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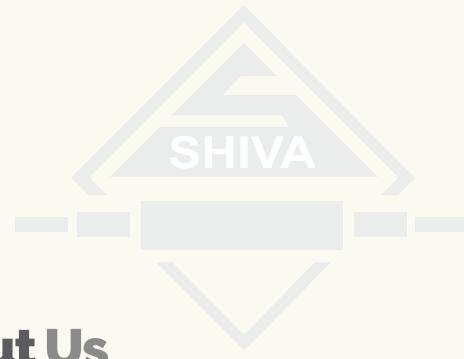
- Quality
- Perfection
- Durability
- Tried & Tested
- Multi-Industrial



SHIVA ALLOY ROLLS

ISO 9001:2015 CERTIFIED COMPANY





About Us

Who we are

Shiva Alloy Rolls, headquartered in Malerkotla, Punjab, started with name Shiva Chill Rolls Pvt. Ltd. was incorporated in the year 1974. Since then, the company manufactures and markets a broad range of Metal Rolls which meet the highest quality standards in the industry. It has 3 manufacturing sister concerns serving Hot Steel Rolling Mills, Flour Mills, Rubber Mixing & Calendaring, Solvent Extraction plants and Paper Industries and a corporate office in Chennai, Tamil Nadu.

Shiva Rolls recently inaugurated a modern manufacturing unit, ISO 9001:2015 accredited in June 2015 to produce Metal Rolls of international benchmark standards.

Our Mission & Vision

Shiva Rolls embodies all aspects of quality, durability and satisfaction. We have made tremendous development in the manufacturing of Rolls and have achieved many milestones in this field. Our technical team has always endeavoured to achieve the highest quality through constant research. Our products are dispatched after extensive quality checking and a thorough after sales service is our assurance. To provide best customer service and cost-efficient quality solutions is our prime motto. Innovation through constant research on products, safety and service is our vision.

What we do

We supply Metal Rolls to Hot Steel Rolling Mills, Flour Mills, Rubber Mixing & Calendaring, Solvent Extraction plants and Paper Mills worldwide. Shiva Rolls exports to more than 20 countries worldwide and wishes to see an increasing number with time. Shiva Rolls are available in various qualities such as Spheroidal Graphite (Accicular & Pearlite), Adamite, Forged, Alloy Chilled Cast Iron and various Rolls as the application demands.



Arial View of our Plant
at Malerkotla

Infrastructure

Shiva Alloy Rolls comprises of skilled labour and engineers led by a proficient management. The winsome blend of expertise and resources has made us achieve great success over the years. We are proud to say

that we have an ultra-modern manufacturing facility assuring high quality Metal Rolls. We have three manufacturing facilities and different varieties of Metal Rolls are manufactured in each facility.

■ Melting shop and Casting

Our Melting shop is equipped with Induction Furnaces for casting of Metal Rolls. Static and Centrifugal casting are used to produce Metal Rolls of highest quality. Shiva Rolls can produce Metal Rolls weighing up to 6 metric tonnes with diameters ranging from 150 mm to 600 mm.

■ Laboratory and Testing equipment

Testing facility comprises of an ultra-modern Laboratory that is equipped with Ultrasonic testing machine, Emission Spectrometer, Analysis Instruments, C and S analysis and digital Hardness testers to maintain quality of the Rolls.



■ Heat Treatment and Machine Shop

For the heat treatment (if required) of Metal Rolls our firm is equipped with Annealing Furnace of capacity ranging from 50 to 60 Tonnes that heats the Rolls and relieves internal stress which alters the physical and chemical properties of the Metal Roll to make it more workable and improve mechanical properties. To obtain the desired dimensions of the Metal Rolls our Machine shop is armed with CNC controlled Turning Machines, Vertical Turning Lathes, Heavy Duty Lathe Machines, Boring machines, Milling Machines, Grinding Machines, and Wobbler Cutting Machines.

