

DOCOL[®]
THE AUTOMOTIVE STEEL

THE MOST SUSTAINABLE SOLUTION

Setting the new standard for
the automotive industry.



www.docol.com

SSAB

THIS IS DOCOL

The Automotive Steel



The cleanest steel solution

Sweden is the no. 1 country in sustainability* and has the highest environmental standards in the world. With pure ore from northern Sweden and the cleanest steelmaking technology, we produce the most CO₂-efficient steel for lightweight solutions. We help you make cars lighter, stronger, cleaner and greener.

Dedicated global support

No matter where you are in the world, you'll have access to a dedicated support team of automotive experts ready to tackle your challenges.

Setting new standards in innovation

As pioneers in advanced high-strength steel, we have a proven track record of helping our customers develop the cars of tomorrow through innovative steel solutions.

*RobecoSam:
www.robecosam.com/images/Country_Ranking_Update_May_2016.pdf

Sharing our knowledge and experience

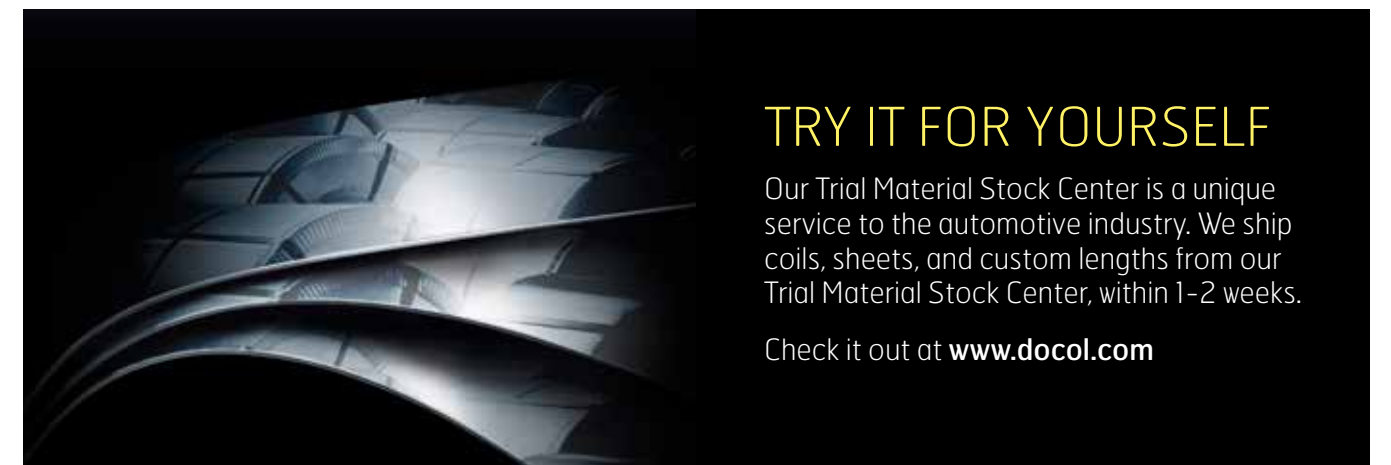
Thanks to a long history of collaborating with our customers, we've built up extensive expertise. We're happy to share our knowledge with you through seminars, research and special projects.

Trial material stock

Our Trial Material Stock Center is a unique service to the automotive industry. We ship coils, sheets and custom lengths of any size, anywhere in the world, within 1–2 weeks. This allows you to work, test and inspect the steel, and accelerate your time to market.

Highest value in use

Having the cleanest steelmaking technology available, we guarantee consistent high quality that optimizes productivity. We provide solutions that meet the economic and environmental targets for the automotive industry.



TRY IT FOR YOURSELF

Our Trial Material Stock Center is a unique service to the automotive industry. We ship coils, sheets, and custom lengths from our Trial Material Stock Center, within 1-2 weeks.

