Materials France

Aerospace

thyssenkrupp

Summary

Ready to take off?

001 Alloy steels
002 Stainless steels
003 Aluminium alloys
004 Copper alloys
005 Superalloys
006 Titanium alloys

Global summary.

Grades	Euronorm EN DIN	Former designation AFNOR	Long Products	Flat Products	Tubular Products	Page
Alloy steels						
15 CDV 6	Fe PL 1505	AIR-ASNA-CCT				5
16 NCD 13 E 16 NCD 13	Fe PL 71	AIR-ASNA-CCT				8
30 NCD 16	Fe PL 2107	AIR-ASNA-CCT				9
35 NC 6	Fe PL 2102	AIR-ASNA-CCT				10
35 NCD 16	Fe PL 2108	AIR-ASNA-CCT				12
Stainless steels						
Z 7 CNU 16-04	X 5 Cr Ni Cu Nb 16-4					14
E-Z 5 CNU 15-05	Fe PM 3802					15
Z 8 CND 17-04	X 4 Cr Ni Mo 16-5-1	AIR-ASNA				17
Z 15 CN 17-03	X 17 Cr Ni 16-2	AIR-ASNA				18
Z 100 CD 17	X 105 Cr Mo 17	AIR-ASNA				20
Z 10 CNT 18-11	X 6 Cr Ni Ti 18-10	AIR-ASNA-DMD				21
E-Z 6 NCT 25	X 5 Ni Cr Ti 26-15	ASNA-DMD				22
Aluminium alloys						
2024		AIR-ASNA-NCT-EN				24
2618 A		AIR-ASNA				25
5086		AIR-ASNA				26
6061		AIR-ASNA				27
7075 / 7175		AIR-ASNA				28
7010 / 7050		AIR-ASNA				29
Copper alloys						
Cu Al 10 Ni 5 Fe 4		NFL-ASNA				32
Cu Al 11 Ni 5 Fe 5		NFL-NCT (MD)				33
Cu Ni 3 Si		NFL-ASNA				34
Cu Ni 14 Al 2		NFL-ASNA				35
Cu Sn 8,5 P		NFL				36
Cu Be 1,9		NFL-ASNA				37
Cu Zn 19 Al 6		NFL-ASNA-NCT (MD)				38
Superalloys						
Alloy 625	Ni Cr 22 Mo 9 Nb					40
Alloy 718	Ni Cr 19 Nb Mo	NC 19 Fe Nb - DMD				41
TK ALLOY 36		Fe Ni 36				42
Titanium alloys						
TA 6 V		AIR-ASNA-DMD				44

Round bars
Flat bars
Square bars
Hexagonal bars
Angle bars
Profiles(L,U,T,H,I)
Wires
Hot rolled (coils and plates)
Cold rolled (coils and sheets)
Checker plates, patterned sheets
Strips
Hollow bars
Pipes
Decoration and structural tubes (round, square, rectangular)
Fittings

Pictograms in blue: available from European central stock, short delivery time.

Alloy steels.

15 CDV 6

Delivery Specifications

AIR 9160 C
ASNA 3119 / 3120 / 3192 / 3193 /3102 /3100
CCT LA 285 / LA 071 / LA 081
Pr EN 2213 / 3523
Further specifications on request (LW,....).

Other designations

France : AIR-ASNA-CCT
Euronorm : Fe PL 1505

Applications areas

Welded components for aerospace.

Steel properties

Weldable low alloy Cr Mo V steel capable of achieving high mechanical properties after welding.

Available stock

Rolled plates hardened and tempered
T 980 condition: thickness < 8 mm
T 1080 condition: thickness ≥ 8 mm

	1,5	2	2,5	3	3,5	4	5	6	8	9	10
1000 x 2000	●	●	●	●	●	●	●	●	●	●	●

Rolled sheets, annealed

	1	1,5	2	2,5	3	4	5	6	8	9	10	12	15	20	30	40	50
1000 x 2000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 197 HB
Capability test TH 965/985°C + Ru 620/630°C:

MPa	MPa	%	DaJ/cm²	HB
1080-1280	≥ 930	≥ 10	≥ 8	325-380

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 197 HB
Capability test TH 965/985°C + Ru 620/630°C:

20	25	30	35	40	50	60	65	70	80	90	100	110	120	130	140
150	160	180	200	220	240	300	350	400							

Hot rolled bars, hardened and tempered, peeled: T 1080
Condition as supplied TH 965/985°C + Ru 600/630°C
Length: 3.6-4 m

MPa	MPa	%	HB
1080-1280	≥ 930	≥ 10	325-380

Hot rolled bars, hardened and tempered, peeled: T 1080
Condition as supplied TH 965/985°C + Ru 600/630°C
Length: 3.6-4 m

45	50	60	70

Hot rolled bars, hardened and tempered, centerless ground h10: T 980
Condition as supplied TH 965/985°C + Ru 620/650°C
Length: 3-3.2 m

MPa	MPa	%	HB
980-1180	≥ 780	≥ 12	291-350

15 CDV 6

Hot rolled bars, hardened and tempered, centerless ground h10: T 980
Condition as supplied TH 965/985°C + Ru 620/650°C
Length: 3-3.2 m

6	8	10	12	14	16

Hot rolled bars, hardened and tempered, gauged h10: T 1080
Condition as supplied TH 965/985°C + Ru 600/630°C
Length: 3-3.2 m

MPa	MPa	%	HB
1080-1280	≥ 930	≥ 10	325-380

Hot rolled bars, hardened and tempered, gauged h10: T 1080
Condition as supplied TH 965/985°C + Ru 600/630°C
Length: 3-3.2 m

20	25	30	36	40

16 NCD 13 / E 16 NCD 13

Delivery Specifications

AIR 9160 C
ASNA 3122
ECS 2136
CCT LA 304
CCT LA 140
Further specifications on request (LW, Pr EN,....)

Other designations

France : AIR-ASNA-CCT
Euronorm : Fe PL 71

Applications areas

Security components for aerospace. Highly stressed structural components used in the carburized or non-carburized condition (in power transmission, e.g. gears, shafts, hubs).

