

NALCO Products

Opening International Horizons for a Progressive Nation



National Aluminium Company limited

A Navratna CPSE

A Government of India Enterprise



OVERVIEW

Incorporated in 1981, as a central public sector enterprise, National Aluminium Company Limited (NALCO) is India's largest integrated alumina-aluminium complex, comprising bauxite mining, alumina refining, aluminium smelting & casting, power generation, rail and port facilities.

Being one of the largest exporters of aluminium metal & having international customer base, NALCO is recognized as a 'Navratna Company' under the Ministry of Mines, Government of India.

The capacity of operating units :

UNIT	CAPACITY
Bauxite Mines	68,25,000 MT
Alumina Refinery	22,75,000 MT
Aluminium Smelter	4,60,000 MT
Captive Power Plant	1200 MW
Wind Power Plant-I	50.4 MW
Wind Power Plant-II	47.6 MW
Wind Power Plant-III	50.0 MW
Wind Power Plant-IV	50.4 MW
Roof top Solar Power System	310 KWp

BAUXITE MINES

On Panchpatmali hills of Koraput district in Odisha, a fully mechanized opencast mine of 68,25,000 tpa, serves feedstock to Alumina Refinery located downhill, through a 14.6 km long single-flight multi-curve variable speed cable belt conveyor. NALCO's bauxite mining is considered as one of the most sophisticated and eco-friendly mining operations to be found worldwide. Panchpatmali Bauxite Mines is ranked No. 1 among the lowest-cost producers of bauxite in the world according to the Wood Mackenzie Report.



ALUMINA REFINERY

Ranked No.1 among the lowest cost producers of alumina according to the Wood Mackenzie Report, the 22,75,000tpa Alumina Refinery at Damanjodi, Koraput, utilizes time-tested Bayer Process technology of atmospheric pressure digestion. After meeting the consumption needs of the Company's



Smelter, the balance quantity of alumina goes to international markets through Visakhapatnam Port.

ALUMINIUM SMELTER

At Angul in Odisha, the 4,60,000tpa capacity Aluminium Smelter is based on energy-efficient state-of-the-art technology of smelting and pollution control. The Smelter comprises four potlines with 240 electrolytic pot cells in each, along with integrated facilities for casting of ingots, sows, billets, strips, wire rods and rolled products.

CAPTIVE POWER PLANT



Close to the Aluminium Smelter, a Captive Power Plant has been established to feed the Smelter. The capacity of power plant has been increased to 1200 MW. The coal demand of the Plant is met from a dedicated mine of Mahanadi Coalfields Limited. The Plant is also connected with the State Grid for sale of surplus power.



WIND & SOLAR POWER

Nalco has diversified into wind power with the commissioning of a 50.4 MW wind power plant at Gandikota, Andhra Pradesh in Dec'12. The 2nd Wind Power Plant of 47.6 MW at Jaisalmer, Rajasthan was commissioned in Jan'14. Growing further in enhancing its renewable energy portfolio, a 50 MW Wind Power Plant in Jaisalmer, Rajasthan & 50.4 MW Wind Power Plant at Sangli, Maharashtra was commissioned in FY 2016-17. The Total Wind Power Plant in Operation is 198 MW.



The Company has also utilised the available roof top space in Corporate Office, township, Research centre, training centre at Bhubaneswar for setting up of 310 kWp solar power plants.

PORT & RAIL OPERATIONS

On the inner harbour of Visakhapatnam Port, on the Bay of Bengal, NALCO has mechanized storage and ship handling facilities for export of alumina and aluminium as well as import of caustic soda lye and other raw materials. With storage facility up to 75,000 tonnes and ship-loading rate of 2200 tonnes per hour, this gateway to overseas market can reliably handle export of about one million tonnes of alumina per annum. Besides, NALCO also exports from ports of Paradeep and Kolkata.

NALCO also operates own locomotives and wagons for surface transportation of finished goods and raw materials.



PRODUCT PROFILE

Registered with London Metal Exchange, NALCO products enjoy worldwide reputation on account of their quality, reliability in shipment, backed by high standard customer service. NALCO is among the most advanced manufacturing units in the world and its products are sold in more than 20 countries.