■ Quality Assurance

We at Shiva Rolls believe in long and mutually profitable connection thereby we take care of all the control procedures ranging from Roll quality through chemical analysis, hardness testing, ultrasonic testing, dimension control to dispatch & packaging. Our company is equipped with all the necessary tools and instruments that are used to control quality of each and every product coming out of Shiva Alloy Rolls.

Range of Applications

- While we are capable of producing rolls weighing up to 6 MT with diameters ranging from 150 mm to 600 mm. We plan to increase our range two-fold by the year end.

Various qualities of Metal Rolls are cast depending upon the application of these rolls. Some of the qualities are:

- Spheroidal Graphite Pearlitic Iron Roll
- Spheroidal Graphite Accicular Iron Roll
- Adamite Roll (Alloy Steel Base)
- Steel Rolls (Alloy Cast & Alloy Steel Base)
- Indefinite Chill Cast Iron Rolls
- Double Poured Indefinite Chill Rolls
- Centrifugally Cast Metal Rolls
- Ring Rolls/Sleeves
- Hollow & Solid Rolls (for non-metallic applications).



These Metal Rolls are made mainly for the following applications :

- Hot Steel Rolling Mills
- Cold Steel Rolling Mills
- Paper Calendering
- Rubber Mixing & Calendering
- Seamless Tube Rolling
- Solvent Extraction through Cracking & Flaking
- Compound Mixing in Soap, Chocolate, Paint Industries.
- Stem Flattening Machines for Tobacco Industries.
- Sugar & Salt Milling
- Textile Calendering



Spheroidal Graphite Cast Iron Rolls (Nodular Iron Rolls)

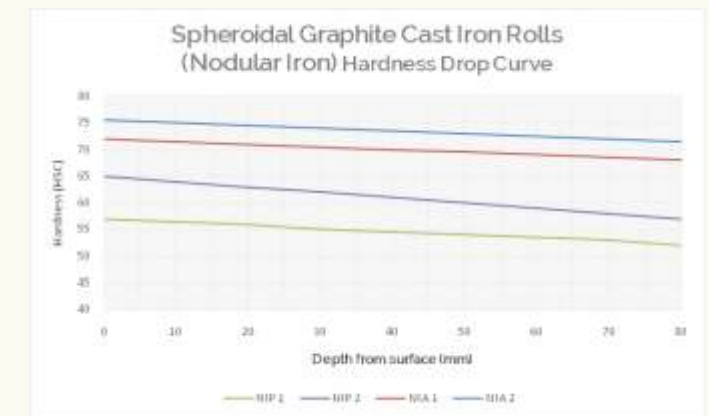
These static cast Rolls are structurally characterized by nodular graphite. High Tensile strength and deep hardness penetration are few properties that nodular graphite gives these Metal Rolls. Because of excellent mechanical & material properties these Metal Rolls are capable of withstanding heavy loads and hence these Rolls are used in various Mills that produce different products. These Rolls are structurally made up of cementite and nodular graphite. Sufficient water cooling is a necessity for satisfactory performance.

Depending upon the required mechanical properties i.e. wear resistance, Roll hardness, strength, of Rolls, wide range of Rolls:

- Pearlitic and
- Bainitic Accicular can be made by alloying with nickel, molybdenum and chromium for added strength and deep hardness penetration.

Nodular Iron Rolls	NIP 1	NIP 2	NIA 1	NIA 2
Composition (%wt)				
Carbon (C)	2.90-3.20	3.00-3.40	3.10-3.50	3.25-3.55
Silicon (Si)	1.50-2.00	1.50-1.80	1.20-1.50	1.10-1.40
Manganese (Mn)	0.70 MAX	0.70 MAX	0.70 MAX	0.70 MAX
Nickel (Ni)	1.40-1.80	1.50-1.90	2.50-3.00	2.80-4.00
Chromium (Cr)	0.40-0.60	0.40-0.70	0.30-0.70	0.30-0.80
Molybdenum (Mo)	0.25-0.45	0.25-0.45	0.60-1.10	0.70-1.20
Mechanical Properties				
Hardness (HSC)	45-55	55-65	65-75	75-80
Ultimate Tensile strength (N/mm ²)	400-500		500-600	