Steel properties

Low alloy Ni Cr Mo carburizing case-hardenable steel. In the carburized condition, its high case hardness is combined with desirable impact and fracture toughness characteristics in the core.

Available stock

Electro-slag remelted bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 241 HB
Capability test TH 815/835°C + Ru 185/195°C:

MPa	MPa	%	DaJ/cm²	HB
1180-1380	≥ 980	≥ 8	≥ 6	340-410

Electro-slag remelted bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 241 HB
Capability test TH 815/835°C + Ru 185/195°C:

65	110	140

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 241 HB
Capability test TH 815/835°C + Ru 185/195°C:

MPa	MPa	%	DaJ/cm²	HB
1180-1380	≥ 980	≥ 8	≥ 6	340-410

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 241 HB
Capability test TH 815/835°C + Ru 185/195°C:

20	25	30	35	40	45	50	55	60	65	70	75	80	90	100	110
120	130	150	160	180	200	220									

30 NCD 16

Delivery Specifications

AIR 9160 C
ASNA 3130 / 3194
CCT LA 306
Pr EN 2137
Further specifications on request (LW,....).

Other designations

France : AIR-ASNA-CCT
Euronorm : Fe PL 2107

Applications areas

Highly stressed structural parts and security components for aerospace.

Steel properties

Low alloy Ni Cr Mo steel with desirable strength and toughness.
Excellent behaviour to fatigue and repeated impacts.

Available stock

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 270 HB
Capability test TH 840/860°C + Ru 580/590°C:

MPa	MPa	%	DaJ/cm²	HB
1100-1230	≥ 900	≥ 10	≥ 7	325-360

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 270 HB
Capability test TH 840/860°C + Ru 580/590°C:

40	45	50	60	70	80	90	100	110	120	130	140	150	160	180	200
250															

Hot rolled bars, hardened and tempered, peeled: T 1100
Condition as supplied TH 840/860°C + Ru ≥ 580°C
Length: 3.6-4 m

MPa	MPa	%	HB
1100-1230	≥ 900	≥ 10	325-360

Hot rolled bars, hardened and tempered, peeled: T 1100
Condition as supplied TH 840/860°C + Ru ≥ 580°C
Length: 3.6-4 m

20	22	25	28	30	32	35	40	45	50	55	60	65	70	80	90
100															

Hot rolled bars, hardened and tempered, gauged h10: T 1100
Condition as supplied TH 840/860°C + Ru ≥ 580°C
Length: 3-3.2 m

MPa	MPa	%	HB
1100-1230	≥ 900	≥ 10	325-360

Hot rolled bars, hardened and tempered, gauged h10: T 1100
Condition as supplied TH 840/860°C + Ru ≥ 580°C
Length: 3-3.2 m

8	10	12	14	16	18										

35 NC 6

Delivery Specifications

AIR 9160 C
ASNA 3131 / 3132 / 3195
CCT LA 307
Pr EN 2438
Further specifications on request (LW,....).

Other designations

France : AIR-ASNA-CCT
Euronorm : Fe PL 2102

Applications areas

Medium weight structural components for aerospace (shafts, gears,....). Screws and bolts for aerospace.

Steel properties

Low alloy Ni Cr steel with very good mechanical properties
despite a limited hardenability (compared to that of alloy steels 30 NCD 16 or 35 NCD 16).

Available stock

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 223 HB
Capability test TH 840/860°C + Ru 570/580°C:

MPa	MPa	%	DaJ/cm²	HB
900-1100	≥ 750	≥ 14	≥ 7	267-324

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 223 HB
Capability test TH 840/860°C + Ru 570/580°C:

40	45	50	60	70	80	95	100	110	125	140	160	180	200	225	250

Hot rolled bars, hardened and tempered: T 900
Condition as supplied TH 840/860°C + Ru ≥ 550°C
Length: 3.6-4 m

MPa	MPa	%	HB
900-1100	≥ 750	≥ 14	267-324

Hot rolled bars, hardened and tempered: T 900
Condition as supplied TH 840/860°C + Ru ≥ 550°C
Length: 3.6-4 m

20	25	30	32	35	40

Hot rolled bars, hardened and tempered, peeled: T 780
Condition as supplied TH 840/860°C + Ru ≥ 580°C
Length: 3.6-4 m

MPa	MPa	%	HB
780-980	≥ 640	≥ 15	232-291

Hot rolled bars, hardened and tempered, peeled: T 780
Condition as supplied TH 840/860°C + Ru ≥ 580°C
Length: 3.6-4 m

45	50	55	60	65	70	80	90	100

35 NC 6

Hot rolled bars, hardened and tempered, gauged h10: T 900
Condition as supplied TH 840/860°C + Ru ≥ 550°C
Length: 3-3.2 m

MPa	MPa	%	HB
900-1100	≥ 750	≥ 14	267-324

Hot rolled bars, hardened and tempered, gauged h10: T 900
Condition as supplied TH 840/860°C + Ru ≥ 550°C
Length: 3-3.2 m

6	8	10	12	14	16	18	20	22	25	28	30	35	40

35 NCD 16

Delivery Specifications

AIR 9160 C
ASNA 3133 / 3134
CCT LA 309
Pr EN 2480
Further specifications on request (LW,....).

Other designations

France : AIR-ASNA-CCT
Euronorm : Fe PL 2108

Applications areas

Structural components for aerospace subject to high stress levels. Parts with complex shapes.

Steel properties

Low alloy Ni Cr Mo steel with high through hardenability combined with very low deformation during quenching. High wear resistance when used in the maximum hardness zone (reached after annealing at low temperatures, i.e. below 250°C).

