

JINDAL ALUMINIUM LIMITED (ROLLING & EXTRUSION DIVISION)			
PROCEDURE FOR CAST HOUSE			
DOC. NO. JAL/R&E/CH/PR/06		TITLE PAGE	
Issue #	Issue Date	Revision No.	Revision Date
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**DISTRIBUTION LIST\***

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AMENDMENT RECORD

Amendment			Discard		Insert	
Sr. No.	Date	Description	Page No.	Rev. No.	Page No.	Rev. No.
01	01.07.17	In view correction of all pages, Issue-A of cast house procedure has made to Issue-B	--	--	--	--
02	01/06/18	Amended of Quality objectives as mentioned below a) To reduce NC due to composition variation except GEQ & Intermediate coil. b) To reduce NC due to crown variation.	02	00	02	01
03	01/10/18	Amended for inclusion of percentage of Scrap and Ingot for charging	10	00	10	01
04	01/10/18	Amended of caster process parameter	18	00	18	01
05	08/10/18	Amended of quality objectives ( Procedure clause1.1 (a) )	02	01	02	02

	POSITION	SIGNATURE	DATE
Prepared by	QMS COORDINATOR		
Verified by	CAST HOUSE - MANAGER		
Approved by	GM(O)		

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**1.0 PURPOSE**

The purpose of this procedure is to produce Aluminium Alloy Continuous Cast Coils as per JAL (R&E) Standard No. JAL/R&E/QA/STD/0001 for further rolling in Rolling Mill Department.

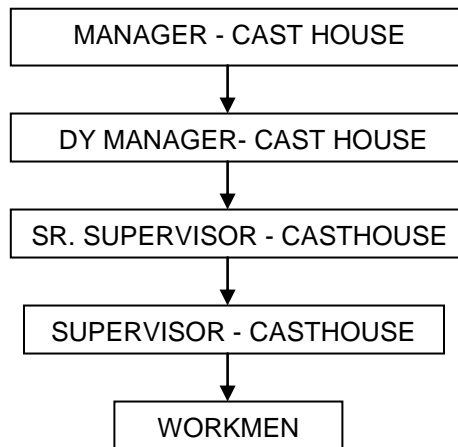
**1.1 OBJECTIVES**

- a) To achieve LNG consumption.
- b) To reduce NC due to composition variation (except GEQ and Intermediate Coil)
- c) To reduce NC due to crown variation.

**2.0 SCOPE :** To supply aluminium alloy continuous cast coils to Rolling Mill Department  
 Cl: 8.1 of IS/ISO-9001:2015 – Operational Planning and Control and  
 Cl: 8.5 of IS/ISO-9001:2015 - Production & Service Provision

**3.0 DEPARTMENT FUNCTIONAL CHART:**

Department functional chart, responsibilities & authorities- Cl: 5.3 of IS/ISO 9001:2015



**3.1 ROLES, RESPONSIBILITY & AUTHORITY**

**3.1.1 MANAGER - CAST HOUSE**

Cast House In charge will be reporting to GM (Operation) and Manager to Cast House In charge and Assistant Cast House Manager to Cast House Manager. They will be responsible for:-

- Operational Planning of regular production, based on Cast House planning issued by PPC.
- Also responsible for in-process inspection & raw material inspection and daily maintenance.
- To review various aluminium alloys continuous cast coils produced in the Cast House and see that they conform to chemical composition & properties.

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- To identify risks and opportunities of Cast House.
- To ensure maximum economy is achieved in Cast House.
- To educate the staff on safety and environmental requirements.
- Maintain QMS documentation.
- Educate the supervisors on implementation of Quality Management System.
- To follow-up corrective action on the non-conformities.

### **3.1.2 Dy MANAGER - CAST HOUSE**

Reporting to Cast House - Manager and be responsible for: -

- In-process inspection & raw material inspection.
- Produce material as per production planning.
- Maintain all cast house documentation.
- Also responsible for machine maintenance.

### **3.1.3 CAST HOUSE SR.SUPERVISORS/SUPERVISORS:-**

Reporting to Cast House - Manager and be responsible for: -

- Carrying out routine production process, inspecting raw material and in-process inspection of the continuous cast coils produced.
- Responsible to plan the daily maintenance works.
- To follow the instruction of Cast House In charge and also instruct routine works to workers.

### **3.1.4 CAST HOUSE WORKMEN**

Reporting to Supervisors and be responsible for:-

- To carry out the Cast House in-process works and also follow the instructions of Cast House In charge/Manager and Asst Cast House Manager & Cast House Supervisors.

## **4.0 REFERENCES:**

- JAL/R&E/QA/STD/0001 and JAL//R&E/CH/ANX/07
- JAL/R&E/NCO/PR/04 – Control of nonconforming outputs
- JAL/R&E/NCA/PR/05 – Nonconformity and corrective action

## **4.1 INTERFACE:**

- Stores
- Purchase ( Ind & Imp )
- Rolling
- Quality Assurance
- Maintenance
- Marketing
- Administration

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## 5.0 DEFINITIONS:

**5.1 CC Coils:** These are the coils of aluminium alloys continuously cast from molten metal.

**5.2 Dross:** It is an Oxide of Aluminium, Magnesium, Silicon etc., which is removed from top surface of molten metal.

**5.3 Bales:** Compact form of rejected scrap.

**5.4 Master Alloy:** Master Alloy is an alloy having required composition in Ingot which helps easy dissolution of alloying element in molten Aluminium.

**5.5 Alloying Elements:** Alloying elements like pure Fe, Si & Mg used for addition in molten aluminium to produce aluminium alloys as per JAL/R&E/QA/STD/0001 and JAL/R&E/CH/ANX/04.

## 5.6 Spectrometer Analysis:

Melting Sample: Aluminium alloy sample for assessing chemical composition as per alloys in Melting Furnace.

Holding Sample: Aluminium alloy sample from holding furnace.

