

KITZ Special Alloy Steel Valves

KITZ unique integrated production system covers all phases of valve manufacturing including its reputed in-house steel foundry operation 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				Bar or Forgings			
			ASTM	DIN (W.-Nr.)	UNS-No.	JIS	ASTM	DIN (W.-Nr.)	UNS-No.	JIS
Iron based alloy	Martensitic Stainless Steel									
	CA6NM	13Cr-4Ni-0.8Mo	A743 CA6NM	1.4313	J91540	SCS6	A276 S41500	1.4313	S41500	—
	Austenitic Stainless Steel									
	SCS13	18Cr-8Ni	A351 CF8	1.4308	J92600	SCS13A	A276 304	1.4301	S30400	SUS 304
	KA13	18Cr-8Ni-LS ⁽¹⁾								
	SCS19	18Cr-8Ni-LC ⁽²⁾	A351 CF3	1.4306	J92500	SCS19A	A276 304L	1.4306	S30403	SUS 304L
	SCS14	18Cr-9Ni-2Mo	A351 CF8M	1.4408	J92900	SCS14A	A276 316	1.4401	S31600	SUS 316
	KA14	18Cr-9Ni-2Mo-LS ⁽¹⁾								
	SCS16	18Cr-9Ni-2Mo-LC ⁽²⁾	A351 CF3M	1.4404	J92800	SCS16A	A276 316L	1.4404	S31603	SUS 316L
	SCS21	18Cr-10Ni-Nb	A351 CF8C	1.4552	J92710	SCS21	A276 347	1.4550	S34700	SUS 347
	CG8M	18Cr-12Ni-3.5Mo	A351 CG8M	—	J93000	—	A276 317	1.4449	S31700	SUS 317
	CG3M	18Cr-12Ni-3.5Mo-LC ⁽²⁾	A351 CG3M	—	J92999	—	A276 317L	1.4438	S31703	SUS 317L
	KSN1	18Cr-13Ni-4.5Si	—	—	—	—	—	—	—	—
	CN7M	21Cr-29Ni-2.5Mo-3.5Cu	A351 CN7M	1.4536	J95150	SCS23	A473 N08020	2.4660	N08020	—
	CN3MCu	21Cr-29Ni-2.7Mo-3.2Cu-LC ⁽²⁾	A990 CN3MCu	—	—		—	—	—	—
	CK20	25Cr-20N	A351 CK20	—	J94202	SCS18	A276 310S	1.4845	S31008	SUS 310S
	K800	33Ni-20Cr-45Fe-Nbi	A351 CT15C	1.4859	N28820	—	B408 N08800	1.4876	N08800	NCF800
	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	1.4462	S32205	SUS 329J3L
	KDPV25	25Cr-5Ni-Mo-Cu	A890 Gr.1A CD4MCu	—	J93370	—	A790 S31260	—	S31260	—
	Super Duplex Stainless Steel									
	SDPV-K1	25Cr-7Ni-3Mo-N	—	—	—	SCS10	A479 S32750	1.4460	S32750	SUS 329J4L
	SDPV-K2	28Cr-7Ni-4Mo-N	—	—	—	SCS10 mod.	—	—	—	—
	SDPV-K3	25Cr-7Ni-3Mo-Cu-N-W	A890 Gr.6A CD3MWCuN	1.4468	J93380	—	A479 S32750	1.4460	S32750	—
SDPV-K4	25Cr-7Ni-4Mo-N	A890 Gr.5A CE3MN	—	J93404	—	A479 S32750	1.446	S32750	—	
Nickel based alloy	Ni-Cu Alloy									
	M-35-1	67Ni-30Cu	A494 M-35-1	2.4365	N24135	NCuC	B164 N04400	2.4360	N04400	—
	Ni-Cr Alloy									
	K600	78Ni-15Cr-5Fe	A494 CY-40	2.4816	N06040	NCrFC	B166 N06600	2.4817	N06600	NCF600
	Ni-Mo Alloy									
	HB-K1	67Ni-28Mo-5Fe	A494 N-12MV	2.4882	N30012	NMC	B335 N10001	2.4819	N10001	NM1B
	HB-K2	68Ni-31Mo-1Fe	A494 N-7M	2.4617	N30007	—	B335 N10665	2.4856	N10665	NM2B
	Ni-Cr-Mo Alloy									
	HC-K1	58Ni-16Cr-16Mo-6Fe-4W	A494 CW-12MW	2.4686	N30002	NMCrC	B574 N10276	2.4819	N10276, N10002	NMCrB
	HC-K2	58Ni-21Cr-14Mo-4Fe-3W	A494 CX2MW	9.4602	N26022	—	B574 N06022	2.4602	N06022	—
	HC-K3	64Ni-18Cr-18Mo	A494 Cw-6M	—	N30107	—	B574 N10276	—	N10276	—
	K625	65Ni-22Cr-9Mo-3.5Nb	A494 CW-6MC	2.4856	N26625	—	B446 N06625	2.4856	N06625	NCF625
K825	43Ni-22Cr-3Mo-30Fe-Nb	A494 CU5MCuC	2.4858	N08826	—	B425 N08825	2.4858	N08825	NCF825	
Nickel	Nickel									
	CZ-100	97Ni	A494 CZ-100	—	N02100	—	B160 N02200	2.4068	N02200	—
Titanium	Titanium									
	T-K1	99Ti	—	—	—	—	B348 Gr.2	3.7035	R52400	TB340H

