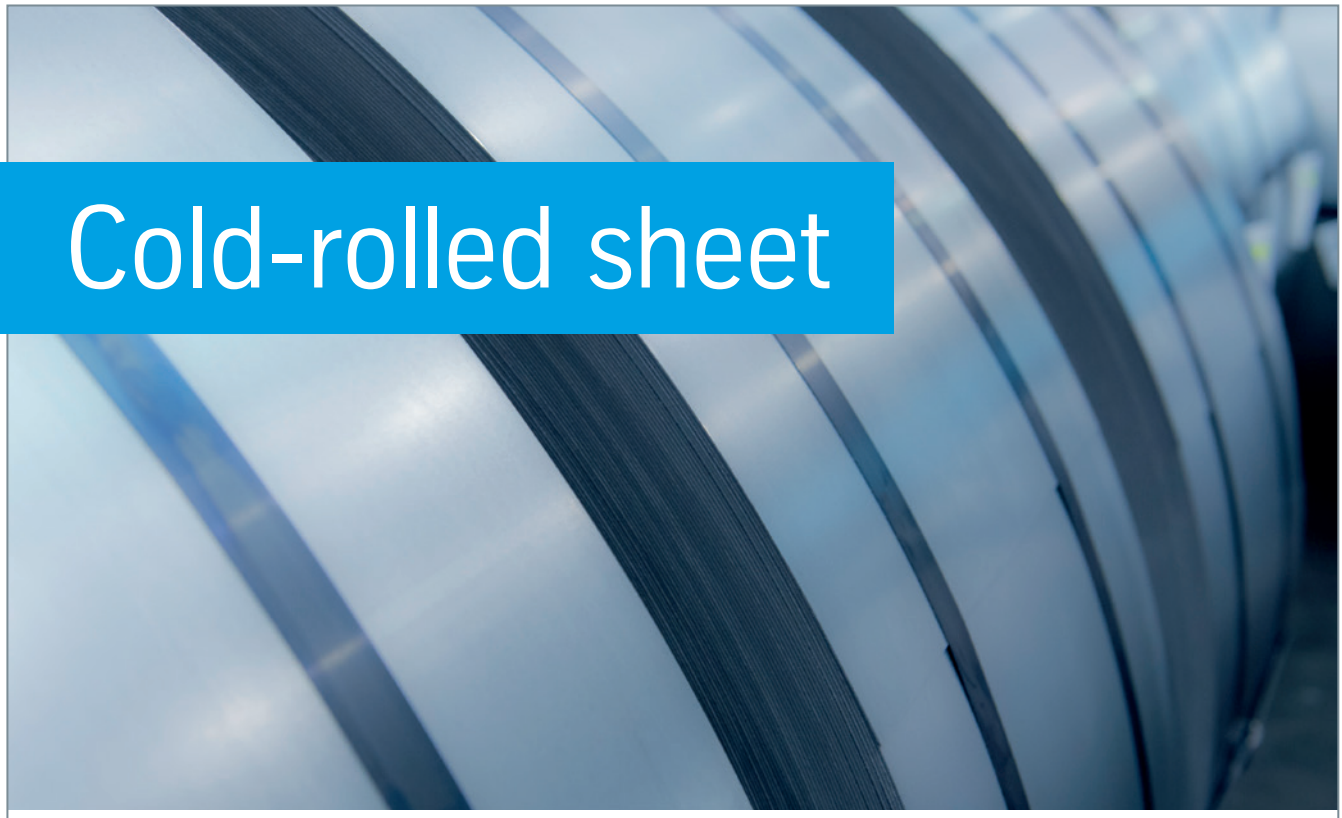
Cold-rolled sheet



Cold-rolled strip is superior to hot strip in terms of surface condition and formability. It also features closer tolerances and is available in smaller thicknesses. Cold-rolled flat products are extremely versatile and come in a host of varieties for a wide range of applications: in the automotive industry, enamelling operations, the manufacture of tubes and tube sections, drums and barrels, or in the construction industry and the sanitary sector.

Surface types to DIN EN 10 130

A	normal surface
B	improved surface

Surface finishes and center roughness values

b	extra smooth	$R_a \leq 0.4$ µm
g	smooth	$R_a \leq 0.9$ µm
m	matt	0.6 µm $< R_a \leq 1.9$ µm
r	rough	$R_a > 1.6$ µm

Surface treatments

O	oiled
U	unoiled

Surface types to VDA 239-100

E	Exposed parts
U	Non exposed parts

Tolerances

Dimensional and shape tolerances to DIN EN 10 131. Closer tolerances on request.

