

JINDAL ALUMINIUM LIMITED ROLLING AND EXTRUSION DIVISION			
PROCEDURE FOR EXTRUSION FOUNDRY			
Doc.No.JAL/R&E/EFOU/PR/08		Title Page	
Issue #	Issue Date	Revision No.	Revision Date
B	01.07.2017	02	03/01/2019

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AMENDMENT RECORD

Amendment			Discard		Insert	
Sl. No.	Date	Description	Page No	Rev. No.	Page No.	Rev. No.
01	24.07.18	Anx-9 amended for homogenizing furnace process operation	15	00	15	01
02	03.01.19	Amended of format as mentioned below a) Casting & log inspection report. b) Water flow & start & end time.	--	00	--	01

	POSITION	SIGNATURE	DATE
Prepared by	EXTRUSION FDY MANAGER		
Verified by	QMS COORDINATOR		
Approved by	DGM(C)		

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1.0 PURPOSE

The purpose of this procedure is to produce Silicon, Manganese & Chromium Master Alloys for alloying liquid melt & to cast Aluminium logs & Aluminium Alloy logs as per JAL Standard No. JAL/STD/ 0003 for extrusion purpose.

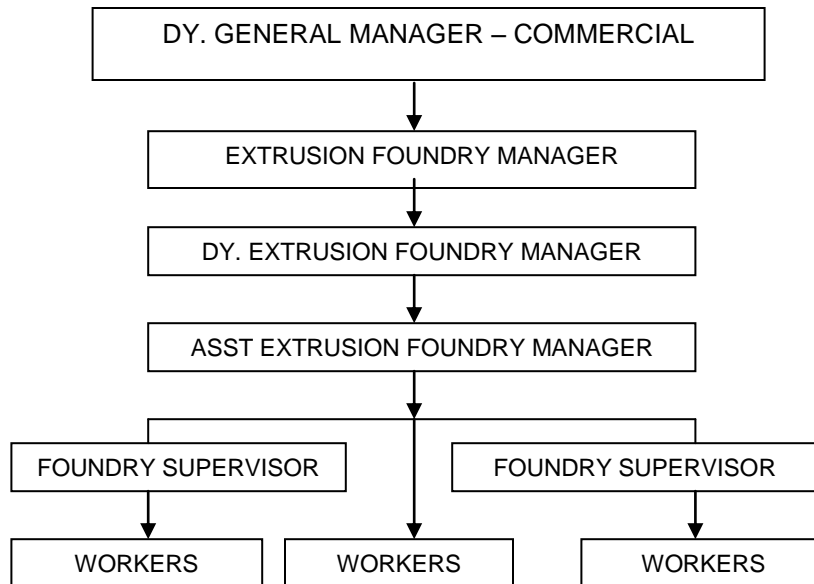
1.1 OBJECTIVES

- To reduce composition deviation in A5S alloy for Magnesium
- To reduce composition deviation in A5S alloy Silicon elements.
- To reduce furnace Oil/LNG consumption Per ton of logs production

2.0 SCOPE (Cl: 8.1 of IS/ISO-9001:2015 – Operational planning and control and 8.5 of IS/ISO-9001:2015 - Production & Service Provision)
To supply alloy logs to Production Department.

3.0 DEPARTMENT FUNCTIONAL CHART:

Organizational roles, responsibilities and authorities (Cl: 5.3 of IS/ISO-9001:2015)



3.1 RESPONSIBILITY & AUTHORITY

3.1.1 EXTRUSION FOUNDRY MANAGER / Dy. Manager-FOU / Asst. Manager-FOU

- a) Reporting to DGM (C) and be responsible for planning of routine production, maintenance, in-process inspection & raw material inspection.
- b) To review various alloys developed in the Foundry and see that they conform to properties.
- c) To see that maximum economy is achieved in Foundry

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- d) Educating the staff on safety requirements.
- e) Maintaining quality records.
- f) Educate the Supervisors on implementation of Quality Management System.
- g) To propose corrective and preventive action for the non-conformities.

3.1.2 Foundry Supervisors (FS)

- a) Reporting to FM / Dy. FM / AFM and be responsible for carrying out routine production process, inspecting raw material and in-process inspection of the logs produced.
- b) Responsible to plan the departmental related preventive maintenance works in coordination with Maintenance department.
- c) To follow the instruction of Extrusion Foundry Manager / Foundry Manager / Asst. Foundry Manager and also instruct routine works to workers.

3.1.3 Foundry Workers

To carry out the Foundry in-process works and also follows the instruction of Extrusion Foundry Manager/ Asst. Extrusion Foundry Manager & Foundry Supervisors.

4.0 REFERENCES: JAL/STD/0003

4.1 INTERFACE:

Extrusion Production,
Extrusion QA Dept,
Maintenance,
Purchase,
Stores and
Personnel department

5.0 DEFINITIONS:

- 5.1 **Logs:** A relatively long casting made by direct chill casting process.
- 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 composition, which will help easy dissolution of alloying element in molten Aluminium. In our case, the composition of Silicon, Manganese & Chromium is the Master alloy.
- 5.5 **DC Casting:** The method used to produce logs of various diameters and length for further processing in extrusion.

If any minor deviation is observed from standard (i.e., deviation within IS specification or from JAL Standard No. JAL/STD/0003, can be accepted after approval from AGM (QA). Material is rejected if any major deviation (deviation outside the IS and JAL standard specification) is noticed.

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5.7 **Abbreviations:**

- a) CRMA - Chromium Master Alloy
- b) MNMA - Manganese Master Alloy
- c) SIMA - Silicon Master Alloy
- d) EC - Electrical Conductivity
- e) TIBAL - Titanium-Boron-Aluminium
- f) HTC – Hot Top Casting

6.0 **INPUTS**

Raw Materials
Alloying Element
Internal specification
Standard for chemical composition of ALUMINIUM alloys.

7.0 **OUTPUTS**

ALUMINIUM Logs for extrusion.

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 Foundry Department is responsible for

- a) Receiving and inspection of raw material & production consumables.
- b) Melting and casting of Aluminium alloy logs for the specified compositions.
- c) In-process inspection of products produced in the Foundry.

