HLH | PROTOTYPES PROTOTOOL PRODUCTION

CNC MACHINING SPECIFICATION SHEETS

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Material Reference

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Material Reference

PLASTIC

ABS

BASIC PHYSICAL PROPERTIES

Performance project	Testing conditions	Test method	NUMERICAL /DESCRIPTION	Unit
Tensile Strength		ASTM D638/ISO 527	530(52)	kg/cm²(MPa)[Lb/in2]
Elongation at break		ASTM D638/ISO 527		%
Tensile modulus		ASTM D638/ISO 527		kg/cm²(MPa)[Lb/in2]
Tensile yield elongation		ASTM D638/ISO 527		%
Tensile strain at break		ASTM D638/ISO 527		%
Flexural modulus (flexural elasticity)		ASTM D790/ISO 178	28000(2750)	kg/cm²(MPa)[Lb/in2]
Flexural strength		ASTM D790/ISO 178	870(86)	kg/cm²(MPa)[Lb/in2]
Rockwell hardness		ASTM D785	R-110	
IZOD Notch impact strength	1/4" 23℃	ASTM D256/ISO 179	14(137)	kg·cm/cm(J/M)ft·lb/in
	1/4" -30℃	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
	1/8" 23℃	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
	1/8" -30℃	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
Charpy impact strength	23℃ （Gap）	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
	-30℃ （Gap）	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
	23℃ （Gap）	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
	-30℃ （Gap）	ASTM D256/ISO 179		kg·cm/cm(J/M)ft·lb/in
Specific gravity (density)		ASTM D792/ISO 1183	1.05	
Forming shrinkage		ASTM D955		%
Melting Index (Flow Coefficient)		ASTM D1238/ISO 1133	1.8	g/10min
		ASTM D1238/ISO 1133	20	g/10min
Water absorption rate 23℃/24H		ASTM D570/ISO 62		%
Hot Deformation Temperature	Annealing	ASTM D648/ISO 75	100	℃（℉）
	Not annealed	ASTM D648/ISO 75	88	℃（℉）
Vicat softening point		ASTM D1525/ISO R306	103	℃（℉）
Melting point		-		℃（℉）
Combustibility		UL94	1/16	
Linear expansion coefficient		ASTM D696/ISO 11359		mm/mm.℃

PLASTIC

POM

BASIC PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	VALUE	UNITS
Density	ASTM D792	1.41	g/cm³
Tensile Strength	ASTM D638	620	Kg/cm³
Hardness	ASTM D2240	R119	Rockwell
Flexural Strength	ASTM D790	910	g/cm²
Coefficient of linear expansion	ASTM D696	9	10^{-5}/℃
Thermal conductivity	DIN 52612	0.2	Kcal/m.hr.℃
Temperature Resistance		90 - 105	℃

The above data give our knowledge. Thet can't guarantee the named properties fo usage.

PLASTIC

PMMA

BASIC PHYSICAL PROPERTIES

Impact toughness resistance	ISO527	15KJ/m²	Coefficient of friction
Notch impact toughness	ISO527	1.5KJ/m²	combustion performance
Rockwell hardness of ball pressure law	ISO20391	185Mpa	UV resistance
Shore D hardness	DIN53505	90	Acid resistance
Flexural Strength	ISO178	1256Mpa	
Elastic Modulus	ISO527	3300Mpa	Carbonated water resistant
Vicat softening temperature	ISO306	100℃	Aerotolerant carbonated water
Heat distortion temperatureResistance	ISO75	95℃	Resistance to aromatic compounds
Hotline expansion coefficient	DIN53752	0.7k*10	Anti-ketogenic
Thermal conductivity 20℃	DIN52612	0.19w/（mxk）	Heat water resistance

The above data for reference only and do not guarantee as selection material.