Check it out at www.docol.com

MEET THE AUTOMOTIVE STEEL EXPERTS

To help you realize the full potential of your products, SSAB provides you with an advanced sales and technical support organization – no matter where you are in the world. We can give you in-depth expertise, guidance and advice about all SSAB steels for the automotive business. You'll gain access to technical support, co-development opportunities and problem-solving for both short and long term in these areas:

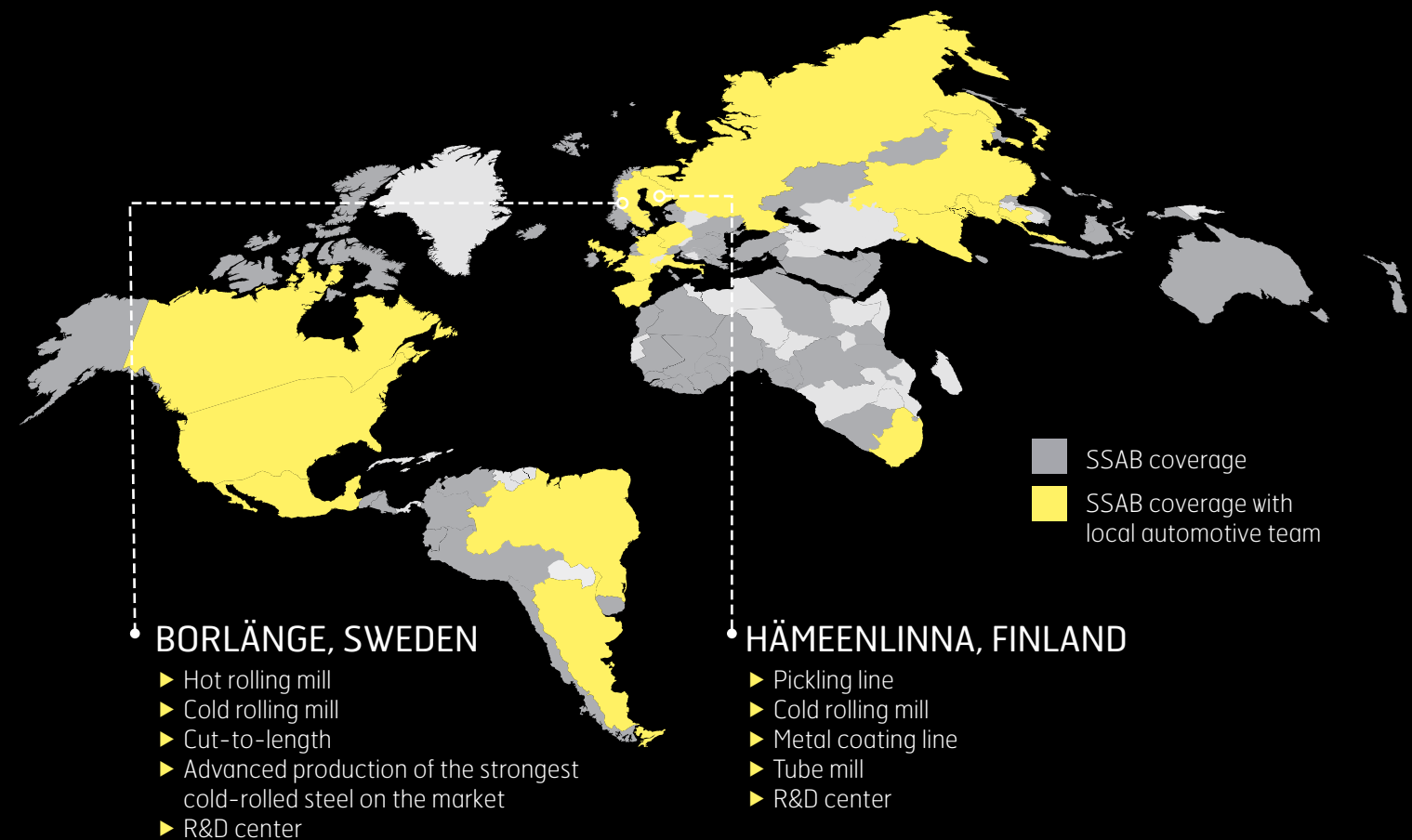
- ▶ Design technology
- ▶ Forming technology
- ▶ Joining technology

Global, yet local

SSAB manufactures steel for the automotive industry and beyond. Our Hardox®, Strenx™ and ArmoX® steels serve industries in mining, construction, transportation, security, agriculture and many more.