(m+) Grades marked with this symbol are available with closer thickness tolerances according to DIN EN 10 140 from the Basque Mungia.

Mild low-carbon steel for cold forming · DIN EN 10 130

Steel type			Mechanical properties, transverse					Chemical composition, heat analysis				
Short designation	VDA239-100*	Material number	Yield strength R_e[1] MPa max.	Tensile strength R_m MPa	Elongation at fracture A_{80}[2] % min.	Anisotropy r_{90}[3][4] min.	Strain hardening exponent n_{90}[3] min.	Percentage by weight % max. C	P	S	Mn	Ti
DC01	CR1	1.0330	280	270–410	28	–	–	0.12	0.045	0.045	0.60	–
DC03	CR2	1.0347	240	270–370	34	1.3	–	0.10	0.035	0.035	0.45	–
DC04	CR3	1.0338	210	270–350	38	1.6	0.180	0.08	0.030	0.030	0.40	–
DC05	CR4	1.0312	180	270–330	40	1.9	0.200	0.06	0.025	0.025	0.35	–
DC06	CR5	1.0873	170	270–330	41	2.1	0.220	0.02	0.020	0.020	0.25	0.3
DC07	–	1.0898	150	250–310	44	2.5	0.230	0.01	0.020	0.020	0.20	0.2

1) Where no yield strength is defined, the respective values shall apply to the 0.2 % proof stress ($R_{p0.2}$) or to the lower yield strength (R_{eL}). For thicknesses ≤ 0.7 mm but > 0.5 mm, the maximum yield strength values may be 20 MPa higher. In case of thicknesses ≤ 0.5 mm, the maximum yield limits may be 40 MPa higher.
2) For thicknesses ≤ 0.7 mm but > 0.5 mm, the minimum elongation at fracture may be 2 units lower. For thicknesses ≤ 0.5 mm, the minimum elongation at fracture may be 4 units lower.
3) The r_{90} and n_{90} values apply to product thicknesses ≥ 0.5 mm only.
4) For thicknesses > 2 mm, the r_{90}-value is reduced by 0.2.

Mild low carbon steel for cold forming from Basque Mungia · DIN EN 10 139

Steel type			Mechanical properties. transverse					Chemical composition. heat analysis			
Short designation	VDA239-100*	Material number	Yield strength R_e[1] MPa max.	Tensile strength R_m MPa	Elongation at fracture A_{80} %	Elongation at fracture A_5 %	Elongation at fracture Hardness HV	Percentage by weight % max. C	Mn	P	S
DC01 LC	CR1	1.0330	≤ 280	270–410	≥ 28	≥ 30	≤ 115	0.12	0.6	0.045	0.045
DC01 C290	CR1	1.0330	200-380	290–430	≥ 18	≥ 20	95–125	0.12	0.6	0.045	0.045
DC01 C340	CR1	1.0330	≥ 250	340–490	–	–	105–155	0.12	0.6	0.045	0.045
DC01 C390	CR1	1.0330	≥ 310	390–540	–	–	117–172	0.12	0.6	0.045	0.045
DC01 C440	CR1	1.0330	≥ 360	440–590	–	–	135–185	0.12	0.6	0.045	0.045
DC01 C490	CR1	1.0330	≥ 420	490–640	–	–	155–200	0.12	0.6	0.045	0.045
DC01 C590	CR1	1.0330	≥ 520	590–740	–	–	185–225	0.12	0.6	0.045	0.045
DC01 C690	CR1	1.0330	≥ 630	≥ 690	–	–	≥ 215	0.12	0.6	0.045	0.045
DC03 LC	CR2	1.0347	≤ 240	270–370	≥ 34	≥ 36	≤ 110	0.1	0.45	0.035	0.035
DC03 C290	CR2	1.0347	210–355	290–390	≥ 22	≥ 24	95–117	0.1	0.45	0.035	0.035
DC03 C340	CR2	1.0347	≥ 240	340–440	–	–	105–130	0.1	0.45	0.035	0.035
DC03 C390	CR2	1.0347	≥ 330	390–490	–	–	117–155	0.1	0.45	0.035	0.035
DC03 C440	CR2	1.0347	≥ 380	440–540	–	–	135–172	0.1	0.45	0.035	0.035
DC03 C490	CR2	1.0347	≥ 440	490–590	–	–	155–185	0.1	0.45	0.035	0.035
DC03 C590	CR2	1.0347	≥ 540	≥ 590	–	–	≥ 185	0.1	0.45	0.035	0.035
DC04 LC	CR3	1.0338	≤ 210	270–350	≥ 38	≥ 40	≤ 105	0.08	0.4	0.03	0.03
DC04 C290	CR3	1.0338	220–325	290–390	≥ 24	≥ 26	95–117	0.08	0.4	0.03	0.03
DC04 C340	CR3	1.0338	≥ 240	340–440	–	–	105–130	0.08	0.4	0.03	0.03
DC04 C390	CR3	1.0338	≥ 350	390–490	–	–	117–155	0.08	0.4	0.03	0.03
DC04 C440	CR3	1.0338	≥ 440	440–540	–	–	135–172	0.08	0.4	0.03	0.03
DC04 C490	CR3	1.0338	≥ 490	490–590	–	–	155–185	0.08	0.4	0.03	0.03
DC04 C590	CR3	1.0338	≥ 590	590–690	–	–	185–215	0.08	0.4	0.03	0.03
DC05 LC	CR4	1.0312	≤ 180	270–330	≥ 40	≥ 42	≤ 100	0.06	0.35	0.025	0.025

