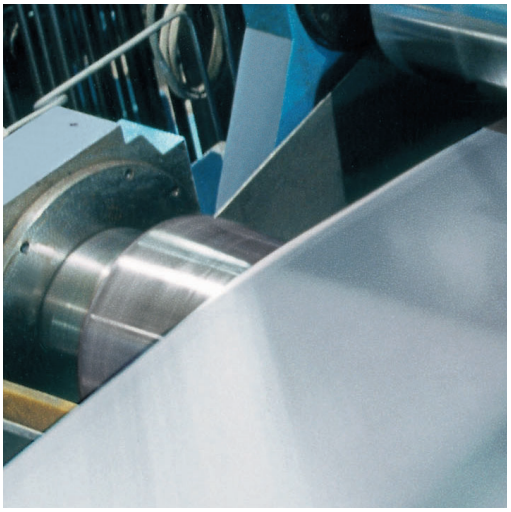
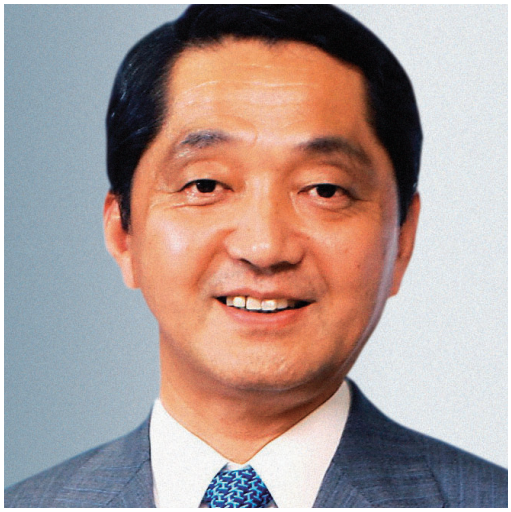
Two Companies.
One Global Product Portfolio.

JFE Steel Corporation

ThyssenKrupp Steel



Two Partners.
One Worldwide Supply Program.



Global availability of high-quality steels is becoming tremendously important particularly for automobile manufacturers operating on a global level. When JFE Steel Corporation and ThyssenKrupp Steel agreed to join forces in 2002, we set forth one agenda.

We wanted to offer an interlinked range of products to give our customers all over the world the opportunity to purchase comparable products in the high qualities they have become accustomed to. This idea gave rise to a network going far beyond a joint range of products. This is a linkage driven by our complementary engineering excellence and joint research and development work. A primary example are the work groups we have formed for accelerating the development of high-strength steels, trailblazing coating techniques and enhanced technologies for steel applications to achieve our goal of next-generation lightweight and environmentally friendly cars. One thing our customer driven projects are pioneering are new lightweight designs, especially in application technologies. Further, our relationship has also proven its worth in license exchanges and a whole range of fascinating joint technical activities.

This brochure presents the first extensive cross-section of our joint range of products specifically aligned to the needs of automobile manufacturers. We have adopted a joint nomenclature to make it easier for you to access this joint range of products of ThyssenKrupp Steel and JFE Steel Corporation. We believe that this will advance the establishment of reliable global quality standards for successful, profitable and cooperative business relations with our customers from the automobile industry.

Hajime Bada
President and CEO
JFE Steel Corporation

Prof. h.c. (CHN) Dr. Ulrich Middelmann
Chairman of the Executive Board
ThyssenKrupp Steel AG

Unique Cultures.
Common Specifications for a Consistent Automobile Quality.

The automobile industry is intensifying its focus on lightweight, safe and cost effective cars worldwide, creating a growing demand for global availability of high-quality steel products for manufacturing cars and components.

That is why the automobile industry is integrating more and more of the leading steel manufacturers directly into the development and application processes. This integrates the work of steel manufacturers and their customers to meet the challenge of continually driving down vehicle weight and manufacturing costs in product and process developments for the next generation of cars. New grades of steel, effective coating techniques and knowledge transfer of state-of-the-art application technologies from other industries to the automobile industry are becoming increasingly important. They have to be supplied directly to the facilities of car manufacturers all over the world. JFE Steel Corporation and ThyssenKrupp Steel have joined forces to provide one common range of products aligned to these needs. What is the benefit to the automobile industry? The same grades of steel, available where clients need them to be, in the quality they have become accustomed to. That results in a technical alliance between JFE Steel Corporation and ThyssenKrupp Steel.