While our origins are Nordic, SSAB is a global steel manufacturer with a strong local presence in all regions across the world. Our automotive steel experts are always close at hand, so we can provide on-site visits, seminars and workshops.

Superior quality and global availability in combination with our expertise make SSAB a strong partner, and Docol® the steel of choice for the automotive industry.

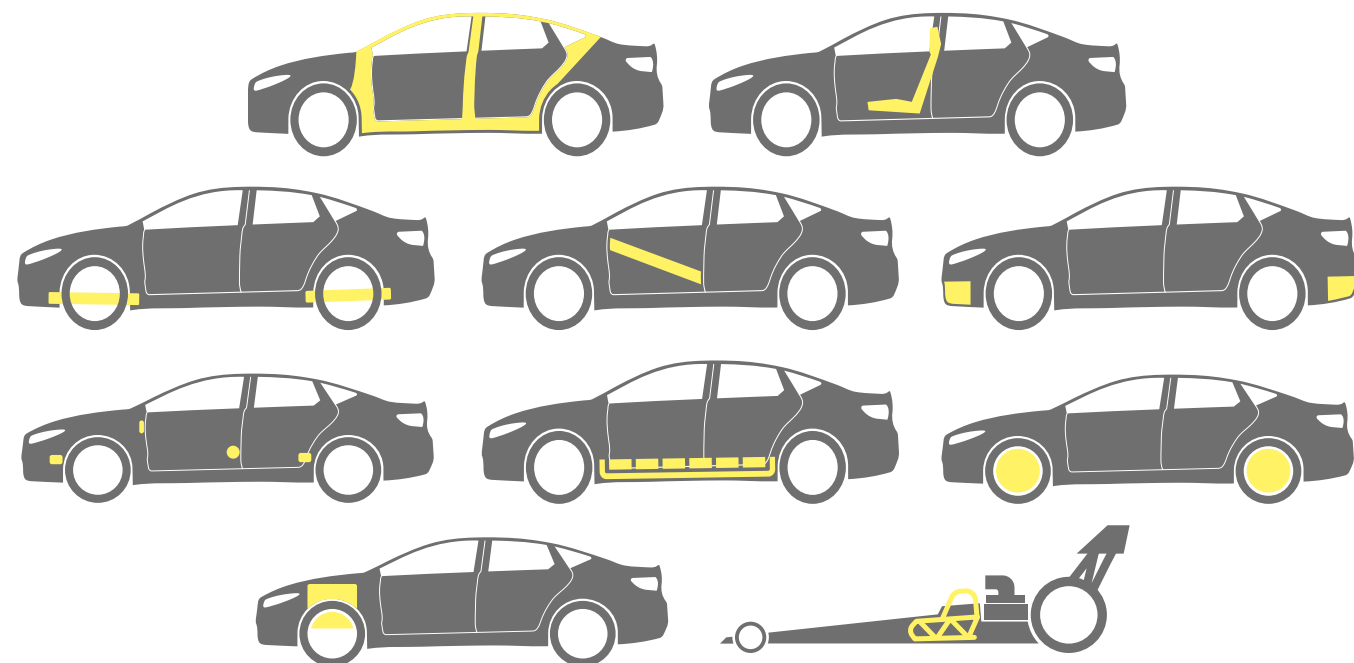


AUTOMOTIVE STEEL AND AUTOMOTIVE INDUSTRY APPLICATIONS



Docol® steel grades are being used by OEMs and tier suppliers in millions of vehicles around the world, in a range of components and applications. We partner with our customers throughout the life cycle of their products to develop stronger and lighter steel materials – and total solutions that help drive the industry forward.

Go to www.docol.com and see where you can use Docol®.