Cast Coil Samples: Three Cast coil samples are taken out for chemical composition at equal intervals of total buildup.

If any minor deviation (i.e. deviation within internal specification) JAL Standard No. JAL/R&E/QA/STD/0001 and JAL/R&E/CH/ANX/04 can be accepted after approval from Quality Assurance department. If material is rejected due to major deviation (deviation outside the internal specification) is noticed, the rejected material should have RED paint mark and alloy code for identification.

## 5.7 Abbreviations:

- a) CC Coils – Continuous Cast Coils
- b) SIMA – Silicon Master Alloy
- c) TIBAL - Titanium-Boron-Aluminium (Grain Refiner)
- d) R&E – Rolling & Extrusion Division
- e) MnMA – Manganese Master alloy
- f) Si – Silicon
- g) Fe – Iron
- h) Mg - Magnesium

## 6.0 INPUTS

Raw Materials – Aluminium Ingots, In-house scrap, imported scrap, Dross ingot and Alloying elements .

Internal specifications

Standards for chemical composition of Aluminium alloys.

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## **7.0 OUTPUTS**

Aluminium Alloy Continuous Cast Coils for Rolling Mill.

## **8.0 INFRASTRUCTURE**

The details of plant and machinery of this department are detailed in Procedure for Maintenance JAL/R&E/MAT/PR/14.

## **9.0 PROCEDURE**

The Cast House Department is responsible for

- a) Receiving and inspection of raw material & consumables.
- b) Melting and casting of Aluminium alloy cast coils for the specified compositions.
- c) In-process inspection of products produced in the Cast House.

### **9.1 Receiving inspection**

The raw material and consumables are inspected / accepted by the Department on receipt in the premises. The list of materials with purchasing data and the acceptance criteria is given at Annexure JAL/R&E/CH/ANX/01.

Only the accepted raw materials and consumables are used for production.

The details of inspection of Aluminium ingots from Nalco, Vedanta, Hindalco & Imported are maintained in Format No. JAL/R&E/CH/F/07 and the details of other raw material & consumables are maintained in Format No. JAL/R&E/CH/F/06.

### **9.2 Production Planning**

The production plan for the month is received by the Cast House In charge from the Planning Department as per JAL/R&E/CH/F/08. Based on the plan, Cast House In charge arranges for production of CC Coils and at the end of the month updates the actual produced in the format JAL/R&E/CH/F/03.

### **9.3 Process Control**

Flow Chart for the process is given in the Quality Plan detailed in this procedure.

### **9.4 Operational planning and control**

The melting furnace is charged with Aluminium ingots, Aluminium scrap and master alloy/alloying elements.

The requirement of alloying elements/master alloy is calculated and additions are made accordingly. The charge for the melting furnace is entered in the melt record as per Format No. JAL/R&E/CH/F/01.

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Grain Refiner Rods / Nitrogen Gas are used for treatment of the melt to ensure non-porous fine grain cast coils. Cover Flux is added to ensure that the dross is in powder form for its removal from furnaces with minimum percentage of metal. Degassing work instruction displayed near Cast house department

A sample is taken from the melting furnace to verify the chemical composition. Any adjustments for composition are carried out by addition of required alloying elements based on the chemical composition of melting sample. Before transfer of molten metal from Melting Furnace to Holding furnace required chemical composition must be ensured in Melting Furnace.

3 Nos. of CC coil sample is taken during continuous casting of every coil at equal intervals for composition to ensure that the final composition is as per specified requirements.

Temperature of Molten metal before starting of caster should be 740 deg C to 760 deg C and casting speed 800 mm/min. to 1000 mm/min. Factors affecting the casting speed are temperature of molten metal, alloy & water inlet temp.

The coils are marked with coil number, alloy, sheet thickness, width & weight.

The test results of samples and raw material in Spectrometer are maintained in Format No. JAL/R&E/CH/F/04 – Chemical Composition Report.

The cast coils are inspected for -

- a) Band Marks
- b) Edge Cracks
- c) Surface Finish
- d) Bleeding
- e) Sticking
- f) Chemical Composition
- g) % Crown

The test results are maintained in Format No. JAL/R&E/CH/F/05.

If any coil is rejected due to non-conformity of chemical composition requirement, it is re-assessed by Quality Assurance Department by re-testing the sample. If the sample conforms, the coil is accepted. If the sample is not conforming to the requirement, the coil is re-graded or accepted under deviation by Q.A. Department. The details of re-grading are entered in the format JAL/R&E/CH/F/04 by the QA. The accepted coil will be marked with coil number and alloy code.

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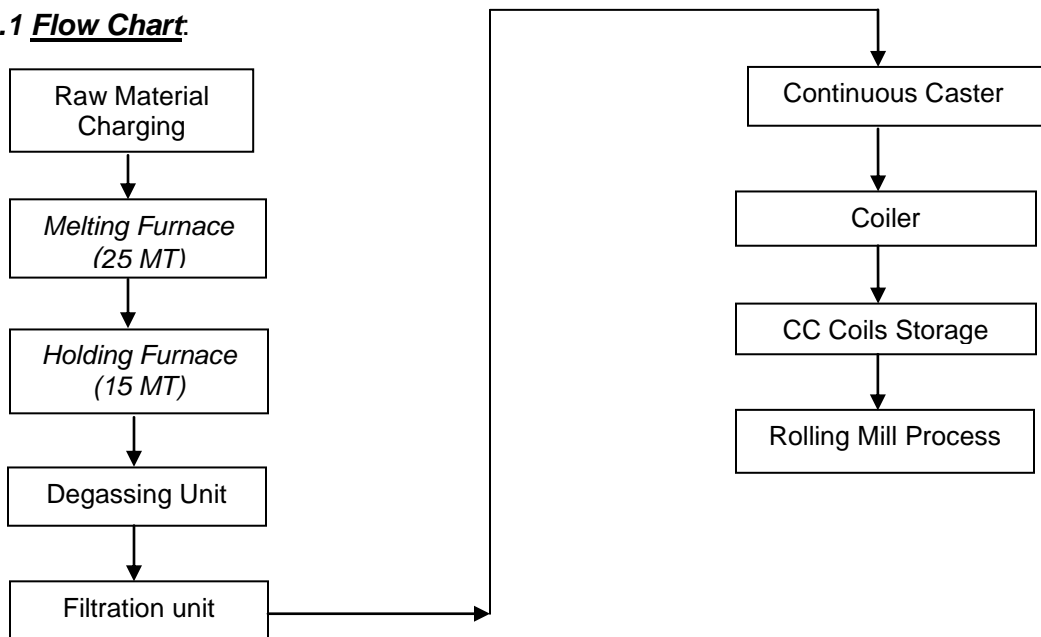
QUALITY PLAN