INGOTS/SOWS/T-INGOTS

General Composition

*LME Grade-99.7% (min.) (IE07/SE07/IT07)	*LME Grade Primary Aluminium conforming to PI020A LME specifications.
EC Grade-99.5% (min.)	For fabrication of electrical conductors, casting and other applications. Generally conforming to IS-4026

*Ingots with Fe/Si ratio adjustment for electrical conductors can be produced on specific requirement.

Typical Composition

Elements %	LME HIGH GRADE	IS-4026-1987 EC GRADE
Al	99.70 (based on 100-(%Si+%Fe+%V+%Ga+%Zn))	99.5 min.
Fe	0.20 max.	0.35 max.
Si	0.10 max.	0.15 max.
Zn	0.03 max.	-
(Ti+V)	-	0.02 max.
Ga	0.04 max.	-
V	0.03 max.	-
Other Elements	% of other each element < 0.03	-
Other's total	<0.10 max. excluding Si, Fe, T, V, Ga & Zn	-

Availability

- Each Standard Ingot weighs 20/18.5/22.5 kgs. (approx.). 49/44 pcs. of Ingots are strapped together to form a bundle of 1 tonne (approx.).
- Each Sow Ingot weighs maximum 750 kgs.
- Each T-Ingot weighs 650 kgs ±62kgs. (1075 mm x 850 mm x 350 mm)

ALLOY INGOTS

Product Code	Si %	Fe %	Mg %	Cu %	Alloy Equivalent
IA 10	9 - 11.5	1 max.	0.3 max.	0.7 - 2.5	LM 2
IA 20	4 - 6	0.8 max.	0.15 max.	2 - 4	LM 4
IA 30	10 - 13	0.6 max.	0.1 max.	0.1 max.	LM 6
IA 40	8 - 9.5	1 max.	0.3 max.	3 - 4	LM 24
IA 50	11 - 12.5	0.5 - 0.7	0.05 max.	1.9 - 2.5	Al - Si 132
IA 70	10.5 - 12	1.3 max.	0.3 max.	1.5 - 3.5	ADC 12

Availability

Each Alloy Ingot weighs 10 kgs. and 57 pcs. of Ingots are strapped together to form a bundle.



WIRE RODS

Hot rolled rods, manufactured from furnace processed aluminium by Properzi Continuous Casting and Rolling process, are available in normal dia of 9.5 / 11.95 mm in coil forms.

Coil Dimensions & Weight

ID	: 760 mm
OD	: 1520 mm
Height	: 850 mm
Weight	: 2000 kgs. (approx.)

Specifications

Product (Code)	: Electrical Conductivity % IACS
EC Wire Rod (WE 10/12)	: > 61.500
EC Wire Rod (WE 20/22)	: 61.00 to 61.499
CG Wire Rod (WC 10/12)	: < 61.000


Flipped wire rod coils are also available in normal rod dia of 9.5 mm / 11.95 mm in coil form in steel cage, weighing 1200-1400 kgs. These coils have wide applications in Steel Plants.



ALUMINIUM BILLETS


Nalco has 30,000 tpy Airslip/ Maxi Cast Billet Casting facility. The world-class billet casting technology provides distinct advantages in production of superior quality DC Cast Aluminium Billets in soft and hard alloys - the basic input for manufacture of high-quality extrusions.

Specifications

Elements %	CH 10*	CH90	CH 05*	CH 82*	CH 61	CH91
Si	0.38 to 0.48	0.40 To 0.45	0.60 to 1.0	0.70 to 1.3	0.40 to 0.80	0.40 To 0.48
Fe	0.10 to 0.20	0.15 To 0.18	0.35 max.	0.50 max.	0.70 max	0.10 To 0.30
Cu	0.02 max.	0.02 max	0.10 max.	-	0.15 to 0.40	0.02 max
Mn	0.03 max.	0.01 To 0.05	0.10 max.	0.40 to 1.0	0.01 To 0.05	0.05 max
Mg	0.47 to 0.57	0.40 To 0.45	0.45 to 0.80	0.60 to 1.2	0.08 to 1.20	0.47 To 0.57
Zn	0.03 max.	0.03 max	0.10 max.	-	0.25 max	0.03 max
Ti	0.02 max.	0.03 max	0.10 max.	-	0.15 max	0.02 max
Cr	0.03 max.	0.03 max	0.10 max.	-	0.04 to 0.35	0.03 max
Sr	-	-	-	-	-	0.05 max
Other Imp. Each	0.03 max.	0.03 max	0.05 max.	-	0.05 max	-
Other Imp. Total	0.10 max.	0.1 max	0.15 max.	-	0.15 max	-
* CH - Cut Homogenized						
DIAMETER	127 mm ± 1.5 mm	178 mm ± 1.5 mm				
	152 mm ± 1.5 mm	203 mm ± 1.5 mm				
	229 mm ± 1.5 mm	254 mm ± 1.5 mm				
LENGTH	400 mm to 5800 mm with a tolerance of ± 5 mm for every 1000 mm length or part thereof					
SQUARENESS	1 mm max. per 100 mm diameter					
BOW	2 mm per meter with 10 mm max. per log					