9.1 **RECEIVING INSPECTION**

The raw material and consumables are inspected / accepted by the Department on receipt in the premises. A list of products with purchasing data and the acceptance criteria is given at Annexure JAL/R&E/EFOU/ANX/01. Products are used for production, only after the acceptance by the concerned authorities.

The details of inspection of Aluminium ingots from NALCO, VEDANTA, HINDALCO & BALCO & imported aluminium logs are maintained in Format No.JAL/R&E/EFOU/F/07 and for the incoming inspection is maintained as per JAL/R&E/EFOU/F/08 for Furnace Oil and for LPG by Utility department and the details of other raw material & consumables are maintained in Format No. JAL/R&E/EFOU/F/06.

a) Production Planning

The production plan for the month is received by the Extrusion Foundry Manager from the Production Manager as per JAL/R&E/EPRN/F/12. Based on the plan, Extrusion Foundry Manager arranges for production of logs and at end of the month updates the actual produced in the format JAL/R&E/EFOU/F/03.

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b) Process Control

Flow Chart for the process is given in the Quality Plan.

The melting furnace is charged with ALUMINIUM ingots, ALUMINIUM scrap and master alloy. The master alloy is in three grades as per the following specifications:

SLNo.	Alloy	Range
1	AlSi	Si. = 10 – 13%
2	AlMn	Mn. = 8 - 11%
3	AlCr	Cr. = 1.5 – 2.5%

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

Grain Refiner Rods / Nitrogen Gas is added for treatment of the melt to ensure non-porous fine grain cast logs. The degassing procedure is given as per Work Instructions (JAL/R&E/EFOU/ANX/04). Cover Flux is added to ensure that the dross is in liquid form with minimum percentage of metal.

A sample called 'X' sample is taken from the holding furnace to verify the chemical composition. Any adjustments for composition are carried out by addition of required metal based on the chemical composition of 'X' sample.

A sample identified as 'Y' sample is taken after adjustment of composition to ensure that the final composition is as per specified requirements.

Temperature of liquid alloy before starting of drop should be 690°C to 730°C and casting speed 55 mm to 125 mm/min. Factors affecting the casting speed are temperature of melt, alloy & water flow in the mould.

Drop analysis of melt is taken as Z & ZT samples. Z samples are taken at a height of 0.5 to 1.0 Meter whereas, ZT samples are taken at a height of 5.0 Meters to 6.0 Meters during casting.

After Z & ZT samples are checked, the logs are marked with alloy and batch number.

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

The cast logs are inspected for -

- a) Bends
- b) Star cracks
- c) Surface finish

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

Defective portion of logs are identified with 'X' mark in red paint and the same is cut and sent for re-melting.

If any material 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 batch is accepted. If the sample is not conforming to the requirement, the batch is re-graded or accepted under deviation by Q.A. Department. The details of re-grading are entered in the format JAL/R&E/EQA/F/04 by the QAM. The accepted material will be marked with batch number and internal alloy code. Copy of re-grading in format No. JAL/R&E/EQA/F/04 to be sent to Foundry.

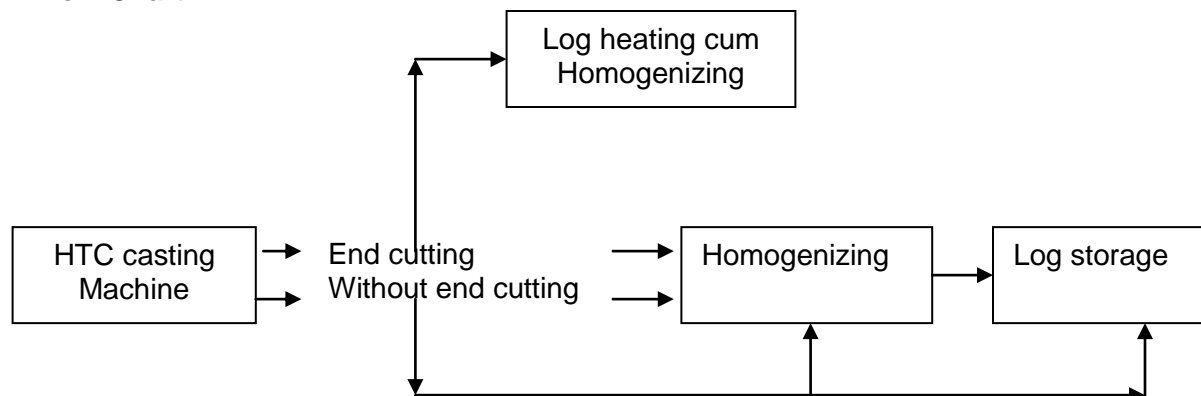
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QUALITY PLAN

Sequence	Quality Control	Documentation	Sampling Frequency
<pre> graph TD A[Raw Material Receipt] --> B[Inspection] B --> C[Reject] B --> D[Storage with Identification] D --> E[Aluminium ingots, scrap, Silicon master alloy charged in Melting furnace.] E --> F[Addition of all required alloying elements & grain refiner, flux, degasser & dross skimming in holding furnace.] F --> G[DC Casting] G --> H[Homogenizing] H --> I[Log Identification and Inspection] </pre>	<p>Visual Inspection. Spectrovac chemical analysis with supplier's standard & test certificate.</p> <p>Pre-calculated amount of Master Alloy addition.</p> <p>Analysis of X & Y samples.</p> <p>Drop analysis of Z & ZT samples per cast during casting.</p> <p>a) Visual inspection before transfer for extrusion process. b) Identification mark of alloy with Batch No. c) In-process inspection for quality like bend star crack. Surface finish, etc. e) Ultrasonic inspection for cracks for log size P3, P6, 12" and Special alloy (for future).</p>	<p>1) Analysis report from supplier. 2) Spectrometer analysis</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&E/EFOU/F/01.</p> <p>Spectrometer analysis.</p> <p>Spectrometer analysis (Ref: JAL/R&E/EQA/F/04)</p> <p>Format No. JAL/R&E/EFOU/F/05.</p> <p>Shall be written using chalk on all logs. Ref: Format No. JAL/R&E/EFOU/F/05</p> <p>Ref: JAL/R&E/EQA/F/10</p>	<p>Refer JAL/R&E/EFOU/ANX/02</p> <p>Whenever material received.</p> <p>All batches.</p> <p>-</p> <p>Two samples.</p> <p>All batches.</p> <p>100% of logs of all special alloys (SS, HE30-, 6082, AE305, 6061, 6005, 3103SU, EC, 3003</p>