PLASTIC

PP report

BASIC PHYSICAL PROPERTIES

PRORERTY	TEST METHOD	VALUE	UNITS
Density	ASTM D792	0.91	g/cm³
Tensile strength	ASTM D638	330	Kg/cm²
Flexural strength	ASTM D790	420-550	Kg/cm²
Izod Impact strength	ASTM D256	3.8	kg-cm/cm
Coefficient of linear thermal expansion	ASTM D696	711	$\times 10^{-6}$/℃
Heat distortion temp	ASTM D648 (18.5kg/cm²)	80-120	℃

PLASTIC

PTFE

BASIC PHYSICAL PROPERTIES

PRORERTY	TEST METHOD	VALUE	UNITS
Density	ASTM D792	2.2	g/cm³
Tensile strength	ASTM D638	140-350	kN/m²
Hardness	ASTM D2240	D55	Rockwell
Flexural strength	ASTM D790	16.4	g/cm²
Coefficient of linear thermal expansion	ASTM D696	7	$\times 10^{-6}$/℃
Thermal conductivity	DM 52612	6	kcal/(m·h·℃)
Temperature resistance		150	℃

PLASTIC

PC

BASIC PHYSICAL PROPERTIES

Density	ISO1183	g/cm³	1.2
Heat distortion temperature	ISO75	℃	137
Coefficient of linear termal expansion	DIN53752	K-1*104	0.65
Izod impact strength	ISO179	KJ/m²	30
Heat conductivity（20℃）	DIN52612	w/(msk)	0.21
Tensile strength	ISO527	Mpa	65
Flexural strength	ISO527	Mpa	100
Flexural modulus	ISO527	Mpa	2300

PLASTIC

PA

BASIC PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	VALUE	UNITS
Density	ASTM D792	1.14	g/cm³
Tensile strength	ASTM D638	720 - 840	Mpa
Hardness	ASTM D2240	R110 – 120	Rockwell
Flexural Strength	ASTM D790	950 – 1200	Mpa
Coefficient of linear expansion	ASTM D696	8	$\times 10^{-5}/℃$
Thermal conductivity	DIN 52612	0.18	Kcal/m.hr.℃
Temperature Resistance		120	℃

The above data give our knowledge. Thet can't guarantee the named properties fo usage.

PLASTIC

PC/ABS Alloy

BASIC PHYSICAL PROPERTIES

PEATURES	APPLICATIONS
· Excellent balance properties	· Household appliance
· Good impact strength	· Automobile interior/exterior trim parts
· Good processing properties	· Telecommunication equipment
· Suit for electro-plating and paint	· Computer and accessories

Properties(1)	Test Method ASTM	Test Condition	UNITS	Typical Values(2)
Mechanical				
Tensile Strength	D638	50mm/min	Mpa	48
Elongation at break	D638	50mm/min	%	≥30
Flexural strength	D790	2mm/min	Mpa	75
Flexural Modulus	D790	2mm/min	Mpa	2100
IZOD Impact Strength	D256	3.2mm, 23℃,notched	J/m	450
		3.2mm, 23℃,unnotched	J/m	NB
Thermal				
Heat Distortion Temp	D648	0.45Mpa, 6.4mm	℃	105
		1.8Mpa, 6.4mm	℃	90
Electrical				
Volume Resistivity	D257	-	Ω·cm	10^{15}
Surface Resistivity	D257	-	Ω	10^{15}
Others				
Melt Flow Index	D1238	260℃, 5KG	g/10min	22
Specific Gravity	D792	23℃	g/cm³	1.07
Mold Shrinkage	D955	23℃	%	0.5-0.7
Water Absorption	D570	2mm/min	%	0.2
Flammability	UL94	1.0mm	Class	HB
		3.2mm	Class	HB

[1] The values of pigmented material may be different.
[2] The listed values are measured by test specification and used for referential purpose only.

PLASTIC

HDPE

BASIC PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	UNITS	VALUE
Melt index（19℃/2, 6kg）	D1238	g/10min	0.25
Density	D1505	g/cm³	0.957
vicat softening point	D1525	℃	129
Melting temperature	DSC	℃	133
Tensile strength	D638	Kg/cm²	230
Elongation at break	D638	%	＞500
Notch impact (23 ℃)	D256	Kgcm/cm	15
Shore D hardness	D2240		64
Bending modulus	D790	Kg/cm²	12000
ESCR（F50）	D1693	hr	50
Embrittlement temperature	D740	℃	＜-80

Metal

A380

BASIC PHYSICAL PROPERTIES

	Si	Fe	Cu	Mn	Mg	Zn	Cr	Ti	Ni	Sn	Al
主要成分	0.534	0.811	0.24	0.24	0.59	0.267	0.0339	0.0104	0.016	0.0075	97.3
主要要求	0.4-0.8	0.7	0.15-0.4	0.15	0.8-1.2	0.25	0.04-0.35	0.02	0.05≤	0.05≤	