TYPES OF STEEL

High Strength Low Alloy (HSLA) steels

High Strength Low Alloy (HSLA) steels have a typically small difference between yield strength and tensile strength (<100 MPa). They, therefore, offer excellent bendability. With little pearlite and no other hard phases they also have better fine blanking properties compared to DP steels and due to lean composition they are very easy to weld.

Dual Phase (DP) steels

For Dual Phase (DP) steels there is a big difference in yield and tensile strength in un-deformed areas. The work hardening in forming is very strong. DP steels have good formability compared to its strength but are limited in hole expansion. With its lean composition these steels are easy to weld but sensitive to heat treatment (> 200 °C).

Dual Phase with High Formability (DH) Steels

Dual Phase with High Formability (DH) steels belong to the so called 3rd generation steel family and offer improved deep drawing formability compared to DP steels together with stretch-flange ability close to CP steels. Its lean composition enables good welding properties. DH steel undergoes a special heat treatment producing mainly two-phase structures. Ferrite that imparts unique forming properties represents one phase and martensite that accounts for the strength represents the other phase. Small amounts of bainite and retained austenite further improves formability.

Complex Phase (CP) steels

Complex Phase (CP) steels have higher yield strength and lower work hardening effect, compared to DP steels for the same strength level. CP steels have good fatigue properties when it comes to low cycle fatigue. Compared to DP, the CP steels offer better flanging and ISO hole expansion performance and these steels are suitable for applications where high strength, good bendability and stretch-flange ability is required.

Ferritic-Bainitic (FB) steels

Ferritic-Bainitic (FB) steels have mechanical properties that are similar to CP steels but have a higher gap between yield and tensile strength. FB steels are characterized by good bendability and excellent stretch-flange ability. They are best suited for parts with stretched edges.

Martensitic (M) steels

Martensitic (M) steels have very high yield strength (Re) and an extremely high tensile strength (Rm). Docol® martensitic steel has quite good draw ability and good edge stretching properties. It is also good in welding.

Press Hardening Steel (PHS)

For Press Hardening (PHS) Steel it is the combined forming and hardening process at the customer which sets the final characteristics on the material. Forming at high temperatures facilitates complex structures as the martensitic microstructure is developed after press hardening. This material has a limitation in welding properties.

VDA

Verband der Automobilindustrie, VDA, is the German Association of the Automotive Industry and consists of more than 600 companies involved in production for the automotive industry in Germany. Most of them are represented around the globe. A large number of VDA recommendations are produced every year. The goal is to standardize specifications, test procedures, data formats, material and component properties or material compatibilities by means of voluntary standardizations.

In some of these working groups, SSAB takes part and can contribute with experience and know-how related

to advanced high-strength steel for cars. One example is the VDA 239-100 material specification (Sheet Steel for Cold forming). VDA is aiming for a global standard for the automotive industry and SSAB works continuously to match our offer with customer needs. However the so called house standards for OEMs overrule VDA, and as a steel supplier we also need to, and do, meet the many specific OEM standards worldwide.



PRODUCT PROGRAM

This program is a brief overview only. For detailed technical information please download our datasheets at www.docol.com

Are you looking for other grades?

We supply many steel grades according to SAE, other regional standards and OEM standards. If you don't find the steel grade you are looking for in this program, please let us know, by calling or sending us an e-mail and our technical support will give you more information.