FLAT ROLLED PRODUCTS*


STANDARD COIL

Alloy & Product Code	AA1050 - RC10 AA1100 - RC11 AA1200 - RC12 AA3003 - RC03 AA3105 - RC31	
Thickness	0.30 mm to 3.00 mm	
Width	305 - 1600 mm for AA 1xxx, 8xxx, 3xxx &	
Temper	O, H12, H14, H16, H18, H22, H24, H26, H28	
Tolerances	Thickness : 0.30 mm to 1 mm : ±5%	
	Above 1 mm : ±3%	
	Width : ± 1 mm	
Coil Outside Diameter (OD)	1600 mm (max.)	
Coil Inside Diameter (ID)	300 mm, 400 mm, 500 mm.	
Coil weight	8 MT (max.)	
Cut Edges	Smooth and tear - free edge	
Build up	Straight	

STANDARD SHEET

Alloy & Product Code	AA1050 - RS10 AA1100 - RS11 AA1200 - RS12 AA3003 - RS03 AA3105 - RS31 AA8011 - RS80
Thickness	0.30 mm to 3.00 mm
Width	500 - 1600 mm for AA 1xxx, 8xxx, 3xxx &
Length	1000 mm to 4000 mm
Temper	H12, H14, H16, H18, H22, H24, H26
Tolerances	Thickness : 0.30 mm to 1 mm : ±5%
	Above 1 mm : ±3%
	Width : ±1 mm
	Length : ±1 mm
	Diagonal difference : 1 mm
Stack Weight	2 MT (max.)
Stack Height	400 mm (max.) Plus 150 mm Pallet

STANDARD CHEQUERED SHEET

Alloy & Product Code	AA1050 - RQ10 AA1100 - RQ11 AA1200 - RQ12 AA3003 - RQ03 AA3105 - RQ31 AA8011 - RQ80	
5 Bar Pattern		
Thickness	0.30 mm to 3.00 mm	
Width	700 - 1400 mm	
Length	1000 mm to 4000 mm	
Temper	H12, H14, H16, H18	
Tolerances	Thickness : 0.30 mm to 0.99 mm : ±6%	
	1.0 mm to 1.63 mm : ± 0.10 mm	
	1.64 mm to 2.50 mm : ± 0.12 mm	
	2.51 mm to 3.00 mm : ± 5%	

	Width : Width < 1000 mm : ± 3 mm
	Width > 1001 mm : ± 4 mm
	Length : Length < 1000 mm : ± 3 mm
	Length 1001-2000 mm : ± 4 mm
	Length 2001-3000 mm : ± 5 mm
	Length > 3001 mm : ± 6 mm
Diagonal Tolerance	Length < 1000 mm : = < 6 mm
	Length 1000-2000 mm : = < 8 mm
	Length 2000-3000 mm : = < 10 mm
	Length > 3000 mm : = < 12 mm
Stack Weight	2 MT (max.)
Stack Height	400 mm (max.) Plus 150 mm Pallet
Bend Test	It will be carried out as per IS:737 clause no. 7.2
There may be some residual oil or stain on the sheet surface, unless specially requested.	
* Packing : Sea worthy strong packing suitable for fork-lift handling (for all Rolled Products)	
* Alloys of other grades and closer tolerances are subject to enquiry	

ALUMINA HYDRATE

PRODUCT CODE : AH 10

CHEMICAL FORMULA : Al₂O₃.3H₂O

APPEARANCE : White

Physical Properties	Typical	Maximum
LOI (110 - 1000° C)%	34 - 36	36
Moisture (%)	3 - 6	8
GRANULOMETRY		
-45 Micron (%)	3 - 6	7

Properties	Typical	Min/Max
Al ₂ O ₃ (%)	65 ± 0.5	64.5 min.
Na ₂ O (%) total	0.23 - 0.30	0.33 max.
Na ₂ O (%) soluble	0.015 - 0.025	0.03 max.
SiO ₂ (%)	0.007 - 0.010	0.016 max.
Fe ₂ O ₃ (%)	0.005 - 0.008	0.016 max.
CaO (%)	0.026 - 0.03	0.033 max.
Hydrate (%)	99.0	98.5 min.