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

Classification	KITZ Codes	Characteristics	Typical application	Equivalent	
Iron based alloy	Martensitic Stainless Steel				
	CA6NM	Higher corrosion resistance and weldability than other martensitic stainless steel with Ni and Mo	Oil well and oil refining	—	
	Austenitic Stainless Steel				
	SCS13	Superior corrosion resistance to 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 resistance		—	
	SCS19	Higher intergranular corrosion resistance than CF8		—	
	SCS14	Higher pitting corrosion resistance than CF8		—	
	KA14	Improved 316 with higher pitting and crevice corrosion resistance		—	
	SCS16	Higher intergranular corrosion resistance than CF8M		—	
	SCS21	Higher intergranular corrosion resistance than CF8 with carbide stabilized with Nb	—		
	CG8M	Higher pitting and crevice corrosion resistance than CF8M	Power generation, seawater service, and oil pipelines	—	
	CG3M			—	
	KSN1	Superior corrosion resistance to nitric acid of any concentration and under fuming nitric acid environment	Nitric acid production processes	NAR-SN-1	
	CN7M	Superior corrosion resistance to sulfuric acid of any concentration at 60°C and lower, and to heated dilute oxide	Chemical processes handling acetic acid, alkali, dilute hydrochloric acid, dilute hydrofluoric acid, dilute fluorosilic acid and phosphoric acid, also for 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	—	
	K800	Superior mechanical strength at high temperature and resistance to carburizing with stabilized structure to be used for long duration; also superior corrosion resistance under humid environment	Petrochemical and carburizing processes	Incoloy alloy 800	
	Super Austenitic Stainless Steel				
	SASV-Z1	The most superior acid and alkali resistance among all austenitic stainless steel and superior pitting and crevice corrosion resistance to chloride solution such as seawater	Chemical processes for highly concentrated chloride, flue gas desulfurization, acid and alkali reactor, salt manufacturing processes and seawater desalination	AL-6XN	
	SASV-Z2			—	
	SASV-Z3			254SMO	
	Duplex Stainless Steel				
	KDPV22	Superior stress corrosion cracking and pitting corrosion resistance to chloride environment of middle concentration and superior general corrosion resistance to environment of dilute sulfuric acid and phosphoric acid.	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 resistance than CF3M with higher mechanical strength	Salt manufacturing processes, seawater desalination, and seawater service under chloride environment and dilute sulfuric acid, phosphoric acid, formic acid, acetic acid, and urea production under acid environment, also for 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 under reducing environment, no local corrosion and stress corrosion cracking resistance	Chemical processes handling alkali chloride and boiled acid, also for oil refining	Monel alloy 400
		Ni-Cr Alloy			
K600		Superior corrosion resistance to pure water and alkali under oxidizing and high temperature environment; also resistant 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, resistant to reducing chloride such as sulfuric acid (up to 60%), phosphoric acid and copper chloride, resistant to high temperature but not suitable under highly oxidizing environment	Corrosion resistant processes handling chlorine, sulfuric acid, phosphoric acid, acetic acid and hydrogen chloride gas, also for processes handling chloride with high concentration at high temperature	Hastelloy alloy B	
HB-K2				Hastelloy alloy B2	
Ni-Cr-Mo Alloy					
HC-K1		Superior resistance under oxidizing environment, such as wet chlorine gas and chlorine dioxide; also resistance to organic acid and chloride such as acetic acid and seawater	Processes handling oxidizing acid, formic acid, acetic anhydride and seawater, also for chemical processes handling fluoride	Hastelloy alloy C276	
HC-K2				Hastelloy alloy C22	
HC-K3				Hastelloy alloy C276	
K625		Superior corrosion resistance under oxidizing and high temperature environment and superior erosion resistance	Chemical processes in general	Inconel alloy 625	
K825		Superior corrosion resistance to sulfuric acid and phosphoric acid; also resistance to stress corrosion cracking and crevice corrosion	Chemical processes in general	Incoloy alloy 825	
Ni-ckel	Nickel				
	CZ-100			Alloy 200	
Titanium	Titanium				
	T-K1	Superior corrosion resistance under oxidizing environment, such as nitric acid, to organic compound such as acetic acid and seawater	Chemical processes, oil refining and pulp and paper mills	—	