High Strength Low Alloy (HSLA)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	
										Min	Max	Min	Max	Min	Min
Docol 420LA	Docol CR420LA	CR	VDA 239-100:2016			●	■	■	L	420	520	480	600	17	-
	Docol HR420LA	HR	VDA 239-100:2016	●	●	■			L	420	520	480	600	18	22
	HC420LA	CR	EN 10268+A1:2013	●					T	420	520	470	600	17	-
	HX420LAD	CR/HR	EN 10346:2015			●	●	●	T	420	520	470	590	17	-
Docol 460LA	Docol CR460LA	CR	VDA 239-100:2016	●	●	■	■		L	460	580	520	680	15	-
	Docol HR460LA	HR	VDA 239-100:2016	●					L	460	560	520	640	16	20
	HC460LA	CR	EN 10268+A1:2013	●					T	460	580	510	660	13	-
	HX460LAD	CR/HR	EN 10346:2015			●	■	■	T	460	560	500	640	15	-
Docol 500LA	Docol HR500LA	HR	VDA 239-100:2016	●					L	500	620	560	700	14	17
	HC500LA	CR	EN 10268+A1:2013	●					T	500	620	550	710	12	-
	HX500LAD	CR/HR	EN 10346:2015			●	■	■	T	500	620	530	690	13	-
Docol 550LA	Docol HR550LA	HR	VDA 239-100:2016	●		■			L	550	670	610	750	12	16
Docol 600LA	Docol HR600LA	HR	SSAB	●					L	600	730	650	820	13	16
Docol 650LA	Docol HR650LA	HR	SSAB	●					L	650	780	700	880	12	14
Docol 700LA	Docol HR700LA	HR	VDA 239-100:2016	●		■			L	700	850	750	950	10	13
Docol 800LA	Docol CR800LA	CR	SSAB	■					L	800	950	800	950	9	-

Dual Phase (DP)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	
										Min	Max	Min	Max	Min	Min
Docol 500DP	Docol CR290Y490T-DP	CR	VDA 239-100:2016	●		●	■	●	L	290	380	490	600	24	-
	HCT490X	CR	EN 10338:2015	●					L	290	380	490	-	24	-
	HCT490X	CR	EN 10346:2015			●	■	●	L	290	380	490	-	24	-
	Docol CR230Y500T-DL	CR	SSAB	●					T	230	300	500	600	24	-
	Docol CR290Y500T-DP	CR	SSAB	●					T	290	370	500	600	20	-
Docol 600DP	Docol CR330Y590T-DP	CR	VDA 239-100:2016	●		●	●	●	L	330	430	590	700	20	-
	HCT590X	CR	EN 10338:2015	●					L	330	430	590	-	20	-
	HCT590X	CR	EN 10346:2015			●	●	●	L	330	430	590	-	20	-
	Docol CR280Y600T-DL	CR	SSAB	●					T	280	360	600	700	20	-
	Docol CR350Y600T-DP	CR	SSAB	●					T	350	450	600	700	16	-
Docol 800DP	Docol CR440Y780T-DP	CR	VDA 239-100:2016	●		●	●	■	L	440	550	780	900	14	-
	HCT780X	CR	EN 10338:2015	●					L	440	550	780	-	14	-
	HCT780X	CR	EN 10346:2015			●	●	■	L	440	550	780	-	14	-
	Docol CR450Y780T-DP	CR	SSAB	●					L	450	550	780	900	15	-
	Docol CR390Y800T-DL	CR	SSAB	●					T	390	-	800	950	13	-
	Docol CR500Y800T-DP	CR	SSAB	●					T	500	650	800	950	10	-
	Docol 800DPX	CR	SSAB			●	■		T	620	770	800	950	10	-
Docol 1000DP	Docol CR590Y980T-DP	CR	VDA 239-100:2016	●	●	●	■	■	L	590	740	980	1130	10	-
	Docol CR700Y980T-DP	CR	VDA 239-100:2016	●	●	●	■	■	L	700	850	980	1130	8	-
	HCT980X	CR	EN 10338:2015	●	●				L	590	740	980	-	10	-
	HCT980X	CR	EN 10346:2015			●	■	■	L	590	740	980	-	10	-
	HCT980XG	CR	EN 10338:2015	●	●				L	700	850	980	-	8	-
	HCT980XG	CR	EN 10346:2015			●	■	■	L	700	850	980	-	8	-
	Docol CR700Y980T-DP-LCE	CR	SSAB	●	●	■	▲	■	L	700	900	980	1130	8	-
	Docol CR700Y1000T-DP	CR	SSAB	●	●				T	700	950	1000	1200	7	-
Docol 1000DPX	CR	SSAB			●	■		T	800	1000	1000	1200	6	-	
Docol 1200DP	Docol CR780Y1180T-DP	CR	SSAB			▲	▲		L	780	950	1180	1350	7	-