Available stock

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 295 HB

MPa	MPa	%	DaJ/cm²	HRc
1760-2010	≥ 1420	≥ 6	≥ 3	48

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 295 HB

MPa	MPa	%	DaJ/cm²	HB
1230-1380	≥ 1030	≥ 8	≥ 5	363-415

Hot rolled or forged bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 295 HB

20	25	30	35	40	45	50	60	70	80	90	100	110	120	140	150
160	180	200	250												

Hot rolled bars, hardened and tempered, peeled: T 1230
Condition as supplied TA 865/885 °C + Ru 550/580 °C
Length: 3.6-4 m

MPa	MPa	%	HB
1230-1380	≥ 1030	≥ 8	363-415

Hot rolled bars, hardened and tempered, peeled: T 1230
Condition as supplied TA 865/885 °C + Ru 550/580 °C
Length: 3.6-4 m

20	22	25	28	30	32	35	36	40	45	50	55	60	63	70	75

Stainless steels.

Z 7 CNU 16-04

AISI: 630 (17-4 PH)

Delivery Specifications

AMS 5643
DMD 229-20
NACE MR 0175 (H1150 condition)
ASTM A 564 / NF EN 10088-3 (X 5 Cr Ni Cu Nb 16-4)
Further specifications on request (LW, NFS....).

Other designations

Euronorm : X 5 Cr Ni Cu Nb 16-4

Applications areas

Aerospace (aircraft fittings, fasteners, missiles and jet engine parts). Oilfield engineering (valve parts, pump shafts, probes,....). Agri-business and paper mill equipments. Instruments. Surgical and orthopedic ancillary equipments.

Steel properties

Age-hardening martensitic stainless steel offering high strength and hardness along with good corrosion resistance (comparable to that of 304 type stainless steels).
This steel has to be used in the age-hardened condition.Three aged conditions are available on stock meeting the requirements of aerospace and oilfield engineering (double temper according to NACE MR 0175), i.e. H1150 condition (temper at 620°C = 1150°F), H1025 condition (temper at 550°C = 1025°F) and H1075 (temper at 580°C = 1075°F).
Starting from solution treated stock material (A condition), different strength levels may be obtained after age-hardening on rough machined parts, depending on the aging temperature used. For example, this steel can be hardened up to 40-46 HRC by heating solution treated material to a temperature of 480°C for one hour (H900 condition).

Chemical composition

in %

≤ 0,07	15,0-17,0	3,0-5,0	3,0-5,0	0,15-0,45

Mechanical properties

condition as supplied, solution annealed

0,00-0,00	0,00-0,00

Condition as supplied, aged

	MPa	MPa	%	J
H1150	930-1100	= 725	= 16	= 41
H1025	1070-1270	= 1000	= 12	= 20
H1075	= 1000	= 862	= 13	= 30

Traitement thermique

Recuit de mise en solution	1020-1050 °C
Conditions de refroidissement	Huile, air pulsé
Durcissement structural	480-620 °C / 1 h - 4 h
Conditions de refroidissement	Air

Available stock

Hot rolled bars, age-hardened, peeled
H1075 condition
Length: 3.6-4 m

25	60	90	102	120

Z 7 CNU 16-04

AISI: 630 (17-4 PH)

Hot rolled or forged bars, peeled or turned:
Solution annealed (A condition)
Length: 3.6-4 m

5	6,5	8	10	12	14	15	16	18	20	22	25	30	35	40	45
50	55	60	65	70	75	80	90	100	110	120	140	150	160	180	200
220	240	260	300												

E-Z 5 CNU 15-05

AISI: XM 12 (15-5 PH ESR)

Delivery Specifications

AMS 5659
ASTM A 564 / Pr EN 2817
Further specifications on request (NF EN/FDA, ASNA, LW,....).

Other designations

Euronorm : Fe PM 3802

Applications areas

Mainly aircraft and military industries: aircraft and missile structural components (actuators body, jet engine and structure parts,....). Other applications similar to those of 17-4 PH requiring high transverse mechanical properties.

Steel properties

Remelted precipitation hardening martensitic stainless steel. 15-5 PH is to be considered as a compositional modification of 17-4 PH with minimal delta ferrite (close to 0). Remelting provides superior cleanliness. This results in optimum transverse properties, i.e. toughness and ductility.
Longitudinal mechanical properties and corrosion resistance comparable to 17-4 PH. 15-5 PH has a higher degree of forgeability.
This alloy is supplied in the aged H1025 condition (temper at 550°C = 1025°F) or solution annealed.

Chemical composition

in %

≤ 0,07	14,0-15,5	3,5-5,5	2,5-4,5	0,15-0,45

Mechanical properties

mm	MPa	MPa	%	J
< 75	1070-1200	≥ 1000	≥ 12	≥ 80
≥ 75	1070-1200	≥ 1000	≥ 8 (T)	≥ 56 (T)

Available stock

Flat bars

75			●																		
85					●																
100		●					●														

Hot rolled bars, solution annealed, peeled
A condition
Length: 3.6-4 m

70	115	120	241																		

Hot rolled bars, age-hardened, centerless ground h10
H1025 condition
Length: 3.6-4 m

10	12	15	18	20																	

Hot rolled bars, age-hardened, peeled
H1025 condition
Length: 3.6-4 m

22	25	30	35	40	45	50	55	60	65	70	75	80	90	100	110						
120	130	140	150	160	180	200	220	240													

Z 8 CND 17-04

AISI: F 15 NM

Delivery Specifications

AIR 9160 C
ASNA 6099
NF EN 10088-3 (X 4 Cr Ni Mo 16-5-1)
GAM MM02
Further specifications on request (LW, Pr EN,....).

Other designations

France : AIR-ASNA
Euronorm : X 4 Cr Ni Mo 16-5-1

Applications areas

Welded or non-welded components subject to mechanical stresses and corrosion for aerospace or military applications. Used in various fields such as chemical or oilfield engineering (parts subject to corrosion by sea water) and power generation: components for pumps, bolts (ties,....).

Steel properties

Martensitic stainless steel with high corrosion resistance combined with high strength and toughness levels. Excellent fatigue properties.
Corrosion resistance level between that of 13% chrome martensitic and 304 type stainless steels. Excellent corrosion resistance in sea water, good resistance to organic acids (after a fine finish-machining). At equivalent strength, this steel has a better ductility and toughness compared to grade Z 15 CN 17-03, in particular at low temperatures. Besides, it can be easily welded.