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9.1.1 Flow Chart:



9.1.2 Casting speed for log casting (mm/min):

Alloy	DP1	DP2	DP3	DP4	DP5
Common alloy	100-120	100-120	90 – 120	90 – 120	
EC	-	80-110	90 – 120	90 – 120	
Special alloy	-	80-100	80 – 100	80 – 100	

9.2 Other processes

9.2.1 Handling of Ingot, Log, Scrap, Boring and Dross:

This section covers the movement of Aluminium logs from the foundry units to the log heating furnaces. This is carried out by trained personnel by means of cranes and fixtures. The logs are loaded on the platform of the log heating furnace by the above method.

9.2.2 Handling of Scrap: Bundled scrap, which is kept in trolley, shall be brought near the charging area of melting furnace. Likewise, bailed scrap shall be transferred to charging area manually as well as with the help of trolley. Loose scrap shall be made available near melting furnace by transporting through trolleys. Above scrap shall be charged in the furnace by transferring it manually as well as with the help of crane and using charging machine.

9.2.3 Handling of Boring: Boring generated during log end cutting shall be handed over to contractor for aluminium recycling.

9.2.4 Handling of Dross: After removing hot dross from holding and melting furnace, it is transferred to dross handling area and spread for cooling. After segregation of big metallic aluminium lumps, the dross is handed over to contractor for recycling.

9.2.5 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 and trolley, followed by charging with the help of charging machine.

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9.2.6 Handling of Ingots.

Ingots, which are received from suppliers like NALCO, BALCO, INDALCO, VEDANTA & impored, have weight of 18Kgs to 22 Kgs per piece. These ingots are unloaded manually inside or outside the factory depending upon the space availability. While Unloading, arrange the ingots in the form of stacks. The Stacks, which are arranged in Foundry 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 machine and manually if charged in holding furnace. The ingots, which are lying outside foundry, shall be brought inside with the help of trolley manually or by Jumbo.

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

9.2.7 Handling of Magnesium & Silicon Metal

These are received in Stores directly. As and when required, it will be drawn from Stores against issue slip.

9.2.8 Handling of logs

After casting is over, logs in the casting pit are lifted with the help of crane and transferred to log and cutting stand. Use steel chain while lifting the Logs. After cutting its ends, logs should be rolled on next platform from which these logs can be removed with the help of crane. Such end cut logs can directly be shifted to log heating furnace platform or stacked on desired area.

9.2.9 Master alloy furnace (Wesman make) 1.5 MT capacity - procedure for operation, holding temperature and other check points: (For future requirement)

- a) The operator must take care that in a day 6 drops should come if silicon master alloy is only made. In case of other alloys, drop to drop timings should be within 5 1/2 hours. Oil consumption has to be maintained at 100 litres/ton for master alloys. Raw material should be kept ready before charging so that there will not be any wastage of time. Burners must be cleaned at least once a week by the operators. This will be checked by the supervisors. Furnace oil temperature should be monitored on a continuous basis.
- b) Casting to casting time:
 - (i) Silicon master alloy - 4 hours
 - (ii) Manganese, chromium and copper - 5 1/2 hours
- c) Quality Check Points:
 01. Master alloy: Proper mixing of alloying elements, proper numbering, marking with colour code of batch number and checking of chemical composition in Spectrovac.
CRMA – Yellow;
MNMA – Red;
SIMA - Black
 02. Logs:
 - (a) Batch number and internal alloy to be written on each & every log after removal from casting pit.
 - (b) Visual inspection of logs should be done for any star-crack.
 - (c) Composition should be checked and kept under strict control by using Spectrovac.
 - (d) Surface finish of logs should be excellent.
 - (e) In case of bent logs or short length logs, make cut billets in required size and send directly to presses. To inform Production Manager accordingly.

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9.2.10 Standardization:

Oil & consumables (for guidelines only and when only ingots are used)

01. Furnace oil/LNG consumption per ton of logs production: 60 litres
(Average per month) (Variation up to 2 litres is allowed)
02. LPG consumption per ton of log production in Homogenizing furnace: 24 kgs
03. LNG consumption per ton of log production in Homogenizing furnace: 1.35 mmbtu
04. Consumption of titanium/boron master alloy (per ton of production):

Press	Alloy	Addition of Tibal in Kgs Per ton of Prdn
DP1/DP2	HE9	1.5
DP3	Special	3.0
DP3	EC/A3L	Nil
DP3	HE9	2.0
DP4	HE9	1.5

Note: For making 8" & 11" logs for Bangalore factory, the consumption pattern will have to be worked out.

05. Consumption of cover flux/ton of log production: 0.5 to 1.0 kg
06. Consumption of ceramic foam filter per drop - 1 piece
07. Standardization of log length:
For all presses long length – 5.70 to 6.05 Mtrs. For JAL Supplied logs 8" & 11" diameter Log length to be 4.3 to 4.55 Mtr._EXCEPTION: Length can be different in case of special alloy production, power failure during casting, last drop of week-end at the closure of foundry and before production of EC grade casting. Special requirement of Production department.
08. Percentage of Scrap:
The following are the guidelines for using external scrap:
 - a) For electric conductivity grade, no scrap to be used.
 - b) For anodizing quality, not more than 20% external scrap should be used.
 - c) For commercial alloys, the percentage of external scrap should not exceed 50% of the total charge. Any deviation in the above shall be approved by DGM (C).