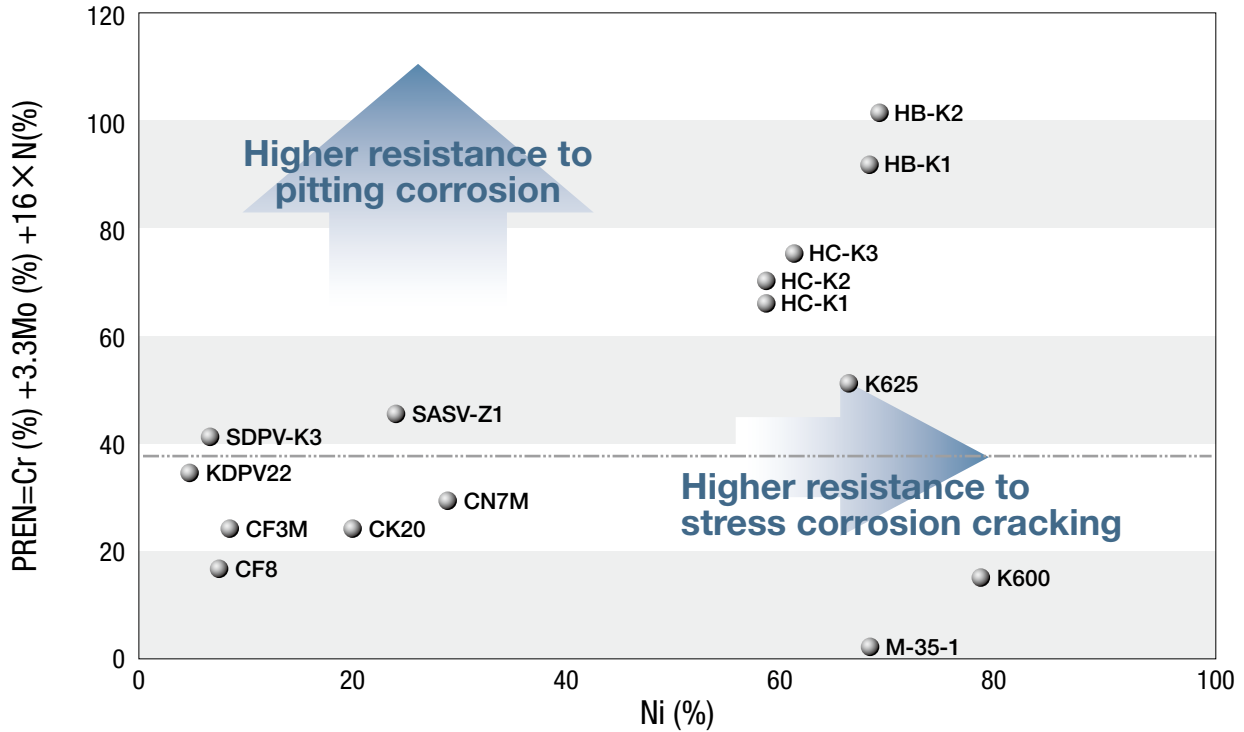
Note: The above materials are applicable to valve shells. Contact KITZ Corporation for other valve component materials. SDPV and SASV are KITZ'S registered trademarks. (Other trademarks: SandvikAB for SAF 2205 / SAF 2507, SPECIAL METALS for Inco / Monel, Haynes for Hastelloy) Allegheny Ludlum for AL-6XN,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