Chemical composition

in %

≤ 0,10	15,0-17,0	3,5-5,0	0,8-1,5

Mechanical properties

mm	MPa	MPa	%	J	J
Ø ≤ 75	900-1050	≥ 700	≥ 16	≥ 120	≥ 80
75 < Ø ≤ 150	900-1050	≥ 700	≥ 12	≥ 80 (T)	≥ 40 (T)

Available stock

Hot rolled bars, hardened and tempered, peeled (or pickled for Ø ≤ 18 mm): T 900
Condition as supplied TH 1020/1030 °C + Ru 580/600 °C
Length: 3.6-4 m

10	12	15	16	18	20	22	25	28	30	35	40	45	50	55	60
70	80	90	100	110	120	130	140	150	160	170	180	200	230	250	

Z 15 CN 17-03

AISI: 431

Delivery Specifications

AIR 9160 C
ASNA 3138 / 3299
BS 6 S 80 / 5 S 100
Pr EN 3490
NF EN 10088-3 (X 17 Cr Ni 16-2)
Further specifications on request (LW, DMD,....).

Other designations

France : AIR-ASNA
Euronorm : X 17 Cr Ni 16-2

Applications areas

Components for aerospace or military applications subject to high stresses and corrosion. Used in various fields such as chemical or oilfield engineering and power generation: pumps, gates....

Steel properties

Martensitic stainless steel with high-strength properties combined with good corrosion resistance after fine finish-machining in the following media: marine environment, sea water, steam (up to 350°C), exhaust gases, organic acids,....
Corrosion resistance level between that of 13% chrome martensitic and 304 type stainless steels.
Good behaviour in rolling fatigue conditions.
For the manufacture of welded equipments, the grade Z 8 CND 17-04 shall be used.

Chemical composition

in %

0,12-0,2	15,0-18,0	2,0-3,0

Available stock

Hot rolled bars, hardened and tempered, gauged h10: T 900
Condition as supplied TH 1000/1030°C + Ru 600/620°C
Length: 3-3.2 m

MPa	MPa	%	HB
900-1080	≥ 690	≥ 12	269-326

Hot rolled bars, hardened and tempered, gauged h10: T 900
Condition as supplied TH 1000/1030°C + Ru 600/620°C
Length: 3-3.2 m

5	6	8	10	12	14	15	16	18	20	22	24	25	28	30	35
40															

Hot rolled bars, hardened and tempered, peeled: T 900
Condition as supplied TH 1000/1030°C + Ru 600/620°C
Length: 3.6-4 m

MPa	MPa	%	HB
900-1080	≥ 690	≥ 12	269-326

Hot rolled bars, hardened and tempered, peeled: T 900
Condition as supplied TH 1000/1030°C + Ru 600/620°C
Length: 3.6-4 m

20	25	30	35	40	45	50	55	60	65	70	80	90	100	120	140
150	170														

Hot rolled bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 248 HB
Capability test TH 1000/1030°C + Ru 600/620°C

MPa	MPa	%	HB
900-1080	≥ 690	≥ 12	269-326

Z 15 CN 17-03

AISI: 431

Hot rolled bars, annealed, peeled
Length: 3.6-4 m
Condition as supplied: hardness ≤ 248 HB
Capability test TH 1000/1030°C + Ru 600/620°C

110	125	160	200												

Z 100 CD 17

AISI: 440 C

Delivery Specifications

AIR 9160 C / 0819 classe 3
AMS 5618 / 5630 / 5880 - QQS 763
Pr EN 2030
ASTM A 756 / NF EN 10088-3 (X 105 Cr Mo 17)
Further specifications on request (LW, BS,....).

Other designations

France : AIR-ASNA
Euronorm : X 105 Cr Mo 17

Applications areas

Aerospace and military applications. Pump and valve parts subject to wear. Bearing components, guiding parts. Surgery instruments.

Steel properties

Bearing quality martensitic stainless steel combining the high-carbon grade wear resistance with a good corrosion behaviour after a fine finish-machining in the following media: water, steam, crude oil, weak acids, food stuffs. The optimum wear resistance and corrosion behaviour are achieved for the maximum hardness (in the range 57-59 HRC after hardening and tempering at low temperatures) but this alloy may be used with good results at operating temperatures up to 500°C. Recommended in many applications for stressed parts subject to rolling fatigue conditions and subject to corrosive actions or operating at elevated temperatures. We can deliver two versions: air melted or vacuum remelted.

Chemical composition

in %

0,95-1,10	16,0-18,0	0,40-0,65

Mechanical properties

condition as supplied, globular anneal

0,00-0,00	0,00-0,00

capability test

0,00-0,00	0,00-0,00

Available stock

Hot rolled bars, annealed, centerless ground h10
Length: 3-3.2 m

10	12	15	18	20							

Hot rolled bars, annealed, peeled
Length: 3.6-4 m

25	30	35	40	45	130						

Z 10 CNT 18-11

AISI: 321

Delivery Specifications

AIR 9160 C
ASNA 3139 / 3202
DMD 276-22
Pr EN 3487 / NF EN 10088-3 (X 6 Cr Ni Ti 18-10)
AMS 5645
Further specifications on request (LW, BS, QQS, CCT,....).

Other designations

France : AIR-ASNA-DMD
Euronorm : X 6 Cr Ni Ti 18-10

Applications areas

Various components used for fluid transportation and hydraulic circuits for aerospace and military applications (connecting sleeves, flanges, welded assemblies,....).

Steel properties

Ti-stabilized austenitic stainless steel resisting to intergranular corrosion up to 400°C. Excellent resistance to corrosion and oxidation up to 800°C.