9.2.11 Homogenizing Procedure

The logs are fed to the homogenizing furnace by controlled speed as per Annexure JAL/R&E/EFOU/ANX/03. This process is done to achieve uniform mechanical properties throughout the log. There are two types of operation: single furnace and double furnace operation. The log movement is slow in single furnace operation compared to double furnace operation. The logs are preheated first to the required temperature. The preheating is done in one stage with single furnace operation and two stages in double furnace operation.

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After preheating is done, the logs are soaked in two-stage soaking process. The temperatures vary for different types of grades. We have capacity for 50 logs (irrespective of grade) inside the single furnace operation at any point of time and for the double furnace operation we have the following capacity with respect to various grades at any point of time apart from 50 logs in single furnace:

DP1 & DP2 – 120 Logs;
DP3 – 60 Logs;
DP4 – 84 logs
P3/8"-48 logs (For JAL B/F)
P6/11"-24 logs(For JAL B/F)

The temperature of the furnace is PLC controlled and the log temperature is maintained between 565 - 580°C for common alloy and 545 - 560°C for special alloys as indicated in Annexure: JAL/R&E/EFOU/ANX/03.

10.0 PROCESS MONITORING

- Raw material on receipt is inspected as per standards and accepted material are 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 log is done for any bend, cracks, surface finish, etc.

Documented Instruction JAL/R&E/EFOU/ANX/01 addresses the instructions to be followed.

Documented Instruction JAL/R&E/EFOU/ANX/02 addresses sampling frequency of raw material.

11.0 TRACEABILITY

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

12.0 SAFETY AND ENVIRONMENTAL REQUIREMENTS

The following safety requirements are to be followed in the Foundry:

- 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.
- d) Use facemask and hand gloves during charging ingots in melting furnace and while casting logs.
- 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.

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13.0 CONTROL OF NONCONFORMING OUTPUTS:

The Non conforming outputs in the Extrusion Foundry like off composition, defective logs etc. are segregated and disposal action is taken as per following formats:
In process Inspection Report in format JAL/R&E/EFOU/F/05.

14.0 NON CONFORMITY AND CORRECTIVE ACTION:

The Non conformities in the foundry like bend logs, star cracks etc are segregated and disposal action is taken as mentioned below:

- a) Bend logs are cut to get straight billet and accepted.
- b) Logs with star cracks are kept separately and will be used with hollow dies.
- c) Logs are accepted for surface finish with respect to visual inspection.

Inspection details are maintained in Format No. JAL/R&E/EFOU/F/05

The non-conformities are analysed 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 details are recorded in Format No.JAL/R&E/NCA/F/01.

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 (The data to be furnished by EQA department):

Mg, Si - One sample for 20 consecutive days in three months average 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 dept may use outsourced manpower for various jobs in the dept. The outsourced persons will be given on the job training by the dept. The records of such training will be maintained in format no. JAL/R&E/TRG/F/04. The job performed by the outsourced persons will be controlled and supervised by dept. staff. Dept. head is responsible to ensure that the outsourced persons are given the necessary training to enable them to carry out their job in line with the quality requirements.

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 records is shown in the Annexure No JAL/R&E/EFOU/ANX/04 & maintained by HOD. Competency chart is shown in the Annexure No JAL/R&E/EFOU/ANX/07.

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ACCEPTANCE OF CRITERIA

Sl. No.	Description of Material	Purchasing Data	Acceptance Criteria	Remarks
01.	Aluminium Ingots	CG Grade 99% EC Grade 99.5%	Conformance to the composition as per specification of supplier's contract	Sampling as per Annexure JAL/R&E/EFOU/ANX/02
02.	Aluminium Scrap	Scrap of any one of the alloys: a) 1200 b) 6061 c) 6063 d) 6082 e) 5052 f) 5086	Conformance to the composition as per BS 1474.	Sampling as per Annexure JAL/R&E/EFOU/ANX/02
03.	Aluminium Logs	Logs of any one of the alloys: a) EC b) 6063 c) 6061 d) 6351	Conformance to the composition as per BS 1474	Sampling as per JAL/R&E/EFOU/ANX/02
04.	Magnesium	Mg. 99.5%	Accepted against supplier's test certificate	Magnesium 99.5% Min. Format No.: JAL/R&E/EFOU/F/06
05.	Silicon	Si. Purity 98%	Accepted against supplier's test certificate	Si. 98% Min. Format No.: JAL/R&E/EFOU/F/06
06.	Cover Flux	---	Dross Quality-checked visually.	Inspection Report on Format No. JAL/R&E/EFOU/F/06

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ACCEPTANCE CRITERIA (Continued...)

Sl. No.	Description of Material	Purchasing Data	Acceptance Criteria	Remarks
08.	Electro-Manganese	99% Purity	Accepted against Test Certificate of the Supplier / our Lab analysis	Refer Format No. JAL/R&E/EFOU/F/06
09.	Alumina Shield Bricks	Alumina 60%	Samples checked for chemical analysis for acceptance in any outside laboratories.	Refer Format No. JAL/R&E/EFOU/F/06
10.	Fire Clay	---	Free from lumps	Refer Format No. JAL/R&E/EFOU/F/06
11.	Furnace Oil	IS 1593:1960	a) Specific gravity 0.9 to 0.98 checked by Gravity Meter b) Water content up to 1%	Refer Format No. JAL/R&E/EFOU/F/08
12.	Titanium-Boron Master Alloy	Titanium 4.5 to 5.5% & Boron 0.8 to 1.2%	Accepted against supplier's certificate.	Refer Format No. JAL/R&E/EFOU/F/06
14.	Nitrogen Gas	20 PPM Max	Own generation. PPM gauge is available to measure.	---

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SAMPLING FREQUENCY OF RAW MATERIAL:

I Aluminium, Silicon, Magnesium, Manganese, Copper & Chromium:

01. Visual Inspection: To inspect for dross / other entrapment embedded on surface of ingots.

02. Selection of Aluminium Ingots / Aluminium Logs for Analysis:

Aluminium ingots are accepted based on supplier Test Certificate. Aluminium logs will be analyzed at the rate of one sample per lorry load if test certificate is received. Aluminium ingots and logs will be analyzed two samples from each lorry load if test certificate is not received.