Sequence	Quality Control	Documentation	Sampling Frequency
<pre> graph TD     A[Raw Material Receipt] --&gt; B[Inspection]     B --&gt; C[Reject]     B --&gt; D[Storage with Identification]     D --&gt; E["Aluminium ingots, scrap, alloying elements, Master alloy charged in Melting F/c."]     E --&gt; F["Addition of all required alloying elements &amp; grain refiner, flux, degasser &amp; dross skimming in holding furnace."]     F --&gt; G[CC Casting]     G --&gt; H[CC Coil Storage]     H --&gt; I[CC Coil Identification and Inspection]           </pre>	<p>Visual Inspection. Spectrometer chemical analysis with supplier's standard &amp; test certificate.</p> <p>Pre-calculated amount of alloying elements/master alloy addition.</p> <p>Analysis of Melting Furnace &amp; Holding Furnace samples.</p> <p>3 Nos. of CC Coil samples during casting after equal intervals</p> <p>a) Visual inspection before transfer for rolling process. b) Identification mark of alloy with coil number. c) In-process inspection for quality like band marks, edge cracks, bleeding &amp; surface finish, etc. d) % crown of each coil</p>	<p>1) Analysis report from supplier. 2) Spectrometer analysis As per format No. JAL/R&amp;E/CH/F/04</p> <p>All the receipts to be noted in Main Stores Register date-wise.</p> <p>Entry to be made in melt record as per Format No. JAL/R&amp;E/CH/F/01.</p> <p>Spectrometer analysis.</p> <p>Spectrometer analysis (Ref: JAL/R&amp;E/CH/F/04)</p> <p>Format No. JAL/R&amp;E/CH/F/05.</p> <p>Shall be written using hot chalk on all coils. Ref: Format No. JAL/R&amp;E/CH/F/05</p> <p>Ref: JAL/R&amp;E/QA/F/12</p>	<p>Refer JAL/R&amp;E/CH/ANX/02</p> <p>Whenever material received.</p> <p>All batches.</p> <p>-</p> <p>Three samples.</p> <p>All coils.</p> <p>All coils.</p>



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#### **9.4.1 Flow Chart:**



#### **9.4.2 Casting speed for coil casting (mm/min):**

Alloy	Strip Speed (MM/Min.)
1000 series	800 – 1050
8011 series	800– 1000
3000 series	750 – 1000

Casting speed may vary depending on the width / thickness of the sheet.

All will ensure that furnaces are run continuously as long as possible. Furnaces should not be stopped even for a short time except for emergency.

Cast House Incharge will ensure that proper records for maintenance of furnaces in following proforma:

- Date of start of melting furnace.
- Date of stopping the melting furnace.
- Nature of maintenance done.
- Time taken.

### **9.5 Other processes**

#### **9.5.1 Handling of Ingot, Coil, Scrap, Edge Trimming and Dross:**

This section covers the movement of CC Coils from the Cast House units to rolling mills. This is carried out by trained crane operator by means of coil transfer trolley.

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9.5.2 Handling of Scrap: In-house scrap/drain slabs/foil stock bale, which is kept in trolley, shall be brought near the charging area of melting furnace. Likewise, bailed scrap shall be transferred to charging area with the help of overhead crane. Above scrap shall be charged in the furnace by transferring it manually as well as with the help of charging bucket and charging crane.

9.5.3 Handling of Dross: After removing hot dross from melting and holding furnace, it is transferred to DPM machine where liquid metal will be extracted and remaining dross will be cooled, crushed, sieved, separated and recycled.

9.5.4 Handling of Sow Ingots:

Sow Ingots, which are received in lorries, shall be unloaded with the help of crane. such ingots are to be stacked one above the other and to check for its stability. It should be brought near the charging platform of melting furnaces with the help of the crane, followed by charging with the help of charging bucket & charging crane.

9.5.5 Handling of Ingots.

Ingots, which are received from suppliers like Nalco, Vedanta, Hindalco etc., have weight of 18 Kgs. to 22 Kgs. per piece. These ingots are unloaded manually or with the help of overhead crane inside the factory depending upon the space availability. While Unloading, arrange the ingots in the form of stacks. The Stacks, which are arranged in Cast House shed, can be shifted to the charging area with the help of crane or trolley. Such ingots shall be charged in melting furnace with the help of charging bucket & charging crane and manually if charged in holding furnace.

Handling of Master Alloys shall be done with the help of crane as well as manually.

9.5.6 Handling of Magnesium & Silicon Metal

If the above metal is received in packing, it shall be unloaded with the help of crane .

9.5.7 Handling of CC Coils

After CC coil is made as per required build-up & weight are lifted with the help of crane and transferred to CC coils storage area.