CALCINED ALUMINA

PRODUCT CODE : CA 10 / CHEMICAL FORMULA : Al₂O₃

TYPE : Metallurgical Grade (Sandy Type)

Physical Properties	Typical	Range
LOI (300 - 1000° C)%	-	0.5 - 1.0
BET Surface Area (m ² /gm)	-	60 - 80
Alpha Alumina Content %	-	10 max.
GRANULOMETRY:		
+125 Micron (%)	-	15 max.
-45 Micron (%)	10	12 max.
Bulk Density (T/M ³)	-	0.95 - 1.05

Properties	Typical	Limit
Al ₂ O ₃ (%)	98.7	98.5 min.
Na ₂ O (%)	0.38	0.50 max.
Fe ₂ O ₃ (%)	0.01	0.015 max.
SiO ₂ (%)	0.012	0.02 max.
CaO (%)	0.042	0.050 max.
V ₂ O ₅ (%)	0.0015	0.002 max.
ZnO (%)	0.0005	0.0008 max.
TiO ₂ (%)	0.0013	0.004 max.
K ₂ O (%)	0.0015	0.002 max.
Ga ₂ O ₃ (%)	-	0.012 max.
P ₂ O ₅ (%)	0.0015	0.002 max.

Speciality Hydrates :

Speciality hydrates are widely used as a filler material in plastic, rubber, paper, PVC, paint etc. and also in manufacturing several alumina chemicals. These are produced in grades named as: NSPH 5, NSPH 10, NSPH 20, NSPH 25, NSPH 30 etc. These are dry and ground hydrates of different particle sizes for different applications.

NEW PRODUCTS

MECHANIZED SOWS



HIGH SPEED ALLOY BILLETS : (CH 90)

Element	HSA, %	Permissible Range for HSA, %	AA6063, %
Mg	0.45	0.40 - 0.45	0.40 - 0.90
Si	0.45*	0.40 - 0.45	0.30 - 0.70
Fe	0.15	0.15 - 0.18	0.60 max
Mn	0.01	0.01 - 0.05	0.30 max
Al +	Balance	Balance	Balance

*Preferred range 0.42-0.43%

High Speed Alloy (HSA) Billets (CH90):-

Within the range of AA6063 has higher extrudability. Can be safely extruded at 25-30 % higher speed as compared to AA 6063. Also it shows higher strength compared to 6063 alloy on account of its favorable microstructure.

MICROSTRUCTURAL REPORTS OF HSA BILLETS

PARAMETERS(in μm)	NALCO DATA	WAGSTAFF CRITERIA
SHELL ZONE	20 - 35	< 150
GRAIN SIZE	150 - 165	< 180
Avg. SDAS	12 - 14	< 30

Strontium Modified Billets (CH91):-

Within the range of 6060, has higher extrudability, better surface finish and increased homogenization level.

Fan Blade:-

Fan Blade stock Aluminium sheets in alloy AA3105 and AA8011 with temper H16 and thickness from 0.81 mm to 1.10 mm. The above sheets are used for manufacturing of fan blades.



Foil stock :-

Nalco's foil stock is produced from concast coils and it can be rolled to thin gauges of aluminium foil for a number of applications such as in the industry of household, kitchen, adornment, air-conditioner, food packaging and pharmaceutical packaging. The foil stock coils can be supplied in width of 915 to 1250mm in Alloy AA8011 and thickness 0.30mm to 0.50mm.