Chemical composition

in %

≤ 0,08	17,0-19,0	10,0-12,0	5 x % C - 0,80

Mechanical properties

MPa	MPa	%
490-690	≥ 220	≥ 40

Available stock

Cold rolled sheets, pickled
Specifications: WL 1.4544.9 / AMS 5510 / ASNA 3106
DMD 276-23 / CCT LA 371 / BS 5526 / Pr EN 3488

	0,5	0,6	0,8	1	1,2	1,5	2	2,5	3
1000 x 2000	●	●	●	●	●	●	●	●	●

Hot rolled bars, solution annealed, centerless ground h10
Length: 3-3.2 m

6	8	10	12	13	14	15	16	18	20	22	24	25	28	30	32

Hot rolled bars, solution annealed, peeled
Length: 3.6-4 m

35	40	45	50	55	60	65	70	75	80	90	100	110	120	130	140
150	160	180	200	230											

E-Z 6 NCT 25

AISI: 660 (A 286)

Delivery Specifications

ASNA 3142
DMD 274-22
AMS 5732 / ASTM A 638 gr. 660
Pr EN 2303
Further specifications on request (LW, ASTM,....)

Other designations

France : ASNA-DMD
Euronorm : X 5 Ni Cr Ti 26-15

Applications areas

Choice-material for aerospace: fasteners, fittings or highly stressed parts for high temperature service in corrosive atmospheres (afterburner parts). Various parts for oilfield engineering (non-magnetic instruments). Cryogenic engineering.

Steel properties

Age-hardening austenitic stainless steel, remelted for high-temperature applications requiring high strength and good corrosion resistance up to 700°C. This alloy offers high ductility in notched sections. This makes it be the candidate for hot working bolts and screws.

Chemical composition

in %

0,03-0,08	24,0-27,0	13,5-16,0	1,0-1,5	1,9-2,3	0,10-0,50	0,003-0,008

Mechanical properties

MPa	MPa	%	HB	J	J
960-1200	≥ 660	≥ 16	≥ 277-341	≥ 50	≥ 43

Traitement thermique

Recuit de mise en solution	970-990 °C
Conditions de refroidissement	Huile, eau
Durcissement structural	700-760 °C / 16 h
Conditions de refroidissement	Air

Available stock

Hot rolled bars, age-hardened, peeled
Length: 3.6-4 m

10	13	15	16	18	20	22	25	30	35	40	45	50	55	60	65
70	75	80	90	100	110	120	150	200							

Aluminium alloys.

2024

Delivery Specifications

AIR9048-9049
ASNA 3351-3010-3011-3012
ABS 5032-5044D-5055-ABM1-6015
ITC/CO/DV/381 - DAN 422
A/DA/SM 999772
EN 2318-2633-2419
NCT 10 235 03 MD
NCT 15 235 06MB-15 235 07MB-15235-03/05/18
AMS 4037-4041-QQA 250/4-QQA 250/3-QQA 250/5
CCT LA 279-CR 1-1-0-36
WL 3.1354 T351
QQA 200/3.

Other designations

France : AIR-ASNA-NCT-EN

Applications areas

Aerospace and military industries

Steel properties

Good machinability. Good chip breakage. Weldability: good with ERW method. Avoid cold forming in hardened condition. Anodising: according to colouring.

Chemical composition

in %

≤ 0,50	≤ 0,50	3,8-4,9	0,30-0,9	1,2-1,8	≤ 0,10	≤ 0,25	< 0,15	≤ 0,20
≤ 0,05			≤ 0,15			Reste		

Mechanical properties

Sheets and plates

	mm	MPa	MPa	% mini
T 3	0,4 ≤ e ≤ 3	≥ 430	≥ 290	14
T 351	6< e ≤ 10	≥ 440	≥ 290	12
	10 < e ≤ 25	≥ 430	≥ 290	12
	25 < e ≤ 40	≥ 430	≥ 300	10
	40 < e ≤ 60	≥ 420	≥ 300	8
	60 < e ≤ 80	≥ 415	≥ 300	7
	80 < e ≤ 100	≥ 420	≥ 310	7
	100 < e ≤ 120	≥ 380	≥ 300	7
	120 < e ≤ 150	≥ 379	≥ 248	4

Extruded bars
T 3 / T 3511 / T 3510 condition

	mm	MPa	MPa	% mini
T3511 / T3510	12 =< Ø ≤ 25	≥ 460	≥ 340	10
	25 < Ø ≤ 75	≥ 460	≥ 350	10
	75 < Ø ≤ 160	≥ 470	≥ 345	10
T3	160 < Ø ≤ 250	≥ 450	≥ 280	9

Physical Properties

k^{-1}	g/cm ^{3}	MPa
$22{,}8.10^{-6}$	2,77	73 000

2024

Available stock

Sheets A30 / T3

	0,8	1	1,2	1,6	2	2,5	3	4	5
1250 x 2500	●	●	●	●	●	●	●	●	●

Alclad sheets A31 / T3

	0,5	0,6	0,8	1	1,2	1,6	2	2,5	3
1250 x 2500	●	●	●	●	●	●	●	●	●

Plates T351

	8	10	12	15	16	20	25	30	32	35	40	45	50	55	60	65	70	75	80	85	90	100	110
1250 x 2500	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ABS5032				●		●	●	●		●	●		●			●							

Extruded bars T3510

30	36	40	50	60	70	80	90	100	110	125	130	140	150	160

	80	85	90	100	110	120
1250 x 2500	●	●	●	●	●	●
ABS5032						

Extruded bars T3511 / T3
Length: 3 m

12	14	16	20	25	28	30	32	36	40	42	45	50	56	60	63
65	70	75	80	85	90	95	100	105	110	120	125	130	140	150	160
170	180	200	225	250	300										

2618 A

Other designations

France : AIR-ASNA

Applications areas

Aerospace and military industries

Steel properties

Welding: good with ERW and brazing methods. Avoid cold forming in hardened condition. Machining: good. Anodising: good (with plate protection).