Application and Selection of Stainless Steel Materials

Typical Applications		Service Environment	Required Properties	ASTM Material Designations	Product Codes
Seawater	Seawater handling	Seawater desalination	Pitting corrosion resistance Crevice corrosion resistance	A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
		Heat exchangers		A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
		Pumps		A351 CN3MN	<i>SASV-Z1</i>
				A351 CF3M	<i>SCS16</i>
	Salt manufacturing	Salt manufacturing process Bittern making process	Pitting corrosion resistance Crevice corrosion resistance	A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
				A351 CD3MWCuN mod. (UNS S32760 mod.)	<i>SDPV-K2</i>
A351 CN3MN				<i>SASV-Z1</i>	
A351 CK3MCuN				<i>SASV-Z3</i>	
			Hastelloy C 276	<i>HC-K1</i>	
Chemical	Sulfuric acid	Lower concentration	Acid resistance (whole surface corrosion) Intergranular corrosion resistance	A351 CF3M	<i>SCS16</i>
				A351 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	Acid resistance (whole surface corrosion)	A351 CF3M	<i>SCS16</i>
				SN-1	<i>KSN1</i>
	Hydrochloric acid	Lower concentration	Acid resistance (whole surface corrosion)	A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
				Alloy 20	<i>CN7M</i>
					<i>CN3MCu</i>
				Hastelloy C 276	<i>HC-K1</i>
				Hastelloy B	<i>HB-K1</i>
	Acetic acid	Any concentration	Acid resistance (whole surface corrosion) Pitting corrosion resistance	A351 CF3M	<i>SCS16</i>
				A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
				A351 CF3MN	<i>SASV-Z1</i>
				A351 CK3MCuN	<i>SASV-Z3</i>
				Alloy 20	<i>CN7M</i>
				Hastelloy C 276	<i>HC-K1</i>
Urea synthesizing	Carbamide	Acid resistance (whole surface corrosion) Delta ferrite (selective corrosion)	A351 CF3M	<i>SCS16</i>	
			A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>	
Soda manufacturing	30 to 50% NaOH	Whole surface corrosion resistance	A351 CF3M	<i>SCS16</i>	
	Higher temperature and higher concentration	Whole surface corrosion resistance Stress corrosion cracking resistance	Alloy 20	<i>CN7M</i>	
			Alloy 600	<i>CY40</i>	
Oil Refining and Petrochemical	Hydro desulfurization	H ₂ -H ₂ S	Polytheonic acid resistance Stress corrosion cracking resistance	A351 CF8C	<i>SCS21</i>
		Wet H ₂ S	H ₂ S corrosion resistance	A351 CF3M	<i>SCS16</i>
				A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
	Heat exchangers Piping	Seawater (cooling water)	Pitting corrosion resistance Crevice corrosion resistance (seawater resistance)	A351 CF3M	<i>SCS16</i>
A351 CD3MWCuN (UNS S32760)				<i>SDPV-K3</i>	
Environment	Flue gas desulfurization (wet)	Absorption	Pitting corrosion resistance Crevice corrosion resistance	A351 CF3M	<i>SCS16</i>
				A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</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	<i>CK20</i>
Energy	Boilers	Seawater piping	Pitting corrosion resistance Crevice corrosion resistance (seawater resistance)	A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>
	Nuclear	Seawater piping	Pitting corrosion resistance Crevice corrosion resistance (seawater resistance)	A351 CD3MWCuN (UNS S32760)	<i>SDPV-K3</i>

Stainless and High Nickel Alloy Steels

Chemical Composition and Resistance to Pitting Corrosion and Stress Corrosion Cracking



Following development of new industrial technologies, valves and other piping equipments are being seriously required to meet increasingly diversified, harsh service environments.

This is how the market demand for higher corrosion resistant steels has become remarkably stronger. Use of new materials, new processes and new plant equipments to meet the need of maximized production efficiency has made such service environments even more hazardous and severe.

This latest industrial trend encourages foundries all over the world for further development of new steels which could satisfy all these requirements with a minimized cost impact.

