JINDAL ALUMINIUM LIMITED
(ROLLING AND EXTRUSION DIVISION)

PROCEDURE FOR EXTRUSION PRODUCTION

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AMENDMENT RECORD

AMENDMENT			DISCARD		INSERT	
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DETAILS	POSITION	SIGNATURE	DATE
Prepared by	DY MANAGER-PRD		
Verified by	QMS COORDINATOR		
Approved by	DGM (C)		

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1.0 PURPOSE

The purpose of this procedure is to have control on the processes in manufacture of aluminium extrusions, so as to establish and maintain optimum production and quality of extrusion during all stages of the production.

1.1 OBJECTIVES

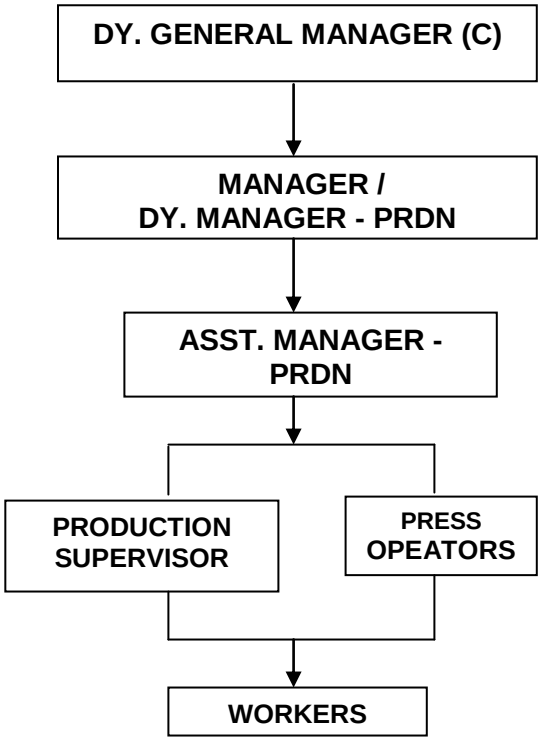
- To achieve press-wise recovery in % set.
- To achieve monthly productivity (in Kg/Hr) press-wise.

2.0 SCOPE

(Cl: 8.1 of IS/ISO-9001:2015 – Operation Control and Planning:
Cl.8.5 of IS/ISO-9001:2015 - Production & Service Provision)
To supply Aluminium Extrusions

3.0 ORGANISATION CHART:

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



3.1 RESPONSIBILITIES AND AUTHORITY

3.1.1 DY.GENERAL MANAGER (C)

Reporting to GM and be responsible –

a) To plan and monitor all presses requirement by fixing monthly target in consultation with Shipping Department and check the production rate of all presses, rejection, die failures, quality etc.

b) To plan manpower and put it to its optimum uses.

c) To arrange timely and prompt correction of extruded material.

d) To arrange timely and prompt ageing of material.

3.2.2 PRODUCTION MANAGER (PM) / DY. MANAGER (PRDN)

Reporting to DGM(C) and be responsible for –

a) Proper planning of presses and manpower to avoid wastage of resources.

b) Identifying the training needs for the staff and to ensure that they are trained for necessary skills to assure quality throughout the processes.

c) Educate the Supervisors on implementation of Quality Management System.

d) To conduct monthly meeting with staff & press operators for discussing various problems & give guidance for future.

3.2.3 ASST. MANAGER PRODUCTION (AMP)

Reporting to Production Manager/Dy. Manager and fully responsible for production on presses including planning, adjusting shift timings, number of workers, balancing of dies, use of puller and proper utilisation of manpower. To see that production targets are achieved without any problem. Other responsibilities are:

a) To get all the records connected with production well in time and to check periodically for its correctness.

b) To keep a check on trial runs by Tool Shop and inform DGM(C).

c) To give alloy programme to Foundry as per Production requirement.

d) To guide the Staff and Workers in Production Department. (for proper use of equipment, safety and maintenance).

e) To guide Workers and Press Operators to control die failures with reference to operation parameters like temperature of billets, tonnage, alloy, die oven temperature etc.

f) To arrange for completion of Inspection Report with the help of Supervisors.

g) To ensure that extrusion press and allied equipment are working satisfactorily. In case of any malfunction, report to Maintenance Department.

h) To see that recovery of all the presses are improved by constant monitoring extrusion parameters.

i) To plan for Heat Treatment for optimum usage of Ageing Ovens.

j) To ensure hand-to-hand rectification to avoid backlog and further damage.

k) He will be responsible for continuous working of ageing ovens both day and night. Running of ageing ovens should be planned in such a way that they run continuously and material on conveyor is also available regularly.

3.2.4 PRODUCTION SUPERVISORS

a) To inspect the samples of extrusions against section drawing & in line with product & customer requirements. To check samples within 2 – 3 starting billets. Die must be removed if sample is not OK. To check the quality of extrusion frequently on run out table. To take extra care whenever any special/export section is being extruded and ensure that all instructions of the customers are strictly followed.

b) To check for finish, eccentricity or ovality of the sections being extruded. Dimensional tolerances shall be as per relevant Standards (JAL/R&E/EPRD/ANX/04) unless specified otherwise.

c) To follow the instructions for special sections whenever such sections are being extruded. Critical and important dimensions shall be checked for special sections as per the approved sections drawings for every 8 – 10 billets. To coordinate with Tool Shop for clearing heavy/light materials. To give correct nose piece/sample to Tool Shop for necessary correction with proper marking of hole and direction of running.

d) If the sections being extruded are as per list and any deviation, out of tolerance with respect to weight is observed, use Yellow Paint if it is lighter and Black Paint if heavier.

e) To arrange for inspection of the extrusions by allocating work to the workers and records shall be maintained as per Format No. JAL/R&E/EPRN/F/06 for each press.