If any of the ingots are received without any identification of heat number or grade, then the grade will be marked by referring to the Test Certificate.

03. Material received without Test Certificate or Test Certificate may be used if internal test results conform to specification as per supplier's contract. 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 or can be accepted after approval from General Manager (Operations) / Joint Managing Director. Material accepted under deviation will be diluted with high purity of Aluminium Ingots to achieve the required specification and then it will be used.

04. Ingots marked 'NOT CLEARED' should not be used until it is cleared by Stores.

05. Ingots from NALCO will be randomly checked @ 2 samples/week & ingots from VEDANTA will be checked @ 1 sample/week.

II. FUEL (FURANCE OIL):

First Check:

Truck:

01. Check the calibration certification & calibration due date for the truck.
02. Measure the oil level with dipstick of the truck as mentioned in the calibration report.
03. Verify whether oil level of each tank matches with the respective mark of the dipstick.
04. Verify whether the valves are properly sealed.

These checks are to be carried out in the presence of Stores Personnel and the quantity must be certified. The details of the inspection are recorded in the format JAL/R&E/EFOU/F/08.

III. Composition of main alloying elements has been mentioned in JAL Standard No. JAL/STD/0003.

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Log Exit Temperature Alloy - HE9/E91E/6063/6101 -- 565-580 DegC

Log Exit temperature - Alloy - HE30/6082/6351 --- 545-560 DegC

Homogenizing-1 (Double Furnace Operation)						
Log Dia	Pre-Heating		Soaking		STD Log Exit Time	Total Cycle Hours
	No of Logs	Time	No of Logs	Time		
7" (HE9)	35	3:13 min	50	4:34 min	5.5 min	7 Hrs 47 min
7"(SPL Alloy)	35	3:47 min	50	5:26 min	6.5 min	9 hrs 13 min
6"	38	2:51 min	50	3:45 min	4.5 min	6 Hrs 36 min
5"	42	2:06 min	50	2:30 min	3.0 min	4 Hrs 36 min

Homogenizing-1 (Single Furnace Operation)						
Log Dia	Pre-Heating		Soaking		STD Log Exit Time	Total Cycle Hours
	No of Logs	Time	No of Logs	Time		
7" (HE9)	15	1:38 min	35	3.47 min	6.5	5 Hrs 25 min
7" (SPL Alloy)	15	1:45 min	35	4.05 min	7	5 Hrs 50 min
6"	15	1:15 min	35	2.55 min	5	4 Hrs 10 min
5"	15	1:00 min	35	2.20 min	4	3 Hrs 20 min

Homogenizing-2 (Double Furnace Operation)						
Log Dia	Pre-Heating		Soaking		STD Log Exit Time	Total Cycle Hours
	No of Logs	Time	No of Logs	Time		
8" (HE9)	28	2:48 min	44	4:24 min	6 min	7 Hrs 12 min
8" (SPL Alloy)	28	3:16 min	44	5:08 min	7 min	8 Hrs 24 min
7" (HE9)	33	3:01 min	44	4:03 min	5.5 min	7 Hrs 04 min
7" (SPL Alloy)	33	3:34min	44	4:46 min	6.5 min	8 Hrs 20 min
6"	36	2:42 min	44	3:18 min	4.5 min	6 Hrs 00 min
5"	40	2:00 min	44	2:12 min	3:0 min	4 Hrs 12 min

Homogenizing-2 Single Furnace Operation						
Log Dia	Pre-Heating		Soaking		STD Log Exit Time	Total Cycle Hours
	No of Logs	Time	No of Logs	Time		
8" (HE9)	12	1:36 min	32	6:14 min	8 min	5:52 min
8" (SPL Alloy)	12	1:48 min	32	4:48 min	9 min	6:36 min
7" (HE9)	12	1:18 min	32	3:28 min	6.5 min	4:46 min
7" (SPL Alloy)	12	1:30 min	32	4:00 min	7.5 min	5:30 min
6"	12	1:00 min	32	2:40 min	5 min	3:40 min
5"	12	0:48 min	32	2:08 min	4 min	2:56 min

JINDAL ALUMINIUM LIMITED (ROLLING & EXTRUSION DIVISION)			
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LIST OF RECORDS

Type of Records	Format Reference	Responsible Person	Retention Period
a. Melt Record	JAL/R&E/EFOU/F/01	} Foundry Manager	3 months
b. Master Alloy	JAL/R&E/EFOU/F/02		3 months
c. FOU Prdn Status with respect to Prdn PIng	JAL/R&E/EFOU/F/03		3 months
d. Chemical Composition Report	JAL/R&E/EQA/F/04		6 months
e. In process Inspection Report	JAL/R&E/EFOU/F/05		3 months
f. Material Inspection Report	JAL/R&E/EFOU/F/06		6 months
g. Aluminum Raw Material Inspection	JAL/R&E/EFOU/F/07		6 months
h. Furnace oil inspection record	JAL/R&E/EFOU/F/08		6 months
j. Quality Objectives monitoring record	JAL/R&E/QMSC/F/01		3 years
k) Nonconformity and corrective actions.	JAL/R&E/NCA/F/01		Till NC is implemented

TRAINING RECORDS

Type of Records	Format Reference	Responsible Person	Retention Period
a. Employee details	JAL/R&E/TRG/F/01	} HOD	Till end of services
b. Training needs identified	JAL/R&E/TRG/F/02		1 Year
c. Record of Training Imparted	JAL/R&E/TRG/F/03		1 year
d. Review of Effectiveness of Training	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.

