

Special Alloy Steel Materials

KITZ's unique integrated production system covers all phases of valve manufacturing and includes its reputed in-house steel foundry operation, which accounts for Japan's largest production of stainless and high alloy steel valve castings.



KITZ Special Alloy Steel Availability Chart

Classification	KITZ Codes	Main Ingredients	Standards					
			Castings			Bars or Forgings		
			ASTM	UNS	JIS	ASTM	UNS	JIS
Iron-Based Alloy	Austenitic Stainless Steel							
	SCS13	18Cr-8Ni	A351 CF8	J92600	SCS13A	A276 304	S30400	SUS 304
	KA13	18Cr-8Ni-LS ⁽¹⁾						
	SCS19	18Cr-8Ni-LC ⁽²⁾	A351 CF3	J92500	SCS19A	A276 304L	S30403	SUS 304L
	SCS14	18Cr-9Ni-2Mo	A351 CF8M	J92900	SCS14A	A276 316	S31600	SUS 316
	KA14	18Cr-9Ni-2Mo-LS ⁽¹⁾						
	SCS16	18Cr-9Ni-2Mo-LC ⁽²⁾	A351 CF3M	J92800	SCS16A	A276 316L	S31603	SUS 316L
	SCS21	18Cr-10Ni-Nb	A351 CF8C	J92710	SCS21	A276 347	S34700	SUS 347
	CG8M	18Cr-12Ni-3.5Mo	A351 CG8M	J93000	—	A276 317	S31700	SUS 317
	CG3M	18Cr-12Ni-3.5Mo-LC ⁽²⁾	A351 CG3M	J92999	—	A276 317L	S31703	SUS 317L
	KSN1	18Cr-13Ni-4.5Si	—	—	—	—	—	—
	CN7M	21Cr-29Ni-2.5Mo-3.5Cu	A351 CN7M	J95150	SCS23	B473 N08020	N08020	—
	CN3MCu	21Cr-29Ni-2.7Mo-3.2Cu-LC ⁽²⁾	A990 CN3MCu	—		—	—	—
	CK20	25Cr-20N	A351 CK20	J94202	SCS18	A276 310S	S31008	SUS 310S
	Super Austenitic Stainless Steel							
	SASV-Z1	21Cr-24Ni-6.5Mo-N	A351 CN3MN	—	—	B691 N08367	N08367	SUS 836L
	SASV-Z2	25Cr-24Ni-6.5Mo-N	A351 CN3MN mod.	—	—	—	—	—
	SASV-Z3	20Cr-18Ni-6.5Mo-N-Cu	A351 CK3MCuN	J93254	—	A276 S31254	S31254	—
	Duplex Stainless Steel							
	KDPV22	22Cr-5Ni-3Mo-N	A995 Gr.4A CD3MN	J92205	—	A276 S32205	S32205	SUS 329J3L
	KDPV25	25Cr-5Ni-Mo-Cu	A995 Gr.1B CD4MCuN	J93372	—	A790 S31260	S31260	—
	Super Duplex Stainless Steel							
	SDPV-K1	25Cr-7Ni-3Mo-N	—	—	SCS10	A479 S32750	S32750	SUS 329J4L
SDPV-K2	28Cr-7Ni-4Mo-N	—	—	SCS10 mod.	—	—	—	
SDPV-K3	25Cr-7Ni-3Mo-Cu-N-W	A995 Gr.6A CD3MWCuN	J93380	—	A479 S32750	S32750	—	
SDPV-K4	25Cr-7Ni-4Mo-N	A995 Gr.5A CE3MN	J93404	—	A479 S32750	S32750	—	
Nickel-Based Alloy	Ni-Cu Alloy							
	M-35-1	67Ni-30Cu	A494 M35-1	N24135	—	B164 N04400	N04400	—
	Ni-Cr Alloy							
	K600	78Ni-15Cr-5Fe	A494 CY40	N06040	—	B166 N06600	N06600	—
	Ni-Mo Alloy							
	HB-K1	67Ni-28Mo-5Fe	A494 N12MV	N30012	—	B335 N10001	N10001	—
	HB-K2	68Ni-31Mo-1Fe	A494 N7M	J30007	—	B335 N10665	N10665	—
	Ni-Cr-Mo Alloy							
	HC-K1	58Ni-16Cr-16Mo-6Fe-4W	A494 CW12MW	N30002	—	B574 N10276	N10276, N10002	—
	HC-K2	58Ni-21Cr-14Mo-4Fe-3W	A494 CX2MW	N26022	—	B574 N06022	N06022	—
	HC-K3	64Ni-18Cr-18Mo	A494 CW6M	N30107	—	B574 N10276	N10276	—
	K625	65Ni-22Cr-9Mo-3.5Nb	A494 CW6MC	N26625	—	B446 N06625	N06625	—
	K825	43Ni-22Cr-3Mo-30Fe-Nb	A494 CU5MCuC	N08826	—	B425 N08825	N08825	—
Nickel	Nickel							
	CZ-100	97Ni	A494 CZ100	N02100	—	B160 N02200	N02200	—
Titanium	Titanium							
	T-K1	99Ti	—	—	—	B348 Gr.2	R52400	TB340H

