			Alloy base Fe, all values shown are maximum values unless otherwise indicated										
Material No.	EN/ISO	AISI ASTM	JIS	GB	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	V %	N %	Ti %
1.4878	X8CrNiTi18-10	321	SUS321	1Cr18Ni9Ti	0.10	1.00	2.00	0.045	0.015	17.0-19.0		9.0-12.0			0.800
1.4923	X22CrMoV12-1	AMS 5,655		21Cr12MoV (S46020)	0.18-0.24	0.50	0.40-0.90	0.025	0.015	11.0-12.5	0.80-1.20	0.30-0.80	0.25-0.35		
1.4948	X6CrNi18-10	304H	SUS302	07Cr19Ni10 (S30409)	0.04-0.08	1.00	2.00	0.035	0.015	17.0-19.0		8.00-11.0		0.10	

Other materials upon request

Product portfolio and technical data



Profile types

hot-rolled, cold-rolled, cold-drawn, induction-hardened

Cross sections

Profile cross sections 5 to 7,650 mm²
(40 g/m to 60 kg/m)

Availability

Bars up to 12 m, rings up to 2 t

Dimensional tolerances

from 30 µm

Surface roughness

from Rz 5 µm

Materials

Structural steels, free-machining steels, case-hardened steels, heat-treated steels, roller bearing steels, tool steels, stainless steels

Processing

Heat treatment, induction hardening with achievable surface hardnesses of up to 64 HRC, ready-to-fit components including mechanical processing and surface finishing

ZOLLERN Group

Product areas

Metals and shaping

// Investment casting parts



- Turbine components
 - Vanes / Blades / Shrouds / Heat Shields
- Structural Castings
 - Gas Turbines / Aero / Engines Defense / Medical / Industrial Components
- Automotive
 - Turbine Wheels / Waste gates / Vanes / Pins / Planet carriers
- Implants
 - Knees (Femur, Tibia) / Hipps
- Alloys
 - Super alloys / Cobalt Chrome alloys

// Sand casting parts



- Sand casting
- Croningguss / Maskenguss
- Ceramic casting
- Continuous casting
- Centrifugal casting

// Forgings



- Forgings made of pure copper and copper alloys
- Semi-finished products, open die forged, flat bars, round bar
- Drop forged parts
- Rings, seamlessly rolled
- Bushings, seamlessly forged
- Individual pieces, small series, large series

// Special profiles and finished parts



- Special profiles, coils, bars
- Customer-specific finished parts
- Profile types hot-rolled, cold-rolled, cold-drawn, induction-hardened

Drive technology and automation

// Gearboxes



- Travel drives
- Slewing gearboxes
- Winch gearboxes
- Industrial gear units
- Gearboxes for tunnel boring machines
- Sugar mill gearboxes
- Electric drive systems
- Condition Monitoring and Predictive Maintenance

// Winches



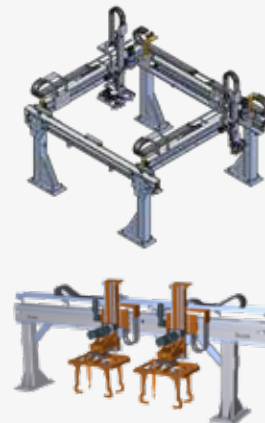
- Hoisting winches
- Free fall winches
- Pull winches
- Rescue boat winches
- Winch systems
- Winch gearboxes

// Electric motors



- Torque motors kits
- Synchronous motor kits
- Synchronous motor modules

// Automation, special systems



- Linear units, linear modules, gantry axes, portal units
- Telescoping axes
- Rotary modules, rotary tables
- Line gantries, area gantries
- Robot traverse axes, jig axes
- Storey lifter and lifting columns
- Fast conveyor
- Framing tenter handling / overhead systems
- Storage systems
- Complete systems with steel construction and control
- Special solutions
- Gripper

// Hydrostatic systems



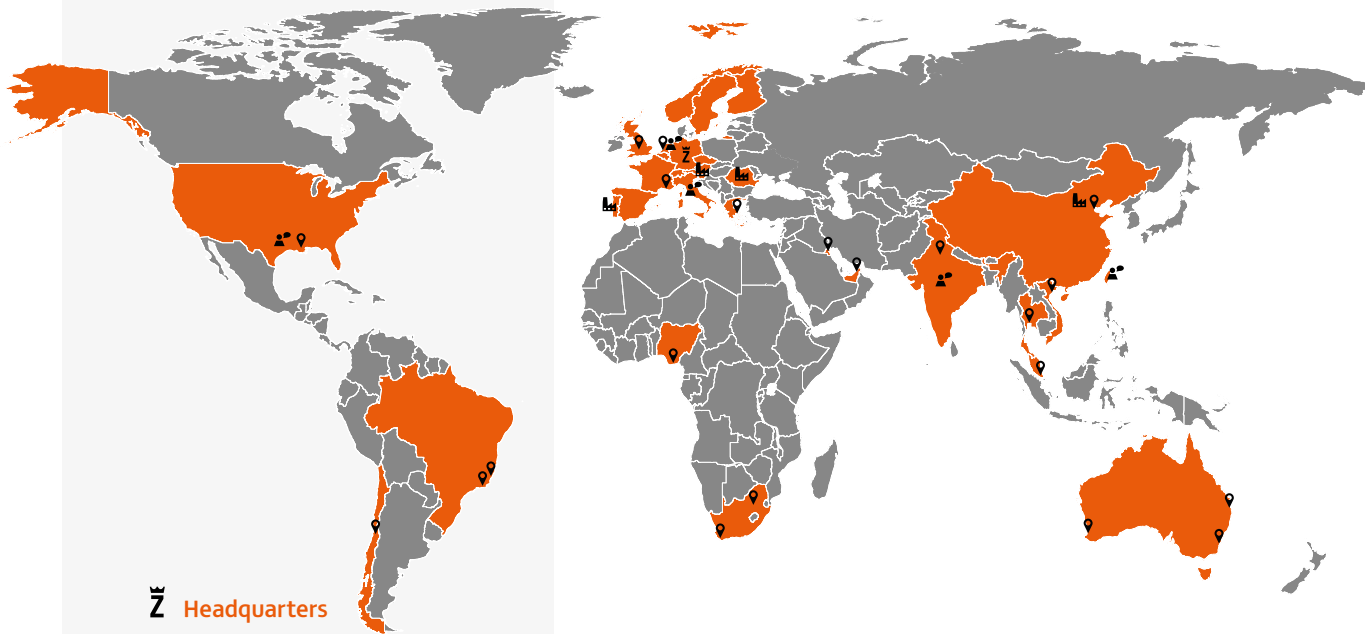
- Hydrostatic spindle units
- Hydrostatic rotary tables
- Aerostatic rotary tables
- Hydrostatic linear guides
- Hydrostatic center drive spindles
- Hydrostatic bearing components
- Hydrostatic special applications and test benches

// Rotary tables systems



- Roller bearing rotary tables
- Hydrostatic rotary tables
- Automatic pallet changing systems and linear axes
- Swiveling tables
- After sales service for products of ZOLLERN, Rüdcke and Eimeldingen

ZOLLERN



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Great Britain
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Singapore
South Africa
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USA
Vietnam



ZOLLERN-worldwide



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