		JINDAL ALUMINIUM LIMITED (ROLLING & EXTRUSION DIVISION)		
TITLE: PROCEDURE FOR EXTRUSION FOUNDRY				
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Registers

Sl. No.	Name of the Register	Prepared by	Approved by	Circulated to	Remarks
01	Melt Record	Foundry Supervisor	EFM	-	Daily (whenever cast)
02	Furnace Oil Register	-do-	EFM	DGM(P)/ GM(Tech) / VC	Monthly
03	Breakdown and Maintenance Register	-do-	EFM	DGM(P) / GM(Tech) / VC / Sr.Mgr.(M)	Weekly
04	Monthly Production Report	-do-	EFM	DGM(P)/ GM(Tech) / VC	Monthly
05	In-process Inspection Report	-do-	EFM	-	Daily (whenever logs are cut)
06	Raw Material Inspection Report	-do-	EFM	-	Daily (whenever raw material is inspected)

JINDAL ALUMINIUM LIMITED (ROLLING & EXTRUSION DIVISION)			
TITLE: PROCEDURE FOR EXTRUSION FOUNDRY			
Doc.No.: JAL/R&E/EFOU/ANX/06	Rev. No.: 00	Date : 01.07.2017	Page # 18

TITLE-STANDARD FOR CHEMICAL COMPOSITION OF ALUMINIUM ALLOYS

DOC NO:JAL/STD/003

ISSUE:29

DATE: 06/10/2016

INT CODE	EQUIVALENT ALLOY	Mg%	Si%	Mn%	Fe%	Cu%	Zn%	Ti%	Cr%	Pb%	Bi%	Al%	REMARKS
A2S-DP1	6360 /6060 / 63400/HE9	0.32-0.35	0.43-0.47	0.02-0.05	0.1-0.25	0.05	0.05	0.05	-	-	-	-	Very light sections with 0.50mm W.Thk without scrap
A2S		0.32-0.35	0.46-0.50	0.02-0.05	0.1-0.3	0.05	0.05	0.05	-	-	-	-	Very light sections square tube 0.70mm W.Thk without scrap
A2R		0.32-0.35	0.46-0.50	0.02-0.05	0.1-0.25	0.05	0.05	0.05	-	-	-	-	Very light sections square tube 0.70mm W.Thk (Virgin metal)
A2S SPL		0.32-0.36	0.32-0.36	0.02-0.05	0.1-0.3	0.05	0.05	0.05	-	-	-	-	Special alloy for cold drawing(to make pens) for Akash Extrusions. No imported scrap addition.
A3S		0.42-0.45	0.38-0.42	0.02-0.05	0.1-0.3	0.05	0.10	0.05	-	-	-	-	For irrigation tubes (light/medium) and window sections
A3		0.35-0.39	0.47-0.51	0.02-0.05	0.1-0.3	0.05	0.10	0.05	-	-	-	-	For lighter sections up to 2 mm on P6 Extrusion Press.
A3D		0.39-0.42	0.40-0.43	0.02-0.08	0.1-0.3	0.05	0.06	0.05	-	-	-	-	With imported scrap for tower bolt, rod for dealers anodizing quality
A3L	63401(E91E)	0.42-0.46	0.33-0.37	0.02	0.20	0.01	0.01	0.01	-	-	-	-	Use 100% ingots and no Tibal. Bus bars for electrical applications.
A5L	63401(E91E)	0.49-0.53	0.42-0.46	0.02	0.20	0.01	0.01	0.01	-	-	-	-	Use 100% ingots and no Tibal. Used for IPS Round tubes for electrical applications.
A5L SPL	63401(E91E)	0.50-0.54	0.42-0.46	0.01	0.20	0.01	0.01	0.01	-	-	-	-	For Power grid tubes Use 100% ingots and no Tibal. Add boron master alloy 50Kg/heat
6101	63401(E91E)	0.46-0.5	0.36-0.40	0.02	0.20	0.02	0.01	0.01	-	-	-	-	Use 100% ingots and no Tibal. Add boron master alloy 25Kg/heat
A5	6063/ 63400/ HE9	0.46-0.50	0.40-0.44	0.03-0.07	0.35	0.05	0.10	0.05	-	-	-	-	For good surface finish & below 25 mm rods.
A5S		0.46-0.50	0.40-0.44	0.03-0.06	0.25	0.03	0.03	0.05	-	-	-	-	For good surface finish & anodizing quality < 25 mm thickness.
A5ST		0.46-0.50	0.40-0.44	0.03-0.05	0.22	0.03	0.02	0.05	-	-	-	-	Use 100% ingots only. For Tata BP Solar - anodizing quality.
6106	6106	0.52-0.55	0.43-0.46	0.06-0.10	0.30	0.05	0.05	0.05	0.10	-	-	-	
6063A	6063A	0.6-0.65	0.5-0.55	0.10	0.15-0.25	0.05	0.05	0.05	0.02	-	-	-	

