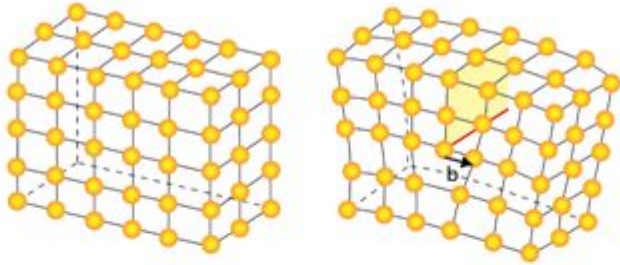
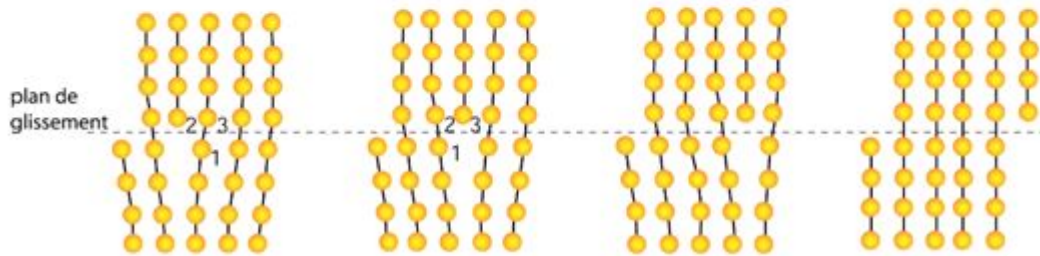


Métaux

Structure atomique



*Mer d'électrons →
conduction électrique et thermique
déplacement dislocations*



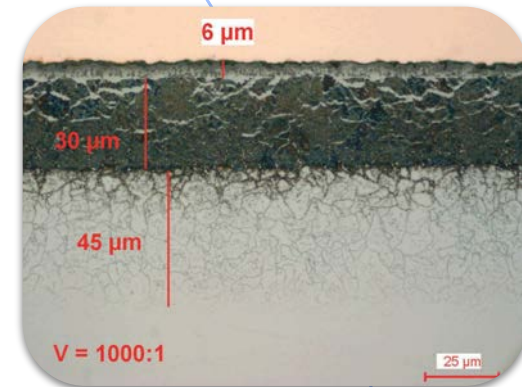
Malléable, usinable, formable

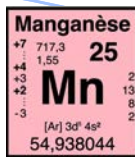
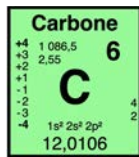
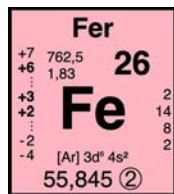
Pur = caractéristiques mécaniques généralement faible

Alliage → amélioration des caractéristiques mécaniques

Traitement thermique → augmente la ténacité

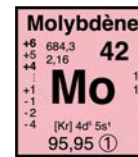
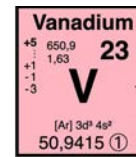
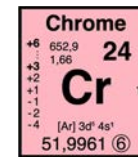
Traitement de surface → protection anti-corrosion, dureté élevée, tribologie





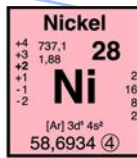
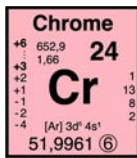
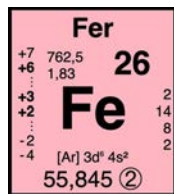
Acier courant

Densité ~7.8



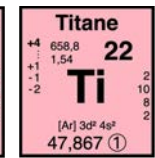
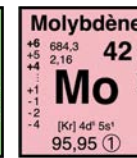
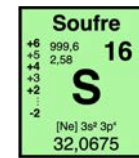
Acier	Limite d'élasticité	Résistance à la traction	Allongement à la rupture	Dureté	Module d'élasticité
1.0038/S235JR	185 – 235	340 – 510	21 – 26	120	210
1.0503 / C45	275	560	16	255	205
1.0511 / C40	285	482	21	322	372
1.0570 / S355J2G3	315 – 355	490 – 630	22	217	210
1.2842 / 90MnCrV8	739	914	14	334	386
1.7131 / 16MnCr5	440 – 735	640 – 1375	8 – 15	207	190 – 210
1.7218 / 25CrMo4	345 – 700	600 – 1100	12 – 16	212 – 255	210
1.7225 / 42CrMo4	500 – 900	750 – 1300	10 – 14	219	164 – 217
	(MPa)	(MPa)	(%)		(GPa)