JFE Steel Corporation and ThyssenKrupp Steel are joining forces to provide an extensive range of deep-drawing mild steels, conventional high-strength and advanced high-strength steels. You can also get a wide range of cold-rolled grades of steel in high-quality coatings as well.

This brochure offers a cross-section of our entire range of products on the following pages. It identifies the steel grades with identical property ranges in Japan and Europe and those steel grades with property ranges typically used in Japan or Europe for cross-referencing similar products on the other continent. For example, Japanese bake hardenable BH 20/34 is comparable but not identical to European bake hardenable BH 22/32.

Identical grades are defined both in standard tolerances and closer tolerances. Standard tolerances in some cases already have tighter tolerances compared to national standards. Closer tolerances (ct) have further limitations on mechanical properties to fulfill advanced demands of the automotive industries.

To make it easier for you to address the steel grades, we have assigned for our steel products exclusive names which describe the type of steel and strength level, e. g. **tj**BH 18/29 which means a bake hardenable steel with minimum 180 MPa yield strength and 290 MPa tensile strength. We have also made references to the corresponding Japanese and European standards (if any) for each grade in the overview table on the following pages. The grades of steel presented in this brochure cover more than 80 percent of the materials needed for the body-in-white.

JFE Steel Corporation and ThyssenKrupp Steel are constantly expanding their joint range of products and you can keep up with our latest developments on the internet at **www.tks-jfe.com**.

Please contact JFE Steel Corporation or ThyssenKrupp Steel if you have any questions on our products or wish to make an inquiry or place an order. You will find the appropriate contact person at www.tks-jfe.com.

How to order

This brochure is the result of the technical alliance between JFE Steel Corporation and ThyssenKrupp Steel and gives information about steel grades which can be produced by both of the partners. Consequently this brochure is not intended to implement or to give information about joint sales activities. In the event that you would like to purchase our products, either JFE Steel Corporation or ThyssenKrupp Steel would negotiate or receive your order independently.

Some Definitions:

Identical Grades
This group of steel grades has identical mechanical properties in both Europe and Japan. To give maximum benefit to our customers we offer standard tolerances and additionally closer tolerances.

Similar Grades
Similar grades are produced and supplied in both Europe and Japan separately. To ensure a global stable supply chain an agreement with the local cooperation partner has to be considered.

Standard Tolerances
All of the product designations printed with light-grey background are products with so called standard tolerances which are in some cases tighter than the corresponding national standards.

Japanese Version
Grades of steel with properties typically used in Japan.

Closer Tolerances
Grades of steel with closer tolerances compared to standard tolerances.

European Version
Grades of steel with properties typically used in Europe.

All other characteristics, e. g. dimensions, oiling, coating, unexposed/exposed parts, are to be discussed with the local cooperation partner.

A Joint Range of Products.
JFE Steel Corporation and ThyssenKrupp Steel.

Deep-Drawing Steels (page 7)

Deep-drawing steels from JFE Steel Corporation and ThyssenKrupp Steel feature outstanding drawing properties. Some examples of hot-rolled deep-drawing steel applications are structural components, chassis components and wheels. Cold-rolled steel grades have outstanding forming properties making them ideal for manufacturing intricate exterior and interior body panels, e. g. fenders, side panels, floor pans and doors. Cold-rolled grades of steel are available in a variety of coatings. For availability of coated hot-rolled grades, please contact one of the partners JFE or ThyssenKrupp Steel.

High-Strength Steels

One of the steel industry's answers to the car industry's demand for reduced-weight design is the application of high-strength steels. Their high strength allows reduced sheet-metal thickness and thus lower weight while retaining accepted production technologies, for example good weldability with low carbon and alloying contents.
A variety of steel grades covers wide ranges of mechanical properties which provide the car designer with a whole series of areas where hot- and cold-rolled high-strength steels could be used. High-strength steels are currently divided into two categories: conventional high-strength steels and advanced high-strength steels.