**9.6 Standardization:**

01. Consumption of Titanium/Boron master alloy (per ton of production):

Alloy	Tibal Addition
1000 series	5.0 – 7.0 kgs / ton
3000 series	4.5 – 5.0 kgs / ton
8000 series	4.0 to 4.5 kgs / ton
8011 GEQ	3.5 to 4.0 kgs / ton

02. Consumption of cover flux/ton of CC coils production: 1.0 to 1.25 kg

03. Consumption of ceramic foam filter per start-up - 2 piece.

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04. Standardization of CC Coil weight:

Coil Weight - 7500 to 13000 Kgs.

05. **Percentage of Scrap and Ingot for charging is standardized as below:**

<b>ALLOY CHARGE MIXING RATIO FOR MELTING</b>			
<b>Sl. No</b>	<b>Alloy</b>	<b>Al (Min)</b>	<b>Ingredients</b>
1	1060	99.60%	100 % EC Ingot
2	1050	99.50%	100 % EC Ingot
3	1100 D / 1235	99.35%	100 % EC Ingot
4	1100	99.00%	80% EC Ingot + 20% Identified Scarp of 1xxx
5	19000/1200	99.00%	80% EC Ingot + 20% Identified good Scarp
6	8011 F/S	98.00%	100 % Ingot
7	8011 PP Cap	98.00%	80% Ingot + 20% Identified Scarp
8	8011 CRL	98.00%	80% Ingot + 20% Identified Scarp
9	8006 SRC	98.00%	100 % Ingot
10	8021	98.00%	100 % Ingot
11	5005	Remainder	100 % Ingot ( if available Scarp in 5xxx / 1xxx then add 20% )
12	5052	Remainder	100 % Ingot ( if available Scarp in 5052/5005 then add)
13	3003	Remainder	80% Ingot + 20% Identified Scarp
14	3004	Remainder	80% Ingot + 20% Scarp of 3105/3003
15	3105 (Crompton)	Remainder	60% Ingot + 40% Plant Scarp
16	3105 TTK	Remainder	100% Ingot
17	3105 (OEM / JSW)	Remainder	25% Ingot + 50% Plant identified Scarp + 25% TT
18	8011 OEM	98.00%	70% Ingot + 30% Plant Scarp
19	8011 GEQ	98.00%	25% Ingot + 50% Plant identified Scarp + 25% TT
20	8011 Stove craft	98.00%	70% ingot + 30% Extrusion Imported Scarp
21	8011 Fan Blade	98.00%	75% Ingot + 25% Plant Scarp

All personnel to put all their efforts for economical running of melting furnaces, holding furnaces and continuous casters. By doing this, maximum economy, more production and better quality should be achieved

All should make efforts and give suggestions to reduce LPG/FO consumption and increase production/efficiency.

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#### **10.0 PROCESS MONITORING**

- Raw material on receipt is inspected as per standards and only accepted material is used for production.
- The in-process inspection is carried out for liquid metal and chemical analysis of the liquid metal is verified as per the Quality plan and in case of any deviation, it is adjusted by addition or dilution of alloying elements in the furnace to get the desired results.  
Visual inspection of the CC coils is done for any band mark, edge crack, bleeding, sticking, surface finish, etc

#### **11.0 TRACEABILITY**

For traceability of particular ingot usage, a logbook is maintained supplier-wise.

#### **12.0 SAFETY AND ENVIRONMENTAL REQUIREMENTS**

The following safety and environmental requirements are to be followed in the Cast House:

- a. Use safety shoes while moving on the shop floor.
- b. Use proper tools while working on the moulds.
- c. Avoid loose clothing while working and use Apron while dressing
- d. Use facemask and hand gloves during charging ingots in melting furnace and while casting rolling sheets.
- e. Avoid oil spillage on the floor.
- f. To clean oil spillage immediately to avoid slipping and accidents.
- g. While lifting load by the crane, ensure that the load is within the safe working capacity of the crane.
- h. To clean the machine and take utmost care while cutting Magnesium and to collect the boring and store separately in a safe area.
- i. In the event of any accident / shock, to give First Aid immediately.
- j. To have full knowledge of operating the fire extinguisher in the event of fire hazards like for oil - Foam type, paper & gunny; Electrical - Carbon Dioxide and dry powder.
- k. Use sufficient light below the work spot to avoid accidents.
- l. In addition to above, any safety orders/instructions issued by Management from time to time, are also to be followed.

#### **13.0 CONTROL OF NONCONFORMING OUTPUTS:**

The Non conforming outputs in the Cast House like off composition, defective coils etc. are segregated and disposal action is taken as per following formats:

In process Inspection Report in format JAL/R&E/CH/F/05 & maintained by foundry person.

Control of Non conforming outputs in format JAL/R&E/NCO/F/01 & maintained by QA person.

#### **14.0 NONCONFORMITY AND CORRECTIVE ACTION:**

The non-conformities are analyzed for causes and suitable corrective action is taken to ensure that the non-conformities are not repeated. These actions are verified for effectiveness during subsequent processing.

The potential non-conformities are analyzed for causes and are taken to avoid the occurrence and repetition of the non-conformities. The action taken is monitored for effectiveness by the Cast House In-charge. Non conformity & corrective action details are recorded in the format JAL/R&E/NCA/F/01.

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**15.0 RISKS AND OPPORTUNITIES**

Risk & opportunity is defined as separate procedure. JAL has established, implemented & maintained this procedure for managing risk & opportunities.

**16.0 ANALYSIS AND EVALUATION**

The following data are analyzed by using the statistical techniques:  
Fe, Si - One sample for 20 consecutive days in a month for specific alloy.

**17.0 CONTINUAL IMPROVEMENT:**

The quality objectives are monitored for improvement once in 12 months and the current level of the objectives is noted down and target level is fixed for the next period and action plan is developed to attain the target level and monitored for improvement. The details are recorded in the format JAL/R&E/QMSC/F/01.

The effectiveness of corrective action taken for the non-conformities is also monitored for improvement.