NALCO WORKS & OFFICES

Regd. & Corporate Office

Nalco Bhawan, P/1, Nayapalli
Bhubaneswar - 751013, India
Phone : 0674 - 2301988 to 2301999
Fax : 0674 - 2300521 / 2300580 / 2301290
Website: www.nalcoindia.com

Mines & Refinery

Damanjodi - 763008, Koraput, Odisha
Phone : 06853 - 254515 / 254550
Fax : 06853 - 254361 / 254251

Smelter Plant

Nalco Nagar - 759145, Angul, Odisha
Phone : 06764 - 220110
Fax : 06764 - 220738 / 220206

Captive Power Plant

Nalco Nagar, Angul - 759145, Odisha
Phone : 06764 - 220158
Fax : 06764 - 220646

Port Facilities

Port Area, Visakhapatnam - 530035
Phone : 0891 - 2561433 / 2561432
E-mail : gmpport@nalcoindia.co.in

Northern Region Delhi

Core-4, 5th Floor,
South Tower,
District Centre, Scope Minar,
Laxmi Nagar,
Delhi - 110092
Phone: 011 - 22010793 / 794 / 801
Fax: 011 - 22010790 / 792 / 800 / 47608054
E-mail: rmnorth@nalcoindia.co.in

Eastern Region Kolkata

J. K. Millennium Centre,
1st Floor, 46-D,
Chowringhee Road,
Kolkata - 700071
Phone : 033 - 66224510-34,
Fax : 033 - 22878936 / 22810393
E-mail : rmeast@nalcoindia.co.in

Western Region Mumbai

215, T. V. Industrial Estate
S. K. Ahire Marg, Worli,
Mumbai - 400030
Phone : 022 - 24939288 / 89 / 24961711
Fax : 022 - 24950500
E-mail : rmwest@nalcoindia.co.in

Southern Region Chennai

3E, Century Plaza, 560 Anna Salai
Teynampet, Chennai - 600018
Phone : 044 - 24349157 / 24344162
Fax : 044 - 24343495
E-mail : rmsouth@nalcoindia.co.in

Bengaluru

KUWS & D Board, JalaBhavan,
Ground Floor,
No. 5 & 6, 1st Stage,
1st Phase, BTM Layout,
Bannerghatta Main Road,
Bengaluru - 560029
Phone : 080-26637083 / 26637297
Fax : 080 - 26530148
E-mail : nalblr@nalcoindia.co.in

Paradeep

'V' Point, Badapadia,
Paradeep - 754142
Phone : 06722 - 221286
Fax : 06722 - 221286
E-mail : nalco_paradeep@nalcoindia.co.in

STOCKYARDS

Sl.No.	Stockyard	Address
1	Baddi	C/o NSIC LTD, Village Dharampur, PO Baddi, Baddi 173205, Solan, Himachal Pradesh. Contact No:- 8629000335
2	Delhi	C/o Supreme Road Transport Pvt Ltd, Khasra 46/15/1, Village Tikri Kalan, NetajiSubashVihar, New Delhi 110041 Contact No:- 7703854205, 9354368603
3	Jaipur	C/o Om Prakash Agarwal, Khasra 9/2/3, 9/2/4 & 16/2, Gram Nimesa, Near Bindyaka Industrial Area, Sirsi Road, Jaipur - 302012, Rajasthan. Contact No:- 0141-2972002, 9414047578
4	Vadodara	C/o Central Warehousing corporation Near Ranoli Flyover, Ranoli, Karachiya, Vadodara, Gujarat - 391350. Contact No:- 0265 -2241014
5	Bhiwandi	C/o National small Industries Corporation. 183/5 Indian corporation, Mankholi Naka, Bhiwandi, Maharashtra - 421302
6	Chennai	M/s. National Aluminium Co. Ltd., C/o. NSIC Ltd., Plot No.A12, CMDA Truck Terminal, Ponniamanmedu Post, Madhavaram, Chennai - 600 110. Contact No:- 044-25530310/320
7	Kolkata	C/o: Balmer Lawrie & Co. Ltd. Warehouse : 1, Sonarpur Road Kolkata - 700 088 Contact No:- (033) 24506840
8	Visakhapatnam	NALCO Port Facilities, Port Area Opp. Ore Handling Complex VISAKHAPATNAM Contact No:- (0891) 2721032 / 2529578, 0891-2561598



Under Ministry of Mines, Govt of India
Nalco Bhawan, Nayapalli, Bhubaneswar - 751 013, India
www.nalcoindia.com
CIN : L27203OR1981GOI000920