

नालको  **NALCO**

**INDIAN ESSENCE
GLOBAL PRESENCE**



NALCO
PRODUCT PROFILE



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
Rooftop Solar Power System	260 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.



ALUMINA REFINERY

Ranked No.1 among the lowest cost producers of alumina according to the Wood Mackenzie Report, the 22,75,000 tpa 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 4,60,000 tpa 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

with a view harness renewable energy sources, NALCO has set up its 1st wind power plant of 50.4 MW at Gandikota, Andhra Pradesh and 2nd wind power plant of 47.6 MW at Jaisalmer, Rajasthan. 260 KWp Rooftop Solar Power System has also been made operational at Office and Township, Bhubaneswar



PORT & RAIL OPERATIONS

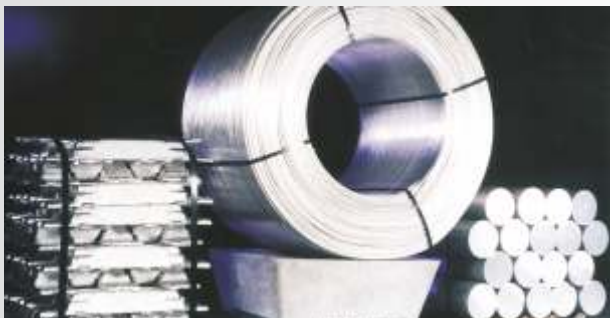
On the inner harbour of Visakhapatnam Port, on the Bay of Bengal, NALCO has mechanized storage and ship handling facilities for export of alumina and aluminium as well as import of caustic soda lye and other raw materials. With storage facility up to 75,000 tonnes and ship-loading rate of 2200 tonnes 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.)	*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

1. 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.).
2. Each Sow Ingot weighs maximum 750 kgs.
3. Each T-Ingot weighs 650 kgs ± 50 kgs.

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*	CH 64*	CH 05*	CH 82*	CH 61	CH 70
Si	0.38 to 0.48	0.43 to 0.53	0.60 to 1.0	0.70 to 1.3	0.40 to 0.80	0.20 max
Fe	0.10 to 0.20	0.35 max.	0.35 max.	0.50 max.	0.70 max	0.25 max
Cu	0.02 max.	0.10 max.	0.10 max.	-	0.15 to 0.40	0.04 max
Mn	0.03 max.	0.10 max.	0.10 max.	0.40 to 1.0	0.15 max	0.03 max
Mg	0.47 to 0.57	0.46 to 0.52	0.45 to 0.80	0.60 to 1.2	0.08 to 1.20	0.03 max
Zn	0.03 max.	0.10 max.	0.10 max.	-	0.25 max	0.04 max
Ti	0.02 max.	0.10 max.	0.10 max.	-	0.15 max	0.03 max
Cr	0.03 max.	0.10 max.	0.10 max.	-	0.04 to 0.35	%V=0.05 max
Other Imp. Each	0.03 max.	0.05 max.	0.05 max.	-	0.05 max	0.03 max
Other Imp. Total	0.10 max.	0.15 max.	0.15 max.	-	0.15 max	% Al=99.70 min


* 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*

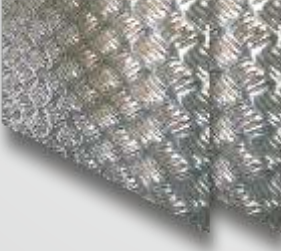
STANDARD COIL

Alloy & Product Code	AA1050 - RC10 AA1100 - RC11 AA1200 - RC12 AA3003 - RC03 AA3105 - RC31 AA5005 - RC05 AA5052 - RC52 AA8011 - RC80	
Thickness	0.30 mm to 3.00 mm	
Width	500 - 1600 mm for AA 1xxx, 8xxx, 3xxx & 500 - 1100 mm for AA 5xxx series alloys	
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 on Core subject to enquiry	
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 AA5005 - RS05 AA5052 - RS52 AA8011 - RS80
Thickness	0.30 mm to 3.00 mm
Width	500 - 1600 mm for AA 1xxx, 8xxx, 3xxx & 500 - 1100 mm for AA 5xxx series alloys
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 : $Al_2O_3 \cdot 3H_2O$
 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_2O_3 (%)	65 ± 0.5	64.5 min.
Na_2O (%) total	0.23 - 0.30	0.33 max.
Na_2O (%) soluble	0.015 - 0.025	0.03 max.
SiO_2 (%)	0.007 - 0.010	0.016 max.
Fe_2O_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 : Al_2O_3
 TYPE : SANDY - COARSE

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_2O_3 (%)	98.7	98.5 min.
Na_2O (%)	0.38	0.50 max.
Fe_2O_3 (%)	0.01	0.015 max.
SiO_2 (%)	0.012	0.02 max.
CaO (%)	0.042	0.050 max.
V_2O_5 (%)	0.0015	0.002 max.
ZnO (%)	0.0005	0.0008 max.
TiO_2 (%)	0.0013	0.004 max.
K_2O (%)	0.0015	0.002 max.
Ga_2O_3 (%)	-	0.012 max.
P_2O_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.

Speciality Aluminas :

The speciality aluminas are basically of three grades in general with respect to soda content : normal soda, intermediate soda and low soda grades. However, the aluminas are further graded as per their particle size and alpha content. These are produced in grades named as : NSPL 20, NSPL 30, NSPL 40, NSPL 50, NSPL 60, NSPL 100, NSPL 101, NSPL 102, NSPL 103, NSPL 104, NSPL 120, NSPL 121, NSPL 122, NSPL 200, NSPL 201, NSPL 202, NSPL 203, NSPL 204, NSPL 205 etc., having applications in refractory and ceramic industries.

NEW ARRIVALS

MECHANISED SOWS



HIGH SPEED ALLOY BILLETS

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%

MICROSTRUCTURAL REPORTS OF HSA BILLETS

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



FOIL STOCK



NALCO WORKS & OFFICES

Regd. & Corporate Office

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Mines & Refinery

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Smelter Plant

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Captive Power Plant

Nalco Nagar, Angul - 759145, Odisha
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Port Facilities

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Northern Region Delhi

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Paradeep

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E-mail : nalco_paradeep@nalcoindia.co.in

STOCKYARDS

Jaipur

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Central Warehouse, SP-1296,
Sitapura Industrial Area,
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Fax : (0141) 2770817

Bengaluru

C/o Container Corpn. of India Ltd.
Inland Container Depot,
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Whitefield Road,
Bengaluru - 560066
Phone: (080) 28451327 / 28,
Fax: (080) 28451329

Visakhapatnam

Nalco Port Facilities,
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Opp. Ore Handling Complex,
Visakhapatnam - 530035
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Fax : (0891) 2561598

Chennai

C/o NSIC Ltd., NAFED Warehousing Complex
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Phone : (044) 25530320 / 327 / 433

Kolkata

C/o Balmer Lawrie & Co. Ltd.
WH, 1 Sonapur Road, Kolkata - 700088
Phone : (033) 24506840

Silvassa

C/o NSIC Ltd., Shalimar Enterprises Corpn.
80/4, Dayat Falia Road, Amli (Piparia),
Silvassa - 396230
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Phone : (0260) 2641436

Faridabad

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Baddi

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Tahasil: Nalagarh, District: Solam, (HP)
Phone : (0179) 5652114, 5657114

Bhiwandi

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नालको  NALCO

National Aluminium Company Limited

A NAVRATNA PSU

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