Surface appearance MA and MB
Dimensional tolerances EN 10140

* Comparative grade, therefore minor deviations from DIN EN values possible

Mild low-carbon steel for vitreous enamelling · DIN EN 10 209

Steel type			Mechanical properties, transverse				Chemical composition, heat analysis				
Short designation	VDA239-100*	Material number	Yield strength R_e[1] MPa max.	Tensile strength R_m MPa	Elongation at fracture A_{80}[2] % min.	Anisotropy $\bar{r}$[3][4] min.	Percentage by weight % max.				
							C	Ti	Mn	P	S
DC01EK	–	1.0390	270	270–390	30	–	0.08	–	0.60	0.045	0.050
DC04EK	–	1.0392	220	270–350	36	–	0.08	–	0.50	0.030	0.050
DC05EK	–	1.0386	220	270–350	36	1.5	0.08	–	0.50	0.025	0.050
DC06EK	–	1.0869	190	270–350	38	1.6	0.02	0.30	0.50	0.020	0.050
DC03ED	–	1.0399	240	270–370	34	–	[5]	–	0.40	0.035	0.050
DC04ED	–	1.0394	210[4]	270–350	38	–	[5]	–	0.40	0.030	0.050
DC06ED	–	1.0872	190	270–350	38	1.6	0.02	0.30	0.35	0.020	0.050

1) Where no yield strength is defined, the respective values shall apply to the 0.2 % proof stress ($R_{p0.2}$) or to the lower yield strength (R_{eL}). For thicknesses ≤ 0.7 mm but > 0.5 mm, the maximum yield strength values may be 20 MPa higher. In case of thicknesses ≤ 0.5 mm, the maximum yield limits may be 40 MPa higher.
2) For thicknesses ≤ 0.7 mm but > 0.5 mm, the minimum elongation at fracture may be 2 units lower. For thicknesses ≤ 0.5 mm, the minimum elongation at fracture may be 4 units lower.
3) The $\bar{r}$ values apply to product thicknesses ≥ 0.5 mm only. For thicknesses > 2 mm, the $\bar{r}$ value is reduced by 0.2.
4) For thicknesses ≥ 1.5 mm, the maximum permissible yield strength is 225 MPa.
5) Steel types DC03ED and DC04ED can be subjected to a decarburization treatment in the solid or liquid phase. The maximum permissible carbon content by check analysis is 0.004 %.