※ (1) S < 0.002 mass%
 ※ (2) C < 0.03 mass%

Classification	KITZ Codes	Characteristics	Typical applications	Equivalent
Iron-Based Alloy	Austenitic Stainless Steel			
	SCS13	Superior corrosion resistance in nitric acid, phosphoric acid, and organic acid	Pulp and paper mills, chemical processes, and seawater service	—
	KA13	Improved 304 with higher pitting and crevice corrosion resistances		—
	SCS19	Higher intergranular corrosion resistance than CF8		—
	SCS14	Higher pitting corrosion resistance than CF8		—
	KA14	Improved 316 with higher pitting and crevice corrosion resistances		—
	SCS16	Higher intergranular corrosion resistance than CF8M		—
	SCS21	Higher intergranular corrosion resistance than CF8, with carbide stabilized by Nb		—
	CG8M	Higher pitting and crevice corrosion resistances than CF8M	Power generation, seawater service, and oil pipelines	—
	CG3M			—
	KSN1	Superior corrosion resistance in nitric acid of any concentration and in fuming nitric acid environment	Nitric acid production processes	NAR-SN-1
	CN7M	Superior corrosion resistance in sulfuric acid of any concentration, at 60°C and lower, and in heated dilute oxides	Chemical processes handling acetic acid, alkali, dilute hydrochloric acid, dilute hydrofluoric acid, dilute fluorosilicic acid, and phosphoric acid, and, oil refining	—
	CN3MCu			—
	CK20	Used for sulfurous acid and dilute sulfuric acid at ambient temperature, with higher Cr and Ni contents than 304	Chemical processes	—
	Super Austenitic Stainless Steel			
	SASV-Z1	Most superior acid and alkali resistances among all austenitic stainless steels and superior pitting and crevice corrosion resistances in chloride solutions such as seawater	Chemical processes for highly concentrated chlorides, flue gas desulfurization, acid and alkali reactors, salt manufacturing processes and seawater desalination	AL-6XN
	SASV-Z2			—
	SASV-Z3			254SMO
	Duplex Stainless Steel			
	KDPV22	Superior stress corrosion cracking and pitting corrosion resistances in chloride environments of medium concentration and superior general corrosion resistance in dilute sulfuric acid and phosphoric acid environments.	Pulp and paper mills, chemical processes, and seawater service	SAF 2205
KDPV25	DP3			
Super Duplex Stainless Steel				
SDPV-K1	Higher stress corrosion cracking resistance than austenitic stainless steel, higher weldability than ferritic stainless steel, and higher acid, pitting, and crevice corrosion resistances than CF3M, with higher mechanical strength	Salt manufacturing processes, seawater desalination, seawater service under chloride, dilute sulfuric acid, phosphoric acid, formic acid, and acetic acid, environments, urea production under acid environments, chemical processes, flue gas desulfurization, and waste fluid concentration	—	
SDPV-K2			—	
SDPV-K3			DP3W, SAF 2507	
SDPV-K4			DP3W, SAF 2507	
Nickel-Based Alloy	Ni-Cu Alloy			
	M-35-1	Superior corrosion resistance in reducing environments, no local corrosion, and stress corrosion cracking resistance	Chemical processes handling alkali chlorides and boiled acids and oil refining	Monel alloy 400
	Ni-Cr Alloy			
	K600	Superior corrosion resistance in pure water and alkalis under oxidizing and high-temperature environments and resistance to stress corrosion cracking by Cl ions	Chemical and food processes	Inconel alloy 600
	Ni-Mo Alloy			
	HB-K1	Resistance to hydrochloric acid of any concentration up to boiling point, resistance to reducing chlorides such as sulfuric acid (up to 60%), phosphoric acid, and copper chloride, and resistance to high temperatures, but not suitable for highly oxidizing environments	Corrosion-resistant processes handling chlorine, sulfuric acid, phosphoric acid, acetic acid, and hydrogen chloride gas and processes handling chlorides with high concentrations at high temperatures	Hastelloy alloy B
	HB-K2			Hastelloy alloy B2
	Ni-Cr-Mo Alloy			
	HC-K1	Superior resistance in oxidizing environments, such as wet chlorine gas and chlorine dioxide, and resistance to organic acids and chlorides such as acetic acid and seawater	Processes handling oxidizing acid, formic acid, acetic anhydride, and seawater and chemical processes handling fluorides	Hastelloy alloy C276
	HC-K2			Hastelloy alloy C22
HC-K3	Hastelloy alloy C276			
K625	Superior corrosion resistance in oxidizing and high-temperature environments and superior erosion resistance	Chemical processes in general	Inconel alloy 625	
K825	Superior corrosion resistance in sulfuric acid and phosphoric acid and resistance to stress corrosion cracking and crevice corrosion	Chemical processes in general	Incoloy alloy 825	
Ni-Nickel	Nickel			
	CZ-100	Superior corrosion resistance in alkali hydroxide solutions and fused alkali, including sodium hydrate and potassium hydrate.	Chemical substance manufacturing devices and petroleum refineries, which handle alkali salt and hydrofluoric acid.	Alloy 200
Titanium	Titanium			
	T-K1	Superior corrosion resistance in oxidizing environments, such as nitric acid, and in organic compounds such as acetic acid and seawater	Chemical processes, oil refining, and pulp and paper mills	—