Chemical composition

in %

0,15-0,25	0,9-1,4	1,8-2,7	≤ 0,25	1,2-1,8	0,8-1,4	≤ 0,15	< 0,20	≤ 0,25

≤ 0,05	≤ 0,15	Reste

Mechanical properties

Rolled
T 851 condition

mm	MPa	MPa	% mini
6 < e ≤ 40	≥ 430	≥ 380	5
40 < e ≤ 80	≥ 420	≥ 380	5
80 < e ≤ 120	≥ 400	≥ 370	4

Extruded bars
T 8511 / T8 condition

	mm	MPa	MPa	% mini
T8511	≤ 180	≥ 415	≥ 350	6
T8	200 < Ø ≤ 250	≥ 380	≥ 320	6

Physical Properties

k $^{-1}$	g/cm ^{3}	MPa
22.10 $^{-6}$	2,76	72 000

Available stock

Plates T851

	8	10	12	16	20	25	30	32	35	40	45	50	55	60	65	70	80	90	100	120	130	140
1250 x 2500	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Extruded bars T8511 / T8
Length: 3 m

16	20	25	30	32	36	40	45	50	56	60	65	70	75	80	85
90	100	110	120	125	130	140	150	160	170	180	200	210	250		

5086

Other designations

France : AIR-ASNA

Applications areas

Aerospace and military industries

Steel properties

Good welding with flame welding, TIG, MIG and ERW methods. Good cold forming in annealed condition. Machining: acceptable. Can be anodised. Very good atmospheric corrosion resistance.

Chemical composition

in %

≤ 0,40	≤ 0,50	≤ 0,10	0,20-0,7	3,5-4,5	0,05-0,25	≤ 0,25	< 0,15

≤ 0,05	≤ 0,15	Reste

Mechanical properties

Rolled
H 111 condition

mm	MPa	MPa	% mini
0,4 ≤ e ≤ 6	≥ 240	≥ 100	16

Physical Properties

k^{-1}	g/cm^3	MPa
$23,5.10^{-6}$	2,65	71 000

Available stock

Sheets A32

	0,5	0,6	0,8	1	1,2	1,6	2	2,5	3
1250 x 2500	●	●	●	●	●	●	●	●	●

Sheets 55A

0,8	1	1,2	1,6	2
●	●	●	●	●

Extruded bars H111
Length: 3 m

12	20	25	30	32	36	40	45	50	60	70	80	90	100	110	120
125	140	150	160	180	220	225									

6061

Other designations

France : AIR-ASNA

Applications areas

Aerospace and military industries

Steel properties

Weldability: good with TIG, MIG ERW and brazing methods. Machining: acceptable. Anodising: good (with plate protection). Very good atmospheric corrosion resistance.

Chemical composition

in %

0,40-0,80	≤ 0,70	0,15-0,40	≤ 0,15	0,8-1,2	0,04-0,35	≤ 0,25	< 0,15

≤ 0,05	≤ 0,15	Reste

Mechanical properties

Extruded Bars
T 6 condition

mm	MPa	MPa	% mini
20 ≤ Ø ≤ 300	≥ 270	≥ 245	8

Physical Properties

k^{-1}	g/cm^3	MPa
$23,6.10^{-6}$	2,70	69 500

Available stock

Extruded bars

20	32	40	50	60	70	80	90	100	110	120	125	130	150	160	180
200	210	220	225	240	260										

7175 / 7075

Other designations

France : AIR-ASNA
Euronorm : 7175

Applications areas

Aerospace and military industries

Steel properties

Welding: good with ERW method. Bad cold forming in hardened condition. Machining: good. Anodising: medium. Atmospheric corrosion resistance: acceptable.

Chemical composition

in %

≤ 0,15	≤ 0,20	1,2-2,0	≤ 0,10	2,1-2,9	0,18-0,28	5,1-6,1	< 0,1

≤ 0,05	≤ 0,15	Reste

Mechanical properties

Rolled plates
T 7351 condition

mm	MPa	MPa	% mini
6 ≤ e ≤ 25	≥ 480	≥ 390	7
25 ≤ e ≤ 40	≥ 470	≥ 390	6
40 < e ≤ 60	≥ 460	≥ 370	6
60 < e ≤ 80	≥ 440	≥ 350	6
80 < e ≤ 100	≥ 430	≥ 340	6

Extruded bars
T 73511 / T 73 condition

	mm	MPa	MPa	% mini
T 73511	20 ≤ Ø ≤ 100	≥ 470	≥ 390	7
	100 < Ø ≤ 180	≥ 430	≥ 350	7
T 73	170 ≤ Ø ≤ 200	≥ 430	≥ 350	7

Physical Properties

k^{-1}	g/cm^3	MPa
$23,6.10^{-6}$	2,80	72 000

Available stock

Plates

	8	10	12	16	20	25	30	32	35	40	45	50	55	60	65	70	75	80	85	90	100	110	140
1250 x 2500	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ABS5064				●	●	●	●	●	●	●	●	●	●	●	●	●							

Extruded bars
F condition

170	230	250	260	275	300	315	355

7050 / 7010

Chemical composition

in %

7010	≤ 0,12	≤ 0,15	1,5 - 2,0	≤ 0,10	2,1 - 2,6	5,7 - 6,7	0,10 - 0,16
7050	≤ 0,12	≤ 0,15	1,5 - 2,6	≤ 0,10	1,9 - 2,6	5,7 - 6,7	0,08 - 0,17

7010	≤ 0,05	≤ 0,15	Reste
7050	≤ 0,05	≤ 0,15	Reste

Mechanical properties

mm	MPa	MPa	% mini
20 ≤ e ≤ 25	≥ 480	≥ 390	7
25 < e ≤ 40	≥ 470	≥ 390	6
40 < e ≤ 50	≥ 460	≥ 370	6
50 < e ≤ 80	≥ 440	≥ 350	6
80 < e ≤ 100	≥ 430	≥ 340	6

Available stock

Plates
7010

	30	40	60	80	100	110	120	150
1250 x 2500	●	●	●	●	●	●	●	●

Copper alloys.

Cu Al 10 Ni 5 Fe 4

Other designations

France : NFL-ASNA

Applications areas

Aerospace: rings, pot type joints.Marine: dispatchers, nuts.

Steel properties

Good mechanical properties. Good marine corrosion resistance. Resistance to oxidation.