3.2.5 PRESS OPERATORS

a) Daily extrusion production programme (soft copy) is entered by Shipping department. Tool Shop will fill die and tooling details. Production department will fill up details regarding alloy and quenching medium for AO & Export sections.

b) After this, the EPF for AO & Export sections is checked and authorized for production by EQA.

c) Special sections if any, will be taken up for production only after the EPF is authorized. All the sections which are pending for extrusion will appear in Pending Extrusion Report in format No.JAL/R&E/EPRN/F/20. The report contains all relevant details. Operators should refer to this report and follow instructions/information given in the report.

d) To ensure before starting the press that die slide is aligned with respect to the container.

e) To ensure that desired temperature is reached in

i) Container:
All presses = 400 - 420°C

ii) Die Heating Oven:
460°C - 490°C & not to cross 490°C at any cost. Record as per Form No. JAL/R&E/EPRN/F/08.

f) Die heating oven should be switched on 6 hrs prior to starting of Presses.

g) Container should be switched on 12 hours prior to starting of the press.

h) Die oven and container should be switched off immediately the press is stopped for more than ½ day e.g. weekend.

i) To check the billet temperature & maintain the temperature as per standard No. JAL/R&E/STD/0004. If changes in the press parameter are required for particular sections other than the prescribed standard No.JAL/R&E/STD/0004 for billet temperature, it should be authorized by DGM (C). Butt thickness is to be maintained as follows:

DP1 – 18 to 25 mm;
DP2 – 18 to 25 mm;
DP3 – 25 to 30 mm;
DP4 - 25 to 30 mm.
DP5 - 25 to 30 mm.

The thickness may vary depending upon the customer requirement and to control the flow of the product.

j) Use cleanout whenever required to avoid air / oxide entrapment.

k) To use burp cycle as and when required.

l) To keep optimum extrusion length to reduce scrap. Length of extrusion should be in multiples of required length as given in programme. Wastage should not be more than 1 ft. If wastage is more than 1 ft, reason should be mentioned in P-Form.

m) Die Accounts Query/Die Performance for last six runs for a particular die is to be referred for selecting billet size. To enter the P-Form as per Format No. JAL/R&E/EPRN/F/04 for the details of extrusion like section number, alloy etc. from Extrusion Programme Form.

n) To observe the product coming out and take remedial steps so as to achieve quality with optimum production rate. Press wise & date wise production details along with section number, hourly production, etc are entered in Process Query Format No.JAL/R&E/EPRN/F/16 in the system.

o) To co-ordinate with the Production Supervisor and remove the die if the product is out of tolerance or of not acceptable quality.

p) To inform Maintenance for any malfunctioning or abnormality observed in the press and related equipments and record the same in Format No.JAL/R&E/EPRN/F/05.

q) To maintain fuel consumption as per Format No.JAL/R&E/EPRN/F/03.

3.2.6 WORKERS

a) Puller

i) To cut the samples of extrusion within the first three cycles of extrusions.

ii) To keep a check on the product during extrusion either with the help of representative samples having standard defects or extrusion defects like blister, shearing, waves, etc. and inform the Supervisor / Operator if any similarity is present in the product.

b) Die Heating Oven

i) To lubricate and assemble the dies and related tooling as per the Extrusion Programme Form.

ii) To soak the dies in the oven minimum 2 - 4 hours at set temperature of 460°C - 490°C – Not to cross 490°C at any cost.

iii) To maintain the records of Die Heating and Soaking Time as per Format No. JAL/R&E/EPRN/F/08.

iv) To load the die assembly with tooling on the die station just before extrusion from 1st die is over.

v) To send the dies/rings for cooking timely.

c) Homogenizing

Homogenizing of logs is carried out at homogenizing furnaces installed in Foundry. The logs are heated at 575˚C ± 10˚C temperature for 3 to 4 hours, allowed to cool and transferred to log heating furnace.

d) Log Heating Furnace

i) Log heating furnace should be started 1½ hours before start of Press or less depending upon furnace temperature prior to starting of the Press.

ii) Furnace Operator shall load the furnace as per the availability of dies.

iii) To ensure that there is no wastage of heat from log heating furnace and all openings of the furnaces are closed.

iv) To ensure that there is no jamming of logs in the furnaces.

e) Ageing Oven

i) To load inspected material requiring ageing into ageing ovens.

ii) To note on the black boards provided on each ageing oven the date and time at which ageing is
   A) started
   B) to be opened for loading new charge

iii) The temperature & time to be maintained as per JAL standard No. JAL/R&E/STD/0005.

Details will be recorded in Format No. JAL/R&E/EPRN/F/10.

iv) After ageing, if required hardness is not achieved, the material may be sent for re-ageing or for solution treatment, followed by ageing.