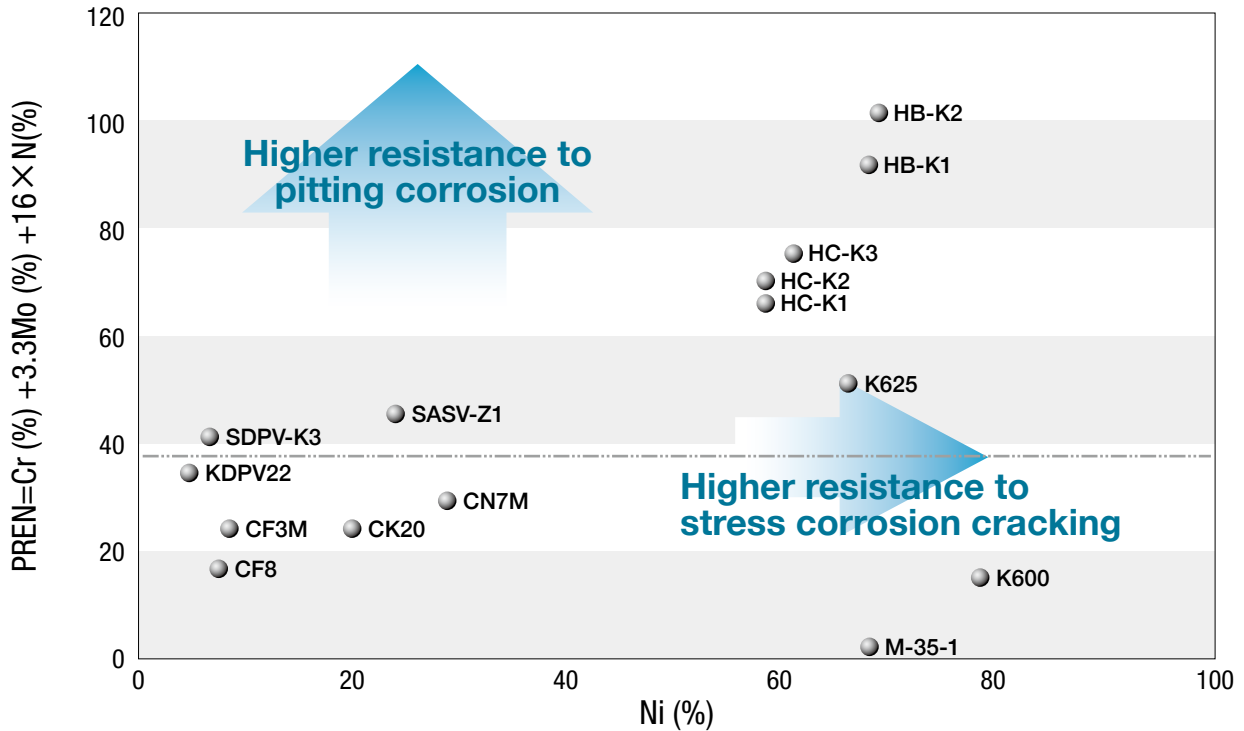
Note: The above materials are applicable to valve shells. Contact KITZ Corporation for other valve component materials. SDPV and SASV are registered trademarks of KITZ. (Other trademarks: SandvikAB for SAF 2205 / SAF 2507, SPECIAL METALS for Inco / Monel, Haynes for Hastelloy, Allegheny Ludlum for AL-6XN, Avesta for 254SMO, SUMITOMO METALS for DP3 / DP3W / NAR.)