Chemical composition

in %

10	5	4	0,5	Reste

Mechanical properties

MPa	MPa	%
≥ 690	≥ 320	≥ 13

Physical Properties

	(20-200 °C)				
W/(m.k)	k^{-1}	g/cm^{3}	MPa	µ O/cm	
0,10	16.10^{-6}	7,6	125 000	22	1,50

Available stock

Hollow bars

mm	mm
82,55	44,45
101,6	50,8
120	50
127	88,9
150	80
150	95
160	130
185	160
203,2	114,3
225,25	139,7
254	171,45

Extruded round bars

16	20	25	30	36	45	50	60	70	80	95	100	110	140

Cu Al 11 Ni 5 Fe 5

Other designations

France : NFL-NCT (MD)

Applications areas

Aerospace: rings, pot type joints, mechanical components.

Steel properties

High mecanical properties. Resistance to oxidation.

Chemical composition

in %

11	5	5	Reste

Mechanical properties

F condition

MPa	MPa	%
≥ 740	≥ 390	≥ 8

TQ 50 condition

mm	MPa	MPa	%
Ø = 25,4	≥931	≥ 690	≥ 6
25,4 < Ø ≤ 50,8	≥ 896	≥ 655	≥ 6
50,8 < Ø ≤ 101,6	≥ 896	≥ 621	≥ 6

Physical Properties

	(20-200 °C)				
W/(m.k)	k^{-1}	g/cm^3	MPa	µ O/cm	
0,10	16.10^{-6}	7,5	125 000	22	1,50

Available stock

Extruded hollow bars

mm	mm
80	50
101	52
110	70
138	75
160	100
220	140
250	200

Extruded round bars A62
TQ 50 condition

25,4	31,75	38,1	44,45	50,8	63,5	76,2	88,9	101,6	114,3

Extruded Round bars A73

76,2	82,55	88,9	110	152	152,4

Cu Ni 3 Si

Other designations

France : NFL-ASNA

Applications areas

Ball bearing housings.Friction rings.

Steel properties

High mechanical properties. Good electrical and thermal properties. Good friction properties.

Chemical composition

in %

2,3	0,6	Reste

Mechanical properties

mm	MPa	MPa	%
Ø ≤ 30	≥ 650	≥ 590	≥ 8
30 < Ø ≤ 60	≥ 650	≥ 500	≥ 12
Ø > 60	≥ 590	≥ 440	≥ 12

Physical Properties

	(20-200 °C)				
W/(m.k)	k^{-1}	g/cm ^{3}	MPa	µ O/cm	
0,42	16.10^{-6}	8,8	130 000	4	1,01

Available stock

Extruded round bars
Hardened and tempered

10	20	30	36	40	50	62	66	71	81	87	102

Cu Ni 14 Al 2

Other designations

France : NFL-ASNA

Applications areas

Components for aerospace: rings, hinges.

Steel properties

High mechanical properties. Good marine corrosion resistance. Non magnetic.

Chemical composition

in %

14	3	0,5	Reste

Mechanical properties

mm ^{2}	MPa	MPa	%
s ≤ 2000	≥ 780	≥ 590	≥ 10
s > 2000	≥ 740	≥ 540	≥ 7

Physical Properties

	(20-200 °C)				
W/(m.k)	k^{-1}	g/cm ^{3}	MPa	µ Ω/cm	
0,08	17.10^{-6}	8,6	145 000	19	< 1,01

Available stock

Extruded round bars
O or H 12 condition

16	20	25	30	50

Cu Sn 8,5 P

Other designations

France : NFL

Applications areas

Components for aerospace: rings, bushes, segments....

Steel properties

High frictional resistance. Hard bronze. High speeds.

Chemical composition

in %

8	0,15	Reste

Mechanical properties

MPa	MPa	%
≥ 440	≥ 290	≥ 25

Physical Properties

	(20-200 °C)			
W/(m.k)	k^{-1}	g/cm^3	MPa	µ O/cm
0,14	17.10^{-6}	8,8	112 000	15

Available stock

Extruded round bars

20	25	30	45	80	130

Cu Be 1,9

Other designations

France : NFL-ASNA

Applications areas

Components for aerospace: brackets, rings, structural wear parts.

Steel properties

Age-hardenable alloy with very high mechanical properties combined with a good thermal conductivity.

Chemical composition

in %

1,8-2	≥ 0,2	Reste

Mechanical properties

mm^2	MPa	MPa	%
s ≤ 3800	≥ 1150	≥ 1000	≥ 4
s > 3800	≥ 1050	≥ 850	≥ 2

Physical Properties

	(20-200 °C)			
W/(m.k)	k^{-1}	g/cm^3	MPa	µ O/cm
0,35	17.10^{-6}	8,3	130 000	6

Available stock

Round bars
Hardened and tempered
Ø < 35 : drawn
Ø ≥ 35 : extruded

25,4	31,75	40	60	70	82,55	120

Cu Zn 19 Al 6

Other designations

France : NFL-ASNA-NCT (MD)

Applications areas

Friction rings. Guiding rings for undercarriages.

Steel properties

High mechanical properties. Good friction properties. Resistance to oxidation.

Chemical composition

in %

18	7	5,5	3,5	Reste

Mechanical properties

mm ^{2}	MPa	MPa	%
s ≤ 2000	≥ 830	≥ 590	≥ 7
s > 2000	≥ 780	≥ 540	≥ 7

Physical Properties

	(20-200 °C)				
W/(m.k)	k^{-1}	g/cm ^{3}	MPa	µ Ω/cm	
0,08	17.10^{-6}	7,6	110 000	28	1,2

Available stock

Hollow bars
Ø ≤ 120 : extruded
Ø > 120 : forged and bored

mm	mm
80	50
90	50
101	52
110	70
138	75
145	100
155	100
172	130
185	115
190	150
210	170

Extruded round bars

25	30	36	40	45	50	55	60	65	80	90	101	120	140

Superalloys.

Alloy 625
UNS: N 06625

Delivery Specifications
AMS 5666
ASTM B 446 Gr. 1
NACE MR 01-75

Other designations
Euronorm : Ni Cr 22 Mo 9 Nb

Applications areas
Aerospace and military applications (navy): components working at high temperatures (heat shields, jet engine, nuclear reactors). Gas turbine engine ducting.