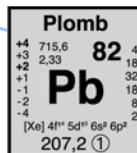
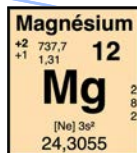
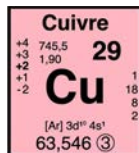
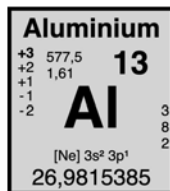
Acier Inoxydable

Densité ~8.02



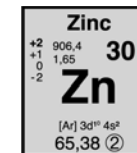
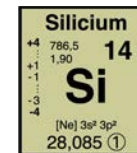
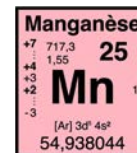
Alliage Inoxydable	Limite d'élasticité	Résistance à la traction	Allongement à la rupture (%)	Dureté	Module d'élasticité
303 / 1.4305 / X10CrNiS18-9	351	398	31,00 %	234	562
304 / 1.4301 / X5CrNi18.10	260 – 270	520 – 680	≥ 45	215	200
316L / 1.4404 / X2CrNiMo17-12-2	225	500 – 700	35 – 45	215	200
316Ti / 1.4571 / X6CrNiMoTi17-12-2	235	500 – 700	30 – 40	215	200
304L / 1.4307 / X2CrNi18-9	175 – 210	500 – 700	45	215	193
	(MPa)	(MPa)	(%)		(GPa)



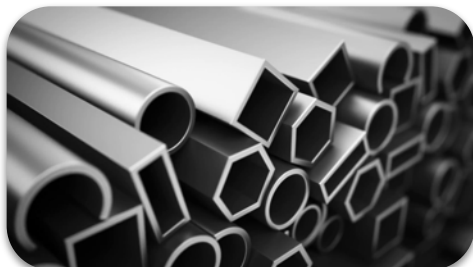


Aluminium

Densité ~2.70



Alliage	Limite d'élasticité	Résistance à la traction	Allongement à la rupture	Dureté	Module d'élasticité
2007 / 3.1645 / Al-CuMgPb	210 – 250	370	6 – 8	130	72,5
2017A / 3.1325 / Al-Cu4Mg	135 – 240	250 – 370	8 – 12	45 – 105	72,5
5083 / 3.3547 / AlMg _{4,5} Mn	115 – 200	270 – 345	16	81,5	71
6060 / 3.3206 / Al-MgSi	60 – 160	120 – 215	6 – 16	45 – 70	~70
6061 / 3.3211 / Al-Mg ₁ SiCu	110 – 240	180 – 260	7 – 15	65 – 85	70
6082 / 3.2315 / Al-Si ₁ Mg	110 – 260	205 – 310	6 – 15	65 – 95	70
7075 / 3.4365 / Al-Zn ₆ MgCu	145 – 475	275 – 540	2 – 10	55 – 163	72
	(MPa)	(MPa)	(%)		(GPa)



Plastiques

Transparence

Faible densité

Mise en oeuvre diversifiée

Isolant électrique

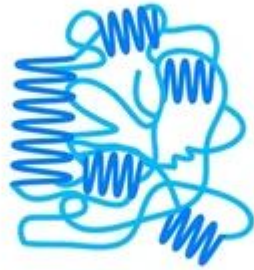
Isolant thermique

Accessibilité

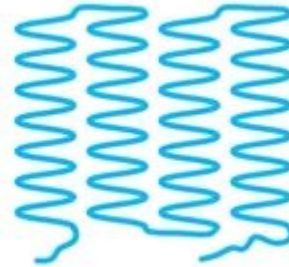
Technicité



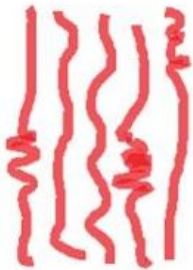
Amorphe



Semi-cristallin



Cristallin



Thermoplastique

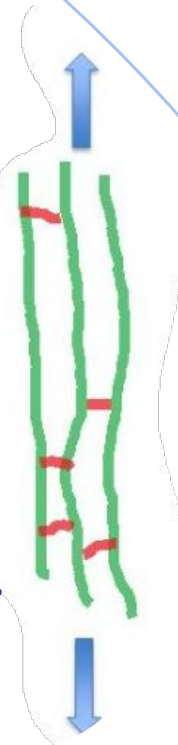


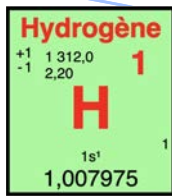
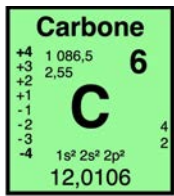
Thermodurcissable