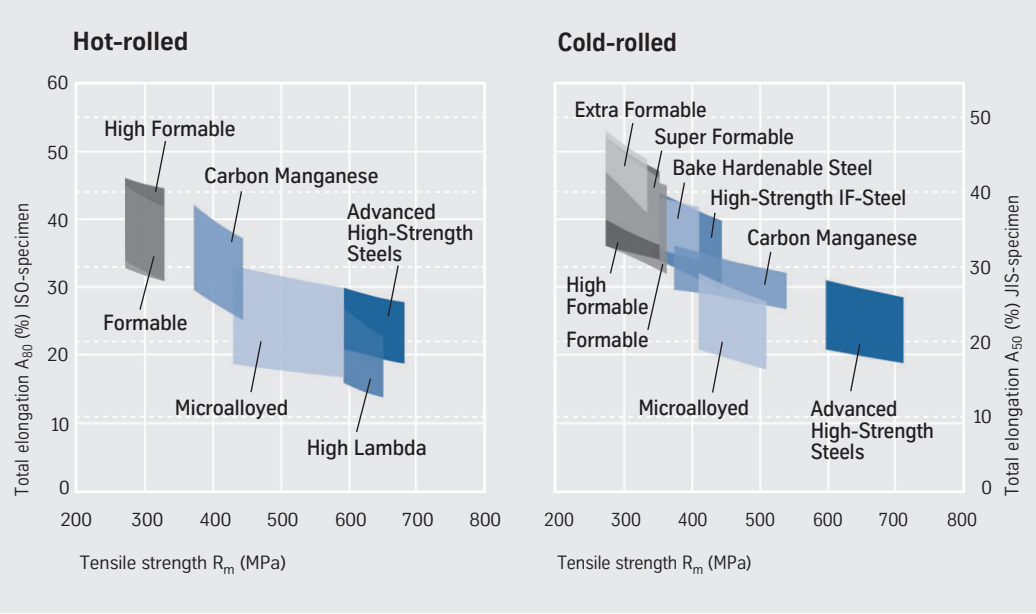
Conventional High-Strength Steels (pages 8-9)

Conventional high-strength steels meet the automobile industry's general needs for weight reduction. Microalloyed hot-rolled grades are applied, for example, for structural components and wheels. Cold-rolled steel grades like high-strength IF-steel fulfill requirements of high formability for intricate deep-drawing interior and exterior panels.

Advanced High-Strength Steels (page 10)

The main advantage of advanced high-strength steels is the excellent forming properties and outstanding bake hardening behaviour for the strength level over 590 MPa in tensile strength. Consistent use of these steels combined with modern design methods allows significant weight reduction in body design. The advanced high-strength steels will present a new family of steel grades. Applications in new vehicles have started.

However the development of common specifications is an ongoing process and updated on a regular basis on our homepage www.tks-jfe.com.



Overview of steel grades in Common Specification

Deep-Drawing Steels.
Exciting in Every Way.