Dual Phase with High Formability (DH)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	
										Min	Max	Min	Max	Min	Min
Docol 600DH	Docol CR330Y590T-DH	CR	SSAB			■	▲		L	330	430	590	700	26	-
Docol 800DH	Docol CR440Y780T-DH	CR	VDA 239-100:2016			▲	▲		L	440	550	780	900	18	-
Docol 1000DH	Docol CR590Y980T-DH	CR	SSAB			▲	▲		L	590	740	980	1180	14	-
	Docol CR700Y980T-DH	CR	VDA 239-100:2016			▲	▲		L	700	850	980	1180	13	-

Mechanical properties for information only. Coating and thickness-specific restrictions exist. Check specifications for exact requirements.

EXPLANATIONS: UC = Uncoated EG = Electro Galvanized (ZE in EN standard) GI = Hot Dip Galvanized (Z in EN standard) GA = Galvannealed (ZF in EN standard) ZA = Galfan
 ● = open in product program ■ = available upon request ▲ = under development

Complex Phase (CP)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	Elongation (A, %)
										Min	Max	Min	Max	Min	Min
Docol 600CP	Docol CR350Y600T-CP	CR	SSAB			●	●	●	L	350	500	600	740	16	-
	HCT600C	CR	EN 10346:2015			●	●	●	L	350	500	600	-	16	-
Docol 800CP	Docol CR570Y780T-CP	CR	VDA 239-100:2016	■		●	■	■	L	570	720	780	920	10	-
	Docol HR660Y760T-CP	HR	VDA 239-100:2016	●		■			L	660	820	760	960	10	13
	HCT780C	CR	EN 10338:2015	■					L	570	720	780	-	10	-
	HCT780C	CR	EN 10346:2015			●	■	■	L	570	720	780	-	10	-
	Docol Roll 800	CR	SSAB	●					T	600	750	800	950	10	-
Docol 1000CP	Docol CR780Y980T-CP	CR	VDA 239-100:2016	●	●	●			L	780	950	980	1140	6	-
	HCT980C	CR	EN 10338:2015	●	●				L	780	950	980	-	6	-
	HCT980C	CR	EN 10346:2015			●			L	780	950	980	-	6	-
	Docol HR800Y950T-CP	HR	SSAB	■	■				T	800	900	950	1050	-	9
	Docol Roll 1000	CR	SSAB	●	●				T	800	950	980	1140	6	-
	Docol Roll 1000 HY	CR	SSAB	●	●				T	850	-	1000	1200	5	-
Docol 1200CP	Docol CR900Y1180T-CP	CR	VDA 239-100:2016	●	●	▲	▲		L	900	1100	1180	1350	5	-
Docol HR800HE	Docol HR800HE	HR	SSAB	▲					-	-	-	-	-	-	-
Docol HR1000HE	Docol HR1000HE	HR	SSAB	▲					-	-	-	-	-	-	-

Ferritic Bainitic (FB)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	Elongation (A, %)
										Min	Max	Min	Max	Min	Min
Docol 600FB	Docol HR440Y580T-FB	HR	VDA 239-100:2016	■					L	440	600	580	700	15	17
Docol 800FB	Docol HR600Y780T-FB	HR	VDA 239-100:2016	▲					L	600	760	780	920	12	15