Metal

ADC12

BASIC PHYSICAL PROPERTIES

主要成分	Si	Fe	Mg	Cu	Mn	Al	HB
	0.7~0.8	0.7~0.8	0.9~1.1	0.2~0.3	0.18~0.23	0.7~0.8	80°~90°

Metal

AL2017

BASIC PHYSICAL PROPERTIES

		MELT ANALYSIS											TENSILE TEST			HARDNESS
ELMENT		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Zr	AL	Y.S.	T.S.	Elongation	HB
											-		MPa		A50mm A	
STANDARD	min	0.2		3.5	0.4	0. 4		-				REMAIN	260	390	13	
	max	0.8	0.7	4.5	1.0	0.8	0.1		0.25		-					
ACTUAL		0.5	0.16	3.7	0.6	0.58	0.02		0.07				265	412	√	√

REMARKS:

[1] There is no any requirement to the hardness in the technique specification ,the actual hardness value is for reference only.

[2] While there was no standard value in the tensile test,it means that the technique specification did not provide any mechanical property value for the given dimension, the actual value is for reference only.

STATEMENT: We hereby certify that material described herein has manufactured and tested with satisfactory result in accordance with the requirements of the above material specification.

Metal

AL2024

BASIC PHYSICAL PROPERTIES

Chemical composition（%）										Others		Al	Mechanical Properties		
ELMENT		Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Each	Total				
STANDARD	min			3.8	0.3	1.2						REMAIN	Tensile strength Rm(Mpa)	yield strength Rp0.2 (Mpa)	Elongation A50mm(%)
	max	0.5	0.5	4.9	0.9	1.8	0.10	0.25	0.15	0.05	0.01				
Stretch plate		0.11	0.25	4.67	0.59	1.64	0.01	0.13	0.03	≤0.05	≤0.1		415-421	302-307	9.0-9.5
													Hardness	50	

Metal

AL5052 H112

BASIC PHYSICAL PROPERTIES

Product Name	Specification (Thickness ×Width ×Length)	Quantity	Weight (kg)		Chemical composition（%）								Others		Al	Mechanical Properties		
				Range	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Each	Total				
				min					2.2	0.15						Tensile strength Rm(Mpa)	yield strength Rp0.2 (Mpa)	Elongation A50mm(%)
				max	0.25	0.4	0.1	0.1	2.8	0.35	0.1	0.1	0.05	0.01	REMAIN			
Alloy aluminum plate	20*1500*300	10	2486	-	0.08	0.22	0.03	0.05	2.45	0.17	0.07	0.01	≤0.05	≤0.1		200	125	18
																Hardness	50	

Metal

AL5083

BASIC PHYSICAL PROPERTIES

Chemical composition（%）												Al	TENSILE TEST			Hardness
ELMENT		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Zr		yield strength Y.S. (Mpa)	tensile strength T.S. (Mpa)	Elongation A50mm(%)	HB
STANDARD	min				0.4	4.0	0.05	-			-	REMAIN	125	275	12	
	max	0.4	0.4	0.1	1.0	4.9	0.25		0.15	0.15						
Stretch plate		0.11	0.25	4.67	0.59	1.64	0.01	-	0.03	0.03	-		176	306	23	

REMARKS:

[1] There is no any requirement to the hardness in the technique specification ,the actual hardness value is for reference only.

[2] While there was no standard value in the tensile test,it means that the technique specification did not provide any mechanical property value for the given dimension, the actual value is for reference only.

STATEMENT: We hereby certify that material described herein has manufactured and tested with satisfactory result in accordance with the requirements of the above material specification.

Metal

AL6061

BASIC PHYSICAL PROPERTIES

Chemical composition（%）												Al	TENSILE TEST			Hardness
ELMENT		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Zr		yield strength Y.S. (Mpa)	tensile strength T.S. (Mpa)	Elongation A50mm(%)	HB
STANDARD	min	0.4		0.15		0.8	0.04	-			-	REMAIN	240	290	8	
	max	0.8	0.7	0.4	0.15	1.2	0.35		0.25	0.15						
ACTUAL		0.66	0.36	0.21	0.03	1	0.1	-	0.06	0.029	-		265	305	13	

REMARKS:

[1] There is no any requirement to the hardness in the technique specification ,the actual hardness value is for reference only.