Table 1: Chemical Composition and Mechanical properties of Spheroidal Graphite Cast Iron Rolls, NIP: Nodular Iron Pearlitic, NIA: Nodular Iron Accicular

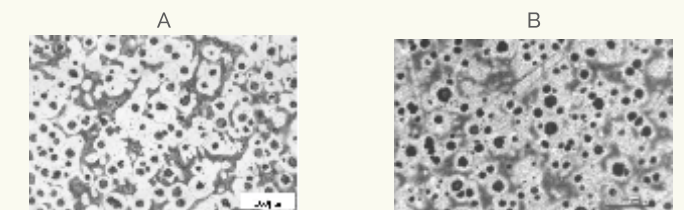


Graph 1: Hardness drop curve for Spheroidal Graphite Cast Iron Rolls, NIP: Nodular Iron Pearlitic, NIA: Nodular Iron Accicular

Applications of Spheroidal Graphite Iron Rolls include:

- Blooming, section and wire rod roughing.
- Wire rod roughing and intermediate rolling.
- Plate intermediate and finish rolling.
- Roughing, intermediate and finishing for Rail and Structural mills.

METAL STRUCTURE



A: Nodular Iron Pearlitic

B: Nodular Iron Accicular

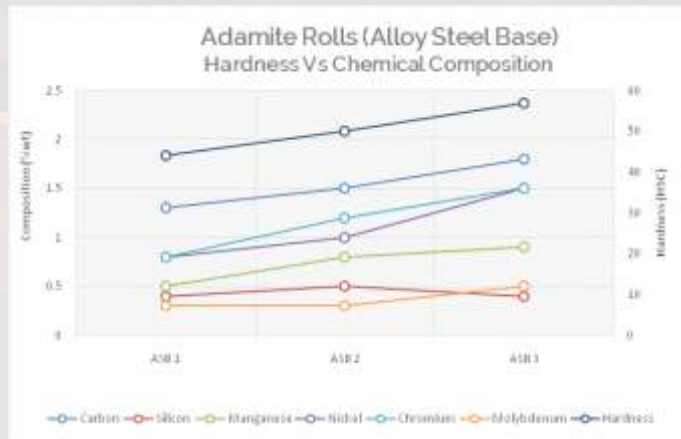
Adamite Rolls (Alloy Steel Base)

Adamite Steel Rolls are mainly composed of fine pearlitic matrix with some cementite in the structure. The structure consists of well broken up and dispersed carbides in a pearlitic matrix complementing the hardness and wear resistance imparted by highly alloyed matrix. They typically have great strength, good thermal properties and high wear resistance. Unlike other Metal Rolls, these have uniform hardness from depth to the surface which makes them very special.

Hardness of these Rolls is supposedly maximum amongst the steel based Rolls. These Rolls are made by static casting and go through multi stage heat treatment process (Annealing) followed by Tempering phases in order to develop the combination of hardness, toughness and wear resistance required for heavy duty wear applications.

Adamite Rolls	ASB 1	ASB 2	ASB 3
Composition (%Wt)			
Carbon (C)	1.40-1.60	1.50-1.80	1.60-2.00
Silicon (Si)	0.40-0.70	0.30-0.70	0.30-0.70
Manganese (Mn)	0.50-0.80	0.50-1.00	0.50-1.00
Nickel (Ni)	0.40-1.00	0.70-1.10	1.50 MAX
Chromium (Cr)	0.80-1.20	1.00-1.40	1.10-1.60
Molybdenum (Mo)	0.20-0.40	0.20-0.40	0.25-0.50
Mechanical Properties			
Hardness (HSC)	40-45	45-50	50-55
Tensile Strength (N/mm ²)	500-700		