Steel Grade	HR/CR Coating	Japanese Standard	European Standard	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%) min.		r-value min.		n-value min.	Test Direction	
						JFS	ISO	JFS r_m	ISO r_t	ISO n_{90}	JFS	ISO
Formable												
tjF 305	HR	JSH270C (JFS A 1001)	DD 13 (DIN EN 10111)	185 - 305	≥ 270	37	33	-	-	-	L	T
tjF 240*	GI		DX 53 D + Z (DIN EN 10327)	140 - 240	≥ 270	40	30	1.2	1.2	-	L	T
tjF 240 ct*	GI		DX 53 D + Z (DIN EN 10327)	140 - 240	270 - 360	42	33	1.2	1.3	0.17	L	T
tjF 240*	GA	JAC270D (JFS A 3011)	DX 53 D + ZF (DIN EN 10327)	140 - 240	≥ 270	38	30	1.2	1.2	-	L	T
tjF 240 ct*	GA	JAC270D (JFS A 3011)	DX 53 D + ZF (DIN EN 10327)	140 - 240	270 - 360	41	32	1.2	1.3	0.16	L	T
tjF 220	CR/EG	JSC270D (JFS A 2001)/ JEC270D (JFS A 3021)	DC 03 / + ZE (DIN EN 10130)/ (DIN EN 10152)	140 - 220	≥ 270	39	35	1.2	1.4	-	L	T
tjF 220 ct				140 - 210	270 - 350	41	36	1.2	1.4	0.18	L	T
High formable												
tjHF 285	HR	JSH270D (JFS A 1001)	DD 14 (DIN EN 10111)	175 - 285	≥ 270	39	34	-	-	-	L	T
tjHF 210	GI		DX 54 D + Z (DIN EN 10327)	140 - 210	≥ 270	41	36	1.3	1.6	0.18	L	T
tjHF 210 ct	GI		DX 54 D + Z (DIN EN 10327)	140 - 200	270 - 350	44	37	1.4	1.8	0.19	L	T
tjHF 210	GA	JAC270E (JFS A 3011)	DX 54 D + ZF (DIN EN 10327)	140 - 210	≥ 270	39	34	1.2	1.4	0.17	L	T
tjHF 210 ct	GA	JAC270E (JFS A 3011)	DX 54 D + ZF (DIN EN 10327)	140 - 200	270 - 350	43	36	1.3	1.6	0.18	L	T
tjHF 190	CR/EG	JSC270E (JFS A 2001)/ JEC270E (JFS A 3021)	DC 04 / + ZE (DIN EN 10130)/ (DIN EN 10152)	140 - 190	≥ 270	42	38	1.4	1.8	0.19	L	T
tjHF 190 ct				140 - 190	270 - 340	43	39	1.4	1.8	0.19	L	T
Super formable												
tjSF 180	CR/EG	JSC270F (JFS A 2001)/ JEC270F (JFS A 3021)	DC 05 / + ZE (DIN EN 10130)/ (DIN EN 10152)	120 - 180	≥ 270	45	40	1.5	1.9	0.20	L	T
tjSF 180 ct				140 - 180	270 - 340	45	40	1.5	1.9	0.20	L	T
tjSF 180	GI		DX 56 D + Z (DIN EN 10327)	120 - 180	≥ 270	45	39	1.5	1.9	0.20	L	T
tjSF 180 ct	GI		DX 56 D + Z (DIN EN 10327)	130 - 180	270 - 350	46	39	1.6	1.9	0.21	L	T
tjSF 180	GA	JAC270F (JFS A 3011)	DX 56 D + ZF (DIN EN 10327)	120 - 180	≥ 270	42	37	1.4	1.7	0.19	L	T
tjSF 180 ct	GA	JAC270F (JFS A 3011)	DX 56 D + ZF (DIN EN 10327)	130 - 180	270 - 350	45	38	1.5	1.7	0.20	L	T
Extra formable												
tjEF 160	CR/EG	JSC270G (JFS A 2001)/ JEC270G (JFS A 3021)	DC 06 / + ZE (DIN EN 10130)/ (DIN EN 10152)	120 - 160	≥ 270	47	42	1.7	2.2	0.22	L	T
tjEF 160 ct				120 - 160	270 - 330	47	42	1.7	2.2	0.22	L	T

* JAC270D and DX 53 D do not correspond exactly regarding elongation and n-value. Therefore the differences in those characteristics are higher as usual. Additionally the max Yield Strength is higher compared to JFS.

Description Coating

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Identical Grades
Standard Tolerances
Closer Tolerances

Similar Grades
Japanese Version
European Version

The mechanical properties are valid for a thickness range from 0.7 to 1.2 mm for cold-rolled grades, 2.0 to 3.0 mm for hot-rolled grades. Customer can specify either JFS **or** ISO.
For most current data, please see General Note on page 10.

Conventional High-Strength Steels.
High Strength, Reduced Gauge, Low Weight.