Applications and Selection of Stainless Steel Materials

Typical Application	Service Environment	Required Properties	ASTM Material Designation	Product Code
Seawater	Seawater handling	Seawater desalination	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
		Heat exchangers	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
			A351 CN3MN	<i>SASV-Z1</i>
		Pumps	A351 CF3M	<i>SCS16A</i>
	Salt manufacturing	Salt manufacturing process Bittern making process	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
			A995 CD3MWCuN mod. (UNS S32760 mod.)	<i>SDPV-K2</i>
			A351 CN3MN	<i>SASV-Z1</i>
Chemical	Sulfuric acid	Low concentration	A351 CF3M	<i>SCS16A</i>
			A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
			A351 CK20	<i>CK20</i>
			A351 CN7M	<i>CN7M</i>
			A990 CN3MCu	<i>CN3MCu</i>
	Nitric acid	Any concentration	A351 CF3M	<i>SCS16</i>
			SN-1	<i>KSN1</i>
	Hydrochloric acid	Low concentration	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
			A351 CN7M	<i>CN7M</i>
			A990 CN3MCu	<i>CN3MCu</i>
A494 CW12MW			<i>HC-K1</i>	
Acetic acid	Any concentration	A494 N12MV	<i>HB-K1</i>	
		A351 CF3M	<i>SCS16A</i>	
		A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>	
		A351 CF3MN	<i>SASV-Z1</i>	
		A351 CK3MCuN	<i>SASV-Z3</i>	
		A351 CN7M	<i>CN7M</i>	
Urea synthesizing	Carbamide	A990 CN3MCu	<i>CN3MCu</i>	
		A494 CW12MW	<i>HC-K1</i>	
Soda manufacturing	30-50% NaOH	A351 CF3M	<i>SCS16A</i>	
		A351 CN7M	<i>CN7M</i>	
	High temperature and high concentration	A494 CY40	<i>CY40</i>	
Oil Refining and Petrochemical	Hydro-desulfurization	H ₂ -H ₂ S	A351 CF8C	<i>SCS21</i>
		Wet H ₂ S	A351 CF3M	<i>SCS16A</i>
	Heat exchangers and piping	Seawater (cooling water)	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
			A351 CF3M	<i>SCS16A</i>
Environmental	Flue gas desulfurization (wet)	Absorption	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
			A351 CF3M	<i>SCS16A</i>
			A351 CN3MN	<i>SASV-Z1</i>
			A351 CK3MCuN	<i>SASV-Z3</i>
	City garbage furnace	Superheater (for high heat efficiency at 400°C)	Molten salt corrosion resistance	A351 CK20
Energy	Boilers	Seawater piping	A995 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>