[2] While there was no standard value in the tensile test,it means that the technique specification did not provide any mechanical property value for the given dimension, the actual value is for reference only.

STATEMENT: We hereby certify that material described herein has manufactured and tested with satisfactory result in accordance with the requirements of the above material specification.

Metal

AL6061 T6

BASIC PHYSICAL PROPERTIES

Product Name	Specification (Thickness ×Width ×Length)	Quantity	Weight (kg)		Chemical composition（%）								Others		Al	Mechanical Properties		
				Range	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Each	Total				
				min	0.4		0.15		0.8							Tensile strength Rm(Mpa)	yield strength Rp0.2 (Mpa)	Elongation A50mm(%)
				max	0.8	0.7	0.4	0.2	1.2	0.35	0.25	0.15	0.05	0.01	REMAIN			
Alloy aluminum plate	diameter 110	25	2486	-	0.49	0.22	0.22	0.03	1.01	0.1	0.04	0.03	≤0.05	≤0.1		243	257	10
																Hardness	50	

Metal

AL6061-T651

BASIC PHYSICAL PROPERTIES

Product	Lot No	Alloy And Temper	Dimension	Quantity	Weight
Aluminum plate		6061-T651	55*1220*2440		
Technical standard	YS/T 439-2001	chemical composition standard	GB/T 3190-1996		

chemical composition

Melt No	Element	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Al
	Standard value	0.4-0.8	≤0.7	0.15-0.4	≤0.3	0.8-1.2	0.18-0.28	-	0.25	0.15	Remainder
100918-20	Actual value	0.6	0.43	0.23	0.04	1.1	0.26	-	0.15	0.002	

Mechanical property

Sampling Method	Tensile Strength		Yield Strength		Elongation		Hardness	
Aluminum plate	Standard value	Actual value	Standard value	Actual value	Standard value	Actual value	Standard value	Actual value
Longitudinal	≥265	365	≥230	220	≥9	10	-	HB150-156
Transverse								
Height								

Microstructure	Macrostructure	UI trasonic	Surface Control	(ml/100AL) Hydrogen Content	
				Standard value	Actual value
Dimension Control					

Metal

AL6063

BASIC PHYSICAL PROPERTIES

Mechanical Property											Ultrasonic
Temper	Tensile Strength		Yield Strength		Elongation		Curve				
	Standard value	Actual value	Standard value	Actual value	Standard value	Actual value	Standard value				
	210-250	250	130	130	5	5	Standard value				
Chemical Composition											
Melt No	Range	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Al
2457K	min	0.25	0.40	0.3	0.10	2.5-2.8	0.15-0.35	.....	0.10	.....	
	max	0.18	0.32	0.08	0.75	2.50	0.2	.....	0.08	.....	Remainder

Metal

AL6063 T6

BASIC PHYSICAL PROPERTIES

chemical composition										
Melt No	Element	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
	Standard value	0.2-0.6	≤0.35	≤0.10	≤0.350.10	0.45-0.9	≤0.10	≤0.10	≤0.10	Remainder
	Actual value	0.52	0.25	0.025	0.012	0.76	0.026	0.021	0.012	

Mechanical property								
Melt No	Tensile Strength		Yield Strength		Elongation		Tensile Strength	
2457K	Standard value	Actual value	Standard value	Actual value	Standard value	Actual value	Standard value	Actual value
	≥230	258	≥180	196	≥5	7	-	61HB

Microstructure	Macrostructure	UI trasonic	Surface Control	（ml/100AL）	Hydrogen Content
				Standard value	Actual value
Dimension Control					

Metal

AL6082 T6

BASIC PHYSICAL PROPERTIES

Chemical composition（%）												Al	TENSILE TEST			Hardness
ELMENT		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Zr		yield strength Y.S. (Mpa)	tensile strength T.S. (Mpa)	Elongation A50mm(%)	HB
STANDARD	min	0.7			0.4	0.6		-			-	REMAIN	255	300	9	
	max	1.3	0.5	0.1	1.0	1.2	0.25		0.2	0.1						
Stretch plate		1.02	0.33	0.03	0.56	0.91	0.03	-	0.06	0.03	-		285	340	10	

REMARKS:

[1] There is no any requirement to the hardness in the technique specification ,the actual hardness value is for reference only.