4.0 REFERENCES: IS:1285-2002, IS:733-1983, IS:2673-2002, IS:3965-1981, IS: 6477-1983, IS: 7092(Part 2) 1987, IS: 5082-1998

5.0 INTERFACE

a) Foundry
b) Tool Shop
a) Quality Assurance
b) Marketing and Dispatch
c) Maintenance
d) Stores

6.0 DEFINITIONS

6.1 **Extrusion**: Metal working process in which a specific section is produced in length by forcing the metal under pressure through one or more die orifices.

6.2 **Alloy**: A material that has metallic properties and is composed of two or more chemical elements of which atleast one is a metal.

6.3 **Blister**: A raised spot on the surface of the metal caused by expansion of gas in a subsurface zone during extrusion.

6.4 **Entrapment**: Foreign particle present in the product because of inclusions in the log/ ingot or lubricant.

6.5 **Die Line:** Longitudinal line or scratch resulting from the use of a roughened tool or drag of a foreign particle between the tool and the product.

6.6 **Hot Rub**: Defect caused when sections, which have been extruded through a multiple hole die, rub against one another during the extrusion process.

6.7 **Kink**: Sectional irregularities caused by an uneven extrusion rate and by material not being led from the die in an uniform manner.

6.8 **Die Pick Up**: Small particles of Oxidized metal adhering to the surface of an extrusion.

6.9 **Run out Defect**: Material getting damaged on the runout table during extrusion.

6.10 **Weld Break**: Hot metal leaving the dies does not completely weld together.

6.11 **Twist**: A winding departure from flatness.

6.12 **Shearing**: Typical cracks or separations due to high extrusion speed or extrusion temperature.

6.13 **Waves**: Unbalanced flow of material through the die orifice.

6.14 **Oval**: Deviation in diameter of a Round Tube beyond the standard or specified dimensional tolerances.

6.15 **Catalogue:** Where section numbers along with their drawings and important dimensions are listed serially.

6.16 **Extrusion Programme Form (EPF)**: Form which contains the list of section numbers along with their related details like alloy, temper, length etc. for a particular press and date.

6.17 **Grade**: Internal specification of alloy and this is controlled by Drawing Office as per JAL/STD/003.

6.18 **Ageing**: Change in the properties of an Aluminium Alloy that generally occurs at room temperatures and more rapidly at higher temperatures.

6.19 **List of No. of Pieces**: A compilation of section numbers of those extrusions which are supplied as per the number of pieces of that section in 12 ft. length per 100 kg e.g., Section No.2310 – 560 Pieces. This means that 560 pieces of 12 ft. length of Section No.2310 shall weigh 100 kg. The list also gives the tolerances.

6.20 **Logs**: A relatively long, round logs made by hot top casting which, after end cutting, are sheared off to required lengths for extruding.

6.21 **Section Number**: A numerical code assigned to each and every section in the product range.

7.0 INPUTS

- Dies from the Tool Shop
- EPF from the shipping department
- Logs from the foundry
- Special quality instructions from EQA
- Alloy instructions from Production
- Specific dies & tooling instructions from Tool Shop

8.0 OUTPUTS

- Extrusion Products as per the requirements of the customer

9.0 INFRASTRUCTURE

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

10.0 PROCEDURE

10.1 The Quality Plan for production and related activities are as per Annexure No. JAL/R&E/EPRN/ANX/01.

10.2 Extrusion Presses shall be run as per the weekly schedule chalked out for a particular target for a month. Production plan for the month is made by the Production supervisor as per Format No. JAL/R&E/EPRN/F/12 and communicated to Foundry Manager. Special alloys to be made as per Extrusion Program Form are planned & communicated to Foundry.

10.3 The Extrusion Program Form (EPF) shall be prepared in the Despatch Section as per Marketing Procedure-Packing & Despatch.

10.4 In the EPF, the Production Department shall fill up the following information in Internal Alloy Selection Format (JAL/R&E/EPRN/F/15) as soft copy only.

a) Mention the Grade, if not already mentioned in the program

b) Modify to an alternative grade depending on the specific requirements of customer or due to non-availability of the particular grade.

c) Indicate the billet length and total numbers to be taken for extrusion as per the quantity (weight) required, which may be changed depending on the die performance at particular run. This shall be written in the form of a fraction where, the numerator shall denote the length of the billet and the denominator the number of billets.

d) Specify the quenching medium.

e) Mention whether the Ageing process is to be carried out or not.

10.5.1 Mention whether the cold drawing operation is to be carried out in the remarks column.

10.6 Except for Agricultural Pipes and Sections extruded against Acceptance of Orders, the alloy composition shall be as per the internal standards of JAL as per market requirement for Commercial / Dealer items and may not conform to any external standards

10.7 The logs shall be heated in the log heating furnaces/homogenizing furnaces.

10.7.1 Temperature of the billet shall be as per Standard JAL/R&E/STD/0004, for various alloys. Records of Temperature at the start of extrusion for each section are maintained in Format No.JAL/R&E/EPRN/F/04.

10.7.2 Daily fuel consumption shall be maintained as per Format No.JAL/R&E/EPRN/F/03.

10.7.3 Extrusion pressure is recorded at the start of extrusion of every section.

10.8 The length of extrusions shall be planned for multiples of the required cutting length and appropriate overall allowance shall be given for shrinkage, stretcher jaw marks, collapsing of hollow sections, piping defect etc.