Stainless and High Nickel Alloy Steels

Chemical Composition and Resistance to Pitting Corrosion and Stress Corrosion Cracking



With the rapid development in industrial technologies, valves and other piping equipment are being required to withstand increasingly diversified and harsh service environments, and the market demand for high corrosion resistant steels has become remarkably stronger.

The use of materials, processes, and plant equipment to meet the need for maximized production efficiency has made such service environments even more hazardous and severe.

This latest industrial trend has encouraged foundries all over the world to develop new steels that could satisfy all these requirements with minimal cost impact.

The diagram above briefly introduces the special stainless and high alloy steel valve castings now available from the foundries of KITZ Corporation.

KITZ Casting Materials

We are now able to provide you with superior quality high alloy materials by means of our unique melting processes.

SDPV-K3

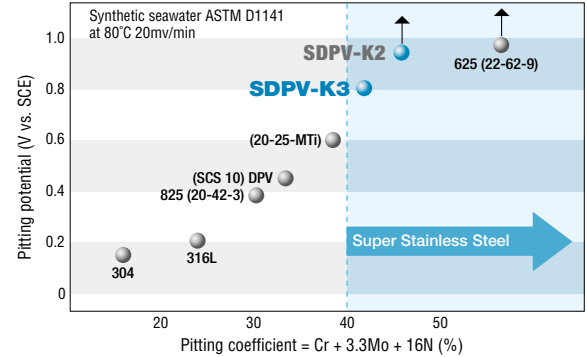
KITZ Super Duplex Phase Stainless Steel

KITZ Super Duplex Stainless Steel Valves are provided with all the advantages of ferritic and austenitic stainless steels, along with upgraded pitting corrosion resistance and high cost performance

Advantages and Disadvantages of Stainless Steel

	Ferritic stainless steel	Duplex stainless steel	Austenitic stainless steel
Advantages	<ul style="list-style-type: none"> ● Excellent resistance to SCC (stress corrosion cracking) ● Low cost (with no Ni content) 	<ul style="list-style-type: none"> ● High tenacity equivalent to austenitic stainless steel ● High resistance to SCC ● High mechanical strength ★ High cost performance (SDPV-K3) 	<ul style="list-style-type: none"> ● High tenacity ● High weldability
Disadvantages	<ul style="list-style-type: none"> ● Low tenacity ● Low weldability ● H₂ embrittlement 	<ul style="list-style-type: none"> ● α-embrittlement (high Cr, Mo) ★ Low α-embrittlement (SDPV-K3) 	<ul style="list-style-type: none"> ● Low resistance to SCC

What is Super Stainless Steel?



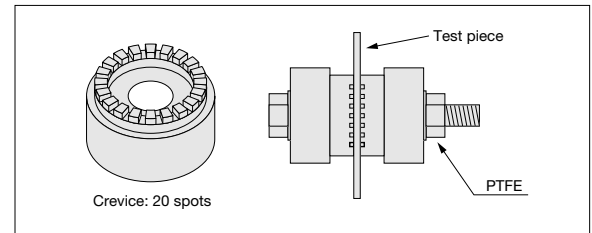
Superior Material Characteristics

Upgraded pitting corrosion resistance and cost effectiveness

Characteristic	Ferritic	Austenitic	Duplex	SDPV-K3	Hastelloy
Pitting corrosion resistance	×	×	○	⊙	⊙
Stress corrosion cracking resistance	⊙	×	○	○	⊙
Tenacity	×	⊙	○	○	⊙
Hardness	△	△	⊙	⊙	○
Weldability	×	⊙	⊙	⊙	⊙
Cost performance	○	○	○	○	×