**18.0 EXTERNALLY PROVIDED SERVICES:**

Depending on the need the department may use external manpower for various jobs in the department. The external person will be given on-the-job training in-house. The records of such training will be maintained in format no. JAL/R&E/TRG/F/03

**19.0 ORGANIZATIONAL KNOWLEDGE, COMPETENCE, AWARENESS AND COMMUNICATION**

Training is defined as separate procedure. The purpose of this procedure is to define the requirements for positions in the company affecting quality, for hiring and training employees to ensure these requirements are met, and for evaluating the effectiveness of training provided.

List of training record is shown in the Annexure No JAL/R&E/ANX/04 & Maintained by HOD.  
Competency Chart is identified for all positions in the cast house department as per Annexure No JAL/R&E/ANX/07.

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ACCEPTANCE CRITERIA

Sr. No.	Description of Material	Purchasing Data	Acceptance Criteria	Remarks
01.	Aluminium Ingots	CG Grade from 99.5 to 99.7% EC Grade above 99.7%	Conformance to the composition as per specification of supplier's contract/ In-house test	Sampling as per Annexure JAL/R&E/ CH/ANX/02
02.	Aluminium Imported Scrap	Scrap of any alloys:	As per ISRI Standard	Sampling as per Annexure JAL/R&E/ CH/ ANX/02
03.	Magnesium	Mg. 99.5%	Confirmation as per specification of supplier's contract/In-house test	Magnesium 99.5% Min. Format No.: JAL/R&E/CH/F/06
04.	Silicon	Si. Purity 99.00%	Confirmation as per specification of supplier's contract/ In-house test	Si. 98% Min. Format No.: JAL/R&E/CH/F/06
05.	Degasser	---	Visual check	Refer Format No.JAL/R&E/CH/F/06
06.	Cover Flux	---	Dross Quality- checked visually.	Format No. JAL/R&E/ CH/F/06
07.	MN Master alloy	Mn= 10 to 12% Remaining AL	Accepted against Test Certificate of the Supplier contract/ In-house test.	Refer Format No. JAL/R&E/CH/F/06
08.	Alumina Shield Bricks	Alumina 60 % or 75 %	As per supplier TC	Refer Format No. JAL/R&E/CH/F/06
09.	Fire Clay	---	Free from lumps	Refer Format No. JAL/R&E/CH/F/06
10.	FO	Grade MV 2	a) Specific gravity 0.9 to 0.98 checked by Gravity Meter b) Water content up to 1%	Refer Format No. JAL/R&E/CH/F/08
11.	Iron Powder	99 % Purity	Accepted as per specification of supplier's contract/ In-house test	Fe Powder 99% Min. Format No.: JAL/R&E/CH/F/06
12.	Titanium-Boron Master Alloy	Titanium 4.5 to 5.5% & Boron 0.8 to 1.2%	Accepted as per specification of supplier's contract/ In-house test	Refer Format No. JAL/R&E/CH/F/06
13.	Nitrogen Gas	20 PPM Max.	Own generation. PPM gauge is available to measure.	---

<b>JINDAL ALUMINIUM LIMITED (ROLLING &amp; EXTRUSION DIVISION)</b>			
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### RAW MATERIAL INSPECTION

#### Aluminium, Iron, Silicon, Magnesium, Manganese, Copper:

01. Visual Inspection: To inspect for dross / other entrapment embedded on surface of ingots.
02. Selection of Aluminium Ingots:  
Aluminium ingots are accepted as per Supplier contract & also confirm to internal spectrometer result. Aluminium ingots will be checked weekly once.
03. Selection of Imported scrap, iron, silicon, manganese, magnesium, copper:  
Similarly imported scrap, iron, silicon, magnesium, manganese, copper are accepted after confirmation of internal test result with supplier TC .Checking of composition of alloying element is done randomly
04. In case test certificate or internal test results are not meeting the specification as per supplier's contract, either it should be rejected & kept separately marked with Red paint.
05. Composition of all primary ingot is checked randomly once or twice in a week and compare with supplier test certificates
06. Inspection of Imported scarp is done by opening 4 bale randomly after unloading of container and accepted if Impurity of non metal or metal other than Aluminium does not exceed 1% of unloaded aluminium scrap
07. All raw materials are received without any identification of heat number or grade and then the grade will be marked by referring to the Test Certificate.

<b>JINDAL ALUMINIUM LIMITED (ROLLING &amp; EXTRUSION DIVISION)</b>			
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### LIST OF RECORDS

SL. NO	Type of Records	Format Reference	Responsible Person	Retention Period(Min)
1	Melt Record	JAL/R&E/CH/F/01	HOD	1 Year
2	CH Production status wrt prod planning	JAL/R&E/CH/F/02		1 year
3	Daily Production caster coils	JAL/R&E/CH/F/03		1 year
4	Spectrometer chemical analysis report	JAL/R&E/CH/F/04		1 Year
5	In process inspection Report	JAL/R&E/CH/F/05		1 Year
6	Raw material Inspn Report(other than Al)	JAL/R&E/CH/F/06		1 Year
7	Aluminium raw material insp report	JAL/R&E/CH/F/07		1 Year
8	Castor planning	JAL/R&E/CH/F/08		1 Year
9	Nonconformity and corrective action	JAL/R&E/NCA/F/01		3 Years
10	Quality objectives and monitoring record	JAL/R&E/QMSC/F/01		3 Years

### TRAINING RECORDS

Sl. No.	Type of Records	Format Reference	Responsible Person	Retention Period
1	Employee Details	JAL/R&E/TRG/F/01	HOD	Till end of service
2	Training needs identified	JAL/R&E/TRG/F/02		1 year
3	Record of training imparted	JAL/R&E/TRG/F/02		1 year
4	Review of training effectiveness	JAL/R&E/TRG/F/04		1 year

**Note:**

The computer generated documents (soft copy) will not be having the signature of the generating department. However, if a hard copy is taken out, it has to have signature of the concerned person.