* Comparative grade, therefore minor deviations from DIN EN values possible

High and higher strength steel for cold forming · DIN EN 10 268

Steel type			Mechanical properties, transverse					
Short designation	VDA239-100*	Material number	Proof stress $R_{p0.2}$ [1] MPa	Tensile strength R_m MPa	Elongation at fracture A_{80} [2] % min.	Anisotropy r_{90} [3][4]	Strain hardening exponent n_{90} [3] min.	Bake hardening index BH_2 [5] min.
High-strength IF steel						min.		
HC180Y	CR180IF	1.0922	180–230	330–400	35	1.7	0.19	–
HC220Y	CR210IF	1.0925	220–270	340–420	33	1.6	0.18	–
HC260Y	CR240IF	1.0928	260–320	380–440	31	1.4	0.17	–
Isotropic steel						max.		
HC220I	–	1.0346	220–270	300–380	34	1.4	0.18	–
HC260I	–	1.0349	260–310	320–400	32	1.4	0.17	–
HC300I	–	1.0447	300–350	340–440	30	1.4	0.16	–
Bake hardening steel						min.		
HC180B	CR180BH	1.0395	180–230	290–360	34	1.6	0.17	35
HC220B	CR210BH	1.0396	220–270	320–400	32	1.5	0.16	35
HC260B	CR240BH	1.0400	260–320	360–440	29	–	–	35
HC300B	–	1.0444	300–360	390–480	26	–	–	35
Micro-alloyed steel			Our specialist for narrower thickness tolerances in the Basque Mungia offers you this material on request also with narrower tolerances according to DIN EN 10 140.					
HC260LA	CR240LA	1.0480	260–330	350–430	26	–	–	–
HC300LA	CR270LA	1.0489	300–380	380–480	23	–	–	–
HC340LA	CR300LA	1.0548	340–420	410–510	21	–	–	–
HC380LA	CR340LA	1.0550	380–480	440–580	19	–	–	–
HC420LA	CR380LA	1.0556	420–520	470–600	17	–	–	–
HC460LA	CR420LA	1.0574	460–580	510–660	13	–	–	–
HC500LA	–	1.0573	500–620	550–710	12	–	–	–

Steel type			Chemical composition, heat analysis							
Short designation	VDA239-100*	Material number	Percentage by weight % max.							
			C	Si	Mn	P	S	Al min.	Ti [6]	Nb [6]
High-strength IF steel										
HC180Y	CR180IF	1.0922	0.01	0.3	0.7	0.06	0.025	0.01	0.12	0.09
HC220Y	CR210IF	1.0925	0.01	0.3	0.9	0.08	0.025	0.01	0.12	0.09
HC260Y	CR240IF	1.0928	0.01	0.3	1.6	0.1	0.025	0.01	0.12	0.09
Isotropic steel										
HC220I	–	1.0346	0.07	0.5	0.6	0.05	0.025	0.015	0.05	–
HC260I	–	1.0349	0.07	0.5	1.2	0.05	0.025	0.015	0.05	–
HC300I	–	1.0447	0.08	0.5	0.7	0.08	0.025	0.015	0.05	–
Bake hardening steel										
HC180B	CR180BH	1.0395	0.06	0.5	0.7	0.06	0.030	0.015	–	–
HC220B	CR210BH	1.0396	0.08	0.5	0.7	0.085	0.030	0.015	–	–
HC260B	CR240BH	1.0400	0.1	0.5	1.0	0.1	0.030	0.015	–	–
HC300B	–	1.0444	0.1	0.5	1.0	0.12	0.030	0.015	–	–
Micro-alloyed steel			Our specialist for narrower thickness tolerances in the Basque Mungia offers you this material on request also with narrower tolerances according to DIN EN 10 140.							
HC260LA	CR240LA	1.0480	0.1	0.5	1.0	0.03	0.025	0.015	0.15	0.09
HC300LA	CR270LA	1.0489	0.12	0.5	1.4	0.03	0.025	0.015	0.15	0.09
HC340LA	CR300LA	1.0548	0.12	0.5	1.5	0.03	0.025	0.015	0.15	0.09
HC380LA	CR340LA	1.0550	0.12	0.5	1.6	0.03	0.025	0.015	0.15	0.09
HC420LA	CR380LA	1.0556	0.14	0.5	1.6	0.03	0.025	0.015	0.15	0.09
HC460LA	CR420LA	1.0574	0.14	0.6	1.8	0.03	0.025	0.015	0.15	0.09
HC500LA	–	1.0573	0.14	0.6	1.8	0.03	0.025	0.015	0.15	0.09

1) Where no yield strength is defined, the respective values shall apply to the lower yield strength (R_{eL})
2) For thicknesses ≤ 0.7 mm but > 0.5 mm, the minimum elongation at fracture may be 2 units lower. For thicknesses ≤ 0.5 mm, the minimum elongation at fracture may be 4 units lower.
3) The r_{90} and n_{90} minimum values apply to product thicknesses ≥ 0.5 mm only.
4) For thicknesses > 2 mm, the r_{90} value is reduced by 0.2.
5) For thicknesses > 1.2 mm, special arrangements are required.
6) Additions of vanadium and boron are also permissible. The total content of all four elements must not exceed 0.22 % .