Elastomère

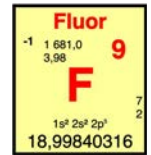
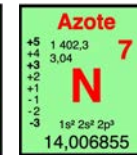
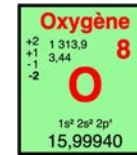
je tire
→



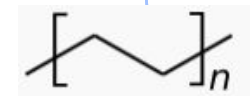
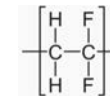
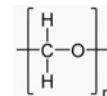
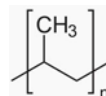
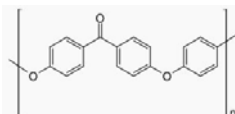
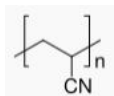
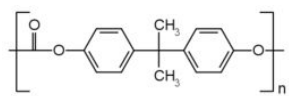


Plastiques courants

Densité moyenne ~1.2 variable



Plastiques courants	Module d'élasticité en traction	Résistance à la traction	Allongement à la rupture	Résistance à la flexion	Dureté	Module d'élasticité en flexion
ABS (1.14)	2270	46	48	69	68 – 118	23,5
Acrylique (1.18)	2413 – 3447	55,1 – 75,8	2	82,7 – 117,2	98	5,51 – 7,58
PC (PolyCarbonate) (1.2)	2206	65,5	60	103,4	95	2,58
PEEK / Polyétheréthercétone (1.32)	3792	99,9	35	165,4	230	4,13
Polypropylène (PP) (0.92)	1600	30	150	40	70	1,5
POM / Polyoxyméthylène - Delrin (1.41)	3102	75,8	30	89.6	150	3,1
PTFE/ Polytétrafluoroéthylène - Téflon (2.2)	551,5	26,88	300	14	57	0,49
PVDF/fluorure de polyvinylidène (1.78)	2000	55	20	–	77	0,89
UHMW PE/Polyéthylène haute densité (0.94)	551,5	39,9	300	25,13	64	0,606
	(MPa)	(MPa)	(%)	(MPa)		(GPa)



PLASTIC PROCESSING DIFFICULTIES

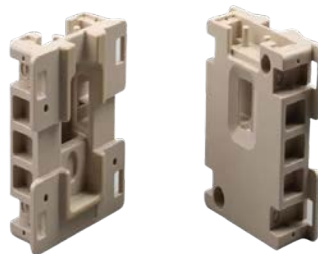
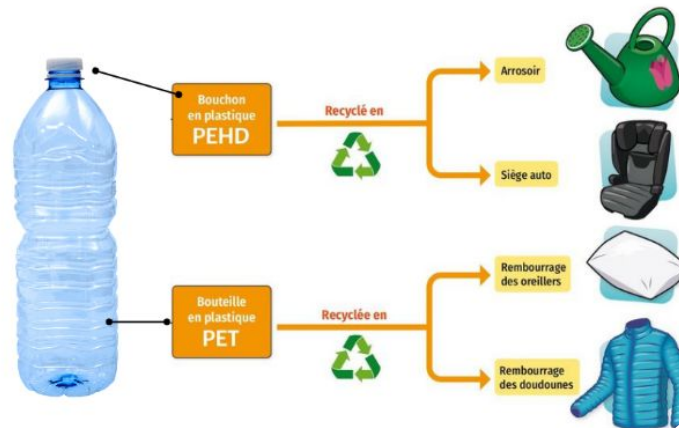
PET	HDPE	PVC	LDPE	PP	PS	O
polyéthylène téréphtalate	high-density polyéthylène	polyvinyl chloride	low-density polyéthylène	polypropylène	polystyrène	other
EASY	POSSIBLE	ALMOST IMPOSSIBLE	POSSIBLE	POSSIBLE	DIFFICULT	ALMOST IMPOSSIBLE