Steel Grade	HR/CR Coating	Japanese Standard	European Standard	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%) min.		r-value min.		n-value min.	BH_2 (MPa) min.	Test Direction	
						JFS	ISO	JFS r_m	ISO r_t	ISO n_{90}	ISO	JFS	ISO
Bake Hardenable Steel													
tjBH 18/29	CR/EG		H 180 B / + ZE (DIN EN 10268)	180 - 240	290 - 360	35	32	1.2	1.5	-	35	L	T
tjBH 18/29 ct				180 - 230	290 - 360	37	34	1.3	1.6	0.17	35	L	T
tjBH 18/30	GI		H 180 BD + Z (DIN EN 10292)	180 - 230	300 - 360	37	34	1.3	1.6	0.16	35	L	T
tjBH 15/27	GI			150 - 200	270 - 330	43	39	1.4	1.7	0.19	30	L	T
tjBH 18/30	GA		H 180 BD + ZF (DIN EN 10292)	180 - 230	300 - 360	35	32	1.2	1.4	0.15	35	L	T
tjBH 15/27	GA	JAC270H (JFS A 3011)		150 - 200	270 - 330	42	38	1.3	1.6	0.18	30	L	T
tjBH 22/32	CR/EG		H 220 B / + ZE (DIN EN 10268)	220 - 280	320 - 400	35	32	1.2	1.5	0.16	35	L	T
tjBH 20/34	CR/EG	JSC340H (JFS A 2001)		200 - 270	340 - 410	37	34	1.3	1.6	0.18	30	T	T
tjBH 22/32	GI		H 220 BD + Z (DIN EN 10292)	220 - 270	320 - 400	35	32	1.1	1.2	0.15	35	L	T
tjBH 20/34	GI			200 - 270	340 - 410	37	34	1.3	1.6	0.17	30	T	T
tjBH 22/32	GA		H 220 BD + ZF (DIN EN 10292)	220 - 270	320 - 400	33	30	1.0	1.0	0.14	35	L	T
tjBH 20/34	GA	JAC340H (JFS A 3011)		200 - 270	340 - 410	35	32	1.2	1.4	0.16	30	T	T
High-Strength IF-Steel													
tjIF 18/34	CR/EG	JSC340P (JFS A 2001)/ JEC340P (JFS A 3021)	H 180 Y / + ZE (DIN EN 10292)/ (DIN EN 10268)	180 - 240	≥ 340	37	34	1.4	1.7	0.19	-	T	T
tjIF 18/34 ct				180 - 230	340 - 400	38	36	1.4	1.8	0.20	-	T	T
tjIF 18/34	GI		H 180 YD + Z (DIN EN 10292)	180 - 260	≥ 340	37	34	1.4	1.7	0.18	-	T	T
tjIF 18/34 ct	GI		H 180 YD + Z (DIN EN 10292)	180 - 240	340 - 400	38	35	1.4	1.7	0.19	-	T	T
tjIF 18/34	GA	JAC340P (JFS A 3011)	H 180 YD + ZF (DIN EN 10292)	180 - 260	≥ 340	35	32	1.3	1.6	0.18	-	T	T
tjIF 18/34 ct	GA	JAC340P (JFS A 3011)	H 180 YD + ZF (DIN EN 10292)	180 - 240	340 - 400	36	33	1.3	1.6	0.19	-	T	T
tjIF 22/35	CR/EG		H 220 Y / + ZE (DIN EN 10268/10292)	220 - 270	350 - 420	36	34	1.3	1.6	0.18	-	T	T
tjIF 22/39	CR/EG	JSC390P (JFS A 2001)/ JEC390P (JFS A 3021)		220 - 280	≥ 390	35	33	1.4	1.7	0.19	-	T	T
tjIF 22/35	GI		H 220 YD + Z (DIN EN 10292)	220 - 280	350 - 420	34	32	1.2	1.5	0.18	-	T	T
tjIF 22/39	GI			220 - 290	≥ 390	34	32	1.4	1.7	0.18	-	T	T
tjIF 22/35	GA		H 220 YD + ZF (DIN EN 10292)	220 - 280	350 - 420	32	30	1.1	1.3	0.18	-	T	T
tjIF 22/39	GA	JAC390P (JFS A 3011)		220 - 290	≥ 390	32	30	1.3	1.6	0.18	-	T	T
tjIF 26/38	CR/EG		H 260 Y / + ZE (DIN EN 10268/10292)	260 - 320	380 - 440	34	32	1.2	1.4	0.17	-	T	T
tjIF 26/44	CR/EG	JSC440P (JES A 2001)/ JEC440P (JFS A 3021)		260 - 340	≥ 440	32	29	1.3	1.6	0.18	-	T	T
tjIF 26/38	GI		H 260 YD + Z (DIN EN 10292)	260 - 320	380 - 440	32	30	1.2	1.4	0.14	-	T	T
tjIF 26/44	GI			260 - 340	≥ 440	32	30	1.3	1.6	0.14	-	T	T
tjIF 26/38	GA		H 260 YD + ZF (DIN EN 10292)	260 - 320	380 - 440	31	28	1.1	1.3	0.14	-	T	T
tjIF 26/44	GA	JAC440P (JFS A 3011)		260 - 340	≥ 440	31	28	1.2	1.4	0.14	-	T	T