<b>JINDAL ALUMINIUM LIMITED (ROLLING &amp; EXTRUSION DIVISION)</b>			
<b>TITLE: PROCEDURE FOR CAST HOUSE</b>			
<b>Doc. No.: JAL/R&amp;E/CH/ANX/04</b>	<b>Rev. No.: 00</b>	<b>Date: 01.07.2017</b>	<b>Page # 16</b>

**REGISTERS**

Sl. No.	Name of the Register	Prepared by	Approved by	Circulated to	Remarks
01	Melt Record	Cast House Supervisor	Cast House In charge	-	Daily (whenever cast)
02	Breakdown and Maintenance Register	-do-		Top Management	Weekly
03	Monthly Production Report	-do-		Top Management	Monthly
04	Imported scrap report	-do-		-	Daily (whenever logs are cut)
05	Primary ingots Inspection Report	-do-		-	Daily (whenever raw material is inspected)

<b>JINDAL ALUMINIUM LIMITED (ROLLING &amp; EXTRUSION DIVISION)</b>			
<b>TITLE: PROCEDURE FOR CAST HOUSE</b>			
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**CHEMICAL COMPOSITION LIMITS (JAL/R&E/QA/STD/0001)**

ALLOY	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others each	Aluminium
1060	0.15 Max	0.25 Max	0.01 Max	0.01 Max	0.01 Max	0.01 Max	0.01 Max	0.02-0.03	0.005	99.60 MINIMUM
1050/19500	0.20 Max	0.35 Max	0.01 Max	0.01 Max	0.01 Max	0.01 Max	0.01 Max	0.02-0.03	0.005	99.50 MINIMUM
1100/19002	<b>FE + SI = 0.95 Max</b>		0.05-0.20	0.01 Max	0.01 Max	0.01 Max	0.01 Max	0.02-0.03	0.005	99.00 MINIMUM
1200/19000	0.20 Max	0.50-0.60	0.05-0.10	0.01 Max	0.01 Max	-	0.01 Max	0.02-0.03	0.005	99.00 MINIMUM
1235	<b>Fe +Si =0.65 max &amp; Fe:Si=3:1</b>		0.03 Max	0.01 Max	0.01 Max	Nil	0.01 Max	0.020-0.03	0.03 Max	99.35 MINIMUM
	<b>Fe:Si Ratio : 3:1 minimum</b>									
1350	0.1 Max	0.25 Max	0.002 Max	0.002 Max	0.002 Max	0.001 Max	0.01 Max	0.025 Max	0.005	99.50 MINIMUM
3003 SHEET / COIL/31200	0.15- 0.40	0.25 - 0.50	0.05-0.10	1.10 -1.25	0.03 Max	0.05 Max	0.10 Max	0.10 Max	0.03 Max	REMINDER
3003 - FOR CIRCLE	0.15- 0.40	0.3 - 0.50 Max	0.05-0.20	1.00 -1.10	0.02 Max	0.02 Max	0.01 Max	0.02-0.025	0.03 Max	REMINDER
3005	0.15 - 0.30	0.30-0.40	0.05-0.30	1.0-1.5	0.30-0.40	-	-	-	-	REMINDER
3103/31000	0.15 - 0.40	0.25 - 0.50	0.05 -0.10	0.85 - 1.20	0.10 Max	0.05 Max	0.10 Max	0.10 Max	0.03 Max	REMINDER
3105/31500B	0.15 - 0.40	0.25 - 0.70	0.10 Max	0.50 - 0.60	0.25 - 0.30	0.05 Max	0.10 Max	0.10 Max	0.03 each	REMINDER
3004/31500/ASTM-B209	0.20-0.25	0.50 -0.60	0.1 Max	1.10 -1.30	1.0 -1.10	-	0.01 Max	0.02-0.030	0.03 Max	REMINDER
5005	0.30 Max	0.70 Max	0.20 Max	0.20 Max	0.55 - 0.70	0.10 Max	0.25 Max	0.02-0.04	0.05 Max	REMINDER
5052	0.25 Max	0.40 Max	0.1 Max	0.1 Max	2.2 -2.80	0.15 -0.35	0.1 Max	0.02-0.03	0.05 Max	REMINDER
8011 PP CAP (0.13-to 0.18 mm)	0.6-0.70	0.70-0.80	0.02-0.05	0.01 Max	0.01 Max	0.02 Max	0.01 Max	0.02-0.03	0.03 Max	98.00 MINIMUM
8011 PP CAP (0.19 TO 0.23 mm)	0.65-0.7	0.75-0.85	0.02-0.05	0.01 Max	0.01 Max	0.02 Max	0.01 Max	0.03-0.05	0.03 Max	98.00 MINIMUM
8011 - OEM	0.60-0.95	0.60-0.95	0.05-0.10	0.10 Max	0.10 Max	0.02 Max	0.20 Max	0.020-0.025	0.03 Max	98.00 MINIMUM
8011 - FOIL STOCK/40800	0.65-0.70 FE:SI=1.1:1	0.73-0.78	0.02 Max	0.01 Max	0.01 Max	0.01 Max	0.01 Max	0.02-0.03	0.03 Max	98.00 MINIMUM
8011 - FOR CIRCLE	0.65-0.70	0.70-0.80	Max.0.05	0.03 MAX	0.03 MAX	0.02 MAX	0.01 MAX	0.02-0.025	0.03 MAX	98.00 MINIMUM
8006 - SRC STOCK	0.15-0.20	1.30-1.50	0.15-0.20	0.05Max	0.04 MAX	-	0.04 MAX	0.02-0.03	0.005	REMINDER
8021 - Alu-Alu foil STOCK	0.05-0.10Max.	1.35-1.40	0.010 Max	0.01Max	0.01 Max	-	0.01 Max	0.02-0.03	0.005	REMINDER