PMMA



POM



PEEK



PET - PEHD



Polystyrène



Composite

Matrice

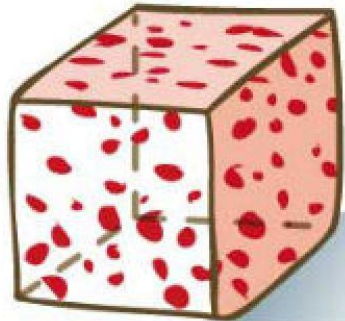
Mise en oeuvre complexe

Technicité

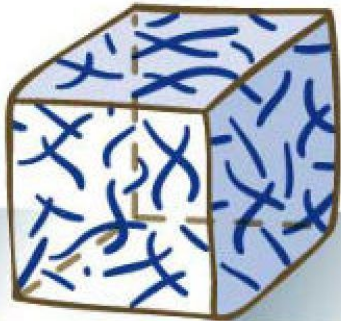
Légèreté

Flexibilité

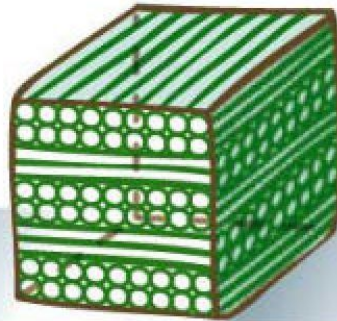
Résistance



à particules



à fibres



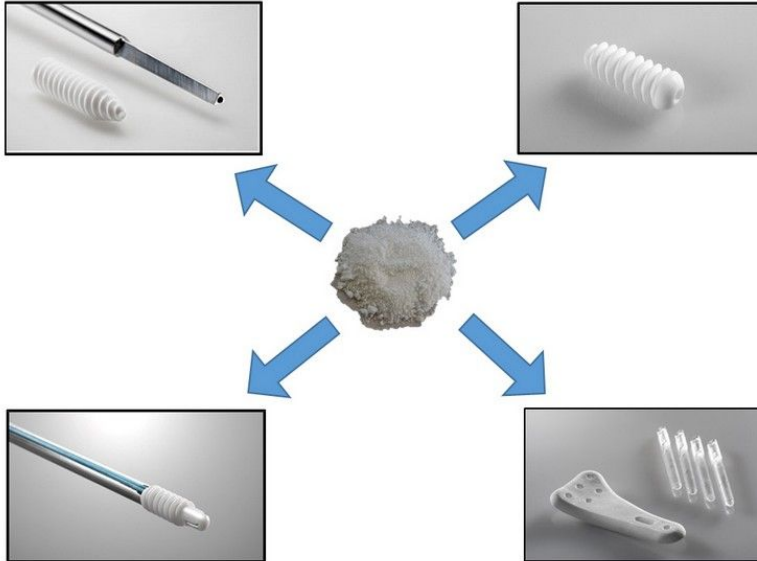
laminés



Céramique

Principalement oxydes

Poudre compactée



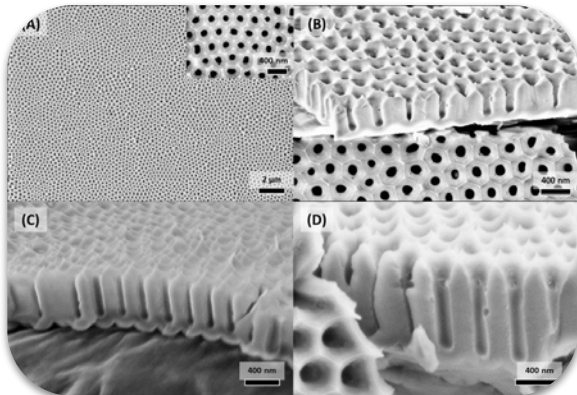
Très grande dureté

Chimiquement inerte

Biocompatible

Réfractaire

Fragile



Aluminium

Alumine

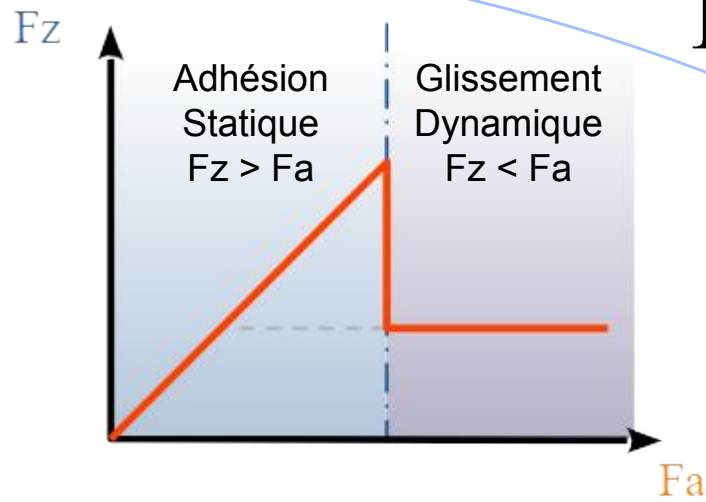
Anodisation



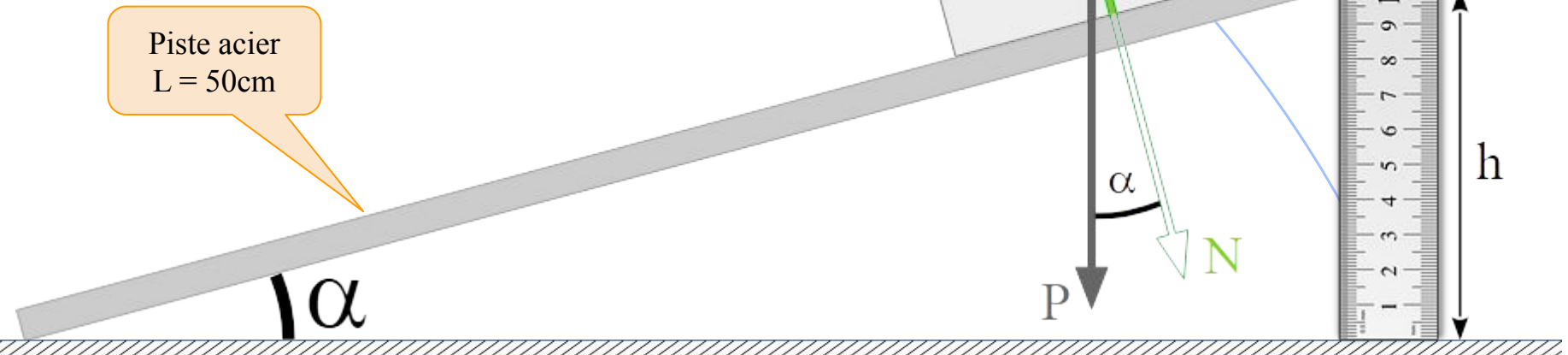
Matériaux

		Conducteur électrique	Isolant électrique	Conducteur thermique	Isolant thermique	Transparent	Densité	Métal	Polymère	Composite
1	Bois						Faible			
2	Tube profilé étiré à froid						Élevée			
3	POM – Polyoxyméthylène						Moyenne			
4	PTFE – Téflon						Moyenne			
5	Acier Inoxydable						Élevée			