10.9 Rods of diameter 75 mm and above and other sections, if required, are subjected to separate solution treatment as per Format No. JAL/R&E/EPRN/F/11. All sizes of HE15 / 7075 alloy are subjected to solution heat treatment.

10.10 Heavier sections and rods of harder alloys, which cannot be straightened by stretcher, are straightened manually by using hydraulic press or fly press.

10.11 To avoid damage in handling while inspection of very lighter sections like transport beading, the products after cutting are first loaded in loose condition for Ageing. After ageing, the products are inspected and bundled to the required number of pieces.

10.12 Annealing: Product which requires Annealing Treatment will be loaded in the trolley and annealed in annealing furnace. The temperature is raised to 400ºC - 550ºC and the holding time is 4 to 12 hours (Temperature & Holding time varies from section to section and alloy to alloy). Then the heater is switched Off and the product is allowed to cool inside the furnace till the temperature reaches 100ºC. After this, the product is removed from the furnace and allowed to cool naturally to room temperature. The Annealing record is maintained in Format No.JAL/R&E/EPRN/F/09.

10.13 Inspection In-Process: Quality of extrusions is checked as per work instruction.

10.14 After inspection, the accepted material is taken up for ageing as per requirement. Material without ageing ('W' or 'M' temper) is forwarded to Quality Assurance Department. Where W = Solution treated; M = As fabricated, as manufactured or as cast; WP = Solution heat treated and precipitation heat treated.

10.15 The details regarding percentage of accepted material, rejected material and rate of production are recorded in Format No.JAL/R&E/EPRN/F/07.

10.16 Handling of Material:

10.16.1 Extrusion Stage:

This section covers the handling of extrusions during the extrusion stage. Mechanical pullers are employed to pull the extrusions under controlled tension thereby, minimizing twists and warps.

Damage to aluminium extrusions is prevented by the extensive use of graphite. The area in front of the platen is covered by graphite plates. This eliminates the possibility of scratches and denting of the aluminium product during extrusion.

Conveyors on the extrusion run-out have aluminium sections topped by graphite flats / heat resistant pads, rollers, since hot extrusions are more prone to scratches.

10.16.2 Upto Despatch of Extrusions:

The extrusions after having been cut, are transferred by the lift over arms, which are again graphite topped or by belt to the cooling bed. All presses are having cooling bed with heat resistant pads. All presses are having walking beam alternated with stationary beam where, sections get cooled before reaching stretching station. The walking beam or cooling bed moves the extrusions laterally along the bed to the stretching station.

After completion of stretching, the product is again shifted laterally by another set of walking beams or belt to next stage of sawing operation. At this stage, the sections are cooled either on belts or wooden beams.

Handling of extrusions at the saw area takes place by powered belting and guiding rollers. There are either wooden rollers, rollers with PVC sleeves or PVC rollers with sleeves, which protect the extrusions from dents, etc.

To ensure that extrusions are marked with JINDAL monogram, adjacent to the cutting machine, a printing machine is installed to enable the cutting machine operator to mark the monogram before packing. However, the marking of monogram is not applicable to special export sections as well as extrusions made from DP1 press and lighter sections made from other presses like: glazing clips, double glass channel, small channel, angles and round tubes. JINDAL monogram is not marked for heavy profiles which are not cut on-line.

For special sections and small cut lengths, bundle weight shall be as per convenience.

When extruded material is bundled, rayon cord / rayon card-corrugated paper combination is used depending upon the requirement.

11.0 TRACEABILITY

For traceability of extrusions for each Press, the details will be entered in Traceability Report as per Format No.JAL/R&E/EPRN/F/01.

All the baskets are lined with aluminium flats to prevent damage of extruded sections. Aluminium spacers are used along with heat resistant sleeves to avoid scratches on extrusions and to separate each layer of the extruded sections either in bundles or in loose condition. Aluminium spacers are put to serve the dual purpose of allowing air to pass through during ageing and protecting the inspected material from scratches. Then the full basket is transferred from conveyor to ageing oven by using overhead crane or tunnel conveyor. Skilled laborers do loading and unloading of material from ageing oven by using the overhead crane.

Once the material is aged, it is allowed to cool either naturally or by forced air. Once the material gets cooled, the baskets are transferred to packing conveyors.

Materials in the baskets, which are already bundled, are directly loaded on the conveyor for weighing. After weighment, depending on customer's requirement, the material is packed. If material is in loose condition, it will be bundled near the conveyor (as per list) and then loaded on the conveyor for weighment.

12.0 PROCESS MONITORING

- The output from the press is monitored as per the format JAL/R&E/EPRN /F/04.
- The ageing process is monitored for temperature and duration of the ageing time.
- Solution treatment is monitored for temperature and time.
- Traceability report is prepared after cutting and is monitored.
- In process inspection is carried out for Acceptance of Order and export items and in case of any deviation they are sent for rework or rejected.
- Number of pieces per 100 kg is monitored as per requirement.

13.0 PRODUCT MONITORING

- The inspection of the bundling is carried out before ageing and in case of any deviation they are either reworked or rejected as scrap.
- The In-process inspection is carried out as explained in work instruction.