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Identical Grades
Standard Tolerances
Closer Tolerances

Similar Grades
Japanese Version
European Version

The mechanical properties are valid for a thickness range from 0.7 to 1.2 mm for cold-rolled grades, 2.0 to 3.0 mm for hot-rolled grades. Customer can specify either JFS **or** ISO.
For most current data, please see General Note on page 10.

Steel Grade	HR/CR Coating	Japanese Standard	European Standard or ThyssenKrupp Stahl Material Data Sheet	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%) min.		Hole Expand Ratio	Test Direction	
						JFS	ISO	JFS %	JFS	ISO
Microalloyed Steel										
tjMA 35/43	HR		S 355 MC (DIN EN 10149)	≥ 355	430 - 550	21	19		L	L
tjMA 32/44	HR	JSH440R (JFS A 1001)		325 - 440	≥ 440	27	25		L	L
tjMA 42/48	HR		S 420 MC (DIN EN 10149)	≥ 420	480 - 620	18	16		T	L
tjMA 42/54	HR	JSH540R (JFS A 1001)		420 - 560	≥ 540	20	18		T	L
tjMA 45/59	HR	JSH590R (JFS A 1001)	FB-W 600 Material data sheet ThyssenKrupp Stahl	450 - 600	≥ 590	18	16		T	T
tjMA 34/41	CR/EG		H 340 LA / + ZE (DIN EN 10292)/ (DIN EN 10268)	340 - 420	410 - 510	23	21		T	T
tjMA 34/44	CR/EG	JSC440R (JFS A 2001)		335 - 420	≥ 440	24	22		T	T
tjMA 34/41	GI		H 340 LAD + Z (DIN EN 10292)	340 - 420	410 - 510	24	22		T	T
tjMA 34/44	GI			345 - 440	≥ 440	23	21		T	T
tjMA 34/41	GA		H 340 LAD + ZF (DIN EN 10292)	340 - 420	410 - 510	24	22		T	T
tjMA 34/44	GA	JAC440R (JFS A 3011)		345 - 440	≥ 440	23	21		T	T
High Lambda										
tjHL 45/59	HR	JSH590A (JFS A 1001)	FB-W 600 Material data sheet ThyssenKrupp Stahl	450 - 600	≥ 590	18	16	≥ 55	T	T
Carbon Manganese										
tjCM 21/37	HR	JSH370W (JFS A 1001)	S 235 JRG2 (DIN EN 10025)	215 - 335	≥ 370	35	30		L	T
tjCM 28/44	HR	JSH440W (JFS A 1001)	S 275 J2G3 (DIN EN 10025)	275 - 390	≥ 440	30	25		L	T
tjCM 26/39	CR/EG	JSC390W (JFS A 2001)/ JEC390W (JFS A 3021)	WHZ 260 /+ ZE Material data sheet ThyssenKrupp Stahl	260 - 355	≥ 390	30	27		T	T
tjCM 26/39 ct				260 - 340	390 - 480	31	28		T	T
tjCM 26/39	GI		WHZ 260 D + Z Material data sheet ThyssenKrupp Stahl	250 - 360	390 - 490	29	26		T	T
tjCM 26/39 ct	GI		WHZ 260 D + Z Material data sheet ThyssenKrupp Stahl	260 - 355	390 - 490	30	28		T	T
tjCM 26/39	GA	JAC390W (JFS A 3011)	WHZ 260 D + ZF Material data sheet ThyssenKrupp Stahl	250 - 360	390 - 490	28	25		T	T
tjCM 26/39 ct	GA	JAC390W (JFS A 3011)	WHZ 260 D + ZF Material data sheet ThyssenKrupp Stahl	260 - 355	390 - 490	30	28		T	T
tjCM 30/44	CR/EG		WHZ 300 / + ZE Material data sheet ThyssenKrupp Stahl	300 - 390	440 - 540	28	25		T	T
tjCM 27/44	CR/EG	JSC440W (JFS A 2001)/ JEC440W (JFS A 3021)		270 - 370	440 - 540	28	25		T	T
tjCM 30/44	GI		WHZ 300 D + Z Material data sheet ThyssenKrupp Stahl	300 - 400	440 - 540	27	25		T	T
tjCM 30/44 ct	GI		WHZ 300 D + Z Material data sheet ThyssenKrupp Stahl	300 - 390	440 - 540	29	26		T	T
tjCM 30/44	GA	JAC440W (JFS A 3011)	WHZ 300 D + ZF Material data sheet ThyssenKrupp Stahl	300 - 400	440 - 540	26	24		T	T
tjCM 30/44 ct	GA	JAC440W (JFS A 3011)	WHZ 300 D + ZF Material data sheet ThyssenKrupp Stahl	300 - 390	440 - 540	27	25		T	T