6	PMMA – Polyméthylmétacrylate						Moyenne			
7	Bronze						Élevée			
8	PVC – Polychlorure de vinyl						Moyenne			
9	Acier laminé						Élevée			
10	PA 6-6 – Nylon – Polyamide 6-6						Moyenne			
11	Laiton						Élevée			
12	Aluminium 2017A – Duralumin						Modérée			
13	Fonte						Élevée			
14	Corde à piano						Élevée			

Frottement



Piste acier
 $L = 50\text{cm}$



$$\mu = \frac{F_z}{N}$$

$$\tan a = \frac{O}{A} = \frac{F_a}{N}$$

$$\sin a = \frac{O}{H} = \frac{h}{L}$$

$$\mu = \tan a = \tan \left(a \sin \frac{O}{H} \right)$$

Matière	Altitude relevées (cm)			$\mu = \tan(a \tan(50/h))$		
	Adhésion	Glissement	Roulement	Adhésion	Glissement	Roulement
PMMA	21,5	9	0,5	0,48	0,18	0,01
PVC	17	9,5	0,8	0,36	0,19	0,02
Bronze	12	7,5		0,25	0,15	
POM	14,5	9,5	0,5	0,30	0,19	0,01
Patins PTFE	10,5	5		0,21	0,10	
Fonte	13,5	6,5		0,28	0,13	
Nylon	11	7,5		0,23	0,15	
Bois	16,5	11		0,35	0,23	
Alu	12,5	7,5		0,26	0,15	
Laiton	16	7,5		0,34	0,15	