Table : Chemical composition and Mechanical properties of Adamite Rolls, ASB-Alloy Steel Base

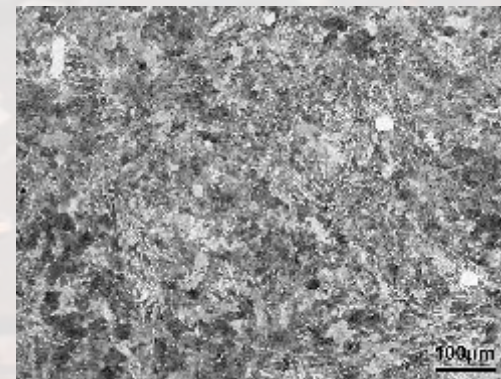


Graph 1 : Hardness Vs Chemical composition of Adamite Rolls, ASB: Alloy Steel Base

Applications of Adamite Rolls include:

- Section finishing, wire rod intermediate rolling.
- Roughing stands of strip mills.
- Medium and small blooming rolling.
- Wire rod and bar steel roughing.

METAL STRUCTURE



Adamite (Alloy Steel Base)

Indefinite Chilled Cast Iron Rolls (ICCI)

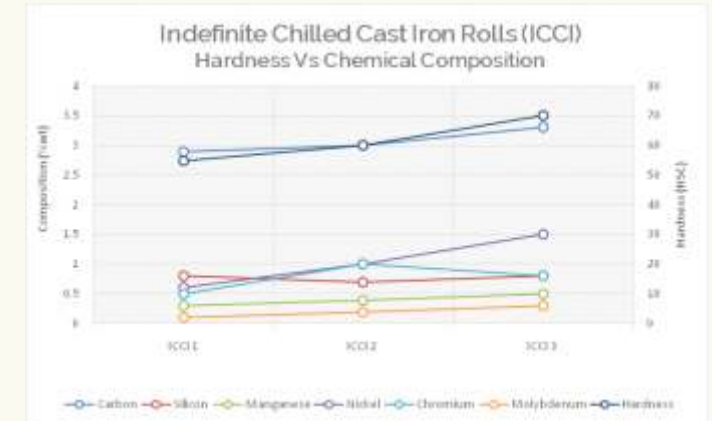
These are Chill Rolls with various alloys and are cast iron based. The matrix structure is pearlitic or bainitic depending on the alloys and its percentage. High alloy content gives uniform carbide distribution and fine deposits of graphite on the microstructure.

Hardness of these Rolls can be varied by controlling the chemical composition and using different casting method from soft to hard and vice versa according to the application. These rolls produce excellent results in plate and section finishing.



Indefinite Chilled Cast Iron Rolls	ICCI 1	ICCI 2	ICCI 3
Composition (%wt)			
Carbon (C)	2.90-3.30	3.00-3.30	3.20-3.50
Silicon (Si)	0.80 MAX	0.80 MAX	0.80 MAX
Nickel (Ni)	0.50-0.80	0.80-1.20	1.20-1.50
Chromium (Cr)	0.50-1.00	1.00 MAX	1.00 MAX
Molybdenum (Mo)	0.10-0.30	0.10-0.30	0.10-0.30
Manganese (Mn)	0.20-0.40	0.20-0.40	0.20-0.40
Mechanical Properties			
Hardness (HSC)	55-60	60-65	65-70
Tensile Strength (N/mm ²)	250-400		

Graph 1 : Hardness Vs Chemical composition of ICCI Rolls, ICCI: Indefinite chilled cast Iron Rolls