[2] While there was no standard value in the tensile test,it means that the technique specification did not provide any mechanical property value for the given dimension, the actual value is for reference only.

Metal

AL7075 T6

BASIC PHYSICAL PROPERTIES

Product Name	Specification (Thickness ×Width ×Length)	Quantity	Weight (kg)		Chemical composition（%）								Others		Al	Mechanical Properties		
				Range	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Each	Total				
				min			1.2		2.1	0.18	5.1					Tensile strength Rm(Mpa)	yield strength Rp0.2 (Mpa)	Elongation A50mm(%)
				max	0.4	0.5	2.0	0.3	2.9	0.28	6.1	0.2	0.05	0.01	REMAIN			
Alloy aluminum plate	diameter 25		3180	-	0.08	0.22	1.5	0.1	2.45	0.2	5.8	0.05	≤0.05	≤0.1		599	536	9
																Hardness	199	

Metal

AL7075 T651

BASIC PHYSICAL PROPERTIES

chemical composition														
Melt No	Element	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Zr	Each	Total	Al
	Standard value	≤ 0.40	≤ 0.50	1.2 ~ 2.0	≤ 0.3	2.1 ~ 2.9	0.18 ~ 0.28	-	5.1 ~ 6.1	≤ 0.2		≤ 0.2	≤0.15	
Actual value	G00643	0.07	0.16	1.58	0.13	2.67	0.20	-	5.88	0.03		0.03	≤0.15	Rest

Structure or mechanical property				
Mechanical Performance	tensile strength Rm/Mpa	Elongation Rp0.2/Mpa	Elongation at break A/%	
Standard value	540	460	8	
Actual value G00643	590～591	519	10.5～11.5	-

Size	Surface	Notes	Above are computer printouts,handwrittenand altered are invalid. No shading paper andno product certification seal are invalid.
Qualified	Qualified		

Metal

LM24

BASIC PHYSICAL PROPERTIES

chemical composition											
Melt No	Element	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Al
	Standard value	≤ 0.40	≤ 0.50	1.2 ~ 2.0	≤ 0.3	2.1 ~ 2.9	0.18 ~ 0.28	-	5.1 ~ 6.1	≤ 0.2	
Actual value	100918-02	0.08	0.33	1.48	0.04	2.59	0.21	-	5.67	0.02	Remainder

Mechanical Property								
Sampling Method	Tensile Strength		Yield Strength		Elongation		Hardness	
Standard value	Standard Value	Actual Value	Standard Value	Actual Value	Standard Value	Actual Value	Standard Value	Actual Value
Actual value	≥ 560	545 - 560	≥ 460	470 - 520	≥ 6.0	9.0 - 11	-	HB150 - 156

Size	Surface	Notes	Above are computer printouts,handwrittenand altered are invalid. No shading paper andno product certification seal are invalid.
Qualified	Qualified		

Metal

BRASS

BASIC PHYSICAL PROPERTIES

chemical composition														
Melt No	Element	Cu	Zn	Pb	Al	Mn	Sn	Fe	Si	Sb	Cd	Bi	P	Ni
	Standard value	57.1	≤ 0.50	3.39	≤ 0.0010	0.0034	0.389	0.432	＜0.0010	0.029	0.0009	0.071	0.0056	0.158

Metal

17-4PH

BASIC PHYSICAL PROPERTIES

Warranty book number：Z01070601862										
Order NO：										
Contract NO：Z2009-406-ZH465A-1867										
Steel number: 17-4PH	Technical conditions：CJX-Z050-2009				Specifications					
Production number: 09E - 3139	Furnace number: P07601550				Production process					
Delivery status: H1075 (Solid dissolution)										
Delivery weight: 8550KG										
chemical composition (%)	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Nb+Ta
	0.06	0.40	0.32	0.018	0.012	15.50	3.20	0.20	3.70	0.17
Mechanical properties	Sample	1. Elongation after breaking δ_5: 13			2. Tensile strength σb:1000Mpa				3. Proof stress σS:860Mpa	
		4. Shrinkage ψ: 45%			5. Hardness HRC32-38					
Others	Surface qualified									
Remarks:	This certificate is subject to red stamp.									