AISI Type 304L Stainless Steel

Categories: [Metal](#), [Ferrous Metal](#), [Heat Resisting](#), [Stainless Steel](#), [T 300 Series Stainless Steel](#)

Material Notes: Austenitic Cr-Ni stainless steel. Better corrosion resistance than Type 302. High ductility, excellent drawing, forming, and spinning properties. Essentially non-magnetic, becomes slightly magnetic when cold worked. Low carbon content means less carbide precipitation in the heat-affected zone during welding and a lower susceptibility to intergranular corrosion. Applications include beer barrels, bellows, chemical equipment, coal hopper linings, cooling coils, cryogenic vessels, dairy equipment, evaporators, feedwater tubing, flexible metal hose, food processing equipment, hypodermic needles, nuclear vessels, oil well filter screens, refrigeration equipment, paper industry, pressure vessels, sanitary fittings, valves, shipping drums, spinning, still tubes, textile dyeing equipment, tubing.

Key Words: aisi304, AISI 304, T304, T 304, SUS304, SS304, 304SS, 304 SS, T304L, T304 L, 304L, 304 L, UNS S30403, AMS 5647, QQ-S-763, austenitic, Cr-Ni stainless steel, SAE 30304L, DIN 1.4306, X2CrNi189, B.S. 304 S 12, PN 86020 (Poland), OOH18N10, ISO 4954 X2CrNi1810E, ISO 683/13 10, 18-8

Vendors: No vendors are listed for this material. Please [click here](#) if you are a supplier and would like information on how to add your listing to this material.

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[Export data to your CAD/FEA program](#)

Add to Folder: ☐ My Folder 0/0

Physical Properties	Metric	English	Comments
Density	8.00 g/cc	0.289 lb/in ³	
Mechanical Properties	Metric	English	Comments
Hardness, Knoop	158	158	Converted from Rockwell B Hardness Value
Hardness, Rockwell B	82	82	
Hardness, Rockwell C	15	15	10% Cold-worked
Hardness, Vickers	159	159	Converted from Rockwell B Hardness Value.
Tensile Strength, Ultimate	564 MPa	81800 psi	0% Cold-worked
Tensile Strength, Yield	210 MPa	30500 psi	0% Cold-worked
Elongation at Break	58 %	58 %	In 50mm (2 in.)
Modulus of Elasticity	193 - 200 GPa	28000 - 29000 ksi	
Charpy Impact	216 J	159 ft-lb	
Electrical Properties	Metric	English	Comments
Magnetic Permeability	1.008	1.008	at RT
Thermal Properties	Metric	English	Comments
Specific Heat Capacity	0.500 J/g-°C	0.120 BTU/lb-°F	Estimated based on a comparison with similar stainless steels.
Thermal Conductivity	14.0 - 16.3 W/m-K	97.0 - 113 BTU-in/hr-ft ² -°F	
Melting Point	1400 - 1450 °C	2550 - 2640 °F	
Solidus	1400 °C	2550 °F	
Liquidus	1450 °C	2640 °F	
Maximum Service Temperature, Air	870 °C	1600 °F	Intermittent
	925 °C	1700 °F	Continuous Service
Component Elements Properties	Metric	English	Comments
Carbon, C	<= 0.030 %	<= 0.030 %	
Chromium, Cr	18 - 20 %	18 - 20 %	
Iron, Fe	64.9 - 74 %	64.9 - 74 %	as balance
Manganese, Mn	<= 2.0 %	<= 2.0 %	
Nickel, Ni	8.0 - 12 %	8.0 - 12 %	
Phosphorus, P	<= 0.045 %	<= 0.045 %	
Silicon, Si	<= 1.0 %	<= 1.0 %	
Sulfur, S	<= 0.030 %	<= 0.030 %	