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

KITZ Casting Materials

We are now available to provide you with high quality of high alloy materials by means of using newly equipped vacuum castings.

SDPV-K3

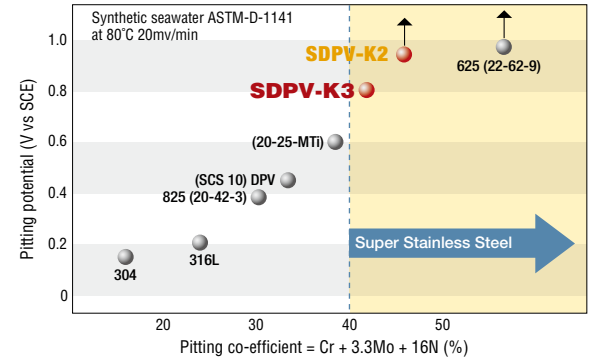
KITZ Super Duplex Phase Stainless Steel

KITZ Super Duplex Stainless Steel Valves are provided with all advantages of ferritic and austenitic stainless steel, plus upgraded pitting corrosion resistance and higher cost performance

Advantages and Disadvantages of Stainless Steel

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

What is Super Stainless Steel?



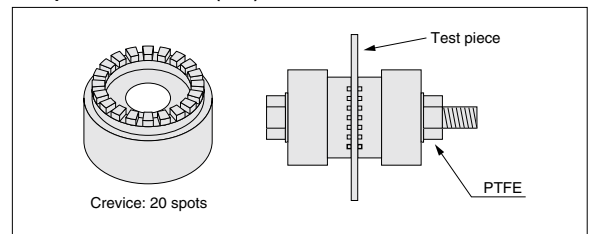
Superior Material Characteristics

Upgraded pitting corrosion resistance and cost effectiveness

Item	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 x 50 x 5t (mm)



Testing conditions:

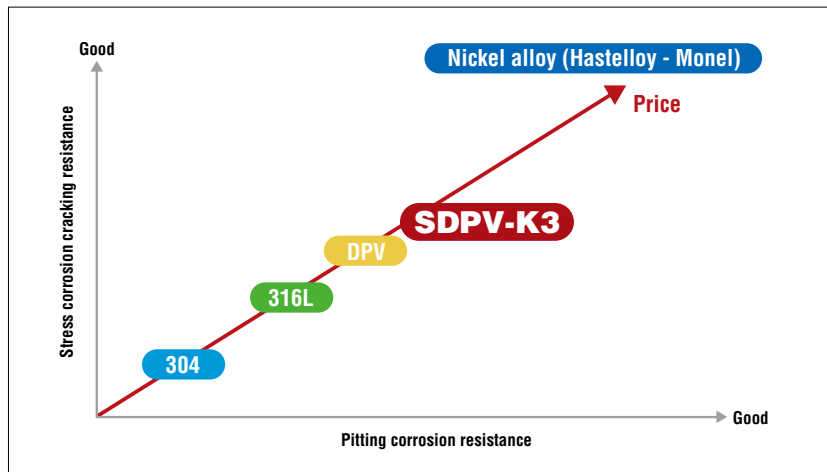
Solution	12.7% FeCl ₃ 6HzO (Cl content 5%)
pH	1~2
Temperature	30°C
Duration	72 hours

Testing result



High cost performance

- Much higher pitting corrosion resistance than conventional duplex stainless steel
- Costs less than half of hastelloy



Target markets

- Salt manufacturing equipment
- Seawater cooling piping
- Various chemical processing equipments (for chloride environment)
- Seawater disalination plants
- Pulp and paper mills
- Water treatment facility (for high temperature and high concentrated chloride environment)
- Flue gas desulfurization equipment



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KITZ Corporation of Taiwan



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KITZ Group

To contribute to the global prosperity, KITZ is dedicated to continually enriching its corporate value by offering originality and quality in all products and services.



Toyo Valve Co., Ltd.



KITZ SCT Co., Ltd.



Miyoshi Valve Co., Ltd.



KITZ Micro Filter Corporation



KITZ Wellness Co., Ltd.



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Shimizu Alloy Mfg. Co., Ltd.



KITZ Engineering Service Co., Ltd.



Hotel Beniya Co., Ltd.



Suwa Garasu Koubou Co., Ltd.



Kitazawa Museum of Art



KITZ Training Center



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