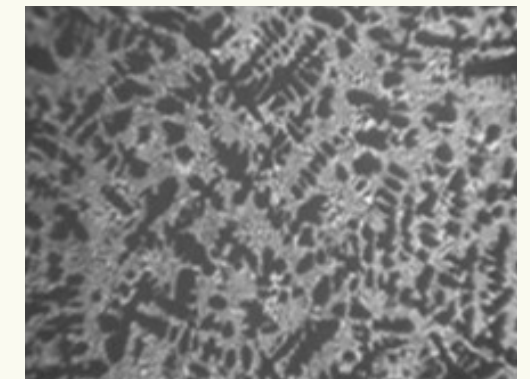


Graph 1 : Hardness Vs Chemical composition of ICCI Rolls, ICCI: Indefinite chilled cast Iron Rolls

Application of Indefinite Chilled Cast Iron include:

- Sheet, plate and strip finishing rolling.
- Section and bar intermediate and finishing rolling.
- Wire rod intermediate and finishing rolling.
- Cold rolling mills for sheets.

METAL STRUCTURE



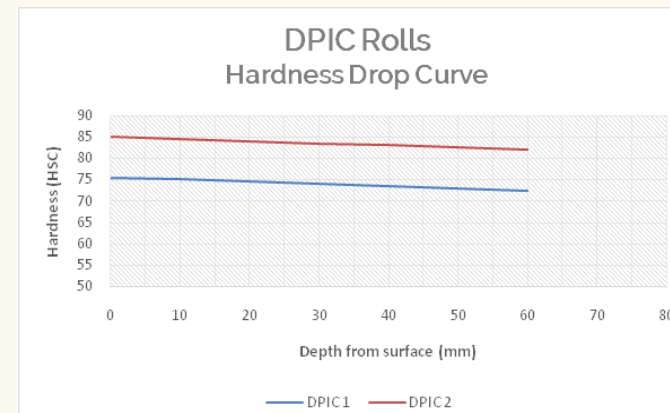
Indefinite Chill Cast Iron

Double Poured Indefinite Chill Cast Iron Rolls (DPIC)

These Metal Rolls have hard alloy iron on the working layer and the core is either made of soft grey iron or nodular iron as application demands. The matrix generally is bainitic with equal distribution of carbides and graphite on the shell. Due to the Nodular core and highly alloyed surface these Rolls have excellent mechanical properties, resistance to shock/thermal/mechanical loads, strength, high wear resistance and good surface finish. These Rolls are produced by spin and static cast together.

Application of DPIC Rolls include:

- Wire rod finishing rolling.
- Flat products rolling in Hot strip and Plate Mills.
- Cold rolling of non-ferrous sheets.
- Wire rod and bar steel roughing.



Graph 1 : Hardness drop curve of DPIC Rolls, DPIC: Double poured Indefinite chill cast Iron Rolls

Double Poured Indefinite Chill Rolls	DPIC 1		DPIC 2	
	Shell	Core	Shell	Core
Composition (%wt)				
Carbon (C)	2.90-3.30	3.10-3.50	3.20-3.50	3.20-3.50
Silicon (Si)	1.00 MAX	1.50 MAX	1.00 MAX	1.50 MAX
Manganese (Mn)	0.50-1.00	0.60-0.90	0.50-0.70	0.60-0.90
Nickel (Ni)	2.50-3.00	0.40-1.00	2.50-3.50	>=1.00
Chromium (Cr)	1.00-1.50	0.25-0.50	1.20-1.80	0.25-0.50
Molybdenum (Mo)	0.25-0.50	-	0.25-0.50	-
Mechanical Properties				
Hardness (HSC)	65-75	30-40	75-85	30-40
Tensile Strength (N/mm ²)	350-500			



Forged Rolls

Forged Rolls are manufactured to an optimum hardness to resist wear and prevent marking. According to the metallurgical and dimensional specifications provided by the customers the forged steel Rolls are manufactured by choosing the right steel ingot.

According to the hardness requirement by the customer, heat treatment is further done. Normalizing and tempering is done when the journal hardness is required. Resistance to thermal

shock and good hardness depth are few properties of Forged Rolls. Ultra-sonic testing is done for every forged roll to detect internal flaws, if any.