Martensitic (M)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	Elongation (A, %)
										Min	Max	Min	Max	Min	Min
Docol 900M	DOCOL CR700Y900T-MS	CR	SSAB	●	●				L	700	1000	900	1100	3	-
Docol 1100M	Docol CR860Y1100T-MS	CR	SSAB	●	●				L	860	1100	1100	1300	3	-
Docol 1200M	Docol CR950Y1200T-MS	CR	SSAB	●	●				T	950	-	1200	1400	3	-
	Docol HR900Y1180T-MS	HR	VDA 239-100:2016	●					L	900	1150	1180	1400	5	8
Docol 1300M	Docol CR1030Y1300T-MS	CR	VDA 239-100:2016	●	●				L	1030	1330	1300	1550	3	-
Docol 1400M	Docol CR1150Y1400T-MS	CR	SSAB	●	●				T	1150	-	1400	1600	3	-
Docol 1500M	Docol CR1220Y1500T-MS	CR	VDA 239-100:2016	●	●				L	1220	1520	1500	1750	3	-
Docol 1700M	Docol CR1350Y1700T-MS	CR	VDA 239-100:2016	●	▲				L	1350	1700	1700	2000	3	-

Press Hardening Steel (PHS)

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	Elongation (A, %)
										Min	Max	Min	Max	Min	Min
Docol PHS 1500	Docol PHS CR1500	CR	SSAB	●					-	1100 l)	-	1500 l)	-	6 l)	-
	Docol PHS HR1500	HR	SSAB	●					-	1100 l)	-	1500 l)	-	10 l)	-
Docol PHS 1800	Docol PHS CR1800	CR	SSAB	●					-	1300 l)	-	1800 l)	-	6 l)	-
Docol PHS 2000	Docol PHS CR2000	CR	SSAB	●					-	1400 l)	-	2000 l)	-	5 l)	-
	Docol PHS HR2000	HR	SSAB	■					-	1400 l)	-	2000 l)	-	5 l)	-

High Strength Low Alloy (HSLA) Tubes

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	Elongation (A, %)
										Min	Max	Min	Max	Min	Min
Docol Tube 420LA	Docol Tube CR420LA	CR	EN 10305-3/5:2016	●		●	●	●	-	420	-	490	-	-	12
	Docol Tube HR420LA	HR	EN 10305-3/5:2016	●					-	420	-	490	-	-	12
Docol Tube 500LA	Docol Tube CR500LA	CR	EN 10305-3/5:2016	●					-	500	-	540	-	-	8
	Docol Tube HR500LA	HR	EN 10305-3/5:2016	●					-	500	-	540	-	-	8
Docol Tube 600LA	Docol Tube HR600LA	HR	EN 10305-3/5:2016	●					-	600	-	640	-	-	6
Docol Tube 700LA	Docol Tube HR700LA	HR	EN 10305-3/5:2016	●					-	600	-	740	-	-	5

Dual Phase (DP) Tubes

	Steel Grade	Substrate (HR/CR)	Specification	UC	EG	GI	GA	ZA	Approximate mechanical limits for material selection purposes						
									Test Direction	Yield Strength (MPa)		Tensile Strength (MPa)		Elongation (A ₈₀ , %)	Elongation (A, %)
										Min	Max	Min	Max	Min	Min
Docol Tube 590DP	Docol Tube CR500Y590T-DP	CR	SSAB	●		●	●	●	-	500	-	590	-	-	12
	Docol Tube CR500Y590T-DH	CR	SSAB	●					-	500	-	590	-	-	20
Docol Tube 780DP	Docol Tube CR600Y780T-DP	CR	SSAB	●		●	●	●	-	600	-	780	-	-	7
	Docol Tube CR600Y780T-DH	CR	SSAB	●					-	600	-	780	-	-	12
	Docol Tube CR700Y800T-DP	CR	SSAB	●					-	700	-	800	-	-	7
Docol Tube 980DP	Docol Tube CR750Y980T-DP	CR	SSAB	●		●	●	●	-	750	-	980	-	-	5

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 ● = open in product program ■ = available upon request ▲ = under development

SSAB is a Nordic and US-based steel company. SSAB offers value added products and services developed in close cooperation with its customers to create a stronger, lighter and more sustainable world. SSAB has employees in over 50 countries. SSAB has production facilities in Sweden, Finland and the US. SSAB is listed on the Nasdaq OMX Nordic Exchange in Stockholm and has a secondary listing on the Nasdaq OMX in Helsinki. www.ssab.com.



Upgrade and save in CO₂ emissions
with SSAB EcoUpgraded concept

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