14.0 SAFETY AND ENVIRONMENTAL REQUIREMENT

The following safety requirements are to be followed in Extrusion Production:

01. Use safety shoes while working.
02. While working, all Furnace Operators and Die Heating Oven Operators shall use hand gloves to protect their hands and fingers from getting burnt or injured.
03. Puller Operators, Stretching Operators and their helpers, who are in close contact with hot extrusions, shall wear hand gloves. The Puller Operators shall, in addition wear a Face Shield.
04. Cutting Operator shall use face shield / safety goggle to prevent Aluminium particles from entering his eyes. Cutting Operator and his helpers shall use hand gloves.
05. Ageing Operators are also to use hand gloves while handling hot extrusions.
06. All the persons who are engaged in pulling the hot extrusions shall use tongs to clasp the material and protect their arms and hands by using sleeves and gloves respectively.
07. During fire or other accidents, immediate action should be taken. If the things do not come under control it should be informed to security for alarm.
08. Baskets should not be overloaded i.e. above the capacity of crane to avoid accidents. All supervisors to keep watch.
09. In the event of any accident/shock, to give first aid immediately.
10. 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
11. Use sufficient light below the work spot to avoid accidents.
12. In addition to the above, any safety orders / instructions are issued by Management from time to time, are also to be followed.

15.0 CONTROL OF NON CONFORMING OUTPUTS:

The Non conforming outputs in the Extrusion Production are controlled as per format JAL/R&E/NCO/F/01

16.0 NONCONFORMITY AND CORRECTIVE ACTION:

The Non-conformities in the production are analyzed for causes by the production in charge and suitable corrective action is taken to ensure that the non-conformities do not repeat and they are verified for effectiveness subsequently. The action taken is recorded in Format No.JAL/R&E/NCA/F/01.

17.0 RISKS AND OPPORTUNITIES:

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

18.0 ANALYSIS AND EVALUATION:

a) Following data are analyzed and evaluated by using statistical techniques.

Area	Parameters	Statistical techniques	Frequency
a) Extrusion	Dimensions	Process Capability	1 Section at random in 3 months.
b) Alloys	Temperature	Control Charts	1 Section per alloy once in 6 months

b) Details of special alloy extrusions (hard alloys) will be recorded in Format No. JAL/R&E/EPRN/F/18.

19.0 CONTINUAL IMPROVEMENT:

The quality objectives are monitored for improvement during the department meeting 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 achieve 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.

20.0 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.

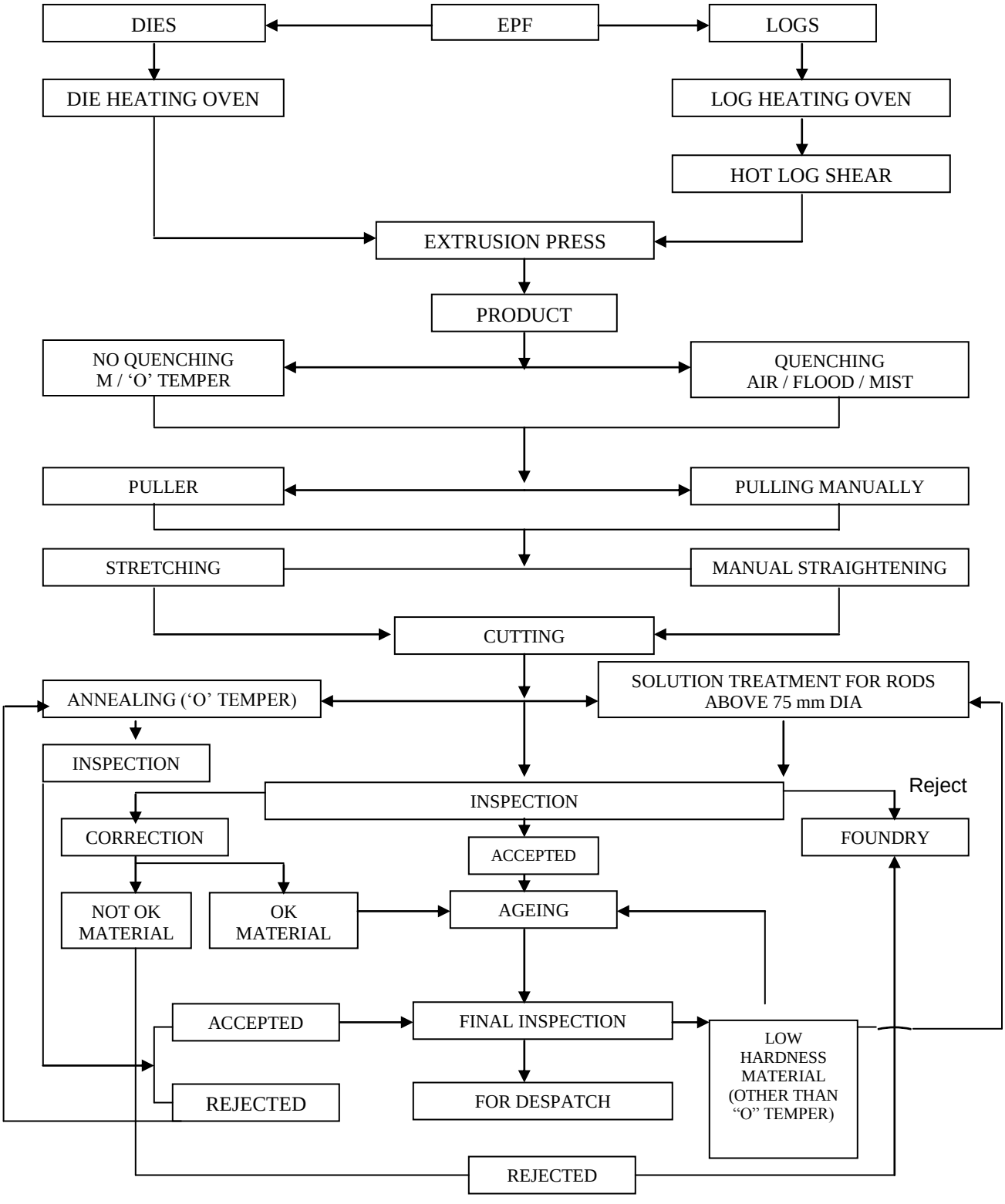
21.0 ORGANIZATIONAL KNOWLEDGE, AWARENESS & COMPETENCE