Advanced High-Strength Steels.
High Strength, Perfect in Form.

Steel Grade	HR/CR Coating	Japanese Standard	European Standard or ThyssenKrupp Stahl Material Data Sheet	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%) min.		n-value min.	BH_2 (MPa) min.	Test Direction	
						JFS	ISO	ISO %	ISO	JFS	ISO
Dual Phase											
tjDP 33/59	HR		DP-W 600 Material data sheet ThyssenKrupp Stahl	330 - 450	≥ 580	22	20	-	-	T	L
tjDP 31/59	HR	JSH590Y (JFS A 1001)		315 - 480	≥ 590	23	21	-	-	T	L
tjDP 34/60	CR/EG	JSC590Y (JFS A 2001)	HCT 600 X DIN prEN 10338 (draft)	330 - 420	≥ 600	22	21	0.14	30	T	L
tjDP 34/60 ct			HXT 600 X + ZE DIN prEN 10336 (draft)	330 - 410	≥ 600	22	21	0.14	30	T	L
tjDP 34/60	GI		HXT 600 X + Z DIN prEN 10336 (draft)	330 - 420	≥ 600	22	21	0.13	35	T	L
tjDP 34/60 ct	GI		HXT 600 X + Z DIN prEN 10336 (draft)	330 - 410	≥ 600	22	21	0.13	35	T	L
tjDP 34/60	GA		HXT 600 X + ZF DIN prEN 10336 (draft)	330 - 420	≥ 600	20	19	0.13	35	T	L
tjDP 34/60 ct	GA		HXT 600 X + ZF DIN prEN 10336 (draft)	330 - 410	≥ 600	20	19	0.13	35	T	L

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Identical Grades

Standard Tolerances
Closer Tolerances

Similar Grades

Japanese Version
European Version

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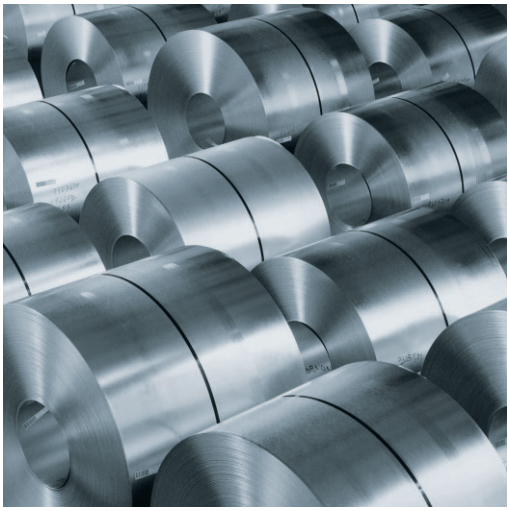
August 2005 edition

General note:

This catalogue and the data provided herein are not subject to regular updates. Since ongoing technical developments may lead to modifications of product properties or other data provided here above, please visit **www.tks-jfe.com** for the most current information.

Information on the quality or usability of materials/products in this catalogue is provided for descriptive purposes only. Quality, specific properties or usability for any specific application, in order to become binding, shall always require individual explicit contractual agreement.



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