Metal

SS301

BASIC PHYSICAL PROPERTIES

Product Name			CUSTOMER			PURCHASER											
Contract No：0000113781-000230					Train Wagon No：4231051												
NO	BOX NO	HEAT NO	HEAT NO	GRADE	DESCT IPTION	WEIGHT	CHEMICAL COMPOSITION(HEAT ANALYSIS)%										
							C	Si	Mn	P	S	Cr	Ni	Cu	Al	N	Mo	Ti
1	50034215C	FA90157760K25c	A1101402	301	9	200	0.15	1	2	0.045	0.03	16.0-18.0	6.0-8.0					

NO	STANDARD	STATE	TENSILE STRENGTH(MPA)	yield strength(Mpa)		Elongation after fracture A /%	HARDNESS			
				Longitudinal yield (0.2)	Longitudinal yield (0.1)		HB	HRB	HRC	HV
1	GB/T3280-2007	cold rolling	520	205		40	187	90		200

NOTE Incase of dispute the purchaser shall supply the number of certficate、contract、batch、vbeln、heat and trade、dimension、quantity.etc.

WE HEREBY THAT MATERIAL DESCRIED HEREIV HA S MANUFACTURED AND TESTED WITH SATI SFACTORY RESLLTS INACCORDANCEWITH REQUIREMENTS OF THE ABOVE SPECIFICAION EN 10204 3.1.

Metal

SS304

BASIC PHYSICAL PROPERTIES

Product Name				CUSTOMER: 848					PURCHASER: BGSAJJCGG14CC563201								
SPECIFICATION: BXYI2012-132.304.NO2 PT.A									CUSTOMER ORDER NO								
NO	BOX NO	PACK NO	HEAT NO	MATERIAL DESCRIPTON					CHEMICAL COMPOSITION(HEAT ANALYSIS)%								
				THICK	WIDTH	LENGTH	SHEETS	MASS(kg)	C	Si	Mn	P	S	Ni	Cr		Ceq
				MM					x10	$x10^2$	$x10^2$	$x10^3$	x10	x10	$x10^3$	$x10^3$	x10	x10
1	1150080102	1	151701	65	/	COIL	/	9526	0.08	1	1.98	0.04	0.03	8.4	18.2		
2	1150080102	1	151702	2	1250	COIL	8	8657	16	2	15	12	9				

TENSILE TESY(G/L=L1)						
		yield strength(Mpa)	Tensile Strength	elongation(%)	R	Yield ratio	BEND TEST
1	1150080102		406	30			OK
1	1150080102	310	425	38			OK

WE HEREBY THAT MATERIAL DESCRIED HEREIV HA S MANUFACTURED AND TESTED WITH SATI SFACTORY RESLLTS INACCORDANCEWITH REQUIREMENTS OF THE ABOVE SPECIFICAION EN 10204 3.1.

Metal

SS316

BASIC PHYSICAL PROPERTIES

CONIPACTINO:													
NAME OF ARTICLE													
BN	Type	Size	KG	CHEMICAL COMPOSITION(HEAT ANALYSIS)%								Mechanical properties			
				C	Si	Mn	P	S	Cr	Ni	Mo	yield strength(Mpa)	tensile strength(Mpa)	Elongation(%)	Surface shrinka(%)
DA0921120	316	20	2.5	0.078	0.381	1.38	0.036	0.01	16.52	10.52	2.02	/	√	√	√
If my quality doubts please clarify via phone call of fax and dicate the code number of the quality certificate.															
The certificate becomes valid only after it is sealed with product inspection stamped copy is invalid.															
The inspection items shall be operated according to the standards and contract stipulations, and the blanks shall be non-inspection items.															