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/EPRN/ANX/02 & Maintained by HOD.

Competency Chart is identified for all positions in the department as per Annexure No JAL/R&E/EPRN/ANX/03.

QUALITY PLAN FOR PRODUCTION



LIST OF PRODUCTION RECORDS

Type of Records	Format Reference	Responsible Person	Retention Period
a) Traceability Report	JAL/R&E/EPRN/F/01*	HOD	3 months
b) Random Checking of Inspected Material	JAL/R&E/EPRN/F/02**		3 months
c) FUEL Consumption	JAL/R&E/EPRN/F/03**		3 months
d) P-Form	JAL/R&E/EPRN/F/04*		3 months
e) Press complaint Register	JAL/R&E/EPRN/F/05**		3 months
f) Inspection Record	JAL/R&E/EPRN/F/06*		3 months
g) Process Report	JAL/R&E/EPRN/F/07*		3 months
h) Record of Die Heating and Soaking Time	JAL/R&E/EPRN/F/08*		3 months
i) Annealing Record	JAL/R&E/EPRN/F/09**		1 year
j) Ageing Oven record	JAL/R&E/EPRN/F/10**		3 months
k) Solution treatment record	JAL/R&E/EPRN/F/11**		3 months
l) Production Planning for the month	JAL/R&E/EPRN/F/12**		3 months
m) Production Planning for the week	JAL/R&E/EPRN/F/13*		1 year
n) Internal Alloy Selection Format	JAL/R&E/EPRN/F/15*		3 months
o) Process Query	JAL/R&E/EPRN/F/16*		3 months
p) Special Alloy/Hard Alloy Record	JAL/R&E/EPRN/F/18*		1 year
q) Pending extrusion report	JAL/R&E/EPRN/F/20*		3 years
r) Quality Objectives Monitoring Record	JAL/R&E/QMSC/F/01**		3 years
s) Non conforming output	JAL/R&E/NCO/F/01**		3 years
t) Nonconformity and Corrective Action	JAL/R&E/NCA/F/01**		Till NC is implemented
Legend: * Soft Copy; ** Hard Copy			

TRAINING RECORDS

Sl. No.	Type of Records	Format Reference	Responsible Person	Retention Period
1	Employees detail	JAL/R&E/TRG/F/01	HOD	Till end of service
2	Training needs identification	JAL/R&E/TRG/F/02		1 Year
3	Record of training imparted	JAL/R&E/TRG/F/03		1 year
4	Training effectiveness	JAL/R&E/TRG/F/04		1 year

COMPETENCY CHART

Name of department: EXTRUSION PRODUCTION

IS/ISO 9001:2015 clause number 7.2

Sl.No.	Position	Required qualification*	Experience required	Training
1	Dy. General Manager	BE/BTech in Mechanical	15 Years	1 year
2	Asst. Gen. Manager	BE/BTech in Mechanical	12 Years	1 year
3	Manager	BE/BTech in Mechanical	10 Years	1 year
4	Dy Manager	DME	08 Years	1 year
5	Asst. Manager	DME	06 Years	1 year
6	Sr. Supervisor	DME	04 Years	1 year
7	Supervisor	DME	02 Years	6 Months
8	Sr. Press Operator	DME	04 Years	6 Months
9	Press Operator	DME	02 Years	6 Months
10	Management Trainee	DME	-	-
11	Aging Oven Operators	ITI/NCVT	02 Years	6 Months
12	Ex. Cutting Operators	ITI/10 Std	02 Years	6 Months
13	Crane Operators	ITI/NCVT	02 Years	6 Months
14	Log Heating Furnace Operators	ITI/NCVT	02 Years	6 Months
15	Log Loading Operators	ITI/NCVT	02 Years	6 Months
16	Die Loading Operators	ITI/NCVT	02 Years	6 Months
17	Puller Operators	ITI/NCVT	02 Years	6 Months
18	Helpers	10 Std/ITI	02 Years	6 Months

*Note: Relaxation in qualification can be given in case the candidate is having sufficient experience in relevant field.