Multiphase steel · DIN EN 10 338

Steel type			Mechanical properties, longitudinal				
Short designation	VDA239-100*	Material number	Proof stress $R_{p0.2}$ MPa	Tensile strength R_m MPa	Elongation at fracture A_{80} [1] % min.	Strain hardening exponent $n_{n10\text{-}UE}$ min.	Bake hardening index BH_2 min.
Dual-phase steel							
HCT450X	–	1.0937	260–340	450	27	0.16	30
HCT490X	CR290Y490T-DP	1.0939	290–380	490	24	0.15	30
HCT590X	CR330Y590T-DP	1.0941	330–430	590	20	0.14	30
HCT780X	CR440Y780T-DP	1.0943	440–550	780	14	–	30
HCT980X	CR590Y980T-DP	1.0944	590–740	980	10	–	30
HCT980XG	CR700Y980T-DP	1.0997	700–850	980	8	–	30
Retained-austenite steel (TRIP steel)							
HCT690T	CR400Y690T-TR	1.0947	400–520	690	23	0.19	40
HCT780T	CR450Y780T-TR	1.0948	450–570	780	21	0.16	40
Complex-phase steel							
HCT600C	–	1.0953	350–500	600	16	–	30
HCT780C	CR570Y780T-CP	1.0954	570–720	780	10	–	30
HCT980C	CR780Y980T-CP	1.0955	780–950	980	6	–	30
Multiphase steel							
HCT1180G2	–	1.0969	900–1,150	1,180	4	–	30

Steel type			Chemical composition, heat analysis									
Short designation	VDA239-100*	Material number	Percentage by weight % max.									
			C	Si	Mn	P	S	$Al_{total\ (span)}$	Cr + Mo	Nb + Ti	V	B
Dual-phase steel												
HCT450X	–	1.0937	0.14	0.75	2.00	0.080	0.015	0.015–1.0	1.00	0.15	0.20	0.005
HCT490X	CR290Y490T-DP	1.0939	0.14	0.75	2.00	0.080	0.015	0.015–1.0	1.00	0.15	0.20	0.005
HCT590X	CR330Y590T-DP	1.0941	0.15	0.75	2.50	0.040	0.015	0.015–1.5	1.40	0.15	0.20	0.005
HCT780X	CR440Y780T-DP	1.0943	0.18	0.80	2.50	0.080	0.015	0.015–2.0	1.40	0.15	0.20	0.005
HCT980X	CR590Y980T-DP	1.0944	0.20	1.00	2.90	0.080	0.015	0.015–2.0	1.40	0.15	0.20	0.005
HCT980XG	CR700Y980T-DP	1.0997	0.23	1.00	2.90	0.080	0.015	0.015–2.0	1.40	0.15	0.20	0.005
Retained-austenite steel (TRIP steel)												
HCT690T	CR400Y690T-TR	1.0947	0.24	2.00	2.20	0.080	0.015	0.015–2.0	0.60	0.20	0.20	0.005
HCT780T	CR450Y780T-TR	1.0948	0.25	2.20	2.50	0.080	0.015	0.015–2.0	0.60	0.20	0.20	0.005
Complex-phase steel												
HCT600C	–	1.0953	0.18	0.80	2.20	0.080	0.015	0.015–2.0	1.00	0.15	0.20	0.005
HCT780C	CR570Y780T-CP	1.0954	0.18	1.00	2.50	0.080	0.015	0.015–2.0	1.00	0.15	0.20	0.005
HCT980C	CR780Y980T-CP	1.0955	0.23	1.00	2.70	0.080	0.015	0.015–2.0	1.00	0.15	0.22	0.005
Multiphase steel												
HCT1180G2	–	1.0969	0.23	1.20	2.90	0.080	0.015	0.015–1.4	1.20	0.15	0.20	0.005

1) Reduced minimum values of elongation at fracture apply to product thicknesses t < 0.60 mm (minus 2 units).

* Comparative grade, therefore minor deviations from DIN EN values possible

The cold-rolled sheet with closer thickness tolerances listed here is available from the Basque Mungia.