Metal

SS316L

BASIC PHYSICAL PROPERTIES

SPECIFICTION			316L														
SURFACE			OK														
NO	BarNo.	HeatNO.	Diamete	Length	Pieces	Mass	C	Si	Mn	P	S	Ni	Cr	Mo	C	C	C
							0.000	0.000	0.000	0.000	0.000	10.000	16.000	2.000	0.000	0.000	0.000
			mm	mm		kg	0.080	1.000	2.000	0.045	0.030	14.000	18.000	3.000	0.080	0.080	0.080
1	B635876C	216528	6.0	2500	50	22.615	0.058	0.710	1.850	0.027	0.016	10.380	16.410	2.510	0.058	0.058	0.058
2	B635876D	216528	8.0	2500	50	22.615	0.058	0.710	1.850	0.027	0.016	10.380	16.410	2.510	0.058	0.058	0.058
3	B635876E	216528	10.0	2500	50	22.615	0.058	0.710	1.850	0.027	0.016	10.380	16.410	2.510	0.058	0.058	0.058
4	B635876F	216528	12.0	2500	50	22.615	0.058	0.710	1.850	0.027	0.016	10.380	16.410	2.510	0.058	0.058	0.058
				total	200	90460											

	Tensile Test*						
NO	0.2 yield strength Y.S n / mm²	Tensile strength T.SN/ mm²	Elongation %EL	Yield extension %EL	Hardness Test	Band Test	Surface
MIN	175	480	40		HV		
MAX							
1	320	690	57.0		265.0		GOOD
2	320	690	57.0		265.0		GOOD
3	320	690	57.0		265.0		GOOD
4	320	690	57.0		265.0		GOOD

REMAKES

Metal

SS420

BASIC PHYSICAL PROPERTIES

Contract N: G015112M-ODD3	Purchuet	Name: stainless steel	Record No: DX08-08-0

Steal Grade	Heat No	Size (mm)Size	Size (mm)Length	Number Of Piec	Weight (kg)	Condition of Deliver	Heat Treatment No.	Specificarion	Purpose of furber processing
420ss	6614102596B	510	12	2	2420	annealing	15M-4-14	/	Pin cutting processing

Chemical Compound（%）

C	Mn	Si	S	P	Ni	Cr	W	Mo	V	Mg	Zn
0.18	1	0.9	0.02	0.025	0.23	12.5	/	0.2	/	/	/
B	Cu	Nb	H	U	N	Pb	Sn	BI	Sb	AI	RE
/	0.13	/	/	/	/	/	/	/	/	/	/

Sample Heat — Mechanical Properties

Normched	Quen ched	Tempched	Yield Point Rp (Mpa)	Yield Point Rp (Mpa)	Ult Tensile Strength Rm (Mpa)	Ult Tensile Strength Rm (Mpa)	ElongAtionA (%)	Redduction of areaZ(%)	ImpaceAK (j)

OrdinaryPorosy	ConterPorsity	Squaresegregation	SpolSegregation	A		B		C		D		Decarburized Layer(mm)
1.0	0.0	1.0	0.0	T	H	T	H	T	T	T	T	0.20
1.0	0.0	1.0	0.0	1.5	0	1	1.5	0	0	1.5	0	0.15
265.0	265.0	265.0	265.0	1.5	0	1	1.5	0	0	1.5	0	0.20
												0.15

Metal

SS455

BASIC PHYSICAL PROPERTIES

Customer		Purchuet		Name: stainless steel		Record No: DX08-08-0				
Cast PO No: N/A		Cust Pare: DIA3-5/8"RND BAR								
Order No. : N/A		Cust Item No.:N/A								
Item No.: N/A		Alloy &Temper: ss455								
Material Type: Ns Extruded		Material No.								
		Lot No.								
		L/C No.								
Length	Φ20 ■ft □min □fnch									
Bundle No.	21500	SHT Lot No.	●	Part Qty	15	Net Weight	1845□Lbg ■kg			
Chemical Composition										
Alloy	C	Cr	Mn	Ni	Si	Mo	P	S	Ti	Cu
ss455 Min	0.05	11	0.5	7.5	0.5	0.5	0.04	0.03	0.8	1.5
Max	≤	12.5	≤	9.5	≤	≤	≤	≤	1.4	2.5
Actual	0.03	11	0.3	8	0.25	0.35	0.018	0.015	0.03	1.5
Comments										
Neither mercary nor any of its composeds are wand in the mandfacturing of our Customer Requlrement if nccegrary										
Eimectslen	□Macro □Micro Stucture			Ultresonle Test			Surface Roughness			
Pasred	N/A			N/A			N/A			
Applesble Spceifcetices										
Spceifcetices No.Revision Amends										
ASTM B221 04A	We hereby certify that the material described herein has been made and tested in accordance with the requirement of purchase specification with satisfactort results									
AMS-4169 K										
QQ-A-200/11 E										
AMS-QQ-A-200/11									Quality Assurancs Manaser	
					Signed	Choi,Jin-Ho		Date Apr.27.2017		
						For end on behalf of ALCOA CPE				