Prepared by:	Approved by:
HOD	DGM(C)

APPLICABLE INDIAN STANDARDS

SL.NO.	STANDARD NO.	DESCRIPTION
01.	IS:1285-2002	Specification for Wrought Aluminium and Aluminium Alloy Extruded Round Tube and Hollow Sections (for General Engineering purposes)
02.	IS:733-1983	Specification for Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (for General Engineering purposes)
03.	IS:2673-2002	Dimensions for Wrought Aluminium and Aluminium Alloys, Extruded Round Tubes
04.	IS:3965-1981	Dimensions for Wrought Aluminium and Aluminium Alloys, Bars, Rods and Sections
05.	IS:6477-1983	Dimensions for Wrought Aluminium and Aluminium Alloys Extruded Hollow Sections
06.	IS:7092(Part 2)-1987	Specification for Aluminium Alloy Tubes for Irrigation Purposes (Part 2 – Extruded Tube)
07.	IS:5082-1998	Specification for extruded sections for electrical purpose.

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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TRACEABILITY REPORT

FORMAT NO.JAL/R&E/EPRN/F/01

RUN DATE:
PAGE No.

Sl.No	Press No.	P-Form No.	Draft Work Order Number	Section No.	Die No.	Description

Alloy Code	Cutting length Required	Cutting length Actual	No. of pieces	Weight (Kgs) (Approx)	12' Pcs / 100 Kgs	
					Required	Actual

Prepared by:
Production Supervisor

RETENTION PERIOD: 3 Months

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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RANDOM CHECKING OF INSPECTED MATERIAL

FORMAT NO.JAL/R&E/EPRN/F/02

Date	Press	Section No.	Description	No.of Pcs.	Inspected By	Status/ Remarks

CHECKED BY
SUPERVISOR
DAILY

APPROVED BY
GM(O)/QAM
ONCE IN A WEEK

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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FUEL CONSUMPTION

FORMAT NO.JAL/R&E/EPRN/F/03

SKO	FUEL OIL	LDO	LPG	LNG

Date	Total Consumption on date	Total Consumption till date	Prepared by	Checked by	Remarks

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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PRODUCTION FORM FORMAT NO.JAL/R&E/EPRN/F/04

WORK ORDER DETAILS:

P.Form No:		Trial Run	Operator/Supervisor:	Run Date:

Press No: Section No: Die No: No. of holes: Dummy Block No:

MINIMUM QTY:

DWO No	Press No	Program Date	Length	Length Tolerance	Unit	Qty	Qty Tolerance	Alloy

Internal Alloy	Quenching	Alloy Code	Spl. Instruction	MK Remarks	Q.A. Spl. Inst	No. of PCs	Prodn Remarks

EXTRUSION CONDITIONS

Die Performance for last runs

Run Date	Sec No	Die No	Prdn Rate	Holes	Billet Length in inches	Ext. Length in feet	Cat. Weight	Alloy/ Int.Allloy	Remarks

DWO No	Cutting Length	Unit	Req.Qty (Kgs)	Qty Over	Qty (Kgs)	Batch	Comple-ted	Quenching	Sh.Spl Instrns	MK Remarks	QA Spl Instrns
							☐ Yes ☐ No				

Billet Length In Inches	No. of Billets	Extn. Length In feet	Batch No.	Billet Weight In Kgs

Extrusion Pressure Kg/Cm^2	Billet Temp	Butt Thickness

Container Temperature	Total Quantity	Approx. Total Butt Weight	Apporx. Push

REMARKS:……

DIE WITHDRAWAL

☐ Yes ☐ No

PERFORMANCE

Extrusion Time:

Time Start:
Time Stop:
Duration:
Approx. Prdn Rate:

Down Time:

From	To	Reason	Type:

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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PRESS / PRODUCTION COMPLAINTS REGISTER

FORMAT NO.JAL/R&E/EPRN/F/05

Date	Complaints / Problems

Prepared by: Checked by:

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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Run Date :

INSPECTION RECORD

FORMAT NO.JAL/R&E/EPRN/F/06

PRESS NO.:

Sl No	DWO No	Inspn Date	Sec No	No.of Pcs per bundle	No. of inspected OK bundles	Inspection Status		Inspected By
						Rejection (No. of pieces)*	Rework (No. of pieces)	

Prepared by:

(Production Supervisor)

Checked By:

(Production Incharge)

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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PROCESS REPORT ON:

FORMAT NO.JAL/R&E/EPRN/F/07

RUN DATE:

Note: All the figures are approximate as physical weight has not been done anywhere.

P Form No.	Section	Die No	Push Appx	Qty After Inspn	Butt	Scrap Kgs	Recovery	Alloy	Time Minutes Actual down	Prod Rate

TOTAL AT PRESS:

PREPARED BY: APPROVED BY:

(PRODUCTION SUPERVISOR) DGM(C)

Remarks :

The figures are before ageing, de-twisting and various other processes. Final figures will differ since some rejection is bound to take place at time of final inspection after ageing.