Case-hardened steel · DIN EN 10 132-2

Steel type			Mechanical properties, longitudinal				Chemical composition, heat analysis					
Short designation	Material number	Delivery condition	Yield strenght R_e MPa max.	Tensile strengh R_m MPa	Elongation at fracture A_{80} % min.	Hardness HV max.	Percentage by weight % max. C	Si max.	Mn	Cr	P max.	S max.
C10E	1.1121	A or LC	345	430	26	135	0.07–0.13	0.40	0.30–0.60	0.40 max.	0.035	0.035
		CR	–	830	–	250						
C15E	1.1141	A or LC	360	450	25	140	0.12–0.18	0.40	0.30–0.60	0.40 max.	0.035	0.035
		CR	–	870	–	260						
16MnCr5	1.7131	A or LC	420	550	21	170	0.14–0.19	0.40	1.00–1.30	0.80 –1.10	0.035	0.035
		CR	–	–	–	–						

Tempering steel · DIN EN 10 132-3

Steel type			Mechanical properties. longitudinal				Chemical composition. heat analysis							
Short designation	Material number	Delivery condition	Yield strenght R_e MPa max.	Tensile strengh R_m MPa	Elongation at fracture A_{80} % min.	Hardness HV max.	Percentage by weight % max. C	Si max.	Mn	P max.	S max.	Cr	Mo	Ni max.
C22E	1.1151	A or LC	400	500	22	155	0.17–0.24	0.40	0.40–0.70	0.035	0.035	0.40 max.	0.1 max.	0.40
		CR	–	900	–	265								
C35E	1.1181	A or LC	430	540	20	170	0.32–0.39	0.40	0.50–0.80	0.035	0.035	0.40 max.	0.1 max.	0.40
		CR	–	930	–	275								
C45E	1.1191	A or LC	455	570	18	180	0.42–0.50	0.40	0.50–0.80	0.035	0.035	0.40 max.	0.1 max.	0.40
		CR	–	1,020	–	290								
C55E	1.1203	A or LC	480	600	17	185	0.52–0.60	0.40	0.60–0.90	0.035	0.035	0.40 max.	0.1 max.	0.40
		CR	–	1,070	–	300								
C60E	1.1221	A or LC	495	620	17	195	0.57–0.65	0.40	0.60–0.90	0.035	0.035	0.40 max.	0.1 max.	0.40
		CR	–	1,100	–	305								
42CrMo4	1.7225	A or LC	480	620	15	195	0.38–0.45	0.40	0.60–0.90	0.035	0.035	0.90–1.20	0.15–0.30	–
		CR	–	–	–	–								
27MnCrB5[1)]	1.7182	A or LC	–	–	–	–	0.24–0.30	0.40	1.10–1.40	0.025	0.035	0.30–0.60	–	–
		CR	–	–	–	–								

1) Mechanical properties can be agreed (DIN EN 10 083-3).

Spring steel · DIN EN 10 132-4

Steel type			Mechanical properties. longitudinal				Chemical composition. heat analysis								
Short designation	Material number	Delivery condition	Yield strenght R_e MPa max.	Tensile strengh R_m MPa	Elongation at fracture A_{80} % min.	Hardness HV max.	Percentage by weight % max. C	Si	Mn	P max.	S max.	Cr	Mo	V	Ni max.
C55S	1.1204	A or LC	480	600	17	185	0.52–0.60	0.15 –0.35	0.60–0.90	0.025	0.025	0.40 max.	0.10	–	0.40
		CR	–	1,070	–	300									
C60S	1.1211	A or LC	495	620	17	195	0.57–0.65	0.15 –0.35	0.60–0.90	0.025	0.025	0.40 max.	0.10	–	0.40
		CR	–	1,100	–	305									
C67S	1.1231	A or LC	510	640	16	200	0.65–0.73	0.15 –0.35	0.60–0.90	0.025	0.025	0.40 max.	0.10	–	0.40
		CR	–	1,140	–	315									
C75S	1.1248	A or LC	510	640	15	200	0.70–0.80	0.15 –0.35	0.60–0.90	0.025	0.025	0.40 max.	0.10	–	0.40
		CR	–	1,170	–	320									
51CrV4	1.8159	A or LC	550	700	13	220	0.47–0.55	0.40 max.	0.70–1.10	0.025	0.025	0.90–1.20	0.10	0.10–0.25	0.40
		CR	–	–	–	–									