Applications of Forged Steel Rolls include:

- Roughing stands of various Mills
- Section Mill

Forged Rolls	EN-8	EN-9	EN-19	EN-24	EN-31	EN-42
Composition (%Wt)						
Carbon (C)	0.35-0.45	0.50-0.60	0.35-0.45	0.35-0.45	0.90-1.20	0.70-0.85
Silicon (Si)	0.10-0.35	0.05-0.35	0.10-0.35	0.35-0.45	0.35-0.45	0.10-0.40
Manganese (Mn)	0.60-1.00	0.50-0.80	0.50-0.80	0.45-0.70	0.30-0.75	0.55-0.75
Sulphur (S)	0.050	0.040	0.040	0.040	0.040	0.040
Phosphorus (P)	0.050	0.040	0.040	0.040	0.040	0.040
Nickel (Ni)	-	-	-	1.30-1.80	-	-
Chromium (Cr)	-	-	0.90-1.40	0.90-1.40	1.00-1.60	-
Molybdenum (Mo)	-	-	0.20-0.40	0.20-0.35	-	-

Table : Chemical composition of Forged Rolls

Rolls for Food Industry



Food Industry

The main properties required for these Rolls is hardness, crack resistance and long life. Indefinite chilled cast iron Rolls are preferred that have uniform Chill with chill depth between 12-15mm in most applications (Higher Chill also offered depending upon application).

Applications of Food industry Rolls include:

- Cracking
- Crushing
- Milling
- Mixing

Processing of items such as:

- Flour
- Cereal
- Salt
- Cattle-feed
- Edible-oil
- Chocolate
- Cocoa

Roll Material selection for Rubber and Paper Industry:

- Indefinite Chilled Cast Iron Rolls

Rolls for Rubber, Paper & Calendaring Industry

Rubber Industry

The main properties required for these Rolls is high thermal conductivity, high tensile strength and wear resistance. Clear Chill Rolls are preferred for mixing, calendaring and cracking of rubber material for production of tires, rubber profiles, rubber products etc.

Applications of Rubber Rolls include:

- Mixing
- Calendaring
- Cracking

Used for production of:

- Tires
- Rubber profiles
- Rubber products



Paper Industry

The main properties required for these Rolls is corrosion resistance and uniform wear resistance. These Rolls are special Alloy Cast Chill Rolls type that have fine pearlite/bainite in the matrix that help give these Rolls great mechanical properties. These Rolls can be manufactured with hardness range between 60 – 75 HSC as application demands. These are also accurately dynamically balanced and have an anti-slip surface as they are subjected to very high RPM.

Application of Paper Rolls include:

- Calender Mills

Roll Material selection for Rubber and Paper Industry:

- Chill Cast Iron Rolls
 - Alloy cast chill Rolls
 - Nodular Iron Rolls
-

Metal Ring Rolls/Sleeves

The Rolling Mill Ring Rolls/Sleeves can be made in various qualities with diverse metallurgical compositions as the application demands. These are made by centrifugal casting and the final cast acquires qualities like high density, high mechanical strength and fine grained structure. Impurities are lesser in this type of casting. These are available in proof machined & CNC machined condition with accurate dimensions as required.

Ring Roll qualities:

- Spheroidal Graphite Accicular
- Spheroidal Graphite Pearlitic
- Alloy Steel base
- Indefinite Chill Cast Iron

Applications of Ring Rolls include:

- Stretch reduction mills
- Bar Straightening mills
- Structure mills
- Tube rolling mills
- Sizing mills
- Clay industries
- Soil and mud bruising mills



Certificate



Quality is taken under assurance at Shiva Alloy Rolls from the preliminary stage that is acquiring of raw materials to the concluding stage packaging and dispatch. The production processes and after sales service are being realized in accordance with the procedures that have been determined beforehand through the ISO 9001:2015 International Quality Management system.

Independent accreditation organizations such as Crisil is an agile and innovative company driven by its mission of making markets/companies function better and we are happy to be monitored by such organizations that keeps us in par with today's fast moving world.