REMARKS: THE ABOVE CHEMICAL COMPOSITION LIMITS BELONGS TO THE STANDARDS OF IS 737:2008, ASTM B 209 AND EN 573- 485/2

<b>JINDAL ALUMINIUM LIMITED (ROLLING &amp; EXTRUSION DIVISION)</b>			
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<b>Doc. No.: JAL/R&amp;E/CH/ANX/06</b>	<b>Rev. No.: 01</b>	<b>Date: 01.10.2018</b>	<b>Page # 18</b>

**CASTER PROCESS PARAMETER**

Width	Alloy	Roll Gap	Roll Camber	Setback	Strip Speed (mm/min)	Water Temp ( Deg C)	Tundish Metal Temp ( Deg C)
1300mm	1050	5.10 to 5.30 mm	0.05 to 0.120 mm	48 to 65 mm	800-1050	28-30	700+/-2
	1100						698+/-2
	3105						690+/-2
	3003						695+/-2
	8011FS						697+/-2
	8011GEQ						693+/-2
	8011 Fan Blade						695+/-2
1620mm	1050	5.10 to 5.30 mm	0.05 to 0.120 mm	48 to 65 mm	800-1050	28-30	702+/-2
	1100						700+/-2
	3105						690+/-2
	3003						695+/-2
	8011FS						697+/-2
	8011GEQ						695-700
	8011 Fan Blade						695+/-2
1000-1050 mm	1050	5.00 to 5.30 mm	0.05 to 0.120 mm	48 to 65 mm	800-1050	28-30	702+/-2
	1100						700+/-2
	3105						690+/-2
	3003						695+/-2
	8011FS						697+/-2
	8011GEQ						695-700
	8011 Fan Blade						695+/-2

<b>JINDAL ALUMINIUM LIMITED (ROLLING &amp; EXTRUSION DIVISION)</b>			
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### COMPETENCY CHART

Name of department: CAST HOUSE			
IS/ISO 9001:2015 clause number 7.2			
Sl.No.	Position	Required qualification*	Experience required
1	Manager	BE/BTech in Metallurgy/Mechanical	10 Years
2	Dy. Manager	Diploma in Metallurgy/Mechanical	08 Years
3	Asst. Manager	Diploma in Metallurgy/Mechanical	06 Years
4	Sr. Supervisor	Diploma in Metallurgy/Mechanical	04 Years
5	Supervisor	Diploma in Metallurgy/Mechanical	02 Years
6	Furnace Operator	ITI	01 Years
7	Casting Machine Operator	ITI	01 Years
8	Crane Operator	ITI	01 Years
9	Helpers	-	00 Years
Note: Relaxation in qualification can be given in case the candidate is having sufficient experience in relevant field.			
Prepared by:		Approved by:	
HOD		GM (O)	

**JINDAL ALUMINIUM LIMITED  
ROLLING & EXTRUSION DIVISION**

**Rev No:00**

**Revision Date: 01.07.2017**

Format No: JAL/R&E/CH/F/01

DATE.....

**MELT RECORD**

(1) MELTING:

Sr No	Date	Batch No.	Alloy	Ingot (Kgs)	Imported Scrap (Kgs)	Caster Slabs (Kgs)	Dross Room Ingot (Kgs)	Foil Stock Bales (Kgs)	JAL Scrap (Kgs)	Rolling Mill Scrap (Kgs)	Si (Kgs)	Mn (Kgs)	Fe (Kgs)	Mg (Kgs)	Cu (Kgs)	Total Inputs (Kgs)
1																
TOTAL (Kgs)																

(2) SUMMARY FOR THE DAY:

1) Total Ingot weight		Kgs
2) Total Master Alloy		Kgs
3) Total Magnesium weight		Kgs
4) Total Silicon weight		Kgs
5) Total Iron weight		Kgs
6) Total Manganese weight		Kgs
7) Total Copper weight		Kgs
8) Total TiBAI addition		Kgs
9) Total Caster Slab		Kgs
10) Total Scrap weight		Kgs
11) Total Imported scrap weight		Kgs
12) Gross Total		Kgs

TOTAL PRODUCTION		KGS
------------------	--	-----

CASTER DAILY PRODUCTION:

Sr. No.	Date	Coil No.	Alloy	Thickness (MM)	Coil Width (MM)	Production (Kgs.)	Remarks

Prepared By:  
Cast House Supervisor

Approved by  
Cast House In charge

<b>JINDAL ALUMINIUM LIMITED ROLLING &amp; EXTRUSION DIVISION</b>	
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**CAST HOUSE PRODUCTION STATUS**  
**WITH RESPECT TO PRODUCTION PLANNING**  
 (Format No: JAL/R&E/CH/F/02)

Date .....

For the Month .....

Alloy	Coil Width (MM)	Thickness (MM)	Planned Qty (from Production) (In MT)	Actual Produced (by Cast House) (In MT)	End Use	Remarks

CAST HOUSE INCHARGE

RETENTION PERIOD: ONE MONTH

<b>JINDAL ALUMINIUM LIMITED</b>	
<b>ROLLING &amp; EXTRUSION DIVISION</b>	
<b>Rev No:00</b>	<b>Revision Date: 01.07.2017</b>

**DAILY PRODUCTION CASTER COIL**  
(Format No: JAL/R&E/CH/F/03)

Sr. No.	Date	Coil No.	Alloy	Thick (MM)	Coil Width (mm)	Prod. (Kgs)	REMARK	TIBAI (Kgs.)
						-		
						-		

RETENTION PERIOD: ONE YEAR

<b>JINDAL ALUMINIUM LIMITED</b>	
<b>ROLLING &amp; EXTRUSION DIVISION</b>	
<b>Rev No:00</b>	<b>Revision Date: 01.07.2017</b>

SPECTROMETER CHEMICAL ANALYSIS REPORT  
Format No: JAL/R&E/CH/F/04

Method: DATE-MONTH-YEAR HOUR: MINUTE

Comment: Al / Mn / Mg - Alloys copy Element concentration

Sample No: Grade: Tested by:

	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn
	%	%	%	%	%	%	%	%
1								
< x > (1)								
sd								
rsd								

	Ti	B	Be	Bi	Ca	Cd	Co	Ga
	%	%	%	%	%	%	%	%
1								
< x > (1)								
sd								
rsd								

	Hg	Li	Na	Pb	Sn	Sr	V	Zr
	%	%	%	%	%	%	%	%
1								
< x > (1)								
sd								
rsd								

	Al							
	%							
1								
< x > (1)								
sd								
rsd								

RETENTION PERIOD: ONE MONTH





<b>JINDAL ALUMINIUM LIMITED ROLLING &amp; EXTRUSION DIVISION</b>	
<b>Rev No:00</b>	<b>Revision Date: 01.07.2017</b>

**RAW MATERIAL INSPECTION REPORT**  
 (Other than Aluminium)  
*Format No: JAL/R&E/CH/F/06*

Date	Description of Material	Supplier	Inspection done	Observation	Inspection Status (Accepted/ Rejected)	Inspected by Cast House Supervisor	Approved by Cast House In charge	Remarks

RETENTION PERIOD: 1 Year



<b>JINDAL ALUMINIUM LIMITED ROLLING &amp; EXTRUSION DIVISION</b>	
<b>Rev No:00</b>	<b>Revision Date: 01.07.2017</b>

**CASTER PLANNING**  
Format No.JAL/R&E/CH/F/08

CASTOR NO. :

Date of operation	Alloy	Thickness ( in mm )	Width ( in mm )	Qty ( in MT )	TRIMMED/ UNTRIMMED	END USE	REMARKS

PPC

QUALITY ASSURANCE

OSD

Cc To Quality

RETENTION PERIOD: ONE MONTH

<b>JINDAL ALUMINIUM LIMITED ROLLING &amp; EXTRUSION DIVISION</b>	
<b>Rev No:00</b>	<b>Revision Date: 01.07.2017</b>

**QUALITY OBJECTIVES MONITORING RECORD**

Format No. JAL/R&E/QMSC/F/01

- 1.0 Department:
- 2.0 Quality Objectives:
- 3.0 Reference Document:
- 4.0 Responsibility:

Sr. No.	Month	Target	Actual	Target period	Action Plan	Remarks

DEPT. HEAD

Retention Period: 3 Years

<b>JINDAL ALUMINIUM LIMITED ROLLING &amp; EXTRUSION DIVISION</b>	
<b>Rev No:00</b>	<b>Revision Date: 01.07.2017</b>

**NONCONFORMITY AND CORRECTIVE ACTIONS**  
As per clause number 10.2 of IS/ISO 9001 : 2015)  
(JAL/R&E/NCA/F/01)

NC & CA No.	DATE:	DEPARTMENT:
NON-CONFORMITY RELATED TO:		
i. PRODUCT <input type="checkbox"/>	iv MAINTENANCE <input type="checkbox"/>	
ii. PROCESS <input type="checkbox"/>	v OTHERS <input type="checkbox"/>	
iii RECORDS <input type="checkbox"/>		
DESCRIBE OF NON- CONFORMITY:		
ROOT CAUSE OF NON-CONFORMITY:		
CORRECTIONS:		
CORRECTIVE ACTION	RESPONSIBILITY	DATE OF COMPLETION
EFFECTIVENESS OF CORRECTIVE ACTION:		
Checked by:		Verified and Approved by:
		(Department Head)

**Retention period:** Until Nonconformity is closed and corrective action is implemented.  
CC: QMS COORDINATOR

<b>JINDAL ALUMINIUM LTD</b> <b>Rolling &amp; Extrusion Division</b>	
<b>Rev No: 00</b>	<b>Rev Date: 01.07.2017</b>

**EMPLOYEE DETAILS**

Format No. JAL/R&E/TRG/F/01

Div Code :	Dept. Code :	Staff Code :
Name :		Designation:
Sex :	D.O.B :	D.O.J. :

Educational Qualifications	Year	Current knowledge (Professional Training)	Year
Previous Experience			
Nature of Job		Duration	
Promotions		Year :	
Training & Additional knowledge			
Programme	Duration	Conducted By	Remarks

DEPT. HEAD

<b>JINDAL ALUMINIUM LTD</b> <b>Rolling &amp; Extrusion Division</b>	
<b>Rev No: 00</b>	<b>Rev Date: 01.07.2017</b>

**TRAINING NEEDS IDENTIFIED**

Format No. JAL/R&E/TRG/F/02

**DEPARTMENT:**

**PERIOD:**

Sl. No.	Name	Designation	Topic	Type of training	Source		Tentative Schedule
					Internal	external	

Prepared By

Approved By

Retention Period: One Year





<b>JINDAL ALUMINIUM LTD</b> <b>Rolling &amp; Extrusion Division</b>	
<b>Rev No: 00</b>	<b>Rev Date: 01.07.2017</b>

**REVIEW OF EFFECTIVENESS OF TRAINING**

Format No: JAL/TRG/F/04

**Department:**

SI No	Name	Topic	Effectiveness Criteria	Excellent	Good	Average	Poor	Date of Review	Sign of HOD
1			Job performance						
			Knowledge & Communication skill						
			Attitude						
2			Job performance						
			Knowledge & Communication skill						
			Attitude						
3			Job performance						
			Knowledge & Communication skill						
			Attitude						
4			Job performance						
			Knowledge & Communication skill						
			Attitude						
5			Job performance						
			Knowledge & Communication skill						
			Attitude						
6			Job performance						
			Knowledge & Communication skill						
			Attitude						
7			Job performance						
			Knowledge & Communication skill						
			Attitude						

Prepared By

Approved By

Note: Effectiveness of Training will be reviewed by concerned HOD after 2 months of training.

Retention Period: One Year