Metal

SS630

BASIC PHYSICAL PROPERTIES

Warranty No.: Z01070601862										
Cast PO No： N/A										
Contract No： Z2009-406-ZN465A-1867										
Steal Grade： SS630	Technical conditions: CJX-Z050-2009						Specifications:			
Production No.: 09e-3139	Heat No: P07601550						Production process:			
Delivery status: H1075 (solid solution)										
Delivery weight: 8550kg	Number of pieces: 100 (60)						Product Name: precipitation hardening stainless steel rod			
Chemical composition%	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Nb+Ta
	0.06	0.40	0.32	0.018	0.012	15.50	3.20	0.20	3.70	0.17
Mechanical properties	sample	1. Elongation after fracture δ 5: 13				2. tensile strength σ b:1000Mpa			3. proof stress σ S:860Mpa	
		4. Shrinkage ψ: 45%				5. Hardness HRC32-38				
other	Surface qualified									
remarks	This certificate is subject to the red seal, and the copy is invalid						Validity Code: 00-20601			

Metal

20NiCrMo

BASIC PHYSICAL PROPERTIES

CERTIFICATE NO. 6880080211			PROOUCT: Alloy structural steel												
MILL.S NO: B7600458228			STEEL GBADE: 20NICRMO				DELIVERTY.STATE								
PURCHASER			SPECIFICATI ON GB/T 3077-1999				WORKING USE								
PURCHASER			CUSTONER ORDER NO: 092801885-10												
LICENSE NO.			DATE OF ISSUE: 2018/4/18				DATE OF DEL LVERY: 2018/4/25								
NO.	HEAT NO.	SLAB NO.	MATERIAL DESCRIPTION				CHEMICAL COMPOSITION%								
			Diameter mm	Length mm	QTY	N.W.（kg）	C	Si	Mn	P	S	Cr	Mo	Ni	Cu
1	1956842	100690	40	6	1	3697	0.17	0.22	0.65	0.015	0.02	0.4	0.25	0.5	0.3
2	1956843	100691	50	6	1	4474	0.17	0.22	0.65	0.015	0.02	0.4	0.25	0.5	0.3
3	1956844	100692	55	6	1	5324	0.17	0.22	0.65	0.015	0.02	0.4	0.25	0.5	0.3
4	1956845	100693	70	6	1	3965	0.17	0.22	0.65	0.015	0.02	0.4	0.25	0.5	0.3
5	1956846	100694	75	6	1	5010	0.17	0.22	0.65	0.015	0.02	0.4	0.25	0.5	0.3

		Tensile Test			Hardness	Shrinkage Factor%
		Yield Point （Mpa）	Tensile Strength (Mpa)	Elongation		
1	1956842	795	1076	9		55
2	1956843					
3	1956844					
4	1956845					
5	1956846					

(Pemaks

Size and surface: Qualified

Tensile test:Technique accord with GB/T1220-2007

Sample specifications:accord with No.5 on GB/T3077-1999

Hardness test： Technique accor with： JIS Z 2244

WE HEREBU OERTIFY YHAT MATERIAL DESSORIBED HEREIN HAS MANUFACIURED AND TESIED WITH SATISFACTORY RESULTS RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERLAL SPECICATION

Metal

40CrNiMo

BASIC PHYSICAL PROPERTIES

Production NO		6-508123		Shape		Round steel	
Steel Grade		40CrNiMoA		Weight		8.032ton	
specification		GB/T3077 1999		Melting Method		By standard	
Designated further		Hot Pressure Processing		Heat No		16121038121	
Condition of Delivery		Hot rolling		License NO			
Heat Treatment NO.				Date of Issue		20170403192136	
1. Chemical Composition (%)							
C	Si	Mn	P	Cr	Ni	Cu	Mo
0.41	0.24	0.61	0.017	0.84	1.27	0.11	0.17
2. Mechanical Property							
Annealing hardness		258.0 258.0					
3. Macrostructure Examination							
Macrostructure Pattern Segregation(Grade) 0.5 0.5 General Porosity(Grade) 0.5 0.5 Central Porosity(Grade) 0.5 0.5							