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
Rev No: 00	**Rev Date: 01.07.2017**

RECORD OF DIE HEATING AND SOAKING TIME
FORMAT NO.JAL/R&E/EPRN/F/08

Date: DIE HEATING OVEN TEMP. RANGE

PRESS No. 460° to 490°C

Die Heat No.	Section No.	Die No.	Observed Temp. Deg.Cent	Time		Soaking time (hrs/min)	Verified by	Remarks
				In	Out			

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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ANNEALING RECORD

FORMAT NO.JAL/R&E/EPRN/F/09

Date	Section No.	Temperature Set °C	Time			***Stop Time***	***Remarks***
			Load In Time	Temperature Reached at	Holding Time		

PREPARED BY
PRODUCTION SUPERVISOR

APPROVED BY
QAM / GM (O)

RETENTION PERIOD: ONE YEAR

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
Rev No: 00	**Rev Date: 01.07.2017**

AGEING OVEN RECORD

FORMAT NO.JAL/R&E/EPRN/F/10

Set Temperature: (As per JAL Standard No.JAL/STD/0005)

Date	Cycle No.	Ageing Oven No.	Time In	Time Out	Oven Temperature ºC			Basket No.	Remarks
					1	2	3		

Prepared by: Checked by:

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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SOLUTION TREATMENT RECORD

JAL/R&E/EPRN/F/11

Date	Sec. No.	Alloy	Qty. (approx)	Load In time	Temp. reach time	Holding Time	Load Out time	Temp.°C (set)	Remarks

Prepared By

Production Supervisor

Verified & Approved By

Production Manager / GM(O)

RETENTION PERIOD: 3 MONTHS

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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PRODUCTION PLANNING FOR THE MONTH OF

JAL/R&E/EPRN/F/12

Press	Planned Quantity
DP1	
DP2	
DP3	
DP4	
DP5	
TOTAL	

Prepared by: Approved by:

Production supervisor GM (C)

Retention Period: One Year

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
Rev No: 00	**Rev Date: 01.07.2017**

PRODUCTION PLANNING FOR THE WEEK:

JAL/R&E/EPRN/F/13

Date:

Date/s	DP1	DP2	DP3	DP4	DP5

Legend:	Y = Production	M = Maintenance

Prepared by:

Production Manager

Retention Period: One Month

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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PRODUCTION REPORT - HARD ALLOY

From……To……

JAL/R&E/EPRN/F/18

Sl. No	Press Date	Section No	Push (Apprx)	Finish	Alloy	Customer	Remarks
Press Total:						Average Recovery:	
Grand Total:							

Retention Period: One Year

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
Rev No: 00	**Rev Date: 01.07.2017**

INTERNAL ALLOY SELECTION FORMAT

JAL/R&E/EPRN/F/15

EPF Selection

From Date:
To Date:
Press/Plant No:
Section No:

Sl. No	Die No	Tool No	Description	Remarks
Die Details:				

Help:

Internal Alloy:

EPF Date	Press	Section	Descri-ption	Alloy	Qty	Length	Pcs

Internal Alloy	Quench	Appro	Remark by Production	Customer Name

Section Tolerance / Remarks

Tolerance Quantity	Tolerance Length	Marketing Remarks	Quality Remarks

Retention Period: 3 Months

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
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JINDAL ALUMINIUM LIMITED
BANGALORE-73.

Run Date:
Page No.

PROCESS QUERY

From……To……

JAL/R&E/EPRN/F/16

Sl. No	Press Date	Section No.	Push (Appx)	Finish	Hourly Prod	Avg. Prod Rate 6 Months	Time Taken	Diff. Perc. Avg	Remarks	***Batch Number***
Press No:										
Press Total:								Average Recovery:		
Grand Total:										

Retention Period: 3 Months

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
Rev No: 00	**Rev Date: 01.07.2017**

CONTROL OF NONCONFORMING OUTPUTS

Clause number 8.7 of IS/ISO 9001: 2015

JAL/R&E/NCO/F/01

To,

Dated	M/c / Press No	Product	Nonconformity	Disposition correction	Re-inspection details	Action taken	Sig of Approving authority	Remarks

Prepared by:

Approved by:

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION 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	Achieved in each press					Target period	Action Plan	Remarks
			DP1	DP2	DP3	DP4	DP5			

Retention period 3 years

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION 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:	DEPARMENT:

NON-CONFORMITY RELATED TO:

i. PRODUCT ☐ iv MAINTENANCE ☐

ii. PROCESS ☐ v OTHERS ☐

iii RECORDS ☐

DESCRIBE OF NON- CONFORMITY:

ROOT CAUSE OF NON-CONFORMITY:

CORRECTIONS:

CORRECTIVE ACTION	RESPONSIBILITY	DATE OF COMPLETION

Prepared by: Verified and Approved by:

(Department Head)

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

JINDAL ALUMINIUM LIMITED ROLLING & EXTRUSION DIVISION	
Rev No: 00	**Rev Date: 01.07.2017**

PENDING EXTRUSION REPORT

(JAL/R&E/EPRN/F/20)

Press: All DP-1 / DP-2 / DP-3 / DP-4/DP-5	Section:	Type: All

Press No	Section	Program Date	DWO No	Quantity	Qty Tolerance	Balance Qty.	Que Med	Alloy	Internal Alloy	Length	Instructions

LEGEND: DWO = Draft Work Order; Que Med = Quench Medium

Selected DWO No:	
Remark by Marketing:	
Spl. Instruction from Quality:	
Remarks by Tool Shop:	
Spl. Instruction from Production:	

Retention period 3 years

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/R&E/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						

Prepared By Approved By

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

Retention Period: One Year