Crevice corrosion resistance test

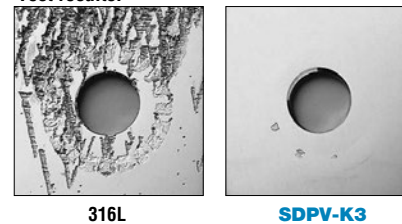
Testing method: in accordance with ASTM G48
Test piece: 50 × 50 × 5t (mm)



Testing conditions:

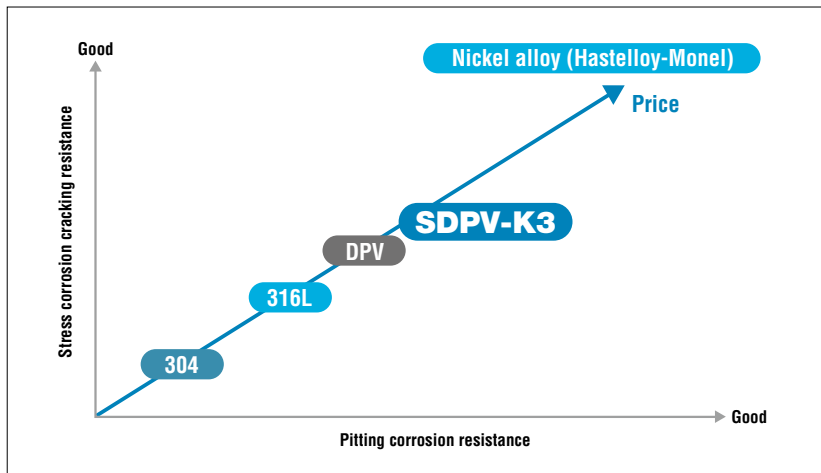
Solution	12.7% FeCl ₃ · 6H ₂ O (Cl content 5%)
pH	1~2
Temperature	30°C
Duration	72 hours

Test results:



High cost performance

- Higher pitting corrosion resistance than conventional duplex stainless steel
- Costs less than half as much as hastelloy



Target markets

- Salt manufacturing equipment
- Seawater cooling piping
- Various chemical processing equipment (for chloride environments)
- Seawater desalination plants
- Pulp and paper mills
- Water treatment facilities (for high-temperature and high-concentration chloride environments)
- Flue gas desulfurization equipment

CAUTION

Pressure-temperature ratings and other performance data published in this catalog have been developed from our design calculation, in-house testing, field reports provided by our customers, and/or published official standards or specifications. They are good only to cover typical applications as a general guideline to users of KITZ products introduced in this catalog.

For any specific application, users are kindly requested to contact KITZ Corporation for technical advice, or to carry out their own study and evaluation for proving the suitability of these products to such an application. Failure to follow this request could result in property damage and / or personal injury, for which we shall not be liable.

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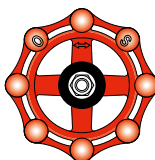
Read the instruction manual carefully before use.

NOTICE

If any products designated as strategic material in the Foreign Exchange and Foreign Trade Law, Cabinet Order Concerning Control of Export Trade, Cabinet order Concerning Control of Foreign Exchange, and other related laws and ordinances ("Foreign Exchange Laws") are exported to any foreign country or countries, an export license issued by the Japanese Government will be required under the Foreign Exchange Laws.

Further, there may be cases where an export license issued by the government of the United States or other country will be required under the applicable export-related laws and ordinances in such relevant countries.

The contract shall become effective subject to the fact that a relevant export license is obtained from the Japanese Government.



*A chrysanthemum handle is a symbol of KITZ,
the brand of valve reliability*

ISO 9001 certified since 1989

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