Steel properties
Non-magnetic nickel base alloy with an outstanding corrosion and oxidation resistance. It displays remarkable strength and toughness in the temperature range cryogenic to 1100°C primarily because of the solid solution strengthening of columbium and molybdenum in a nickel-chrome matrix. Excellent fatigue strength and stress-corrosion cracking resistance to chloride ions.

Chemical composition
in %

Bal	20,0-23,0	8,0-10,0	3,15-4,15	≤ 1,00	≤ 0,10

Mechanical properties

MPa	MPa	%
≥ 830	≥ 420	≥ 30

Available stock
Hot rolled or forged bars, annealed, peeled
Length: 3-4 m

20	25	30	35	40	50	60	80	90	100	130

Alloy 718
UNS: N 07718

Other designations

France : NC 19 Fe Nb - DMD
Germany : 2.4668 / Ni Cr 19 Nb Mo
Euronorm : Ni Cr 19 Nb Mo

Applications areas

Aerospace (high-temperature working components, fasteners....). Naval industry (shafts, rods). Drilling equipments for natural gas wells. Discs, hubs, shafts, flanges, springs and spacing elements used at high and low temperatures. Hot working tools.

Steel properties

Non-magnetic precipitation hardenable nickel-base alloy with a unique combination of high-temperature corrosion resistance and exceptional mechanical properties at high and cryogenic temperatures (high ductility, very high resistance to alternating dynamic stresses). The alloy is processed by vacuum induction melting followed by consumable electrode remelting assuring extremely low gas content, improved homogeneity and superior cleanliness. Alloy 718 keeps high strength up to 650/700°C, therefore it may be a good material choice for some hot working tool applications (header dies, bottom dies, forging machine mandrels).

Chemical composition

in %

50,0-55,0	17,0-21,0	4,75-5,50	2,80-3,30	0,65-1,15	0,20-0,80	≤ 1,0	≤ 0,006	≤ 0,08
Bal								

Mechanical properties

MPa	MPa	%
≥ 1275	≥ 1050	≥ 15

Traitement thermique

Recuit de mise en solution	940-1010 °C
Conditions de refroidissement	Air
Durcissement structural	720 °C / 8 h - refroidissement lent50 °C / h - 620 °C / 8 h / air

Transformation

Difficult welding however its weldability is good when compared to the nickel-base superalloys hardened by aluminium and titanium. Please contact us.

Available stock

Hot rolled or forged bars, peeled
Condition: solution annealed
Length: 3-4 m

16	18	20	25	30	35	40	45	50	60	70	80	90	100	110	122
140															

TK ALLOY 36

Other designations

France : Fe Ni 36

Applications areas

Laser technology, measuring devices, tools and molds (in particular in the aerospace).

Steel properties

Iron-nickel alloy with extremely low coefficient of thermal expansion from cryogenic temperatures to about 260 °C (500 °F).

Chemical composition

in %

35-37	≤ 0,2	≤ 0,5	≤ 0,35	≤ 0,2	≤ 0,03	Bal

Mechanical properties

°C	MPa	MPa	%
20	490	270	40
100	435	180	45
200	430	115	45
300	410	95	50
400	350	90	55
500	290	90	60
600	210	75	70

Transformation

Similar to other nickel alloys, TK ALLOY 36 can be welded by all type of conventional process, preferably the TIG (GTAW) method. Please contact us.

Available stock

Hot rolled plates, annealed, pickled

	6,35	9,52	12,7	15	20	25	45	155
1070 x 2790								●
1500 x 3000							●	
2000 x 4000				●				
2500 x 8000	●	●	●	●	●	●		

Titanium alloys.

TA 6 V / Ti 6 Al 4 V

ASTM: grade 5 / UNS R 56400

Delivery Specifications

AIR 9183 - ASNA 3307/3304 - DMD 776-24-25
AMS 4928/4911 - MIL T 9047/9046
BS 2 TA 11 / 2 TA 12 / TA 56
WL 3.7164.1
Pr EN 3311/3456
Further specifications on request (ASTM, GAMM,....).

Other designations

France : AIR-ASNA-DMD

Applications areas

Aerospace and military applications.
Product is intended for non-critical load carrying applications.

Steel properties

Double vacuum arc melted 6 Al 4 V titanium alloy exhibiting good strength and toughness, excellent fatigue strength and good creep resistance up to approx. 300°C. The particular aluminium-vanadium balance provides this alloy attractive strength in the annealed condition (above 900 MPa). Age-hardening may be carried out using rapid cooling rates from the solution temperature range, i.e. below the transus (solution treating) followed by a single age step. For applications requiring the very highest toughness or operating at cryogenic temperatures, lower oxygen levels are recommended. This means using 6 Al 4 V ELI titanium instead of the standard grade. Compared to aircraft quality 6 Al 4 V, ELI provides significantly higher toughness at some sacrifice in strength.

Chemical composition

in %

5,5-6,75	3,5-4,5	≤ 0,30	≤ 0,20	≤ 0,05	≤ 0,0125	≤ 0,08	Bal

Mechanical properties

MPa	MPa	%
900-1160*	≥ 830*	≥ 10*

Traitement thermique

Température de recuit	700-790 °C / 1 h min.
Conditions de refroidissement	Air
Température de trempe	30°C à 100°Cen-dessous du transus
Conditions de refroidissement	Trempe eau immédiate
Durcissement structural	480-590 °C / 1-24 h

Available stock

Hot rolled plates, annealed, flattened, pickled

	4	5	6	6,35 (1/4")	8	10	12,7 (1/2")	15,88 (5/8")	20	25,4 (1")	30	35	38,1	45
1220 x 3048	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Hot rolled or forged bars, annealed, peeled
Length: 3-4 m

15	18	20	25	26	28	30	35	36,5	40	45	50	55	60	65	70
75	80	90	100	110	120	130	140	150	160	180	200	230			

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