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6063	6063 /63400 / HE9	0.46-0.5	0.5-0.53	0.08	0.32	0.05	0.05	0.05	0.05	-	-	-	
6063D	63400(HE9)	0.46-0.5	0.5-0.53	0.25	0.40	0.10	0.10	0.05	0.05	-	-	-	For dealer HE 9 orders only
HE15	24345 (2014)	0.50-0.60	0.95-1.05	0.60-0.75	0.40	4.2-4.35	0.10	0.05	0.10	-	-	-	Heavy Duty Rods, Bars for Aircraft and Difence applications.
HE20	65032 / 6261	0.70-0.80	0.68-0.73	0.25-0.32	0.40	0.15-0.25	0.10	0.05	0.10	-	-	-	For Ladder Sections.
HE20 S	65032 / 6261	0.70-0.85	0.80-1.00	0.40-0.50	0.40	0.15-0.30	0.10	0.05	0.10	-	-	-	Special grade for Cooker Patti.
HE20SU	65032 / 6261	0.70-0.80	0.68-0.73	0.25-0.32	0.40	0.15-0.25	0.10	0.05	0.10	-	-	-	No scrap addtion
HE30 S	6351/64430	0.68-0.78	0.95-1.05	0.50-0.60	0.40	0.05-0.07	0.10	0.05	-	-	-	-	For Hollow Sections & round rods below 30mm
HE30	64430 (6082)	0.90-0.98	1.08-1.15	0.54-0.65	0.40	0.05-0.07	0.10	0.05	-	-	-	-	For Pump Body, Round Rod and Square Bars
HE30 H	64430 (6082)	0.8-0.85	0.88-0.93	0.45-0.52	0.30	0.04-0.08	0.10	0.05	-	-	-	-	For M/s Hema Pump Body & Hollow profiles, No imported scrap
6082H	64430 (6082)	0.73-0.78	0.85-0.9	0.47-0.52	0.30	0.04-0.08	0.10	0.05	-	-	-	-	For M/s Hema Pump Body & Hollow profiles, No imported scrap
6082	64430 (6082)	0.61-0.67	0.88-0.96	0.44-0.5	0.40	0.04-0.08	0.10	0.05	-	-	-	-	
HE30M	64430 (6082)	0.97-1.02	1.1-1.2	0.65-0.75	0.25	0.05-0.09	0.10	0.05	-	-	-	-	For Mivin
6351	64430 (6082)	0.52-0.56	0.77-0.85	0.42-0.48	0.50	0.07-0.1	0.10	0.05	-	-	-	-	For Cooker patti
6005	6005,	0.45-0.60	0.74-0.85	0.06-0.08	0.30	0.05-0.08	0.07	0.05	0.03-0.06	-	-	-	
6005A	6005, 6005A	0.45-0.60	0.74-0.85	0.06-0.09	0.30	0.05-0.1	0.07	0.05	0.06-0.09	-	-	-	Mn+Cr > 0.13
6061	6061	0.87-1.0	0.66-0.72	0.08-0.12	0.40	0.20-0.35	0.10	0.05	0.10-0.17	-	-	-	For Flat Bars. hexagonal & round rods
6061P	6061	0.93-1	0.68-0.75	0.08-0.12	0.35	0.25-0.3	0.10	0.05	0.06-0.1	-	-	-	For Prithvi metals. No Imported scrap.
6061A	6061	0.87-1.0	0.69-0.73	0.08-0.12	0.25	0.19-0.28	0.10	0.05	0.10-0.17	0	0	-	For Alcan Exports. Use 100% Ingots
6262	6262	0.96-1.02	0.66-0.72	0.08-0.12	0.40	0.25-0.32	0.20	0.10	0.06-0.10	0.45-0.50	0.50-0.55	-	For hexagonal & round rods for free cutting applications.
64423	64423	0.8-0.9	0.95-1.03	0.6-0.7	0.26	0.7-0.8	-	-	-	-	-	-	Special grade for free machining quality rods

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INT CODE	EQUIVALENT ALLOY	Mg%	Si%	Mn%	Fe%	Cu%	Zn%	Ti%	Cr%	Pb%	Bi%	Al%	REMARKS
EC99.5	1050 (19500/1)	0.03	0.15	0.02	0.30	0.02	0.01	0.01	-	-	-	99.5	No Tibal Addition
EC99.6	1060 (19600)	0.02	0.15	0.02	0.25	0.02	0.02	0.01	-	-	-	99.6	No Tibal Addition.
EC99.7	1070 (19700)	0.02	0.15	0.01	0.20	0.02	0.02	0.01	-	-	-	99.7	No Tibal Addition.
EC spl	1070	0.01	0.10	0.01	0.15	0.01	0.01	0.01	0.005	-	-	99.7	Vanadium 0.01 % max. No Tibal Addition. Aluminium purity 99.7% Minimum (Electrical Application) Boron 50 Kg/heat P3/P6, 25 Kg/heat for other press
1350	1350	0.01	0.08	0.008	0.15	0.01	0.01	0.01	0.005	-	-	99.7	Vanadium 0.01 % max. No Tibal Addition. Aluminium purity 99.7% Minimum (Electrical Application) Boron 50 Kg/heat P3/P6, 25 Kg/heat for other press
1100	19000	0.05	0.15- 0.20	0.03	0.35- 0.45	0.07- 0.10	0.10	0.02	0.10	-	-	99.0	
NE4	52000	1.80- 2.10	0.30- 0.40	0.15- 0.22	0.40	0.05	0.10	0.10	0.10	-	-	-	
NE5	53000	2.90- 3.20	0.30- 0.40	0.15- 0.22	0.40	0.05	0.10	0.10	0.10	-	-	-	
5086	5086	3.60- 3.75	0.30	0.40- 0.50	0.35	0.05	0.10	0.10	0.07- 0.12	-	-	-	
5454	AlMg3Mn	2.55- 2.63	0.20	0.58- 0.65	0.25	0.05	0.10	0.10	0.06- 0.08	-	-	-	
3804	DA3804	1.40- 1.50	0.13- 0.16	0.88- 0.93	0.43- 0.49	0.12- 0.17	0.05	0.05	0.04- 0.06	-	-	-	Special alloy as per M/s Subros Specification.
8011 A	8011	0.05	0.55- 0.60	0.05	0.55- 0.60	0.05	0.05	0.03	0.05	-	-	-	
3003	31000	0.05	0.15- 0.20	0.87- 0.95	0.40	0.06- 0.10	0.10	0.10	0.10	-	-	-	
3103	EN AW3103	0.10	0.15- 0.20	0.92- 0.97	0.40	0.05	0.10	0.05	0.05	-	-	-	
3103SU	3103Subros	0.03	0.52- 0.57	1.05- 1.15	0.25	0.45- 0.52	0.05	0.03	0.01	-	-	-	Special Customer alloy for Subros and Global autotech. Aim on lower side of range.
7075	7075	2.25- 2.35	0.25	0.12	0.30	1.4- 1.5	5.6- 5.75	0.05	0.2- 0.25	-	-	-	Zr-0.08-0.1%,

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COMPETENCY CHART

Name of department: EXTRUSION FOUNDRY			
IS/ISO 9001:2015 clause number 7.2			
Sl. No.	Position	Required qualification*	Experience required
1	Sr. Manager	BE/BTech in Metallurgy/Mechanical	10 Years
2	Manager	DME	08 Years
3	Dy. Manager	DME	06 Years
4	Asst. Manager	DME	04 Years
5	Sr. Supervisor	Diploma-Metallurgy/Mechanical	03 Years
6	Supervisor	DME	02 Years
7	Management trainee	DME	00 Year
8	Furnace Operator	ITI/10 Std	02 Years
9	Casting Machine Opr	ITI/10 Std	02 Years
10	Raw Material Charger	ITI/10 Std	02 Years
11	Log Cutting M/c Opr	ITI/10 Std	02 Years
12	Log Loaders and Opr	ITI/10 Std	02 Years
13	Helpers	-	00 Years
Note: Relaxation in qualification can be given in case the candidate is having sufficient experience in relevant field.			
Prepared by: HOD		Approved by: GM(O)	

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

MELT RECORD
JAL/R&E/EFOU/F/01

Sr. No.	Date	Batch No.	Press/ Inch	Alloy	EC Ingot Kgs	In-House Scrap Kgs	Imp. Scrap Kgs	RMD/ Others Scrap Kgs	Cr MA Kgs
Mn MA Kgs	SiMA Kgs	Copper Scrap Kgs	Mg Pure Kgs	Si Pure Kgs	Tibal Kgs	Total Inputs (Kgs.)	Remarks		

SUMMERY OF THE DAY

- | | |
|-------------------------------|-----|
| 1) Total Ingot Weight :- | Kgs |
| 2) Total In-house Scrap :- | Kgs |
| 3) Total Imp. Scrap Weight :- | Kgs |
| 4) Total RMD Scrap:- | Kgs |
| 5) Total CRMA:- | Kgs |
| 6) Mn MA Ingots :- | Kgs |
| 7) Silicon Master Alloy :- | Kgs |
| 8) Magnesium Metal :- | Kgs |
| 9) Total Silicon metal :- | Kgs |
| 10) Copper Scrap :- | Kgs |
| 11) Tibal Consumption :- | Kgs |
| Gross Total :- | Kgs |

SUMMERY OF THE DAY

Press	No Of Logs	Weight

Continued.....

Casting details

Sr. No.	Drop No	Press/ Inch	Alloy	No Of Logs	Log Length	Total Length	Weight	Tibal	Shift In charge	Casting Operator	Remark

Prepared By:

Approved By:

Foundry Supervisor

Extrusion Foundry Manager

Retention period: 3 months

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

MASTER ALLOY
(JAL/R&E/EFOU/F/02)

Date	Batch No.	Ingot/Scrap Wt. (Kgs)	Alloying element Wt. Kgs	% Alloying Element	Remarks

PREPARED BY:

SUPERVISOR

APPROVED BY

EXTRUSION FOUNDRY MANAGER

Retention period: 3 months

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

FOUNDRY PRODUCTION STATUS
WITH RESPECT TO PRODUCTION PLANNING
(JAL/R&E/EFOU/F/03)

Date

For the Month

Press number	Planned Qty (from Production) (In MT)	Actual Produced (by Foundry) (In MT)	Remarks

EXTRUSION FOUNDRY MANAGER

Retention period: 3 months

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

Date:

Time:

CHEMICAL ANALYSIS REPORT
(JAL/R&E/EQA/F/04)

Sample No	Quality	Id-1	Id-2	Id-3	Id-4	Date	Time
Element wise Chemical analysis results							

Tested / Verified by

Approved by

QAM

Retention period: 6 months

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 01	Rev Date:03.01.2019

CASTING & LOG INSPECTION REPORT
(JAL/R&E/EFOU/F/05)

DATE:

Batch No.	Press no.	Unit	Alloy	Water flow	Casting start & end time	QUALITY CHECKS No. of logs			No. of logs accepted	No. of logs accepted after rectification	Checked by Shift supervisor	Remarks
						Bend	Star crack	Surface finish				

Approved by:
EXTRUSION FOUNDRY MANAGER

Retention period: 3 months

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

MATERIAL INSPECTION REPORT
(JAL/R&E/EFOU/F/06)

Date	Description of Material	Supplier	Inspection done	Observation	Inspection Status (Accepted/ Rejected)	Inspected by Foundry Supervisor	Approved by Extrusion Foundry Manager	Remarks

RETENTION PERIOD: 6 MONTHS

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

ALUMINIUM RAW MATERIAL INSPECTION
(JALR&E/EFOU/F/07)

Date	Raw Material	Supplier	Grade as per invoice	Inspection done	Grade as per inspection	Observation	Inspection Status Accepted / Rejected	Inspected by Foundry Supervisor	Approved by Extrusion Foundry Manager	Remarks
01	02	03	04	05	06	07	08	09	10	11

RETENTION PERIOD: 6 MONTHS

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

FURNACE OIL INSPECTION RECORD
(JAL/R&E/EFOU/F/08)

SI No	Date	Supplier	Inspection Parameter				Inspection Status	Inspection by Foundry Supervisor	Approved by Extrusion Foundry Manager	Remarks
			Specific Gravity	Water Content	%	Dip Stick Test (OK / Not OK)				

Retention Period: 1 Month

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

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:

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

DEPT HEAD

Retention Period: 3 Years

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

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
Checked by:		Verified and Approved by:
		(Department Head)

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

JINDAL ALUMINIUM LIMITED R&E DIVISION	
Rev No: 00	Rev Date:01.07.2017

EMPLOYEE DETAILS

(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 :
Additional knowledge			
Programme	Duration	Conducted By	Remarks

DEPT. HEAD

JINDAL ALUMINIUM LTD Rolling & Extrusion Division	
Rev No: 00	Rev Date: 01.07.2017

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

JINDAL ALUMINIUM LTD Rolling & Extrusion Division	
Rev No: 00	Rev Date: 01.07.2017

RECORD OF TRAINING IMPARTED

Format No: JAL/R&E/TRG/F/03

DEPARTMENT:

PERIOD:

Sl No	Name	Designation	Topic	Date of Training	Type of training	Signature of Trainee	Training given by	
							Name	Sign

Retention Period: One Year

JINDAL ALUMINIUM LTD Rolling & Extrusion Division	
Rev No: 00	Rev Date: 01.07.2017

REVIEW OF EFFECTIVENESS OF TRAINING

Format No: JAL/TRG/F/04

DEPARTMENT:

Sl 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